



Preliminary Site Investigation

Site off Bark Hut Road, Woolgoolga,
NSW

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Executive Summary

Resource Design and Management are seeking to submit a Development Application to re-zone a parcel of land to carry out residential land development. The parcel of land is situated proximal to the intersection of Bark Hut Road and Solitary Islands Way (Old Pacific Highway), Woolgoolga, NSW (the Site).

Currently the Site is identified as part of Lot 202 DP 874273 (northern portion only) and is zoned as 'Rural Landscape' under Coffs Harbour Local Environment Plan 2013. SMEC understand that the Site is intended for residential development and proposed to be rezoned for this purpose. To assist in the Development Application (DA) for rezoning, SMEC have prepared this Preliminary Site Investigation is required to assess potential contamination issues.

This report presents findings from desktop investigations and a Site inspection undertaken across the Site in November 2018. The scope of the Preliminary Site Investigation is summarised below:

- A desktop review of relevant information, including:
 - Review of published information relating to the Site including geological, acid sulfate soil, hydrogeological, hydrological, soil types, topographical, and/or land use maps State and Local Environmental Planning maps, Heritage mapping and Ecological Constraints mapping
 - Review of historical aerial photographs and mapping
 - Review of historical business activities at the Site
 - Review of NSW Environmental Protection Authority (EPA) contaminated land and POEO licence online databases
 - Search of nearby registered groundwater bores.
- A Site walkover by an experienced environmental scientist to identify potentially contaminating activities and adjoining sensitive receptors.
- A Site interview was carried out with a neighbouring landowner who was familiar with the Site.
- Preparation of this report presenting the findings of this PSI and conclusion with respect to the objectives in Section 1.2.

Key findings of the Preliminary Site Investigation are summarised below:

Prior to 1942, historical mapping showed the Site to comprise 'scattered timber' or 'camouflage cover or medium timber'. Since 1956, historical aerial photography shows most of the Site to comprise what appears to be natural woodland like that of the surrounding area. Some land clearing is apparent in the central and south-east portions, possibly associated with the drainage lines and eroded soil landscapes. Between 1964 to 1974, the remnant trees and vegetation appear to have undergone periods of clearing and a possible earthen dam appears to intercept drainage line. Since that time, the Site appears to have remained unused or rural grazing pastures until the present day with minor alterations including the formation of onsite access tracks.

Three areas of environmental concern (AEC) have been identified within or proximal to the Site, including:

- AEC 1 – Site wide application of herbicides and pesticides for crop growing
- AEC 2 – Site wide and localised occurrence of fill and/or unauthorised wastes (where observed)
- AEC 3 – Off-site possible application of herbicides and/or pesticides

The analytical results of the limited intrusive soil investigation indicate that there were no exceedances of adopted assessment criteria. SMEC considers that there is a low potential for soil contamination to be present at the Site within the identified AECs (refer to Figure 4, Appendix A).

SMEC recommend that an Unexpected Finds Protocol be developed prior to the commencement of site construction activities. The purpose of the Unexpected Finds Protocol will be to provide a structured approach to the management of unexpected finds of contamination during the construction activities. This could be prepared as part of the Contractor's Construction Environmental Management Plan, or equivalent. Additional sampling and testing may be required at construction stages based on unexpected finds.

It should be noted that if excavated material is proposed to be taken offsite for disposal to a licensed landfill facility, soil will require sampling and testing for waste classification prior to disposal in accordance with the NSW EPA *Waste Classification Guidelines* (November 2014). If contamination is observed/detected during this testing, it is also recommended that the underlying soils are assessed through validation sampling.

1 Introduction

1.1 General

Resource Design and Management Pty Ltd are seeking to submit a Development Application to re-zone a parcel of land to carry out residential land development. The parcel of land is situated proximal to the intersection of Bark Hut Road and Solitary Islands Way (Old Pacific Highway), Woolgoolga, NSW (the Site).

Currently the Site is identified as part of Lot 202 DP 874273 (northern portion only) and is zoned as 'Rural Landscape' under Coffs Harbour Local Environment Plan 2013. SMEC understand that the Site is intended for residential development and proposed to be rezoned for this purpose. To assist in the Development Application (DA) for rezoning, SMEC have prepared this Preliminary Site Investigation is required to assess potential contamination issues.

1.2 Objectives

The objectives of the Preliminary Site Investigation (PSI) are to:

- Assess the likelihood for contamination to be present at the nominated Sites from past or present activities
- Provide recommendations on the need for further investigations.

1.3 Scope of works

To fulfil the above objectives of the PSI, SMEC have undertaken the following scope of work:

- A desktop review of relevant information, including:
 - Review of published information relating to the Site including geological, acid sulfate soil, hydrogeological, hydrological, soil types, topographical, and/or land use maps, State and Local Environmental Planning maps, Heritage mapping and Ecological Constraints mapping
 - Review of historical aerial photographs and mapping
 - Review of historical business activities at the Site
 - Review of NSW Environmental Protection Authority (EPA) contaminated land and POEO licence online databases
 - Search of nearby registered groundwater bores
- A Site walkover by an experienced environmental scientist to identify potentially contaminating activities and adjoining sensitive receptors.
- A Site interview was carried out with a neighbouring landowner who was familiar with the Site.
- Preparation of this report presenting the findings of this PSI and conclusion with respect to the objectives in Section 1.2

It is noted that no previous environmental reports (if any) were made available at the time of this assessment.

1.4 Published guidelines

The assessment has been undertaken in general accordance with applicable guidelines including:

- National Environment Protection Council, National Environmental Protection (Assessment of Site Contamination) Measure, 2013
- NSW EPA, Guidelines for the NSW Site Auditor Scheme (3rd edition), 2017
- NSW Office of Environment and Heritage, Contaminated Sites – Guidelines for Consultants Reporting on Contaminated Sites, 1997 (reprinted 2011)
- State Environmental Planning Policy No.55 - Contaminated Land, 1998

2 Site Information

2.1 Site description and zoning

Table 1 Site description and zoning

ASPECT	DESCRIPTION
Title Identifier	Part Lot 202 DP874273 (Northern portion only)
Address	Site proximal to the intersection of Bark Hut Road and Solitary Islands Way (Old Pacific Highway), Woolgoolga, NSW
Area	An irregular shaped parcel of land approximately 16.6 ha. Figure 1 Appendix A shows the Site layout.
Zoning	The Site is currently characterised as 'Rural Landscape' (Coffs Harbour Local Environmental Plan, 2013). The Site is listed as a State Environmental Planning Policy Strategic Land Use Area for Future Residential Growth.
Current Land use	The Site's current land use is characterised as 'Grazing, native vegetation' (ALUM, Office of Environment and Heritage, 2007)
Proposed land use	SMEC understand that the proposed land use is for a residential development
Surrounding land use	The Site is presently surrounded by: North: Bark Hut Road is adjacent the Site's northern boundary. Bark Hut Road follows a ridge line. An area of agricultural land use is located beyond Bark Hut Road to the north. South: The area immediately to the south of the Site is vacant, unused land zoned as 'Public Recreation' land (Coffs Harbour Environmental Plan, 2013). Recent aerial photography indicates that the land to the south has been built up with imported soils. East: Solitary Islands Way is orientated parallel with the Site's eastern boundary. Woolgoolga High School is located approximately 150m to the east of the Site. West: An area of residential land use is located to the west

2.2 Topography and landforms

The Site slopes to the south and southeast downward from an approximate elevation of 30m AHD in the north to approximately 10m AHD in the south-east. The north-western corner of the site appears to be a local rise within a ridgeline, oriented east-west along Bark Hut Road.

Figure 1, Appendix A shows the topography across the Site.

2.3 Vegetation

The Site comprises a dense area of woodland within the north-west portion as well as sporadic pockets of trees across the entire Site. These trees are described as *Eucalyptus Grandis* (Fisher, 1996).

2.4 Regional geology

Reference to the 1:250,000 Dorrigo-Coffs Harbour Geological Series maps shows the Site is underlain by the Coramba Beds comprising lithofeldspathic wacke, minor siltstone, siliceous siltstone, mudstone, metabasalt, chert and jasper, rare calcareous siltstone and felsic volcanics.

A narrow band of alluvial fan deposits are present from the middle of the Site to the south eastern corner. These deposits comprise fluviially deposited quartz-lithic sand, silt, gravel and clay.

Figure 2 Appendix A shows the regional geology mapping beneath the Site.

2.5 Regional lithology

Reference to the NSW OEH (website) eSPADE online interactive mapping tool, indicates that:

- The project Site is situated on 'Megan' soils
- Landscape consists of rolling low hills, slopes typically 5-20%.
- Soils are typically moderately deep to deep (>100cm), well drained structured Red Earths, Brown Earths and Red and Brown Podzolic Soils.
- Soil type qualities and limitations:
 - Strongly acid, stony soils of high erodibility, aluminium toxicity potential and low subsoil fertility. Steep slopes (localised), mass movement hazards (localised); high water erosion hazard (localised), foundation hazard (localised).
 - Typical land uses for this soil type includes banana plantations, urban developments and grazing pastures.

Further information on the Megan soils is presented within Appendix B .

2.6 Hydrology and hydrogeology

Site drainage is expected to follow an unnamed drainage line which appears to flow south and south-east across the Site, exiting in the south-east corner. This drainage line converges with a second unnamed drainage line off-Site near Woolgoolga High School before discharging into Woolgoolga Lake some 800m south-east of the Site.

Site drainage does not appear to interact with Poundyard Creek and a large unnamed detention pond, located approximately 170m and 570m south of the Site, respectively.

There are 10 registered groundwater bores located within a 500m radius of the Site. Details of registered groundwater bores are presented within Table 3 below:

Table 2 Summary of registered groundwater bores proximal to the Site

BOREHOLE ID	AUTHORISED PURPOSE	DRILLED DEPTH (M BGL)	STANDING WATER LEVEL (M BGL)	YIELD (L/S)	DISTANCE AND DIRECTION FROM SITE
GW302448	Domestic	42.0	Unknown	Unknown	65m (N)
GW302452	Domestic Stock	61.0	Unknown	Unknown	210m (SW)
GW302453	Domestic Stock	120.0	Unknown	Unknown	230m (SW)
GW304272	Domestic	48.0	18.0	0.69	270m (NW)
GW073243	Domestic Stock	53.0	10.0	0.61	270m (W)
GW300594	Domestic Stock	38.0	4.0	0.61	295m (SW)
GW065654	Domestic Stock	40.0	9.0	0.10	295m (SW)
GW300270	Domestic	73.0	9.0	0.19	355m (NW)
GW300031	Irrigation, Recreation (groundwater)	31.0	4.0	2.59	465m (NW)
GW063941	Domestic	31.0	Unknown	Unknown	500m (S)

m BGL = metres below ground level
L/S = litres per second

2.7 Acid Sulfate Soil risk

A review of the Acid Sulfate Soils risks maps (viewed online via the NSW OEH eSPADE online interactive mapping tool) indicates that a small area (approximately 0.2 ha) within the south eastern portion of the Site is located over the edge of an alluvial plain where there is a 'Low Probability' of Acid Sulfate Soils (ASS) to occur '>3m below the ground surface' (or in other words, ground surface elevation is more than 4m above Australian Height Datum).

The remainder of the Site is not mapped within an area of Acid Sulfate Soils occurrence.

Figure 2 Appendix A includes the Acid Sulfate Soil Risk Mapping for the Site.

Additional information in relation to the likelihood of Acid Sulfate Soils at the Site is presented in a Geotechnical Investigation report, separate to this report.

3 Site history and observations

3.1 General

Site history information was compiled based on a review of the following information sources:

- Review of historical aerial photography (1956, 1964, 1974, 1984, 1994, 2001, 2011 and 2018)
- Review of available historical mapping (1942, 1974)
- A search of historical business activities listings
- A search of NSW EPA Contaminated Land and POEO licence records.

A Site inspection was carried out by an experienced environmental scientist from SMEC to make Site observations and confirm Site history information. A Site interview was carried out with a neighbouring landowner who was familiar with the Site.

3.2 Historical aerial photography

Historical aerial photographs obtained and reviewed as part of this PSI are represented within Figure 3, Appendix A . Site features and surrounding Site conditions from the period of 1956 to 2018 are summarised in Table 4:

Table 3 Summary of Historical Aerial Photography

YEAR	SITE DESCRIPTION AND SURROUNDING AREA
Aerial Photo 1956 Black and white	<p>Onsite: Most of the Site appears to be covered by dense vegetation. The vegetation appears to comprise natural woodland like that of the surrounding area. The central eastern and south-eastern portions of the Site appear to be partially cleared land, noting this appears to correspond with alluvial fan deposits and site drainage lines (refer to Section 2.4). This area appears to have sparse vegetation and potentially eroded landscape.</p> <p>Offsite: The vegetation appears to comprise natural woodland, particularly to the north and west. Parcels of land immediately north of Bark Hut Road and approximately 100m west of the Site appears to have been cleared of trees and is being used for crop growing*. Two rectangular structures (possible residential dwellings / sheds) are located north of Bark Hut Road. Land to the south of the Site has been partially cleared, possibly for grazing or for crop growing</p>
Aerial Photo 1964 Black and white	<p>Onsite: The Site remains largely unchanged since 1956 aside from some apparent tree clearing within the western portion of the Site.</p> <p>Offsite: The surrounding areas appear largely unchanged since 1956 with some exceptions. Additional rectangular structures appear to have been constructed on the parcel of land immediately north of Bark Hut Road. The area to the west used for crop growing appears to have expanded; the eastern extent of this crop growing land is now approximately 25m west of the Site. Some additional tree clearing appears to have been undertaken approximately 300m south-west of the Site.</p>
Aerial Photo 1974 Black and white	<p>Onsite: The Site appears to have been almost totally cleared of trees and other vegetation aside from sparse patches within the north-west and north-east. Site drainage lines appear to begin within the central portion of the Site and extend towards the south-east corner of the Site. A possible earthen dam appears to intercept drainage near the southern boundary. Potential scour and erosion scarring can be seen.</p> <p>Offsite: Much of woodland to the north, west and south of the Site appears to have been cleared, only sporadic patches remain. A large earthen dam appears approximately 500m to the south of the Site.</p>
Aerial Photo 1984	<p>This aerial photo was noted to have poor resolution.</p> <p>Onsite: The Site remains largely unchanged since 1974 aerial photograph.</p>

YEAR	SITE DESCRIPTION AND SURROUNDING AREA
Black and white	<p>Offsite: Multiple residential dwellings appear to have been constructed offsite to the west. A small parcel of land approximately 300m to the south of the Site appears to be being used to grow an unknown crop type.</p> <p>Several structures/ buildings possibly associated with Woolgoolga High School have been constructed since 1974 beyond Solitary Islands Way approximately 200m east of the Site.</p> <p>It appears that a crop growing* is being grown immediately north of Bark Hut Road approximately 20m north of the Site. A private dam has been constructed approximately 150m north of the Site beyond Bark Hut Road.</p>
Aerial Photo 1994 Colour	<p>Onsite: The Site remains largely unchanged since 1974 aerial photograph aside from some apparent tree clearing along the northern Site boundary and north-west corner of the Site.</p> <p>Offsite: Additional residential dwellings have been constructed offsite to the west. The crop growing* area located approximately 300m to the south of the Site has expanded since 1984.</p>
Aerial Photo 2001 Colour	<p>Onsite: Two vehicle trackways, one orientated north-south and one orientated east-west dissect the Site. No further tree/vegetation clearance appears to have occurred since 1994.</p> <p>Offsite: A series of trackways cross each other in a grid pattern on the parcel of land immediately offsite to the south.</p>
Aerial Photo 2011 Colour	<p>Onsite: Only the east west orientated vehicle trackway is visible on the aerial photograph.</p> <p>Offsite: The parcel of land immediately north of Bark Hut Road appears to be being utilised for crop growing*, however, the crops appear to either be undercover or contained within elongated greenhouses.</p>
Aerial Photo 2018 Colour	<p>Onsite: Additional vehicle trackways are present onsite, one of which extends along the length of the northern, eastern and western boundary, another dissects the south-west corner of the Site.</p> <p>Offsite: Land immediately to the south of the Site was cleared of vegetation and imported soils were placed onto the land circa 2013. Additional soils appear to have been imported and placed on this land from 2016 to the present day.</p>
<p>*Crop growing types in areas surrounding the Site remain unknown. Anecdotal information suggests a former banana farm on the property north of Bark Hut Road (refer to Section 3.7).</p>	

3.3 Historical mapping and records

Site features and surrounding Site conditions from available Historical Mapping (1942 and 1974) are summarised in Table 5 below.

Table 4 Summary of Historical Mapping

YEAR	SITE DESCRIPTION AND SURROUNDING AREA
Historical Mapping 1942	<p>The historical mapping shows various topographic features associated with the regions agricultural / rural landuse. The Site is mapped within an area identified as ‘scattered timber’ or ‘camouflage cover or medium timber’.</p> <p>In offsite areas, it is noteworthy that two banana plantations are identified on the map, located approximately 1km east and 1.5km south of the Site respectively. Banana plantations are considered a potentially contaminating activity that is common to the Woolgoolga region.</p>
Historical Mapping 1974	<p>The historical map indicates that the northern portion of the Site comprises ‘dense woodland’. An unnamed drainage line is shown to dissect the Site, originating within the middle portion and exiting the Site along the southern Site boundary (similar to topographic mapping).</p>

A review of Historical Business Directory records from 1950, 1961 and 1970 (Universal Business Directories, 2018) has been undertaken. There do not appear to be any businesses registered to the Site or nearby surrounding areas during these periods.

3.4 NSW EPA online searches

3.4.1 Contaminated Land database

A search of the NSW EPA Contaminated Land database was carried out on 21 November 2018. The search indicated one notification of the United Petroleum Service Station is located approximately 860m south-east of the Site. The EPA has completed an assessment of the contamination at the Site and decided that regulation under the Contaminated Land Management Act 1997 is not required. The location of this service station is unlikely to impact the Site.

3.4.2 Protection of the Environment Operations (POEO) Licences database

A search of NSW EPA currently and formerly licensed activities under the Protection of the Environment Operations Act (POEO) 1997 was carried out on 21 November 2018. A summary of these activities and locations is presented in Table 6. The relative proximity if these activities are unlikely to impact the Site.

Table 5 Summary of POEO database search

LICENCE NO.	NAME	LOCATION (PROXIMITY TO SITE)	LICENCE STATUS	ACTIVITY TYPE
13278	Fulton Hogan Construction PTY Ltd	Pacific Highway Sapphire to Woolgoolga Upgrade (907m south-west of Site)	Surrendered	Crushing, grinding or separating, land based extractive activity, road construction
4017	Forestry Corporation of New South Wales	Approximately 1.2 km south-west of the Site	Current	Logging operations
20590	OHL Construction Pacific Pty Ltd	Approximately 2km south-west of the Site	Current	Crushing, grinding or separating, land-based extractive activity, road Construction.
4653 and 6630	Luhrmann Environment Management Pty Ltd/Robert Orchard/Sydney Weed and Pest Management Pty Ltd	NSW waterways*, including stormwater drainage lines	Surrendered on 20 November 2014	Application of Herbicides
* SMEC consider a low potential for this licenced activity to have occurred at the Site noting the scale of this licence applies to all of NSW waterways.				

3.5 Site history summary

Prior to 1942, historical mapping showed the Site to comprise ‘scattered timber’ or ‘camouflage cover or medium timber’. Since 1956, historical aerial photography shows most of the Site to comprise what appears to be natural woodland like that of the surrounding area. Some land clearing is apparent in the central and south-east portions, possibly associated with the drainage lines and eroded soil landscapes. Between 1964 to 1974, the remnant trees and vegetation appear to have undergone periods of clearing and a possible earthen dam appears to intercept drainage line. Since that time, the Site appears to have remained unused or rural grazing pastures until the present day with minor alterations including the formation of onsite access tracks.

3.6 Site observations

A SMEC Associate Environmental Scientist (Ms Sarah Viney) attended the Site to make site observations on 23 November 2018. Site observations were made via accessible trackways and trails allowing for broad Site viewing. Site

observations of the ground surface could not occur in all areas due to property size and presence of vegetation. Selected site photographs are included below, and the following relevant observations were made for this PSI

- The northern portion of the Site slopes moderately toward the south before levelling off within the southern portion (Photograph 1)
- Site is vegetated with shrubs and grasses. Native woodland vegetation was observed within the north-west portion of the Site and within remnant stands across the Site. Evidence of clearing activities was noted with stockpiles of timber (Photograph 6)
- Multiple unsealed access tracks cross the Site (Photograph 7)
- Some unauthorised dumping of waste/ fill stockpiles was noted along northern and eastern boundaries adjacent to Bark Hut Road and Solitary Islands Way. Areas are shown on Figure 4, Appendix A. Wastes observed included plastic household rubbish, fence posts, pumping hose, and rusted metal (Photograph 4 and Photograph 5)
- South west portion of Site is low lying and 'boggy' terrain with reeds (Photograph 3 and Photograph 8)
- Fence lines were noted along the northern, western and eastern boundaries. No fence line present along southern boundary of the Site.

In addition to this Senior Geotechnical Engineer Mark Maharaj attended site on 18 December 2018. Key findings of this inspection included identification of an inferred excavation area and subsequent capping with shallow fill in the south-west of the site.

3.7 Site interview

A SMEC Senior Geotechnical Engineer (Mr Mark Maharaj) conducted a site interview on the 18 December 2018 with the owner of a neighbouring property to the north of Bark Hut Road. Key findings of the interview indicate that:

- The neighbouring property owner was familiar with the Site for the past 30 years. The Site was not known to have any crops during this period. A bulldozer was previously noted on the Site possibly associated with dam construction. There were no observations to indicate that illegal fly tipping or waste disposal historically occurred at the Site.
- The property to the north of Bark Hut Road was previously utilised as a banana farm. Whilst not witnessed, the farm owner indicated this property would have been subject to pesticide application in the past and referred to a 'Farming management plan' being in place, possibly associated with this activity. The farm owner now grows blueberry, chilli and okra, with separate leased areas being used for cucumber and beans.
- Pesticide application methods remain unknown, noting there is potential that aerial spraying could result in pesticide residues to drift onto the investigation Site.



Photograph 1: Looking south from northern portion of Site



Photograph 2: Looking north-west from south-western portion of the Site



Photograph 3: Looking north-east from the southern portion of the Site.



Photograph 4: Scrap metal located near the eastern Site boundary within north-western portion of Site. Potentially indicative of buried fill within this area.



Photograph 5: Evidence of unauthorised dumping of wastes / fill stockpiles located within north-east corner of Site



Photograph 6: Timber stockpile within central northern portion of Site



Photograph 7: View south from western access track



Photograph 8: Looking north from southern access track

4 Areas of Environmental Concern

4.1 Potential Sources of Contamination

Based on the Site history, observations made during the Site inspection, and site interview with a neighbouring property owner the following activities have been identified as potential sources of contamination at the Site:

- Application of herbicides and pesticides associated with crop growing activities
- Unauthorised dumping of wastes along roadside areas and site trails
- Placement of fill of unknown origin and quality.

4.2 Areas of Environmental Concern and Contaminants of potential Concern

Three potential areas of environmental concern (AEC) were assessed at the Site. A summary of AECs and associated contaminants of potential concern (CoPCs) are summarised within Table 6. A preliminary assessment of the likelihood for contamination to be present within each AEC was based on desktop information, Site observations and experience on similar Sites.

Figure 4, Appendix A includes the location of AECs assessed within this Preliminary Site Investigation.

Table 6 Summary of identified AECs

AEC NO.	POTENTIAL AECs	POTENTIALLY CONTAMINATING ACTIVITY	CoPCs	LIKELIHOOD OF POTENTIAL CONTAMINATION* (LOW, MODERATE, HIGH)
AEC 1	Site wide	Site wide application of herbicides/pesticides for crop growing	Herbicides, pesticides, arsenic	Low – Historical aerial photographs suggest rural landuse with potential for grazing pastures. Crop growing noted in surrounding properties. A low likelihood of potential contamination remains due to limited information on previous rural landuse.
AEC 2	Site wide and localised occurrences of filling and/or unauthorised wastes (where observed)	Site wide and localised occurrence of fill (proximal to northern and eastern and south western boundaries).	Heavy metals, PAHs, TPH, BTEX, PCB, OCP, OPP, Phenols, asbestos	Low to moderate – Moderate likelihood in areas where unauthorised wastes/fill stockpiles were observed. Low likelihood remains across remainder of Site where observations of ground surface are limited by vegetation cover. Site interview with neighbouring property owner did not indicate there was illegal fly tipping or waste dumping on the property.
AEC 3 (Offsite)	Offsite nearby crop growing (north and west of Site)	Possible application of herbicides and pesticides associated with crop growing activities	Herbicides, pesticides, arsenic	Low – Unknown crop growing activities in nearby offsite areas have the potential to include banana plantations, common within this region of NSW. Site interview with neighbouring property owner indicated former banana farm on property to the north of Bark Hut Road. Pesticide application is likely in these areas; however, application methods and farming practices are unknown. There remains a low likelihood for onsite impacts noting site topography could receive surface water runoff from properties to the west only. Properties to the north of Bark Hut Road are sloped away from the Site.

* This is a qualitative assessment of the potential for contamination to be present within the AEC, not the impact (financial or other) associated with the contamination (if present)

5 Conceptual site model

5.1 Conceptual site model overview

A preliminary Conceptual Site Model (CSM) has been prepared which presents potential source(s), pathway(s) and ecological/human receptor(s) linkages. Potential source(s), pathway(s) and ecological/human receptor(s) were identified during the PSI. The preliminary CSM should form the basis for decisions regarding the scope of works for further assessment and the ongoing contamination management and remediation options.

The CSM is made up of contaminants of potential concern (CoPC) and receptors that could be exposed to the CoPC.

5.2 Sources

The potential contamination sources are the AECs as summarised in Table 6 in Section 4.

Contaminants of potential concern include:

- Herbicides (phenoxy acid)
- Organochlorine / Organophosphorus pesticides (OC/OPP)
- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni and Zn)
- Polycyclic aromatic hydrocarbons (PAHs) / Phenols
- Total recoverable hydrocarbons (TRH)
- Benzene, Toluene, Ethylbenzene and Xylenes (BTEX)
- Asbestos (presence/absence)

5.3 Exposure pathways

The pathways of exposure consist of:

- A transport mechanism
- A route of exposure.

Based on site information, there is potential for the following contamination pathways to exist at the site:

- Disturbance of potential soil contamination and exposure by ingestion, dermal contact or inhalation
- Air transport of particulates (dust) and exposure by inhalation
- Migration of contaminated run-off and exposure to ecological receptors (aquatic ecosystems)

5.4 Potential receptors

5.4.1 Human receptors

Based on the information available, potential human receptors have been assessed to include:

- Future Site residents, visitors and workers
- Site workers during future construction works or maintenance activities
- Surrounding residential/rural site occupants and workers.

5.4.2 Ecological receptors

The current ecological receptors are native and exotic vegetation species.

Based on the proposed residential land zoning, the site could potentially be used as a growing medium or be accessible to ecological receptors. If soils are contaminated where there could be leaching into groundwater or migration to surface water, then aquatic receptors in the nearest surface water receptor would need to be considered.

5.4.3 Potential source-pathway-receptor linkages

Potential source-pathway-receptor (S-P-R) linkages are where soil, surface water and/or groundwater contamination (if present) has the potential for adverse impact on human health or ecological values for the Site via complete exposure pathways. Limited details were available at the time of this PSI as to the proposed residential development. Table 7 summarises the plausible source-pathway-receptor linkages for each of the identified human and ecologically sensitive receptors.

Table 7 Potential S-P-R Linkages

SOURCE	CoPCs	PATHWAY	RECEPTOR
AEC 1 and AEC 2 – Onsite contamination in topsoil and/or fill soils to be disturbed during construction at the Site	<p>Topsoil: Herbicides, pesticides, arsenic</p> <p>Fill: Heavy metals, PAHs, TPH, BTEX, PCB, OCP, OPP, Phenols, asbestos</p>	<p>Dermal Contact. Oral Ingestion of Potentially Contaminated Soil</p> <p>Migration of contaminated dust</p> <p>Migration of contaminated runoff (soil or water)</p>	<p>Future Site residents at soil reuse location</p> <p>Site workers during future construction works and maintenance activities</p> <p>Surrounding residential/rural site occupants and workers</p> <p>Aquatic ecosystems in surface water receptors adjacent to soil disposal location</p>
AEC 3 (offsite) – Offsite contamination in surface water / sediment runoff or air drift migrating onto to Site	<p>Topsoil: Herbicides, pesticides, arsenic</p>	<p>Migration of contaminated dust/residues from aerial spraying</p> <p>Migration of contaminated runoff (soil or water)</p>	<p>Future Site residents at soil reuse location</p> <p>Site workers during future construction works and maintenance activities.</p> <p>Surrounding residential/rural site occupants and workers</p> <p>Aquatic ecosystems in surface water receptors adjacent to soil disposal location</p>

5.4.4 Site history data gaps

Data gaps were noted including:

- The proposed development details were not supplied at the time of this PSI.
- Limited information of previous rural activities at the Site and surrounding areas. Aerial photographs suggest the potential for onsite pasture grazing at the Site and crop growing (unknown crop type) in nearby properties surrounding the Site.
- Additional anecdotal information obtained during Site interviews with a neighbouring property owner, indicates a former banana farm to the north of Bark Hut Road. There remains potential for pesticide application to have occurred in offsite areas, although methods of application and farming management practices remain unknown.
- Section 10.7 (5) planning certificates were not made available or reviewed as part of this PSI. Planning certificates contain information around various environmental constraints including potential contamination.
- No previous environmental reports or assessments were known or made available for review during this PSI. If required by the proposed development, the findings of further studies (including site history) carried out may be of relevance to this PSI.

SMEC consider the above data gaps may be addressed through a limited soil sampling and analysis carried out within the following sections of this PSI.

6 Sampling and Analysis Plan

The data quality objectives (DQO) in Table 8 were developed for this project and are based on the requirements detailed in ASC NEPM (2013 as amended). The sampling and analysis schedule completed for this project is described in Table 8 below. Sampling locations are shown on Figure 5, Appendix A.

Table 8 Data Quality Objectives

STEP	TASKS
Step 1 State the problem	<p>The primary objectives of the assessment programs were to:</p> <ul style="list-style-type: none"> Assess the potential for soil contamination to be present at the nominated site Provide recommendations on the need for further investigations and/or management. <p>The main problems are:</p> <ul style="list-style-type: none"> How many samples should be collected? What media should be sampled? What sample layout should be used to achieve the above objectives? What analytes should be tested?
Step 2 Identify the decisions / goal of the study	<p>The key decisions to be made include:</p> <ul style="list-style-type: none"> Is contamination likely to be present the Site that would pose a risk to future receptors of the proposed development? If so, what additional investigation/management or remediation is required to further assess these risks? Based on the results of the preliminary investigation, will other media (soil, groundwater, surface water) require assessment?
Step 3 Identify information inputs	<ul style="list-style-type: none"> A review of site history information undertaken at the Site; Field observations, PID screening results, soil laboratory results; Applicable NSW EPA endorsed guidelines.
Step 4 Define the study boundaries	<p>The study boundary is defined by the boundary of the site, as shown on Figure 1, Appendix A. Vertically, the study boundary is defined by the depth of fill, which is expected to be less than 1m.</p>
Step 5 Develop the analytical approach (decision rule)	<p>The decision rule for soil will be as follows:</p> <ul style="list-style-type: none"> A data validation assessment will be carried out for all data collected with respect to quality assurance and quality control (QA/QC) and conclude if the data collected is useable, partially useable with some limitations, or unusable in forming conclusions to the assessment. Where contaminant concentrations for each sample are below the investigation levels then no action will be required with respect to that contaminant or area; Where contaminant concentrations are reported to exceed the investigation levels, additional assessment or remediation or management will be required.
Step 6 Specify performance or acceptance criteria	<p>We have assumed the following to be true in the absence of contrary evidence (i.e. the null hypothesis):</p> <ul style="list-style-type: none"> Contamination at the Site currently poses a potential risk to human and environmental receptors. <p>The possibility exists of making the following decision errors based on the data obtained during this investigation:</p>

STEP	TASKS
	<ul style="list-style-type: none"> • Type 1 error – Deciding the above null hypothesis is false, when it is true. • Type 2 error – Deciding the above null hypothesis is true, when it is false. <p>The consequence of making a Type 1 error is more detrimental as it can result in adverse consequences or may include material impact to human and environmental health. The consequence of making a Type 2 error may result in ‘over-conservatism’ and unnecessary expense of conceptual remediation options and capping design.</p> <p>The potential for decision errors will be minimised by completing a robust QA/QC program and by completing an investigation that has an appropriate sampling and analytical density for the purposes of the investigation.</p>
<p>Step 7</p> <p>Optimise the design for obtaining data</p>	<p>Preliminary soil sampling was proposed to assess the likelihood for contamination at the Site within the contamination sources identified. Based on site history information, detailed site investigations involving systematic (grid-based) soil sampling, groundwater and/or surface water sampling were not required at this stage.</p> <p>The following sampling design was adopted:</p> <ul style="list-style-type: none"> • A total of 12 soil sampling locations (designated TP01 to TP12) as shown on Figure 5, Appendix A. Considering the Site area, this number of test pits is considered to provide a broad spatial coverage to gain an appreciation of the soil conditions of these areas. This limited number of sampling locations have been positioned judgmentally to target accessible areas of the Site. Soil contaminant concentrations may vary in other unassessed portions of the Site. • Soil samples for contamination were collected within near surface soil (less than 0.1m), within drainage lines/sediments, fill materials and past the depth of contamination (if and where observed). The sampling and analysis schedule completed for this project is described in Section 8 below. • Soil headspace screening was carried out using a calibrated Photo-ionisation detector to check for presence of volatile contamination (if any) • A SMEC experienced environmental scientist reviewed logs of the subsurface conditions were reviewed, and discussions were held with field engineers that completed this work. Copies of logs are included within Appendix F. Selected soil samples were then scheduled for analytical testing for the contaminants of potential concern (CoPCs).

7 Assessment Criteria

7.1 General

Evaluation against assessment criteria is used to identify levels of contamination that may pose ecological or health risks to potential receptors or future users of the site.

The National Environment Protection (Assessment of Site Contamination) Measure (NEPM) was first published in 1999 and updated in 2013 by the National Environment Protection Council (NEPC) and provides national standards for a variety of environmental issues, including the assessment of site contamination in Schedule B (1) *Guideline on Investigation Levels for Soil and Groundwater*.

The NEPM requires consideration be given to Health-based Investigation Levels (HIL), Health-based Screening Levels (HSL) for petroleum hydrocarbons, Ecological Investigation Levels (EIL), Ecological Screening Levels (ESL) for petroleum hydrocarbons, Management Limits, asbestos criteria and aesthetic issues. The following section outlines the rationale for the selection of the appropriate levels for this PSI.

Adopted assessment criteria thresholds are shown on data summary tables presented in Appendix D The adopted soil assessment criteria for this investigation were:

Health based criteria

- NEPM 2013 Table 1A (1) Health-based investigation level (HIL A – Residential)
- NEPM 2013 Table 1A (3) Health-based screening level for Vapour Intrusion (HSL A and HSL B Low-high density residential 0-<1m)
- CRC Care 2011 Table 4 Health-based screening level for Direct contact (HSL A Residential low density)
- CRC Care 2011 Table B4 Health-based screening level for Direct contact (HSL B Residential high density)
- CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m
- NEPM 2013 Table 1B (7) Management Limits (Residential, parkland and public open space-coarse texture).

Ecological based criteria

- NEPM 2013 Table 1B (5) and Table 1B (6) Generic Ecological Investigation / Screening Levels (EILs – Urban Residential and public open space)
- NEPM 2009 – Schedule B(1) Generic EILs for metals. *Note: The NEPM 2013 Table 1B (1) to Table 1B (4) provides values for site-specific Ecological Investigation Levels (EILs – Urban Residential and public open space) for soil physical-chemical parameters. These were not derived for this assessment.*

7.2 Health Investigation Levels (HILs) and Health Screening Levels (HSLs)

Health investigation levels (HIL) are scientifically based, generic assessment criteria designed to be used in the first stage (Tier 1 or ‘screening’) of an assessment of potential risks to human health from chronic exposure to contaminants. Soil HILs apply to the first three metres below the surface for residential use. They are intentionally conservative and are based on a reasonable worst-case scenario for four generic land use settings:

- HIL A – residential with garden/accessible soil (home grown produce <10 per cent fruit and vegetable intake, (no poultry), also includes children’s day care centres, preschools and primary schools)
- HIL B – residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high-rise buildings and flats
- HIL C – public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves) which should be subject to a site-specific assessment where appropriate
- HIL D – commercial/industrial such as shops, offices, factories and industrial sites.

The relevance of Health Screening Levels (HSLs) depends upon potential petroleum hydrocarbon contamination. HSLs also consider vapour intrusion for chemicals in groundwater, and soil-vapour.

As the land use is proposed to be rezoned to residential development HIL A (residential with garden/accessible soil) criteria is considered appropriate.

For this assessment, we have conservatively assumed a soil type of sand and coarse-grained soils for application of relevant criteria. For application of HSLs, since soils will be disturbed during excavation we have adopted a depth range of 0 to <1m.

7.3 Ecological investigation levels

Ecological investigation levels (EILs) are relevant where ecological receptors are likely to be present and exposure pathways are complete. As presented in Appendix D, Analytical results were compared with the NEPM (2013) Generic Ecological Investigation Levels (EILs) to determine potential risks to current and future ecological receptors at the site for select analytes (As, DDT, lead and Naphthalene). For other analytes (including Cu, Cr, Ni and Zn) the EIL values rely on site-specific inputs and calculations which have been calculated using the NEPM (2013) ASC Toolbox. As this is a preliminary, SMEC adopted the NEPM (2009) Schedule B1 Generic EILs for these metals as preliminary screening criteria.

7.4 Asbestos Criteria

The adopted site screening level in accordance with NEPM (2013) includes no visible asbestos for surface soil. There is potential for asbestos containing materials (ACM) is identified on the ground surface or in fill material. To verify the presence of asbestos, selected samples of fill and topsoil materials were tested for asbestos presence/absence. If asbestos is present, then a further assessment was required to quantify the risks in NEPM (2013). If asbestos is absent, then a low potential for asbestos contamination may be assessed.

7.5 Management Limits

Management Limits have been considered as investigation levels. The purpose of these is to avoid or minimise potential effects of petroleum hydrocarbons. The ASC NEPM Schedule B (1) identifies these effects as:

- Formation of observable LNAPL
- Fire and explosive hazards; and
- Effects on buried infrastructure.

8 Environmental Field Investigation

8.1 Field Sampling

Soil sampling was undertaken at a total of 12 test pits (designated TP01 to TP12) as shown on Figure 5, Appendix A. Test pits were excavated with a 3.5 tonne excavator with a 300mm toothed bucket. Test pit locations were excavated to depths ranging from surface to 3.0m and were extended past the base of the fill into natural soils or practical refusal, whichever occurred first.

Soil sampling was carried out during excavation of geotechnical test pits by a SMEC Senior geotechnical engineer (Mr Mark Maharaj), who is trained and experienced in environmental soil sampling. Sampling was conducted to the rationale in Section 6. Soil types were logged in general accordance with Australian Standards. Descriptions included soil type (using the unified soil classification system (USCS)) and apparent indicators of contamination such as discolouration, staining or odours.

Each soil sample was collected within clean laboratory-supplied containers. A new pair of nitrile gloves were worn during the collection of each sample and during logging. Samples were collected in duplicate in zip lock bags and screened with a calibrated photo-ionisation detector (PID). Field quality control is discussed further in Section 8.3.

8.2 Laboratory Testing

All primary and intra-laboratory duplicate samples were sent to ALS Environmental, Smithfield NSW (primary laboratory). Some samples for asbestos analysis were subcontracted to ASET laboratory for asbestos identification testing. One inter-laboratory duplicate was sent directly to Envirolab Services Pty Ltd, Chatswood NSW (secondary laboratory). All laboratories were NATA accredited for the analyses performed. Laboratory reports with accompanying Chain of Custody (COC) documentation are included within Appendix E. Samples were selected for analysis based on the observations in the field and analysed for the respective CoPC as shown in Table 9 below.

Table 9 Sampling and Analysis Schedule

AEC	DESCRIPTION	NUMBER OF SAMPLING LOCATIONS (IDENTIFIERS)	TESTING SUITE NUMBER OF PRIMARY SAMPLES ANALYSED			
			Herbicides (phenoxy acid)	Pesticides (OCP / OPP)	Heavy metals	TRH, BTEX, PAH/Phenols, PCB and asbestos
AEC 1	Site wide	12 (TP01 to TP12)	12	12	12	-
AEC 2	Site wide and localised occurrences of filling and/or unauthorised wastes (where observed)	4 (TP01, TP09 and TP11 and TP12)	-	-	3	6
AEC 3 (Offsite)	Offsite nearby crop growing (north and west of Site)	6 (TP01*, TP02*, TP03*, TP04*, TP07 within drainage line, TP08 within low lying soils)* *Analysis already carried out as part of AEC 1	1	1	1	-
Total - Primary samples			13	13	16	6
Total – Field duplicates (intra- or inter-laboratory duplicates)			0	0	2	2

8.3 Quality Assurance and Quality Control

Data Quality Indicators for the project were based on the field and laboratory considerations in NEPM Schedule B2 Appendix B, (NEPC 1999) which include:

- Completeness – a measure of the amount of useable data (expressed as %) from a data collection activity;
- Comparability – the confidence (expressed qualitatively) that data may be equivalent for each sampling and analytical event;
- Representativeness – the confidence (expressed qualitatively) that data are representative of each media present on the site;
- Precision – A quantitative measure of the variability (or reproducibility) of data; and
- Accuracy – a quantitative measure of the closeness of reported data to the true value.

8.3.1 Sample Handling, Storage and Transportation

Sampling was carried out as per SMEC standard operating procedures. Samples were stored in appropriately preserved sample containers provide by the laboratory. All sample jars and bags were immediately placed into an ice-filled chest to maintain the samples below the recommended preservation temperature of less than 5°C for the duration of fieldwork.

All samples were promptly transported to the laboratory with relevant Chain of Custody (COC) documentation within one day of sampling. The COC form was completed with the sample names, sampling date and required analyses.

8.3.2 Laboratories

Primary and secondary samples were submitted to a National Association Testing Authority (NATA) accredited laboratory (ALS Environmental, North Sydney NSW). Analytical methods complied with NEPM and NSW EPA requirements.

The laboratory Certificate of Analysis, Sample Receipt Advice and COC information are provided in Appendix E

8.3.3 Documentation

COC documentation was signed and dated by the laboratories, and laboratory Sample Receipt Advice was provided stating that all samples:

- Were received in good order.
- Were presented in adequate sample containers.
- That all samples submitted for volatiles were correctly contained with no headspace.
- That all samples were labelled appropriately according to current quality field sampling protocols.

The laboratory Sample Receipt Advice/Notifications notes that samples were received with an attempt to chill evident.

The chain of custody and sample receipt are presented in Appendix E

8.3.4 Field duplicates

Two intra-laboratory duplicate samples and one inter-laboratory triplicate sample was analysed. Intra-laboratory samples were analysed with the primary laboratory ALS Environmental and the interlaboratory sample was analysed with the secondary laboratory, Envirolab.

A summary of quality control duplicate samples is presented in Table 10.

Table 10 Quality control duplicate samples

PRIMARY SAMPLE	DUPLICATE SAMPLE	QA SAMPLE LABORATORY
TP02 - 1.0m	QC1	ALS
TP09 – 0.5m	QC2	ALS
TP09-0.5m	QC3	Envirolab*

*Results still pending from laboratory.

Relative percent differences (RPD) were calculated using the method advised in Section 8.2.6 of AS4482.1-2005. RPDs are presented Table D2, Appendix D .Appendix E All RPDs comparison results were within the accepted criteria (that is, less than 50%).

8.4 Laboratory QAQC

8.4.1 Methods

The laboratory used NATA accredited testing procedures. Analytical methods were in accordance with NEPM (2013) testing procedures. An exception was as follows:

- Two soil samples analysed for asbestos (namely TP01-0.1m and TP12-0.1m) where the laboratory was required to sub-sample from a single container. The laboratory indicated that the NATA accreditation does not apply to these samples. The data is considered useable in the context of this preliminary assessment.
- All tests are NATA accredited except for asbestos analysis to a detection limit of 0.001%. NATA News March 2014, p.7, states in relation to AS4964: *"This is a qualitative method with a nominal reporting limit of 0.01%" and that currently in Australia "there is no validated method available for the quantification of asbestos"*. Accordingly, NATA Accreditation does not cover the performance of this service.

8.4.2 Spikes, blanks and duplicates

All of the blanks, matrix spikes, surrogate spikes, laboratory control samples and duplicates conducted by the analysing laboratories were within accepted criteria.

8.4.3 QA/QC decision error limits

There are two main sources of potential errors:

- Sampling errors, which occur when the samples collected are not representative of the conditions within the investigation area
- Measurement errors, which occur during sample collection, handling, preparation, analysis and data reduction.

The types of decision errors are outlined within Table 8 in Section 6. The potential for decision errors was minimised by completing a robust QA/QC program and by completing an investigation that has an appropriate sampling and analytical density for the purposes of the investigation.

8.4.4 QA/QC summary

Based on the assessment carried out, the data was assessed to be suitable for the purposes of this assessment.

9 Results

9.1 Field observations

A site walkover was undertaken on 23 November 2018, with key observations detailed in Section 3.6. There were no visual or olfactory signs of contamination identified.

9.2 Subsurface conditions

Test pit logs are included in Appendix F.

Soils encountered at the Site typically consisted of a relatively thin layer of topsoil (typically 0.1m thick) comprising brown sandy silt or dark brown silty clay (low lying). Fill materials were encountered at TP09 and TP11 (between 0.4 and 1.1m thick) comprising silty clay, mottled red-grey, brown, orange with gravel, cobbles and/or boulders, which appeared to be locally derived materials, described as overlaying a mottled red brown, clayey silt/silly clay residual soil.

There were no visual or olfactory signs of contamination (such as staining or odours) identified within these layers. Soil screening using a photo-ionisation detector (PID) was carried out to check the presence of volatile contamination. The results recorded at each location were negligible (less than 2ppm) indicating a low potential for volatile contamination within sampled layers. The results of PIDs are recorded on test pit logs.

9.3 Laboratory results

Soil sample concentrations were recorded below the adopted assessment criteria. Except for heavy metals, the remaining contaminant concentrations were generally below the laboratory detection limit.

The laboratory analysis reports are included in Appendix E.

10 Conclusions and Recommendations

10.1 Conclusions

The Site appears to have a history of rural land use. Prior to 1942, historical mapping showed the Site to comprise 'scattered timber' or 'camouflage cover or medium timber'. Since 1956, historical aerial photography shows most of the Site to comprise what appears to be natural woodland like that of the surrounding area. Some land clearing is apparent in the central and south-east portions, possibly associated with the drainage lines and eroded soil landscapes. Between 1964 to 1974, the remnant trees and vegetation appear to have undergone periods of clearing and a possible earthen dam appears to intercept drainage line. Since that time, the Site appears to have remained unused or rural grazing pastures until the present day with minor alterations including the formation of onsite access tracks.

Three areas of environmental concern (AEC) have been identified within or proximal to the Site, including:

- AEC 1 – Site wide application of herbicides and pesticides for crop growing
- AEC 2 – Site wide and localised occurrence of fill and/or unauthorised wastes (where observed)
- AEC 3 – Off-site possible application of herbicides and/or pesticides.

The analytical results of the limited intrusive soil investigation indicate that there were no exceedances of adopted assessment criteria. SMEC considers that there is a low potential for soil contamination to be present at the Site within the identified AECs (refer to Figure 4, Appendix A).

10.2 Recommendations

SMEC recommend that an Unexpected Finds Protocol be developed prior to the commencement of site construction activities. The purpose of the Unexpected Finds Protocol will be to provide a structured approach to the management of unexpected finds of contamination during the construction activities. This could be prepared as part of the Contractor's Construction Environmental Management Plan, or equivalent. Additional sampling and testing may be required at construction stages based on unexpected finds.

It should be noted that if excavated material is proposed to be taken offsite for disposal to a licensed landfill facility, soil will require sampling and testing for waste classification prior to disposal in accordance with the NSW EPA Waste Classification Guidelines (November 2014). If contamination is observed/detected during this testing, it is also recommended that the underlying soils are assessed through validation sampling.

11 References

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- State Environmental Planning Policy No.55 – Remediation of Land, 1998.

Appendix A Site figures

Figure 1 – Site Location and Layout

Figure 2 – Geology and ASSRisk Mapping

Figure 3 – Historical Aerial Photography (1956, 1964, 1974, 1984, 1994, 2001, 2011 and 2018)

Figure 4 – Areas of Environmental Concern

Figure 5 – Test pit locations



FIG NO. 1 FIGURE TITLE Site Layout and Location	DATE 26/11/2018	PAGE SIZE A3	COORDINATE SYSTEM GDA 1994 MGA Zone 56
PROJECT NO. 30012537 PROJECT TITLE Preliminary Site Investigation: Woolgoolga	CREATED BY SV14139 SOURCES NearMaps (2018)	© SMEC Australia Pty Ltd 2018. All Rights Reserved. <small>Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.</small>	

Location: \\AU-GRFFP001\G-RData\Proposals\1032679-RDM - Geotech and Contamination_Woolgoolga\Contributors\0_data\05\Figure 1_Site Layout, Location, Topography\Fig_1_Site Location, Layout, Topo.mxd Last updated by: SV14139 on 26/11/2018 at 10:19



FIG NO. 2 FIGURE TITLE Site Geology and Acid Sulfate Soil Risk Mapping	DATE 26/11/2018	PAGE SIZE A3	COORDINATE SYSTEM GDA 1994 MGA Zone 56
PROJECT NO. 30012537 PROJECT TITLE Preliminary Site Investigation - Woolgoolga	CREATED BY SV14139 SOURCES NearMap(2018)	© SMEC Australia Pty Ltd 2018. All Rights Reserved. Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.	

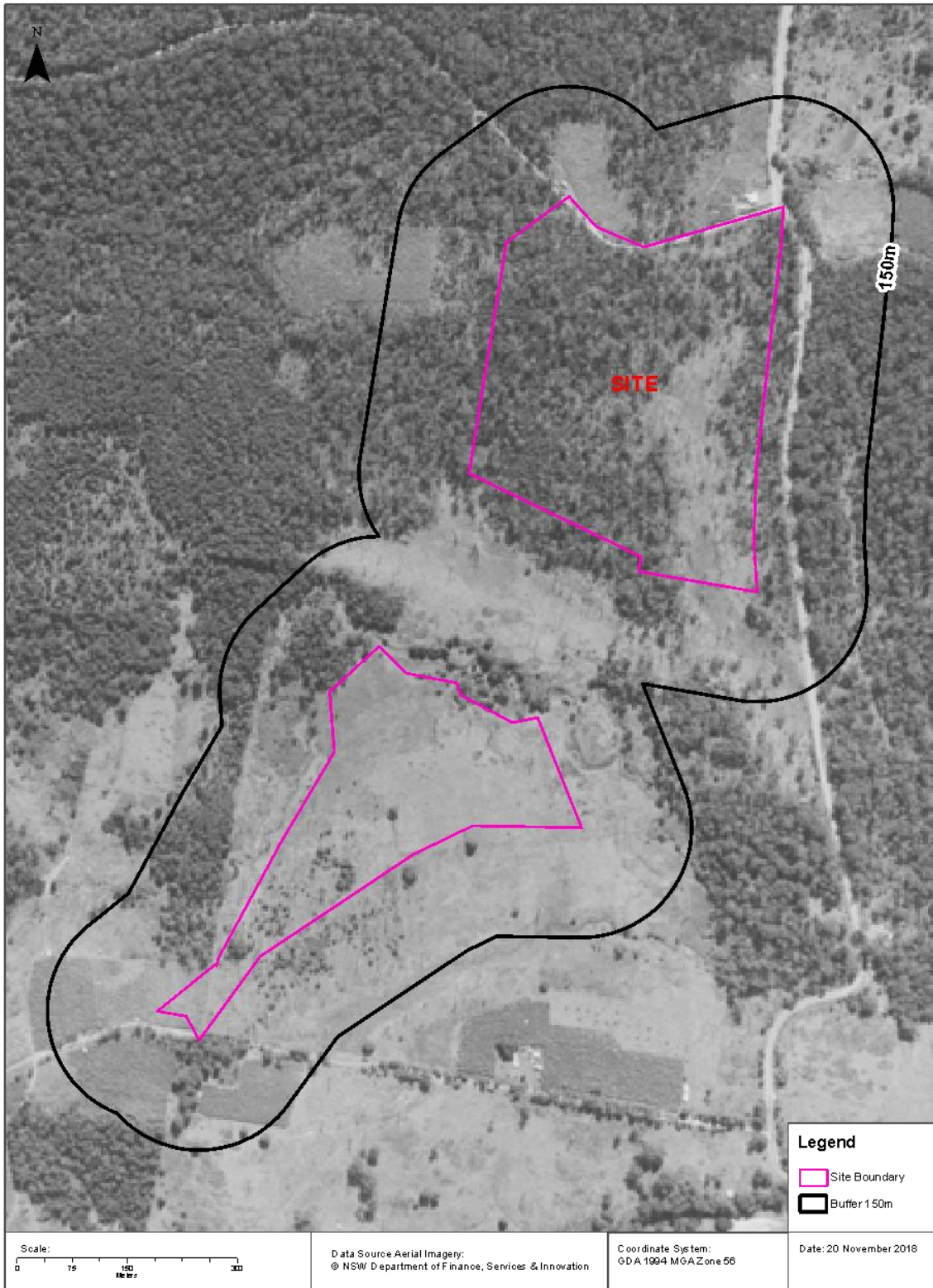
Location: \\AUORFFP001\G-RData\Proposals\1032679 RDM - Geotech and Contamination_Woolgoolga\Contributors\0_data\05\Figure 2_Geology\Fig2_Geology.mxd

Last updated by: SV14139 on 26/11/2018 at 15:41



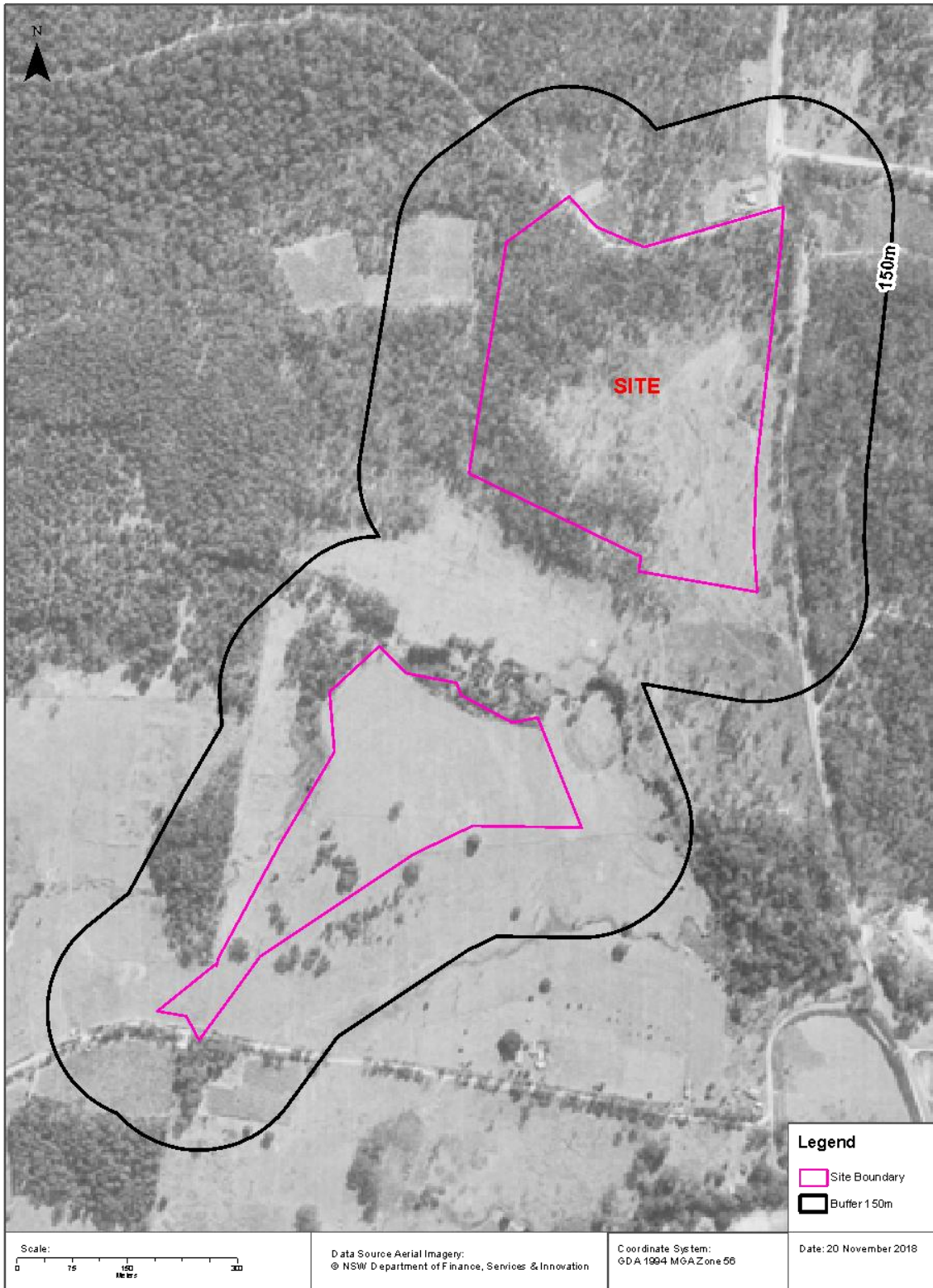
Aerial Imagery 1956

Bark Hut Road, Woolgoolga, NSW 2456



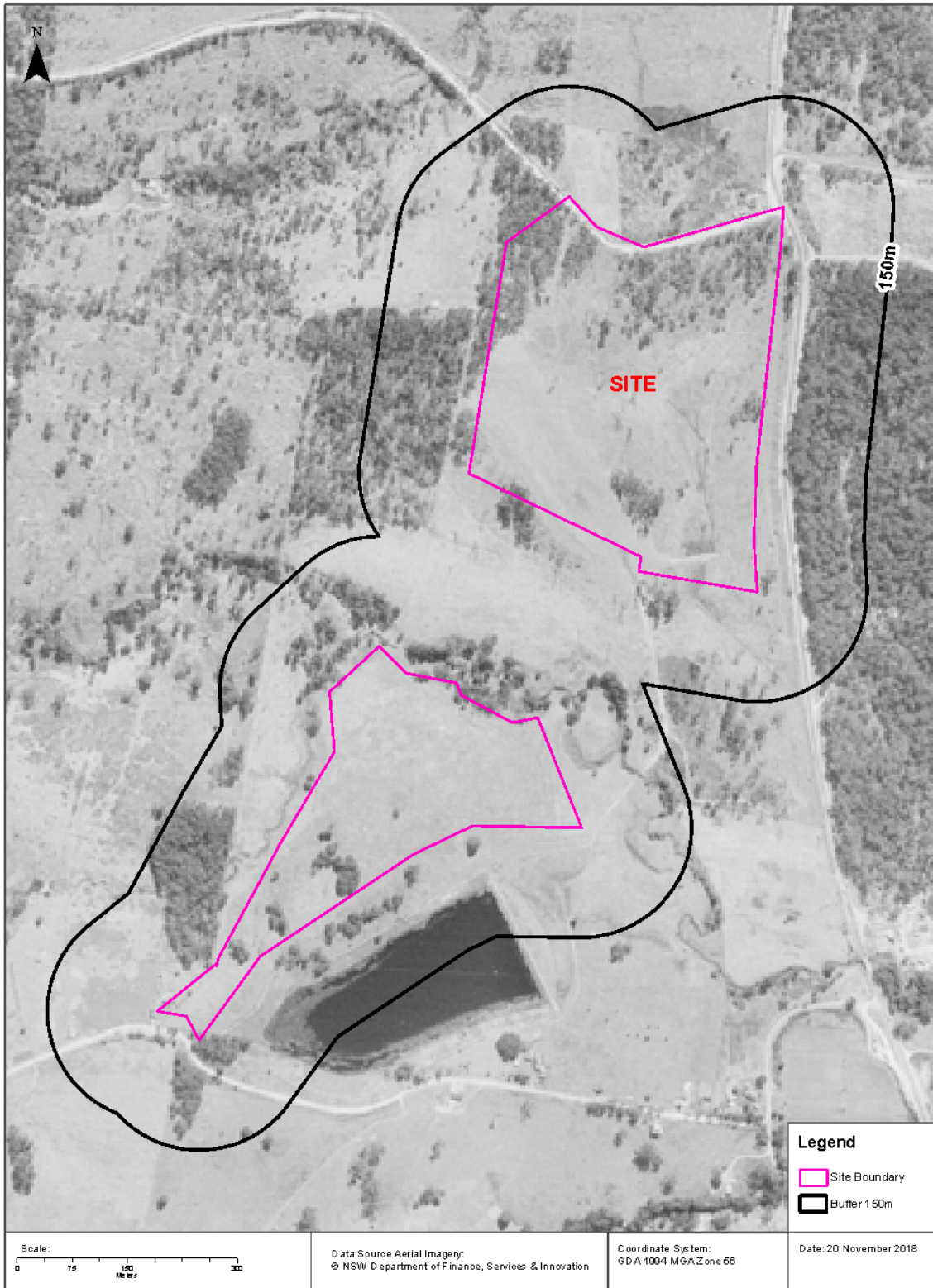
Aerial Imagery 1964

Bark Hut Road, Woolgoolga, NSW 2456



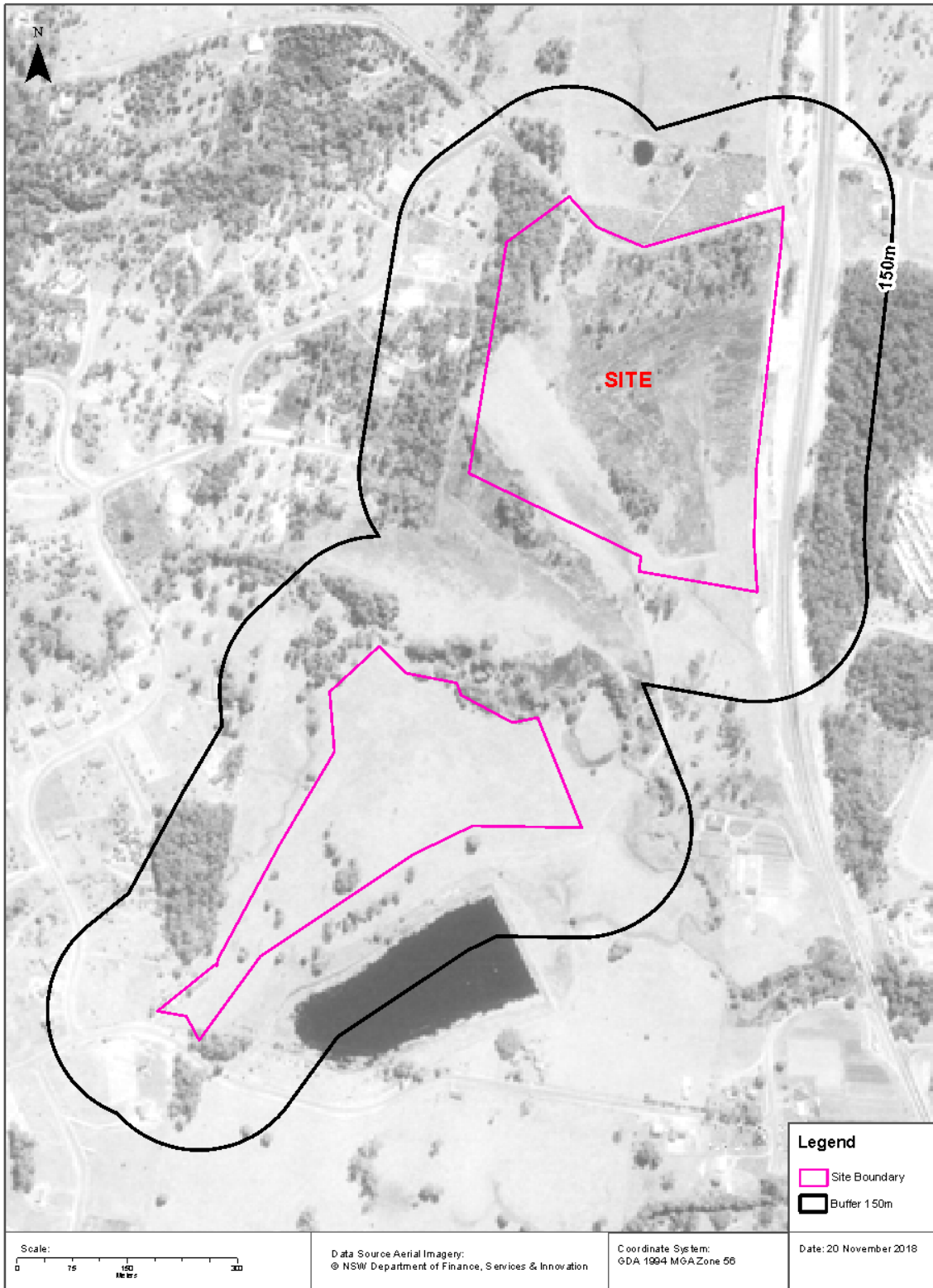
Aerial Imagery 1974

Bark Hut Road, Woolgoolga, NSW 2456



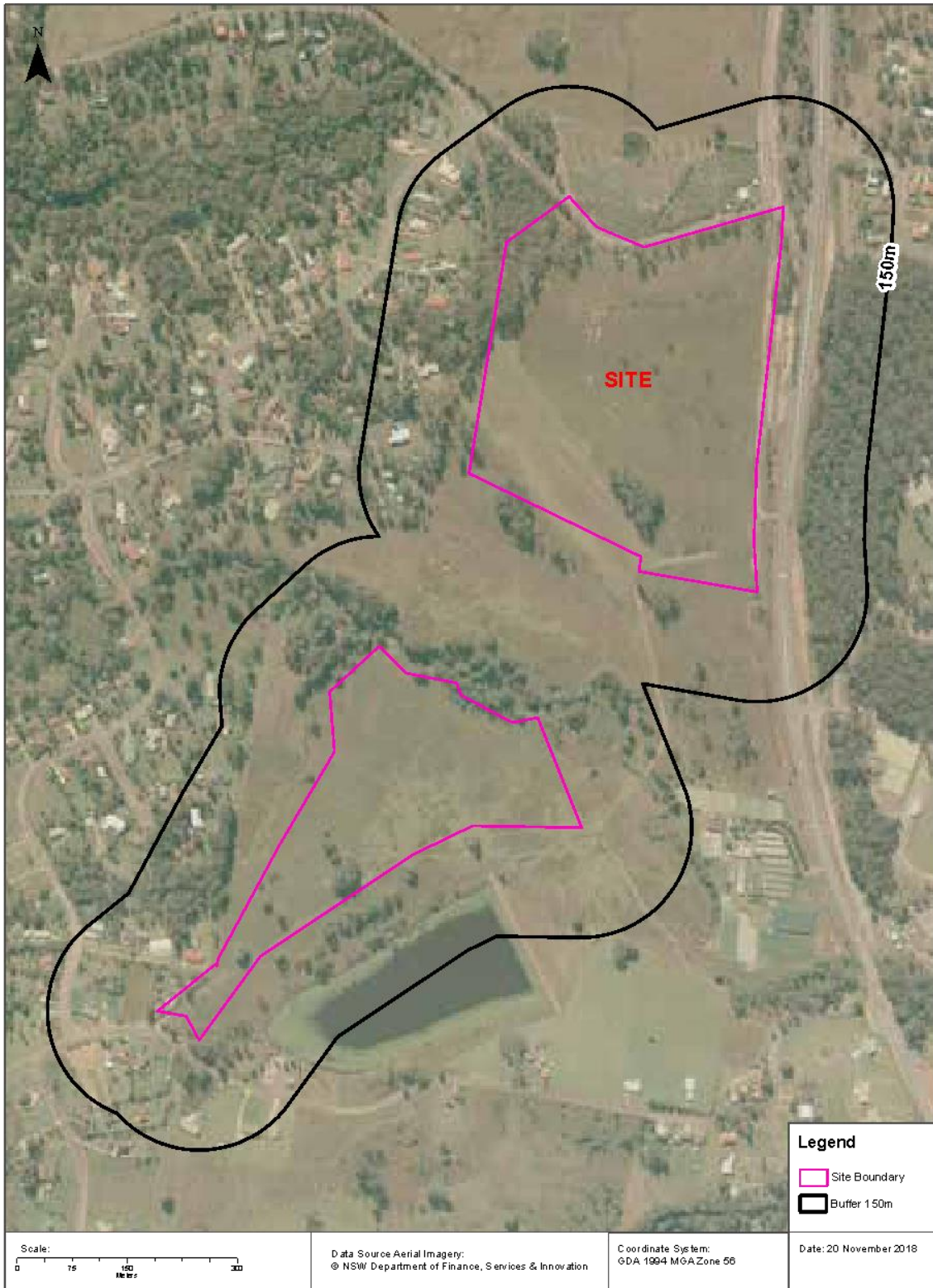
Aerial Imagery 1984

Bark Hut Road, Woolgoolga, NSW 2456



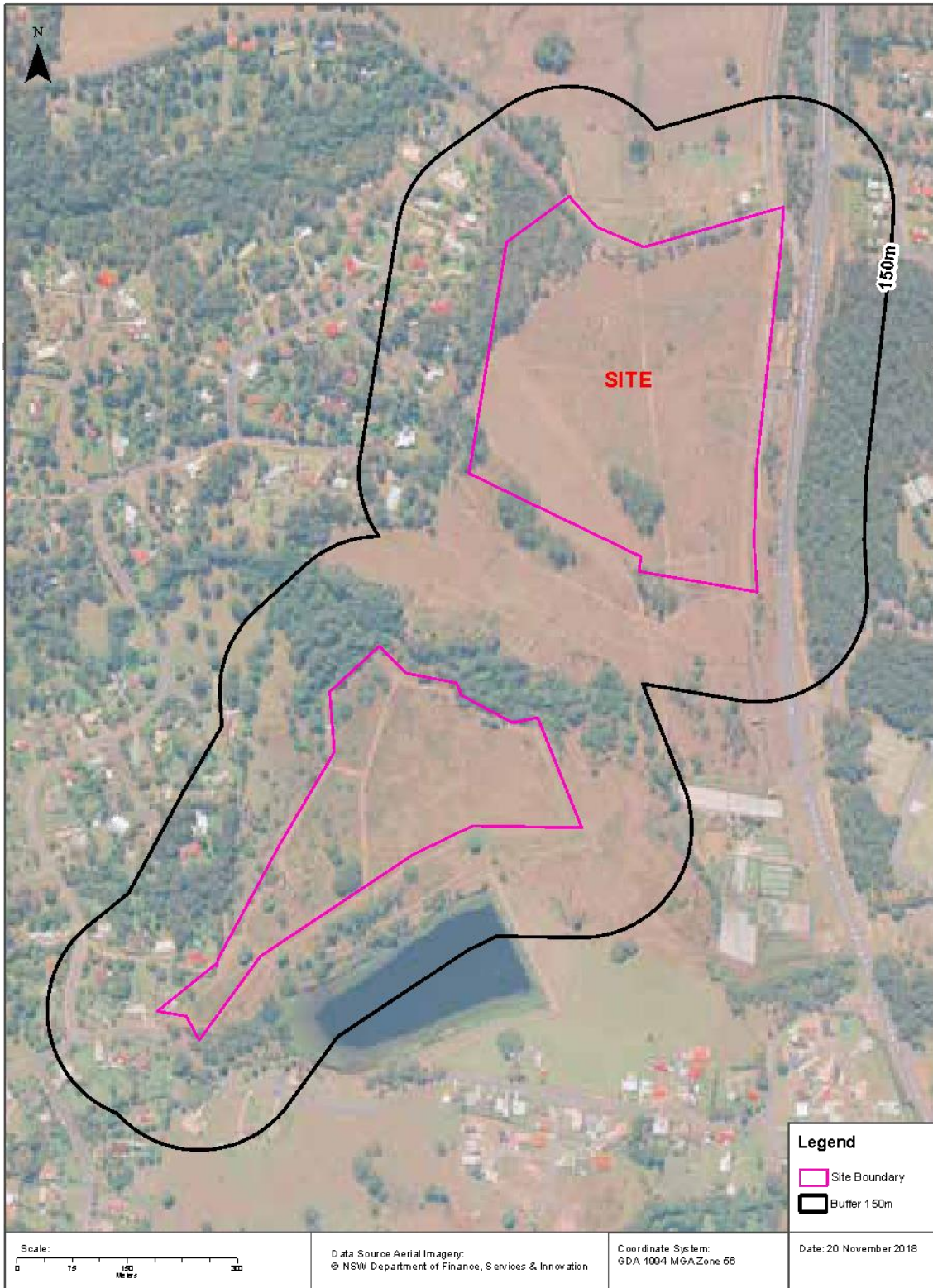
Aerial Imagery 1994

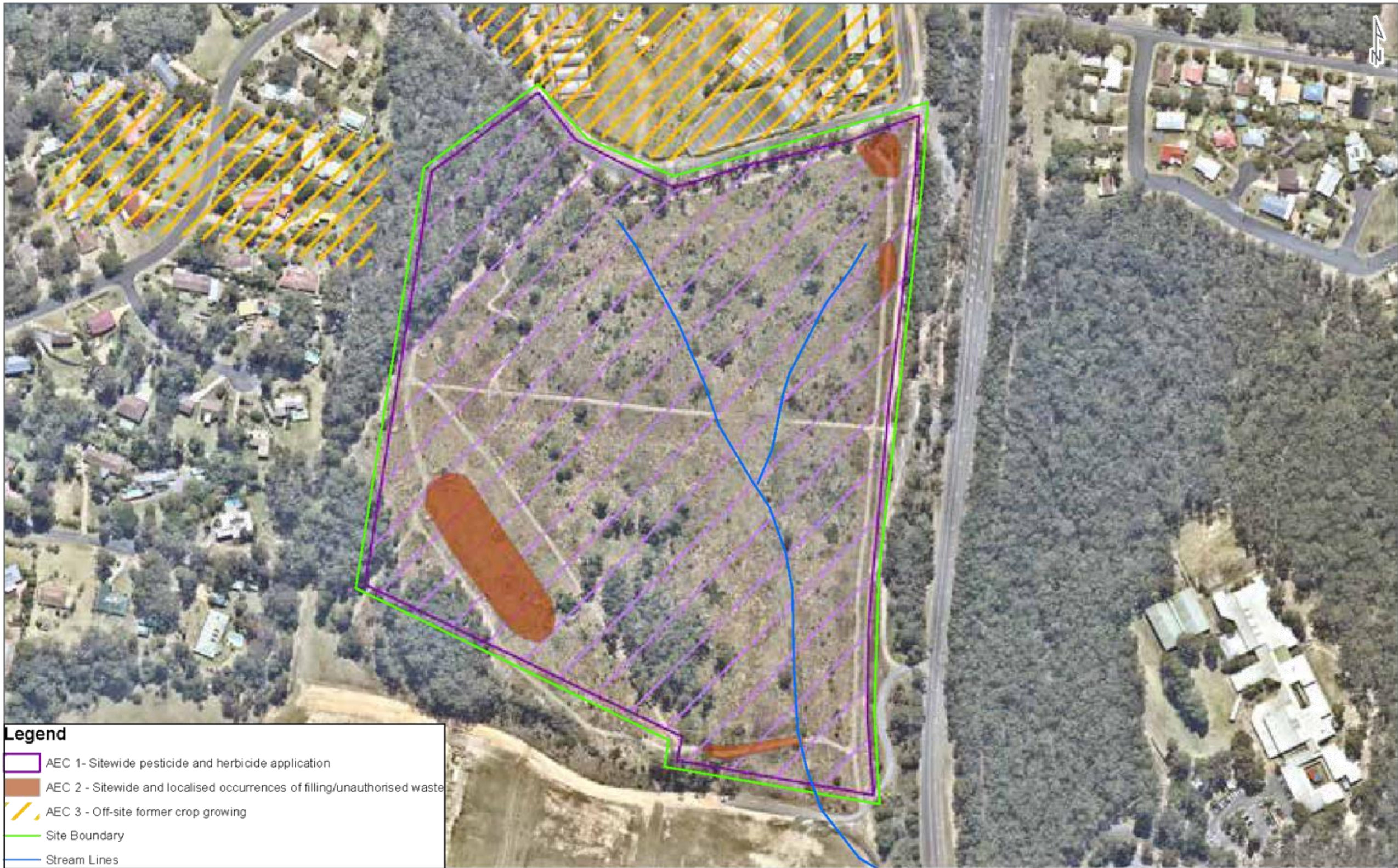
Bark Hut Road, Woolgoolga, NSW 2456



Aerial Imagery 2001

Bark Hut Road, Woolgoolga, NSW 2456





Legend	
	AEC 1 - Sitewide pesticide and herbicide application
	AEC 2 - Sitewide and localised occurrences of filling/unauthorised waste
	AEC 3 - Off-site former crop growing
	Site Boundary
	Stream Lines

FIG NO. 4 FIGURE TITLE Areas of Environmental Concern		DATE 20/12/2018		PAGE SIZE A3	COORDINATE SYSTEM GDA 1994 MGA Zone 56	© SMEC Australia Pty Ltd 2018. All Rights Reserved. <small>Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, the map-maker does not warrant or give any liability for the information contained on this map if the information is incorrect. Any reliance placed on this information is at the sole risk of the user. Please verify the accuracy of all information prior to using this map in a design document.</small>	
PROJECT NO. 30012537	PROJECT TITLE Preliminary Site Investigation - Woolgoolga	CREATED BY EC13990	SOURCES NearMap(2018)				

Location: \\AUGRFP001\6-RD\ata\Projects\30012537 Woolgoolga Prelim Geotech and Contamination\150 Enviro\02 Report\Desktop Assessment\data\015\Figure 4_Areas of Environmental Concern\Figure 4 AECs.mxd

Last updated by: EC 13990 on 20/12/2018 at 16:31



TEST PIT LOCATION DETAILS

ID	EASTING	NORTHING
TP01	518016.000	6870388.000
TP02	517892.000	6870388.000
TP03	517721.000	6870396.000
TP04	517774.000	6870305.000
TP05	517883.000	6870238.000
TP06	517936.000	6870256.000
TP07	517954.000	6870159.000
TP08	517946.000	6870016.000
TP09	517946.000	6870009.808
TP10	517734.000	6870091.000
TP11	517748.000	6870118.000
TP12	517810.000	6870051.000

LEGEND

- TP06 SMEC TEST PIT
- 2x Ø200 RCP CULVERTS
- INFERRED EXTENT OF FILL
- SITE BOUNDARY
- APPROXIMATE LOCATION OF TELSTRA SERVICES
- APPROXIMATE LOCATION OF COUNCIL WATER MAIN

NOT FOR CONSTRUCTION

155 mm ON ORIGINAL
 150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

DRAWING FILE LOCATION / PATH V:_Vaul\Projects\30012537\CAD\DWG\102_GT_Smecth\30012537-DD-GT-01.dwg		PLOT DATE 28 Dec 2018	TIME 15:43:48						
EXTERNAL REFERENCE FILES		REV	DATE	AMENDMENT / REVISION DESCRIPTION	VHS No.	APPROVAL	TITLE	NAME	
<h3 style="margin: 0;">Fig No.5 Test Pit Locations</h3>		01	28.12.18	PRELIMINARY DESIGN - ISSUED FOR REVIEW	001	101	DRAFTER	DAVID KELLY	
							DRAFTING CHECK	MARK MAHARAJ	
								DESIGNER	MARK MAHARAJ
								DESIGN CHECK	
								PROJECT MANAGER	MARK MAHARAJ
						PROJECT DIRECTOR	MARK MAHARAJ		
SCALE 1:2500								SMFC AUSTRALIA PTY LTD 12 VEC URBAN 3 STREET GRYTON NSW 2453 PH: 08 9071 7237 SVEC PROJECT No 30012537	
CLIENT Resource Design and Management		PROJECT / DRAWING No. 30012537-DD-GT-0101		PROJECT TITLE PRELIMINARY SITE INVESTIGATION LOT 202, DP 874273, WOOLGOOLGA GEOTECHNICAL AND ENVIRONMENTAL INVESTIGATION PLAN		SCALE 1:2500@A3		PAGE PRELIMINARY	REVISION 01



FIG NO. 1 FIGURE TITLE Site Layout and Location	DATE 26/11/2018	PAGE SIZE A3	COORDINATE SYSTEM GDA 1994 MGA Zone 56
PROJECT NO. 30012537 PROJECT TITLE Preliminary Site Investigation: Woolgoolga	CREATED BY SV14139 SOURCES NearMaps (2018)	© SMEC Australia Pty Ltd 2018. All Rights Reserved. <small>Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, this map contains data from a number of sources - no warranty is given that the information contained on this map is free from error or omission. Any reliance placed on such information shall be at the sole risk of the user. Please verify the accuracy of all information prior to using it. This map is not a design document.</small>	

Location: \\AU-GRFFP001\G-RData\Proposals\1032679-RDM - Geotech and Contamination_Woolgoolga\Contributors\0_data\05\Figure 1_Site Layout, Location, Topography\Fig_1_Site Location, Layout, Topo.mxd Last updated by: SV14139 on 26/11/2018 at 10:19

Appendix B Soil landscape information

me

MEGAN



Megan (me) soil landscape; on Mount Browne Road 2 km south-east of Upper Orara.

Landscape— rolling low hills to hills on Late Carboniferous metasediments of the Coffs Harbour association in the Coast Range and Gleniffer-Bonville Hills. Local relief to 90 m, occasionally to 200 m; slopes typically 5 - 20%, occasionally to 33%; elevation to 317 m. Partially cleared, tall open-forest and tall closed-forest.

Soils— moderately deep to deep (>100 cm), well-drained structured Red Earths (Gn3.11), Brown Earths (Gn3.21), Brown Podzolic Soils (Db4.11) and Red Podzolic Soils (Dr2.11), with moderately deep to deep (>100 cm), structured Yellow Earths (Gn3.21; Gn3.71) and Yellow Podzolic Soils (Dy4.11) in drier situations, and moderately deep to deep (>120 cm), well-drained Krasnozems (Gn3.11; Gn3.14) in the moistest sites.

Qualities and Limitations— strongly acid, stony (localised) soils of high erodibility, aluminium toxicity potential and low subsoil fertility. Steep slopes (localised); mass movement hazard (localised); high water erosion hazard (localised); foundation hazard (localised).

LOCATION

Rolling hills in the Coast Range and northern Gleniffer-Bonville Hills, particularly as shallower, lower slopes beneath steep mid-slopes (Bobo (**bo**), Never Never (**nn**) or Suicide (**su**) soil landscapes). Type location is the Bruxner Park Flora Reserve (area reference 5 09***E, 66 52***N).

LANDSCAPE

Geology and Regolith

Late Carboniferous Coffs Harbour association metasediments of the Coramba and Brooklana Beds and

the Moombil Siltstone (Cccs/Ccbf/Ccmf), comprising a thick turbidite sequence dominated by siliceous mudstone, lithofeldspathic wacke and siltstone with minor metabasalt, felsic volcanics, chert and jasper. Lithology can change abruptly over short distances. These rocks are typically moderately to highly fractured, cleaved and deformed. Metamorphism generally increases from north to south. Regolith is typically 100 cm or less of ferruginised and kaolinised decomposed rock overlying largely fresh fractured rock and typically underlying more than 100 cm of more pedologically altered materials.

Topography

Rolling low hills to hills with moderately broad crests (100 - 300 m) and moderately long to long slopes (100 - 500 m). Local relief to 90 m, occasionally to 200 m; slopes 5 - 20%, occasionally to 33%; elevation up to 317 m west of Sealys Lookout.

Vegetation

Mostly uncleared, tall open-forest in the north and tall closed-forest in the south. Because of climatic variation, the native vegetation varies markedly from north to south across this landscape.

Tall open-forest (wet sclerophyll forest) dominated by tallowwood (*Eucalyptus microcorys*) and Sydney blue gum (*E. saligna*) [Forest Types 46 and 47] occurs extensively on crests and slopes. The drier exposed crests are occupied by tall open-forest dominated by narrow-leaved white mahogany (*E. acmenoides*), spotted gum (*Corymbia maculata*), grey ironbark (*E. paniculata*) and small-fruited grey gum (*E. propinqua*) [Forest Types 60 and 74].

Moderately sheltered valley floors are dominated by brush box (*Lophostemon confertus*) [Forest Type 53] with a dense rainforest understorey, whilst the most sheltered gullies harbour various types of depauperate rainforest. Common dominant species include hoop pine (*Araucaria*

Milford, H.B. 1999, Soil Landscapes of the Coffs Harbour 1:100 000 Sheet - Department of Land and Water Conservation, Sydney.

cunninghamii) [Forest Type 21], yellow carabeen (*Sloanea woollsii*), crabapple (*Schizomeria ovata*), sassafras (*Doryphora sassafras*), corkwood (*Caldcluvia paniculosa*) and silver sycamore (*Cryptocarya glaucescens*) [Forest Type 2/3], and sassafras, fig, e.g., Moreton Bay fig (*Ficus macrophylla*), giant stinging tree (*Dendrocnide excelsa*) and grey myrtle (*Backhousia myrtifolia*) [Forest Type 6/23]. The boundary between tall open-forest and tall closed-forest on lower valley sides is often abrupt and pronounced.

Rainforest becomes more prevalent towards the south, becoming dominated by black booyong (*Argyrodendron actinophyllum*), coachwood (*Ceratopetalum apetalum*) and crabapple (*Schizomeria ovata*) [Forest Type 5/11], with species such as tallowwood (*E. microcorys*), blackbutt (*E. pilularis*) [Forest Type 36], Sydney blue gum (*E. saligna*) [Forest Types 46 and 47] and brush box (*Lophostemon confertus*) [Forest Type 53] persisting on more exposed north-facing slopes.

Land Use

Partially cleared and used for a variety of purposes, including banana plantations and (increasingly) urban development around Coffs Harbour and Woolgoolga as well as grazing on improved pastures in the Orara and Bucca valleys. Parts of this landscape are also contained within Orara East, Lower Bucca and Wedding Bells State Forests, plus Bruxner Park Flora Reserve.

Existing Land Degradation

Moderate, occasionally high erosion of forestry works where vegetation has been cleared, resulting in exposure of hardsetting soil materials (**me2**); also moderately deep, discontinuous gully erosion along drainage lines in cleared areas, particularly upslope of the Kooralbyn (**ko**) soil landscape.

Included Soil Landscapes

Small areas of the Suicide (**su**) soil landscape have been included as localised areas of steep to very steep mid-slopes.

SOILS

Dominant Soil Materials

me1— Brownish black earthy loam (topsoil— A horizon)

Colour	brownish black (7.5YR 3/2) to dark brown (7.5YR 3/4)
Texture Structure	loam to loam, fine sandy earthy
Fabric	rough-faced peds
Field pH	mildly to moderately acid (pH 6.5 - 5.0)
Coarse fragments	usually a few angular fragments of substrate (6 - 60 mm)
Roots	abundant to common
Exposed condition	loosely coherent when dry; soft when moist
Permeability	moderately high
Type location	upper Boambee Creek Valley (Map reference 5 0475°E, 66 4550°N); Coffs Harbour Planning Soil Data System card 21; 0 - 20 cm.

me2— Dark reddish brown pedal clay loam (topsoil— A horizon; subsoil; B horizon)

Colour	brownish black (7.5YR 3/2) through dark reddish brown (5YR 3/3) to reddish brown (5YR 4/8) in moister areas
Texture Structure	clay loam to silty clay loam moderately pedal; sub-angular blocky peds (10 - 50 mm)
Fabric	rough to smooth-faced peds
Field pH	mildly to moderately acid (pH 6.0 - 5.0)
Coarse fragments	common angular fragments of substrate (6 - 60 mm)
Roots	common
Exposed condition	coherent to hardsetting when dry; firm when moist
Permeability	moderate
Type location	upper Boambee Creek Valley (Map reference 5 0475°E, 66 4550°N); Coffs Harbour Planning Soil Data System card 21; 20 - 50 cm.

me3— Reddish brown pedal light clay (subsoil— B horizon)

Colour	dark reddish brown (2.5YR 3/6) to bright reddish brown (5YR 5/8) in moister areas and orange (7.5YR 6/8) in drier situations; commonly with reddish brown to yellow orange mottles (2 - 20%)
Texture Structure	light clay moderately and occasionally strongly pedal; sub-angular blocky and occasionally polyhedral peds (20 - 50 mm)
Fabric	smooth-faced peds
Field pH	moderately acid (pH 5.0 - 4.5)
Coarse fragments	common angular fragments of substrate (6 - 60 mm)
Roots	few
Exposed condition	coherent to hardsetting when dry; firm when moist
Permeability	moderately low
Type location	upper Boambee Creek Valley (Map reference 5 0475°E, 66 4550°N); Coffs Harbour Planning Soil Data System card 21; 50 - 350 cm.

me4— Reddish brown to orange silty clay loam to silty light clay (subsoil— C horizon)

Colour	reddish brown (2.5YR 4/6) to bright reddish brown (5YR 5/6) in moister areas; orange (7.5YR 6/6) to dull yellow orange (10YR 7/4) in drier areas; commonly with yellow orange mottles (2 - 20%)
Texture Structure	silty clay loam to silty light clay massive to strongly pedal; sub-angular blocky peds (20 - 50 mm)
Fabric	earthy to smooth-faced peds
Field pH	moderately acid (pH 5.0 - 4.5)
Coarse fragments	common angular fragments of substrate (6 - 60 mm)

Milford, H.B. 1999, *Soil Landscapes of the Coffs Harbour 1:100 000 Sheet - Department of Land and Water Conservation, Sydney.*

Roots few
Exposed condition coherent to hardsetting when dry; usually soft and sticky when moist
Permeability moderate
Type location 1 km east of Karangi Dam opposite old mill (Map reference 5 03 20°E, 66 52 50°N); Orara-Bucca Urban Study Soil Data System card 29; 120 - 250 cm.

Occurrence and Relationships

Crests and slopes. Typically up to 40 cm of **me2** overlies up to 75 cm of **me3** (moderately deep, well-drained structured Red Earths (Gn3.11), Brown Earths (Gn3.21) and, in drier situations, Yellow Earths (Gn2.21) and structured Yellow Earths (Gn3.71)). On occasions, **me2** is as little as 5 cm deep and is overlain by up to 15 cm of brownish black earthy loam (**me1**). **me3** may either overlie shattered rock at as little as 110 cm depth or overlies as much as 110 cm of bright reddish brown to orange, silty clay loam to silty light clay (**me4**) (moderately deep to deep, well-drained, structured Red Earths (Um6.33) and in the very moistest situations on lower slopes and valley floors, Krasnozems (Gn3.11; Gn3.14)). Alternatively, up to 35 cm of **me1** overlies up to 60 cm of **me3**, which itself overlies over 25 cm of **me4** (moderately deep, well-drained Red Podzolic Soils (Dr2.11) and Brown Podzolic Soils (Db4.11) and, in drier situations, Yellow Podzolic Soils (Dy4.11)). Soil depth generally exceeds 120 cm.

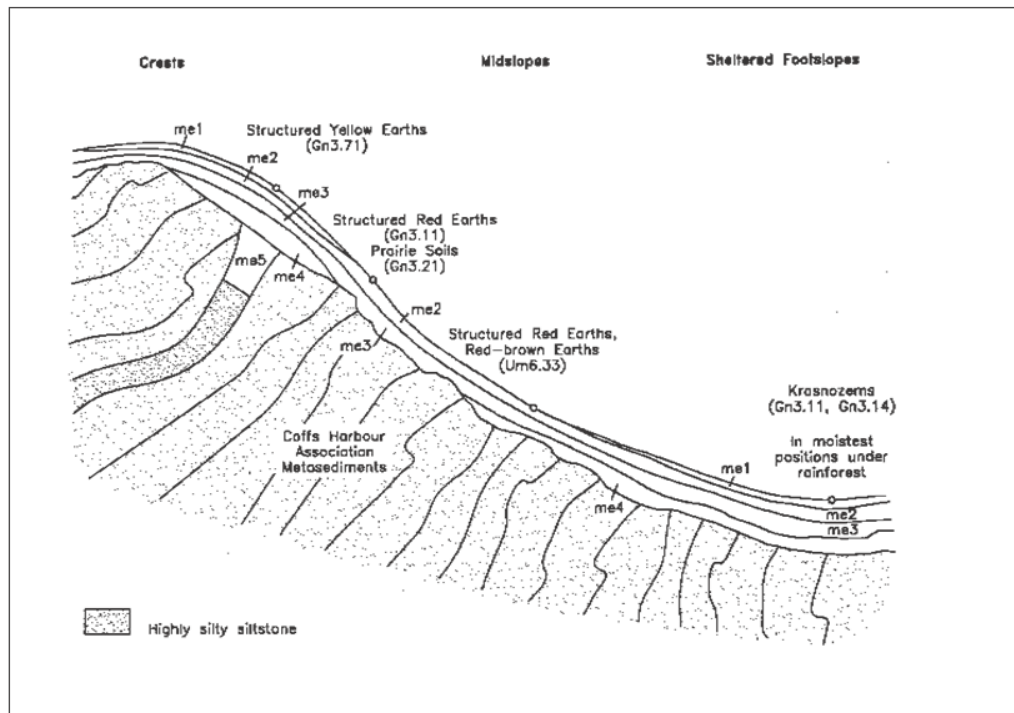
QUALITIES AND LIMITATIONS

Landscape Limitations

Steep slopes (localised)
 Mass movement hazard (localised)
 High water erosion hazard (localised)
 Foundation hazard (localised)

Soil Limitations

me1 Low wet bearing strength
 High organic matter
 Strong acidity
 Stoniness (localised)
me2 Low wet bearing strength
 High erodibility
 Strong to very strong acidity
 Aluminium toxicity potential
 Low fertility
 High organic matter (localised)
 Hardsetting surface (when exposed)
 Stoniness (localised)
me3 High erodibility
 Low permeability
 High aluminium toxicity potential
 Low fertility
 Stoniness (localised)



■ Distribution diagram of Megan soil landscape showing the occurrence and relationship of dominant soil materials.

Milford, H.B. 1999, Soil Landscapes of the Coffs Harbour 1:100 000 Sheet - Department of Land and Water Conservation, Sydney.

me4	High plasticity Low wet bearing strength Low permeability Extreme erodibility Strong to very strong acidity High aluminium toxicity potential Low fertility Stoniness (localised)
------------	--

Note: Laboratory test data was not obtained for any soil materials within this landscape in the Coffs Harbour region. Soil limitations are based on field observation and laboratory test results from similar soil materials from this soil landscape in the adjacent Dorriggo soil landscape report (Milford 1996).

Soil Fertility

Soil Material as Plant Growth Media. Moderately low (**me1**) to low to very low (**me2** to **me4**) suitability. Topsoil **me1** is moderately well structured with very high organic matter, moderate CEC, low available phosphorus and moderate acidity; **me2** has high organic matter but low CEC, low available phosphorus and strong acidity. Subsoil materials **me3** to **me4** are very strongly acid and very low in chemical fertility, with very low CEC, very low available phosphorus, very low organic matter, and high aluminium toxicity potential.

Soil Profile as Plant Growth Media. Generally moderately low to low suitability.

Erodibility

	K factor	Non-concentrated flows	Concentrated flows	Wind
me1	0.026	moderate	moderate	low
me2	0.040	high	high	low
me3	0.039	high	high	low
me4	0.059	very high	very high	low

Erodibility (non-dispersed PSA)

	K factor	Non-concentrated flows	Concentrated flows	Wind
me4	0.091	very high	extreme	low

Erosion Hazard

	Non-concentrated flows	Concentrated flows	Wind
land clearing	moderate	high	low
grazing	low	moderate	low
cultivation	high	high	low

Foundation Hazard

Foundation hazard is generally moderate. Localised limitations include soil materials **me1** to **me4** with high foundation hazard ratings, particularly **me4** which exhibits low wet bearing strength and high to extreme erodibility, and localised steep slopes with high potential for mass movement.

Urban Capability

Generally moderate limitations for urban development.

Septic Effluent Disposal

Generally low suitability for septic disposal systems due to slowly permeable soils (**me1**, **me3**, **me4**), low CEC, localised stoniness and localised steep slopes.

Rural Capability

Generally moderate limitations for grazing, with high to severe limitations for cultivation.

Appendix C Desktop study results (Lot Search)



Date: 19 Nov 2018 09:35:49

Reference: LS004639 EP

Address: Bark Hut Road, Woolgoolga, NSW 2456

Disclaimer:

The purpose of this report is to provide an overview of some of the site history, environmental risk and planning information available, affecting an individual address or geographical area in which the property is located. It is not a substitute for an on-site inspection or review of other available reports and records. It is not intended to be, and should not be taken to be, a rating or assessment of the desirability or market value of the property or its features. You should obtain independent advice before you make any decision based on the information within the report. The detailed terms applicable to use of this report are set out at the end of this report.

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Location Confidences

Where Lotsearch has had to georeference features from supplied addresses, a location confidence has been assigned to the data record. This indicates a confidence to the positional accuracy of the feature. Where applicable, a confidence is given under the field heading "LocConf" or "Location Confidence".

LC Code	Location Confidence
Premise match	Georeferenced to the site location / premise or part of site
General area or suburb match	Georeferenced with the confidence of the general/approximate area
Road match	Georeferenced to the road or rail
Road intersection	Georeferenced to the road intersection
Feature is a buffered point	Feature is a buffered point
Land adjacent to geocoded site	Land adjacent to Georeferenced Site

Dataset Listing

Datasets contained within this report, detailing their source and data currency:

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Cadastral Boundaries	Dept. Finance, Services & Innovation	19/11/2018	19/11/2018	Daily	-	-	-	-
Topographic Data	Dept. Finance, Services & Innovation	17/07/2018	17/07/2018	As required	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	17/10/2018	17/10/2018	Monthly	1000	0	0	1
Contaminated Land Records of Notice	Environment Protection Authority	13/11/2018	13/11/2018	Monthly	1000	0	0	0
Former Gasworks	Environment Protection Authority	06/11/2018	06/11/2018	Monthly	1000	0	0	0
National Waste Management Facilities Database	Geoscience Australia	06/11/2018	07/03/2017	Quarterly	1000	0	0	0
EPA PFAS Investigation Program	Environment Protection Authority	06/11/2018	06/11/2018	Monthly	2000	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	11/01/2018	11/01/2018	As required	1000	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	01/11/2018	01/11/2018	Monthly	1000	0	0	2
Delicensed POEO Activities still Regulated by the EPA	Environment Protection Authority	01/11/2018	01/11/2018	Monthly	1000	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	01/11/2018	01/11/2018	Monthly	1000	3	3	6
UPSS Environmentally Sensitive Zones	Environment Protection Authority	14/04/2015	12/01/2010	As required	1000	1	1	1
UBD Business Directory 1982 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1982 (Road & Area Matches)	Hardie Grant			Not required	150	-	13	13
UBD Business Directory 1970 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1970 (Road & Area Matches)	Hardie Grant			Not required	150	-	27	27
UBD Business Directory 1961 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1961 (Road & Area Matches)	Hardie Grant			Not required	150	-	21	21
UBD Business Directory 1950 (Premise & Intersection Matches)	Hardie Grant			Not required	150	0	0	0
UBD Business Directory 1950 (Road & Area Matches)	Hardie Grant			Not required	150	-	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500	0	0	0
UBD Business Directory Drycleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500	-	10	10
Cattle dips of the Northern Rivers region	NSW Dept. of Primary Industries	06/10/2017	06/10/2017	Annually	1000	0	0	0
Points of Interest	Dept. Finance, Services & Innovation	12/10/2018	12/10/2018	Quarterly	1000	0	0	16
Tanks (Areas)	Dept. Finance, Services & Innovation	15/10/2018	15/10/2018	Quarterly	1000	0	0	0
Tanks (Points)	Dept. Finance, Services & Innovation	15/10/2018	15/10/2018	Quarterly	1000	0	0	0
Major Easements	Dept. Finance, Services & Innovation	12/10/2018	12/10/2018	Quarterly	1000	0	0	4
State Forest	Dept. Finance, Services & Innovation	18/01/2018	18/01/2018	As required	1000	0	0	2
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	18/01/2018	30/09/2017	Annually	1000	0	0	1

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features Onsite	No. Features within 100m	No. Features within Buffer
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	08/10/2014	17/03/2000	As required	1000	1	1	2
Botany Groundwater Management Zones	NSW Department of Primary Industries	15/03/2018	01/10/2005	As required	1000	0	0	0
Groundwater Boreholes	NSW Dept. of Primary Industries - Water NSW, Commonwealth of Australia (Bureau of Meteorology)	24/07/2018	23/07/2018	Annually	2000	0	1	61
Geological Units 1:250,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	2	-	2
Geological Structures 1:250,000	NSW Dept. of Industry, Resources & Energy	20/08/2014		None planned	1000	0	-	4
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000	0	0	0
Soil Landscapes	NSW Office of Environment & Heritage	12/08/2014		None planned	1000	2	-	9
Atlas of Australian Soils	CSIRO	19/05/2017	17/02/2011	As required	1000	2	2	2
Environmental Planning Instrument - Acid Sulfate Soils	NSW Department of Planning and Environment	23/10/2018	12/10/2018	As required	500	2	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000	2	3	3
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000	0	0	0
Dryland Salinity Potential of Western Sydney	NSW Office of Environment & Heritage	12/05/2017	01/01/2002	None planned	1000	-	-	-
Mining Subsidence Districts	Dept. Finance, Services & Innovation	13/07/2017	01/07/2017	As required	1000	0	0	0
SEPP 14 - Coastal Wetlands	NSW Planning and Environment	17/12/2015	24/10/2008	Annually	1000	0	0	0
SEPP 26 - Littoral Rainforest	NSW Planning and Environment	17/12/2015	05/02/1988	Annually	1000	0	0	0
SEPP 71 - Coastal Protection	NSW Planning and Environment	17/12/2015	01/08/2003	Annually	1000	1	1	1
SEPP Major Developments 2005	NSW Planning and Environment	09/03/2013	25/05/2005	Under Review	1000	0	0	0
SEPP Strategic Land Use Areas	NSW Planning and Environment	01/08/2017	28/01/2014	Annually	1000	1	1	1
EPI - Land Zoning	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	1000	2	10	51
EPI - Minimum Lot Size	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	0	1	-	-
EPI - Height of Buildings	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	0	1	-	-
EPI - Floor Space Ratio	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	0	0	-	-
EPI - Land Application	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	0	1	-	-
EPI - Land Reservation Acquisition	NSW Planning and Environment	23/10/2018	12/10/2018	Quarterly	0	0	-	-
State Heritage Register - Curtilages	NSW Office of Environment & Heritage	18/10/2018	19/01/2018	Quarterly	1000	0	0	0
Environmental Planning Instrument - Heritage	NSW Department of Planning and Environment	10/09/2018	27/07/2018	Quarterly	1000	0	0	1
Bush Fire Prone Land	NSW Rural Fire Service	08/08/2018	31/07/2018	Quarterly	1000	3	3	3
Vegetation of Coffs Harbour LGA	NSW Office of Environment & Heritage	06/01/2016	31/12/2012	None planned	1000	5	8	19
RAMSAR Wetlands	Commonwealth of Australia Department of the Environment	08/10/2014	24/06/2011	As required	1000	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	2	2	5
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	14/08/2017	15/05/2017	Unknown	1000	9	9	12
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	13/11/2018	13/11/2018	Daily	10000	-	-	-

Aerial Imagery 2018

Bark Hut Road, Woolgoolga, NSW 2456

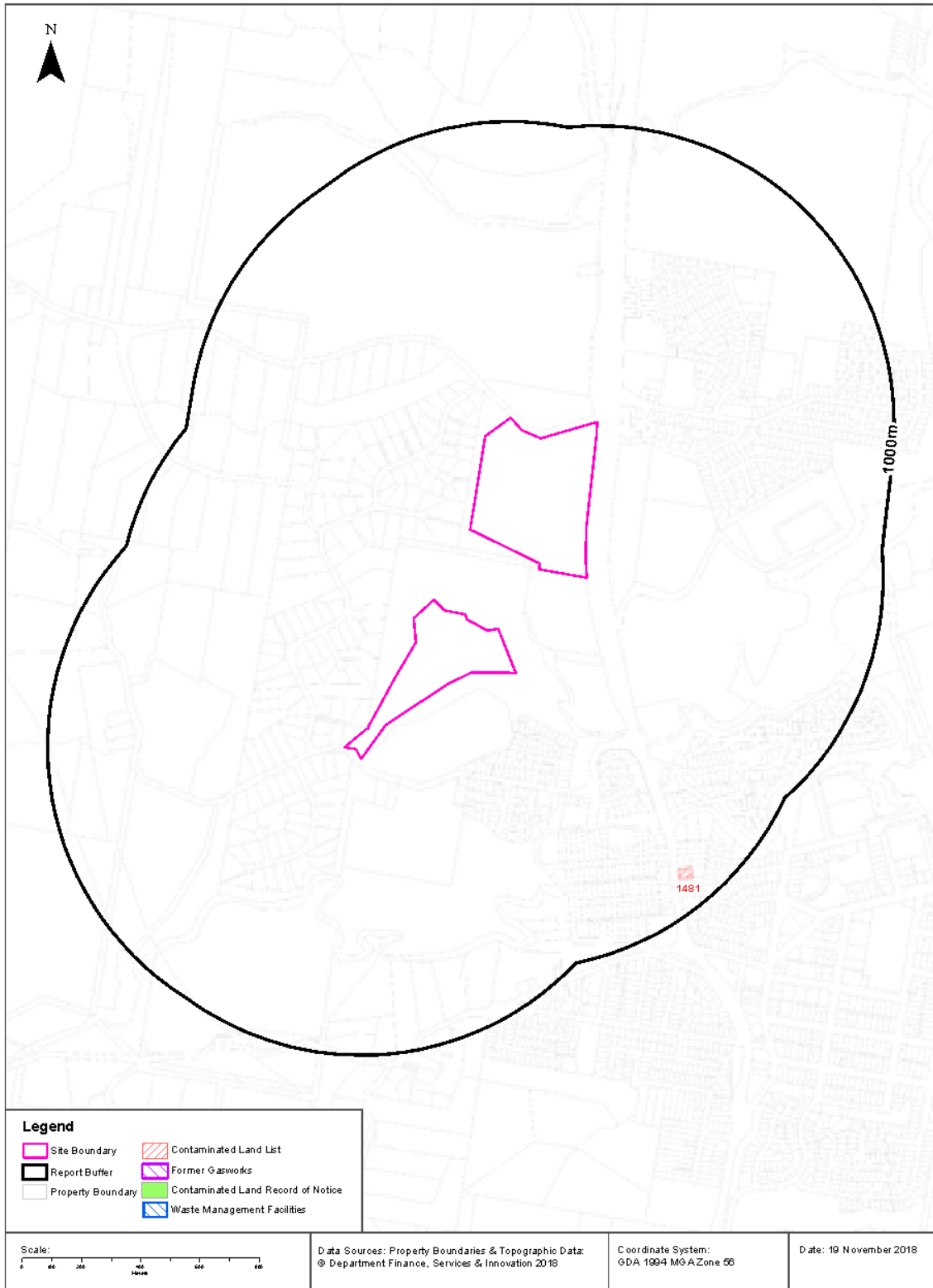


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Contaminated Land & Waste Management Facilities

Bark Hut Road, Woolgoolga, NSW 2456



Contaminated Land & Waste Management Facilities

Bark Hut Road, Woolgoolga, NSW 2456

List of NSW contaminated sites notified to EPA

Records from the NSW EPA Contaminated Land list within the dataset buffer:

Map Id	Site	Address	Suburb	Activity	Management Class	Status	Location Confidence	Dist (m)	Direction
1481	United Petroleum Service Station	56 Clarence Street	Woolgoolga	Service Station	Regulation under CLM Act not required	Current EPA List	Premise Match	862m	South East

The values within the EPA site management class in the table above, are given more detailed explanations in the table below:

EPA site management class	Explanation
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the Environmental Planning and Assessment Act 1979 (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record of Notices.
Contamination currently regulated under POEO Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. Management of the contamination is regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA's regulatory actions under the POEO Act are available on the POEO public register.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the Protection of the Environment Operations Act 1997 (POEO Act).
Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the Environmental Planning and Assessment Act 1979 (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record of Notices.
Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997. A regulatory approach is being finalised.
Regulation under the CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the Contaminated Land Management Act 1997 is not required.
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or Protection of the Environment Operations Act 1997. Alternatively, the EPA may require information via a notice issued under s77 of the Contaminated Land Management Act 1997 or issue a Preliminary Investigation Order.

NSW EPA Contaminated Land List Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

Contaminated Land & Waste Management Facilities

Bark Hut Road, Woolgoolga, NSW 2456

Contaminated Land: Records of Notice

Record of Notices within the dataset buffer:

Map Id	Name	Address	Suburb	Notices	Area No	Location Confidence	Distance	Direction
N/A	No records in buffer							

Contaminated Land Records of Notice Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority
Terms of use and disclaimer for Contaminated Land: Record of Notices, please visit
<http://www.epa.nsw.gov.au/clm/clmdisclaimer.htm>

Former Gasworks

Former Gasworks within the dataset buffer:

Map Id	Location	Council	Further Info	Location Confidence	Distance	Direction
N/A	No records in buffer					

Former Gasworks Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

National Waste Management Site Database

Sites on the National Waste Management Site Database within the dataset buffer:

Site Id	Owner	Name	Address	Suburb	Class	Landfill	Reprocess	Transfer	Comments	Loc Conf	Dist (m)	Direction
N/A	No records in buffer											

Waste Management Facilities Data Source: Geoscience Australia
Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

EPA PFAS Investigation Program

Bark Hut Road, Woolgoolga, NSW 2456

EPA PFAS Investigation Program

Sites that are part of the EPA PFAS investigation program, within the dataset buffer:

Id	Site	Address	Location Confidence	Distance	Direction
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

EPA Other Sites with Contamination Issues

Bark Hut Road, Woolgoolga, NSW 2456

EPA Other Sites with Contamination Issues

This dataset contains other sites identified on the EPA website as having contamination issues. This dataset currently includes:

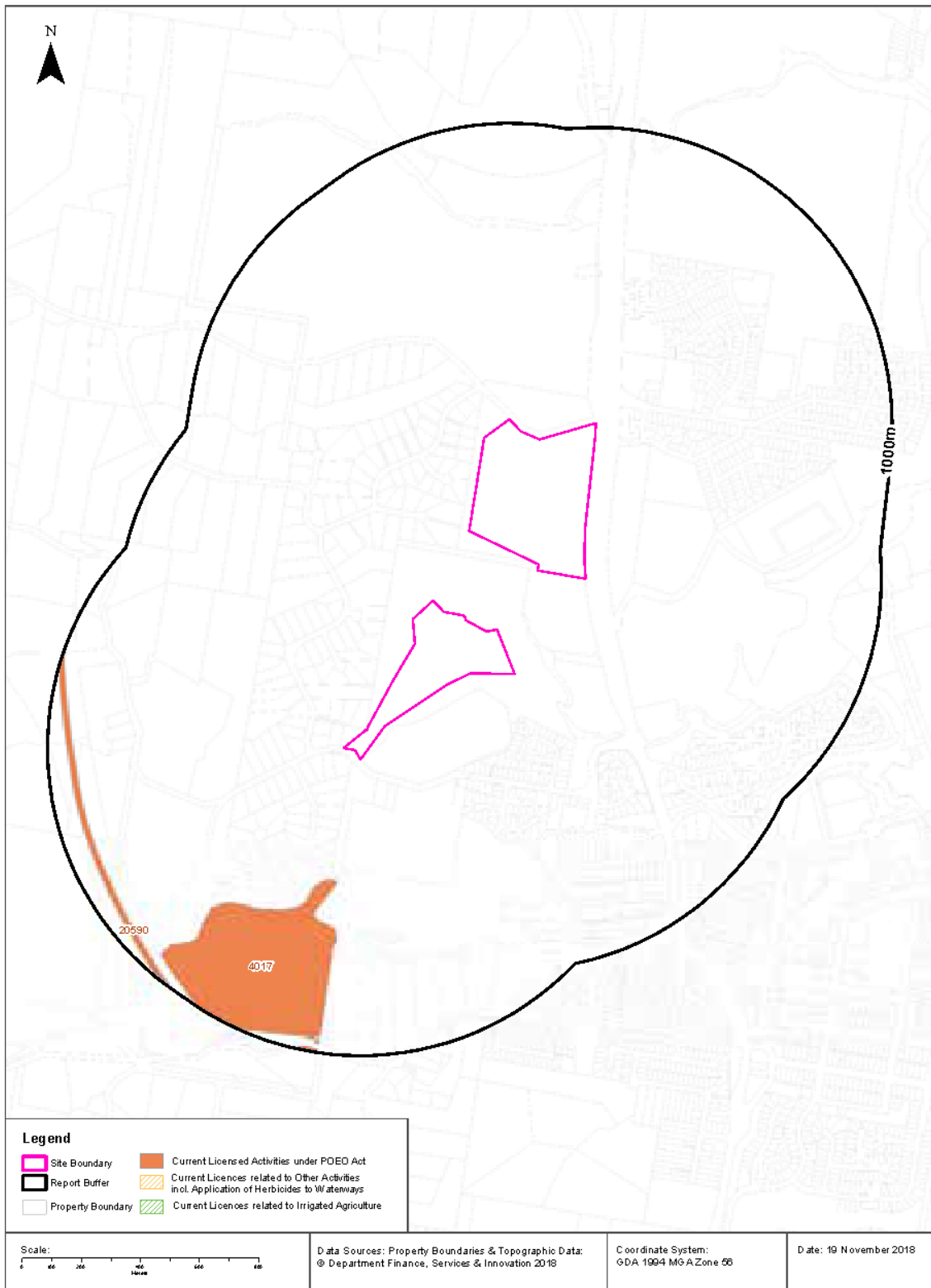
- James Hardie asbestos manufacturing and waste disposal sites
- Radiological investigation sites in Hunter's Hill

Sites within the dataset buffer:

Site Id	Site Name	Site Address	Dataset	Comments	Location Confidence	Distance	Direction
N/A	No records in buffer						

EPA Other Sites with Contamination Issues: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

Current EPA Licensed Activities
 Bark Hut Road, Woolgoolga, NSW 2456



EPA Activities

Bark Hut Road, Woolgoolga, NSW 2456

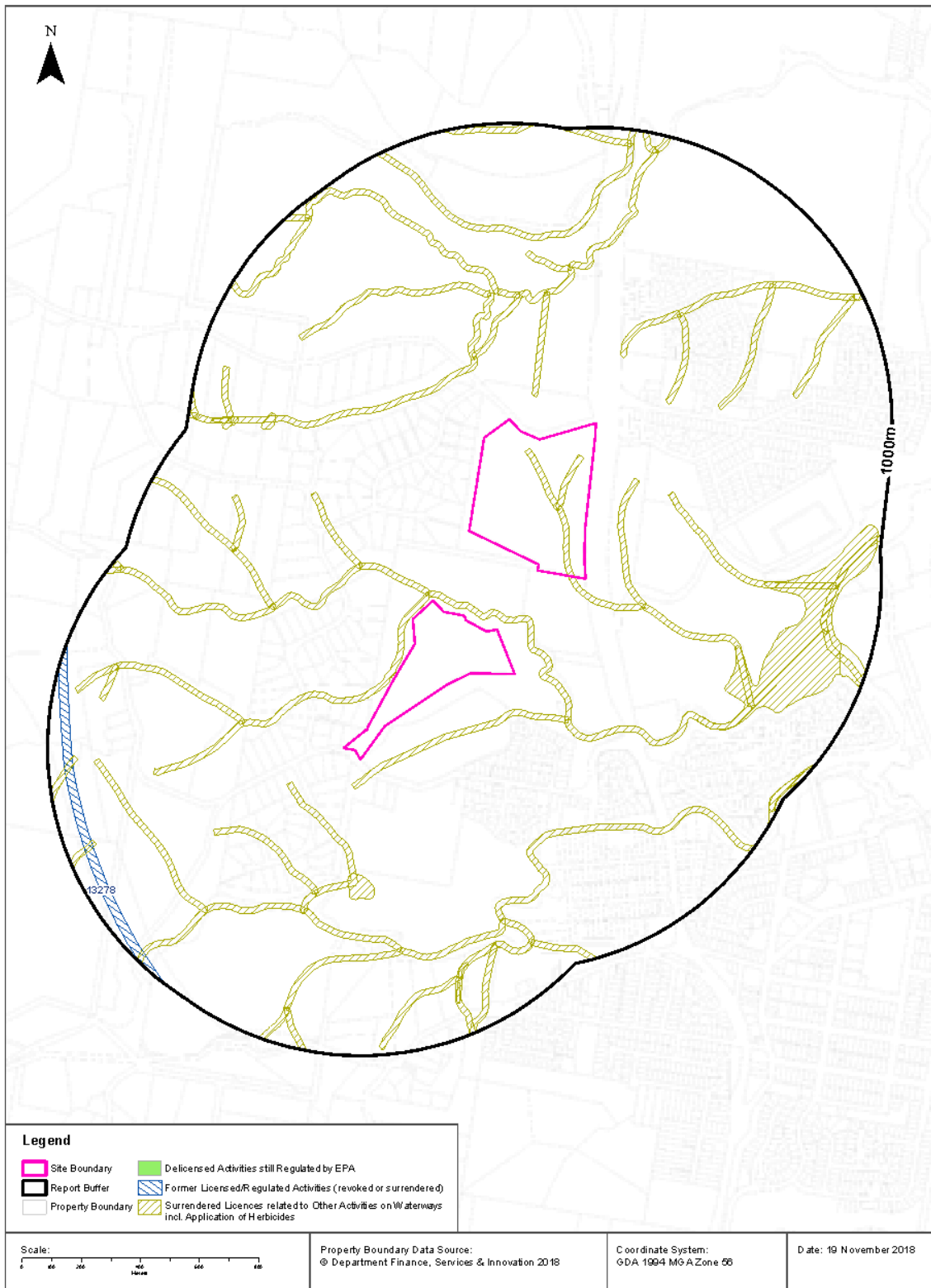
Licensed Activities under the POEO Act 1997

Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

EPL	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
4017	FORESTRY CORPORATION OF NEW SOUTH WALES	UPPER NORTH EAST REGION (UNER) MEANS THE STATE FORESTS AND CROWN -TIMBER LANDS (EX. PLANTATIONS) .	ITHIN THE U.N.E.R. SHOWN ON MAP 1 TO THE NSW U.N.E.R. FOREST AGREEMENT GRANTED ON THE 5 MARCH 1999, COFFS HARBOUR, NSW 2450	COFFS HARBOUR	Logging operations	Network of Features	417m	South West
20590	OHL CONSTRUCTION PACIFIC PTY LTD		Pacific Highway, WOOLGOOLGA, NSW 2456		Crushing, grinding or separating, Land-based extractive activity, Road construction	Road Match	901m	South West

POEO Licence Data Source: Environment Protection Authority
© State of New South Wales through the Environment Protection Authority

Delicensed & Former Licensed EPA Activities
 Bark Hut Road, Woolgoolga, NSW 2456



EPA Activities

Bark Hut Road, Woolgoolga, NSW 2456

Delicensed Activities still regulated by the EPA

Delicensed activities still regulated by the EPA, within the dataset buffer:

Licence No	Organisation	Name	Address	Suburb	Activity	Loc Conf	Distance	Direction
N/A	No records in buffer							

Delicensed Activities Data Source: Environment Protection Authority
 © State of New South Wales through the Environment Protection Authority

Former Licensed Activities under the POEO Act 1997, now revoked or surrendered

Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered		Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	0m	Onsite
13278	FULTON HOGAN CONSTRUCTION PTY LTD	Pacific Highway Sapphire to Woolgoolga Upgrade, Pacific Highway, SAPPHIRE	Surrendered	09/08/2010	Crushing, grinding or separating	Road Match	907m	South West
13278	FULTON HOGAN CONSTRUCTION PTY LTD	Pacific Highway Sapphire to Woolgoolga Upgrade, Pacific Highway, SAPPHIRE	Surrendered	09/08/2010	Land-based extractive activity	Road Match	907m	South West
13278	FULTON HOGAN CONSTRUCTION PTY LTD	Pacific Highway Sapphire to Woolgoolga Upgrade, Pacific Highway, SAPPHIRE	Surrendered	09/08/2010	Road construction	Road Match	907m	South West

Former Licensed Activities Data Source: Environment Protection Authority
 © State of New South Wales through the Environment Protection Authority

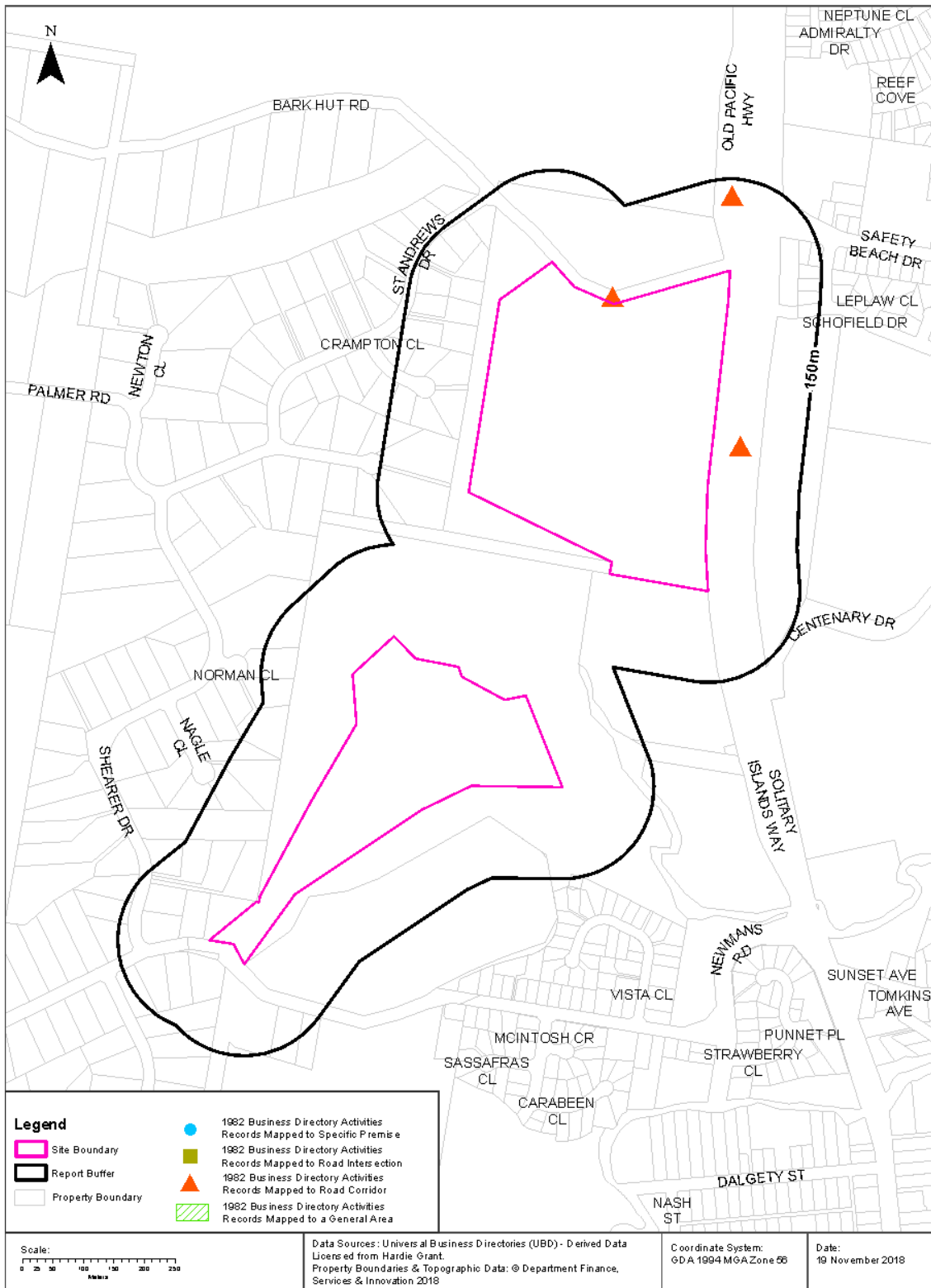
UPSS Sensitive Zones

Bark Hut Road, Woolgoolga, NSW 2456



1982 Historical Business Directory Records

Bark Hut Road, Woolgoolga, NSW 2456



Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

1982 Business Directory Records Premise or Road Intersection Matches

Records from the 1982 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1982 Business Directory Records Road or Area Matches

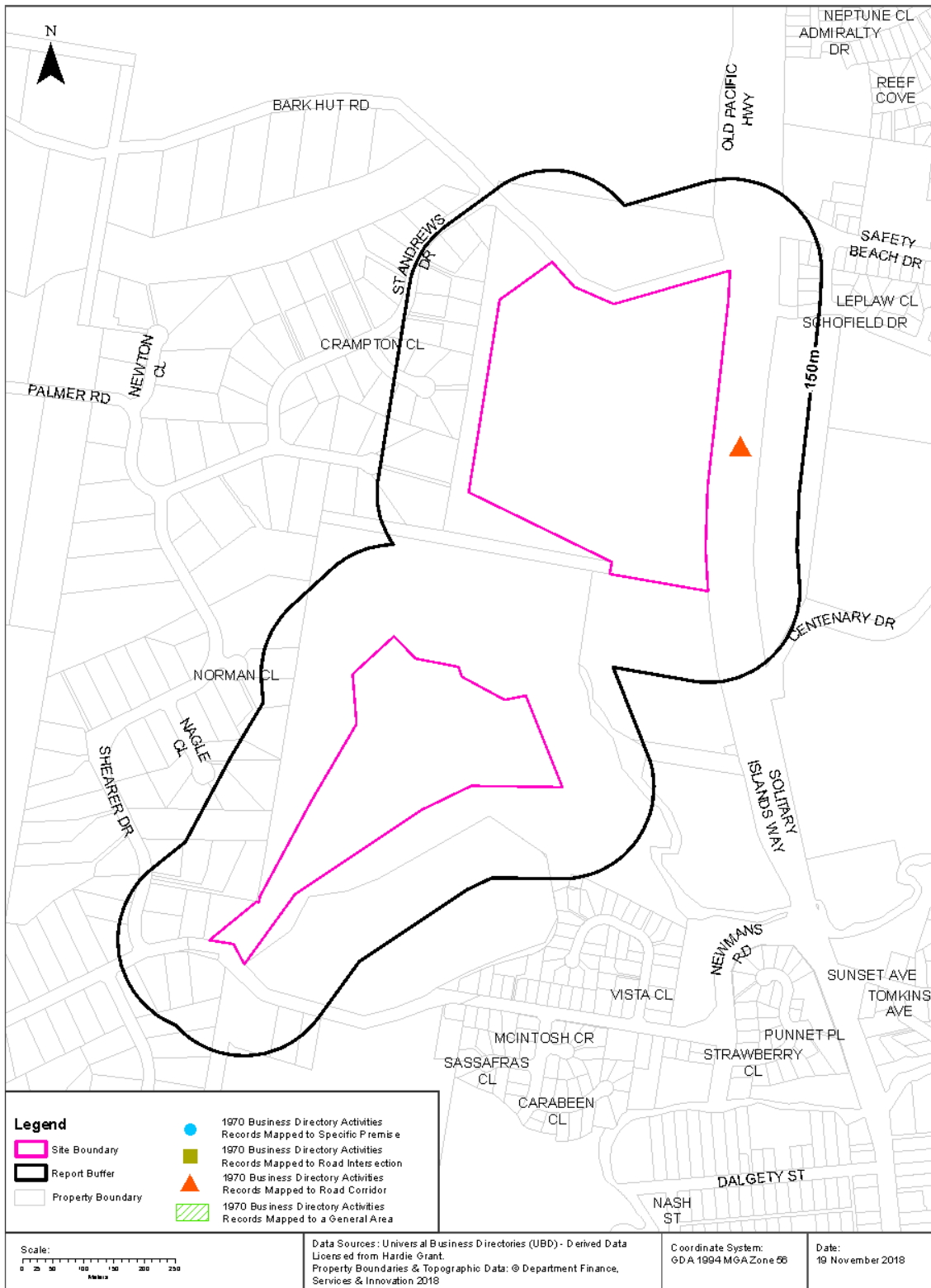
Records from the 1982 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES /OR ENGINEERS &/OR SERVICE STATIONS.	BP Woolgoolga Roadhouse Pacific Highway, Woolgoolga.,	98392	Road Match	0m
Not Listed	Colonial Surfside Caravan Park, Pacific Highway., Woolgoolga	98408	Road Match	0m
Not Listed	Featherstone, W. D. & M. Carrier, Pacific Highway., Woolgoolga	98412	Road Match	0m
Not Listed	Fountain's Motel, Pacific Highway., Woolgoolga	98415	Road Match	0m
Not Listed	Grafton Woolgoolga Bus Service, Bark Hut Rd., Woolgoolga	98418	Road Match	0m
Not Listed	Parbury Henty & Co. Pty. Ltd., Tmbr.Mrcht,Pacific Highway., Woolgoolga	98436	Road Match	0m
Not Listed	Pine Lodge Motel, Pacific Highway., Woolgoolga	98437	Road Match	0m
Not Listed	Strawberry Patch, The, Gmngcr,Pacific Highway., Woolgoolga	98453	Road Match	0m
Not Listed	Sunc coast Auto Port.Pacific Highway, Mullaway. 248., Woolgoolga	98454	Road Match	0m
Not Listed	Sunc coast Motel, Pacific Highway, Mullaway. 248., Woolgoolga	98455	Road Match	0m
Not Listed	Woolgoolga Motor Inn, Pacific Highway., Woolgoolga	98465	Road Match	0m
Not Listed	Woolgoolga Road House, Pacific Highway., Woolgoolga	98469	Road Match	0m
Not Listed	Hall, O. J. & Son, Tmbr. Mrcht., Old Pacific Highway., Woolgoolga	98423	Road Match	91m

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1970 Historical Business Directory Records

Bark Hut Road, Woolgoolga, NSW 2456



Lotsearch Pty Ltd ABN 89 600 168 018

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Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

1970 Business Directory Records Premise or Road Intersection Matches

Records from the 1970 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
N/A	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1970 Business Directory Records Road or Area Matches

Records from the 1970 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

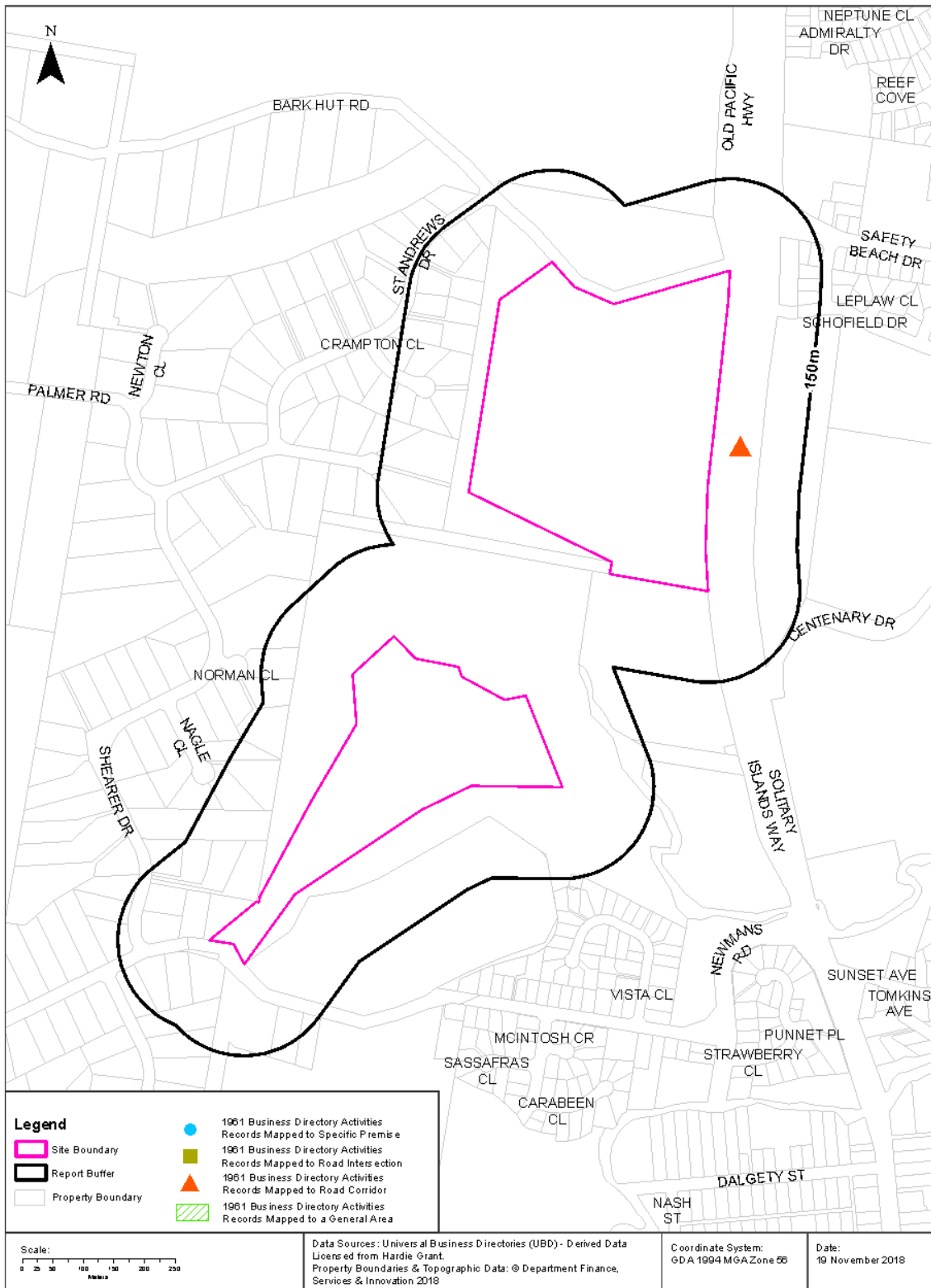
Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MILK VENDORS	Bp Woolgoolga Service Station Pacific Highway, Woolgoolga	616442	Road Match	0m
BOTTLED GAS-SUPPLIERS & OR REFILLERS	BP Woolgoolga Service Station, Pacific Hwy., Woolgoolga	616348	Road Match	0m
CAFES, TEA ROOMS & COFFEE LOUNGES, ETC.	BP Woolgoolga Service Station, Pacific Hwy., Woolgoolga	616360	Road Match	0m
MILK BARS & CONFECTIONERY SHOPS	BP Woolgoolga Service Station, Pacific Hwy., Woolgoolga	616433	Road Match	0m
MOTOR GARAGES & ENGINEERS	BP Woolgoolga Service Station, Pacific Hwy., Woolgoolga	616457	Road Match	0m
TYRE DEALERS, RETREADERS & VULCANIZERS	BP Woolgoolga Service Station, Pacific Hwy., Woolgoolga	616493	Road Match	0m
CARRIERS & CARTAGE CONTRACTORS	Ellis, C. E., Pacific Hwy., Woolgoolga	616371	Road Match	0m
MOTELS	Fountains Motel, Pacific Hwy., Woolgoolga	616449	Road Match	0m
CAFES, TEA ROOMS & COFFEE LOUNGES, ETC.	Golden Fleece Service Station & Restaurant, Pacific Hwy., Woolgoolga	616361	Road Match	0m
MOTOR SERVICE STATIONS- PETROL, OILS, ETC.	Golden Fleece Service Station & Restaurant, Pacific Hwy., Woolgoolga	616464	Road Match	0m
MILK BARS & CONFECTIONERY SHOPS	Golden Fleece Service Station, Pacific Hwy., Woolgoolga	616436	Road Match	0m
BOX & CASE MERCHANTS & OR MANUFACTURERS	Hall, O. J. & Son, Pacific Hwy., Woolgoolga	616352	Road Match	0m
TIMBER MERCHANTS & SAWMILLERS	Hall, O. J. & Son, Pacific Hwy., Woolgoolga	616488	Road Match	0m
ASSOCIATIONS, SOCIETIES, CLUBS & SPORTING BODIES	Masonic Lodge, Pacific Hwy., Woolgoolga	616331	Road Match	0m
TIMBER MERCHANTS & SAWMILLERS	Parbury Henty & Co. Pty. Ltd., Pacific Hwy., Woolgoolga	616490	Road Match	0m
AGRICULTURAL MACHINERY REPAIRERS	Ratcliffe, L., Pacific Hwy., Woolgoolga	616322	Road Match	0m
MOTOR GARAGES & ENGINEERS	Ratcliffe, L., Pacific Hwy., Woolgoolga	616459	Road Match	0m
WELDERS-ELECTRIC & OR OXY	Ratcliffe, L., Pacific Hwy., Woolgoolga	616498	Road Match	0m

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
FRUITERS & GREENGROCERS	Strawberry Patch (The), Pacific Hghwy., Woolgoolga	616396	Road Match	0m
CAFES, TEA ROOMS & COFFEE LOUNGES, ETC.	Suncoast Auto Chef, Pacific Hghwy, Mullaway, Woolgoolga	616364	Road Match	0m
LOCAL BODIES	Woolgoolga Bushfire Brigade, Pacific Hghwy., Woolgoolga	616429	Road Match	0m
BOAT, LAUNCH & YACHT BUILDERS & /OR REPAIRERS	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616344	Road Match	0m
MOTOR BODY BUILDERS & REPAIRERS	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616454	Road Match	0m
MOTOR CAR & /OR TRUCK DEALERS-NEW & /OR USED	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616456	Road Match	0m
MOTOR PAINTERS & PANEL BEATERS	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616461	Road Match	0m
MOTOR RUSTPROOFING SPECIALISTS	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616462	Road Match	0m
MOTOR TOWING SERVICES	Woolgoolga Smash Repairs, Pacific Hghwy., Woolgoolga	616467	Road Match	0m

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1961 Historical Business Directory Records

Bark Hut Road, Woolgoolga, NSW 2456



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Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

1961 Business Directory Records Premise or Road Intersection Matches

Records from the 1961 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
NA	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1961 Business Directory Records Road or Area Matches

Records from the 1961 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

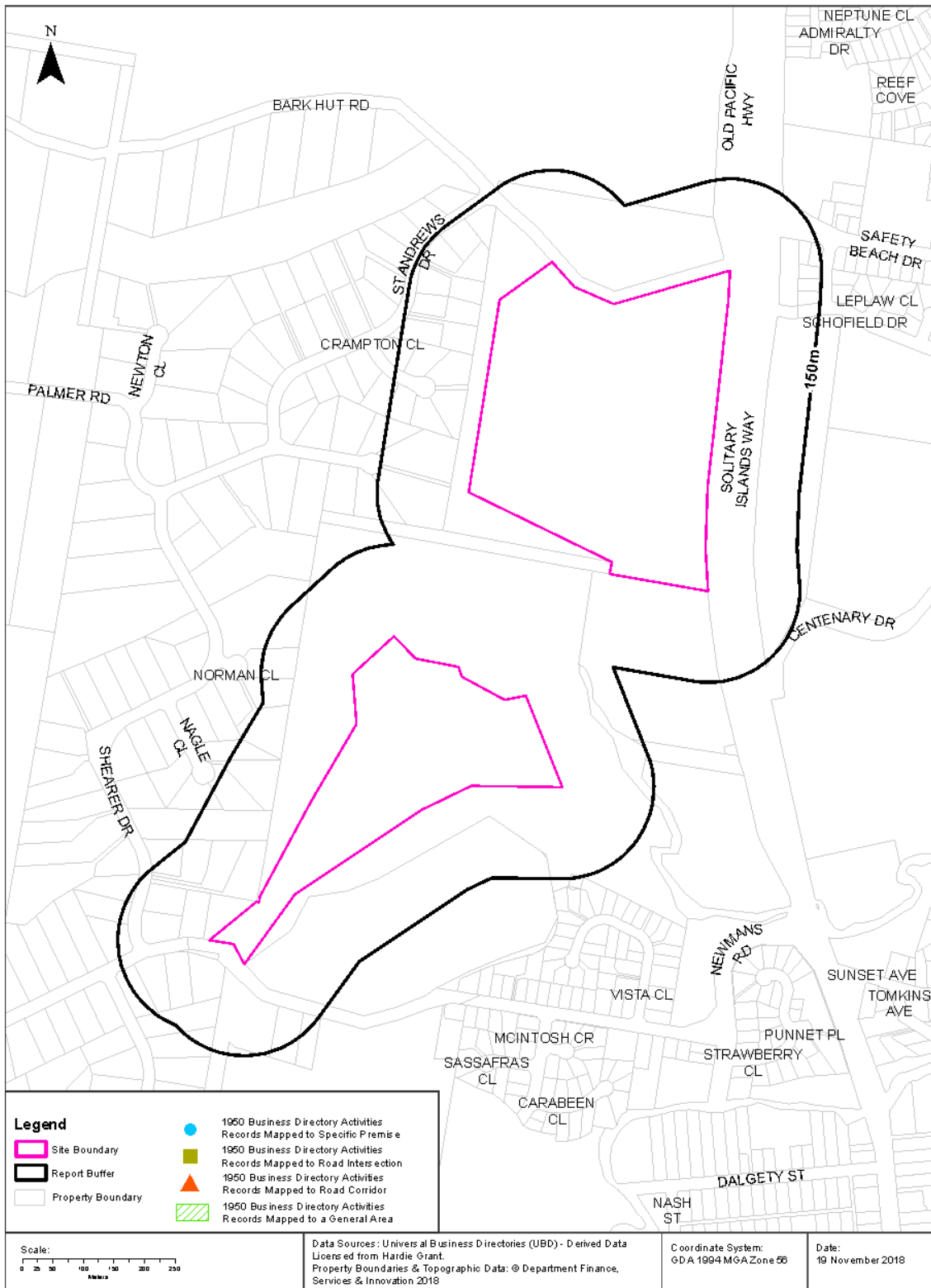
Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES & ENGINEERS	Clouten's, H., Golden Fleece Service Station, Pacific Highway., Woolgoolga	178249	Road Match	0m
MINERAL SANDS-SEPARATION SPECIALISTS	Freeman, R. S., Pacific Highway, Woolgoolga	178237	Road Match	0m
MOTOR GARAGES & ENGINEERS	Greentrees Motors, Pacific Highway., Woolgoolga	178250	Road Match	0m
AGRICULTURAL MACHINERY DEALERS	Greentrees Motors, Pacific Highway., Woolgoolga	177971	Road Match	0m
ENGINEERS-GENERAL, MFRG. & MECHANICAL	Greentrees Motors, Pacific Highway., Woolgoolga	178205	Road Match	0m
INSURANCE AGENTS	Greentrees Motors, Pacific Highway., Woolgoolga	178228	Road Match	0m
MOTOR BODY BUILDERS & REPAIRERS	Greentrees Motors, Pacific Highway., Woolgoolga	178246	Road Match	0m
MOTOR CAR & TRUCK DEALERS-NEW & USED	Greentrees Motors, Pacific Highway., Woolgoolga	178248	Road Match	0m
MOTOR PAINTERS & PANEL BEATERS	Greentrees Motors, Pacific Highway., Woolgoolga	178255	Road Match	0m
MOTOR SERVICE STATIONS	Greentrees Motors, Pacific Highway., Woolgoolga	178258	Road Match	0m
WELDERS-ELECTRIC &/OR OXY	Greentrees Motors, Pacific Highway., Woolgoolga	178279	Road Match	0m
ELECTRICAL SUPPLIES & APPLIANCES RETAILERS	Greentree's Woolgooga Garage and Service Station, Pacific Highway., Woolgoolga	178000	Road Match	0m
REFRIGERATOR DEALERS & SERVICEMEN.	Greentree's Woolgooga Garage and Service Station, Pacific Highway., Woolgoolga	178268	Road Match	0m
MEDICAL PRACTITIONERS	Macpherson, J. R., Pacific Highway., Woolgoolga	178231	Road Match	0m
HAIRDRESSERS (GENT.'S) & TOBACCONISTS	McPherson, C., Pacific Highway., Woolgoolga	178216	Road Match	0m
TIMBER MERCHANTS & SAWMILLERS	Moller, J. J. Pacific Highway., Woolgoolga	178278	Road Match	0m
MOTOR SERVICE STATIONS	Sun Coast Service Station, Pacific Highway., Mullaway, via Woolgoolga	178259	Road Match	0m
MOTOR GARAGES & ENGINEERS	Sykes, A. F., Pacific Highway., Woolgoolga	178252	Road Match	0m
BAKERS-BREAD	Towner, S. E., Pacific Highway., Woolgoolga	177975	Road Match	0m

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
CAFES, TEA ROOMS & COFFEE LOUNGES, ETC.	Woolgoolga Service Station, Pacific Highway., Woolgoolga	177986	Road Match	0m
MOTOR GARAGES & ENGINEERS	Woolgoolga Service Station, Pacific Highway., Woolgoolga	178253	Road Match	0m

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1950 Historical Business Directory Records

Bark Hut Road, Woolgoolga, NSW 2456



Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

1950 Business Directory Records Premise or Road Intersection Matches

Records from the 1950 UBD Business Directory, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Feature Point	Direction
NA	No records in buffer				

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

1950 Business Directory Records Road or Area Matches

Records from the 1950 UBD Business Directory, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Location Confidence	Distance to Road Corridor or Area
NA	No records in buffer			

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

Dry Cleaners, Motor Garages & Service Stations Premise or Road Intersection Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a premise or road intersection, within the dataset buffer:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Feature Point	Direction
NA	No records in buffer					

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Historical Business Directories

Bark Hut Road, Woolgoolga, NSW 2456

Dry Cleaners, Motor Garages & Service Stations Road or Area Matches

Dry Cleaners, Motor Garages & Service Stations from UBD Business Directories, mapped to a road or an area, within the dataset buffer. Records are mapped to the road when a building number is not supplied, cannot be found, or the road has been renumbered since the directory was published:

Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
MOTOR GARAGES /OR ENGINEERS &/OR SERVICE STATIONS.	BP Woolgoolga Roadhouse Pacific Highway, Woolgoolga.,	98392	1982	Road Match	0m
MOTOR GARAGES & ENGINEERS	BP Woolgoolga Service Station, Pacific Hghwy., Woolgoolga	616457	1970	Road Match	0m
MOTOR GARAGES & ENGINEERS	Clouten's, H., Golden Fleece Service Station, Pacific Highway., Woolgoolga	178249	1961	Road Match	0m
MOTOR SERVICE STATIONS- PETROL, OILS, ETC.	Golden Fleece Service Station & Restaurant, Pacific Hghwy., Woolgoolga	616464	1970	Road Match	0m
MOTOR GARAGES & ENGINEERS	Greentrees Motors, Pacific Highway., Woolgoolga	178250	1961	Road Match	0m
MOTOR SERVICE STATIONS	Greentrees Motors, Pacific Highway., Woolgoolga	178258	1961	Road Match	0m
MOTOR GARAGES & ENGINEERS	Ratcliffe, L., Pacific Hghwy., Woolgoolga	616459	1970	Road Match	0m
MOTOR SERVICE STATIONS	Sun Coast Service Station, Pacific Highway., Mullaway, via Woolgoolga	178259	1961	Road Match	0m
MOTOR GARAGES & ENGINEERS	Sykes, A. F., Pacific Highway., Woolgoolga	178252	1961	Road Match	0m
MOTOR GARAGES & ENGINEERS	Woolgoolga Service Station, Pacific Highway., Woolgoolga	178253	1961	Road Match	0m

Business Directory Content Derived from Universal Business Directories (UBD) - Licensed from Hardie Grant

Cattle Dips

Bark Hut Road, Woolgoolga, NSW 2456

Cattle Dips of the Northern Rivers Region

Cattle dip sites within the dataset buffer:

Dip Name	Road	Town	Dip Status	Licence / Lease Status	Licence / Lease Expiry Date	Distance	Direction
N/A	No records in buffer						

Cattle dip site data provided by the NSW Department of Primary Industries.

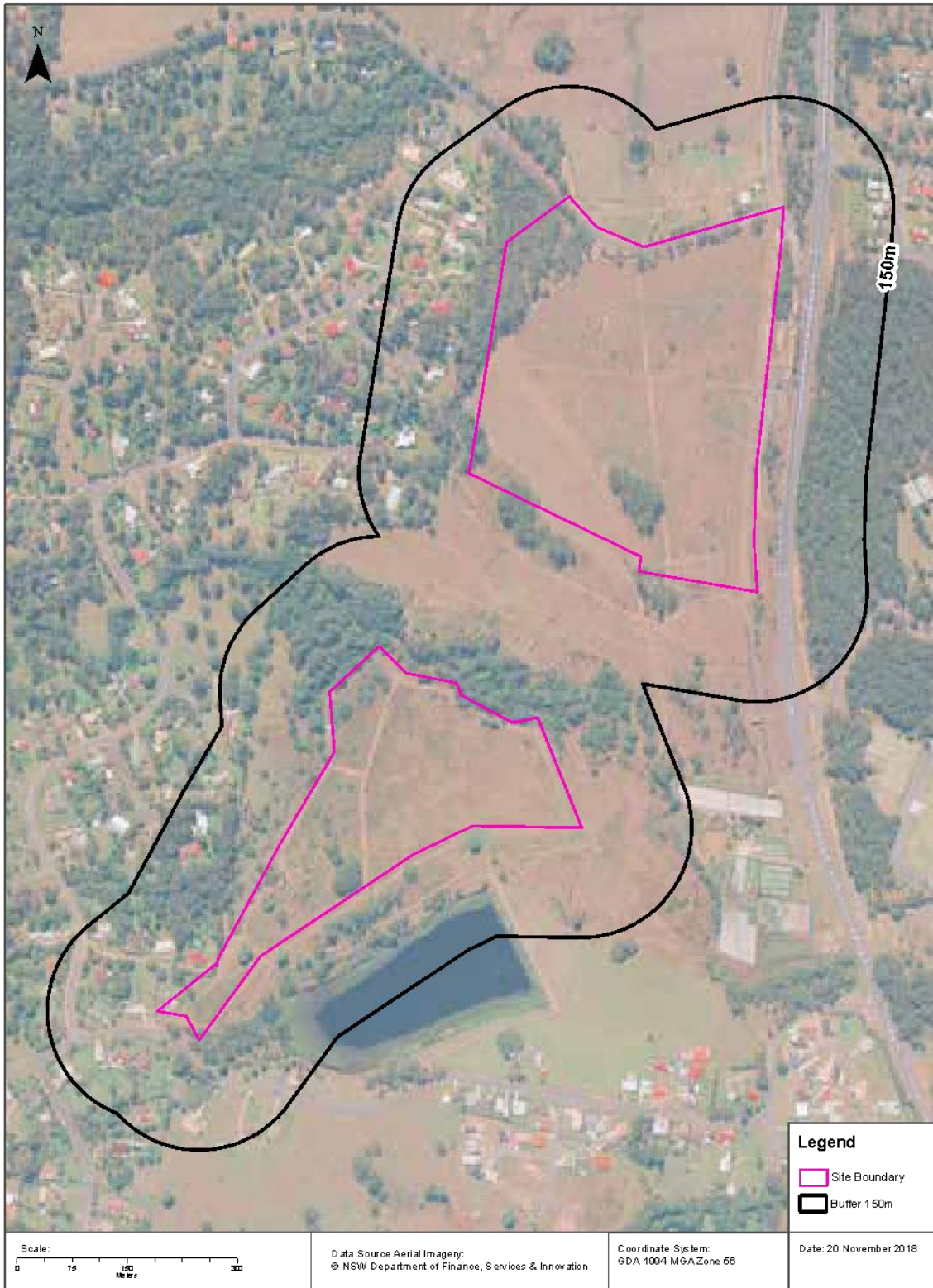
Aerial Imagery 2011

Bark Hut Road, Woolgoolga, NSW 2456



Aerial Imagery 2001

Bark Hut Road, Woolgoolga, NSW 2456

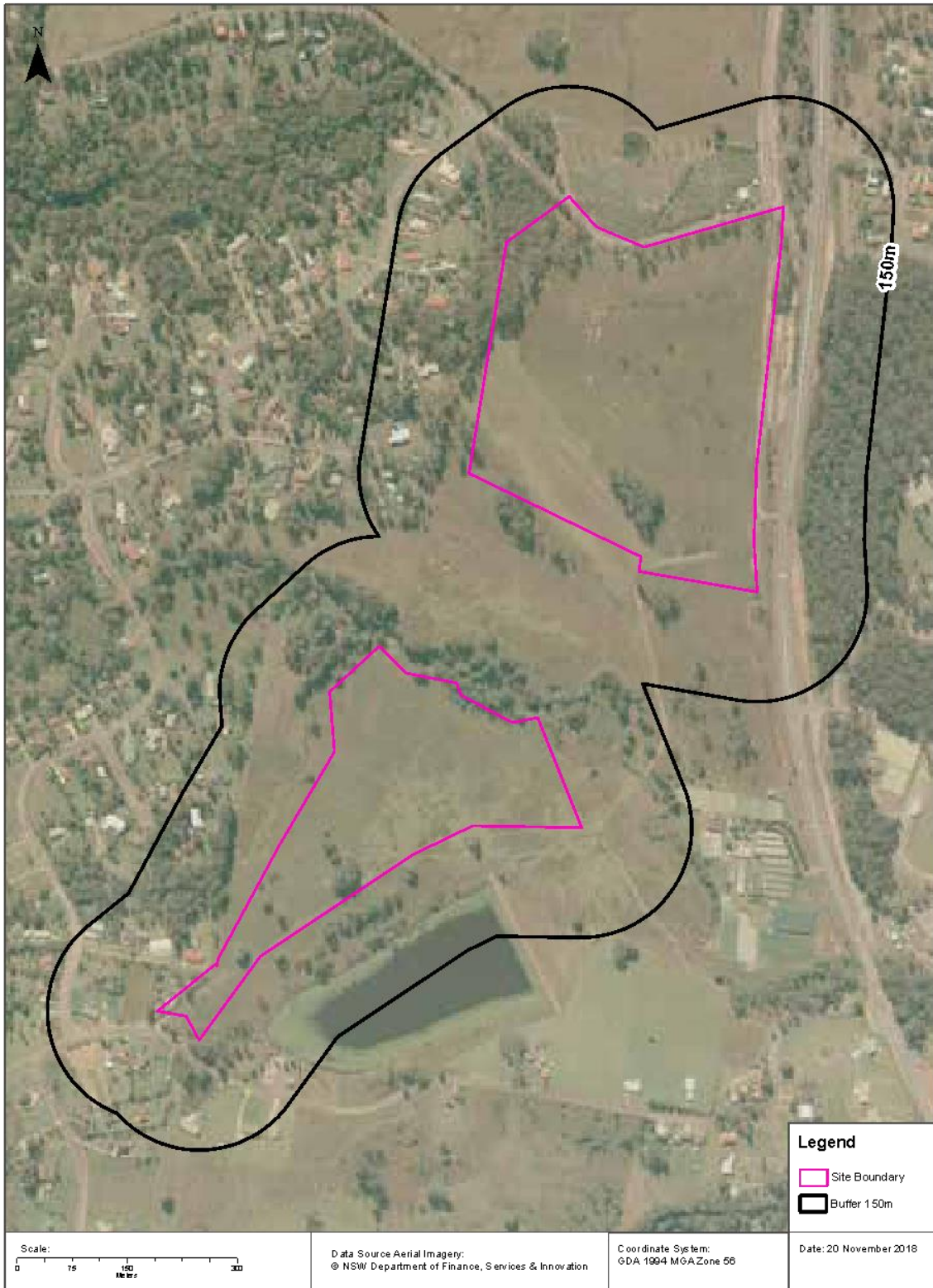


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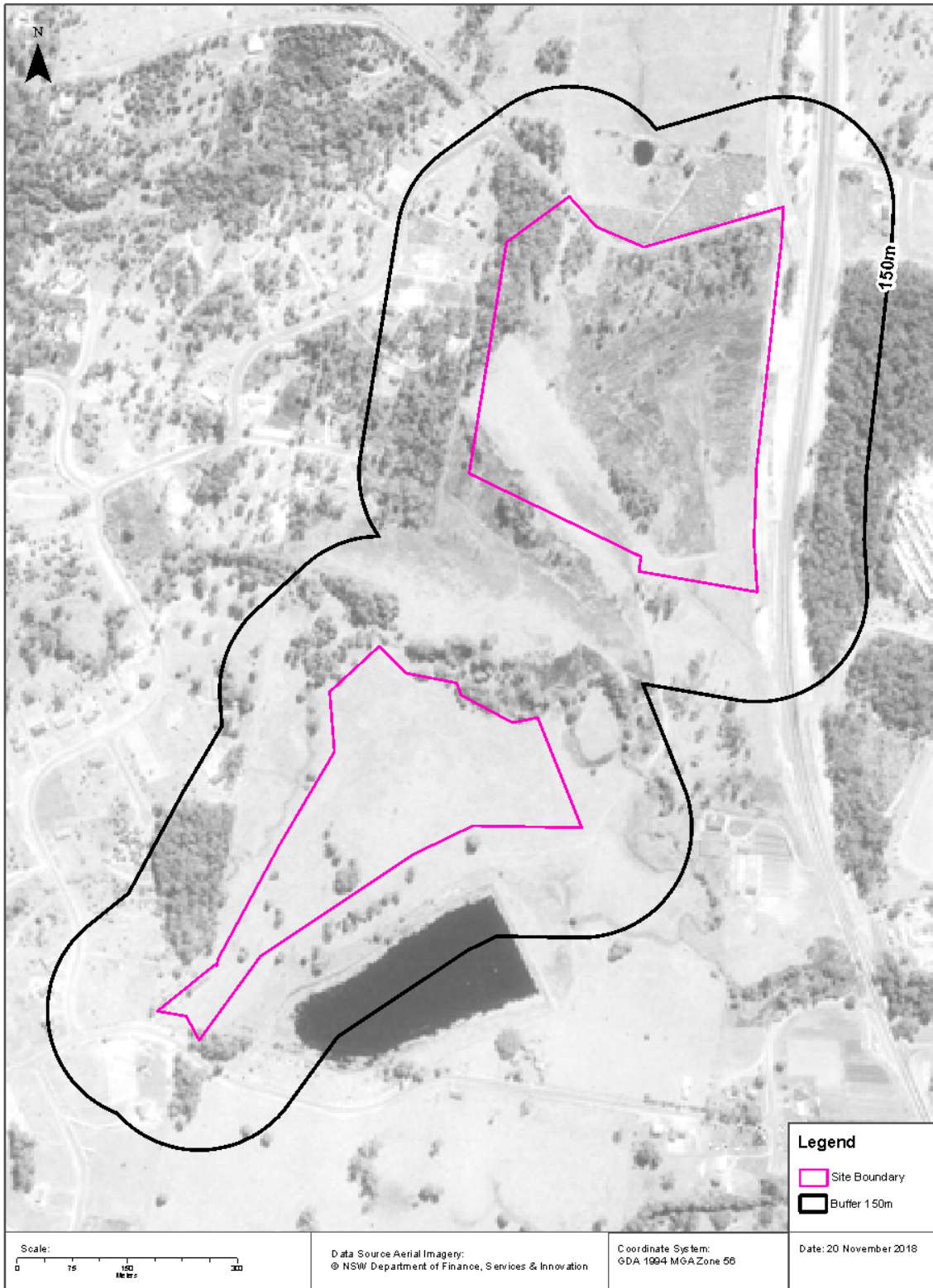
Aerial Imagery 1994

Bark Hut Road, Woolgoolga, NSW 2456



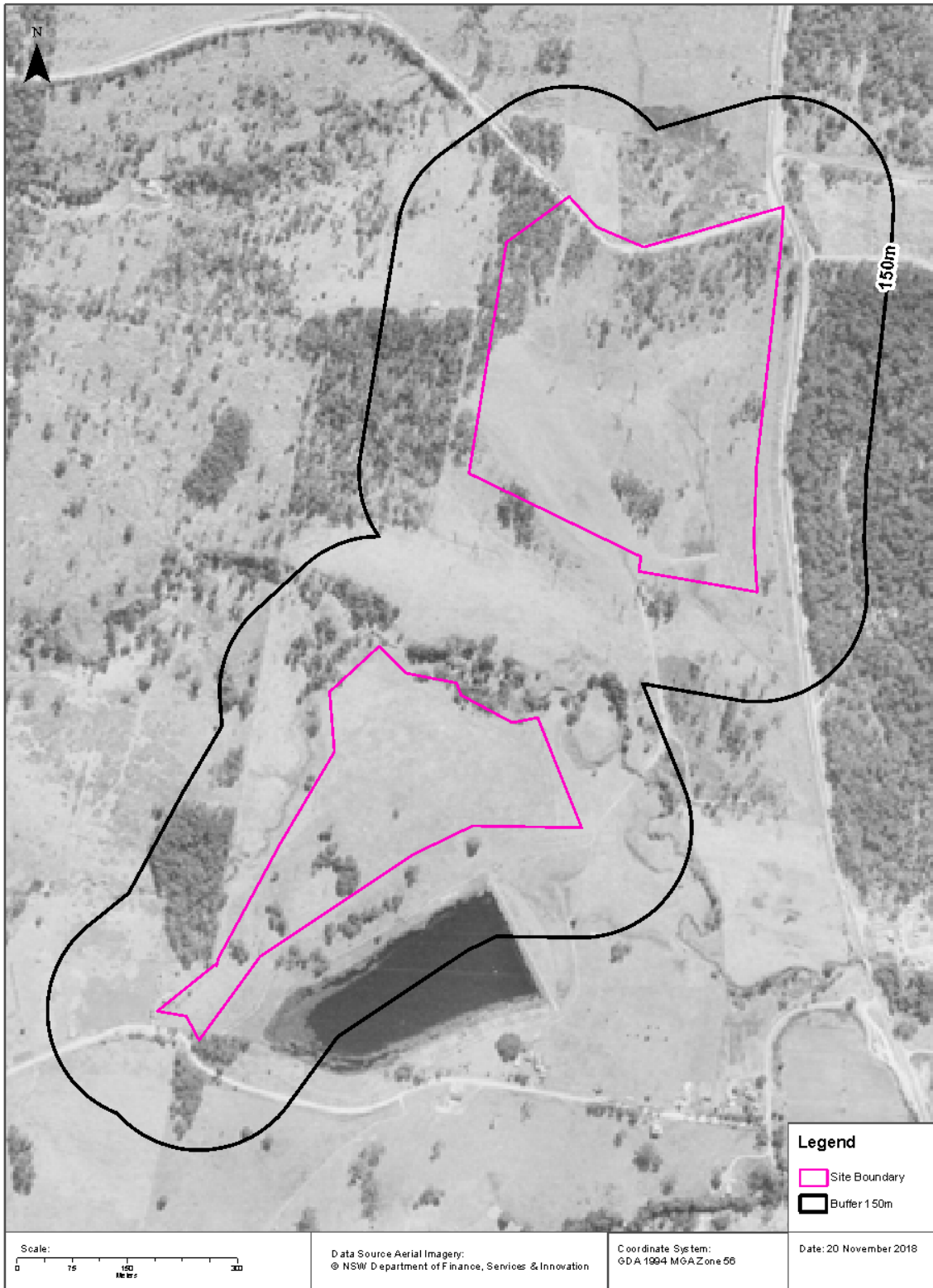
Aerial Imagery 1984

Bark Hut Road, Woolgoolga, NSW 2456



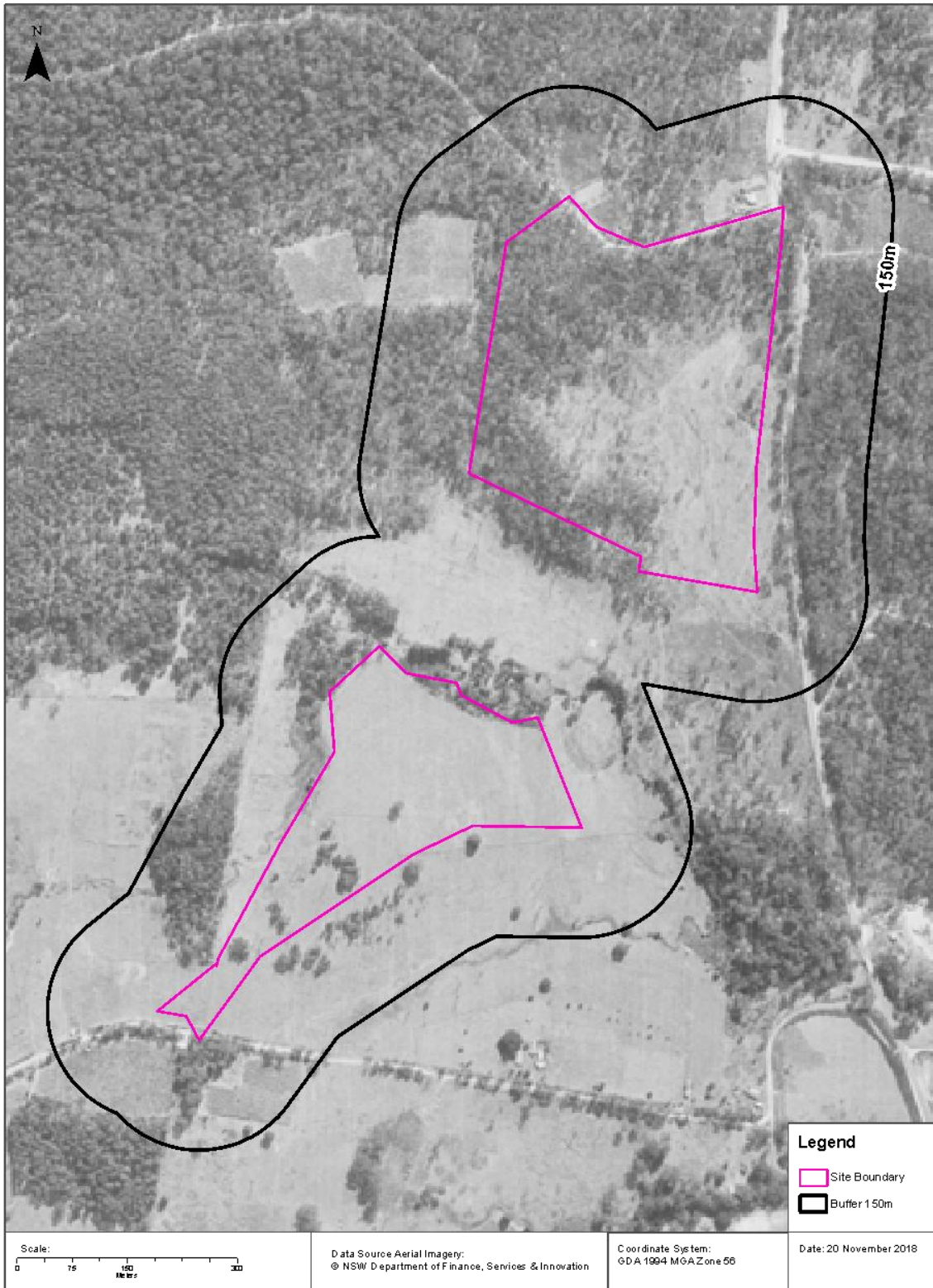
Aerial Imagery 1974

Bark Hut Road, Woolgoolga, NSW 2456



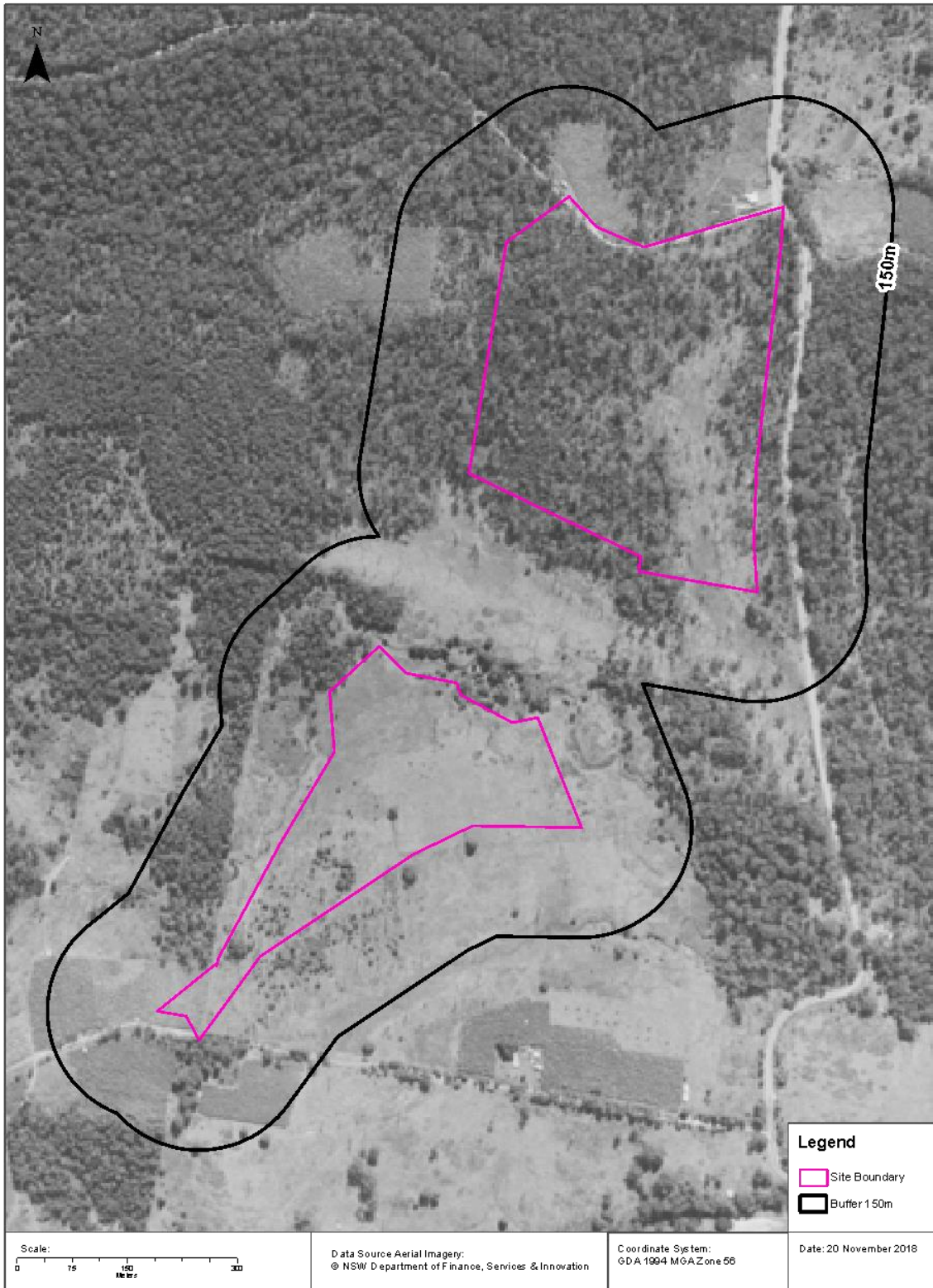
Aerial Imagery 1964

Bark Hut Road, Woolgoolga, NSW 2456



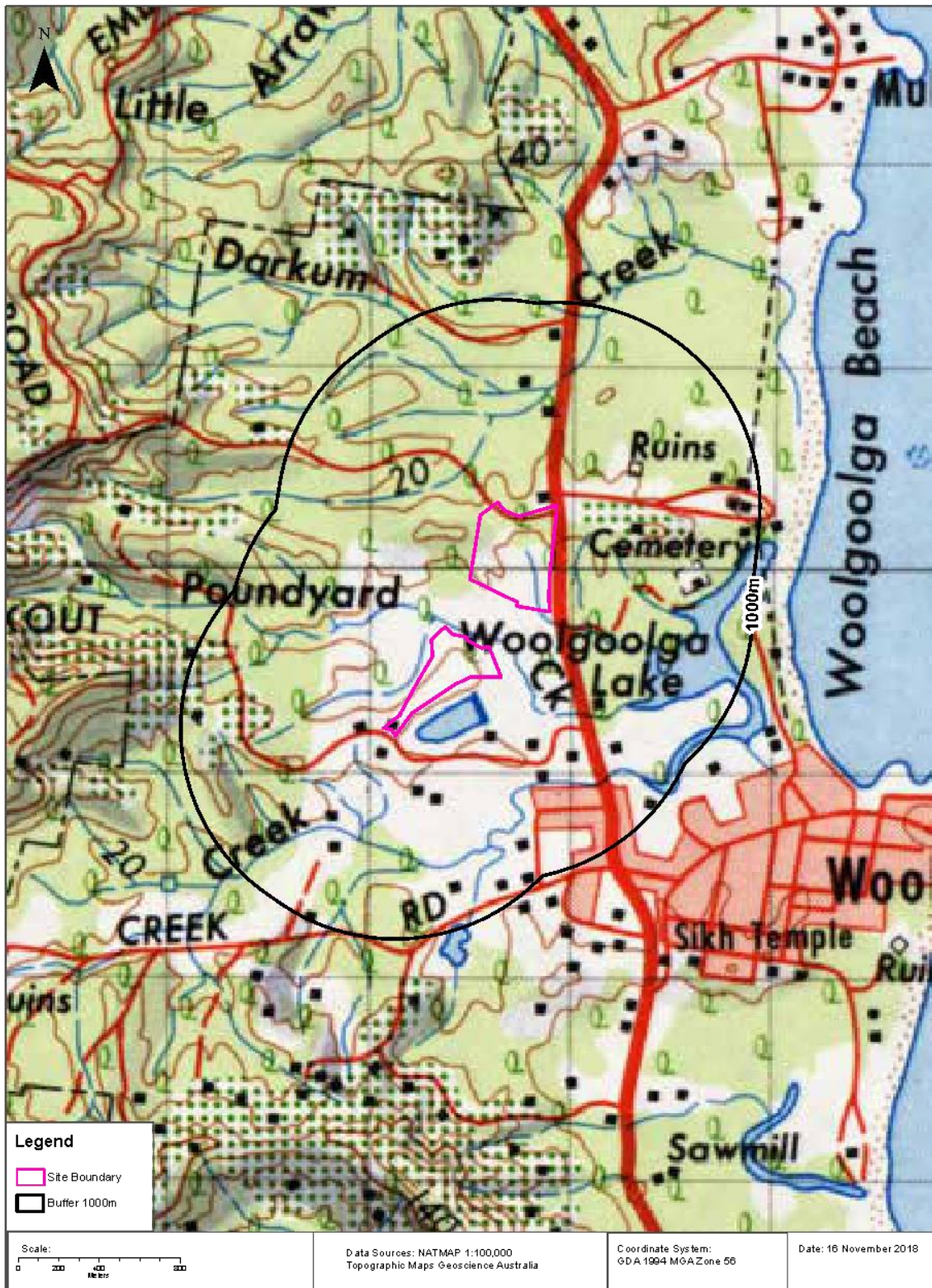
Aerial Imagery 1956

Bark Hut Road, Woolgoolga, NSW 2456



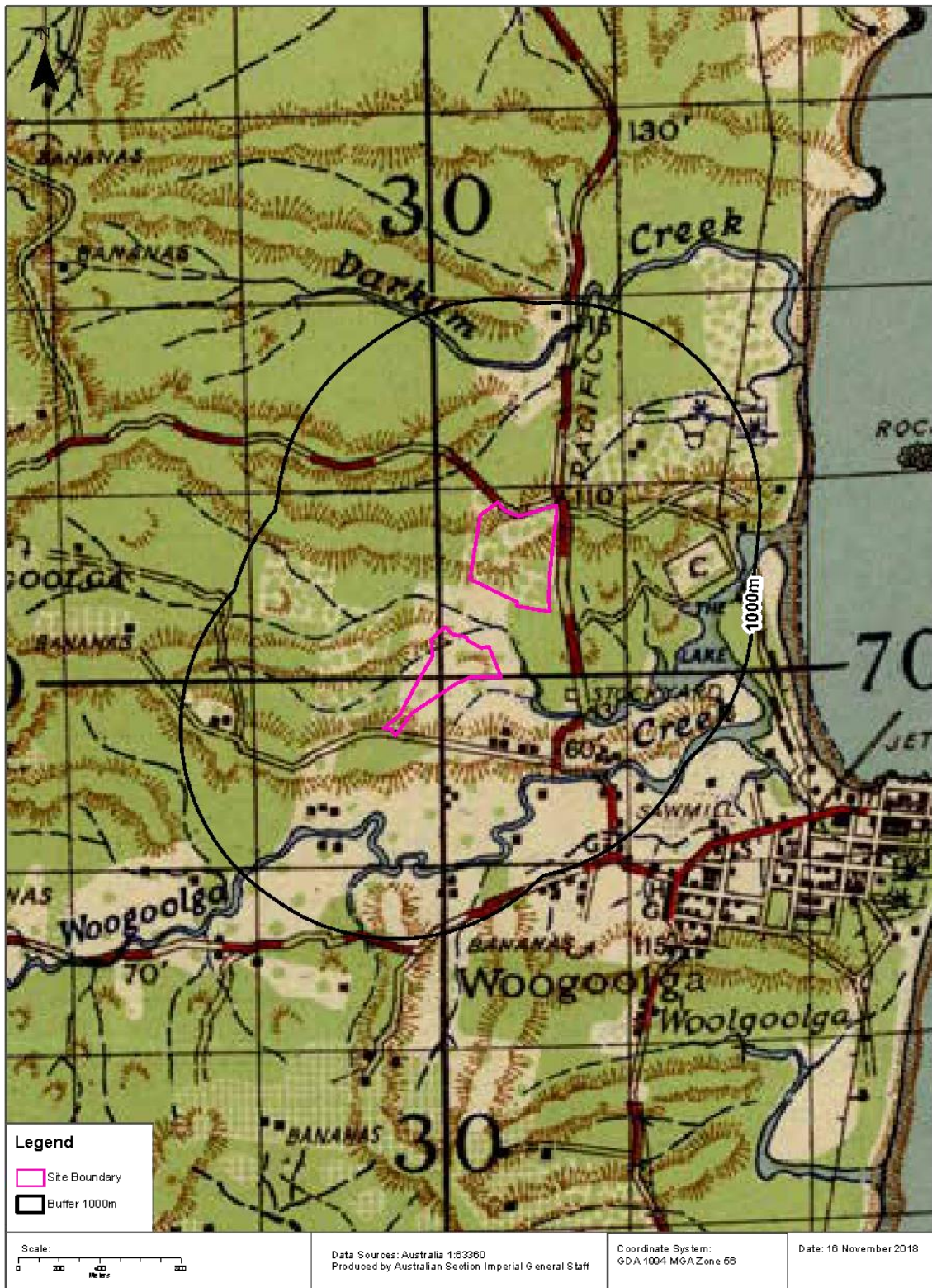
Historical Map 1974

Bark Hut Road, Woolgoolga, NSW 2456



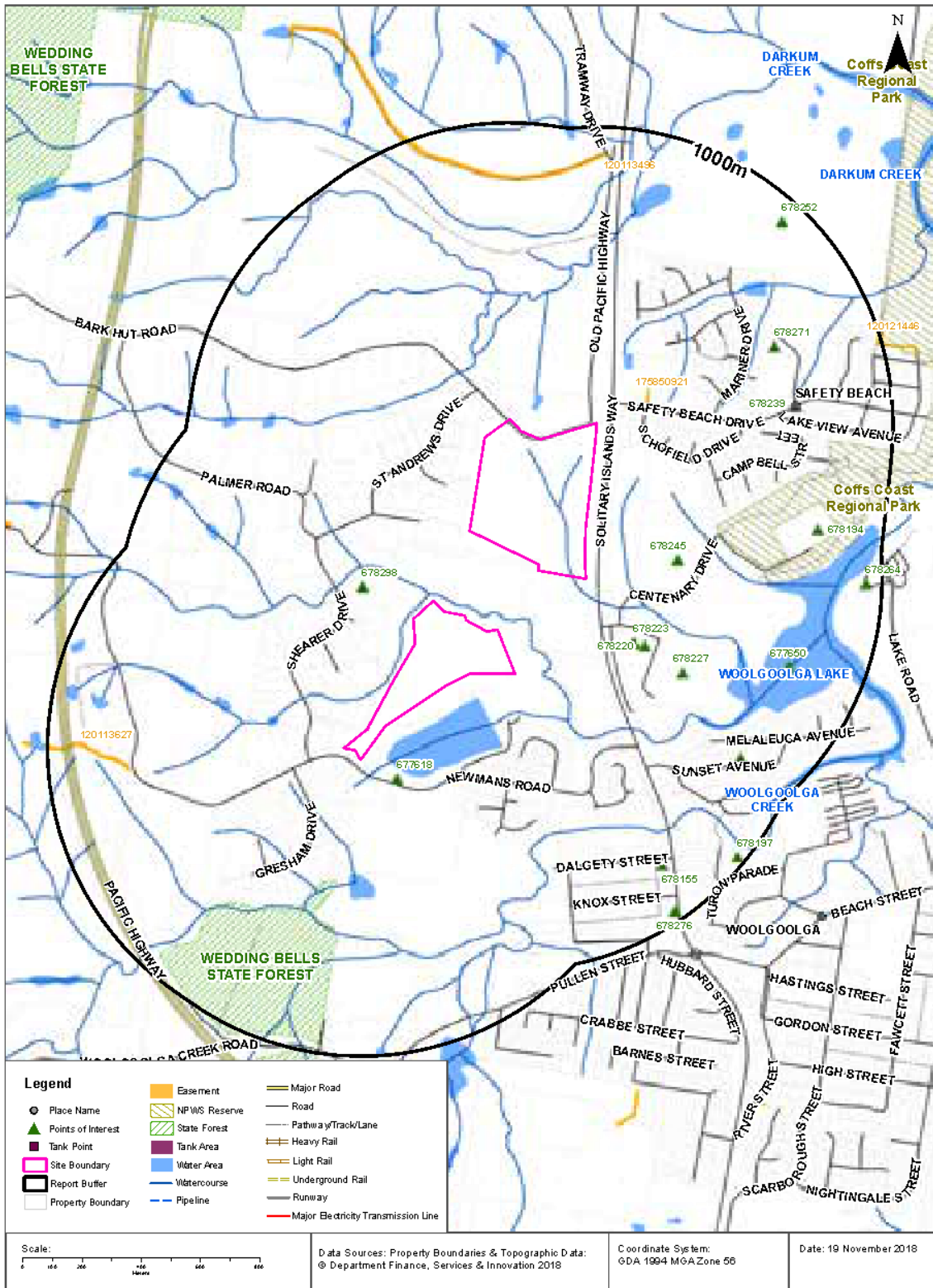
Historical Map 1942

Bark Hut Road, Woolgoolga, NSW 2456



Topographic Features

Bark Hut Road, Woolgoolga, NSW 2456



Topographic Features

Bark Hut Road, Woolgoolga, NSW 2456

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
677618	Firestation - Bush	COUNTRY CLUB RFB	137m	South West
678298	Park	Park	204m	West
678223	Sports Court	TENNIS COURTS	270m	South East
678220	Sports Court	TENNIS COURTS	301m	South East
678245	High School	WOOLGOOLGA HIGH SCHOOL	313m	East
678227	Sports Field	WOOLGOOLGA SPORTSGROUND	455m	South East
678271	Club	WOOLGOOLGA DIGGERS GOLF CLUB	654m	North East
678239	Town	SAFETY BEACH	676m	North East
677650	Natural Waterbody	WOOLGOOLGA LAKE	746m	East
678194	Cemetery	WOOLGOOLGA CEMETERY	780m	East
678196	Park	Park	799m	South East
678155	Fire Station	WOOLGOOLGA FIRE STATION	813m	South East
678252	Golf Course	Golf Course	925m	North East
678264	Picnic Area	Picnic Area	945m	East
678276	Roadside Rest Area	REST AREA	965m	South East
678197	Park	Park	971m	South East

Topographic Data Source: © Land and Property Information (2015)

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Topographic Features

Bark Hut Road, Woolgoolga, NSW 2456

Tanks (Areas)

What are the Tank Areas located within the dataset buffer?

Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
	No records in buffer					

Tanks (Points)

What are the Tank Points located within the dataset buffer?

Note. The large majority of tank features provided by LPI are derived from aerial imagery & are therefore primarily above ground tanks.

Map Id	Tank Type	Status	Name	Feature Currency	Distance	Direction
	No records in buffer					

Tanks Data Source: © Land and Property Information (2015)

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Major Easements

What Major Easements exist within the dataset buffer?

Note. Easements provided by LPI are not at the detail of local governments. They are limited to major easements such as Right of Carriageway, Electrical Lines (66kVa etc.), Easement to drain water & Significant subterranean pipelines (gas, water etc.).

Map Id	Easement Class	Easement Type	Easement Width	Distance	Direction
175850921	Primary	Right of way	4 & 6 m	182m	North East
120113627	Primary	Undefined		724m	South West
120113496	Primary	Undefined		806m	North
120121446	Primary	Undefined		987m	North East

Easements Data Source: © Land and Property Information (2015)

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Topographic Features

Bark Hut Road, Woolgoolga, NSW 2456

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
360	WEDDING BELLS	417m	South West
360	WEDDING BELLS	985m	South

State Forest Data Source: © Land and Property Information (2015)
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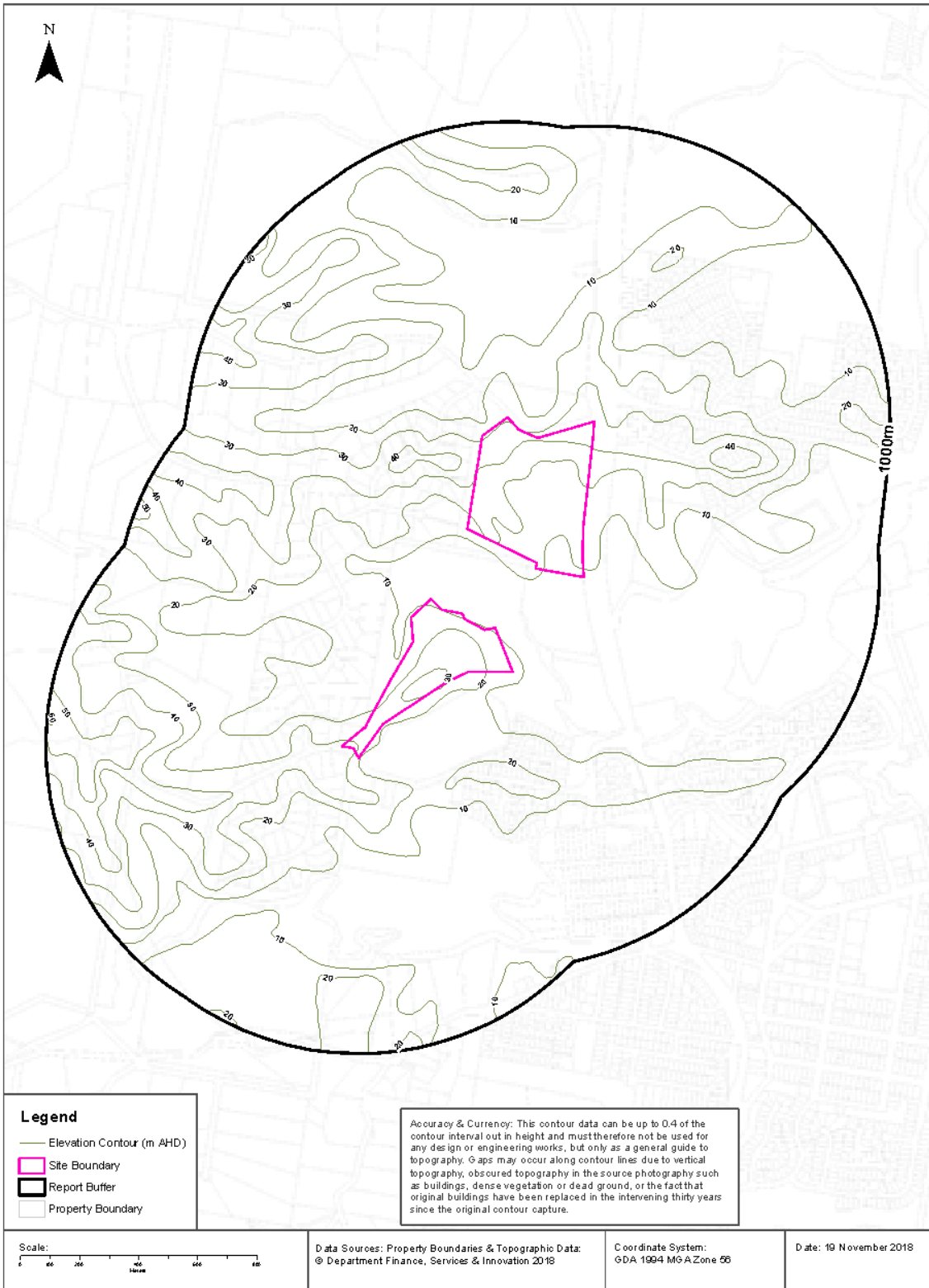
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N1002	REGIONAL PARK	Coffs Coast Regional Park	03/10/2003	437m	South

NPWS Data Source: © Land and Property Information (2015)
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Elevation Contours (m AHD)
 Bark Hut Road, Woolgoolga, NSW 2456



Hydrogeology & Groundwater

Bark Hut Road, Woolgoolga, NSW 2456

Hydrogeology

Description of aquifers on-site:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity

Description of aquifers within the dataset buffer:

Description
Fractured or fissured, extensive aquifers of low to moderate productivity
Porous, extensive highly productive aquifers

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)
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Botany Groundwater Management Zones

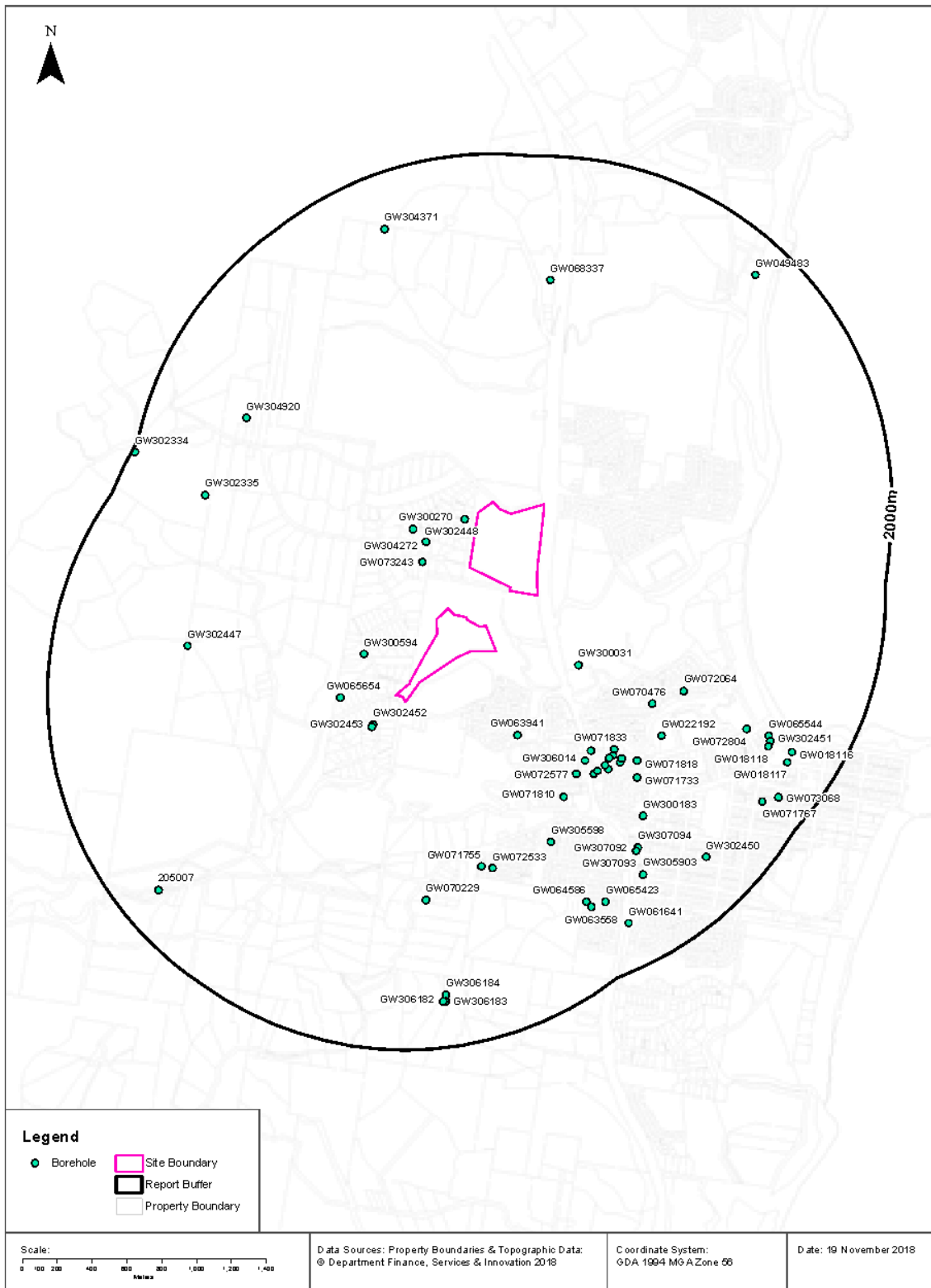
Groundwater management zones relating to the Botany Sand Beds aquifer within the dataset buffer:

Management Zone No.	Restriction	Distance	Direction
N/A	No records in buffer		

Botany Groundwater Management Zones Data Source : NSW Department of Primary Industries

Groundwater Boreholes

Bark Hut Road, Woolgoolga, NSW 2456



Hydrogeology & Groundwater

Bark Hut Road, Woolgoolga, NSW 2456

Groundwater Boreholes

Boreholes within the dataset buffer:

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW302 448	30BL150 739	Bore		Domestic	Domestic		01/12/1992	42.00	42.00					67m	North
GW302 452	30BL176 330	Bore		Domestic	Domestic, Stock		09/11/1994	61.00	61.00					213m	South West
GW302 453	30BL176 330	Bore		Domestic	Domestic, Stock		09/11/1994	120.00	120.00					228m	South West
GW304 272	30BL181 072	Bore	Private	Domestic	Domestic		22/08/2003	48.00	48.00	660	18.00	0.6940		269m	North West
GW073 243	30BL176 329	Bore	Private	Domestic	Domestic, Stock		10/11/1994	53.00	53.00	Good	10.00	0.6100		270m	West
GW300 594	30BL176 649	Bore		Domestic	Domestic, Stock		13/01/1995	38.00	38.00	Good	4.00	0.610		295m	South West
GW065 654	30BL138 480	Bore	Private	Domestic	Domestic		16/11/1988	40.00	40.00		9.00	0.100		316m	South West
GW300 270	30BL145 157	Bore	Private	Domestic	Domestic		21/06/1992	73.00	73.00	Good	9.00	0.189		355m	North West
GW300 031	30BL176 683, 30CA30 2702	Bore		Irrigation, Recreation (groundwater)	Domestic, Stock		07/11/1994	31.00	31.00	Good	4.00	2.590		465m	South East
GW063 941	30BL135 175	Bore	Private	Domestic	Domestic		01/09/1986	31.00	31.00					498m	South
GW306 015	30BL184 223	Well	Private	Monitoring Bore	Monitoring Bore		21/06/2006	7.00	7.00		1.00			792m	South East
GW306 014	30BL184 222	Well	Private	Monitoring Bore	Monitoring Bore		21/06/2006	8.00	8.00		5.70			811m	South East
GW072 577	30BL154 217	Bore	Private	Domestic	Domestic		20/02/1994	30.00	30.00	Good		1.020		843m	South East
GW071 833	30BL154 144	Bore	Private	Domestic	Domestic		15/02/1994	12.00	12.00	Good	6.00	0.610		883m	South East
GW071 423	30BL153 516	Bore	Private	Domestic	Domestic		06/12/1993	21.00	21.00	Good	5.00	0.730		896m	South East
GW305 289	30BL182 625	Bore		Domestic	Domestic		25/06/2004	18.00	18.00		3.00	0.180		901m	South East
GW306 013	30BL183 493	Well	Private	Monitoring Bore	Monitoring Bore		21/06/2006	8.00	8.00		3.40			902m	South East
GW305 388	30BL178 719	Bore	Private	Monitoring Bore	Monitoring Bore		12/10/2005							903m	South East
GW070 476	30BL150 984	Bore	Private	Domestic	Domestic		01/11/1992	54.00	54.00	1800	20.00	2.2730	10.00	906m	South East
GW070 088	30BL150 439, 30BL178 713	Bore	Private	Domestic, Irrigation, Stock	Domestic		12/08/1992	24.00	24.00	Good	9.00	1.263		908m	South East
GW071 810	30BL154 031, 30WA30 2699	Bore	Private	Domestic	Domestic		11/02/1994	15.00	15.00	Good	5.00	0.630		923m	South
GW303 191	30BL179 900	Bore	Private	Domestic	Domestic									936m	South East
GW071 773	30BL153 805	Bore	Private	Domestic	Domestic		14/02/1994	13.00	13.00	Good	6.00	0.610		950m	South East
GW071 424	30BL153 517	Bore	Private	Domestic	Domestic		03/12/1993	15.00	15.00	Good	3.00	1.230		958m	South East
GW072 064	30BL176 565	Bore	Private	Domestic	Domestic		18/12/1994	24.00	24.00	Good	9.00	1.265		1004m	South East

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW071 818	30BL154 087	Bore	Private	Domestic	Domestic		14/02/1994	13.00	13.00	Good	6.00	0.610		1026m	South East
GW071 755	30BL153 541	Bore	Private	Domestic	Domestic		02/12/1993	15.00	15.00	Good	4.00	1.600		1044m	South
GW022 192		Well	Private		Irrigation		01/07/1964	3.70	3.70	0-500 ppm				1069m	South East
GW072 533	30BL153 593	Bore	Private	Domestic	Domestic, Stock		06/12/1993	17.00	17.00		1.00	0.610		1081m	South
GW071 733	30BL153 165	Bore		Domestic	Domestic, Stock		22/02/1994	50.00	51.00	Good		0.480		1087m	South East
GW305 598	30BL181 603	Bore	Private	Domestic	Domestic		23/01/2006	24.00	24.00	610	5.70	1.516		1140m	South
GW070 229	30BL150 738	Bore	Private	Domestic	Domestic		05/10/1992	24.00	24.00	Good	6.00	0.578		1145m	South
GW302 447	30BL153 189	Bore		Domestic	Domestic		12/10/1993	72.00	72.00					1224m	West
GW300 183	30BL144 174	Bore	Private	Domestic	Domestic		25/08/1992	36.00	36.00	Good	9.00	0.758		1268m	South East
GW068 337	30BL140 234	Bore	Private	Domestic, Stock			08/11/1989	70.00	70.00		21.00	0.400		1287m	North
GW307 094		Bore	Private		Monitoring Bore	Beard - MW3	10/06/2011	5.60	5.60		2.50			1391m	South East
GW307 092		Bore	Private		Monitoring Bore	Beard - MW1	08/06/2011	6.50	6.50		2.60			1402m	South East
GW307 093		Bore	Private		Monitoring Bore	Beard - MW2	08/06/2011	5.50	5.50		2.40			1402m	South East
GW072 804	30BL155 387	Bore		Domestic	Domestic, Stock		31/08/1994	15.00	15.00	Good	3.00	0.490		1426m	South East
GW304 920	30BL180 125	Bore		Monitoring Bore	Monitoring Bore		17/06/2002	25.30	25.30					1437m	North West
GW302 335	30BL143 111	Bore		Domestic, Irrigation	Stock		26/06/1992	42.00	42.00	Good	12.00	0.505		1505m	West
GW064 586	30BL137 236	Bore	Private	Domestic, Stock	Domestic, Stock		01/01/1988	33.00	33.00	Good				1530m	South
GW305 903	30BL178 898	Bore	Private	Domestic	Domestic		01/02/2000	100.00			70.00	5.000		1537m	South East
GW065 544	30BL142 970, 30BL143 271	Bore	Private	Irrigation, Test Bore	Irrigation		29/04/1991	31.00	31.00		6.90	1.000		1555m	South East
GW063 558	30BL137 224	Bore	Private	Domestic, Stock	Domestic, Stock		01/01/1988	27.00	27.00	Good				1568m	South
GW065 423	30BL138 164	Bore	Private	Domestic	Domestic		05/08/1988	21.00	21.00	Good		2.000		1570m	South
GW302 451	30BL176 659	Bore		Domestic	Domestic, Stock		17/01/1995	18.00	18.00	Salty				1578m	South East
GW018 118	30BL011 858	Well	Local Govt	Waste Disposal	Not Known		01/12/1955	6.10	6.10					1587m	South East
GW304 371	30BL182 082	Bore	Private	Domestic	Domestic		09/09/2003	42.00	42.00	980	10.00	1.515		1685m	North
GW302 450	30BL176 044	Bore		Domestic	Domestic		15/09/1994	33.00	33.00	Good	9.00	0.100		1691m	South East
GW306 184	30BL183 892	Bore	Private	Domestic	Domestic		13/11/2005	54.00	54.00	520	18.00	0.316		1702m	South
GW018 116	30BL011 859	Well	Local Govt	Waste Disposal	Not Known		01/01/1961	7.30						1717m	South East
GW018 117	30BL011 860	Well	Local Govt	Waste Disposal	Not Known		01/01/1961	5.50	5.50					1728m	South East
GW306 182	30BL183 892	Bore	Private	Domestic	Domestic		11/11/2005	61.00	61.00					1737m	South
GW306 183	30BL183 892	Bore	Private	Domestic	Domestic		12/11/2005	85.00	85.00					1737m	South
GW061 641	30BL133 934	Bore	Private	Domestic	Domestic		01/10/1985	18.00	18.00					1738m	South East
GW071 767	30BL153 737	Bore	Private	Domestic	Domestic		20/02/1994	20.00	27.00					1755m	South East
205007					UNK								26.53	1764m	South West

GW No.	Licence No	Work Type	Owner Type	Authorised Purpose	Intended Purpose	Name	Complete Date	Final Depth (m)	Drilled Depth (m)	Salinity (mg/L)	SWL (m)	Yield (L/s)	Elev (AHD)	Dist	Dir
GW049 483	30BL109 572	Bore open thru rock	Private	Domestic, Stock	Domestic, Stock		01/07/1979	12.20	12.20					1792m	North East
GW073 068	30BL176 056	Bore	Private	Domestic	Domestic		20/09/1994	14.30	14.30	S.Salty	1.50	1.500		1807m	South East
GW302 334	30BL143 111	Bore		Domestic, Irrigation	Stock		25/06/1992	61.00	61.00	Good	27.00	0.1260		1980m	West

Borehole Data Source : NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corporation for all bores prefixed with GW. All other bores © Commonwealth of Australia (Bureau of Meteorology) 2015. Creative Commons 3.0 © Commonwealth of Australia <http://creativecommons.org/licenses/by/3.0/au/deed.en>

Hydrogeology & Groundwater

Bark Hut Road, Woolgoolga, NSW 2456

Driller's Logs

Drill log data relevant to the boreholes within the dataset buffer:

Groundwater No	Drillers Log	Distance	Direction
GW302448	0.00m-12.00m BROWN GREY WACKY SHALE 12.00m-42.00m GREY WACKY	67m	North
GW302452	0.00m-2.00m CLAY 2.00m-4.00m SHALE 4.00m-61.00m MOSTLY BASALT	213m	South West
GW302453	0.00m-3.00m CLAY 3.00m-6.00m SHALE 6.00m-120.00m MOSTLY BASALT	228m	South West
GW304272	0.00m-0.30m BROWN TOPSOIL 0.30m-1.00m BROWN CLAY 1.00m-6.00m BROWN SHALE 6.00m-9.00m BROWN SHALE 9.00m-24.00m BASALT 24.00m-29.00m CRACKY BASALT (WB) 29.00m-42.00m BASALT 42.00m-46.00m CRACKY BASALT (WB) 46.00m-48.00m BASALT	269m	North West
GW073243	0.00m-12.00m Shale 12.00m-16.00m Broken Shale 16.00m-48.00m Mostly Basalt 48.00m-51.00m Broken Shale 51.00m-53.00m Basalt	270m	West
GW300594	0.00m-3.00m CLAY 3.00m-8.00m SHALE 8.00m-34.00m BASALT 34.00m-35.00m BROKEN BASALT 35.00m-38.00m BASALT	295m	South West
GW065654	0.00m-2.00m TOPSOIL 2.00m-5.00m HARD RED CLAY 5.00m-9.00m SHALE 9.00m-20.00m BASALT 20.00m-24.00m SHATTERED BASALT 24.00m-28.00m BASALT 28.00m-29.00m SHALE BLACK 29.00m-40.00m BASALT	316m	South West
GW300270	0.00m-6.00m BROWN SHALE 6.00m-31.00m BASALT 31.00m-36.00m CRACKY BASALT 36.00m-73.00m BASALT	355m	North West
GW300031	0.00m-6.00m Clay 6.00m-12.00m Shale Soft 12.00m-21.00m Shale Hard 21.00m-24.00m Shale - broken 24.00m-31.00m Basalt	465m	South East
GW063941	0.00m-2.00m Soil 2.00m-22.00m Shale Water Supply 22.00m-24.00m Coal Shale 24.00m-29.00m Basalt Broken Rock Water Supply 29.00m-31.00m Basalt	498m	South
GW072577	0.00m-13.00m Colored Clays 13.00m-18.00m Grey Shale 18.00m-30.00m Black Shale	843m	South East
GW071833	0.00m-6.00m Dry Clay 6.00m-8.00m Wet Black Clay	883m	South East

Groundwater No	Drillers Log	Distance	Direction
GW071423	14.00m-18.00m Gravel/clay 18.00m-20.00m Soft Shale	896m	South East
GW305288	0.00m-1.20m soil 1.20m-9.00m clay 9.00m-18.00m dec shale	901m	South East
GW070476	0.00m-0.30m Topsoil 0.30m-4.00m Clay - brown 4.00m-12.00m Shale - brown 12.00m-30.00m Shale - black 30.00m-49.00m Slate - black hard 49.00m-54.00m Slate - black & reef quartz 54.00m-54.00m Slate - black	906m	South East
GW070088	0.00m-1.00m SHALE FILL 1.00m-1.30m BLACK SOIL 1.30m-5.00m BROWN CLAY 5.00m-6.00m GREY CLAY 6.00m-12.00m SOFT BROWN SHALE 12.00m-12.30m CEMENTED WASHED GRAVELS 12.30m-18.00m SOFT BROWN SHALE 18.00m-20.00m HARD " " 20.00m-24.00m FRACTURED HARD BROWN SHALE	908m	South East
GW071810	0.00m-12.00m Colored Clays 12.00m-15.00m Broken Shale	923m	South
GW071773	0.00m-8.00m Dry Clay 8.00m-10.00m Swamp Black Clay 10.00m-13.00m Gravel	950m	South East
GW071424	8.00m-15.00m Gravel & Some Shale	958m	South East
GW072064	0.00m-0.30m Black Topsoil 0.30m-0.90m Clay Fill 0.90m-6.00m Brown Clay 6.00m-12.00m Grey Clay 12.00m-19.00m Grey Shale 19.00m-24.00m Broken Grey Shale	1004m	South East
GW071818	0.00m-6.00m Dry Clay 6.00m-10.00m Wet Black Clay	1026m	South East
GW071755	2.00m-10.00m Soft Shale 12.00m-15.00m Broken Rock/basalt	1044m	South
GW022192	0.00m-0.61m Loam 0.61m-3.66m Gravel Creek Water Supply	1069m	South East
GW072533	0.00m-2.00m Clay 2.00m-8.00m Shale 8.00m-14.00m Basalt 14.00m-16.00m Broken Rock/basalt 16.00m-17.00m Basalt	1081m	South
GW071733	0.00m-6.00m CLAY 6.00m-12.00m BLACK SHALE 12.00m-16.00m GRAVEL/SHALE 16.00m-51.00m BASSALT	1087m	South East
GW305598	0.00m-0.60m shale, fill 0.60m-2.00m clay, brown pug 2.00m-4.50m shale, brown 4.50m-5.00m basalt 5.00m-19.00m basalt 19.00m-23.00m basalt, broken 23.00m-24.00m basalt	1140m	South
GW070229	0.00m-0.30m Black Topsoil 0.30m-6.00m Red Clay 19.00m-24.00m Cracky Basalt	1145m	South
GW302447	0.00m-8.00m SOFT BROWN SHALE 8.00m-36.00m BASALT 36.00m-72.00m BLACK PRESSURED SHALE	1224m	West
GW300183	0.00m-0.30m BLACK TOPSOIL 0.30m-2.30m BROWN CLAY 2.30m-18.00m BROWN SHALE 18.00m-30.00m BROWN SHALE 30.00m-31.00m BASALT 31.00m-36.00m BROKEN BASALT	1268m	South East

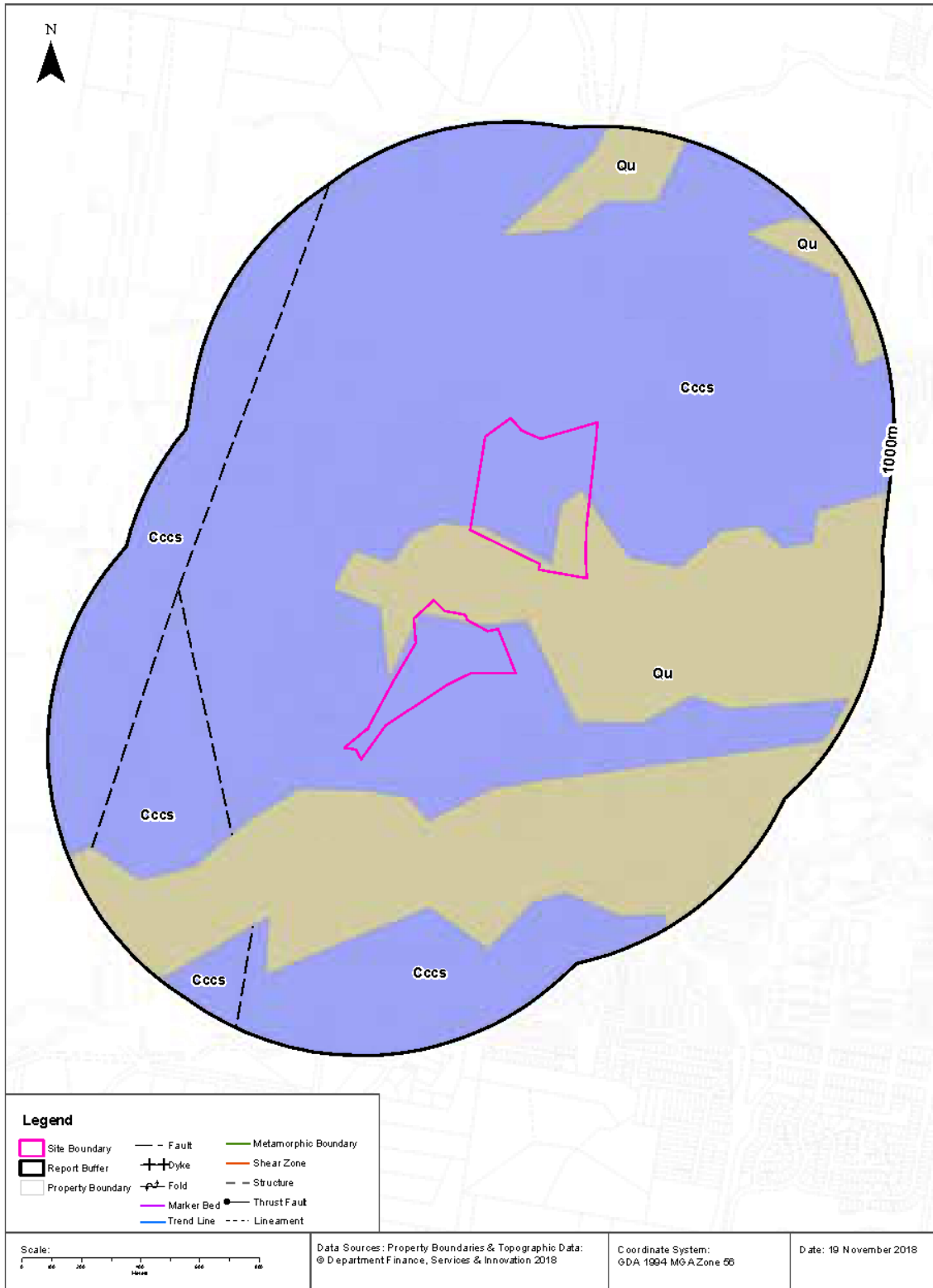
Groundwater No	Drillers Log	Distance	Direction
GW068337	0.00m-2.00m Fill 2.00m-13.00m Clay 13.00m-21.00m Soft Shale 21.00m-24.00m Hard Shale 24.00m-58.00m Basalt 58.00m-61.00m Quartz Seams 61.00m-70.00m Basalt	1287m	North
GW307094	0.00m-0.20m Fill; Concrete 0.20m-1.50m Silty Clay; high plasticity, red-brown, stiff, slightly moist 1.50m-2.50m Clay, Gravelly; medium plasticity, light brown, hard, slightly moist 2.50m-3.00m Silty Clay; high plasticity, light brown, hard, slightly moist 3.00m-5.60m Clay, Gravelly; medium plasticity, light brown, hard, slightly moist, wet @ 5.5m	1391m	South East
GW307092	0.00m-0.20m Fill; c concrete 0.20m-0.50m Fill; Gravelly Sandy Clay; low plasticity, green grey, firm, slightly moist 0.50m-6.50m Silty Clay; high plasticity, orange-grey with mottled red, very stiff, slightly moist, frequent localised gravels/subang	1402m	South East
GW307093	0.00m-0.20m Fill; Concrete 0.20m-5.50m Silty Clay; high plasticity, red-brown, very stiff, slightly moist, gravels frequent from 1.3m, light brown, subangular	1402m	South East
GW072804	0.00m-6.00m Sand 6.00m-13.00m Sand & Loam 13.00m-15.00m Shale interbedded with gravel	1426m	South East
GW304920	0.00m-1.80m clay silty, high plasticity 1.80m-7.80m lithic sandstone 7.80m-22.00m Argillite	1437m	North West
GW302335	0.00m-6.00m BROWN SHALE 6.00m-34.00m BASALT 34.00m-39.00m CRACKY BASALT 39.00m-42.00m BASALT	1505m	West
GW064586	0.00m-8.00m Shale Soft 8.00m-12.00m Shale 12.00m-22.00m Basalt 22.00m-24.00m Basalt Broken Water Supply 24.00m-28.00m Basalt 28.00m-31.00m Basalt Broken Water Supply 31.00m-33.00m Basalt	1530m	South
GW065544	0.00m-2.00m WHITE SAND 2.00m-4.00m BROWN SAND 4.00m-6.00m COFFEE ROCK 6.00m-8.00m BROWN SAND 8.00m-11.00m CLAY 11.00m-12.00m BLUE SHALE 12.00m-16.00m FRACTURED SHALE 16.00m-18.00m BROWN SHALE 18.00m-31.00m BASALT	1555m	South East
GW063558	0.00m-4.00m Clay 4.00m-10.00m Shale 10.00m-19.00m Basalt 19.00m-20.00m Basalt Broken Water Supply 20.00m-22.00m Basalt 22.00m-25.00m Basalt Broken Water Supply, Rock Broken 25.00m-27.00m Basalt	1568m	South
GW065423	0.00m-2.00m CLAY 2.00m-8.00m SOFT SHALE 8.00m-16.00m MID HARD SHALE 16.00m-21.00m BROKEN ROCK	1570m	South
GW302451	0.00m-2.00m TOP SAND 2.00m-8.00m COFFEE ROCK 8.00m-12.00m SAND 12.00m-13.00m BLACK CLAY 13.00m-15.00m GRAVEL & SALT WATER 15.00m-18.00m SHALE	1578m	South East
GW018118	0.00m-2.44m Sand 2.44m-3.05m Sandstone Black 3.05m-6.10m Sand	1587m	South East

Groundwater No	Drillers Log	Distance	Direction
GW304371	0.00m-3.00m CLAY/SHALE FILL 3.00m-12.00m BROWN SHALE HARD 18.00m-24.00m GREY SHALE VOLCANIC HARD 24.00m-29.00m CRACKY BASALT BLACK (WB) 29.00m-36.00m BLACK BASALT 36.00m-40.00m BROKEN BLACK BASALT (WB) 40.00m-42.00m BASALT BLACK	1685m	North
GW302450	0.00m-1.00m TOPSOIL 1.00m-10.00m BROWN CLAY 10.00m-12.00m FRACTURED META SEDIMENT 12.00m-33.00m SHALE	1691m	South East
GW306184	0.00m-12.00m Shale, yellow 12.00m-16.00m Shale, brown 16.00m-31.00m Basalt 31.00m-36.00m Basalt, cracky, water bearing 36.00m-54.00m Slate, black, hard, leafy	1702m	South
GW018117	0.00m-2.44m Sand 2.44m-3.05m Sandstone Black 3.05m-5.49m Sand Water Supply	1728m	South East
GW306182	0.00m-0.30m Topsoil 0.30m-2.00m Clay, yellow 2.00m-40.00m Basalt 40.00m-61.00m Slate, black, hard, leafy	1737m	South
GW306183	0.00m-0.50m Topsoil, grey 0.50m-3.00m Clay, yellow 3.00m-5.00m Shale, yellow 5.00m-42.00m Basalt 42.00m-65.00m Slate, black, hard, leafy	1737m	South
GW061641	0.00m-2.00m Fill 2.00m-5.00m Clay 5.00m-8.00m Shale 5.00m-8.00m Gravel Soil Hard 8.00m-16.00m Shale White Hard Soft Water Supply 16.00m-18.00m Shale	1738m	South East
GW071767	0.00m-6.00m Coloured Clay 6.00m-9.00m Weathered Shale 9.00m-27.00m Black Shale	1755m	South East
GW049483	0.00m-2.00m Soil Black 2.00m-6.70m Clay 6.70m-12.20m Quartzite Soak	1792m	North East
GW073068	0.00m-5.10m Sand 5.10m-7.60m Clay Blue 7.60m-10.60m Fractured Metasediment 10.60m-14.30m Shale And Quartz Large	1807m	South East
GW302334	0.00m-3.00m BROWN SHALE 3.00m-31.00m BASALT 31.00m-36.00m CRACKY BASALT 36.00m-61.00m BASALT	1980m	West

Drill Log Data Source: NSW Department of Primary Industries - Office of Water / Water Administration Ministerial Corp
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Geology 1:250,000

Bark Hut Road, Woolgoolga, NSW 2456



Geology

Bark Hut Road, Woolgoolga, NSW 2456

Geological Units

What are the Geological Units onsite?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Cccs	Lithofeldspathic wacke, minor siltstone, siliceous siltstone, mudstone, metabasalt, chert & jasper, rare calcareous siltstone & felsic volcanics 'Coffs Harbour Association' (Cc)	Coramba beds			Palaeozoic			1:250,000
Qu	Undifferentiated Quaternary sediments including: alluvial mud, silt, sand, gravel deposits, & swamp deposits; coastal sand beaches & dunes; estuarine deposits				Cainozoic			1:250,000

What are the Geological Units within the dataset buffer?

Symbol	Description	Unit Name	Group	Sub Group	Age	Dom Lith	Map Sheet	Dataset
Cccs	Lithofeldspathic wacke, minor siltstone, siliceous siltstone, mudstone, metabasalt, chert & jasper, rare calcareous siltstone & felsic volcanics 'Coffs Harbour Association' (Cc)	Coramba beds			Palaeozoic			1:250,000
Qu	Undifferentiated Quaternary sediments including: alluvial mud, silt, sand, gravel deposits, & swamp deposits; coastal sand beaches & dunes; estuarine deposits				Cainozoic			1:250,000

Geological Structures

What are the Geological Structures onsite?

Feature	Name	Description	Map Sheet	Dataset
No features				1:250,000

What are the Geological Structures within the dataset buffer?

Feature	Name	Description	Map Sheet	Dataset
Fault		Fault, Inferred	UNE	1:250,000
Fault		Fault, Inferred	UNE	1:250,000
Fault		Fault, Inferred	UNE	1:250,000
Fault		Fault, Inferred	UNE	1:250,000

Geological Data Source : NSW Department of Industry, Resources & Energy
 © State of New South Wales through the NSW Department of Industry, Resources & Energy

Naturally Occurring Asbestos Potential

Bark Hut Road, Woolgoolga, NSW 2456

Naturally Occurring Asbestos Potential

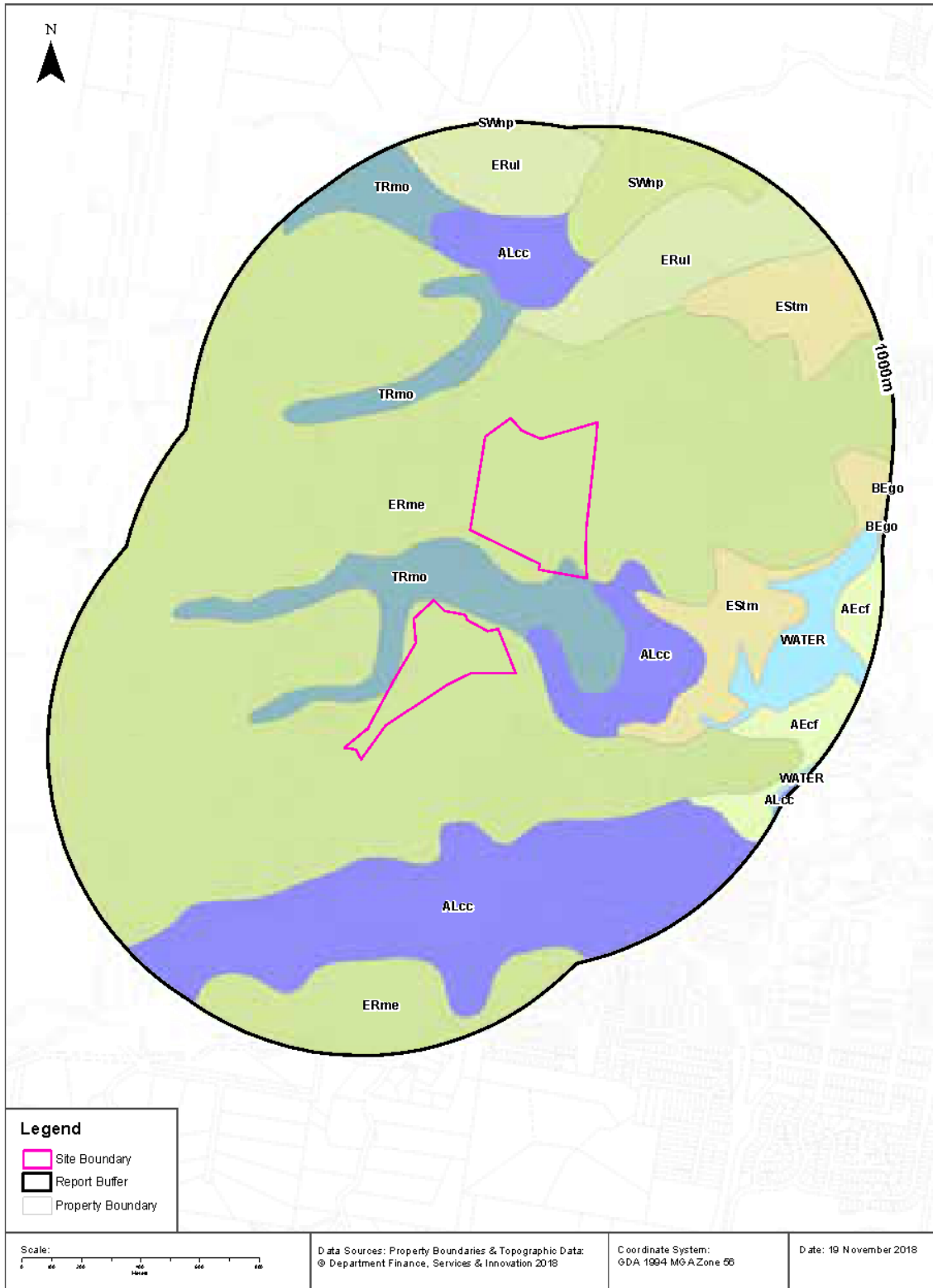
Naturally Occurring Asbestos Potential within the dataset buffer:

Potential	Sym	Strat Name	Group	Formation	Scale	Min Age	Max Age	Rock Type	Dom Lith	Description	Dist	Dir
No records in buffer												

Mining Subsidence District Data Source: © State of New South Wales through NSW Department of Industry, Resources & Energy

Soil Landscapes

Bark Hut Road, Woolgoolga, NSW 2456



Soils

Bark Hut Road, Woolgoolga, NSW 2456

Soil Landscapes

What are the onsite Soil Landscapes?

Soil Code	Name	Group	Process	Map Sheet	Scale
ERme	MEGAN		EROSIONAL	Coffs Harbour	1:100,000
TRmo	MOONEE		TRANSFERRAL	Coffs Harbour	1:100,000

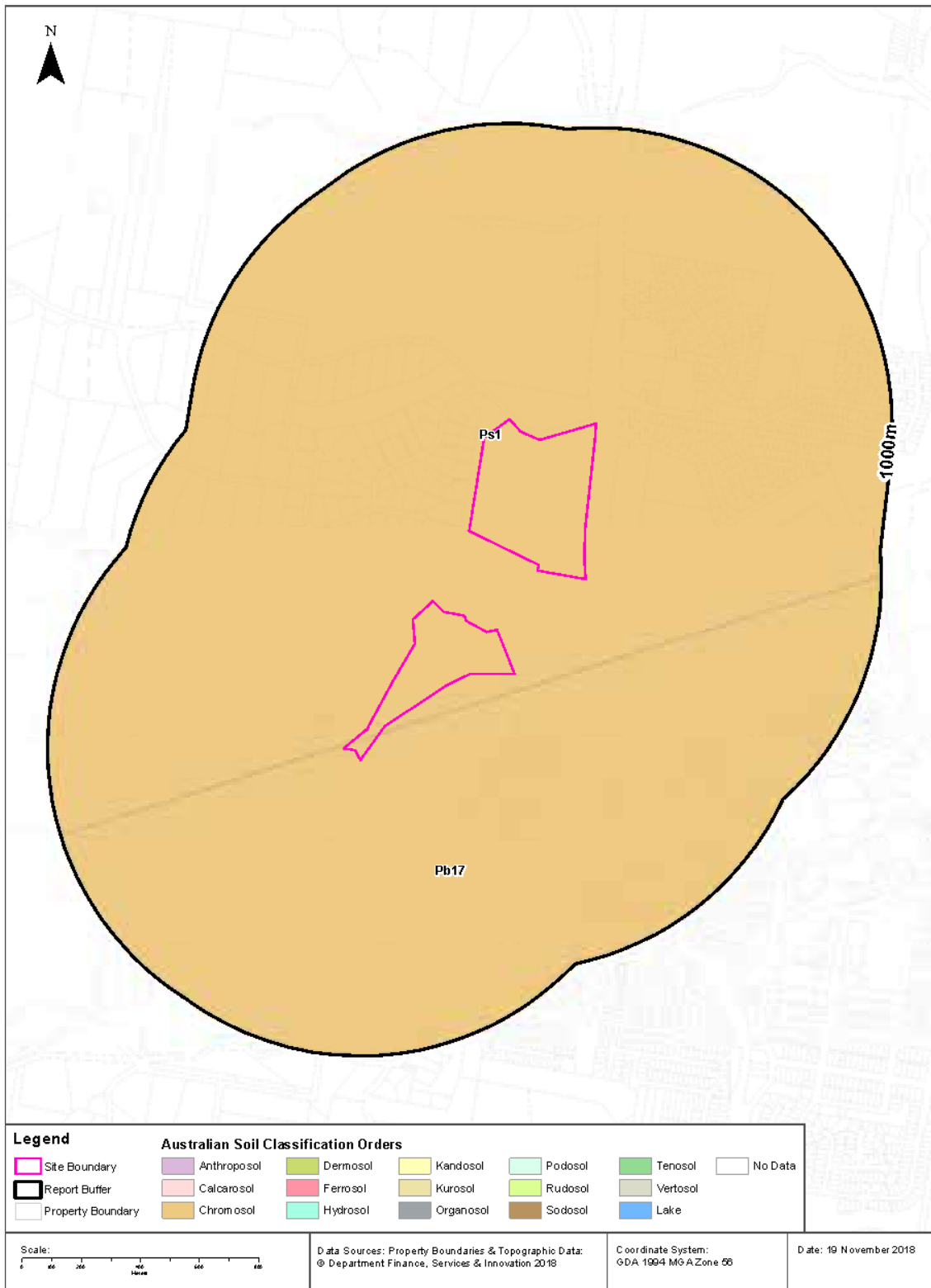
What are the Soil Landscapes within the dataset buffer?

Soil Code	Name	Group	Process	Map Sheet	Scale
AEcf	COFFS HARBOUR		AEOLIAN	Coffs Harbour	1:100,000
ALcc	COFFS CREEK		ALLUVIAL	Coffs Harbour	1:100,000
BEgo	GOOLAWAH		BEACH	Coffs Harbour	1:100,000
ERme	MEGAN		EROSIONAL	Coffs Harbour	1:100,000
ERul	ULONG		EROSIONAL	Coffs Harbour	1:100,000
EStrn	TOORMINA		ESTUARINE	Coffs Harbour	1:100,000
SWnp	NEWPORTS CREEK		SWAMP	Coffs Harbour	1:100,000
TRmo	MOONEE		TRANSFERRAL	Coffs Harbour	1:100,000
WATER	WATER		WATER	Coffs Harbour	1:100,000

Soils Landscapes Data Source : NSW Office of Environment and Heritage
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Atlas of Australian Soils

Bark Hut Road, Woolgoolga, NSW 2456



Soils

Bark Hut Road, Woolgoolga, NSW 2456

Atlas of Australian Soils

Soil mapping units and Australian Soil Classification orders within the dataset buffer:

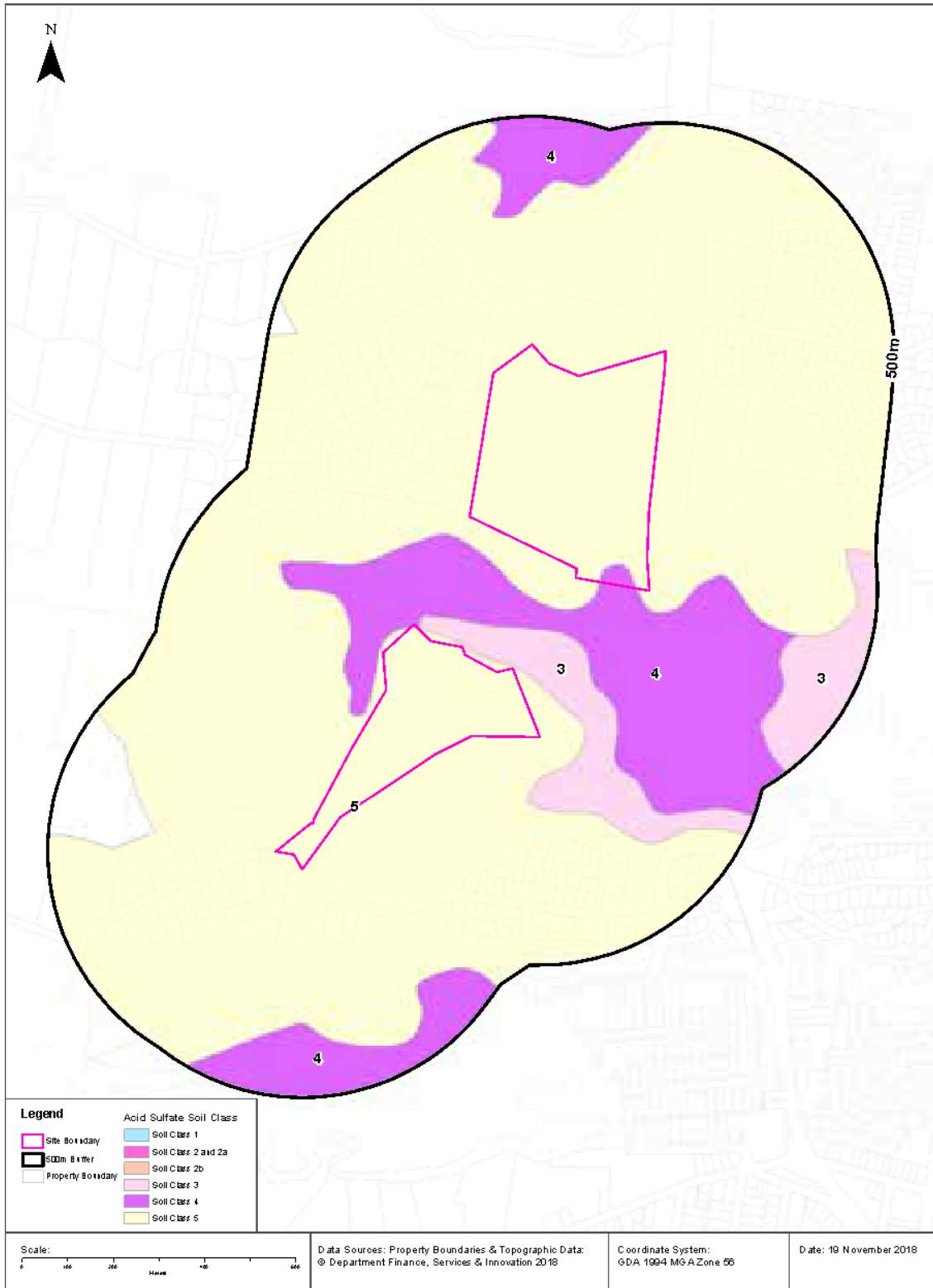
Map Unit Code	Soil Order	Map Unit Description	Distance
Pb17	Chromosol	Hilly areas alternating with small wet flats: hilly areas of hard acidic red soils (Dr2.21 and Dr2.11) possibly with other (D) soils, and small wet flats of such soils as (Gn3.94). Soils data are limited.	0m
Ps1	Chromosol	Steep hills and ridges: chief soils are friable acidic red soils (Dr4.21) and hard acidic red soils (Dr2.21) probably with other (D) soils, not described at present. Associated are (Um4.2) (Gn2.24), and (Gn2.44) soils on the steeper and relatively drier slopes; and (Gn4.14) and (Gn3.14) soils on the relatively more humid slopes.	0m

Atlas of Australian Soils Data Source: CSIRO

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Acid Sulfate Soils

Bark Hut Road, Woolgoolga, NSW 2456



Acid Sulfate Soils

Bark Hut Road, Woolgoolga, NSW 2456

Environmental Planning Instrument - Acid Sulfate Soils

What is the on-site Acid Sulfate Soil Plan Class that presents the largest environmental risk?

Soil Class	Description	EPI
4	Works more than 2 metres below natural ground surface present an environmental risk; Works by which the watertable is likely to be lowered more than 2 metres below natural ground surface, present an environmental risk	Coffs Harbour Local Environmental Plan 2013

If the on-site Soil Class is 5, what other soil classes exist within 500m?

Soil Class	Description	EPI	Distance	Direction
N/A				

Acid Sulfate Data Source Accessed 23/10/2018: NSW Crown Copyright - Planning and Environment
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Acid Sulfate Soils

Bark Hut Road, Woolgoolga, NSW 2456

Atlas of Australian Acid Sulfate Soils

Atlas of Australian Acid Sulfate Soil categories within the dataset buffer:

Class	Description	Distance
B	Low Probability of occurrence. 6-70% chance of occurrence.	0m
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	0m
A	High Probability of occurrence. >70% chance of occurrence.	1m

Atlas of Australian Acid Sulfate Soils Data Source: CSIRO

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Dryland Salinity

Bark Hut Road, Woolgoolga, NSW 2456

Dryland Salinity - National Assessment

Is there Dryland Salinity - National Assessment data onsite?

No

Is there Dryland Salinity - National Assessment data within the dataset buffer?

No

What Dryland Salinity assessments are given?

Assessment 2000	Assessment 2020	Assessment 2050	Distance	Direction
N/A	N/A	N/A	N/A	N/A

Dryland Salinity Data Source : National Land and Water Resources Audit

The Commonwealth and all suppliers of source data used to derive the maps of "Australia, Forecast Areas Containing Land of High Hazard or Risk of Dryland Salinity from 2000 to 2050" do not warrant the accuracy or completeness of information in this product. Any person using or relying upon such information does so on the basis that the Commonwealth and data suppliers shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information. Any persons using this information do so at their own risk.

In many cases where a high risk is indicated, less than 100% of the area will have a high hazard or risk.

Dryland Salinity Potential of Western Sydney

Dryland Salinity Potential of Western Sydney within the dataset buffer?

Feature Id	Classification	Description	Distance	Direction
N/A	Outside Data Coverage			

Dryland Salinity Potential of Western Sydney Data Source : NSW Office of Environment and Heritage

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Mining Subsidence Districts

Bark Hut Road, Woolgoolga, NSW 2456

Mining Subsidence Districts

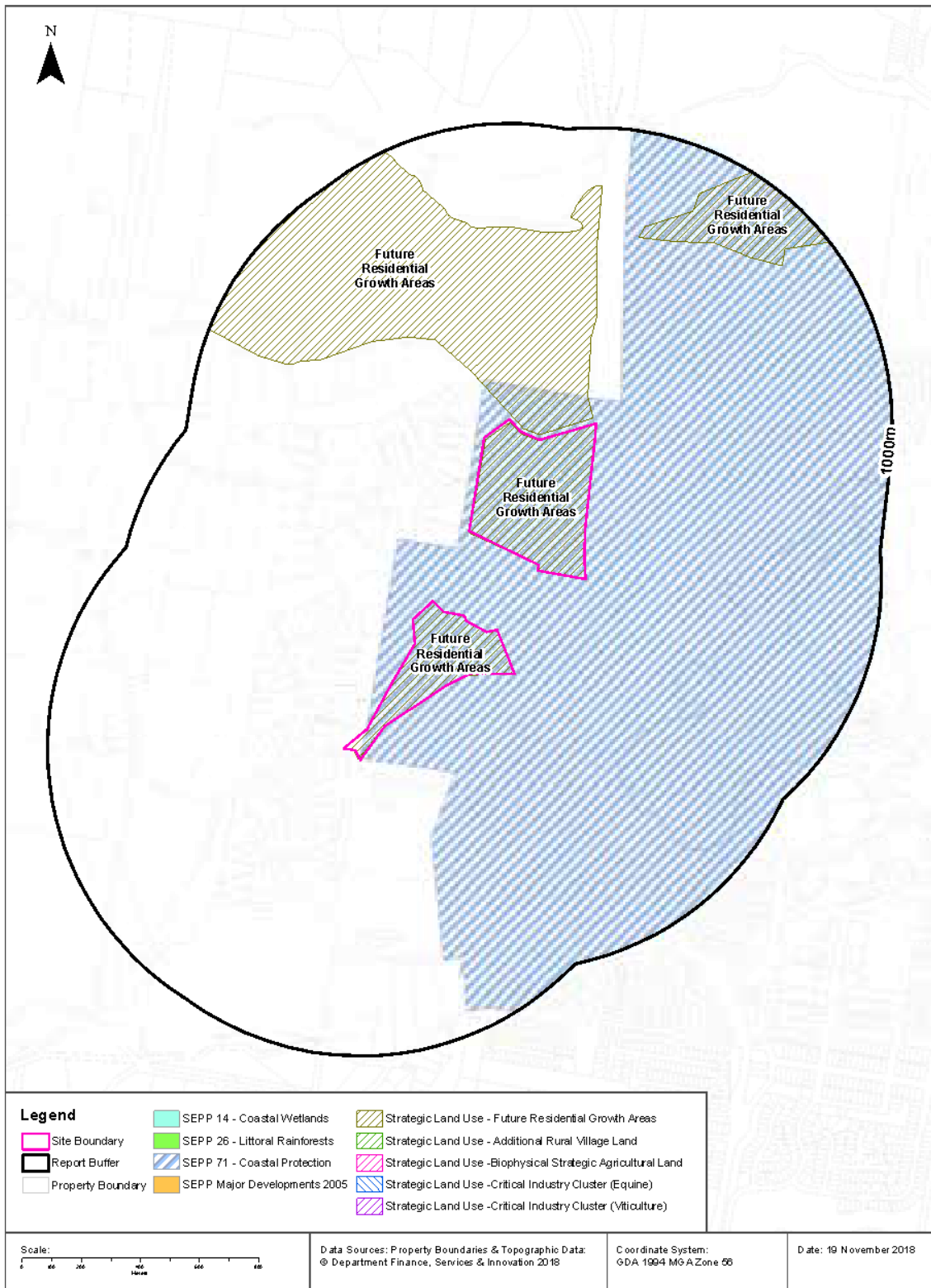
Mining Subsidence Districts within the dataset buffer:

District	Distance	Direction
There are no Mining Subsidence Districts within the report buffer		

Mining Subsidence District Data Source: © Land and Property Information (2016)
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State Environmental Planning Policy

Bark Hut Road, Woolgoolga, NSW 2456



Environmental Zoning

Bark Hut Road, Woolgoolga, NSW 2456

State Environmental Planning Policy Protected Areas

Are there any State Environmental Planning Policy Protected Areas onsite or within the dataset buffer?

Dataset	Onsite	Within Site Buffer	Distance
SEPP 14 - Coastal Wetlands	No	No	N/A
SEPP26 - Littoral Rainforests	No	No	N/A
SEPP 71 - Coastal Protection Zone	Yes - SEPP 71 covers 98.98% of the site	Yes	0m

SEPP Protected Areas Data Source: NSW Department of Planning & Environment
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State Environmental Planning Policy Major Developments (2005)

State Environmental Planning Policy Major Developments within the dataset buffer:

Map Id	Feature	Effective Date	Distance	Direction
N/A	No records within buffer			

SEPP Major Development Data Source: NSW Department of Planning & Environment
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State Environmental Planning Policy Strategic Land Use Areas

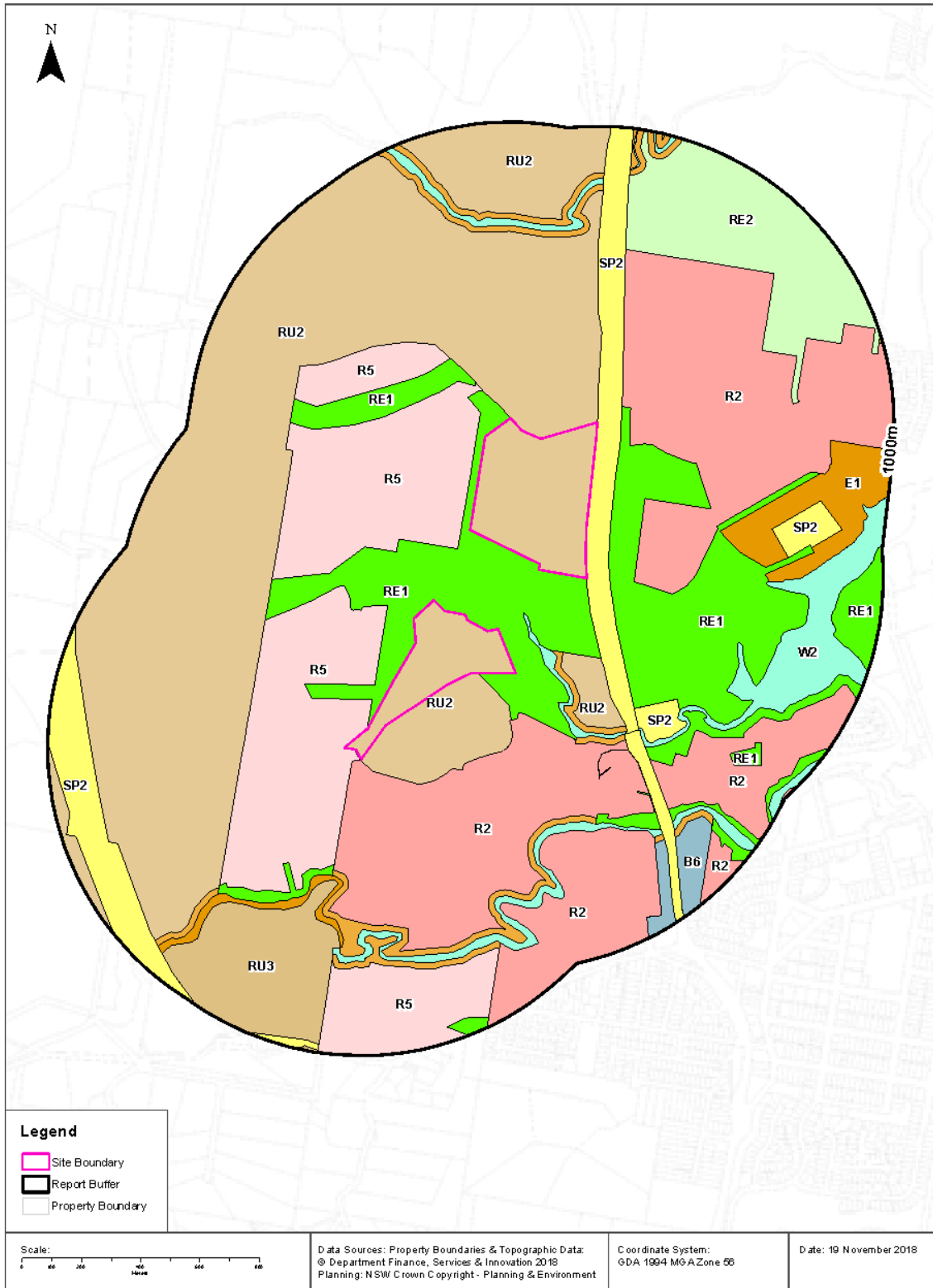
State Environmental Planning Policy Strategic Land Use Areas onsite or within the dataset buffer:

Strategic Land Use	SEPPNo	Effective Date	Amendment	Amendment Year	Distance	Direction
Future Residential Growth Areas	2007	28/01/2014	Coal Seam Gas	2014	0m	Onsite

SEPP Strategic Land Use Data Source: NSW Department of Planning & Environment
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EPI Planning Zones

Bark Hut Road, Woolgoolga, NSW 2456



Environmental Planning Instrument

Bark Hut Road, Woolgoolga, NSW 2456

Land Zoning

What Environmental Planning Instrument Land Zones exist within the dataset buffer?

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RU2	Rural Landscape		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		0m	Onsite
RU2	Rural Landscape		Coffs Harbour Local Environmental Plan 2013	09/02/2018	09/02/2018	21/09/2018	Amendment No 9	0m	Onsite
R5	Large Lot Residential		Coffs Harbour Local Environmental Plan 2013	09/02/2018	09/02/2018	21/09/2018	Amendment No 9	0m	South West
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	09/02/2018	09/02/2018	21/09/2018	Amendment No 9	0m	South West
SP2	Infrastructure	Classified Road	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		0m	North
R2	Low Density Residential		Coffs Harbour Local Environmental Plan 2013	09/02/2018	09/02/2018	21/09/2018	Amendment No 9	5m	South
R5	Large Lot Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		28m	North West
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		77m	East
W2	Recreational Waterways		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		88m	South East
R2	Low Density Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		99m	North East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		130m	South East
RU2	Rural Landscape		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		153m	South East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		160m	North West
R5	Large Lot Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		284m	North West
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		298m	South East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		366m	South West
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		385m	South
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		398m	South East
E1	National Parks and Nature Reserves		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		405m	South West
RU3	Forestry		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		417m	South West
SP2	Infrastructure	Council Activities	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		417m	South East
SP2	Infrastructure	Classified Road	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		422m	South
E1	National Parks and Nature Reserves		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		449m	North East
W2	Recreational Waterways		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		453m	East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		501m	South East
W2	Recreational Waterways		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		529m	South
R2	Low Density Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		537m	South East
R2	Low Density Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		557m	South

Zone	Description	Purpose	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
RE2	Private Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		591m	North East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		593m	South
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		622m	North
SP2	Infrastructure	Cemetery	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		623m	East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		633m	South West
W2	Recreational Waterways		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		642m	North
R5	Large Lot Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		683m	South
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		725m	South East
B6	Enterprise Corridor		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		742m	South East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		746m	South East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		765m	South East
B6	Enterprise Corridor		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		766m	South East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		827m	South East
SP2	Infrastructure	Classified Road	Coffs Harbour Local Environmental Plan 2013	27/07/2018	27/07/2018	21/09/2018	Amendment No 8	829m	South
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		836m	East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		840m	North East
R2	Low Density Residential		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		846m	South East
W2	Recreational Waterways		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		860m	North East
E2	Environmental Conservation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		863m	North East
RE1	Public Recreation		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		940m	South
RU2	Rural Landscape		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		950m	West
RU2	Rural Landscape		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		978m	North East
RU3	Forestry		Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		985m	South

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Environmental Planning Instrument

Bark Hut Road, Woolgoolga, NSW 2456

Minimum Lot Size

What are the onsite Environmental Planning Instrument Minimum Lot Sizes?

Symbol	Minimum Lot Size	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
AB	40 ha	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	21/09/2018		98.83

Maximum Height of Buildings

What are the onsite Environmental Planning Instrument Maximum Height of Buildings?

Symbol	Maximum Height of Building	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
9	8.50 m	Coffs Harbour Local Environmental Plan 2013	27/07/2018	27/07/2018	27/07/2018	Amendment No 8	100

Floor Space Ratio

What are the onsite Environmental Planning Instrument Floor Space Ratios?

Symbol	Floor Space Ratio	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
No Data							

Land Application

What are the onsite Environmental Planning Instrument Land Applications?

Application Type	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Percentage of Site Area
Included	Coffs Harbour Local Environmental Plan 2013	27/07/2018	27/07/2018	27/07/2018	Amendment No 8	100

Land Reservation Acquisition

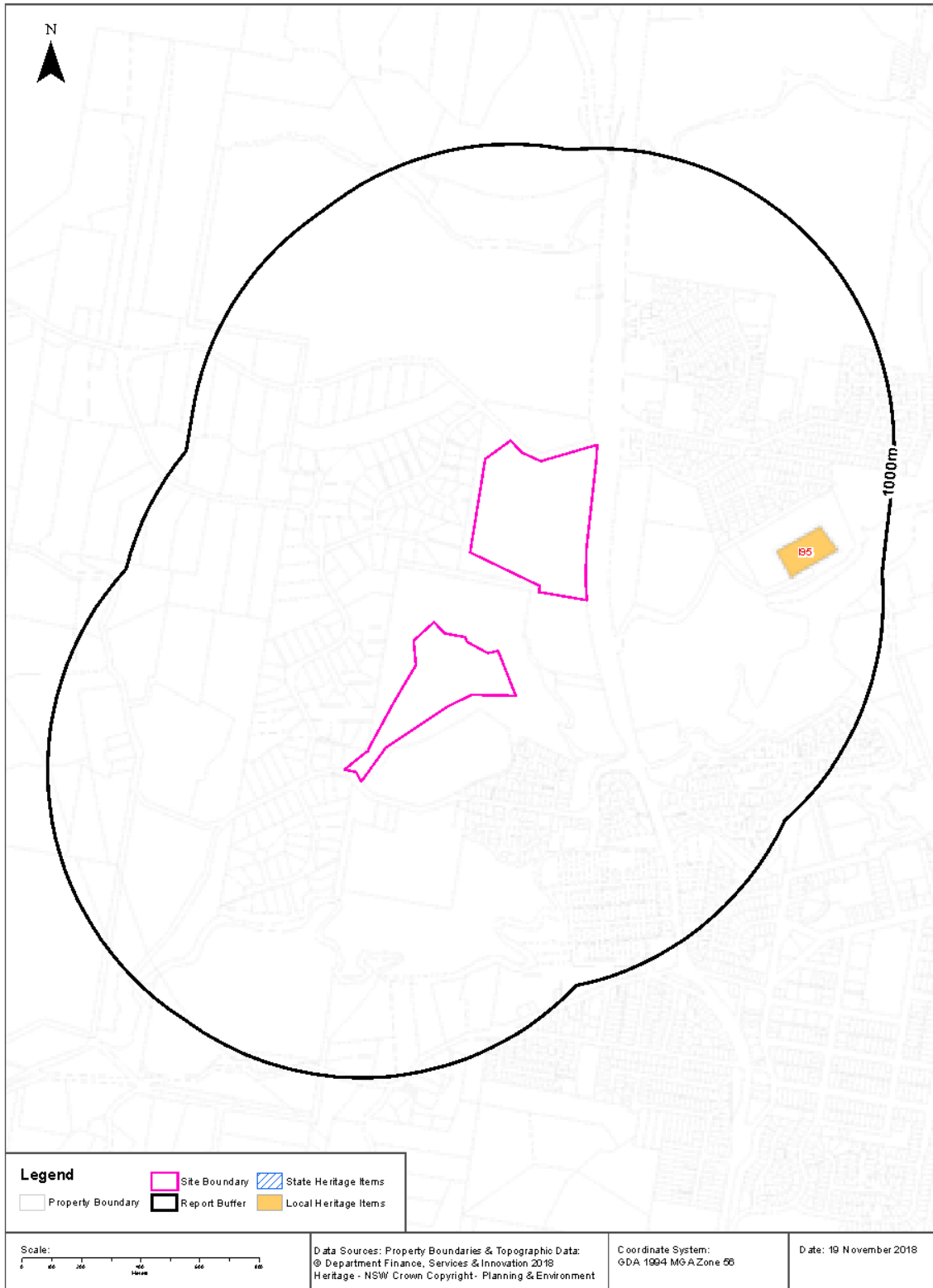
What are the onsite Environmental Planning Instrument Land Reservation Acquisitions?

Reservation	LEP or SEPP	Published Date	Commenced Date	Currency Date	Amendment	Comments	Percentage of Site Area
No Data							

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Heritage Items

Bark Hut Road, Woolgoolga, NSW 2456



Heritage

Bark Hut Road, Woolgoolga, NSW 2456

State Heritage Register - Curtilages

What are the State Heritage Register Items located within the dataset buffer?

Map Id	Name	Address	LGA	Listing Date	Listing No	Plan No	Distance	Direction
N/A	No records in buffer							

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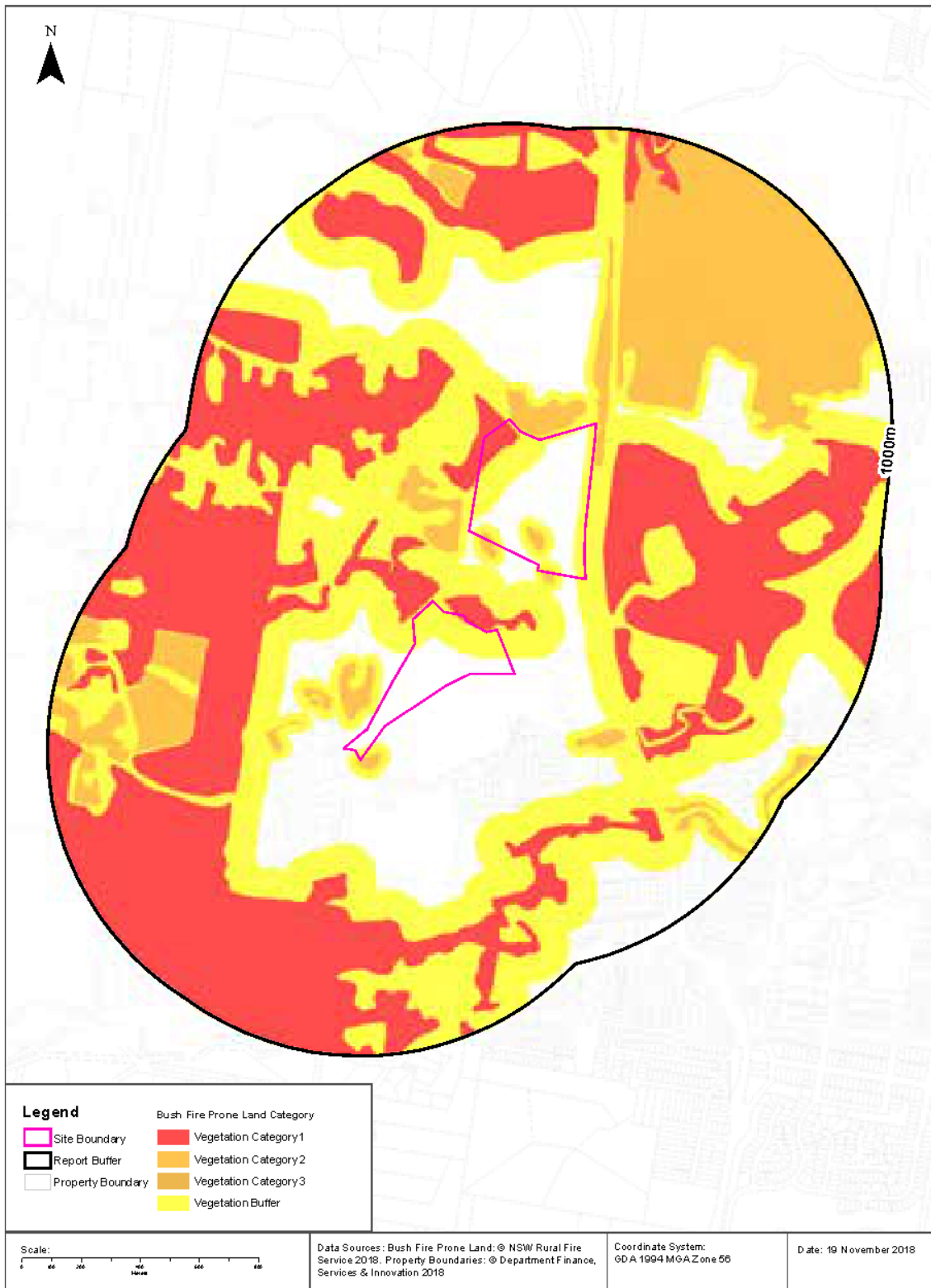
Environmental Planning Instrument - Heritage

What are the EPI Heritage Items located within the dataset buffer?

Map Id	Name	Classification	Significance	EPI	Published Date	Commenced Date	Currency Date	Distance	Direction
I95	Woolgoolga Cemetery	Item - General	Local	Coffs Harbour Local Environmental Plan 2013	27/09/2013	27/09/2013	09/02/2013	637m	East

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Natural Hazards - Bush Fire Prone Land
 Bark Hut Road, Woolgoolga, NSW 2456



Natural Hazards

Bark Hut Road, Woolgoolga, NSW 2456

Bush Fire Prone Land

What are the nearest Bush Fire Prone Land Categories that exist within the dataset buffer?

Bush Fire Prone Land Category	Distance	Direction
Vegetation Buffer	0m	Onsite
Vegetation Category 1	0m	Onsite
Vegetation Category 2	0m	Onsite

NSW Bush Fire Prone Land - © NSW Rural Fire Service under Creative Commons 4.0 International Licence

Ecological Constraints - Vegetation & RAMSAR Wetlands

Bark Hut Road, Woolgoolga, NSW 2456



Ecological Constraints

Bark Hut Road, Woolgoolga, NSW 2456

Vegetation of Coffs Harbour LGA

What Vegetation of Coffs Harbour LGA exists within the dataset buffer?

Vegetation Code	Vegetation Category	Species	Source	Distance	Direction
N11A	Tall Open Forest	Eucalyptus propinqua, E. microcorys.	Veg Mapping. Fisher 1996	0m	Onsite
N27	Tall Open Forest	Eucalyptus grandis	Veg Mapping. Fisher 1996	0m	Onsite
N2A	Open Forest	Eucalyptus pilularis	Veg Mapping. Fisher 1996	0m	Onsite
ST	Scattered Trees		Veg Mapping. Fisher 1996	0m	Onsite
UNtyped	Untyped		Veg Mapping. Fisher 1996	0m	Onsite
N7	Tall Open Forest	Eucalyptus pilularis, E. microcorys	Veg Mapping. Fisher 1996	29m	South West
N44A	Open Forest	Eucalyptus pilularis, E. resinifera, Corymbia intermedia	Veg Mapping. Fisher 1996	60m	East
N67B	Open Forest	Eucalyptus siderophloia, E. propinqua	Veg Mapping. Fisher 1996	74m	North East
N67A	Tall Open Forest	Eucalyptus siderophloia, E. propinqua	Veg Mapping. Fisher 1996	275m	North West
N11A/ST	Tall Open Forest	Eucalyptus propinqua, E. microcorys.	Veg Mapping. Fisher 1996	339m	South West
N20	Swamp Forest	Melaleuca quinquenervia	Veg Mapping. Fisher 1996	371m	South East
N67C/ST	Open Forest	Eucalyptus propinqua, E. siderophloia, Corymbia maculata	Veg Mapping. Fisher 1996	386m	South West
N67C	Open Forest	Eucalyptus propinqua, E. siderophloia, Corymbia maculata	Veg Mapping. Fisher 1996	453m	South West
N50	Swamp Forest	Melaleuca sp., Casuarina glauca, Eucalyptus robusta	Veg Mapping. Fisher 1996	478m	East
N44A/ST	Open Forest	Eucalyptus pilularis, E. resinifera, Corymbia intermedia	Veg Mapping. Fisher 1996	637m	North East
N1B	Open Forest	Eucalyptus tereticornis, Angophora subvelutina, E. robusta, Lophostemon suaveolens	Veg Mapping. Fisher 1996	683m	North East
R	Regrowth		Veg Mapping. Fisher 1996	841m	North
N75A	Foredune Complex	Banksia integrifolia, Acacia sophorae, "Chrysanthemoides monififera".	Veg Mapping. Fisher 1996	877m	East
N26A	Swamp Forest	Casuarina glauca.	Veg Mapping. Fisher 1996	931m	South East

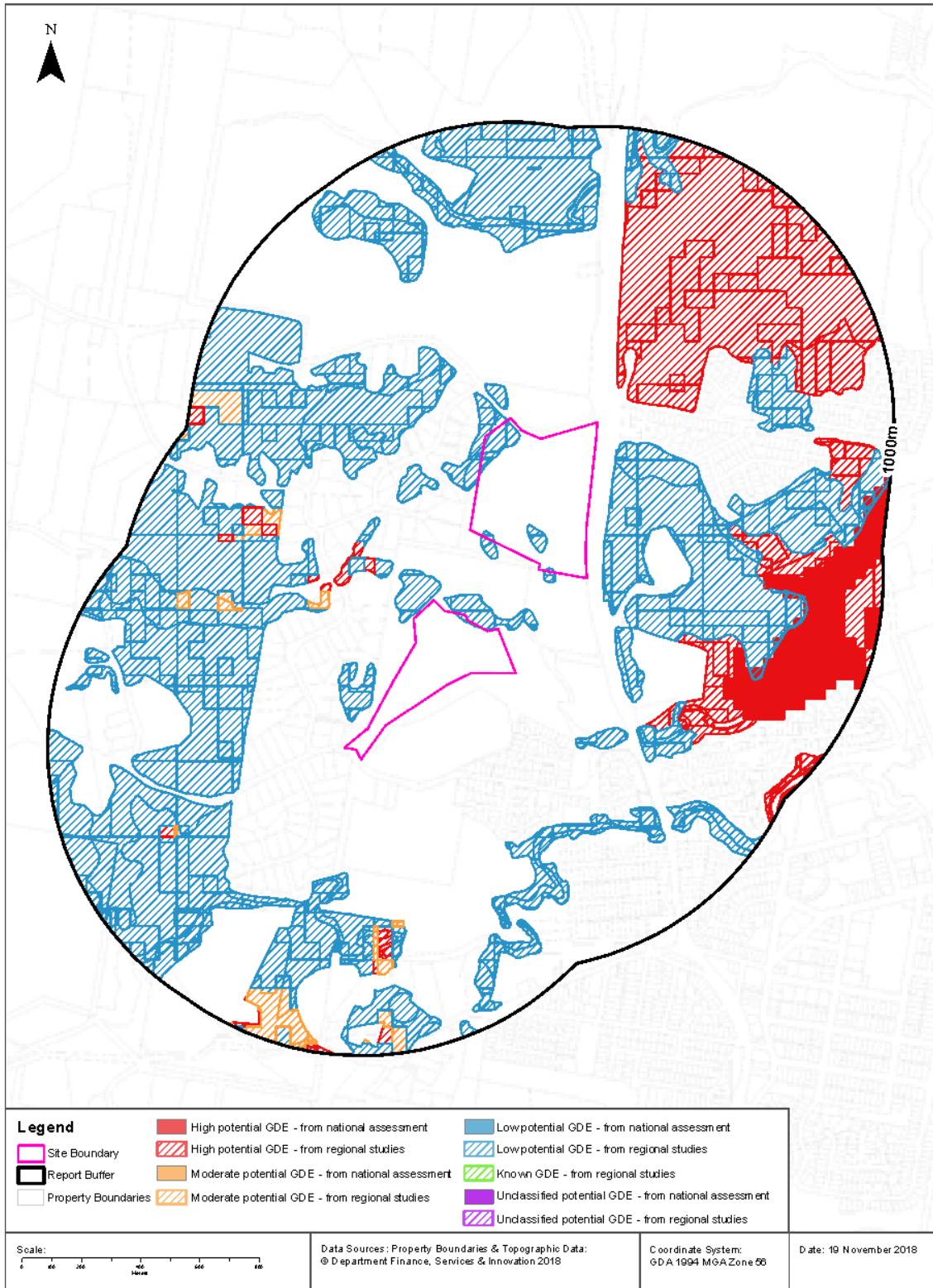
Native Vegetation of Coffs Harbour : NSW Office of Environment and Heritage
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RAMSAR Wetlands

What RAMSAR Wetland areas exist within the dataset buffer?

Map Id	RAMSAR Name	Wetland Name	Designation Date	Source	Distance	Direction
NA	No records in buffer					

RAMSAR Wetlands Data Source: © Commonwealth of Australia - Department of Environment



Ecological Constraints

Bark Hut Road, Woolgoolga, NSW 2456

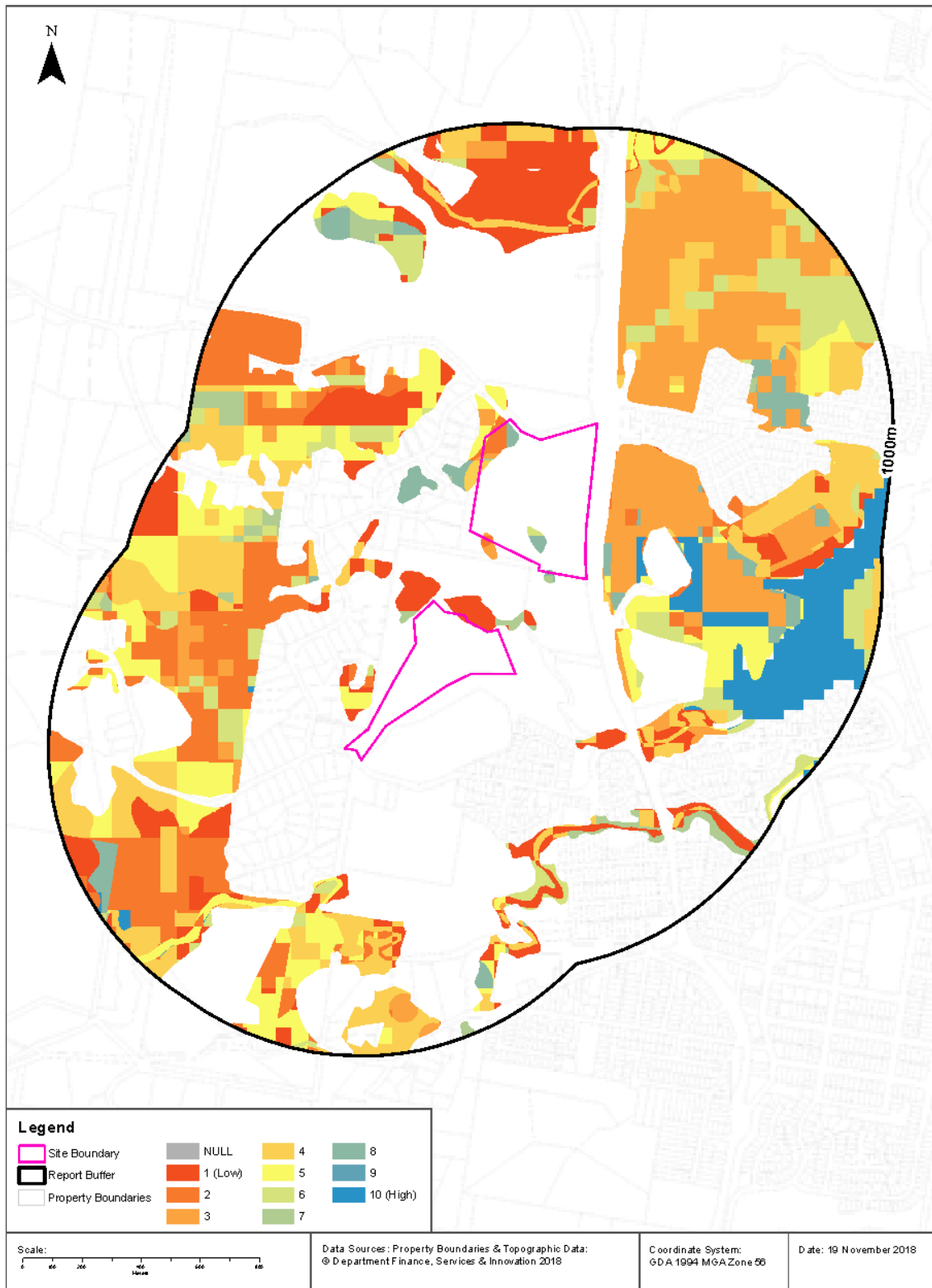
Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	Low potential GDE - from regional studies	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m
Terrestrial	Low potential GDE - from regional studies	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	High potential GDE - from regional studies	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		129m
Terrestrial	Moderate potential GDE - from regional studies	Dissected plateau margin on granite and metamorphic rocks.	Vegetation		287m
Aquatic	High potential GDE - from national assessment	Dissected plateau margin on granite and metamorphic rocks.	Wetland		549m

Groundwater Dependent Ecosystems Atlas Data Source: The Bureau of Meteorology
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Ecological Constraints - Inflow Dependent Ecosystems Likelihood

Bark Hut Road, Woolgoolga, NSW 2456



Ecological Constraints

Bark Hut Road, Woolgoolga, NSW 2456

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance
Terrestrial	1	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	2	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		0m
Terrestrial	2	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	3	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	4	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	5	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	6	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	7	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	8	Plateau flank dissected into narrow strike ridges and valleys.	Vegetation		0m
Terrestrial	10	Coastal lowlands on weak sedimentary rocks, with littoral and alluvial plains.	Vegetation		170m
Aquatic	10	Dissected plateau margin on granite and metamorphic rocks.	Wetland		549m
Aquatic	4	Dissected plateau margin on granite and metamorphic rocks.	Wetland		943m

Inflow Dependent Ecosystems Likelihood Data Source: The Bureau of Meteorology
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Ecological Constraints

Bark Hut Road, Woolgoolga, NSW 2456

NSW BioNet Atlas

Species on the NSW BioNet Atlas that have a NSW or federal conservation status, a NSW sensitivity status, or are listed under a migratory species agreement, and are within 10km of the site?

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Amphibia	<i>Crinia tinnula</i>	Wallum Froglet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	<i>Mixophyes iteratus</i>	Giant Barred Frog	Endangered	Category 2	Endangered	
Animalia	Aves	<i>Anous stolidus</i>	Common Noddy	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	Critically Endangered	Not Sensitive	Critically Endangered	
Animalia	Aves	<i>Apus pacificus</i>	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	<i>Ardea ibis</i>	Cattle Egret	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	<i>Ardenna carneipes</i>	Flesh-footed Shearwater	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	<i>Ardenna pacificus</i>	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	<i>Ardenna tenuirostris</i>	Short-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	<i>Arenaria interpres</i>	Ruddy Turnstone	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	Endangered	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	<i>Calidris tenuirostris</i>	Great Knot	Vulnerable	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA;JAMBA
Animalia	Aves	<i>Calyptorhynchus lathamii</i>	Glossy Black-Cockatoo	Vulnerable	Category 2	Not Listed	
Animalia	Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Coracina lineata</i>	Barred Cuckoo-shrike	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Dromaius novaehollandiae</i>	Emu	Endangered Population	Not Sensitive	Not Listed	
Animalia	Aves	<i>Egretta sacra</i>	Eastern Reef Egret	Not Listed	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	<i>Geloc helidon nilotica</i>	Gull-billed Tern	Not Listed	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	<i>Grus rubicunda</i>	Brolga	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	<i>Haematopus fuliginosus</i>	Sooty Oystercatcher	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Haematopus longirostris	Pied Oystercatcher	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Hieraetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Hydroprogne caspia	Caspian Tern	Not Listed	Not Sensitive	Not Listed	CAMBA; JAMBA
Animalia	Aves	Irediparra gallinacea	Comb-crested Jacana	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Lathamus discolor	Swift Parrot	Endangered	Category 3	Critically Endangered	
Animalia	Aves	Limosa lapponica	Bar-tailed Godwit	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Limosa limosa	Black-tailed Godwit	Vulnerable	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Lophoictinia isura	Square-tailed Kite	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Macronectes giganteus	Southern Giant Petrel	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Merops ornatus	Rainbow Bee-eater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Neophema pulchella	Turquoise Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Numenius phaeopus	Whimbrel	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Oceanites oceanicus	Wilson's Storm-Petrel	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Pandion cristatus	Eastern Osprey	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pezoporus wallicus wallicus	Eastern Ground Parrot	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Phaethon lepturus	White-tailed Tropicbird	Not Listed	Not Sensitive	Not Listed	CAMBA; JAMBA
Animalia	Aves	Plegadis falcinellus	Glossy Ibis	Not Listed	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Pluvialis fulva	Pacific Golden Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus magnificus	Wompoo Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus regina	Rose-crowned Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Ptilinopus superbus	Superb Fruit-Dove	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Sterna hirundo	Common Tern	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Sternula albifrons	Little Tern	Endangered	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA
Animalia	Aves	Stictonetta naevosa	Freckled Duck	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Todiramphus chloris	Collared Kingfisher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tringa brevipes	Grey-tailed Tattler	Not Listed	Not Sensitive	Not Listed	ROKAMBA; CAMBA; JAMBA

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	<i>Tringa incana</i>	Wandering Tattler	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	<i>Tyto novaehollandiae</i>	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	<i>Tyto tenebricosa</i>	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Mammalia	<i>Aepyprymnus rufescens</i>	Rufous Bettong	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Arctocephalus pusillus doriferus</i>	Australian Fur-seal	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Chalinolobus nigrogriseus</i>	Hoary Wattled Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	<i>Dugong dugon</i>	Dugong	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Falstirellus tasmaniensis</i>	Eastern False Pipistrelle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Kerivoula papuensis</i>	Golden-tipped Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Megaptera novaeangliae</i>	Humpback Whale	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	<i>Miniopterus australis</i>	Little Bentwing-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bentwing-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Mormopterus norfolkensis</i>	Eastern Freetail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Myotis macropus</i>	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Petauroides volans</i>	Greater Glider	Not Listed	Not Sensitive	Vulnerable	
Animalia	Mammalia	<i>Petaurus australis</i>	Yellow-bellied Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Petaurus norfolkensis</i>	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Phascolarctos cinereus</i>	Koala	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	<i>Planigale maculata</i>	Common Planigale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Potorous tridactylus</i>	Long-nosed Potoroo	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheathtail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	<i>Syconycteris australis</i>	Common Blossom-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	<i>Caretta caretta</i>	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	<i>Chelonia mydas</i>	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	<i>Eretmochelys imbricata</i>	Hawksbill Turtle	Not Listed	Not Sensitive	Vulnerable	
Animalia	Reptilia	<i>Hoplocephalus stephensi</i>	Stephens' Banded Snake	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	<i>Acronychia littoralis</i>	Scented Acronychia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	<i>Angophora robur</i>	Sandstone Rough-barked Apple	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	<i>Belvisia mucronata</i>	Needle-leaf Fern	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	<i>Boronia umbellata</i>	Orara Boronia	Vulnerable	Not Sensitive	Vulnerable	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Chamaesyce psammogeton	Sand Spurge	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Eleocharis tetraquetra	Square-stemmed Spike-rush	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Hicksbeachia pinnatifolia	Red Boppel Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Lindernia alsinoides	Noah's False Chickweed	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Lindsaea incisa	Slender Screw Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Marsdenia longiloba	Slender Marsdenia	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Maudia triglochoides		Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Niemeyera whitei	Rusty Plum, Plum Boxwood	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Parsonsia dorrigoensis	Milky Silkpod	Vulnerable	Not Sensitive	Endangered	
Plantae	Flora	Phaius australis	Southern Swamp Orchid	Endangered	Category 2	Endangered	
Plantae	Flora	Pultenaea maritima	Coast Headland Pea	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Quassia sp. Moonee Creek	Moonee Quassia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Senna acclinis	Rainforest Cassia	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Sophora tomentosa	Silverbush	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Thesium australe	Austral Toadflax	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Typhonium sp. aff. brownii	Stinky Lily	Endangered	Category 3	Not Listed	
Plantae	Flora	Zieria prostrata	Headland Zieria	Endangered	Not Sensitive	Endangered	

Data does not include NSW category 1 sensitive species.
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Data obtained 16/11/2018

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 12. These Terms are subject to New South Wales law.

Appendix D Laboratory summary tables

Appendix D

30012537 Preliminary Site Investigation, Site off Bark Hut Road, Woolgoolga NSW

Soil Analytical Results Table



Unit of Measurement	Asbestos Identification - Presence/absence	BTEX							Phenols	Halogenated Benzenes	Herbicides									
		Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylenes (o)	Xylenes Total	Total BTEX	Picloram	Hexachlorobenzene	2,4,5-Trichlorophenoxy Acetic Acid	2,4,5-TP (β isox)	Hexdona I	2,4-Dichlorophenoxybuta noic acid	2,4-Dichlorprop	4-Chlorophenoxy acetic acid	Clopyralid	Dicamba	Fluroxypyr	
NA	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.1g/kg	0.2	0.5	0.5	0.5	0.5	0.5	0.2	0.02	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)		100	14,000	4,500			12,000													
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)		140	21,000	5,900			17,000													
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m		77	NL	NL			NL													
NEPM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil																				
NSW 2014 General Solid Waste CT1 (No Leaching)		10	288	600			1,000		60					200					40	
NSW 2014 General Solid Waste SCC1 (with leached)		18	518	1,080			1,800		110					10					75	
NSW 2014 General Solid Waste TCLP1 (leached)																				
NSW 2014 Restricted Solid Waste CT2 (No Leaching)		40	1,152	2,400			4,000		240					800					160	
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m		0.5	160	55			40													
1-2m		0.5	220				60													
2-4m		0.5	310				95													
>=4m		0.5	540				170													
NEPM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space																				
NEPM 2013 Table 1A(1) HILs Res A Soil									4,500	10	600			900						

Field ID	Date	Asbestos	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylenes (o)	Xylenes Total	Total BTEX	Phenols	Halogenated Benzenes	2,4,5-Trichlorophenoxy Acetic Acid	2,4,5-TP (β isox)	Hexdona I	2,4-Dichlorophenoxybuta noic acid	2,4-Dichlorprop	4-Chlorophenoxy acetic acid	Clopyralid	Dicamba	Fluroxypyr
TP01-0.1m	6/12/2018	Not Detected	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP01-0.5m	6/12/2018	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-
TP02-1.0m	6/12/2018	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-
TP02-0.1m	6/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP02-1.0M DUP	6/12/2018	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-
TP03-0.1m	6/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP04-0.1m	6/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP05-0.1m	6/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP06-0.1m	6/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP07-0.1m	7/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP07-0.6m	7/12/2018	-	-	-	-	-	-	-	-	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
TP08-0.1m	7/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	Not Detected	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
TP09-0.5m	7/12/2018	Not Detected	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-
TP09-0.5m DUP	7/12/2018	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	-	-	-	-	-	-	-	-	-	-	-
TP09-1.1m	7/12/2018	Not Detected	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	-	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP11-0.2m	7/12/2018	-	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
TP11-0.2m	7/12/2018	Not Detected	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	Not Detected	-	-	-	-	-	-	-	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04

Statistics	Benzene	Toluene	Ethylbenzene	Xylenes (m & p)	Xylenes (o)	Xylenes Total	Total BTEX	Phenols	Halogenated Benzenes	2,4,5-Trichlorophenoxy Acetic Acid	2,4,5-TP (β isox)	Hexdona I	2,4-Dichlorophenoxybuta noic acid	2,4-Dichlorprop	4-Chlorophenoxy acetic acid	Clopyralid	Dicamba	Fluroxypyr
Number of Results	6	6	8	8	8	8	8	13	13	13	13	13	13	13	13	13	13	13
Number of Detects	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	1	1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.02	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Minimum Detect	1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	1	1	<0.2	<0.5	<0.5	<0.5	<0.5	<0.2	<0.04	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Maximum Detect	1	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	1	1	0.1	0.25	0.25	0.25	0.25	0.1	0.018	0.025	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
Median Concentration *	1	1	0.1	0.25	0.25	0.25	0.25	0.1	0.02	0.025	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Standard Deviation *	0	0	0	0	0	0	0	0.0038	0	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038	0.0038
95% UCL (Student's-t) *	1	1	0.1	0.25	0.25	0.25	0.25	0.1	0.0203	0.025	0.0203	0.0203	0.0203	0.0203	0.0203	0.0203	0.0203	0.0203

* A Non Detect Multiplier of 0.5 has been applied.

Appendix D

30012537



Unit of Measurement	Pesticides				Lead	Metals								Organics							
	2-Methyl-4-Chlorophenoxyacetic Acid	2-Methyl-4-Chlorophenoxy Benzoic Acid	Mecoprop P	Triclopyr	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
EQL	0.02	0.02	0.02	0.02	5	5	1	2	5	0.1	2	5	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)																					
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)																					
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m																					
NEPM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil																					
NSW 2014 General Solid Waste CT1 (No Leaching)				40	100	100	20			4	40										
NSW 2014 General Solid Waste SCC1 (with leached)				75	1,500	500	100			50	1,050										
NSW 2014 General Solid Waste TCLP1 (leached)																					
NSW 2014 Restricted Solid Waste CT2 (No Leaching)				160	400	400	80			16	160										
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																					
1-2m																					
2-4m																					
>=4m																					
NEPM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space						100															
NEPM 2013 Table 1A(1) Hils Res A Soil	600	600	600		300		20		6,000	40	400	7,400			6		50				

Field ID	Date	2-Methyl-4-Chlorophenoxyacetic Acid	2-Methyl-4-Chlorophenoxy Benzoic Acid	Mecoprop P	Triclopyr	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)
TP01-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	15	<5	<1	6	<5	<0.1	<2	14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP01-0.5m	6/12/2018	-	-	-	-	11	<5	<1	10	<5	<0.1	2	8	-	-	-	-	-	-	-	-
TP02-1.0m	6/12/2018	-	-	-	-	8	<5	<1	11	<5	<0.1	2	27	-	-	-	-	-	-	-	-
TP02-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	9	<5	<1	5	<5	<0.1	<2	<5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP02-1.0M DUP	6/12/2018					8	<5	<1	10	<5	<0.1	<2	22	-	-	-	-	-	-	-	-
TP03-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	8	<5	<1	7	<5	<0.1	2	18	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP04-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	10	<5	<1	5	<5	<0.1	<2	6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP05-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	26	8	<1	13	<5	<0.1	4	11	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP06-0.1m	6/12/2018	<0.04	<0.04	<0.04	<0.04	18	<5	<1	8	<5	<0.1	3	8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP07-0.1m	7/12/2018	<0.04	<0.04	<0.04	<0.04	13	<5	<1	10	<5	<0.1	<2	9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP07-0.6m	7/12/2018	<0.02	<0.02	<0.02	<0.02	15	7	<1	16	<5	<0.1	4	14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP08-0.1m	7/12/2018	<0.04	<0.04	<0.04	<0.04	14	<5	<1	7	<5	<0.1	2	10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	<0.02	<0.02	<0.02	<0.02	13	<5	<1	13	<5	<0.1	<2	12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP09-0.5m	7/12/2018	-	-	-	-	13	<5	<1	12	<5	<0.1	<2	13	-	-	-	-	-	-	-	-
TP09-0.5m DUP	7/12/2018	-	-	-	-	15	8	<1	13	<5	<0.1	2	13	-	-	-	-	-	-	-	-
TP09-1.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	<0.04	<0.04	<0.04	<0.04	14	7	<1	11	<5	<0.1	2	14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP11-0.2m	7/12/2018	<0.04	<0.04	<0.04	<0.04	15	6	<1	12	<5	<0.1	2	12	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
TP11-0.2m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	<0.04	<0.04	<0.04	<0.04	15	6	<1	12	<5	<0.1	2	6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Statistics	2-Methyl-4-Chlorophenoxyacetic Acid	2-Methyl-4-Chlorophenoxy Benzoic Acid	Mecoprop P	Triclopyr	Lead	Arsenic	Cadmium	Chromium (III+VI)	Copper	Mercury	Nickel	Zinc	4,4-DDE	a-BHC	Aldrin	Aldrin + Dieldrin	b-BHC	Chlordane	Chlordane (cis)	Chlordane (trans)
Number of Results	13	13	13	13	18	18	18	18	18	18	18	18	13	13	13	13	13	13	13	13
Number of Detects	0	0	0	0	18	6	0	18	0	0	11	17	0	0	0	0	0	0	0	0
Minimum Concentration	<0.02	<0.02	<0.02	<0.02	8	<5	<1	5	<5	<0.1	2	<5	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Minimum Detect	ND	ND	ND	ND	8	6	ND	5	ND	ND	2	6	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.04	<0.04	<0.04	<0.04	26	8	<1	16	<5	<0.1	4	27	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Maximum Detect	ND	ND	ND	ND	26	8	ND	16	ND	ND	4	27	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.018	0.018	0.018	0.018	13	4	0.5	10	2.5	0.05	1.9	12	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Median Concentration *	0.02	0.02	0.02	0.02	13.5	2.5	0.5	10.5	2.5	0.05	2	12	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025
Standard Deviation *	0.0038	0.0038	0.0038	0.0038	4.3	2.2	0	3.1	0	0	0.96	5.9	0	0	0	0	0	0	0	0
95% UCL (Student's-t) *	0.0203	0.0203	0.0203	0.0203	15.11	4.917	0.5	11.38	2.5	0.05	2.284	14.59	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025

* A Non Detect Multiplier of 0.5 has been applied.

Appendix D

30012537



Unit of Measurement	Organochlorine Pesticides															γ-BHC (lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinphos methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos
	p-BHC	DDD	DDT	DDD+DDE+DDD	Dieldrin	Endosulfan	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	γ-BHC (lindane)	Heptachlor	Heptachlor epoxide								
EQL	0.05	0.05	0.2	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.05	0.05	0.05	0.05			
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)																							
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)																							
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m																							
NEPM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil																							
NSW 2014 General Solid Waste CT1 (No Leaching)																							
NSW 2014 General Solid Waste SCC1 (with leached)																							
NSW 2014 General Solid Waste TCLP1 (leached)																							
NSW 2014 Restricted Solid Waste CT2 (No Leaching)																							
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																							
1-2m																							
2-4m																							
>=4m																							
NEPM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space																							
NEPM 2013 Table 1A(1) HSL Res A Soil			180							10						6							

Field ID	Date	p-BHC	DDD	DDT	DDD+DDE+DDD	Dieldrin	Endosulfan	Endosulfan I	Endosulfan II	Endosulfan sulphate	Endrin	Endrin aldehyde	Endrin ketone	γ-BHC (lindane)	Heptachlor	Heptachlor epoxide	Methoxychlor	Azinphos methyl	Bromophos-ethyl	Carbophenothion	Chlorfenvinphos	
TP01-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP01-0.5m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP02-1.0m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP02-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP02-1.0M DUP	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP03-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP04-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP05-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP06-0.1m	6/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP07-0.1m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP07-0.6m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP08-0.1m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP09-0.5m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.5m DUP	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-1.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP11-0.2m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	
TP11-0.2m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	

Statistics																					
Number of Results	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.05	<0.05	<0.05	<0.05
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.025	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025	0.025
Median Concentration *	0.025	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025	0.025
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95% UCL (Student's-t) *	0.025	0.025	0.1	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.025	0.025	0.025	0.025

* A Non Detect Multiplier of 0.5 has been applied.

Appendix D

30012537



Unit of Measurement	Organophosphorous Pesticides											Other Pesticides								
	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Methyl parathion	Monocrotophos	Prothiofos	Ace na phthene	Ace na phth ylene	Anthracene	Ben(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(b)fluoranthene	Benzo(e)pyrene	
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.2	0.2	0.05	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)																				
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)																				
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m																				
NPEM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil																				
NSW 2014 General Solid Waste CT1 (No Leaching)	4															0.8				
NSW 2014 General Solid Waste SCC1 (with leached)	7.5															10				
NSW 2014 General Solid Waste TCLP1 (leached)																				
NSW 2014 Restricted Solid Waste CT2 (No Leaching)	16															3.2				
NPEM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m																	40			
1-2m																				
2-4m																				
>=4m																				
NPEM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space																				
NPEM 2013 Table 1A(1) HILs Res A Soil	160																			

Field ID	Date	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Methyl parathion	Monocrotophos	Prothiofos	Ace na phthene	Ace na phth ylene	Anthracene	Ben(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(b)fluoranthene	Benzo(e)pyrene
TP01-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP01-0.5m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP02-1.0m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP02-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP02-1.0m DUP	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP03-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP04-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP05-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP06-0.1m	6/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP07-0.1m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP07-0.6m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP08-0.1m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP09-0.5m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP09-0.5m DUP	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5	<0.5
TP09-1.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-
TP11-0.2m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5	-	<0.5	<0.5
TP11-0.2m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	-	-	-	-	-	-	-	-

Statistics	Chlorpyrifos	Chlorpyrifos-methyl	Diazinon	Dichlorvos	Dimethoate	Ethion	Fenitrothion	Malathion	Methyl parathion	Monocrotophos	Prothiofos	Ace na phthene	Ace na phth ylene	Anthracene	Ben(a)anthracene	Benzo(a)pyrene	Benzo(a)pyrene TEQ (LOR)	Benzo(b)fluoranthene	Benzo(e)pyrene
Number of Results	13	13	13	13	13	13	13	13	13	13	13	8	8	8	8	8		8	8
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
Minimum Concentration	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND
Maximum Concentration	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.2	<0.2	<0.05	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5	<0.5
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND
Average Concentration *	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.1	0.025	0.25	0.25	0.25	0.25	0.25		0.25	0.25
Median Concentration *	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.1	0.025	0.25	0.25	0.25	0.25	0.25		0.25	0.25
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
95% UCL (Student's-t) *	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.1	0.1	0.025	0.25	0.25	0.25	0.25	0.25		0.25	0.25

* A Non Detect Multiplier of 0.5 has been applied.

Appendix D

30012537



Unit of Measurement	PAH										PCBs (Sum of total)	Organophosphorus Pesticides				C6-C9	C10-C14	C15-C28	C29-C36
	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)		PCBs (Sum of total)	Demeton-S-methyl	Fenamiphos	Parathion				
EQL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.1	0.05	0.05	0.2	0.05	10	50	100	100
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)							1,400												
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)							2,200												
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m																			
NEPM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil																			
NSW 2014 General Solid Waste CT1 (No Leaching)										200	50					650			
NSW 2014 General Solid Waste SCC1 (with leached)										200	50					6,500			
NSW 2014 General Solid Waste TCLP1 (leached)																			
NSW 2014 Restricted Solid Waste CT2 (No Leaching)										800	50					2,600			
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m							3												
1-2m																			
2-4m																			
>=4m																			
NEPM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space							170												
NEPM 2013 Table 1A(1) HILs Res A Soil										300	1								

Field ID	Date	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	PCBs (Sum of total)	Demeton-S-methyl	Fenamiphos	Parathion	Phosphor-ethyl	C6-C9	C10-C14	C15-C28	C29-C36
TP01-0.1m	6/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.05	<0.05	<0.2	<0.05	<10	<50	<100	<100
TP01-0.5m	6/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	-	-	-	<10	<50	<100	<100
TP02-1.0m	6/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	-	-	-	<10	<50	<100	<100
TP02-0.1m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP02-1.0M DUP	6/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	-	-	-	<10	<50	<100	<100
TP03-0.1m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP04-0.1m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP05-0.1m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP06-0.1m	6/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP07-0.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP07-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP08-0.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.05	<0.05	<0.2	<0.05	<10	<50	<100	<100
TP09-0.5m	7/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	-	-	-	<10	<50	<100	<100
TP09-0.5m DUP	7/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	-	-	-	-	<10	<50	<100	<100
TP09-1.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-
TP11-0.2m	7/12/2018	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.05	<0.05	<0.2	<0.05	<10	<50	<100	<100
TP11-0.2m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.2	<0.05	-	-	-	-

Statistics	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Fluoranthene	Fluorene	Indeno(1,2,3-c,d)pyrene	Naphthalene	Phenanthrene	Pyrene	PAHs (Sum of total)	PCBs (Sum of total)	Demeton-S-methyl	Fenamiphos	Parathion	Phosphor-ethyl	C6-C9	C10-C14	C15-C28	C29-C36
Number of Results	8	8	8	8	8	8	8	8	8	8	8	13	13	13	13	8	8	8	8
Number of Detects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minimum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.05	<0.05	<0.2	<0.05	<10	<50	<100	<100
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.1	<0.05	<0.05	<0.2	<0.05	<10	<50	<100	<100
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.025	0.025	0.1	0.025	5	25	50	50
Median Concentration *	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.025	0.025	0.1	0.025	5	25	50	50
Standard Deviation *	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
95% UCL (Student's-t) *	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.05	0.025	0.025	0.1	0.025	5	25	50	50

* A Non Detect Multiplier of 0.5 has been applied.

Appendix D

30012537




Unit of Measurement	Total Recoverable Hydrocarbons							
	C6-C10	C10-C16	C16-C34	+C10-C36 (Sum of total)	C10-C40 (Sum of total)	C34-C40	F1 minus BTEX	F2 minus Naphthalene
	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
EQL	10	50	100	50	50	100	10	50
CRC Care Table 4 HSL-A Residential Direct Contact (Low Density)	4,400	3,300	4,500			6,300		
CRC Care Table B4 HSL-B Residential Direct Contact (High Density)	5,600	4,200	5,800			8,100		
CRC Care Table B3 HSL-A Vapour Intrusion (Maintenance Worker) Sand 0m to <2m								
NEPM 2013 Table 18(7) Management Limits in Res / Parkland, Coarse Soil	700	1,000	2,500			10,000		
NSW 2014 General Solid Waste CT1 (No Leaching)				10,000				
NSW 2014 General Solid Waste SCC1 (with leached)				10,000				
NSW 2014 General Solid Waste TCLP1 (leached)								
NSW 2014 Restricted Solid Waste CT2 (No Leaching)				40,000				
NEPM 2013 Table 1A(3) Res A/B Soil HSL for Vapour Intrusion, Sand 0-1m							45	110
1-2m							70	240
2-4m							110	440
>=4m							200	
NEPM 2013 Table 18(5) Generic EIL - Urban Res & Public Open Space								
NEPM 2013 Table 1A(1) HILs Res A Soil								

Field ID	Date	C6-C10	C10-C16	C16-C34	+C10-C36 (Sum of total)	C10-C40 (Sum of total)	C34-C40	F1 minus BTEX	F2 minus Naphthalene
TP01-0.1m	6/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP01-0.5m	6/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP02-1.0m	6/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP02-0.1m	6/12/2018								
TP02-1.0M DUP	6/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP03-0.1m	6/12/2018	-	-	-	-	-	-	-	-
TP04-0.1m	6/12/2018	-	-	-	-	-	-	-	-
TP05-0.1m	6/12/2018	-	-	-	-	-	-	-	-
TP06-0.1m	6/12/2018	-	-	-	-	-	-	-	-
TP07-0.1m	7/12/2018	-	-	-	-	-	-	-	-
TP07-0.6m	7/12/2018	-	-	-	-	-	-	-	-
TP08-0.1m	7/12/2018	-	-	-	-	-	-	-	-
TP08-0.6m	7/12/2018	-	-	-	-	-	-	-	-
TP08-2.0m	7/12/2018	-	-	-	-	-	-	-	-
TP08-2.4m	7/12/2018	-	-	-	-	-	-	-	-
TP09-0.1m	7/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP09-0.5m	7/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP09-0.5m DUP	7/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP09-1.1m	7/12/2018	-	-	-	-	-	-	-	-
TP10-0.1m	7/12/2018	-	-	-	-	-	-	-	-
TP11-0.2m	7/12/2018	<10	<50	<100	<50	<50	<100	<10	<50
TP11-0.2m	7/12/2018	-	-	-	-	-	-	-	-
TP12-0.1m	7/12/2018	-	-	-	-	-	-	-	-

Statistics									
Number of Results	8	8	8	8	8	8	8	8	8
Number of Detects	0	0	0	0	0	0	0	0	0
Minimum Concentration	<10	<50	<100	<50	<50	<100	<10	<50	
Minimum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND
Maximum Concentration	<10	<50	<100	<50	<50	<100	<10	<50	
Maximum Detect	ND	ND	ND	ND	ND	ND	ND	ND	ND
Average Concentration *	5	25	50	25	25	50	5	25	
Median Concentration *	5	25	50	25	25	50	5	25	
Standard Deviation *	0	0	0	0	0	0	0	0	
95% UCL (Student's-t) *	5	25	50	25	25	50	5	25	

* A Non Detect Multiplier of 0.5 has been applied.

Table E9 - Relative percentage difference - soils and sediment

					Metals								BTEX							TRH				PCB				
					Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Benzene	Toluene	Ethylbenzene	Xylene (m & p)	Xylene (o)	Xylene Total	Total BTEX	C6-C10	C6-C10 less BTEX (F1)	C 10-C16 less naphthalene (F2)	C16-C34 (F3)	C34-C40 (F4)	PAH B[a]P TEQ	Total PAHs	Total PCB	
LOR (ALS Laboratory)					5	1	2	5	5	0.1	2	5	0.2	0.5	0.5	0.5	0.5	0.5	0.2	10	10	50	100	100	0.6	0.5	0.1	
Sample ID	Depth (m)	Lab report	Date*	Matrix																								
Intra-laboratory duplicates																												
TP02	1.0M	1.0	ES1837559	7/12/2018	SOIL	<5	<1	11	<5	8	<0.1	2	27	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<100	<100	1.2	<0.5	<0.1
QC-01		1	ES1837559	7/12/2018	SOIL	<5	<1	10	<5	8	<0.1	<2	22	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<100	<100	1.2	<0.5	<0.1
RPD						N/A	N/A	10	N/A	0	N/A	N/A	20	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A
TP09	0.5M	0.5	ES1837559	7/12/2018	SOIL	<5	<1	12	<5	13	<0.1	<2	13	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<100	<100	1.2	<0.5	<0.1
QC-02		0.5	ES1837559	7/12/2018	SOIL	8	<1	13	<5	15	<0.1	2	13	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<10	<10	<50	<100	<100	1.2	<0.5	<0.1
RPD						N/A	N/A	8	N/A	14	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	N/A
Inter-laboratory duplicates																												
Results still to be provided																												

Notes:

*Sample dates have been corrected as per the field logs. Some differences with laboratory reports are noted.

BOLD

Indicates RPD is outside of control limits if:

-if result less than 10 times the LOR, then no limit.

-if result greater than 10 times the LOR, then control limit of 50 .

Appendix E Laboratory reports



CERTIFICATE OF ANALYSIS

Work Order : ES1837559
Client : SMEC AUSTRALIA PTY LTD
Contact : SAM VAUGHAN
Address : PO BOX 1052
NORTH SYDNEY NSW, AUSTRALIA 2060
Telephone : ---
Project : 30012537
Order number : 30012537
C-O-C number : ---
Sampler : MM
Site : ---
Quote number : EN/025/18 - Primary work
No. of samples received : 40
No. of samples analysed : 25

Page : 1 of 24
Laboratory : Environmental Division Sydney
Contact : Larissa Burns
Address : 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone : +6138549 9644
Date Samples Received : 13-Dec-2018 11:00
Date Analysis Commenced : 14-Dec-2018
Issue Date : 19-Dec-2018 10:50



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
Analytical Results
Descriptive Results
Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Table with 3 columns: Signatories, Position, Accreditation Category. Rows include Christopher Owler (Team Leader - Asbestos), Edwandy Fadjar (Organic Coordinator), Franco Lentini (Analyst), Kim McCabe (Senior Inorganic Chemist), and Satishkumar Trivedi (Senior Acid Sulfate Soil Chemist).



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
a = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- EP202: Particular samples required dilution due to sample matrix. LOR values have been adjusted accordingly.
- ASS: EA033 (CRS Suite): Retained Acidity not required because pH KCl greater than or equal to 4.5
- ASS: EA033 (CRS Suite): ANC not required because pH KCl less than 6.5
- ASS: EA037 (Rapid Field and F(α) screening): pH F(ox) Reaction Rate: 1 - Slight, 2 - Moderate, 3 - Strong, 4 - Extreme
- ASS: EA033 (CRS Suite): Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO₃) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m³ in-situ soil', multiply 'reported results' x 'wet bulk density of soil in t/m³'.
- EA037 ASS Field Screening: NATA accreditation does not cover performance of this service.
- EA200 'Am' - Amosite (brown asbestos)
- EA200 'Cr' - Crocidolite (blue asbestos)
- EA200 'Trace' - Asbestos fibres ("Free Fibres") detected by trace analysis per AS4964. The result can be interpreted that the sample contains detectable 'respirable' asbestos fibres
- EA200: Asbestos Identification Samples were analysed by Polarised Light Microscopy including dispersion staining.
- EA200 Legend
- EA200 'Ch' - Chrysotile (white asbestos)
- EA200: 'UMF' Unknown Mineral Fibres. "-" indicates fibres detected may or may not be asbestos fibres. Confirmation by alternative techniques is recommended.
- EA200: Negative results for vinyl tiles should be confirmed by an independent analytical technique.
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1,2,3-cd)pyrene (0.1), Dibenz(a,h)anthracene (1.0), Benzo(g,h,i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR.
Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EA200: For samples larger than 30g, the <2mm fraction may be sub-sampled prior to trace analysis as outlined in ISO23909:2008(E) Sect 6.3.2-2
- EA200: 'Yes' - Asbestos detected by polarised light microscopy including dispersion staining.
- EA200: 'No*' - No asbestos found, at the reporting limit of 0.1g/kg, by polarised light microscopy including dispersion staining. Asbestos material was detected and positively identified at concentrations estimated to be below 0.1g/kg.
- EA200: 'No' - No asbestos found at the reporting limit 0.1g/kg, by polarised light microscopy including dispersion staining.



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01-0.1m	TP01 - 0.5m	TP02. 0.1m	TP02-1.0m	TP03-0.1m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-001	ES1837559-002	ES1837559-004	ES1837559-005	ES1837559-006	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	16.0	19.2	16.1	14.1	5.8	
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	----	----	----	
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	----	----	----	
Asbestos Type	1332-21-4	-	--	-	----	----	----	----	
Sample weight (dry)	----	0.01	g	25.4	----	----	----	----	
APPROVED IDENTIFIER:	----	-	--	C.OWLER	----	----	----	----	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	<5	<5	<5	<5	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	6	10	5	11	7	
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5	
Lead	7439-92-1	5	mg/kg	15	11	9	8	8	
Nickel	7440-02-0	2	mg/kg	<2	2	<2	2	2	
Zinc	7440-66-6	5	mg/kg	14	8	<5	27	18	
EG005T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	----	<0.1	----	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
^A Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01-0.1m	TP01 - 0.5m	TP02. 0.1m	TP02-1.0m	TP03-0.1m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-001	ES1837559-002	ES1837559-004	ES1837559-005	ES1837559-006	
				Result	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin	72-20-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
^A Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
^A Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
^A Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	----	<0.2	----	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	<0.05	----	<0.05	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01-0.1m	TP01 - 0.5m	TP02. 0.1m	TP02-1.0m	TP03-0.1m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-001	ES1837559-002	ES1837559-004	ES1837559-005	ES1837559-006	
				Result	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Indeno(1,2,3,cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
^A Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
^A Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
^A Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	0.6	0.6	----	0.6	----	
^A Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	1.2	1.2	----	1.2	----	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	<10	----	
C10 - C14 Fraction	----	50	mg/kg	<50	<50	----	<50	----	
C15 - C28 Fraction	----	100	mg/kg	<100	<100	----	<100	----	
C29 - C36 Fraction	----	100	mg/kg	<100	<100	----	<100	----	
^A C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	----	<50	----	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	----	<10	----	
^A C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	----	<10	----	
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	----	<50	----	
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	----	<100	----	
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	----	<100	----	
^A >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	----	<50	----	
^A >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	----	<50	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01-0.1m	TP01 - 0.5m	TP02. 0.1m	TP02-1.0m	TP03-0.1m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-001	ES1837559-002	ES1837559-004	ES1837559-005	ES1837559-006	
				Result	Result	Result	Result	Result	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
^A Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
^A Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	----	<0.5	----	
Naphthalene	91-20-3	1	mg/kg	<1	<1	----	<1	----	
EP202A: Phenoxyacetic Acid Herbicides by LCMS									
4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
2,4-DB	94-82-6	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Dicamba	1918-00-9	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Mecoprop	93-85-2	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
MCPA	94-74-6	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
2,4-DP	120-36-5	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
2,4-D	94-75-7	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Triclopyr	55335-06-3	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
2,4,5-T	93-78-5	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
MCPB	94-81-5	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Picloram	1918-02-1	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Clopyralid	1702-17-6	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	----	<0.04	----	<0.04	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	111	119	----	112	----	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	98.9	----	91.9	----	140	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	72.4	----	60.8	----	91.2	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	72.9	73.8	----	74.8	----	
2-Chlorophenol-D4	93951-73-6	0.5	%	75.1	72.2	----	71.2	----	
2,4,6-Tribromophenol	118-79-6	0.5	%	67.8	54.7	----	52.8	----	
EP075(SIM)T: PAH Surrogates									

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP01-0.1m	TP01 - 0.5m	TP02. 0.1m	TP02-1.0m	TP03-0.1m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-001	ES1837559-002	ES1837559-004	ES1837559-005	ES1837559-006	
				Result	Result	Result	Result	Result	
EP075(SIM)T: PAH Surrogates - Continued									
2-Fluorobiphenyl	321-60-8	0.5	%	86.6	84.8	----	83.6	----	
Anthracene-d10	1719-06-8	0.5	%	84.4	83.5	----	82.1	----	
4-Terphenyl-d14	1718-51-0	0.5	%	80.5	79.9	----	80.2	----	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	110	109	----	116	----	
Toluene-D8	2037-26-5	0.2	%	96.4	94.5	----	90.8	----	
4-Bromofluorobenzene	460-00-4	0.2	%	99.1	102	----	90.3	----	
EP202S: Phenoxyacetic Acid Herbicide Surrogate									
2,4-Dichlorophenyl Acetic Acid	19719-28-9	0.02	%	56.4	----	55.4	----	54.3	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP04-0.1m	TP05-0.1m	TP06-0.1m	TP07-0.1m	TP07 -0.6m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-008	ES1837559-010	ES1837559-012	ES1837559-014	ES1837559-016	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	---	1.0	%	13.6	18.2	21.2	18.4	19.8	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	8	<5	<5	7	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	5	13	8	10	16	
Copper	7440-50-8	5	mg/kg	<5	<5	<5	<5	<5	
Lead	7439-92-1	5	mg/kg	10	26	18	13	15	
Nickel	7440-02-0	2	mg/kg	<2	4	3	<2	4	
Zinc	7440-66-6	5	mg/kg	6	11	8	9	14	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	<0.1	<0.1	<0.1	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
^A Total Chlordane (sum)	---	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
^A Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP04-0.1m	TP05-0.1m	TP06-0.1m	TP07-0.1m	TP07 -0.6m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-008	ES1837559-010	ES1837559-012	ES1837559-014	ES1837559-016	
				Result	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
[^] Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
[^] Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
	0-2								
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
EP202A: Phenoxyacetic Acid Herbicides by LCMS									
4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
2,4-DB	94-82-6	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Dicamba	1918-00-9	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Mecoprop	93-65-2	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
MCPA	94-74-6	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
2,4-DP	120-36-5	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
2,4-D	94-75-7	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Triclopyr	55335-06-3	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
2,4,5-T	93-76-5	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP04-0.1m	TP05-0.1m	TP06-0.1m	TP07-0.1m	TP07 -0.6m
Client sampling date / time				06-Dec-2018 00:00	06-Dec-2018 00:00	06-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-008	ES1837559-010	ES1837559-012	ES1837559-014	ES1837559-016	
				Result	Result	Result	Result	Result	
EP202A: Phenoxyacetic Acid Herbicides by LCMS - Continued									
MCPB	94-81-5	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Picloram	1918-02-1	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Clopyralid	1702-17-6	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.02	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21855-73-2	0.05	%	101	112	94.8	94.7	89.5	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	66.7	76.5	70.4	64.2	62.7	
EP202S: Phenoxyacetic Acid Herbicide Surrogate									
2,4-Dichlorophenyl Acetic Acid	19719-28-9	0.02	%	58.1	51.9	53.0	53.3	56.6	

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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP08-0.1m	TP08-0.6m	TP08-2.0m	TP08-2.4m	TP08-0.1m
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-017	ES1837559-020	ES1837559-021	ES1837559-022	ES1837559-023	
				Result	Result	Result	Result	Result	
EA033-A: Actual Acidity									
pH KCl (23A)	----	0.1	pH Unit	----	5.9	5.7	5.7	----	
Titrateable Actual Acidity (23F)	----	2	mole H+ / t	----	4	2	3	----	
sulfidic - Titrateable Actual Acidity (s-23F)	----	0.02	% pyrite S	----	<0.02	<0.02	<0.02	----	
EA033-B: Potential Acidity									
Chromium Reducible Sulfur (22B)	----	0.005	% S	----	0.015	0.006	0.006	----	
acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	----	<10	<10	<10	----	
EA033-E: Acid Base Accounting									
ANC Fineness Factor	----	0.5	-	----	1.5	1.5	1.5	----	
Net Acidity (sulfur units)	----	0.02	% S	----	0.02	<0.02	<0.02	----	
Net Acidity (acidity units)	----	10	mole H+ / t	----	13	<10	<10	----	
Liming Rate	----	1	kg CaCO3/t	----	<1	<1	<1	----	
Net Acidity excluding ANC (sulfur units)	----	0.02	% S	----	0.02	<0.02	<0.02	----	
Net Acidity excluding ANC (acidity units)	----	10	mole H+ / t	----	13	<10	<10	----	
Liming Rate excluding ANC	----	1	kg CaCO3/t	----	<1	<1	<1	----	
EA037: Ass Field Screening Analysis									
σ pH (F)	----	0.1	pH Unit	----	7.1	7.6	7.4	----	
σ pH (Fox)	----	0.1	pH Unit	----	5.3	5.6	5.7	----	
σ Reaction Rate	----	1	-	----	2	2	2	----	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	44.4	----	----	----	18.6	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	<5	----	----	----	<5	
Cadmium	7440-43-9	1	mg/kg	<1	----	----	----	<1	
Chromium	7440-47-3	2	mg/kg	7	----	----	----	13	
Copper	7440-50-8	5	mg/kg	<5	----	----	----	<5	
Lead	7439-92-1	5	mg/kg	14	----	----	----	13	
Nickel	7440-02-0	2	mg/kg	2	----	----	----	<2	
Zinc	7440-66-6	5	mg/kg	10	----	----	----	12	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	----	----	----	<0.1	
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	----	----	----	<0.1	
EP068A: Organochlorine Pesticides (OC)									

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 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP08-0.1m	TP08-0.6m	TP08-2.0m	TP08-2.4m	TP08-0.1m
Client sampling date / time					07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00
Compound	CAS Number	LOR	Unit	ES1837559-017	ES1837559-020	ES1837559-021	ES1837559-022	ES1837559-023	
				Result	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	----	----	----	----	<0.05
beta-BHC	319-85-7	0.05	mg/kg	<0.05	----	----	----	----	<0.05
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	----	----	----	----	<0.05
delta-BHC	319-86-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Heptachlor	76-44-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Aldrin	309-00-2	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	----	----	----	----	<0.05
^A Total Chlordane (sum)	----	0.05	mg/kg	<0.05	----	----	----	----	<0.05
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	----	----	----	----	<0.05
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Dieldrin	60-57-1	0.05	mg/kg	<0.05	----	----	----	----	<0.05
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Endrin	72-20-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	----	----	----	----	<0.05
^A Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	----	----	----	----	<0.05
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	----	----	----	----	<0.2
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	----	----	----	----	<0.2
^A Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	----	----	----	----	<0.05
^A Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-29-3	0.05	mg/kg	<0.05	----	----	----	----	<0.05
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	----	----	----	----	<0.2
Dimethoate	60-51-5	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Diazinon	333-41-5	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	----	----	----	----	<0.05
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	----	----	----	----	<0.2
Malathion	121-75-5	0.05	mg/kg	<0.05	----	----	----	----	<0.05

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 Project : 30012537



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP08-0.1m	TP08-0.6m	TP08-2.0m	TP08-2.4m	TP09-0.1m
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-017	ES1837559-020	ES1837559-021	ES1837559-022	ES1837559-023	
				Result	Result	Result	Result	Result	
EP068B: Organophosphorus Pesticides (OP) - Continued									
Fenthion	55-38-9	0.05	mg/kg	<0.05	----	----	----	<0.05	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	----	----	----	<0.05	
Parathion	56-38-2	0.2	mg/kg	<0.2	----	----	----	<0.2	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	----	----	----	<0.05	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	----	----	----	<0.05	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	----	----	----	<0.05	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	----	----	----	<0.05	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	----	----	----	<0.05	
Ethion	563-12-2	0.05	mg/kg	<0.05	----	----	----	<0.05	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	----	----	----	<0.05	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	----	----	----	<0.05	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	----	----	----	----	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	----	----	----	----	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	----	----	----	----	<0.5	
Fluorene	86-73-7	0.5	mg/kg	----	----	----	----	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	----	----	----	----	<0.5	
Anthracene	120-12-7	0.5	mg/kg	----	----	----	----	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	----	----	----	----	<0.5	
Pyrene	129-00-0	0.5	mg/kg	----	----	----	----	<0.5	
Benzo(a)anthracene	56-55-3	0.5	mg/kg	----	----	----	----	<0.5	
Chrysene	218-01-9	0.5	mg/kg	----	----	----	----	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	----	----	----	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	----	----	----	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	----	----	----	<0.5	
Indeno(1,2,3.cd)pyrene	193-39-5	0.5	mg/kg	----	----	----	----	<0.5	
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	----	----	----	----	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	----	----	----	----	<0.5	
^A Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	----	----	----	<0.5	
^A Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	----	----	----	<0.5	
^A Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	----	----	----	0.6	
^A Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	----	----	----	1.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	----	----	----	----	<10	

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 Client : SMEC AUSTRALIA PTY LTD
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Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP08-0.1m	TP08-0.6m	TP08-2.0m	TP08-2.4m	TP08-0.1m
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-017	ES1837559-020	ES1837559-021	ES1837559-022	ES1837559-023	
				Result	Result	Result	Result	Result	
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg	----	----	----	----	<50	
C15 - C28 Fraction	----	100	mg/kg	----	----	----	----	<100	
C29 - C36 Fraction	----	100	mg/kg	----	----	----	----	<100	
^A C10 - C36 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	----	----	----	----	<10	
^A C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	----	----	----	<10	
>C10 - C16 Fraction	----	50	mg/kg	----	----	----	----	<50	
>C16 - C34 Fraction	----	100	mg/kg	----	----	----	----	<100	
>C34 - C40 Fraction	----	100	mg/kg	----	----	----	----	<100	
^A >C10 - C40 Fraction (sum)	----	50	mg/kg	----	----	----	----	<50	
^A >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	----	----	----	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	----	----	----	----	<0.2	
Toluene	108-88-3	0.5	mg/kg	----	----	----	----	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	----	----	----	----	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	----	----	----	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	----	----	----	----	<0.5	
^A Sum of BTEX	----	0.2	mg/kg	----	----	----	----	<0.2	
^A Total Xylenes	----	0.5	mg/kg	----	----	----	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	----	----	----	----	<1	
EP202A: Phenoxyacetic Acid Herbicides by LCMS									
4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	----	----	----	<0.02	
2,4-DB	94-82-6	0.02	mg/kg	<0.04	----	----	----	<0.02	
Dicamba	1918-00-9	0.02	mg/kg	<0.04	----	----	----	<0.02	
Mecoprop	93-65-2	0.02	mg/kg	<0.04	----	----	----	<0.02	
MCPA	94-74-6	0.02	mg/kg	<0.04	----	----	----	<0.02	
2,4-DP	120-36-5	0.02	mg/kg	<0.04	----	----	----	<0.02	
2,4-D	94-75-7	0.02	mg/kg	<0.04	----	----	----	<0.02	
Triclopyr	55335-06-3	0.02	mg/kg	<0.04	----	----	----	<0.02	
2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	----	----	----	<0.02	
2,4,5-T	93-76-5	0.02	mg/kg	<0.04	----	----	----	<0.02	
MCPB	94-81-5	0.02	mg/kg	<0.04	----	----	----	<0.02	

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 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP08-0.1m	TP08-0.6m	TP08-2.0m	TP08-2.4m	TP09-0.1m
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-017	ES1837559-020	ES1837559-021	ES1837559-022	ES1837559-023	
				Result	Result	Result	Result	Result	
EP202A: Phenoxyacetic Acid Herbicides by LCMS - Continued									
Picloram	1918-02-1	0.02	mg/kg	<0.04	----	----	----	<0.02	
Clopyralid	1702-17-6	0.02	mg/kg	<0.04	----	----	----	<0.02	
Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	----	----	----	<0.02	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	----	----	----	----	108	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	106	----	----	----	111	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	77.0	----	----	----	82.8	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	----	----	----	----	74.9	
2-Chlorophenol-D4	93951-73-6	0.5	%	----	----	----	----	72.0	
2,4,6-Tribromophenol	118-79-6	0.5	%	----	----	----	----	54.5	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	----	----	----	----	85.1	
Anthracene-d10	1719-06-8	0.5	%	----	----	----	----	83.2	
4-Terphenyl-d14	1718-51-0	0.5	%	----	----	----	----	81.3	
EP080S: TPH(V)BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	----	----	----	107	
Toluene-D8	2037-26-5	0.2	%	----	----	----	----	84.8	
4-Bromofluorobenzene	460-00-4	0.2	%	----	----	----	----	91.8	
EP202S: Phenoxyacetic Acid Herbicide Surrogate									
2,4-Dichlorophenyl Acetic Acid	19719-28-9	0.02	%	51.4	----	----	----	62.3	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP09-0.1m	TP09-0.5m	TP09-0.5m	TP09-1.1m	TP09-0.5m DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-024	ES1837559-025	ES1837559-026	ES1837559-028	ES1837559-029	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	----	20.1	----	----	28.5	
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg	No	----	No	No	----	
Asbestos (Trace)	1332-21-4	5	Fibres	No	----	No	No	----	
Asbestos Type	1332-21-4	-	--	-	----	-	-	----	
Sample weight (dry)	----	0.01	g	281	----	454	450	----	
APPROVED IDENTIFIER:	----	-	--	C.OWMER	----	C.OWMER	C.OWMER	----	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	----	<5	----	----	8	
Cadmium	7440-43-9	1	mg/kg	----	<1	----	----	<1	
Chromium	7440-47-3	2	mg/kg	----	12	----	----	13	
Copper	7440-50-8	5	mg/kg	----	<5	----	----	<5	
Lead	7439-92-1	5	mg/kg	----	13	----	----	15	
Nickel	7440-02-0	2	mg/kg	----	<2	----	----	2	
Zinc	7440-66-6	5	mg/kg	----	13	----	----	13	
EG035T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	----	<0.1	----	----	<0.1	
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	----	----	<0.1	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	----	----	<0.5	
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	----	----	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	----	----	<0.5	
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	----	----	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	----	----	<0.5	
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(b+g)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	----	<0.5	
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	----	<0.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP09-0.1m	TP09-0.5m	TP09-0.5m	TP09-1.1m	TP09-0.5m DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-024	ES1837559-025	ES1837559-026	ES1837559-028	ES1837559-029	
				Result	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	0.6	----	----	0.6	
^A Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	1.2	----	----	1.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	----	<10	
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	<50	
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	<100	
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	<100	
^A C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	----	<10	
^A C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	----	<10	
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	<50	
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	<100	
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	<100	
^A >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50	
^A >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	<0.2	
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Sum of BTEX	----	0.2	mg/kg	----	<0.2	----	----	<0.2	
^A Total Xylenes	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	----	<1	----	----	<1	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	----	122	----	----	120	
EP075(SIM)S: Phenolic Compound Surrogates									

Page : 18 of 24
 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP09-0.1m	TP09-0.5m	TP09-0.5m	TP09-1.1m	TP09-0.5m DUP
				Client sampling date / time	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00
Compound	CAS Number	LOR	Unit	ES1837559-024	ES1837559-025	ES1837559-026	ES1837559-028	ES1837559-029	
				Result	Result	Result	Result	Result	
EP075(SIM)S: Phenolic Compound Surrogates - Continued									
Phenol-d6	13127-88-3	0.5	%	----	76.6	----	----	66.4	
2-Chlorophenol-D4	93951-73-6	0.5	%	----	80.1	----	----	75.2	
2,4,6-Tribromophenol	118-79-6	0.5	%	----	53.9	----	----	54.3	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%	----	87.3	----	----	88.9	
Anthracene-d10	1719-06-8	0.5	%	----	85.1	----	----	85.8	
4-Terphenyl-d14	1718-51-0	0.5	%	----	83.9	----	----	83.6	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	102	----	----	108	
Toluene-D8	2037-26-5	0.2	%	----	85.7	----	----	89.3	
4-Bromofluorobenzene	460-00-4	0.2	%	----	92.2	----	----	94.2	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP10-0.1m	TP11-0.2m	TP11-0.2m	TP12-0.1m	TP02_1.0M DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-030	ES1837559-034	ES1837559-035	ES1837559-036	ES1837559-039	
				Result	Result	Result	Result	Result	
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%	10.1	12.3	----	18.7	22.2	
EA200: AS 4964 - 2004 Identification of Asbestos in Soils									
Asbestos Detected	1332-21-4	0.1	g/kg	----	----	No	No	----	
Asbestos (Trace)	1332-21-4	5	Fibres	----	----	No	No	----	
Asbestos Type	1332-21-4	--	--	----	----	-	-	----	
Sample weight (dry)	----	0.01	g	----	----	366	17.2	----	
APPROVED IDENTIFIER:	----	-	--	----	----	C.OWMER	C.OWMER	----	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	7	6	----	6	<5	
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	<1	<1	
Chromium	7440-47-3	2	mg/kg	11	12	----	12	10	
Copper	7440-50-8	5	mg/kg	<5	<5	----	<5	<5	
Lead	7439-92-1	5	mg/kg	14	15	----	15	8	
Nickel	7440-02-0	2	mg/kg	2	2	----	2	<2	
Zinc	7440-66-6	5	mg/kg	14	12	----	6	22	
EG005T: Total Recoverable Mercury by FIMS									
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	<0.1	<0.1	
EP066: Polychlorinated Biphenyls (PCB)									
Total Polychlorinated biphenyls	----	0.1	mg/kg	----	<0.1	----	----	<0.1	
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
^A Total Chlordane (sum)	----	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP10-0.1m	TP11-0.2m	TP11-0.2m	TP12-0.1m	TP02_1.0M DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-030	ES1837559-034	ES1837559-035	ES1837559-036	ES1837559-039	
				Result	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
^A Endosulfan (sum)	115-29-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
^A Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
^A Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	----	<0.2	----	
Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	----	<0.05	----	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									
Naphthalene	91-20-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Acenaphthylene	208-96-8	0.5	mg/kg	----	<0.5	----	----	<0.5	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP10-0.1m	TP11-0.2m	TP11-0.2m	TP12-0.1m	TP02_1.0M DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-030	ES1837559-034	ES1837559-035	ES1837559-036	ES1837559-039	
				Result	Result	Result	Result	Result	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued									
Acenaphthene	83-32-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Fluorene	86-73-7	0.5	mg/kg	----	<0.5	----	----	<0.5	
Phenanthrene	85-01-8	0.5	mg/kg	----	<0.5	----	----	<0.5	
Anthracene	120-12-7	0.5	mg/kg	----	<0.5	----	----	<0.5	
Fluoranthene	206-44-0	0.5	mg/kg	----	<0.5	----	----	<0.5	
Pyrene	129-00-0	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benz(a)anthracene	56-55-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Chrysene	218-01-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(a)pyrene	50-32-8	0.5	mg/kg	----	<0.5	----	----	<0.5	
Indeno(1,2,3,cd)pyrene	193-39-5	0.5	mg/kg	----	<0.5	----	----	<0.5	
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	----	0.6	----	----	0.6	
^A Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	----	1.2	----	----	1.2	
EP080/071: Total Petroleum Hydrocarbons									
C6 - C9 Fraction	----	10	mg/kg	----	<10	----	----	<10	
C10 - C14 Fraction	----	50	mg/kg	----	<50	----	----	<50	
C15 - C28 Fraction	----	100	mg/kg	----	<100	----	----	<100	
C29 - C36 Fraction	----	100	mg/kg	----	<100	----	----	<100	
^A C10 - C36 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg	----	<10	----	----	<10	
^A C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	----	<10	----	----	<10	
>C10 - C16 Fraction	----	50	mg/kg	----	<50	----	----	<50	
>C16 - C34 Fraction	----	100	mg/kg	----	<100	----	----	<100	
>C34 - C40 Fraction	----	100	mg/kg	----	<100	----	----	<100	
^A >C10 - C40 Fraction (sum)	----	50	mg/kg	----	<50	----	----	<50	
^A >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	----	<50	----	----	<50	



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP10-0.1m	TP11-0.2m	TP11-0.2m	TP12-0.1m	TP02_1.0M DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-030	ES1837559-034	ES1837559-035	ES1837559-036	ES1837559-039	
				Result	Result	Result	Result	Result	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg	----	<0.2	----	----	<0.2	
Toluene	108-88-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg	----	<0.5	----	----	<0.5	
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	----	<0.5	----	----	<0.5	
ortho-Xylene	95-47-6	0.5	mg/kg	----	<0.5	----	----	<0.5	
^A Sum of BTEX	----	0.2	mg/kg	----	<0.2	----	----	<0.2	
^A Total Xylenes	----	0.5	mg/kg	----	<0.5	----	----	<0.5	
Naphthalene	91-20-3	1	mg/kg	----	<1	----	----	<1	
EP202A: Phenoxyacetic Acid Herbicides by LCMS									
4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
2,4-DB	94-82-6	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Dicamba	1918-00-9	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Mecoprop	93-85-2	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
MCPA	94-74-6	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
2,4-DP	120-36-5	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
2,4-D	94-75-7	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Triclopyr	55335-06-3	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
2,4,5-T	93-76-5	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
MCPB	94-81-5	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Picloram	1918-02-1	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Clopyralid	1702-17-6	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	<0.04	----	<0.04	----	
EP066S: PCB Surrogate									
Decachlorobiphenyl	2051-24-3	0.1	%	----	108	----	----	104	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%	87.0	95.8	----	124	----	
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%	102	63.0	----	89.1	----	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%	----	76.2	----	----	74.4	
2-Chlorophenol-D4	93951-73-6	0.5	%	----	73.2	----	----	72.7	
2,4,6-Tribromophenol	118-79-6	0.5	%	----	56.5	----	----	50.9	
EP075(SIM)T: PAH Surrogates									

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 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	TP10-0.1m	TP11-0.2m	TP11-0.2m	TP12-0.1m	TP02_1.0M DUP
Client sampling date / time				07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	07-Dec-2018 00:00	
Compound	CAS Number	LOR	Unit	ES1837559-030	ES1837559-034	ES1837559-035	ES1837559-036	ES1837559-039	
				Result	Result	Result	Result	Result	
EP075(SIM)T: PAH Surrogates - Continued									
2-Fluorobiphenyl	321-60-8	0.5	%	----	86.2	----	----	85.8	
Anthracene-d10	1719-06-8	0.5	%	----	83.5	----	----	84.0	
4-Terphenyl-d14	1718-51-0	0.5	%	----	81.8	----	----	84.7	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%	----	113	----	----	120	
Toluene-D8	2037-26-5	0.2	%	----	86.7	----	----	95.0	
4-Bromofluorobenzene	460-00-4	0.2	%	----	87.8	----	----	102	
EP202S: Phenoxyacetic Acid Herbicide Surrogate									
2,4-Dichlorophenyl Acetic Acid	19719-28-9	0.02	%	59.4	53.8	----	59.1	----	

Analytical Results

Descriptive Results

Method: Compound	Client sample ID - Client sampling date / time	Analytical Results
EA200: AS 4964 - 2004 Identification of Asbestos in Soils		
EA200: Description	TP01-0.1m - 06-Dec-2018 00:00	Mid brown clay soil
EA200: Description	TP09-0.1m - 07-Dec-2018 00:00	Mid brown clay soil
EA200: Description	TP09-0.5m - 07-Dec-2018 00:00	Mid brown clay soil
EA200: Description	TP09-1.1m - 07-Dec-2018 00:00	Mid brown clay soil
EA200: Description	TP11-0.2m - 07-Dec-2018 00:00	Mid brown clay soil
EA200: Description	TP12-0.1m - 07-Dec-2018 00:00	Mid brown clay soil



Surrogate Control Limits

Sub-Matrix: SOIL		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	39	149
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	49	147
EP068T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	35	143
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2,4,6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130
EP202S: Phenoxyacetic Acid Herbicide Surrogate			
2,4-Dichlorophenyl Acetic Acid	19719-28-9	45	139



QUALITY CONTROL REPORT

Work Order	: ES1837559	Page	: 1 of 12
Client	: SMEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: SAM VAUGHAN	Contact	: Larissa Burns
Address	: PO BOX 1052	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
	: NORTH SYDNEY NSW, AUSTRALIA 2060		
Telephone	: ---	Telephone	: +6138549 9644
Project	: 30012537	Date Samples Received	: 13-Dec-2018
Order number	: 30012537	Date Analysis Commenced	: 14-Dec-2018
C-O-C number	: ---	Issue Date	: 19-Dec-2018
Sampler	: MM		
Site	: ---		
Quote number	: EN/025/18 - Primary work		
No. of samples received	: 40		
No. of samples analysed	: 25		



This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full. This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Accreditation Category</i>
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 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
 CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 RPD = Relative Percentage Difference
 # = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: SOIL

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original Result	Duplicate Result	RPD (%)	Recovery Limits (%)
EA033-A: Actual Acidity (QC Lot: 2097917)									
EM1819703-005	Anonymous	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	<2	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	6.7	6.7	0.00	0% - 20%
ES1837559-020	TP08-0.6m	EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	<0.02	0.00	No Limit
		EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	4	3	0.00	No Limit
		EA033: pH KCl (23A)	----	0.1	pH Unit	5.9	6.1	3.33	0% - 20%
EA033-B: Potential Acidity (QC Lot 2097917)									
EM1819703-005	Anonymous	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.618	0.618	0.00	0% - 20%
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	385	386	0.00	0% - 20%
ES1837559-020	TP08-0.6m	EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	0.015	0.016	7.79	No Limit
		EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	<10	0.00	No Limit
EA037: Ass Field Screening Analysis (QC Lot: 2096702)									
EM1819815-075	Anonymous	EA037: pH (F)	----	0.1	pH Unit	5.5	5.4	1.84	0% - 20%
		EA037: pH (F ox)	----	0.1	pH Unit	3.2	3.3	0.00	0% - 20%
EW1805228-002	Anonymous	EA037: pH (F)	----	0.1	pH Unit	5.4	5.4	0.00	0% - 20%
		EA037: pH (F ox)	----	0.1	pH Unit	3.0	3.0	0.00	0% - 20%
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2097500)									
ES1837528-003	Anonymous	EA055: Moisture Content	----	0.1	%	19.5	17.2	12.8	0% - 50%
ES1837559-006	TP03-0.1m	EA055: Moisture Content	----	0.1	%	5.8	6.3	7.18	No Limit
EA055: Moisture Content (Dried @ 105-110°C) (QC Lot: 2097501)									
ES1837559-029	TP09-0.5m DUP	EA055: Moisture Content	----	0.1	%	28.5	25.6	10.8	0% - 20%
EG005T: Total Metals by ICP-AES (QC Lot: 2098367)									

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original ResuR	Duplicate ResuR	RPD (%)	Recovery Limits (%)
EG005T: Total Metals by ICP-AES (QC Lot: 2098367) - continued									
ES1837494-019	Anonymous	EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	50	53	6.72	0% - 20%
		EG005T: Nickel	7440-02-0	2	mg/kg	53	57	6.27	0% - 20%
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	26	28	7.78	No Limit
		EG005T: Lead	7439-92-1	5	mg/kg	6	6	0.00	No Limit
ES1837559-014	TP07-0.1m	EG005T: Zinc	7440-66-6	5	mg/kg	104	109	4.10	0% - 20%
		EG005T: Cadmium	7440-43-9	1	mg/kg	<1	<1	0.00	No Limit
		EG005T: Chromium	7440-47-3	2	mg/kg	10	14	40.2	No Limit
		EG005T: Nickel	7440-02-0	2	mg/kg	<2	<2	0.00	No Limit
		EG005T: Arsenic	7440-38-2	5	mg/kg	<5	<5	0.00	No Limit
		EG005T: Copper	7440-50-8	5	mg/kg	<5	<5	0.00	No Limit
EG035T: Total Recoverable Mercury by FIMS (QC Lot: 2098368)									
ES1837494-019	Anonymous	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
ES1837559-014	TP07-0.1m	EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP066: Polychlorinated Biphenyls (PCB) (QC Lot: 2093508)									
ES1837559-001	TP01-0.1m	EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	<0.1	0.00	No Limit
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2093509)									
ES1837559-030	TP10-0.1m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit

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Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original ResuR	Duplicate ResuR	RPD (%)	Recovery Limits (%)
EP068A: Organochlorine Pesticides (OC) (QC Lot: 2093509) - continued									
ES1837559-030	TP10-0.1m	EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
ES1837559-001	TP01-0.1m	EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2093509)									
ES1837559-030	TP10-0.1m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos M ethyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original ResuR	Duplicate ResuR	RPD (%)	Recovery Limits (%)
EP068B: Organophosphorus Pesticides (OP) (QC Lot: 2093509) - continued									
ES1837559-030	TP10-0.1m	EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
ES1837559-001	TP01-0.1m	EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	<0.05	0.00	No Limit
		EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2093506)									
ES1837559-001	TP01-0.1m	EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(b+g)fluoranthene	205-99-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Indeno(1,2,3-c,d)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	0.00	No Limit

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Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original ResuR	Duplicate ResuR	RPD (%)	Recovery Limits (%)
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QC Lot: 2093506) - continued									
ES1837559-001	TP01-0.1m	EP075(SIM): Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP075(SIM): Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2093507)									
ES1837559-001	TP01-0.1m	EP071: C15 - C28 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C29 - C36 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: C10 - C14 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Petroleum Hydrocarbons (QC Lot: 2094792)									
ES1836902-008	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
ES1836909-027	Anonymous	EP080: C6 - C9 Fraction	----	10	mg/kg	<10	<10	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM2013 Fractions (QC Lot: 2093507)									
ES1837559-001	TP01-0.1m	EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	<100	0.00	No Limit
		EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	<50	0.00	No Limit
EP080/071: Total Recoverable Hydrocarbons - NEPM2013 Fractions (QC Lot: 2094792)									
ES1836902-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
ES1836909-027	Anonymous	EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	0.00	No Limit
EP080: BTEXN (QC Lot: 2094792)									
ES1836902-008	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
ES1836909-027	Anonymous	EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	0.00	No Limit
		EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	0.00	No Limit
		EP080: Naphthalene	91-20-3	1	mg/kg	<1	<1	0.00	No Limit
EP202A: Phenoxyacetic Acid Herbicides by LCMS (QC Lot: 2099300)									
ES1837559-001	TP01-0.1m	EP202: 4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4-DB	94-82-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Dicamba	1918-00-9	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Mecoprop	93-65-2	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: MCPA	94-74-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4-DP	120-36-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit

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Sub-Matrix: SOIL				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	LOR	Unit	Original ResuR	Duplicate ResuR	RPD (%)	Recovery Limits (%)
EP202A: Phenoxyacetic Acid Herbicides by LCMS (QC Lot: 2099300) - continued									
ES1837559-001	TP01-0.1m	EP202: 2,4-D	94-75-7	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Triclopyr	55335-06-3	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4,5-T	93-76-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: MCPB	94-81-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Picloram	1918-02-1	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Clopyralid	1702-17-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
ES1837559-030	TP10-0.1m	EP202: 4-Chlorophenoxy acetic acid	122-88-3	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4-DB	94-82-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Dicamba	1918-00-9	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Mecoprop	93-65-2	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: MCPA	94-74-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4-DP	120-36-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4-D	94-75-7	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Triclopyr	55335-06-3	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: 2,4,5-T	93-76-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: MCPB	94-81-5	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Picloram	1918-02-1	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Clopyralid	1702-17-6	0.02	mg/kg	<0.04	<0.04	0.00	No Limit
		EP202: Fluroxypyr	69377-81-7	0.02	mg/kg	<0.04	<0.04	0.00	No Limit

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Method Blank (MB) and Laboratory Control Spike (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Spike (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: SOIL

Method/Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EA033-A: Actual Acidity (QCLot: 2097917)								
EA033: pH KCl (23A)	----	----	pH Unit	----	4.5 pH Unit	97.8	70	130
EA033: Titratable Actual Acidity (23F)	----	2	mole H+ / t	<2	24.6 mole H+ / t	99.8	70	130
EA033: sulfidic - Titratable Actual Acidity (s-23F)	----	0.02	% pyrite S	<0.02	----	----	----	----
EA033-B: Potential Acidity (QCLot: 2097917)								
EA033: Chromium Reducible Sulfur (22B)	----	0.005	% S	<0.005	0.23483 % S	94.4	70	130
EA033: acidity - Chromium Reducible Sulfur (a-22B)	----	10	mole H+ / t	<10	----	----	----	----
EG005T: Total Metals by ICP-AES (QCLot: 2098367)								
EG005T: Arsenic	7440-38-2	5	mg/kg	<5	21.7 mg/kg	107	86	126
EG005T: Cadmium	7440-43-9	1	mg/kg	<1	4.64 mg/kg	102	83	113
EG005T: Chromium	7440-47-3	2	mg/kg	<2	43.9 mg/kg	108	76	128
EG005T: Copper	7440-50-8	5	mg/kg	<5	32 mg/kg	107	86	120
EG005T: Lead	7439-92-1	5	mg/kg	<5	40 mg/kg	110	80	114
EG005T: Nickel	7440-02-0	2	mg/kg	<2	55 mg/kg	116	87	123
EG005T: Zinc	7440-66-6	5	mg/kg	<5	60.8 mg/kg	112	80	122
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2098368)								
EG035T: Mercury	7439-97-6	0.1	mg/kg	<0.1	2.57 mg/kg	70.8	70	105
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2093508)								
EP066: Total Polychlorinated biphenyls	----	0.1	mg/kg	<0.1	1 mg/kg	88.0	62	126
EP068A: Organochlorine Pesticides (OC) (QCLot: 2093509)								
EP068: alpha-BHC	319-84-6	0.05	mg/kg	<0.05	0.5 mg/kg	100	69	113
EP068: Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	0.5 mg/kg	96.9	65	117
EP068: beta-BHC	319-85-7	0.05	mg/kg	<0.05	0.5 mg/kg	75.9	67	119
EP068: gamma-BHC	58-89-9	0.05	mg/kg	<0.05	0.5 mg/kg	86.0	68	116
EP068: delta-BHC	319-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	81.6	65	117
EP068: Heptachlor	76-44-8	0.05	mg/kg	<0.05	0.5 mg/kg	96.0	67	115
EP068: Aldrin	309-00-2	0.05	mg/kg	<0.05	0.5 mg/kg	96.1	69	115
EP068: Heptachlor epoxide	1024-57-3	0.05	mg/kg	<0.05	0.5 mg/kg	95.8	62	118
EP068: trans-Chlordane	5103-74-2	0.05	mg/kg	<0.05	0.5 mg/kg	87.2	63	117
EP068: alpha-Endosulfan	959-98-8	0.05	mg/kg	<0.05	0.5 mg/kg	97.8	66	116
EP068: cis-Chlordane	5103-71-9	0.05	mg/kg	<0.05	0.5 mg/kg	89.2	64	116
EP068: Dieldrin	60-57-1	0.05	mg/kg	<0.05	0.5 mg/kg	105	66	116
EP068: 4,4'-DDE	72-55-9	0.05	mg/kg	<0.05	0.5 mg/kg	98.6	67	115
EP068: Endrin	72-20-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	67	123
EP068: beta-Endosulfan	33213-65-9	0.05	mg/kg	<0.05	0.5 mg/kg	93.2	69	115

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Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB)	Laboratory Control Spike (LCS) Report				
				Report	Spike Concentration	Spike Recovery (%)		Recovery Limits (%)	
				Result		LCS	Low	High	
EP068A: Organochlorine Pesticides (OC) (QCLot: 2093509) - continued									
EP068: 4,4'-DDD	72-54-8	0.05	mg/kg	<0.05	0.5 mg/kg	103	69	121	
EP068: Endrin aldehyde	7421-93-4	0.05	mg/kg	<0.05	0.5 mg/kg	84.9	56	120	
EP068: Endosulfan sulfate	1031-07-8	0.05	mg/kg	<0.05	0.5 mg/kg	108	62	124	
EP068: 4,4'-DDT	50-29-3	0.2	mg/kg	<0.2	0.5 mg/kg	102	66	120	
EP068: Endrin ketone	53494-70-5	0.05	mg/kg	<0.05	0.5 mg/kg	102	64	122	
EP068: Methoxychlor	72-43-5	0.2	mg/kg	<0.2	0.5 mg/kg	95.1	54	130	
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2093509)									
EP068: Dichlorvos	62-73-7	0.05	mg/kg	<0.05	0.5 mg/kg	97.4	59	119	
EP068: Demeton-S-methyl	919-86-8	0.05	mg/kg	<0.05	0.5 mg/kg	98.4	62	128	
EP068: Monocrotophos	6923-22-4	0.2	mg/kg	<0.2	0.5 mg/kg	96.6	54	126	
EP068: Dimethoate	60-51-5	0.05	mg/kg	<0.05	0.5 mg/kg	96.8	67	119	
EP068: Diazinon	333-41-5	0.05	mg/kg	<0.05	0.5 mg/kg	80.0	70	120	
EP068: Chlorpyrifos-methyl	5598-13-0	0.05	mg/kg	<0.05	0.5 mg/kg	83.1	72	120	
EP068: Parathion-methyl	298-00-0	0.2	mg/kg	<0.2	0.5 mg/kg	83.5	68	120	
EP068: Malathion	121-75-5	0.05	mg/kg	<0.05	0.5 mg/kg	87.8	68	122	
EP068: Fenthion	55-38-9	0.05	mg/kg	<0.05	0.5 mg/kg	90.1	69	117	
EP068: Chlorpyrifos	2921-88-2	0.05	mg/kg	<0.05	0.5 mg/kg	92.6	76	118	
EP068: Parathion	56-38-2	0.2	mg/kg	<0.2	0.5 mg/kg	86.1	64	122	
EP068: Pirimphos-ethyl	23505-41-1	0.05	mg/kg	<0.05	0.5 mg/kg	85.9	70	116	
EP068: Chlorfenvinphos	470-90-6	0.05	mg/kg	<0.05	0.5 mg/kg	83.7	69	121	
EP068: Bromophos-ethyl	4824-78-6	0.05	mg/kg	<0.05	0.5 mg/kg	92.2	66	118	
EP068: Fenamiphos	22224-92-6	0.05	mg/kg	<0.05	0.5 mg/kg	76.6	68	124	
EP068: Prothiofos	34643-46-4	0.05	mg/kg	<0.05	0.5 mg/kg	97.9	62	112	
EP068: Ethion	563-12-2	0.05	mg/kg	<0.05	0.5 mg/kg	90.8	68	120	
EP068: Carbophenothion	786-19-6	0.05	mg/kg	<0.05	0.5 mg/kg	97.7	65	127	
EP068: Azinphos Methyl	86-50-0	0.05	mg/kg	<0.05	0.5 mg/kg	70.1	41	123	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2093506)									
EP075(SIM): Naphthalene	91-20-3	0.5	mg/kg	<0.5	6 mg/kg	116	77	125	
EP075(SIM): Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	6 mg/kg	119	72	124	
EP075(SIM): Acenaphthene	83-32-9	0.5	mg/kg	<0.5	6 mg/kg	107	73	127	
EP075(SIM): Fluorene	86-73-7	0.5	mg/kg	<0.5	6 mg/kg	121	72	126	
EP075(SIM): Phenanthrene	85-01-8	0.5	mg/kg	<0.5	6 mg/kg	118	75	127	
EP075(SIM): Anthracene	120-12-7	0.5	mg/kg	<0.5	6 mg/kg	102	77	127	
EP075(SIM): Fluoranthene	206-44-0	0.5	mg/kg	<0.5	6 mg/kg	124	73	127	
EP075(SIM): Pyrene	129-00-0	0.5	mg/kg	<0.5	6 mg/kg	121	74	128	
EP075(SIM): Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	6 mg/kg	113	69	123	
EP075(SIM): Chrysene	218-01-9	0.5	mg/kg	<0.5	6 mg/kg	112	75	127	
EP075(SIM): Benz(a,b+)fluoranthene	205-99-2	0.5	mg/kg	<0.5	6 mg/kg	102	68	116	
	205-82-3								

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Sub-Matrix: SOIL

Method: Compound	CAS Number	LOR	Unit	Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
				Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
						LCS	Low	High
EP075(SIMB): Polynuclear Aromatic Hydrocarbons (QCLot: 2093506) - continued								
EP075(SIM): Benz o(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	6 mg/kg	104	74	126
EP075(SIM): Benz o(a)pyrene	50-32-8	0.5	mg/kg	<0.5	6 mg/kg	116	70	126
EP075(SIM): Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg	<0.5	6 mg/kg	66.8	61	121
EP075(SIM): Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg	<0.5	6 mg/kg	68.4	62	118
EP075(SIM): Benz o(g,h,i)perylene	191-24-2	0.5	mg/kg	<0.5	6 mg/kg	64.2	63	121
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2093507)								
EP071: C10 - C14 Fraction	----	50	mg/kg	<50	300 mg/kg	105	75	129
EP071: C15 - C28 Fraction	----	100	mg/kg	<100	450 mg/kg	110	77	131
EP071: C29 - C36 Fraction	----	100	mg/kg	<100	300 mg/kg	112	71	129
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2094792)								
EP080: C6 - C9 Fraction	----	10	mg/kg	<10	26 mg/kg	85.2	68	128
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2093507)								
EP071: >C10 - C16 Fraction	----	50	mg/kg	<50	375 mg/kg	94.4	77	125
EP071: >C16 - C34 Fraction	----	100	mg/kg	<100	525 mg/kg	104	74	138
EP071: >C34 - C40 Fraction	----	100	mg/kg	<100	225 mg/kg	103	63	131
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2094792)								
EP080: C6 - C10 Fraction	C6_C10	10	mg/kg	<10	31 mg/kg	80.0	68	128
EP080: BTEXN (QCLot: 2094792)								
EP080: Benzene	71-43-2	0.2	mg/kg	<0.2	1 mg/kg	98.0	62	116
EP080: Toluene	108-88-3	0.5	mg/kg	<0.5	1 mg/kg	96.1	67	121
EP080: Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	1 mg/kg	92.3	65	117
EP080: meta- & para-Xylene	108-38-3	0.5	mg/kg	<0.5	2 mg/kg	96.6	66	118
	106-42-3							
EP080: ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	1 mg/kg	95.7	68	120
EP080: Naphthalene	91-20-3	1	mg/kg	<1	1 mg/kg	98.1	63	119
EP202A: P-henoxyacetic Acid Herbicides by LCMS (QCLot: 2099300)								
EP202: 4-Chlorophenoxy acetic acid	122-89-3	0.02	mg/kg	<0.02	0.1 mg/kg	73.2	54	128
EP202: 2,4-DB	94-82-6	0.02	mg/kg	<0.02	0.1 mg/kg	79.9	46	130
EP202: Dicamba	1918-00-9	0.02	mg/kg	<0.02	0.1 mg/kg	83.4	52	135
EP202: Mecoprop	93-65-2	0.02	mg/kg	<0.02	0.1 mg/kg	75.5	60	130
EP202: MCPA	94-74-6	0.02	mg/kg	<0.02	0.1 mg/kg	74.1	57	131
EP202: 2,4-DP	120-36-5	0.02	mg/kg	<0.02	0.1 mg/kg	113	50	141
EP202: 2,4-D	94-75-7	0.02	mg/kg	<0.02	0.1 mg/kg	84.3	69	131
EP202: Triclopyr	55335-06-3	0.02	mg/kg	<0.02	0.1 mg/kg	97.2	51	141
EP202: 2,4,5-TP (Silvex)	93-72-1	0.02	mg/kg	<0.02	0.1 mg/kg	73.3	41	126
EP202: 2,4,5-T	93-76-5	0.02	mg/kg	<0.02	0.1 mg/kg	84.7	57	139
EP202: MCPB	94-81-5	0.02	mg/kg	<0.02	0.1 mg/kg	72.2	39	137
EP202: Picloram	1918-02-1	0.02	mg/kg	<0.02	0.1 mg/kg	64.0	49	129

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Sub-Matrix: SOIL				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
Method: Compound	CAS Number	LOR	Unit	Result	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
EP202A: Phenoxyacetic Acid Herbicides by LCMS (QCLot: 2099300) - continued								
						LCS	Low	High
EP202: Clopyralid	1702-17-6	0.02	mg/kg	<0.02	0.1 mg/kg	57.6	49	106
EP202: Fluoroxypyr	69377-81-7	0.02	mg/kg	<0.02	0.1 mg/kg	81.8	53	128

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

Sub-Matrix: SOIL				Matrix Spike (MS) Report			
Laboratory sample ID	Client sample ID	Method: Compound	CAS Number	Spike Concentration	Spike Recovery (%)	Recovery Limits (%)	
					MS	Low	High
EG005T: Total Metals by ICP-AES (QCLot: 2098367)							
ES1837494-019	Anonymous	EG005T: Arsenic	7440-38-2	50 mg/kg	92.3	70	130
		EG005T: Cadmium	7440-43-9	50 mg/kg	100.0	70	130
		EG005T: Chromium	7440-47-3	50 mg/kg	101	70	130
		EG005T: Copper	7440-50-8	250 mg/kg	101	70	130
		EG005T: Lead	7439-92-1	250 mg/kg	99.3	70	130
		EG005T: Nickel	7440-02-0	50 mg/kg	103	70	130
		EG005T: Zinc	7440-66-6	250 mg/kg	104	70	130
EG035T: Total Recoverable Mercury by FIMS (QCLot: 2098368)							
ES1837494-019	Anonymous	EG035T: Mercury	7439-97-6	5 mg/kg	82.9	70	130
EP066: Polychlorinated Biphenyls (PCB) (QCLot: 2093508)							
ES1837559-001	TP01-0.1m	EP066: Total Polychlorinated biphenyls	----	1 mg/kg	91.0	70	130
EP068A: Organochlorine Pesticides (OC) (QCLot: 2093509)							
ES1837559-001	TP01-0.1m	EP068: gamma-BHC	58-89-9	0.5 mg/kg	80.2	70	130
		EP068: Heptachlor	76-44-8	0.5 mg/kg	85.0	70	130
		EP068: Aldrin	309-00-2	0.5 mg/kg	96.6	70	130
		EP068: Dieldrin	60-57-1	0.5 mg/kg	82.4	70	130
		EP068: Endrin	72-20-8	2 mg/kg	108	70	130
		EP068: 4,4'-DDT	50-29-3	2 mg/kg	93.8	70	130
EP068B: Organophosphorus Pesticides (OP) (QCLot: 2093509)							
ES1837559-001	TP01-0.1m	EP068: Diazinon	333-41-5	0.5 mg/kg	99.0	70	130
		EP068: Chlorpyrifos-methyl	5598-13-0	0.5 mg/kg	79.7	70	130
		EP068: Pirimphos-ethyl	23505-41-1	0.5 mg/kg	96.0	70	130
		EP068: Bromophos-ethyl	4824-78-6	0.5 mg/kg	91.3	70	130
		EP068: Prothiofos	34643-46-4	0.5 mg/kg	75.8	70	130
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2093506)							
ES1837559-001	TP01-0.1m	EP075(SIM): Acenaphthene	83-32-9	10 mg/kg	91.3	70	130

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Sub-Matrix: **SOIL**

Laboratory sample ID	Client sample ID	Method/Compound	CAS Number	Matrix Spike (MS) Report				
				Spike Concentration	Spike Recovery (%)	Recovery Limits (%)		
				MS	Low	High		
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons (QCLot: 2093506) - continued								
ES1837559-001	TP01-0.1m	EP075(SIM): Pyrene	129-00-0	10 mg/kg	107	70	130	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2093507)								
ES1837559-001	TP01-0.1m	EP071: C10 - C14 Fraction	----	523 mg/kg	94.4	73	137	
		EP071: C15 - C28 Fraction	----	2319 mg/kg	102	53	131	
		EP071: C29 - C36 Fraction	----	1714 mg/kg	112	52	132	
EP080/071: Total Petroleum Hydrocarbons (QCLot: 2094792)								
ES1836902-008	Anonymous	EP080: C6 - C9 Fraction	----	32.5 mg/kg	79.1	70	130	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2093507)								
ES1837559-001	TP01-0.1m	EP071: >C10 - C16 Fraction	----	860 mg/kg	103	73	137	
		EP071: >C16 - C34 Fraction	----	3223 mg/kg	115	53	131	
		EP071: >C34 - C40 Fraction	----	1058 mg/kg	98.7	52	132	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions (QCLot: 2094792)								
ES1836902-008	Anonymous	EP080: C6 - C10 Fraction	C6_C10	37.5 mg/kg	74.5	70	130	
EP080: BTEXN (QCLot: 2094792)								
ES1836902-008	Anonymous	EP080: Benzene	71-43-2	2.5 mg/kg	88.2	70	130	
		EP080: Toluene	108-88-3	2.5 mg/kg	86.0	70	130	
		EP080: Ethylbenzene	100-41-4	2.5 mg/kg	80.5	70	130	
		EP080: meta- & para-Xylene	108-38-3	2.5 mg/kg	82.8	70	130	
			106-42-3					
		EP080: ortho-Xylene	95-47-6	2.5 mg/kg	84.5	70	130	
	91-20-3	2.5 mg/kg	104	70	130			
EP202A: Phenoxyacetic Acid Herbicides by LCMS (QCLot: 2099300)								
ES1837559-001	TP01-0.1m	EP202: Mecoprop	93-65-2	0.1 mg/kg	65.4	60	140	
		EP202: MCPA	94-74-6	0.1 mg/kg	68.3	57	143	
		EP202: 2,4-D	94-75-7	0.1 mg/kg	81.3	68	139	
		EP202: Triclopyr	55335-06-3	0.1 mg/kg	75.3	51	145	
		EP202: 2,4,5-T	93-76-5	0.1 mg/kg	88.7	57	142	
		EP202: Picloram	1918-02-1	0.1 mg/kg	62.6	49	138	
		EP202: Clopyralid	1702-17-6	0.1 mg/kg	72.1	49	149	



QA/QC Compliance Assessment to assist with Quality Review

Work Order	: ES1837559	Page	: 1 of 10
Client	: SMEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: SAM VAUGHAN	Telephone	: +6138549 9644
Project	: 30012537	Date Samples Received	: 13-Dec-2018
Site	: ---	Issue Date	: 19-Dec-2018
Sampler	: MM	No. of samples received	: 40
Order number	: 30012537	No. of samples analysed	: 25

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO** Method Blank value outliers occur.
- **NO** Duplicate outliers occur.
- **NO** Laboratory Control outliers occur.
- **NO** Matrix Spike outliers occur.
- For all regular sample matrices, **NO** surrogate recovery outliers occur.

Outliers : Analysis Holding Time Compliance

- **NO** Analysis Holding Time Outliers exist

Outliers : Frequency of Quality Control Samples

- **NO** Quality Control Sample Frequency Outliers exist



Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for **VOC in soils** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA033-A: Actual Acidity								
Snap Lock Bag - frozen (EA033) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	18-Dec-2018	07-Dec-2019	✓	18-Dec-2018	18-Mar-2019	✓
EA033-B: Potential Acidity								
Snap Lock Bag - frozen (EA033) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	18-Dec-2018	07-Dec-2019	✓	18-Dec-2018	18-Mar-2019	✓
EA033-C: Acid Neutralising Capacity								
Snap Lock Bag - frozen (EA033) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	18-Dec-2018	07-Dec-2019	✓	18-Dec-2018	18-Mar-2019	✓
EA033-D: Retained Acidity								
Snap Lock Bag - frozen (EA033) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	18-Dec-2018	07-Dec-2019	✓	18-Dec-2018	18-Mar-2019	✓
EA033-E: Acid Base Accounting								
Snap Lock Bag - frozen (EA033) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	18-Dec-2018	07-Dec-2019	✓	18-Dec-2018	18-Mar-2019	✓
EA037: Ass Field Screening Analysis								
Snap Lock Bag - frozen (EA037) TP08-0.6m, TP08-2.4m	TP08-2.0m,	07-Dec-2018	17-Dec-2018	05-Jun-2019	✓	17-Dec-2018	05-Jun-2019	✓

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 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EA055: Moisture Content (Dried @ 105-110°C)								
Soil Glass Jar - Unpreserved (EA055)								
TP01-0.1m, TP02-0.1m, TP03-0.1m, TP05-0.1m	TP01 - 0.5m, TP02-1.0m, TP04-0.1m, TP06-0.1m	06-Dec-2018	----	----	----	15-Dec-2018	20-Dec-2018	✓
Soil Glass Jar - Unpreserved (EA055)								
TP07-0.1m, TP08-0.1m, TP09-0.5m, TP10-0.1m, TP12-0.1m	TP07 -0.6m, TP09-0.1m, TP09-0.5m DUP, TP11-0.2m, TP02_1.0M DUP	07-Dec-2018	----	----	----	15-Dec-2018	21-Dec-2018	✓
EA200: AS 4964 - 2004 Identification of Asbestos in Soils								
Snap Lock Bag (EA200)								
TP09-0.1m, TP09-1.1m	TP09-0.5m, TP11-0.2m	07-Dec-2018	----	----	----	17-Dec-2018	05-Jun-2019	✓
Snap Lock Bag - Subsampled by ALS (EA200)								
TP01-0.1m		06-Dec-2018	----	----	----	17-Dec-2018	04-Jun-2019	✓
Snap Lock Bag - Subsampled by ALS (EA200)								
TP12-0.1m		07-Dec-2018	----	----	----	17-Dec-2018	05-Jun-2019	✓
EG005T: Total Metals by ICP-AES								
Soil Glass Jar - Unpreserved (EG005T)								
TP01-0.1m, TP02-0.1m, TP03-0.1m, TP05-0.1m	TP01 - 0.5m, TP02-1.0m, TP04-0.1m, TP06-0.1m	06-Dec-2018	17-Dec-2018	04-Jun-2019	✓	17-Dec-2018	04-Jun-2019	✓
Soil Glass Jar - Unpreserved (EG005T)								
TP07-0.1m, TP08-0.1m, TP09-0.5m, TP10-0.1m, TP12-0.1m	TP07 -0.6m, TP09-0.1m, TP09-0.5m DUP, TP11-0.2m, TP02_1.0M DUP	07-Dec-2018	17-Dec-2018	05-Jun-2019	✓	17-Dec-2018	05-Jun-2019	✓

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 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EG035T: Total Recoverable Mercury by FIMS								
Soil Glass Jar - Unpreserved (EG 035T)								
TP01-0.1m, TP02-0.1m, TP03-0.1m, TP05-0.1m, TP01-0.5m, TP02-1.0m, TP04-0.1m, TP06-0.1m	06-Dec-2018	17-Dec-2018	03-Jan-2019	✓	17-Dec-2018	03-Jan-2019	✓	
Soil Glass Jar - Unpreserved (EG 035T)								
TP07-0.1m, TP08-0.1m, TP09-0.5m, TP10-0.1m, TP12-0.1m, TP07-0.6m, TP09-0.1m, TP09-0.5m DUP, TP11-0.2m, TP02_1.0M DUP	07-Dec-2018	17-Dec-2018	04-Jan-2019	✓	17-Dec-2018	04-Jan-2019	✓	
EP066: Polychlorinated Biphenyls (PCB)								
Soil Glass Jar - Unpreserved (EP066)								
TP01-0.1m, TP02-1.0m, TP01-0.5m	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	
Soil Glass Jar - Unpreserved (EP066)								
TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP, TP09-0.5m, TP11-0.2m	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	
EP068A: Organochlorine Pesticides (OC)								
Soil Glass Jar - Unpreserved (EP068)								
TP01-0.1m, TP03-0.1m, TP05-0.1m, TP02-0.1m, TP04-0.1m, TP06-0.1m	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	
Soil Glass Jar - Unpreserved (EP068)								
TP07-0.1m, TP08-0.1m, TP10-0.1m, TP12-0.1m, TP07-0.6m, TP09-0.1m, TP11-0.2m	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	
EP068B: Organophosphorus Pesticides (OP)								
Soil Glass Jar - Unpreserved (EP068)								
TP01-0.1m, TP03-0.1m, TP05-0.1m, TP02-0.1m, TP04-0.1m, TP06-0.1m	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	
Soil Glass Jar - Unpreserved (EP068)								
TP07-0.1m, TP08-0.1m, TP10-0.1m, TP12-0.1m, TP07-0.6m, TP09-0.1m, TP11-0.2m	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓	

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Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Soil Glass Jar - Unpreserved (EP075(SIM)) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP075(SIM)) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
EP080.071: Total Petroleum Hydrocarbons								
Soil Glass Jar - Unpreserved (EP071) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	15-Dec-2018	20-Dec-2018	✓	16-Dec-2018	20-Dec-2018	✓
Soil Glass Jar - Unpreserved (EP071) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	15-Dec-2018	21-Dec-2018	✓	16-Dec-2018	21-Dec-2018	✓
EP080.071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
Soil Glass Jar - Unpreserved (EP071) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	14-Dec-2018	20-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	15-Dec-2018	20-Dec-2018	✓	16-Dec-2018	20-Dec-2018	✓
Soil Glass Jar - Unpreserved (EP071) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	14-Dec-2018	21-Dec-2018	✓	16-Dec-2018	23-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP080) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	15-Dec-2018	21-Dec-2018	✓	16-Dec-2018	21-Dec-2018	✓

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 Project : 30012537



Matrix: **SOIL** Evaluation: * = Holding time breach ; ✓ = Within holding time.

Method Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis			
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation	
EP080: BTEXN								
Soil Glass Jar - Unpreserved (EP080) TP01-0.1m, TP02-1.0m	TP01 - 0.5m,	06-Dec-2018	15-Dec-2018	20-Dec-2018	✓	16-Dec-2018	20-Dec-2018	✓
Soil Glass Jar - Unpreserved (EP080) TP09-0.1m, TP09-0.5m DUP, TP02_1.0M DUP	TP09-0.5m, TP11-0.2m,	07-Dec-2018	15-Dec-2018	21-Dec-2018	✓	16-Dec-2018	21-Dec-2018	✓
EP202A: Phenoxyacetic Acid Herbicides by LCMS								
Soil Glass Jar - Unpreserved (EP202) TP01-0.1m, TP03-0.1m, TP05-0.1m,	TP02. 0.1m, TP04-0.1m, TP06-0.1m	06-Dec-2018	17-Dec-2018	20-Dec-2018	✓	17-Dec-2018	26-Jan-2019	✓
Soil Glass Jar - Unpreserved (EP202) TP07-0.1m, TP08-0.1m, TP10-0.1m, TP12-0.1m	TP07 -0.6m, TP09-0.1m, TP11-0.2m,	07-Dec-2018	17-Dec-2018	21-Dec-2018	✓	17-Dec-2018	26-Jan-2019	✓



Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: * = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type	Analytical Methods	Method	Count		Rate (%)		Evaluation	Quality Control Specification
			QC	Regular	Actual	Exoected		
Laboratory Duplicates (DUP)								
ASS Field Screening Analysis		EA037	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Chromium Suite for Acid Sulphate Soils		EA033	2	16	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Moisture Content		EA055	3	27	11.11	10.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)		EP075(SIM)	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS		EP068	2	13	15.38	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Phenoxyacetic Acid Herbicides (LCMS - Standard DL)		EP202	2	14	14.29	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Poly chlorinated Biphenyls (PCB)		EP066	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	1	8	12.50	10.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	2	20	10.00	10.00	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)								
Chromium Suite for Acid Sulphate Soils		EA033	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)		EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS		EP068	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Phenoxyacetic Acid Herbicides (LCMS - Standard DL)		EP202	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Poly chlorinated Biphenyls (PCB)		EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)								
Chromium Suite for Acid Sulphate Soils		EA033	1	16	6.25	5.00	✓	NEPM 2013 B3 & ALS QC Standard
PAH/Phenols (SIM)		EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS		EP068	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Phenoxyacetic Acid Herbicides (LCMS - Standard DL)		EP202	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Poly chlorinated Biphenyls (PCB)		EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Mercury by FIMS		EG035T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES		EG005T	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction		EP071	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX		EP080	1	20	5.00	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Matrix Spikes (MS)								
PAH/Phenols (SIM)		EP075(SIM)	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Pesticides by GCMS		EP068	1	13	7.69	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Phenoxyacetic Acid Herbicides (LCMS - Standard DL)		EP202	1	14	7.14	5.00	✓	NEPM 2013 B3 & ALS QC Standard
Poly chlorinated Biphenyls (PCB)		EP066	1	8	12.50	5.00	✓	NEPM 2013 B3 & ALS QC Standard

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 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



Matrix: **SOIL** Evaluation: ✖ = Quality Control frequency not within specification ; ✔ = Quality Control frequency within specification.

Quality Control Sample Type	Method	Count		Rate (%)			Quality Control Specification
Analytical Methods		QC	Regular	Actual	Expected	Evaluation	
Matrix Spikes (MS) - Continued							
Total Mercury by FIMS	EG035T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
Total Metals by ICP-AES	EG005T	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH - Semivolatile Fraction	EP071	1	8	12.50	5.00	✔	NEPM 2013 B3 & ALS QC Standard
TRH Volatiles/BTEX	EP080	1	20	5.00	5.00	✔	NEPM 2013 B3 & ALS QC Standard



Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
Chromium Suite for Acid Sulphate Soils	EA033	SOIL	In house: Referenced to Ahern et al 2004. This method covers the determination of Chromium Reducible Sulfur (SCR); pHKCl; titratable actual acidity (TAA); acid neutralising capacity by back titration (ANC); and net acid soluble sulfur (SNAS) which incorporates peroxide sulfur. It applies to soils and sediments (including sands) derived from coastal regions. Liming Rate is based on results for samples as submitted and incorporates a minimum safety factor of 1.5.
ASS Field Screening Analysis	* FA037	SOIL	In house: Referenced to Acid Sulfate Soils Laboratory Methods Guidelines, version 2.1 June 2004. As received samples are tested for pH field and pH fox and assessed for a reaction rating.
Moisture Content	EA055	SOIL	In house: A gravimetric procedure based on weight loss over a 12 hour drying period at 105-110 degrees C. This method is compliant with NEPM (2013) Schedule B(3) Section 7.1 and Table 1 (14 day holding time).
Asbestos Identification in Soils	EA 200	SOIL	AS 4964 - 2004 Method for the qualitative identification of asbestos in bulk samples Analysis by Polarised Light Microscopy including dispersion staining
Total Metals by ICP-AES	EG005T	SOIL	In house: Referenced to APHA 3120; USEPA SW 846 - 6010. Metals are determined following an appropriate acid digestion of the soil. The ICPAES technique ionises samples in a plasma, emitting a characteristic spectrum based on metals present. Intensities at selected wavelengths are compared against those of matrix matched standards. This method is compliant with NEPM (2013) Schedule B(3)
Total Mercury by FIMS	EG035T	SOIL	In house: Referenced to AS 3550, APHA 3112 Hg - B (Flow-injection (SnCl ₂) (Cold Vapour generation) AAS) FIM-AAS is an automated flameless atomic absorption technique. Mercury in solids are determined following an appropriate acid digestion. Ionic mercury is reduced online to atomic mercury vapour by SnCl ₂ which is then purged into a heated quartz cell. Quantification is by comparing absorbance against a calibration curve. This method is compliant with NEPM (2013) Schedule B(3)
Polychlorinated Biphenyls (PCB)	EP066	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 504)
Pesticides by GCMS	EP068	SOIL	In house: Referenced to USEPA SW 846 - 8270D Extracts are analysed by Capillary GC/MS and quantification is by comparison against an established 5 point calibration curve. This technique is compliant with NEPM (2013) Schedule B(3) (Method 504,505)
TRH - Semivolatile Fraction	EP071	SOIL	In house: Referenced to USEPA SW 846 - 8015A Sample extracts are analysed by Capillary GC/FID and quantified against alkane standards over the range C10 - C40. Compliant with NEPM amended 2013.
PAH/Phenols (SIM)	EP075(SIM)	SOIL	In house: Referenced to USEPA SW 846 - 8270D. Extracts are analysed by Capillary GC/MS in Selective Ion Mode (SIM) and quantification is by comparison against an established 5 point calibration curve. This method is compliant with NEPM (2013) Schedule B(3) (Method 502 and 507)
TRH Volatiles/BTEX	EP080	SOIL	In house: Referenced to USEPA SW 846 - 8260B. Extracts are analysed by Purge and Trap, Capillary GC/MS. Quantification is by comparison against an established 5 point calibration curve. Compliant with NEPM amended 2013.

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 Work Order : ES1837559
 Client : SMEC AUSTRALIA PTY LTD
 Project : 30012537



<i>Analytical Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Phenoxyacetic Acid Herbicides (LCMS - Standard DL)	EP202	SOIL	In house: LCMS (Electrospray in negative mode). Residues of acid herbicides are extracted from soil samples under the alkaline condition. An aliquot of the alkaline aqueous phase is taken and acidified before a SPE cleanup. After eluting off from the SPE cartridge, residues of acid herbicides are dissolved in HPLC mobile phase prior to instrument analysis.
<i>Preparation Methods</i>	<i>Method</i>	<i>Matrix</i>	<i>Method Descriptions</i>
Drying only	EN020D	SOIL	In house
Drying at 85 degrees, bagging and labelling (ASS)	EN020PR	SOIL	In house
Hot Block Digest for metals in soils sediments and sludges	EN69	SOIL	In house: Referenced to USEPA 200.2. Hot Block Acid Digestion 1.0g of sample is heated with Nitric and Hydrochloric acids, then cooled. Peroxide is added and samples heated and cooled again before being filtered and bulked to volume for analysis. Digest is appropriate for determination of selected metals in sludge, sediments, and soils. This method is compliant with NEPM (2013) Schedule B(3) (Method 202)
Extraction for Phenoxy Acid Herbicides in Soils.	EP202-PR	SOIL	In-House: Alkaline extract followed by SPE clean up of acidified portion of the sample extract.
Methanolic Extraction of Soils for Purge and Trap	ORG16	SOIL	In house: Referenced to USEPA SW 846 - 5030A. 5g of solid is shaken with surrogate and 10mL methanol prior to analysis by Purge and Trap - GC/MS.
Tumbler Extraction of Solids	ORG17	SOIL	In house: Mechanical agitation (tumbler). 10g of sample, Na2SO4 and surrogate are extracted with 30mL 1:1 DCM/Acetone by end over end tumble. The solvent is decanted, dehydrated and concentrated (by KD) to the desired volume for analysis.

**SAMPLE RECEIPT NOTIFICATION (SRN)****Work Order : ES1837559**

Client	: SMEC AUSTRALIA PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: SAM VAUGHAN	Contact	: Larissa Burns
Address	: PO BOX 1052 NORTH SYDNEY NSW, AUSTRALIA 2060	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
E-mail	: sam.vaughan@smec.com	E-mail	: Larissa.burns@alsglobal.com
Telephone	: ---	Telephone	: +6138549 9644
Facsimile	: ---	Facsimile	: +61-2-8784 8500
Project	: 30012537	Page	: 1 of 4
Order number	: 30012537	Quote number	: EB2017SMEAU0004 (EN/025/18 - Primary work)
C-O-C number	: ---	QC Level	: NEPM 2013 B3 & ALS QC Standard
Site	: ---		
Sampler	: MM		

Dates

Date Samples Received	: 13-Dec-2018 11:00	Issue Date	: 14-Dec-2018
Client Requested Due Date	: 18-Dec-2018	Scheduled Reporting Date	: 18-Dec-2018

Delivery Details

Mode of Delivery	: Undefined	Security Seal	: Not Available
No. of coolers/boxes	: 2	Temperature	: 13.9°C - Ice present
Receipt Detail	:	No. of samples received / analysed	: 40 / 25

General Comments

- This report contains the following information:
 - Sample Container(s)/Preservation Non-Compliances
 - Summary of Sample(s) and Requested Analysis
 - Proactive Holding Time Report
 - Requested Deliverables
- This is an updated SRN which indicates a change in report recipients.
- **PH for and Chromium suit analysis will be conducted by ALS Brisbane.**
- **Sample TP02_0.5 received extra and place on hold, please confirm.**
- **Please refer to the Proactive Holding Time Report table below which summarises breaches of recommended holding times that have occurred prior to samples/instructions being received at the laboratory. The absence of this summary table indicates that all samples have been received within the recommended holding times for the analysis requested.**
- **Sample(s) requiring volatile organic compound analysis received in airtight containers (ZHE).**
- **Asbestos analysis will be conducted by ALS Newcastle.**
- **EA200: As only one sample container was submitted for multiple tests, sample 1 and 36 sub sampling was conducted prior to Asbestos analysis. As this has the potential to understate detection, results should be scrutinised accordingly and NATA accreditation does not apply to analysis on these samples.**
- Sample TP09_0.5m have been forwarded to ENVIROLAB.
- Please direct any queries you have regarding this work order to the above ALS laboratory contact.
- Analytical work for this work order will be conducted at ALS Sydney.
- Sample Disposal - Aqueous (3 weeks), Solid (2 months) from receipt of samples.



Sample Container(s)/Preservation Non-Compliances

All comparisons are made against pretreatment/preservation AS, APHA, USEPA standards.

Method Client sample ID	Sample Container Received	Preferred Sample Container for Analysis
Asbestos Identification in Soils : EA200		
TP01-0.1m	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Bag
TP12-0.1m	- Snap Lock Bag - Subsampled by ALS	- Snap Lock Bag - ACM/Asbestos Grab Bag

Summary of Sample(s) and Requested Analysis

Some items described below may be part of a laboratory process necessary for the execution of client requested tasks. Packages may contain additional analyses, such as the determination of moisture content and preparation tasks, that are included in the package.

If no sampling time is provided, the sampling time will default 00:00 on the date of sampling. If no sampling date is provided, the sampling date will be assumed by the laboratory and displayed in brackets without a time component

Matrix: **SOIL**

Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - E4055-103 Moisture Content	SOIL - EA200 Asbestos Identification in Soils -	SOIL - EP065 (solids) Polychlorinated Biphenyls by GC/MS	SOIL - EP 202(solids) Phenoxyacetic acids	SOIL - S-13 D/COP/PCB	SOIL - S-26 8 metals/TRH/BTE/XMP/AH
ES1837559-001	06-Dec-2018 00:00	TP01-0.1m		✓	✓		✓	✓	✓
ES1837559-002	06-Dec-2018 00:00	TP01 - 0.5m		✓		✓			✓
ES1837559-003	06-Dec-2018 00:00	TP01 -1.0m	✓						
ES1837559-004	06-Dec-2018 00:00	TP02. 0.1m		✓			✓		
ES1837559-005	06-Dec-2018 00:00	TP02-1.0m		✓		✓			✓
ES1837559-006	06-Dec-2018 00:00	TP03-0.1m		✓			✓		
ES1837559-007	06-Dec-2018 00:00	TP03-0.5m	✓						
ES1837559-008	06-Dec-2018 00:00	TP04-0.1m		✓			✓		
ES1837559-009	06-Dec-2018 00:00	TP04 - 0.3m	✓						
ES1837559-010	06-Dec-2018 00:00	TP05-0.1m		✓			✓		
ES1837559-011	06-Dec-2018 00:00	TP05 - 0.2m	✓						
ES1837559-012	06-Dec-2018 00:00	TP06-0.1m		✓			✓		
ES1837559-013	06-Dec-2018 00:00	TP06 -0.3m	✓						
ES1837559-014	07-Dec-2018 00:00	TP07-0.1m		✓			✓		
ES1837559-015	07-Dec-2018 00:00	TP07 -0.3m	✓						
ES1837559-016	07-Dec-2018 00:00	TP07 -0.6m		✓			✓		
ES1837559-017	07-Dec-2018 00:00	TP08-0.1m		✓			✓		
ES1837559-018	07-Dec-2018 00:00	TP08-0.3m	✓						
ES1837559-019	07-Dec-2018 00:00	TP08-0.6m	✓						
ES1837559-023	07-Dec-2018 00:00	TP09-0.1m		✓		✓	✓		✓
ES1837559-024	07-Dec-2018 00:00	TP09-0.1m			✓				
ES1837559-025	07-Dec-2018 00:00	TP09-0.5m		✓		✓			✓
ES1837559-026	07-Dec-2018 00:00	TP09-0.5m			✓				
ES1837559-027	07-Dec-2018 00:00	TP09-1.1m	✓						
ES1837559-028	07-Dec-2018 00:00	TP09-1.1m			✓				
ES1837559-029	07-Dec-2018 00:00	TP09-0.5m DUP		✓		✓			✓
ES1837559-030	07-Dec-2018 00:00	TP10-0.1m		✓			✓		
ES1837559-031	07-Dec-2018 00:00	TP10-0.1m	✓						
ES1837559-032	07-Dec-2018 00:00	TP10-0.4m	✓						
ES1837559-033	07-Dec-2018 00:00	TP10-0.4m	✓						
ES1837559-034	07-Dec-2018 00:00	TP11-0.2m		✓		✓	✓		✓

Issue Date : 14-Dec-2018
 Page : 3 of 4
 Work Order : ES1837559 Amendment 0
 Client : SMEC AUSTRALIA PTY LTD



Laboratory sample ID	Client sampling date / time	Client sample ID	(On Hold) SOIL No analysis requested	SOIL - E4055-103 Moisture Content	SOIL - E4200 Asbestos Identification in Soils -	SOIL - EP066 (solids) Polychlorinated Biphenyls by GCMS	SOIL - EP202(solids) Phenoxyacetic acids	SOIL - S-13 OC/OP/PCB	SOIL - S-26 8 metals/TRHBTEX/NP/AH
ES1837559-035	07-Dec-2018 00:00	TP11-0.2m							
ES1837559-036	07-Dec-2018 00:00	TP12-0.1m		✓	✓		✓		
ES1837559-037	07-Dec-2018 00:00	TP12-0.5	✓						
ES1837559-038	07-Dec-2018 00:00	TP02_0.5	✓						
ES1837559-039	07-Dec-2018 00:00	TP02_1.0M DUP		✓		✓			✓
ES1837559-040	07-Dec-2018 00:00	TP04_0.3m DUP	✓						

Matrix: SOIL

Laboratory sample ID	Client sampling date / time	Client sample ID	SOIL - E4033 Chromium Suite for Acid Sulphate Soils	SOIL - E4037 ASS Field Screening Analysis	SOIL - S-02 8 Metals (incl. Digestion)	SOIL - S-12 OC/OP Pesticides
ES1837559-004	06-Dec-2018 00:00	TP02_0.1m			✓	✓
ES1837559-006	06-Dec-2018 00:00	TP03-0.1m			✓	✓
ES1837559-008	06-Dec-2018 00:00	TP04-0.1m			✓	✓
ES1837559-010	06-Dec-2018 00:00	TP05-0.1m			✓	✓
ES1837559-012	06-Dec-2018 00:00	TP06-0.1m			✓	✓
ES1837559-014	07-Dec-2018 00:00	TP07-0.1m			✓	✓
ES1837559-016	07-Dec-2018 00:00	TP07 -0.6m			✓	✓
ES1837559-017	07-Dec-2018 00:00	TP08-0.1m			✓	✓
ES1837559-020	07-Dec-2018 00:00	TP08-0.6m	✓	✓		
ES1837559-021	07-Dec-2018 00:00	TP08-2.0m	✓	✓		
ES1837559-022	07-Dec-2018 00:00	TP08-2.4m	✓	✓		
ES1837559-023	07-Dec-2018 00:00	TP09-0.1m			✓	✓
ES1837559-030	07-Dec-2018 00:00	TP10-0.1m			✓	✓
ES1837559-034	07-Dec-2018 00:00	TP11-0.2m			✓	✓
ES1837559-036	07-Dec-2018 00:00	TP12-0.1m			✓	✓

Proactive Holding Time Report

Sample(s) have been received within the recommended holding times for the requested analysis.

Issue Date : 14-Dec-2018
Page : 4 of 4
Work Order : ES1837559 Amendment 0
Client : SMEC AUSTRALIA PTY LTD



Requested Deliverables

ACCOUNTS INVOICES

- A4 - AU Tax Invoice (INV) Email accounts.payable@smec.com

ADAM XANTHIS

- *AU Certificate of Analysis - NATA (COA) Email Adam.xanthis@smec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email Adam.xanthis@smec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email Adam.xanthis@smec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email Adam.xanthis@smec.com
- Chain of Custody (CoC) (COC) Email Adam.xanthis@smec.com
- EDI Format - ESDAT (ESDAT) Email Adam.xanthis@smec.com
- EDI Format - XTab (XTAB) Email Adam.xanthis@smec.com

MARK MAHARAJ

- *AU Certificate of Analysis - NATA (COA) Email mark.maharaj@smec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email mark.maharaj@smec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email mark.maharaj@smec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email mark.maharaj@smec.com
- A4 - AU Tax Invoice (INV) Email mark.maharaj@smec.com
- Chain of Custody (CoC) (COC) Email mark.maharaj@smec.com
- EDI Format - ESDAT (ESDAT) Email mark.maharaj@smec.com
- EDI Format - XTab (XTAB) Email mark.maharaj@smec.com

SAM VAUGHAN

- *AU Certificate of Analysis - NATA (COA) Email sam.vaughan@smec.com
- *AU Interpretive QC Report - DEFAULT (Anon QCI Rep) (QCI) Email sam.vaughan@smec.com
- *AU QC Report - DEFAULT (Anon QC Rep) - NATA (QC) Email sam.vaughan@smec.com
- A4 - AU Sample Receipt Notification - Environmental HT (SRN) Email sam.vaughan@smec.com
- Chain of Custody (CoC) (COC) Email sam.vaughan@smec.com
- EDI Format - ESDAT (ESDAT) Email sam.vaughan@smec.com
- EDI Format - XTab (XTAB) Email sam.vaughan@smec.com

CHAIN OF CUSTODY
 U.S. ENVIRONMENTAL PROTECTION AGENCY
 REGIONAL OFFICE FOR THE PACIFIC NORTHWEST
 1500 COMMERCIAL AVENUE, SUITE 2000
 SEASIDE, OREGON 97138

CLIENT: [Blank]
PROJECT: [Blank]
PROJECT NUMBER: [Blank]
PROJECT MANAGER: [Blank]
CLIENT PROJECT NUMBER: [Blank]
DATE OF SAMPLE: [Blank]
DATE RECEIVED: [Blank]
DATE ANALYZED: [Blank]

ANALYSIS REQUESTED: [Blank]
ANALYSIS METHOD: [Blank]
ANALYSIS LABORATORY: [Blank]
ANALYSIS DATE: [Blank]

CHAIN OF CUSTODY:
 RECEIVED BY: [Blank] RECEIVED BY: [Blank] RECEIVED BY: [Blank]
 DATE: [Blank] DATE: [Blank] DATE: [Blank]

ANALYSIS RESULTS:
 ANALYST: [Blank]
 DATE: [Blank]

LABORATORY USE ONLY:
 ANALYST: [Blank]
 DATE: [Blank]

CONTAINER INFORMATION:
 TYPE & PRESERVATIVE: [Blank]
 DATE & TIME: [Blank]

ANALYSIS RESULTS:
 ANALYST: [Blank]
 DATE: [Blank]

LABORATORY USE ONLY:
 ANALYST: [Blank]
 DATE: [Blank]

**Environmental Division
 Sydney
 Work Order Reference
 ES1837559**

Barcode: [Barcode]

Telephone: + 61 8 9399 9600

Appendix F Test pit logs

EXCAVATION - GEOLOGICAL LOG						PIT NO : TP01						
CLIENT : RDM		PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637						
LOCATION : Lot 202 DP874273; Woolgoolga; NSW		SURFACE ELEVATION :				SHEET : 1 OF 1						
POSITION : E: 518016.0, N: 6670368.0		METHOD : EX - 450mm bucket				FINAL DEPTH : 3 m						
EQUIPMENT TYPE : 5t CAT305E Excavator		LOGGED BY : MM				CHECKED BY :						
DATE EXCAVATED : 06/12/2018		EXCAVATION DIMENSIONS : 4.00 m LONG 0.60 m WIDE										
EXCAVATION			MATERIAL									
VE	EP	PH	SUPPORT	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETRATION (kPa)	STRUCTURE & Other Observations
				0.0m		OL	Sandy SILT: low plasticity, brown, trace clay, with trace roots/rootlets	D	Fr			TOPSOIL
				0.10m ES								
				0.50m ES		ML	Clayey SILT: low plasticity, mottled red brown, trace fine grained sand, with trace roots/rootlets		H			RESIDUAL SOIL
				0.60m DS								0.30: PP In-situ >600 kPa
				1.00m B			Silty CLAY: medium - high plasticity, mottled red brown					0.50: PP In-situ =400 - 600 kPa
				1.60m								0.60: PID = 0.0ppm
				1.80m								0.80: PP In-situ =360 - 600 kPa
				1.90m		CH		W < PL	VSt - H			1.00: PID = 0.1ppm
				2.20m			Silty CLAY: medium plasticity, mottled pale grey, red-orange					1.50: PP In-situ =300 - 600 kPa
				2.50m DS		CH			H			EXTREMELY WEATHERED MATERIAL
				2.60m DS								2.30: PP In-situ >600 kPa
				2.70m DS		GC	Clayey GRAVEL: fine to coarse, angular, blue-grey, mottled orange	D	VD			EXTREMELY WEATHERED MATERIAL / HIGHLY WEATHERED ROCK
				3.00m			Hole Terminated at 3.00 m Target Depth					
PHOTOGRAPHS NOTES			<input type="checkbox"/> YES <input type="checkbox"/> NO									
METHOD		PENETRATION		SAMPLES & FIELD TESTS		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/ RELATIVE DENSITY				
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering		<p>No Resistance</p> <p>10 Oct, 73 Water Level on Date shown</p> <p>water inflow</p> <p>water outflow</p>		ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test		Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense				
See Explanatory Notes for details of abbreviations & basis of descriptions.				SMC AUSTRALIA								

EXCAVATION - GEOLOGICAL LOG										PIT NO : TP02	
CLIENT : RDM			PROJECT : Preliminary Geotechnical and Environmental Investigation					PROJECT NUMBER : 30012637			
LOCATION : Lot 202 DP874273; Woolgoolga, NSW			SURFACE ELEVATION :					SHEET : 1 OF 1			
POSITION : E: 517892.0, N: 6670388.0			METHOD : EX - 450mm/300mm buckets					FINAL DEPTH : 1.6 m			
EQUIPMENT TYPE : 5t CAT305E Excavator			LOGGED BY : MM					CHECKED BY :			
DATE EXCAVATED : 06/12/2018			EXCAVATION DIMENSIONS : 4.00 m LONG 0.60 m WIDE								
EXCAVATION				MATERIAL							
VE	PH	SUPPORT	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETROMETER (kPa)	STRUCTURE & Other Observations
			0.0		OL	Clayey SILT: low plasticity, brown, trace fine sand, roots/rootlets	D	F			TOPSOIL
			0.10m ES			Silty CLAY: medium plasticity, orange brown mottled red, trace rootlets		H			RESIDUAL SOIL 0.20: PP In-situ = 600 kPa 0.20: HP = 600 kPa 0.30: PP In-situ = 350 - 460 kPa 0.30: HP = 350-450 kPa
			0.50m ES		CH		W < PL				0.50: PID = 0.0 ppm
			0.80m DS					Vst - H			
			1.00m BS		SC	Clayey SAND: fine grained, white mottled orange, with ironstone gravel, with silt	M	MD			EXTREMELY WEATHERED MATERIAL 0.90: PP In-situ = 300 - 600 kPa 0.90: HP = 300-600 kPa 0.91: PID = 0.0 ppm 1.10: 300mm to eath bucket below 1.3m
			1.30m B			ARGILLITE: fine grained, pale grey, distinct foliations, low to medium strength, orange staining		D			HIGHLY WEATHERED ROCK 1.30: Closely Fractured 80-100mm, planar jointing/bedding
			1.60m			Hole Terminated at 1.60 m Material Refusal					
			2.0								
			2.5								
			3.0								
			3.5								
PHOTOGRAPHS NOTES			<input type="checkbox"/> YES <input type="checkbox"/> NO								
METHOD		PENETRATION		SAMPLES & FIELD TESTS			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/ RELATIVE DENSITY		
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering				ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test			Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense		
See Explanatory Notes for details of abbreviations & basis of descriptions.				SMC AUSTRALIA							

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP03
PROJECT NUMBER : 30012637
SHEET : 1 OF 1
FINAL DEPTH : 0.9 m

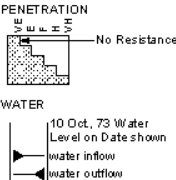
CLIENT : RDM **PROJECT :** Preliminary Geotechnical and Environmental Investigation
LOCATION : Lot 202 DP874273; Woolgoolga, NSW

POSITION : E: 517721.0, N: 6670396.0 **SURFACE ELEVATION :**

EQUIPMENT TYPE : CAT305E Excavator **METHOD :** EX - 450mm/300mm buckets

DATE EXCAVATED : 06/12/2018 **LOGGED BY :** MM **CHECKED BY :**

EXCAVATION DIMENSIONS : 3.50 m LONG 0.45 m WIDE

EXCAVATION				MATERIAL								
VE E F H	SUPPORT	CROWN/WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY	POCKET PENETROMETER	STRUCTURE & Other Observations			
				0.0	GM	0.00m Silty GRAVEL: fine to coarse, angular, roots/rootlets	D	Fr	-	TOPSOIL		
			ES-1	0.10m	GM	Sandy Silty GRAVEL: fine to coarse, angular, pale brown, roots/rootlets	D	-	-	EXTREMELY WEATHERED ROCK		
		Not Observed		0.50m	GM		D	-	-	0.50: 300mm toothed bucket below 0.5m		
			DS-1 ES-1	0.60m	GM	ARGILLITE: fine grained, grey, highly to moderately weathered, low to medium strength, orange staining	D	-	-	WEATHERED ROCK		
				0.90m	GM	Hole Terminated at 0.90 m Material Refusal	D	-	-	0.75: numerous subhorizontal and subvertical defects		
				1.0								
				1.5								
				2.0								
				2.5								
				3.0								
				3.5								
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO												
METHOD N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering		PENETRATION 		SAMPLES & FIELD TESTS ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System MOISTURE D Dry M Moist W Wet			CONSISTENCY/RELATIVE DENSITY VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense		
See Explanatory Notes for details of abbreviations & basis of descriptions.												

SMC AUSTRALIA



EXCAVATION - GEOLOGICAL LOG										PIT NO : TP04	
CLIENT : RDM				PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637			
LOCATION : Lot 202 DP874273; Woolgoolga, NSW				SURFACE ELEVATION :				SHEET : 1 OF 1			
POSITION : E: 517774.0, N: 6670305.0				METHOD : EX - 450mm/300mm buckets				FINAL DEPTH : 2.1 m			
EQUIPMENT TYPE : 5t CAT305E Excavator				LOGGED BY : MM				CHECKED BY :			
DATE EXCAVATED : 06/12/2018				EXCAVATION DIMENSIONS : 3.50 m LONG 0.50 m WIDE							
EXCAVATION					MATERIAL						
VE	EF	PH	SUPPORT	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETROMETER	STRUCTURE & Other Observations
				0.0		Clayey SILT: low plasticity, brown, roots/rootlets	D	Fr			TOPSOIL
				0.10m		Silty CLAY: medium plasticity, red brown		H			RESIDUAL SOIL 0.10: PID = 0.0ppm
				0.30m			W < PL				0.30: PP In-situ > 600 kPa 0.30: PID = 0.0ppm
				0.50m	CH						0.50: PP In-situ = 400 kPa 0.70: PP In-situ = 350 kPa 0.70: PID = 0.0ppm
				0.50m		Silty CLAY: medium plasticity, pale grey mottled red, with fine to medium grained, angular gravel	VSt - H				EXTREMELY WEATHERED ROCK
				1.00m	CH		W = PL				1.40: 300mm to other bucket used below 1.5m depth HIGHLY WEATHERED ROCK
				1.50m		ARGILLITE: fine grained, pale grey, distinct fabric, foliations and planar bedding, low to medium strength, orange staining					
				2.10m		Hole Terminated at 2.10 m Material Refusal					
				2.5							
				3.0							
				3.5							
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO											
METHOD		PENETRATION		SAMPLES & FIELD TESTS			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION			CONSISTENCY/ RELATIVE DENSITY	
N	Natural Exposure	No Resistance		ES	Environmental Sample	Based on Unified Classification System			VS	Very Soft	
X	Existing Excavation	WATER		DS	Disturbed Sample	MOISTURE			S	Soft	
BH	Backhoe Bucket	10 Oct, 73 Water Level on Date shown		B	Bulk Disturbed Sample	D Dry			F	Firm	
B	Bulldozer Blade	water inflow		MC	Moisture Content	M Moist			St	Stiff	
R	Ripper	water outflow		HP	Hand Penetrometer (kPa) Vane	W Wet			VSt	Very Stiff	
EX	Hydraulic Excavator			VS	Shear, P-Peak, R-Remoulded (uncorrected kPa)				H	Hard	
EH	Excavator with Hammer			PBT	Plate Bearing Test				VL	Very Loose	
T	Timbering									L	Loose
										MD	Medium Dense
										D	Dense
										VD	Very Dense
See Explanatory Notes for details of abbreviations & basis of descriptions.											
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EXCAVATION - GEOLOGICAL LOG						PIT NO : TP05			
CLIENT : RDM		PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637			
LOCATION : Lot 202 DP874273; Woolgoolga, NSW		SURFACE ELEVATION :				SHEET : 1 OF 1			
POSITION : E: 517833.0, N: 6670238.0		METHOD : EX - 450mm buckets				FINAL DEPTH : 3 m			
EQUIPMENT TYPE : 5 CAT305E Excavator		LOGGED BY : MM				CHECKED BY :			
DATE EXCAVATED : 06/12/2018		EXCAVATION DIMENSIONS : 4.00 m LONG 0.60 m WIDE							
EXCAVATION			MATERIAL						
VE E F P H	SUPPORT	ORDINARY WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY	POCKET K PENETRO- METER	STRUCTURE & Other Observations
				0.0	OL	Clayey SILT: low plasticity, dark brown, trace fine sand, trace roots/rootlets	M	Fr	TOPSOIL
			ES	0.15m	ML	Clayey SILT: low plasticity, red-brown, rootlets	W < PL	Fr	RESIDUAL SOIL
				0.5	CH	Silty CLAY: medium to high plasticity, red-brown, some carbonaceous charcoal inclusions (black), trace fine sand	W = PL	VS to H	0.30: PP In-situ = 500 kPa 0.30: PID = 0.0 ppm
			DS	0.70m	CH	Silty CLAY: high plasticity, mottled red-grey, trace ironstone gravel	W = PL	VS to H	0.50: PP In-situ = 350 kPa 0.70: PID = 0.0 ppm 0.80: PP In-situ = 350 kPa
				1.10m	CH	Silty CLAY: high plasticity, mottled red-grey, with fine to coarse grained gravel, remnant rock fabric	W = PL	VS to H	1.10: PP In-situ = 350 - 400 kPa
				2.20m	CH	Hole Terminated at 3.00 m Target Depth			EXTREMELY WEATHERED MATERIAL
				2.40m	CH	minor water seepage below 2.4m	W		
				3.00m					
PHOTOGRAPHS NOTES		<input type="checkbox"/> YES <input type="checkbox"/> NO							
METHOD		PENETRATION		SAMPLES & FIELD TESTS		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/RELATIVE DENSITY	
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering		<p>10 Oct., 73 Water Level on Date shown</p> <p>water inflow</p> <p>water outflow</p>		ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test		Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff VSst Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense	
See Explanatory Notes for details of abbreviations & basis of descriptions.				SMC AUSTRALIA					

EXCAVATION - GEOLOGICAL LOG										PIT NO : TP06																
CLIENT : RDM			PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637			SHEET : 1 OF 1																
LOCATION : Lot 202 DP874273; Woolgoolga, NSW			SURFACE ELEVATION :				FINAL DEPTH : 3 m																			
POSITION : E: 517938.0, N: 6670256.0			EQUIPMENT TYPE : CAT305E Excavator				METHOD : EX - 450mm/300mm buckets			CHECKED BY :																
DATE EXCAVATED : 06/12/2018			LOGGED BY : MM																							
EXCAVATION DIMENSIONS : 4.00 m LONG 0.60 m WIDE																										
EXCAVATION					MATERIAL																					
VE	EP	PH	SUPPORT	ORIGIN/WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETROMETER	STRUCTURE & Other Observations												
						0.0		OL	Clayey SILT: low plasticity, dark brown, roots/rootlets	M	Fr			TOPSOIL												
					ES	0.10m		ML	Clayey SILT: medium plasticity, brown, rootlets	W < PL	H			RESIDUAL SOIL 0.10: PID = 0.0 ppm												
					ES	0.30m		CH	Silty CLAY: medium to high plasticity, brown-orange	W = PL				0.30: PP In-situ = 200 kPa 0.30: PID = 0.0 ppm												
					DS	0.50m		CH	Silty CLAY: high plasticity, grey mottled orange, trace carbonaceous inclusions As above, becomes mottled red-grey	St to VS				0.50: PP In-situ = 150 - 200 kPa 0.50: PID = 0.0 ppm 0.60: 300mm toothed bucket used below 0.5m depth												
					DS	1.00m		CH		VS				0.80: PP In-situ = 200 kPa 1.00: PP In-situ = 200 - 300 kPa												
					DS	2.00m		CH	Sandy CLAY: high plasticity, mottled pale grey-orange, with some clayey sand lenses	W > PL				1.50: PP In-situ = 200 kPa 2.00: Moderate water seepage into pit between 2.0m and 2.2m												
					DS	2.90m		CH		St to VS																
						3.00m			Hole Terminated at 3.00 m Target Depth																	
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO																										
METHOD		PENETRATION		SAMPLES & FIELD TESTS		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System			CONSISTENCY/RELATIVE DENSITY																	
N Natural Exposure	X Existing Excavation	BH Backhoe Bucket	B Bulldozer Blade	R Ripper	EX Hydraulic Excavator	EH Excavator with Hammer	T Timbering	ES Environmental Sample	DS Disturbed Sample	B Bulk Disturbed Sample	MC Moisture Content	HP Hand Penetrometer (kPa) Vane	VS Shear; P-Peak	R-Remoulded (uncorrected kPa)	PBT Plate Bearing Test	VS Very Soft	S Soft	F Firm	St Stiff	VSt Very Stiff	H Hard	VL Very Loose	L Loose	MD Medium Dense	D Dense	VD Very Dense
See Explanatory Notes for details of abbreviations & basis of descriptions.		<p>10 Oct., 73 Water Level on Date shown water inflow water outflow</p>				<p>MOISTURE</p> <p>D Dry M Moist W Wet</p>																				

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EXCAVATION - GEOLOGICAL LOG										PIT NO : TP07		
CLIENT : RDM				PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637				
LOCATION : Lot 202 DP874273; Woolgoolga; NSW				SURFACE ELEVATION :				SHEET : 1 OF 1				
POSITION : E: 517954.0, N: 6670159.0				EQUIPMENT TYPE : CAT305E Excavator				METHOD : EX - 450mm/300mm buckets				
DATE EXCAVATED : 07/12/2018				LOGGED BY : MM				CHECKED BY :				
EXCAVATION DIMENSIONS : 3.50 m LONG 0.50 m WIDE												
EXCAVATION					MATERIAL							
VE	EP	PH	SUPPORT	DEPTH (m)	GRAPHIC LOG SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETROMETER (kPa)	STRUCTURE & Other Observations	
				0.0								
				0.10m	OL	Clayey SILT: low plasticity, dark brown, trace fine sand, roots/rootlets	D	Fr			TOPSOIL	
				0.30m	ML	Clayey SILT: low to medium plasticity, or orange-brown, trace rootlets	W < PL	Fr			0.10: PID = 0.0ppm RESIDUAL SOIL	
				0.50m	CH	Silty CLAY: medium plasticity, mottled orange-grey	W = PL	VS			0.30: PID = 0.0 ppm 0.40: PP In-situ = 400 kPa 0.50: PP In-situ = 350 kPa 0.60: PP In-situ = 300 kPa 0.60: PID = 0.0 ppm	
				0.80m	CH	CLAY: high plasticity, pale grey with orange, trace rootlets	W > PL	S			0.80: PP In-situ = 180 kPa	
				1.05m	GP	Clayey GRAVEL: medium to coarse, angular, blue grey ARGILLITE: blue grey, highly fractured, fracture spacing typically less than 50mm, moderately weathered, high strength, stained red		MD			EXTREMELY WEATHERED MATERIAL WEATHERED ROCK 1.10: Switched to 300mm toothed bucket below 1.1m	
				1.60m		Hole Terminated at 1.60 m Material Refusal						
				2.0								
				2.5								
				3.0								
				3.5								
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO												
METHOD		PENETRATION		SAMPLES & FIELD TESTS			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/RELATIVE DENSITY			
N	Natural Exposure	No Resistance		ES	Environmental Sample	Based on Unified Classification System		VS	Very Soft			
X	Existing Excavation	WATER		DS	Disturbed Sample	MOISTURE		S	Soft			
BH	Backhoe Bucket	10 Oct, 73 Water Level on Date shown		B	Bulk Disturbed Sample	D Dry		F	Firm			
B	Bulldozer Blade	water inflow		MC	Moisture Content	M Moist		St	Stiff			
R	Ripper	water outflow		HP	Hand Penetrometer (kPa) Vane	W Wet		VSt	Very Stiff			
EX	Hydraulic Excavator			VS	Shear, P-Peak, R-Remoulded (uncorrected kPa)			H	Hard			
EH	Excavator with Hammer			PBT	Plate Bearing Test			VL	Very Loose			
T	Timbering								L	Loose		
										MD	Medium Dense	
										D	Dense	
										VD	Very Dense	
See Explanatory Notes for details of abbreviations & basis of descriptions.					SMC AUSTRALIA					SMC		

EXCAVATION				MATERIAL			
VE E P PENETRATION F H		SUPPORT		MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components		STRUCTURE & Other Observations	
ORIGIN/WATER LEVELS		SAMPLES & FIELD TESTS		MOISTURE CONDITION		PENETRATION	
DEPTH (m)		GRAPHIC LOG		CONSISTENCY RELATIVE DENSITY		POCKET PENETROMETER	
CLASSIFICATION SYMBOL		CLASSIFICATION SYMBOL		W > PL		KPa	
0.0		OH		F to St		TOPSOIL	
0.10m ES		0.20m		X		0.05: Peeds on surface. Low lying poorly drained land. 0.10: PID = 0.0 ppm	
0.30m DS ES		As above, orange and greystreaks		X		ALLUVIUM	
0.60m B DS ES		Net Observed		X		0.30: PP In-situ = 90 kPa 0.30: PID = 0.0 ppm 0.40: PP In-situ = 110 kPa 0.40: PID = 0.0 ppm	
1.0		CH		X		0.60: PP In-situ = 120 kPa 0.60: PID = 0.0 ppm	
1.5		CH		X		0.80: PP In-situ = 100 - 120 kPa	
2.0		CH		X		1.30: PP In-situ = 180 kPa	
2.00m DS		CH		X		2.00: PP In-situ = 100 - 180 kPa	
2.40m DS		CH		X		EXTREMELY WEATHERED MATERIAL	
2.6		Gravelly CLAY: high plasticity, blue-grey mottled orange, medium to coarse grained, angular gravel, remnant rock fabric		X			
2.6		Hole Terminated at 2.50 m Target Depth					
3.0							
3.5							
PHOTOGRAPHS NOTES		YES		NO			
METHOD		PENETRATION		SAMPLES & FIELD TESTS		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION	
N Natural Exposure X Existing Excavation BH Backhoe Bucket R Ripper EX Hydraulic Excavator EH Excavator with Hammer		No Resistance WATER 10 Oct, 73 Water Level on Date shown water inflow water outflow		ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test		Based on Unified Classification System MOISTURE D Dry M Moist W Wet	
SUPPORT T Timbering						CONSISTENCY/ RELATIVE DENSITY VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense	
See Explanatory Notes for details of abbreviations & basis of descriptions.							

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EXCAVATION - GEOLOGICAL LOG										PIT NO : TP09	
CLIENT : RDM			PROJECT : Preliminary Geotechnical and Environmental Investigation							PROJECT NUMBER : 30012637	
LOCATION : Lot 202 DP874273; Woolgoolga, NSW			SURFACE ELEVATION :							SHEET : 1 OF 1	
POSITION : E: 517946.0, N: 6670009.0			EQUIPMENT TYPE : CAT305E Excavator							METHOD : EX - 450mm bucket	
DATE EXCAVATED : 07/12/2018			LOGGED BY : MM							CHECKED BY :	
EXCAVATION DIMENSIONS : 2.00 m LONG 0.50 m WIDE											
EXCAVATION					MATERIAL						
VE P PENETRATION H	SUPPORT	GROUNDWATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	POCKET PENETRO- METER	STRUCTURE & Other Observations	
				0.0		FILL: Silty CLAY: medium to high plasticity, mottled red-grey, trace siltstone gravel and cobble, angular, fine to coarse grained				FILL	
			ES	0.10m						0.10: PID = 0.0 ppm	
				0.50m			W < PL	H		0.50: PID = 0.0 ppm	
		Not Observed		1.0m							
			ES	1.10m	CH	Silty CLAY: high plasticity, dark brown-black, trace rootlets				TOPSOIL	
				1.20m	CH	Silty CLAY: high plasticity, mottled orange-brown-grey	W > PL			ALLUVIUM	
				1.50m		Hole Terminated at 1.50 m Target Depth					
				2.0m							
				2.5m							
				3.0m							
				3.5m							
PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO											
METHOD		PENETRATION		SAMPLES & FIELD TESTS			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/RELATIVE DENSITY		
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering		<p>No Resistance</p> <p>WATER 10 Oct, 73 Water Level on Date shown water inflow water outflow</p>		ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear; P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test			Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense		
See Explanatory Notes for details of abbreviations & basis of descriptions.											

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EXCAVATION - GEOLOGICAL LOG										PIT NO : TP10	
CLIENT : RDM			PROJECT : Preliminary Geotechnical and Environmental Investigation							PROJECT NUMBER : 30012637	
LOCATION : Lot 202 DP874273; Woolgoolga, NSW			POSITION : E: 517734.0, N: 6670091.0							SHEET : 1 OF 1	
EQUIPMENT TYPE : 5t CAT305E Excavator			SURFACE ELEVATION :							FINAL DEPTH : 1.6 m	
DATE EXCAVATED : 07/12/2018			METHOD : EX - 450mm/300mm buckets							LOGGED BY : MM	
EXCAVATION DIMENSIONS : 3.00 m LONG 0.50 m WIDE			CHECKED BY :								
EXCAVATION				MATERIAL							
VE	PH	SUPPORT	DEPTH (m)	GRAPHIC LOG	CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY	RELATIVE DENSITY	POCKET PENETROMETER	STRUCTURE & Other Observations
			0.0		OL	Clayey SILT: low plasticity, brown, roots/rootlets	D	Fr			TOPSOIL
			0.10m ES		CH	Gravelly CLAY: medium plasticity, mottled red-grey-orange	D	Fr			EXTREMELY WEATHERED MATERIAL to HIGHLY WEATHERED MATERIAL 0.10: PID = 0.0 ppm
			0.40m ES		GP	Clayey GRAVEL: coarse, angular, pale grey with orange staining		D to VD			EXTREMELY WEATHERED MATERIAL to HIGHLY WEATHERED MATERIAL 0.40: PID = 0.0 ppm 0.60: Switch to 300mm toothed bucket below 0.5m
			0.80m			ARGILLITE: pale grey, highly to moderately weathered, low to medium strength, highly fractured intersecting subvertical joint sets; planar, smooth, orange staining					WEATHERED ROCK 0.90: recovered as angular cobbles typically 65mm to 150mm
			1.60m			recovered angular cobbles up to 150mm nominal size					
			1.60m			Hole Terminated at 1.60 m Material Refusal					
			2.0								
			2.5								
			3.0								
			3.5								
PHOTOGRAPHS NOTES			<input type="checkbox"/> YES <input type="checkbox"/> NO								
METHOD		PENETRATION		SAMPLES & FIELD TESTS			CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/RELATIVE DENSITY		
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering				ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test			Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense		
See Explanatory Notes for details of abbreviations & basis of descriptions.				SMC AUSTRALIA							

EXCAVATION - GEOLOGICAL LOG						PIT NO : TP11	
CLIENT : RDM		PROJECT : Preliminary Geotechnical and Environmental Investigation				PROJECT NUMBER : 30012637	
LOCATION : Lot 202 DP874273; Woolgoolga, NSW		SURFACE ELEVATION :				SHEET : 1 OF 1	
POSITION : E: 517748.0, N: 6670118.0		METHOD : EX - 450mm/300mm buckets				FINAL DEPTH : 0.75 m	
EQUIPMENT TYPE : CAT305E Excavator		LOGGED BY : MM				CHECKED BY :	
DATE EXCAVATED : 07/12/2018		EXCAVATION DIMENSIONS : 3.00 m LONG 0.50 m WIDE					
EXCAVATION			MATERIAL				
VE E P F H	SUPPORT	DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION	MOISTURE CONDITION	CONSISTENCY RELATIVE DENSITY	STRUCTURE & Other Observations
	Not Observed	0.0		FILL: Clayey SILT: low plasticity, brown, roots/rootlets	W < PL		FILL / TOPSOIL
		0.20m		FILL: MIXTURE OF CLAY AND SILT: medium to high plasticity, mottled red, brown, orange, trace rootlets	W < PL	Fr	FILL 0.10: Argillite boulder buried in topsoil; 300mm, angular, slightly weathered, high strength 0.20: PID = 0.0 ppm
		0.40m		Clayey GRAVEL: medium to coarse, angular, pale grey with red and orange staining, with angular cobble	W	MD to D	HIGHLY WEATHERED MATERIAL
		0.70m		ARGILLITE: pale grey, moderately weathered, medium to high strength	D		WEATHERED ROCK
		0.75m		Hole Terminated at 0.75 m Material Refusal			0.75: Refusal on rock with 300mm toothed bucket
		1.0					
		1.5					
		2.0					
		2.5					
		3.0					
		3.5					
PHOTOGRAPHS NOTES		<input type="checkbox"/> YES <input type="checkbox"/> NO					
METHOD	PENETRATION	SAMPLES & FIELD TESTS		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION		CONSISTENCY/ RELATIVE DENSITY	
N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer	 No Resistance WATER 10 Oct, 73 Water Level on Date shown water inflow water outflow	ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test	Based on Unified Classification System MOISTURE D Dry M Moist W Wet		VS Very Soft S Soft F Firm St Stiff Vst Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense		
SUPPORT T Timbering							
See Explanatory Notes for details of abbreviations & basis of descriptions.		SMC AUSTRALIA					

EXCAVATION - GEOLOGICAL LOG

PIT NO : TP12
PROJECT NUMBER : 30012637
SHEET : 1 OF 1
FINAL DEPTH : 2.2 m

CLIENT : RDM **PROJECT :** Preliminary Geotechnical and Environmental Investigation

LOCATION : Lot 202 DP874273; Woolgoolga, NSW

POSITION : E: 517810.0, N: 6670051.0

SURFACE ELEVATION :

EQUIPMENT TYPE : CAT305E Excavator

METHOD : EX - 450mm/300mm buckets

DATE EXCAVATED : 07/12/2018

LOGGED BY : MM

CHECKED BY :

EXCAVATION DIMENSIONS : 3.00 m LONG 0.50 m WIDE

EXCAVATION				MATERIAL					
VE E P F H	SUPPORT	ORIGIN WATER LEVELS	SAMPLES & FIELD TESTS	DEPTH (m)	GRAPHIC LOG CLASSIFICATION SYMBOL	MATERIAL DESCRIPTION SOIL NAME : plasticity or particle characteristic, colour, secondary and minor components ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	MOISTURE CONDITION CONSISTENCY RELATIVE DENSITY	POCKET PENETROMETER	STRUCTURE & Other Observations
				0.0	OL	Clayey SILT: low plasticity, brown, roots/rootlets	W < PL	Fr	TOPSOIL
				0.10m	ES	Silty CLAY: high plasticity, mottled red-grey, trace rootlets and trace gravel			RESIDUAL SOIL 0.10: PID = 0.0 ppm
				0.40m	CH	Silty CLAY: high plasticity, mottled red-brown, some siltstone gravel		H	0.20: PP In-situ = 400 - 600 kPa
				0.50m	CH	Clayey GRAVEL: fine to coarse, angular, pale grey with red staining		MD	EXTREMELY WEATHERED MATERIAL 0.45: remnant rock fabric 0.50: PID = 0.0 ppm
				1.00m	B	ARGILLITE: pale grey, highly weathered, low to medium strength, highly fractured, stained orange and red		D	0.75: switched to 300mm toothed bucket at 0.8m HIGHLY WEATHERED MATERIAL
				1.00m	B	recovered as angular gravel and cobble up to 150mm, some gravelly clay seams			
				2.20m		Hole Terminated at 2.20 m Material Refusal			
				2.5					
				3.0					
				3.5					
<p>PHOTOGRAPHS NOTES <input type="checkbox"/> YES <input type="checkbox"/> NO</p>									
METHOD N Natural Exposure X Existing Excavation BH Backhoe Bucket B Bulldozer Blade R Ripper EX Hydraulic Excavator EH Excavator with Hammer SUPPORT T Timbering		PENETRATION No Resistance WATER 10 Oct. 73 Water Level on Date shown water inflow water outflow		SAMPLES & FIELD TESTS ES Environmental Sample DS Disturbed Sample B Bulk Disturbed Sample MC Moisture Content HP Hand Penetrometer (kPa) Vane VS Shear, P-Peak, R-Remoulded (uncorrected kPa) PBT Plate Bearing Test		CLASSIFICATION SYMBOLS & SOIL DESCRIPTION Based on Unified Classification System MOISTURE D Dry M Moist W Wet		CONSISTENCY/ RELATIVE DENSITY VS Very Soft S Soft F Firm St Stiff VSt Very Stiff H Hard VL Very Loose L Loose MD Medium Dense D Dense VD Very Dense	
See Explanatory Notes for details of abbreviations & basis of descriptions.									

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PLANNING PROPOSAL

COFFS HARBOUR CITY COUNCIL

**Newmans Road, Woolgoolga
Part Lot 202 DP 874273**

VERSION 1 – Pre-Exhibition
September 2019

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INTRODUCTION

Planning Proposal

The preparation of a Planning Proposal is the first step in making an amendment to the *Coffs Harbour Local Environmental Plan 2013* (LEP 2013). A Planning Proposal is a document that explains the intended effect and justification for the proposed amendment. Under the *Environmental Planning and Assessment Act 1979*, Council must prepare and submit a Planning Proposal to the Department of Planning, Industry and Environment for consideration of an amendment to LEP 2013.

This Planning Proposal has been prepared in accordance with the *Environmental Planning and Assessment Act 1979* and the NSW Department of Planning, Industry and Environment's *A guide to preparing planning proposals 2018* and *A guide to preparing local environmental plans 2018*.

It explains the intended effects of a proposed amendment to LEP 2013 to enable low density residential development and manage the environmental attributes on land at Newmans Road Woolgoolga.

Purpose of this Planning Proposal

The purpose of this Planning Proposal is to amend LEP 2013 to allow low density residential development on part of Lot 202 DP 874273. The Planning Proposal will:

- rezone the subject land from Zone RU2 Rural Landscape to part Zone R2 Low Density Residential and part Zone E3 Environmental Management,
- amend the relevant lot size map accordingly,
- create an additional "key sites" clause within LEP 2013 and create a new key sites map accordingly, and
- enable the development of the land for low density residential purposes, subject to the preparation of a development control plan that will ensure that any development of the area occurs in an orderly, logical and sustainable manner.

Property details

This Planning Proposal applies to part of Lot 202 DP 874273, being an allotment comprising two portions, separated by public open space land. Lot 202 DP 874273 includes a northern portion; referenced in Figure 1 as 'Bark Hut Road Planning Area' and a southern portion; referenced in Figure 1 as 'Newmans Road Planning Area'. This Planning Proposal applies to the Newmans Road Planning Area (the subject land) only and consideration of the Bark Hut Road Planning Area is subject to a separate Planning Proposal.



Figure 1: Locality Map: Lot 202 DP 874273

Site location, context and setting

The subject land has an area of 9.2 hectares and is located approximately 22 km north of Coffs Harbour and 1.4 km northwest of Woolgoolga. The subject land is located in close proximity to the established residential areas of Woolgoolga and Safety Beach and a Large Lot Residential precinct is also located to the west. The subject land is situated west of Solitary Islands Way (the former Pacific Highway) and is accessed by Newmans Road. The land is currently zoned RU2 Rural Landscape under LEP 2013 and the zones of land in the immediate vicinity are shown in Figure 2.

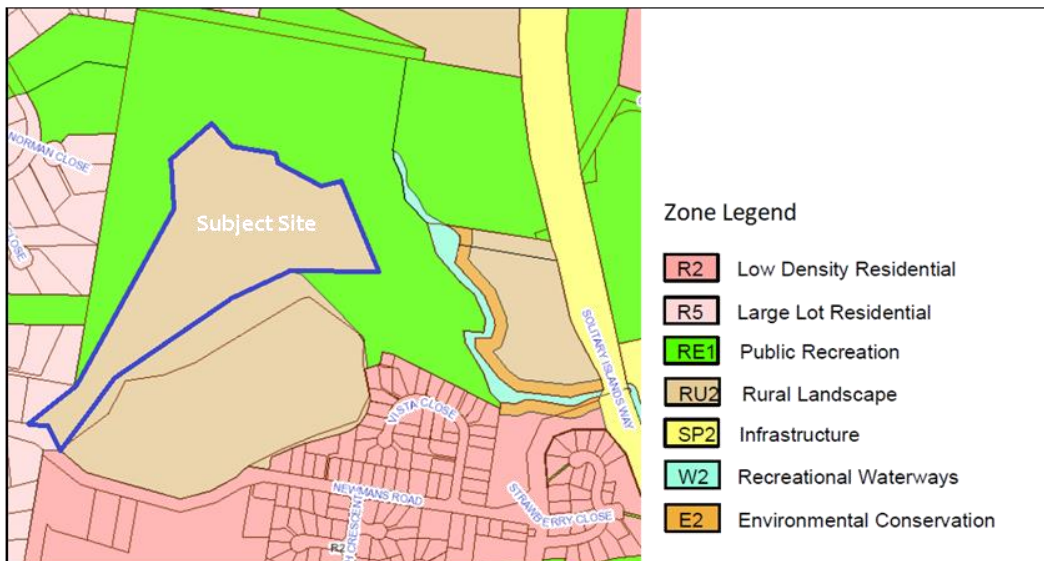


Figure 2: Current Land Use Zones – Coffs Harbour LEP 2013

An aerial photograph of the subject land is shown in Figure 3.



Figure 3: Aerial Photograph of the Subject land

Concept low density residential subdivision

A landscape character conceptual masterplan and low density residential subdivision lot layout is included in Appendix A. The Proponent's indicative 82 lot subdivision concept for the site is also shown in Figure 4 below:

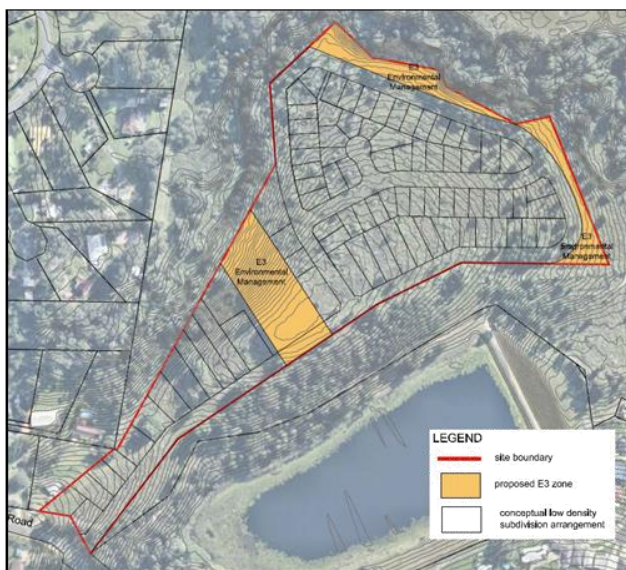


Figure 4: concept low density residential subdivision

Note:

The concept masterplan submitted by the proponent with the application to amend Coffs Harbour LEP 2013 for the subject site is not endorsed by Council. Detailed masterplanning for the subject site is to be addressed as part of any subsequent development application for the land.

PART 1 – OBJECTIVES OR INTENDED OUTCOMES

The objectives and intended outcomes of this Planning Proposal are to:

- Amend LEP 2013 to permit low density residential development on the subject land, subject to the preparation of a development control plan for the Woolgoolga North West growth area;
- Ensure that Woolgoolga North West is developed in accordance with sound planning and design principles; and
- Ensure that the rezoning is consistent with the broad strategic direction for the locality as described by North Coast Regional Plan 2036 and Council's LGMS (2008).

PART 2 – EXPLANATION OF PROVISIONS

The intended outcomes of the Planning Proposal will be achieved by making the following amendments to LEP 2013 maps:

- Amend the Coffs Harbour Land Zoning Map (Sheet LZN_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to change land currently zoned RU2 Rural Landscape to part Zone R2 Low Density Residential and part Zone E3 Environmental Management;
- Amend the Coffs Harbour Minimum Lot Size Map (Sheet LSZ_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to change land currently subject to minimum lot size provision AB – 40ha to part AB – 40ha and part F – 400 sqm;
- Amend the Coffs Harbour Terrestrial Biodiversity Map (Sheet CL2_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to include areas proposed to be zoned E3 Environmental Conservation as terrestrial biodiversity on the map; and
- Introduce a new Coffs Harbour Key Sites Map (KYS_005F).

All of the above amendments to LEP 2013 maps are shown in Part 4 (mapping) of this Planning Proposal.

The rezoning includes the application of an R2 Low Density Residential Zone, as well as an E3 Environmental Management Zone. In this situation, the E3 zone is a suitable 'transitional' zone between RE1 Public Recreation zoned land surrounding the site that is partially cleared and partially inclusive of remnant wet sclerophyll forest and an R2 Low Density Residential zone. Native vegetation located within the proposed E3 zoned land, some of which adjoins the existing RE1 zoned land, contribute to valuable flora and fauna connections through to adjacent land. The protection of this vegetation is outlined in a Vegetation Management Plan (Appendix C) which will need to accompany a Development Application for subdivision of the subject land that is consistent with the concept subdivision shown in Appendix A. The inclusion of a Vegetation Management Plan with a subdivision application is a requirement of chapter E1.5(12) of Coffs Harbour Development Control Plan 2015.

A "key sites" clause is also included in this planning proposal. As further outlined in Part 3 of this planning proposal, the land is included within Council's Local Growth Management Strategy 2008 – Urban Lands Component as a "possible future urban investigation" area and at the time, was given a long term priority (after 2031). The land is also within the growth area boundary for Woolgoolga, mapped in the *North Coast Regional Plan 2036*. Due to the long-term priority given to the land and the significant dwelling capacity earmarked for the area (see figure 4), it is appropriate to masterplan the area and prepare a site specific Development Control Plan chapter within Coffs Harbour Development Control Plan 2015, as well as an associated Developer Contributions Plan for Woolgoolga North West. Part 7 of Coffs Harbour LEP 2013 is proposed to include a "key sites" clause similar to the following:

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Development on certain land at Woolgoolga North West (Part Lot 202 DP 874273, Newmans Road Woolgoolga)

1. The objectives of this clause are:
 - a) to ensure the subject land is developed in accordance with sound planning and design principles, and
 - b) to ensure development is carried out in an orderly, structured manner and is sympathetic of the constraints to the land and surrounding land uses.
2. This clause applies to land identified as “Woolgoolga North West” on the Key Sites Map.
3. Development consent must not be granted for development on land to which this clause applies unless a development control plan that provides for the matters specified in subclause (4) has been prepared for the land.
4. The development control plan must provide for the following:
 - a) masterplan to guide future development within Woolgoolga North West,
 - b) the appropriate use of land for residential development and infrastructure provision having regard to the environmental and other constraints of Part Lot 202 DP 874273 (such as bush fire, water quality, Aboriginal heritage and surrounding land uses particularly agricultural activities including but not limited to associated buffer requirements to minimize impacts from dust, noise and spray drift),
 - c) subdivision layout,
 - d) pedestrian and cycleway connectivity within future development and to adjoining public reserve areas,
 - e) an integrated traffic management strategy which ensures the safe and efficient movement of traffic within the development and onto adjoining land, and
 - f) the management, protection and (where appropriate) rehabilitation of high conservation value land.
5. Subclause (3) does not apply to development for any of the following purposes:
 - a) a subdivision for the purpose of a realignment of boundaries that does not create additional lots,
 - b) a subdivision of land if any of the lots proposed to be created are to be reserved or dedicated for public open space, public roads or any other public or environmental protection or management purpose,
 - c) a subdivision of land in a zone in which erection of structures is prohibited,
 - d) development of land that is of a minor nature only, if the consent authority is of the opinion that the carrying out of the proposed development would be consistent with the objectives of the zone in which the land is situated.

PART 3 – JUSTIFICATION

Section A – Need for the Planning Proposal

1. Is the Planning Proposal a result of any strategic study or report?

This Planning Proposal has been prepared in response to a landowner's request and is accompanied by a number of detailed environmental studies, which are included as attachments. The subject site is included in Council's Local Growth Management Strategy 2008 – Urban Lands Component as a "possible future urban investigation" area. At the time, the investigation of this land for urban purposes was given a long-term priority (after 2031). The land is also included in the Coffs Harbour Draft Local Growth Management Strategy currently being prepared by Council and is shown within the growth area boundary for Woolgoolga, as mapped in the *North Coast Regional Plan 2036*.

A detailed Residential Land Demand Analysis accompanies this Planning Proposal (refer Appendix B), which concluded that:

It is estimated that there is only three years of serviced residential zoned land supply available to the market within the Study Area, including land that is currently not being developed and subject to owner intents and commercial viabilities.

As mentioned above, Council is currently undertaking a review of the Local Growth Management Strategy (LGMS). Peer review of this Planning Proposal has identified that it is consistent with the objectives of the Draft LGMS 'Strategic Approach', particularly:

- The subject site is identified within the Woolgoolga North West Growth Area in the LGMS as a high priority 1-4 years land release program.
- Residential demand for the entire (Woolgoolga North West) growth area indicates that there is capacity for additional 1030 total dwelling yield (see figure 5).
- The LGMS also identifies that greenfield developments should carefully consider environmental constraints, water sensitive design and walkability.

Ensuring there is sufficient residential zoned land to meet present and future demand is also an important consideration in maintaining housing affordability.

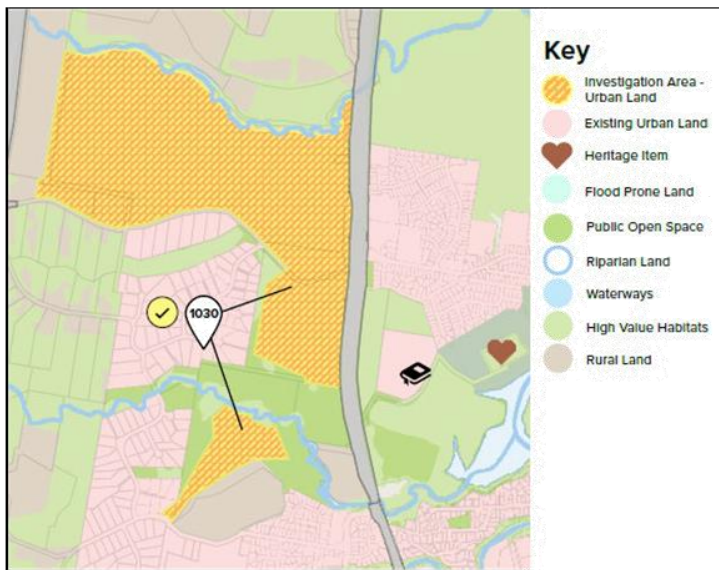


Figure 5: Draft LGMS - Dwelling Capacity in NW Woolgoolga

2. Is the Planning Proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

This Planning Proposal is not an overall review of the City controls proposed through the preparation of an LGA wide LEP review. Therefore, a site specific Planning Proposal accompanied by relevant environmental planning studies is the only way of achieving the release of additional residential land at Woolgoolga North West. Achieving the intended outcomes outlined in this Planning Proposal is also dependent on the preparation of a masterplan for Woolgoolga North West, for inclusion within a site-specific Development Control Plan chapter within Coffs Harbour Development Control Plan 2015 and an associated Developer Contributions Plan.

3. Is there a net community benefit?

The rezoning of the subject land enables the development of approximately 82 low-density residential lots within a 9.2 ha portion of the site proposed to be zoned R2 Low Density Residential.

Net Community Benefit Criteria are identified in the NSW Government’s publication *The Right Place for Business and Services*. This policy document has a focus on ensuring growth within existing centres and minimising dispersed trip-generating development. It applies most appropriately to Planning Proposals that promote significant increased residential areas or densities, or significant increased employment areas or the like.

A net community benefit test (NCBT) analyses the potential social and economic impact to the Woolgoolga community arising from the Planning Proposal and assesses whether the site is suitable for rezoning and will provide positive benefits to the community. A summary of potential benefits and costs is outlined below.

The ‘base case’ is that the land remains under its present RU2 Rural Landscape zoning.

Potential benefits versus Base Case

- Increasing land for housing supply in the Woolgoolga North West locality by approximately 82 lots suitable for detached low-density dwellings.
- Contributing to the stock of unconstrained land for vernacular housing.
- Meeting the forecasted population increase for the Coffs Coast area by increasing the supply of unconstrained residential land to the Woolgoolga area.

Costs of future development versus Base Case

- Short-term increase in heavy vehicle traffic during the construction phase of the subdivision. Appropriate mitigation measures would need to be implemented.
- Short-term adverse impacts on environmental amenity during the construction process. Appropriate mitigation measures would need to be implemented.
- Loss of rural land, although the site is not currently used for agricultural purposes and holds little agricultural potential, being located amongst existing and proposed residential lands.

The associated negative impacts of the proposal are considered to be manageable. The Planning Proposal will deliver land for housing in accordance with projected lot yields for the area and therefore is likely to provide a net community benefit.

Section B – Relationship to strategic planning framework

4. Is the Planning Proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including exhibited draft strategies)?

North Coast Regional Plan 2036

The *North Coast Regional Plan 2036* applies to the Coffs Harbour LGA. The land is identified as an Urban Growth Area in the *North Coast Regional Plan 2036*, as shown in Figure 6.

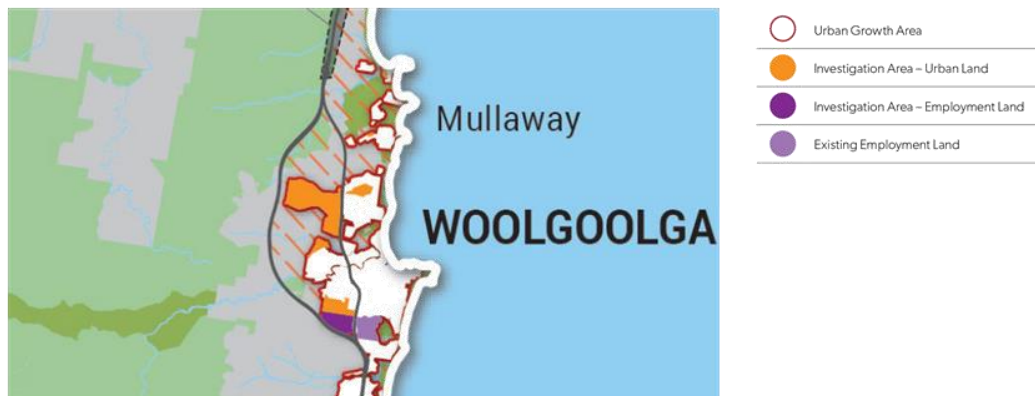


Figure 6: Context within the North Coast Regional Plan 2036

The following outlines how the Planning Proposal complies with the Goals and Directions contained in the *North Coast Regional Plan 2036*:

Goal 1: The most stunning environment in NSW

Direction 1: Deliver environmentally sustainable growth

The subject land is within the *North Coast Regional Plan 2036* urban growth area boundary. These areas *have been identified to achieve a balance between urban expansion and protecting coastal and other environmental assets.*

The proposed key sites clause will allow master planning of the overall Woolgoolga North West growth area and will allow Council to deliver environmentally sustainable growth.

The subject land is surrounded by residential development and is close to urban services including schools and a shopping centre. The land is not located near any significant farmland or sensitive ecosystems.

Direction 2: Enhance biodiversity, coastal and aquatic habitats, and water catchments

Ecological features in proximity to the subject site include an area of wet sclerophyll forest along the northern boundary, which is mapped secondary koala habitat. This connects to Poundyard Creek and flows to Woolgoolga Lake to the east. Connecting Poundyard Creek and the large freshwater wetland located outside the southern boundary is a patch (approximately 500 m²) of brushbox (*Lophostemon confertus*), turpentine (*Syncarpia glomulifera*) and a few large diameter tallowwoods (*Eucalyptus microcorys*) which is mapped dry sclerophyll forest. Tallowwood is an important koala food tree (KFT).

As described above, the remnant native vegetation, whilst not an EEC, has biodiversity importance and should therefore be recognised in an appropriate environmental zone. None of these areas have especially high conservation values, and do not meet planning criteria for the E2 Environmental Conservation zone under either the Practice Note PN 11-002 or the Northern Councils E zone recommendations. These areas are proposed to be zoned E3 Environmental Management to provide for the management actions recommended in the Preliminary Vegetation Management Plan (Appendix C).

Direction 3: Manage natural hazards and climate change

A concept low density subdivision master plan (Appendix A) has been prepared to indicate a potential internal road and lot layout and overall lot yield.

Perimeter roads as shown in the concept master plan and the management actions described in the preliminary VMP will be an important part of future bushfire hazard protection.

Direction 4: Promote renewable energy opportunities

The proposed residential area has a suitable microclimate within a generally north easterly facing valley; resulting in good solar access opportunities which will enable resulting low density residential development to design accordingly.

Goal 2: A thriving, interconnected economy

Direction 5: Strengthen communities of interest and cross-regional relationships

The proposed residential area will have good access to local employment opportunities as well as the Pacific Highway for broader regional opportunities.

Direction 6: Develop successful centres of employment

The additional residential area will support the existing Woolgoolga business and industrial areas and will help strengthen the Coffs Harbour LGA as a centre of employment.

Direction 7: Coordinate the growth of regional cities

The proposed rezoning supports the growth and redevelopment of Coffs Harbour (a designated regional city), and is consistent with the *North Coast Regional Plan 2036* and Council's Local Growth Management Strategy.

Direction 8: Promote the growth of tourism

The proposed residential area will indirectly provide for tourism by providing land for housing, which may cater for tourism workers.

Direction 9: Strengthen regionally significant transport corridors

The proposed residential area is in close proximity to Solitary Islands Way, which is a connector road to the Pacific Highway.

Direction 10: Facilitate air, rail and public transport infrastructure

The proposed residential area is accessible to air and rail transport nodes in Coffs Harbour, via the Pacific Highway. Local bus services are available nearby in Newmans Road and will be able to service the proposed residential area.

Direction 11: Protect and enhance productive agricultural lands

The subject site does not contain highly productive agricultural land and is not identified as Regionally Significant Farmland.

Direction 12: Grow agribusiness across the region

The proposed rezoning will not adversely affect any existing agribusiness.

Direction 13: Sustainably manage natural resources

The proposed rezoning will not adversely affect any nearby natural resources.

Goal 3: Vibrant and engaged communities

Direction 14: Provide great places to live and work

The proposed key sites clause and map will allow master planning of the overall Woolgoolga North West growth area and will outline how low-density residential development will interact with surrounding land. *Coffs Harbour Development Control Plan 2015* will include a masterplan and specific controls to guide new development to assist the Woolgoolga North West growth area to integrate into surrounding urban areas, including its relationship with nearby road networks and open space.

Direction 15: Develop healthy, safe, socially engaged and well-connected communities

The concept master plan submitted with the Planning Proposal (Appendix A) illustrates passive links to the surrounding open space and future sporting fields. There are possibilities for links between the subject land and the Woolgoolga Sporting Fields and with the Woolgoolga State High School and the existing network of cycleways and paths on the eastern side of Solitary Islands Way.

The proposed master planning exercise provides an opportunity to ensure that these communities are well-connected with their surroundings. Existing DCP objectives and controls aim to *ensure that subdivision proposals provide appropriate connectivity for servicing vehicular, walking and cycling networks*. Subdivision infrastructure including cycleways, footpaths and street lighting will ensure that future residential areas are both healthy and safe via crime prevention through environmental design outcomes.

Direction 16: Collaborate and partner with Aboriginal communities

The Aboriginal community were engaged in site investigations to inform the Aboriginal Cultural Heritage Assessment Report (Appendix D). A consultation process with the Aboriginal community was undertaken in accordance with the (former) OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010) (ACHCRP).

Direction 17: Increase the economic self-determination of Aboriginal communities

The Planning Proposal will not have outcomes that are contrary to this direction.

Direction 18: Respect and protect the North Coast's Aboriginal heritage

The results of the Archaeological Assessment are summarised as follows:

- *A PAD was identified in the vicinity of the Project Area comprising a knoll to the west of the water storage dam however no Aboriginal objects were identified on the knoll. However, the presence of topsoil on the knoll provides an indication that there is the potential for an Aboriginal stone artefact scatter to occur on the knoll.*
- *Having consideration for the landscape context of the Project Area and the history of disturbance it is considered unlikely that the Project Area will contain Aboriginal sites of high or moderate conservation value. The Project Area is unlikely to contain burials or middens and does not contain scarred or modified trees. Whilst some historic campsites are known in the general vicinity the site, none are known within the Project Area. No Mythological or ceremonial sites are known to occur*

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within the Project Area, however it is noted that the ridge-crest may have been utilised as a pathway between the coast and hinterland.

An onsite AHIP consultation meeting was held on 18th January 2018 with the applicant's cultural heritage consultant and members of the local Aboriginal community and the Coffs Harbour and District Local Aboriginal Land Council. According to the report (Appendix D), those present agreed that the rezoning would be acceptable.

It is also appropriate that a Gateway Determination should require further consultation with local Aboriginal stakeholders and the NSW Department of Premier and Cabinet.

Direction 19: Protect historic heritage

No historic heritage is identified within the Planning Proposal area.

Direction 20: Maintain the region's distinctive built character

Existing Coffs Harbour DCP 2015 controls will assist in preserving the distinctive North Coast built character.

Direction 21: Coordinate local infrastructure delivery

Local infrastructure will be coordinated via Council's Development Servicing Plans.

Goal 4: Great housing choice and lifestyle options

Direction 22: Deliver greater housing supply

The proposed rezoning will result in an estimated 82 additional low density residential allotments within the subject land.

Direction 23: Increase housing diversity and choice

The proposed residential area will be rezoned R2 Low Density Residential which provides for a range of residential accommodation land uses.

Direction 24: Deliver well-planned rural residential housing areas

Existing and future Large Lot (ie rural) Residential precincts are identified by Council's LGMS. This Planning Proposal does not propose Large Lot Residential zoned land.

Direction 25: Deliver more opportunities for affordable housing

The minimum lot size for the proposed development is one lot/dwelling per 400 m² which is the standard allotment size for the majority of low density residential housing in the Coffs Harbour LGA. The release of the subject land for low density residential housing purposes will provide additional affordable housing choice for the Woolgoolga locality.

5. Is the Planning Proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

MyCoffs Community Strategic Plan

Coffs Harbour City Council's Community Strategic Plan (MyCoffs) is based on four key themes, being: Community Wellbeing, Community Prosperity, and a Place for Community, and Sustainable Community Leadership.

This Planning Proposal is consistent with the following relevant Objectives from the MyCoffs Plan:

An active, safe and healthy community	A2.1: We support our community to lead healthy active lives
A thriving and sustainable local economy	B1.2 We attract people to work, live and visit in the Coffs Harbour local government area
Liveable neighbourhoods with a defined identity	C1.1 - We create livable spaces that are beautiful and appealing. C1.2 We undertake development that is environmentally, socially and economically responsible
A natural environment sustained for the future	C2.1: We protect the diversity of our natural environment. C2.2: We use resources responsibly to support a safe and stable climate.
Our leaders give us confidence in the future	D1.2 We undertake effective engagement and are informed
We have effective use of public resources	D2.1 - We effectively manage the planning and provision of regional public services and infrastructure. D2.2 We collaborate to achieve the best possible future for all the Coffs Harbour area

Local Growth Management Strategy – Urban Lands Component 2008

Council's Local Growth Management Strategy (LGMS) – Urban Lands Component was finalised in 2008. The LGMS sets out a future for the growth and development of the LGA until 2031. The goal of the LGMS – Urban Lands Component is to foster healthy urban communities which contribute to delivering the Vision for the City. The Vision is described as: The Healthy City, the Smart City and the Cultural City for our future.

The LGMS projects a population of 99,000 people by 2031 with 94,000 accommodated in existing zoned areas and the balance of 6000 people expected to be accommodated in Greenfield sites. The LGMS states that "Projected population growth indicates that, at existing rates of consumption, additional land will be required for residential purposes by the period 2016-2021 in proximity to the Coffs Harbour Township [City]."

The LGMS – Urban Lands Component is presented in five parts. Part 3 of the Strategy contains the overall Strategy, and provides details on development areas and recommended priority releases for each area. The Strategy concentrates growth in the City's Central Business District (CBD) and key centres. It offers a hierarchy of Coffs Harbour as Coastal City; Woolgoolga, Moonee and

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Sawtell/Toormina/Boambee as Coastal Towns; and other settlements generally as Coastal and Hinterland Villages.

Detailed strategies are outlined for each urban area along with recommendations for future Place Management Plans for each of these areas. Part 3 also contains a supply and demand supply analysis based on population projections, and a servicing analysis.

Part 5 of the LGMS – Urban Lands Component refers to a series of maps, which include detailed strategies for each urban area within the LGA. These identify future development areas, expected limits to growth and key strategic actions for each area. In addition, each Map includes a series (A, B and C), which provide for each urban investigation area:

- expected lot yields;
- development areas; and
- constraints.

Map 4 of the LGMS – Urban Lands Component includes Woolgoolga, which in turn includes the subject site shown as a ‘possible future urban investigation’ area.

Map 4A provides details on urban investigation areas and shows the subject land as a ‘possible future urban investigation area’.

Map 4B provides details on proposed agreed growth areas and shows the site as ‘residential after 2031’ and potentially capable of housing 90 dwellings.

Map 4C deals with constraints, and shows the land as being generally unconstrained.

When applying the underlying growth principles of the LGMS, the proposed rezoning will achieve the following:

- deliver housing diversity and choice;
- provide walkable neighbourhoods by ensuring good connectivity between the development and West Woolgoolga Sporting Fields; and
- enhance the economic and social functions of existing local centres.

It is also acknowledged that the subject land is not highly constrained, can be efficiently serviced and has access to existing established areas of Safety Beach, Arrawarra/Mullaway, Woolgoolga High School and the Pacific Highway bypass.

Local Growth Management Strategy – Strategic Approach

Council’s peer review of this Planning Proposal reveals that it is consistent with the strategic approach taken by the revised draft Local Growth Management Strategy currently being prepared by Council, particularly:

- The subject land is identified within the Woolgoolga North West Growth Area in the draft Local Growth Management Strategy as a high priority 1-4 year land release program.
- Residential demand for the entire growth area indicates that there is capacity for an additional 1030 total dwelling yield.

- The draft Local Growth Management Strategy also identifies that greenfield developments should carefully consider environmental constraints, water sensitive design and walkability.

6. Is the Planning Proposal consistent with applicable State Environmental Planning Policies?

The State Environmental Planning Policies (SEPPs) applicable to the Planning Proposal are discussed in Table 1 below:

Table 1: Consistency with applicable SEPPs

State Environmental Planning Policy	Comments	Consistency
SEPP No 1 – Development Standards	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 21 – Caravan Parks	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 33 – Hazardous and Offensive Development	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 36 – Manufactured Home Estates	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 44 – Koala Habitat Protection	<p>This SEPP encourages the conservation and management of natural vegetation areas that provide habitat for koalas to ensure that permanent free-living populations will be maintained over their present range.</p> <p>Comment: Council has an adopted <i>Koala Plan of Management 1999</i> (KPoM) which includes local provisions that apply to identified koala habitat. The KPoM identifies a small area on the northern boundary of the Subject land as Secondary Koala Habitat – see Figure 8. The provisions of the KPoM have been addressed in Appendix E to this Planning Proposal.</p>	Consistent.

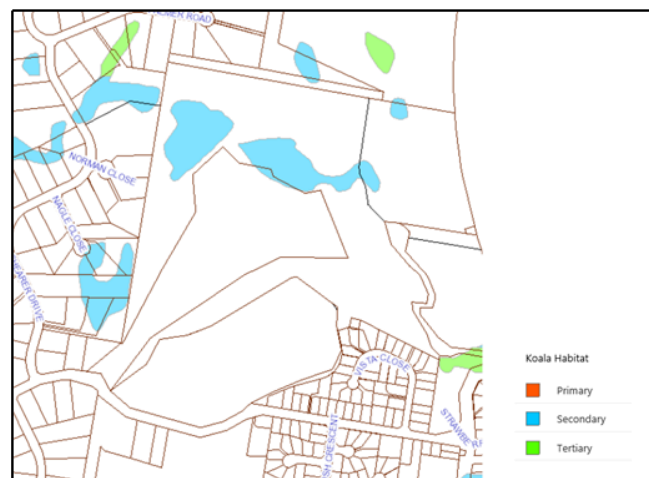


Figure 7: Koala Plan of Management Mapping

The Planning Proposal is consistent with the KPOM in that new areas of land zoned Zone E3 Environmental Management will provide additional protection for biodiversity connections and habitat links for Koalas and other threatened species. The Council has an adopted Koala Plan of Management for the LGA.

SEPP No 50 – Canal Estate Development	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 55 – Remediation of Land	A review of previous land uses of the site suggests that contamination of the site is unlikely. Past uses include low intensity stock grazing and the land is not mapped as former banana cultivation land. Searches of the land contamination register, record of notices and contaminated sites notified to Environmental Protection Authority have not identified the subject land. Contamination potential is considered minimal and manageable with appropriate remediation procedures available.	Consistent.
SEPP No 64 – Advertising and Signage	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP No 65 – Design Quality of Residential Flat Development	Residential flat buildings are prohibited in the R2 zone under Coffs Harbour Local Environmental Plan 2013.	Consistent.
SEPP No 70 – Affordable Housing (Revised Schemes)	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent

SEPP (Coastal Management) 2018

The aim of this Policy is to promote an integrated and co-ordinated approach to land use planning in the coastal zone in a manner consistent with the objects of the Coastal Management Act 2016, including the management objectives for each coastal management area by establishing a framework for land use planning to guide decision-making in the coastal zone.

Consistent.

As shown in Figure 7 below, the eastern extremity of the site is located within the coastal environment area.

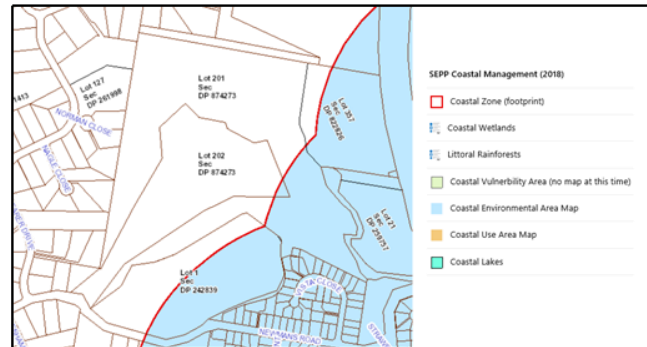


Figure 7: SEPP (Coastal Management) 2018

Comment:

This SEPP states as follows:

- 1) *Development consent must not be granted to development on land that is within the coastal environment area unless the consent authority has considered whether the proposed development is likely to cause an adverse impact on the following:*
 - (a) *the integrity and resilience of the biophysical, hydrological (surface and groundwater) and ecological environment,*
 - (b) *coastal environmental values and natural coastal processes,*
 - (c) *the water quality of the marine estate (within the meaning of the Marine Estate Management Act 2014), in particular, the cumulative impacts of the proposed development on any of the sensitive coastal lakes identified in Schedule 1,*
 - (d) *marine vegetation, native vegetation and fauna and their habitats, undeveloped headlands and rock platforms,*
 - (e) *existing public open space and safe access to and along the foreshore, beach, headland or rock platform for members of the public, including persons with a disability,*
 - (f) *Aboriginal cultural heritage, practices and places,*
 - (g) *the use of the surf zone.*

	<p>2) <i>Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that:</i></p> <p>(a) <i>the development is designed, sited and will be managed to avoid an adverse impact referred to in subclause (1), or</i> (b) <i>if that impact cannot be reasonably avoided—the development is designed, sited and will be managed to minimise that impact, or</i> (c) <i>if that impact cannot be minimised—the development will be managed to mitigate that impact.</i></p> <p>As the affected area is very small and corresponds with a proposed E3 Environmental Management zone and an appropriate revegetation strategy, it is considered that the eventual development of the land will not compromise the aims of the SEPP.</p> <p>Woolgoolga Lake is listed as a sensitive coastal lake identified in Schedule 1 of the SEPP. Council’s DCP controls and Water Sensitive Urban Design Guidelines will ensure that future Development Application/s for subdivision incorporate water sensitive urban design into their design. This will help ensure that water quality levels are maintained and/or improved in waterways draining into Woolgoolga Lake.</p>	
SEPP (Affordable Rental Housing) 2009	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Building Sustainability Index: BASIX) 2004	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent.
SEPP (Concurrences) 2018	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Educational Establishments and Child Care Facilities) 2017	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Exempt and Complying Development Codes) 2008	No additional exempt or complying uses have been included in this Planning Proposal.	Consistent.
SEPP (Housing for Seniors or	Seniors housing is permitted with consent in the R2 Low Density Residential Zone under Coffs Harbour Local Environmental Plan 2013.	Consistent.

People with a Disability) 2004 SEPP (Infrastructure) 2007	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Mining, Petroleum Production and Extractive Industries) 2007	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Miscellaneous Consent Provisions) 2007 SEPP (Primary Production and Rural Development) 2019	<p>This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.</p> <p><i>The aims of this Policy are:</i></p> <ul style="list-style-type: none"> (a) to facilitate the orderly economic use and development of lands for primary production, (b) to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources, (c) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations, (d) to simplify the regulatory process for smaller-scale low risk artificial waterbodies, and routine maintenance of artificial water supply or drainage, in irrigation areas and districts, and for routine and emergency work in irrigation areas and districts, (e) to encourage sustainable agriculture, including sustainable aquaculture, (f) to require consideration of the effects of all proposed development in the State on oyster aquaculture, (g) to identify aquaculture that is to be treated as designated development using a well-defined and concise development assessment regime based on environment risks associated with site and operational factors. <p>Comment: The Planning Proposal is consistent with the aims of the SEPP in that:</p> <ul style="list-style-type: none"> • The lands affected by the Planning Proposal are excluded from Regionally Significant farmland considerations and are recognised as a future residential growth area by the <i>North Coast Regional Plan 2036</i>. • The site has not been used for productive agricultural uses for a significant amount of time, therefore, the impact on 	<p>Consistent</p> <p>Consistent.</p>

	<p>the overall availability of rural lands for this purpose will be negligible.</p> <ul style="list-style-type: none"> • The land is small in area and is inappropriately located for sustainable agriculture, given its proximity to adjacent residential land and its recognition as an urban investigation area by Council's LGMS 2008 and as a future residential growth area by the <i>North Coast Regional Plan 2036</i> • Social, economic and environmental interests are better served by rezoning the land for residential and environmental management purposes. • Important native vegetation will be managed under the provisions of the E3 zone. • The Planning Proposal is consistent with the North Coast Regional Plan 2036. 	
SEPP (State and Regional Development) 2011	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (State Significant Predincts) 2005	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP.	Consistent
SEPP (Vegetation in Non-Rural Areas) 2017	This Planning Proposal does not contain provisions that contradict or hinder the application of this SEPP. Coffs Harbour DCP 2015 contains requirements that address the removal of significant vegetation within the Coffs Harbour LGA.	Consistent

7. Is the Planning Proposal consistent with applicable Ministerial Directions (s9.1 directions)?

Consistency with applicable s9.1 Local Planning Directions is outlined in Table 2 below.

Table 2: Consistency with s9.1(2) Directions

Ministerial Direction	Comments	Consistency with Direction
1. Employment and Resources		
1.1 Business and Industrial Zones	<p><i>The objectives of this direction are to:</i></p> <p>(a) encourage employment growth in suitable locations, (b) protect employment land in business and industrial zones, and (c) support the viability of identified centres.</p> <p>The Planning Proposal does not propose or affect any business or industrial zoned land.</p>	Consistent.
1.2 Rural Zones	<p><i>The objective of this direction is to protect the agricultural production value of rural land.</i></p> <p>This Planning Proposal seeks to rezone land from an existing rural zone to a residential zone. However, this inconsistency is considered to be justified for the following reasons:</p> <ul style="list-style-type: none"> • The lands affected by the Planning Proposal are excluded from Regionally Significant farmland considerations and are recognised as a future residential growth area by the North Coast Regional Plan 2036. • The site has not been used for productive agricultural uses for a significant amount of time and therefore, the impact on the overall availability of rural lands for this purpose will be negligible. • The land is small in area and is inappropriately located for sustainable agriculture, given its proximity to adjacent residential land and its recognition as an urban investigation area by Council's LGMS 2008 and as a future residential growth area by the North Coast Regional Plan 2036. 	Justifiably inconsistent for reasons listed.
1.5 Rural Lands	<p><i>The objectives of this direction are to:</i></p> <p>(a) protect the agricultural production value of rural land, (b) facilitate the orderly and economic use and development of rural lands for rural and related purposes, (c) assist in the proper management, development and protection of rural lands to promote the social, economic and environmental welfare of the State,</p>	Justifiably inconsistent for reasons listed.

Ministerial Direction	Comments	Consistency with Direction
	<p>(d) minimise the potential for land fragmentation and land use conflict in rural areas, particularly between residential and other rural land uses,</p> <p>(e) encourage sustainable land use practices and ensure the ongoing viability of agriculture on rural land</p> <p>(f) support the delivery of the actions outlined in the New South Wales Right to Farm Policy.</p> <p>This direction applies as the Planning Proposal includes changes in existing rural zone boundaries and minimum lot sizes of rural zoned land.</p> <p>Land which is currently zoned RU2 Rural Landscape is proposed to be amended to Zone R2 Low Density Residential and Zone E3 Environmental Management.</p> <p>The land is identified in the <i>North Coast Regional Plan 2036</i> and <i>Council's Local Growth Management Strategy 2008</i> as within the urban growth area boundary and as an urban investigation area respectively.</p>	
<p>2 Environment and Heritage</p>		
<p>2.1 Environment Protection Zones</p>	<p><i>The objective of this direction is to protect and conserve environmentally sensitive areas.</i></p> <p>Areas of remnant native vegetation on the subject site will be rezoned from Zone RU2 Rural Landscape to Zone E3 Environmental Management in accordance with Practice Note PN 11-003 directions.</p> <p>An Ecological Constraints Analysis and a Targeted Survey Report for the Lesser Swamp Orchid (Appendix E) were prepared to inform the Planning Proposal. The ecological studies indicate that:</p> <ul style="list-style-type: none"> • The site consists primarily of cleared land of low ecological value. • No lesser swamp orchid were located on the site or in the potential habitat surveyed on community land surrounding the site. • No potential habitat for the orchid was identified on site. • There are a few small patches, particularly on the edge of the project site containing areas of medium or high ecological value. • No Commonwealth or NSW threatened ecological communities are likely to occur within the project area and given that the site is mainly cleared and has low vegetation 	<p>Consistent</p>

Ministerial Direction	Comments	Consistency with Direction
	<p>values, it is unlikely to support a diversity of threatened fauna and flora species.</p> <ul style="list-style-type: none"> Riparian areas should be maintained and improved and retention of areas of high ecological value should be included in forward planning for the project site. <p>There is no high conservation value land within the site, therefore the E3, rather than the E2 zone is considered to be appropriate for those areas of remnant vegetation with biodiversity and habitat corridor value.</p> <p>This approach meets the intent of this direction by protecting land under the E3 zone without unnecessarily zoning land for environmental protection purposes that may not actually have significant environmental value.</p>	
2.2 Coastal Management	<p><i>The objective of this direction is to protect and manage coastal areas of NSW.</i></p> <p>The south eastern corner of the subject land is affected by the <i>Coastal Environment Area</i> which is one of four coastal management areas as defined under the <i>SEPP (Coastal Management) 2018</i>. The <i>Coastal Environment Area</i> identifies the environmental features of the coastal zone, such as state waters, estuaries, coastal lakes and coastal lagoons.</p> <p>Overall, the Planning Proposal is consistent with the aims and objectives of the <i>Coastal Management Act 2016</i>. It will not affect public access to the beaches and coastal foreshore areas or generate the need to provide new access; it will not result in adverse impacts upon the environmental assets of the coast; and will not increase future coastal risks to the Woolgoolga Lake Catchment. The Planning Proposal will not alter the relevance or effect the <i>Coastal Design Guidelines 2003</i>.</p> <p>At the development application stage, mitigative measures will be incorporated into the stormwater drainage design to ensure all runoff will have a nil or beneficial impact downstream. There is sufficient area within the subject land to accommodate this outcome.</p>	Consistent
2.3 Heritage Conservation	<p><i>The objective of this direction is to conserve items, areas, objects and places of environmental heritage significance and indigenous heritage significance.</i></p> <p>The applicant's consultants stated that they undertook a consultation process with the Aboriginal community in accordance with the (former) OEH <i>Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010)</i> (ACHCRP) and</p>	Consistent

Ministerial Direction	Comments	Consistency with Direction
2.4 Recreation Vehicle Areas	<p>prepared an Aboriginal Cultural Heritage Assessment Report (Appendix D).</p> <p>The results of the Archaeological Assessment are summarised as follows:</p> <ul style="list-style-type: none"> • A PAD was identified in the vicinity of the Project Area comprising a knoll to the west of the water storage dam however no Aboriginal objects were identified on the knoll. However, the presence of topsoil on the knoll provides an indication that there is the potential for an Aboriginal stone artefact scatter to occur on the knoll. • Having consideration for the landscape context of the Project Area and the history of disturbance it is considered unlikely that the Project Area will contain Aboriginal sites of high or moderate conservation value. The Project Area is unlikely to contain burials or middens and does not contain scarred or modified trees. Whilst some historic campsites are known in the general vicinity the site, none are known within the Project Area. No Mythological or ceremonial sites are known to occur within the Project Area, however it is noted that the ridge-crest may have been utilised as a pathway between the coast and hinterland. <p>An onsite AHIP consultation meeting was held on 18th January 2018 with the applicant's cultural heritage consultant and members of the local Aboriginal community and the Coffs Harbour and District Local Aboriginal Land Council. According to the report (Appendix D), those present agreed that the rezoning would be acceptable.</p> <p>It is also appropriate that a Gateway Determination should require further consultation with local Aboriginal stakeholders and the NSW Department of Premier and Cabinet.</p> <p><i>The objective of this direction is to protect sensitive land or land with significant conservation values from adverse impacts from recreation vehicles.</i></p> <p>This planning proposal does not enable land to be developed for the purpose of a recreation vehicle area.</p>	Consistent
3. Housing, Infrastructure and Urban Development		

Ministerial Direction	Comments	Consistency with Direction
3.1 Residential Zones	<p><i>The objectives of this direction are:</i></p> <ul style="list-style-type: none"> (a) <i>to encourage a variety and choice of housing types to provide for existing and future housing needs,</i> (b) <i>to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and</i> (c) <i>to minimise the impact of residential development on the environment and resource lands.</i> <p>The Planning Proposal provides for an additional 8-9 hectares of R2 Zone Low Density Residential land under <i>Coffs Harbour LEP 2013</i>.</p> <p>The provision of additional Low Density Residential land will broaden lifestyle choices in a suitable location. The proposed minimum lot size is 400m² providing an opportunity for a variety of housing types.</p> <p>The residential land is located such that the full range of existing urban services can be readily extended to service the area. A preliminary Engineering Appraisal prepared by deGroot and Benson, Consulting Engineers (Appendix G) indicates that a low density residential subdivision of the land can be adequately serviced.</p> <p>The proposal will increase the supply of residential land adjoining other residential land, as well as land earmarked for public recreation.</p> <p>The conceptual subdivision master plan illustrates how a low density residential subdivision could be located within the site when considering the site's constraints and opportunities. Appropriate planning controls are also contained within <i>Coffs Harbour DCP 2015</i> to ensure that development within R2 Low Density Residential zoned land is of good design.</p>	Consistent
3.2 Caravan Parks and Manufactured Home Estates	<p><i>The objectives of this direction are:</i></p> <ul style="list-style-type: none"> (a) <i>to provide for a variety of housing types, and</i> (b) <i>to provide opportunities for caravan parks and manufactured home estates.</i> <p>This Planning Proposal is consistent with this direction. Caravan parks are permitted with consent in the R2 Low Density Residential zone under <i>Coffs Harbour LEP 2013</i>. There are no existing caravan parks located on the subject lands.</p>	Consistent

Ministerial Direction	Comments	Consistency with Direction
3.3 Home Occupations	<p><i>The objective of this direction is to encourage the carrying out of low-impact small businesses in dwelling houses.</i></p> <p>Home occupations are permitted without consent in both the R2 and E3 zone under <i>Coffs Harbour LEP 2013</i>. This Planning Proposal does not seek to alter those LEP provisions.</p>	Consistent
3.4 Integrating Land Use and Transport	<p><i>The objective of this direction is to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:</i></p> <ul style="list-style-type: none"> <i>(a) improving access to housing, jobs and services by walking, cycling and public transport, and</i> <i>(b) increasing the choice of available transport and reducing dependence on cars, and</i> <i>(c) reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and</i> <i>(d) supporting the efficient and viable operation of public transport services, and</i> <i>(e) providing for the efficient movement of freight.</i> <p>This Planning Proposal is consistent with the objectives of this direction. The introduction of a key sites clause will provide an opportunity for Council to strategically examine the area and prepare appropriate DCP provisions to provide for an efficient transport network in the area. Increasing residential development within an area served by an existing public road network will support the local school bus service and may lead to additional transport services in the area. Passive forms of transport will be improved through the provision of links and pathways to recreational areas, the Woolgoolga High School and the future West Woolgoolga Sports Complex situated immediately to the south of the subject land.</p>	Consistent
3.5 Development Near Regulated Airports and Defence Airfields	<p><i>The objectives of this direction are:</i></p> <ul style="list-style-type: none"> <i>(a) to ensure the effective and safe operation of regulated airports and defence airfields;</i> <i>(b) to ensure that their operation is not compromised by development that constitutes an obstruction, hazard or potential hazard to aircraft flying in the vicinity; and</i> <i>(c) to ensure development, if situated on noise sensitive land, incorporates appropriate mitigation measures so that the development is not adversely affected by aircraft noise.</i> 	Consistent

Ministerial Direction	Comments	Consistency with Direction
	This planning proposal does not affect land within the vicinity of a regulated airport or defence airfield.	
3.6 Shooting Ranges	<p><i>The objectives are:</i></p> <p>(a) to maintain appropriate levels of public safety and amenity when rezoning land adjacent to an existing shooting range,</p> <p>(b) to reduce land use conflict arising between existing shooting ranges and rezoning of adjacent land,</p> <p>(c) to identify issues that must be addressed when giving consideration to rezoning land adjacent to an existing shooting range.</p> <p>This planning proposal does not affect, create, alter or remove a zone or a provision relating to land adjacent to and/or adjoining an existing shooting range.</p>	Consistent
4. Hazard and Risk		
4.1 Acid Sulfate Soils	<p><i>The objective of this direction is to avoid significant adverse environmental impacts from the use of land that has a probability of containing acid sulfate soils.</i></p> <p>The subject site has a low risk of containing acid sulphate soils as the site includes land within Class 5 as shown on the acid sulphate soils risk maps.</p> <p>Future building envelopes are not expected to disturb potential Class 4 or 5 ASS. However, at the development application stage, any potential excavations, including earthworks associated with civil works would need to satisfy the ASS provisions of Coffs Harbour LEP 2013 (cl 7.1).</p> <p>For these reasons the provisions of the Planning Proposal that are inconsistent are considered to be “of minor significance”.</p> <p>An approval for a variation to this s117 Direction is considered to be reasonable under the circumstances.</p>	Justifiably inconsistent for reasons listed.
4.3 Flood Prone Land	<p><i>The objectives of this direction are:</i></p> <p>(a) to ensure that development of flood prone land is consistent with the NSW Government's Flood Prone Land Policy and the principles of the Floodplain Development Manual 2005, and</p> <p>(b) to ensure that the provisions of an LEP on flood prone land is commensurate with flood hazard and includes consideration of the potential flood impacts both on and off the subject land.</p>	Consistent

Ministerial Direction	Comments	Consistency with Direction
	The subject site is not located within the mapped 1:100 year ARI flood extent.	
4.4 Planning for Bushfire Protection	<p><i>The objectives of this direction are:</i></p> <p>(a) <i>to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and</i></p> <p>(b) <i>to encourage sound management of bush fire prone areas.</i></p> <p>It is expected that Consultation will be undertaken with the NSW Rural Fire Service pending issue of the Gateway Determination. If this Planning Proposal is finalised, all future subdivision development application(s) will be required to comply with the 'specifications and requirements' of <i>Planning for Bush Fire Protection 2006</i> and associated documents.</p> <p>Future development applications for subdivision and/or special fire protection purposes involving bushfire prone land in the Planning Proposal area will be referred to the NSW Rural Fire Service as required under s100B of the <i>Rural Fires Act 1997</i>.</p> <p>The conceptual masterplan and Bushfire Report (see Appendix F) demonstrates that a low density residential subdivision designed to accommodate the site's topographical opportunities and constraints, incorporating a road network system where feasible, will provide suitable dwelling areas within all lots that are at or below BAL-29 construction level.</p>	Referral to NSW Rural Fire Service is required prior to confirmation of consistency with this particular Direction.
5. Regional Planning		
5.1 Implementation of Regional Strategies	<p><i>The objective of this direction is to give legal effect to the vision, land use strategy, policies, outcomes and actions contained in regional strategies.</i></p> <p>No Regional Strategy applies to the Coffs Harbour Local Government Area.</p>	Consistent
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	<p><i>The objectives for managing commercial and retail development along the Pacific Highway are:</i></p> <p>(a) <i>to protect the Pacific Highway's function, that is to operate as the North Coast's primary inter- and intra-regional road traffic route;</i></p> <p>(b) <i>to prevent inappropriate development fronting the highway;</i></p> <p>(c) <i>to protect public expenditure invested in the Pacific Highway;</i></p>	Consistent

Ministerial Direction	Comments	Consistency with Direction
	<p>(d) to protect and improve highway safety and highway efficiency;</p> <p>(e) to provide for the food, vehicle service and rest needs of travelers on the highway; and</p> <p>(f) to reinforce the role of retail and commercial development in town centres, where they can best serve the populations of the towns.</p> <p>This proposal will not affect commercial and retail land along the Pacific Highway, North Coast.</p>	
5.10 Implementation of Regional Plans	<p><i>The objective of this direction is to give legal effect to the vision, land use strategy, goals, directions and actions contained in Regional Plans.</i></p> <p>The North Coast Regional Plan 2036 (NCRP) applies to the Coffs Harbour LGA. The NCRP includes actions on environmental, economic and social (community) opportunities, as well as maintaining character and housing.</p> <p>Specific responses to relevant strategic directions and the accompanying actions contained within the NCRP are provided in Part 3, Section A (3) and Section B (4) above. It is considered that the Planning Proposal will result in development that supports the intent of the above actions and is therefore considered to be consistent with the NCRP.</p>	Consistent
6. Local Plan Making		
6.1 Approval and Referral Requirements	<p><i>The objective of this direction is to ensure that LEP provisions encourage the efficient and appropriate assessment of development.</i></p> <p>The Planning Proposal does not include provisions that require the concurrence, consultation or referral of development applications to a Minister or public authority.</p> <p>It does not identify development as designated development.</p>	Consistent
6.2 Reserving Land for Public Purposes	<p><i>The objectives of this direction are:</i></p> <p>(a) to facilitate the provision of public services and facilities by reserving land for public purposes, and</p> <p>(b) to facilitate the removal of reservations of land for public purposes where the land is no longer required for acquisition.</p> <p>The Planning Proposal does not create, alter or reduce land reserved for a public purpose.</p>	Consistent

Ministerial Direction	Comments	Consistency with Direction
6.3 Site Specific Provisions	<p><i>The objective of this direction is to discourage unnecessarily restrictive site specific planning controls.</i></p> <p>The Planning Proposal includes a key sites clause and associated map, Land Zone Map and Lot Size Map to amend Coffs Harbour LEP 2013. Given that the Planning Proposal intends to rezone the subject land to an existing zone that already applies in an existing environmental planning instrument without imposing any development standards or requirements in addition to those already contained in the zone, the Planning Proposal is considered to be consistent with this Direction.</p>	Consistent

Section C – Environmental, social and economic impact

8. Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The Ecological Constraints Analysis and Targeted Survey Report for the Lesser Swamp Orchid (Appendix E) identifies important areas of remnant native vegetation proposed to be included in Zone E3 Environmental Management. Key ecological findings are summarised as follows:

- The subject land consists primarily of cleared land of low ecological value.
- There is no high conservation value land within the subject land.
- No lesser swamp orchid examples were located on the subject land, or in the potential habitat surveyed on community land surrounding the subject land.
- No potential habitat for the lesser swamp orchid was identified on the subject land.
- There are isolated locations, particularly on the edge of the project site containing areas of medium or high ecological value.
- No Commonwealth or NSW threatened ecological communities are likely to occur within the project area and as the site is mainly cleared and has low vegetation value, it is unlikely to support a diversity of threatened fauna and flora species.
- Riparian areas should be maintained and improved and areas of high ecological value should be retained and included in forward planning for the site.

The proposed E3 Environmental Management zone is considered appropriate for those areas of remnant vegetation with biodiversity and habitat corridor value. This approach protects land under the E3 zone without unnecessarily zoning land for environmental protection purposes that may not actually have significant environmental value.

9. Are there any other likely environmental effects as a result of the Planning Proposal and how are they proposed to be managed?

The following is a summary of other likely environmental constraints associated with the Planning Proposal:

Flood Prone Land

All lands proposed to be zoned R2 Low Density Residential areas are located outside the mapped 1:100 year ARI flood extent.

Bushfire Risk

Asset Protection Zones (APZs) for residential land are identified within the subject land. Where feasible, the conceptual road network adjoins the required APZs. Areas that will be rezoned for residential purposes under this Planning Proposal do not rely on the removal or modification of any significant or high value vegetation for bushfire management purposes. NSW Rural Fire Service are yet to provide comment on this Planning Proposal.

The Bushfire Risk has been addressed by Ecological Australia in their Bushfire Assessment. (See Appendix C).

Site Contamination

A review of previous land uses of the site indicates that contamination of the site is unlikely. The land is not mapped as former banana cultivation land and past known land uses comprise low intensity stock grazing. Searches of the land contamination register, record of notices and contaminated sites notified to Environmental Protection Authority have not identified the subject land. Contamination potential is considered minimal and manageable with recognised remediation procedures available.

Acid Sulfate Soils

Council's mapping system indicates that the subject land is mapped as Class 5 Acid Sulfate Soils. Class 5 is the lowest risk class and therefore it is highly unlikely that development of the property into residential lots will disturb acid sulphate soils.

Indigenous Heritage

A Potential Archaeological Deposit (PAD) was identified in the southern portion of the subject land comprising a knoll to the west of the water storage dam, although no Aboriginal objects were identified on the knoll. However, the presence of topsoil on the knoll provides an indication that there is the potential for an Aboriginal stone artefact scatter to occur. The knoll is proposed to be rezoned E3, therefore the PAD is unlikely to be disturbed.

The consultant report recommends that cultural heritage induction and the application of an Aboriginal Find Procedure is the appropriate level of management for work in the vicinity of the southern PAD. The full cultural heritage assessment is provided at Appendix D.

Given the above, it is considered appropriate that a Gateway Determination should require consultation with local Aboriginal stakeholders and the NSW Department of Premier and Cabinet.

European Heritage

The subject site does not contain any items listed as Heritage Items in Schedule 5 of Coffs Harbour Local Environmental Plan 2013 or the State Heritage Register. There are no European Heritage issues that would prevent the rezoning of this site.

Visual Amenity

Visual characteristics within the site range from small pockets of retained vegetation to cleared paddocks. The site has the capability to absorb visual change from rural to residential as it adjoins existing low density residential and large lot residential development.

Tree retention within the proposed E3 Environmental Management zone and the adjoining (existing) RE1 Public Recreation zoned land will provide some visual softening of future residential development and generally maintain the character of the area.

10. How has the Planning Proposal adequately addressed any social and economic effects?

Social and economic effects arising from the Planning Proposal will be positive in terms of the provision of land for new housing close to recreation land, the Woolgoolga State High School and urban facilities in Woolgoolga.

Social Considerations

The subject land is a 'greenfield' development site of a similar character to other growth areas within the Coffs Harbour LGA. The social implications of rezoning the subject land to provide for residential development are envisaged to be positive. The interface between the site and surrounding existing residential development is suitably buffered by RE1 Public Recreation zoned land. Passive connections between the subject land and the RE1 zoned land will occur over time as the nearby sporting fields and pedestrian/cycleway connections are built. The likely population of the subject land once developed (82 lots x 2.3 people) is estimated to be 190 persons. There are adequate services available in the Woolgoolga area to cater for a gradual growth of population.

Eventual housing resulting from the rezoning is likely to have a positive impact on the Woolgoolga community in terms of the provision of affordable housing, strengthening of existing community, commercial and retail services. Similarly, the development of the Northern Beaches Multi-Purpose Centre and West Woolgoolga Sports Complex that are located in between the two planning proposal areas will complement the growth of the Woolgoolga North West urban investigation area and provide important community facilities.

Economic Issues

A detailed Residential Land Demand Analysis was prepared to inform this Planning Proposal. The full report is included as Appendix B and the findings are summarised below:

- *There are numerous factors driving the demand for new residential development and the demand for detached housing lots within the Woolgoolga area including:*
 - *Low interest rates and the availability of finance,*
 - *Improved employment prospects and labour markets within the Coffs Harbour region,*
 - *Affordable housing options relative to other major markets along Australia's east coast; and*
 - *A fundamentally solid rental market which is attractive for residential property investment.*
- *Residents of the Study Area (an area from Red Rock to Emerald each and west to Upper Corindi) community have a propensity of demand for affordable detached housing for families, but also a choice in residential product catering to retirees, older persons and other more compact households.*

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- *Based on population growth alone, the Woolgoolga Study Area is projected to require an additional 2,600 dwellings between 2017 and 2036 or more than 130 new dwellings per annum over this period. A significant share of this dwelling demand will continue to be directed to detached dwellings and therefore demand for residential lots.*
- *The residential market in Coffs Harbour and the Study Area is demonstrating a supply-led market including signs of decreasing affordability and more limited choice in available residential product. It is important to ensure the timely delivery of residential land to maintain confidence in the residential market and in the ongoing delivery of affordable residential lifestyles for the Coffs Harbour community. A 7 to 8 year lead time is critical in ensuring sufficient residential land supply is available in maintaining affordability and confidence in the local residential market.*
- *Underlying demand drivers are indicative of increasing population growth and demand for residential lifestyles in Coffs Harbour and the Study Area, bringing forward population projections and dwelling demand within the Study Area.*
- *It is estimated that there is only three years of supply available to the market within the Study Area, including land that is currently not being developed and subject to landowner intentions and commercial viabilities, indicative of a pressing need for release of land to maintain affordability and confidence in the market.*

The Residential Land Demand Analysis suggests that rezoning the subject land for residential purposes will assist in meeting current demand for additional low density residential land stock in the Woolgoolga locality.

Section D – State and Commonwealth interests

11. Is there adequate public infrastructure for the Planning Proposal?

Reticulated water supply and sewerage are available to service the Woolgoolga North West Investigation Area. Although insufficient capacity exists at the moment, there are planned upgrades to the network that will be able to service future residential development. Masterplanning of the Woolgoolga North West urban investigation area will provide guidance to potential developers on this issue. Electricity and telecommunications infrastructure is also available to the subject land.

The site has frontage to Newmans Road Woolgoolga, which is an existing collector road that services a growing urban area. The Traffic Assessment (refer to Appendix H) and subsequent amendments indicate that the eventual development of the site will not compromise traffic flow and the safe passage of traffic in and out of the West Woolgoolga area.

Council intends to undertake a broader traffic assessment and traffic modelling exercise as part of the master planning of the Woolgoolga North West urban investigation area to provide an optimal arrangement for traffic movement in the area. A broader traffic assessment will consider:

- the developing West Woolgoolga area surrounding the subject land;
- the desire for east-to-west pedestrian / bicycle connectivity across Solitary Islands Way (SIW) to connect Woolgoolga High School and the existing cycleway (on the east side of SIW) to the proposed West Woolgoolga Playing fields and the future Woolgoolga North West growth area on the west side
- the need for multiple intersection upgrades and new intersections along SIW in association with current growth and future growth areas and the need to access the proposed West Woolgoolga Playing fields.

12. What are the views of State and Commonwealth public authorities consulted in accordance with the Gateway determination?

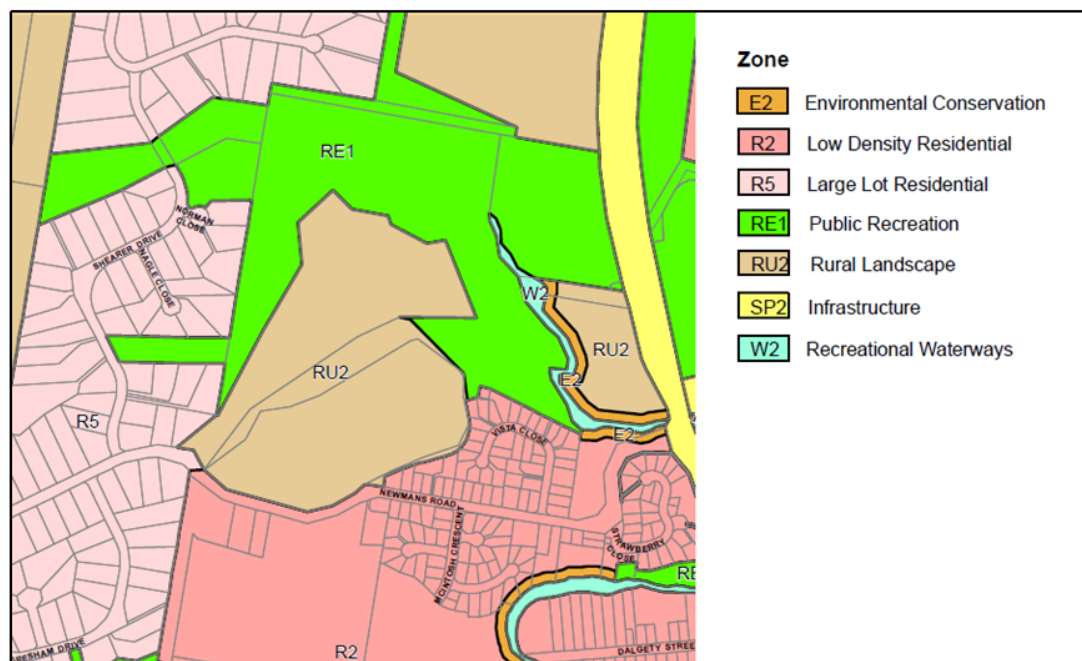
This will be determined following additional consultation with any State and Commonwealth Public Authorities as identified in a Gateway Determination issued by NSW Department of Planning, Industry and Environment.

PART 4 – MAPPING

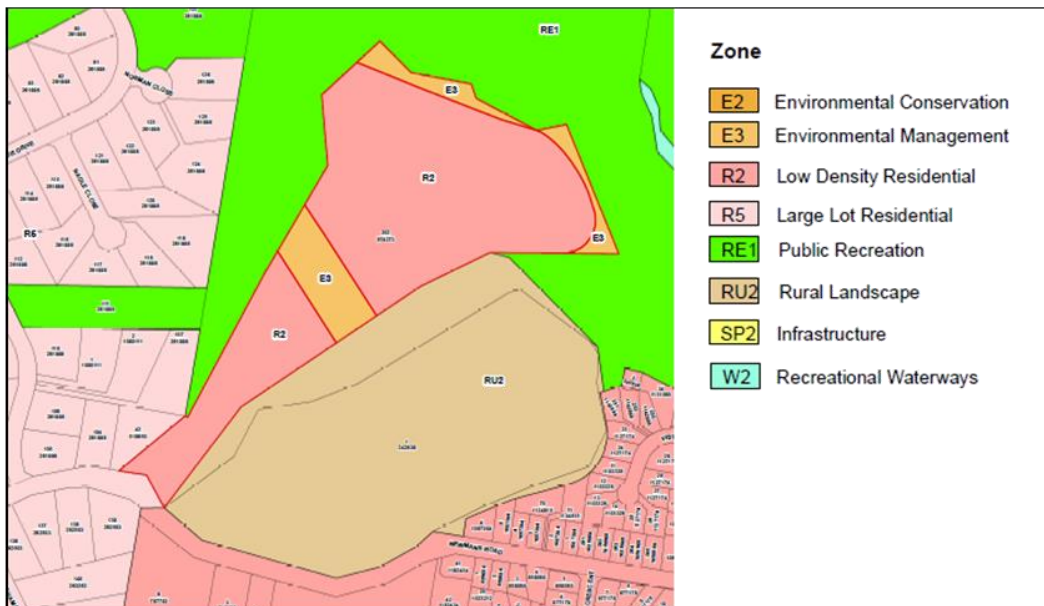
The following amendments are proposed to Coffs Harbour LEP 2013 maps:

- Amend the Coffs Harbour Land Zoning Map (Sheet LZN_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to show land currently zoned RU2 Rural Landscape to part R2 Low Density Residential and part E3 Environmental Management;
- Amend the Coffs Harbour Minimum Lot Size Map (Sheet LSZ_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to show land currently subject to minimum lot size provision AB – 40ha to part AB – 40ha and part F – 400 sqm;
- Amend the Coffs Harbour Terrestrial Biodiversity Map (Sheet CL2_005F) over Part Lot 202 DP 874273, Newmans Road, Woolgoolga to include areas proposed to be zoned E3 Environmental Conservation as terrestrial biodiversity on the map; and
- Introduce a new Coffs Harbour Key Sites Map (KYS_005F).

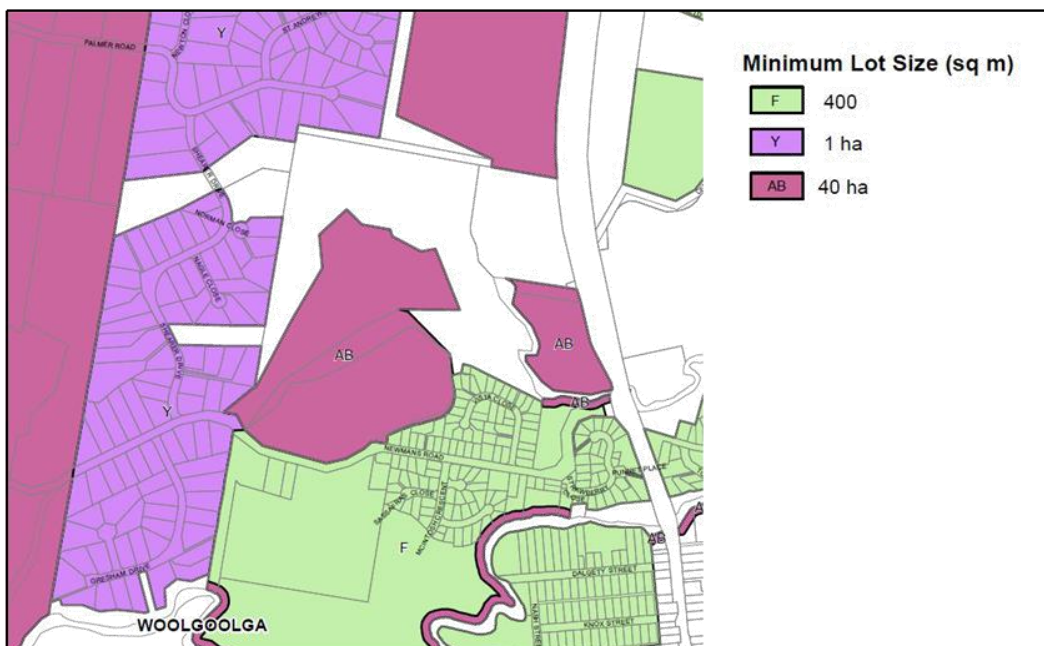
Existing mapping and proposed LEP mapping amendments are shown below:



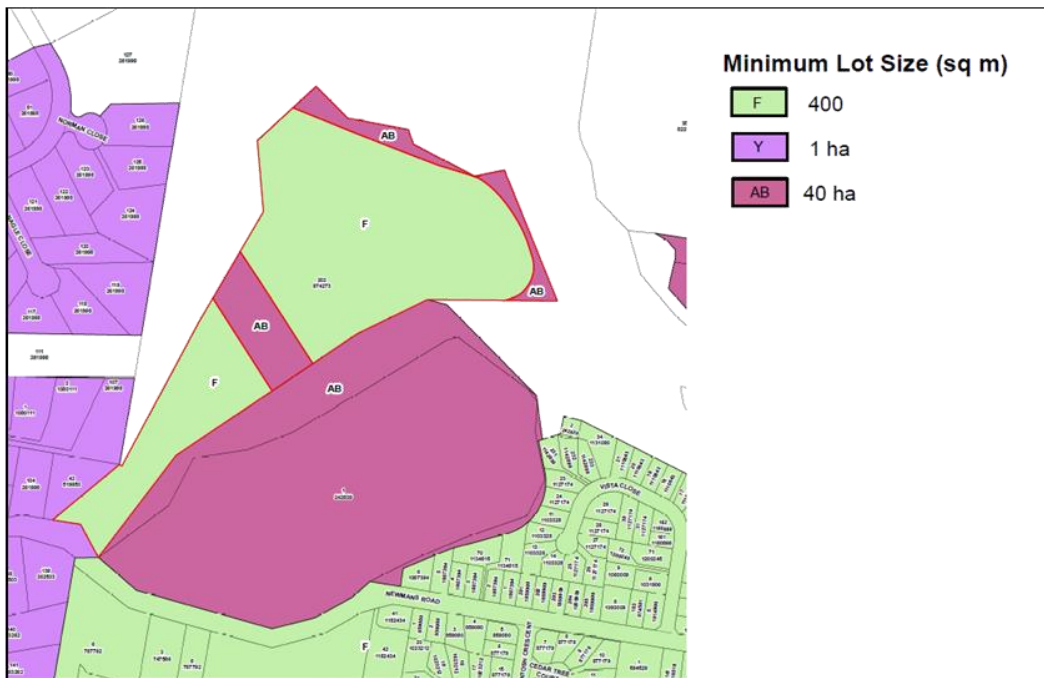
Existing LEP 2013 Zones



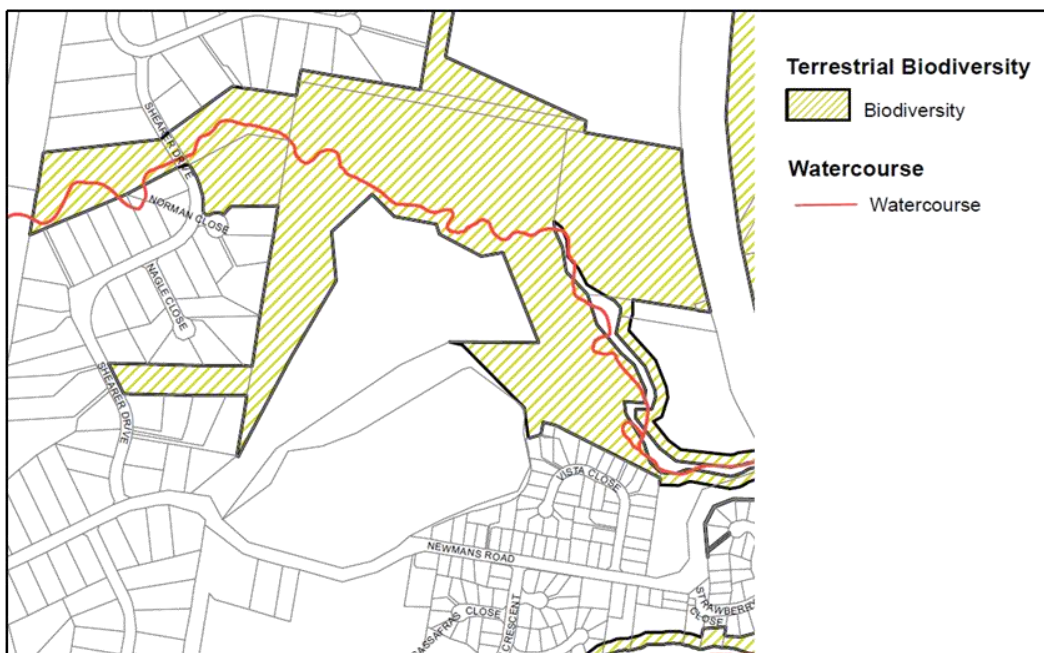
Proposed LEP 2013 Zones



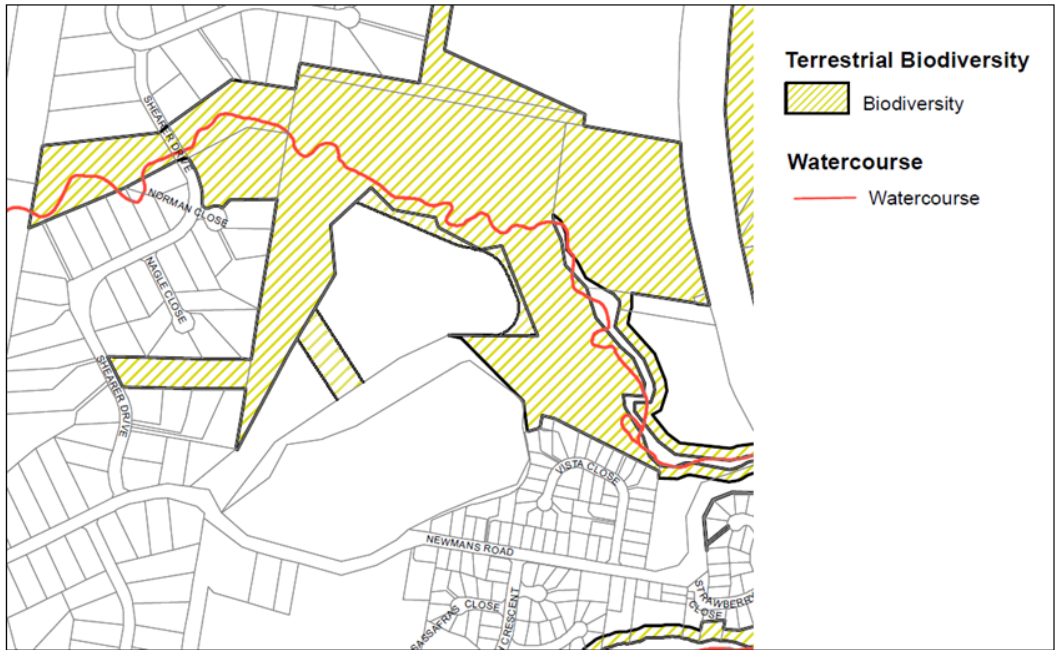
Existing LEP 2013 Minimum Lot Sizes



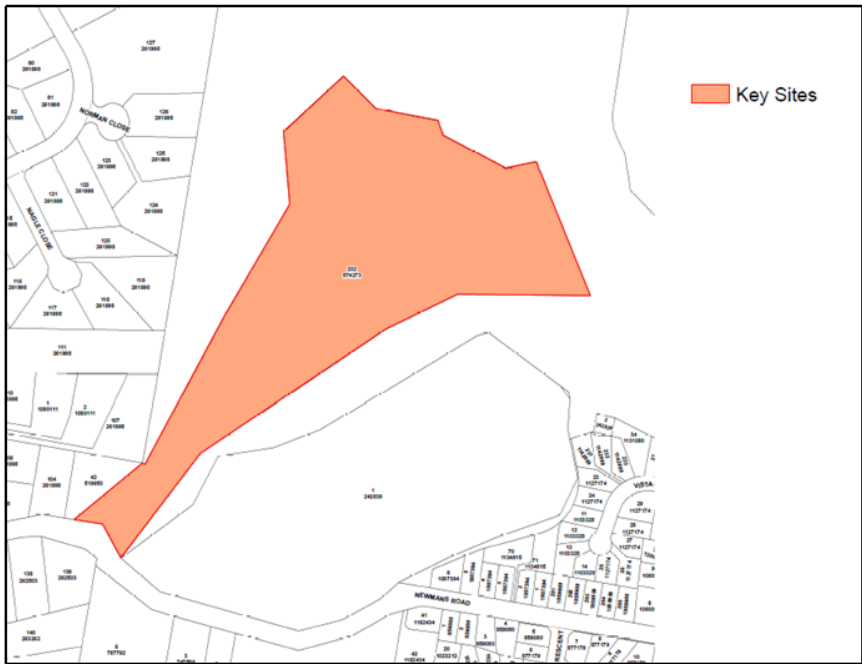
Proposed LEP 2013 Minimum Lot Sizes



Existing Terrestrial Biodiversity Map



Proposed Terrestrial Biodiversity Map



Proposed Key Sites Map

PART 5 – COMMUNITY CONSULTATION

Should the NSW Department of Planning, Industry and Environment endorse exhibition of this Planning Proposal and issue a Gateway Determination, the community, government agencies and other stakeholders will have an opportunity to make submissions to this Planning Proposal.

If endorsed to do so, the Planning Proposal will be exhibited in accordance with the Gateway Determination and relevant provisions of Section 3.34(2) of the *Environmental Planning and Assessment (EP&A) Act 1979*.

PART 6 – INDICATIVE TIMETABLE

The indicative timeframe for this Planning Proposal is outlined in table 3 below.

Table 3: Indicative timetable

Task	Estimated timeframe
Resolution by CHCC to proceed	September 2019
Gateway determination	October 2019
Finalisation of additional information as requested by Council and Gateway determination	October 2019
Public exhibition of Planning Proposal	November - December 2019
Agency consultation	November - December 2019
Review submissions	December 2019 - January 2020
Report to Council	February 2020
Submission to Planning Minister	March 2020
Finalisation	April - May 2020

APPENDICES

APPENDIX A – Landscape Character and Conceptual Master Plan and Subdivision

APPENDIX B – Residential Land Demand Analysis

APPENDIX C – Preliminary Vegetation Management Plan

APPENDIX D – Aboriginal Cultural Heritage Assessment Report

APPENDIX E – Lesser Swamp Orchid Report and Ecological Report

APPENDIX F – Bushfire Report

APPENDIX G – Engineering Appraisal

APPENDIX H – Traffic Assessment and Addendums

Appendix A ~ Landscape Character Concept Master Plan & Subdivision





scattered trees and grassland within the site



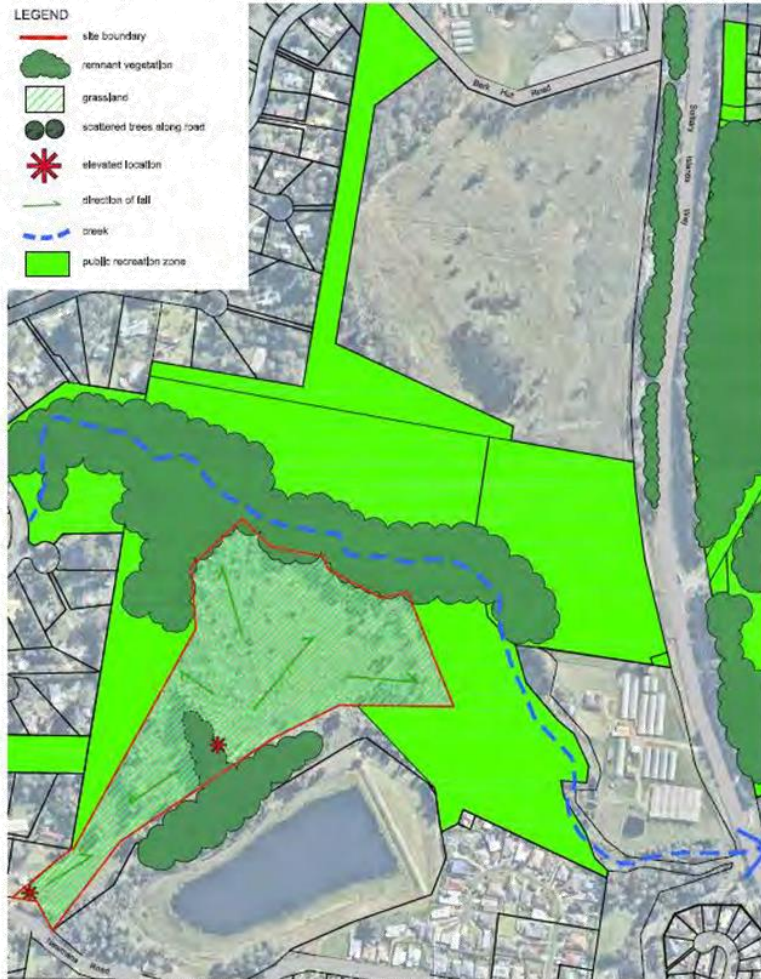
sample of scattered trees in the southwest of the site



creek and riparian vegetation (between the site and public recreation area)

LEGEND

- site boundary
- remnant vegetation
- grassland
- scattered trees along road
- elevated location
- direction of fall
- creek
- public recreation zone



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AMENDMENTS			
Serial	Date	Details	MM
A	20/09/18	Revised drawing	JA
B	13/10/18	Revised drawing	JA

PROJECT	Bark Hut Road, Woolgoolga
PLANNING PROPOSAL	Site Character
CLIENT	Kelley Hunter Urban Planner

DRAWING	Planning Proposal Site Character
DRAWING NO.	1730-03

DRAWN	ISSUE
JA	B
DATE	September 2018



Scale 1:600 @ A3
mm 0 20 40 60 80 100

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jacinta@jlapr.com.au





PHOTO 1 - Looking across dam from Newmans Road to site



PHOTO 2 - Looking to creek from the site






PHOTO 3 - Entry to site from Newmans Road

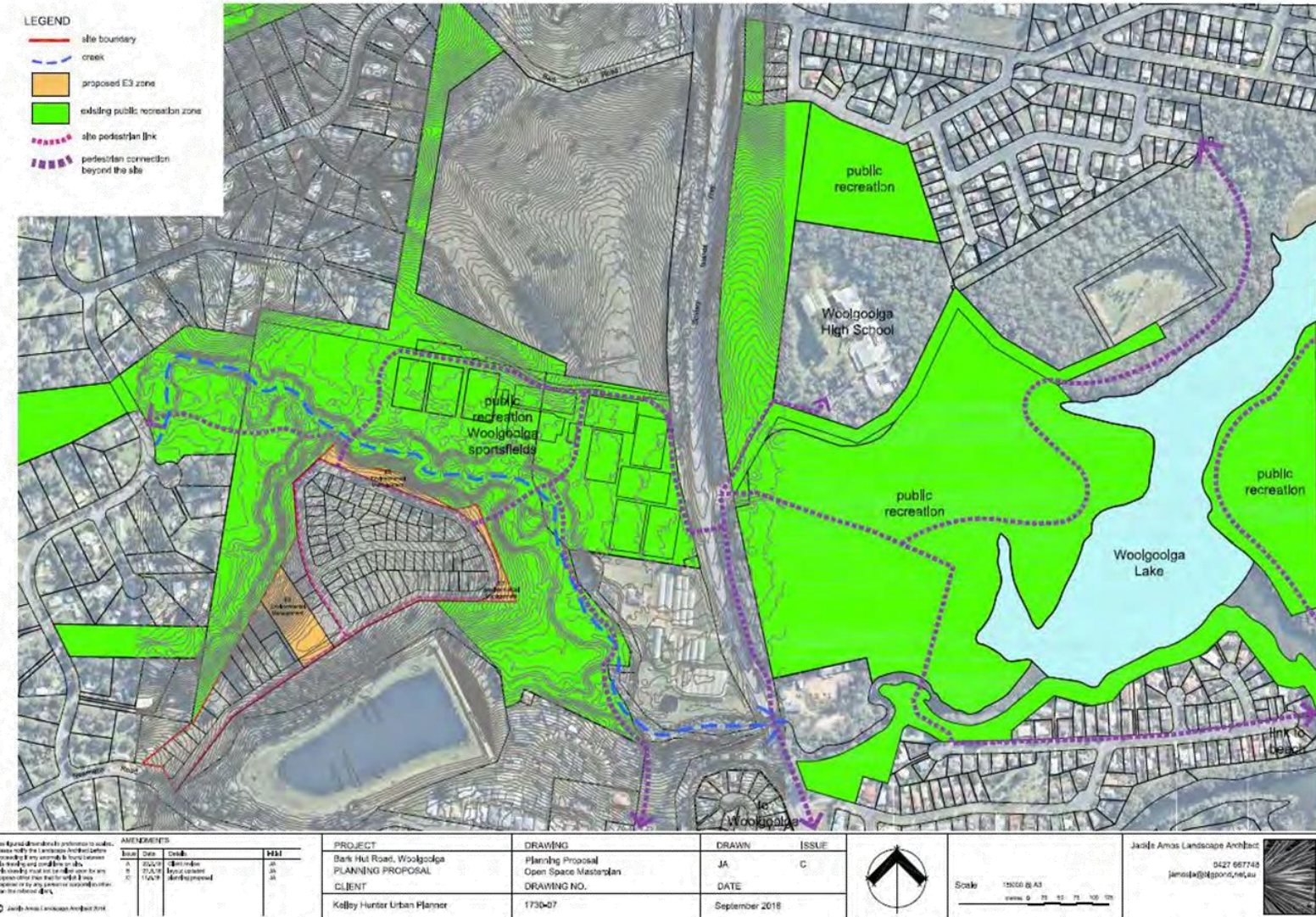


PHOTO 4 - View from site looking east



PHOTO 5 - View from site looking south

<small>Use Name Amendment in accordance to codes. Please refer to the Landscape Architect's office for any amendments to codes. The drawing must not be used for any purpose other than that for which it was prepared or by any person or company other than the Architect.</small> <small>© Jackie Amos Landscape Arch © 2018</small>	AMENDMENTS		PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL CLIENT Kelley Hunter Urban Planner	DRAWING Planning Proposal Views to the Site DRAWING NO. 1735-02	DRAWN JA ISSUE A DATE September 2018		Scale 1:500 @ A3 	Jackie Amos Landscape Arch 0427 667748 jemohe@bigpond.net.au								
	<table border="1"> <thead> <tr> <th>Issue</th> <th>Date</th> <th>Drawn</th> <th>CHK</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>27/2/18</td> <td>JA</td> <td>JA</td> </tr> <tr> <td>2</td> <td>11/2/18</td> <td>JA</td> <td>JA</td> </tr> </tbody> </table>	Issue								Date	Drawn	CHK	1	27/2/18	JA	JA
Issue	Date	Drawn	CHK													
1	27/2/18	JA	JA													
2	11/2/18	JA	JA													



LEGEND

- site boundary
- - - creek
- proposed E3 zone
- existing public recreation zone
- - - site pedestrian link
- - - pedestrian connection beyond the site

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AMENDMENTS			
Serial	Date	Details	By
A	04/11/17	Issue for review	JA
B	21/11/17	Issue for comment	JA
C	11/01/18	Final proposal	JA

PROJECT
Bank Hill Road, Woolgoolga
PLANNING PROPOSAL
Open Space Masterplan
CLIENT
Kelley Hunter Urban Planner

DRAWING
Planning Proposal
Open Space Masterplan
DRAWING NO.
1730-07

DRAWN | **ISSUE**
JA | C
DATE
September 2018



Scale 1:500 @ A3
sheet 0 10 20 30 40 50m

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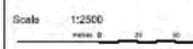




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Rev	Date	Description	By
A	22/09/18	Submitted	JA
B	17/09/18	Approved for Asset Protection Zones	JA
C	17/09/18	Approved for the DDB feedback	JA
D	17/09/18	E3 zone added	JA
E	17/09/18	Issued for printing	JA

PROJECT	DRAWING	DRAWN	ISSUE
Bark Hut Road, Woolgoolga	Planning Proposal	JA	E
PLANNING PROPOSAL	Proposed Subdivision Layout Newmans Rd		
CLIENT	DRAWING NO.	DATE	
Kilbey Hunter Urban Planner	1730-08	September 2018	



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Appendix B ~ Woolgoolga Residential Demand Analysis





Subject site looking south from Bark Hut Rd

Residential Land Demand Analysis: Bark Hut Road, Woolgoolga



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Prepared on behalf of:

Vadejil Pty Ltd

Prepared by:

Kerrienne Meulman
Managing Director

Joshua Binkley
Consultant

January 2018 Update

16069

Warranty

This report has been based upon the most up to date readily available information at this point in time, as documented in this report. Urban Economics has applied due professional care and diligence in accordance with generally accepted standards of professional practice in undertaking the analysis contained in this report from these information sources. Urban Economics shall not be liable for damages arising from any errors or omissions which may be contained within these information sources.

As this report involves future market projections which can be affected by a number of unforeseen variables, they represent our best possible estimates at this point in time and no warranty is given that this particular set of projections will in fact eventuate.

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EXECUTIVE SUMMARY

- A masterplan has been prepared for the establishment of a 293-lot residential development on Bark Hut Road, Woolgoolga. The location has been investigated for residential development since the mid-1990's and it is now considered suitable to progress development at the site. Lots are estimated to be on average 600m², and to potentially include a range of lot sizes accommodating choice in dwelling types and promoting affordability.
- There are numerous factors driving the demand for new residential development and the demand for detached housing lots within the Woolgoolga area including:
 - Low interest rates and the availability of finance,
 - Improved employment prospects and labour markets within the Coffs Harbour region,
 - Affordable housing options relative to other major markets along Australia's east coast; and
 - A fundamentally solid rental market which is attractive for residential property investment.
- Residents of the Study Area community have a propensity of demand for affordable detached housing for families, but also a choice in residential product catering to retirees, older persons and other more compact households.
- Based on population growth alone, the Woolgoolga Study Area is projected to require an additional 2,600 dwellings between 2017 and 2036 or more than 130 new dwellings per annum over this period. A significant share of this dwelling demand will continue to be directed to detached dwellings and therefore demand for residential lots.
- The residential market in Coffs Harbour and the Study Area is demonstrating a supply-led market including signs of decreasing affordability and more limited choice in available residential product. It is important to ensure the timely delivery of residential land to maintain confidence in the residential market and in the ongoing delivery of affordable residential lifestyles for the Coffs Harbour community. A 7 to 8 year lead time is critical in ensuring sufficient residential land supply is available in maintaining affordability and confidence in the local residential market.
- Underlying demand drivers are indicative of increasing population growth and demand for residential lifestyles in Coffs Harbour and the Study Area, bringing forward population projections and dwelling demand within the Study Area.
- It is estimated that there is only 3 years of supply available to the market within the Study Area, including land that is currently not being developed and subject to owner intents and commercial viabilities, indicative of a pressing need for release of land to maintain affordability and confidence in the market.



1.0 INTRODUCTION

1.1 BACKGROUND

A masterplan has been prepared for the establishment of a 293-lot residential development on Bark Hut Road, Woolgoolga. The location has been investigated for residential development since the mid-1990's and it is now considered suitable to progress development at the site.

Coffs Harbour City Council's Our Living City Settlement Strategy has identified the two land parcels within the possible Future Urban Investigation area, and has stated that it requires "an extremely compelling case to justify Council amending the priority" of the demand for residential land within the Woolgoolga area.

This Residential Land Demand Analysis has been undertaken by Urban Economics on behalf of Vadejil Pty Ltd, to comprehensively address the concerns and issues raised by Council regarding this development examining demand for residential land relative to existing and intended supply.

Urban Economics is a specialist economic and market research consultancy, with considerable experience in examining need and demand for the residential sector including masterplanned residential communities, worker's villages, rural residential and rural living developments, apartments, retirement and aged care, student accommodation and affordable housing.

1.2 STUDY OBJECTIVES AND METHODOLOGY

The key objective of this Analysis is to examine the need and demand for residential land in Woolgoolga and the relative position of the subject development within this supply and demand framework. A secondary objective will consider the proposed timing of the development as this relates to Council's strategy.

In meeting these objectives, Urban Economics has undertaken the following tasks:

- Inspected the subject properties and reviewed the masterplan for the proposed development;
- Identified existing estates currently selling within the Woolgoolga area, including an assessment of take-up rates, target markets and future supply;
- Reviewed historic aerial photography to critique take-up of residential land in Woolgoolga;
- Developed a Study Area for the proposed development and subject sites;
- Analysed historic population growth within Woolgoolga and the Coffs Harbour region;
- Conducted a series of interviews with local estate agents to explore key target markets for vacant land, key release areas, demand requirements of buyers and expectations etc;
- Prepared estimates of existing population and dwellings within the Woolgoolga area;



- Reviewed projections of the growth of the population of Woolgoolga;
- Analysed vacant residential land sales activity and median sales prices for vacant residential land within Woolgoolga;
- Reviewed the relevant planning and economic strategy framework for Coffs Harbour and the Woolgoolga local area;
- Critiqued other trends influencing the residential property market in Woolgoolga including infrastructure, employment, economic development and demographic trends;
- Analysed the supply-demand interplay within Woolgoolga and implications for the release of additional residential land;
- Analysed qualitative demand issues that may influence the demand for the subject development; and
- Critiqued economic and social benefits of the proposed residential estate.



2.0 THE PROPOSED DEVELOPMENT

2.1 PLANNING FRAMEWORK AND BACKGROUND

The planning framework for residential development within Coffs Harbour is guided by numerous documents and strategies. The following summarises the key planning and strategic documents relevant to the subject development in Woolgoolga and residential land supply.

Mid North Coast Regional Strategy 2009

The **Mid North Coast Regional Strategy 2009** outlines the development regulations and guidelines for the mid North Coast regional area to best accommodate the projected housing needs from 2006-31. The plan places restrictions on growth in areas where environmental and/or cultural importance is high. It also encompasses guidelines to provide sufficient employment opportunities for new jobs expected to hit the region in this time frame. The Strategy uses a population projected increase of around 91,000 with a reasonable amount deriving from Coffs Harbour, Port Macquarie, and Great Lakes/Taree. The Strategy also attempts to accommodate for the ageing population. It predicts that the area will need almost 60,000 new dwellings (Coffs Coast making up around 19,000 of these) to accommodate population growth, the ageing population, declining occupancy rates, and tourism demands. To achieve this, the Strategy suggests an increase in the proportion of multiunit dwellings by 20%.

The overarching goal of the Strategy is to *"maintain and enhance the opportunity for the communities of the Region to experience a healthy, prosperous and sustainable lifestyle."*

Draft North Coast Regional Plan

The **Draft North Coast Regional Plan** develops a strategy for the Mid and Far North Coast for the next 20 years to provide *"a sustainable future for the region as it grows that protects the environment, builds a prosperous community and offers attractive lifestyle choices for residents."* The primary focus is on Port Macquarie, Coffs Harbour and Tweed Heads regions. This Plan outlines guidelines for accommodating the ageing population and improving the affordability of the area. This Plan projects a population increase of just under 100,000, with 67% of growth stemming from the three regions above. 90% of the population growth is expected to be derived from people over 65 years of age.

This is a significant weighting of the Region's population with considerable implications for housing and lifestyle delivery, as well as the mix of services and facilities available to the community.

The Regional Plan outlines 5 goals to achieve the above measures:

- 1) Protecting the natural environment and cultural heritage



- 2) Developing and maintaining an enjoyable area to work and live through growth opportunities
- 3) Meeting the housing needs of the changing population
- 4) Maintaining a well-performing economy with infrastructure and services
- 5) Updating freight patterns and transport connectivity

Coffs Harbour Local Environment Plan 2013 (LEP)

The **Coffs Harbour LEP 2013** provides *“local environmental planning provisions for land in Coffs Harbour in accordance with the relevant standard environmental planning instrument under Section 33A”* of the Environmental Planning and Assessment Act. The LEP hopes to encourage sustainable economic growth and development in the Coffs Harbour region. Other relevant aims include:

- development of a liveable urban sector that offers a combination of residential dwellings to meet the diverse needs of the population
- sustainable conservation and management of the region’s natural environment and culture
- protection of especially valuable scenic and recreational areas
- ecologically sustainable development and limited exposure to natural hazards

Coffs Harbour Development Control Plan 2015 (DCP)

The **Coffs Harbour DCP 2015** complements the LEP 2013 detailed above, as such to *“give effect to the aims of the Coffs Harbour LEP 2013, to facilitate development that is permissible under the Coffs Harbour LEP 2013 and achieve the objectives of land use zones under the Coffs Harbour LEP 2013.”* The DCP outlines 4 main objectives to achieve this goal:

- 1) Environmental Sustainability
 - Protection of high conservation value land and environmental heritage
 - Implementation of water-sensitive designs and minimisation of waterway impacts
 - Adherence to environmental characteristics of land
- 2) Social Sustainability
 - Meeting of needs of the population, including housing, leisure, and community facilities
 - Improving public transport, cycling paths, and walkways to minimise car dependence
- 3) Civic Leadership
 - Transparent, consistent, and accountable development proposals
- 4) Economic Sustainability
 - Contribution to economic growth and local employment opportunities
 - Sufficient support for public utilities and facilities so as to not burden the existing community



Coffs Harbour City Revised Land Capacity Assessment 2004

The **Coffs Harbour City Revised Land Capacity Assessment** estimates Coffs Harbour LGA's total population capacity and land availability for existing and future lands as of December 2004. As of 2004, the region was expected to need to accommodate for 32,000 new residents by 2030. Most of those were considered to be accommodated by subdivided vacant lots or unsubdivided land, but at least 6,000 of those require new urban zones. The entire LGA is predicted to increase by nearly 34,000, and in Woolgoolga, population is expected to increase by 3,550, while dwellings are expected to increase by 1,574 by 2031 (with an occupancy rate of 2.3). However, the Assessment notes that Woolgoolga Sewage Treatment Plant is capped to service 18,000 people unless augmented. Most of Woolgoolga's needs are to be met with vacant lots, unsubdivided land, and potential residential land and infill development. Possible future urban investigation amounts to 475 people and 190 dwellings.

Local Growth Management Strategy (LGMS) Review Stage 1 - Land Capacity Assessment Audit

The **LGMS Review Stage 1** of 2014 provides data on land capacity and supply of land *"to aid in the making of good planning decisions into the future for large lot residential, residential, business, industrial and tourist purposes"* as part of a review of the 2007 LGMS. According to the LGMS Review based on real estate responses, there is an adequate 5-year supply of land available for all of these categories (with the exception of residential land which did not have a clear agreement) in the northern part of the LGA, which centres on Woolgoolga. In the entire LGA, the audit indicates that there is significant land stock to accommodate future residential dwellings, especially where there is undeveloped land in Woolgoolga, West Coffs, North Boambee Valley, and South Coffs Harbour. R2 low density residential land can accommodate 2,970 more dwellings, while R3 medium density and R4 high density residential land can accommodate 899 more dwellings.

Our Living City Settlement Strategy

The **OLC Settlement Strategy** outlines guidelines for future urban rezoning in the LGA until 2031. This Strategy bases its plan off an expected population projection of 99,000 by 2031. The goal is to *"provide a blueprint for a smart city with accessible and reliable transport, a strong regional economy, a vibrant community and a healthy natural environment for us all."* The OLC Settlement Strategy has three objectives:

- 1) The Healthy City: Environmental Sustainability
 - Conservation of natural resources
 - Enhancement of natural values and accountability for environmental constraints
 - Efficient resource use and minimisation of negative externalities
- 2) The Smart City: Economic Sustainability
 - Augmentation of growth and development
 - Advancing employment and educational opportunities
 - Management of the population size to sufficiently sustain and advance services



3) The Cultural City: Social Sustainability

- Improvement of liveability and identity of communities
- Providing of fair access to resources for all residents
- Improvement of lifestyle through health and well-being

To achieve these goals, the OLC Settlement Strategy has specific strategies for each region. For Woolgoolga, these include but are not limited to: development as a Coast Town, determination of appropriate zonings for the environment, advance the commercial aspect of the town, develop employment opportunities and industrial land needs, initiate a Special Investigation Area to the south west, and investigate potential expansion to the north west.

The **Residential Strategy: Draft Issues & Options Discussion Paper for Community Engagement** outlines the important residential issues in Coffs Harbour to be addressed before Stage 2. The Coffs Harbour City Council highlighted five key issues:

1) A growing and changing community

- Ageing population

2) Evolving housing and accommodation needs

- Lower occupancy rates
- Importance of tourism
- Woolgoolga has a high proportion of households experiencing rental stress at 41%

“housing affordability is a significant issue within Coffs Harbour and appropriate planning responses are required to ensure that the community can meet household commitments.”

3) Better definition of the character of residential zones

- Encouragement of infill residential development

4) A review of built form controls and how they should be administered

- Should contribute to natural, cultural, visual and built character values

5) Consideration of special ‘character’ precincts

- Woolgoolga needs an easily identifiable centre, improved service range, and various dwelling types.

To address these concerns, the Report outlines potential options that necessitate further investigation and reiterates claims from previous reports that the Region has sufficiently zoned residential land to accommodate growth to meet community needs. This is despite Coffs Harbour not having a current and adopted Residential Strategy which adequately measures the community’s needs. Urban Economics considers that much of the land within *deferred* areas such as Moonee Beach which have not progressed for more than 15years, do not contribute to the residential land needs of Coffs Harbour and are unlikely to contribute in the short to medium term given the deferred status of these localities.



2.2 THE SUBJECT SITE

The subject sites comprise two distinct land parcels described as Lot 202 on DP874273 and is approximately 25.64ha. The parcels have different access points and road frontages with the southern parcel accessed from Newmans Road and the northern parcel having frontages to Bark Hut Road and Solitary Islands Way as illustrated in FIGURE 2.1.

The site is proximate to Woolgoolga High School which included more than 840 enrolments through 2016 and straddles the proposed Woolgoolga sports precinct. The subject development is convenient to a range of services and facilities including the Woolgoolga activity centre and a modern Woolworths supermarket; all of which are within 2km of the subject site.

FIGURE 2.1: Subject Site



Source: Nearmap showing May 5th 2016



2.3 THE MASTERPLAN

It is proposed to ultimately develop 82 residential lots within the masterplan area. Lots are estimated to be on average 600m², and to potentially include a range of lot sizes accommodating choice in dwelling types and promoting affordability.

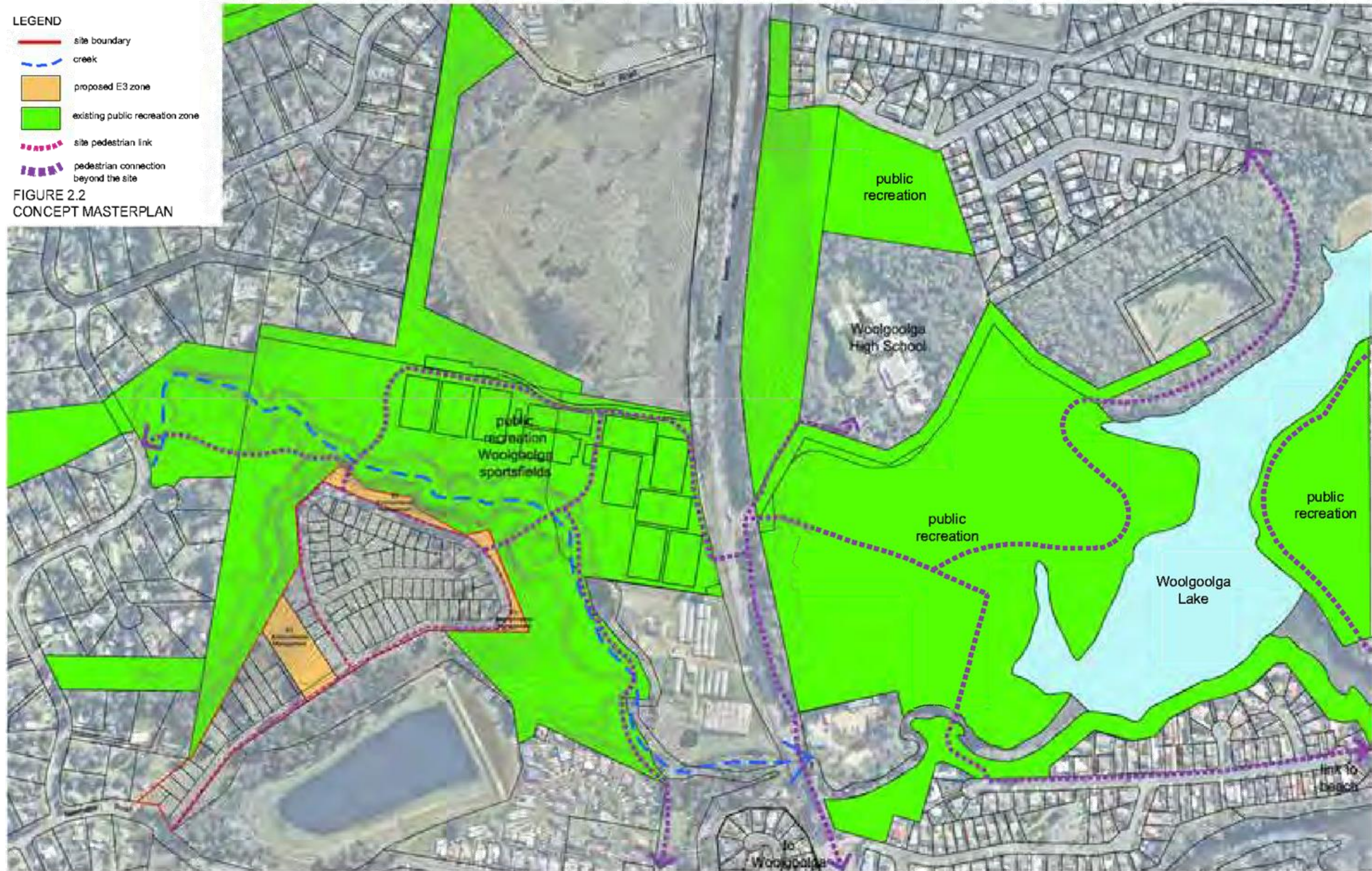
The masterplan is conceptual at this stage, but provides an indication of intentions for the site. Other considerations for the masterplan have also included an integrated aged care and retirement facility, such as has established at The Lakes community within the North Boambee Valley. Illustrated in FIGURE 2.2, the Draft Masterplan highlights the proposed development's proximity to Woolgoolga High School and the future West Woolgoolga Sports Complex and fields.



LEGEND

-  site boundary
-  creek
-  proposed E3 zone
-  existing public recreation zone
-  site pedestrian link
-  pedestrian connection beyond the site

**FIGURE 2.2
CONCEPT MASTERPLAN**



Use figured dimensions in preference to scales. Please notify the Landscape Architect before proceeding if any anomaly is found between this drawing and conditions on site. This drawing must not be relied upon for any purpose other than that for which it was prepared or by any person or corporation other than the intended client.

Issue	Date	Details	Initial
A	22.2.18	Client review	JA
B	21.8.18	layout updated	JA
C	11.9.18	planning proposal	JA

PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL	DRAWING Planning Proposal Open Space Masterplan	DRAWN JA	ISSUE C
CLIENT Kelley Hunter Urban Planner	DRAWING NO. 1730-07	DATE September 2018	



Scale 1:5000 @ A3
metres 0 25 50 75 100 125

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3.0 RESIDENTIAL SUPPLY ANALYSIS

3.1 STUDY AREAS

Urban Economics has defined study areas for the analysis of residential land supply, to allow for statistical comparison between markets and localities. FIGURE 3.1 illustrates the Woolgoolga Study Area which is defined by the 2456 postal area and includes the localities (state suburbs) of Arrawarra, Arrawarra Headland, Corindi Beach, Emerald Beach, Mullaway, Red Rock, Safety Beach, Sandy Beach, Upper Corindi and Woolgoolga; within the context of the Coffs Harbour local government area (LGA).

The Woolgoolga Study Area has also been defined utilising Census statistical geographies and includes parts of both the Korora - Emerald Beach and Woolgoolga – Arrawarra statistical areas (SA2).



FIGURE 3.1: Study Area



3.2 COFFS HARBOUR RESIDENTIAL MARKET

The Draft Coffs Harbour Residential Strategy identifies the historic role of the housing market of the region in *“the attraction of families and retirees from metropolitan areas further south in NSW such as Sydney. This has resulted in the steady residential expansion of coastal localities along the Mid North coastline to cater for population increases derived from the expansion of existing communities and migration in-flows.”*

At the time of the 2011 Census, Coffs Harbour included approximately 29,000 dwellings (26,000 occupied) of which around 76% were detached dwellings, 11% were semi-detached dwellings (row, terrace etc.) and 10% were flats units or apartments. Since this time, there have been more than 2,300 additional dwellings approved in the region and 2016 Census data indicates some 30,000 dwellings (27,000 occupied) at the time.

TABLE 3.1: Building Approvals – Coffs Harbour LGA

	New houses	New other residential building	Total dwellings
2011-12	195	53	273
2012-13	208	44	257
2013-14	227	51	282
2014-15	292	81	381
2015-16	268	178	452
2016-17	332	131	468
2017-18*	129	62	192

Source: ABS

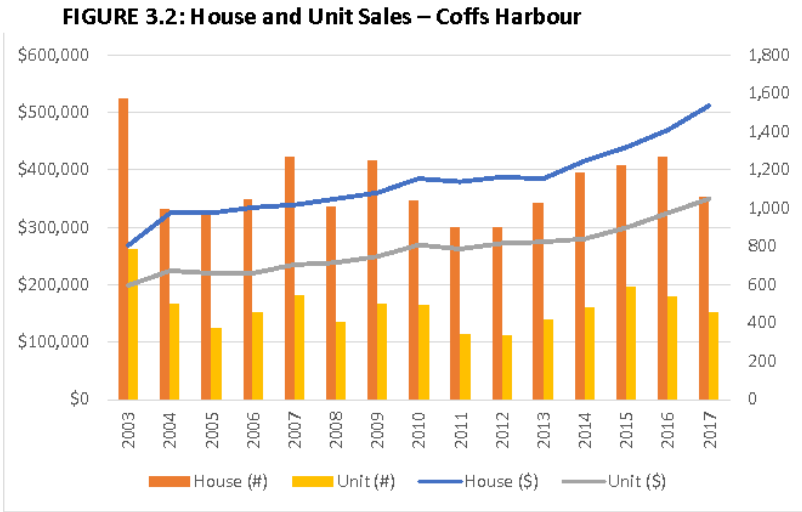
*FY to November 2017

Similarly, the NSW Valuer General noted 23,148 lots within residential zones of Coffs Harbour as at July 1st 2017. The Valuer General’s 2015 report notes that *“Historically low interest rates have resulted in continued improvement in demand for properties throughout this sector (residential) of the market with local real estate agents reporting that selling periods have shortened and buyer demand has remained steady and strong throughout the past 12 -18 months. Single residential land values have increased across all established residential areas within the LGA, with most localities recording increases in the 3% to 6% range. No area reflected a drop in value levels which also **reflects a lack of supply** to the steadily growing demand which in turn drives up prices.”* The July 2017 Report further states *“Residential land showed a strong increase with increased demand for all classes of residential land in the coastal region (Coffs Harbour),”* and indicates a 10.3% increase in residential land values from 2016 to 2017.



Herron Todd White’s Month in Review for October 2016 indicated that residential property within Coffs Harbour is rising/approaching the peak of the market. The key housing market is indicated to be within the sub-\$500,000 range, mostly sought by first home buyers and establishing families, or investors capitalising on the transient nature of the region which inherently includes a strong rental market. HTW’s October 2017 report further indicates that housing within Coffs Harbour has decreased in affordability and “fringe beachside localities such as Corindi Beach to the north, being popular with commuters from both Coffs Harbour and Grafton, and Nambucca Heads to the south where property prices are considerably more affordable in the \$300,000 to \$400,000 price range.”

FIGURE 3.2 illustrates the growth within the house and unit markets of Coffs Harbour between to December 2017. Most notably, median house prices have increased more than 47% or approximately \$243,000 since 2003.

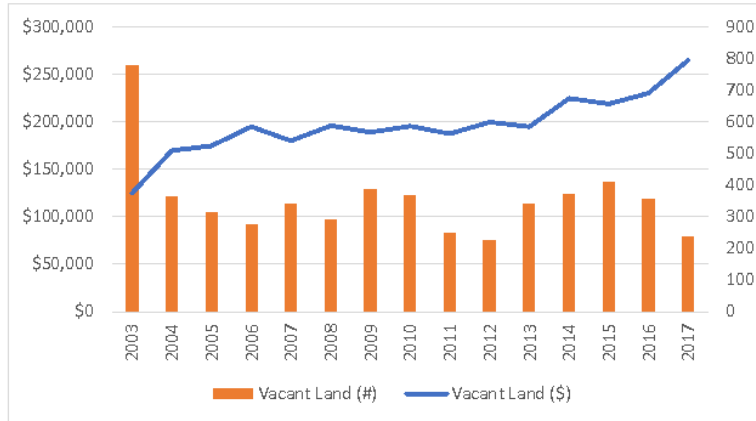


Source: Pricefinder

Coffs Harbour has also recognised price growth within the market for vacant land, which as noted by the Valuer General, is a result of limited new supply within the region over this period. FIGURE 3.3 illustrates this dynamic whereby the volume of vacant land sales has declined and the median price has increased.



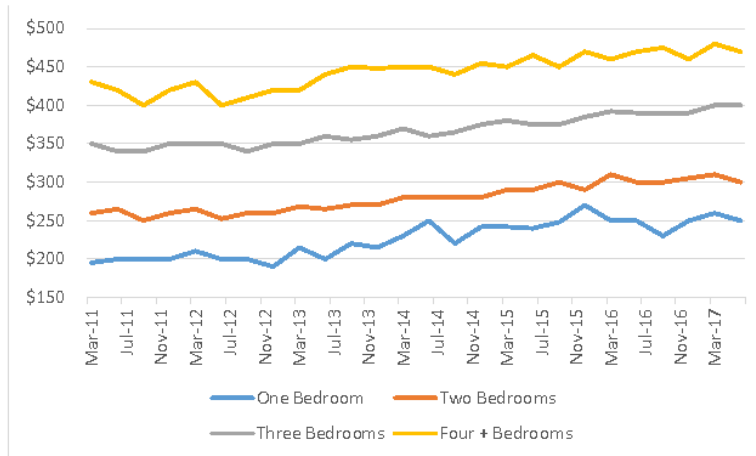
FIGURE 3.3: Vacant Land Sales – Coffs Harbour



Source: Pricefinder

Quarterly data provided by the Department of Family and Community Services outlines that the median rental price across the Coffs Harbour LGA has steadily increased, suggesting some supply constraints in the availability of rental accommodation. FIGURE 3.4 highlights this growth with a 4-bedroom house reporting a median rental price of \$470 for the June Quarter 2016.

FIGURE 3.4: Median Rents – Coffs Harbour



Source: Department of Family and Community Services



3.2 RESIDENTIAL ESTATES

There are numerous residential developments underway and proposed throughout Coffs Harbour. The following summarises known residential development projects for detached housing throughout the region.

Urban Economics undertook inspections of the various estates in October 2016 and gathered sales data from the respective agencies to determine the availability of lots within these developments at the time.

Elements@Coffs is a masterplanned estate in Boambee East which has been proposed to include some 221 lots over 13 stages. The release of stage 1 which comprises 30 lots has sold 29. Stage 1a has sold 3 of its 15 lots. Stage 2a has sold 4 of 11 lots. Stage 9 has sold 2 of its 15 lots. The median sale price has been approximately \$195,000 (\$250/m²) for sold lots between December 2013 and June 2017; less than 1 lot per month over this period. Based on sale plans for the estate, approximately 40 lots have been sold within the development. Whilst the price may be considered within the affordable range, the masterplanned area is quite undulating, which would add to the ultimate cost of building; and likely part of the reason for the subdued uptake of lots.

Aspect@The Summit is a land release within **The Summit** development which is situated on the ridge above The Big Banana. Aspect included 29 lots between 465m² and 1,001m², all of which have already been sold. Available lots had a large price range of between \$220,000 and \$410,000; reflective of the achievable views and cost of development for sloped land.

Woopi Beach Estate is located at the corner of Hearnese Lake Rd and Solitary Islands Way in Woolgoolga which will ultimately include some 90 lots averaging around 700m² each. Currently undertaking presales for second release, 42 of the initial 90 lots have been sold or are under contract for between \$218,000 and \$235,000, with a further 60-lots becoming available in a potential future release.

North Sapphire Beach is a large masterplanned estate established by the Walker Group which sold out between early 2011 and October 2017. The final 'Sugar Mill' release in the development is currently sold out with lot sales priced between \$250,000 and \$285,000 for lots of between 447m² and 685m².

Sapphire Beachfront is a premium beachside release of lots within a community titles scheme. Of the 40 lots released all have been sold, with vacant lots achieving up to \$825,000 or \$1,475/m².

Woolgoolga Heights is an approved 50 lot development (Stage 1) located at the intersecting Haviland and Backhouse streets in Woolgoolga. Advertised from \$185,000 for lots sized between 600 and 700m², the relevant sales agency has advised that development is not progressing at Woolgoolga Heights at this stage. Woolgoolga Heights forms part of a 30.4ha, 'proposed agreed growth area' within the Our Living City Settlement Strategy and is illustrated in FIGURE 3.5 below.



This area was intended to support some 300 dwellings from 2016 of which none have progressed at this stage.



Stalled development at Woolgoolga Heights

North Sandy Beach estate includes some 82 lots of which all have been sold. Initial lots were sold individually for \$155,000-\$190,000 and as 'affordable' house and land packages within the sub-\$500,000 bracket. The short sales period of just 15 months for this development (February 2015 to May 2016) is indicative of the demand for affordable family dwellings and investor demand in this price range.



Detached housing construction at North Sandy Beach

Seacrest at Sandy Beach adjoins North Sandy Beach estate and is masterplanned to include 166 residential lots. Stages 1 and 2 (43 lots) are completed and sold whilst 123 lots within stages 3 to 5 are predominantly presold with civil works continuing.

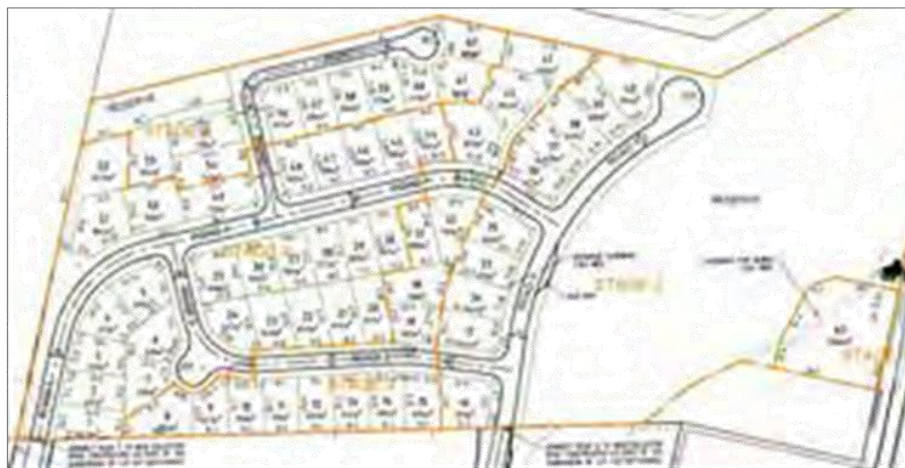
Nautica Fairways Estate at Safety Beach has evolved since initial lots were released in 2003. The development has more recently accelerated sales with the current release of 9 lots in Stage 9 having already sold 3. Available lots are currently advertised for \$260,000 and \$310,000 for areas of between 639m² and 852m².



Emerald Beach Estate is a 112-lot subdivision is located at the entrance to the Emerald Beach residential area. Stages 1 and 2 within the project have sold out (60 lots) and Stage 3 (16 lots) has just 6 remaining according to the December 2017 sales plan.

3.3 PROPOSED AND APPROVED DEVELOPMENTS

- Immediately north of the subject site a parcel described as Lot 2 on DP1143755 has been mooted to include a residential subdivision. The Our Living City Settlement Strategy (FIGURE 3.5) identifies that this parcel could support approximately 540 dwellings after 2031. Sequentially, development at this site would logically follow development at the subject site based on geographic position and location with respect to services and facilities.
- A 14.2ha growth area has been designated within the Woolgoolga Diggers Golf Course (FIGURE 3.5). This site was proposed to support 120 dwellings from 2016, however no plans or development have progressed to date.
- 13 Hearnese Lake Rd, Woolgoolga is proposed to include some 63 lots from 547m² in area. The development would sequentially follow on from the current development of Woopi Beach Estate and has been included as such within this Analysis.



Proposed 13 Hearnese Lake Rd subdivision

Other residential 'proposed agreed growth areas' within the Study Area have been identified from the Our Living City Settlement Strategy, none of which have commenced to an application or development phase including:

- 15.8hectares over 12 large lots at Corindi Beach



- 5 hectares at 97 Pacific St, Corindi Beach
- 2.5 hectares at Arrawarra Headland
- 0.8 hectares at Mullaway.

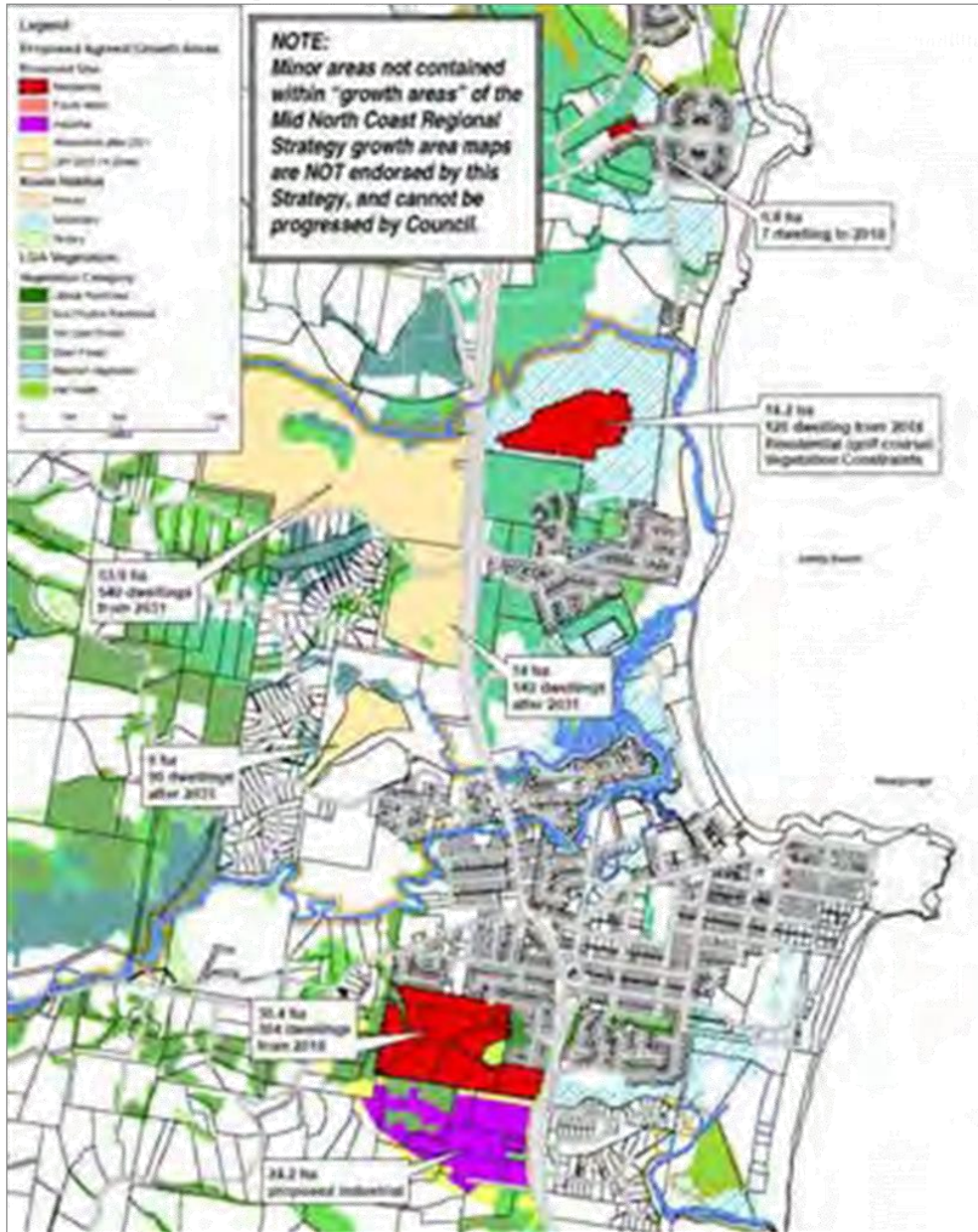
In total, some 68.8 hectares of land with the noted potential of approximately 665 dwellings has yet to have had plans progressed for development, which is not conducive to the steady and orderly release of residential land in the area.

The trend for residential development plans not advancing in the Region is evident within the numerous former 'Part 3A applications' which are now listed as Major Project Assessments by the Department of Planning and Environment including:

- **Glades Estate** at Moonee Beach which was initially proposed in mid-2006 to include approximately 522 lots and has undergone numerous iterations and modifications since;
- A 165-lot subdivision at Lyons Rd, North Bonville which commenced in 2008;
- The **Moonee Waters** project was initiated in 2005 to include 300 lots adjoining the North Sapphire Beach Estate, on a site with environmental constraints;
- **Sandy Beach North** (noted as an undeveloped and zoned urban area) has been proposed since early 2006 to include 280 residential lots on a 50-hectare site bound by Hearn's Lake, the Pacific Highway and the coast.
- A development parcel of approximately 25ha and known as '**Pacific Bay Estate**' has recently been sold. The site was mooted as being able to support residential development of 110 to 130 residential lots since 2006.



FIGURE 3.5: Proposed Agreed Growth Areas

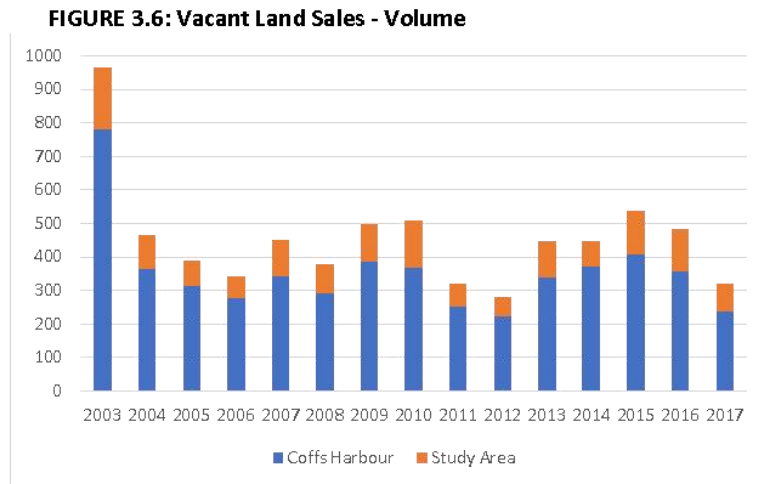


Source: Our Living City Settlement Strategy – Map 4B



3.4 THE WOOLGOOLGA STUDY AREA

The market within the Study Area has consistently represented approximately 20% of the volume of house sales and 5% of unit sales within the broader Coffs Harbour area. These products have also for the most part, had commensurate median sales prices over this time. Vacant land sales however have diverged, with the majority of new estates establishing within the Study Area as opposed to the balance of the greater Coffs Harbour region as illustrated within FIGURE 3.6, representing 35% of all sales through 2016 and 2017.

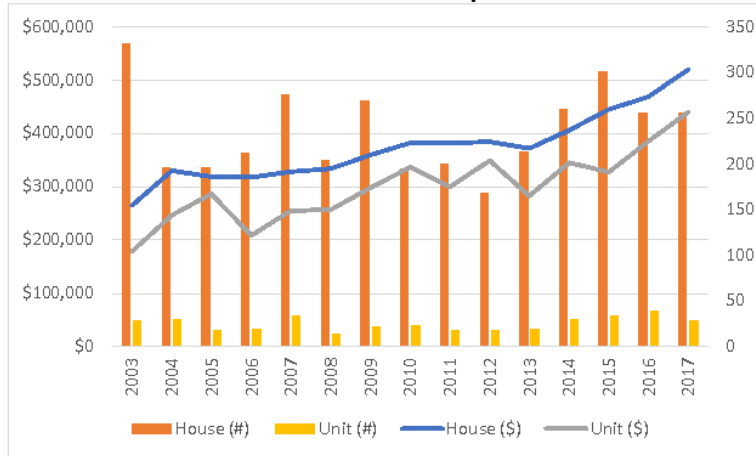


Source: Pricefinder

Detached house sales represent the majority of transactions within the Study Area. For the year to December 2017, the median sales price within the Woolgoolga Study Area was \$520,000 and whilst representative of a substantially more affordable market than Greater Sydney, Brisbane and the Gold Coast and even the Regional markets of Port Macquarie and Newcastle; has demonstrated significant price growth since 2013, impacting upon the area's relative affordability.



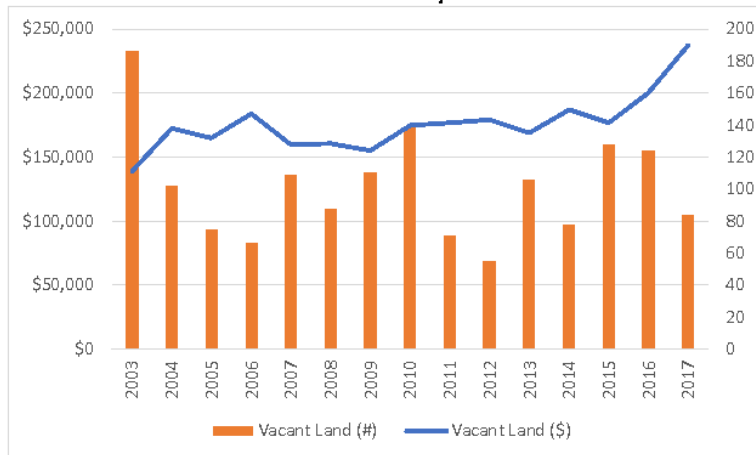
FIGURE 3.7: House and Unit Sales – Study Area



Source: Pricefinder

Vacant land sales within FIGURE 3.8 illustrate the vagaries of the land supply market and indicators of a supply-led market within the Study Area over the last 15 years, with median land prices moderating during periods of increased supply. The median residential lot price within the Study Area has increased markedly between 2015 and 2018, indicative of a supply constrained market.

FIGURE 3.8: Vacant Land Sales – Study Area



Source: Pricefinder



3.5 VACANT LAND SUPPLY

In summary, Urban Economics considers the Woolgoolga Study Area to have the following supply implications regarding the provision of lots for detached residential housing development.

- There is evidence of a supply-led and in some instances supply-constrained land supply market within the Study Area with a number of estates reporting pre-scales of lots prior to certification and works.
- 80 lots available within active residential estates within the Study Area (Woopi Beach and Nautica Fairways).
- 350 lots approved within the Study Area (Woolgoolga Heights, Hearnnes Lake Rd, Emerald Beach Estate and Seacrest at Sandy Beach).
- 1,155 potential lots within identified growth areas of the Our Living City Strategy (excluding the subject site and proposed/approved developments).
- 400 potential lots within existing residential zoned englobo areas including Sandy Beach North.
- Numerous proposed, stalled and low potential projects throughout the Coffs Harbour region which will have limited opportunity to contribute to land supply and housing affordability in the short to medium term.





Woopi Beach Estate lot plan, Woolgoolga



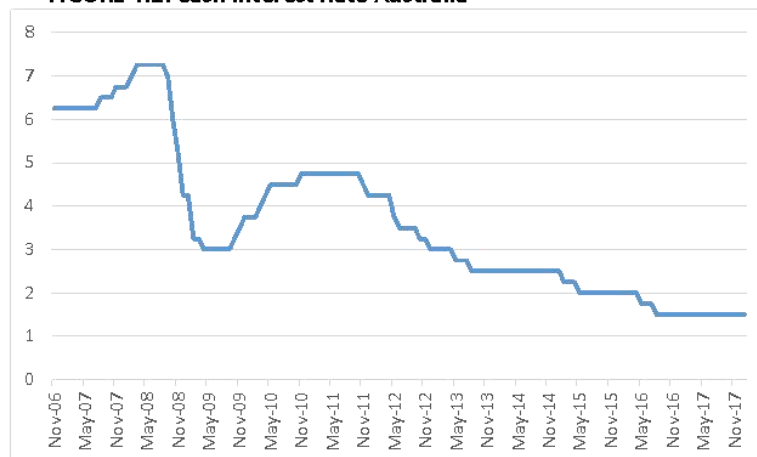
4.0 DEMAND ANALYSIS

4.1 DEMAND DRIVERS

Economic conditions in Australia have in more recent times been defined by the existence of a “two speed economy” - the resources and energy sector, which has experienced strong levels of activity, fuelled by demand particularly from China and India, and the remainder of the economy, which is much more susceptible to fluctuating international conditions, particularly from Europe and the US, which impact on business and consumer confidence. Slowing of the resources and energy sector has seen the strengthening of property and health care sectors in supporting economic growth.

The tenuous conditions have been reflected in the Reserve Bank’s policy approach to adopt a sustained record low interest rate in seeking to stimulate activity and confidence in the Australian economy post the GFC and as the resources and energy sector plateaus. The sustained low interest rates have created substantial competition amongst financial institutions and lenders, offering investors and borrowers access to more affordable lending rates, whilst the flow-on effects for the residential property market are being realised.

FIGURE 4.1: Cash Interest Rate Australia

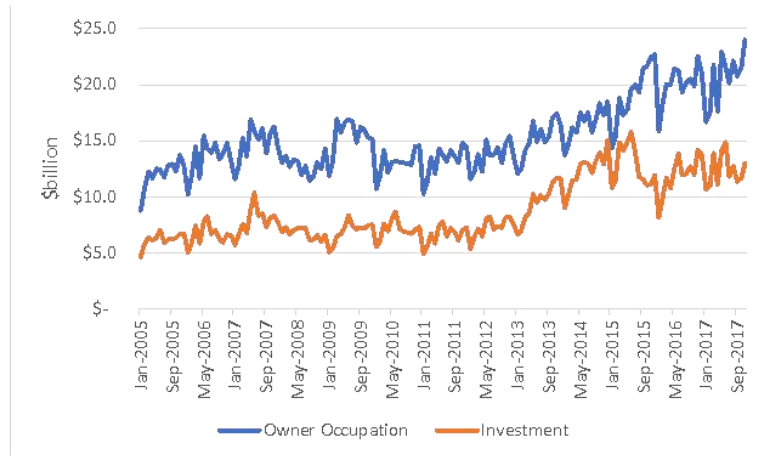


Source: Reserve Bank of Australia

It is interesting to note that the value of housing finance commitments continued to rise to record highs for investors in 2014/15 and owner occupation at the end of 2015. Tighter lending conditions imposed by banks has moderated lending activity somewhat; particularly from investors however there has remained significant activity from owner occupiers which accounted for \$25billion of residential loans in November 2017, as illustrated in FIGURE 4.2.



FIGURE 4.2: Residential Finance Commitments Australia



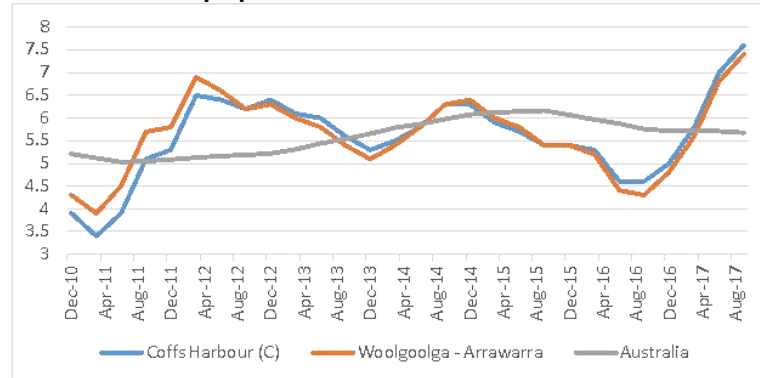
Source: ABS

Another measure of Australia’s economic performance and indicators for consumer confidence is Gross Domestic Product (GDP). Australia was the only advanced economy to not record negative GDP growth following the GFC, largely attributed to the buoyancy of the resources sector at the time. In a post-resources boom, areas such as new housing and construction will play an increasingly significant part in maintaining a positive economic output, and have been much relied upon by various state and federal treasuries in budget formulation. This is particularly important in the Coffs Harbour region whereby the construction industry accounts for some 15% of employment.

FIGURE 4.3 illustrates the unemployment rates of Coffs Harbour and the Woolgoolga-Arrowarra SA2 to the Australian average; highlighting the declining employment rate in the region.



FIGURE 4.3: Unemployment Australia



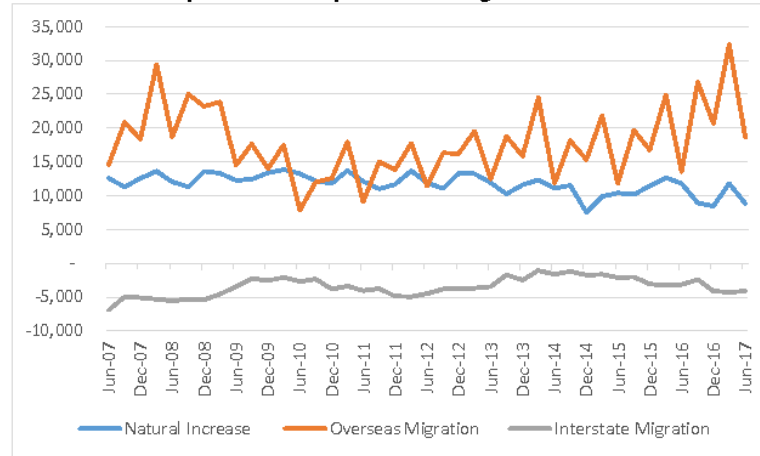
Source: Department of Employment

Critically, with national and state economic conditions being fundamentally solid, the indicator of consumer confidence has remained in positive territory, although subdued, and is reflective of confidence being buoyed by a level of job security expectations, low interest rates and rebounding commodity prices, yet weighed down by fears about the potential rising costs of living and international events. The Westpac-Melbourne Institute’s Consumer Sentiment Index remained positive for the 105.1 as at January 2018.

Typically, NSW and Sydney has the largest net loss of population through interstate and intrastate migration respectively. Commensurately, NSW and Sydney also have the highest levels of overseas migration contributing to population growth. More recently however, net migration outflows from NSW have reduced as illustrated in FIGURE 4.4, coincident with the stronger performing economy in New South Wales and lower unemployment rates.



FIGURE 4.4: Components of Population Change – NSW



Source: ABS

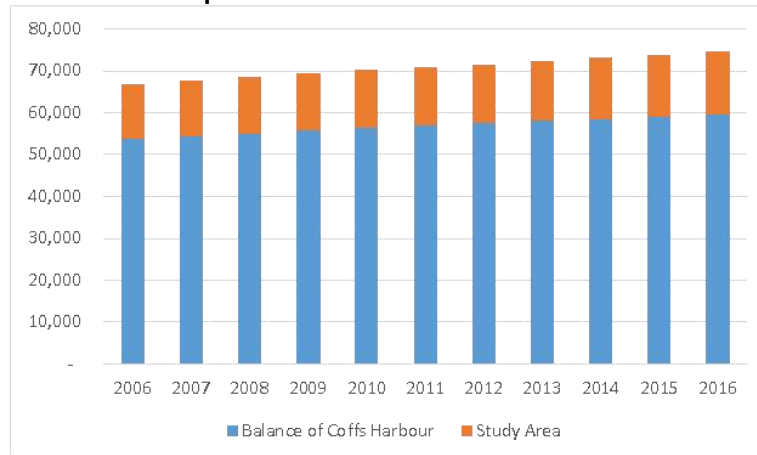
Urban Economics notes that the increasing price disparity between housing in Australia’s eastern capital cities of Sydney, Brisbane and Melbourne compared to other regional centres such as Coffs Harbour, is creating conditions that may again see an influx of interstate and intrastate movers into regional areas with solid job prospects, and further demand for housing, particularly if coupled with increasing employment opportunities and affordable family and investment dwellings.

4.2 POPULATION AND HOUSEHOLD GROWTH

Between 2006 and 2016, the population of Coffs Harbour increased from an estimated 66,657 in 2006 to 74,641 persons in 2016; or by almost 8,000 persons at approximately 1.1% per annum over this period. FIGURE 4.5 breaks down population growth within the region between 2006 and 2016, demonstrating the increasing proportion of this growth within the Woolgoolga Study Area which increased by around 2,050 persons or 1.5% per annum over the decade.



FIGURE 4.5: Population Growth 2006-2016



Source: ABS

Population projections prepared by the NSW Department of Planning estimate that population growth will continue within Coffs Harbour to include some 92,650 persons by 2036 or around 16,800 additional persons between 2016 and 2036.

Coffs Harbour City Council has had population projections prepared by Forecast.id. for small areas in the Region. These projections highlight the anticipated acceleration of growth within the northern localities of Coffs Harbour, particularly Woolgoolga which is forecast to include some 3,450 additional residents between 2018 and 2036. The following TABLE 4.6 summarises Urban Economics’s population projections for the Woolgoolga Study Area guided by data from the ABS, NSW Department of Planning & Environment and Coffs Harbour City Council (Forecast.id. & Our Living City Settlement Strategy/Land Capacity Assessment).

Approximately one third of population and household growth within the Coffs Harbour region is projected to be accommodated within the Study Area. This position is commensurate with the Our Living City Settlement Strategy, whereby the ‘Northern Beaches’ (including Woolgoolga) is projected to support some 35% of new dwellings within the Region over the life of the Strategy.

Urban Economics’s projections for population growth within the defined Woolgoolga Study Area have applied an accelerating growth between 2016 and 2026. This position has been based on some assumptions which have guided the projections including:

- The development profile of the Study Area continues to include detached and relatively affordable, family type dwellings which will support and attract larger households and family groups; reflected in slightly increasing household sizes.



- Current takeup rates of other estates within the Study Area such as Woopi Beach Estate North Sandy Beach and Emerald Beach Estate suggest that there is an existing and emerging demand for residential land and dwellings in the area which is affordable. The proposed development and subject site would similarly provide a residential product to meet this demand and has been assumed to commence by 2021.
- The Our Living City Settlement Strategy estimated that growth within the Northern Beaches locality would be strongest between 2006 and 2011 (2.5% p.a.) and tapering off towards 2031. Urban Economics's projections have adopted this growth profile, however have shifted forward the timeline to allow for changes since the Strategy was published.

Population estimates by age have also been derived for the Study Area utilising projections provided by the Department of Planning and Environment. Whilst almost 50% of the growth is noted to comprise persons aged over 65, this is significantly lower than the estimated 90% of growth that the Draft North Coast Regional Plan projects will be from persons aged 65+ across the Region. Similarly, the age profile suggests the need and potential for a diversity of housing types within the Study Area toward 2036; including detached family dwellings, retirement living and aged care facilities. Diversity of residential living options and dwellings forms contributes to promoting affordable lifestyles.



TABLE 4.6: Study Area Population and Household Projections

	2011 (Act)	INCREASE P.A.	2016 (Act)	INCREASE P.A.	2017 (Est)	INCREASE P.A.	2021 (Proj)	INCREASE P.A.	2026 (Proj)	INCREASE P.A.	2031 (Proj)	INCREASE P.A.	2036 (Proj)
Population	14,023	1.4%	15,039	2.1%	15,360	1.8%	16,520	1.7%	17,980	1.5%	19,370	1.2%	20,540
Dwellings	5,842	40	6,042	100	6,142	150	6,742	150	7,492	150	8,242	100	8,742
PPH	2.40		2.49		2.50		2.45		2.40		2.35		2.35

Source: ABS, QGSO, Coffs Harbour City Council, NSW Department of Planning and Urban Economics' estimates

TABLE 4.7: Study Area Population Projections by Age

Age	2011	2016	2021	2026	2031	2036
0-4	823	847	921	993	1,039	1,078
5-9	843	914	990	1,087	1,158	1,187
10-14	1,036	1,035	1,165	1,290	1,387	1,450
15-19	949	912	938	1,064	1,157	1,221
20-24	597	605	590	601	657	681
25-29	663	737	775	783	797	842
30-34	686	811	916	968	982	988
35-39	801	788	952	1,080	1,119	1,116
40-44	890	865	900	1,088	1,205	1,213
45-49	930	893	917	965	1,142	1,238
50-54	1,136	1,094	1,125	1,195	1,234	1,418
55-59	1,173	1,232	1,262	1,333	1,391	1,424
60-64	1,001	1,096	1,226	1,278	1,328	1,366
65-69	761	964	1,107	1,267	1,304	1,339
70-74	596	724	957	1,130	1,272	1,295
75-79	503	567	725	973	1,123	1,258
80-84	354	357	432	584	793	908
85+	634	702	801	952	1,149	1,424
TOTAL	14,023	14,770	16,290	18,170	19,740	20,920



4.3 DEMOGRAPHIC PROFILE

The results of the 2016 ABS Population and Household Census (the most recent Census results available) have been utilised to examine the demographic and socio-economic characteristics of the resident population of the Study Area community, compared to the Coffs Harbour LGA, and NSW and are summarised in TABLE 4.8.

TABLE 4.8: Demographic Profile

Demographic	Study Area	Coffs Harbour	NSW
Age Profile (%)			
<i>0-14yrs</i>	18.4	18.2	18.5
<i>15-29yrs</i>	15.6	16.2	19.6
<i>30-59yrs</i>	37.3	37.2	40.0
<i>60+yrs</i>	28.7	28.4	21.9
Labour Force (%)			
<i>Unemployment Rate</i>	7.6	7.3	6.3
<i>Workforce Participation Rate</i>	53.0	53.6	55.5
Occupation Profile (%)			
<i>Managers/Administrators</i>	14.1	11.9	13.5
<i>Professionals</i>	17.0	18.8	23.6
<i>Technicians & Trade Workers</i>	13.9	13.5	12.7
<i>Community & Personal Service Workers</i>	11.5	12.4	10.4
<i>Clerks, Administrative & Sales Workers</i>	11.6	13.0	13.8
<i>Sales Workers</i>	8.1	10.8	9.2
<i>Machine Operators & Drivers</i>	5.5	5.4	6.1
<i>Labourers</i>	16.6	12.5	8.8
<i>Inadequately Described/Not Stated</i>	1.8	1.7	1.8
Home Ownership (%)			
<i>Owned Outright</i>	41.5	36.3	32.2
<i>Mortgage</i>	29.5	28.7	32.3
<i>Rent</i>	24.7	30.8	31.8
<i>Other/Not Stated</i>	4.3	4.2	3.8
Structure of Dwellings (%)			
<i>Separate House</i>	85.6	74.3	66.4
<i>Semi-detached/Row/Terrace/Townhouse</i>	7.3	12.3	12.2
<i>Flat/Unit</i>	1.7	10.1	19.9
<i>Other/Not Stated</i>	5.4	3.3	1.4
Number of Vehicles Per Dwelling (%)			
<i>0</i>	4.1	6.1	9.2
<i>1</i>	35.9	37.7	36.3
<i>2</i>	37.8	36.3	34.1
<i>3</i>	10.9	10.6	10.9
<i>4+</i>	6.5	5.2	5.8



<i>Not Stated</i>	4.8	4.1	3.7
Average Annual Household Income (\$2016)	72,690	73,290	96,410
Relationship in Household (%)			
Husband or wife in a registered marriage	38.8	37.0	38.5
Partner in de facto marriage	8.8	8.3	6.9
Lone parent	5.0	5.6	4.5
Child under 15	18.7	18.7	18.9
Dependent student (Aged 15-24 years)	3.9	4.1	5.2
Non-dependent child	5.7	5.8	6.8
Other related individual	2.1	2.0	2.6
Unrelated individual living in family household	1.4	1.3	1.4
Group household member	2.9	3.4	3.8
Lone person	9.5	11.0	9.0
Visitor (from within Australia)	3.0	3.0	2.2

Source: 2016 ABS Census

- Both the Study Area and Coffs Harbour communities had distinctly higher proportions of retirees and older persons compared to NSW. At the time of the Census, approximately 28.7% of Study Area residents were aged over 60 compared to 21.9% in NSW.
- Whilst having a high proportion of older persons, the Study Area also included an average level of school aged children, commensurate with the number of schools in the area including Woolgoolga High School, Woolgoolga PS, Sandy Beach PS, Mullaway PS and St. Francis Xavier Primary; which together had 1,984 enrolments through 2016.
- At the time of the 2016 Census, the Study Area had a heightened unemployment rate (7.6%) and lower levels of workforce participation (53%), typical of areas with higher levels of retired persons.
- Dwellings within the Study Area in 2016 were predominantly detached houses (85.6%) with limited flats, units and apartments (1.7%), demonstrative of the area's popularity for families seeking larger dwellings. Similarly, more than 40% of dwellings within the Study Area were owned outright in 2016 which is characteristic of the higher incidence of families in the later stages of the lifecycle including retirees.
- Average household incomes within the Study Area (\$72,690) and Coffs Harbour region (\$73,290) were significantly lower than the NSW average. This is linked to the heightened proportion of retired persons in these areas and a blue collar workforce with higher levels of labourers, trade workers, clerks and sales workers at the time. Despite this, 2013-14 data from the ATO outlines average individual salaries and wages of \$42,000 within the Study Area at the time.



4.4 RETIREMENT LIVING AND AGED CARE DEMAND

Whilst not included as part of the concept masterplan for the subject site, the potential for retirement living and residential aged care has been investigated for the Study Area and proposed development, particularly given the age profile of the community and issues raised within the Draft Residential Strategy.

The proponent has considered 'The Lakes' development at North Boambee Valley, which integrates an Opal aged care facility and The Lakes Village retirement living as an example of a potential outcome for the subject site at Woolgoolga.

Typically, some 6% of Australian's over the age of 65 years live within purpose built retirement accommodation such as independent living units (ILU). At an average of 1.5 persons per dwelling this suggests a ***demand for some 115 retirement dwellings within the Study Area in 2016 increasing to 155 dwellings by 2026.***

This makes no allowance for over 65's in coastal areas such as Coffs Harbour to live in purpose-built retirement accommodation. For instance, Urban Economics's analysis in Bundaberg estimates that some 16% of those aged 65+ live in retirement accommodation.

Development of residential aged care within Australia is guided by a government planning ratio of 80 places per 1,000 persons aged 70+. Based on this ratio, residents of the Study Area would have a demand for some ***150 residential aged care places in 2016 and 200 places by 2026.***

The Study Area currently includes the Woolgoolga and District Retirement Village which has 66 residential aged beds and 30 ILUs. Gateway Lifestyle also operate 'The Pines' and 'Lorikeet Park' manufactured home parks for over 50's which have 264 approved home sites of which approximately 50% are occupied. There is a need to ensure choice in the timely provision of age and sector appropriate housing in the Study Area and Coffs Harbour.



Opal Aged Care facility, The Lakes



4.5 IMPLICATIONS

There are numerous factors driving the demand for new residential development and the demand for detached housing lots within the Woolgoolga area including:

- Low interest rates and the availability of finance,
- Improved employment prospects and labour markets within the Coffs Harbour region,
- Affordable housing options relative to other major markets along Australia's east coast; and
- A fundamentally solid rental market which is attractive for residential property investment.

Residents of the Study Area community have a propensity for demand for affordable detached housing for families, but also a choice in residential product catering to retirees, older persons and other more compact households.

Based on population growth alone, the Study Area is projected to require an additional 2,600 dwellings between 2017 and 2036 or more than 130 new dwellings per annum over this period. A significant share of this dwelling demand will continue to be directed to detached dwellings and therefore demand for residential lots.



5.0 DEMAND AND SUPPLY CRITIQUE

5.1 SEQUENTIAL SITE ANALYSIS

This section seeks to summarise the case for the subject site to establish as an important residential land release area within the Woolgoolga area, prior to the existing planning timeframe of 2031. It is Urban Economics's view that the subject site represents the most sequentially logical englobed land parcel within the region which could accommodate residential development from an economic perspective. The following supports this view:

- Approximately 38.3ha of land slated to support 353 residential lots from 2016 within the Our Living City Settlement Strategy as 'growth areas' have yet to commence any advanced planning or had any plans progressed which would see them contribute to supply within Woolgoolga in the short to medium term. A further 30.4ha and 300+ dwellings have stalled in development within the Woolgoolga Heights estate.
- The subject site is proximate to Woolgoolga High School, the only secondary education facility between Orara High School to the south and facilities within Grafton some 55km driving to the north.
- A substantial amount of land area within the Coffs Harbour region is quite undulating and sloped. Construction costs for dwellings on sloped land is considerably higher than flat sites. Whilst the subject site has some undulation; the proposed development has the potential to provide 'easy to build' lots; contributing to the ultimate affordability of housing in the locality.
- Other significant proposed projects such as Sandy Beach North have considerable environmental constraints, similarly limiting their potential contribution to residential land supply within the Woolgoolga Study Area. The subject site is largely cleared and set back from waterways and the coast, limiting its environmental constraints and subsequent potential for delivering the proposed development.
- The proposed development would contribute to, and support the construction of, the West Woolgoolga Sports Facility which will be an important piece of community infrastructure once completed.
- The subject site is within 2km of the Woolgoolga activity centre and just 1km from the Woolgoolga Woolworths shops, consolidating households within the catchment areas for these centres and contributing to the vibrancy and vitality of these centres as well as ensuring the development of residential activity within proximity of convenience and weekly shopping and services.





Woolworths Woolgoolga

- The subject site would deliver a masterplanned development offering certainty in ongoing supply of residential land within Woolgoolga proximate to services and community facilities in maximising an affordable lifestyle for residents.

5.2 IMPLICATIONS FOR LAND SUPPLY & THE PROPOSED DEVELOPMENT

- Residential development inherently has a level of ‘supply-led’ demand. That is, without the delivery of the appropriate housing product and residential land, demand from population growth cannot be accommodated or eventuate. Woolgoolga is planned to include a significant share of the population growth within Coffs Harbour, but the area is currently hamstrung as a result of uncertainty in the delivery of appropriate residential development.
- Some smaller and existing residential developments such as the Nautical Fairways estate have not benefited from the sales momentum that is achieved through the creation of a large, staged and masterplanned community. The proposed development would contribute almost 300 lots and potentially integrate aged care and retirement facilities proximate to numerous community facilities; creating a development which is attractive for purchasers and capitalising on the ‘Delfin Effect’ which acknowledges the success of masterplanned communities by the former Delfin Group (now Lend Lease).
- The actual release and development of most ‘*proposed agreed growth area*’ land within the Settlement Strategy has little potential of actually keeping pace with the planned release ‘*from 2016*’. The subject site is more ‘shovel ready’ and proximate to the Woolgoolga activity centre and facilities; which is sequentially superior to much of the land release areas than the planned post-2031 development timeframe.

- The Woolgoolga locality is experiencing a decrease in affordability, a feature which in the past has made it an attractive place to establish a home. Urban Economics's investigations have revealed that there are no longer any lots available within the Woolgoolga Study Area within the sub-\$200,000 price bracket with the minimum lot now marketed from \$220,000 in existing developments. The proposed development would contribute to reducing the increasing growth rate of residential land in Woolgoolga and continue to promote the area for affordable living for families and retirees alike.
- Generally, future land planning should allocate at least seven years of residential supply in creating a balanced market which is developed in a timely manner and is not impacted by inflationary price pressures. Confidence in future land supply and delivery is critical to maintaining housing affordability. Existing lots, approved developments and zoned/high potential residential land represents an estimated 310 lots or approximately 3 years supply within the Study Area, allowing for a mix of attached and alternative dwelling forms.
- Between 3 to 5 years is typically required for the delivery of lots to market from residential concept through application to marketing, necessitating continuity in residential land supply.
- This land supply analysis assumes that all approved, zoned and high potential residential land is developed and within a timely period. This is subject to several local and market vagaries including the intentions and capacities of land owners, commercial developability and viability of various land parcels and development options and the mix of product delivered to the market. In reality, this 3 years supply may in effect be considerably reduced, however, for the purposes of this consultancy we have applied the "ultimate" development scenario in examining the potential demand for the proposed residential development.
- Based on demand and the projected take up of land, the proposed development would represent approximately 3 years supply of detached residential housing lots from 2021. TABLE 5.1 outlines the land supply critique within the Woolgoolga Study Area, identifying the potential for the development to proceed in the short to medium term (prior to 2021).
- Whilst the potential and proposed supply suggests a supply of around 3 years, residential lots which are actually available to the market for purchase within Study Area developments represent only 2 to 3 months supply; limiting choice and affordability, which is evidenced by the sharply escalating price for lots within the area.



TABLE 5.1: Supply Potential Critique

Name	Status	Land Area	Total Lots	Lots Sold	Lots Available	Potential	High Potential Supply
Woopi Beach Estate	Stage 2 sales	9.5ha	150	42	108	High	108
Woolgoolga Heights	Pre-sales	4.92ha	50	0	0	Low	-
North Sandy Beach	Complete	8.4ha	82	82	0	-	-
Seacrest at Sandy Beach	Stage 1 & 2 complete	18.8ha	166	166	0	High	-
Nautica Fairways Estate	Stage 11 sales	18.5ha	209	201	8	High	25
Emerald Beach Estate	Stage 3	11.5ha	76	70	6	High	6
Balance of zoned englobo land	Zoned Urban - Residential	15ha	150	0	0	High	150
Proposed Growth Areas from 2016							
2 Arrawarra Rd, Mullaway	Approved	3.1ha	22	0	0	High	22
220 Arrawarra Rd, Arrawarra	?	2.1ha	21	0	0	Low	-
Woolgoolga Golf Course	?	14.2ha	120	0	0	Low	-
Red Rock Rd, Corindi	?	15.8ha	158	0	0	Low	-
97 Pacific St, Corindi	?	5ha	50	0	0	Low	-
201-203 Arrawarra Rd, Arrawarra	?	0.4ha	4	0	0	Low	-
Sandy Beach North	Proposed	49.6ha	280	0	0	Low	-
Proposed Growth Areas from 2031							
Subject Site - Bark Hut Rd, Woolgoolga	Proposed	25.7ha	293	0	0	High	293
Lot 2 on DP1143755, Pacific Highway Woolgoolga	Proposed	53.9ha	540	0	0	Low	-



6.0 CONCLUSION

The residential market in Coffs Harbour and the Study Area is demonstrating a supply-led market including signs of decreasing affordability and more limited choice in available residential product. It is important to ensure the timely delivery of residential land to maintain confidence in the residential market and in the ongoing delivery of affordable residential lifestyles for the Coffs Harbour community. A 7 to 8 year lead time is critical in ensuring sufficient residential land supply is available in maintaining affordability and confidence in the local residential market.

Underlying demand drivers are indicative of increasing population growth and demand for residential lifestyles in Coffs Harbour and the Study Area, bringing forward population projections and dwelling demand within the Study Area.

It is estimated that there is only 3 years of supply available to the market within the Study Area, including land that is currently not being developed and subject to owner intents and commercial viabilities.

Whilst the timeframe for approval and development of the subject site may not see the creation and release of lots until 2019, the existing supply of residential land and high potential proposed developments in Woolgoolga, dictates that the subject site would be able to contribute to land supply and housing affordability within Coffs Harbour and Woolgoolga significantly prior to the existing post-2031 planning horizon.

More particularly there is compelling demand to bring forward the supply of well located, residential land that will deliver affordable lifestyles for the Woolgoolga Study Area and wider Coffs Harbour community.

The subject site is a sequentially superior residential development site within the Woolgoolga area, and best positioned to accommodate demand within the locality, compared with other planned growth areas, whilst offering prospective residents proximity and accessibility to services and maximising the commercial viability of the catchments for the nearby retail and commercial centres.

Significantly, the location of the subject property, its capacity to be developed as a masterplanned community and its topography, contribute to the commercial viability of the subject property to deliver affordable lifestyles for the Woolgoolga community, relative to other less well located and developable designated sites within the Study Area.



Appendix C ~ Preliminary Vegetation Management Plan



Preliminary Vegetation Management Plan

Newmans Road
September 2018

Vadejil Pty Ltd



ecology / vegetation / wildlife / aquatic ecology / GIS

Glossary, acronyms and abbreviations

APZ	Asset Protection Zone
CHCC	Coffs Harbour City Council
DBH	Diameter at breast height
DCP	Development Control Plan
IBRA	Interim Biogeographical Regionalisation of Australia
IPA	Inner Protection Area
KFT	Koala feed tree
LGA	Local Government Area
OPA	Outer Protection Area
SERA	Society for Ecological Restoration Australasia
TEC	Threatened ecological community
TPZ	Tree Protection Zone
VMP	Vegetation management plan

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1 Introduction

This preliminary Vegetation Management Plan (VMP) is for part of Lot 202 DP874273 (the site), being the southern precinct of the lot in Woolgoolga, west of the Pacific Highway and 30 km north of Coffs Harbour, New South Wales. The site borders Newmans Road (9.23 ha) (Figure 1). This VMP is intended to contribute to a planning proposal for the subject land. The concept design for the preliminary proposal for re-zoning is provided in Appendix 1.

The northern precinct (part of Lot 202 DP874273) is the subject of a separate application and does not form part of this VMP.

The VMP draws upon information provided in Coffs Harbour City Council's (CHCC) Development Control Plan (DCP) 2015, Appendix 2 Guidelines for preparing vegetation management plans, as well as the Australian Standard AS4970-2009 Protection of trees on development sites. Restoration principles have been adopted in accordance with the National standards for the practice of ecological restoration in Australia (SERA). This report should be read in conjunction with the ecological assessment (Ecosure 2017).

1.1 Site description

The study site, is bounded to the north by Poundyard Creek and council owned land currently being developed for the purposes of a community sports field. The entry adjoins Newmans Road as part of west Woolgoolga.

Ecological features of the site include an area of wet sclerophyll forest along the northern boundary which is mapped as secondary koala habitat (CHCC). This connects to Poundyard Creek and flows to Woolgoolga Lake (Ecosure 2018). Connecting Poundyard Creek and the large freshwater wetland located outside the southern boundary is a patch (approximately 500 m²) of brushbox (*Lophostemon confertus*), turpentine (*Syncarpia glomulifera*) and a few large diameter tallowwoods (*Eucalyptus microcorys*). This area of remnant vegetation is mapped by CHCC as dry sclerophyll forest. Tallowwood is recognised as an important koala food tree (KFT). The remainder of the site consists of individual native trees, and exotic grassland, shrubs and trees.



Figure 1: Site location

Vadejil Pty Ltd
 Newmans Road VMP

 Project area



Job Number: PR3278
 Revision: 0
 Author: DJB, KF
 Date: 28/03/2019



GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994
 Units: Meter

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1.2 Aims and objectives

This VMP aims to:

- retain mapped koala habitat and remnant vegetation on the site
- provide linkages of remnant vegetation on the site with extant vegetation to provide suitable wildlife corridors
- provide details of how vegetation is to be retained and managed during construction works including the identification of vegetation management zones
- identify the targets, goals and objectives to monitor progress of the rehabilitation areas over time
- to progress each vegetation management zone as far as possible towards full recovery, relative to an appropriate local indigenous reference ecosystem.

The objective of the VMP is to maximise the ecological value of the site by:

- enhancing habitat value in proposed E3 zoned areas as per the design drawings through planting of appropriate species i.e. 'gap filling', connectivity plantings and weed control
- utilising koala feed trees in appropriate areas
- identifying areas for buffer zones around remnant vegetation
- identifying areas for weed control and maintenance activities.

2 Vegetation management

In urban and urban fringe areas, wildlife corridors are smaller, less defined linkages that provide local connections of vegetation for wildlife movement. They can consist of creek lines, wetlands, large single trees, or ridgelines, and are an important component of an overall regional landscape conservation framework as outlined in *Landscape Corridors of the Coffs Harbour Local Government Area Final Report May 2015* (CHCC 2015).

The site contains areas of native vegetation that contribute to the local connectivity network linking wildlife habitat through both corridors and stepping stones, forming a locally derived network that is nested within regional, state and continental wide connectivity conservation planning.

Based on the Society for Ecological Restoration Australasia (SERA) 2017 standards, the primary objective of vegetation management will be to ensure that adjacent threats are being managed or mitigated and to ensure a very low threat from undesirable species on site. Using the SERA one to five star recovery wheel the intention for this site overall is to reach level 3 to 5, depending on the restoration area (See Appendix 2 for a review of the five star recovery levels based on the SERA standards). A survey conducted on 6 December 2017 observed that a moderate subset of characteristic weed species such as lantana (*Lantana camara*), setaria grass (*Setaria sphacelata*), winter senna (*Senna pendula* var. *glabrata*) and groundsel bush (*Baccharis halimifolia*) are established on the site.

The site already has some baseline evidence of ecosystem functionality with good connectivity and enough remnant vegetation to establish an ongoing seed source for natural regeneration. While the proposed development will impact some of these values it is expected that the areas to be protected will remain viable and be better connected. Based on these observations, the respective restoration areas will quickly reach level 3 – 5 on the recovery wheel through the vegetation management actions as described in this plan.

2.1 Vegetation management zones

The site has been divided into two management zones. Each management zone will require rehabilitation to improve connectivity between remnant patches of vegetation, as well as planting within existing patches to develop ecosystem resilience and enhance biodiversity. Weed control will also be conducted in both zones (refer to Section 4). The key areas of ecological value identified in the ecological assessment (Ecosure 2017) are proposed to be retained as E3 – Environmental Management





These areas have been identified as linkages and refuges for wildlife with important habitat value. Asset protection zones (APZ) should avoid proposed E3 zoned areas where possible. If this is impractical, only the Outer Protection Area (OPA) should encroach in to this zone (See Section 3). Indicative APZ setbacks specified in the bushfire report for the subject land (Holiday Coast Bushfire Solutions 2018) are shown in Figure 2. Weed control must be applied in both zones (see Section 4).



Figure 2: Vegetation management zones and APZ requirements

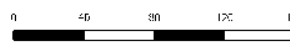
Vadejil Pty Ltd
Vegetation Management Plan

Note – there may be spatial misalignment between lot boundaries and underlying imagery

-  Site boundary (Part lot 202 DP874273)
-  Proposed E3 Zone
-  APZ
-  Biolink



Job number: PR3278
Revision: 0
Author: JLY
Date: 29/09/2018



GDA 1994 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1994
Units: Meter

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2.1.1 Enhancement and connectivity planting

Remnant vegetation has been divided up into two zones (Table 1). Zone 1 and Zone 2 (biolink) are mapped as wet sclerophyll forest. Enhancement planting should be undertaken using appropriate species and densities for each zone outlined below and in Table 2.

Table 1 Details of planting zones

Zone	Location	Area (ha)	Vegetation community
1	North eastern boundary with Poundyard Creek in the southern precinct	0.62	Wet sclerophyll forest
2	Biolink	0.77	Dry sclerophyll forest

Revegetation and enhancement planting will incorporate koala feed trees where possible. Tubestock will be used for revegetation and should be sourced from a nursery specialising in local provenance species.

Planting density for trees and shrubs should be one per 4 m² or greater to ensure compliance with bushfire requirements, and one groundcover or grass every 1 m². These densities will allow for improved ecological value and accommodate planting requirements. Planting densities can be reduced or eliminated where APZs apply.

Zone 1

This zone includes a linear area of wet sclerophyll forest along the northern boundary of the site and connects to remnant vegetation associated with Poundyard Creek. This area is mapped by CHCC as secondary koala habitat. Enhancement planting will be undertaken using species outlined in Table 2.

Zone 1 may require some bushfire fuel management to ensure APZs are appropriately maintained to protect proposed future dwellings to the south.

Zone 2 (biolink)

This zone represents an area of mapped dry sclerophyll forest (CHCC). It is located in the centre of the site and includes a patch of large, mature native trees that provide a linkage between remnant vegetation toward Poundyard Creek and a large freshwater wetland outside the southern boundary. Enhancement planting should include species outlined in Table 2.

The biolink may require some bushfire fuel management to ensure APZs are appropriately maintained to protect future dwellings that surround this zone.

Table 2 Planting species list for enhancement and connectivity planting in management zones

Scientific name	Common name	Layer	Height	Growth rate	Habitat values/comments
North Coast Dry Sclerophyll Forest					
<i>Acacia irrorata</i>	Green wattle	Midstorey	4-12 m	F	Flowers following good rain providing nectar for insects. Sap eaten by Sugar Gliders. Fast growing hardy tree, well suited to revegetation sites.
<i>Allocasuarina torulosa</i>	Forest Oak	Mid storey	12 m	M	Cones a major food source for Glossy Black Cockatoo
<i>Angophora costata</i>	Smooth-barked Apple	Canopy	25 m	F	Older trees readily develop hollows. Flowers late spring/early summer. Important nectar resource for insects, birds and arboreal mammals.
<i>Corymbia intermedia</i>	Pink bloodwood	Canopy	30 m	F	Flowers in summer. Important nectar resource for insects, birds and arboreal animals. Sap provides food resource for sugar gliders. Older trees readily develop hollows.
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Ground layer			
<i>Dianella caerulea</i>	Blue Flax-lily	Ground layer			
<i>Davesia ulicifolia</i>	Gorse Bitter Pea	Understorey			
<i>Eleocharis reticularis</i>	Blueberry ash	Mid storey	12 m	M	Blue berries attractive to a range of frugivorous birds. Germination is difficult. Often grown from cuttings.
<i>Eucalyptus pilularis</i>	Blackbutt	Canopy	60 m	F	Important nectar and pollen resource for a range of animals, birds and insects. Older trees have many hollows. Slightly susceptible to Myrtle Rust. Koala feed tree.
<i>Eucalyptus propinqua</i>	Small-fruited grey gum	Canopy	30 m	F	Koala feed tree.
<i>Glochidion ferdinandi</i>	Cheese Tree	Mid storey	10 m	F	Small red seeds are consumed by a number of birds. Excellent pioneer species for revegetation sites.
<i>Hibbertia scandens</i>	Climbing Guinea Flower	Understorey			

Scientific name	Common name	Layer	Height	Growth rate	Habitat values/comments
<i>Imperata cylindrica</i>	Blady Grass	Ground layer			
<i>Leucopogon pimeleoides</i>	Beard Heath	Understorey	3 m	S	Small red fruit eaten by birds. Very difficult to germinate but cuttings strike.
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Ground layer			
<i>Persoonia stradbrokeensis</i>	Geebung	Midstorey	5 m	F	Often pollinated by native short-tongued Leioproctus bees. Fruits eaten by a variety of birds. Difficult to propagate.
<i>Pultenaea villosa</i>	Hairy bush-pea	Understorey	2 m		Germinates and restores soil nitrogen after fire.
<i>Syncarpia glomulifera</i>	Turpentine	Canopy	20 m		Flowers in spring. Nectar resource for insects and birds. Young growth very susceptible to Myrtle Rust.
<i>Themeda triandra</i>	Kangaroo Grass	Ground layer			

North Coast Wet Sclerophyll Forest

<i>Acacia irrorata</i>	Green wattle	Midstorey	4-12 m	F	Flowers following good rain providing nectar for insects. Sap eaten by Sugar Gliders. Fast growing hardy tree, well suited to revegetation sites.
<i>Acacia melanoxylon</i>	Blackwood	Mid storey			
<i>Allocasuarina torulosa</i>	Forest Oak	Mid storey	12 m	M	Cones a major food source for Glossy Black Cockatoo
<i>Angophora costata</i>	Smooth-barked Apple	Canopy	25 m	F	Older trees readily develop hollows. Flowers late spring/early summer. Important nectar resource for insects, birds and arboreal mammals.
<i>Breynia oblongifolia</i>	Coffee Bush	Mid storey	3 m	M	Pollinated by a single species of moth from the family Gracillariidae. Food plant for the Large Grass Yellow butterfly. Ripe berries eaten by a range of birds.
<i>Cordyline stricta</i>	Slender Palm Lily	Mid storey	5 m		Adaptable species growing on swampy as well as well drained sites.
<i>Cryptocarya glaucescens</i>	Jackwood	Canopy	20 m	S	Purple-black drupes attract numerous frugivorous birds.

Scientific name	Common name	Layer	Height	Growth rate	Habitat values/comments
<i>Dianella caerulea</i>	Blue Flax-lily	Ground layer			
<i>Eucalyptus microcorys</i>	Tallowwood	Canopy	30 m	F	Koala feed tree.
<i>Eucalyptus tereticornis</i>	Forest Red Gum	Canopy	30 m	F	Koala feed tree.
<i>Eucalyptus pilularis</i>	Blackbutt	Canopy	60 m	F	Important nectar and pollen resource for a range of animals, birds and insects. Older trees have many hollows. Slightly susceptible to Myrtle Rust.
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Ground layer			
<i>Lophostemon confertus</i>	Brush Box	Canopy	30 m	F	
<i>Polyscias sambucifolia</i>	Elderberry Panax	Mid storey			
<i>Syncarpia glomulifera</i>	Turpentine	Canopy	20 m	M	Flowers in spring. Nectar resource for insects and birds. Young growth very susceptible to Myrtle Rust.

3 Tree protection measures

Prior to any machinery arriving at the site, tree protection fencing is to be installed around the tree protection zone (TPZ) of trees to be retained. Where groups of trees are being retained, the fencing can be around the group rather than each single tree.

The tree protection fencing can be either:

- High visibility power webbing/mesh installed with 1500 mm stakes with 3 m centres, or;
- Rope flagging installed with 1500 mm stakes at 3 m centres.

Signs should be installed intermittently (at high visibility locations) stating that the fenced area is a TPZ. Once installed, fencing is not to be removed or altered until works with machinery have ceased, or access is required for rehabilitation purposes. In accordance with AS 4970 – 2009 (Protection of trees on development sites), the following activities are not permitted within the fenced off tree protection area:

- trenching or excavation
- placing of fill or sediment
- installation of sediment fencing
- cultivation activities, or parking of vehicles or plant
- storage of items
- mixing, storage or preparation of chemicals
- machine or equipment wash downs or cleaning
- damage to vegetation
- any other activity detrimental to the ongoing health of the tree or vegetation to be retained.

In accordance with AS 4970-2009, the TPZ is calculated at 12 x diameter at breast height (DBH). All personnel are to be briefed at the site induction on the tree protection locations and other relevant information, including the fact that the fencing is not to be removed. Fencing inspections are to be included on the supervisor's daily inspection sheet and maintained as required. Trees to be removed are to be felled away from any TPZ.

4 Weed management

Weeds species identified on the site within the vegetation management zones are to be managed in accordance with the *Biosecurity Act 2015* (the Act) which came into effect on 1 July 2017 and repeals various pieces of legislation including the *Noxious Weeds Act 1993*. Under the Act, weed management applies to all land whether government or privately owned (NCLLS 2017). Priority weeds and landholder responsibility for management and control have been identified in Schedule 3 of the Act.

Species identified on site and listed as priority weeds in the North Coast Local Land Service area in the regional plan (NCLLS 2017) include groundsel bush (*Baccharis halimifolia*) and lantana (*Lantana camara*). A weed species list is provided (Appendix 3). Management categories within the regional plan and relevant to the site include 'containment' and 'asset protection', while plants that are state listed are also included (Tables 3 - 5).

Table 3 Priority weed species under the *Biosecurity Act 2015* identified on site (DPI 2017)

Weed	Duty of landholder
groundsel bush	Regional Recommended Measure: Exclusion zone: whole region excluding the core infestation area of Richmond Valley Council, Ballina Shire Council, Lismore Council, Kyogle Council, Byron Shire Council and Tweed Shire Council. Whole region: The plant or parts of the plant should not be traded, carried, grown or released in the environment. Exclusion zone: Land managers should mitigate the risk of spread of the plant from their land. Land managers should mitigate the risk of the plant establishing on their land. Core infestation: Land managers should reduce impacts from the plant on priority assets.
lantana	Must not be imported into the State or sold.

Table 4 Management categories applicable for weeds at the site

Category	Objective	Characteristic
Containment	To prevent the ongoing spread of the species in all or part of the region	These species have a limited distribution in the region. Regional containment strategies aim to prevent spread of the weed from an invaded part of the region (core infestation), and/or exclude the weed from an uninvaded part of the region (exclusion zone).
Asset protection	To prevent the spread of weeds to key sites/assets of high economic, environmental, and social value, or to reduce their impact on these sites if spread has already occurred.	These weed species are widespread and unlikely to be eradicated or contained within the wider regional context. Effort is focussed on reducing weed threats to protect priority value assets.

Table 5 Weed species and management category for priority weeds (NCLLS 2017).

Common name	Scientific name	Zone 1	Zone 2 (Biolink)	Management Category
groundsel bush	<i>Baccharis halimifolia</i>	X	X	Containment
lantana	<i>Lantana camara</i>	X	X	Asset protection
camphor laurel	<i>Cinnamomum camphora</i>	X		Asset protection
asparagus fern	<i>Asparagus aethiopicus</i>		X	Asset protection

Weed control will be undertaken in both management zones and is required in the early stages of revegetation works and generally every three months for the first 24 months. After approximately two years weed control will only be required on an on-going as-needs basis. All personnel engaged in chemical weed control would be expected to have attained a minimum AQF III level in Chemical Application as well as a minimum of Certificate III in Conservation and Land Management (Natural Area Restoration) plus 500 hours of practical bushland regeneration under an experienced supervisor. Supervisors would be required to have at least some supervisory experience, preferably a higher qualification (AQF IV or V) and a minimum of 700 hours bush regeneration experience. Preferably, lead supervisors should also be a member of the Australian Association of Bush Regenerators (AABR).

Works will preferably need to be undertaken by a suitably qualified contractor with Australian Association of Bush Regenerators membership. They will need to specialise in ecological restoration and have relevant experience in weed control, revegetation, plant identification, site management and on-going monitoring/maintenance works.

4.1 Weed treatment methods

Cut-scrape-paint method (CS&P)

This method applies to all woody shrubs, trees and some vines.

Cut plant low to the ground (approx. 1–2 cm above soil level) and level so herbicide does not run off. Cut stems are less hazardous to workers who may kneel on the ground at a later date. Apply herbicide immediately at the suitable rate with a paintbrush approximately 1.5 cm wide. Scrape 3-4 sides of the remaining stump lightly to reveal green tissue and apply the herbicide to the scraped area. Take care that the brush is not contaminated with soil.

Note all seed that has high viability and longevity should be removed from the parent and removed from the site e.g. *Senna* spp. and other members of the Fabaceae family with large seed pods or plants with a high invasive potential such as moth vine (*Araujia sericifera*).

Note larger trunks, stems or tubers should be scraped and painted in sections as cells quickly shut down once exposed preventing the translocation of herbicide.

Gouge-paint method

This method applies to those plant species that have a fleshy root system such as rhizomes

or large bulbs. It is particularly appropriate for the treatment of Kahili ginger (*Hedychium gardnerianum*) or canna lily (*Canna indica*) but can also be applied to prickly pear (*Opuntia spp.*), if each cladode (flattened stem) is treated.

1. Cut the stems of the plant at head height and then at ground level. The stems are then cut up and spread over the ground to act as part of the leaf litter. Gouge out sections of the fleshy base with a knife. Apply herbicide at the recommended rate with a paintbrush approximately 1.5 cm wide avoiding contact with soils.

Stem Injection method

This method applies to all woody trees and shrubs with a diameter of about 6-10 cm or greater and is suited to umbrella trees and camphor laurel on site.

1. With a tomahawk make a cut the width of the blade at an angle of about 45 degrees into the trunk.
2. Apply herbicide at recommended rate immediately into the cut using a tree injecting device.
3. Repeat this procedure in a brickwork pattern around the circumference of the tree as close to the ground as possible. Where the presence of a crotch angle makes this difficult make a cut above it. Ensure cuts are also made on the inside of forks. This may need to be done with a Drill, Hand Saw or Chisel. Note two rows of cuts will be sufficient for trees with trunks of 6-10 cm. Larger trunk diameters will need correspondingly more.
4. Treat all visible lateral roots as per 1 and 2.

Note stem injection can also be carried out using a drill. Holes can be inserted approximately 10 cm apart and filled with the appropriate herbicide. Lateral roots should also be drilled and filled with the appropriate herbicide. It is also essential that stem injection is not applied to umbrella trees while in flower as herbicide may be translocated to flowers and affect birds feeding on nectar.

Scrape and paint method

This method is applicable to many species of vines where it is desirable to treat the vines intact, particularly those with aerial tubers such as Madeira vine (*Anredera cordifolia*) or those that will propagate from segments e.g. Cape ivy (*Delairia odorata*).

1. Remove and bag tubers before scraping to avoid dislodging them during treatment.
2. Scrape the stem tissue on one side of the stem only for up to 100cm if possible before leaving a small gap (approx. 5 cm) and changing sides. Note: on Madeira vine it's necessary to scrape heavily, to expose white inner tissue. Scrape as much of the stem as possible.
3. Apply undiluted Glyphosate with a paintbrush within 7 seconds of scraping the stem i.e. scrape and paint in sections.
4. In the case of *Anredera cordifolia* (madeira vine) it is essential that ground tubers and lateral roots are also treated with a heavy scrape and paint. If the tuber is of substantial

size a gouge can be made into the tuber with a knife and apply herbicide. Any side roots must also be scraped and painted.

Spot spraying method

This is carried out using a 15 litre backpack spray unit with a modified spray nozzle that gives an accurate and easily adjustable spray pattern e.g. Rega®. It is advised to fill up the backpack to 10 litres only, to avoid back strain, particularly where spraying for extended periods. Glyphosate and metsulfuron methyl are the main herbicides used with the addition of a marker dye. A surfactant such as Pulse® is added in some treatments to assist the transfer of the herbicide through the surface tissue – particularly plants with waxy leaves, such as camphor laurel, Madeira vine and trad. Additives such as Pulse or herbicides such as metsulfuron methyl may need to be avoided in some areas (i.e. low-lying areas or at certain times of the year (e.g. when frogs are breeding)).

Overspray method

This method is applicable to large, dense infestations of such plants as lantana (*Lantana camara*). This method may be used where it is desirable to leave partially dead or dead plants intact to prevent erosion and over exposure of large areas, provide habitat and protect native seedlings from predators such as wallabies. Avoid trampling to retain habitat, identify an edge (e.g. to prevent machinery from impacting the site) and to save on resources.

Spray over the top of the infestation when the plant is actively growing (i.e. not stressed) using a solution of water and herbicide at the recommended rate. **Note** any native plants that may be under the weed may need to be protected by preparing or cutting the lantana away from native plants. The type of spray pattern and density of foliage cover of the weed will need to be assessed. Leave the sprayed plants intact so that native seedlings can establish under the shelter provided.

4.2 Weed control methods

Ratios for application of herbicide

Dilution ratios for the application of herbicide are provided in the table below. Always read and follow the directions on the product label and obtain a Safety Data Sheet for each chemical and additive. For some weeds a combination of glyphosate and metsulfuron-methyl (such as Associate®) is recommended, permitted under APVMA off-label permit numbers PER 11463 and PER 11371. A surfactant such as Pulse® is added in some treatments to assist the transfer of the herbicide through the surface tissue – particularly plants with waxy leaves, such as camphor laurel, Madeira vine and trad.

Abbreviations and application rates

Table 6 Abbreviations commonly used in weed control techniques and recommended application rates

Common name	Scientific name	Control method
broad-leaf paspalum	<i>Paspalum mandiocanum</i>	Spray 1:100 Gly + O + dye. Can be hand weeded and left in-situ.
camphor laurel	<i>Cinnamomum camphora</i>	Hand pull seedlings or spray 1:50 Gly + S + dye or for better results spray 1:50 Gly + 1.5 g MM:10L water + S + dye. Saplings CS&P Gly 1:1.5. Trees stem inject 1:1.5 Gly.
cobbler's pegs	<i>Bidens pilosa</i>	Spray 1:100 Gly + O + dye
groundsel bush	<i>Baccharis halimifolia</i>	Hand pull seedlings. Saplings and trees CS&P 1:1.5 Gly. Spray seedlings/regrowth 1:50 Gly + O + dye
lantana	<i>Lantana camara</i>	Lopper, then CS&P bases 1:1.5 Gly. Spot spray regrowth and overspray large infestations 1:100 Gly + O + dye. Red flowering species will require a rate of 1: 50 Gly + O + dye. Splatter gun method Gly 1:9 (1 part Gly to 9 parts water) + dye (best results when plants actively growing).
purpletop	<i>Verbena bonariensis</i>	Spray 1:50 Gly + O + dye
senna	<i>Senna pendula</i> var. <i>glabrata</i>	Spot spray seedlings 1:50 Gly + S + dye. CS&P medium plants 1:1.5 Gly. Stem inject large specimens 1:1.5 Gly. (bag seed pods and dispose off site)
whisky grass	<i>Andropogon virginicus</i>	Spray 1:50 Gly + O + dye if sufficient active growth; Crown smaller infestations
umbrella tree	<i>Schfierra actinophylla</i>	Spray 1:50 Gly + O + dye; seedlings can be hand weeded; CS&P medium plants 1:1.5 Gly. Stem inject large specimens 1:1.5 Gly (not if in flower)

5 Monitoring and ongoing maintenance

Maintenance of revegetation works should occur six months after initial planting with ongoing maintenance occurring annually for a period of five years to ensure a successful level of plant establishment.

Maintenance activities in the management zones will include:

- Planting
- Watering
- Weed control (see Section 4 above)
- Replacement of lost plants (if losses are greater than 20%)
- Mulching (if required).

For each of the management zones, a restored state will be considered to have been achieved when each management zones attributes are on a secure trajectory approximating those of the target ecological reference community (star rating - see table in Appendix 2). The objectives of the VMP will be achieved if no further repair-phase interventions are required. Following this phase, the relevant management zone under recovery would be considered 'self-organising' and increasingly resilient to natural disturbances. Table 7 below indicates the current star rating for each management zone and its predicted rating at the completion of management in five years.

Table 7 Targets and criteria for each management zone for Newmans Road over five years

Management zone	Current star rating	Year 5
Zone 1 (rehabilitate)	2	4
Zone 2 (enhance) - Biolink	3	4

6 Conclusion

The Newmans Road site contains areas of remnant vegetation that have important ecological values that contribute to local biodiversity and the local landscape connectivity network. This VMP outlines how these areas will be improved by drawing upon relevant documents that will successfully guide rehabilitation by enhancing habitat quality and increasing linkages across the site. This document should be read in conjunction with the ecological assessment (Ecosure 2018) and bushfire hazard assessment report (Holiday Coast Bushfire Solutions 2018).

This VMP also provides details of how the site is to be managed during construction and identifies the targets and objectives to monitor progress of rehabilitation of the site over time. These restoration principles have been adopted in accordance with the National Standards for the practice of ecological restoration in Australia. Restoration together with planned revegetation works and ongoing weed control and maintenance will further aid in improving the ecological value of the site and assist in mitigating any impacts that arise from vegetation removal on site.

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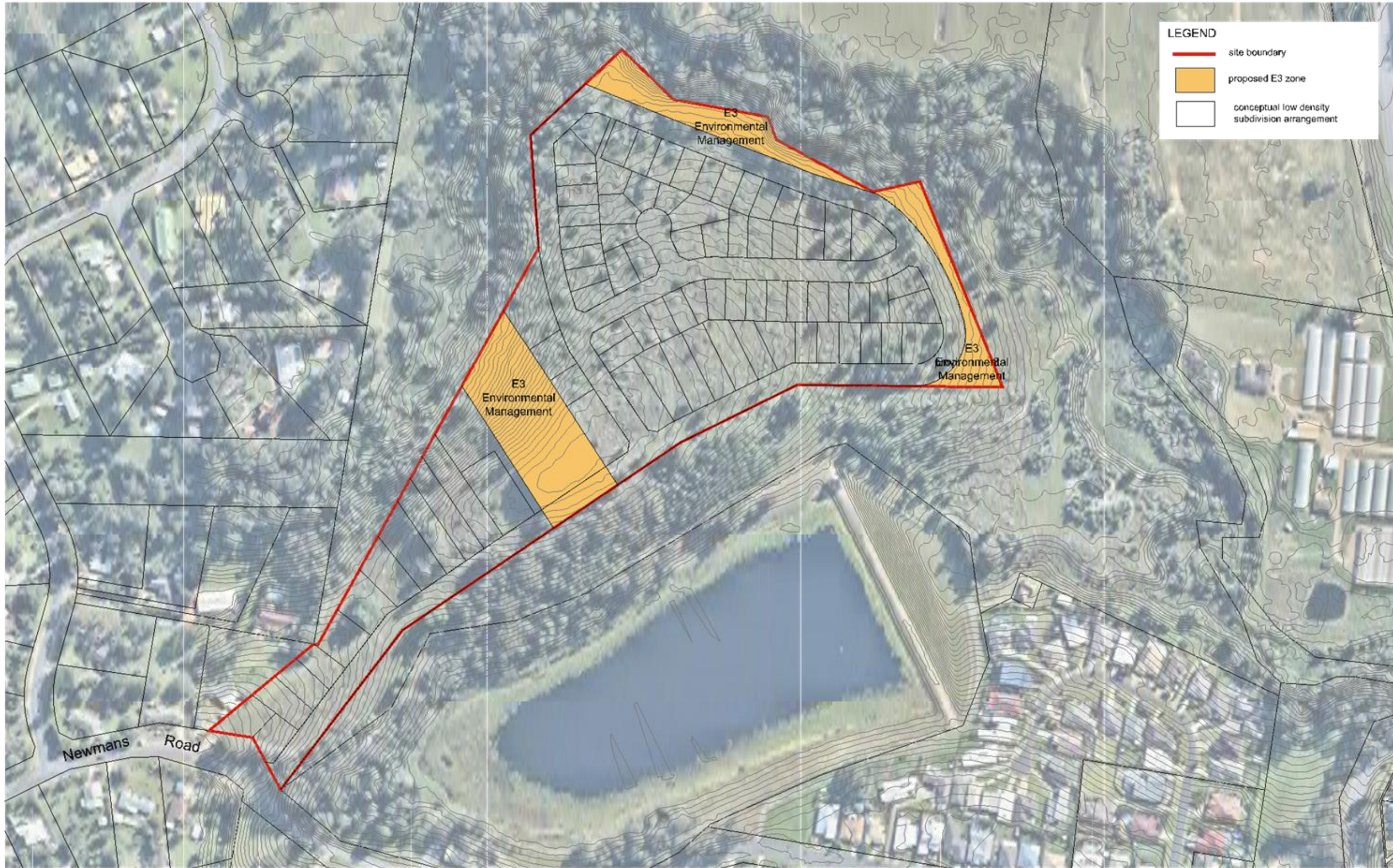
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Appendix 1 Concept design



LEGEND

- site boundary
- proposed E3 zone
- conceptual low density subdivision arrangement

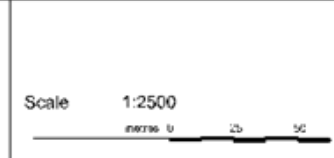
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Issue	Date	Details	Initial
A	25.7.18	Client review	JA
B	11.8.18	Approved the Final Planning Zoning	JA
C	11.8.18	Approved the Final Planning Zoning	JA
D	27.10.18	All zones added	JA
E	11.9.18	Planning proposal	JA

PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL
CLIENT Keiley Hunter Urban Planner

DRAWING Planning Proposal Proposed Subdivision Layout Newmans Rd
DRAWING NO. 1730-06

DRAWN JA	ISSUE E
DATE September 2018	



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Issue	Date	Description	Initials
A	22/7/18	Client review	JA
B	11/9/18	Permitting, propose	JA

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PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL	DRAWING Planning Proposal Site Context	DRAWN JA	ISSUE B
CLIENT Keiley Hunter Urban Planner	DRAWING NO. 1730-01	DATE September 2018	

Scale 1:5000 @ A3

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Appendix 2 Summary of generic standards for one to five star recovery levels

Number of stars	Recovery outcome modelled on an appropriate local indigenous ecological reference
1	Ongoing deterioration prevented. Substrates remediated (physically and chemically). Some level of indigenous biota present; future recruitment niches not negated by biotic or abiotic characteristics. Future improvements for all attributes planned and future site management secured
2	Threats from adjacent areas starting to be managed or mitigated. Site has a small subset of characteristic indigenous species and there is low threat from undesirable species on site. Improved connectivity arranged with adjacent property holders.
3	Adjacent threats being managed or mitigated and very low threat from undesirable species on site. A moderate subset of characteristic indigenous species are established and evidence of ecosystem functionality commencing. Improved connectivity in evidence.
4	A substantial subset of characteristic biota present (representing all species groupings), providing evidence of a developing community structure and commencement of ecosystem processes. Improved connectivity established and surrounding threats being managed or mitigated.
5	Establishment of a characteristic assemblage of biota to a point where structural and trophic complexity is likely to develop without further intervention other than maintenance. Appropriate ecosystem exchanges are enabled and commencing and high levels of resilience is likely with return of appropriate disturbance regimes. Long term management arrangements

Note 1: Each level is cumulative

Note 2: The different attributes will progress at different rates

Ref: National standards for the practice of ecological restoration in Australia (SERA 2017)

Appendix 3 Weed list

Family Name	Scientific Name	Common Name
Apocynaceae	<i>Gomphocarpus physocarpus</i>	balloon cotton bush
Asparagaceae	<i>Asparagus aethiopicus</i>	asparagus fern
Asteraceae	<i>Ageratum conyzoides</i>	blue billygoat weed
Asteraceae	<i>Baccharis halimifolia</i>	groundsel bush
Asteraceae	<i>Bidens pilosa</i>	cobbler's pegs
Asteraceae	<i>Cirsium vulgare</i>	spear thistle
Asteraceae	<i>Tagetes minuta</i>	stinking roger
Convolvulaceae	<i>Ipomoea cairica</i>	mile-a-minute
Fabaceae (Caesalpinioideae)	<i>Senna pendula var. glabrata</i>	winter senna
Lauraceae	<i>Cinnamomum camphora</i>	camphor laurel
Passifloraceae	<i>Passiflora suberosa</i>	cork passionfruit
Passifloraceae	<i>Passiflora subpeltata</i>	white passionflower
Pinaceae	<i>Pinus elliotii</i>	slash pine
Poaceae	<i>Paspalum mandiocanum</i>	broadleaf paspalum
Poaceae	<i>Setaria sphacelata</i>	south African pigeon grass
Rutaceae	<i>Citrus limon</i>	bush lemon
Solanaceae	<i>Solanum mauritianum</i>	wild tobacco bush
Verbenaceae	<i>Lantana camara</i>	lantana
Verbenaceae	<i>Verbena bonariensis</i>	purpletop

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	31/08/20018	Preliminary Vegetation Management Plan Newmans Road	Trudy Thompson, Senior Environmental Scientist	Nigel Cotsell, Manager Coffs Harbour	Heather Richards, Regional Manager

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Appendix D ~ Aboriginal Cultural Heritage Assessment



**ABORIGINAL CULTURAL HERITAGE
ASSESSMENT REPORT**

BARK HUT ROAD REZONING



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EXECUTIVE SUMMARY

This report provides the results of an Aboriginal Cultural Heritage Assessment for the proposed rezoning of land at Bark Hut Road, Woolgoolga NSW (the 'Project'). The lands subject to assessment include Lot 202 DP874273 and are approximately 25.55 hectares in area. The planning proposal is to rezone the land from RU1 Primary Production to R 2 Low density residential. The intent of the archaeological investigation is to identify Aboriginal and historical archaeological or cultural heritage constraints for the Project, and if found, establish ways in which any impacts could be mitigated or avoided. Everick Heritage Consultants (the 'Consultant') was commissioned by Keiley Hunter on behalf of Vadejil Pty Ltd (the 'Proponent') to undertake this assessment. It is understood that this assessment will be used in support of a Development Application to the Coffs Harbour City Council ('CHCC').

The brief for this Project was to undertake an Aboriginal and European heritage assessment of suitable standard to accompany the Development Application to the CHCC. In accordance with the relevant administrative and legislative standards for New South Wales (see Section 2 below), the methods employed in this assessment included:

- a) a search of relevant heritage registers;
- b) a site inspection undertaken by Senior Archaeologist Tim Hill on 1 March 2016;
- c) a review of the archaeological and cultural heritage assessments pertinent to the potential heritage values associated with the Project Area;
- d) review historical aerial photographs of the Project Area; and
- e) assessment of the potential for the Project Area to contain significant Aboriginal heritage and the impact on the Project may have on said heritage, consistent with the OEH *Due Diligence Code for the Protection of Aboriginal Objects in NSW* (2010).

As a result of the desktop study, field inspections, Aboriginal community consultation and archaeological investigation of the Project Area, the following was found.

- Two artefacts (Bark Hut Road IF 01 #22-1-0503 and Bark Hut Road IF 02 #22-1-0504) were observed on the access trail immediately south of the Bark Hut Road entrance to the Project Area. These consisted of stone flakes derived from Greywacke and Rhyolite, which are common in the Woolgoolga area. Given the location of the artefacts on an area of upper slope, it is likely that the artefacts are a secondary deposit from the main campsite, which is identified in the Council Reserve to the immediate west of the access road. This area will not be part of the rezoning application and as such this ridge crest was not surveyed.



- Having consideration for the landscape context of the Project Area and the history of disturbance it is considered unlikely that the Project Area will contain Aboriginal sites of high or moderate conservation value. The Project Area is unlikely to contain burials or middens and does not contain scarred or modified trees. Whilst some historic campsites are known in the general vicinity the Project Area none are known within the Project Area. No Mythological or ceremonial sites are known to occur within the Project Area, however it is noted that the ridge-crest may have been utilised as a pathway between the coast and hinterland.
- There is very little topsoil material in the upper slope and the artefacts were identified on the compacted surface of the trail. It is considered unlikely that the surrounding soils would contain Aboriginal objects. However, having consideration for the Due Diligence Code of Practice requirements the entire ridge crest is considered to be a Potential Archaeological Deposit (PAD). This includes a small ridge crest in the north-east corner of the Project Area.
- A second PAD was identified in the southern portion of the Project Area comprising a knoll to the west of the water storage dam however no Aboriginal objects were identified on the knoll. However, the presence of topsoil on the knoll provides an indication that there is the potential for an Aboriginal stone artefact scatter to occur on the knoll.

On the basis of the results and discussed above, the following management recommendations are provided:

Recommendation 1: Cultural Heritage Induction

It is recommended that a cultural heritage induction is provided by representatives of the RAPs for all senior civil works staff involved in the initial removal of topsoil from the ridge crests identified by the ACHAR. This induction should provide;

- an overview of the nature and extent of archaeological materials within the Project Area;
- the broader cultural context of the site and its significance to Aboriginal people;
- an outline of relevant legislation; and
- an outline of the AHIP salvage procedure and an outline of an appropriate Finds Procedure.

Recommendation 2: Application for an Aboriginal Heritage Impact Permit (AHIP)

It is recommended that prior to commencement of works (issue of Construction Certificate) that the proponent apply for an Aboriginal Heritage Impact Permit (AHIP) for salvage of known Aboriginal Objects from within the Project Area (Bark Hut Road IF 01 #22-1-0503 and Bark Hut Road IF 02 #22-1-0504). This AHIP should be subject to the following conditions relating to the salvage program:



- Cultural heritage induction for all ground clearance contractors.
- Collection of surface artefacts by Raps and temporary storage at CHDLALC.
- Monitoring of topsoil removal and collection of artefacts from the ridge crest and temporary storage at CHDLALC.
- The monitoring should be in an area 20m below the access track and along the apex of the ridge to the upper/ mid slope. All the way down to Creek.
- Permanent burial of artefacts within a reserve or garden area nearby.
- The monitoring should also include the ridge area in the north-east of the Lot.

Recommendation 3: Southern PAD

It is noted that the site inspection did not identify any Aboriginal objects within the southern PAD area, defined by the knoll to the west of the water storage dam. Having consideration for the potential of this PAD to contain Aboriginal sites of high or moderate conservation value it is recommended that the minimum management response for this PAD is a cultural heritage induction and the application of an Aboriginal Find Procedure.

If it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

- a) work in the surrounding area is to stop immediately;
- b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
- c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
- d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the *ACHCRP Guidelines* (2010).

Should the material be identified as an Aboriginal object and the proposed works cannot be amended to avoid the Aboriginal site an Aboriginal Heritage Impact Permit (AHIP) would be required prior to recommencement of works in the vicinity of the site. Consultation with stakeholders from the Aboriginal community would be required as a part of the AHIP application process.

It is recommended that these requirements are formalised within a Cultural Heritage Management Plan agreed to by Registered Aboriginal Parties prior to issue for the Development Application for subdivision to allow an opportunity for RAPs to better consider the full impacts of proposed works.



Recommendation 4: Aboriginal Human Remains

Although it is unlikely that Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The Site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Coffs Harbour), the Coffs Harbour Local Aboriginal Land Council and the OEH Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.

Recommendation 5: Conservation Principles

It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable, mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal community.



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DEFINITIONS

The following definitions apply to the terms used in this report:

Aboriginal Object means any deposit, object or material evidence (not being a handicraft made for sale) relating to the [Aboriginal](#) habitation of the area that comprises New South Wales, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes [Aboriginal remains](#).

Aboriginal Place means any place declared to be an Aboriginal place (under s.84 of the NPW Act) by the Minister administering the NPW Act, by order published in the NSW Government Gazette, because the Minister is of the opinion that the place is or was of special significance with respect to Aboriginal culture. It may or may not contain Aboriginal Objects.

AHCRP Guidelines means the OEH *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

AHIP means Aboriginal Heritage Impact Permit

Code of Practice means the OEH *Code of Practice for Archaeological Conduct in New South Wales* (2010).

Consultant means qualified archaeological staff and/or contractors of Everick Heritage Consultants Pty Ltd.

Development Area means those lands within the Project Area subject to the Proposed Works.

Due Diligence Code means the OEH *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (2010).

LALC means Local Aboriginal Land Council

LEP means the Local Environment Plan

NPW Act means the *National Parks and Wildlife Act 1974* (NSW).

NPW Regulations means the *National Parks and Wildlife Regulations 2009* (NSW).

OEH means the New South Wales Office of Environment and Heritage.

Project means the proposed future development of the Project Area for a low density residential subdivision.

Project Area means the land subject to this assessment being Lot 202 DP 874273, located at Bark Hut Road Woolgoolga NSW.

Proposed Works means all activities associated with proposed future ground disturbance within the Development Area, including activities undertaken by subsequent landholders.

Proponent means Vadejil Pty Ltd, and all associated employees and contractors and subcontractors of the same.



1. INTRODUCTION

1.1 Purpose of the Cultural Heritage Assessment

This report provides the results of an Aboriginal Cultural Heritage Assessment for the proposed rezoning of land at Bark Hut Road, Woolgoolga NSW (the 'Project'). The lands subject to assessment include Lot 202 DP874273 and are approximately 25.55 hectares in area (Figure 1). The planning proposal is to rezone the land from RU1 Primary Production to R2 Low density residential.

The intent of the archaeological investigation is to identify Aboriginal and historical archaeological or cultural heritage constraints for the Project, and if found, establish ways in which any impacts could be mitigated or avoided.

1.2 Proponent, Project Brief & Methodology

Everick Heritage Consultants (the 'Consultant') was commissioned by Keiley Hunter on behalf of Vadejil Pty Ltd (the 'Proponent') to undertake this assessment. It is understood that this assessment will be used in support of a Development Application to the Coffs Harbour City Council ('CHCC').

The brief for this Project was to undertake an Aboriginal and European heritage assessment of suitable standard to accompany the Development Application. In accordance with the relevant administrative and legislative standards for New South Wales (see Section 2 below), the methods employed in this assessment included:

- a) a search of relevant heritage registers;
- b) a site inspection undertaken by Senior Archaeologist Tim Hill on 01 March 2016;
- c) a review of the archaeological and cultural heritage assessments pertinent to the potential heritage values associated with the Project Area; and
- d) assessment of the potential for the Project Area to contain significant Aboriginal heritage and the impact on the Project may have on said heritage, consistent with the OEH *Due Diligence Code for the Protection of Aboriginal Objects in NSW* (2010).



The methods used for this assessment are in compliance with the OEH *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales 2010* and all relevant legislation as described in Section 2 of this Report.

1.3 Description of Proposal

The current proposal is to rezone the Project Area from RU2 (Rural Landscape) to R2 (Low Density Residential) for the purpose of developing the land into a residential subdivision. The average lot size will be approximately 600m². The overall development will be centred around the Woolgoolga sports field development (Figure 2 and Figure 3). The Proposed Works also include connection of all utilities and construction of roads, paths and landscaping.

1.4 Report Authorship

The desktop study was undertaken by Senior Archaeologist Tim Hill, assisted by Archaeologist Pauline Fowler. The field inspection was conducted by Senior Archaeologist Tim Hill. This report was written by Tim Hill and Everick Director Tim Robins.

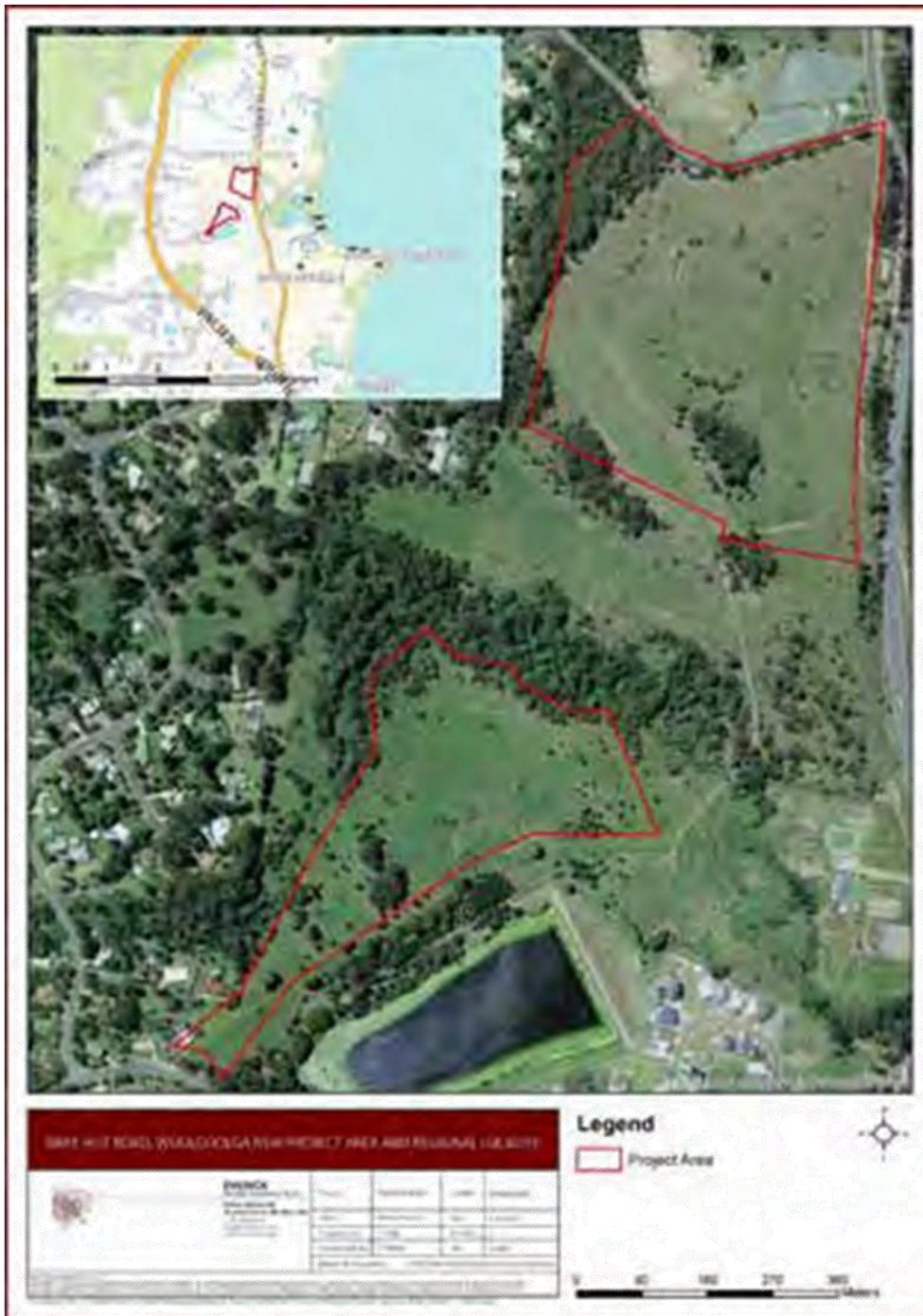


Figure 1: Regional Locality of the Project Area.





Figure 2: Proposed Lot Layout (Northern section)



Figure 3: Proposed Lot Layout (Southern Section).



2. LEGISLATIVE AND PLANNING CONTEXT

The following legislation provides the context for cultural heritage in NSW: the *National Parks and Wildlife Act 1974* (NSW) ('NPW Act'), the *Environmental Planning and Assessment Act 1979* (NSW) ('EP&A Act') and the *Heritage Act 1977* (NSW). The Commonwealth also has a role in the protection of nationally significant cultural heritage through the *Environmental Protection and Biodiversity Conservation Act 1999* (Cth), *The Protection of Movable Cultural Heritage Act 1986* (Cth) and the *Historic Shipwrecks Act 1976* (Cth).

For the purposes of this assessment it is the state and local legislation that is relevant. The consent authorities will be the CHCC and, where a referral agency is required to be reported to, the OEH. Approval from the OEH will be required should the Project propose to impact on identified Aboriginal Objects. The information below lists the legislative and policy framework within which this assessment is set.

2.1 The *National Parks and Wildlife Act 1974* (NSW) and the *National Parks and Wildlife Regulations 2009* (NSW)

The NPW Act is the primary legislation concerning the identification and protection of Aboriginal cultural heritage. It provides for the management of both Aboriginal Objects and Aboriginal Places. Under the NPW Act, an Aboriginal Object is any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area, regardless of whether the evidence of habitation occurred before or after non-Aboriginal settlement of the land. This means that every Aboriginal Object, regardless of its size or seeming isolation from other Objects, is protected under the Act.

An Aboriginal Place is an area of particular significance to Aboriginal people which has been *declared* an Aboriginal Place by the Minister. The drafting of this legislation reflects the traditional focus on Objects, rather than on areas of significance such as story places and ceremonial grounds. However, a gradual shift in cultural heritage management practices is occurring towards recognising the value of identifying the significance of areas to Indigenous peoples beyond their physical attributes.

With the introduction of the *NPW Amendment Act 2010* (NSW) the former offence provisions under Section 86 of 'disturbing', 'moving', 'removing' or 'taking possession' of Aboriginal Objects or Places have been replaced by the new offence of 'harming or desecrating'. The definition of 'harm' is 'destroying, defacing or damaging an Object'. Importantly in the context of the management recommendations in this assessment, harm to an Object that is 'trivial or negligible' will not constitute an offence.



The new amendments also significantly strengthen the penalty provisions. The issue of intent to harm Aboriginal cultural heritage has been formally addresses by separating it from inadvertent harm. The penalty for individuals who inadvertently harm Aboriginal Objects is up to \$55,000, while for corporations it is \$220,000. Also introduced is the concept of '*circumstances of aggravation*' which allow s for harsher penalties (up to \$110,000) for individuals who inadvertently harm Aboriginal heritage in the course of undertaking a commercial activity or have a record for committing similar offences. For those who knowingly harm Aboriginal cultural heritage, the penalty will rise substantially. The maximum penalty is set at \$275,000 or one year imprisonment for individuals, while for corporations it will rise to \$1,100,000.

Where a land user has or is likely to undertake activities that will harm Aboriginal Objects, the Director General (OEH) has a range of enforcement powers, including stop work orders, interim protection orders and remediation orders.

The NPW Act also includes a range of defence provisions for unintentionally harming Aboriginal Objects:

- a) Undertaking activities that are prescribed as 'Low Impact'.
- b) Acting in accordance with the new Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (2010) ('Due Diligence Code');
- c) Using a consulting archaeologist who correctly applies the OEH Code of Practice for Archaeological Conduct in New South Wales (2010); and
- d) Acting in accordance with an Aboriginal Heritage Impact Permit (AHIP).

2.1.1 '*Low Impact Activities*'

The NPW Regulations allow for a range of low impact activities to be undertaken without the need to consult the OEH or a consulting archaeologist. Generally, those who undertake activities of this nature will not be committing an offence, even if they inadvertently harm Aboriginal objects. These activities include:

- a) maintenance such as on existing roads and tracks, or on existing utilities such as underground power cables and sewage lines;
- b) farming and land Management for land previously disturbed, activities such as cropping, grazing, bores, fencing and erosion control;
- c) removal of dead or dying vegetation (only if there is minimal ground disturbance);
- d) environmental rehabilitation such as weed removal, bush regeneration;
- e) development in accordance with a Development Certificate issued under the EPA Act 1979 (provided the land is previously disturbed);

- f) downhole logging, sampling and coring using hand held equipment; and
- g) geochemical surveying, seismic surveying, costeaming or drilling.*

*This defence is only available where the land has been disturbed by previous activity. Disturbance is defined as a clear and observable change to the land's surface, including but not limited to land disturbed by the following: soil ploughing; urban development; rural infrastructure (such as dams and fences); roads, trails and walking tracks, pipelines, transmission lines; and storm water drainage and other similar infrastructure.

2.2 Due Diligence Code of Practice for the Protection of Aboriginal Objects

The Due Diligence Code has been applied in Section 10 of this assessment. It operates by posing a series of questions for land users before they commence development. These questions are based around assessing previous ground disturbance. An activity will generally be unlikely to harm Aboriginal Objects where it:

- a) will cause no additional ground disturbance;
- b) is in a developed area; or
- c) is in a significantly disturbed area.

Where these criteria are not fulfilled, further assessment for Aboriginal cultural heritage will typically be required prior to commencing the activity.

2.3 The ACHCRP (2010)

The *Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010)* ('ACHCRP') provide an acceptable framework for conducting Aboriginal community consultation in preparation for impacts to Aboriginal cultural heritage. Proponents are required to follow them where a Project is likely to impact on cultural heritage and where required by Council.

It is recommended by the OEH that all cultural heritage assessments involve this level of consultation, although it is not strictly a requirement unless it meets the above criteria. The ACHCRP Guidelines typically take a minimum of 90 days to complete. However, in complicated Projects this period may need to be extended by several months. The Guidelines require public notice of the assessment, preparation of a proposed methodology, undertaking site meetings and excavations where required, the production of a draft report, which is distributed to the registered Aboriginal groups and the production of a final report.



Given the low archaeological potential of the current Project Area, it has been concluded that following the ACHCRP Guidelines is not warranted for this assessment.

2.4 The Coffs Harbour Local Environmental Plan 2013

The Coffs Harbour LEP 2013 provides statutory protection for items already listed as being of heritage significance (Schedule 5), items that fall under the ambit of the *Heritage Act 1977 (NSW)* and Aboriginal Objects under the *National Parks and Wildlife Act 1974 (NSW)*. It aims to ensure best practice components of the heritage decision making process are followed.

For listed heritage items, or a building, work, relic or tree and heritage conservation areas, the following action can only be carried out with the consent of the Coffs Harbour City Council (CHCC):

- a) demolishing or moving a heritage item or a building, work, relic or tree within a heritage conservation area;
- b) altering a heritage item or a building, work, relic, tree or place within a heritage conservation area, including (in the case of a building) making changes to the detail, fabric, finish or appearance of its exterior;
- c) altering a heritage item that is a building by making structural changes to its interior;
- d) disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed;
- e) disturbing or excavating a heritage conservation area that is a place of Aboriginal heritage significance;
- f) erecting a building on land on which a heritage item is located or that is within a heritage conservation area; and
- g) subdividing land on which a heritage item is located or that is within a heritage conservation area.

In addition, CHCC may not grant development consent without considering the effect the proposed development will have on the heritage significance of heritage item or heritage conservation area concerned.

Furthermore, in regards to Aboriginal heritage significance (Part 5.10.8) the consent authority must, before granting consent under this clause to the carrying out of development in a place of Aboriginal heritage significance:

- a) consider the effect of the proposed development on the heritage significance of the place and any Aboriginal object known or reasonably likely to be located at the place; and



- b) notify the local Aboriginal communities (in such way as it thinks appropriate) about the application and take into consideration any response received within 28 days after the notice is sent.

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3. ABORIGINAL COMMUNITY CONSULTATION

3.1 Traditional Owner Knowledge

The Aboriginal Stakeholders are the primary determinants of the significance of their cultural heritage. Members of the Aboriginal community will be consulted, and will continue to be consulted, with regard to their concerns not only about known archaeological sites in the region, but also about cultural values such as areas with historic and spiritual significance, and other values relating to flora and fauna of the area. Everick recognises that there may be Traditional Owner knowledge associated with the region that will have to be treated in a confidential manner.

3.2 The Consultation Process

Everick undertook a consultation process with the Aboriginal community in accordance with the *OEH Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010)* (ACHCRP). A summary of the process undertaken is as follows:

- a) correspondence to the Office of Environment and Heritage (dated 6 October 2017);
- b) correspondence to The Registrar, *Aboriginal Land Rights Act 1983* for a list of Aboriginal Owners (dated 6 October 2017);
- c) correspondence to NTSCORP Limited (dated 6 October 2017); and
- d) correspondence to Coffs Harbour City Council (dated 6 October 2017).

Written correspondence was forwarded on 2 November 2017 to the following individuals and organisations providing an opportunity to be involved in the assessment project:

- Garby Elders,
- Coffs Harbour and District Local Aboriginal Land Council,
- Garlambirla Guuyu-girrwa Aboriginal Corporation,
- Mudjay Elders,
- Bagawa Birra Murri Aboriginal Corporation,
- Yarrawarra Aboriginal Corporation,
- Mimi Mothers Aboriginal Corporation,

- Muurrbay Aboriginal Language and Cultural Cooperative Ltd,
- Ciaron Dunn,
- Gumbayngirr Native Title Group,
- Gumbayngirr Elders,
- Ngurrala Aboriginal Corporation,
- Uncle Thomas Kelly and Family,
- Derrick Vale Sr.,
- Natalene Mercy,
- Jagun Elders; and
- Norm Archibold.

A public advertisement was placed in the Coffs Coast Advocate on 4 November 2017 (Figure 4) with a closing date of 12 April 2016.

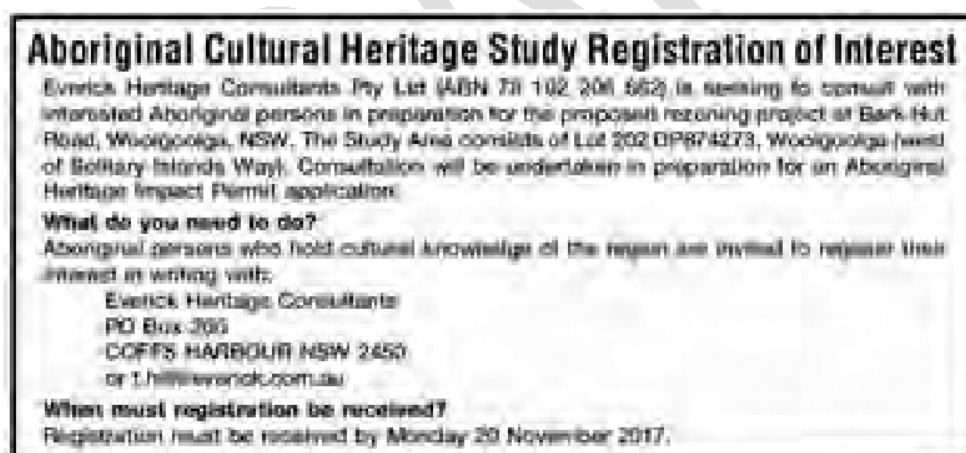


Figure 4: Copy of advertisement placed in Coffs Coast Advocate 4 November 2017

As a result of the consultation process the following list of Registered Aboriginal Parties (RAPs) was developed:

- Coffs Harbour and District Local Aboriginal Land Council; and
- Jagun Elders (via email see Appendix 3).



Everick Heritage Consultants believe that this Community Consultation process was adequate for the current project and as such has utilised this list as the basis for consultation for the current assessment.

A letter was forwarded to OEH and Coffs Harbour and District Local Aboriginal Land Council on 29 November 2017 notifying them of the outcomes of the consultation process (Appendix 4).

A consultation meeting was held with Mr Ian Brown and Ms Luana Ferguson (CHDLALC) and Uncle Tony Perkins (Jagun Elders) on 18 January 2018 to discuss the results of the initial inspection and provide advice and comment on the proposed management response for the project. An invitation to attend this meeting was provided to the Garby Elders however Uncle Milton Duroux and MR Tony Dootson were not able to attend the meeting. The notes from the meeting and email responses from RAPs are provide in Appendix D.

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4. ABORIGINAL CULTURAL HERITAGE DESKTOP REVIEW

4.1 The OEH Aboriginal Heritage Information Management System (AHIMS)

Care should be taken when using the AHIMS database to reach conclusions about site prevalence or distribution. For example, a lack of sites in a given area should not be seen as evidence that the area was not occupied by Aboriginal people. It may simply be an indication that it has not been surveyed for cultural heritage, or that the surveys were undertaken in areas of poor surface visibility. Further to this, care needs to be taken when looking at the classification of sites. For example, the decision to classify a site an artefact scatter containing shell rather than a midden can be a highly subjective exercise, the threshold for which may vary between archaeologists.

An extensive search was conducted on 12 January 2017 of the OEH AHIMS for the Project Area with a 50 metre buffer (ID 261963) which returned 2 Aboriginal site listings. Site features include artefacts and an Aboriginal Resource and Gathering site (See Table 1 and Figure 5). These sites are located within a proposed reserve area associated with Poundyard Creek and the Woolgoolga Sports Field development and will not be affected by the rezoning proposal.

Table 1: AHIMS Search Results

<i>Site Number</i>	<i>Name</i>	<i>Easting</i>	<i>Northing</i>	<i>Site 'Features'</i>
22-1-0152	C1_Poundyard Creek	517710	6669940	Artefact (1)
22-1-0408	West Woolgoolga Sports Field	517856	6669964	Artefact (2)



Figure 5: AHIMS extensive search results.



4.2 Other Heritage Registers

The following heritage registers were accessed on 27 September 2017:

- **The National Heritage List** (Australian Heritage Council): Contains no Aboriginal heritage listings within or within close proximity to the Project Area.
- **Commonwealth Heritage List** (Australian Heritage Council): Contains no Aboriginal heritage listings within or within close proximity to the Project Area.
- **Register of the National Estate** (Australian Heritage Council): Contains no Aboriginal heritage listings within or within close proximity to the Project Area.
- **The State Heritage Register** (NSW Heritage Office): Contains no Aboriginal heritage listings under Section 1 (Aboriginal Places listed under the NPW Act) within or within close proximity to the Project Area;
- **The Register of the National Trust of Australia:** Contains no listings within or within close proximity to the Project Area.
- **Coffs Harbour Local Environment Plan 2013 ('LEP'):** Contains no listings within or within close proximity to the Project Area.



5. LANDSCAPE CONTEXT

5.1 Environment Locality

5.1.1 Topography

Topography can generally be described as gently slopes and ridges. Elevation of the site varies from approximately RL 9.5m AHD, to around RL 38.0 m AHD. Surface slope is relatively moderate, typically around 10%, with isolated areas getting as steep as 25% and as flat as 1%. The northern portion of the site is situated on the southern side of a ridge, and consequently, falls to the south-east, to a well defined gully running south to Poundyard Creek. The southern portion of the site is located on a knoll, and as such the land falls away from the top of the feature.



Figure 6: Lot Layout and contour map- Northern section.



Figure 7: Lot Layout and contour map- Southern section.



6. ARCHAEOLOGICAL SYNTHESIS AND PREDICTIONS

6.1 European History of the Coffs Harbour Area.

The first historical documents relating to the Woolgoolga area are the naming of the 'Solitary Islands' by James Cook in May 1770, with additionally mapping by Matthew Flinders in 1779. However, despite the early records from 1791 of the convicts William and Mary Bryan and their two children running away to the area, it was not until 1847 that the next record of the settlement exists, with Captain John Korff taking shelter at the southern Headland of the area that is now 'Coffs Harbour' (Thomas 2013). European settlement of the Coffs Harbour/ Woolgoolga area was relatively late compared to areas along the Bellinger and Clarence Rivers. This was largely due to the absence of a large river system:

There was at least some cedar getting at Coffs Creek by Walter Harvie and George Tucker in 1865, with the camp set up by Harvie and Tucker being one of the earliest known semi-permanent settlements in the Coffs Harbour area. Timber getters often employed the services of Aboriginal bushmen who had the knowledge and skills to rapidly identify Cedar trees (Thomas 2013:2).

The township of 'Woogoolga' was first gazetted in 1888, (subsequently changed to Woolgoolga in 1966) following initial settlement in the 1870's. Three major phases of settlement can be defined within the Coffs Harbour area which have had cumulative impacts around Woolgoolga:

Forestry and forest related industries: This phase of settlement includes the very early extraction of cedar and later more broad extraction of remaining eucalypt species. This later process of clearing has historic linkages to the settlement of the area post World War 1 and the clearing of land by returned soldiers for early agriculture and horticulture. It is reasonable to assume that the Project Area was initially cleared for its timber resources.

Horticulture and agriculture: Farming has played an important role in the study area and has had the most significant impact on the physical landscape. Large areas of land have been cleared and regrowth managed for grazing and horticulture. Significant early crops include bananas, sugar cane and pineapples. Some agricultural diversification has taken place, and contemporary land use includes the cultivation of Blueberries and nuts (Macadamias particularly) and the establishment of aquaculture. A number of market gardens have operated within the area and are consistent with the historical process of dividing agricultural land into smaller lots as the district population increased. This type of land use has had the most significant historical effect on the Project Area.

Residential development: This process of urbanisation has increased significantly since the 1980's. This process is most noticeable with the development of residential areas around small coastal settlements such as Sandy



Beach and Safety Beach. This urbanisation has mostly been contained within areas already cleared as a result of forestry and horticulture, and has significantly changed water courses and drainage. No evidence of residential development was observed on the Project Area.

6.2 Aboriginal History

The study area is located within the Gumbayngirr Nation/Language Area which is broadly known to include the lands north of Nambucca Heads, south of the Clarence River and west up to the Great Dividing Range (Thomas 2013:1). The name Woolgoolga is understood to be derived from the word Wee-gullga or Weilgulga for a native plum or lilly pilly which was known to occur abundantly between the beach and lake (http://www.gnb.nsw.gov.au/place_naming/placename_search/extract?id=5XlpMKmMn). This reference supports the use of the area for exploitation of closed and rainforest resources.

Given the problematic nature of pre-European Aboriginal population estimates, the latter and more 'general' observations of Mathews (1898) for the broader Northern NSW coastline are more relevant:

In the well-watered coastal districts of New South Wales, where fish and game are abundant, their hunting grounds would be comparatively small (Mathews 1898:66).

Radcliffe Brown (in Lane 1970:V.8) concludes for the coastal areas that population densities would be in the order of 'one person to every three square miles'. Estimates of tribal groups in the order of 200 individuals are relatively common amongst ethno-historic and anthropological literature (i.e. see Lane (1970) for the Nambucca River district immediately south). An additional element to this discussion of population density is the differentiation between the coastal and the escarpment areas where it is generally accepted had lower and much more mobile Aboriginal populations. For the larger River systems (Nambucca, Clarence and Madaey) the concept of more intensive use of the coast as compared to the up-river and escarpment is generally accepted (i.e. McBryde 1974, Godwin 1990).

However, a unique aspect of the Coffs Harbour/ Woolgoolga area is the close proximity of the Great Dividing Range to the Coastline and the absence of a major river system. No other 'district' on the North Coast has such a narrow coastal zone, or such a short distance between the very different environments of coast and elevated/cold forests, and so many small creek or estuary systems which run directly into the Pacific Ocean. There is however great potential for pathways and routes between the coast and escarpment/hinterland however, these are not necessarily represented archaeologically through the discard of Aboriginal Objects or noted in early ethno-historical accounts.



Due largely to the absence of a large river system the Coffs Harbour district was settled by Europeans later than areas of the Clarence River to the north or Bellingen/ Kalang and Nambucca Rivers to the South. As such any observations from the relatively late settlement of the Woolgoolga area would also be biased as Gumbayngirr people generally would have had some 25 years of contact with European settlers by the time detailed records of Aboriginal life in the area were produced. It is expected that most of the local populations would have moved northward to Grafton around the time of settlement of Woolgoolga.

The relatively limited amount of ethno historical information available for Coffs Harbour has been collated for the Coffs Harbour by-pass project which is focussed on the edge of the Coffs Harbour escarpment and therefore an analogous environment to the Study Area (Connell Wagner 2004). The study suggests that a mode of occupation focussed around 'base camps' which provided a degree of protection from the elements surrounded by a series of smaller 'resource-specific' sites in between. The study places populations (in terms of size of group per camp) at 50 with groups as large as 200 recorded at Sawtell/ Bonville Creek. The study (Connell Wagner 2004:6) also makes specific reference to the sub-coastal area- indicating that permanent occupation of these areas was rare- with use being typically during travel to another location.

Historic camps in the Coffs Harbour area tended to be on Public land and nearby to small townships where there was access to water either naturally occurring or at a public tap. The main camping areas identified by Goulding (2001:64,65) are at Corindi Lake, inland from Arrawarra, Nana Glen (junction of Orara River and Bucca Bucca Creek), Happy Valley in Coffs Harbour, Coffs Creek/Fitzroy Oval, Wongala Estate and Yellow Rock. Generally speaking the historical experiences of Aboriginal people has been one of exclusion up until the 1960's (i.e Calley 1956:201). The nature of historic Aboriginal camps and economy within the historic period is such that it is unlikely these types of 'sites' will be present in the historic record of the study area.

6.3 Archaeological and Cultural Heritage Assessments

6.3.1 *Hearnes Lake.*

Hearnes Lake is a small creek and estuary system located immediately south of Woolgoolga Creek and provides a useful analogy for the Project Area. An archaeological assessment of the Hearnes Lake Caravan Park was undertaken in 1983 (Lilley 1983). No sites were recorded during the survey in the caravan park however, an isolated artefact and midden scatter was recorded immediately north of Hearnes Lake Road. The middens were described as 'dinner time camps' and contained Triton Spp. which are associated with rocky coastlines.

Dallas (2008) undertook an archaeological assessment for a proposed residential development to the south of Hearnes Lake which identified a number of sites directly associated to Hearnes Lake and Double Crossing Creek. Site types included artefact scatters and isolated artefacts. These artefacts were typically derived from locally



available cobbles or pebbles and included several manuports. The sites were located on the alluvial plain in close proximity to estuarine and swamp environments

An archaeological survey was undertaken for the Development Control Plan for Hearnese Lake residential area immediately south of the Woolgoolga industrial area (Collins 2004). This study identified a number of Aboriginal sites and PADs including site HL-1 (22-1-0234) which is described as an Artefact Scatter consisting of flakes and cores produced from locally available Greywackes as well as introduced Cherts and indurated Mudstones. A total of 13 stone artefacts were recorded (Collins 2004:20). The DCP survey also identified 19 stone artefacts within Lot 21 DP 714858 (#22-1-0359-Hearnese RD Lot 21 Ridge Site) which is immediately adjacent to the coastline/ Hearnese Lake entrance.

Two archaeological assessments were undertaken for the 'Woopi Beach Estate' residential development which comprised the area of the Hearnese Lake 1 site (Hill et al 2015a, 2015b). These studies confirmed the extent of the Hearnese Lake 1 site as being the ridge crest as originally mapped by Collins (2004). Artefacts identified at Hearnese Lake 1 included a large number of small flakes produced from mudstones and siltstones; quartz and silcrete however the assemblage predominately comprised simple greywacke flakes, cores and flake pieces. A double edge ground greywacke axe and an isolate flake to the east of the study area (Hearnese Lake 5) were also identified by this study (Hill 2015a). A major finding of the study was the presence of artefacts in areas which had been cleared and grazed and the absence of artefacts in areas which had been excavated.

6.3.2 *Coffs Harbour- Urunga Forestry Management Areas (Davies and Stewart Zerba 1995).*

The Coffs Harbour- Urunga Forestry Management study provides the most comprehensive regional assessment of the archaeological values and potential of the Coffs Coast hinterland. Whilst it is acknowledged that the sub-coastal zone which comprises the Project Area is not included within the Davies study some of its findings have practical application as the study was structured around 'landsystems' (Davies and Stewart Zerba 2005). Overall the sampling strategy employed by the study was biased towards the location of open campsites, stone artefact scatters and isolated finds. However the study found a strong correlation between archaeological sites; the degree of slope and the sandiness of soils and concluded that the majority of archaeological sites occurred on the crests of spurs in areas which would have been dry sclerophyll or open forest. Regionally the majority of archaeological sites in the study area were associated with the dissected escarpment and ranges with relatively few sites found on near coastal low hills and rises. However, the study found that whilst 'site density' was greater in the escarpment area the number of artefacts per site was much lower when compared to coastal and sub-coastal sites. This finding supports a model of greater mobility through the escarpment and a relative absence of permanent camps when compared resource rich marine and estuarine areas of the coastline.



6.3.3 *Sapphire to Woolgoolga Pacific Highway Upgrade (Collins 2007)*

The upgrade of the Pacific Highway between Sapphire and Woolgoolga resulted in the construction of a new highway bypass less than 1km west of the Project Area. The archaeological assessment for this major project was undertaken by Collins (2007) and identified a total of 7 archaeological sites and 8 PADs. Three of these sites (S2W-5, S2W-6 and S2W-7) are in close proximity to the Project Area (refer section 5.1 above) and are located on a single south facing ridge-crest which forms part of the Woolgoolga Creek catchment area. Two PADs (PAD 2 and 3) were also recorded during this study.

Two of the sites (S2W 5 and S2W-6) were recorded as isolated artefacts whilst the S2W-7 site was recorded as a much larger stone artefact scatter with at least 200 artefacts. The artefact assemblage in S2W-7 is diverse and includes (as examples) simple greywacke flakes, retouched mudstone flakes; chert flakes, chert cores and a grindstone. As such it is reasonable to conclude that the ridge crest was used as a campsite and knapping area. The average density of S2W-7 was estimated to be 2.2 artefact per m² (Collins 2007:40-44).

6.3.4 *Woolgoolga Modular Housing Estate (Hill et al 2016)*

Everick Heritage Consultants undertook an Aboriginal Cultural Heritage Assessment of the Woolgoolga Modular Housing Estate ('MHE') located on McIntosh Crescent, to the south of Newmans Road, Woolgoolga. This survey resulted in the identification of 2 artefacts on a small tributary to Woolgoolga Creek and a redeposited hammer stone in a pile of introduced fill. The study concluded that the area was not utilised as a main campsite or stone tool production area. The study proposed that the main campsites, and therefore areas of high archaeological potential, are located along the Woolgoolga Estuary closer to the coast and on the surrounding ridge crests to the north of the Project Area. Consultation with Coffs Harbour and District Local Aboriginal Land Council indicated that the study area may have been a 'pathway' between Woolgoolga Creek Estuary and the Coast Range, including 'Marys Waterhole' or have functioned as a peripheral area to the Woolgoolga fighting ground located to the east (near the Fire station).

6.4 Potential Site Types: Aboriginal Archaeological Sites in the Coffs Harbour Region

The most comprehensive 'regional' model for the area is provided by Godwin (1990) in a major review of the earlier archaeological research of Isabelle McBryde. Godwin's model specifically investigates patterns of movement between the coastal, sub-coastal and tablelands (escarpment) areas. However the applicability of this model to the Coffs Harbour area is problematic as the tablelands/escarpment intrude so far into the coastal zone.



For the purposes of understanding the archaeological record the study area is considered to fall into the 'coastal' area.

Amongst coastal groups proper there was no movement from the coast back into the sub-coastal river valleys and foothills. These people were semi-sedentary and lived close to the coast the whole year round. Movement associated with the subsistence round involved travelling only short distances away from the littoral. There were instances of long distance travel associated with ceremonial gatherings. However, such movement was generally parallel to the coast (i.e. north-south along the coast rather than east-west from coast to hinterland) (Godwin 1990:122,123).

Collins (2007:27-28) study of the Sapphire to Woolgoolga Highway upgrade proposed a model of archaeological sensitivity based on landform. This study identifies three broad land systems- being Coastal Alluvial Plains; Coastal Ramp and Escarpment Foothills. The Project Area is considered to fall within the Coastal Alluvial Plain of which the study (Collins 2007) proposes;

...those with highest archaeological sensitivity are well-drained swamp and estuary banks, and the level to low - gradient crests of low rises and spurs.

Elements of lowest archaeological sensitivity are valley flats, plains and open depressions. Irrespective of their landscape context, areas developed for residential uses or otherwise intensively disturbed (e.g. road and services easements) will also have low archaeological sensitivity. (Collins 2007:27)

For the purposes of this model the Project Area is considered to be a valley flat or plain on the grounds that the adjacent creek is not estuarine and there is no noticeable gradient typical of crests of spurs which occur further to the west and north.

Based on the review of previous archaeological and cultural heritage assessments in Woolgoolga and the broader region it is reasonable to propose that specific environment contexts including lowland hills, estuarine creek banks and coastal dunes are more likely to contain evidence of Aboriginal occupation. The review of previous studies indicates that archaeological sites are rarely found on alluvial flats not associated to estuarine environments. However, the following site types and potential types have been identified in the above contexts.

6.4.1 *Isolated Artefacts*

These sites consist of single stone artefacts, which may have been randomly discarded or lost. They can occur in almost any environmental context exploited by Aboriginal people. They are commonly stone axes, single cores, hammer stones, pebbles, flakes and grinding stones and/or grooves. Their presence may indicate that more



extensive scatters of stone artefacts exist or existed nearby, perhaps obscured by vegetation or dispersed by mechanical means.

There is a low potential for isolated artefacts to be located within the Project Area. Should these occur they are likely related to peripheral use of larger campsites along ridge crests to the west and the Woolgoolga Creek estuary to the south.

6.4.2 *Open Campsites/Artefact Scatters*

Open campsites/artefact scatters generally consist of scatters of stone artefacts and possibly bone and hearth features. Their exposure to the elements means that evidence of food resources used on the site (with the exception of shellfish) is usually lacking. An open campsite containing a large component of shell refuse may be described as a midden. They invariably consist of low or high density scatters of primary and secondary flakes in addition to the types of artefacts found as isolated finds. Open campsites may also contain burials when located on sand strata. Few open campsites are found on kraznozem and podzolic soils, possibly due to the destructive impacts of land clearing and the heavy vegetation cover. Detection is usually unlikely unless a high degrees of surface visibility is present.

There is a low potential for artefacts scatters to be located within the Project Area. It is likely that larger open campsites will be located on ridgecrests to the west of the Project Area and to the east along the Woolgoolga Creek estuary.

6.4.3 *Quarry Sites*

A stone quarry may occur where a source of opaline silica exists or other siliceous types of stone occur (e.g. chert, chalcedony and silcrete). The area can be identified by a number of different types of stone tools in various stages of production as well as refuse flakes.

Given that lack of visible suitable bedded rock outcrops or known sources of siliceous material, it is reasonable to expect that no quarry sites will be located within the Project Area.

6.4.4 *Scarred Trees*

Scarred trees result from the removal of bark for use as covering, shields, containers or canoes. No doubt, as an outcome of widespread intensive land clearing and natural causes very few have survived.

As the Project Area has been completely cleared of trees, it is reasonable to assume that no scarred trees will be located. Scarred trees may exist within the riparian zone however would not be affected by the rezoning proposal.



6.4.5 *Burials*

Human burials are typically individual or small group interments which can be found in sandy soil substrates, such as creek lines or within small rock crevices. Most of the known burials have been located by accidental means through mechanical disturbance or natural erosion.

Given that the underlying soil is not sandy, there is a low potential to locate burials within the Project Area.

6.4.6 *Ceremonial Sites*

Ceremonial grounds are typically places identified by Aboriginal groups as places of importance which were visited by groups to mark or commemorate rites or other occasions. One such example is Bora grounds; earthen mounds crafted in a circular formation which were used for the purposes of ceremonial practices.

No ceremonial sites are known to occur on within the Project Area.

6.4.7 *Mythological Sites*

These sites are natural features, which derive their significance from an association with stories of the creation and mythological heroes.

No mythological sites are known to occur within the Project Area.



7. FIELD SURVEY: ABORIGINAL CULTURAL HERITAGE

7.1 Survey Team

A pedestrian survey for cultural heritage of the Project Area was undertaken by Everick Senior Archaeologist Tim Hill and CHDLALC Senior Aboriginal Sites Officer Ian Brown on 20 September 2017.

7.2 Assessment Methods

The field methods aimed to inspect exposed ground surfaces as conditions would allow, to record any archaeological material found and undertake a preliminary assessment of its significance. The potential of the Development Area to contain sub-surface deposits (PADs) was also assessed through observation of soil profiles along Woolgoolga Creek and in any disturbed areas.

Photographs were taken as a record of general features and to document past disturbance. Notes were made of the degree of disturbance and the archaeological potential. A Garmin GPS (GDA 94 datum) was used to record the extent of survey coverage. Mapping and plans used in this assessment were provided by Connectability Pty Ltd and represent the level of information provided to the consultant.

In addition to assessing the cultural heritage potential of the Project Area, the survey aimed to confirm the interpretation of the nature and degree of ground disturbance observed in and satellite imagery (Figure 2 and Figure 3).

For ease of ground coverage and for purposes of description the Project Area is treated as a single unit due to the uniformity of conditions. There are no mature trees within the Development Area and as such these were not directly targeted by the survey.

7.3 Constraints to Site Detection

An assessment of the constraints to site detection is made to assist in formulating a view as to the effectiveness of the field inspection to find Aboriginal sites and cultural heritage materials. It also assists in the forming of a view of the likelihood of concealed sites (PADs), keeping in mind a site specific knowledge of the disturbance impacts that European land uses and natural processes may have had on the 'survivability' of Aboriginal sites in a Development Area.



The constraints to site detection are almost always most influenced by post European settlement land uses and seldom by natural erosion processes. The area of surface exposure and the degree of surface visibility within exposed surfaces are usually the product of 'recent' land uses e.g. land clearing, ploughing, road construction, natural erosion and accelerated (manmade) erosion (McDonald et .al. 1990:92).

In this case the major 'manmade' constraints to Aboriginal site survivability and detection are due to the clearing of original forest and the subsequent impacts of grazing which through, what is called taphonomic processes, can have the effect of accelerating movement of artefacts such as stone downward through soft soils. Detection of Aboriginal archaeological sites in the Project Area is severely limited by the presence of improved pastures. Vegetation has been cleared in the past. Some evidence of mass movement and erosion of soils was noted throughout the Project Area in the form of a large swale which has likely been constructed from material excavated from the Sports Field. Based on the observations taken during the survey it reasonable to conclude that it is unlikely that any soils in the upper 300mm contain original surfaces (Figure 8, Figure 9 and Figure 10).

Table 2: Summary of Environment and Ground Disturbance for Survey Unit.

<i>Survey Unit</i>	<i>Environmental Description</i>	<i>Ground Disturbance Summary</i>
Ridge crests	Open pastured grassland with some sparse native and introduced (pine) trees. Vehicle tracks occur along the spine of most ridge crests.	Land clearing.
Slopes	Open pastured grassland with some sparse native and introduced (pine) trees.	Land clearing.

7.4 Survey Coverage

To achieve as thorough and effective an archaeological assessment as possible a pedestrian ground survey of a sample of the Project Area was undertaken. The following summarises the broad conditions for the survey of each identified unit within the Project Area:

- a) Ridge crests. Cleared open grassland with some regrowth of native trees and introduced pines. The understorey was typically dense comprising bladey grass and weeds.
- b) Slopes. Cleared grassland with large patches of regrowth forest including native trees and introduced pines. The understorey was typically dense comprising bladey grass and weeds.

Table 3 and Table 4 present information on the extent to which survey data provides sufficient evidence for an evaluation of the distribution of archaeological materials across the Project Area. The evaluation of survey



coverage provides a measure of the potential for the survey to identify archaeological evidence. The calculations in Table 4 and Table 3 do not provide an exact percentages, but reasonable estimates.

Table 3: Survey Coverage.

Survey Unit	Landform	Survey Area (m ²)	Visibility (%)	Exposure (%)	Effective Coverage Area (m ²)	Effective Coverage (%)	Sites Found
PAD 1 (North ridge)	Ridgecrest	200	20	30	12	6	2
PAD 2 (Middle Ridge)	Ridgecrest	375	20	30	22.5	6	0
PAD 3 (South Ridge)	Ridgecrest	150	5	5	.375	0.25	0

Table 4: Landform summary- sampled areas

Landform	Landform Area (m ²)	Area Effectively surveyed (m ²)	% of Landform effectively surveyed	Number of sites	Number of artefacts
PAD 1 (North ridge)	4119	12	0.29	2	2
PAD 2 (Middle Ridge)	5028	22.5	0.44	0	0
PAD 3 (South Ridge)	9742	.375	0.0038	0	0

The following should be considered when reviewing the effectiveness of the survey and the survey results:

- a) The target total survey area for pedestrian transects was 5% of the Project Area which was not achieved by the survey primarily due to the significant amount of improved pasture and weeds over the Project Area at the time of the survey.
- b) The overall low predicted likelihood of identifying sites within the Project Area.
- c) The potential that stone artefacts have moved downward through the soil profile as a result of clearing, trampling and topsoil disturbance.



Figure 8: Typical surface exposure along trail on ridge crest with regrowth trees on slope.



Figure 9: Trail along ridge with cleared crest and slopes.



Figure 10: Typical exposure on trail from western portion of Project Area.

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8. RESULTS

8.1 Results

As a result of the desktop study, field inspections, Aboriginal community consultation and archaeological investigation of the Project Area, the following was found.

- Two artefacts (Bark Hut Road IF 01 #22-1-0503 and Bark Hut Road IF 02 #22-1-0504) were observed on the access trail immediately south of the Bark Hut Road entrance to the Project Area (Figure 12 **Error! Not a valid bookmark self-reference.**). These consisted of stone flakes derived from Greywacke and Rhyolite, which are common in the Woolgoolga area. Given the location of the artefacts on an area of upper slope, it is likely that the artefacts are a secondary deposit from the main campsite, which is identified in the Council Reserve to the immediate west of the access road. This area will not be part of the rezoning application and as such this ridge crest was not surveyed.
- Having consideration for the landscape context of the Project Area and the history of disturbance it is considered unlikely that the Project Area will contain Aboriginal sites of high or moderate conservation value. The Project Area is unlikely to contain burials or middens and does not contain scarred or modified trees. Whilst some historic campsites are known in the general vicinity the Project Area none are known with the Project Area. No Mythological or ceremonial sites are known to occur within the Project Area, however it is noted that the ridge-crest may have been utilised as a pathway between the coast and hinterland.
- There is very little topsoil material in the upper slope and the artefacts were identified on the compacted surface of the trail. It is considered unlikely that the surrounding soils would contain Aboriginal objects. However, having consideration for the Due Diligence Code of Practice requirements the entire ridge crest is considered to a Potential Archaeological Deposit (PAD). This includes a small ridge crest in the north-east corner of the Project Area.
- A second PAD was identified in the southern portion of the Project Area comprising a knoll to the west of the water storage dam however no Aboriginal objects were identified on the knoll. However, the presence of topsoil on the knoll provides an indication that there is the potential for an Aboriginal stone artefact scatter to occur on the knoll.



Table 5: Summary of survey results

<i>Site Name</i>	<i>Feature</i>	<i>Easting (GDA94)</i>	<i>Northing (GDA 94)</i>	<i>Survey Unit</i>	<i>Landform</i>
<i>Bark Hut Road IF 01 (#22-1-0503)</i>	Stone artefact	517672	6670314	2	Upper Slope.
<i>Bark Hut Road IF 02 (#22-1-0504)</i>	Stone artefact	517742	6670394	2	Upper Slope.

No items or relics of European heritage were identified during the assessment.

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Figure 11: Bark Hut Road Isolated Find locations



Figure 12: Site and PAD locations northern section.



Figure 13: PAD location southern section.



Figure 14: Location of Bark Hut Road Isolated Find 01 on access trail.



Figure 15: Detail of Bark Hut Road Isolated Find 1.



Figure 16: Location of Bark Hut Road Isolated Find 02 on access trail.



Figure 17: Detail Bark Hut Road Isolated Find 2 core.



8.2 Significance Assessment

The artefacts identified by the study are determined to have low scientific value. The basis for this assessment is primarily the low degree of confidence that the artefacts are insitu, and that the artefacts are similar to stone artefacts from other assemblages in the Woolgoolga area. It is likely that the artefacts have been moved down slope from the adjacent ridge crest.

Based consultation with Aboriginal Sites Officers present during the assessment the Bark Hut Road sites are considered to be of social or cultural significance.

The aesthetic significance of the sites is considered to be low given the extent of surrounding land clearing.

8.3 Impact Assessment

The following table is provided to summarise the impacts that might arise from the Project (Table 6).

Table 6: Bark Hut Road impact assessment summary.

<i>Site Name</i>	<i>Type of Harm</i>	<i>Degree of Harm</i>	<i>Consequence of Harm</i>
<i>Bark Hut Road IF 01</i>	Direct	Total	Total loss of value
<i>Bark Hut Road IF 02</i>	Direct	Total	Total loss of value

8.4 Management and Mitigation Measures

The following management and mitigation options have been considered for the Bark Hut Road IF 01 and Bark Hut Road IF 02 sites:

- a) complete avoidance;
- b) harm with salvage and repatriation on-site; and
- c) harm without salvage.

It is concluded that 'harm with salvage and repatriation onsite' is the most appropriate management response for Bark Hut Road IF 01 and Bark Hut Road IF 02 sites.

The options for the salvage any Aboriginal objects which may occur within the Project Area include;



- retrieval of artefacts via a mechanical sieving program and reburial within the Project Area;
- relocation of the topsoil into designated reserve/ landscape areas; and
- relocation of topsoil to an appropriate location away from the Project Area.

8.5 Ecologically Sustainable Design Principles

It is reasonable to conclude that the Development Area has a low potential to contain Aboriginal objects and that the Bark Hut Road Isolated Finds 01 and 02 are disturbed. It is likely that the main areas of occupation, and therefore potential to contain Aboriginal objects, are located on the ridge crest to the west of Bark Hut Road IF 02.

The Bark Hut Road Isolated Finds 01 and 02 sites will not significantly add to the current knowledge of coastal archaeology due to the nature of disturbance across the site and overall low artefact densities. Further the artefacts are not considered sufficiently unique to add to collections of artefacts held by the CHDLALC for future educational use or display.

The potential cumulative impact of the harm has been assessed as low on the basis that the Bark Hut Road Isolated Finds 01 and 02 sites have already disturbed.

8.6 Additional Research

It is not considered that additional archaeological research, in the form of test pit excavations, will significantly inform the management response for sites within the Project Area. This conclusion is based on the following considerations;

- the absence of large scale stone artefact scatters identified during the archaeological survey;
- the absence of known ceremonial or intangible sites in the Project Area and surrounds;
- the nature and extent of known archaeological sites in the surrounding areas; and
- The absence of deep and undisturbed topsoil deposits.

It is considered unlikely that an archaeological excavation program over the PAD areas will identify a stone artefact scatter with either high or moderate conservation value. Stone artefact scatters, should they occur, are likely to be disturbed, have low artefact densities and are unlikely to contain locally unique artefacts. As such it is reasonable to conclude that these sites, should they exist, will be of low



conservation value. As with the known Isolated Finds, salvage with repatriation on site is considered to be an appropriate management response for archaeological sites on PAD areas.



9. CONCLUSIONS AND RECOMMENDATIONS

On the basis of the results and discussed above, the following management recommendations are provided:

Recommendation 1: Cultural Heritage Induction

It is recommended that a cultural heritage induction is provided by representatives of the RAPs for all senior civil works staff involved in the initial removal of topsoil from the ridge crests identified by the ACHAR. This induction should provide;

- an overview of the nature and extent of archaeological materials within the Project Area;
- the broader cultural context of the site and its significance to Aboriginal people;
- an outline of relevant legislation; and
- an outline of the AHIP salvage procedure and an outline of an appropriate Finds Procedure.

Recommendation 2: Application for an Aboriginal Heritage Impact Permit (AHIP)

It is recommended that prior to commencement of works (issue of Construction Certificate) that the proponent apply for an Aboriginal Heritage Impact Permit (AHIP) for salvage of known Aboriginal Objects from within the Project Area (Bark Hut Road IF 01 #22-1-0503 and Bark Hut Road IF 02 #22-1-0504). This AHIP should be subject to the following conditions relating to the salvage program:

- Cultural heritage induction for all ground clearance contractors.
- Collection of surface artefacts by Raps and temporary storage at CHDLALC.
- Monitoring of topsoil removal and collection of artefacts from the ridge crest and temporary storage at CHDLALC.
- The monitoring should be in an area 20m below the access track and along the apex of the ridge to the upper/ mid slope. All the way down to Creek.
- Permanent burial of artefacts within a reserve or garden area nearby.
- The monitoring should also include the ridge area in the north-east of the Lot.

Recommendation 3: Southern PAD

It is noted that the site inspection did not identify any Aboriginal objects within the southern PAD area, defined by the knoll to the west of the water storage dam. Having consideration for the potential of this PAD to contain Aboriginal sites of high or moderate conservation value it is recommended that the minimum management response for this PAD is a cultural heritage induction and the application of an Aboriginal Find Procedure.



If it is suspected that Aboriginal material has been uncovered as a result of development activities within the Project Area:

- a) work in the surrounding area is to stop immediately;
- b) a temporary fence is to be erected around the site, with a buffer zone of at least 10 metres around the known edge of the site;
- c) an appropriately qualified archaeological consultant is to be engaged to identify the material; and
- d) if the material is found to be of Aboriginal origin, the Aboriginal community is to be consulted in a manner as outlined in the *ACHCRP Guidelines* (2010).

Should the material be identified as an Aboriginal object and the proposed works cannot be amended to avoid the Aboriginal site an Aboriginal Heritage Impact Permit (AHIP) would be required prior to recommencement of works in the vicinity of the site. Consultation with stakeholders from the Aboriginal community would be required as a part of the AHIP application process.

It is recommended that these requirements are formalised within a Cultural Heritage Management Plan agreed to by Registered Aboriginal Parties prior to issue for the Development Application for subdivision to allow an opportunity for RAPs to better consider the full impacts of proposed works.

Recommendation 4: Aboriginal Human Remains

Although it is unlikely that Human Remains will be located at any stage during earthworks within the Project Area, should this event arise it is recommended that all works must halt in the immediate area to prevent any further impacts to the remains. The Site should be cordoned off and the remains themselves should be left untouched. The nearest police station (Coffs Harbour), the Coffs Harbour Local Aboriginal Land Council and the OEH Regional Office (Coffs Harbour) are all to be notified as soon as possible. If the remains are found to be of Aboriginal origin and the police do not wish to investigate the Site for criminal activities, the Aboriginal community and the OEH should be consulted as to how the remains should be dealt with. Work may only resume after agreement is reached between all notified parties, provided it is in accordance with all parties' statutory obligations.

It is also recommended that in all dealings with Aboriginal human remains, the Proponent should use respectful language, bearing in mind that they are the remains of Aboriginal people rather than scientific specimens.



Recommendation 5: Conservation Principles

It is recommended that all effort must be taken to avoid any impacts on Aboriginal Cultural Heritage values at all stages during the development works. If impacts are unavoidable, mitigation measures should be negotiated between the Proponent, OEH and the Aboriginal community.



10. REFERENCES

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APPENDIX A: AHIMS SEARCH RESULTS

NSW Office of Environment and Heritage		AHIMS Web Services (AWS)		Site List report		Total AHIMS Records (Total Site List)		Download (CSV)	
Search	Results	Search	Results	Search	Results	Search	Results	Search	Results
1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018
1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018	1/1/2018



APPENDIX B: CORRESPONDENCE TO POTENTIAL ABORIGINAL STAKEHOLDERS

02 November 2017

Our Ref: EV.600

Garby Elders
Deborah Dootson
21 Knox Street
WOOLGOOLGA NSW 2456

Dear Deborah,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

We wish to advise that we have been engaged to undertake an Aboriginal Cultural Heritage Assessment for the above mentioned study area. The land subject to assessment is situated at Bark Hut Road, Woolgoolga, NSW. The assessment will be conducted for the proposed rezoning of Lot 202 DP874273, Woolgoolga, NSW, (west of Solitary Islands Way)(see enclosed plan).

We are seeking to consult with all Aboriginal persons and organisations that may have knowledge about the history of the Project Area. Consultation will be consistent with the *Office of Environmental Heritage Aboriginal Cultural Heritage Consultation Requirements for Proponents (2010)*. If you are interested, or know of persons who may be interested, we request that you contact us by **20 November 2017** to register your interest. Please write to:

Tim Hill
Senior Archaeologist
Everick Heritage Consultants
PO Box 200
Coffs Harbour NSW 2450 /or
t.hill@everick.com.au

If you have any questions about the Project, please contact Tim Hill on 0422 309 822. If you wish to find out more about our qualifications and experience in this field, please visit our website www.everick.com.au. We look forward to hearing from you.

Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Coffs Harbour and District Local Aboriginal Land Council
Greg Douglas
PO Box 6150
COFFS HARBOUR NSW 2450

Dear Greg,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Tim Hill
Senior Archaeologist
Everick Heritage Consultants
PO Box 200
Coffs Harbour NSW 2450 /or
t.hill@everick.com.au

If you have any questions about the Project, please contact Tim Hill on 0422 309 822. If you wish to find out more about our qualifications and experience in this field, please visit our website www.everick.com.au. We look forward to hearing from you.

Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Garlambirla Guuyu-girrwa Aboriginal Corporation
The Chairperson
PO Box 6904
PARK BEACH NSW 2450

To the nominated Chairperson,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Mudjay Elders
Cultural Heritage Officer
11 Anderton Street
COFFS HARBOUR NSW 2450

To the nominated Cultural Heritage Officer,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Bagawa Birra Murri Aboriginal Corporation
Susan Hoskins
31 Soren Larson Crescent
BOAMBEE EAST NSW 2452

Dear Susan,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Gurehlgam Corporation Ltd T/A Yarrawarra
Kenn Payne
PO Box 1676
GRAFTON NSW 2460

Dear Kenn,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Mimi Mothers Aboriginal Corporation
Marcia Hillery
90 High Street
BOWRAVILLE NSW 2449

Dear Marcia,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Muurrbay Aboriginal Language and Cultural Co-operative Ltd
Gary Williams
14 Belwood Road
Via NAMBUCCA HEADS NSW 2448

Dear Gary,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Cultural Heritage Officer
Gumbaynggirr Native Title Group
14 Belwood Road
NAMBUCCA HEADS NSW 2448

To the nominated Cultural Heritage Officer,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Cultural Heritage Officer
Gumbaynggirr Elders
PO Box 400
NAMBUCCA HEADS NSW2448

To the nominated Cultural Heritage Officer,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Noel Campbell
Ngurrala Aboriginal Corporation
PO Box 62
MACKSVILLE NSW 2447

Dear Noel,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

DFTV Enterprises
5 Mountbatten Close
RUTHERFORD NSW 2320

Dear Derrick,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Aaron Talbott & Natalene Mercy
6 Bando Street
GUNNEDAH NSW 2380

Dear Aaron & Natalene,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Jagun Elders
Tony Perkins
PO Box 649
WOOLGOOLGA NSW 2456

Dear Tony,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
LOT 202 DP874273, WOOLGOOLGA, NSW**

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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



02 November 2017

Our Ref: EV.600

Norm Archibald
17 Flobern Ave
WAUCHOPE NSW 2446

Dear Norm,

**RE: ABORIGINAL CULTURAL HERITAGE ASSESSMENT/ABORIGINAL HERITAGE IMPACT PERMIT
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Yours faithfully,

Tim Robins
Director/Archaeologist
Everick Heritage Consultants



APPENDIX C: REGISTRATION FROM ABORIGINAL STAKEHOLDERS

From: Culture [mailto:Culture@coffsharbourlalc.com.au]
Sent: Thursday, 9 November 2017 1:07 PM
To: Tim Hill <t.hill@everick.net.au>
Subject: Bark Hut Road Woolgoolga

Hi Tim,
To keep it official I am registering our interest in this project ok – thank you,

Yours in Unity

Michelle Flanders

Project Officer Culture & Heritage
CH&D LALC
2-3 Wongala Drive, Wongala Estate
PO Box 6150
Coffs Harbour NSW 2450
Ph: 02 6652 8740
Fax: 02 6652 5923
culture@coffsharbourlalc.com.au

PLEASE NOTE: I ONLY WORK ON THURSDAYS & FRIDAYS. If your enquiry requires urgent attention please contact the office on 02 6652 8740 for further assistance.

My office is located on Gumbaynggirr land & I pay my respect to our Elders past & present



Jagun Aged & Community Care

ABN: 73 116 506 546

Phone: 0417 806 239

PO Box 649 Woolgoolga NSW 2456

Everick Heritage Consultants Pty Ltd

P.O. Box 200

Coffs Harbour NSW 2450

Attention: Tim Hill

Jagun Aged and Community Care hereby register an interest in Aboriginal Cultural Heritage Assessment reporting land from RU2 (Rural landscape) to R2 (low density residential) Woolgoolga DPS74273.

Jagun will be represented by Anthony Perkins, Sumbawngger Elder/ Cultural Knowledge Holder, who has vast knowledge of the area.

Contact details for Anthony Perkins: mobile 0417 848 962, email anthony@sumbawngger.com.au and postal address PO Box 649 Woolgoolga NSW 2456.

Kind regards,

Simone Perkins

Program Manager

21/10/2017



APPENDIX D: CONSULTATION NOTES 18 JANUARY 2018

From: Tim Hill [<mailto:t.hill@everick.net.au>]
Sent: Friday, 19 January 2018 4:12 PM
To: Culture; Simone Perkins; Deb Dootson
Cc: Ian Brown; tony dootson; Keiley Hunter
Subject: Bark Hut Road AHIP consultation/ site inspection

Hi Tony, Michelle and Deb (Ian and Tony)

Please see below my notes from the AHIP consultation meeting at Bark Hat Road Woolgoolga yesterday (18th January 2018). The meeting was attended by Uncle Tony Perkins (Jagun Elders), Ian Brown and Luana Ferguson (CHDLALC). Uncle Milton Duroux and Tony Dootson were apologies for the meeting.

BARK HUT ROAD ISOLATED FINDS 1 & 2

Tim Provided a background to the proposed subdivision rezoning, indicating that the rezoning would provide for lots with a Lot size of between 500-600m². The boundaries of the area are the fenceline (to immediate west of meeting) and the Solitary Island Way and a section of and to the other side of Woopi Creek.
Noted that the initial site inspection included Ian Brown from CHDLALC and 2 flakes were recorded on the access trail (location of meeting). The flakes were rhyolite and greywacke, they were typical of flakes from the coastal area.

Ian Indicated that there was an outcrop of Rhyolite underneath Corindi village. Discussed the qualities of rhyolite for knapping- particularly that you needed to heat the rock to get through the cortex before knapping.

Tim Discussed the landscape context of the site and noted that the topsoil layer was very thin and disturbed. Discussed what might have been the practice of clearing- that was likely in the 1960's or 70s.

Mika Indicated that he bought the block in 1988 and have mostly just had it slashed since then.

Ian Indicated that there was a walking trail through Woopi Creek down to the lake at Woolgoolga- that the lake was a teaching site.

Tony Indicated that an old lady had a camp in the 1950's up near the Country Club Estate and that Michael McDougall had a camp across Bark Hut Road in an old packing shed.
Noted that the old 'battle ground' was down on the creek where the Council depot is on the other side of the old highway. Described the last known use of this place and that the young man was buried in Woolgoolga Creek under a log.

Tim Noted that two artefacts had previously been recorded in the area of the sportsfield proposal.

Ina Thought that there were more than 2 artefacts.

Tony Noted the problem that Council brought a lot of fill into the sportsfield area and he wasn't sure where it came from.

General discussion of management of the artefacts.

Ian Noted that he had problems with test pits in areas like this where there isn't a big site. Referred back to the excavations at Hearne's Lake ACHA study and noted they found a lot more during the ground works than they expected from the excavation results.

Tim Indicated that if the site was a large stone artefact scatter it would be visible on the ground and track. The absence of artefacts probably means it is only a low density stone artefact scatter or a small knapping area. Noted that it was unlikely to contain midden, scarr ed trees, unlikely to contain burials and there is no known mythological or historic sites. The main story is the connection through to St Mary's waterhole but that pathway isn't clearly understood to come through this block.

Ian Discussed the location of burials in the area and some traditional practices of burial.
General discussion of the ridge to the south of the site.



- Tony Indicated it was likely the connection to the coast was from the north-east through to Arrawarra headland and Mullaway
- Ian Noted the 'cut' along Bark Hut Road and that only some of the ridge is left intact
- Tony Indicated that women used to carry white clay along all the ridges up to the waterhole- probably up until the 1940's. The young girls went up into the mountains before they had babies.
- Ian Suggested that test pits in this area probably wouldn't show up anything.
- Discussion of management for the site
- Cultural heritage induction for all ground clearance contractors.
 - Collection of surface artefacts by Raps and temporary storage at CHDLALC.
 - Monitoring of topsoil removal and collection of artefacts and temporary storage at CHDLALC.
 - Permanent burial of artefacts within a reserve or garden area nearby.
 - The monitoring should be in an area 20m below the access track and along the apex of the ridge to the upper/ mid slope. All the way down to Creek.
 - The monitoring should include the ridge area in the north-east of the Lot.
 - Noted that the AHIMS site #Ds should be combined from two isolated finds to 1 single site.

DISCUSSION OF SOUTHERN PAD

Tim Identified the obvious knoll- hilltop and noted that this had been identified as a PAD during the initial site inspection.

Tony Questioned if the block was cleared in the 1960's when they built the water dam - would have been 66 or 65- that was the town water supply then.

Ian indicated that the trees might be 30 or 40 years old.

Tim Questioned if test pits would be required prior to rezoning or Development consent.

Tony Questioned if the trees would be retained or removed for the development.

Mika Indicated the ecologist report did not specify to retain the trees.

General discussion of a test pit program around the knoll. Conclusion that the program would be 1-2 days depending on if anything was located.

Ian Noted that a minimum they would need to have an induction and a 'Find Procedure' which involved stopping work.

Tim Noted that- as with the other PAD on Bark Hut Road- there was unlikely to be middens, scarred trees, burials and no known historical or mythological sites were known in the area. If there was sites they would likely be low density stone artefact scatters which have likely been disturbed when the land was cleared. Noted that there were no sites which would likely stop the development based on cultural or scientific significance.

Ian Indicated that test pit excavations should be completed prior to going to the DA- this would clear up the matter of whether an AHIP is required or not. Discussed the delays of stopping work if artefacts are found during construction works.

Tony Agreed that there are problems stopping work during construction and that he recommends getting an AHIP prior to starting the work.

Tim Suggested and a Cultural Heritage Management Plan could be a minimum requirement for the rezoning.

Noted the other sites at Hearn's Lake and McIntosh Crescent are close by and similar- both of those projects required test pit excavations.

General discussion of the proximity of the knoll to other landmarks and access routes up Woopi Creek. Noted that the estuary is a fair way downstream- but the knoll is still a good campsite.

Agreement to recommend test pit excavation prior to development consent to determine the requirement for an AHIP. Noted that the rezoning would be OK based on what is thought to be on the knoll.

Tim Hill BA (Hons.)

Senior Archaeologist

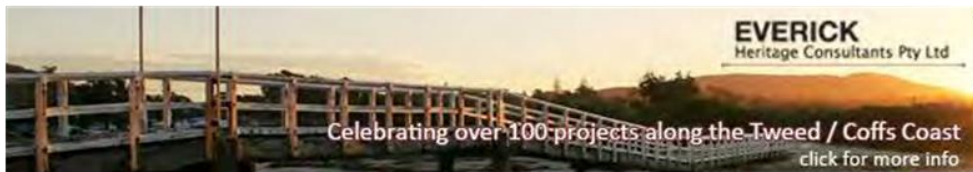


EVERICK Heritage Consultants Pty Ltd
ABN 78102206682

PO Box 200
Coffs Harbour NSW 2450

Ph: 1300 124 356
Mob: 0422 309 822
Fax: (07) 3368 2440
Email: t.hill@everick.com.au

Web: www.everick.com.au





APPENDIX E: CORRESPONDENCE FROM JAGUN ELDERS

From: Simone Perkins [mailto:simone@jagunagedcare.com.au]
Sent: Monday, 22 January 2018 8:41 PM
To: Tim Hill <t.hill@everick.net.au>
Subject: RE: Bark Hut Road AHIP consultation/ site inspection

Hi Tim

Tony has reviewed notes from AHIP Consultation meeting on 19/01/2018 and verifies are true and correct as per consultation discussions.

Simone Perkins
Jagun Aged Care
M: 0429 811 742
E: simone@jagunagedcare.com.au
Website: www.jagunagedcare.com.au

Appendix E ~ Ecological Report & Lesser Swamp Orchid Report





Bark Hut Road – Lesser Swamp-orchid

Targeted Survey Report (Draft)
November 2016

Keiley Hunter Planning



ecology / vegetation / wildlife / aquatic ecology / GIS

Glossary, acronyms and abbreviations

CHCC	Coffs Harbour City Council
ECA	Ecological Constraints Analysis
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
NSW	New South Wales
TSC Act	<i>Threatened Species Conservation Act 1995</i>

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1 Introduction

Keiley Hunter Planning engaged Ecosure Pty Ltd (Ecosure) in June 2016, to provide an Ecological Constraints Analysis (ECA) that identified ecological constraints for possible future rezoning of two (2) parcels of land (the site) in Woolgoolga, New South Wales (NSW).

The site is located at Lot 202 DP874273 (totalling 25.64 ha) and is bisected by Coffs Harbour City Council (CHCC) reserves. The northern portion of the site (bordering Bark Hut Road) is 16.41 ha and the southern portion is 9.23 ha (Figure 1).

The ECA report (Ecosure 2016) identified five threatened flora species with the potential to occur within the site. The Lesser Swamp-orchid (*Phaius australis*) was identified as likely to occur within flood prone areas of Poundyard Creek (between the two parcels of land). It is listed as endangered under both the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Threatened Species Conservation Act 1995* (TSC Act).

At a pre-planning proposal lodgement meeting, CHCC requested a targeted survey to determine the presence of Lesser Swamp-orchid. The survey was to be conducted during the known flowering time for this species (i.e. September to November).


The scope of this project included:

1. Desktop assessment
 - a. to identify potential habitat of the lesser swamp-orchid (the orchid) within and around the two parcels of land (Lot 202 DP874273; the site)
 - b. search of Bionet records to identify known locations of the orchid
 - c. liaison with relevant qualified personnel regarding known accessible locations of the orchid
2. Field survey
 - a. confirmation of presence of orchid in the local area (off site survey at known reference sites)
 - b. on site survey for the orchid in areas of potential habitat
 - c. off site survey in and around Poundyard Creek in accessible areas of potential habitat, within a 100 m (approximate) buffer of the two sites
3. Mapping of areas surveyed and locations of any orchid observed
4. A brief report outlining methods, results, maps, and recommendations.



Figure 1: Site Location

Keiley Hunter Planning
 PR2152 - Bark Hut Road Planning
 Lesser Swamp-orchid

 Study site (Lot 202 DP874273)



Job number: PR1732
 Revision: 2
 Author: DJB
 Date: 14/11/2016



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 Projection: Transverse Mercator
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 Unit: Meter

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PR2152_MP_1_Site_location A4

2 Methods

2.1 Literature review

Key background information including database searches was reviewed and included:

- Bark Hut Road Planning Proposal Environmental Investigation Report (Ecosure 2016)
- relevant databases including the Department of Energy and Environment species profile and threats database
- CHCC fine scale vegetation mapping.

Discussions with suitably qualified personnel were also conducted to determine known locations of the orchid in the area and flowering times.

Digital maps were produced with the CHCC fine scale vegetation mapping and aerial imagery for use by the project team to provide information for this report.

2.2 Off site survey – confirmation of presence in the area

Discussions were held with relevant qualified personnel who identified three locations of the orchid in the local area. One of these sites was visited to confirm presence prior to conducting the field survey.

2.3 Field survey – on site and off site

A targeted search for the orchid was conducted on Wednesday 9 November 2016 by a qualified ecologist. The survey concentrated on likely habitat within the site and on community land surrounding the two parcels of land. A 100 m buffer around the lot boundaries was used as a basis for the off site survey. Suitable habitat on and off site (within a general 100 m buffer) was identified through the desktop assessment and assessed during the field survey.

Within areas confirmed as potential habitat, linear transects at 10 m – 15 m spacings were searched for the orchid. All other mapped native vegetation was searched using a meandering transect (Figure 2 and Figure 3). The 100 m buffer was chosen to include potential habitat in the vicinity of the site. Community land between the two sites outside the 100 m buffer to the east was identified during the field survey as potential habitat and also surveyed.

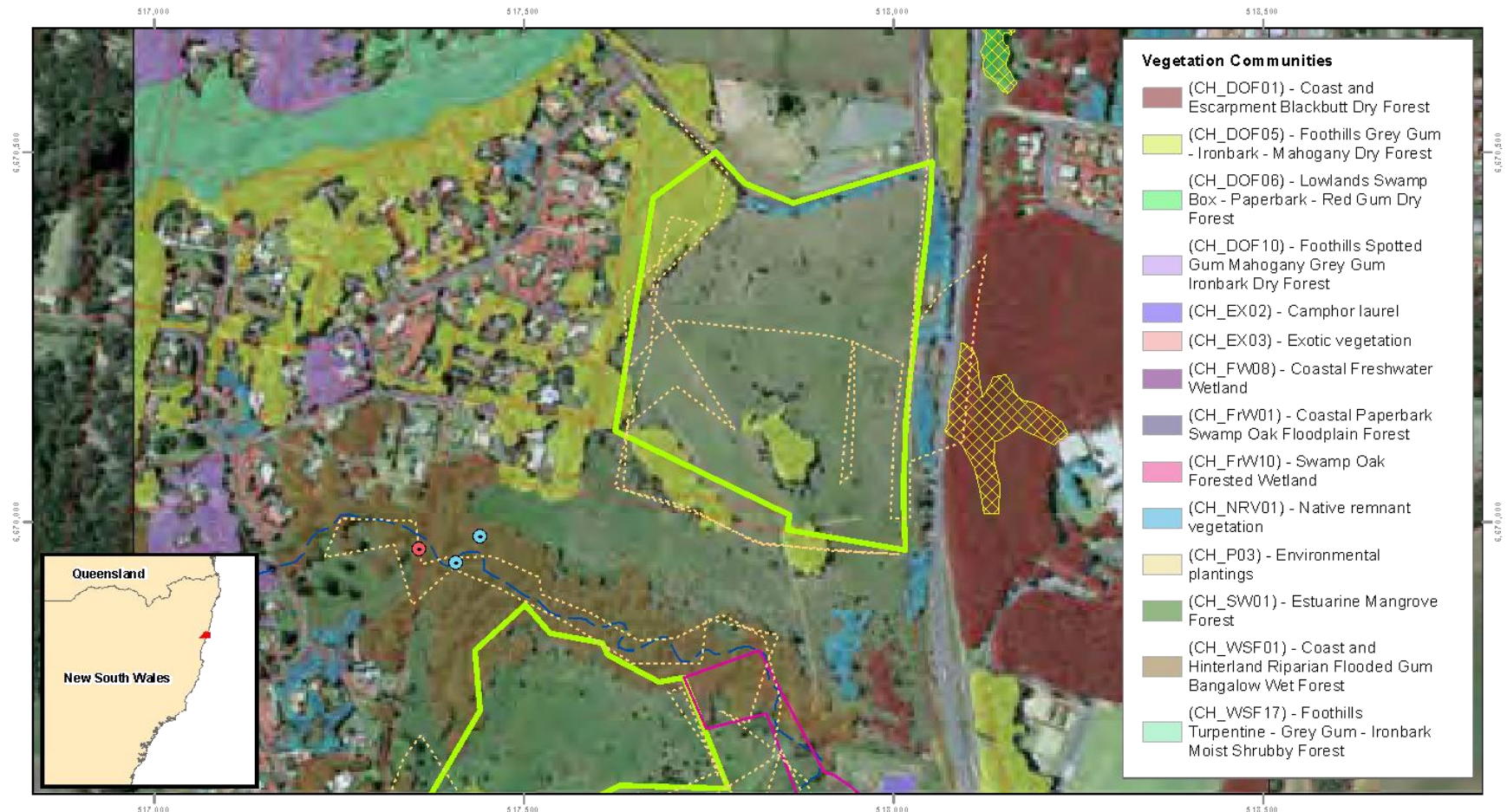


Figure 2: Northern survey area

Keiley Hunter Planning
 PR2152 - Bark Hut Road Planning
 Lesser Swamp-orchid survey

- Study site (202 DP874273)
- Likely EEC
- Fine-leaved tuckeroo
- Rough-shelled bush nut
- Poundyard Creek
- Survey route (meander)
- Survey area (transect)



Job number: PR2152
 Revision: 2
 Author: DJB
 Date: 14/11/2016

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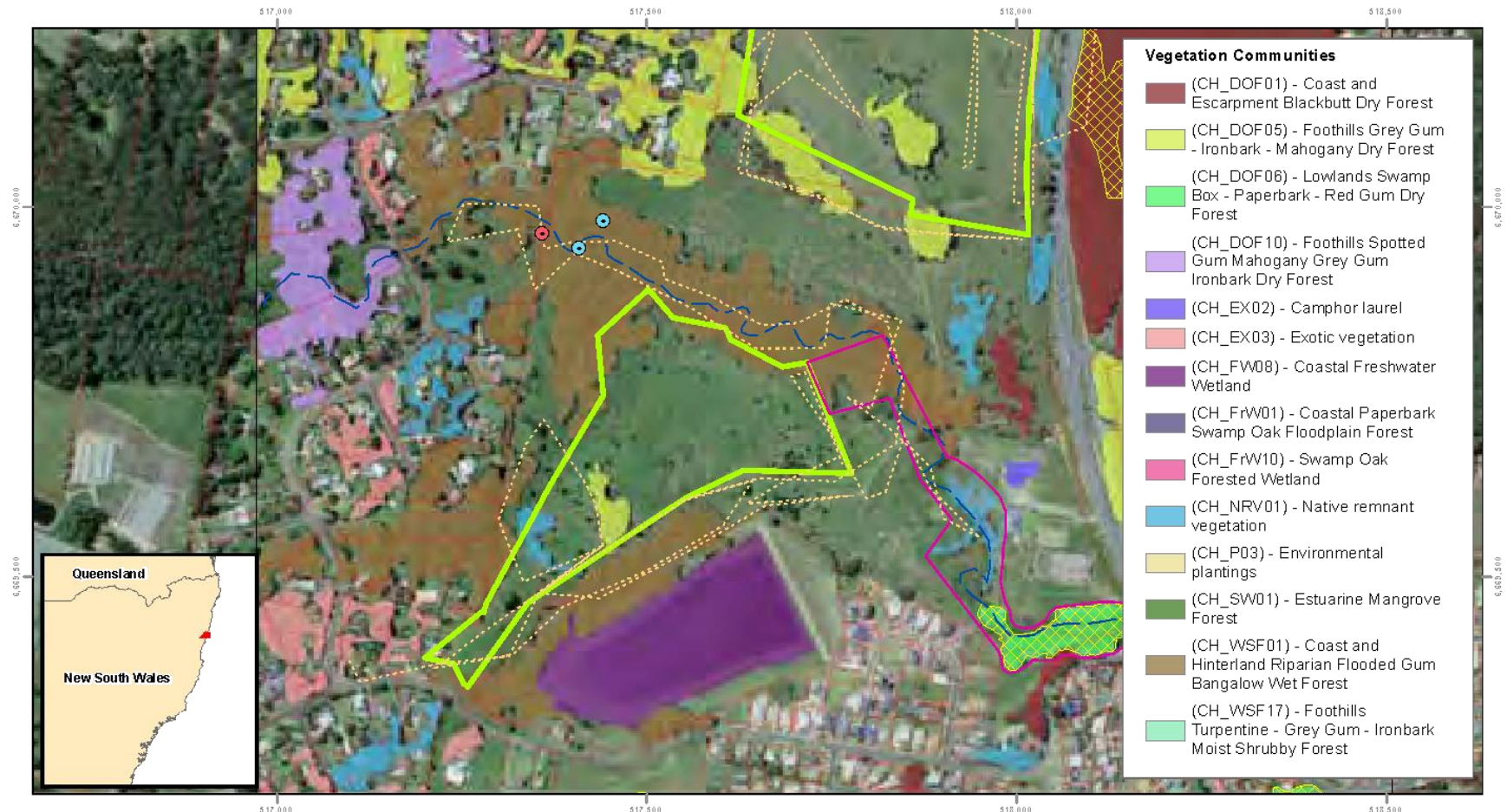


Figure 3: Southern survey area

Keiley Hunter Planning
 PR2152 - Bark Hut Road Planning
 Lesser Swamp-orchid survey



Job number: PR2152
 Revision: 2
 Author: DJB
 Date: 14/11/2016

Scale: 0 37.5 75 150 Meters

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2.4 Limitations

This report did not include detailed flora and fauna assessments or detailed ground-truthing of vegetation communities as the purpose of the report was to identify the presence of the Lesser Swamp-orchid. Whilst flowering of a known Lesser Swamp-orchid within the local region was confirmed at the time of survey, it does not guarantee that any specimens on site were flowering concurrently. Due to the height and density of vegetation, it would have been difficult to detect non-flowering orchids if they did exist, however narrow transects were undertaken to improve detectability.

3 Results and discussion

3.1 Literature review

A review of relevant publications and databases identified that the orchid is generally found in and adjacent to inundated or periodically inundated vegetation communities including coastal wet heath, freshwater wetlands, swamp grasslands, swamp forest, swamp rainforest and swamp sclerophyll forest (Barry 2005; Benwell 1994b; Bishop 1996; Harden 1993; NSW DECCW 2005). It is usually found where Broad-leaved Paperbark (*Melaleuca quinquenervia*) and Swamp Mahogany (*Eucalyptus robusta*) occur (Sparshott & Bostock 1993, NH NSW 2006), and where rainforest communities feature, including where Bangalow Palm (*Archontophoenix cunninghamiana*) or Cabbage Tree Palm (*Livistona australis*) are present (Benwell 1994b; Bishop 1996; Harden 1993).

The site consists mainly of cleared land with exotic grasses and patches of native vegetation. A review of CHCC's online mapping viewer (CHCC 2016) indicated the dominant mapped vegetation within the 100 m buffer surveyed was (CH_WSF01) - Coast and Hinterland Riparian Flooded Gum Bangalow Wet Forest. This community is predominately mapped around Poundyard Creek and enters the northern boundary of the southern land parcel (as well as a small section in this parcel's southern boundary. (CH_DOF05) - Foothills Grey Gum - Ironbark - Mahogany Dry Forest - occurs in patches on and off site in the 100 m buffer. There are also areas of (CH_DOF01) - Coast and Escarpment Blackbutt Dry Forest - to the east of the site, (CH_FW08) - Coastal Freshwater Wetland - adjoining the southern boundary and smaller patches of (CH_NRV01) - Native remnant vegetation (Figure 2 and Figure 3).

The desktop assessment identified the areas of CH_WSF01 around Poundyard Creek, CH_FW08 adjoining the southern boundary and smaller patches of CH_NRV01 in the south east corner as the most likely habitat for the orchid.

3.2 Off site survey

Discussions with local qualified personnel provided three known locations of the orchid in the area i.e. within a residential property in Sawtell, Coffs Harbour Botanic Gardens and a site near Coffs Harbour airport.

Of the three sites, one was confirmed as currently flowering (residential garden, Sawtell) (pers com Peter Richards, Senior Botanist). The orchids at the Botanic Gardens had completed flowering (pers com Alex Floyd, Curator) and an inspection of the specimen near the Coffs Harbour Airport indicated that it had not flowered this season and there was no evidence to indicate it would flower this season (pers com Peter Richards).

3.3 Field survey

Survey timing (9th November 2016) coincided with the usual flowering period (September to November) for the species (Benwell 1994b). No individuals or populations of the orchid were found during the site survey.

Areas identified as potential habitat adjacent to Poundyard Creek and mapped as (CH_WSF01) - Coast and Hinterland Riparian Flooded Gum Bangalow Wet Forest - were not swampy and did not contain species usually associated with the orchid. Lantana dominated the mid and understorey either side of Poundyard Creek. The heavy infestations of lantana made linear transects difficult to conduct and considerably reduced the potential habitat for the orchid in this area.

Riparian rainforest species occurred in a narrow strip both sides of Poundyard creek and transitioned up steep banks into sclerophyll communities dominated by Flooded Gum (*Eucalyptus grandis*), Tallowwood (*Eucalyptus microcorys*), Small Fruited Grey Gum (*Eucalyptus propinqua*), Grey Ironbark (*Eucalyptus siderophloia*) and Coastal Blackbutt (*Eucalyptus pilularis*). Despite the presence of rainforest species none of the (CH_WSF01) - Coast and Hinterland Riparian Flooded Gum Bangalow Wet Forest was swampy and no Broad-leaved Paperbark or Swamp Mahogany occurred.

Areas to the north of the creek did not contain suitable habitat. Areas under tree cover were mainly dominated by Coastal Blackbutt and were considered too dry for the species to exist. Parallel to the eastern boundary, a north south gully has been cleared and grazed. Although swampy in the bottom of this gully, previous management practices and the resulting vegetation makes this area unlikely to contain the orchid. To the south of the creek tall blady grass and bracken fern dominated the site. These areas were not considered likely habitat.

The survey identified that the areas of CH_NRV01 in the south east corner of the site, where Poundyard Creek widens into overflow channels and associated freshwater wetlands, were the most likely habitat for the orchid. This area (approximately 250 m from the eastern boundary of the southern portion of the site and therefore outside the 100 m buffer) contained fenced-off tree plantings, tall ferns, grasses and sedges. A search of this area revealed no orchids. If a non flowering orchid existed in this area it would have been difficult to detect due to the height and density of existing vegetation. Due to the distance of this area from the property boundary, if located, it would be expected that any impacts could be mitigated.

The CH_FW08 - Coastal Freshwater Wetland adjoining the southern boundary was a large dam. The adjoining mapped (CH_WSF01) - Coast and Hinterland Riparian Flooded Gum Bangalow Wet Forest was dominated by exotic pine with occasional Tallowwood trees. No suitable orchid habitat was recorded in this area.

3.3.1 Additional observations

Two species located on the site, with similar leaf formation to the orchid, were positively identified as Cocos Palm (*Syagrus romanzoffiana*) and Cabbage Tree Palm seedlings.

Two NSW threatened flora species were recorded in the western section of Poundyard Creek (Figure 3), approximately 135 m from the northwestern corner of the southern portion of the site. These were Fine-leaved Tuckeroo (*Lepiderema pulchella*) and Rough-shelled Bush Nut (*Macadamia tetraphylla*). Both of these species are listed as Vulnerable in NSW under the TSC Act; however the records of both these species at this site are considered to be outside their normal distribution.

Fine-leaved Tuckeroo normally occurs north of the Brunswick River and mainly in the Tweed Valley in north east NSW (OEH 2014). This species is commonly used in landscaping and is attractive to birds; its presence at the site may be due to seed dispersal by birds.

Rough-shelled Bush Nut usually occur north of the Clarence River (OEH 2014b). A database search conducted as part of the constraints report (Ecosure 2016) identified this species as potentially occurring within 5 km of the project area. It was considered unlikely to occur as there is no rainforest habitat mapped within the site. Although not likely to have been introduced by birds, it is possible this species was introduced to the site from nearby residential gardens during a previous flood event.

4 Conclusion

At the time of the survey, no lesser swamp orchid were located on the site or in the potential habitat surveyed on community land surrounding the site. No potential habitat for the orchid was identified on site. The most suitable potential habitat occurred to the south-east of the site where restoration works had occurred. No orchids were observed in this area, however it should be noted that the height and density of this vegetation made detection of any non-flowering orchids extremely difficult. This potential habitat was a considerable distance from the project site (approximately 250 m from the eastern corner of the southern site).

Two threatened flora species were located off site, approximately 135 m from the southern site's northwestern boundary, with their location shown on Figure 2. Whilst these specimens are considered to be outside their natural range and a considerable buffer is provided between the site boundaries and their location, it is recommended that their presence is considered in future developments to ensure that they are protected.

CHCC has requested this survey to determine the feasibility of future re-zoning of the site – Lot202 DP874273. More detailed flora and fauna assessments may be required to meet CHCC's Gateway requirements. No orchids were detected on or off site at the time of the survey, and no suitable habitat was observed on site. A precautionary approach is recommended to guide future management for areas off site as height and density of some vegetation may have prevented detection of non-flowering orchids. A substantial buffer exists between the boundary of the two sites and the potential orchid habitat to the east. To mitigate any potential adverse impacts to the potential habitat as a result of future development, it is recommended that appropriate erosion and sediment control during construction is implemented as well as appropriate hydrological and storm water management.

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Newmans Road – Southern Precinct Ecological Assessment

Final Report
September 2018

Keiley Hunter Urban Planner



ecology / vegetation / wildlife / aquatic ecology / GIS

Glossary, acronyms and abbreviations

BC Act	<i>Biodiversity Conservation Act 2016</i>
APZ	Asset Protection Zone
BC Act	<i>Biodiversity Conservation Act 2016</i>
CHCC	Coffs Harbour City Council
CHLC	Coffs Harbour Landscape Corridors
CKPoM	Comprehensive Koala Plan of Management
CZMP	Coastal Zone Management Plan
DCP	Development Control Plan
EEC	Endangered ecological community
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
HVH	High valued habitat
LEP	Local Environment Plan
OEH	Office of Environment and Heritage
PCT	Plant community type
SAT	Spot assessment technique
TEC	Threatened Ecological Community
TSC Act	<i>Threatened Species Conservation Act 1995</i>
VMP	Vegetation Management Plan

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1 Introduction

1.1 Overview

Keiley Hunter Urban Planner engaged Ecosure Pty Ltd (Ecosure) to conduct an ecological assessment of part Lot 202 DP874273 (southern precinct) in Woolgoolga, west of the Pacific Highway, 30 km north of Coffs Harbour, New South Wales. The subject land borders Newmans Road to the south and Poundyard Creek to the north and has a total area of 9.23 ha (Figure 1). The assessment is necessary in order to meet state and local government requirements for a planning proposal for the subject land. The concept design for the preliminary proposal is provided as Appendix 1.

The *Biodiversity Conservation Act 2016* (BC Act) commenced on 25 August 2017 with transitional provisions in place for the Coffs Harbour Local Government Area until 25 November 2018. Under Part 7 of the BC Act (Savings and Transitional) Regulation 2017, Council can assess DAs under the former planning provisions. Accordingly, this report has been prepared in accordance with the threatened species impact assessment requirements under Section 94 of the *Threatened Species Conservation Act 1995* (TSC Act).

The project scope included:

- a literature review which included findings from the constraints analysis (Ecosure 2016a), recommendations from the Northern Councils Review of Environmental Zonings (DPE 2015), and relevant Coffs Harbour City Council (CHCC) Local Environment Plan (LEP), Development Control Plan (DCP), policies and guidelines
- an assessment of fauna habitat particularly for threatened fauna species likely to occur based on findings from the constraints analysis (including identification of landscape features such as dry slopes and wet areas, features that could provide habitat including dead wood and dead trees, identification of hollow-bearing trees, searches for distinctive scats and scratches on trees, and identification of nests and assessment of culverts and drainage lines)
- a modified koala Spot Assessment Technique (SAT) survey targeting primary koala feed trees if they occur on-site and a review of mapped koala habitat including the consideration of Council's Comprehensive Koala Plan of Management (CKPoM)
- a flora assessment that ground-truthed vegetation communities in accordance with NSW Plant Community Types (PCTs) and Council's fine scale vegetation mapping (OEH 2012a).
- a targeted search for threatened flora species identified as potentially occurring on the site
- detailed mapping identifying potential E3 – Environmental Management zoned land

- an assessment of potential habitat linkages associated with the subject area.

1.2 Site description

The subject area falls within the North Coast Bioregion and the Coffs Coast and Escarpment Interim Biogeographic Regionalisation of Australia sub-region. The eastern boundary is located approximately 1 km from the eastern seaboard and would be influenced by the maritime environment depending on wind direction and speed. The land is gently sloping, rarely exceeding 10 degrees. There are no major landscape features associated with the site, such as karst, caves, crevices, cliffs and areas of geological significance.

The project area is mostly cleared with scattered patches of vegetation. Small patches of dry sclerophyll forest are present with wet sclerophyll forest in the gullies and creek lines. Poundyard Creek flows just to the north of the southern precinct (Figure 1) although the stream and its banks fall outside the lot boundaries of the subject area.

The southern precinct is geographically separated by Poundyard Creek and council owned land currently being developed for the purposes of a community sports field. The western boundary of the southern precinct is bounded by residential development while the eastern portion adjoins Council land including a large dam. The entry point to the southern precinct is Newmans Road and is part of west Woolgoolga.



Figure 1: Site location

Keiley Hunter Urban Planner
 Newmans Road EA

 Project area



Job Number: PR3278
 Revision: 0
 Author: DJB, KF
 Date: 28/03/2019



GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
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PR2336_MP1_Location_A4

2 Methods

2.1 Literature review

The following information was reviewed:

- previous reports including Bark Hut Road Planning Proposal-Environmental Investigation Report (Ecosure 2016a) and Bark Hut Road Lesser Swamp-orchid (Ecosure 2016b)
- relevant biodiversity databases (i.e. NSW BioNet and the EPBC Act Protected Matters Search) for flora and fauna records
- vegetation community mapping data (OEH 2012a)
- plant community types (OEH 2017) and fine-scale vegetation mapping (OEH 2012b)
- preliminary layout design plan (Appendix 1)
- review of relevant legislation, plans and policies including relevant sections of the CHCC LEP (CHCC 2013) and the Coffs Harbour Comprehensive Koala Plan of Management (CHCC 1999).
- review of Landscape Corridors of the Coffs Harbour Local Government Area (CHCC 2015)
- Northern beaches kangaroo management plan (CHCC 2017)
- Woolgoolga Lake Estuary Coastal Zone Management Plan (GeoLink 2013).

2.2 Flora assessment

Flora surveys were undertaken in the southern precinct on the 3rd November 2017. Sampling of the site involved the “random meander” transect method (Cropper 1993) and targeted sampling within each mapped vegetation community area. Mapped vegetation communities were ground truthed and dominant species within each vegetation patch were assessed and matched to NSW Office of Environment and Heritage (OEH) PCTs. Vegetation was also matched against vegetation community profiles within the *Development of a Fine-scale vegetation map for the Coffs Harbour local government area volume 2: vegetation community profiles* (OEH 2012b).

A GPS enabled digital tablet was used to compare the location of existing mapped ecosystems to the communities occurring in the field. Where differences between mapped and actual ecosystems were observed, the ground truthed communities were mapped and used to produce an updated vegetation communities map. Targeted searches for threatened flora species within each vegetation community were undertaken.

The areas that did not contain native vegetation (i.e. land not included in native vegetation extent) required no further assessment.

2.3 Fauna habitat assessment including modified SAT

Fauna habitat and opportunistic fauna sightings were recorded within and adjacent to the site as follows:

- Opportunistic fauna sightings were recorded throughout the day.
- Targeted assessments for threatened fauna and associated fauna habitat were undertaken with a particular focus on koala feed tree species and hollow-bearing trees.
- Modified SAT surveys were conducted in areas of remnant. For each area, 25 trees were surveyed for a period of two minutes per tree to determine presence/absence of koala scat.
- Populations of the eastern kangaroo (*Macropus giganteus*) were estimated in the southern precinct.

2.4 Bushfire threat analysis

The proposed design layout (Appendix 1) was reviewed to determine potential location of infrastructure including roads and building envelopes. Vegetation and slope were inspected on 25th September to make a preliminary determination of bushfire threat associated with the proposed layout design.

The vegetation assessment associated with this report will be used to inform a comprehensive bushfire report being prepared by Holiday Coast Bushfire Solutions.

3 Results

3.1 Literature review

Various reports, databases, and maps were reviewed to gain an understanding of the characteristics of the site and potential environmental constraints.

Previous reports

Findings from the desktop constraints analysis (Ecosure 2016a) and the targeted survey for the southern swamp-orchid (*Phaius australis*) (Ecosure 2016b) identified the following:

- the majority of the site is considered to be of low ecological value. An area in the north and northwestern part of the southern precinct is considered of high ecological value
- patches of vegetation scattered throughout the southern precinct are considered of medium ecological value
- secondary koala habitat is mapped on the site
- riparian areas and zones of high ecological value should be retained.

A summary of potential environmental constraints was provided and indicated that no high valued habitats have been mapped on the site (Ecosure 2016a) (Table 1).

Table 1 Potential environmental constraints (only those applicable to the site have been included)

Operational Layer	Result		Details
Coffs Harbour City LEP 2013	Natural resource waterways	n/a	Drainage line associated with Poundyard Creek flows to the north of the southern precinct of Lot 20 2DP874273
	Land zoning	RU2	Rural landscape
	Potential Acid Sulphate Soils	Class 3	Southern precinct - northern tip Southern precinct – along northern border
Constraints	Acid Sulphate Soils	Class 5 Class 4	Southern precincts Southern precinct - north western tip
	Koala Habitat	Secondary	Southern precincts contain some patches
	SEPP71 Coastal Policy	yes	Relevant to southern precinct
Bushfire prone mapping	Fire Prone Vegetation Categories	Category 1	Tip of southern precinct
	Fire Prone Vegetation Buffers	100m buffer	Southern precincts
Flooding information	Flood planning area	Yes	Southern precinct – northern tip
	AEP flood extents	Yes	Southern precinct – along northern border
Coffs Harbour Fine Scale Vegetation Mapping	Remnant native vegetation	Yes	Southern precinct (CH_NRV01)
	Wet sclerophyll forests	Yes	Southern precinct (CH_WSF01)

Operational Layer	Result		Details
High Valued Habitats (HVH)	Endangered ecological communities (EECs)	n/a	Likely EECs are mapped to occur within one (1) km of project area however no EEC are mapped to occur within the project area

A targeted survey for the southern swamp-orchid, determined to potentially occur on the site, did not locate the species nor was any potential habitat for the species identified on the site (Ecosure 2016b). Vegetation mapping by OEH identifies three communities within the site (Figure 2).

3.2 NSW BioNet and EPBC Act Protected Matters Searches

A search of NSW BioNet records within 5 km of the site returned 47 species listed as threatened under the *Biodiversity Conservation Act 2016* (BC Act), (Appendix 2). A 5 km *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters search returned 73 threatened species and 51 migratory species (Appendix 3).

The EPBC search also returned three threatened ecological communities (TECs).

As the NSW BioNet search returns actual records of threatened species (while the EPBC Act Protected Matters Search returns all species possibly occurring), only the BioNet records have been included and discussed in relation to their likelihood of occurrence (Table 2 and Table 3). It should be noted that this analysis excludes species found in the ocean (e.g. whale, turtle, etc.) and marine dependent birds. Locations of threatened species records are mapped in Figure 3.



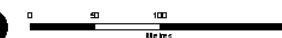
Figure 2: Plant community types (PCT)

Keiley Hunter Urban Planner
Newmans Road EA

Project area
Property boundary



Job Number: P R2836
Revision: 0
Author: DJB
Date: 10/11/2017



GDA 1984 MGA Zone 56
Projection: Transverse Mercator
Datum: GDA 1984
Units: Meter

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Table 2 Likelihood of occurrence of threatened flora species recorded within 5 km of the site

Scientific name	Common name	EPBC Act status	BC Act status	Likelihood of occurrence	Potential site impacts
<i>Hicksbeachia pinnatifolia</i>	red boppel nut	V	V	Unlikely. Occurs in rainforest habitat which is not mapped within the site.	Very minimal, unlikely to occur within development footprint
<i>Macadamia tetraphylla</i>	rough-shelled bush nut	V	V	Unlikely. Occurs in rainforest habitat which is not mapped within the site.	Very minimal, unlikely to occur within development footprint
<i>Marsdenia longiloba</i>	slender marsdenia	V	E	Possible. Associated with vegetation community CH_WSF01 which is mapped to occur within the project area.	Minimal, species likely to occur outside the development footprint
<i>Niemeyera whitei</i>	rusty plum, plum boxwood		V	Possible. Associated with vegetation community CH_WSF01 with a single record to the north of the subject land. Despite this record targeted searches did not find this species.	Minimal, species likely to occur outside the development footprint
<i>Phaius australis</i>	southern swamp orchid	E	E	Possible, but only in flood prone areas of Poundyard Creek. This species has been heavily impacted by illegal collection.	Minimal, not likely to occur within the development footprint.

Key: BC Act: E1 Endangered, P Protected, V Vulnerable

EPBC: E Endangered, V Vulnerable

Table 3 Likelihood of occurrence of threatened fauna species recorded within 5 km of the site

Class	Scientific name	Common name	EPBC Act status	BC Act status	Likelihood of occurrence	Potential site impacts
Amphibia	<i>Mixophyes iteratus</i>	giant barred frog	E	E1	Unlikely Found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Generally associated with deep leaf litter for shelter and foraging.	There are no permanent streams or creeks associated with either the southern precinct so the proposal is very unlikely to have any impact on this frog. Surveys may locate this species in Poundyard Creek but appropriate sediment and erosion control measures will mitigate any impacts on the creek.
Birds	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		E1	Unlikely. More likely associated with estuarine areas further to the east and large dam to the east of the southern precinct. There is a single record east of the southern precinct near the large council dam.	Negligible, there is no suitable habitat available for the black-necked stork.
Birds	<i>Ardea ibis</i>	cattle egret	C,J (migratory)		Possible. Occurs in tropical and temperate grasslands and woodlands which is mapped to occur within project area.	Negligible, there is no suitable habitat available for the cattle egret.
Birds	<i>Hirundapus caudacutus</i>	white-throated needletail	C,J,K		Possible. High flying species occurring in Australia only between late spring and early autumn. The species is unlikely to be recorded perching but may be seen above the subject site.	Negligible, the species is almost exclusively aerial in Australia over a wide range of habitats.
Birds	<i>Stictonetta naevosa</i>	freckled duck		V	Unlikely. More likely associated with estuarine areas further to the east and large dam to the east of the southern precinct.	Negligible, there is no suitable habitat available for the duck in the southern precinct although suitable waterbodies occur to the east of the site.
Birds	<i>Ptilinopus magnificus</i>	wompoo fruit-dove		V	Possible. May occur in wet sclerophyll forest within Poundyard Creek but unlikely to occur within the southern precincts.	Negligible, this dove generally prefers high quality habitat including rainforest, neither of which occurs on site.
Birds	<i>Ixobrychus flavicollis</i>	black bittern		V	Unlikely. More likely associated with estuarine areas further to the east and large dam to the east of the southern precinct.	Negligible, there is no suitable habitat available for the bittern in the southern precinct. Adjoining council land associated with Poundyard Creek may have some suitable habitat.

Class	Scientific name	Common name	EPBC Act status	BC Act status	Likelihood of occurrence	Potential site impacts
Birds	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		V	Likely. Found in coastal habitats and may be flying over the project area.	The sea-eagle may be an itinerant visitor to the subject site as there are known nesting pairs further to the east along the coast, however, there are no large water bodies associated with the site which would provide suitable foraging habitat. Similarly, there are no large tree stags for nesting.
Birds	<i>Lathamus discolor</i>	swift parrot	CE	E	Possible. Occurs on the coast and inhabits dry sclerophyll eucalypt forest which is mapped to occur within project area.	All consolidated areas of remnant vegetation will be retained, limiting any impact on the foraging resources of this parrot.
Birds	<i>Grus rubicunda</i>	brolga		V	Unlikely. Occurs in open grassland habitat including pasture which is mapped to occur within the project area.	Negligible, there is no suitable habitat available for the brolga in the southern precinct although suitable waterbodies occur to the east of the site.
Birds	<i>Irediparra gallinacea</i>	comb-crested jacana		V	Unlikely. More likely associated with estuarine areas further to the east and large dam to the east of the southern precinct.	Negligible, there is no suitable habitat available for the jacana in the southern precinct although suitable waterbodies occur to the east of the site.
Birds	<i>Daphoenositta chrysoptera</i>	varied sittella		V	Possible. Some suitable foraging habitat may be available in the remnant areas associated with the southern and northern precinct.	All consolidated areas of remnant vegetation will be retained within the precinct, limiting any impact on the foraging resources of the sittella.
Birds	<i>Calyptorhynchus lathami</i>	glossy black-cockatoo		V	Possible. Occurs in open woodlands on the coastline and is highly dependent on vegetation where <i>Allocasuarina</i> sp is present, which may occur within the project area.	There are scattered <i>Allocasuarina</i> along the northern boundary of the southern precinct. No consolidated areas of habitat are proposed for removal as part of the development proposal. Additionally all remnant vegetation is proposed to be protected under an E3 zone.

Class	Scientific name	Common name	EPBC Act status	BC Act status	Likelihood of occurrence	Potential site impacts
Birds	<i>Pandion cristatus</i>	eastern osprey		V	Possible. More likely associated with estuarine areas further to the east and large dam to the east of the southern precinct	The osprey may be an itinerant visitor to the subject site as there are known nesting pairs further to the east along the coast, however, there are no large water bodies associated with the site which would provide suitable foraging habitat. Similarly, there are no large tree stags for nesting.
Birds	<i>Ninox strenua</i>	powerful owl		V	Possible. Inhabits a range of vegetation types including woodland and open sclerophyll forest to tall open wet forest (including fragmented landscapes) which is mapped to occur within the project area.	The powerful owl may utilise the site for foraging but there are no hollow-bearing trees suitable for breeding. All consolidated areas of remnant vegetation on the site are proposed to be protected under environmental zoning.
Mammals	<i>Dasyurus maculatus</i>	spotted-tailed quoll	E	V	Possible. As a wide ranging landscape species the quoll could find suitable foraging habitat in the remnant forest located on the southern precinct.	Negligible, no consolidated areas of remnant vegetation are being removed as part of the proposal, however the species is wide ranging and falls in to the landscape species management stream. Quolls are likely to benefit from movement habitat linkages across the local area.
Mammals	<i>Phascolarctos cinereus</i>	koala	V	V	Possible. There is mapped secondary koala habitat mapped across the subject area and three records from vegetation associated with Poundyard Creek.	There are three BioNet records associated with Poundyard Creek, this land is not part of the development footprint and is likely to continue to act as a movement corridor for koalas. All consolidated remnants of native vegetation, including primary koala food trees, are proposed to be protected on the development site under environmental zoning. The planting of primary koala food trees within the indicative habitat linkages, as part of the proposed VMP, will consolidate habitat resources for the koala.

Class	Scientific name	Common name	EPBC Act status	BC Act status	Likelihood of occurrence	Potential site impacts
Mammals	<i>Pteropus poliocephalus</i>	grey-headed flying-fox	V	V	Likely. Occurs in tall open forest and forages in flowering trees of rainforests, eucalypts, paperbarks and banksias which may be present within the project area	May utilise flowering eucalypts and paperbarks on a seasonal basis. A large flying fox camp located further east may increase the chances that habitat in the area is utilised by the grey headed flying fox. All consolidated areas of remnant vegetation on the site are proposed to be retained under environmental zoning.
Mammals	<i>Kerivoula papuensis</i>	golden-tipped bat		V	Recorded from southern precinct. Occurs in dry eucalypt forest and wet sclerophyll forest which is mapped to occur within the project area.	This bat may utilise the site for foraging but all consolidated areas of remnant vegetation on the site are proposed to be retained under environmental zoning.

Key: BC Act: E1 Endangered, V Vulnerable

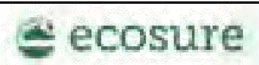
EPBC: CE Critically endangered, E Endangered, V Vulnerable,



Figure 3: Threatened species records (Bionet)

Keiley Hunter Urban Planner
Newmans Road EA

- | | | |
|---------------------------------|---------------------------------|----------------------|
| Project area | Threatened fauna species | Koala |
| Property boundary | Black-necked Stork | Spotted-tailed Quoll |
| Threatened flora species | Freckled Duck | |
| Rusty Plum, Plum Boxwood | Golden-tipped Bat | |



Job Number: PR2836
 Revision: 0
 Author: ALN, DJB
 Date: 24/11/2017

0 50 100 200
 Metres

GDA 1994 MGA Zone 56
 Projection: Transverse Mercator
 Datum: GDA 1994
 Units: Metre

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3.3 Flora assessment

Appendix 4 lists flora species identified during field surveys. No threatened species were recorded. Ground-truthing of the PCT boundaries was confirmed to be correct and the PCTs matched the NSW BioNet Vegetation Classification, see Figure 2. These vegetation communities are also confirmed against the equivalent LGA fine-scale vegetation mapping (OEH 2012a).

3.3.1 Threatened flora

The desktop assessment identified five threatened flora species within 5 km of the site. A site survey targeting the southern swamp-orchid (*Phaius australis*), listed as endangered under both the EPBC Act and the 2016 BC Act, did not locate this species (Ecosure 2016b).

There is a single rusty plum record to the north of the subject land, although this appears to be erroneous as the coordinates place the record in the middle of long since cleared area. Targeted searches did not locate this species in nearby remnant vegetation or anywhere else across the subject site.

Similarly, targeted searches did not detect the other three threatened flora species returned in the 5km BioNet search including slender marsdenia, red boppel nut and rough-shelled bush nut.



Plate 1. Remnant vegetation associated with biolink looking east towards dam



Plate 2. Example of isolated paddock tree (*Lophostemon confertus*)

3.3.1 Endangered ecological communities

The EPBC Act Protected Matters Search identified three listed TECs as likely to occur within the area. These are:

- Littoral Rainforest and Coastal Vine Thickets of Eastern Australia TEC listed as critically endangered under the EBPC Act. This community is analogous to Littoral Rainforest in the South East Corner, Sydney Basin and NSW North Coast Bioregions which is listed as a TEC under the BC Act.
- Lowland Rainforest of Subtropical Australia TEC listed as critically endangered under the EBPC Act. This community is analogous to Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions which is listed as a TEC under the BC Act.
- Subtropical and Temperate Coastal Saltmarsh TEC listed as vulnerable under the EPBC Act. This community is analogous to Coastal saltmarsh in the NSW North Coast, Sydney Basin and South East Corner bioregions which is listed as a TEC under the BC Act.

Ground truthing did not detect any of the EPBC Act listed TECs.

3.4 Fauna habitat assessment and modified SAT

Appendix 5 lists fauna species identified by timed bird surveys and opportunistic sightings. Forty-seven species of bird and one mammal (Eastern grey kangaroo) were observed. No threatened species were recorded.

The site does provide marginal habitat as part of a larger connected network of linear vegetated strips across the local landscape. Given the site's proximity to urban development and that the majority of the site is cleared, the fauna habitat present is low to medium.

There are some isolated patches of brushbox (*Lophostemon confertus*) and tallowwood (*Eucalyptus microcorys*) in the southern end of the southern precinct which are less than 80 years old. There are two much larger brushbox that may exceed 150 years old but neither is currently hollow-bearing. Portions of the northern end of this lot are being invaded by wilding slash pine (Plate 3). There are no large diameter hollow-bearing trees associated with this precinct. The remainder of the site is dominated by exotic grasses and perennial weeds perpetuated by regular slashing of the site.



Plate 3. Young slash pine forest associated with the southern precinct

Comprehensive Koala Plan of Management (CKPoM)

The southern precinct contains secondary koala habitat along the northern boundary which is associated with riparian vegetation along Poundyard Creek. There is no other koala habitat mapping associated with the southern precinct, see Figure 4.

Primary and secondary koala feed trees were surveyed including areas mapped as secondary koala habitat under Councils CKPoM (Lunney et al. 1999). No koalas were sighted or distinctive scats found on the site based on the modified SAT assessment of 25 trees within the southern precinct.

While there are no koala records associated with the subject area, there are three NSW BioNet records located close to Poundyard Creek where council owned land adjoins the site at its northern extremity, Figure 4. These koala records are quite old having been observed between 2004 – 2006 as part of a community wildlife survey, Figure 4. It is reasonable to assume that koalas use this riparian corridor to move across the landscape. There are also primary koala food trees including *Eucalyptus tereticornis* and *Eucalyptus grandis*, located within this riparian corridor.

The proposed development will not remove any secondary koala habitat or remove any of the primary koala food tree species including tallowwood (*Eucalyptus microcorys*), swamp mahogany (*E. robusta*), flooded gum (*E. grandis*), forest red gum (*E. tereticornis*), or small-fruited grey gum (*E. propinqua*).

Retention of all the large remnant areas of native vegetation will ensure the development will not destroy, damage or compromise the values of the land as koala habitat.

The proposal will not result in significant barriers being established to koala movement by ensuring habitat linkages are enhanced through implementation of a VMP to improve the habitat availability for koalas where appropriate. A proposed biolink through the centre of the site will provide an important movement corridor between vegetation located on the eastern and western side of the subject land. The biolink also contains semi-mature eucalypts that will be protected as part of this planning proposal.

Additionally, boundary fencing will not prevent the free movement of koalas, although it may be necessary to erect exclusion fencing to prevent koalas from entering areas where there is high usage by people, vehicles and dogs.

New local roads will be designed to reduce traffic speed to 40 kph where roads cross identified wildlife corridor areas. It may be necessary to exclude all dogs from areas set aside for wildlife corridor management.

Kangaroo assessment

Eastern grey kangaroo counts across the southern precinct returned 45 individuals. Council owned land to the north of the southern precinct is the subject of ongoing construction for the purposes of sporting fields. That area contains a large resident population of approximately 145 kangaroos. At the time of the site assessment, this large mob was taking advantage of





the new growth associated with the fields. Based on diurnal and evening surveys kangaroos are resting in the peripheral shaded areas during the hottest part of the day and browsing on the more open areas during the morning, late afternoon and evening. A number of kangaroo carcasses were located during the survey suggesting wild dogs or dingoes are having some impact on the local population.

Subdivision design will need to incorporate a number of the key objectives of the Coffs Harbour Kangaroo Management Plan to ensure the welfare of both kangaroos and future residents (CHCC 2017).



Figure 4: Mapped koala habitat

Keiley Hunter Urban Planner
Newmans Road EA

-  Koala (Bionet record)
-  Tertiary koala habitat
-  Secondary koala habitat
-  Project area



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 Date: 25/05/2016



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3.5 Bushfire threat analysis

It is anticipated that an Asset Protection Zone (APZ) will be required where proposed dwellings adjoin areas of consolidated dry sclerophyll forest, particularly along the northern boundary of the southern precinct. Holiday Coast Bushfire Solutions will determine the requisite distances based on the plant community type, structure and slope and target Bushfire Attack Level (BAL).

APZs will generally be excluded from extending in to remnant native vegetation. However, there may be circumstances where the Outer Protection Area (OPA) of an APZ will impinge in to proposed E3 zones.

3.6 Woolgoolga Lake Estuary Coastal Zone Management Plan

The Coastal Zone Management Plan (CZMP) recognises that new developments have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls are placed on this new development to ensure no negative net impact upon water quality. This includes stormwater management (treatment and detention) of a standard that will not impact on Poundyard Creek or the Woolgoolga Lake Estuary. Stormwater management and pollutant inputs from the catchment was the second highest ranked issue identified in the CZMP.

Water quality also has the potential to impact on a range of terrestrial and aquatic threatened fauna including some of the threatened entities identified in Table 3.

4 Discussion

Areas of ecological value that are proposed to be retained and zoned as E3 – Environmental Management are shown in Figure 5. Indicative wildlife linkages are also shown to demonstrate the major pathways for wildlife through the landscape both along Poundyard Creek and through the centre of the site using existing mature vegetation as a biolink.

The natural values of the southern precinct include scattered brushbox, turpentine and a few large diameter tallowwoods. There are no large diameter hollow-bearing trees associated with the site although some of the larger diameter trees are likely to become hollow in future decades. There are some fringes of wet sclerophyll forest mapped as secondary koala habitat along the northern boundary that link with riparian vegetation associated with Poundyard Creek. Some infill planting of this area would further consolidate this vegetation and enhance ecological buffering of the creek.

A large council owned water storage south-east of the southern precinct has a number of NSW BioNet threatened species records of wetland fauna.




The rest of the site is dominated by exotic grassland and invasive shrubs and trees including large areas of establishing wildling slash pine. There are opportunities to retain individual eucalypts and a larger patch of remnant vegetation (approximately 500 m²) of eucalypts located across the central portion of the site as a biolink. This patch of remnant vegetation could become a more passive community based area for the benefit of local residents.

The thin area of mapped secondary koala habitat along the northern boundary will be retained and rehabilitated under a VMP to better consolidate riparian vegetation associated with Poundyard Creek. Protection of this vegetated link is important given it is likely to act as a movement corridor for koalas across the landscape. There are also three historical koala records from this area in NSW BioNet.



Figure 5: Proposed environmental zoning and indicative biolink

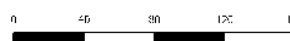
Keiley Hunter Urban Planner
Newmans Road EA

-  Site boundary (Part lot 202 DP874273)
-  Proposed E3 Environmental management
-  50m biolink

Note – there may be spatial misalignment between lot boundaries and underlying imagery



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Revision: 0
Author: JLY
Date: 23/09/2018



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5 Recommendations

The following actions are recommended for the future development of the site:

1. Retain as much remnant native vegetation on-site as possible, including all mapped secondary koala habitat and ensure that proposed APZs do not impinge on these areas where possible (see Figure 5).
2. Conduct additional flora and fauna surveys to account for seasonal variations (and investigate presence of frogs), targeting species that have been determined to possibly occur on the site (Table 3).
3. Consider the development proposal's impact on eastern grey kangaroos, particularly within the context of the Council sports fields being developed to the north of the southern precinct which will increase the availability of food resources.
4. Where possible, link remnant vegetation of the site to other extant vegetation across the landscape to provide suitable movement pathways for wildlife. For the subject area this should include a network of E3 zoned areas in appropriate locations (Figure 5).
5. Retain individual eucalypts and a larger patch of remnant vegetation (approximately 500m²) of eucalypts as a biolink, establishing a connection between vegetation on the eastern and western sides of the subject land. The area can also be used for passive community based recreation for the benefit of local residents.
6. Prepare a Comprehensive Vegetation Management Plan (VMP) in accordance with CHCC's requirements to increase habitat value. The comprehensive VMP should give specific consideration to:
 - enhancement of proposed E3 zoned areas under CHCC's LEP
 - linking areas of remnant vegetation by identifying habitat linkages and 'gap filling' as required including the northern boundary of the southern precinct.
7. Conduct a detailed impact assessment that shows the extent of vegetation that will be removed / retained when the final concept design is developed and submitted under a Development Application to Council.
8. Given the subject lands proximity to Woolgoolga Lake and the Solitary Islands Marine Park, effective sediment and erosion controls should be employed during any future construction works. A management plan is recommended to prevent, mitigate and ameliorate the impacts of sediment runoff.
9. Implement the key objectives of the Coffs Harbour Kangaroo Management Plan to establish a strategic approach to maintain wild populations of eastern grey kangaroo while managing the social, economic and ecological impacts to ensure their welfare.
10. Implement a Storm Water Management Plan (including artificial wetlands if required) to reduce nutrients and sediments from reaching the surrounding areas. This is also recommended in the Woolgoolga Lake Estuary Coastal Zone Management Plan.

11. Limit the impact of APZs on remnant vegetation ensuring only Outer Protection Areas (OPA) impinge in to proposed E3 zoned areas
12. Utilise local native landscaping for future development (including any revegetation works), sourcing seed where possible from surrounding vegetation.

6 Conclusion

The southern precinct associated with the planning proposal has had a long history of agricultural use including extensive grazing. More recently these areas have been maintained as grassland, predominately exotic, by slashing. The southern precinct, if left undisturbed, would eventually revert to a mature slash pine forest as there are many 'wildings' currently dominating the site.

No large diameter hollow-bearing trees were located during the field assessment, suggesting that the site has been successively logged over the last 150 years. The majority of remnant vegetation is young eucalypt forest dominated by blackbutt and interspersed with other eucalypt species. This has limited the habitat value of the vegetation for a range of arboreal wildlife such as microbats, gliders, quolls, phascogales and large forest owls.

The current field assessment did not detect any threatened flora or fauna species on the site at the time of the survey. The author is unsure whether the spatial records are inaccurate or whether the individual plants have been collected (i.e. Southern swamp orchid), or perished as a result of grazing, slashing, clearing, fungal attack or drought.

The NSW Bionet records indicate that the site, and its surrounds, are utilised by a range of threatened fauna species on a seasonal basis. Further seasonal surveys for some fauna species are required.

The planning proposal will need to give consideration to the very large population of eastern grey kangaroos currently inhabiting the subject area and surrounds (including the proposed council sports fields). Based on estimates, the population currently numbers approximately 300 individuals which will be severely compromised by a large lot subdivision and formal sports fields.

This report recommends a biolink to connect linear remnants of vegetation across the broader landscape using riparian vegetation along Poundyard Creek as a focal point (Figure 5). The proposed re-zoning of the best consolidated patches of remnant vegetation under E3 – Environmental Management is important to consolidate the long term protection of habitat. This is one of the objectives under CHCC's Development Control Plan 2015 (E1.2 compensatory requirements) 'to protect and maintain important linkages between habitats'.

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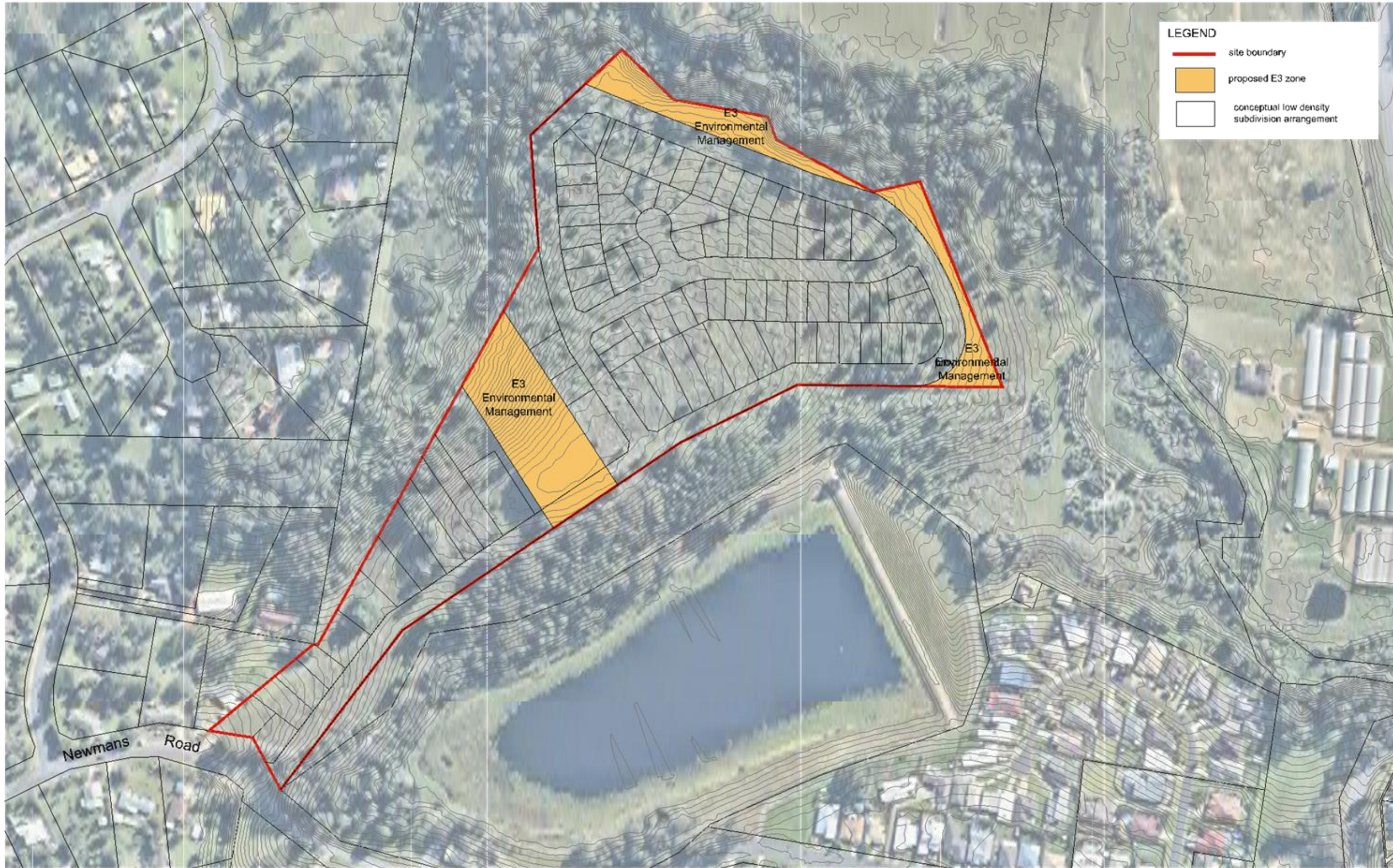
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Appendix 1 Preliminary concept design



LEGEND

- site boundary
- proposed E3 zone
- conceptual low density subdivision arrangement

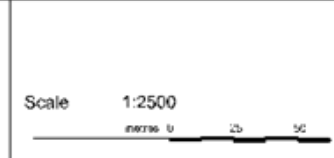
Use figures & annotations in accordance to scale.
 Please refer to the Landscape Architect or other
 professional if any and only to those between
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 than the intended user.

Issue	Date	Details	Initial
A	25.7.18	Client review	JA
B	11.8.18	Approved the Final Planning Zoning	JA
C	11.8.18	Approved the Final Planning Zoning	JA
D	27.10	All zones added	JA
E	11.9.18	Planning proposal	JA

PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL
CLIENT Keiley Hunter Urban Planner

DRAWING Planning Proposal Proposed Subdivision Layout Newmans Rd
DRAWING NO. 1730-06

DRAWN JA	ISSUE E
DATE September 2018	



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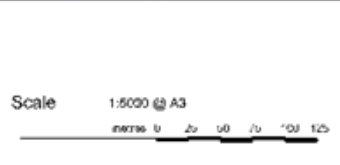
The figures contained in this drawing are for information only. The client is responsible for the accuracy of the data provided. The drawing is not to be used for any purpose other than that for which it was prepared or by any person or corporation other than the client.

Issue	Date	Description	Initials
A	22/7/18	Client review	JA
B	11/9/18	Permitting, propose	JA

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PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL	DRAWING Planning Proposal Site Context	DRAWN JA	ISSUE B
CLIENT Keiley Hunter Urban Planner	DRAWING NO. 1730-01	DATE September 2018	

PROJECT Bark Hut Road, Woolgoolga PLANNING PROPOSAL	DRAWING Planning Proposal Site Context	DRAWN JA	ISSUE B
CLIENT Keiley Hunter Urban Planner	DRAWING NO. 1730-01	DATE September 2018	



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Appendix 2 BioNet search

Class name	Family name	Scientific name	Common name	NSW Status	Comm Status
Frogs	Myobatrachidae	<i>Mixophyes iteratus</i>	Giant Barred Frog	E1,2	E
Birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1	not listed
	Psittacidae	<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE
	Ardeidae	<i>Ardea ibis</i>	Cattle Egret	not listed	C,J
	Apodidae	<i>Hirundapus caudacutus</i>	White-throated Needletail	not listed	C,J,K
	Anatidae	<i>Stictonetta naevosa</i>	Freckled Duck	V	not listed
	Columbidae	<i>Ptilinopus magnificus</i>	Wompoo Fruit-Dove	V	not listed
	Ardeidae	<i>Ixobrychus flavicollis</i>	Black Bittern	V	not listed
	Gruidae	<i>Grus rubicunda</i>	Brolga	V	not listed
	Jacaniidae	<i>Irediparra gallinacea</i>	Comb-crested Jacana	V	not listed
	Neosittidae	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	not listed
Accipitridae	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	C	
Cacatuidae	<i>Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,2	not listed	
Accipitridae	<i>Pandion cristatus</i>	Eastern Osprey	V,3	not listed	
Strigidae	<i>Ninox strenua</i>	Powerful Owl	V,3	not listed	
Mammals	Dasyuridae	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E
	Phascolarctidae	<i>Phascolarctos cinereus</i>	Koala	V	V
	Pteropodidae	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V
	Vespertilionidae	<i>Kerivoula papuensis</i>	Golden-tipped Bat	V	not listed
Flora	Apocynaceae	<i>Marsdenia longiloba</i>	Slender Marsdenia	E1	V
	Orchidaceae	<i>Phaius australis</i>	Southern Swamp Orchid	E1,2	E
	Sapotaceae	<i>Niemeyera whitei</i>	Rusty Plum, Plum Boxwood	V	not listed
	Proteaceae	<i>Hicksbeachia pinnatifolia</i>	Red Boppel Nut	V	V
	Proteaceae	<i>Macadamia tetraphylla</i>	Rough-shelled Bush Nut	V	V

TSA: E1 Endangered, P Protected, V Vulnerable, 2 Category 2 sensitive species, 3 Category 3 sensitive species

EPBC: CE Critically endangered, E Endangered, V Vulnerable

Appendix 3 EPBC protected matters search results



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/09/17 10:51:00

[Summary](#)

[Details](#)

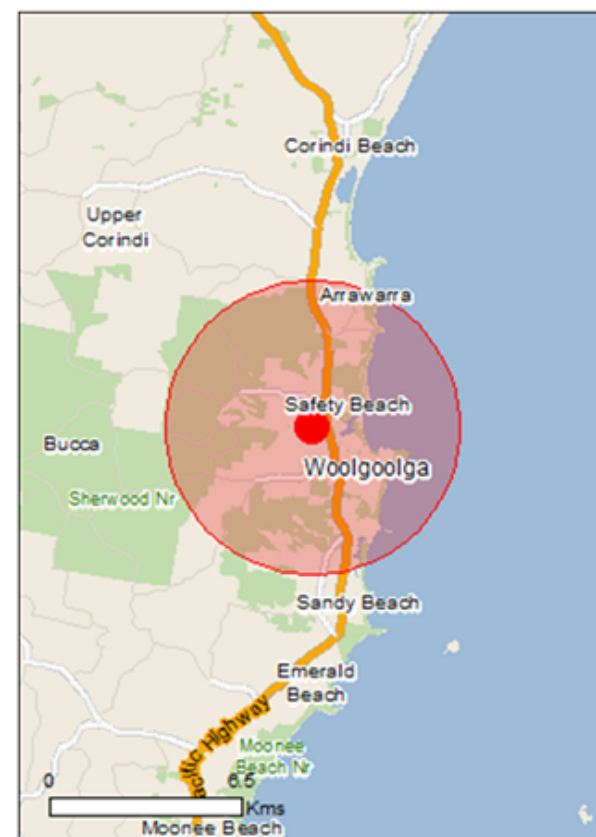
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

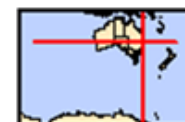
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	73
Listed Migratory Species:	51

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	89
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	5
Regional Forest Agreements:	1
Invasive Species:	41
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat likely to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
Dasyornis brachypterus Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely

Name	Status	Type of Presence
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	to occur within area Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat may occur within area
Fish		
Epinephelus daemeli Black Rockcod, Black Cod, Saddled Rockcod [68449]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria aurea Green and Golden Bell Frog [1870]	Vulnerable	Species or species habitat may occur within area
Litoria olongburensis Wallum Sedge Frog [1821]	Vulnerable	Species or species habitat likely to occur within area
Mixophyes iteratus Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat known to occur within area
Insects		
Argynnis hyperbius inconstans Australian Fritillary [88056]	Critically Endangered	Species or species habitat may occur within area
Phyllodes imperialis smithersi Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Petrogale penicillata Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pseudomys novaehollandiae New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Allocasuarina defungens Dwarf Heath Casuarina [21924]	Endangered	Species or species habitat known to occur within area
Allocasuarina thalassoscopica [21927]	Endangered	Species or species habitat known to occur within area
Arthraxon hispidus Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
Boronia umbellata Orara Boronia [56301]	Vulnerable	Species or species habitat likely to occur within area
Cryptostylis hunteriana Leafless Tongue-orchid [19533]	Vulnerable	Species or species habitat may occur within area
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat likely to occur within area
Hicksbeachia pinnatifolia Monkey Nut, Bopple Nut, Red Bopple, Red Bopple Nut, Red Nut, Beef Nut, Red Apple Nut, Red Bopple Nut, Ivory Silky Oak [21189]	Vulnerable	Species or species habitat known to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat may occur within area
Macadamia tetraphylla Rough-shelled Bush Nut, Macadamia Nut, Rough-shelled Macadamia, Rough-leaved Queensland Nut [6581]	Vulnerable	Species or species habitat known to occur within area
Marsdenia longiloba Clear Milkvine [2794]	Vulnerable	Species or species habitat likely to occur within area
Parsonsia dorrigoensis Milky Silkpod [64684]	Endangered	Species or species habitat likely to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat known to occur within area
Samadera sp. Moonee Creek (J.King s.n. Nov. 1949) [86885]	Endangered	Species or species habitat likely to occur within area
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Tylophora woollsii [20503]	Endangered	Species or species habitat likely to occur within area
Zieria prostrata Headland Zieria [56782]	Endangered	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Sharks		
Carcharias taurus (east coast population) Grey Nurse Shark (east coast population) [68751]	Critically Endangered	Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species **[Resource Information]**

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore		Species or species

Name	Threatened	Type of Presence
Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994] Manta birostris		habitat known to occur within area
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995] Megaptera novaeangliae		Species or species habitat may occur within area
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
 Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
 Orcinus orca		
Killer Whale, Orca [46]		Species or species habitat may occur within area
 Rhincodon typus		
Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
 Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Cuculus optatus		
Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
 Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat known to occur within area
 Monarcha melanopsis		
Black-faced Monarch [609]		Species or species habitat known to occur within area
 Monarcha trivirgatus		
Spectacled Monarch [610]		Species or species habitat known to occur within area
 Myiagra cyanoleuca		
Satin Flycatcher [612]		Breeding known to occur within area
 Rhipidura rufifrons		
Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos		
Common Sandpiper [59309]		Species or species habitat known to occur within area
 Calidris acuminata		
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
 Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
 Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area
 Calidris melanotos		
Pectoral Sandpiper [858]		Species or species habitat may occur within area
 Gallinago hardwickii		
Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may

Name	Threatened	Type of Presence
Gallinago megala Swinhoe's Snipe [864]		occur within area Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Commonwealth Land - Australian Telecommunications Commission

Listed Marine Species [[Resource Information](#)]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species

Name	Threatened	Type of Presence
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	habitat known to occur within area Species or species habitat likely to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calonectris leucomelas Streaked Shearwater [1077]		Species or species habitat may occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Cuculus saturatus Oriental Cuckoo, Himalayan Cuckoo [710]		Species or species habitat may occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Foraging, feeding or related behaviour may occur within area
Gallinago megala Swinhoe's Snipe [864]		Foraging, feeding or related behaviour likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Foraging, feeding or related behaviour likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur

Name	Threatened	Type of Presence within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Foraging, feeding or related behaviour likely to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phoebastria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Species or species habitat may occur within area
Thalassarche eremita Chatham Albatross [64457]	Endangered	Species or species

Name	Threatened	Type of Presence
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	habitat may occur within area Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus kelloggi Kellogg's Seahorse, Great Seahorse [66723]		Species or species habitat may occur within area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species

Name	Threatened	Type of Presence
Hippocampus planifrons Flat-face Seahorse [66238]		habitat may occur within area Species or species habitat may occur within area
Hippocampus trimaculatus Three-spot Seahorse, Low-crowned Seahorse, Flat-faced Seahorse [66720]		Species or species habitat may occur within area
Hippocampus whitei White's Seahorse, Crowned Seahorse, Sydney Seahorse [66240]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Microphis manadensis Manado Pipefish, Manado River Pipefish [66258]		Species or species habitat may occur within area
Solegnathus dunckeri Duncker's Pipehorse [66271]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solegnathus spinosissimus Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paegnius Rough-snout Ghost Pipefish [68425]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within

Name	Threatened	Type of Presence area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat may occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Breeding known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Species or species habitat known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Species or species habitat known to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding likely to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area
Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat likely to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area

Name	Status	Type of Presence
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Coffs Coast	NSW
Forestry Management Areas in Coffs Harbour	NSW
Garby	NSW
Sherwood	NSW
UNE Special Management Zone No1	NSW

Regional Forest Agreements	[Resource Information]
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Note that all areas with completed RFAs have been included.

Name	State
North East NSW RFA	New South Wales

Invasive Species	[Resource Information]
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Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resources Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
<i>Pycnonotus jocosus</i> Red-whiskered Bulbul [631]		Species or species habitat likely to occur within area
<i>Streptopelia chinensis</i> Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur within area
<i>Turdus merula</i> Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Frogs		
<i>Rhinella marina</i> Cane Toad [83218]		Species or species habitat likely to occur within area
Mammals		
<i>Bos taurus</i> Domestic Cattle [16]		Species or species habitat likely to occur within area
<i>Canis lupus familiaris</i> Domestic Dog [82654]		Species or species habitat likely to occur within area
<i>Felis catus</i> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
<i>Lepus capensis</i> Brown Hare [127]		Species or species habitat likely to occur within area
<i>Mus musculus</i> House Mouse [120]		Species or species habitat likely to occur within area
<i>Oryctolagus cuniculus</i> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<i>Rattus norvegicus</i> Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
<i>Rattus rattus</i> Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
<i>Sus scrofa</i> Pig [6]		Species or species habitat likely to occur within area
<i>Vulpes vulpes</i> Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
<i>Alternanthera philoxeroides</i> Alligator Weed [11620]		Species or species habitat likely to occur within area
<i>Anredera cordifolia</i> Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine,		Species or species

Name	Status	Type of Presence
Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643] Asparagus aethiopicus		habitat likely to occur within area
Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] Asparagus plumosus		Species or species habitat likely to occur within area
Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] Chrysanthemoides monilifera		Species or species habitat likely to occur within area
Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] Pinus radiata		Species or species habitat likely to occur within area
Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Protasparagus densiflorus Asparagus Fern, Plume Asparagus [5015]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Reptiles		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-30.1027 153.18391

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [-Office of Environment and Heritage, New South Wales](#)
- [-Department of Environment and Primary Industries, Victoria](#)
- [-Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [-Department of Environment, Water and Natural Resources, South Australia](#)
- [-Department of Land and Resource Management, Northern Territory](#)
- [-Department of Environmental and Heritage Protection, Queensland](#)
- [-Department of Parks and Wildlife, Western Australia](#)
- [-Environment and Planning Directorate, ACT](#)
- [-Birdlife Australia](#)
- [-Australian Bird and Bat Banding Scheme](#)
- [-Australian National Wildlife Collection](#)
- [-Natural history museums of Australia](#)
- [-Museum Victoria](#)
- [-Australian Museum](#)
- [-South Australian Museum](#)
- [-Queensland Museum](#)
- [-Online Zoological Collections of Australian Museums](#)
- [-Queensland Herbarium](#)
- [-National Herbarium of NSW](#)
- [-Royal Botanic Gardens and National Herbarium of Victoria](#)
- [-Tasmanian Herbarium](#)
- [-State Herbarium of South Australia](#)
- [-Northern Territory Herbarium](#)
- [-Western Australian Herbarium](#)
- [-Australian National Herbarium, Canberra](#)
- [-University of New England](#)
- [-Ocean Biogeographic Information System](#)
- [-Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [-Geoscience Australia](#)
- [-CSIRO](#)
- [-Australian Tropical Herbarium, Cairns](#)
- [-eBird Australia](#)
- [-Australian Government – Australian Antarctic Data Centre](#)
- [-Museum and Art Gallery of the Northern Territory](#)
- [-Australian Government National Environmental Science Program](#)
- [-Australian Institute of Marine Science](#)
- [-Reef Life Survey Australia](#)
- [-American Museum of Natural History](#)
- [-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [-Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

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Appendix 4 Flora survey results

Family name	Scientific name	Common name	Exotic
Apiaceae	<i>Hydrocotyle bonariensis</i>	Largeleaf Pennywork	*
Apocynaceae	<i>Araujia sericifera</i>	Moth vine	*
	<i>Asclepias curassavica</i>	Milkweed	*
	<i>Gomphocarpus physocarpus</i>	Balloon Cotton Bush	*
	<i>Parsonsia straminea</i>	Common Silkpod	
Araliaceae	<i>Polyscias sambucifolia</i>	Elderberry Panax	
	<i>Schefflera actinophylla</i>	Umbrella tree	*
Asparagaceae	<i>Asparagus aethiopicus</i>	Asparagus Fern	*
Asteraceae	<i>Ageratum conyzoides</i>	Blue billygoat weed	*
	<i>Ageratum houstonianum</i>	Whiskey grass	*
	<i>Baccharis halimifolia</i>	Groundsel Bush	*
	<i>Bidens pilosa</i>	Cobbler's Pegs	*
	<i>Chrysanthemoides monilifera subsp. rotundata</i>	Bitou Bush	*
	<i>Cirsium vulgare</i>	Spear Thistle	*
	<i>Ozothamnus diosmifolius</i>	White Dogwood	
	<i>Senecio madagascariensis</i>	Fireweed	*
	<i>Tagetes minuta</i>	Stinking roger	*
Blechnaceae	<i>Blechnum cartilagineum</i>	Gristle Fern	
Casuarinaceae	<i>Allocasuarina torulosa</i>	Forest Oak	
Convolvulaceae	<i>Convolvulus erubescens</i>	Australian Bindweed	
	<i>Ipomoea cairica</i>	Mile-a-minute	*
Cupressaceae	<i>Callitris rhomboidea</i>	Port Jackson Pine	
Curcubitaceae	<i>Cucumis zeyheri</i>	South African spiny cucumber	*
Cyatheaceae	<i>Cyathea australis</i>	Rough Treefern	
Cyperaceae	<i>Baumea juncea</i>	Bare twigrush	
	<i>Baumea teretifolia</i>	Common twig rush	
Dennstaedtiaceae	<i>Pteridium esculentum</i>	Bracken	

Family name	Scientific name	Common name	Exotic
e			
Dilleniaceae	<i>Hibbertia scandens</i>	Climbing Guinea Flower	
Ericaceae	<i>Leucopogon pimeleoides</i>	Beard heath	
	<i>Trochocarpa laurina</i>	Tree Heath	
Escalloniaceae	<i>Cuttisia viburnea</i>	Elderberry	
Fabaceae	<i>Chorizema parviflorum</i>	Eastern Flame Pea	
	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea	
	<i>Jacksonia scoparia</i>	Dogwood	
	<i>Kennedia rubicunda</i>	Dusky Coral-pea	
	<i>Senna pendula var. glabrata</i>	Winter Senna	*
	<i>Pultenaea retusa</i>	Notchedbush pea	
	<i>Acacia irrorata</i> <i>Acacia melanoxylon</i>	Green Wattle Blackwood	
Goodeniaceae	<i>Goodenia rotundifolia</i>	Round-leaved Goodenia	
Juncaceae	<i>Juncus usitatus</i>	Common rush	
Lauraceae	<i>Cinnamomum camphora</i>	Camphor Laurel	*
Lindsaeaceae	<i>Lindsaea microphylla</i>	Wedge fern	
Lomandraceae	<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	
Luzuriagaceae	<i>Eustrephus latifolius</i>	Wombat Berry	
	<i>Geitonoplesium cymosum</i>	Scrambling Lily	
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	*
Menispermaceae	<i>Stephania japonica var. discolor</i>	Snake Vine	
Moraceae	<i>Ficus watkinsiana</i>	Strangling Fig	
Myrtaceae	<i>Corymbia intermedia</i>	Pink Bloodwood	
	<i>Eucalyptus eugonoides</i>	Thin-leaved stringbark	
	<i>Eucalyptus microcorys</i>	Tallowwood	
	<i>Eucalyptus pilularis</i>	Blackbutt	
	<i>Eucalyptus propinqua</i> <i>Eucalyptus siderophloia</i>	Small-fruited Grey Gum Grey Ironbark	

Family name	Scientific name	Common name	Exotic
	<i>Eucalyptus tereticornis</i>	Forest Red Gum	
	<i>Lophostemon confertus</i>	Brush Box	
	<i>Lophostemon suaveolens</i>	Swamp Mahogany, Swamp Turpentine	
	<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark	
	<i>Syncarpia glomulifera</i>	Turpentine	
Ochnaceae	<i>Ochna serrulata</i>	Mickey Mouse Plant	*
Oleaceae	<i>Notelaea longifolia</i>	Large Mock-olive	
	<i>Notelaea venosa</i>	Veined Mock-olive	
Orchidaceae	<i>Dipodium punctatum</i>	Blotched Hyacinth Orchid	
	<i>Spiranthes sinensis</i>	Chinese sinensis	
Passifloraceae	<i>Passiflora spp.</i>		*
	<i>Passiflora suberosa</i>	Cork Passionfruit	*
	<i>Passiflora subpeltata</i>	White Passionflower	*
Philydraceae	<i>Philydrum lanuginosum</i>	Woolly Frogmouth	
Phormiaceae	<i>Dianella caerulea</i>	Blue Flax-lily	
Phyllanthaceae	<i>Breynia oblongifolia</i>	Coffee Bush	
	<i>Glochidion ferdinandi</i>	Cheese Tree	
Pinaceae	<i>Pinus elliotii</i>	Slash pine	*
Pittosporaceae	<i>Billardiera scandens</i>	Hairy Apple Berry	
	<i>Pittosporum undulatum</i>	Sweet Pittosporum	
Poaceae	<i>Andropogon virginicus</i>	Whisky Grass	*
	<i>Axonopus fissifolius</i>	Narrow-leafed Carpet Grass	*
	<i>Chloris gayana</i>	Rhodes Grass	*
	<i>Cymbopogon refractus</i>	Barbed wire grass	
	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	
	<i>Imperata cylindrica</i>	Blady Grass	
	<i>Oplismenus aemulus</i>	Basket grass	
	<i>Paspalum mandiocanum</i>	Broadleaf Paspalum	*
	<i>Paspalum urvillei</i>	Vasey Grass	*

Family name	Scientific name	Common name	Exotic
	<i>Pennisetum clandestinum</i>	Kikuyu Grass	*
	<i>Setaria sphacelata</i>	South African Pigeon Grass	*
	<i>Themeda triandra</i>	Kangaroo grass	
Polygonaceae	<i>Persicaria spp.</i>	Knotweed	*
Proteaceae	<i>Grevillea robusta</i>	Silky Oak	*
	<i>Persoonia stradbrogensis</i>	Geebung	
Rubiaceae	<i>Psychotria loniceroides</i>	Hairy Psychotria	
Rutaceae	<i>Citrus limon</i>	Bush Lemon	*
Sapindaceae	<i>Cupaniopsis anacardioides</i>	Tuckeroo	
	<i>Jagera pseudorhus var. pseudorhus</i>	Foambark Tree	
Scrophulariaceae	<i>Digitalis purpurea</i>	Foxglove	*
Solanaceae	<i>Solanum mauritianum</i>	Wild Tobacco Bush	*
Stackhousiaceae	<i>Stackhousia viminea</i>	Slender stachousia	
Thymelaeaceae	<i>Pimelia latifolia subsp. altior</i>	Broad-leaved Riceflower	
Verbenaceae	<i>Lantana camara</i>	Lantana	*
	<i>Verbena bonariensis</i>	Purpletop	*
Vitaceae	<i>Cissus antarctica</i>	Water Vine	
	<i>Cissus hypoglauca</i>	Giant Water Vine	

Appendix 5 Fauna survey results

Class name	Scientific name	Common name
Frogs	<i>Litoria fallax</i>	Eastern Dwarf Tree Frog
Birds	<i>Accipiter novaehollandiae</i>	Grey Goshawk
	<i>Acrocephalus australis</i>	Australian Reed Warbler
	<i>Calyptorhynchus funereus</i>	Yellow-tailed Black-Cockatoo
	<i>Coracina tenuirostris</i>	Cicadabird
	<i>Corvus tasmanicus</i>	Forest Raven
	<i>Dacelo novaeguineae</i>	Laughing Kookaburra
	<i>Eopsaltria australis</i>	Eastern Yellow Robin
	<i>Eudynamys orientalis</i>	Eastern Koel
	<i>Eurystomus orientalis</i>	Dollarbird
	<i>Haliastur sphenurus</i>	Whistling Kite
	<i>Hirundo neoxena</i>	Welcome Swallow
	<i>Lopholaimus antarctica</i>	Topknot pigeon
	<i>Malurus cyaneus</i>	Superb Fairy-wren
	<i>Malurus melanocephalus</i>	Red-backed Fairy-wren
	<i>Manorina melanocephala</i>	Noisy Miner
	<i>Meliphaga lewinii</i>	Lewin's Honeyeater
	<i>Merops ornatus</i>	Rainbow Bee-eater
	<i>Neochmia temporalis</i>	Red-browed Finch
	<i>Philemon citreogularis</i>	Little Friarbird
	<i>Psophodes olivaceus</i>	Eastern Whipbird
<i>Rhipidura albiscapa</i>	Grey Fantail	
<i>Strepera graculina</i>	Pied Currawong	
<i>Todiramphus sanctus</i>	Sacred Kingfisher	
<i>Trichoglossus haematodus</i>	Rainbow Lorikeet	
<i>Zosterops lateralis</i>	Silvereye	
Mammals	<i>Canis lupus</i>	Dingo, domestic dog

Class name	Scientific name	Common name
	<i>Macropus giganteus</i>	Eastern Grey Kangaroo
	<i>Macropus rufogriseus</i>	Red-necked Wallaby

Revision History

Revision No.	Revision date	Details	Prepared by	Reviewed by	Approved by
00	31/08/2018	Newmans Road – southern precinct Ecological Assessment	Nigel Cotsell Senior Ecologist	Trudy Thompson Senior Environmental Scientist	Diane Lanyon General Manager

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Appendix F ~ Bushfire Report



BUSHFIRE HAZARD ASSESSMENT REPORT

REPORT PREPARED IN RELATION TO:	PROPOSED REZONING AND SUBDIVISION MINISTERIAL DIRECTIONS UNDER THE EP&A ACT (SECTION 117, 4.4 BUSHFIRE PROTECTION)
PROPERTY DESCRIPTION:	PART LOT 202 IN DP 874273, NEWMANS ROAD, WOOLGOOLGA, NSW.
REPORT COMMISSIONED BY: (my Client)	Ecosure Pty Ltd.
	 DATE ISSUED: 14 September 2018

IMPORTANT NOTICE

Site inspections, and the results found herein, are carried out in accordance with the methodology as set out in the document "*Planning for Bushfire Protection 2006*".

The results of the site inspections and their correlation with *PBP-2006* are based on information provided by the "Reference Documents" and information provided by the Client (or his/her agents).

Holiday Coast Bushfire Solutions Pty Ltd will not be held liable for the omission to provide, or restrict access to, critical information (such as restrictions on property Title, easements, relevant consultant reports, etc) relevant to this development proposal.

The author of this Report, S. Ellis, possesses qualifications that include Graduate Diploma in Design for Bushfire Prone Areas (UWS) and Certificate 2 & 3 in Firefighting Operations and Certificate 4 in Firefighting Supervision.

DATE SAVED: 14/09/2018
DATE PRINTED: 14/09/2018



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Glossary

APZ	- Asset protection zone. An area surrounding a development managed to reduce the bush fire hazard to an acceptable level. The APZ, consisting of an area maintained to minimal fuel loads and, for subdivision, comprising a combination of perimeter road, fire trail, rear yard or a reserve, so that a fire path is not created between the hazard and the building.
AS 3959	- Australian Standard AS3959 Construction of buildings in bushfire-prone areas, Standards Australia, 2009, that outlines construction standards applicable to residential developments in bush fire prone areas.
BAL	- Bushfire Attack Level – refer to CoBA below.
BCA	- Building Code of Australia.
BPM	- Bushfire protection measures. A range of measures (controls) available to minimise the risk arising from a bushfire. BPMs include APZs, construction standards, suitable access arrangements, water and utility services, emergency management arrangements and landscaping.
Bushfire hazard	- The potential severity of a bushfire. Usually measured in terms of intensity (kW/m), the factors that influence a bush fire hazard include climate and weather patterns, vegetation (fuel quantity, distribution and moisture) and slope.
Bushfire-prone area / land	- An area of land that can support a bushfire or is likely to be subject to bushfire attack. In general, a bushfire-prone area is an area mapped for a local government area that identifies the vegetation types and associated buffer zones. Bushfire prone land maps are prepared by local councils and certified by the Commissioner of the RFS.
Bushfire risk	- Is the chance of a bushfire igniting, spreading and causing damage to assets of value to the community. Risk may be rated as being extreme, major, moderate, minor or insignificant and is related to the vulnerability of the asset.
CoBA	- Category of Bushfire Attack. Either BAL-12.5, BAL-19, BAL-29, BAL-40, or BAL-FLAME ZONE. The degree to which a (proposed) building is subject to the modelled RHF from a potential bushfire. The CoBA determines the construction standards applicable.
Contagious Ignition	- The ignition of one building by an adjoining flaming building (or material) <u>other than</u> by the direct ignition from the flaming bushfire hazard.



Defendable Space	- An area within the APZ that provides an environment in which a person can undertake property protection after the passage of a bushfire with some level of safety.
D-T-S	- Deemed to Satisfy (prescriptive requirements of either the BCA or PBP-2006).
DE	- Dwelling or Building Envelope. The foot print of a (proposed) structure.
FFDI	- Forest fire danger index.
Flame Zone	- The distance from a bushfire at which it is calculated for the purposes of this document that there is significantly increased likelihood for flame contact to a building. Determined by the calculated distance at which the radiant heat received by the proposed building exceeds 40kW/m ² or calculated by the point of potential flame contact, whichever occurs first.
IFEG-2005	- International Fire Engineering Guidelines (Edition 2005).
Infill Development	- The development of land by the erection of or addition to a residential building (or buildings) which does not require the spatial extension of services including public roads, electricity, water or sewerage and is within an existing allotment.
Inner Protection Area	- The inner component of an asset protection zone, consisting of an area maintained to minimal fuel loads and comprising a combination of perimeter road, fire trail, rear yard or reserve, so that a fire path is not created between the hazard and the building.
Outer Protection Area	- The outer component of an asset protection zone, where fuel loads are maintained at a level (usually less than 8 t/ha) where the intensity of an approaching bushfire would be significantly reduced.
Required	- Required by PBP-2006 or other legislative requirements.
Setback	- The distance required through planning provisions to separate a building from the bushfire hazard, street frontage or from adjacent buildings. In most cases the land within the setback will also be within the Flame Zone.



1.0 GENERAL DESCRIPTION OF LAND AND PROPOSAL

1.1 Introduction

This Report is prepared as a Report that addresses both the Ministerial Directions and the requirements of *PBP-2006*.

The initial site constraints were assessed in June of 2016. These constraints were identified on sketches provided to the Client, and included the indicative vegetation classes occurring at that time, and effective slopes. Since that time, assessments have been carried out by other project experts, some of which have altered the site's bushfire constraints.

1.2 The Land

The site is located on the northern outskirts of Woolgoolga, on the mid-north coast. The site is identified as the southern portion of lot 202//874273, located on the northern side of Newman's Road.

The site is constrained, from a bushfire-perspective, generally by remnant vegetation. The only large parcel of un-managed vegetation within the assessment area around the site is on its north-eastern exposure, surrounding the neighbouring Woolgoolga High School.

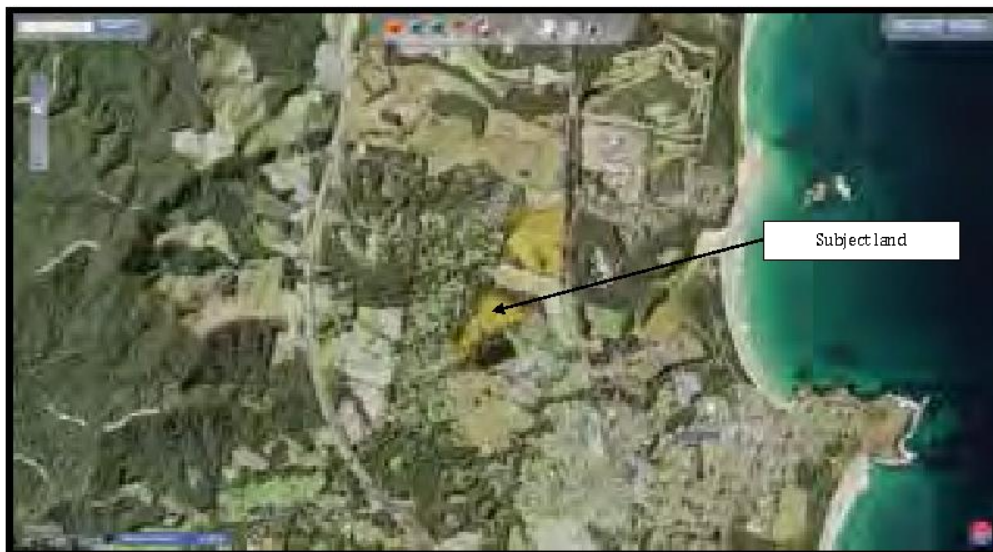


Figure 1: map showing general locality of subject site (© Google Maps 2017)

The parcel was vacant at the time of the site assessments. The parcel was overgrown with unmanaged grass and remnant vegetation. The property boundaries were not able to be identified as they were not pegged or otherwise marked, or due to their overgrown



nature, any boundary markings were not able to be found. The topography of the site varied from slight to moderate.

The site has an area of approximately 9.0 hectares, with a perimeter of approximately 1.7km. This parcel is bordered to the west, north and east by CHCC-managed land. To the north is a riparian remnant along its northern boundary with the planned sporting precinct further north. The land to the east and west is a strip of regrowth that comprises a structure consistent with a *tall heath*. The land beyond the CHCC land is managed in one way or another.



Figure 2: aerial image of southern parcel (© NSW Lands, 2017)

Bushfire prone land maps provide the trigger for the various development assessment provisions. The identification of bushfire-prone areas in NSW is required under section 146 of the *EP&A Act*. The NSW Rural Fire Service designates, through separate guidelines, what constitutes a bushfire-prone area and how it is to be mapped. Each Council then prepares a map in accordance with the guidelines and submits the map for approval by the NSW Rural Fire Service.

The subject site has been identified as bushfire-prone land by the Coffs Harbour City Council's Bushfire Prone Land Map, an extract of which is provided below.



Figure 3: extract of CHCC's BPLM (© CHCC, 2018)

1.3 The Proposal

Holiday Coast Bushfire Solutions Pty Ltd has been engaged by the Client to provide a Bushfire Hazard Assessment Report to support a rezoning application and subdivision application.

The proposal will be measured against the specific requirements outlined in division 9.1 (Ministerial Directions, provided below) of the *EP&A Act 1979*, as well as the residential subdivision provisions of *PBP-2006*.

Division 9.1 of the Environmental Planning & Assessment Act 1979

4.4 Planning for Bushfire Protection

Objectives

(1) The objectives of this direction are:

- (a) to protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and
- (b) to encourage sound management of bush fire prone areas.

Where this direction applies

(2) This direction applies to all councils that are required to prepare a bush fire prone land map under section 146 of the *Environmental Planning and Assessment Act 1979* (the *EP&A Act*), or, until such a map has been certified by the Commissioner of the NSW Rural Fire Service, a map referred to in Schedule 6 of that Act.

When this direction applies

(3) This direction applies when a council prepares a draft LEP that affects, or is in proximity to land mapped as bush fire prone land.

What a council must do if this direction applies



(4) In the preparation of a draft LEP a Council shall consult with the Commissioner of the NSW Rural Fire Service under section 62 of the EP&A Act, and take into account any comments so made,

(5) A draft LEP shall:

(a) have regard to *Planning for Bushfire Protection 2006*,

(b) introduce controls that avoid placing inappropriate developments in hazardous areas, and

(c) ensure that bushfire hazard reduction is not prohibited within the APZ.

(6) A draft LEP shall, where development is proposed, comply with the following provisions, as appropriate:

(a) provide an Asset Protection Zone (APZ) incorporating at a minimum:

(i) an Inner Protection Area bounded by a perimeter road or reserve which circumscribes the hazard side of the land intended for development and has a building line consistent with the incorporation of an APZ, within the property, and

(ii) an Outer Protection Area managed for hazard reduction and located on the bushland side of the perimeter road,

(b) for infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the draft LEP permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with,

(c) contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks,

(d) contain provisions for adequate water supply for firefighting purposes,

(e) minimise the perimeter of the area of land interfacing the hazard which may be developed,

(f) introduce controls on the placement of combustible materials in the Inner Protection Area.

Consistency

(7) A draft LEP may be inconsistent with the terms of this direction only if council can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the council has obtained written advice from the Commissioner of the NSW Rural Fire Service, to the effect that, notwithstanding the non-compliance, the NSW Rural Fire Service does not object to the progression of the draft LEP.

In accordance with the NSW Rural Fire Service document "Practice Note 5/12 - Reuse of Rezoning Reports on Bushfire Prone Land", this Report will address the proposal from a strategic-planning perspective as well as address the subdivision provisions of *PBP-2006*.

As well as addressing the matters contained in the Ministerial Direction 4.4 (division 9.1 of the *Environmental Planning & Assessment Act*), this Report will assess the proposal against the provisions contained in Clause 44 of the *Rural Fires Regulation*.



Figure 4: extract of concept subdivision plan for southern site, provided by Ecosure Pty Ltd, 21/08/2018



2.0 VEGETATION AND SLOPE ASSESSMENT

The following procedure is to be adopted when assessing a development at a defined precinct level in order to determine whether the development is bush fire prone and if so, which setbacks will be appropriate:

- (a) Determine vegetation formations, as follows:
 - (i) identify all vegetation in all directions from the site for a distance of 140 metres;
 - (ii) consult Table A2.1 of PBP-2006 to determine the predominant vegetation type; and
 - (iii) select the predominant vegetation formation as described in Table A2.1 of PBP-2006.
- (b) Determine the effective slope of the land under the Predominant Vegetation Class and the site.
- (c) Determine the appropriate fire (weather) area in Table A2.3 of PBP-2006 and note the relevant FDI.
- (d) Consult Tables A2.4–2.7 of PBP-2006 and determine the appropriate setback for the assessed land use, vegetation group and slope range.

The vegetation and slope assessment used for this Report is based on the previous assessment carried out by this office and provided to the Client on 14/6/16. The following Figures set out a summary of the vegetation and slope assessment determined at that time.



Figure 5: vegetation and slope assessment (June 2016)

Although some of the vegetation found on the lands adjoining the sites did not neatly fit into any of the vegetation classifications depicted in the indicative vegetation classes within PBP-2006, they have been classed as depicted above due to their structure at the time of the site assessment.

Post Initial Site Assessment

Through the process of preparing the Planning Proposal, areas of the site previously not occupied by bushfire hazard vegetation have been identified for revegetation. This has



affected the initial site assessment information gathered during the 2016 site assessment. The following Figure is a reproduction of Figure 5 above, except they recognise the amended indicative vegetation classes due to the proposed revegetation.



Figure 6: amended vegetation and slope assessment

3.0 BUSHFIRE ASSESSMENT MATTERS

3.1 Ministerial Directions

The following sub-sections of this Report will be formulated from the requirements of the Ministerial Directions 4.4 as stipulated in division 9.1 of the *EP&A Act*.

3.1.1 A draft LEP shall have regard to *PBP-2006*.

This Report will aim to address the requirements of the *EP&A Act* and *PBP-2006* as they relate to the bushfire constraints of the site.

It should be pointed out that *PBP-2006* is primarily concerned with residential development and *Special Fire Protection Purpose (SFPF)* developments. Apart from s.4.3.6(f), *PBP-2006* is essentially silent in relation to commercial or industrial land. Whilst commercial and industrial developments do not ordinarily accommodate residential uses, the bushfire-resilience of these types of developments should be no less important from a business-continuity and community-recovery perspective.

In relation to land proposed to be rezoned for residential purposes, or land that could accommodate a development that is defined as a *Special Fire Protection Purpose* development under s.100B of the Rural Fires Act, a Bushfire Assessment should



determine those parts of the site that are unsuitable for accommodating residential or *Special Fire Protection Purpose* developments. The Client should prepare a plan showing the minimum APZs to achieve a BAL-29 construction in accordance with *AS3959-2009 Construction of buildings in bushfire-prone areas*. The information required for the creation of that plan is provided at section 3.2.4.7 of this Report.

3.1.2 A draft LEP shall introduce controls that avoid placing inappropriate developments in hazardous areas.

PBP-2006 and *PBP-2001* provide lists of development types that are both suitable, and unsuitable, for bushfire-prone areas, summarised as follows:

Table 1

Not Desirable	Desirable
<ul style="list-style-type: none"> • Camping grounds • Assembly buildings • Land sharing communities • Commercial and retail premises • Education premises • Prisons • Premises for people with mental or physical incapacities • Hospitals • Flammable material bulk storage • Stock / sale yards • Timber yards • Factories / warehouses • Plantations • Waste disposal / landfill depots • Power generating works • Sawmills • Junk yards • Liquid fuel depots • Offensive and hazardous industries • Chemical industries • Service stations • Ammunition storage / manufacture • Fireworks manufacture / storage 	<ul style="list-style-type: none"> • Tennis courts • Golf courses • Swimming pools • Cemeteries • Airstrips • Cleared open space / recreation areas

The LEP should prohibit the listed developments as “not desirable” within the bushfire-prone areas (and within 100m of identified bushfire hazard vegetation) of the subject site.



3.1.3 A draft LEP shall ensure that bushfire hazard reduction is not prohibited within the APZ.

Parts of the site are proposed to be Zoned E3 under the LEP.

Where the APZ is proposed to be incorporated into the proposed E3 Zone, the LEP should acknowledge that the component of the APZ on the E3 Zone will be the Outer Protection Area (OPA) only. This will allow for significant woody vegetation to be retained within the E3 area while meeting the performance criteria of an OPA as defined by the Rural Fire Service document "*Standards for Asset Protection Zones*".

The creation of the OPA on the E3 Zone areas is to provide for the reduction of bushfire fuel in this area to decrease the intensity of an approaching fire and restricting the pathways, or 'wicks', to 'crown' or elevated fuels.

Within the OPA any trees and shrubs should be maintained in such a manner that the vegetation is not continuous. Fine fuel loadings within the OPA should be kept to a level where the fire intensity expected will have no significant impact on adjacent developments. Eight (8) tonnes per hectare of fuel is commonly used. Essentially trees and shrubs should be discontinuous, and grass maintained below 10 centimetres in height.

All of the land on the subject sites other than the retained native vegetation is to have no restriction placed on it that prohibits APZ maintenance. This will include restrictions such as "tree preservation orders" and the like.

Any development consent of future developments on the bushfire-prone land should impose conditions that require the management of vegetation within the development site to ensure that bushfire hazard vegetation does not regenerate on the site.

Also refer to section 3.2.1 below.

3.1.4 For infill development (that is development within an already subdivided area), where an appropriate APZ cannot be achieved, provide for an appropriate performance standard, in consultation with the NSW Rural Fire Service. If the provisions of the draft LEP permit Special Fire Protection Purposes (as defined under section 100B of the *Rural Fires Act 1997*), the APZ provisions must be complied with.

There are no existing assets identified on the site, therefore the infill provisions of *PBP-2006* are not applicable.



3.1.5 Contain provisions for two-way access roads which links to perimeter roads and/or to fire trail networks.

PBP-2006 states it is preferable to have roads interfacing with unmanaged bushfire hazard vegetation rather than individual lots, where practical. Although the results of the Canberra fires in 2003 would suggest that perimeter roads have their own set of problems, which can be overcome with fire trails and non-perimeter roads.

Notwithstanding, the proposed lot layout incorporates perimeter road along the eastern boundary, interfacing with the forest vegetation. The perimeter road will allow for 2-way access and have a minimum width of 8m as per the *PBP-2006* requirements. The perimeter road should link with internal roads at intervals of not greater than 500m, as per the *PBP-2006* requirement.

Even though some of the site will eventually be located outside bushfire-prone land, the road network should link with the existing public road with roads of a commensurate width, i.e., road widths do not diminish from the interface to the existing public roads. All other road widths should comply with the following Table (road widths for medium-rigid vehicles).

Curve radius (inside edge) (metres)	Swept Path (metres width)	Single lane (metres width)	Two way (metres width)
<40	3.5	4.5	8.0
40-69	3.0	3.9	7.5
70-100	2.7	3.6	6.9
>100	2.5	3.5	6.5

Figure 7: Source: AS 2890.2 – 2002

The road network for the site is exposed to a traffic *pinch-point* due to the creation of an E3 Zone corridor through the site.

3.1.6 Contain provisions for adequate water supply for firefighting purposes.

Fire hydrants should be located within the footpaths / nature strips at intervals not exceeding 90m. An hydraulic analysis should be undertaken to ensure that flow rates and pressures are commensurate with *AS 2419.1-2005 Fire hydrant installations - System design, installation and commissioning* (10 L/s at 150 kPa).

3.1.7 Minimise the perimeter of the area of land interfacing the hazard which may be developed.

The perimeter of the site that interfaces with bushfire hazard vegetation is unable to be altered. Furthermore, the creation of an E3 Zone corridor through the site increases the



bushfire risk to the site, and creates a traffic *pinch-point* where the corridor crosses the proposed perimeter road.

Perimeter roads locate the future development further from the interface, but the area of land interfacing with the existing bushfire hazard vegetation, surrounding and within the site, is unable to be significantly altered.

3.1.8 Introduce controls on the placement of combustible materials in the Inner Protection Area.

Perimeter roads or open space recreation areas (such as playgrounds and the like) would enable bushfire fuel loads within the IPA to be minimised. Such planning would enable routine management of those areas to maintain bushfire fuel loads to an acceptable level.

Additionally, prohibiting certain development (refer to list as Table 1) on bushfire-prone land provides another means to limit the possibility of compromising the effectiveness of an APZ.

3.2 RURAL FIRES REGULATION - CLAUSE 44.

3.2.1 Identification of any significant environmental features on the property

This matter is to be addressed by the applicant in a Statement of Environmental Effects.

3.2.2 The details of any threatened species, population or ecological community identified under the [Threatened Species Conservation Act 1995](#) that is known to the applicant to exist on the property

This matter is to be addressed by the applicant in a Statement of Environmental Effects.

3.2.3 The details and location of any Aboriginal object (within the meaning of the [National Parks and Wildlife Act 1974](#)) or Aboriginal place (within the meaning of that Act) that is known to the applicant to be situated on the property

This matter is to be addressed by the applicant in a Statement of Environmental Effects.



3.2.4 A bush fire assessment for the proposed development (including the methodology used in the assessment) that addresses the following matters:

3.2.4.1 The extent to which the development is to provide for setbacks, including asset protection zones

APZs are addressed in detail in Section 3.3.1 of this Report, below. That Section addresses the minimum setbacks from the identified bushfire hazard vegetation in order to meet the provisions of Appendix 2 of *PBP-2006*.

The broader planning issues regarding APZs are addressed in the sub-sections of Section 3.1 of this Report, above.

3.2.4.2 The siting and adequacy of water supplies for fire fighting

The Client advises that the proposed subdivision will be provided with a reticulated water supply. This negates the need for additional water supplies for firefighting purposes.

The specific requirements relating to the location of the firefighting water supply are addressed at Section 3.3.5 of this Report, below.

3.2.4.3 The capacity of public roads in the vicinity to handle increased volumes of traffic in the event of a bush fire emergency

The existing public roads servicing the site all have a proven capacity to handle 2-way traffic. Newman's Road also links with the old Pacific Highway to the east of the site.

The width and gradient of the new public roads will meet the standards required by *PBP-2006*, and are addressed at section 3.3.2 of this Report.

3.2.4.4 Whether or not public roads in the vicinity that link with the fire trail network have two-way access

There are no existing or proposed fire trails, within or immediately adjacent to, the sites.

3.2.4.5 The adequacy of arrangements for access to and egress from the development site for the purposes of an emergency response

The width and gradient of the new public roads will meet the standards required by *PBP-2006*. These matters are dealt with in more detail at section 3.3.2 of this Report.



3.2.4.6 The adequacy of bush fire maintenance plans and fire emergency procedures for the development site

A Vegetation Management Plan should be developed for the site if the proposed subdivision is to be released in a 'Staged' manner. Essentially the goal for the release of the land should be to provide a perimeter road or temporary fire trail separating the Stage from the undeveloped part of the site, and to ensure that regular management occurs on the undeveloped land to ensure bushfire hazard vegetation does not regenerate on the site. The remainder of the site should be managed as an "outer protection area" as described in the NSW Rural Fire Service document titled "Standards for Asset Protection Zones" and Appendix 5 of *PBP-2006*, provided as Appendix A of this Report. The temporary APZ should be created and maintained on land owned by the developer, or by other legally-binding arrangement such as s.88B of the *Conveyancing Act 1919*.

3.2.4.7 The construction standards to be used for building elements in the development

PBP-2006 contains 2 separate, and different, methods of determining residential building setbacks from bushfire hazard vegetation. Appendix 2 of *PBP-2006* is used to determine an APZ distance, and these distances are provided in Table A2.5, provided below.

Vegetation Formation	Effective Slopes				
	Upslope/Flat	+0°-5°	+5°-10°	+10°-15°	+15°-18°
Rainforests	10	10	15	15	20
Forests	20	20	30	40	45
Woodland	10	15	15	20	25
Plantations (Pine)	15	20	25	35	40
Tall Heath (Scrub)	15	15	20	20	20
Short Heath (Open Scrub)	10	10	10	15	15
Freshwater Wetlands	10	10	10	15	15
Forested Wetlands	15	20	20	30	35
Semi-Arid (Woodland)	10	10	10	10	15
Arid Shrubland	10	10	10	15	15

Figure 8: table A2.5 of *PBP-2006*

Alternatively, to determine the Bushfire Attack Level (BAL) zones so that compliance with *AS 3959-2009 Construction of buildings in bushfire-prone areas* can be verified and accomplished, Addendum Appendix 3 of *PBP-2006* is used, and these distances are provided in Table 2.4.3 of *AS3959-2009 Construction of buildings in bushfire-prone areas*, provided below.



Vegetation classification	Bushfire Attack Levels (BALs)				
	BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
	Distance (m) of the site from the predominant vegetation class				
All upslopes and flat land (0 degrees)					
A. Forest	<16	16-21	21-31	31-42	42-<100
B. Woodland	<10	10-14	14-20	20-29	29-<100
C. Shrubland	<7	7-9	9-13	13-19	19-<100
D. Scrub	<10	10-13	13-19	19-27	27-<100
E. Mallee/Mulga	<6	6-8	8-12	12-17	17-<100
F. Rainforest	<6	6-9	9-13	13-19	19-<100
G. Grassland	<6	6-8	8-12	12-17	17-50
Downslope >0 to 5 degrees					
A. Forest	<20	20-27	27-37	37-50	50-<100
B. Woodland	<13	13-17	17-25	25-35	35-<100
C. Shrubland	<7	7-10	10-15	15-22	22-<100
D. Scrub	<11	11-15	15-22	22-31	31-<100
E. Mallee/Mulga	<7	7-9	9-13	13-20	20-<100
F. Rainforest	<8	8-11	11-17	17-24	24-<100
G. Grassland	<7	7-9	9-14	14-20	20-50
Downslope >5 to 10 degrees					
A. Forest	<26	26-33	33-46	46-64	64-<100
B. Woodland	<16	16-22	22-31	31-43	43-<100
C. Shrubland	<8	8-11	11-17	17-25	25-<100
D. Scrub	<12	12-17	17-24	24-35	35-<100
E. Mallee/Mulga	<7	7-10	10-15	15-23	23-<100
F. Rainforest	<11	11-15	15-22	22-31	31-<100
G. Grassland	<8	8-10	10-16	16-23	23-50
Downslope >10 to 15 degrees					
A. Forest	<33	33-42	42-56	56-73	73-<100
B. Woodland	<21	21-28	28-39	39-53	53-<100
C. Shrubland	<9	9-13	13-19	19-28	28-<100
D. Scrub	<14	14-19	19-28	28-39	39-<100
E. Mallee/Mulga	<8	8-11	11-18	18-26	26-<100
F. Rainforest	<14	14-19	19-28	28-39	39-<100
G. Grassland	<9	9-12	12-18	18-26	26-50
Downslope >15 to 20 degrees					
A. Forest	<42	42-52	52-68	68-87	87-<100
B. Woodland	<27	27-35	35-48	48-64	64-<100
C. Shrubland	<10	10-15	15-22	22-31	31-<100
D. Scrub	<15	15-21	21-31	31-43	43-<100
E. Mallee/Mulga	<9	9-13	13-20	20-29	29-<100
F. Rainforest	<14	14-25	25-36	36-48	48-<100
G. Grassland	<10	10-14	14-21	21-30	30-50

Figure 9: Table 2.4.3 of AS3959-2009



3.2.4.8 The adequacy of sprinkler systems and other fire protection measures to be incorporated into the development

Bushfire-sprinkler systems will not be required for development on these sites.

3.3 CHAPTER 4 OF PBP-2006.

3.3.1 Asset Protection Zones

Table 2

ASSET PROTECTION ZONES Intent of measures: to provide sufficient space and maintain reduced fuel loads, so as to ensure radiant heat levels at buildings are below critical limits and to prevent direct flame contact with a building.		COMPLIES / DOES NOT COMPLY
Performance Criteria	Acceptable solutions	
The intent may be achieved where:		
<ul style="list-style-type: none"> Radiant heat levels at any point on a proposed building will not exceed 29 kW/m². 	<p>[1] An APZ is provided in accordance with the relevant tables/ figures in Appendix 2 of PBP-2006.</p>	Complies
	<p>[2] The APZ is wholly within the boundaries of the development site. Exceptional circumstances may apply (see section 3.3)</p>	Complies
<ul style="list-style-type: none"> APZs are managed and maintained to prevent the spread of a fire towards the building. 	<p>[3] In accordance with the requirements of Standards for Asset Protection Zones (AFS, 2005)</p> <p><i>Note: A Monitoring and Fuel Management Program should be required as a condition of development consent.</i></p>	Complies
<ul style="list-style-type: none"> APZ maintenance is practical, soil stability is not compromised and the potential for crown fires is negated. 	<p>[4] The APZ is located on lands with a slope less than 18°.</p>	Complies

In relation to *Acceptable Solution 1*, the minimum separation / APZ required by PBP-2006 are provided in Appendix 2 of PBP-2006. These distances are summarised for the 2 sites in the following table.

Table 3

	Vegetation Classification	Effective Slope	Minimum APZ (App.2 of PBP-2006)
North	Forest	0° - level	20m
East	Tall Heath	>5°-10° downslope	20m
	Forest	>10°-15° downslope	40m
West	Remnant	>5°-10° downslope	15m
	Tall Heath	>5°-10° downslope	20m



In relation to *Acceptable Solution 2*, all of the required setbacks are able to be provided within the subject site being developed.

In relation to *Acceptable Solution 3*, a vegetation management plan should be developed for the site. The purpose of the VMP is to formalise the vegetation management regime over the site where the development is 'Staged'. Essentially the goal for the release of the land should be to provide a perimeter road or temporary fire trail separating the Stage from the un-developed part of the site, and to ensure that regular management occurs on the un-developed land to ensure bushfire hazard vegetation does not regenerate on the site. The remainder of the site should be managed as an "outer protection area" as described in the NSW Rural Fire Service document titled "Standards for Asset Protection Zones" and Appendix 5 of *PBP-2006*, provided as Appendix A of this Report. These documents have been provided as Appendix A of this Report for the benefit of the Client.

3.3.2 Public Roads

Table 4

ACCESS – PUBLIC ROADS Intent of measures: to provide safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.		COMPLIES / DOES NOT COMPLY
Performance Criteria	Acceptable solutions	
The intent may be achieved where:		
<ul style="list-style-type: none"> Firefighters are provided with safe all weather access to structures (thus allowing more efficient use of firefighting resources). 	[5] Public roads are two-wheel drive, all weather roads.	Complies
<ul style="list-style-type: none"> Public road widths and design that allow safe access for firefighters while residents are evacuating an area. 	[6] Urban perimeter roads are two-way, that is, at least two traffic lane widths (carriageway 8m minimum kerb to kerb), allowing traffic to pass in opposite directions. Non-perimeter roads comply with Table 4.1 – Road widths for Category 1 Tanker (Medium Rigid Vehicle). [7] The perimeter road is linked to the internal road system at an interval of no greater than 500m in urban areas. [8] Traffic management devices are constructed to facilitate access by emergency services vehicles. [9] Public roads have a cross fall not exceeding 3%.	Complies Complies Complies Complies



	<p>[10] All roads are through-roads. Dead-end roads are not recommended, but if unavoidable, dead-ends are not more than 200m in length, incorporate a minimum 12m outer radius turning circle, and are clearly sign posted as a dead-end and direct traffic away from the hazard.</p> <p>[11] Curves of roads (other than perimeter roads) are a minimum inner radius of 6m and minimal in number, to allow for rapid access and egress.</p> <p>[12] The minimum distance between inner and outer curves is 6m.</p> <p>[13] Maximum grades for sealed roads do not exceed 15° and an average grade of not more than 10° or other gradient specified by road design standards, whichever is the lesser gradient.</p> <p>[14] There is a minimum vertical clearance to a height of 4m above the road at all times.</p>	<p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p>
<ul style="list-style-type: none"> The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. 	<p>[15] The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles (approximately 15 tonnes for areas with reticulated water, 28 tonnes or 9 tonnes per axle for all other areas). Bridges clearly indicate load rating.</p>	<p>Complies</p>
<ul style="list-style-type: none"> Roads that are clearly sign- posted (with easily distinguishable names) and buildings/properties that are clearly numbered. There is clear access to reticulated water supply. 	<p>[16] Public roads greater than 6.5m wide to locate hydrants outside of parking reserves to ensure accessibility to reticulated water for fire suppression.</p> <p>[17] Public roads between 6.5m and 8m wide are "No Parking" on one side with the services (hydrants) located on this side to ensure accessibility to reticulated water for fire suppression.</p> <p>[18] Public roads up to 6.5m wide provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.</p> <p>[19] One-way only public access roads are no less than 3.5m wide and provide parking within parking bays and locate services outside of the parking bays to ensure accessibility to reticulated water for fire suppression.</p>	<p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p>
<ul style="list-style-type: none"> Parking does not obstruct the minimum paved width. 	<p>[20] Parking bays are a minimum of 2.6m wide from kerb edge to road pavement. No services or hydrants are located within the parking bays.</p> <p>[21] Public roads directly interfacing the bush fire hazard vegetation provide roll top kerbing to the hazard side of the road.</p>	<p>Complies</p> <p>Complies</p>



In relation to *Acceptable Solution 6*, the perimeter road will be at least 8m wide. The non-perimeter roads will have widths complying with Figure 7 of this Report.

In relation to *Acceptable Solution 10*, cul-de-sac heads should be either 24m in diameter, or they shall have a diameter of not less than 17m and "NO PARKING" is to be provided in the cul-de-sac head so that emergency service vehicles can turn in one movement.

3.3.3 Property Access Roads

Table 5

ACCESS - PROPERTY ACCESS Intent of measures: to provide safe access to/from the public road system for firefighters providing property protection during a bush fire and for occupants faced with evacuation.		COMPLIES / DOES NOT COMPLY
Performance Criteria	Acceptable solutions	
The intent may be achieved where:		
<ul style="list-style-type: none"> Access to properties is provided in recognition of the risk to fire fighters and/or evacuating occupants. 	(22) At least one alternative property access road is provided for individual dwellings (or groups of dwellings) that are located more than 200m from a public through-road.	Not applicable
<ul style="list-style-type: none"> The capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. 	(23) Bridges clearly indicate load rating and pavements and bridges are capable of carrying a load of 15 tonnes.	Not applicable
<ul style="list-style-type: none"> All weather access is provided. 	(24) Roads do not traverse a wetland or other land potentially subject to periodic inundation (other than a flood or storm surge).	Not applicable
<ul style="list-style-type: none"> Road widths and design enable safe access for vehicles 	(25) A minimum carriageway width of 4m for rural-residential areas, rural landholdings or urban areas with a distance of greater than 70m from the nearest hydrant point to the most external part of a proposed building (or footprint). (26) In forest, woodland and heath situations, rural property access roads have passing bays every 200m that are 20m long by 2m wide, making a minimum trafficable width of 6m at the passing bay. (27) A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches. (28) Internal roads for rural properties provide a loop road around any dwelling or incorporate a turning circle with a minimum 12m outer radius.	Not applicable Not applicable Not applicable Not applicable



(29) Curves have a minimum inner radius of 6m and are minimal in number to allow for rapid access and egress.	Not applicable
(30) The minimum distance between inner and outer curves is 6m.	Not applicable
(31) The cross-fall is not more than 10°.	Not applicable
(32) Maximum grades for sealed roads do not exceed 15° and not more than 10° for unsealed roads. <i>Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m), extend for no more than 30m and where the obstruction cannot be reasonably avoided or removed. The gradients applicable to public roads also apply to community style development property access roads in addition to the above.</i>	Not applicable
(33) Access to a development comprising more than 3 dwellings have formalised access by dedication of a road and not by right of way.	Not applicable

In relation to property access roads (driveways), *PBP-2006* provides the following concession for urban areas supplied with a reticulated water supply.

Note: No specific access requirements apply in a urban area where a 70m unobstructed path can be demonstrated between the most distant external part of the proposed dwelling and the nearest part of the public access road (where the road speed limit is not greater than 70kph) that supports the operational use of emergency firefighting vehicles (i.e. a hydrant or water supply).

The property access road provisions of *PBP-2006* will not apply to the site. Additionally, the LEP should ensure that future development complies with the guidelines contained in the Fire & Rescue NSW document "*Fire Safety Guideline - Fire Hydrants for Minor Residential Development*".

(http://www.fire.nsw.gov.au/gallery/files/pdf/guidelines/guidelines_for_minor_residential.pdf)

3.3.4 Fire Trails

Table 6

ACCESS - FIRE TRAILS Intent of measures: to provide suitable access for fire management purposes and maintenance of APZs.		COMPLIES / DOES NOT COMPLY
Performance Criteria	Acceptable solutions	
The intent may be achieved where:		
<ul style="list-style-type: none"> The width and design of the fire trails enables safe and ready access for firefighting vehicles 	(34) A minimum carriageway width of 4m with an additional 1m wide strip on each side of the trail (clear of bushes and long grass) is provided.	Able to comply
	(35) The trail is a maximum grade of 15° if sealed and not more than 10° if unsealed.	Able to comply



	<p>[36] A minimum vertical clearance of 4m to any overhanging obstructions, including tree branches is provided.</p> <p>[37] The cross-fall of the trail is not more than 1%.</p> <p>[38] The trail has the capacity for passing by:</p> <ul style="list-style-type: none"> - reversing bays using the access to properties to reverse fire tankers, which are 6m wide and 8m deep to any gates, with an inner minimum turning radius of 6m and outer minimum radius of 12m; and/or - a passing bay every 200m, 20m long by 3m wide, making a minimum trafficable width of 7m at the passing bay. <p><i>Note: Some short constrictions in the access may be accepted where they are not less than the minimum (3.5m) and extend for no more than 30m and where obstruction cannot be reasonably avoided or removed.</i></p>	<p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p>
<ul style="list-style-type: none"> • Fire trails are trafficable under all weather conditions. Where the fire trail joins a public road, access shall be controlled to prevent use by non authorised persons. • Fire trails designed to prevent weed infestation, soil erosion and other land degradation. 	<p>[39] The fire trail is accessible to firefighters and maintained in a serviceable condition by the owner of the land.</p> <p>[40] Appropriate drainage and erosion controls are provided.</p> <p>[41] The fire trail system is connected to the property access road and/or to the through road system at frequent intervals of 200m or less.</p> <p>[42] Fire trails do not traverse a wetlands or other land potentially subject to periodic inundation (other than a flood or storm surge).</p> <p>[43] Gates for fire trails are provided and locked with a key/lock system authorized by the local RFS.</p> <p>[44] Fire trail design does not adversely impact on natural hydrological flows.</p> <p>[45] Fire trail design acts as an effective barrier to the spread of weeds and nutrients.</p> <p>[46] Fire trail construction does not expose acid-sulphate soils.</p>	<p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p> <p>Able to comply</p>

No fire trails are proposed. A perimeter road is proposed along the northern and eastern boundary. The hazard to the west of the short length of western boundary is narrow and doesn't justify the construction of a fire trail through these properties.



If the subdivision is to be "Staged", a temporary fire trail should be provided between the development footprint and unmanaged areas unless a properly formed public road is provided as the separation.

3.3.5 Utility Services (water, electricity, LPG)

Table 7

<p>SERVICES – WATER, ELECTRICITY, GAS</p> <p><i>Intent of measures: to provide adequate services of water for the protection of buildings during and after the passage of a bush fire, and to locate gas and electricity so as not to contribute to the risk of fire to a building.</i></p>		<p>COMPLIES / DOES NOT COMPLY</p>
<p>Performance Criteria</p>	<p>Acceptable solutions</p>	
<p>The intent may be achieved where:</p>		
<p>Reticulated water supplies</p> <ul style="list-style-type: none"> Water supplies are easily accessible and located at regular intervals. <p>Electricity Services</p> <ul style="list-style-type: none"> Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of buildings Regular inspection of lines is undertaken to ensure they are not fouled by branches. 	<p>[47] Reticulated water supply to urban subdivisions uses a ring main system for areas with perimeter roads.</p> <p>[48] Fire hydrant spacing, sizing and pressures comply with AS2419.1-2005. Where this cannot be met, the RFS will require a test report of the water pressures anticipated by the relevant water supply authority. In such cases, the location, number and sizing of hydrants shall be determined using fire engineering principles.</p> <p>[49] Hydrants are not located within any road carriageway.</p> <p>[50] All above ground water and gas service pipes external to the building are metal, including and up to any taps.</p> <p>[51] The provisions of parking on public roads are met.</p> <p>[52] Where practicable, electrical transmission lines are underground.</p> <p>[53] Where overhead electrical transmission lines are proposed:</p> <ul style="list-style-type: none"> lines are installed with short pole spacing (30m), unless crossing gullies, gorges or riparian areas; and no part of a tree is closer to a power line than the distance set out in accordance with the specifications in 'Vegetation Safety Clearances' issued by Energy Australia (NS179, April 2002). 	<p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p> <p>Complies</p>



Gas services • Location of gas services will not lead to ignition of surrounding bushland or the fabric of buildings	[54] Reticulated or bottled gas is installed and maintained in accordance with AS1596 and the requirements of relevant authorities. Metal piping is to be used.	Complies
	[55] All fixed gas cylinders are kept clear of all flammable materials to a distance of 10m and shielded on the hazard side of the installation.	Complies
	[56] If gas cylinders need to be kept close to the building, the release valves are directed away from the building and at least 2m away from any combustible material, so that they do not act as a catalyst to combustion. Connections to and from gas cylinders are metal.	Complies
	[57] Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not used.	Complies

Fire hydrants should be located within the footpaths / nature strips at intervals not exceeding 90m. An hydraulic analysis should be undertaken to ensure that flow rates and pressures are commensurate with *AS 241 9.1-2005 Fire hydrant installations - System design, installation and commissioning* (10 L/s at 150 kPa).

In relation to electricity supplies, the services should be located underground, along with other services such as phone/internet.

All of the *Acceptable Solutions* regarding LPG supplies listed above are able to be addressed at the time of construction of the future dwellings.



4.0 SUMMARY / CONCLUSION / RECOMMENDATIONS

This Report assesses the proposed rezoning and eventual subdivision of part of the property known as lot 202//874273, Newmans Road, Woolgoolga.

The proposal has been measured against the criteria listed in the Ministerial Directions 4.4 (Planning for Bushfire Protection) as well as the subdivision provisions of *PBP-2006*. This Report can be used for both purposes, as outlined in the NSW RFS document "*Practice Note 5/12 - Reuse of Rezoning Reports on Bushfire Prone Land*".

The criteria in the Ministerial Directions identify strategic planning goals. These are provided in section 3.1 of this Report. There are matters raised in those sub-sections that should be addressed in the LEP so that unsuitable developments (those that are considered inconsistent with bushfire-prone areas) are prohibited, and the need for additional bushfire assessments for future developments on the site is mostly avoided.

All of the relevant *Acceptable Solutions* contained in 4.1.3 of *PBP-2006* have been, or are able to be, complied with. I recommend the proposal should be approved subject to the following specific recommendations.

1. The LEP should prohibit the undesirable developments, listed in Table 1 of this Report, within the bushfire-prone areas (land within 100m of identified bushfire hazard vegetation) of the subject site.
2. All of the land on the subject site, other than the retained native vegetation located outside of the identified APZs, should have no restriction placed on it that prohibits APZ maintenance. This will include restrictions such as "tree preservation orders" and the like.
3. A Vegetation Management Plan should be prepared for the site. The Vegetation Management Plan should address temporary APZs for Staged development, ongoing management of non-vegetated areas to ensure bushfire hazard vegetation does not regenerate on the site.
4. The LEP should provide a mechanism to ensure the Fire & Rescue NSW document "*Fire Safety Guideline - Fire Hydrants for Minor Residential Development*" is included as a policy for future developments within the site.
5. The consent authority should make a request to the Fire Services Joint Standing Committee (Postal Address: Locked Bag 17, GRANVILLE NSW 2142) to conduct a review of the fire service jurisdictional boundaries associated with the sites.

4.1 Limitation

- 6.1.1 This Report and the subsequent recommendations reflect the reasonable and practical efforts of the author. It is important to note that the author (and State and



Local Government authorities) cannot guarantee that bushfire ignition and subsequent bushfire damage will not occur.

- 6.1.2 Current legislation is essentially 'silent' in relation to the maintenance of bushfire protection measures. Maintenance is a major factor in the effectiveness of any BPM provided/installed. The extent to which the BPMs are implemented and maintained will affect the probability of achieving adequate bushfire safety margins.
- 6.1.3 Given the natural phenomenon of bushfires, and limitations in technology and research, a system to guarantee the survival of life and property cannot be made. This is reflected in the following statements of limitations:

The goal of 'absolute' or '100% safety is not attainable and there will always be a finite risk of injury, death or property damage. (IPEG-2005)

No development in a bushfire prone area can be guaranteed to be entirely safe from bushfires. (PBP-2001)

Notwithstanding the precautions adopted, it should always be remembered that bushfires burn under a wide range of conditions and an element of risk, no matter how small, always remains. (PBP-2001)

Holiday Coast Bushfire Solutions
 Grad. Dip. Design in Bushfire Prone Areas



5.0 REFERENCES

Fire & Rescue NSW (2016), *Fire hydrants for minor residential development*, Sydney.

NSW Government, *Environmental Planning and Assessment Act 1979* (as amended), <http://www.legislation.nsw.gov.au>

NSW Government, *Rural Fires Act 1997*, <http://www.legislation.nsw.gov.au>

NSW Government, *Rural Fires Regulation 2013*, <http://www.legislation.nsw.gov.au>

NSW Government Geospatial Portal (2017-'18), *various images*, <http://maps.six.nsw.gov.au/>

NSW Rural Fire Service (2006), *Planning for Bushfire Protection 2006 including Addendum Appendix 3*, Sydney.

NSW Rural Fire Service (2001), *Planning for Bushfire Protection 2001*, Sydney.

NSW Rural Fire Service (2005), *Standards for asset protection zones*, Sydney.

NSW Rural Fire Service (2012), *Practice note 4/12 - 'In principle' masterplan agreements in bush fire prone areas*, Sydney.

NSW Rural Fire Service (2012), *Practice note 5/12 - Reuse of rezoning reports on bushfire prone land*, Sydney.

Standards Australia (2009), *Australian Standard 3959-2009 Construction of buildings in bushfire-prone areas*, Sydney.

6.0 APPENDICES

Appendix A - Standards for APZs (RFS 2005) and Appendix 5 of *PBP-2006*.

ECOSURE-2017-47 APPENDIX A

STANDARDS FOR ASSET PROTECTION ZONES

PLANNING PROPOSAL AND SUBDIVISION CONCEPTS

**LOT 202 IN DP 874273,
BARK HUT ROAD & NEWMANS ROAD,
WOOLGOOLGA.**

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INTRODUCTION

For thousands of years bush fires have been a natural part of the Australian landscape. They are inevitable and essential, as many Australian plants and animals have adapted to fire as part of their life cycle.

In recent years developments in bushland areas have increased the risk of bush fires harming people and their homes and property. But landowners can significantly reduce the impact of bush fires on their property by identifying and minimising bush fire hazards. There are a number of ways to reduce the level of hazard to your property, but one of the most important is the creation and maintenance of an Asset Protection Zone (APZ).

A well located and maintained APZ should be used in conjunction with other preparations such as good property maintenance, appropriate building materials and developing a family action plan.

WHAT IS AN ASSET PROTECTION ZONE?

An Asset Protection Zone (APZ) is a fuel reduced area surrounding a built asset or structure. This can include any residential building or major building such as farm and machinery sheds, or industrial, commercial or heritage buildings.

An APZ provides:

- a buffer zone between a bush fire hazard and an asset;
- an area of reduced bush fire fuel that allows suppression of fire;
- an area from which backburning may be conducted; and
- an area which allows emergency services access and provides a relatively safe area for firefighters and home owners to defend their property.

Potential bush fire fuels should be minimised within an APZ. This is so that the vegetation within the planned zone does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy.

WHAT WILL THE APZ DO?

An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack on the asset.

WHERE SHOULD I PUT AN APZ?

An APZ is located between an asset and a bush fire hazard.

The APZ should be located wholly within your land. You cannot undertake any clearing of vegetation on a neighbour's property, including National Park estate, Crown land or land under the management of your local council, unless you have written approval.

If you believe that the land adjacent to your property is a bush fire hazard and should be part of an APZ, you can have the matter investigated by contacting the NSW Rural Fire Service (RFS).

There are six steps to creating and maintaining an APZ. These are:

1. Determine if an APZ is required;
2. Determine what approvals are required for constructing your APZ;
3. Determine the APZ width required;
4. Determine what hazard reduction method is required to reduce bush fire fuel in your APZ;
5. Take measures to prevent soil erosion in your APZ; and
6. Landscape and regularly monitor in your APZ for fuel regrowth.

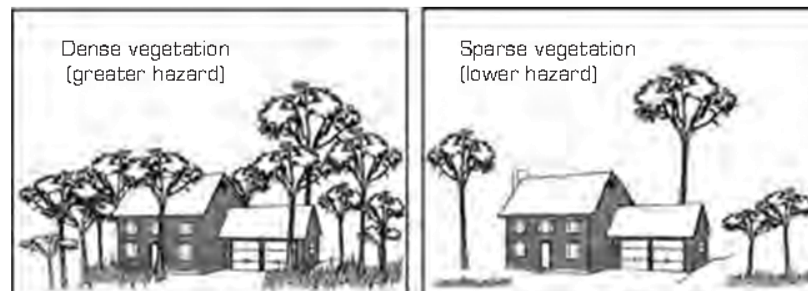
STEP 1. DETERMINE IF AN APZ IS REQUIRED

Recognising that a bush fire hazard exists is the first step in developing an APZ for your property.

If you have vegetation close to your asset and you live in a bush fire prone or high risk area, you should consider creating and maintaining an APZ.

Generally, the more flammable and dense the vegetation, the greater the hazard will be. However, the hazard potential is also influenced by factors such as slope.

- A large area of continuous vegetation on sloping land may increase the potential bush fire hazard.
- The amount of vegetation around a house will influence the intensity and severity of a bush fire.
- The higher the available fuel the more intense a fire will be.



Isolated areas of vegetation are generally not a bush fire hazard, as they are not large enough to produce fire of an intensity that will threaten dwellings.

This includes:

- bushland areas of less than one hectare that are isolated from large bushland areas; and
- narrow strips of vegetation along road and river corridors.

If you are not sure if there is a bush fire hazard in or around your property, contact your local NSW Rural Fire Service Fire Control Centre or your local council for advice.

STEP 2. DETERMINE WHAT APPROVALS ARE REQUIRED FOR CONSTRUCTING YOUR APZ

If you intend to undertake bush fire hazard reduction works to create or maintain an APZ you must gain the written consent of the landowner.

Subdivided land or construction of a new dwelling

If you are constructing an APZ for a new dwelling you will need to comply with the requirements in *Planning for Bushfire Protection*. Any approvals required will have to be obtained as part of the Development Application process.

Existing asset

If you wish to create or maintain an APZ for an existing structure you may need to obtain an environmental approval. The RFS offers a free environmental assessment and certificate issuing service for essential hazard reduction works. For more information see the RFS document *Application Instructions for a Bush Fire Hazard Reduction Certificate* or contact your local RFS Fire Control Centre to determine if you can use this approval process.

Bear in mind that all work undertaken must be consistent with any existing land management agreements (e.g. a conservation agreement, or property vegetation plan) entered into by the property owner.

If your current development consent provides for an APZ, you do not need further approvals for works that are consistent with this consent.

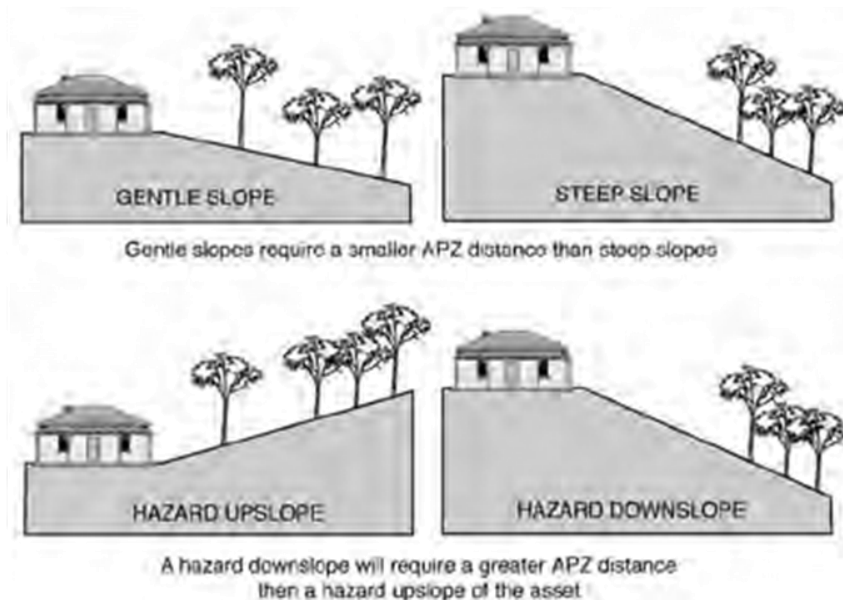
If you intend to burn off to reduce fuel levels on your property you may also need to obtain a Fire Permit through the RFS or NSW Fire Brigades. See the RFS document *Before You Light That Fire* for an explanation of when a permit is required.

STEP 3. DETERMINE THE APZ WIDTH

The size of the APZ required around your asset depends on the nature of the asset, the slope of the area, the type and structure of nearby vegetation and whether the vegetation is managed.

Fires burn faster uphill than downhill, so the APZ will need to be larger if the hazard is downslope of the asset.

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Different types of vegetation (for example, forests, rainforests, woodlands, grasslands) behave differently during a bush fire. For example, a forest with shrubby understorey is likely to result in a higher intensity fire than a woodland with a grassy understorey and would therefore require a greater APZ width.

A key benefit of an APZ is that it reduces radiant heat and the potential for direct flame contact on homes and other buildings. Residential dwellings require a wider APZ than sheds or stockyards because the dwelling is more likely to be used as a refuge during bush fire.

Subdivided land or construction of a new dwelling

If you are constructing a new asset, the principles of *Planning for Bushfire Protection* should be applied. Your Development Application approval will detail the exact APZ distance required.

Existing asset

If you wish to create an APZ around an existing asset and you require environmental approval, the Bush Fire Environmental Assessment Code provides a streamlined assessment process. Your Bush Fire Hazard Reduction Certificate (or alternate environmental approval) will specify the maximum APZ width allowed.

For further information on APZ widths see *Planning for Bushfire Protection* or the *Bush Fire Environmental Assessment Code* (available on the RFS website), or contact your local RFS Fire Control Centre.

STEP 4. DETERMINE WHAT HAZARD REDUCTION METHOD IS REQUIRED TO REDUCE BUSH FIRE FUEL IN YOUR APZ

The intensity of bush fires can be greatly reduced where there is little to no available fuel for burning. In order to control bush fire fuels you can reduce, remove or change the state of the fuel through several means.

Reduction of fuel does not require removal of all vegetation, which would cause environmental damage. Also, trees and plants can provide you with some bush fire protection from strong winds, intense heat and flying embers (by filtering embers) and changing wind patterns. Some ground cover is also needed to prevent soil erosion.

Fuels can be controlled by:

1. raking or manual removal of fine fuels

Ground fuels such as fallen leaves, twigs (less than 6 mm in diameter) and bark should be removed on a regular basis. This is fuel that burns quickly and increases the intensity of a fire.

Fine fuels can be removed by hand or with tools such as rakes, hoes and shovels.

2. mowing or grazing of grass

Grass needs to be kept short and, where possible, green.

3. removal or pruning of trees, shrubs and understorey

The control of existing vegetation involves both selective fuel reduction (removal, thinning and pruning) and the retention of vegetation.

Prune or remove trees so that you do not have a continuous tree canopy leading from the hazard to the asset. Separate tree crowns by two to five metres. A canopy should not overhang within two to five metres of a dwelling.

Native trees and shrubs should be retained as clumps or islands and should maintain a covering of no more than 20% of the area.

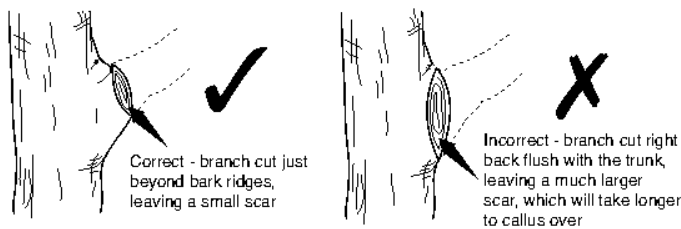
When choosing plants for removal, the following basic rules should be followed:

1. Remove noxious and environmental weeds first. Your local council can provide you with a list of environmental weeds or 'undesirable species'. Alternatively, a list of noxious weeds can be obtained at www.agric.nsw.gov.au/noxweed/;
2. Remove more flammable species such as those with rough, flaky or stringy bark; and
3. Remove or thin understorey plants, trees and shrubs less than three metres in height.

The removal of significant native species should be avoided.

Prune in accordance with the following standards:

- Use sharp tools. These will enable clean cuts and will minimise damage to the tree.
- Decide which branches are to be removed before commencing work. Ensure that you maintain a balanced, natural distribution of foliage and branches.
- Remove only what is necessary.
- Cut branches just beyond bark ridges, leaving a small scar.
- Remove smaller branches and deadwood first.



There are three primary methods of pruning trees in APZs:

1. Crown lifting (skirting)

Remove the lowest branches (up to two metres from the ground). Crown lifting may inhibit the transfer of fire between the ground fuel and the tree canopy.

2. Thinning

Remove smaller secondary branches whilst retaining the main structural branches of the tree. Thinning may minimise the intensity of a fire.

3. Selective pruning

Remove branches that are specifically identified as creating a bush fire hazard (such as those overhanging assets or those which create a continuous tree canopy). Selective pruning can be used to prevent direct flame contact between trees and assets.

Your Bush Fire Hazard Reduction Certificate or local council may restrict the amount or method of pruning allowed in your APZ.

See the *Australian Standard 4373 (Pruning of Amenity Trees)* for more information on tree pruning.

4. Slashing and trittering

Slashing and trittering are economical methods of fuel reduction for large APZs that have good access. However, these methods may leave large amounts of slashed fuels (grass clippings etc) which, when dry, may become a fire hazard. For slashing or trittering to be effective, the cut material must be removed or allowed to decompose well before summer starts.

If clippings are removed, dispose of them in a green waste bin if available or compost on site (dumping clippings in the bush is illegal and it increases the bush fire hazard on your or your neighbour's property).

Although slashing and trittering are effective in inhibiting the growth of weeds, it is preferable that weeds are completely removed.

Care must be taken not to leave sharp stakes and stumps that may be a safety hazard.

5. Ploughing and grading

Ploughing and grading can produce effective firebreaks. However, in areas where this method is applied, frequent maintenance may be required to minimise the potential for erosion. Loose soil from ploughed or graded ground may erode in steep areas, particularly where there is high rainfall and strong winds.

6. Burning (hazard reduction burning)

Hazard reduction burning is a method of removing ground litter and fine fuels by fire. Hazard reduction burning of vegetation is often used by land management agencies for broad area bush fire control, or to provide a fuel reduced buffer around urban areas.

Any hazard reduction burning, including pile burns, must be planned carefully and carried out with extreme caution under correct weather conditions. Otherwise there is a real danger that the fire will become out of control. More bush fires result from escaped burning off work than from any other single cause.

It is YOUR responsibility to contain any fire lit on your property. If the fire escapes your property boundaries you may be liable for the damage it causes.

Hazard reduction burns must therefore be carefully planned to ensure that they are safe, controlled, effective and environmentally sound. There are many factors that need to be considered in a burn plan. These include smoke control, scorch height, frequency of burning and cut off points (or control lines) for the fire. For further information see the RFS document *Standards for Low Intensity Bush Fire Hazard Reduction Burning*, or contact your local RFS for advice.

7. Burning (pile burning)

In some cases, where fuel removal is impractical due to the terrain, or where material cannot be disposed of by the normal garbage collection or composted on site, you may use pile burning to dispose of material that has been removed in creating or maintaining an APZ.

For further information on pile burning, see the RFS document *Standards for Pile Burning*.

In areas where smoke regulations control burning in the open, you will need to obtain a Bush Fire Hazard Reduction Certificate or written approval from Council for burning. During the bush fire danger period a Fire Permit will also be required. See the RFS document *Before You Light that Fire* for further details.

STEP 5. TAKE MEASURES TO PREVENT SOIL EROSION

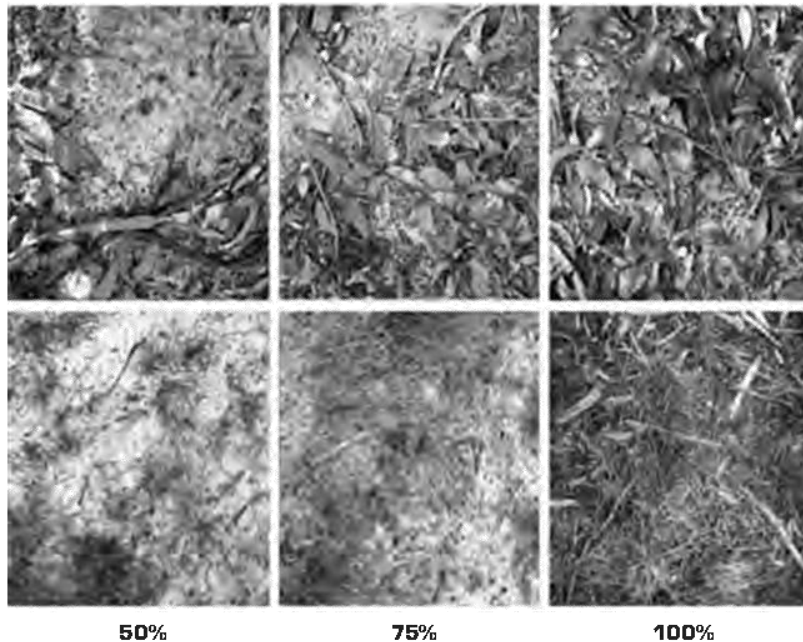
While the removal of fuel is necessary to reduce a bush fire hazard, you also need to consider soil stability, particularly on sloping areas.

Soil erosion can greatly reduce the quality of your land through:

- loss of top soil, nutrients, vegetation and seeds
- reduced soil structure, stability and quality
- blocking and polluting water courses and drainage lines

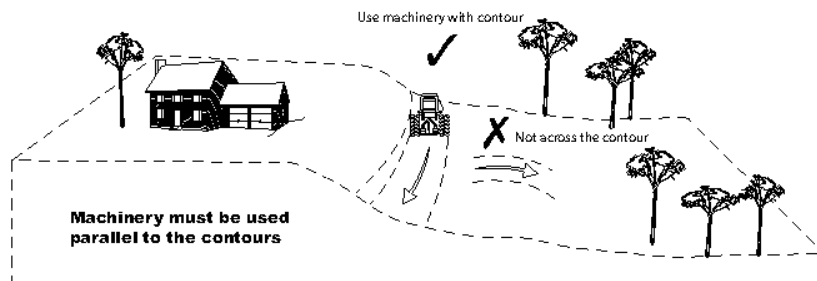
A small amount of ground cover can greatly improve soil stability and does not constitute a significant bush fire hazard. Ground cover includes any material which directly covers the soil surface such as vegetation, twigs, leaf litter, clippings or rocks. A permanent ground cover should be established (for example, short grass). This will provide an area that is easy to maintain and prevent soil erosion.

When using mechanical hazard reduction methods, you should retain a ground cover of at least 75% to prevent soil erosion. However, if your area is particularly susceptible to soil erosion, your Hazard Reduction Certificate may require that 90% ground cover be retained.



Ground Cover

To reduce the incidence of soil erosion caused by the use of heavy machinery such as ploughs, dozers and graders, machinery must be used parallel to the contours. Vegetation should be allowed to regenerate, but be managed to maintain a low fuel load.



STEP 6. ONGOING MANAGEMENT AND LANDSCAPING

Your home and garden can blend with the natural environment and be landscaped to minimise the impact of fire at the same time. To provide an effective APZ, you need to plan the layout of your garden to include features such as fire resistant plants, radiant heat barriers and windbreaks.

Layout of gardens in an APZ

When creating and maintaining a garden that is part of an APZ you should:

- ensure that vegetation does not provide a continuous path to the house;
- remove all noxious and environmental weeds;
- plant or clear vegetation into clumps rather than continuous rows;
- prune low branches two metres from the ground to prevent a ground fire from spreading into trees;
- locate vegetation far enough away from the asset so that plants will not ignite the asset by direct flame contact or radiant heat emission;
- plant and maintain short green grass around the house as this will slow the fire and reduce fire intensity. Alternatively, provide non-flammable pathways directly around the dwelling;
- ensure that shrubs and other plants do not directly abut the dwelling. Where this does occur, gardens should contain low-flammability plants and non flammable ground cover such as pebbles and crush tile; and
- avoid erecting brush type fencing and planting "pencil pine" type trees next to buildings, as these are highly flammable.



Removal of other materials

Woodpiles, wooden sheds, combustible material, storage areas, large quantities of garden mulch, stacked flammable building materials etc. should be located away from the house. These items should preferably be located in a designated cleared location with no direct contact with bush fire hazard vegetation.

Other protective features

You can also take advantage of existing or proposed protective features such as fire trails, gravel paths, rows of trees, dams, creeks, swimming pools, tennis courts and vegetable gardens as part of the property's APZ.

PLANTS FOR BUSH FIRE PRONE GARDENS

When designing your garden it is important to consider the type of plant species and their flammability as well as their placement and arrangement.

Given the right conditions, all plants will burn. However, some plants are less flammable than others.

Trees with loose, fibrous or stringy bark should be avoided. These trees can easily ignite and encourage the ground fire to spread up to, and then through, the crown of the trees.

- Plants that are less flammable, have the following features:
- high moisture content
 - high levels of salt
 - low volatile oil content of leaves
 - smooth barks without "ribbons" hanging from branches or trunks; and
 - dense crown and elevated branches.

When choosing less flammable plants, be sure not to introduce noxious or environmental weed species into your garden that can cause greater long-term environmental damage.

For further information on appropriate plant species for your locality, contact your local council, plant nurseries or plant society.

If you require information on how to care for fire damaged trees, refer to the Firewise brochure *Trees and Fire Resistance; Regeneration and care of fire damaged trees*.

WIND BREAKS

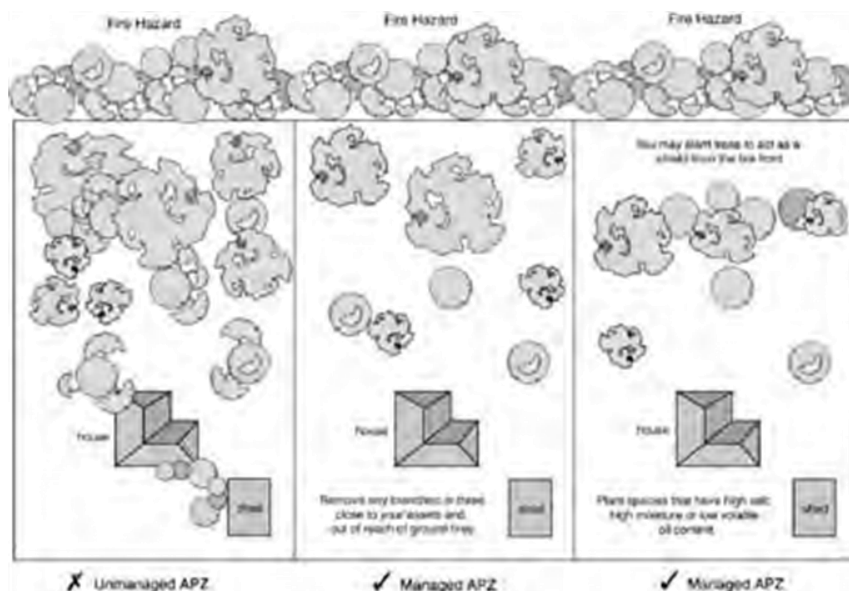
Rows of trees can provide a wind break to trap embers and flying debris that could otherwise reach the house or asset.

You need to be aware of local wind conditions associated with bush fires and position the wind break accordingly. Your local RFS Fire Control Centre can provide you with further advice.

When choosing trees and shrubs, make sure you seek advice as to their maximum height. Their height may vary depending on location of planting and local conditions. As a general rule, plant trees at the same distance away from the asset as their maximum height.

When creating a wind break, remember that the object is to slow the wind and to catch embers rather than trying to block the wind. In trying to block the wind, turbulence is created on both sides of the wind break making fire behaviour erratic.

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HOW CAN I FIND OUT MORE?

The following documents are available from your local Fire Control Centre and from the NSW RFS website at www.rfs.nsw.gov.au.

- Before You Light That Fire
- Standards for Low Intensity Bush Fire Hazard Reduction Burning
- Standards for Pile Burning
- Application Instructions for a Bush Fire Hazard Reduction Certificate

If you require any further information please contact:

- your local NSW Rural Fire Service Fire Control Centre. Location details are available on the RFS website or
- call the NSW RFS Enquiry Line 1800 679 737 (Monday to Friday, 9am to 5pm), or
- the NSW RFS website at www.rfs.nsw.gov.au.

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Appendix 5

Bush Fire Provisions - Landscaping and Property Maintenance

A5.1 Introduction

Bush fires are a natural and periodic event in the Australian landscape. Many Australian plants and animals have adapted to fire over thousands of years and require fire as part of their life cycle.

However, development adjacent to bushland areas has increased the risk of fire impacting on people and their assets. Fire management needs to strike a balance between the protection of life and property and the maintenance of ecological processes and systems.

In Australia, bush fires are inevitable and an essential aspect of the landscape.

However, the impact on property and life can be reduced with responsible preparation and management of bush fire hazards. This is the responsibility of all land managers, as well as communities and individuals taking responsibility for their own fire safety.

The level of protection for life or whether or not a house or other assets survive a bush fire ultimately depends on the landowner and their level of preparedness against bush fire attack.

The planning system can be used to better effect in protecting human life, property and environmental values from the impacts of bush fire events.

In some cases this will involve land use planning and development controls, construction standards, APZs and subdivision layout, siting, design and provision of services. It also involves careful and deliberate consideration of the environmental impacts of these and how we can recognise the need to protect our wetlands, rainforests, koala habitat and other biodiversity and cultural values.

However, the best planning can be undone by poor maintenance and lack of forethought when landscaping a development. Therefore house survival ultimately depends on the householder.

Some maintenance also depends upon adjoining neighbours and upon fuel management in adjacent bush land areas by the owners, occupiers or managers of that land. General housekeeping and maintenance of the grounds by the householder is equally important and, in some cases, may even be more so.

Experience from the Canberra 2003 fires suggests that house losses are greatest in the area up to 250 metres from the bush interface. Distances of

less than 100 metres are particularly vulnerable to flame contact, radiant heat and ember attack.

Hence it is within this distance that efforts should be made to prepare for the onslaught of major bush fire events.

While other legislation provides the impetus for planning objectives, the RF Act provides the legislative vehicle to achieve bush fire management objectives.

In this appendix consideration will be given to the principles for landscaping and management, and the role of property maintenance during the fire event.

A5.2 Principles of Protection

Bush fire attack takes essentially five forms;

- wind,
- smoke,
- ember,
- radiant heat and
- flame.

Evidence indicates ember attack is responsible for most bush fire related house fires. Strong winds resulting from severe bush fires will drive embers into vulnerable areas of a building, preheat and dry fuel ahead of a fire, lift roofing and extend flames along a more horizontal plane closer to building elements. Embers can also cause spotting in advance of the bush fire and provide piloted ignition to building elements. To effectively protect a building, strategies must be implemented that separate it from the hazard and reduce the intensity of bush fires to minimise the combined impact of ember, wind, flame and heat attack.

While smoke will cause minimal damage to property, it can severely affect the health of residents. Smoke is a significant factor in areas in which aged or disabled persons reside – hospitals and nursing homes - and more so where residents are susceptible to respiratory disorders.

Radiant heat (measured in kW/m²) can severely impair firefighting operations, the health of residents and the integrity of building elements. Radiant heat in excess of 10kW/m² can prevent emergency services personnel assisting residents of SFPP developments.

Flame attack will severely restrict firefighting operations, provide piloted ignition to building elements and threaten the health of residents and their capacity to evacuate the area.

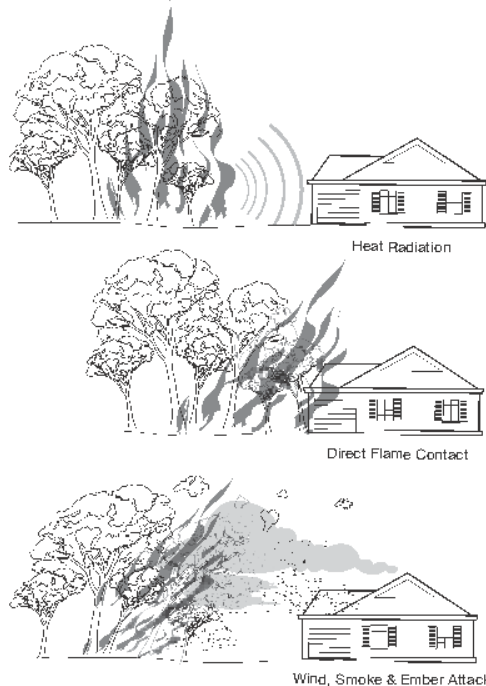


Figure A 5.1 Bush Fire Attack Mechanisms

Overall the intention of bush fire protection measures should be to prevent flame contact to a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and reduce the effects of smoke on residents and firefighters.

A5.3 Principles of Landscaping Properties for Bush Fire Protection

The principles of landscaping for bush fire protection aim to:

- Prevent flame impingement on the dwelling;
- Provide a defensible space for property protection;
- Reduce fire spread;
- Deflect and filter embers;
- Provide shelter from radiant heat; and
- Reduce wind speed.

(a) Vegetation choices

All vegetative material can burn under the influence of bush fire.

With this in mind, careful attention must be paid to species selection, their location relative to their flammability, avoidance of continuity of vegetation (horizontally and vertically), and ongoing maintenance to readily remove flammable fuels (leaf litter, twigs and debris).

In the paper "Landscape and Building Design for Bushfire Areas" G.C. Ramsay and L. Rudolph have provided 14 attributes of vegetation which affect bush fire attack. In summary these attributes are:

- Moisture content of leaves;
- Volatile oil content of leaves;
- Mineral content of leaves;
- Leaf fineness;
- Density of foliage;
- Continuity of plant form;
- Height of lowest foliage above ground;
- Size of plant;
- Dead foliage on the plant;
- Bark texture;
- Quantity of ground fuels;
- Fineness of ground fuels;
- Compaction ability of ground fuels; and
- Mineral content of ground fuel.

What is clear is that the higher moisture content of leaves (mesic), the less bark that will be available and the lower the leaf drop, all of which will assist with maintenance of the understorey and will also assist in reducing bush fire attack.

Work in the USA and elsewhere has also suggested that in addition to removal of understorey species, the trimming of lower limbs of trees also assists in reducing fire penetration into the canopy. Trees such as 'pencil pines' and African olive have been attributed with high fire propagation due to the high fine fuel and/or oil content captured within the canopy. This leads to significant flame height. Avoid such species in favour of rainforest species such as Figs and Syzygium.

When choosing plants, be sure not to introduce weed species into an area. Fire events may provide the opportunity for weed species to spread and may contribute fuel to an area of otherwise lower fuel loads.

Contact local councils, plant nurseries and plant societies to determine suitable species for your area.

(b) Trees as Windbreaks

The use of trees as windbreaks is a common practice but trees also provide a useful function, trapping embers and flying debris, which would otherwise reach the house. The tree crown will rarely carry fire unless there is a significant fuel loading on the ground.

By reducing the wind speed, a row of trees also slows the rate of spread of a bush fire and a dense foliage traps radiant heat, lowering bush fire radiant heat.

Because of the effect of turbulence, a balance has to be struck between a high density of trees (that

maximises the trapping of embers and radiant heat but also maximises turbulence) and a lower density (that allows more embers and radiant heat to pass through but minimises turbulence). A windbreak that allows 30–60% of the wind to pass through is ideal as less than this becomes too solid with ember laden winds being carried over the top of the break.

To be effective a windbreak must:

- be located on the side of the lot from which fire weather normally approaches;
- be of sufficient length (generally 100 metres minimum length);
- be located at a distance of one to three times the height of fully grown trees but not within the IPA;
- use smooth barked eucalypts, rainforest trees or deciduous trees;
- make sure there are no breaks of sufficient size to allow winds to funnel through; and
- be separated by sufficient distance from the hazard so as not to be consumed and become a hazard itself.

A5.4 Vegetation Management

Where APZs have been incorporated as part of the development approval for subdivision or for dwelling construction, the environmental aspects of the development should have already been taken into account.

In general, it is expected that APZs will be maintained by the owner of the land including maintenance of any fire trail constructed as part of the development.

It is accepted practice that after construction of a dwelling, gardens will be established and landscaping of the grounds will be undertaken. It is essential that efforts to reduce fuels on adjoining properties are therefore not negated by actions within the immediate curtilage of the building.

In terms of priorities of addressing bush fire attack, priority should be given to preventing flame impingement by not allowing fine debris to accumulate close to the building. Secondly, removal of understorey fuels aids in the reduction of flame heights and likely canopy fire, thereby reducing overall radiant heat. Removal of loose bark and fine fuels reduces both heat output and ember generation, while the retention of taller trees with canopies will also assist in filtering out embers.

To maintain a garden that does not contribute to the spread of bush fires, it is necessary to plan the layout of the garden beds and take an active decision to minimise certain features in favour of other features. These should include:

- maintaining a clear area of low cut lawn or pavement adjacent to the house;
- keeping areas under fences, fence posts and

- gates and trees raked and cleared of fuel;
- utilising non-combustible fencing and retaining walls
- breaking up the canopy of trees and shrubs with defined garden beds;
- organic mulch should not be used in bush fire prone areas and non flammable material should be used as ground cover, eg Scoria, pebbles, recycled crushed bricks.
- planting trees and shrubs such that:
 - the branches will not overhang the roof;
 - the tree canopy is not continuous; and
 - there is a windbreak in the direction from which fires are likely to approach.

The RFS has developed its document "Standards for Asset Protection Zones" which should be consulted for APZ specifications. This is also available on the RFS web page at www.rfs.nsw.gov.au.

A5.5 Maintenance of Property

Sensible arrangements for landscaping and maintenance of the property are critical in the prevention of losses.

In considering property maintenance the following items should therefore be implemented in advance of the bush fire season:

- removal of material such as litter from the roof and gutters;
- ensure painted surfaces are in good condition with decaying timbers being given particular attention to prevent the lodging of embers within gaps;
- check pumps and water supplies are available and in working order;
- driveways are in good condition with trees not being too close and forming an obstacle during smoky conditions;
- check tiles and roof lines for broken tiles or dislodged roofing materials;
- screens on windows and doors are in good condition without breaks or holes in flyscreen material and frames are well fitting into sills and window frames;
- drenching or spray systems are regularly tested before the commencement of the fire season;
- hoses and hose reels are not perished and fittings are tight and in good order;
- doors are fitted with draught seals and well maintained;
- mats are of non combustible material or in areas of low potential exposure; and
- woodpiles, garden sheds and other combustible materials are located downslope and well away from the house.

Trees and other vegetation in the vicinity of power lines and tower lines should be managed and trimmed in accordance with the specifications in "Vegetation Safety Clearances" issued by Energy Australia (NS179, April 2002).

Appendix G ~ Engineering Report

Engineering Appraisal

For

Part Lot 202 DP 874273

Newmans Road Woolgoolga

September 2018



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INTRODUCTION

de Groot & Benson Pty Ltd has been engaged by Keiley Hunter Town Planning Pty Ltd to prepare a Development Appraisal for a parcel of land at Newmans Road, Woolgoolga, NSW.

The cadastral description of the subject site is Part Lot 202 DP 874273 and the property is located within the local government area of Coffs Harbour City Council.

The purpose of this report is to provide preliminary information on the development potential of this allotment.

1.1 Existing Site

The subject site consists of two segments of land documented as the one parcel of land, as is identified below in Figure 1.

Figure 1: Site Locality and Extents



The area of the subject land is 9.229 ha. The site consists of moderately undulating grassland, with some scattered trees. The site is located on a knoll, and as such the land falls away from the top of the feature. Elevation of the site varies from approximately RL 9.5m AHD, to around RL 38.0 m AHD. Surface slope is relatively moderate, typically around 10%, with isolated areas getting as steep as 25% and as flat as 1%. At present there are no dwellings on the site.



1.2 Zoning

The land is currently zoned RU2 – Rural Landscape, with the northern and southern parts of Lot 202 being separated by RE1 - public recreation land.

It is proposed by the applicant that this land be rezoned as R2 – Low Density Residential, to allow subdivision down to a minimum of 400 m² lot area.

Such zoning would be consistent with neighbouring properties, which are generally residential developments of various densities.

2 CONCEPT LAYOUT

2.1 Layout Drawings

In order to aid in determining the feasibility of the proposal, a concept subdivision layout has been prepared indicating that the potential lot yield is 80 to 90 low density lots of around 600 m² or greater. The concept layout took into consideration standard engineering and planning practices, in order to produce a good indication of the likely resemblance of a residential subdivision of the property.

3 INFRASTRUCTURE

3.1 Water and Sewerage

The site falls within the areas proposed for service of Coffs Harbour Water – the arm of Council which provides this infrastructure.

Preliminary investigations with Coffs Harbour City Council indicate that adequate water is available to the site from mains located in neighbouring developments.

A similar story applies for sewerage, with adequate treatment capacity available at Woolgoolga Sewage Treatment Plant. Augmentations however may be required for the transfer system from the site to the Treatment Plant, but this normally is the responsibility of Council.

It is expected that the sewerage from the entirety of the site can be drained by gravity to a single new sewage pump station located in the reserve which runs between the two portions of the site. From there rising mains would convey the sewage to existing Council systems leading to the Woolgoolga Sewage Treatment Plant.

3.2 Energy and Telecommunications



No approaches have been made to Essential Energy or telecommunication service providers, but supply is not expected to pose any constraint to development.

Neighbouring properties are occupied by residential developments of various densities and as such are supplied with Energy and Telecommunication services.

Therefore, servicing any new developments should be a relatively simple undertaking.

3.3 Access

Access to the land is via Newmans Road. Newmans Road is a sealed public road, 6m in width, and connects to Solitary Islands Way, to the east of the site.

As part of the development of the site, new AC sealed roads would be constructed to convey traffic throughout the subdivision.

4 POTENTIAL CONSTRAINTS

4.1 Flooding

Almost the entirety of the site is situated outside Council's Flood Planning Area, with only a very small portion at the southern boundary of the northern section of Lot 202 (not part of the subject land) noted as flood prone on Council mapping.

The land has adequate fall to efficiently convey stormwater runoff, via piped systems as well as designated overland flow paths, and thusly the risk of flooding of future residences is reduced.

In light of the above, it can be concluded that flooding concerns will not be a constraint to this rezoning.

4.2 Acid Sulfate Soils

Coffs Harbour City Council Mapping shows that practically the entirety of the site is classified as Class 5 Acid Sulfate Soils, which is the lowest possible risk class.

Therefore, it is highly unlikely that development of the property into residential lots will disturb acid sulphate soils (ASS).

4.3 Contaminated Lands – Banana Cultivation

Council mapping shows that none of the site has been used for banana cultivation, and as such land contamination is not considered to be an issue for this proposal.



4.4 Landform

As was previously mentioned, the whole site has land slopes less than 25%. This being the case, landform does not impose any impediment to urban development. Generally, the landform is suitable for the full range of urban development, right down to 400 m² allotments.

The elevation range of the site (approximately RL 9.5m AHD to RL 38.0m AHD) will allow for normal development of the property.

As a matter of good civil engineering practice, residential allotments will not be placed in natural drainage paths (gullies), but instead roads should be used as safe overland drainage channels, as is shown on drawing 04253 – SK1 to 04253 – SK3.

4.5 Geotechnical Considerations

From our general knowledge of the area, we do not expect any geotechnical factors will be limiting to the construction of dwellings and civil infrastructure.

4.6 Bush Fire Considerations

In planning the development, consideration will need to be given to the “Planning for Bushfires Guidelines” as set out by the New South Wales Rural Fire Service.

Coffs Harbour City Council mapping shows that some Category 1 and Category 2 vegetation does surround the site, and in some cases protrudes into the subject land.

In determining lot yields, we have placed perimeter roads around the concept subdivision where adjacent properties have significant vegetation. These perimeter roads will allow space for bushfire asset protection zones (APZ).

Final lot yields will be informed by a bushfire report.

5 DEVELOPMENT CONSTRAINT ANALYSIS

Listed below is a brief constraint analysis for the site:

ITEM	Comment
• Zoning	Provided the land is appropriately re-zoned, zoning of the land is not envisaged to be a constraint to development.
• Infrastructure	As discussed in Section 3, water, sewerage, power and telephone services are not expected to be a constraint for development.
• Flooding	The site has sufficient elevation and fall to ensure that flooding will not be an issue for the development, as is discussed in Section 4.1.



• Acid Sulfate Soils	Minimal or no acid sulphate soils are expected to be disturbed by the development of the site.
• Geotechnical	Geotechnical issues are not expected to be any constraint on development.
• Slope	The site is generally less than 20% and therefore slope should not be a constraint to any development.
• Chemical Contamination	No chemical contamination is expected to be present on the site.
• Bushfire	With the proper use of APZs, bushfire concerns will not prove to be a constraint to the development of this site.

Appendix H ~ Traffic Impact Assessment





**ADDENDUM -
TRAFFIC IMPACT ASSESSMENT**

(ADDRESSING COUNCIL INFORMATION REQUEST
DATED OCTOBER 2018)

PROPOSED RESIDENTIAL ESTATE

92 NEWMANS ROAD AND 36A BARK HUT ROAD,
WOOLGOOLGA

Prepared for
SUNDERPAL SODHI

25 OCTOBER 2018

DOCUMENT REGISTER


Document Bark Hut Road Rezoning
Traffic Impact Assessment (TIA)

RTG Reference 17274

Date 25 October 2018

Prepared by Dare Janzekovic, Luke Rytenskild

Document History

Version	Version date	Details	Reviewed and Authorised	
			Name / Position	Signature
1	25 October 2018	DA Submission	Luke Rytenskild Director RPEQ 6293	

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1.0 INTRODUCTION

Rytenskild Traffic Engineering (RTE) has been engaged by Sunderpal Sodhi to review the traffic impacts of its proposed Residential Subdivision at Woolgoolga.

This is an addendum to the Traffic Impact Assessment dated 13th September, 2018 and responds to matters raised by Council. In accordance with Council's request, the traffic analysis presented in this report has been adjusted to allow for:

- the potential traffic generation of other future development along Newmans Road ;
- a more conservative distribution of development traffic along Newmans Road and at the Solitary Islands Way intersection ;
- a higher background traffic growth rate for through traffic on Solitary Island Ways ;
- a 20 year design horizon (year 2040) ;
- an assessment of various upgrade options for the Solitary Islands Way / Newmans Road intersection.

2.0 REVISED DESIGN TRAFFIC CALCULATIONS

2.1 Background Traffic Volumes

Background traffic volumes have been estimated by applying a 2% per annum growth rate to through traffic volumes on Solitary Islands Way. A design horizon has been set at the year 2040, with the commencement year assumed to be 2020. It is noted that the surveyed turning movement volumes shown in the GHD report dated 15th November 2015 are marginally higher than those surveyed by RTE in February 2018. To be conservative, the GHD volumes have been adopted, along with the through traffic volumes on Solitary Islands Way, provided to RTE by Council.

2.2 Traffic Generated by Other Future Development

Traffic generation estimates have been applied for the following future development areas along Newmans Road :

- West Woolgoolga Development Control Plan (DCP) – 139 lots ;
- Approved Manufactured Home Park to the south of Macintosh Crescent (196 sites).

It is noted that the GHD traffic report dated 15th November 2015 allowed for the following development in the above areas :

- West Woolgoolga Development Control Plan (DCP) – 139 lots ;
- Approved DA (45 lots and 92 x Seniors Living Dwellings).

A trip generation of 75 vehicles per hour was adopted for the approved development. The current proposal will have a similar generation of 78 vehicles per hour (i.e. 196 sites x 0.4 trips). On this

basis, the trip generation outlined in the GHD report has been assumed for both the DCP and approved DA.

2.3 Proposed Development Traffic

It has been assumed that all traffic generated by the southern precinct will use Newmans Road to access Solitary Island Way. Trip generation estimates as outlined in the Traffic Impact Assessment are provided below:

Table 5.1 - Estimated Development Traffic Generation (Proposed southern precinct)

Component	Morning Peak Hour			Afternoon Peak Hour		
	In	Out	Total	In	Out	Total
Southern precinct (94 lots):	15	61	76	45	31	76

Peak Hour Distribution: AM – 20 / 80, PM – 60 / 40

2.4 Design Traffic Volumes

The design traffic volumes equate to the summation of the above traffic estimates for the commencement year and the year 2040. The traffic volume estimates are shown in Figures 2.1 and 2.2, with the design volumes shown in Figure 2.3.

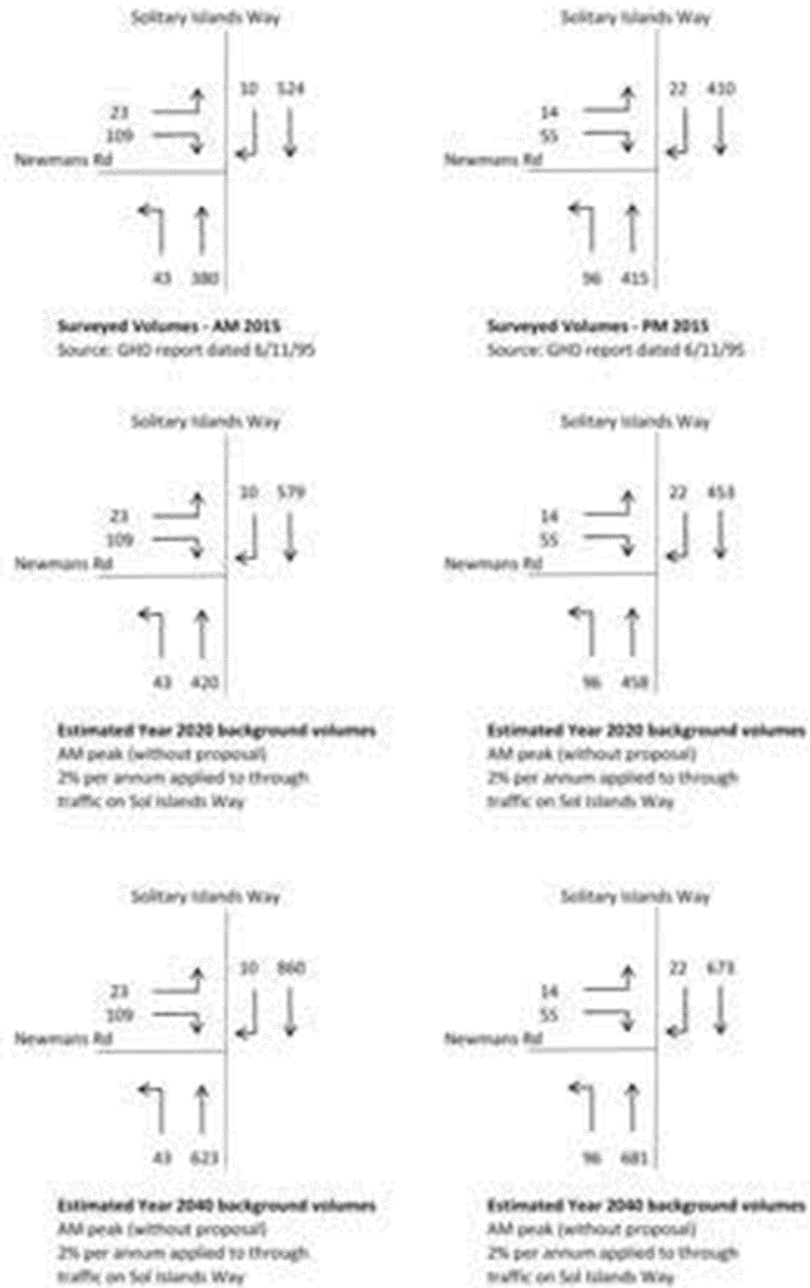


FIGURE 2.1 – BACKGROUND TRAFFIC VOLUME ESTIMATES FOR THE SOLITARY ISLANDS WAY / NEWMANS RD INTERSECTION

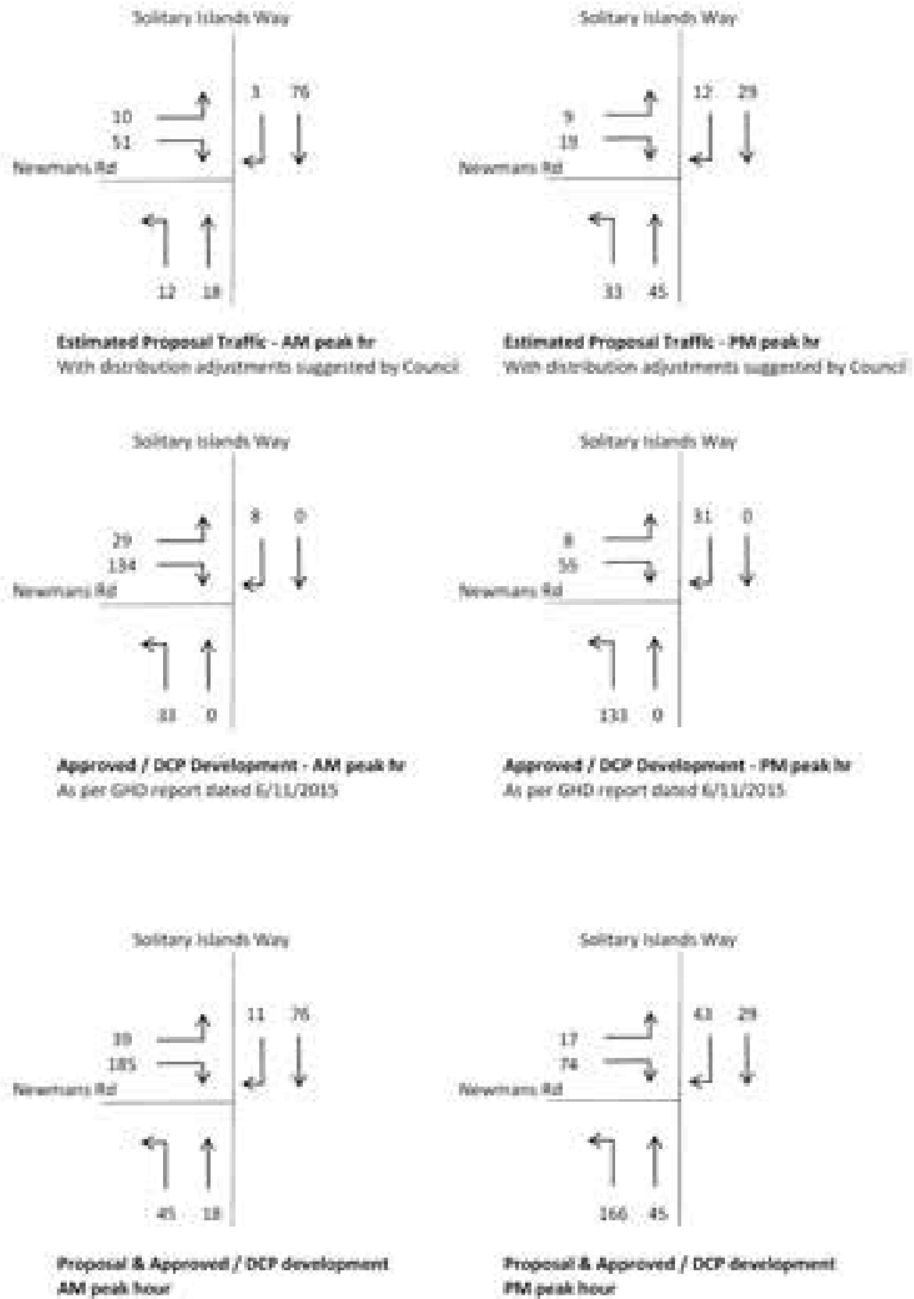


FIGURE 2.2 – ESTIMATED TRAFFIC VOLUMES AT THE SOLITARY ISLANDS WAY / NEWMANS ROAD INTERSECTION (GENERATED BY THE PROPOSAL AND OTHER PLANNED DEVELOPMENT ALONG NEWMANS ROAD)

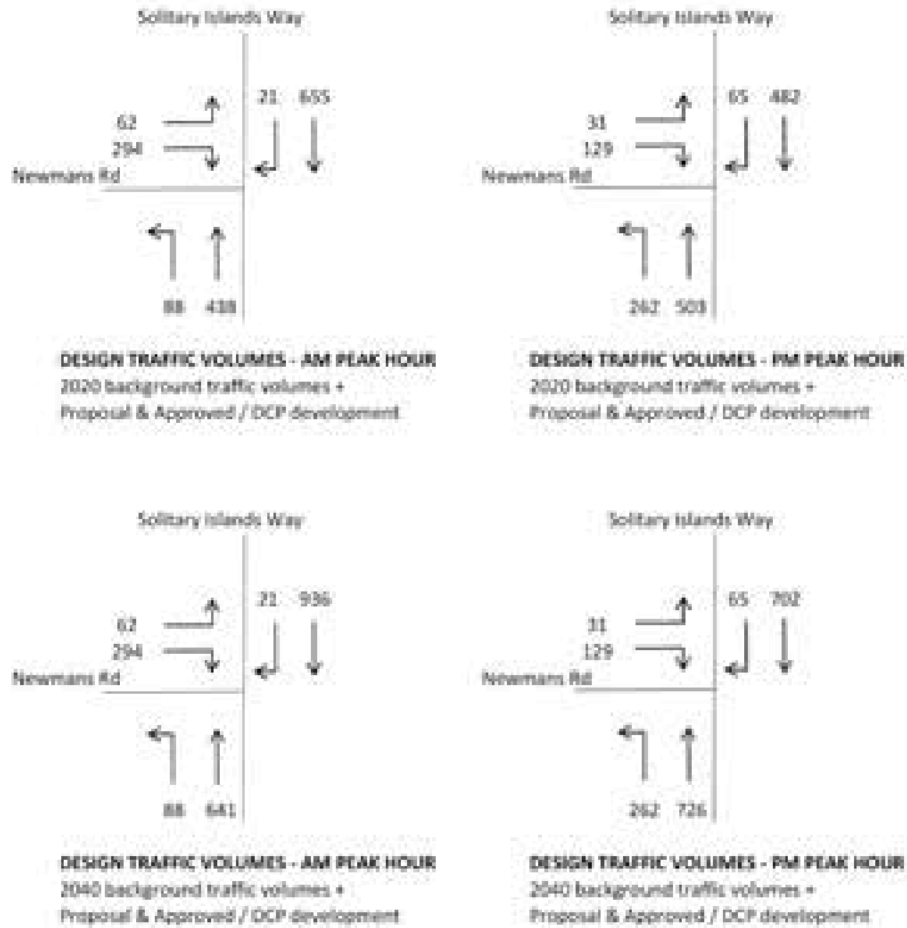


FIGURE 2.3 – DESIGN PEAK HOUR TRAFFIC VOLUMES (2020 AND 2040) AT THE SOLITARY ISLANDS WAY / NEWMANS ROAD INTERSECTION

3.0 SOLITARY ISLANDS WAY / NEWMANS ROAD INTERSECTION

3.1 Existing Intersection Layout

The results of the SIDRA analysis are presented in Appendix C and summarised below in Table 3.1. The criteria for evaluating the SIDRA results is presented in Appendix B.

Table 3.1: SIDRA Results (Solitary Islands Way / Newmans Road intersection)

Scenario	Degree of Saturation	Level of Service*	Total Average Delay (seconds)	Queue Length (metres)
2020 AM Peak – design traffic	1.024	F	26.4	204
2020 PM Peak – design traffic	0.44	C	3.1	13.1

The SIDRA output is provided in Attachment B.

As shown in the original Traffic Impact Assessment, the existing Solitary Islands Way / Newmans Road intersection is currently performing satisfactorily. However, as shown above in Table 3.1, the intersection would fail with the Newmans Road catchment fully developed (i.e. the proposal, the approved manufacturing home park, and the west Woolgoolga DCP completed). As shown, the intersection would fail during the morning peak hour which is the critical period for the right turn movement from Newmans Road to the south.

3.2 Future Upgrade Requirements

Further traffic modelling has been carried out to test the performance of the following intersection controls:

- Roundabout;
- Traffic signals.

As shown in Table 3.2, a roundabout option has been modelled using an inside island diameter of 20 metres. It is noted that the GHD report from November 2015 assumed a 10 metre diameter, however it is considered that such would not be appropriate for a major road such as Solitary Islands Way. As shown in Table 3.2, a single lane roundabout would approach capacity during the year 2020 morning peak hour, assuming the full development of the Newmans Road catchment. This option would not be suitable for the ultimate design horizon (2040).

A sensitivity analysis has been carried out for a double lane roundabout layout. As shown in Table 3.2, a double lane roundabout would perform satisfactorily for ultimate traffic conditions.

Table 3.2: SIDRA Results (Solitary Islands Way / Newmans Road – single lane roundabout)

Scenario	Degree of Saturation	Level of Service*	Total Average Delay (seconds)	Queue Length (metres)
2020 AM Peak – design traffic	0.702	A	8.0	64
2020 PM Peak – design traffic	0.569	A	5.8	42
2040 AM Peak – design traffic	0.989	C	21.0	314
2040 PM Peak – design traffic	0.729	A	6.0	77
Sensitivity – 2040 AM Peak – design traffic	0.524	A	6.6	34
Sensitivity – 2040 PM Peak – design traffic	0.487	A	5.5	32

The SIDRA output is provided in Attachment C.

The traffic modelling indicates that the signalised layout tested by GHD would fail during the short – medium term, as there would be excessive queuing on Solitary Islands Way, in each direction. Further modelling indicates that a signalised layout would need to include a second short through lane in each direction on Solitary Islands Way. As shown below, this layout would perform satisfactorily under year 2040 peak traffic periods. The modelled intersection layout is shown in Appendix D.

Table 3.3: SIDRA Results (Solitary Islands Way / Newmans Road – traffic signals)

Scenario	Degree of Saturation	Level of Service*	Total Average Delay (seconds)	Queue Length (metres)
2040 AM Peak – design traffic	1.079	F	110.4	869
2040 PM Peak – design traffic	0.888	C	31.1	309
Sensitivity – 2040 AM Peak – design traffic	0.867	D	37.4	206.9
Sensitivity – 2040 PM Peak – design traffic	0.757	C	26.2	105.9

The SIDRA output is provided in Attachment D.

It appears that the requires signalised layout may not be practical given constraints associated with the bridge just to the north of the intersection. However, as shown in Figure 3.1., it may be possible to achieve the double lane roundabout layout without impacting upon the bridge. Detailed investigations of each option should be carried out by Council.



FIGURE 3.1 – CONCEPT SKETCH OF DOUBLE LANE ROUNDABOUT

4.0 SUMMARY OF CONCLUSIONS & RECOMMENDATIONS

- Further traffic modelling has been carried out which allows for other planned development in Newmans Road and also a design horizon at the year 2040. The analysis also allows more conservative assumptions with respect to background traffic growth and trip distribution.
- The traffic modelling indicates that the Solitary Islands Way / Newmans Road intersection would need to be upgraded to a roundabout or traffic signal control in the medium term future, as the Newmans Road catchment develops.
- The modelling indicates that a roundabout would need to comprise of two circulating lanes, with a double approach lane on each Solitary Islands Way approach.
- A signalised layout would need to comprise of a second short through lane in each direction on Solitary Islands Way in order to accommodate ultimate queuing demands. It may not be practical to achieve this layout due to constraints associated with the bridge located just to the north of Newmans Road.

APPENDICES

APPENDIX A – CRITERIA FOR EVALUATING SIDRA RESULTS
APPENDIX B – DETAILED SIDRA RESULTS

APPENDIX A – CRITERIA FOR EVALUATING SIDRA RESULTS

1. Level of Service (LOS)

LOS	Traffic Signals and Roundabouts	Give Way and Stop Signs
'A'		Good operation.
'B'	Good operation.	Acceptable delays and spare capacity.
'C'	Good with acceptable delays and spare capacity.	Satisfactory but accident study required.
'D'	Satisfactory.	Near capacity and accident study required.
'E'	Operating near capacity.	At capacity and requires other control mode.
'F'	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	Unsatisfactory and requires other control mode.

2. Average Vehicle Delay (AVD)

The AVD provides a measure of the operational performance of an intersection as indicated on the table below which relates AVD to LOS. The AVD's listed in the table should be taken as a guide only as longer delays could be tolerated in some locations (i.e. inner city conditions) and on some roads (i.e. minor side street intersecting with a major arterial route).

Level of Service	Average Delay per Vehicle (secs/veh)	Traffic Signals, Roundabout	Give Way and Stop Signs
A	less than 14	Good operation.	Good operation.
B	15 to 28	Good with acceptable delays and spare capacity.	Acceptable delays and spare capacity.
C	29 to 42	Satisfactory.	Satisfactory but accident study required.
D	43 to 56	Operating near capacity.	Near capacity and accident study required.
E	57 to 70	At capacity; at signals incidents will cause excessive delays. Roundabouts require other control mode.	At capacity and requires other control mode.

3. Degree of Saturation (DS)

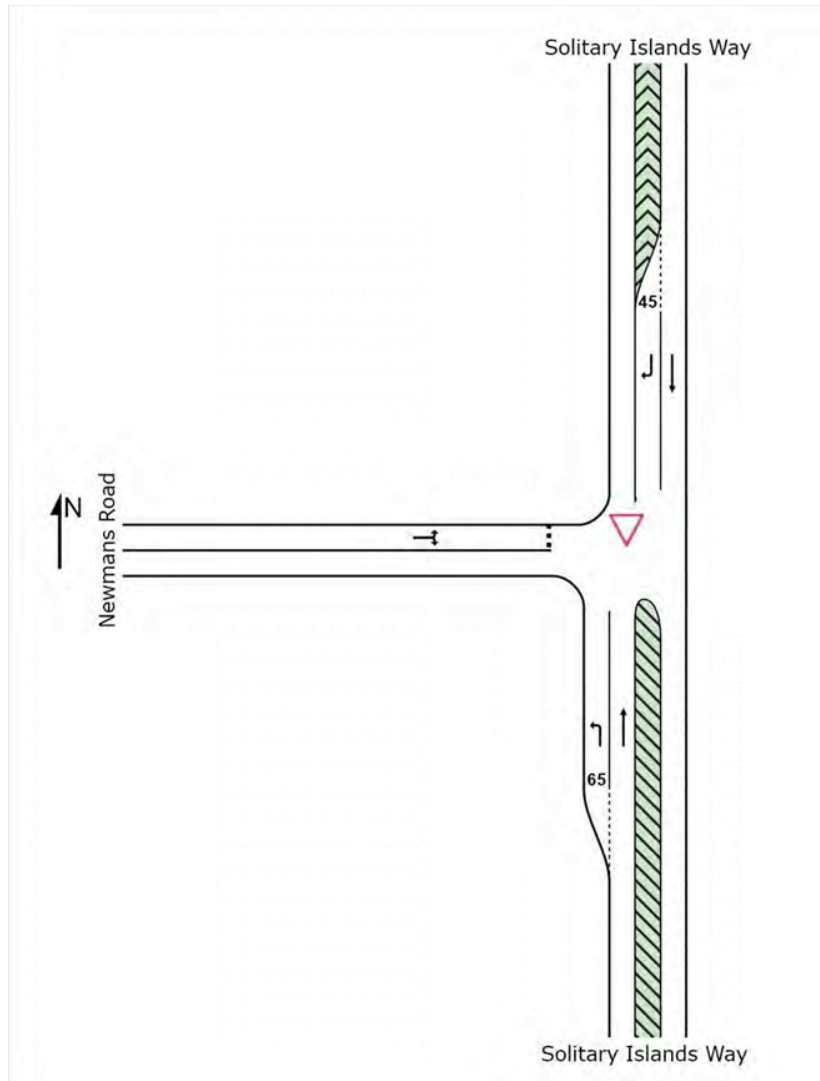
The DS is another measure of the operational performance of individual intersections.

For intersections controlled by **traffic signals**¹ both queue length and delay increase rapidly as DS approaches 1, and it is usual to attempt to keep DS to less than 0.9. Values of DS in the order of 0.7 generally represent satisfactory intersection operation. When DS exceeds 0.9 queues can be anticipated.

For intersections controlled by a **roundabout or GIVE WAY or STOP signs**, satisfactory intersection operation is indicated by a DS of 0.8 or less.

¹The values of DS for intersections under traffic signal control are only valid for cycle length of 120 secs.

APPENDIX B – SIDRA RESULTS (EXISTING SOL ISLANDS WAY / NEWMANS RD)



YEAR 2020 – WITH NEWMANS ROAD FULLY DEVELOPED

MOVEMENT SUMMARY

Site: 2020 AM Peak - DESIGN

17274 - Newmans Road / Solitary Islands Way Intersection
 Sensitivity model - no traffic to west
 Overview / Yield (Two-Way)

Movement Performance - Vehicles											
Way	Phase	Flow	Delay	Queue	Stop	Start	Stop	Start	Stop	Start	Stop
North Solitary Islands Way											
1	L2	80	5.5	1,098	0.8	1,098	0.8	0.8	1.00	0.98	48.9
2	T1	434	15.1	3,209	2.0	1,098	0.0	0.0	1.00	0.98	59.9
Approach		514	8.3	4,307	1.0	NA	0.8	0.8	1.00	0.98	69.9
North Solitary Islands Way											
8	T1	480	16.0	3,209	0.0	1,098	0.8	0.8	0.99	0.98	59.9
9	R2	31	0.9	1,021	7.7	1,098	0.1	0.8	1.00	0.98	49.9
Approach		511	8.9	4,230	7.7	NA	0.9	0.8	1.00	0.98	69.9
West Newmans Road											
10	L2	62	3.5	1,024	10.0	1,098	27.8	200.8	1.00	0.27	11.1
11	R2	294	9.9	1,024	10.7	1,098	27.8	200.8	0.99	0.27	11.2
Approach		356	8.0	2,048	11.5	1,098	55.6	201.6	1.00	0.27	11.2
All Approaches		1,030	8.3	4,024	28.4	NA	27.8	201.6	0.28	0.79	69.9

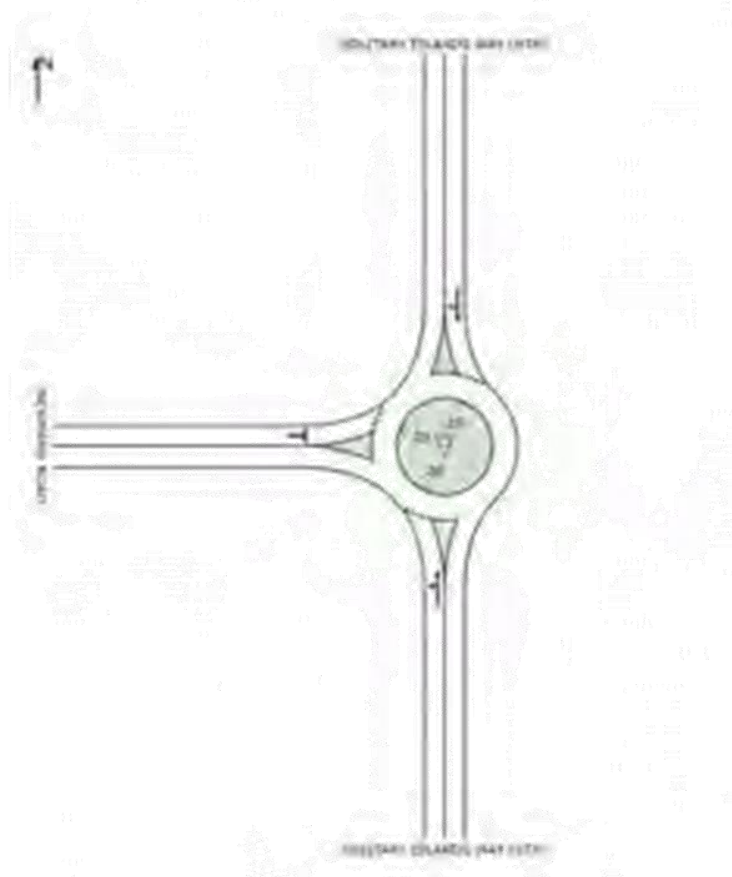
MOVEMENT SUMMARY

Site: 2020 PM Peak - DESIGN

17274 - Newmans Road / Solitary Islands Way Intersection
 Sensitivity model - no traffic to west
 Overview / Yield (Two-Way)

Movement Performance - Vehicles											
Way	Phase	Flow	Delay	Queue	Stop	Start	Stop	Start	Stop	Start	Stop
North Solitary Islands Way											
1	L2	280	2.3	1,144	0.8	1,098	1.1	0.0	0.00	1.07	48.8
2	T1	380	10.0	3,275	0.0	1,098	0.0	0.0	0.00	0.99	59.9
Approach		660	8.8	4,419	0.8	NA	0.0	0.0	0.00	0.99	57.1
North Solitary Islands Way											
8	T1	480	16.0	3,275	0.0	1,098	0.0	0.0	0.00	0.99	59.9
9	R2	39	0.8	1,097	8.0	1,098	0.4	0.0	0.00	0.99	44.1
Approach		519	8.4	4,372	8.0	NA	0.4	0.0	0.00	0.99	59.9
West Newmans Road											
10	L2	61	3.3	1,140	7.0	1,098	0.8	0.0	0.76	0.99	59.9
11	R2	290	9.2	1,140	10.0	1,098	0.8	0.0	0.76	0.99	59.9
Approach		351	8.2	2,280	17.0	1,098	1.6	0.0	0.76	0.99	59.9
All Approaches		1,021	8.8	3,640	17.0	NA	1.6	0.0	0.41	0.20	59.9

APPENDIX C – SIDRA RESULTS (SOL ISLANDS WAY / NEWMANS RD – SINGLE LANE ROUNDABOUT)



YEAR 2020 – WITH NEWMANS ROAD FULLY DEVELOPED

MOVEMENT SUMMARY

Site: 2020 AM Peak DESIGN roundabout
 Salford Islands Way / Newmans Rd, Hookepoole Roundabout

Movement Performance - Vehicles												
Mov	LT	RT	Thru	Left	Right	Left	Thru	Right	Left	Thru	Right	Delay (sec)
Northbound (Salford Islands Way (S11))												
1	L2	51	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	54.8	
2	T1	487	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	55.0	
Approach		538	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	54.9	
Southbound (Salford Islands Way (S11))												
4	T1	881	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	52.0	
5	R2	327	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	52.0	
Approach		1208	0.0	0.002	0.0	L20.4	0.1	23.0	0.11	0.40	52.0	
Westbound (Newmans Road)												
10	L2	65	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.2	
11	R2	300	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.2	
Approach		365	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.0	
All vehicles		1941	0.0	0.010	0.0	L20.4	0.1	23.0	0.11	0.40	50.7	

MOVEMENT SUMMARY

Site: 2020 PM Peak DESIGN single roundabout
 Salford Islands Way / Newmans Rd, Hookepoole Roundabout

Movement Performance - Vehicles												
Mov	LT	RT	Thru	Left	Right	Left	Thru	Right	Left	Thru	Right	Delay (sec)
Northbound (Salford Islands Way (S11))												
1	L2	78	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	52.6	
2	T1	870	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	52.8	
Approach		948	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	52.6	
Southbound (Salford Islands Way (S11))												
4	T1	100	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.0	
5	R2	38	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.0	
Approach		138	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.0	
Westbound (Newmans Road)												
10	L2	72	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.1	
11	R2	340	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.1	
Approach		412	0.0	0.008	0.0	L20.4	0.1	23.0	0.11	0.40	50.1	
All vehicles		1540	0.0	0.016	0.0	L20.4	0.1	23.0	0.11	0.40	50.7	

YEAR 2040 – WITH NEWMANS ROAD FULLY DEVELOPED

MOVEMENT SUMMARY

Site: 2040 AM Peak DESIGN single roundabout

Saltley Islands Way / Newmans Rd Woodgrove Roundabout

Movement Performance - Vehicles											
Mov	Dir	Vol	Cap	SL	SL	SL	SL	SL	SL	SL	SL
South (SALTY ISLANDS WAY) (Veh)											
1	S2	83	5.0	0.466	6.1	1.084	0.3	49.1	0.75	0.26	64.4
2	T1	173	15.0	0.466	13.0	1.084	3.0	163.1	0.21	0.20	159.1
Approach		257	6.4	0.466	19.1	1.084	3.0	163.1	0.74	0.26	163.1
North (SALTY ISLANDS WAY) (Veh)											
3	T1	449	15.0	0.466	36.0	1.084	19.0	213.1	1.06	1.06	203.1
4	R2	25	5.0	0.466	40.4	1.084	11.0	213.1	1.80	1.80	192.1
Approach		474	9.9	0.466	76.4	1.084	30.0	213.1	1.06	1.80	192.1
West (NEWMANS ROAD)											
10	L2	93	5.0	0.466	10.7	1.084	1.8	26.2	0.82	0.82	44.0
11	R2	199	5.0	0.466	16.7	1.084	3.8	26.2	0.80	0.80	49.0
Approach		292	5.0	0.466	27.4	1.084	5.6	26.2	0.82	0.80	49.0
All Movements		1121	9.9	0.466	113.6	1.084	41.2	213.1	0.86	1.06	144.0

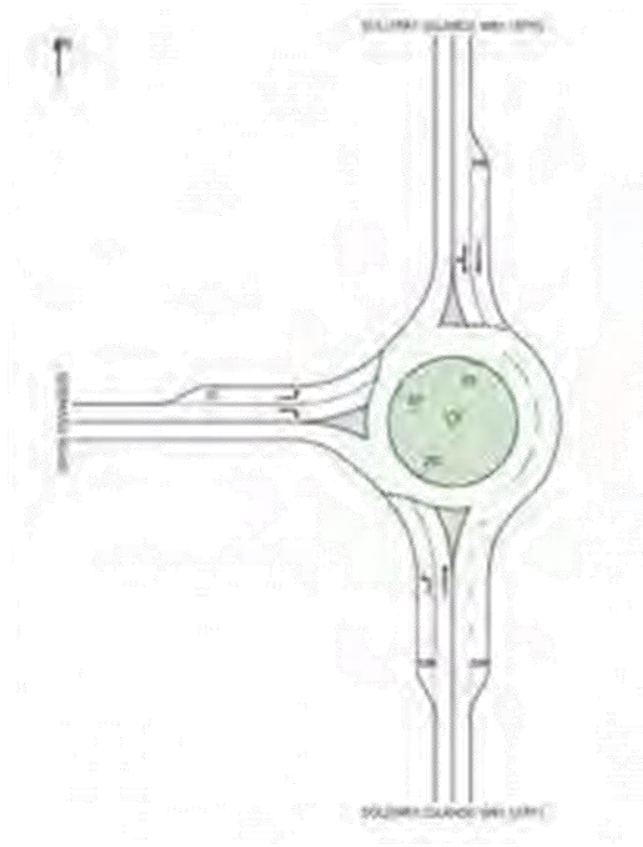
MOVEMENT SUMMARY

Site: 2040 PM Peak DESIGN single roundabout

Saltley Islands Way / Newmans Rd Woodgrove Roundabout

Movement Performance - Vehicles											
Mov	Dir	Vol	Cap	SL	SL	SL	SL	SL	SL	SL	SL
South (SALTY ISLANDS WAY) (Veh)											
1	S2	178	5.0	0.729	6.7	1.084	16.2	66.8	0.20	0.40	103.1
2	T1	384	15.0	0.729	31.0	1.084	19.0	76.8	0.23	0.40	114.0
Approach		562	6.7	0.729	37.7	1.084	35.2	76.8	0.21	0.40	114.0
North (SALTY ISLANDS WAY) (Veh)											
3	T1	126	15.0	0.640	10.0	1.084	7.1	54.0	0.60	0.34	61.0
4	R2	66	5.0	0.640	19.0	1.084	7.1	54.0	0.60	0.34	61.0
Approach		192	9.8	0.640	19.0	1.084	7.1	54.0	0.60	0.34	61.0
West (NEWMANS ROAD)											
10	L2	81	5.0	0.290	9.0	1.084	1.8	12.8	0.81	0.81	49.0
11	R2	156	5.0	0.290	14.4	1.084	1.8	12.8	0.81	0.81	49.0
Approach		237	5.0	0.290	13.2	1.084	1.8	12.8	0.81	0.81	49.0
All Movements		1143	8.1	0.729	89.1	1.084	48.2	76.8	0.56	0.58	114.0

SENSITIVITY – 2040 AM PEAK HOUR (TWO LANE ROUNDABOUT)



MOVEMENT SUMMARY

Site: 2040 AM Peak DESIGN two lane roundabout
 Sutter Islands Way / Meiners Rd, Woodgrove Roundabout

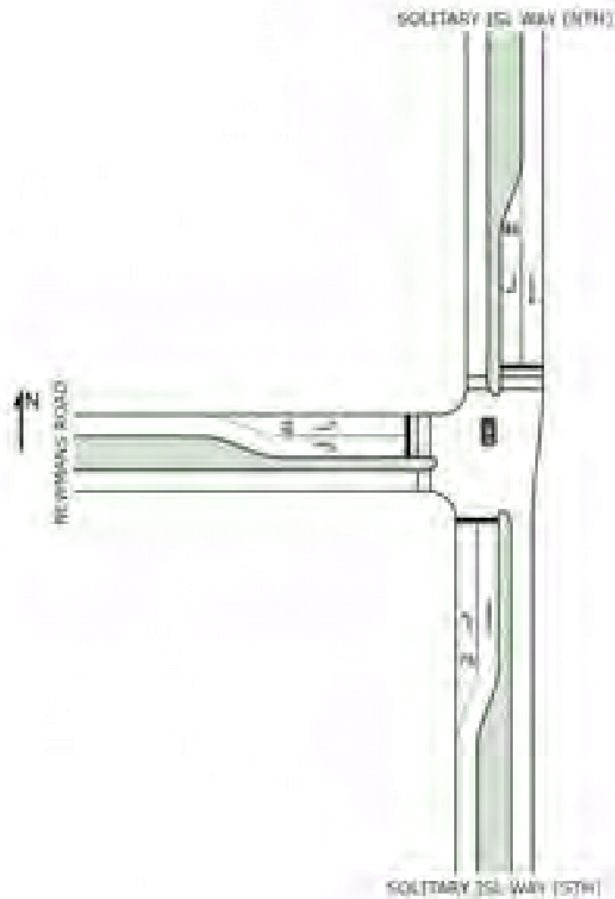
Movement Performance - Vehicles											
Seq #	Dir	Volume (veh)	Control Type	LOS	Delay (sec)	Queue Length (veh)	Stop Time (min)	Stop Distance (ft)	Stop Time (min)	Stop Distance (ft)	Stop Time (min)
North SUTTER ISLANDS WAY (Lanes)											
1	L2	81	0.0	0.001	4.3	0.004	0.0	0.0	0.0	0.0	0.0
2	T1	875	0.0	0.802	8.3	0.008	0.0	0.0	0.0	0.0	0.0
Approach		957	0.4	0.402	4.3	0.004	0.0	0.0	0.0	0.0	0.0
North SUTTER ISLANDS WAY (PCH)											
3	T1	481	0.0	0.504	6.2	0.006	0.0	0.0	0.0	0.0	0.0
4	R2	21	0.0	0.004	0.8	0.008	0.0	0.0	0.0	0.0	0.0
Approach		502	0.0	0.104	6.2	0.006	0.0	0.0	0.0	0.0	0.0
West MEINERS ROAD											
5	L2	80	0.0	0.001	4.3	0.004	0.0	0.0	0.0	0.0	0.0
6	R2	89	0.0	0.002	0.7	0.007	0.0	0.0	0.0	0.0	0.0
Approach		170	0.0	0.002	0.7	0.007	0.0	0.0	0.0	0.0	0.0
All Movements		1793	0.4	0.104	6.2	0.006	0.0	0.0	0.0	0.0	0.0

MOVEMENT SUMMARY

Site: 2040 PM Peak DESIGN two lane roundabout
 Sutter Islands Way / Meiners Rd, Woodgrove Roundabout

Movement Performance - Vehicles											
Seq #	Dir	Volume (veh)	Control Type	LOS	Delay (sec)	Queue Length (veh)	Stop Time (min)	Stop Distance (ft)	Stop Time (min)	Stop Distance (ft)	Stop Time (min)
North SUTTER ISLANDS WAY (Lanes)											
1	L2	176	0.0	0.230	4.7	0.004	0.0	0.0	0.0	0.0	0.0
2	T1	794	0.0	0.447	4.0	0.004	0.0	0.0	0.0	0.0	0.0
Approach		970	0.0	0.447	4.0	0.004	0.0	0.0	0.0	0.0	0.0
North SUTTER ISLANDS WAY (PCH)											
3	T1	188	0.0	0.230	4.0	0.004	0.0	0.0	0.0	0.0	0.0
4	R2	64	0.0	0.000	0.4	0.004	0.0	0.0	0.0	0.0	0.0
Approach		252	0.0	0.230	4.0	0.004	0.0	0.0	0.0	0.0	0.0
West MEINERS ROAD											
5	L2	18	0.0	0.007	0.8	0.008	0.0	0.0	0.0	0.0	0.0
6	R2	176	0.0	0.004	0.0	0.008	0.0	0.0	0.0	0.0	0.0
Approach		194	0.0	0.004	0.0	0.008	0.0	0.0	0.0	0.0	0.0
All Movements		2098	0.0	0.447	4.0	0.004	0.0	0.0	0.0	0.0	0.0

APPENDIX D – SIDRA RESULTS (TRAFFIC SIGNALS AS PER GHD REPORT)



YEAR 2040 – WITH NEWMANS ROAD FULLY DEVELOPED

MOVEMENT SUMMARY

Site: 2040 AM Peak DESIGN signals

Signal: 2040 AM Peak DESIGN signals
 Signal - Fixed Time (Fixed) - Cycle Time = 150 seconds (Practical Cycle Time)
 Variable Response Analysis applied. The results are given for the selected output scenario.

Movement Performance - Vehicles												
ID	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol
Signal: 2040 AM Peak DESIGN signals												
1	L2	46	46	0.100	283	0.060	43	20.4	0.56	4.71	47.0	
2	T1	376	600	0.397	20.4	0.060	18.3	282.3	0.48	0.39	39.4	
Approach		350	544	0.170*	18.9	0.050*	18.3	282.3	0.48	0.37	38.7	
Signal: 2040 AM Peak DESIGN signals												
3	T1	360	600	0.360	117.3	0.060	110.3	388.7	1.00	1.42	18.4	
4	R2	22	600	0.278	16.3	0.060	1.7	52.8	1.00	0.77	20.4	
Approach		200	544	0.280	18.2	0.050*	110.3	388.7	1.00	1.44	18.5	
Signal: 2040 AM Peak DESIGN signals												
10	L2	45	45	0.100	141.7	0.060	13	50.2	1.00	1.15	11.9	
11	R2	30	45	0.060	171.3	0.060	16.3	284.8	1.00	1.19	13.4	
Approach		375	45	0.075*	204.8	0.050*	16.3	284.8	1.00	1.18	13.7	
All Vehicles		2046	45	0.075*	214.4	0.050*	210.6	388.7	0.99	1.15	17.8	

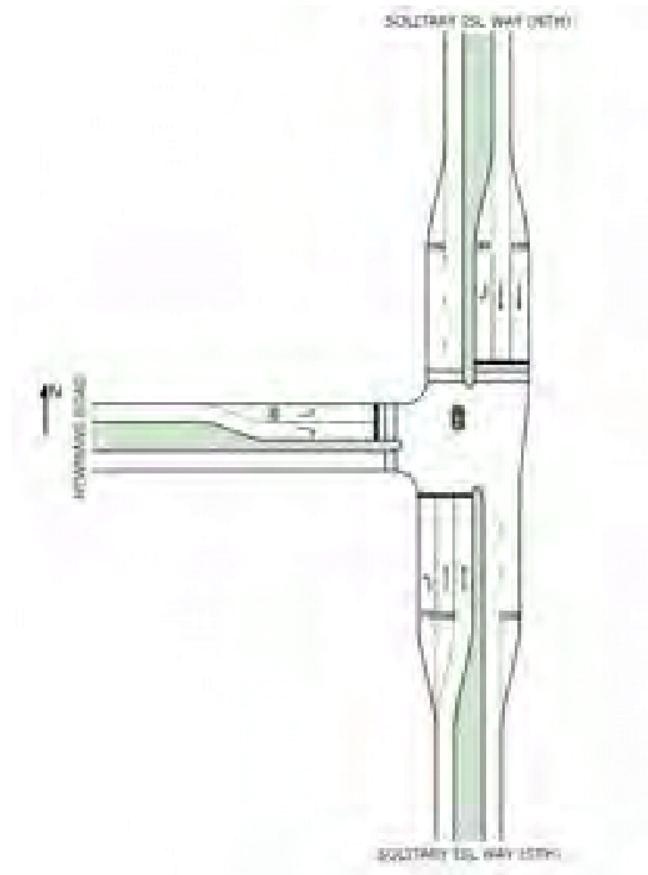
MOVEMENT SUMMARY

Site: 2040 PM Peak DESIGN CHD signals

Signal: 2040 PM Peak DESIGN CHD signals
 Signal - Fixed Time (Fixed) - Cycle Time = 120 seconds (Practical Cycle Time)
 Variable Response Analysis applied. The results are given for the selected output scenario.

Movement Performance - Vehicles												
ID	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol	Flow	Vol
Signal: 2040 PM Peak DESIGN CHD signals												
1	L2	376	600	0.260	20.7	0.060	18	42.8	0.55	0.75	44.1	
2	T1	764	600	0.278	30.7	0.060	14.7	596.8	0.79	0.75	39.8	
Approach		680	47	0.405*	37.4	0.060	14.7	596.8	0.72	0.99	40.8	
Signal: 2040 PM Peak DESIGN CHD signals												
3	T1	196	600	0.296	20.2	0.060	100	335.8	0.75	0.69	40.4	
4	R2	19	600	0.060	22.8	0.060	4.9	51.2	1.00	0.82	21.0	
Approach		187	54	0.090*	25.0	0.060	100	335.8	0.77	0.71	41.2	
Signal: 2040 PM Peak DESIGN CHD signals												
10	L2	45	45	0.100	16.1	0.060	14	19.4	0.81	0.75	21.5	
11	R2	18	45	0.060	80.8	0.060	8.7	10.7	1.00	0.88	21.8	
Approach		180	45	0.080*	71.9	0.060	13.7	10.7	0.99	0.81	23.0	
All Vehicles		2019	71	0.080*	81.1	0.060	44.7	306.8	0.78	0.76	68.8	

SENSITIVITY – EXPANDED SIGNALISED LAYOUT



YEAR 2040 – WITH NEWMANS ROAD FULLY DEVELOPED

MOVEMENT SUMMARY

Site: 2040 AM Peak DESIGN RTE signals

Signal: Island Way / Newmans Rd
 Signal - Fixed Time Control - Cycle Time = 90 seconds (Practical Cycle Time)
 Vehicle-Sequence Analyzer applied. The results are given for the selected output sequence

Movement Performance - Vehicles												
Seq	Phase	Flow	Vol	Cap	Util	Level of Service	Queue Length (m)	Stop Time (s)	Delay (s)	Stop Distance (m)	Stop Time (s)	Stop Distance (m)
Island Way (Newmans Rd) (WB) (Veh)												
1	L2	44	43	0.758	91.2	<D&C	1.5	22.9	4.75	0.14	16.9	16.9
2	T3	47	43.8	0.933	29.0	<D&C	0.2	14.2	0.47	0.76	48.8	48.8
Approach												
		91	86.8	0.895	89.4	<D&C	1.7	19.2	5.22	0.14	65.7	65.7
Island Way (Newmans Rd) (NB) (Veh)												
4	T1	80	84	0.947	36.9	<D&C	0.3	24.9	0.48	0.43	37.3	37.3
5	R2	22	21.8	0.213	87.2	<D&C	1.3	9.4	0.88	0.71	29.8	29.8
Approach												
		102	105.8	0.867	32.4	<D&C	0.6	29.9	1.36	1.14	67.1	67.1
West of NEWMANS ROAD												
6	L2	31	31.6	0.249	47.8	<D&C	2.8	21.1	0.91	0.73	39.3	39.3
7	R2	28	27.9	0.883	85.8	<D&C	0.7	22.1	1.02	0.96	30.8	30.8
Approach												
		59	59.5	0.942	84.4	<D&C	0.7	32.1	1.93	0.69	70.1	70.1
All Vehicles												
		294	292	0.861	57.4	<D&C	0.3	26.8	2.22	0.86	90.6	90.6

MOVEMENT SUMMARY

Site: 2040 PM Peak DESIGN RTE signals

Signal: Island Way / Newmans Rd
 Signal - Fixed Time Control - Cycle Time = 70 seconds (Practical Cycle Time)
 Vehicle-Sequence Analyzer applied. The results are given for the selected output sequence

Movement Performance - Vehicles												
Seq	Phase	Flow	Vol	Cap	Util	Level of Service	Queue Length (m)	Stop Time (s)	Delay (s)	Stop Distance (m)	Stop Time (s)	Stop Distance (m)
Island Way (Newmans Rd) (WB) (Veh)												
1	L2	37	33	0.488	31.0	<D&C	7.8	37.8	0.89	0.91	41.7	41.7
2	T1	176	162	0.729	21.5	<D&C	0.8	108.9	0.33	0.52	41.2	41.2
Approach												
		213	195	0.718	34.9	<D&C	1.6	148.7	0.91	0.83	42.4	42.4
Island Way (Newmans Rd) (NB) (Veh)												
4	T1	233	213	0.723	23.7	<D&C	0.8	91.3	0.91	0.99	41.4	41.4
5	R2	68	63	0.642	41.1	<D&C	2.4	78.1	0.99	0.76	32.6	32.6
Approach												
		301	276	0.765	24.8	<D&C	1.2	169.4	0.92	0.99	42.0	42.0
West of NEWMANS ROAD												
6	L2	35	33	0.118	33.8	<D&C	0.9	7.2	0.89	0.71	37.8	37.8
7	R2	124	118	0.757	43.8	<D&C	0.1	17.9	0.79	0.76	34.4	34.4
Approach												
		159	151	0.757	41.8	<D&C	0.1	17.2	0.88	0.68	39.0	39.0
All Vehicles												
		398	371	0.757	39.2	<D&C	1.8	188.3	1.41	0.83	42.1	42.1

Author: Section Leader Compliance and Regulatory Enforcement
Authoriser: Director Sustainable Communities
MyCoffs: A.2 An active, safe and healthy community
Attachments: ATT1 SC19/43 Compliance Response Framework [↓](#)
ATT2 SC19/43 Escalation Matrix [↓](#)

EXECUTIVE SUMMARY

At its meeting of 27 June 2019, Council considered a report in respect to proposed revisions to its Compliance Response Framework (CRF) and adopted the following resolution:

That Council:

- 1. Endorse the release of the revised Compliance Response Framework for public exhibition and invite submissions for a period of 30 days.*
- 2. Note that a further report will be brought back to Council for consideration following public exhibition of the revised Compliance Response Framework.*

The revised CRF was subsequently placed on public exhibition for the period from 10 July 2019 through to 11 August 2019. No submissions were received.

This report seeks Council's adoption of the revised CRF as an attachment to Council's adopted Compliance and Enforcement Policy.

RECOMMENDATION:

That Council adopt the revised version of the Compliance Response Framework (Attachment 1) and note it is an attachment to Council's Compliance and Enforcement Policy.

REPORT

Description of Item:

Council receives a significant number of customer requests seeking assistance to resolve a broad range of matters. Resource limitations necessitate the application of a tailored approach toward Council's level of compliance involvement.

Generally speaking, Council's objectives when dealing with reports alleging unlawful activity are to:

- maintain the collective good and welfare of the community;
- prevent or minimise harm to health, welfare, safety, property or the environment;
- consider the broader public interest having regard to Council's priorities and any resource limitations;
- consider the report fairly and impartially.

A review of the CRF identified a number of proposed revisions to the existing list of descriptors and response times as well as the inclusion of several new matters.

The review also identified an opportunity to improve upon the existing framework. In addition to identifying Council's level of involvement and initial response timeframes, a further risk based hierarchy of likely responses has been applied to the main groups or types of requests outlined within the CRF. This will assist in providing a consistent and transparent approach to Council's level of involvement and the resolution that may result.

Issues:

No submissions or issues were raised during the public exhibition of the CRF.

Placescore

The 2019 PLACESCORE report was presented to Council on 11 April 2019. The prioritisation and focus of compliance and enforcement towards protecting the broader public interest is consistent with community 'care factors' to minimise harm to health, welfare safety, property and the environment.

Options:

It is considered that the following options are available for Council's consideration:

1. Adopt the recommendation provided to Council;
2. Modify the CRF to incorporate shorter/longer service response times and/or more or less resource allocation toward management of customer requests noting that changes to response times and/or resource allocation may impact other responsibilities and levels of service provision;
3. Reject the CRF noting that such a decision is not in the best interests of achieving the efficient utilisation of staff resources. Such a decision may be to the detriment to service provision within other areas, for example Council may not be able to meet its regulatory inspection programs of food shops, public pools, building information certificates, skin penetration, etc.

Option 1 is recommended as the suitable course of action.

Sustainability Assessment:**• Environment**

The proposed changes to the CRF will have no impact in regard to Council's undertaking of its relevant statutory responsibilities associated with compliance and enforcement related environmental impacts that affect the public interest.

• Social

The proposed changes to the CRF will assist community understanding about Council's compliance and enforcement activities. Adoption of the CRF will cause no detrimental social impacts.

• Civic Leadership

The Council has a duty under the Local Government Act Charter of guiding principles to ensure that it acts consistently and without bias in the exercise of its regulatory functions. The proposed changes to the CRF are designed to assist Council in undertaking regulatory functions in a consistent and unbiased manner.

The proposed enhancement of the CRF will assist in managing customer expectations in relation to the potential outcomes that may be achieved through Council's compliance involvement. This assists efficiencies in resource management and cost savings in governance.

• Economic – Broader Economic Implications

The proposed changes to the CRF will have no discernible impacts in respect to broader economic implications.

- **Economic - Delivery Program/Operational Plan Implications**

The proposed changes to the CRF are not expected to have any impacts on the Delivery Program or Operational Plan.

Risk Analysis:

The CRF, first implemented almost four years ago, has been effective in establishing a clear and consistent approach in Council's handling of customer requests. The proposed changes and enhancement incorporating the risk based escalation matrix are not expected to cause any adverse risk considerations.

Consultation:

The revisions to the CRF was publicly exhibited for a period from 10 July 2019 to 11 August 2019 (inclusive).

No submissions were received following the public exhibition of the revisions to the CRF.

Related Policy, Precedents and / or Statutory Requirements:

Council currently has a range of Policies that deal with complaint and compliance management functions, the main ones being:

- Compliance and Enforcement Policy;
- Enforcement Of Parking Restrictions Policy;
- Complaints and other Feedback Policy.

There are a number of Acts that provide council with a range of statutory compliance and enforcement powers including:

- *Local Government Act 1993;*
- *Environmental Planning and Assessment Act;*
- *Food Act 2003;*
- *Protection of the Environment Operations Act 1997;*
- *Public Health Act 2010;*
- *Roads Act 1993;*
- *Swimming Pools Act 1992.*

Implementation Date / Priority:

The revised CRF will be implemented upon adoption by Council.

Conclusion:

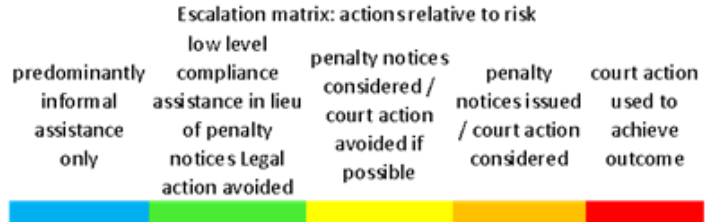
The revised CRF provides clear information about what can be expected from Council in terms of compliance involvement, initial service response time and potential extent of Council's involvement.

The revised CRF has been developed with regard to resourcing levels and to ensure that resources are effectively and efficiently utilised in the delivery of regulatory compliance functions to the benefit of the public interest.

DESCRIPTION OF RISK	INITIAL RESPONSE TIME & RISK TO THE COMMUNITY					Escalation matrix: actions relative to risk
	EXTREME	HIGH	MEDIUM	MINOR	MINOR	
	4 hours	Within 2 Working Days	Within 7 Working Days	Information Only **	No Action	
PLANNING BUILDING AND COMPLIANCE						
Dangerous structure adjoining public land, eg dilapidated awnings		✓				
Swimming pool fencing complaint on private land		✓				
Non compliance with development consent or construction works governing environmental protection (operational machinery)		✓				
Development not in accordance with consent			✓			
Development carried out without consent / construction certificate			✓			
Right of way and covenant complaints, other than conditions of consent					✓	
Building works carried out without approval now made lawful by Exempt and Complying Development SEPP				✓		
Retaining wall (structurally unsafe) that potentially impacts public safety and/or neighbouring infrastructure			✓			
Boundary fence and retaining wall issues where the Dividing Fences Act applies - Community Justice Centre and the Local Court				✓		
Landform modification involving potential flooding impacts or potential property damage		✓				
Landform modification without consent			✓			
Unauthorised use of premises (requiring consent)			✓			
Short term holiday letting				✓		
Strata property disputes					✓	
Inadequate Sediment and Erosion Control, direct flow into waterway		✓				
Inadequate Sediment and Erosion Control not in accordance with consent		✓				
Inadequate Sediment and Erosion Control not direct flow into waterway but nuisance to public place		✓				
Inadequate Sediment and Erosion Control causing nuisance between adjoining neighbours (works not requiring consent)					✓	
ANIMALS						
Dog attacks Major - (eg imminent risk to public, where a person has been bitten or serious injury to other animals, or assistance to Police)	✓					
Dog attacks minor (after an event - minor or no injury to persons or animals or risk to public safety)		✓				
Dog - Dangerous, Menacing or Restricted Breed as per Companions Animal Act, no imminent risk to public safety, eg dog contained		✓				
Pick up of seized Dogs contained (Pound operating hours only)	✓					
Domestic roaming dogs - general complaint after the event.			✓			
Dog barking (complaints from 2 or more premises)			✓			
Barking Dogs Anon or one resident complainant only. (Dog owner to be given advice only)				✓		
Impounding of Cats - Council provides pound facility but no collection service					✓	
Breach of Companion Animals Act - identification, registration		✓				
Wild dogs and foxes on Council own land			✓			
Stock on high use road	✓					
Stock on low use road		✓				
Stock Complaints General trespassing - Horses, Cattle, Sheep, Donkeys			✓			
Keeping of non stock animals e.g. rabbits, birds, geese, ferrets, chickens, roosters - including enclosures, noise and odours				✓		
FOOTPATH AND CYCLEWAYS						
Footpath obstruction (immediate safety hazard - 8am - 5pm, 7 days per week - after hours Police matter)	✓					
Footpath obstruction, eg builder's material obstructing pedestrian access		✓				
Footpath obstructions, minor or nuisance			✓			
PARKING						
Parking traffic hazard (8am - 5pm, 7 days per week - after hours Police matter)	✓					
Parking - general complaints		✓				
Abandoned motor vehicles (posing immediate safety hazard, 8am - 5pm, 7 days per week - after hours Police matter)	✓					
Abandoned motor vehicles and articles (public place)			✓			
Road Offences illegal works general			✓			
ENVIRONMENTAL HEALTH						
Air Pollution - source occurring from commercial or industrial premises			✓			
Air Pollution - burning of prohibited items eg tyres, coated wire, paint and solvent containers	✓					
Air Pollution - Prohibited Lighting of Fires: Schedule 2 areas under POEO			✓			
Asbestos- inappropriate removal or burial of asbestos containing material on private land		✓				
Asbestos- building or structures containing asbestos or storage of asbestos on private land, no removal or active disturbance of material, unlikely to pose a threat to public health or safety				✓		
Nuisance from domestic smoke - BBQ's, domestic wood heaters, residential burning off				✓		
Rural and Agricultural nuisances including but not limited to burning of vegetation, noise, soil and erosion control issues (not entering waterways)					✓	
Land Pollution - Accumulation of waste, dumped or deposited waste on private land impacting on the public interest and or public health			✓			
Land Pollution public lands - rubbish dumping, littering		✓				
Odours - Residential and commercial garbage complaints: location of garbage bins, dog faeces, domestic odours					✓	
Noise Pollution - commercial and industrial impacting on residential areas affecting the community and or public interest			✓			
Neighbour to neighbour impact associated with domestic noise pollution complaints - e.g. air conditioners, heat pumps, amplified sound equipment, musical instruments, power tools, lawn mowers, leaf blowers, swimming pool pumps and motor vehicles/trail bikes				✓		
Water Pollution Incidents having an effect on waterways - Environmental degrading substances into waterways e.g. oil, paint, nutrient runoff - Failing Onsite Sewerage Management System into waterways	✓					

DESCRIPTION OF RISK	INITIAL RESPONSE TIME & RISK TO THE COMMUNITY					Escalation matrix: actions relative to risk
	EXTREME	HIGH	MEDIUM	MINOR	MINOR	
	4 hours	Within 2 Working Days	Within 7 Working Days	Information Only **	No Action	
Urgent Response requests from other Agencies (i.e. NSW Police, HAZMAT, EPA, Ministry of Health, NSW Food Authority), relating to Food Poisoning Outbreak, Major Pollution Incidents, Notifiable Disease Outbreaks and Clandestine Drug Laboratories	✓					
Complaints relating to regulated premises (food premises, skin penetration/hairdressers, beauty salons, cooling towers/ warm water systems, public swimming and spa pools, caravan parks, water carters)			✓			
Public swimming pool water quality			✓			
Unhealthy Condition of Premises - breeding of mosquitoes, vermin and pests, significant accumulation of waste, failing OSSM			✓			
Domestic green/unclean pools - no evidence of mosquito larvae					✓	
Unsanitary motels including bed bugs					✓	
Unsanitary premises - condition of property not deemed a public health risk					✓	
Mould in private residences				✓		
SEWER						
Urgent Response requests - sewer overflows - private line	✓					
Urgent Response requests - sewer overflows, Council reticulated service	✓					
Trade Waste Agreements - Compliance with conditions of approval			✓			
Private Sewer Pump Station Agreements - Compliance with conditions		✓				
Building in Vicinity of Sewers - Compliance with Council Policy for matters not requiring consent			✓			
Effluent Pumpout Agreements (Nana Glenn and Coramba)			✓			
Unauthorised connection to Council's Sewer infrastructure			✓			
STORMWATER						
Overland stormwater flow nuisances (private property)				✓		
Overland stormwater flow nuisances (Council owned property)			✓			
Stormwater nuisance (diversion / downpipes / guttering)			✓			
Overland stormwater flow nuisances associated with development consent?????			✓			
Unauthorised connection to Council's Stormwater infrastructure			✓			
WATER						
Water Restriction Breaches		✓				
Water Backflow Agreements - Compliance with conditions of approval		✓				
Unauthorised connection to Council's Water infrastructure			✓			
Water Carters Agreements - Compliance with conditions			✓			
Reclaimed Water Agreements - Compliance with conditions and management plan			✓			
Raw Water Agreements - Compliance with conditions			✓			
PARK AND RESERVES _ OPEN SPACES						
Public reserve breaches (unauthorised use)			✓			
Public land licence breaches (fitness, outdoor dining, surf school)			✓			
Illegal Camping public lands		✓				
SIGNAGE						
Illegal signage public place			✓			
TREES AND VEGETATION						
Overgrown land which exceeds the following criteria: a) The average height of grass on the land exceeds 500mm or one metre in any area, or b) The site has an accumulation of vegetation, rubbish or materials, which provides a harbourage for vermin.			✓			
Overgrown land which does not meet the above criteria					✓	
Unauthorised clearing of mapped prescribed vegetation or vegetation protected under SEPP (Coastal Management) 2018 (operational machinery)	✓					
Unauthorised clearing of prescribed vegetation (operational machinery)		✓				
Unauthorised clearing of protected native vegetation as determined by corporate mapping (ceased or historic works)			✓			
Enquires regarding native vegetation not prescribed under the Preservation of Vegetation Controls					✓	
Non compliance with development consent governing biodiversity protection (operational machinery)	✓					
Non compliance with development consent governing biodiversity protection (works ceased)			✓			
Tree Disputes Between Neighbours (not prescribed vegetation under Preservation of vegetation controls)					✓	
Tree removal - public lands (removal in progress)	✓					
Tree removal - public lands (removal completed)			✓			
Noxious weeds			✓			
ROADS						
Road Opening Permits - works without a permit or non compliance with permit		✓				
Driveway Applications - works without a permit or non compliance with permit			✓			
Damage to local road/s/kerb/footpath during construction			✓			
Unmade/unmaintained Council Road Reserves - no works identified within Capital Works Program; no high risk safety issues identified					✓	
Trading without approval public lands (Section 68 Local Government Act) - ie busking, vehicles for sale, stalls, mobile vendors		✓				

** Note: Information Only consists of:
- Referral to Council / Government / Industry website
- Posting a pamphlet / information sheet
- Letter providing information



Escalation Matrix

Resolution Action	Escalation Matrix				
	Insignificant*	Minor*	Moderate*	Major*	Catastrophic*
Prosecution			✓	✓	✓
Court Order					✓
Closure direction			✓	✓	✓
Affirmative action ie initiate works to effect compliance with direction			✓	✓	✓
Penalty Notice			✓	✓	✓
Formal Order/ Direction/Prohibition		✓	✓	✓	✓
Formal Notice		✓	✓	✓	✓
Show cause	✓	✓	✓	✓	✓
Letter requesting undertaking	✓	✓	✓	✓	✓
Negotiated Outcome	✓	✓	✓	✓	✓
Formal Caution/Warning	✓	✓	✓	✓	✓
Civil dispute mediation	✓	✓	✓	✓	✓
Property Notation/Breach recorded	✓	✓	✓	✓	✓
Verbal advice only	✓	✓	✓	✓	
Information sheet	✓	✓			
No Action	✓				

Author:	Section Leader Compliance and Regulatory Enforcement
Authoriser:	Director Sustainable Communities
MyCoffs:	D.2 We have effective use of public resources.
Attachments:	ATT1 SC19/44 CONFIDENTIAL Summary of Expressions of Interest <i>Confidential in accordance with Section 10A(2)(d)(i),(d)(ii) of the Local Government Act as it contains commercial information of a confidential nature that would, if disclosed prejudice the commercial position of the person who supplied it, and information that would, if disclosed, confer a commercial advantage on a competitor of the council.</i>

EXECUTIVE SUMMARY

Council has a statutory responsibility for the provision of impounding services to receive and manage surrendered, seized and stray companion animals. RSPCA NSW has provided this service to Council to date.

Council at its meeting of 10 May 2018, considered a report in relation to notification received from RSPCA NSW that they will not be seeking to provide this service beyond the expiry of the present contract in September 2020. At this meeting, Council resolved:

- 1. That Council seek 'expressions of interest' to establish an understanding of the available opportunities to meet Council's statutory obligations associated with the provision of specialist impounding services on a long term basis.*
- 2. That a further report be brought back to Council detailing the available options and recommendations for the provision of specialist impounding facilities.*
- 3. That Council approach the RSPCA with a view to exploring the purchase of the land and facilities currently operated by the RSPCA as the Coffs Harbour Animal Shelter at 25 Dowsett Drive Coffs Harbour. Council prepare a report for Councillors on the response from the RSPCA and analysis of the economic, social and logistical merit if council were to proceed to purchase.*

This report provides details of the results in relation to the above actions and a proposed way forward to meet Council's obligations toward the provision of an impounding facility and services.

RECOMMENDATION:

That Council:

- 1. Thank the parties who submitted an expression of interest for their efforts and advise their submission did not meet Council's needs on this occasion.**
- 2. Thank the RSPCA NSW for their response and reciprocate Council's willingness to maintain a relationship that will benefit the future service needs of both parties.**
- 3. Confirms Lot 1 DP 1080285, Christmas Bells Road, Coffs Harbour as the preferred site for construction of an animal impounding facility and allocates \$30,000 for the preparation of a development application (funding source to be identified at Quarterly Budget Review).**
- 4. Receive a further report upon obtaining development consent with detailed costing for the construction of the animal impounding facility.**

REPORT

Description of Item:

Council has a statutory responsibility for the provision of impounding services to receive and manage surrendered, seized and stray companion animals. RSPCA NSW has provided this service to Council to date. RSPCA NSW have advised Council they will not be seeking to provide this service beyond the expiry of the present contract in September 2020. Council has undertaken an expression of interest process (EOI) to explore opportunities to meet Council's statutory obligations.

This report includes a summary of the EOI and the response received from the RSPCA to Council's approach seeking to explore the purchase of their land and facilities.

This report also details a proposed course of action to address Council's need to provide an alternative impounding facility given the RSPCA's withdrawal from this service provision.

Issues:

Three responses to the EOI were received. The RSPCA also responded in April this year following extended deliberation in relation to Council's approach to explore the purchase of their land and facilities. Refer to Confidential Attachment 1 for further detail.

Expressions of Interest

The EOI process has demonstrated an absence of service providers within the private sector suitable to meet Council needs. These needs include:

- Provision of an impound facility that is:
 - located to maximise accessibility to the wider community;
 - located to maximise Ranger efficiencies associated with impounding of dogs and cats;
 - served by a maintained public road;
 - served by reticulated water and sewer;
 - located to minimise noise impacts on sensitive receivers.
- Limiting exposure to market forces, ie if a provider withdraws from their service provision Council retains options to meet its statutory responsibilities with minimal disruption.

RSPCA Response

The RSPCA has advised that they do not wish to sell their facilities. They have also indicated a willingness to maintain a relationship with Council relating to its future service needs as outlined in Confidential Attachment 1.

Proposed Direction

The EOI process has demonstrated the absence of suitable service providers within the private sector. When coupled with Council not having its own impound facility, this exposes Council's operational risks and highlights the need to find a solution that will address current service requirements and provide a degree of future proofing to manage and minimise service costs.

Initial investigation has identified a parcel of land owned by Council at Lot 1 DP 1080285, Christmas Bells Road, Coffs Harbour which adjoins the RSPCA owned land. The land appears suitable to enable the construction of an animal impounding facility subject to addressing relevant site constraints. The footprint required for an impound facility and associated infrastructure is relatively modest, with preliminary considerations indicating the potential to construct a facility within the constraints of the site.

The construction of an impound facility would satisfy Council's key needs and also be a major step toward 'future proofing' Council by enabling the delivery of services to be undertaken by either an employee model or a contract model. Council does not currently have these options and is exposed to external market forces.

The construction of an impound facility on either a Council owned site, or an alternative site if necessary, is considered the best option available at this time. The Council owned site at Christmas Bells Road has significant financial benefits (no purchase cost) and is the favoured option. It is proposed to move forward by further investigating the suitability of the site and seek development consent for the construction of an impound facility. If site constraints prevent this, then further investigation would need to be undertaken to find a suitable site for purchase and construction of a facility.

Options:

Council has a number of options available in relation to this matter. They include:

1. Adopt the recommendations as provided; Adopting this option will commit Council to a course of action seeking to obtain development consent for the construction of an impound facility at Lot 1 DP 1080285, Christmas Bells Road, Coffs Harbour.
2. Reject the recommendations as provided. If a suitable impounding service is not established in readiness for the RSPCA withdrawal of services it will leave Council without an appropriate means to comply with its statutory obligations under the NSW Companion Animals Act 1998 – No 87.

Option 1 is recommended as the suitable course of action.

Sustainability Assessment:

- **Environment**

Impounding facilities are an essential part of animal control as it helps keep domestic animals off the street. Control of roaming domestic animals is an important strategy in protecting native wildlife and reducing faeces from our public areas and waterways.

- **Social**

Under the Companion Animals Act, Council has a statutory obligation to accept stray companion animals found wandering the streets. Although the legislation does not require Council to actively look for strays, it is a service provided in order to keep the general public safe from dog attacks and other situations whereby dogs or cats cause public nuisances.

- **Civic Leadership**

The Companion Animals Act places a clear responsibility on Local Government to have in place sound practices to deal with companion animals. The identification and implementation of alternative measures to maintain a continuity of impounding services will demonstrate and meet Council's civic leadership responsibilities.

- **Economic – Broader Economic Implications**

The RSPCA has provided Council with an excellent cost efficient service. Their withdrawal of services is expected to result in service cost increases that cannot be quantified at this time.

The EOI process has demonstrated an absence of service providers within the private sector suitable to meet Council needs. This coupled with Council not having its own pound facility intensifies the problem and highlights the need to find a solution that will address current service requirements and provide a degree of future proofing to manage and minimise service costs.

- **Economic - Delivery Program/Operational Plan Implications**

The proposal to locate a suitable site and construct and operate a Council pound will have financial implications. In the first instance, \$30,000 will need to be allocated for the preparation

of a development application. Secondly, preliminary project construction cost estimates have been developed which indicate a potential construction cost in the order of \$1.2M. If Council supports the recommendations, detailed costing will be undertaken and provided in a further report to Council prior to proceeding with construction of any facility.

Risk Analysis:

If Council does not plan and secure alternative service arrangements in readiness for the proposed withdrawal of RSPCA services, it may be unable to meet relevant statutory obligations.

The absence of having a suitable animal impounding facility will cause significant interruption to Council's Ranger services and have an adverse impact to the public.

The extent of the financial impacts are currently unknown. A draft costing scenario has been prepared in relation to the development costs to construct a pound, however the operational costs to meet the day to day servicing have not yet been determined.

The failure to plan and develop an alternative service model is likely to have significant financial impacts in addition to any impacts that will arise due to not having an alternative arrangement to the current service provisions.

Consultation:

The RSPCA has advised their preparedness to extend their service provision beyond the September 2020 contract expiry subject to demonstrated actions being taken by Council to implement an alternative service delivery model. The seeking of development consent for the construction of an impound facility at Council's site in Christmas Bells Road will be a step toward demonstrating Council's actions toward this goal.

Related Policy, Precedents and / or Statutory Requirements:

The following Acts have relevance to Council's statutory responsibilities associated with the provision of animal impounding facilities:

- *NSW Companion Animals Act 1998 – No 87*
- *Impounding Act 1993*
- *Local Government Act 1993*
- *Animal Research Act 1993*

Implementation Date / Priority:

Action will commence to prepare and submit a development application for the construction of an impound facility at Lot 1 DP 1080285 Christmas Bells Road Coffs Harbour upon adoption of the recommendation.

Conclusion:

Council is required by legislation to have either a pound facility or a suitable agent for the holding of impounded companion animals in accordance with the Companion Animals Act, with such facilities meeting guidelines set by the Department of Primary Industries. With the withdrawal of services by the RSPCA, Council needs to implement alternative arrangements.

The EOI process and discussions with the RSPCA failed to identify a suitable alternative to fulfil Council's needs.

The construction of a Council owned pound is considered to be the best option at this time. A Council owned site at Christmas Bells Road has been identified for its potential to develop an impound facility to meet Council's statutory responsibilities. A Council owned pound will provide opportunity to staff the facility with Council employees or potentially contract out the services needed. Owning the facility will minimise Council's exposure to market forces and potentially

assist with limiting operational costs. It is recommended that Council progress with seeking development consent for the proposal on the identified site.