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Date: 23rd October 2023

To: The General Manager
Tweed Shire Council
PO Box 816
Murwillumbah NSW 2484

Dear Sir,

Re: Peer Review and Preliminary Risk Assessment of Solo Resource Recovery Site - Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066 84-92 Chinderah Bay Drive, Chinderah NSW

Background

Melaleuca Group Pty Ltd has engaged by Rico Recovery Systems Aust Pty Ltd to complete a Peer Review of available documentation relating to Contamination and prepare a Preliminary Risk Assessment to support a Planning Proposal for the Subject Site located at 84-92 Chinderah Bay Drive, Chinderah NSW, would include amending Schedule 1 of TLEP2014 to include a "depot" as a land use permitted, with consent.

The Subject Site is currently used by Solo Resource Recovery as a large-scale depot, and no change of use is proposed within the planning proposal.

This assessment extends the investigations required to meet the obligations under the State Environmental Policy (Resilience and Hazards) 2021 (SEPP 2021).

Available Documentation

Documentation reviewed as part of this assessment incudes:

- HMC Environmental Consulting Pty Ltd (2023) Preliminary Site Investigation Planning Proposal August 2023 Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066 84-92 Chinderah Bay Drive, Chinderah NSW (**Attachment A**);
- GeoTech Investigations (2023a) Subsurface Sampling and Laboratory Testing (**Attachment B**);
- GeoTech Investigations (2023b) Report on Limited Subsurface Investigation for Proposed Sheds at 86-88 Chinderah Bay Drive Chinderah (**Attachment C**);

- DAC Planning (2022) Amended Scoping Proposal Planning Proposal to Amend TLEP2014 to Include a "Depot" And "Light Industry" in Schedule 1 of the Plan at 84, 86, 88, 90 & 92 Chinderah Bay Drive Chinderah;
- Solo (2022a) Chinderah Environment Management Plan;
- Solo (2002b) Site Emergency Management Plan Chinderah; and
- Solo (2022c) Hazardous Substances & SDS

In addition, Solo's Liquid Trade Waste Approval and Environmental Management System (ISO14001:2015) Certificate of Registration was reviewed.

Land Use Summary

Historical and current land uses of the site are detailed in both HMC (2023) and DAC (2022). A comparison of described land uses is provided in **Table D1, Attachment D**.

Both reports described the general use of the site as a depot from the 1950s onwards with various descriptions of its expansion over time.

The identified data gap was the description of when the Subject Site is likely to have been filled. It is considered that filling of the site occurred throughout the business' expansion from the 1950s onwards.

Areas of Environmental Concern (AEC) and Potential Contaminants of Concern (PCoCs)

HMC (2023) provides the following information in relation to AECs and PCoCs:

> *The fabrication and assembly, servicing of waste transport vehicles and associated equipment requires the use of a mechanical workshop, metal lathe, spray painting booths, sand blasting and fuel/oil storage and dispensing.*
>
> *Areas of concern would be locations on the site exposed to spills, leaks, washdown or housekeeping where concentrations of fuel, oil, metals, thinners, paints and other potential contaminants of concern may be present in the soil or groundwater from activities undertaken on the site.*

Details of the PCoCs and the Conceptual Site Model is provided in Tables 8 and 9 (HMC 2023, **Attachment A**).

Melaleuca Group concurs with the AECs and PCoCs s described by HMC (2023). However, the report does not discuss the gradual filling of the site and makes the assumption that the *in situ* natural soils and groundwater would likely be impacted.

Additional Site Investigations

On receipt of the HMC (2023) report, it is understood that Solo engaged GeoTech Investigations to complete additional studies at the site. It was considered this would act as a scoping study for the requirement of additional studies (e.g. DSI). These studies (GeoTech 2023a and 2023b) were completed concurrently with the excavation of four (4) boreholes across the site.

The location of boreholes was determined by staff from Solo with their knowledge and experience of the site with the following descriptions;

- Borehole 1 (BH1) – located at the lowest point of the site and adjacent to the stormwater pit that collects surface water flows before a filtering system and discharge to the Tweed River.
- Borehole 2 (BH2) - located at the rear of a mechanical workshop considered a potential recipient area of historical discharges from the workshop floor (i.e., wash out waters containing hydrocarbons)
- Borehole 3 (BH3) - located at along the northern edge of the site and in the vicinity of a potential future shed expansion; and
- Borehole 4 (BH4) – located along the western edge of the site and in the vicinity of a potential future shed expansion.

For boreholes BH1 and BH2 as these were considered to represent the likely location of impacted soils (B Irwin, Solo, Pers. Comm.), samples were collected at the following depths: 0-0.1, 0.1-0.2, 0.5-0.6, 1.0-1.2, 1.5-1.6 and 2.0. Samples were analysed for BTEX, Total Petroleum Hydrocarbons (TPH) and Poly Aromatic Hydrocarbons (PAH).

Samples were not collected at Boreholes BH3 and BH4. This was at the discretion of staff from Solo and budgetary restrictions. However, it is noted that staff from GeoTech Investigations were instructed to sample if soils with detectable visual (e.g. soil discoloration) or olfactory (e.g. hydrocarbon odour) signs indicated possible contamination. Staff from GeoTech Investigations regularly complete Environmental sampling and have advised no obvious signs were detected in soils at BH3 and BH4.

The study showed that the depth of Fill at the site ranged from 0.6 to 1.1m and Groundwater was detected between 1.3 to 1.5m across the site (Table 1, GeoTech 2023b, **Attachment C**).

The soil results indicated the following:

- No detection of BTEX;
- No detection of F1 Fraction;
- Single Detection of F2 Fraction (in Sample BH1 0-0.1m – 41mg.kg);
- Detection of F3 Fraction in three samples (Samples BH1 0-0.1, 0.1-0.2 and 05-0.6 with concentrations of 620, 480 and 190 mg/kg respectively);
- Detection of F4 Fraction in two samples (Samples BH1 0-0.1 and 0.1-0.2 with concentrations of 490 and 530 mg/kg respectively; and
- No detection of PAHs

The applicable NEPM (2013) Health Screening Levels (HSLs) for the detected compounds are as follows:

- F2 – 110 mg/kg, Sands, 0-<1m (Residential Limit – most stringent limit available).

The applicable NEPM (2013) Ecological Screening Levels (ESLs) for the detected compounds are as follows (utilising most stringent levels available):

- F2 – Areas of Ecological Significance – 25 mg/kg (moderate reliability as noted in NEPM 2013);
- F2 – Urban residential and public Open Space – 120 mg/kg (moderate reliability as noted in NEPM 2013);
- F3 - Urban residential and public Open Space (Coarse/Sand) – 300 mg/kg;
- F3 – Commercial and Industrial (Coase/Sand) - 1,700 mg/kg; and
- F4 - Urban residential and public Open Space (Coarse/Sand) – 2,800 mg/kg

Utilising the available assessment levels, the sample set demonstrates the detected compounds meet most of the more stringent available levels and thereby meets Residential/Urban/Public Open space requirements. While it is possible that that the F2 Fraction may exceed the Ecological ESL, it is also noted that this available level is noted by the NEPM as having only moderate reliability. The detected level does not exceed the Urban Residential ESL and thereby is automatically below the Commercial/Industrial ESL. As this sample was collected from surface soils, the higher level (41mg/kg) may not pose an unacceptable ecological risk as volatilisation is considered likely to occur, may represent similar fractions from fuels, oils and the like on nearby roads and the surface soils are situated atop compacted fill materials and the F2 fraction was not detected in underlying soils indicating the potential migration to groundwater is limited. Surface flows from the site through the stormwater system includes a filtration system as per the management requirements of the site (Humes oil and grit interceptor). As such, if this material was washed into the stormwater system of the site, removal from filtration would occur prior to release to the Tweed River.

Similarly, the levels detected for F3 exceed the Urban Residential ESL but is well below the Commercial/Industrial ESL. The two (2) impacted samples were collected within the upper 0.2m of the land surface and as above, may continue volatilisation and/or filtration if washed into the stormwater system. Further, the underlying samples did not record detectable levels of this fraction.

<u>Assessment and Conclusion</u>

While the investigation of the site with two (2) boreholes is considered a small sample set, it is considered these results indicate that broad-scale contamination of the fill and natural in-situ soils have not occurred at the site.

Further, the results do not indicate that a broadscale issue of groundwater contamination is likely.

HMC (2023) recommended that:

> That a Detailed Site Investigation be undertaken in accordance with the NSW EPA (2020) Consultants reporting on contaminated land – Contaminated land guidelines by a suitably qualified environmental consultant to assess potential historic site contamination from long term industrial activities on the site.

The proposal is to amend Schedule 1 of TLEP2014 to include a “depot” as a land use permitted, with consent. No changes to the current land use are proposed.

Direction 4.4 was issued by the Minister for Planning to relevant planning authorities under section 9.1(2) of the Environmental Planning and Assessment Act 1979 and commenced on 1 March 2022:

1. A planning proposal authority must not include in a particular zone (within the meaning of the local environmental plan) any land to which this direction applies if the inclusion of the land in that zone would permit a change of use of the land, unless:
   a) the planning proposal authority has considered whether the land is contaminated, and
   b) if the land is contaminated, the planning proposal authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and
   c) if the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning proposal authority is satisfied that the land will be so remediated before the land is used for that purpose. In order to satisfy itself as to paragraph 1(c), the planning proposal authority may need to include certain provisions in the local environmental plan.
2. Before including any land to which this direction applies in a particular zone, the planning proposal authority is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the contaminated land planning guidelines.

The PSI (HMC 2023) identified several AECs and PCoCs at the site. However, it is considered the PSI did not consider the historical and long-term filling of the site. Based on investigations at two (2) locations and with the knowledge of fill of between 1.3 to 1.5m depth across the site, it is considered that the site does not represent a significant risk to current landusers.

The historical placement of fill across the site is considered likely to have occurred before any regular identified activities took place. As such, any spills, leaks, washdown or housekeeping where concentrations of fuel, oil, metals, thinners, paints and other potential contaminants of concern are considered likely to have occurred atop filled materials that have remained in place over time. These highly compacted materials are likely to have impeded any migration of PCoCs into the groundwater. Further, the majority of the site (and all of the 'working' area) is covered by Asphalt which further would impede migration of PCoCs to groundwater.

The site is drained to a centralised stormwater pit which contains a filtration system to exclude solids, fuels and oils before release into the Tweed River. This management system does not include a soakage pit, stormwater detection basin or other management options than may provide a pathway to the groundwater.

It is acknowledged that the investigations to date include a small sample set and that historical landuses may have resulted in contamination of natural *in situ* soils of the site. However, the fill and asphalt at the site provide encapsulation of any such unknown contamination. With a depth of between 1.3 to 1.5m depth, this encapsulation is in exceedance of normal capping designs for the PCoCs identified.

The PCoCs identified, Heavy Metals and PAHs bind strongly to soils and as such would require physical movement of impacted soils (if detected). For the BTEX and TPH, bioattenuation management options are regularly employed if detected in soils and groundwater.

As such it is considered there is sufficient evidence available to satisfy Council that the site in its current state would be suitable for its ongoing use as a depot.

While future proposals may require excavations into the fill materials and/or breach the fill materials (e.g. construction of footings for a new shed), it is considered that investigations into potential contamination for such proposals should occur at that stage as a requirement of the Development Application process and to meet the requirements of the State Environmental Planning Policy (Resilience and Hazards) 2021.

Similarly, while the zoning allows for more sensitive landuses at the site. Such a change of use would require a Development Application and thereby a requirement to complete additional site investigations to determine any potential contamination at the site. However, the site is mapped as flood liable and is already filled (up to 1.5m depth). Thereby, it is considered unlikely that a future proposal for a more sensitive land use would entail the removal of broad areas of the fill and exposure to *in situ* soils. Rather, it is considered likely, additional fill materials would be placed on the site which would further increase the encapsulation of any unknown or undetected contaminated soils at the site. If any fill materials need removal from the site for any future proposal, these would require characterization under NSW EPA (2014) Waste Classification Guidelines to determine the appropriate destination of the material.

If you require any further information, please do not hesitate to contact the undersigned.

Yours faithfully,
Melaleuca Group

.....
Dr. Melissa Van Zwieten
Senior Environmental Scientist

Attachment A: HMC Environmental Consulting Pty Ltd (2023)
Attachment B: GeoTech Investigations (2023a) Subsurface Sampling and Laboratory Testing
Attachment C: GeoTech Investigations (2023b) Report on Limited Subsurface Investigation for Proposed Sheds at 86-88 Chinderah Bay Drive Chinderah
Attachment D: Additional Site Analysis Information

Attachment A: HMC Environmental Consulting Pty Ltd (2023)

ENVIRONMENTAL CONSULTING Pty Ltd

PRELIMINARY SITE INVESTIGATION

PLANNING PROPOSAL

August 2023

BAGCORP PTY LTD

Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403
& Lot 10 DP 1037066
84-92 Chinderah Bay Drive,
Chinderah NSW

HMC2023.58

RE: Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW.

HMC Environmental Consulting Pty Ltd is pleased to present our report for a Preliminary Site Investigation for the abovementioned site.

We trust this report meets with your requirements. If you require further information, please contact HMC Environmental Consulting directly on the numbers provided.

HMC Environmental Consulting		PH:	0755368863
Suite 29, Level 2, 75-77 Wharf Street		Email:	admin@hmcenvironment.com.au
PO Box 311		Web:	www.hmcenvironment.com.au
Tweed Heads NSW 2485		ABN:	60 108 085 614
Title:	Preliminary Site Investigation		
Job No:	2023.58		
Client:	Bagcorp Pty Ltd		

Document Record:				
Version	Date	Prepared by	Checked by	Approved for issue by
Draft Issue A	14.06.2023	MF	MT	KH
Final Issue A	01.08.2023	MF	MT	SV

Distribution List	Date	Version	Comments
R. Richards Bagcorp Pty Ltd DAC Planning	14.06.2023	Draft Issue A	For Review
R. Richards Bagcorp Pty Ltd DAC Planning	01.08.2023	Final Issue A	Final

This report should be cited as '*HMC Environmental Consulting (2023). Preliminary Site Investigation, Planning Proposal, Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW. Report No. HMC2023.58.*'

EXECUTIVE SUMMARY

BACKGROUND

A Planning Proposal for the subject site located at 84-92 Chinderah Bay Drive, Chinderah NSW, would include amending Schedule 1 of TLEP2014. Solo Resource Recovery currently uses the site as a large scale depot, with no change of use proposed within the planning proposal. To address potential site contamination associated with current and former land use, HMC Environmental Consulting (HMC) was commissioned by DAC Planning Pty Ltd on behalf of the proponent Bagcorp Pty Ltd, to undertake the required investigation in accordance with *State Environmental Policy (Resilience and Hazards) 2021 (SEPP 2021)*.

A Preliminary Site Investigation (PSI) including a desktop assessment of available information, and a detailed site inspection was completed.

OBJECTIVES

The objectives of the Preliminary Site Investigation are to:

- Assess the current and former land use on the site for potentially contaminating activities.
- Based on potentially contaminating activities associated with the current and former land use, assess the suitability of the site for the proposed land use.

SCOPE OF WORKS

The scope of work undertaken during the investigation included the following:

- A desktop assessment of current and former land use on the site including search of available records.
- Review previous investigations.
- A detailed site inspection.
- Preparation of a Preliminary Site Investigation report including:
  - review of available land use history information, and results of the site inspection.
  - assessment of potentially contaminating activities, potential contaminants of concern (PCoC) and areas of concern (AoC).
  - preparation of a soil and analysis quality plan (SAQP).
  - conclusions and recommendations including suitability of the site for the proposed rezoning, and need for further investigation and remediation.

CONCLUSIONS/RECOMMENDATIONS

The Preliminary Site Investigation conclusions are based on the information described in this report and Appendices and should be read in conjunction with the complete report, including Section 8 Limitations.

A planning proposal for the existing commercial and light industrial property at Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW, would include amending the Schedule 1 of TLEP2014 to include a "depot" and Light Industry as a land use permitted, with consent. A review of available information, and a detailed site inspection revealed the long-term occupation of the waste vehicle depot since 1950 to present day. As there is no change of use, there would be no earthworks allowing for increased exposure to existing soil. However, given the long-term use of the workshops, a strategic sampling regime is recommended to meet the requirements of Direction 4.4 and assess whether the land is contaminated, and, if the land is contaminated, whether the land is suitable in its

contaminated state (or will be suitable, after remediation) for all the potential land uses within the proposed zoning

Given the low-lying land and expected shallow groundwater, it would be necessary to assess the impact of the long term industrial use on the site groundwater regime. Should the preliminary groundwater investigation show contaminant concentrations exceeding investigation criteria, further investigation would be required to assess potential migration of impacted groundwater off-site.

Based on the information presented, in relation to potential site contamination associated with current and former land use and considering the requirements of State Environmental Planning Policy (Resilience and Hazards) 2021, Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW, further investigation is required to assess areas of concern identified on the site.

RECOMMENDATION:

1. That a Detailed Site Investigation be undertaken in accordance with the NSW EPA (2020) *Consultants reporting on contaminated land – Contaminated land guidelines* by a suitably qualified environmental consultant to assess potential historic site contamination from long term industrial activities on the site.

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Abbreviations/acronyms

ACM	Asbestos containing material
ANZECC	Australian and New Zealand Environment and Conservation Council
AoPC	Area of potential concern
ARMCANZ	Agricultural and Resource Management Council of Australia and New Zealand
AS	Australian Standard
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013)
Client	Bagcorp Pty Ltd
CLM Act	*Contaminated Land Management Act 1997*
CSM	Conceptual site model
DQO	Data quality objective
DSI	Detailed Site Investigation
EIL	Ecological Investigation Level
EPA	Environment Protection Authority
HIL	Health Investigation Level
HMC	HMC Environmental Consulting
Investigation Area	The entire site subject to the Planning proposal
mBGL	Metres below ground level
OEH	[NSW] Office of Environment and Heritage
PCoC	Potential Contaminants of Concern
PSI	Preliminary Site Investigation
Site	Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW
TLEP 2014	Tweed Local Environmental Plan 2014

1 INTRODUCTION

1.1 BACKGROUND

A Planning Proposal for the subject site located at 84-92 Chinderah Bay Drive, Chinderah NSW, would include amending Schedule 1 of TLEP2014. Solo Resource Recovery currently uses the site as a large scale depot, with no change of use proposed within the planning proposal. To address potential site contamination associated with current and former land use, HMC Environmental Consulting (HMC) was commissioned by DAC Planning Pty Ltd on behalf of the proponent Bagcorp Pty Ltd, to undertake the required investigation in accordance with *State Environmental Policy (Resilience and Hazards) 2021 (SEPP 2021)*.

A Preliminary Site Investigation (PSI) including a desktop assessment of available information, and a detailed site inspection was completed.

1.2 PROJECT DESCRIPTION

The development proposal would require the preparation of a Planning Proposal to amend Schedule 1 of TLEP2014 to include a "depot" and Light Industry as a land use permitted, with consent.

Solo Resource Recovery currently operate on the property as a depot and there is no change of use proposed.

1.3 OBJECTIVE OF THE INVESTIGATION

The objectives of the Preliminary Site Investigation are to:

- Assess the current and former land use on the site for potentially contaminating activities.
- Based on potentially contaminating activities associated with the current and former land use, assess the suitability of the site for the proposed land use.

1.4 SCOPE OF WORKS

The scope of work undertaken during the investigation included the following:

- A desktop assessment of current and former land use on the site including search of available records.
- Review previous investigations.
- A detailed site inspection.
- Preparation of a Preliminary Site Investigation report including:
  - review of available land use history information, and results of the site inspection.
  - assessment of potentially contaminating activities, potential contaminants of concern (PCoC) and areas of concern (AoC).
  - preparation of a soil and analysis quality plan (SAQP).
  - conclusions and recommendations including suitability of the site for the proposed rezoning, and need for further investigation and remediation.

1.5 LEGISLATION

Direction 4.4 was issued by the Minister for Planning to relevant planning authorities under section 9.1(2) of the Environmental Planning and Assessment Act 1979 and commenced on 1 March 2022.

Application

This direction applies when a planning proposal authority prepares a planning proposal that applies to:

(a) land that is within an investigation area within the meaning of the Contaminated Land Management Act 1997,

(b) land on which development for a purpose referred to in Table 1 to the contaminated land planning guidelines is being, or is known to have been, carried out,

(c) the extent to which it is proposed to carry out development on it for residential, educational, recreational or childcare purposes, or for the purposes of a hospital – land:

> *i. in relation to which there is no knowledge (or incomplete knowledge) as to whether development for a purpose referred to in Table 1 to the contaminated land planning guidelines has been carried out, and*
>
> *ii. on which it would have been lawful to carry out such development during any period in respect of which there is no knowledge (or incomplete knowledge).*

Direction 4.4

1. *A planning proposal authority must not include in a particular zone (within the meaning of the local environmental plan) any land to which this direction applies if the inclusion of the land in that zone would permit a change of use of the land, unless:*
    a) *the planning proposal authority has considered whether the land is contaminated, and*
    b) *if the land is contaminated, the planning proposal authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and*
    c) *if the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning proposal authority is satisfied that the land will be so remediated before the land is used for that purpose. In order to satisfy itself as to paragraph 1(c), the planning proposal authority may need to include certain provisions in the local environmental plan.*
2. *Before including any land to which this direction applies in a particular zone, the planning proposal authority is to obtain and have regard to a report specifying the findings of a preliminary investigation of the land carried out in accordance with the contaminated land planning guidelines*

The direction provides clarification that legislation requires a Preliminary Site Investigation be carried out in accordance with the contaminated land planning guidelines

2 SITE INFORMATION

2.1 SITE IDENTIFICATION

Table 1 - Site Identification Summary

Street Address		84, 86, 88, 90 & 92 Chinderah Bay Drive, Chinderah NSW
Allotment Description		Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066
Allotment size		22,729.6m^2 (~2.27 Ha)
Property Number		12375, 12374, 12373 & 51207
Local Government		Tweed Shire
Parish		Cudgen
County		Rous
Geographical Coordinates (MGA Zone 56)		Easting: 554634.55m E Northing: 6876732.49m S (Approximate centre of site).
Zoning		Current - B4 – Mixed Use
Land use - Existing		Commercial/Light Industrial (Solo Waste), Residential
Land use - Proposed		No proposed change of use.
Site Services		Electrical, Sewer, Town Water
Surround Land Uses	North	Residential, Commercial
	East	Commercial (Wholesale Nursery)
	South	Chinderah Village Caravan Park
	West	Chinderah Bay Drive, Tweed River
Closest Sensitive Environment		The property is in close proximity to Tweed River (~35m west). Stormwater from the property would flow generally west into stormwater drainage running parallel to Chinderah Bay Drive, which discharges into Tweed River to the northwest.

Table 2 – Site Characteristics

Topography	The property is generally level and low-lying, in close proximity to Tweed River Approximately 2-3 AHD across the property (Google Earth)
Regional Geology	Cenozoic Undifferentiated Sediments/Sedimentary Rocks Unconsolidated mud, silt, sand and gravel of an uncertain age and origin.
Soil Landscape	Kingscliff (ki) landscape: Extremely low, level to gently undulating Pleistocene sand sheets. Extensively cleared and disturbed open-heathland and forest. Soils: Deep, generally well-drained Podzols. Geology: Aeolian and marine quartz sand sheets and dunes of the Pleistocene inner barrier system.
Australian Soil Classification	Podosols (PO) Soils with B horizons dominated by the accumulation of compounds of organic matter, aluminium and/or iron.

Regional Hydrogeology	Groundwater vulnerability is mapped as moderately high to high for the investigation area. Given the property is low-lying and within close proximity to the tidal Tweed River, it is expected that groundwater would be shallow onsite (<2m depth). Groundwater flow would be expected to flow towards the Tweed River estuary.
Groundwater Database Search	The online NSW Office of Water groundwater mapping (http://allwaterdata.water.nsw.gov.au/water.stm) shows that the nearest mapped registered groundwater bore is GW305254, located approximately 50m northeast on the adjoining property. The registered use and current status of the bore are not listed.

3 SITE HISTORY

3.1 OWNERSHIP

As of the search date, the property is currently owned by Solo Waste Australia. A review of the title information via the online Land and Property Information portal on 11 January 2023 provides the following information:

Table 3 – Property Ownership

Folio Description	Date of Folio	Search Date	Ownership Details
8/216403	2/9/2018	11/1/2023	Solo Waste Aust. Pty Ltd

3.2 AERIAL PHOTOGRAPH INTERPRETATION

A summary of the reviewed historic aerial photography is shown in Table 4. The reviewed historic aerial photography is within pages 22-37 of the LotSearch report in Appendix 9.

Table 4 – Historic Aerial Photography Summary

Year	Source	Comments	Areas of Potential Concern Yes/No
1930	Lotsearch Pty Ltd	The site appears to have been cleared of native vegetation. There is a structure visible on the south-west corner of the site, along with multiple smaller structures, likely sheds. The remainder of the site appears to be clear of structures or intensive land uses. The surrounding area has also been generally cleared of native vegetation, with the land to the south covered in cropping.	No
1947		Similar to 1930. There are structures visible on the south-west portion of the site. The remainder of the property is clear of structures and visible land uses. The land to the north appears to have been developed.	
1955		A number of structures appear to now be existing on the property along the Chinderah Bay frontage, including the existing	Yes

		caretaker's residence on the north-western boundary, as well as two structures on the location of the existing administration buildings.	Long term use of the property as a waste vehicle depot including workshops, assembly, and refuelling.
1961		Similar to 1955, no visible significant changes to the property have been made. The development is still confined to the western boundary with the remainder of the property clear of any structures or land uses.	
1966		The historic aerial is of poor quality and difficult to distinguish. It appears that the existing workshop is now existing on site to the east of the other structures. No other changes are visible.	
1972		The existing extended workshop is now visible. Vehicles are visible parked across the property.	
1979		The existing warehouse attached to the workshop is now visible, along with a structure on the eastern boundary on the site of the site of the existing assembly warehouse. The small existing garages to the east and south of the existing office building are now visible.	
1987		The majority of the existing structures are now visible, including the assembly warehouse along the eastern boundary, the adjacent sand blasting structure, and the refuelling/washdown bay. The existing carport to the west of the workshop is also visible.	
1991		Similar to 1987. The paint and electronics warehouse on the northern boundary is now existing.	
2003		The majority of the northern portion of the property appears to now have bitumen ground cover. The office building appears to now be in its existing state, and the attached administration extension on the western boundary has now been constructed. The caravan park on the adjoining property to the south has been developed to its existing state.	
2008 - 2022		Similar to 2003. No significant developments have occurred on the site. The southern portion of the property now appears to be used for vehicle storage, while the area to the north of the refuelling bay is now used for bin storage.	

Table 5 - Statutory Searches

Search	Comment
NSW EPA Contaminated Land Public Record http://www.epa.nsw.gov.au/prclmapp/searchregister.aspx	No records (orders, notices) for the site were discovered.
Australian Department of Defence Unexploded Ordinance Contaminated Sites http://www.defence.gov.au/uxo/where_is_uxo/UXOSearch.asp?State=NSW	No UXO sites are located near the investigation area.

Cattle Dip Site Locator http://www.dpi.nsw.gov.au/agriculture/livestock/health/specific/cattle/ticks/cattle-dip-site-locator	There are no registered cattle dip sites located within 500m of the investigation area.

3.3 HISTORIC PARISH MAPS & TOPOGRAPHIC MAPS

A summary of the available historic parish and topographic mapping information is shown in Table 6.

Table 6 - Historic Parish and Topographic Map Summary

Search	Comment
Historic Cudgen Parish Maps 1920, 1928, 1942, 1969 https://hlrv.nswlrs.com.au/	Maps do not record land use. Cudgen parish maps 1920 to 1969 show the subject site as part of the historic lots 130, 131 & 132. No changes were noted.
Topographic maps:	
● Australian Section of the Imperial General Staff (1935), *1:63360 N°213[4] Zone 8 Tweed Heads,* Topographic Map	There is one structure mapped on site. There are no other land uses mapped. Chinderah Bay Drive is also mapped.
● Department of National Development (1966), *1:50000 9641-IV Tweed Heads,* Topographic Map	It appears that four structures are mapped for the property, three fronting Chinderah Bay Drive and one further east.
● Department of Lands NSW (1974), *1:25000 9641-IV-S Tweed Heads,* Topographic Map	There are three structured mapped for the property. No other land uses are mapped.
● NSW Land & Property Information (2002), *1:25000 9641-4S Tweed Heads,* Topographic Map	The existing lot boundaries are now mapped. The property is mapped as '*built-up area*'.
● NSW Land & Property Information (2016) *1:25000 9641-4S Tweed Heads,* GeoPDF Topographic Map	Similar to 2002.

3.4 TWEED SHIRE COUNCIL – INFORMAL INFORMATION REQUEST

An informal request for information was submitted by HMC on 11 January 2023. A response was received on 2 February 2023 with the following information:

- The only development application that was discovered on file was a Development Application (DA 0421/2001) for the construction of new administration extensions, which was approved on 19 September 2001. The plans show that the application was for the existing administration building on the western boundary. A prior application (DA 0886/2000) approved on 6 December 2000 related to the demolition of the previously existing structures on the site.

A search of the Tweed Shire Council's online development application records showed additional applications, including:

- Historic application (T4/1967) approved on 22 July 1982 for extensions to existing office.

- Historic Application (T4/4138) approved on 5 November 1985 for the erection of a factory building for the purpose of manufacturing/maintenance and storage of buses.
- Development Application (D87/0769) approved on 7 December 1987 for the erection of a paint room by way of an extension to an existing factory complex.
- Development Application (D89/0263) approved on 16 May 1989 for the establishment of a home industry comprising assembly and restoration of imported motorcycles & cars.
- Development Application (D91/0209) approved on 23 August 1991 for the erection of an office/ administration building.

3.5 SAFEWORK NSW

A site search was submitted to Safework NSW on 28 February 2023 for Schedule 11 Hazardous Chemicals on premises. The search reported that there were no records relating to the subject premises.

3.6 INTERVIEW

An interview was conducted by HMC during the detailed site inspection with Mr Wayne Stegeman, a long-term employee who was very knowledgeable about the history and use of the site. The information gathered is as follows:

- Solo Waste (then J.J. Richards & Sons) first occupied the site in 1950 as a small workshop, and the site has continued to be used as a depot since.
- Development in the late 1960s with the construction of the existing workshop. The beginning of the use of MGBs in the 1980s significantly increased the operation on site and eventuated in the construction of numerous additional structures including the large assembly warehouse on the eastern boundary and the paint room on the northern boundary.
- The original office structure was constructed and operated in 1991, while the larger adjacent administration building was constructed in 2001.
- To the best of his knowledge, the property was not used for agricultural purposes prior to the acquisition by J.J. Richards & Sons in 1950, and has remained as a waste transport vehicle depot in the years since.
- A large above ground diesel fuel tank for the waste vehicles is located towards the northern boundary of the site, adjacent to the wash bay and the bin storage area.

A request for further information on any historical underground petroleum storage on the site was forwarded by email on 22 May 2023. There was no knowledge of any past underground fuel storage area on the site.

4 SITE INSPECTION

A site inspection was undertaken by M. Tunks and M. Flanagan of HMC on the 6 March 2023. The property is accessed via Chinderah Bay Drive on the western boundary of the site. The property is generally low-lying and level land, located in close proximity to the Tweed River (bounding Chinderah Bay Drive to the west). The majority of the site has bitumen ground cover within the depot area, with the land surrounding the existing caretakers residence and dwelling, and the vehicle storage area on the southern boundary, remaining exposed soil/gravel and grass ground cover. There is mature vegetation existing on the boundaries of the site and around the structures fronting Chinderah Bay Drive to the west.

There are numerous structures existing on site, as shown in the Photographic Log in Appendix 8. The Solo Resource Recovery administration and office buildings are located on the entrance to the site to the west. The large two-storey brick administration building is located on the western boundary, with the original brick

veneer office structure located adjacent and attached to the east. A small metal garage is located adjacent east of the office building. There is a small carpark and restricted access gate to the depot located adjacent north to the administration and office buildings. A two storey concrete-rendered caretakers dwelling is located on the northwest corner of the property fronting Chinderah Bay Drive. Another timber-framed dwelling and detached garage is located on the southern lot.

There are numerous large metal warehouse structures located across the eastern portion of the site. These structures are used for the fabrication, assembling and storage of waste transport vehicle parts and associated machinery.

A small site office/staff room and carport are located to the east of the office building. The site office is attached to the large mechanic workshop. Isolated concrete staining within the structure was identified, typical of a mechanic workshop. The workshop is attached to the large storage warehouse for truck parts. A lathe, used for metal fabrication, is located within the warehouse, adjacent to the mechanic workshop. The storage warehouse opens into the large assembly warehouse which is located along the eastern boundary of the site. A sand blasting room is located off the assembly warehouse. A detached structure on the northern boundary comprises of an electrician workshop for the wiring of the vehicles, and the paint room. A wash bay is located towards the north-western portion of the site, together with an adjacent fuelling station with a large above ground diesel fuel tank.

An open area to the north-west of the wash bay is used for the storage of waste receptacles, while there are waste vehicle parts stored across the property. The southern lot is primarily used for the parking and storage of the waste vehicles when not in use. There are no agricultural uses on the property.

The surrounding area has a mixture of land uses with the Chinderah Village Tourist Caravan Park located adjacent south, and a large wholesale plant nursery located adjacent east. The remaining area is a mixture of residential and commercial uses, including a childcare centre immediately north.

4.1 SUMMARY OF SITE CONDITIONS

Table 7 provides a summary of observations during the site inspection.

4.2 SITE PHOTOGRAPHS

See Appendix 8.

4.3 SITE LAYOUT

The details of the site inspections are shown in Table 7.

4.4 SITE FEATURES

Table 7 - Site Features Indicating Potential Contamination

Features of Contamination	Comments
Disturbed, discoloured, or stained soil	Isolated areas of minor soil staining possibly from the storage of vehicles and some mechanical work/parts.
Disturbed or distressed vegetation	None observed.
Surface water quality	The Tweed River to the west appears to be of good water quality, with no visible scum, sheen, or chemical odour.
Agrichemical Storage/Use	None recorded during site inspection.

Other chemical/fuel storage	Paint products including paint thinners and various paint products are located on the northern part of the site associated with the paint shop with spray booth. A large above ground diesel fuel tank is located adjacent to the wash bay with petroleum hydrocarbon (fuel/oil storage in various containers. Areas of waste oil, separators on site associated with workshop/maintenance areas.
Waste storage	Numerous waste storage receptacles located across the property.
Asbestos Waste or Use in Structures	None observed. Likely present in some structures pre mid 1980s. No demolition proposed. No damage to external linings/fragments on ground surface recorded
Fill from unapproved source	None recorded.
Other	Site has long term mechanical assembly use. Likely metal shavings/particles present from cutting/welding/grinding metal.

5 IDENTIFIED AREAS OF CONCERN AND CONTAMINANTS OF POTENTIAL CONCERN

Historic aerial photography and topographic mapping show the rural site generally clear of native vegetation since prior to 1930. The property was occupied by Solo Resource Recovery (then J.J. Richards & Sons) since 1950 and has been used as a waste vehicle depot in the years since. The depot has developed over time, particularly during the late 1960s, and the 1980s, spearheading innovations, and evolving into the existing operation today.

A review of the available historic aerials do not show any intensive land uses on the investigation area prior to 1950. Historic structures (likely the existing dwellings) were located along the western boundary prior to the depot being establish in 1950.

The fabrication and assembly, servicing of waste transport vehicles and associated equipment requires the use of a mechanical workshop, metal lathe, spray painting booths, sand blasting and fuel/oil storage and dispensing.

Areas of concern would be locations on the site exposed to spills, leaks, washdown or housekeeping where concentrations of fuel, oil, metals, thinners, paints and other potential contaminants of concern may be present in the soil or groundwater from activities undertaken on the site.

Although there is no change of use proposed, Council is required to be provided with adequate information to assess whether the site has been subject to site contamination, and is suitable for the proposed land use. If site contamination is identified exceeding investigation criteria, further investigation is required to delineate the impacted area and provide information on whether the site is able to be remediated to be suitable for the proposed land use.

Crucially, for this long-term manufacturing site, the potential migration of potential contaminants of concern exceeding investigation criteria from the site to adjoining properties and ecological receptors would need to be assessed. The shallow groundwater in sandy soil with unpaved or slightly porous ground cover may provide a pathway for movement offsite, especially in groundwater flow. Stormwater flows collecting surface runoff may also be a source of off-site migration of PCoC, if present in locations within the catchment of the site

stormwater drainage system that discharges into the street stormwater drainage system feeding into the Tweed River estuary on the western side of Chinderah Bay Drive

Table 8 - List of Potential Contaminants of Concern (PCoC) and Areas of Concern (AoC)

	PCoC	Description and common relationship
Fabrication/Assembly/Servicing	Heavy metals - arsenic (As), cadmium (Cd), copper (Cu), chromium (Cr), nickel (Ni), lead (Pb), zinc (Zn), mercury (Hg)	• Long term use of site for manufacturing purposes. • Potential leaks and spills associated with storage of chemicals, paint, solvents, and fuels/oil. • Generation of metal fragments/shavings/dust associated with long term metal fabrication, cutting/grinding/welding.
	Petroleum Hydrocarbons – benzene, toluene, ethyl benzene, xylene (BTEX), volatile and semi-volatile Total Recoverable Hydrocarbons (TPH C6-C40), Polyaromatic hydrocarbons (PAH).	
	Volatile Organic Compounds	

6 CONCEPTUAL SITE MODEL

Table 9 Conceptual Site Model

POTENTIAL SOURCE	PATHWAY	EXPOSURE ROUTE	RECEPTOR
Long term use as a waste vehicle depot, including workshops, storage, paint room, sand blasting and refuelling.	Surface water runoff	Chemical/sediment entering local water ways	Ecological receptors
	Exposed surface soil	Dermal contact to exposed soil during earthworks, proposed arena use	Site worker, Occupier, Visitor
	Atmospheric dispersion	Inhalation of soil exposed from exposed bare soil areas	
	Leaching to groundwater	Groundwater movement off-site to beneficial users or ecological receptors	Beneficial users/Ecological receptor

7 CONCLUSIONS AND RECOMMENDATIONS

The Preliminary Site Investigation conclusions are based on the information described in this report and Appendices and should be read in conjunction with the complete report, including Section 8 Limitations.

A planning proposal for the existing commercial and light industrial property at Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW, would include amending the Schedule 1 of TLEP2014 to include a "depot" and Light Industry as a land use permitted, with consent. A review of available information, and a detailed site inspection revealed the long-term occupation of the waste vehicle depot since 1950 to present day. As there is no change of use, there would be no earthworks allowing for increased exposure to existing soil. However, given the long-term use of the workshops, a strategic sampling regime is recommended to meet the requirements of Direction 4.4 and assess whether the land is contaminated, and, if the land is contaminated, whether the land is suitable in its

contaminated state (or will be suitable, after remediation) for all the potential land uses within the proposed zoning

Given the low-lying land and expected shallow groundwater, it would be necessary to assess the impact of the long term industrial use on the site groundwater regime. Should the preliminary groundwater investigation show contaminant concentrations exceeding investigation criteria, further investigation would be required to assess potential migration of impacted groundwater off-site.

Based on the information presented, in relation to potential site contamination associated with current and former land use and considering the requirements of State Environmental Planning Policy (Resilience and Hazards) 2021, Lot 5 DP 501046, Lot 8 DP 216403, Lot 7 DP 216403 & Lot 10 DP 1037066, 84-92 Chinderah Bay Drive, Chinderah NSW, further investigation is required to assess areas of concern identified on the site.

7.1 RECOMMENDATION:

1. That a Detailed Site Investigation be undertaken in accordance with the NSW EPA (2020) *Consultants reporting on contaminated land – Contaminated land guidelines* by a suitably qualified environmental consultant to assess potential historic site contamination from long term manufacturing activities on the site. The investigation is to include potential groundwater contamination.

8 LIMITATIONS

Any conclusions presented in this report are relevant to the site condition at the time of inspection and legislation enacted as at date of this report. Actions or changes to the site after time of inspection or in the future will void this report as will changes in relevant legislation.

The findings of this report are based on the objectives and scope of work outlined in Section 1. HMC Environmental has performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties or guarantees expressed or implied, are given. This report does not comment on any regulatory issues arising from the findings, for which a legal opinion should be sought. This report relates only to the objectives and scope of work stated and does not relate to any other works undertaken for the client. The report and conclusions are based on the information obtained at the time of the assessment.

The site history and associated uses, areas of use, and potential contaminants were determined based on the activities described in the scope of work. Additional site information held by the client, regulatory authorities or in the public domain, which was not provided to HMC Environmental or was not sourced by HMC Environmental under the scope of work, may identify additional uses, areas of use and/or potential contaminants. The information sources referenced have been used to determine the site history.

Whilst HMC Environmental has used reasonable care to avoid reliance on data and information that is inaccurate and unsuitable, HMC Environmental is not able to verify the accuracy or completeness of all information and data made available. Further chemicals or categories of chemicals may exist at the sites, which were not identified in the site history, and which may not be expected at the site. The absence of any identified hazardous or toxic materials on the subject land should not be interpreted as a warranty or guarantee that such materials do not exist on the site. If additional certainty is required, additional site history or desktop studies, or environmental sampling and analysis should be commissioned.

The results of this assessment are based upon site inspections and fieldwork conducted by HMC Environmental personnel and information provided by the client. All conclusions regarding the property area are the professional opinions of the HMC Environmental personnel involved with the project, subject to the qualifications made above. HMC Environmental assume no responsibility or liability for errors in any data obtained from regulatory agencies, information from sources outside of HMC Environmental, or developments resulting from situations outside the scope of this project.

9 SIGNATURE

This report has been prepared by Mark Tunks of HMC Environmental Consulting, a suitably qualified environmental consultant, in accordance with the NSW EPA (2020) *Consultants reporting on contaminated land – Contaminated land guidelines*. Note that HMC Environmental Consulting holds current Professional Indemnity Insurance to 4th August 2023.

Mark Tunks
Principal

01 August 2023
Completion Date

10 REFERENCES

Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (ANZECC guidelines) published by the Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council, January 1992

Hashimoto T.R & Troedson A.I. 2008 *Tweed Heads 1:100 000 and 1:25 000, Coastal Quaternary Geology Map Series*. Geological Survey of New South Wales, Maitland

Morand, D.T., *Soil Landscapes of the Murwillumbah-Tweed Heads 1:100 000 Sheet, 1996*

NEPC, 2013. National Environment Protection (Assessment of Site Contamination) Measure 1999 *Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater*, National Environment Protection Council Service Corporation, as amended 16 May 2013

NSW Environment Protection Authority (2020) *Consultants reporting on contaminated land - Contaminated land guidelines*

NSW Department of Planning and Environment. (2021) *State Environmental Planning Policy (Resilience and Hazards) 2021*

11 GLOSSARY

Added contaminant limit (ACL) is the added concentration of a contaminant above which further appropriate investigation and evaluation of the impact on ecological values will be required. ACL values are generated in the process of deriving ecological investigation levels (EILs).

Ambient background concentration (ABC) of a contaminant is the soil concentration in a specified locality that is the sum of the naturally occurring background and the contaminant levels that have been introduced from diffuse or non-point sources by general anthropogenic activity not attributable to industrial, commercial or agricultural activities.

An **area of ecological significance** is one where the planning provisions or land use designation is for the primary intention of conserving and protecting the natural environment. This would include national parks, state parks, and wilderness areas and designated conservation areas.

Bioavailability is a generic term defined as the fraction of a contaminant that is absorbed into the body following dermal contact, ingestion or inhalation.

Bonded asbestos-cement-material (bonded ACM) comprises bonded asbestos containing material which is in sound condition (although possibly broken or fragmented) and is restricted to material that cannot pass a 7 mm x 7 mm sieve. This sieve size is selected as it approximates the thickness of common asbestos cement sheeting and for fragments to be smaller than this would imply a high degree of damage and potential for fibre release.

Conceptual site model (CSM) is a description of a site including the environmental setting, geological, hydrogeological and soil characteristics together with the nature and distribution of contaminants. Potentially exposed populations and exposure pathways are identified. Presentation is usually graphical or tabular with accompanying explanatory text.

Contamination means the condition of land or water where any chemical substance or waste has been added as a direct or indirect result of human activity at above background level and represents, or potentially represents, an adverse health or environmental impact.

Ecological investigation levels (EILs) are the concentrations of contaminants above which further appropriate investigation and evaluation will be required. EILs depend on specific soil physicochemical properties and land use scenarios and generally apply to the top 2 m of soil. EILs may also be referred to as soil quality guidelines in Schedules B5b and B5c.

Health investigation levels (HILs) are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required. HILs are generic to all soil types and generally apply to the top 3 m of soil.

Health risk assessment (HRA) is the process of estimating the potential impact of a chemical, biological or physical agent on a specified human population system under a specific set of conditions.

Investigation levels and **screening levels** are the concentrations of a contaminant above which further appropriate investigation and evaluation will be required. Investigation and screening levels provide the basis of Tier 1 risk assessment.

Multiple-lines-of-evidence approach is the process for evaluating and integrating information from different sources of data and uses best professional judgement to assess the consistency and plausibility of the conclusions which can be drawn.

Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain timeframe.

Risk management is a decision-making process involving consideration of political, social, economic and technical factors with relevant risk assessment information relating to a hazard to determine an appropriate course of action.

Screening is the process of comparison of site data to screening criteria to obtain a rapid assessment of contaminants of potential concern.

Tier 1 assessment is a risk-based analysis comparing site data with investigation and screening levels for various land uses to determine the need for further assessment or development of an appropriate management strategy.

12 APPENDICES

See following Pages.

APPENDIX 1 - LOCATION MAPS

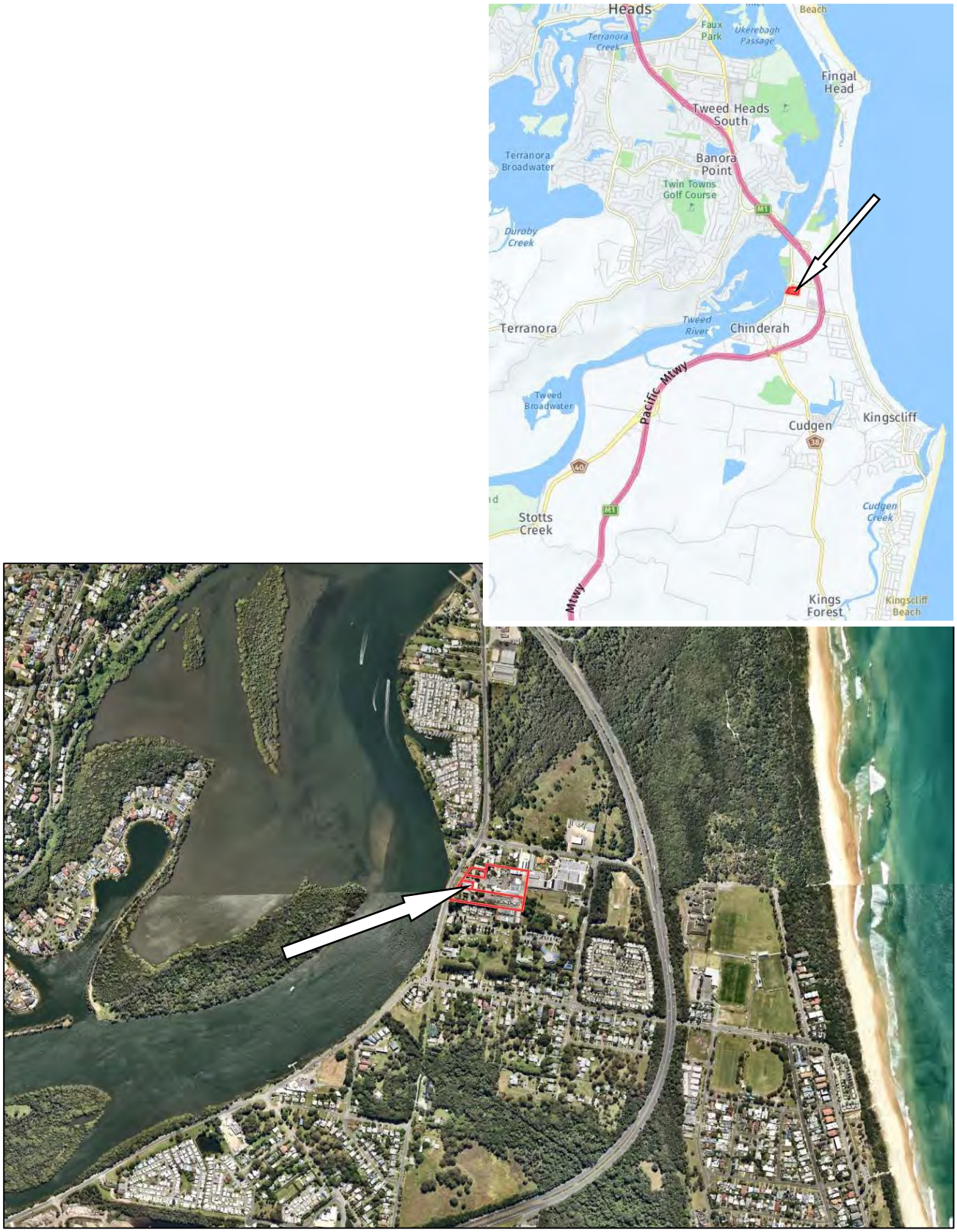


Figure 1 - Surrounding Area (Source: Nearmap 2023)

Figure 2 – Subject Site (Source: Nearmap 2023)

APPENDIX 2 - GEOLOGY AND SOIL LANDSCAPE

Figure 3 - Geology Map (Source: Geoscience Australia)

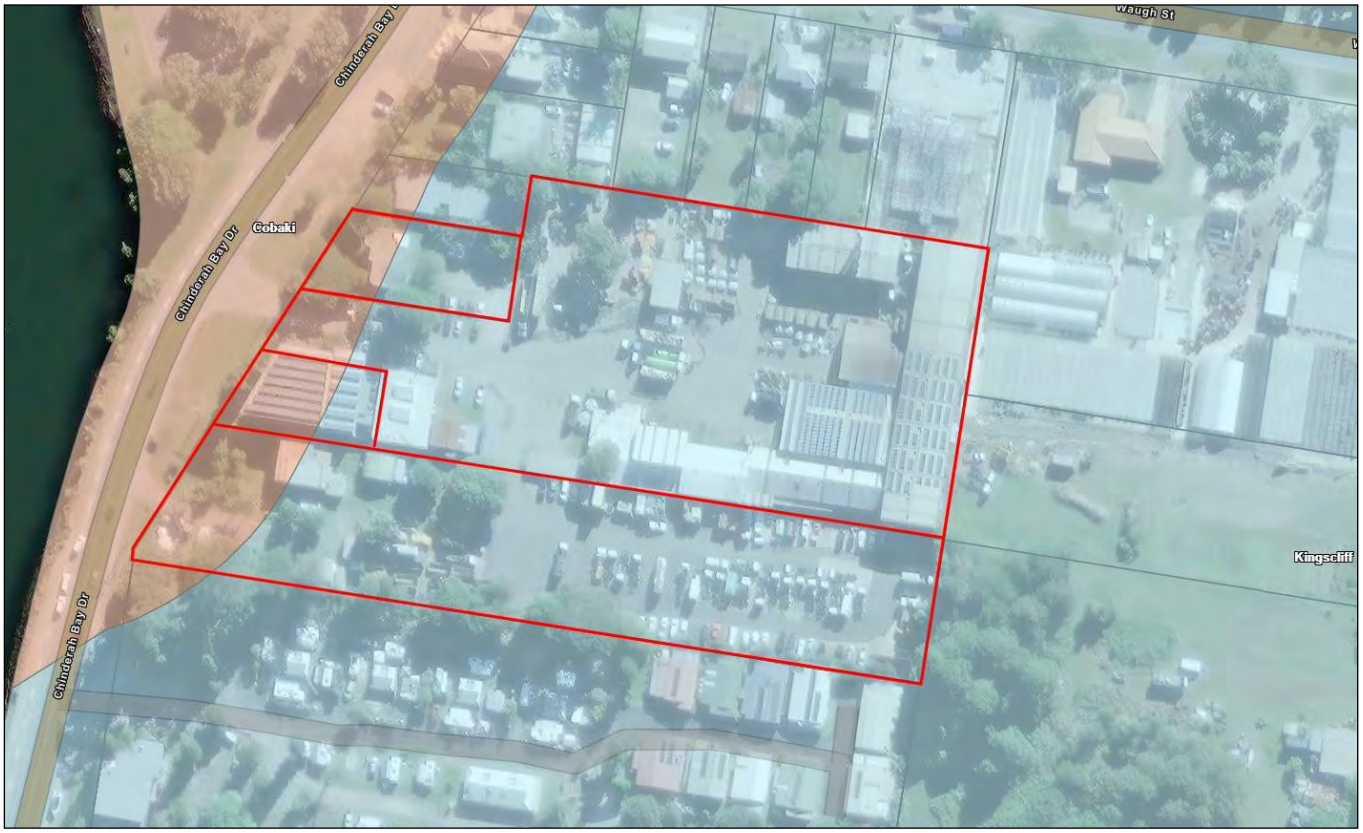


Figure 4 - Soil Landscape (Source: eSPADE NSW)

APPENDIX 3 - LICENSED GROUNDWATER BORES

Figure 5 – Groundwater Bore Locations (Source: http://allwaterdata.water.nsw.gov.au/water.stm)

APPENDIX 4 - CATTLE DIP SITES

Figure 6 – Cattle Dip Locations (Source: HMC GIS)

APPENDIX 5 - HISTORIC PARISH MAPS

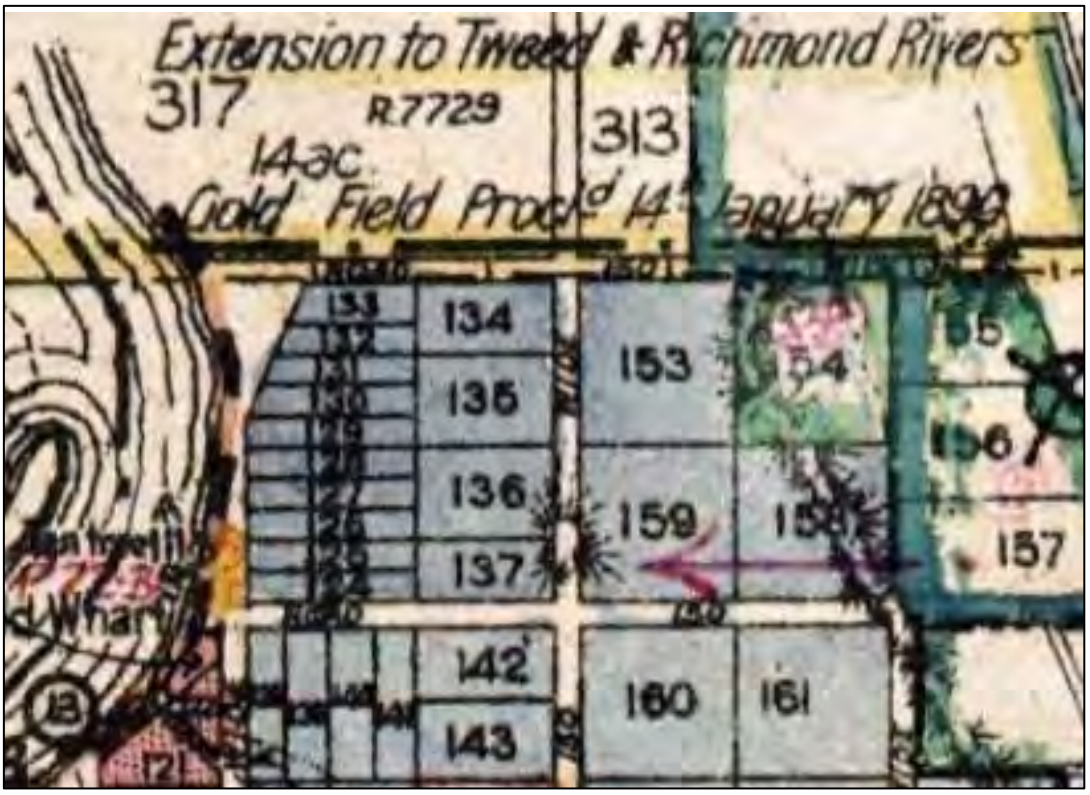


Figure 7 – 1920 Cudgen Parish Map Extract (http://hlrv.nswlrs.com.au/pixel.htm)

Figure 8 – 1928 Cudgen Parish Map Extract (http://hlrv.nswlrs.com.au/pixel.htm)

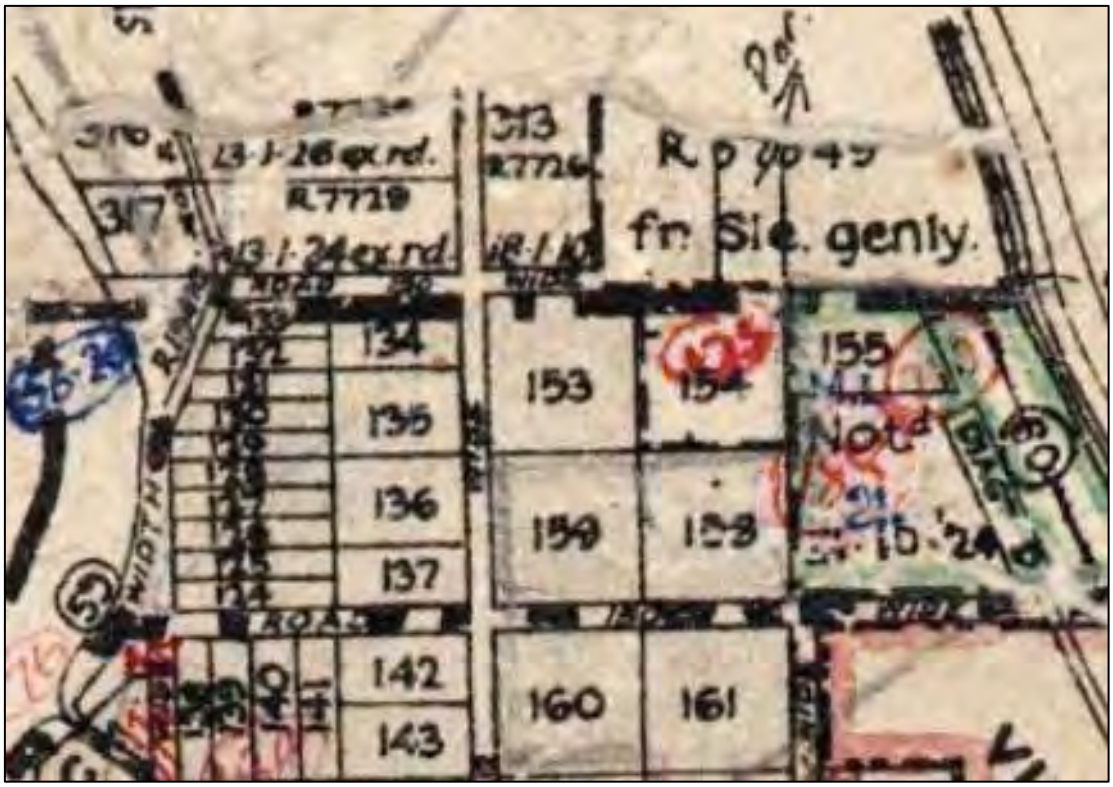


Figure 9 – 1942 Cudgen Parish Map Extract (http://hlrv.nswlrs.com.au/pixel.htm)

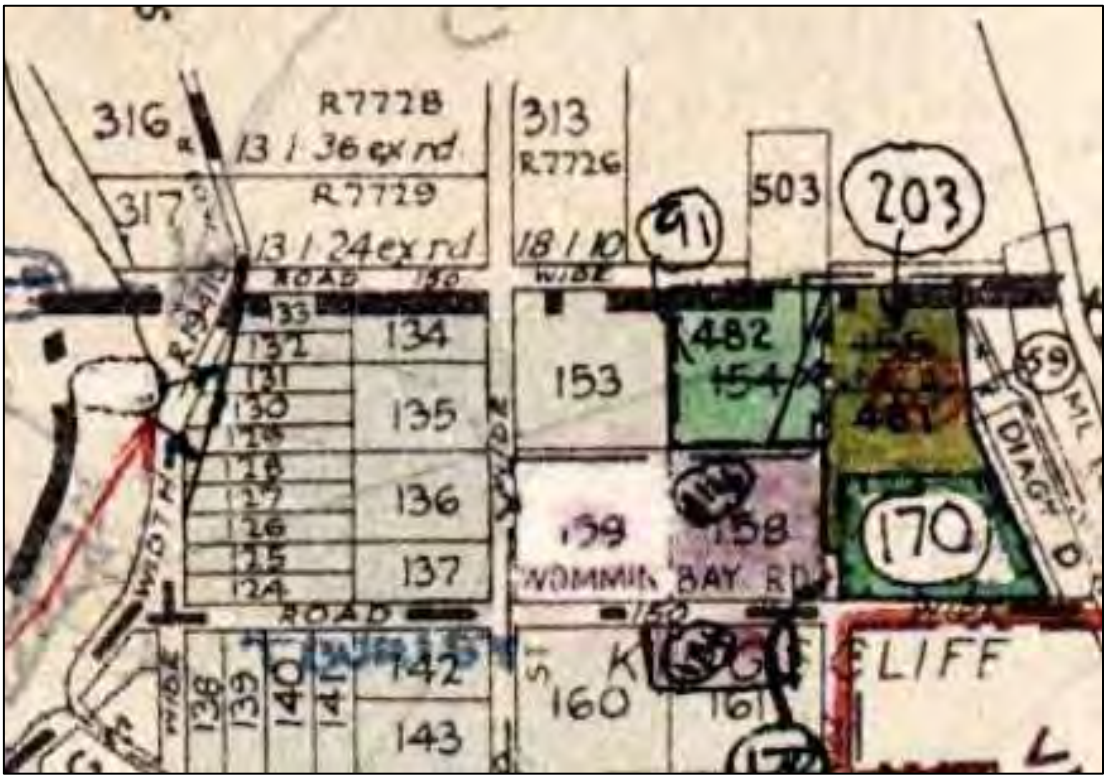


Figure 10 – 1969 Cudgen Parish Map Extract (http://hlrv.nswlrs.com.au/pixel.htm)

APPENDIX 6 - HISTORIC TOPOGRAHPIC MAPS

Figure 11 – 1935 *Tweed Heads* Topographical Map extract.

Figure 12 – 1966 *Tweed Heads* Topographical Map extract.

Figure 13 – 1974 *Tweed Heads* Topographical Map extract.

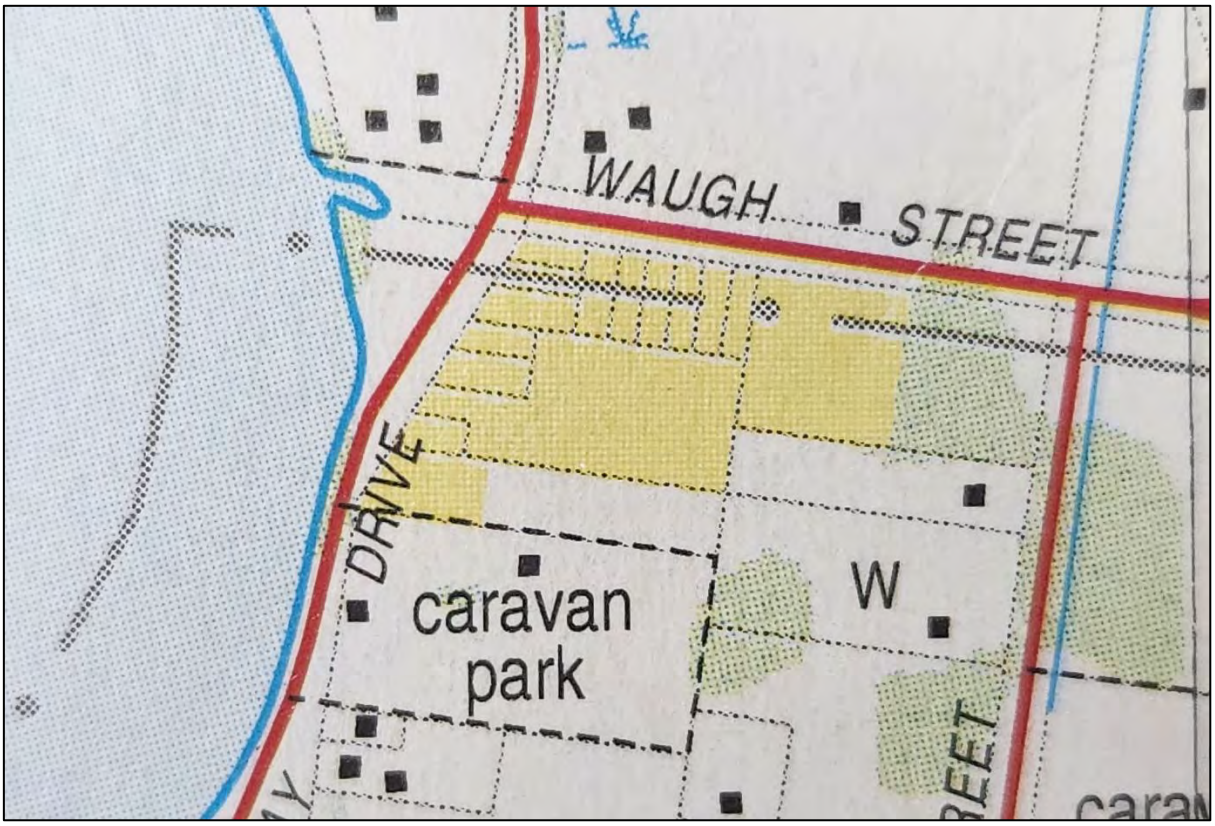


Figure 14 – 2002 *Tweed Heads* Topographical Map extract.

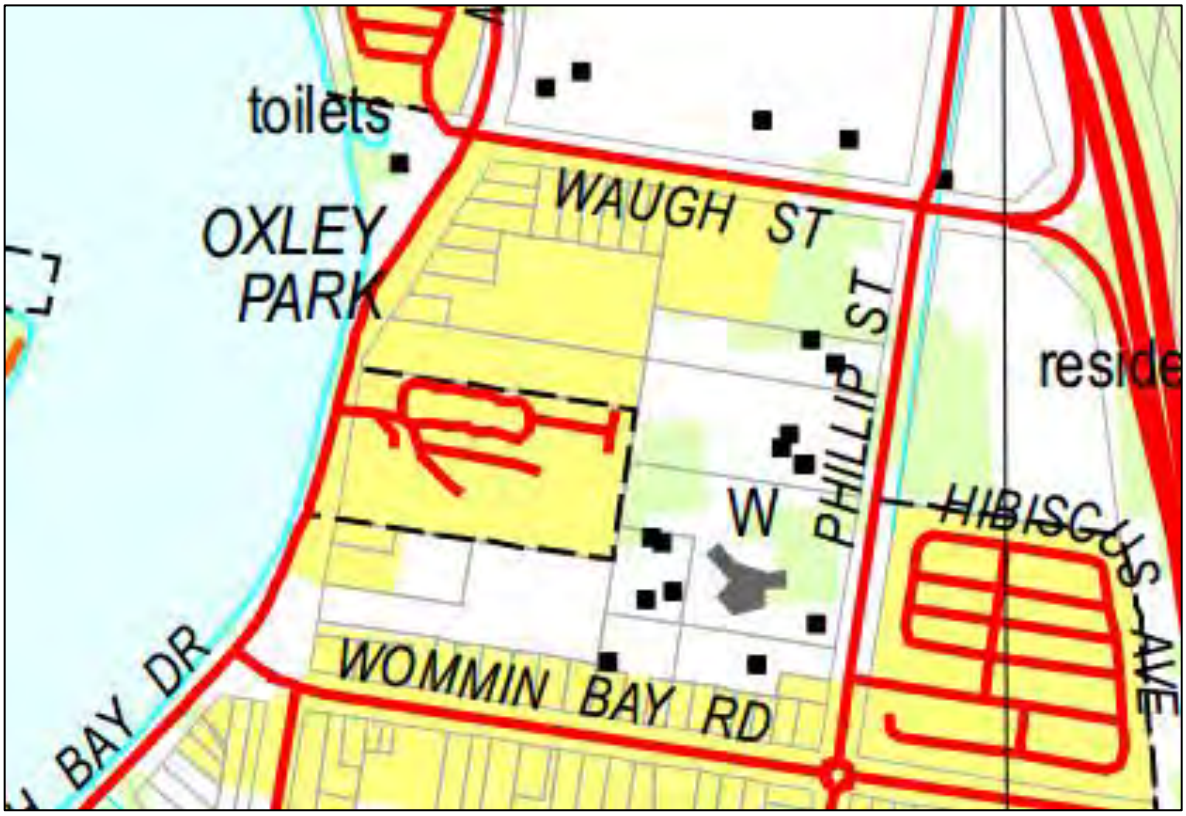


Figure 15 – 2017 *Burringbar* Topographical Map extract.

APPENDIX 7 - ZONE MAPPING

Figure 16 – NSW Legislation Zone Plan

(Source: http://www.legislation.nsw.gov.au/maintop/view/inforce/epi+177+2014+cd+0+N)

APPENDIX 8 - PHOTOGRAPHIC LOG

Photo No. 1	Date 01.05.2023

Description:
View east overlooking the driveway entrance to the subject property.

Photo No. 2	Date 01.05.2023

Description:
View southwest overlooking the existing two-storey administration building on the western boundary.

Photo No. 3	Date 01.05.2023

Description:
View north overlooking the existing caretakers dwelling located on the northwestern corner of the site.

Photo No. 4	Date 01.05.2023

Description:
View southwest overlooking the existing single-storey office building.

Photo No. 5	Date 01.05.2023

Description:
View south overlooking the existing staffroom building.

Photo No. 6	Date 01.05.2023

Description:
View southeast overlooking the existing mechanic workshop structure.

Photo No. 7	Date 01.05.2023

Description:
View east overlooking the entryway into the storage warehouse and the assembly area.

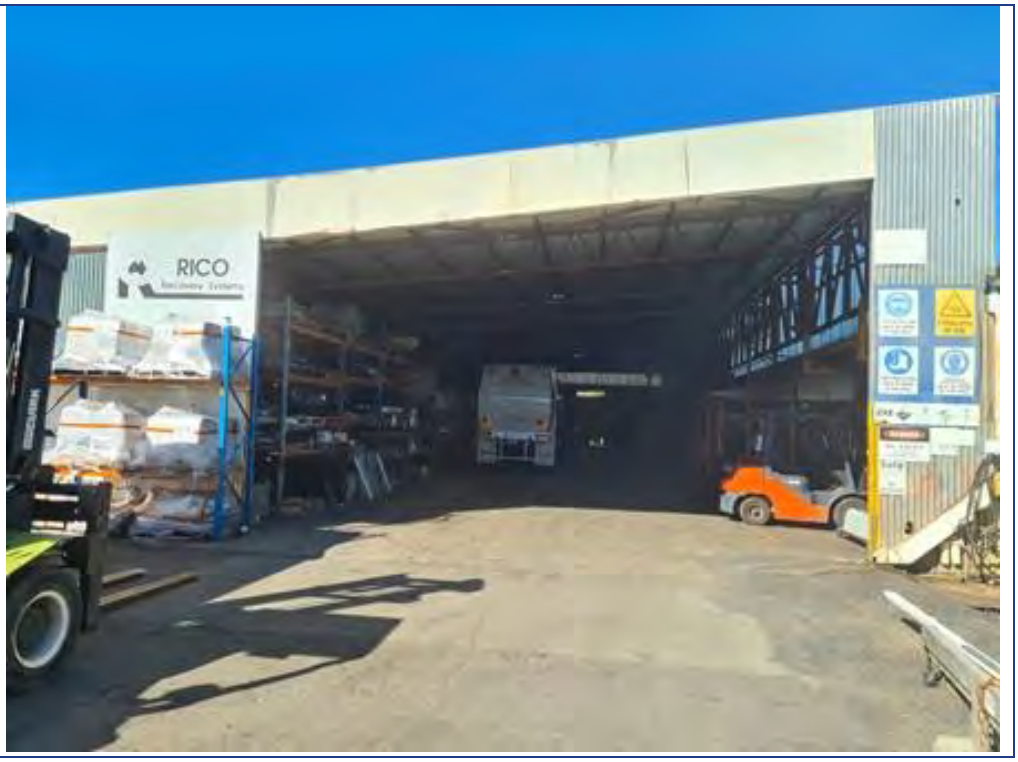


Photo No. 8	Date 01.05.2023

Description:
View east overlooking depot towards the sand blasting structure. Scattered truck parts visible in the depot.

Photo No. 9	Date 01.05.2023

Description:
View east overlooking the existing paint shop on the northern boundary.

Photo No. 10	Date 01.05.2023

Description:
View southeast overlooking the existing vehicle storage area on the southern portion of the property.

APPENDIX 9 - LOTSEARCH REPORT

LOTSEARCH

LOTSEARCH ENVIRO PROFESSIONAL

Date: 02 Mar 2023 11:18:05

Reference: LS041089 EP

Address: 84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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 On-site	No. Features within 100m	No. Features within Buffer
Cadastre Boundaries	NSW Department of Customer Service - Spatial Services	14/02/2023	14/02/2023	Quarterly	-	-	-	-
Topographic Data	NSW Department of Customer Service - Spatial Services	22/08/2022	22/08/2022	Annually	-	-	-	-
List of NSW contaminated sites notified to EPA	Environment Protection Authority	13/02/2023	10/01/2023	Monthly	1000m	0	0	0
Contaminated Land Records of Notice	Environment Protection Authority	27/02/2023	27/02/2023	Monthly	1000m	0	0	0
Former Gasworks	Environment Protection Authority	06/12/2022	14/07/2021	Quarterly	1000m	0	0	0
National Waste Management Facilities Database	Geoscience Australia	26/05/2022	07/03/2017	Annually	1000m	0	0	0
National Liquid Fuel Facilities	Geoscience Australia	23/08/2022	13/07/2012	Annually	1000m	0	0	2
EPA PFAS Investigation Program	Environment Protection Authority	13/02/2023	23/09/2022	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Investigation Sites	Department of Defence	14/02/2023	14/02/2023	Monthly	2000m	0	0	0
Defence PFAS Investigation & Management Program - Management Sites	Department of Defence	14/02/2023	14/02/2023	Monthly	2000m	0	0	0
Airservices Australia National PFAS Management Program	Airservices Australia	13/02/2023	13/02/2023	Monthly	2000m	0	0	0
Defence 3 Year Regional Contamination Investigation Program	Department of Defence	02/09/2022	02/09/2022	Quarterly	2000m	0	0	0
EPA Other Sites with Contamination Issues	Environment Protection Authority	16/02/2022	13/12/2018	Annually	1000m	0	0	0
Licensed Activities under the POEO Act 1997	Environment Protection Authority	27/02/2023	27/02/2023	Monthly	1000m	0	0	0
Delicensed POEO Activities still regulated by the EPA	Environment Protection Authority	27/02/2023	27/02/2023	Monthly	1000m	0	0	0
Former POEO Licensed Activities now revoked or surrendered	Environment Protection Authority	27/02/2023	27/02/2023	Monthly	1000m	0	4	5
UBD Business Directories (Premise & Intersection Matches)	Hardie Grant			Not required	150m	0	0	0
UBD Business Directories (Road & Area Matches)	Hardie Grant			Not required	150m	-	24	24
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Premise & Intersection Matches)	Hardie Grant			Not required	500m	0	0	0
UBD Business Directory Dry Cleaners & Motor Garages/Service Stations (Road & Area Matches)	Hardie Grant			Not required	500m	-	1	1
Cattle dips of the Northern Rivers region	NSW Dept. of Primary Industries	09/08/2022	09/08/2022	Annually	1000m	0	0	0
Points of Interest	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	2	32
Tanks (Areas)	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	0	0
Tanks (Points)	NSW Department of Customer Service - Spatial Services	19/10/2022	19/10/2022	Quarterly	1000m	0	0	0
Major Easements	NSW Department of Customer Service - Spatial Services	16/02/2023	16/02/2023	Quarterly	1000m	0	0	2
State Forest	Forestry Corporation of NSW	16/08/2022	14/08/2022	Annually	1000m	0	0	0
NSW National Parks and Wildlife Service Reserves	NSW Office of Environment & Heritage	16/02/2023	31/12/2022	Annually	1000m	0	0	0
Hydrogeology Map of Australia	Commonwealth of Australia (Geoscience Australia)	29/08/2022	19/08/2019	Annually	1000m	0	0	1
Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018	NSW Department of Planning, Industry and Environment	28/03/2022	23/02/2018	Annually	1000m	0	0	0

Dataset Name	Custodian	Supply Date	Currency Date	Update Frequency	Dataset Buffer (m)	No. Features On-site	No. Features within 100m	No. Features within Buffer
National Groundwater Information System (NGIS) Boreholes	Bureau of Meteorology; Water NSW	14/02/2023	14/02/2023	Annually	2000m	0	1	42
NSW Seamless Geology Single Layer: Rock Units	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	1	4	15
NSW Seamless Geology – Single Layer: Trendlines	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	0	0	0
NSW Seamless Geology – Single Layer: Geological Boundaries and Faults	Department of Regional NSW	17/02/2022	01/05/2021	Annually	1000m	0	0	0
Naturally Occurring Asbestos Potential	NSW Dept. of Industry, Resources & Energy	04/12/2015	24/09/2015	Unknown	1000m	0	0	0
Atlas of Australian Soils	Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)	19/05/2017	17/02/2011	As required	1000m	1	1	2
Soil Landscapes of Central and Eastern NSW	NSW Department of Planning, Industry and Environment	18/08/2022	27/07/2020	Annually	1000m	2	2	11
Environmental Planning Instrument Acid Sulfate Soils	NSW Department of Planning, Industry and Environment	28/02/2023	02/12/2022	Monthly	500m	1	-	-
Atlas of Australian Acid Sulfate Soils	CSIRO	19/01/2017	21/02/2013	As required	1000m	1	1	3
Dryland Salinity - National Assessment	National Land and Water Resources Audit	18/07/2014	12/05/2013	None planned	1000m	0	0	0
Mining Subsidence Districts	NSW Department of Customer Service - Subsidence Advisory NSW	14/02/2023	14/02/2023	Quarterly	1000m	0	0	0
Current Mining Titles	NSW Department of Industry	13/02/2023	13/02/2023	Monthly	1000m	0	0	0
Mining Title Applications	NSW Department of Industry	13/02/2023	13/02/2023	Monthly	1000m	0	0	0
Historic Mining Titles	NSW Department of Industry	13/02/2023	13/02/2023	Monthly	1000m	8	8	9
Environmental Planning Instrument SEPP State Significant Precincts	NSW Department of Planning, Industry and Environment	15/11/2021	07/12/2018	Monthly	1000m	0	0	0
Environmental Planning Instrument Land Zoning	NSW Department of Planning, Industry and Environment	15/12/2022	02/12/2022	Monthly	1000m	1	8	53
Commonwealth Heritage List	Australian Government Department of the Agriculture, Water and the Environment	03/06/2022	13/04/2022	Annually	1000m	0	0	0
National Heritage List	Australian Government Department of the Agriculture, Water and the Environment	03/06/2022	13/04/2022	Annually	1000m	0	0	0
State Heritage Register - Curtilages	NSW Department of Planning, Industry and Environment	18/10/2022	01/07/2022	Quarterly	1000m	0	0	0
Environmental Planning Instrument Local Heritage	NSW Department of Planning, Industry and Environment	28/02/2023	17/02/2023	Monthly	1000m	0	0	1
Bush Fire Prone Land	NSW Rural Fire Service	27/02/2023	25/10/2022	Weekly	1000m	0	0	3
Eastern Bushland Database (North Region)	NSW Office of Environment & Heritage	24/07/2016	01/01/1991	Annually	1000m	0	0	1
Ramsar Wetlands of Australia	Australian Government Department of Agriculture, Water and the Environment	28/03/2022	19/03/2020	Annually	1000m	0	0	0
Groundwater Dependent Ecosystems	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	0	0	2
Inflow Dependent Ecosystems Likelihood	Bureau of Meteorology	28/10/2022	26/10/2022	Annually	1000m	0	0	3
NSW BioNet Species Sightings	NSW Office of Environment & Heritage	27/02/2023	27/02/2023	Weekly	10000m	-	-	-

Site Diagram

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Legend

- Site Boundary
- Internal Parcel Boundaries

Total Area: 22715m²

Total Perimeter: 645m

Scale: 0 25 50 Meters

Data Source Aerial Imagery: © Aerometrex Pty Ltd

Disclaimers:

Measurements are approximate only and may have been simplified or smaller lengths removed for readability.

Parcels that make up a small percentage of the total site area have not been labelled for increased legibility.

Coordinate System: GDA 1994 MGA Zone 56

Date: 02 March 2023

Contaminated Land

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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	Direction
N/A	No records in buffer								

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

Contaminated Land

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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

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

Waste Management & Liquid Fuel Facilities

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Waste Management & Liquid Fuel Facilities

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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	Direction
N/A	No records in buffer											

National Liquid Fuel Facilities

National Liquid Fuel Facilties within the dataset buffer:

Map Id	Owner	Name	Address	Suburb	Class	Operational Status	Operator	Revision Date	Loc Conf	Dist	Direction
3895	BP	BP Chinderah	Lot 9-12 Chinderah Bay Drive	Chinderah	Petrol Station	Operational		25/07/2011	Premise Match	703m	North
3897	BP	BP Connect Chinderah	69 Ozone Street	Chinderah	Petrol Station	Operational		25/07/2011	Premise Match	912m	South

PFAS Investigation & Management Programs

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

EPA PFAS Investigation Program

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

Map ID	Site	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

EPA PFAS Investigation Program: Environment Protection Authority

Defence PFAS Investigation Program

Sites being investigated by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Investigation Program Data Custodian: Department of Defence, Australian Government

Defence PFAS Management Program

Sites being managed by the Department of Defence for PFAS contamination within the dataset buffer:

Map ID	Base Name	Address	Loc Conf	Dist	Dir
N/A	No records in buffer				

Defence PFAS Management Program Data Custodian: Department of Defence, Australian Government

Airservices Australia National PFAS Management Program

Sites being investigated or managed by Airservices Australia for PFAS contamination within the dataset buffer:

Map ID	Site Name	Impacts	Loc Conf	Dist	Dir
N/A	No records in buffer				

Airservices Australia National PFAS Management Program Data Custodian: Airservices Australia

Defence Sites

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Defence 3 Year Regional Contamination Investigation Program

Sites which have been assessed as part of the Defence 3 Year Regional Contamination Investigation Program within the dataset buffer:

Property ID	Base Name	Address	Known Contamination	Loc Conf	Dist	Dir
N/A	No records in buffer					

Defence 3 Year Regional Contamination Investigation Program, Data Custodian: Department of Defence, Australian Government

EPA Other Sites with Contamination Issues

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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
- Pasminco Lead Abatement Strategy Area

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

EPA Activities

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Licensed Activities under the POEO Act 1997

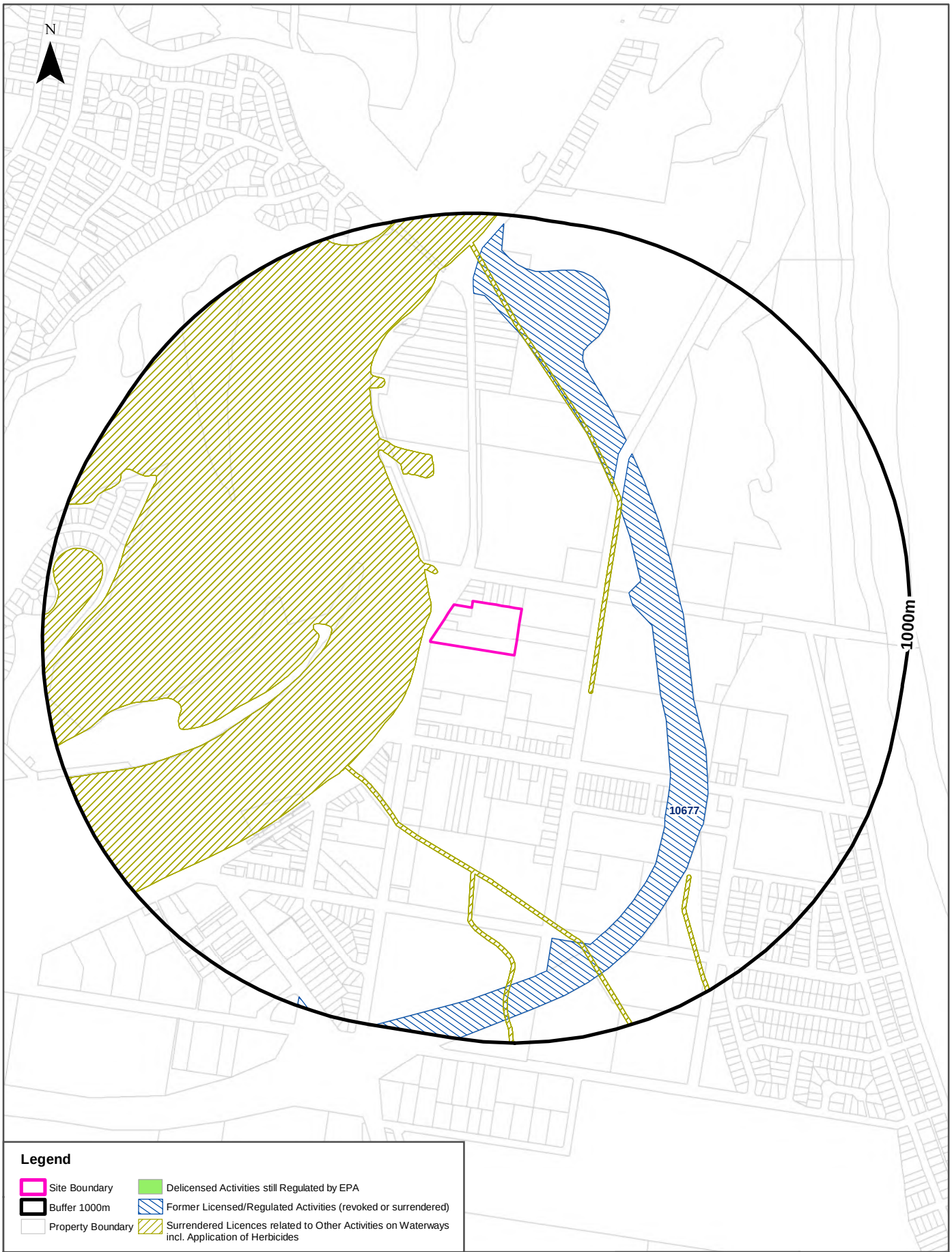
Licensed activities under the Protection of the Environment Operations Act 1997, within the dataset buffer:

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

POEO Licence Data Source: Environment Protection Authority

Delicensed & Former Licensed EPA Activities

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



EPA Activities

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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

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

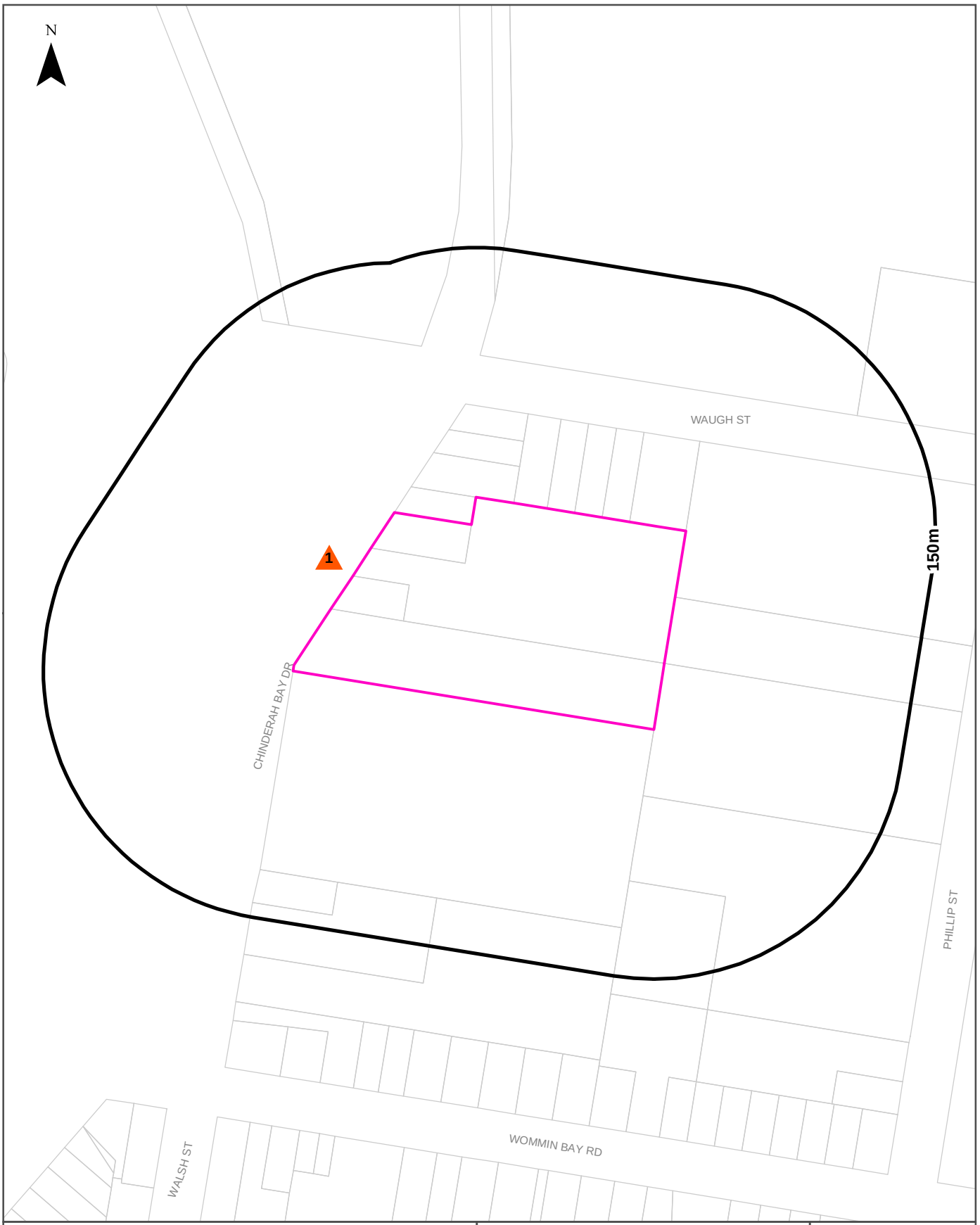
Former Licensed activities under the Protection of the Environment Operations Act 1997, now revoked or surrendered, within the dataset buffer:

Licence No	Organisation	Location	Status	Issued Date	Activity	Loc Conf	Distance	Direction
4292	FAR NORTH COAST COUNTY COUNCIL	COUNTY DISTRICT - LISMORE NSW 2480	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	24m	West
4653	LUHRMANN ENVIRONMENT MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW	Surrendered	06/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	24m	West
4838	Robert Orchard	Various Waterways throughout New South Wales - SYDNEY NSW 2000	Surrendered	07/09/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	24m	West
6630	SYDNEY WEED & PEST MANAGEMENT PTY LTD	WATERWAYS THROUGHOUT NSW - PROSPECT, NSW, 2148	Surrendered	09/11/2000	Other Activities / Non Scheduled Activity - Application of Herbicides	Network of Features	24m	West
10677	ACCIONA INFRASTRUCTURE PROJECTS AUSTRALIA PTY LTD	Between chainage 50743 at Yelgun and chainage 79331 at Chinderah, YELGUN, NSW 2483	Surrendered	01/05/2000	Freeway or Tollway Construction	Road Match	279m	East

Former Licensed Activities Data Source: Environment Protection Authority

Historical Business Directories

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Legend

- Site Boundary
- Buffer 150m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 40 80 120 160 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 02 March 2023

Historical Business Directories

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Business Directory Records 1950-1991
Premise or Road Intersection Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, mapped to a premise or road intersection within the dataset buffer:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

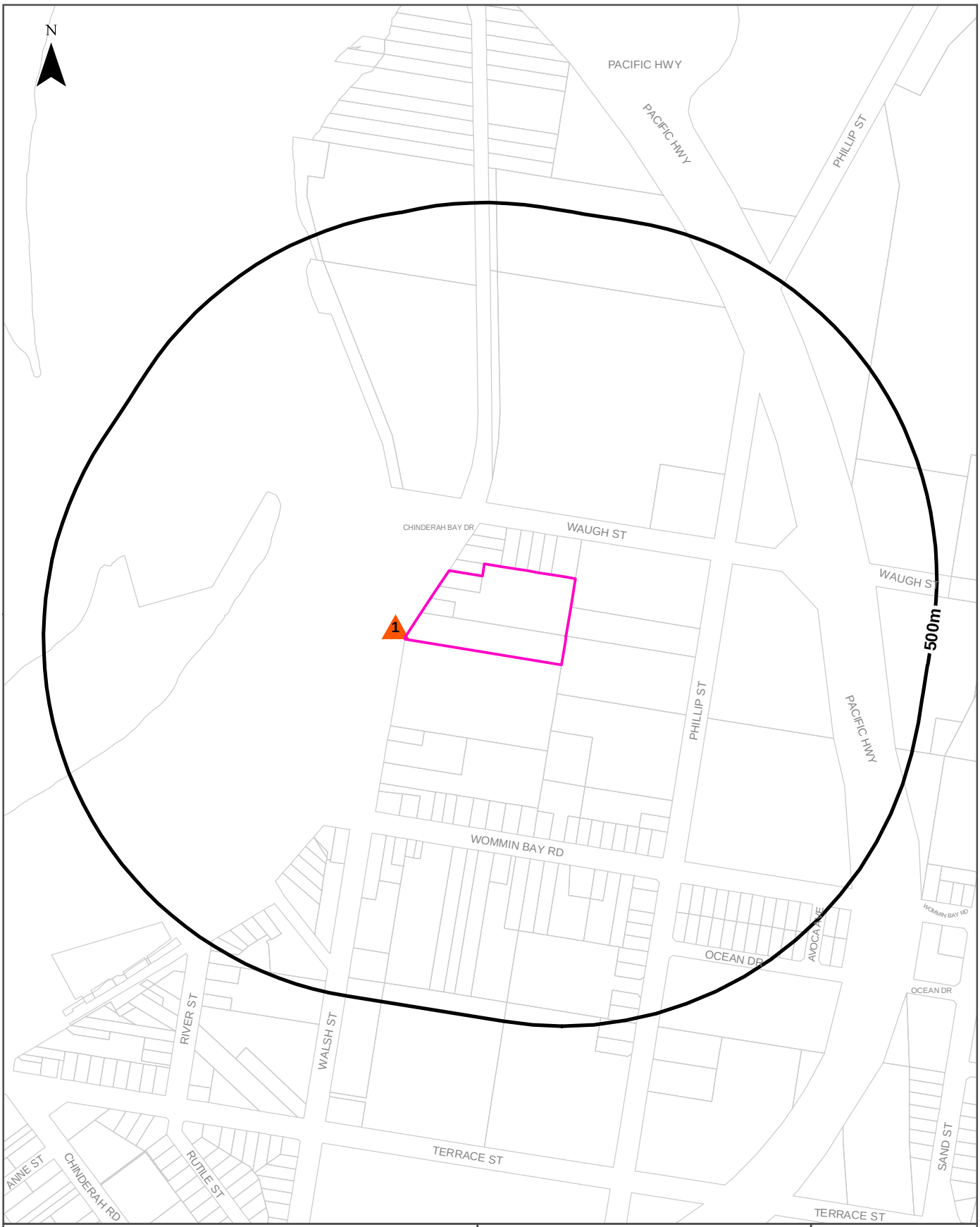
Business Directory Records 1950-1991
Road or Area Matches

Universal Business Directory records from years 1991, 1982, 1970, 1961 & 1950, 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:

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Ahren's Bros., Btchr., Pacific Highway., Chinderah 2413	87541	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Big Sombrero Caravan Park, Pacific Highway., Chinderah 2413	87542	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Big Sombrero Speedy Store, Grcr., Pacific Highway., Chinderah 2413	87543	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Chinderah Hotel, Pacific Highway., Chinderah 2413	87546	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Chinderah Lake Caravan Park, Pacific Highway., Chinderah 2413	87547	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Chinderah Newsagency, Pacific Highway., Chinderah 2413	87549	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Esso Car Care Centre, Pacific Highway., Chinderah 2413	87550	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Hacienda Caravan Park, The, Pacific Highway., Chinderah 2413	87554	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Jenners Corner, Mixed Busns., Pacific Highway., Chinderah 2413	87555	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Pacific Star Caravan Park, The, Pacific Highway., Chinderah 2413	87556	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Riverside Nursery, Pacific Highway., Chinderah 2413	87557	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Tweed Skl Lodge, Campg. Grnds, Pacific Highway., Chinderah 2413	87558	1982	Road Match	0m
	WINE &/OR SPIRIT MERCHANTS WHOLESALE.	Wide Sea Pty. Ltd., Fish Shp Pacific Highway., Chinderah 2413	87559	1982	Road Match	0m
	HOTELS-LICENSED	Chinderah Hotel, Pacific Hghwy., Chinderah, 2485	604515	1970	Road Match	0m
	MIXED BUSINESSES	Dove, R. J. & P. A. R., Pacific Hghwy., Chinderah, 2485	604516	1970	Road Match	0m
	GROCERS & SELF SERVICE STORES	Dove's Store, Pacific Hghwy., Chinderah, 2485	604514	1970	Road Match	0m
	MIXED BUSINESSES	Jenner's Corner, Pacific Hghwy., Chinderah, 2485	604517	1970	Road Match	0m
	NEWSAGENTS-GENERAL	Jenner's Corner, Pacific Hghwy., Chinderah, 2485	604520	1970	Road Match	0m
	MOTOR SERVICE STATIONS-PETROL, OILS, ETC.	Jenner's Corner., Pacific Hghwy., Chinderah, 2485	604519	1970	Road Match	0m
	GOVERNMENT DEPARTMENTS	Post Office, Pacific Hghwy., Chinderah, 2485	604513	1970	Road Match	0m
	BAKERS	Toy, Chas., Pacific Hghwy., Chinderah, 2485	604509	1970	Road Match	0m
	FRUITERERS & GREENGROCERS	Wale, F. K., Pacific Hghwy., Chinderah, 2485	604512	1970	Road Match	0m
	BUTCHERS-RETAIL	Ahrens Bros., Pacific Highway., Chinderah	147096	1961	Road Match	0m
	FRUITERERS & GREENGROCERS	Wale, F. K., Pacific Highway., Chinderah	147097	1961	Road Match	0m

Dry Cleaners, Motor Garages & Service Stations

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Legend

- Site Boundary
- Buffer 500m
- Property Boundary
- Business directory records mapped to a specific premise
- Business directory records mapped to a road intersection
- Business directory records mapped to a road corridor
- Business directory records mapped to a general area

Scale: 0 100 200 300 400 Meters

Coordinate System: GDA 1994 MGA Zone 56

Date: 02 March 2023

Historical Business Directories

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Property Boundary or Road Intersection	Direction
N/A	No records in buffer						

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.

Map Id	Business Activity	Premise	Ref No.	Year	Location Confidence	Distance to Road Corridor or Area
1	MOTOR SERVICE STATIONS-PETROL, OILS, ETC.	Jenner's Corner., Pacific Hghwy., Chinderah, 2485	604519	1970	Road Match	0m

Cattle Dips

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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 2022

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Scale: 0 30 60 90 120 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 02 March 2023

Aerial Imagery 2019

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Scale: 0 30 60 90 120 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 02 March 2023

Aerial Imagery 2016

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Scale: 0 30 60 90 120 Meters	Data Source Aerial Imagery: © Aerometrex Pty Ltd	Coordinate System: GDA 1994 MGA Zone 56	Date: 02 March 2023

Aerial Imagery 2012

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Scale:
0 30 60 90 120
Meters

Data Source Aerial Imagery: © 2023 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

Date: 01 March 2023

Aerial Imagery 2008

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Aerial Imagery 2003

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Scale:
0 30 60 90 120
Meters

Data Source Aerial Imagery: © 2023 Google Inc, used with permission. Google and the Google logo are registered trademarks of Google Inc.

Coordinate System:
GDA 1994 MGA Zone 56

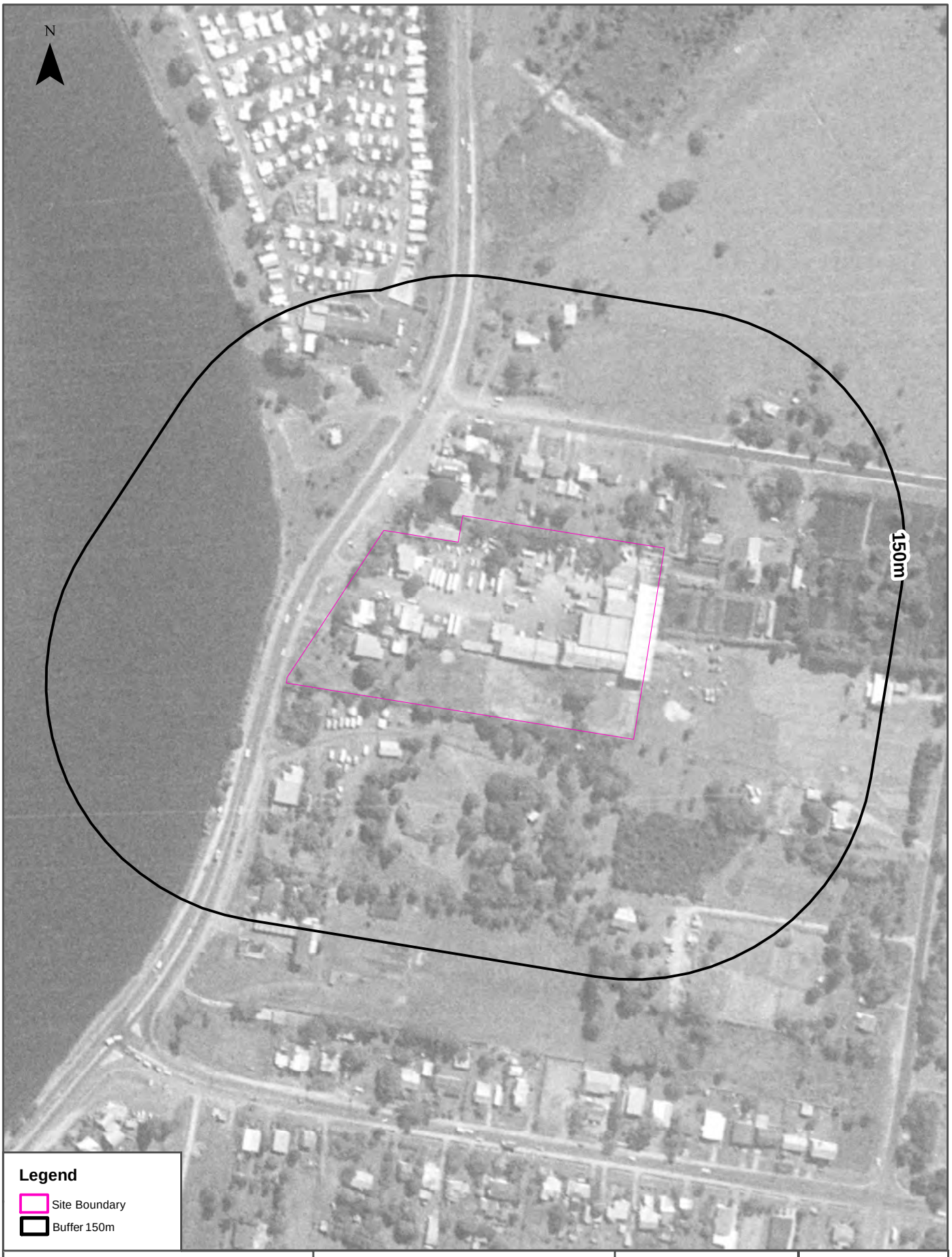
Date: 01 March 2023

Aerial Imagery 1991

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

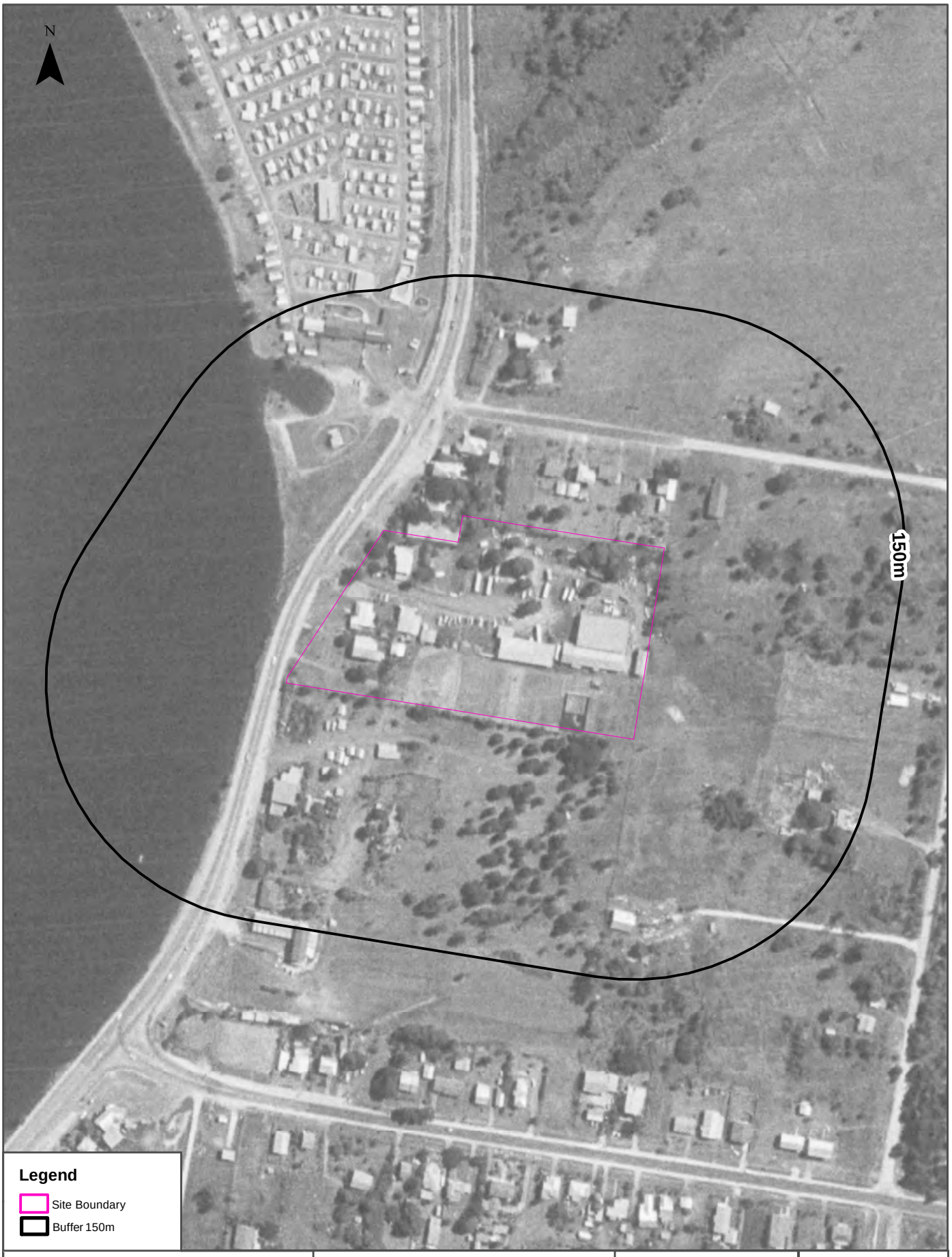
Aerial Imagery 1987

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Aerial Imagery 1979

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Aerial Imagery 1972

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

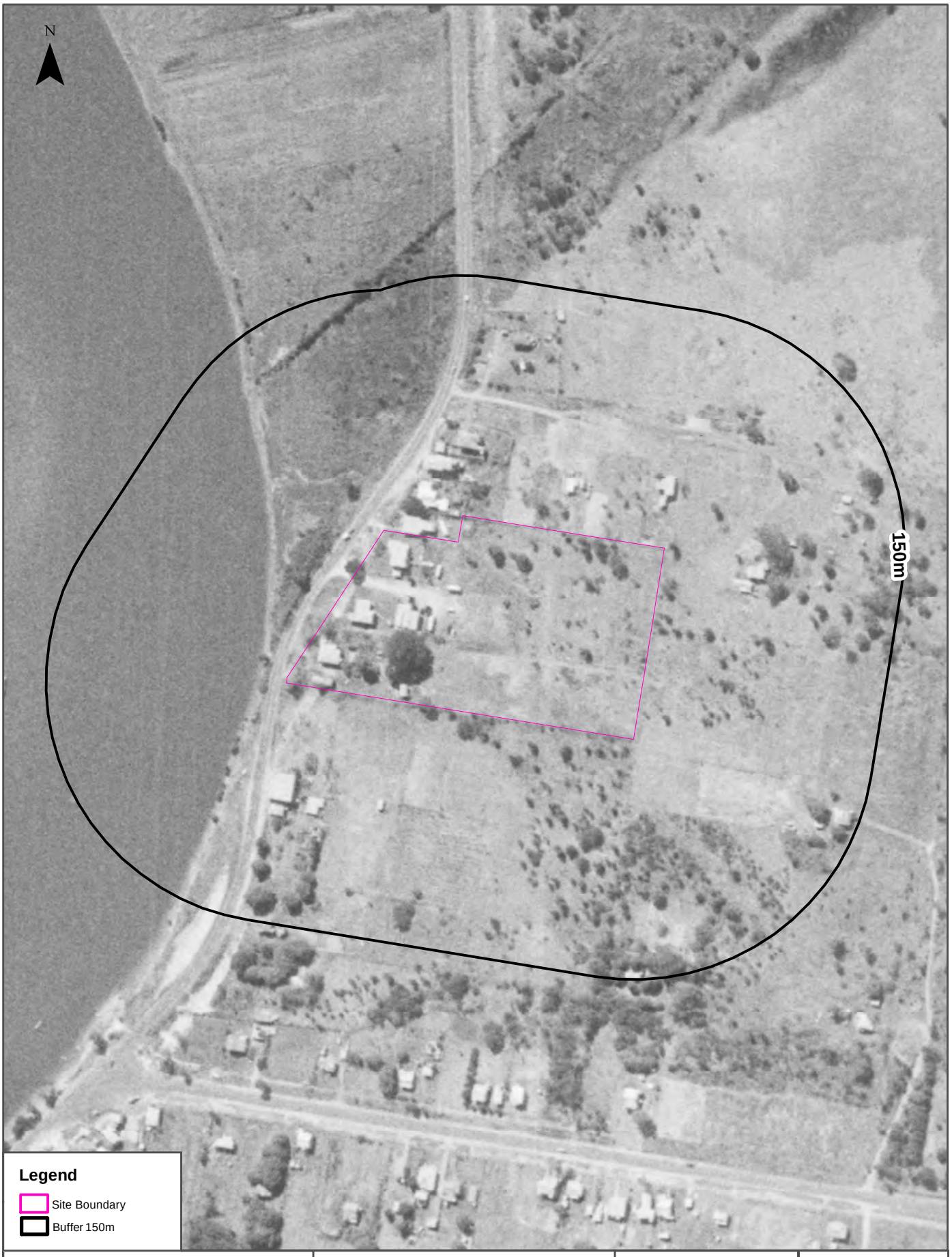
Scale: 0 30 60 90 120 Meters	Data Source Aerial Imagery: © NSW Department of Customer Service	Coordinate System: GDA 1994 MGA Zone 56	Date: 01 March 2023

Aerial Imagery 1966

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Aerial Imagery 1961

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

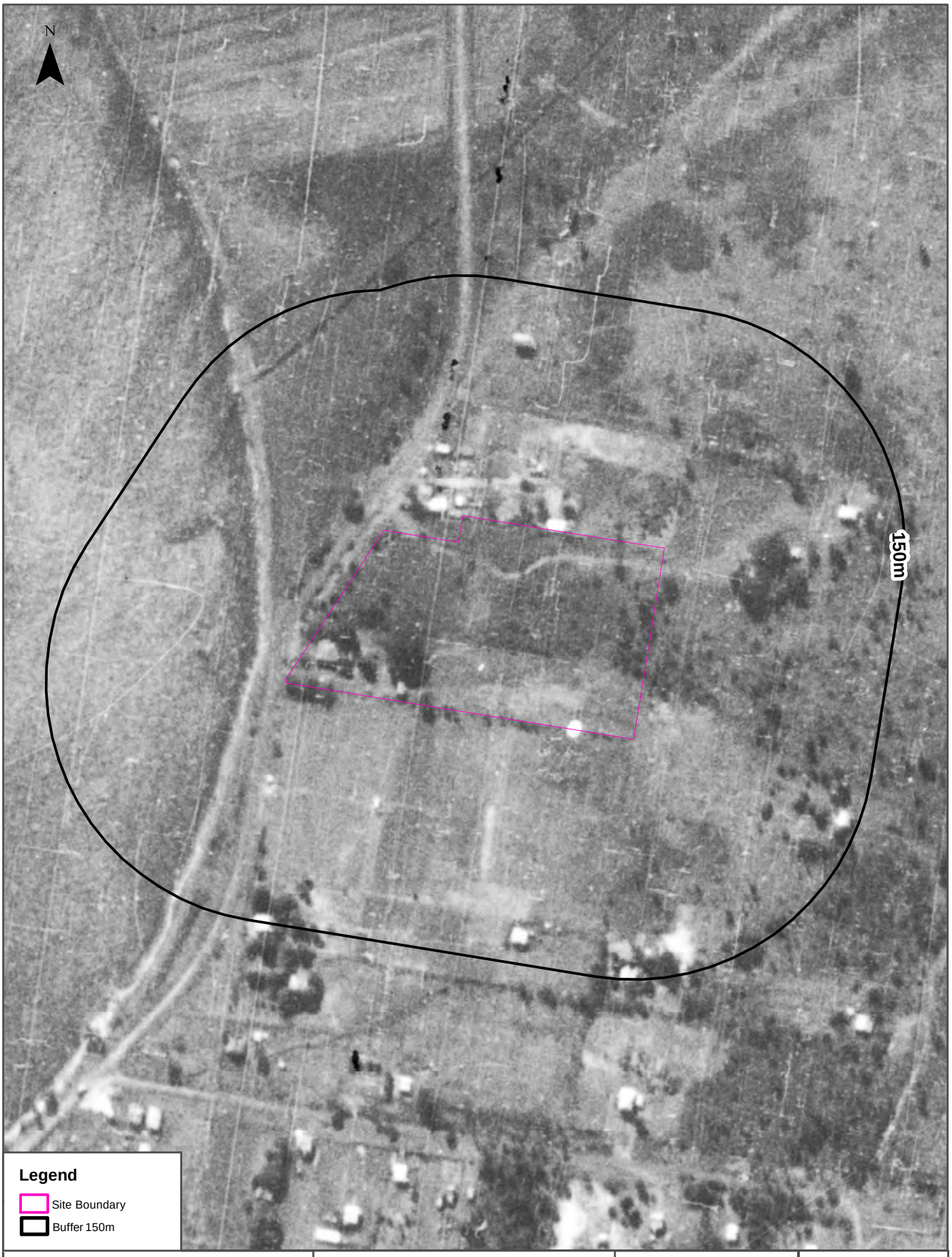


Aerial Imagery 1955

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Aerial Imagery 1947

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Aerial Imagery 1930

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Topographic Map 2015

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

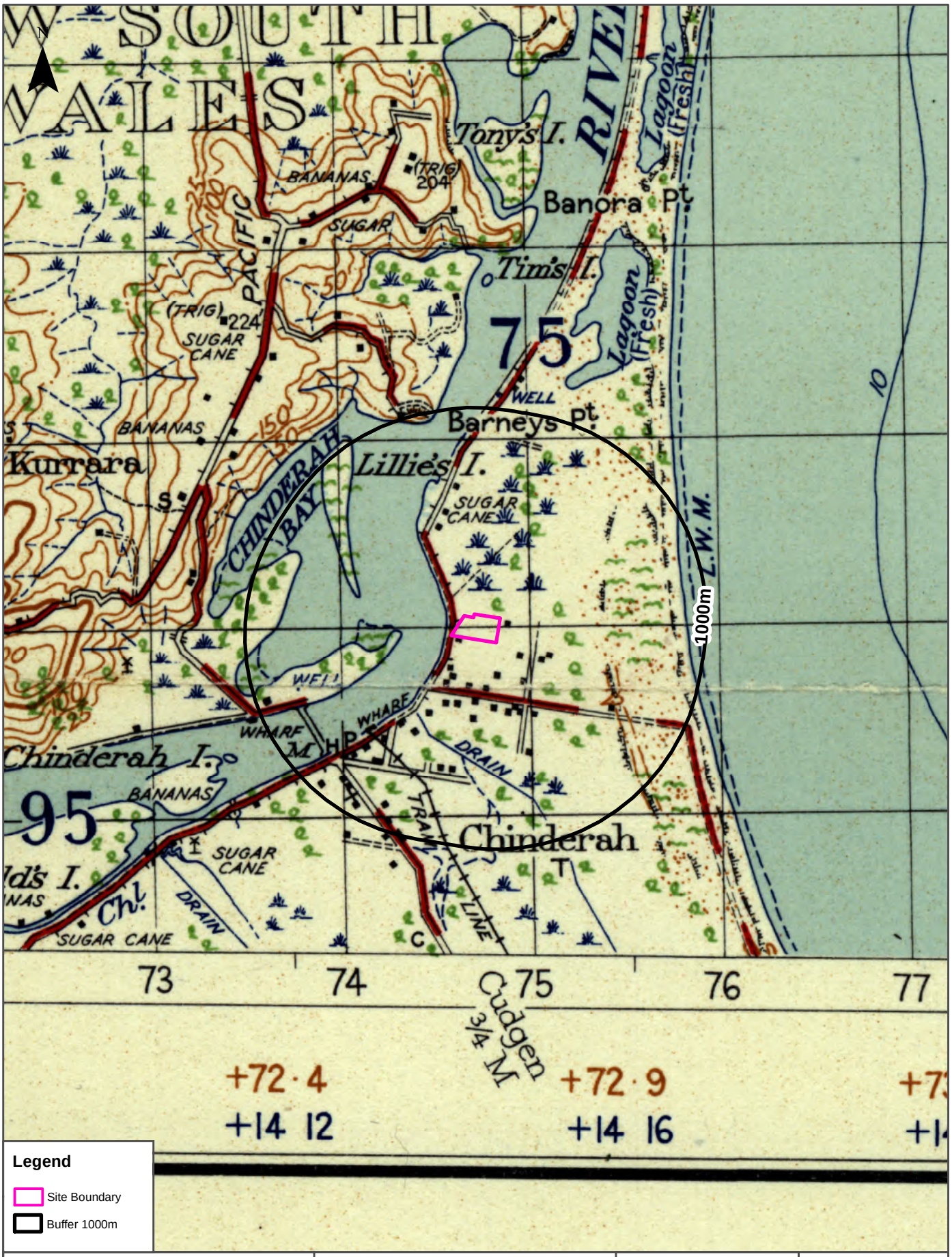
Scale: 0 150 300 Meters 450 600	Data Sources: Topographic Map Data © NSW Land and Property Information	Coordinate System: GDA 1994 MGA Zone 56	Date: 02 March 2023

Historical Map 2005

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Historical Map c.1935

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



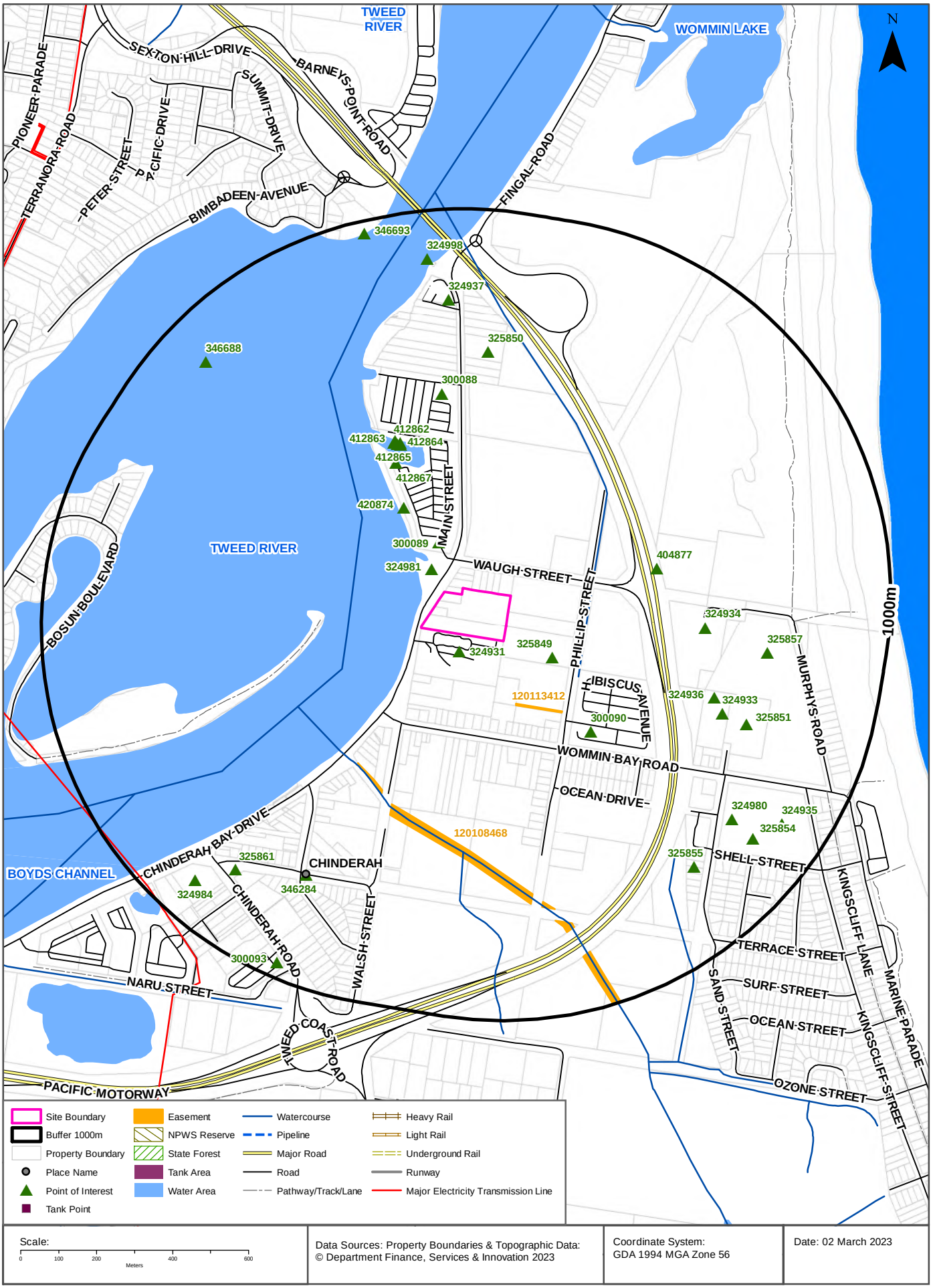
Legend

- Site Boundary
- Buffer 1000m

Scale:	Data Sources: Australia 1:63360 Produced by Australian Section Imperial General Staff	Coordinate System: GDA 1994 MGA Zone 56	Date: 01 March 2023

Topographic Features

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Topographic Features

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Points of Interest

What Points of Interest exist within the dataset buffer?

Map Id	Feature Type	Label	Distance	Direction
324931	Tourist Park / Home Village	CHINDERAH VILLAGE CARAVAN PARK	45m	South
324981	Park	OXLEY PARK	68m	North West
300089	Tourist Park / Home Village	TWEED RIVER HACIENDA HOLIDAY PARK	130m	North West
325849	Place Of Worship	SEVENTH DAY ADVENTIST CHURCH	135m	South East
420874	Park	TUMBULGUM FORESHORE	247m	North West
300090	Tourist Park / Home Village	DRIFTERS HOLIDAY VILLAGE	332m	South East
412867	Boat Ramp	Boat Ramp	362m	North West
404877	Roadside Rest Area	NORTH WOMMIN BAY ROAD REST AREA	392m	East
412866	Wharf	Wharf	404m	North
412864	Wharf	Wharf	409m	North West
412865	Wharf	Wharf	410m	North
412862	Wharf	Wharf	414m	North West
412863	Wharf	Wharf	418m	North West
300088	Tourist Park / Home Village	HOMESTEAD HOLIDAY PARK	516m	North
324934	Nursing Home	FEROS VILLAGE WOMMIN BAY	519m	East
324936	Sports Field	BOWLING GREENS	575m	East
324933	Club	CUDGEN LEAGUES CLUB	607m	East
325850	Sports Centre	CHINDERAH INDOOR SPORTS CENTRE	626m	North
325851	Sports Field	NED BYRNE FIELD	676m	East
325857	Sports Field	WALTER PEATE RESERVE	690m	East
346284	Village	CHINDERAH	717m	South West
324937	Tourist Park / Home Village	TWEED SKI LODGE CARAVAN PARK	762m	North
324980	Park	MERV EDWARDS RESERVE	762m	South East
325855	Place Of Worship	CHRISTIAN CITY CHURCH	778m	South East
325861	Park	COROWA PARK	802m	South West
325854	Community Facility	KINGSCLIFF SOCCER CLUB	838m	South East
346688	Island	LILLIES ISLAND	872m	North West
324998	Wharf	Wharf	873m	North
324935	Sports Field	REG DALTON OVAL	876m	South East
324984	Park	TURNOCK PARK	892m	South West
300093	Tourist Park / Home Village	ROYAL PACIFIC TOURIST RETREAT AND CARAVAN PARK	959m	South West

Map Id	Feature Type	Label	Distance	Direction
346693	Headland	BARNEYS POINT	967m	North

Topographic Features

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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
N/A	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
N/A	No records in buffer					

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
120113412	Primary	Undefined		168m	South East
120108468	Primary	Undefined		393m	South

Topographic Features

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

State Forest

What State Forest exist within the dataset buffer?

State Forest Number	State Forest Name	Distance	Direction
N/A	No records in buffer		

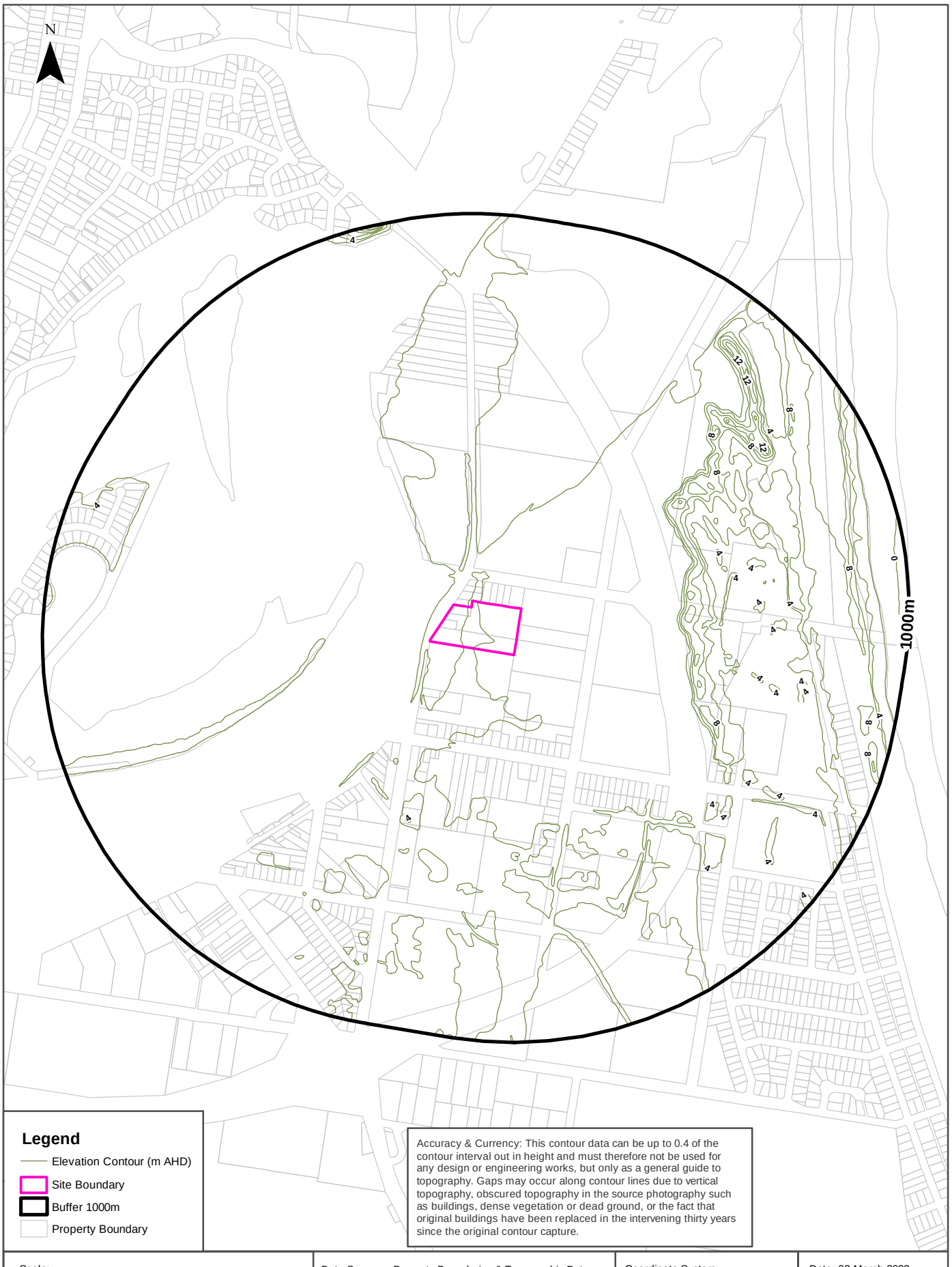
National Parks and Wildlife Service Reserves

What NPWS Reserves exist within the dataset buffer?

Reserve Number	Reserve Type	Reserve Name	Gazetted Date	Distance	Direction
N/A	No records in buffer				

Elevation Contours (m AHD)

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Hydrogeology & Groundwater

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Hydrogeology

Description of aquifers within the dataset buffer:

Description	Distance	Direction
Porous, extensive highly productive aquifers	116m	South East

Hydrogeology Map of Australia : Commonwealth of Australia (Geoscience Australia)

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018

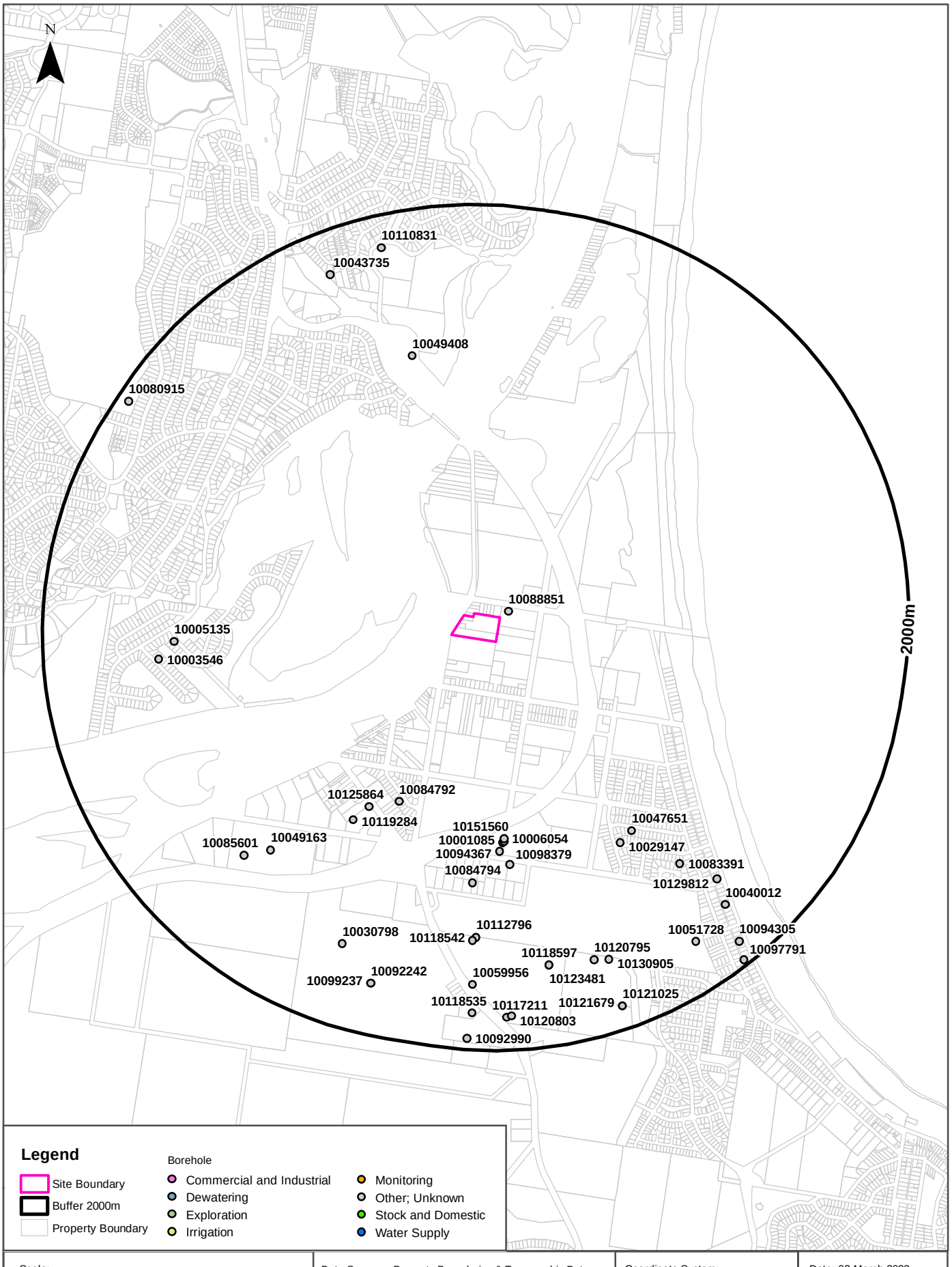
Temporary water restrictions relating to the Botany Sands aquifer within the dataset buffer:

Prohibition Area No.	Prohibition	Distance	Direction
N/A	No records in buffer		

Temporary Water Restriction (Botany Sands Groundwater Source) Order 2018 Data Source : NSW Department of Primary Industries

Groundwater Boreholes

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Hydrogeology & Groundwater

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Groundwater Boreholes

Boreholes within the dataset buffer:

NGIS Bore ID	NSW Bore ID	Bore Type	Status	Drill Date	Bore Depth (m)	Reference Elevation	Height Datum	Salinity (mg/L)	Yield (L/s)	SWL (mbgl)	Distance	Direction
10088851	GW305254		Unknown	23/12/2000	5.00		AHD	Fair	1.300		52m	North East
10084792	GW304979		Unknown	17/11/2004	6.00		AHD	2	0.500	2.00	857m	South West
10125864	GW300857		Unknown				AHD				933m	South West
10151560	GW307612		Functional	17/12/2009	8.00		AHD			2.40	965m	South
10006054	GW307611		Functional	17/12/2009	6.00		AHD			2.30	977m	South
10001085	GW307610		Functional	17/12/2009	6.00		AHD			2.30	983m	South
10094367	GW306267		Functioning	18/09/2007	17.00		AHD	Good	5.000	2.96	1025m	South
10119284	GW300858		Unknown				AHD				1025m	South West
10098379	GW305154		Unknown	10/05/2005			AHD				1091m	South
10047651	GW305037		Unknown	01/02/2005	6.00		AHD	1	0.500	3.50	1139m	South East
10029147	GW305116		Unknown	23/03/2005	6.00		AHD		0.500	1.80	1157m	South East
10084794	GW300846		Unknown	01/01/1979	6.00		AHD				1184m	South
10049408	GW306220		Functional	19/07/2004	10.20		AHD			3.00	1291m	North
10005135	GW308691		Functioning	13/02/2020	7.00		AHD				1355m	West
10049163	GW307490		Functional	01/07/2001	5.00		AHD				1375m	South West
10083391	GW307368		Functioning	11/12/2013	5.10		AHD		0.600	3.00	1410m	South East
10003546	GW309026		Proposed	13/01/2020	5.40		AHD				1434m	West
10112796	GW300756		Unknown	31/10/1995	2.00		AHD		0.100	1.50	1450m	South
10118542	GW300759		Unknown	31/10/1995	6.00		AHD		0.100	1.50	1466m	South
10085601	GW305057		Unknown	29/04/2005			AHD				1481m	South West
10129812	GW301955		Unknown	31/12/1993	9.00		AHD		0.300	8.50	1586m	South East
10118597	GW300761		Unknown	31/10/1995	6.00		AHD	180	0.100	2.50	1602m	South
10123481	GW300760		Unknown	31/10/1995	2.50		AHD			2.50	1602m	South
10030798	GW306980		Functioning	04/09/2010	3.50		AHD			1.20	1603m	South West
10120795	GW300753		Unknown	31/10/1995	2.00		AHD	370	0.100	1.50	1627m	South
10130905	GW300754		Unknown	31/10/1995	6.00		AHD	280	0.100	1.50	1650m	South
10059956	GW048858		Functioning	01/01/1973	4.10		AHD				1681m	South
10040012	GW305038		Unknown	08/03/2005	8.00		AHD		0.400	7.00	1707m	South East
10092242	GW306978		Functioning	04/09/2010	3.50		AHD			1.20	1750m	South
10099237	GW306979		Functioning	04/09/2010	3.50		AHD			1.20	1750m	South

NGIS Bore ID	NSW Bore ID	Bore Type	Status	Drill Date	Bore Depth (m)	Reference Elevation	Height Datum	Salinity (mg/L)	Yield (L/s)	SWL (mbgl)	Distance	Direction
10051728	GW012934		Unknown	01/12/1956	37.80		AHD	Salty			1763m	South East
10043735	GW306217		Functional	17/07/2004	11.70		AHD			4.50	1789m	North West
10118535	GW302457		Unknown	02/02/1996	6.00		AHD		2.000	2.00	1820m	South
10120803	GW300764		Unknown	31/10/1995	6.00		AHD	108	0.100	1.40	1833m	South
10117211	GW300752		Unknown	31/10/1995	2.00		AHD	300	0.100	1.40	1837m	South
10110831	GW016345		Unknown	01/06/1960	3.90		AHD				1840m	North
10121025	GW300762		Unknown	31/10/1995	2.00		AHD	180	0.100	1.40	1886m	South
10121679	GW300763		Unknown	31/10/1995	6.00		AHD	310	0.100	1.40	1886m	South
10094305	GW306769		Unknown	02/01/2003	8.00		AHD	excellent			1888m	South East
10080915	GW307243		Functional	01/11/2013	5.00		AHD		0.062	0.61	1944m	North West
10092990	GW300835		Unknown	01/01/1980	6.00		AHD		0.570		1945m	South
10097791	GW304903		Functioning	21/11/2004	6.50		AHD	0.02	0.500	5.50	1973m	South East

Hydrogeology & Groundwater

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Driller's Logs

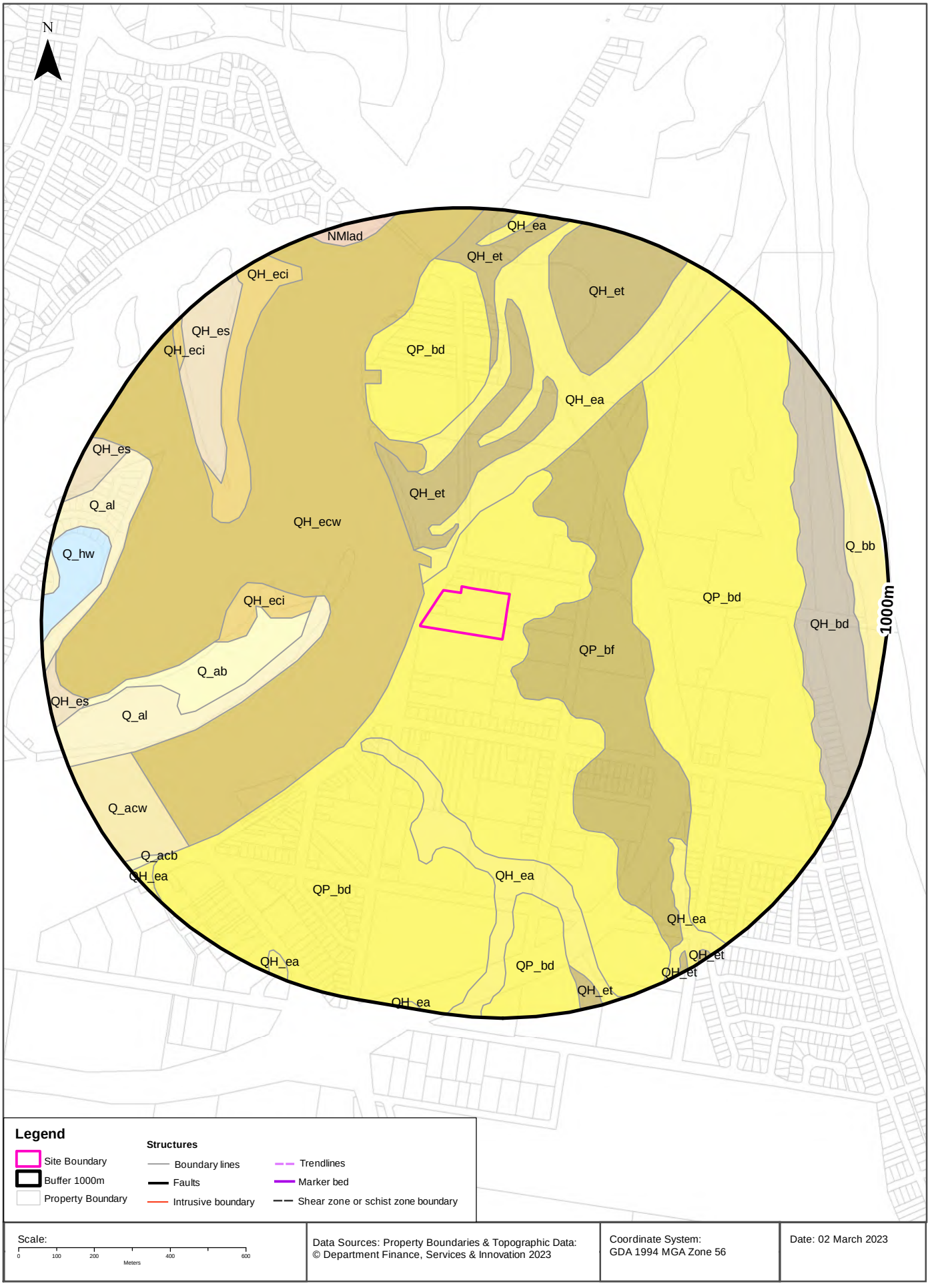
Drill log data relevant to the boreholes within the dataset buffer:

NGIS Bore ID	Drillers Log	Distance	Direction
10084792	0.00m-1.00m grey sand 1.00m-6.00m grey / white sand	857m	South West
10151560	0.00m-0.10m Fill; Bitumen 0.10m-0.30m Gravel, Silty; orange to black, non plastic 0.30m-0.40m Gravel, Silty/Sand; grey, non plastic 0.40m-2.00m Silt, Gravelly; orange to brown, non plastic 2.00m-2.30m Sand; fine to medium grained, light grey, non plastic, with organics 2.30m-4.00m Sand, Silty; fine to medium grained, grey, non plastic 4.00m-8.00m Sand; grey, non plastic, with shells @ 6m	965m	South
10006054	0.00m-0.10m Fill; Bitumen 0.10m-0.30m Gravel, silty; orange to black, non plastic 0.30m-0.50m Gravel, Silty; grey, non plastic 0.50m-0.90m Silt, Gravelly; orange to brown, non plastic 0.90m-2.00m Gravel; coarse fragments, brown, non plastic 2.00m-2.20m Sand; fine to medium grained, grey, non plastic 2.20m-2.40m Sand; fine to medium grained, orange to brown, non plastic 2.40m-6.00m Sand; grey, non plastic	977m	South
10001085	0.00m-0.20m Fill; Concrete 0.20m-0.40m Gravel, Silty; grey, non plastic 0.40m-0.90m Gravel/Sand, Silty; with cobbles & boulders, orange-brown-grey, non plastic 0.90m-1.50m Gravel, Silty; brown to grey, non plastic 1.50m-1.80m Sand, Silty; fine to medium grained, orange-brown-dark grey, non plastic 1.80m-2.00m Sand, Silty; dark grey, non plastic 2.00m-2.30m Sand; fine to medium grained, light brown, non plastic 2.30m-6.00m Sand; grey, non plastic	983m	South
10094367	0.00m-2.00m Gravel Fill Roadbase with large stones 2.00m-6.00m Sand, fine, medium, grey 6.00m-15.00m Sand, fine, medium, light grey 15.00m-17.00m Sand, fine, medium, light grey with sea shells	1025m	South
10047651	0.00m-0.10m grey sand 0.10m-6.00m sand white	1139m	South East
10029147	0.00m-0.60m grey sand 0.60m-6.00m gold sand	1157m	South East
10049408	0.00m-3.00m Sand, fine 3.00m-10.00m Sand, silty, fine-medium 10.00m-10.20m Sandy Clay, high plasticity	1291m	North
10083391	0.00m-4.20m Sand; grey, medium grained 4.20m-5.10m Sand; free flowing, yellow, fine	1410m	South East
10112796	0.00m-0.30m Top soil 0.30m-1.50m Brown sand 1.50m-2.00m Grey sand	1450m	South
10118542	0.00m-0.30m Top soil 0.30m-1.50m Brown sand 1.50m-6.00m Grey sand	1466m	South
10118597	0.00m-1.10m Top soil - snad 1.10m-2.50m Brown sand - OK 2.50m-6.00m Fine brown sand - OK	1602m	South
10123481	0.00m-0.50m Top soil 0.50m-2.10m Brown sand 2.10m-2.50m Grey sand	1602m	South
10120795	0.00m-0.50m Grey sand 0.50m-1.50m Brown sand 1.50m-2.00m Grey sand	1627m	South
10130905	0.00m-0.50m Silm sand 0.50m-1.50m Brown sand 1.50m-4.70m Grey sand 4.70m-6.00m Grey sand	1650m	South
10059956	0.00m-0.76m Loam Black Sand 0.76m-4.11m Water Supply	1681m	South
10040012	0.00m-1.50m sand grey 1.50m-3.00m sand white 3.00m-7.00m sand orange	1707m	South East

NGIS Bore ID	Drillers Log	Distance	Direction
10051728	0.00m-0.60m Soil Peaty 0.60m-1.52m Sand Water Supply 1.52m-5.48m Sand Grey Water Supply 5.48m-7.01m Sand Indurated Pebbles/pebbly 7.01m-8.53m Sand Water Supply 8.53m-11.58m Sand Reddish Water Supply 11.58m-15.84m Sand Yellowish Heaving Water Supply 15.84m-18.28m Sand Red Water Supply 18.28m-18.89m Sandstone Soft Rock Water Supply 18.89m-19.81m Clay Sandy 19.81m-21.94m Shale 21.94m-28.95m Shale Puggy Fossils:shell Fragments 28.95m-30.48m Shale Sandy 30.48m-37.79m Shale Puggy Sandy Shaley Bands	1763m	South East
10043735	0.00m-1.50m Silty Clay, red brown 1.50m-11.70m Porphorytic Basalt, fresh	1789m	North West
10120803	0.00m-0.30m Top soil 0.30m-1.40m Brown sand 1.40m-2.10m Organic sand 2.10m-6.00m Grey sand	1833m	South
10117211	0.00m-0.30m Top soil 0.30m-1.40m Sand - brown 1.40m-2.00m Sand - grey	1837m	South
10121025	0.00m-0.20m Top soil 0.20m-1.40m Brown sand 1.40m-2.00m Grey sand	1886m	South
10121679	0.00m-0.20m Top soil 0.20m-1.40m Brown sand 1.40m-6.00m Grey sand	1886m	South
10080915	0.00m-1.00m Fill 1.00m-3.50m Peat; marine clay 3.50m-4.50m Sand; fine, marine clay 4.50m-5.00m Clay; dark	1944m	North West
10097791	0.00m-4.00m sand white 4.00m-5.00m sand brown 5.00m-6.50m sand white	1973m	South East

Geology

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Geology

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Geological Units

What are the Geological Units within the dataset buffer?

Unit Code	Unit Name	Description	Unit Stratigraphy	Age	Dominant Lithology	Distance
QP_bd	Coastal deposits - dune facies	Marine-deposited and aeolian-reworked coastal sand dunes; partially consolidated.	/Coastal deposits//Coastal deposits - dune facies//	Quaternary (base) to Now (top)	Sand	0m
QH_ecw	Estuarine channel deposits (subaqueous)	Fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell, gravel.	/Estuarine deposits//Estuarine channel deposits/Estuarine channel deposits (subaqueous)/	Holocene (base) to Now (top)	Clastic sediment	20m
QH_ea	Estuarine palaeochannel fill	Organic mud, peat, clay, silt, fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited).	/Estuarine deposits//Estuarine palaeochannel fill//	Holocene (base) to Now (top)	Organic rich sediment	45m
QP_bf	Coastal deposits - backbarrier flat facies	Fine- to medium-grained quartz-lithic sand with carbonate and humic components (marine-deposited), indurated sand, silt, clay, gravel, organic mud, peat.	/Coastal deposits//Coastal deposits - backbarrier flat facies//	Quaternary (base) to Now (top)	Clastic sediment	50m
QH_et	Estuarine tidal-delta flat	Fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell material, polymictic gravel.	/Estuarine deposits//Estuarine tidal-delta flat//	Holocene (base) to Now (top)	Clastic sediment	111m
Q_al	Alluvial levee/overbank deposits	Fluvially deposited fine- to medium-grained lithic to quartz-rich sand, silt, clay.	/Alluvium//Alluvial levee/overbank deposits//	Quaternary (base) to Now (top)	Clastic sediment	240m
QH_eci	Estuarine in-channel bar and beach deposits	Fine- to medium-grained lithic-carbonate-quartz sand (marine-deposited), silt, clay, shell, gravel.	/Estuarine deposits//Estuarine channel deposits/Estuarine in-channel bar and beach deposits/	Holocene (base) to Now (top)	Clastic sediment	285m
Q_ab	Alluvial backswamp deposits	Organic-rich mud, peat, silt, clay.	/Alluvium//Alluvial backswamp deposits//	Quaternary (base) to Now (top)	Organic rich sediment	293m
QH_es	Estuarine swamp	Organic-rich mud, peat, clay, silt, very fine- to fine-grained sand (marine-deposited), fine- to medium-grained sand (fluvially deposited).	/Estuarine deposits//Estuarine swamp//	Holocene (base) to Now (top)	Organic rich sediment	644m
QH_bd	Coastal deposits - dune facies	Marine-deposited and aeolian-reworked coastal sand dunes.	/Coastal deposits//Coastal deposits - dune facies//	Holocene (base) to Now (top)	Sand	755m
Q_acw	Alluvial channel deposits - subaqueous	Fluvially deposited sand, gravel, silt, clay.	/Alluvium//Alluvial channel deposits/Alluvial channel deposits-subaqueous/	Quaternary (base) to Now (top)	Clastic sediment	825m
Q_hw	Anthropogenic stored water, pondage, reservoirs, canals	Thinly laminated muds and silts with humic to biogenic debris (as bottom sediment to the overlying stored waters).	/Anthropogenic deposits//Anthropogenic stored water, pondage, reservoirs, canals//	Quaternary (base) to Now (top)	Anthropogenic material	842m
Q_bb	Coastal deposits - beach facies	Marine-deposited quartz-lithic fine- to medium-grained sand, shell and shell material, polymictic gravel.	/Coastal deposits//Coastal deposits - beach facies//	Quaternary (base) to Now (top)	Sand	890m

Unit Code	Unit Name	Description	Unit Stratigraphy	Age	Dominant Lithology	Distance
Q_acb	Alluvial channel deposits - in-channel bar	Polymictic to lithic to quartz-rich sand and gravel; silt and clay; polymictic pebble- to cobble- in-channel imbricated lag and bar deposits with interstitial sand, silt and clay.	/Alluvium//Alluvial channel deposits/Alluvial channel deposits - in-channel bar/	Quaternary (base) to Now (top)	Clastic sediment	896m
NMlad	Beechmont Basalt	Predominantly tholeiitic with occasional alkaline types of formations.	/Lamington Volcanic Complex//Beechmont Basalt//	Chattian (base) to Aquitanian (top)	Basalt	944m

Linear Geological Structures

What are the Dyke, Sill, Fracture, Lineament and Vein trendlines within the dataset buffer?

Map ID	Feature Description	Map Sheet Name	Distance
No Features			

What are the Faults, Shear zones or Schist zones, Intrusive boundaries & Marker beds within the dataset buffer?

Map ID	Boundary Type	Description	Map Sheet Name	Distance
No Features				

Naturally Occurring Asbestos Potential

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

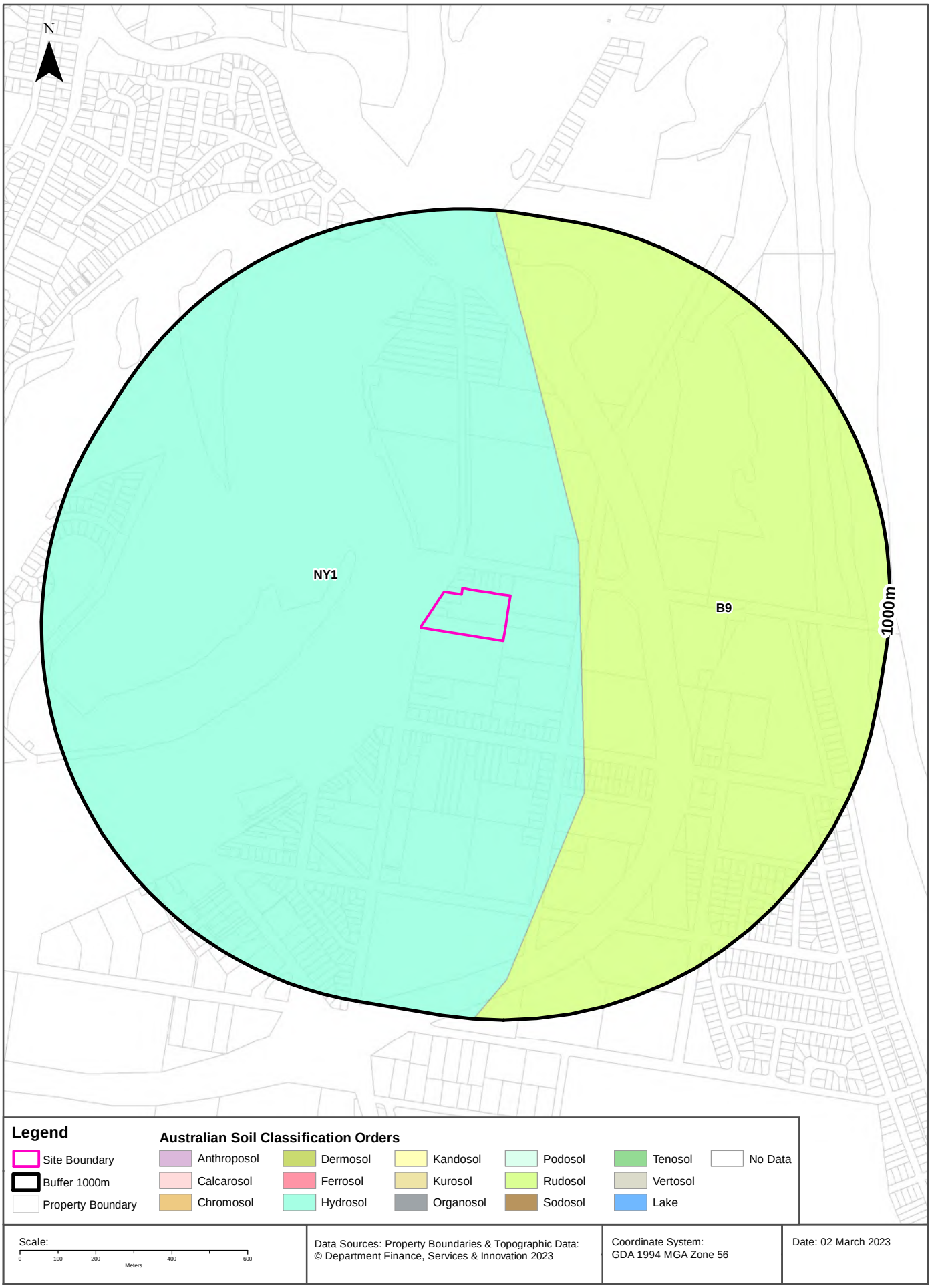
Naturally Occurring Asbestos Potential

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												

Atlas of Australian Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

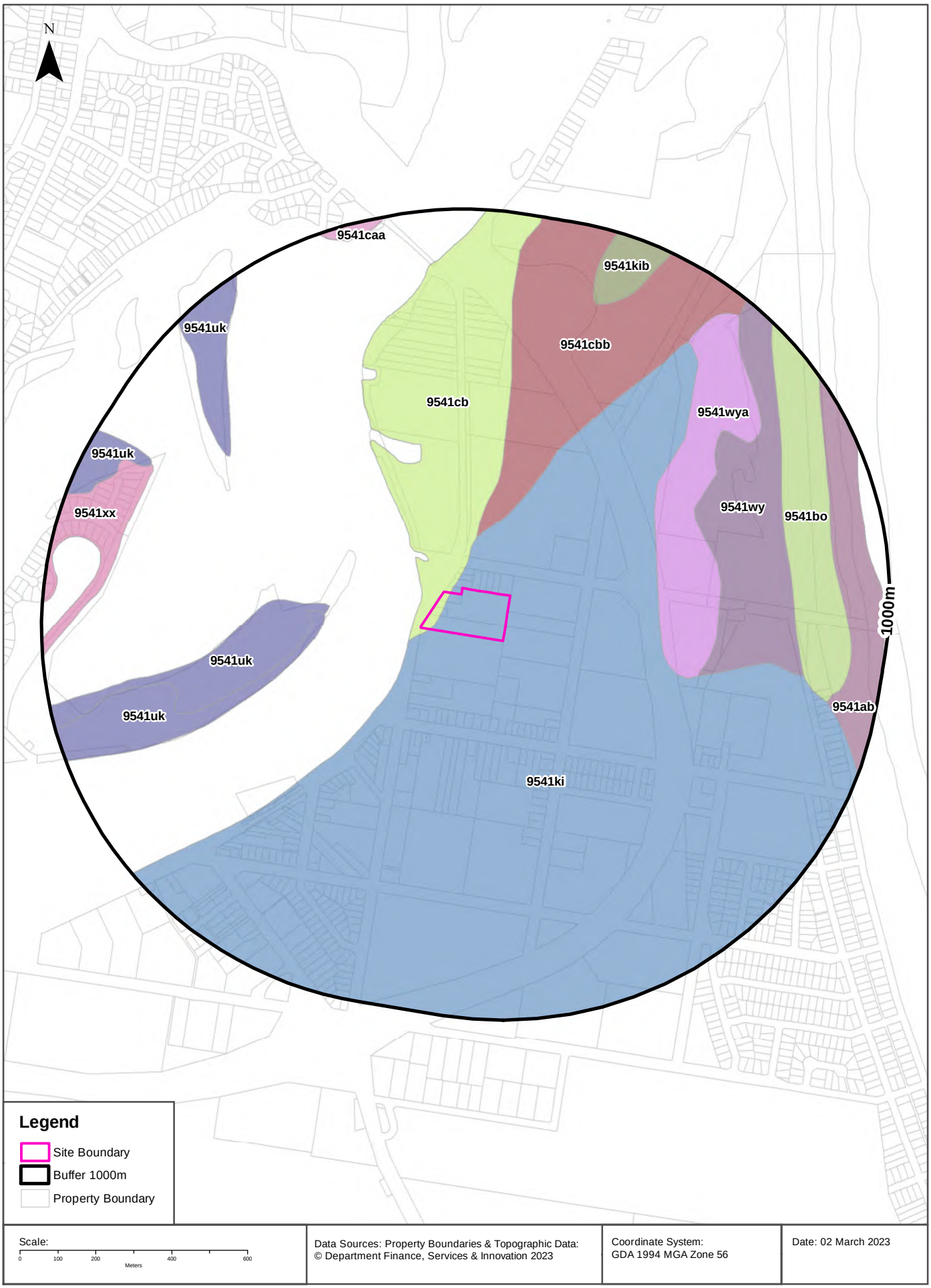
Atlas of Australian Soils

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

Map Unit Code	Soil Order	Map Unit Description	Distance	Direction
NY1	Hydrosol	Coastal plains, generally low lying, poorly drained, and subject to flooding (lower and middle reaches of river flood-plains, swamps, estuarine areas, and tidal marshes): chief soils seem to be friable acidic gley soils (Dg4.11), (Dg4.41), and (Dg4.81); friable acidic yellow mottled soils (Dy5.11); leached sand soils (Uc2.2) and/or (Uc2.3); and sandy acidic yellow mottled soils (Dy5.61), (Dy5.41), and (Dy5.81) in a complex and not well-known pattern, generally as follows: (i) flat to gently sloping areas of (Dg4.11), (Dg4.41), and (Dg4.81) or (Dy5.11), and/or (Ug5.16) and (Ug5.4), with some (Dd3.11) and (Uf6.41); (ii) sandy flats and swamps of (Uc2.2), and/or (Uc2.3), and/or acid peats (0); and (iii) slightly raised sandy areas of (Dy5.61), (Dy5.41), and (Dy5.81) with (Uc2.2) and (Uc4.2). Small areas of units NY2 (Sheet 3) and B9 are included.	0m	On-site
B9	Rudosol	Present beach system of dunes and estuaries: dunes of siliceous sands (Uc1.21) backed by slopes of siliceous sands (Uc1.21) and/or leached sand soils (Uc2.2 and Uc2.3); other soils include (Dy5.81) and acid peats (0). As mapped, small areas of units NY1 and NY2 are included.	181m	East

Soil Landscapes of Central and Eastern NSW

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

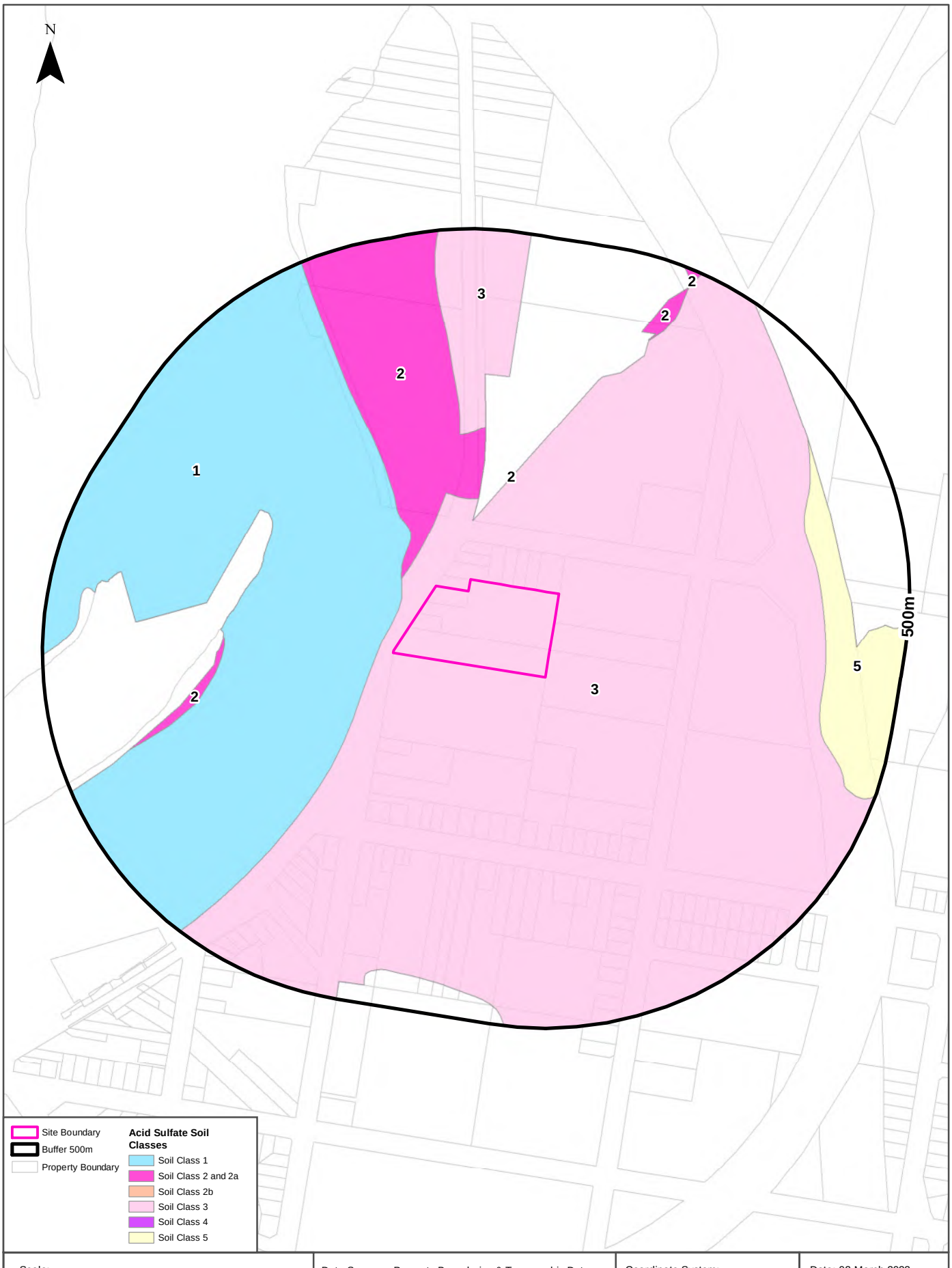
Soil Landscapes of Central and Eastern NSW

Soil Landscapes of Central and Eastern NSW within the dataset buffer:

Soil Code	Name	Distance	Direction
9541ki	Kingscliff	0m	On-site
9541cb	Cobaki	0m	On-site
9541cbb	Cobaki variant b	136m	North East
9541uk	Ukerabagh	248m	West
9541wya	Wooyung variant a	388m	North East
9541wy	Wooyung	521m	East
9541bo	Bogangar	737m	East
9541kib	Kingscliff variant b	804m	North East
9541xx	Disturbed Terrain	815m	West
9541ab	Angels Beach	856m	East
9541caa	Carool variant a	962m	North

Acid Sulfate Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Acid Sulfate Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Environmental Planning Instrument - Acid Sulfate Soils

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

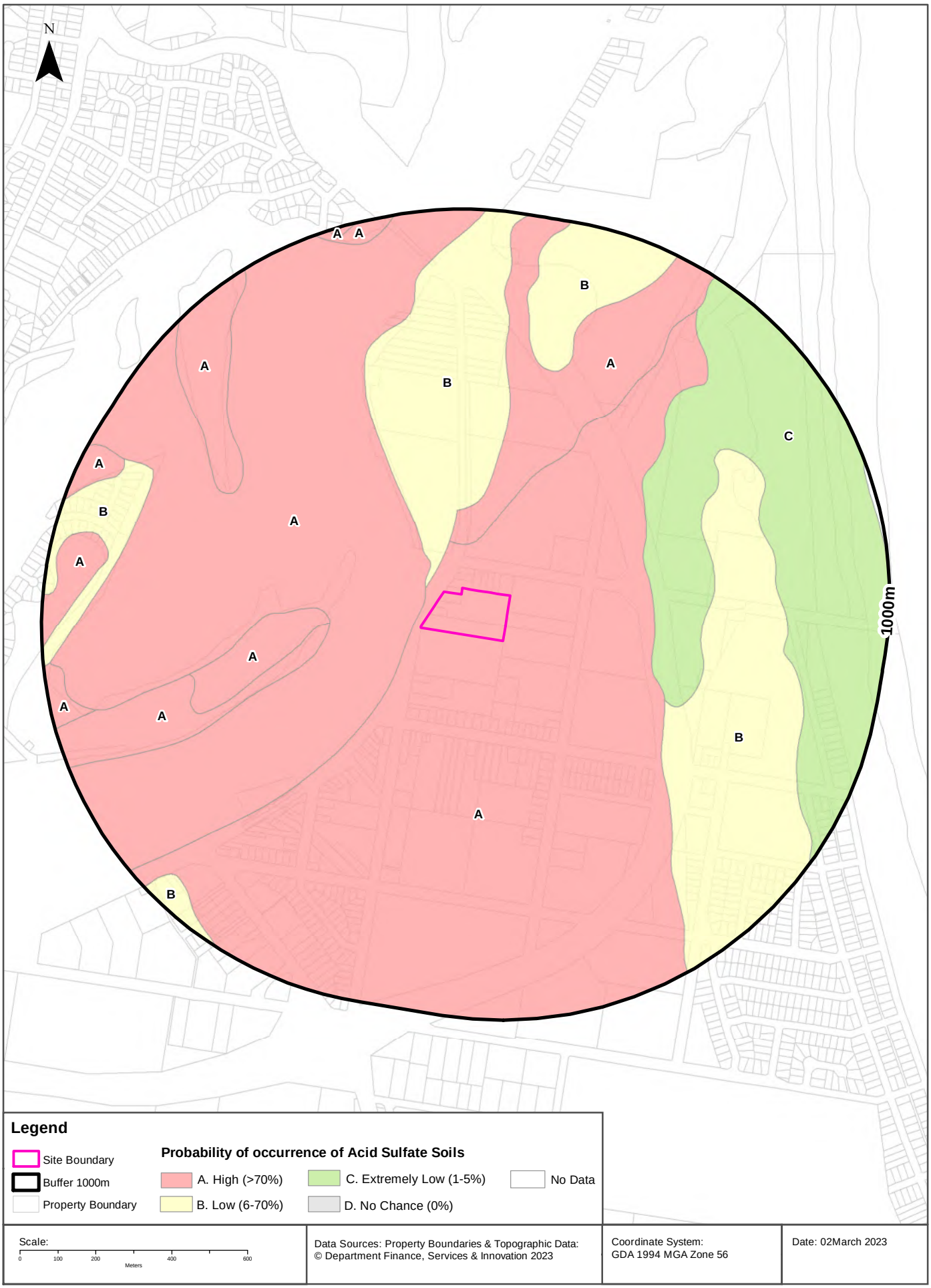
Soil Class	Description	EPI Name
3	Works more than 1 metre below natural ground surface present an environmental risk; Works by which the watertable is likely to be lowered more than 1 metre below natural ground surface, present an environmental risk	Tweed Local Environmental Plan 2014

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

Soil Class	Description	EPI Name	Distance	Direction
N/A				

Atlas of Australian Acid Sulfate Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Acid Sulfate Soils

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Atlas of Australian Acid Sulfate Soils

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

Class	Description	Distance	Direction
A	High Probability of occurrence. >70% chance of occurrence.	0m	On-site
C	Extremely low probability of occurrence. 1-5% chance of occurrence with occurrences in small localised areas.	361m	East
B	Low Probability of occurrence. 6-70% chance of occurrence.	799m	West

Dryland Salinity

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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		

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.

Mining

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

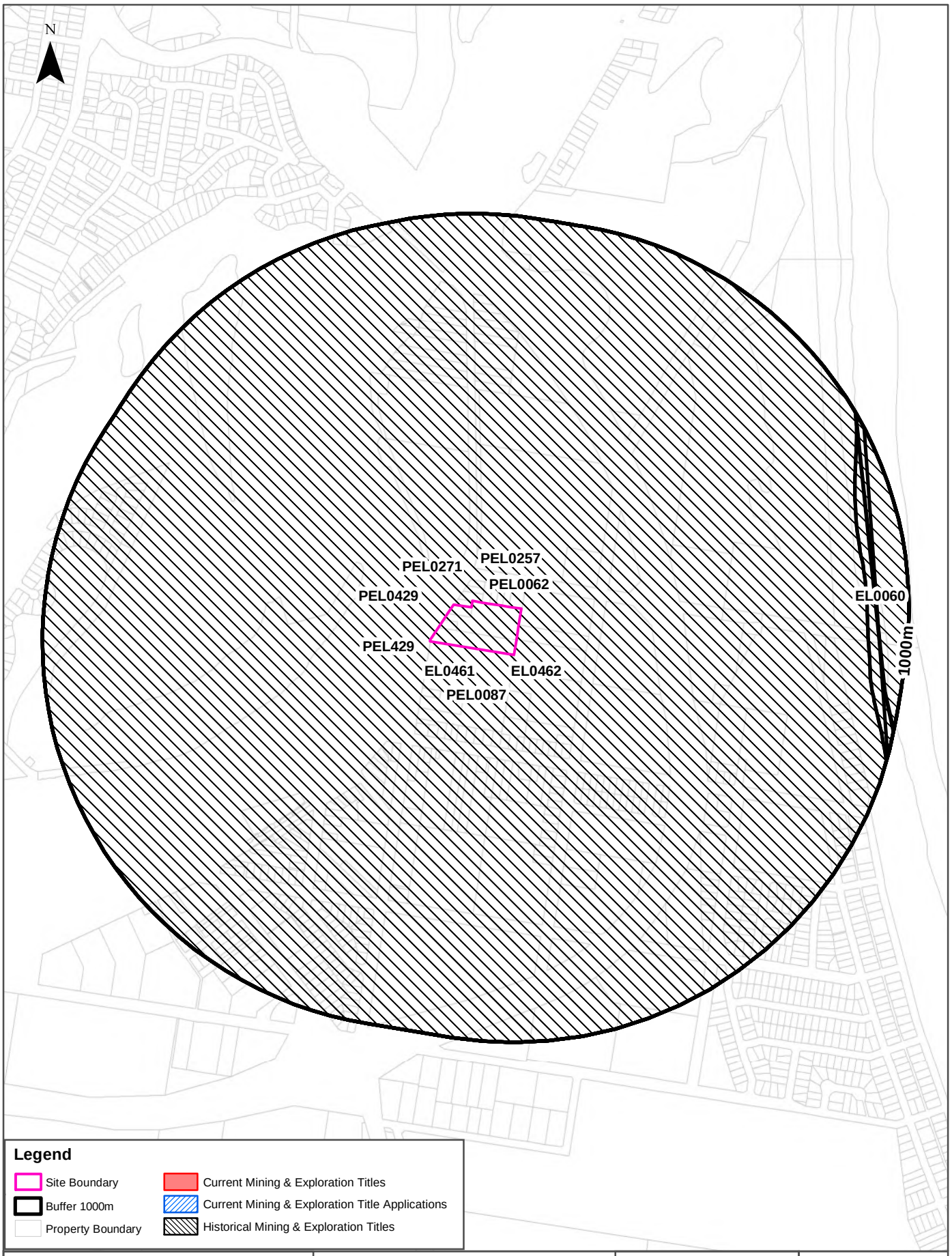
Mining Subsidence Districts

Mining Subsidence Districts within the dataset buffer:

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

Mining & Exploration Titles

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Mining

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Current Mining & Exploration Titles

Current Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Grant Date	Expiry Date	Last Renewed	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer								

Current Mining & Exploration Titles Data Source: © State of New South Wales through NSW Department of Industry

Current Mining & Exploration Title Applications

Current Mining & Exploration Title Applications within the dataset buffer:

Application Ref	Applicant	Application Date	Operation	Resource	Minerals	Dist	Dir
N/A	No records in buffer						

Current Mining & Exploration Title Applications Data Source: © State of New South Wales through NSW Department of Industry

Mining

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Historical Mining & Exploration Titles

Historical Mining & Exploration Titles within the dataset buffer:

Title Ref	Holder	Start Date	End Date	Resource	Minerals	Dist	Dir
PEL0429	SUNOCO INC	20010210	20030111	PETROLEUM	Petroleum	0m	On-site
PEL0257	OIL AND MINERALS QUEST NL	19800312		PETROLEUM	Petroleum	0m	On-site
PEL429	SUNOCO INC.	19991026	20001117	MINERALS		0m	On-site
PEL0062	MID-EASTERN OIL			PETROLEUM	Petroleum	0m	On-site
PEL0087	NATIONAL OIL HOLDINGS LTD, ALLIANCE OIL DEVELOPMENT AUSTRALIA NL			PETROLEUM	Petroleum	0m	On-site
PEL0271	BASE RESOURCES LTD, EDGEWORTH MINERALS LTD	19841005	19860905	PETROLEUM	Petroleum	0m	On-site
EL0461	PLANET METALS LIMITED	19710601	19721201	MINERALS	Ti Fe Th Heavy mineral sands Zircon	0m	On-site
EL0462	PLANET METALS LIMITED	19710601	19721201	MINERALS	Ti Fe Th Heavy mineral sands Zircon	0m	On-site
EL0060	PLANET MINING COMPANY PTY LIMITED	19660901	19690901	MINERALS	Heavy mineral sands	915m	East

State Environmental Planning Policy

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

State Significant Precincts

What SEPP State Significant Precincts exist within the dataset buffer?

Map Id	Precinct	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
N/A	No records in buffer							

EPI Planning Zones

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Environmental Planning Instrument

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Land Zoning

What EPI Land Zones exist within the dataset buffer?

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
B4	Mixed Use		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		0m	On-site
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		0m	East
W2	Recreational Waterways		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		19m	West
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		20m	North West
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		21m	South West
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		85m	North
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		85m	North
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		97m	North
R2	Low Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		161m	South
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		215m	South East
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		223m	West
SP2	Infrastructure	Classified Road	Tweed Local Environmental Plan 2014	18/01/2019	18/01/2019	02/09/2022	Amendment No 10	279m	East
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		294m	North
SP2	Infrastructure	Sewerage System	Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		367m	South West
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		373m	South
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		402m	North East
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		430m	East
R2	Low Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		444m	East
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		448m	South
B4	Mixed Use		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		507m	South West
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		516m	East
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		527m	South
B4	Mixed Use		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		543m	North
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		545m	East
R2	Low Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		576m	South East
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		588m	North West
B2	Local Centre		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		614m	South East
R3	Medium Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		659m	South East

Zone	Description	Purpose	EPI Name	Published Date	Commenced Date	Currency Date	Amendment	Distance	Direction
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		659m	South East
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		699m	South East
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		704m	North
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		727m	North
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		729m	North
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		739m	North
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		753m	East
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		767m	South West
W1	Natural Waterways		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		802m	West
R3	Medium Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		806m	South East
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		815m	North West
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		817m	West
R2	Low Density Residential		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		832m	West
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		835m	South East
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		836m	West
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		888m	South
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		897m	North
IN1	General Industrial		Tweed Local Environmental Plan 2014	22/01/2016	22/01/2016	02/09/2022	Amendment No 12	907m	South
W3	Working Waterways		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		909m	North
B4	Mixed Use		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		924m	South West
RU2	Rural Landscape		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		934m	South East
RE1	Public Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		955m	South East
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		956m	North
RE2	Private Recreation		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		976m	South West
DM	Deferred Matter		Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	02/09/2022		982m	North West

Heritage Items

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Heritage

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Commonwealth Heritage List

What are the Commonwealth Heritage List Items located within the dataset buffer?

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

National Heritage List

What are the National Heritage List Items located within the dataset buffer?
Note. Please click on Place Id to activate a hyperlink to online website.

Place Id	Name	Address	Place File No	Class	Status	Register Date	Distance	Direction
N/A	No records in buffer							

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							

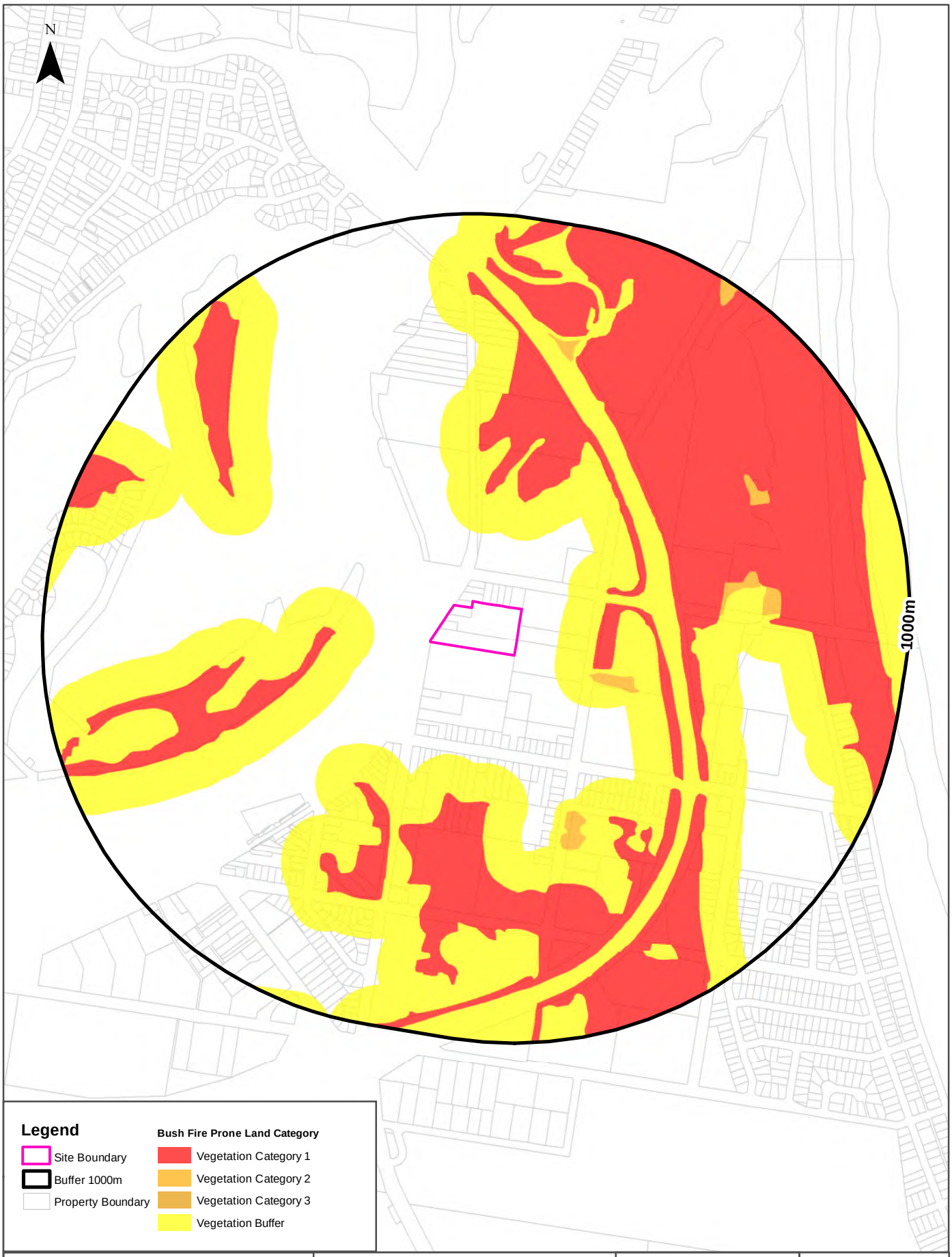
Environmental Planning Instrument - Heritage

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

Map Id	Name	Classification	Significance	EPI Name	Published Date	Commenced Date	Currency Date	Distance	Direction
I100	Osprey Nests as mapped from time to time by the National Parks & Wildlife Service	Item - General	Local	Tweed Local Environmental Plan 2014	04/04/2014	04/04/2014	04/04/2014	816m	North

Natural Hazards - Bush Fire Prone Land

84-92 Chinderah Bay Drive, Chinderah, NSW 2487



Data Sources: Bush Fire Prone Land: © NSW Rural Fire Service 2023. Property Boundaries: © Department Finance, Services & Innovation 2023

Coordinate System: GDA 1994 MGA Zone 56

Date: 02 March 2023

Natural Hazards

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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	103m	South East
Vegetation Category 2	196m	East
Vegetation Category 1	202m	East

Ecological Constraints - Vegetation & Ramsar Wetlands

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Ecological Constraints

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Vegetation - Eastern Bushland Database (North Region)

What Vegetation exists within the dataset buffer?

Veg Code	Veg Desc	NVISCode	NVISDesc	Distance	Direction
x	disturbed forest woodland	23	Disturbed bushland	251m	North

Ramsar Wetlands

What Ramsar Wetland areas exist within the dataset buffer?

Map Id	Ramsar Name	Wetland Name	Designation Date	Source	Distance	Direction
N/A	No records in buffer					

Ecological Constraints - Groundwater Dependent Ecosystems Atlas

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Ecological Constraints

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Groundwater Dependent Ecosystems Atlas

Type	GDE Potential	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Terrestrial	High potential GDE - from regional studies	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		192m	East
Terrestrial	Low potential GDE - from regional studies	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		445m	East

Ecological Constraints - Inflow Dependent Ecosystems Likelihood

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Ecological Constraints

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

Inflow Dependent Ecosystems Likelihood

Type	IDE Likelihood	Geomorphology	Ecosystem Type	Aquifer Geology	Distance	Direction
Terrestrial	6	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		192m	East
Terrestrial	1	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		332m	East
Terrestrial	4	Baslatic plateau terminating southeast in dissected volcanic pile (Mount Warning).	Vegetation		685m	North West

Ecological Constraints

84-92 Chinderah Bay Drive, Chinderah, NSW 2487

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	Crinia tinnula	Wallum Froglet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Amphibia	Litoria olongburensis	Olongburra Frog	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Actitis hypoleucos	Common Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Amaurornis moluccana	Pale-vented Bush-hen	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Anous stolidus	Common Noddy	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Anseranas semipalmata	Magpie Goose	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Apus pacificus	Fork-tailed Swift	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Ardenna carneipes	Flesh-footed Shearwater	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Ardenna grisea	Sooty Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Ardenna pacifica	Wedge-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Ardenna tenuirostris	Short-tailed Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Arenaria interpres	Ruddy Turnstone	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Botaurus poiciloptilus	Australasian Bittern	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Burhinus grallarius	Bush Stone-curlew	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Calidris acuminata	Sharp-tailed Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris canutus	Red Knot	Not Listed	Not Sensitive	Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris ferruginea	Curlew Sandpiper	Endangered	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris ruficollis	Red-necked Stint	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calidris tenuirostris	Great Knot	Vulnerable	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calonectris leucomelas	Streaked Shearwater	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Category 2	Vulnerable	
Animalia	Aves	Carterornis leucotis	White-eared Monarch	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Charadrius leschenaultii	Greater Sand-plover	Vulnerable	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Charadrius mongolus	Lesser Sand-plover	Vulnerable	Not Sensitive	Endangered	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Chlidonias leucopterus	White-winged Black Tern	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Circus assimilis	Spotted Harrier	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Coracina lineata	Barred Cuckoo-shrike	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Diomedea exulans	Wandering Albatross	Endangered	Not Sensitive	Endangered	
Animalia	Aves	Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Esacus magnirostris	Beach Stone-curlew	Critically Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Falco subniger	Black Falcon	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Fregata ariel	Lesser Frigatebird	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Fregata minor	Great Frigatebird	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Gallinago hardwickii	Latham's Snipe	Not Listed	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Gelochelidon nilotica	Gull-billed Tern	Not Listed	Not Sensitive	Not Listed	CAMBA
Animalia	Aves	Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus fuliginosus	Sooty Oystercatcher	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Haematopus longirostris	Pied Oystercatcher	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Hirundapus caudacutus	White-throated Needletail	Not Listed	Not Sensitive	Vulnerable	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Hydroprogne caspia	Caspian Tern	Not Listed	Not Sensitive	Not Listed	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	Lichenostomus fasciogularis	Mangrove Honeyeater	Vulnerable	Not Sensitive	Not Listed	
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	Macronectes halli	Northern Giant-Petrel	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Nettapus coromandelianus	Cotton Pygmy-Goose	Endangered	Not Sensitive	Not Listed	
Animalia	Aves	Ninox connivens	Barking Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Ninox strenua	Powerful Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Numenius madagascariensis	Eastern Curlew	Not Listed	Not Sensitive	Critically Endangered	ROKAMBA;CAMBA; JAMBA
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	Onychoprion fuscata	Sooty Tern	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Pandion cristatus	Eastern Osprey	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Petroica boodang	Scarlet Robin	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Aves	Phaethon lepturus	White-tailed Tropicbird	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Phaethon rubricauda	Red-tailed Tropicbird	Vulnerable	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Pluvialis fulva	Pacific Golden Plover	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Pluvialis squatarola	Grey 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	Pterodroma leucoptera leucoptera	Gould's Petrel	Vulnerable	Not Sensitive	Endangered	
Animalia	Aves	Pterodroma solandri	Providence Petrel	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	Puffinus assimilis	Little Shearwater	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Stercorarius longicaudus	Long-tailed Jaeger	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Stercorarius parasiticus	Arctic Jaeger	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Stercorarius pomarinus	Pomarine Jaeger	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Sterna hirundo	Common Tern	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Sterna sumatrana	Black-naped Tern	Not Listed	Not Sensitive	Not Listed	CAMBA;JAMBA
Animalia	Aves	Sternula albifrons	Little Tern	Endangered	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Sula dactylatra	Masked Booby	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;JAMBA
Animalia	Aves	Sula leucogaster	Brown Booby	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Thalassarche cauta	Shy Albatross	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Thalassarche chrysostoma	Grey-headed Albatross	Not Listed	Not Sensitive	Endangered	
Animalia	Aves	Thalassarche melanophris	Black-browed Albatross	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Aves	Thalasseus bergii	Crested Tern	Not Listed	Not Sensitive	Not Listed	JAMBA
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
Animalia	Aves	Tringa incana	Wandering Tattler	Not Listed	Not Sensitive	Not Listed	JAMBA
Animalia	Aves	Tringa nebularia	Common Greenshank	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Tringa stagnatilis	Marsh Sandpiper	Not Listed	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Aves	Turnix maculosus	Red-backed Button-quail	Vulnerable	Not Sensitive	Not Listed	
Animalia	Aves	Tyto longimembris	Eastern Grass Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto novaehollandiae	Masked Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Tyto tenebricosa	Sooty Owl	Vulnerable	Category 3	Not Listed	
Animalia	Aves	Xenus cinereus	Terek Sandpiper	Vulnerable	Not Sensitive	Not Listed	ROKAMBA;CAMBA; JAMBA
Animalia	Gastropoda	Thersites mitchellae	Mitchell's Rainforest Snail	Endangered	Not Sensitive	Critically Endangered	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Animalia	Insecta	Phyllodes imperialis southern subspecies	Southern Pink Underwing Moth	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Arctocephalus forsteri	New Zealand Fur-seal	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Arctocephalus pusillus doriferus	Australian Fur-seal	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Chalinolobus nigrogriseus	Hoary Wattled Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Not Sensitive	Endangered	
Animalia	Mammalia	Dugong dugon	Dugong	Endangered	Not Sensitive	Not Listed	
Animalia	Mammalia	Eubalaena australis	Southern Right Whale	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Mormopterus lumsdenae	Northern Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Myotis macropus	Southern Myotis	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Nyctimene robinsoni	Eastern Tube-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Nyctophilus bifax	Eastern Long-eared Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Ozimops lumsdenae	Northern Free-tailed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Petauroides volans	Southern Greater Glider	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Phascolarctos cinereus	Koala	Endangered	Not Sensitive	Endangered	
Animalia	Mammalia	Physeter macrocephalus	Sperm Whale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Planigale maculata	Common Planigale	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Potorous tridactylus	Long-nosed Potoroo	Endangered Population, Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Mammalia	Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Mammalia	Syconycteris australis	Common Blossom-bat	Vulnerable	Not Sensitive	Not Listed	
Animalia	Reptilia	Caretta caretta	Loggerhead Turtle	Endangered	Not Sensitive	Endangered	
Animalia	Reptilia	Chelonia mydas	Green Turtle	Vulnerable	Not Sensitive	Vulnerable	
Animalia	Reptilia	Eretmochelys imbricata	Hawksbill Turtle	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Acacia bakeri	Marblewood	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Acalypha eremorum	Acalypha	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Acronychia littoralis	Scented Acronychia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Archidendron hendersonii	White Lace Flower	Vulnerable	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Bosistoa transversa	Yellow Satinheart	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Cassia marksiana		Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Centranthera cochinchinensis	Swamp Foxglove	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Chamaesyce psammogeton	Sand Spurge	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Coatesia paniculata	Axe-Breaker	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Corokia whiteana	Corokia	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Cryptocarya foetida	Stinking Cryptocarya	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Cupaniopsis serrata	Smooth Tuckeroo	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Dendrocnide moroides	Gympie Stinger	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Desmodium acanthocladum	Thorny Pea	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Diospyros mabacea	Red-fruited Ebony	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Diospyros yandina	Shiny-leaved Ebony	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Diploglottis campbellii	Small-leaved Tamarind	Endangered	Category 2	Endangered	
Plantae	Flora	Drynaria rigidula	Basket Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Eleocharis tetraquetra	Square-stemmed Spike-rush	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Elionurus citreus	Lemon-scented Grass	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Endiandra hayesii	Rusty Rose Walnut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Endiandra muelleri subsp. bracteata	Green-leaved Rose Walnut	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Floydia praealta	Ball Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Geodorum densiflorum	Pink Nodding Orchid	Endangered	Category 2	Not Listed	
Plantae	Flora	Gossia fragrantissima	Sweet Myrtle	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Grevillea hilliana	White Yiel Yiel	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Hicksbeachia pinnatifolia	Red Boppel Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Lepiderema pulchella	Fine-leaved Tuckeroo	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Lindsaea brachypoda	Short-footed Screw Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Lindsaea fraseri	Fraser's Screw Fern	Endangered	Category 3	Not Listed	
Plantae	Flora	Macadamia integrifolia	Macadamia Nut	Not Listed	Not Sensitive	Vulnerable	
Plantae	Flora	Macadamia tetraphylla	Rough-shelled Bush Nut	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Marsdenia longiloba	Slender Marsdenia	Endangered	Not Sensitive	Vulnerable	
Plantae	Flora	Niemeyera whitei	Rusty Plum, Plum Boxwood	Vulnerable	Not Sensitive	Not Listed	
Plantae	Flora	Oberonia titania	Red-flowered King of the Fairies	Vulnerable	Category 2	Not Listed	
Plantae	Flora	Ochrosia moorei	Southern Ochrosia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Oldenlandia galioides	Sweet False Galium	Endangered	Not Sensitive	Not Listed	

Kingdom	Class	Scientific	Common	NSW Conservation Status	NSW Sensitivity Class	Federal Conservation Status	Migratory Species Agreements
Plantae	Flora	Peristeranthus hillii	Brown Fairy-chain Orchid	Vulnerable	Category 2	Not Listed	
Plantae	Flora	Phaius australis	Southern Swamp Orchid	Endangered	Category 2	Endangered	
Plantae	Flora	Randia moorei	Spiny Gardenia	Endangered	Not Sensitive	Endangered	
Plantae	Flora	Rhodamnia maideniana	Smooth Scrub Turpentine	Critically Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Rhodamnia rubescens	Scrub Turpentine	Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Rhodomyrtus psidioides	Native Guava	Critically Endangered	Not Sensitive	Critically Endangered	
Plantae	Flora	Sarcochilus fitzgeraldii	Ravine Orchid	Vulnerable	Category 2	Vulnerable	
Plantae	Flora	Sophora tomentosa	Silverbush	Endangered	Not Sensitive	Not Listed	
Plantae	Flora	Symplocos baeuerlenii	Small-leaved Hazelwood	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Syzygium hodgkinsoniae	Red Lilly Pilly	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Syzygium moorei	Durobby	Vulnerable	Not Sensitive	Vulnerable	
Plantae	Flora	Xylosma terrae-reginae	Queensland Xylosma	Endangered	Not Sensitive	Not Listed	

Data does not include NSW category 1 sensitive species.

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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 code is given under the field heading “LC” or “LocConf”. These codes lookup to the following location confidences:

LC Code	Location Confidence
Premise Match	Georeferenced to the site location / premise or part of site
Area Match	Georeferenced to an approximate or general area
Road Match	Georeferenced to a road or rail corridor
Road Intersection	Georeferenced to a road intersection
Buffered Point	A point feature buffered to x metres
Adjacent Match	Land adjacent to a georeferenced feature
Network of Features	Georeferenced to a network of features
Suburb Match	Georeferenced to a suburb boundary
As Supplied	Spatial data supplied by provider

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Attachment B: GeoTech Investigations (2023a) Subsurface Sampling and Laboratory Testing

ABN 81154555478
ACN 154555478

P 07 5523 3979
F 07 5523 3981
admin@geotechinvestigations.com

SUBSURFACE SAMPLING AND LABORATORY TESTING

From:	James Walle james@geotechinvestigations.com
To:	Brad Irwin brad.irwin@solowater.com.au
Client:	Rico Recovery Systems Aust Pty Ltd
Project:	Chinderah 'Solo'
Location:	No.86-88 Chinderah Bay Drive
Job No:	GI 7032-a
Date:	3 August 2023

As requested by Rico Recovery Systems Aust Pty Ltd, Geotech Investigations Pty Ltd (GI) has been engaged to complete a limited subsurface sampling and laboratory testing investigation at No.86-88 Chinderah Bay Drive. The scope of services required subsurface logging and sampling for laboratory analysis by others, with no interpretation of the investigation results required by GI, at this stage.

Fieldwork was undertaken on the 6th of July 2023, and comprised the drilling of two (2) boreholes, designated BH 1 and BH 2 using an vehicle mounted drill rig. The approximate locations of the boreholes are shown on Site Plan S01 in Appendix A. The boreholes were drilled using solid flight auguring techniques to 2 m depth. This investigation has been carried out in accordance with AS 1726 – 2017[1] in terms of soil description, with the fieldwork supervised by experienced Senior Geotechnical Engineer from GI, who positioned and logged the boreholes.

The results of the fieldwork are presented on the Engineering Logs attached in Appendix B, along with explanatory notes.

Laboratory testing was undertaken by Environmental Analysis Laboratory (EAL). The results are presented in the laboratory test reports attached as Appendix C.

We trust that the above meets your immediate needs. Please contact us should you require any further information.

Yours faithfully
For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

[1] Australian Standard AS 1726-2017 *'Geotechnical site investigations'*, Standards Australia

APPENDIX A

SITE PLAN OF APPROXIMATE TEST LOCATIONS

GEOTECH INVESTIGATIONS PTY LTD
(07) 5523 3979
3/42 Machinery Dr.
Tweed Heads South NSW 2486
admin@geotechinvestigations.com

Map description	Site Plan S01		
Site location	86-88 Chinderah Bay Drive, Chinderah NSW		
Client	Rico Recovery Systems Australia Pty Ltd		
Project name	Proposed Shed		
Project No	GI 7032	**Scale**	Not to scale

APPENDIX B

ENGINEERING LOGS:

- **BOREHOLE PROFILES BH 1 TO BH 2**
- **GEOTECHNICAL REPORT STANDARD NOTES**

Geotech Investigations Pty Ltd
3/42 Machinery Dr, Tweed Heads South NSW 2486
Phone: (07) 5523 3979

Geotechnical Log - Borehole

BH 1

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554611.37	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876743.51	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2 m BGL	**Date**	: 06/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.1	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine to medium grained.	M	MD		
		0.4	Fill		GW	Fill- sandy GRAVEL (GW) : medium dense, grey, fine to coarse sized, fine to coarse grained sand.	D			
		0.5	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine to medium grained, with medium plasticity clay.	M			
		0.6	Alluvial		SP	Alluvial- SAND (SP) : medium dense, brown, fine grained, (trace silt).	W-M			
		1								
	▼	1.3	Alluvial		SP	As above, but	W			
		1.5								
		2				**BH 1 Terminated at 2 m**				
		2.5								

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification

GW	well graded gravels	**SW**	well graded sands
GP	poorly graded gravels	**SP**	poorly graded sands
GM	silty gravel	**SM**	silty sands
GC	clayey gravel	**SC**	clayey sands
ML	inorg silts low plastic	**CL**	inorg clay low plastic
MH	inorg clay high plastic	**CI**	inorg clay med plastic
OL	org silts low plastic	**CH**	inorg clay high plastic
OH	org sills high plastic	**Pt**	peat of high org soils

Consistency
- **VS** Very soft
- **S** Soft
- **F** Firm
- **St** Stiff
- **VSt** Very stiff
- **H** Hard

Density
- **VL** Very loose
- **L** Loose
- **MD** Medium dense
- **D** Dense
- **VD** Very dense

Moisture
- **D** Dry
- **M** Moist
- **W** Wet
- **PL** plastic limit
- **LL** liquid limit

Soil Samples
- **B** bulk
- **D** disturbed
- **U(63)** U(63) push tube
- **U(50)** U(50) push tube
- **WS** water

In Situ Testing
- **PP** pen penetrometer
- **VS** vane shear
- **DCP** dynamic cone penetrometer

Laboratory Results
- **UC** undrained unconsol cohesion
- **UF** undrained unconsol friction angle
- **MC** moisture content
- **DD** dry density
- **LL** liquid limit
- **PL** plastic limit
- **LS** linear shrinkage
- **CC** undrained console cohesion
- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
- **CBR** californian bearing ratio

Geotech Investigations Pty Ltd
3/42 Machinery Dr, Tweed Heads South NSW 2486
Phone: (07) 5523 3979

Geotechnical Log - Borehole

BH 2

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554668.04	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876686.53	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2 m BGL	**Date**	: 10/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.1	Fill		GW	Fill- sandy GRAVEL (GW) : medium dense, grey, fine to medium sized, fine to coarse grained sand.	M	MD		
		0.5	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine grained, trace medium plasticity clay.				
		0.7	Fill		SW	Fill- SAND (SW) : medium dense, grey, fine to medium grained.				
		1								
	▼	1.3	Alluvial		SP	Alluvial- SAND (SP) : medium dense, brown, fine grained, (with silt).	W-M			
		1.5								
		2				**BH 2 Terminated at 2 m**				
		2.5								

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification
- **GW** well graded gravels
- **GP** poorly graded gravels
- **GM** silty gravel
- **GC** clayey gravel
- **ML** inorg silts low plastic
- **MH** inorg clay high plastic
- **OL** org silts low plastic
- **OH** org sills high plastic
- **SW** well graded sands
- **SP** poorly graded sands
- **SM** silty sands
- **SC** clayey sands
- **CL** inorg clay low plastic
- **CI** inorg clay med plastic
- **CH** inorg clay high plastic
- **Pt** peat of high org soils

Consistency
- **VS** Very soft
- **S** Soft
- **F** Firm
- **St** Stiff
- **VSt** Very stiff
- **H** Hard

Density
- **VL** Very loose
- **L** Loose
- **MD** Medium dense
- **D** Dense
- **VD** Very dense

Moisture
- **D** Dry
- **M** Moist
- **W** Wet
- **PL** plastic limit
- **LL** liquid limit

Soil Samples
- **B** bulk
- **D** disturbed
- **U(63)** U(63) push tube
- **U(50)** U(50) push tube
- **WS** water

In Situ Testing
- **PP** pen penetrometer
- **VS** vane shear
- **DCP** dynamic cone penetrometer

Laboratory Results
- **UC** undrained unconsol cohesion
- **UF** undrained unconsol friction angle
- **MC** moisture content
- **DD** dry density
- **LL** liquid limit
- **PL** plastic limit
- **LS** linear shrinkage
- **CC** undrained console cohesion
- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
- **CBR** californian bearing ratio

SCOPE These standard notes may be of assistance when understanding terms and recommendations given in this report. These notes are for general conditions and not all terms given may be of concern to the report attached. The descriptive terms adopted by Geotech Investigations Pty Ltd are given below and are largely consistent with Australian Standards AS1726-1993 'Geotechnical Site Investigations'.

CLIENT can be described and is limited to the financier of this geotechnical investigation.

LEGALITY and privacy of this document is based on communication between Geotech Investigations Pty Ltd and the client. Unless indicated otherwise the report was prepared specifically for the client involved and for the purposes indicated by the client. Use by any other party for any purpose, or by the client for a different purpose, will result in recommendations becoming invalid and Geotech Investigations Pty Ltd will hold no responsibility for problems which may arise.

GEOTECHNICAL REPORTS are predominantly derived using professional estimates determined from the results of fieldwork, in-situ and laboratory testing and experience from previous investigations in the area, from which geotechnical engineers then formulate an opinion about overall subsurface conditions. The client must be made aware that the investigations are undertaken to ensure minimal site impact using test-pits or small diameter boreholes and soil conditions on-site may vary from those encountered during the investigation.

CLIENTS RESPONSIBILITY to notify this office should there be adjustments in proposed structure/location or inconsistencies with material descriptions given in this report and those encountered on site. Geotech Investigations Pty Ltd is able to provide a range of services from on-site inspections to full project supervision to confirm recommendations given in the report.

CSIRO Publication BTF 18 'Foundation Maintenance and Footing Performance: A Homeowner's Guide' explains how to adequately maintain drainage during and post construction which lies as the responsibility of the client. Suitable drainage ensures recommendations given in this report remain valid.

INVESTIGATION METHODS adopted by Geotech Investigations Pty Ltd are designed to incorporate individual project-specific factors to obtain information on the physical properties of soil and rock around a site to design earthworks and foundations for proposed structures. The following methods of investigation currently adopted by this company are summarised below:-

HAND AUGER – investigations enable field work to be undertaken where access is limited. The materials must have sufficient cohesion to stand unsupported in an unlined borehole and there must be no large cobbles boulders or other obstructions which would prevent rotation of the auger.

TEST-PITS – investigations are carried out with an excavator or backhoe, allowing a visual inspection of sub-surface material in-situ and from samples removed. The limit of investigation is restricted by the reach of the excavator or backhoe.

CONTINUOUS SPIRAL FLIGHT AUGERING TECHNIQUES – investigations are advanced by pushing a 100mm diameter spiral into the sub-surface and withdrawing it at regular intervals to allow sampling or testing as it emerges.

WASH BORING – investigations are advanced by removing the loosened soil from the borehole by a stream of water or drilling mud issuing from the lower end of the wash pipe which is worked up and down or rotated by hand in the borehole. The water or mud carries the soil up the borehole where it overflows at ground level where the soil in suspension is allowed to settle in a pond or tank and the fluid is re-circulated or discharged to waste as required.

NON-CORE ROTARY DRILLING – investigations are advanced using a rotary bit with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from feel and rate of penetration.

ROTARY MUD DRILLING – is carried out as above using mud as support and circulating fluid for the borehole drilling. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling.

CONTINUOUS CORE DRILLING – investigations are carried out in rock material, specimens of rock in the form of cylindrical cores are recovered from the drill holes by the means of core barrel. The core barrel is provided at its lower end with a detachable core bit which carries industrial diamond chips in a matrix of metal. Rotation of the barrel by means of the drill rods causes the core bit to cut an annulus in the rock, the cuttings being washed to the surface by a stream of pumped down the hollow drill rods.

TESTING METHODS adopted by Geotech Investigations Pty Ltd to determine soil properties include but not limited to the following:-

U50 – Undisturbed samples are obtained by inserting a 50mm diameter thin-walled steel tube into the material and withdrawing with a sample of the soil in a moderately undisturbed condition.

PP – Pocket Penetrometer tests are commonly used on thin walled tube samples of cohesive soils to evaluate consistency and approximate unconfined compressive strength of saturated cohesive soils. They may also be used for the same purpose in freshly excavated trenches.

VS – Vane Shear test are commonly used in-situ or on thin walled tube samples of cohesive soils by introducing the vane into the material where the measurement of the undrained shear strength is required. Then the vane is rotated and the torsional force required to cause shearing is calculated.

DCP – Dynamic Cone Penetrometer tests are commonly used in-situ to measure the strength attributes of penetrability and compaction of sub-surface materials.

SPT – Standard Penetration Tests are commonly used to determine the density of granular deposits but are occasionally used in cohesive material as a means of determining strength and also of obtaining a relatively unmixed sample. Samples and results are obtained by driving a 50mm diameter split tube through blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. Blow counts are recorded for 150mm intervals with the sum of the number of blows required for the second and third 150mm of penetration is termed the "standard penetration resistance" or the "N-value".

GEOLOGICAL ORIGINS of sub-surface material plays a considerable role in the development of engineering parameters and have been summarised as follows:-

FILL – materials are man made deposits, which may be significantly more variable between test locations than naturally occurring soils.

RESIDUAL – soils are present in a region because of weathering over the geological time scale.

COLLUVIAL – soils have been deposited recently, on the geological time scale, as soils being transported slowly down slope due to gravitational creep.

ALLUVIAL – soils have been deposited recently, on the geological time scale, as water borne materials.

AEOLIAN – soils have been deposited recently, on the geological time scale, as wind borne materials.

SOIL DESCRIPTION is based on an assessment of disturbed samples, as recovered from boreholes and excavations, and from undisturbed materials. Soil descriptions adopted by Geotech Investigations Pty Ltd are largely consistent with AS 1726-2017 '*Geotechnical Site Investigation'.* Soil types are described according to the predominating particle size and behaviour, qualified by the grading of other particles present on the following bases detailed in Table 1.

COHESIVE SOILS ability to hold moisture known as its liquid limit is the state of a soil when it goes from a solid state to a liquid state described in Table 2

TABLE 1

Soil Classification	Particle Size
Clay	< 0.002 mm
Silt	0.002 – 0.06 mm
Sand	0.06 – 2.00 mm
Gravel	2.00 – 60.0 mm

TABLE 2

Descriptive Type	Range of Liquid Limit %
Of low plasticity	≤ 35
Of medium plasticity	> 35 ≤ 50
Of high plasticity	> 50

Furthermore to soil description cohesive soils are described on their strength (assessed in conjunction with penetration tests) and liquid limit. Non-cohesive soil strengths are described by their density index. With descriptions for cohesive and non-cohesive soils summarised in Table 3.

TABLE 3

COHESIVE SOILS		NON-COHESIVE SOILS	
Term	**Undrained Shear Strength kPa**	**Term**	**Density Index %**
Very soft	≤ 12	Very Loose	≤15
Soft	> 12 ≤25	Loose	> 15 ≤35
Firm	> 25 ≤50	Medium Dense	> 35 ≤65
Stiff	> 50 ≤100	Dense	> 65 ≤85
Very Stiff	> 100 ≤200	Very Dense	> 85
Hard	> 200		

Description of terms used to describe material portion are summarised in Table 4.

TABLE 4

COARSE GRAINIED SOILS		FINE GRAINED SOILS	
% Fines	**Modifier**	**% Coarse**	**Modifier**
≤ 5	Omit or 'trace'	≤ 15	Omit or 'trace'
> 5 ≤12	Describe as 'with'	> 15 ≤30	Describe as 'with'
> 12	Prefix soil as 'silty/clayey'	> 30	Prefix soil as 'sandy/gravelly'

ROCK DESCRIPTIONS are determined from disturbed samples or specimens collected during field investigations. A rocks presence of defects and the effects of weathering are likely to have a great influence on engineering behaviour.

Rock Material Weathering Classification is summarised in Table 5.

TABLE 5

Term	Symbol	Definition
Residual Soils	-	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded, in water
Distinctly Weathered Rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to decomposition of weathering products in pores
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh rock	FR	Rock shows no signs of decomposition or staining

Rock Material Strength Classification is summarised in Table 6.

TABLE 6

Term	Symbol	Point load index (MPa) I_s50	Field guide to strength
Extremely Low	EL	≤0.03	Easily remoulded by hand to a material with soil properties
Very Low	VL	>0.03 ≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3cm thick can be broken by finger pressure
Low	L	>0.1 ≤0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling
Medium	M	>0.3 ≤1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty
High	H	>1.0 ≤3.0	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer
Very High	VH	>3.0 ≤10	Hand specimen breaks with pick after more than one blow; rock rings under hammer
Extremely High	EH	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer

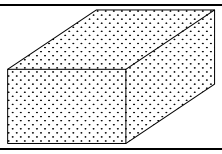
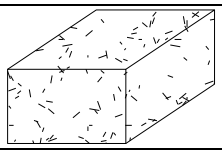
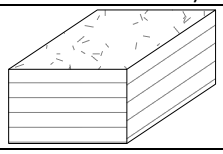
Rock Material Defect Shapes are summarised in Table 7.

TABLE 7

Term	Description
Planar	The defect does not vary in orientation.
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps.
Irregular	The defect has many sharp changes of orientation
Smooth	The defect has a flat even finish
Rough	The defect has a irregular disoriented finish

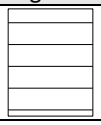
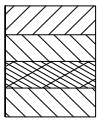
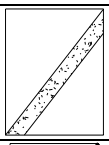
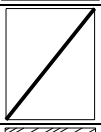
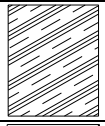
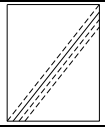
Rock Material Texture and Fabric are summarised in Table 8.

TABLE 8

Geological Description	Massive		Layered (Bedded foliate cleaved)
Diagram			
Fabric Type	Effectively homogenous and isotropic. Bulky or equi-dimensional grains uniformly distributed	Effectively homogeneous and isotropic. Elongated	Effective homogeneous with planar anisotropy. Elongated or tabular grains or pores in a layered arrangement

Rock Material Defect Type is summarised in Table 9

TABLE 9

Term	Definition	Diagram
Bedding	Signifying existence of beds or laminate. Planes dividing sedimentary rocks of the same or different lithology. Structure occurring in granite and similar rocks evident in a tendency to split more or less horizontally to the land surface	
Cross Bedding	Also called cross-lamination or false bedding. The structure commonly present in granular sedimentary rocks, which consists of tabular, irregularly lenticular or wedge-shaped bodies lying essentially parallel to the general stratification and which them selves show pronounced lamination structure in which the laminae are steeply inclined to the general bedding.	
Crushed Seam	A fracture at a more or less acute angle to applied force generally with some pulverized material along its surface	
Joint	A fracture in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.	
Parting	A small joint in rock or a layered rock where the tendency of crystals to separate along certain planes that are not true cleavage planes.	
Sheared Zone	A fracture that results from stresses which tend to shear one part of a specimen past the adjacent part	

APPENDIX C

LABORATORY TEST REPORTS

RESULTS OF SOIL ANALYSIS

12 samples supplied by Geotech Investigations Pty Ltd on 12/07/2023. Lab Job No. P2944.
Samples submitted by James Walle. Your Job: GI 7032 BH #1 & #2.
3/42 Machinery Drive TWEED HEADS NSW 2486

SAMPLE ID	Job No.	% Moisture (%W/W)	BTEX	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	m/p-xylene (mg/kg)	o-xylene (mg/kg)	Total Xylenes (mg/kg)	Total BTEX (mg/kg)	Naphthalene (VOC) (mg/kg)	Total Petroleum Hydrocarbons (TPH)	Benzene (F0) (mg/kg)	TRH C6-C9 (mg/kg)	TRH C6-C10 (mg/kg)	TRH C6-C10 minus BTEX (F1) (mg/kg)	TRH C10-C14 (mg/kg)	TRH C15-C28 (mg/kg)	TRH C29-C36 (mg/kg)	TRH C37-C40 (mg/kg)	TRH >C10-C16 (mg/kg)	TRH >C10-C16 - Naphthalene (F2) (mg/kg)	TRH >C16-C34 (F3) (mg/kg)	TRH >C34-C40 (F4) (mg/kg)	TRH C10-C36 Total (mg/kg)
	Method	Subcontracted: SGS report SE 250675		Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675		Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675	Subcontracted: SGS report SE 250675
BH #1 0-0.1M	P2944/1	12.7		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	33	300	550	290	41	41	620	490	880
BH #1 0.1-0.2 M	P2944/2	8.8		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	220	490	320	<25	<25	480	530	710
BH #1 05.-0.6 M	P2944/3	10.1		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	88	160	<100	<25	<25	190	<120	240
BH #1 1.0-1.2 M	P2944/4	6.3		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #1 1.5-1.6 M	P2944/5	20.2		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 2.0M	P2944/6	18.2		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 0-0.1M	P2944/7	10.7		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 0.1-0.2 M	P2944/8	10.4		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 05.-0.6 M	P2944/9	7.3		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 1.0-1.2 M	P2944/10	5.7		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 1.5-1.6 M	P2944/11	19.0		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110
BH #2 2.0M	P2944/12	17.4		<0.1	<0.1	<0.1	<0.2	<0.1	<0.3	<0.6	<0.1		<0.1	<20	<25	<25	<20	<45	<45	<100	<25	<25	<90	<120	<110

Notes:

1. ppm = mg/Kg dried sample
2. All results as dry weight DW - samples were dried at 40oC for 24-48hrs prior to crushing and analysis.
3. Methods from Rayment and Lyons, Soil Chemical Methods - Australasia
4. Analysis conducted between sample arrival date and reporting date.
5. ** NATA accreditation does not cover the performance of this service.
6. .. Denotes not requested.
7. This report is not to be reproduced except in full.
8. All services undertaken by EAL are covered by the EAL Laboratory Services Terms and Conditions (refer SCU.edu.au/eal/t&cs or on request).
9. Results relate only to the samples tested.
10. This report was issued on 20/07/2023.

checked:.....
Graham Lancaster

TRH >C10-C40 Total (F bands) (mg/kg)	Polynuclear Aromatic Hydrocarbons	Naphthalene (mg/kg)	2-methylnaphthalene (mg/kg)	1-methylnaphthalene (mg/kg)	Acenaphthylene (mg/kg)	Acenaphthene (mg/kg)	Fluorene (mg/kg)	Phenanthrene (mg/kg)	Anthracene (mg/kg)	Fluoranthene (mg/kg)	Pyrene (mg/kg)	Benzo(a)anthracene (mg/kg)	Chrysene (mg/kg)	Benzo(b&j)fluoranthene (mg/kg)	Benzo(k)fluoranthene (mg/kg)	Benzo(a)pyrene (mg/kg)	Indeno(1,2,3-cd)pyrene (mg/kg)	Dibenzo(ah)anthracene (mg/kg)	Benzo(ghi)perylene (mg/kg)	Carcinogenic PAHs, BaP TEQ <LOR=0 TEQ (mg/kg)	Carcinogenic PAHs, BaP TEQ <LOR=LOR TEQ (mg/kg)	Carcinogenic PAHs, BaP TEQ <LOR=LOR/2 TEQ (mg/kg)	Total PAH (18) (mg/kg)	Total PAH (NEPM/WHO 16) (mg/kg)
Subcontracted: SGS report SE 250675		*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*	*Subcontracted: SGS report SE 250675*
1200		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
1000		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8
<210		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.3	<0.2	<0.8	<0.8

checked:...............
Graham Lancaster

Attachment C: GeoTech Investigations (2023b) Report on Limited Subsurface Investigation for Proposed Sheds at 86-88 Chinderah Bay Drive Chinderah

REPORT ON

LIMITED SUBSURFACE INVESTIGATION

FOR

PROPOSED SHEDS AT

86-88 CHINDERAH BAY DRIVE

CHINDERAH

PREPARED FOR

RICO RECOVERY SYSTEMS AUST PTY LTD

PROJECT REF: GI 7032-B

3 AUGUST 2023

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Geotech Investigations Pty Ltd ACN:154555478
OFFICE: Unit 3 / 42 Machinery Drive
Tweed Heads South NSW 2486
POSTAL: PO Box 6885
Tweed Heads South NSW 2486

DRILLING ENVIRONMENTAL GEOTECHNICAL

TABLE OF CONTENTS

1 INTRODUCTION

This report details the results of a limited subsurface investigation for the proposed sheds at No.86-88 Chinderah Bay Drive, Chinderah. Geotech Investigations Pty Ltd (GI) was commissioned by Rico Recovery Systems Aust Pty Ltd, to complete this investigation.

Details of the sheds are not available at the time of preparing the report, however, are understood to comprise slab on ground construction, portal steel frame and light weight sheeting.

2 OBJECTIVES AND AGREED SCOPE OF SERVICE

The investigation was to determine information regarding the subsurface conditions and how this influences the design of the new structure/s etc. The investigation and report involved:-

- Drilling and sampling of borehole(s) / Dynamic Cone Penetrometer test(s) at four (4) locations within the general building area;
- Summarise the subsurface conditions, including any groundwater observations at the time;
- Typical constraints that these conditions may have on the project;
- General earthworks recommendations;
- Estimated movements relating from Shrink-Swell of cohesive soils;
- Site Classification in accordance with AS2870-2011[1] to assist with footing and slab design; and
- Soil strength information and estimated settlements for footing and slab design.

3 SITE LOCATION AND DESCRIPTION

The site is irregular shaped and located on the eastern side of Chinderah Bay Drive approximately 250 m north of the intersection with Wommin Bay Road. At the time of the investigation, the site was a well established Solo waste depot comprising a combination of hard stand and exposed ground, landscaped areas and light industrial type buildings.

4 GEOTECHNICAL CONDITIONS

4.1 Geotechnical Model

Reference to the Tweed Heads 1:100,000 Coastal Quaternary Geology Map Series by the Geological Survey of New South Wales indicates the site is underlain by Pleistocene dune comprising *'marine sand and indurated sand'.*

[1] Australian Standard AS2870-2011 *'Residential footings and slabs - Construction'*, Standards Australia

4.2 Field Work Methodology

Fieldwork was undertaken on the 6th of July 2023, and comprised the drilling of four (4) boreholes, designated BH 1 to BH 4 using an vehicle mounted drill rig. The boreholes were undertaken at accessible locations employing spiral flight auguring techniques to the termination depths of between 2 m and 2.8 m.

Dynamic cone penetrometer test/s (DCPs) were carried out adjacent to the borehole/s BH 3 and BH 4 to provide an estimate of the strength consistency or relative density of the subsurface soils. The approximate locations of the boreholes are shown on Site Plan S01 attached in Appendix A.

This investigation has been carried out generally in accordance with AS 1726 – 2017[2] in terms of soil description. The fieldwork was carried out by an experienced Senior Geotechnical Engineer from GI who logged the materials encountered in the boreholes and completed the DCP testing. At the completion of drilling, the boreholes were backfilled loosely with drill spoil.

4.3 Field Work Results

The results of the fieldwork are detailed on the Engineering Log attached in Appendix B, along with explanatory notes. Table 1 below provides a summary of these conditions.

Table 1: Summary of Subsurface Conditions *(depth below existing surface level)*

Material Descriptions	BH 1 (m)	BH 2 (m)	BH 3 (m)	BH 4 (m)
Fill - Silty SAND / Sandy GRAVEL	0 to 0.6	0 to 0.7	0 to 1.1	0 to 1.1
Alluvial (Natural) - Medium Dense (or denser) SAND	0.6 to 2.0	0.7 to 2.0	1.1 to 2.8	1.1 to 2.8
Groundwater	1.3	1.4	1.5	1.5

Note: NE – Not Encountered

It should be noted that groundwater is affected by various influences and will vary over time.

5 INTERPRETATION OF RESULTS

5.1 Possible Constraints of Subsurface Conditions to the Project

Based on the results of the test locations, the exposed subgrade underside of **NEW** footing excavations will likely comprise areas of existing uncontrolled fill materials underlain by medium dense and dense alluvial sands. Ground water was encountered between 1.3 and 1.5 m depth below existing surface levels. Shallow footings including some piering would be the expected foundation, depending on construction loads and requirements.

[2] Australian Standard AS 1726-2017 *'Geotechnical site investigations'*, Standards Australia

5.2 Earthworks

Earthworks are proposed to comprise the partial clearing of the building area followed by minor levelling and footing excavations. Should additional earthworks be proposed, this office must be contacted to provide further advice.

5.3 Shrink-Swell Movements and Site Classification

The conditions encountered must be classified as **'Class P'** in accordance with the provisions of AS 2870 due to the presence of uncontrolled fill. This indicates that engineering principles must be adopted in the design for new footings and slabs.

A Site Classification is provided to allow the determination of appropriate footing sizes and slab details to be designed, and is based on the soil profile, the soil reactivity, and the climatic conditions at the site. The soil profile is identified by the site investigation drilling and in-situ testing, while the soil reactivity is determined from laboratory testing to provide the Shrink-Swell Index (I_{SS}). On the majority of sites, this information is used to calculate the characteristic surface movement (y_S), which is an estimation of the amount of movement at the surface of the site, subject to normal seasonal wetting and drying.

The results of the fieldwork indicate that the encountered subsurface conditions in the upper 1.5 m (depth of design soil suction change) predominately comprised inert materials (i.e. sands), and as such, shrink-swell movements will be negligible. Therefore, the surcharge from the structure, a reactivity similar to 'Class M' (moderately reactive) in accordance with AS 2870 may be considered, provided settlements can be allowed for and footings are found in the alluvial sands. Suggested design information is provided in Section 5.4 below.

This classification is relevant to sites subject to seasonal moisture changes only. Abnormal moisture conditions, such as from the removal or planting of trees (including on adjacent sites), poor site drainage, and development of gardens adjacent to the footings, may cause higher movements to occur, probably resulting in damage, which may or may not be within acceptable ranges.

5.4 Preliminary Footing Design Parameters

Preliminary design advice for strip and pad footings (including waffle raft slab) may be designed for an allowable bearing pressure of 100 kPa in the medium dense (or better) alluvial sands. Strip and pad footings will require a minimum 300 mm socketing depth. Bored piers found into the alluvial sand may be designed for an allowable end bearing pressure of 150 kPa.

Footing and construction loads **are not** to be supported in any topsoil, existing fill, or loose sands. The footing design **will require** the use of deepened footings, shallow bored piers or excavation bucket piers to transfer loads into the appropriate founding stratum, with all loads founded in uniform material to limit the potential for differential settlements that are likely to damage the structure.

Inspection of footing trenches, bored piers or founding subgrade level should be carried out by GI for confirmation of the above bearing pressures prior to placement of concrete. Additonal investigations of the building may be beneficial once final locations and the structure's loads are known.

5.5 General Comments

The above information and calculations are based on existing site soils and assumes moisture conditions within site soils vary due to seasonal effects only. If abnormal moisture conditions occur (due to drying by tree root action, or wetting by leaking pipes, water ponding, etc.), significantly greater movements are considered possible, and the Site Classification should be reconsidered.

It is recommended that good engineering practices be adopted in the design of all structures and foundations and in particular, the following should be considered for movement in sensitive areas underlain with reactive materials:-

- Trees and shrubs should not be planted or be allowed to remain closer than their mature height to movement sensitive structures / features. Where trees exist within this distance, deeper foundations may be required and GI should be notified immediately to provide such recommendations;
- Soil moisture should be controlled to limit moisture content change during or following construction;
- The site should be graded to allow surface water to easily flow into a suitable stormwater system, and prevent ponding, particularly adjacent to the footings; and
- Underground services should be made flexible where possible.

During periods of high rainfall, concentrated surface water runoff or ponding may occur on the site. Suitable drainage and diversion of all runoff into the stormwater articulation systems to prevent water ponding is necessary prior, during and after the construction of any proposed residential development.

6 LIMITS OF INVESTIGATION

Recommendations given in this report are based on the information supplied regarding the proposed building construction in conjunction with the findings of the investigation. Any change in the construction type or building location may require additional testing and/or make recommendations invalid.

Every reasonable effort has been made to locate the test sites so that the borehole/s are representative of the soil conditions within the area to be investigated. The client should be made aware, however, that this assessment has been based on limited site data using small diameter borehole/s, and that subsurface conditions may vary across the area.

If you should require any further information or clarification, please do not hesitate to contact this office.

Yours faithfully
For and on behalf of
Geotech Investigations Pty Ltd

James Walle *B.Eng (Civil), RPEQ (15701), RPEng (Civil)*
Senior Geotechnical Engineer

APPENDIX A

SITE PLAN S01

GEOTECH INVESTIGATIONS PTY LTD
(07) 5523 3979
3/42 Machinery Dr.
Tweed Heads South NSW 2486
admin@geotechinvestigations.com

Map description	Borehole Location Plan		
Site location	86-88 Chinderah Bay Drive, Chinderah NSW		
Client	Rico Recovery Systems Australia Pty Ltd		
Project name	Proposed Shed		
Project No	GI 7032	**Scale**	Not to scale

APPENDIX B

ENGINEERING LOG – BOREHOLE PROFILES BH 1 TO BH 4
GEOTECHNICAL REPORT STANDARD NOTES

Geotech Investigations Pty Ltd
3/42 Machinery Dr, Tweed Heads South NSW 2486
Phone: (07) 5523 3979

Geotechnical Log - Borehole

BH 1

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554611.37	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876743.51	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2 m BGL	**Date**	: 06/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.1	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine to medium grained.	M	MD		
		0.4	Fill		GW	Fill- sandy GRAVEL (GW) : medium dense, grey, fine to coarse sized, fine to coarse grained sand.	D			
		0.5	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine to medium grained, with medium plasticity clay.	M			
		0.6	Alluvial		SP	Alluvial- SAND (SP) : medium dense, brown, fine grained, (trace silt).	W-M			
		1								
	▼	1.3	Alluvial		SP	As above, but	W			
		1.5								
		2				**BH 1 Terminated at 2 m**				
		2.5								

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification

GW	well graded gravels	**SW**	well graded sands
GP	poorly graded gravels	**SP**	poorly graded sands
GM	silty gravel	**SM**	silty sands
GC	clayey gravel	**SC**	clayey sands
ML	inorg silts low plastic	**CL**	inorg clay low plastic
MH	inorg clay high plastic	**CI**	inorg clay med plastic
OL	org silts low plastic	**CH**	inorg clay high plastic
OH	org sills high plastic	**Pt**	peat of high org soils

Consistency
- **VS** Very soft
- **S** Soft
- **F** Firm
- **St** Stiff
- **VSt** Very stiff
- **H** Hard

Density
- **VL** Very loose
- **L** Loose
- **MD** Medium dense
- **D** Dense
- **VD** Very dense

Moisture
- **D** Dry
- **M** Moist
- **W** Wet
- **PL** plastic limit
- **LL** liquid limit

Soil Samples
- **B** bulk
- **D** disturbed
- **U(63)** U(63) push tube
- **U(50)** U(50) push tube
- **WS** water

In Situ Testing
- **PP** pen penetrometer
- **VS** vane shear
- **DCP** dynamic cone penetrometer

Laboratory Results
- **UC** undrained unconsol cohesion
- **UF** undrained unconsol friction angle
- **MC** moisture content
- **DD** dry density
- **LL** liquid limit
- **PL** plastic limit
- **LS** linear shrinkage
- **CC** undrained console cohesion
- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
- **CBR** californian bearing ratio

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Geotechnical Log - Borehole

BH 2

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554668.04	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876686.53	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2 m BGL	**Date**	: 10/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.1	Fill		GW	Fill- sandy GRAVEL (GW) : medium dense, grey, fine to medium sized, fine to coarse grained sand.	M	MD		
		0.5	Fill		SM	Fill- silty SAND (SM) : medium dense, dark grey, fine grained, trace medium plasticity clay.				
		0.7	Alluvial		SW	Alluvial- SAND (SW) : medium dense, grey, fine to medium grained.				
		1								
		1.3	Alluvial		SP	Alluvial- SAND (SP) : medium dense, brown, fine grained, (with silt).	W-M			
	▼	1.5								
		2				**BH 2 Terminated at 2 m**				
		2.5								

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification
- **GW** well graded gravels
- **GP** poorly graded gravels
- **GM** silty gravel
- **GC** clayey gravel
- **ML** inorg silts low plastic
- **MH** inorg clay high plastic
- **OL** org silts low plastic
- **OH** org sills high plastic
- **SW** well graded sands
- **SP** poorly graded sands
- **SM** silty sands
- **SC** clayey sands
- **CL** inorg clay low plastic
- **CI** inorg clay med plastic
- **CH** inorg clay high plastic
- **Pt** peat of high org soils

Consistency
- **VS** Very soft
- **S** Soft
- **F** Firm
- **St** Stiff
- **VSt** Very stiff
- **H** Hard

Density
- **VL** Very loose
- **L** Loose
- **MD** Medium dense
- **D** Dense
- **VD** Very dense

Moisture
- **D** Dry
- **M** Moist
- **W** Wet
- **PL** plastic limit
- **LL** liquid limit

Soil Samples
- **B** bulk
- **D** disturbed
- **U(63)** U(63) push tube
- **U(50)** U(50) push tube
- **WS** water

In Situ Testing
- **PP** pen penetrometer
- **VS** vane shear
- **DCP** dynamic cone penetrometer

Laboratory Results
- **UC** undrained unconsol cohesion
- **UF** undrained unconsol friction angle
- **MC** moisture content
- **DD** dry density
- **LL** liquid limit
- **PL** plastic limit
- **LS** linear shrinkage
- **CC** undrained console cohesion
- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
- **CBR** californian bearing ratio

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Geotechnical Log - Borehole

BH 3

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554639.43	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876772.83	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2.8 m BGL	**Date**	: 06/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.4	Fill		GW	Fill- sandy GRAVEL (GW) : dense, grey, fine to coarse sized, fine to coarse grained sand.	M	D		
		0.5	Fill		SW	Fill- SAND (SW) : dense, grey, fine to medium grained, (trace silt).			12	
									11	
									9	
									6	
		1							9	
		1.1							7	
			Alluvial		SW	Alluvial- SAND (SW) : dense, grey, fine to medium grained, (trace silt).	W-M		7	
									9	
									8	
	▼	1.5							8	
									3	
		1.7							6	
			Alluvial		SW	Alluvial- SAND (SW) : dense, brown, fine to medium grained, (trace silt).	M		4	
		2								
		2.5								
						BH 3 Terminated at 2.8 m				

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification
- **GW** well graded gravels
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- **GM** silty gravel
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- **SW** well graded sands
- **SP** poorly graded sands
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- **CI** inorg clay med plastic
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- **Pt** peat of high org soils

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Moisture
- **D** Dry
- **M** Moist
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- **PL** plastic limit
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Soil Samples
- **B** bulk
- **D** disturbed
- **U(63)** U(63) push tube
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- **WS** water

In Situ Testing
- **PP** pen penetrometer
- **VS** vane shear
- **DCP** dynamic cone penetrometer

Laboratory Results
- **UC** undrained unconsol cohesion
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- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
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Geotechnical Log - Borehole

BH 4

UTM	: 56J	**Driller Rig**	: GT 10	**Job Number**	: GI 7032
Easting (m)	: 554704.73	**Driller Supplier**	: Geotech Investigations	**Client**	: Rico Recovery Systems Australia Pty Ltd
Northing (m)	: 6876653.88	**Logged By**	: Dean Wedge	**Project**	: Proposed Shed
Ground Elevation	: Not Surveyed	**Reviewed By**	:	**Location**	: 86-88 Chinderah Bay Drive, Chinderah NSW
Total Depth	: 2.8 m BGL	**Date**	: 06/07/2023	**Loc Comment**	:

Drilling Method	Water	Depth (m)	Soil Origin	Graphic Log	Classification Code	Material Description	Moisture	Consistency/Density	DCP graph	Testing
		0.5	Fill		SM	Fill- silty SAND (SM) : dense, dark grey and orange mottled brown, fine to coarse grained, trace fine to coarse sized gravel.	M	D	6	
		1	Fill		SM	Fill- silty SAND (SM) : dense to very dense, dark grey, fine grained.		D-VD	6 5 4 2 2 2	
		1.4	Alluvial		SW	Alluvial- SAND (SW) : medium dense to dense, dark grey, fine to medium grained, (with silt).		MD-D	7 7 7	
	▼	1.5	Alluvial		SW	Alluvial- SAND (SW) : dense, brown, fine to medium grained, (trace silt).	W-M	D	6 7 8 8 8	
		2.5				**BH 4 Terminated at 2.8 m**				

Method
- **EX** excavator
- **BH** backhoe bucket
- **NE** natural exposure
- **EE** existing xcavation
- **RP** ripper

Water
- complete water less
- Water inflow
- water level
- Level during drilling
- **P** partial water loss
- **N** none encountered

USC Classification
- **GW** well graded gravels
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- **CC** undrained console cohesion
- **CF** undrained console friction angle
- **FH** falling head permeability
- **CH** constan head permeablity
- **CBR** californian bearing ratio

SCOPE These standard notes may be of assistance when understanding terms and recommendations given in this report. These notes are for general conditions and not all terms given may be of concern to the report attached. The descriptive terms adopted by Geotech Investigations Pty Ltd are given below and are largely consistent with Australian Standards AS1726-1993 'Geotechnical Site Investigations'.

CLIENT can be described and is limited to the financier of this geotechnical investigation.

LEGALITY and privacy of this document is based on communication between Geotech Investigations Pty Ltd and the client. Unless indicated otherwise the report was prepared specifically for the client involved and for the purposes indicated by the client. Use by any other party for any purpose, or by the client for a different purpose, will result in recommendations becoming invalid and Geotech Investigations Pty Ltd will hold no responsibility for problems which may arise.

GEOTECHNICAL REPORTS are predominantly derived using professional estimates determined from the results of fieldwork, in-situ and laboratory testing and experience from previous investigations in the area, from which geotechnical engineers then formulate an opinion about overall subsurface conditions. The client must be made aware that the investigations are undertaken to ensure minimal site impact using test-pits or small diameter boreholes and soil conditions on-site may vary from those encountered during the investigation.

CLIENTS RESPONSIBILITY to notify this office should there be adjustments in proposed structure/location or inconsistencies with material descriptions given in this report and those encountered on site. Geotech Investigations Pty Ltd is able to provide a range of services from on-site inspections to full project supervision to confirm recommendations given in the report.

CSIRO Publication BTF 18 'Foundation Maintenance and Footing Performance: A Homeowner's Guide' explains how to adequately maintain drainage during and post construction which lies as the responsibility of the client. Suitable drainage ensures recommendations given in this report remain valid.

INVESTIGATION METHODS adopted by Geotech Investigations Pty Ltd are designed to incorporate individual project-specific factors to obtain information on the physical properties of soil and rock around a site to design earthworks and foundations for proposed structures. The following methods of investigation currently adopted by this company are summarised below:-

HAND AUGER – investigations enable field work to be undertaken where access is limited. The materials must have sufficient cohesion to stand unsupported in an unlined borehole and there must be no large cobbles boulders or other obstructions which would prevent rotation of the auger.

TEST-PITS – investigations are carried out with an excavator or backhoe, allowing a visual inspection of sub-surface material in-situ and from samples removed. The limit of investigation is restricted by the reach of the excavator or backhoe.

CONTINUOUS SPIRAL FLIGHT AUGERING TECHNIQUES – investigations are advanced by pushing a 100mm diameter spiral into the sub-surface and withdrawing it at regular intervals to allow sampling or testing as it emerges.

WASH BORING – investigations are advanced by removing the loosened soil from the borehole by a stream of water or drilling mud issuing from the lower end of the wash pipe which is worked up and down or rotated by hand in the borehole. The water or mud carries the soil up the borehole where it overflows at ground level where the soil in suspension is allowed to settle in a pond or tank and the fluid is re-circulated or discharged to waste as required.

NON-CORE ROTARY DRILLING – investigations are advanced using a rotary bit with water being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from feel and rate of penetration.

ROTARY MUD DRILLING – is carried out as above using mud as support and circulating fluid for the borehole drilling. The mud tends to mask the cuttings and reliable identification is again only possible from separate intact sampling.

CONTINUOUS CORE DRILLING – investigations are carried out in rock material, specimens of rock in the form of cylindrical cores are recovered from the drill holes by the means of core barrel. The core barrel is provided at its lower end with a detachable core bit which carries industrial diamond chips in a matrix of metal. Rotation of the barrel by means of the drill rods causes the core bit to cut an annulus in the rock, the cuttings being washed to the surface by a stream of pumped down the hollow drill rods.

TESTING METHODS adopted by Geotech Investigations Pty Ltd to determine soil properties include but not limited to the following:-

U50 – Undisturbed samples are obtained by inserting a 50mm diameter thin-walled steel tube into the material and withdrawing with a sample of the soil in a moderately undisturbed condition.

PP – Pocket Penetrometer tests are commonly used on thin walled tube samples of cohesive soils to evaluate consistency and approximate unconfined compressive strength of saturated cohesive soils. They may also be used for the same purpose in freshly excavated trenches.

VS – Vane Shear test are commonly used in-situ or on thin walled tube samples of cohesive soils by introducing the vane into the material where the measurement of the undrained shear strength is required. Then the vane is rotated and the torsional force required to cause shearing is calculated.

DCP – Dynamic Cone Penetrometer tests are commonly used in-situ to measure the strength attributes of penetrability and compaction of sub-surface materials.

SPT – Standard Penetration Tests are commonly used to determine the density of granular deposits but are occasionally used in cohesive material as a means of determining strength and also of obtaining a relatively unmixed sample. Samples and results are obtained by driving a 50mm diameter split tube through blows from a slide hammer with a weight of 63.5kg falling through a distance of 760mm. Blow counts are recorded for 150mm intervals with the sum of the number of blows required for the second and third 150mm of penetration is termed the "standard penetration resistance" or the "N-value".

GEOLOGICAL ORIGINS of sub-surface material plays a considerable role in the development of engineering parameters and have been summarised as follows:-

FILL – materials are man made deposits, which may be significantly more variable between test locations than naturally occurring soils.

RESIDUAL – soils are present in a region because of weathering over the geological time scale.

COLLUVIAL – soils have been deposited recently, on the geological time scale, as soils being transported slowly down slope due to gravitational creep.

ALLUVIAL – soils have been deposited recently, on the geological time scale, as water borne materials.

AEOLIAN – soils have been deposited recently, on the geological time scale, as wind borne materials.

SOIL DESCRIPTION is based on an assessment of disturbed samples, as recovered from boreholes and excavations, and from undisturbed materials. Soil descriptions adopted by Geotech Investigations Pty Ltd are largely consistent with AS 1726-2017 '*Geotechnical Site Investigation'.* Soil types are described according to the predominating particle size and behaviour, qualified by the grading of other particles present on the following bases detailed in Table 1.

COHESIVE SOILS ability to hold moisture known as its liquid limit is the state of a soil when it goes from a solid state to a liquid state described in Table 2

TABLE 1

Soil Classification	Particle Size
Clay	< 0.002 mm
Silt	0.002 – 0.06 mm
Sand	0.06 – 2.00 mm
Gravel	2.00 – 60.0 mm

TABLE 2

Descriptive Type	Range of Liquid Limit %
Of low plasticity	≤ 35
Of medium plasticity	> 35 ≤ 50
Of high plasticity	> 50

Furthermore to soil description cohesive soils are described on their strength (assessed in conjunction with penetration tests) and liquid limit. Non-cohesive soil strengths are described by their density index. With descriptions for cohesive and non-cohesive soils summarised in Table 3.

TABLE 3

COHESIVE SOILS		NON-COHESIVE SOILS	
Term	**Undrained Shear Strength kPa**	**Term**	**Density Index %**
Very soft	≤ 12	Very Loose	≤15
Soft	> 12 ≤25	Loose	> 15 ≤35
Firm	> 25 ≤50	Medium Dense	> 35 ≤65
Stiff	> 50 ≤100	Dense	> 65 ≤85
Very Stiff	> 100 ≤200	Very Dense	> 85
Hard	> 200		

Description of terms used to describe material portion are summarised in Table 4.

TABLE 4

COARSE GRAINIED SOILS		FINE GRAINED SOILS	
% Fines	**Modifier**	**% Coarse**	**Modifier**
≤ 5	Omit or 'trace'	≤ 15	Omit or 'trace'
> 5 ≤12	Describe as 'with'	> 15 ≤30	Describe as 'with'
> 12	Prefix soil as 'silty/clayey'	> 30	Prefix soil as 'sandy/gravelly'

ROCK DESCRIPTIONS are determined from disturbed samples or specimens collected during field investigations. A rocks presence of defects and the effects of weathering are likely to have a great influence on engineering behaviour.

Rock Material Weathering Classification is summarised in Table 5.

TABLE 5

Term	Symbol	Definition
Residual Soils	-	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded, in water
Distinctly Weathered Rock	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to decomposition of weathering products in pores
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock
Fresh rock	FR	Rock shows no signs of decomposition or staining

Rock Material Strength Classification is summarised in Table 6.

TABLE 6

Term	Symbol	Point load index (MPa) I_s50	Field guide to strength
Extremely Low	EL	≤0.03	Easily remoulded by hand to a material with soil properties
Very Low	VL	>0.03 ≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 3cm thick can be broken by finger pressure
Low	L	>0.1 ≤0.3	Easily scored with a knife; indentations 1mm to 3mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150mm long 50mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling
Medium	M	>0.3 ≤1.0	Readily scored with a knife; a piece of core 150mm long by 50mm diameter can be broken by hand with difficulty
High	H	>1.0 ≤3.0	A piece of core 150mm long by 50mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer
Very High	VH	>3.0 ≤10	Hand specimen breaks with pick after more than one blow; rock rings under hammer
Extremely High	EH	>10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer

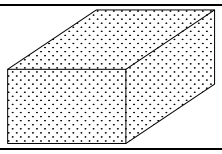
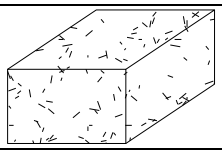
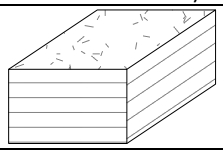
Rock Material Defect Shapes are summarised in Table 7.

TABLE 7

Term	Description
Planar	The defect does not vary in orientation.
Curved	The defect has a gradual change in orientation
Undulating	The defect has a wavy surface
Stepped	The defect has one or more well defined steps.
Irregular	The defect has many sharp changes of orientation
Smooth	The defect has a flat even finish
Rough	The defect has a irregular disoriented finish

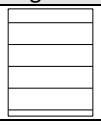
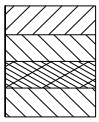
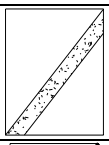
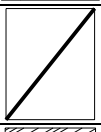
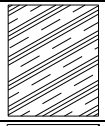
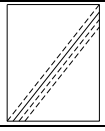
Rock Material Texture and Fabric are summarised in Table 8.

TABLE 8

Geological Description	Massive		Layered (Bedded foliate cleaved)
Diagram			
Fabric Type	Effectively homogenous and isotropic. Bulky or equi-dimensional grains uniformly distributed	Effectively homogeneous and isotropic. Elongated	Effective homogeneous with planar anisotropy. Elongated or tabular grains or pores in a layered arrangement

Rock Material Defect Type is summarised in Table 9

TABLE 9

Term	Definition	Diagram
Bedding	Signifying existence of beds or laminate. Planes dividing sedimentary rocks of the same or different lithology. Structure occurring in granite and similar rocks evident in a tendency to split more or less horizontally to the land surface	
Cross Bedding	Also called cross-lamination or false bedding. The structure commonly present in granular sedimentary rocks, which consists of tabular, irregularly lenticular or wedge-shaped bodies lying essentially parallel to the general stratification and which them selves show pronounced lamination structure in which the laminae are steeply inclined to the general bedding.	
Crushed Seam	A fracture at a more or less acute angle to applied force generally with some pulverized material along its surface	
Joint	A fracture in rock, generally more or less vertical or transverse to bedding, along which no appreciable movement has occurred.	
Parting	A small joint in rock or a layered rock where the tendency of crystals to separate along certain planes that are not true cleavage planes.	
Sheared Zone	A fracture that results from stresses which tend to shear one part of a specimen past the adjacent part	

Attachment D: Additional Site Analysis Information

Table D1. Comparison of Historical land uses

HMC (2023)	DAC (2022)	Further Analysis
To the best of his (*Mr Wayne Stegeman*) knowledge the property was not used for agricultural purposes prior to the acquisition by J.J. Richards & Sons in 1950 and has remained as a waste transport vehicle depot in the years since. A review of the available historic aerials do not show any intensive land uses on the investigation area prior to 1950. Historic structures (likely the existing dwellings) were located along the western boundary prior to the depot being establish in 1950.	No comment	Interpretation of available imagery from 1930 and 1947 indicate only low-intensity land use (e.g. possible grazing) at the site. 1930 and 1947 - Single dwelling on Lot 10. Dwelling is still in existence. Considered probably that land filled in the vicinity of the dwelling at the time of its construction. Evidence in DAC (2022) that Lot 10 was utilised as a turf farm (dates unknown)
Solo Waste (then J.J. Richards & Sons) first occupied the site in 1950 as a small workshop, and the site has continued to be used as a depot since.	Lot 5: This lot has the old family house on it and best we can determine was built in 1949. It would appear that the land was being used as a depot before that date.	Interpretation of available imagery from 1955 indicate the following: • Dwelling on Lot 10; • New dwelling on Lot 5; • New building on Lot 7; and • New building on Lot 8 Dwellings on Lots 5 and 10 still in existence, and considered probable that land filled at the time of their construction. Building on Lot 7 in location of current Administration building (constructed by 1961 with subsequent approved expansions). Probable that land filled at the time of original

		construction with subsequent filling during expansions in 1980s. Building on Lot 8 now known as 'garage'. Probable land filled at time of construction (by 1961) along with surrounding lands to accommodate access and storage of vehicles and use of the western portion of the site as a depot.
Development in the late 1960s with the construction of the existing workshop. The beginning of the use of MGBs in the 1980s significantly increased the operation on site and eventuated in the construction of numerous additional structures including the large assembly warehouse on the eastern boundary and the paint room on the northern boundary.	Planning approvals: Lot 5: Nil Lot 8: - Town Planning Permit 1158 approved 15 February 1968 for factory extension to existing building. - Town Planning Permit 3498 approved 7 July 1973 for extensions to existing factory. - Town Planning Permit 5597 approved 9 April 1976 for retail sale and service of boats. - Town Planning Permit T4/1967 approved 22 July 1982 for extensions to existing office. - Town Planning Permit No. T4/4138 approved 5 November 1985 for the Erection of a Factory Building for the Purpose of Manufacturing/ Maintenance and Storage of Buses. - Development Application No 87/769 approved 7 December 1987 for erection of a paint room as extension to existing factory complex. - Development Application No. 91/209 approved 23 August 1991 for The Erection of An Office/Administration Building.	The approved Development applications demonstrate that the site usage has expanded from the 1980s to date. All the proposal with the exception of DA 91/209 does not indicate the demolition of any building, only expansion. DAC (2022): The Assessment Report for the DA 91/209 contains the following statement: *"The present application involves the demolition of an old factory building with a floor space of approximately 180 square metres. It is intended that this building be replaced by a new administration/office building with a floor space of 290 square metres.* *The existing floor space of the present "existing use" is approximately 2975 square metres. The proposed new building has a floor space of 290 square metres which is within the 10% limitation".* The interpretation of aerial imagery from 1966 onwards indicates that with the expansion of the operations of the site, so too did the filling of the site. Filling is considered to have commenced along the western boundary of the site with

	- Building Permit 884/91 approved 26th August 1991 for construction of office building. Lot 7: - DA89/0263 approved 16 May 1989 for the establishment of a home industry comprising assembly and restoration of imported motorcycles & cars - DA89/0263 (as modified) approved 31 July 1991 for amendment to the consent of home industry comprising assembly and restoration of imported motorcycles & cars - DA2000/0886 approved 6 December 2000 for demolition and construction of new administration extensions. - DA2001/0421 approved 19 September 2001 for the construction of new administration extensions Lot 10: Nil	probable connection to the construction of dwellings (and office and garage). Filling appears to have then expanded eastwards, particularly through the centre of the site (to allow construction of buildings in 1966 and 1972 and subsequently. Land appears generally filled northwards to allow for access, parking and outdoor storage area. Asphalt areas can be depicted on imagery from 1979 onwards. While it appears Lot 10 was filled last, based aerial interpretation including vegetation on the site, filling appears to have occurred from the 1970s. The 1979 image depicts a change in the surface of the site. It is considered this may indicate the turf farm or the filling. Trees depicted on imagery from 1987 were still present in imagery from 2008. This is despite noticeable changes to the land use including vehicle parking. Trees in the eastern portion of this allotment are not depicted in imagery from 2012. This indicates a possible filling of land in this section of the site. However, it is also noted trees along the western edge of the parking area are still in existence. Collectively, the Development Approvals and interpretation of aerials indicates that the site has been filled for some time and likely before any of the known activities were undertaken.