DEVELOPMENT APPLICATION

SUPPORTING INFORMATION

MARKARNA GRAZING COMPANY PTY LTD

EXTRACTION PIT (SAND), STORAGE SHED, SEPTIC SYSTEM AND ANCILLARY INFRASTRUCTURE

PALANA ROAD, FLINDERS ISLAND

1 JANUARY 2026

Van Diemen CONSULTING PO BOX 171 BRIGHTON TAS 7030

Van Diemen Consulting Pty Ltd

PO Box 171
Brighton, Tasmania

T: 0438 588 695 E: rwbarnes73@gmail.com

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ACRONYMS

DA	Development Application
DNRET	Department of Natural Resources and Environment Tasmania
DPIPWE (now DNRE)	Department of Primary Industries, Parks, Water and Environment
ENV	Effective Neutralising Value (used in relation to the ability of a substance to neutralise acidity)
EMPCA	*Environmental Management and Pollution Control Act 1994*
EPA	Environment Protection Authority
LUPAA	*Land Use Planning and Approvals Act 1993*
ML	Mining Lease 2117P/M
MRT	Mineral Resources Tasmania
QCP	Tasmanian *Quarry Code of Practice 2017*
RMPS	Resource Management and Planning System objectives to be found in Schedule 1 of EMPCA

DEFINITION OF TERMS

the 'Activity'	All use and development associated with the lime sand extraction pit in the Development Area including the screening of extracted sands and ancillary infrastructure such as the storage shed (including crib room), sediment ponds and drains, road and access tracks, hardstand, and wastewater (septic) infrastructure.
Development Area	The area used to extract, screen, and store lime sand (ready to be collected and delivered to land in agricultural use) and installation and use of associated infrastructure: the storage shed (including crib room), sediment ponds and drains, road and access tracks, hardstand, and wastewater (septic) infrastructure.
(the) Land	The land covered by ML 2117 P/M – **Figures 1 and 2**
(the) Scheme	Tasmanian Planning Scheme - Flinders

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PREFACE

This document contains supporting information for a Development Application (DA) that seeks a permit under the *Land Use Planning and Approvals Act 1993* for an Extraction Pit (lime sand) at Marshall Bay, Flinders Island. The lime sand deposits at Marshall Bay are well known and proven in their ENV[1] on agricultural lands.

The DA is made, and permit under LUPAA sought, on the basis that the planning scheme amendment for the zone change to Rural from Landscape Conservation is approved by the Tasmanian Planning Commission.

Mining Lease 2117P/M is in force.

The Extraction Pit includes two activities defined within Schedule 2 of the *Environmental Management and Pollution Control Act 1994* (EMPCA) –

- '5. Extractive Industries.

  (b) Extractive pits: the extraction of 5,000 cubic metres or more of sand or clay per year if the extraction is the subject of, or requires, a mining lease under the *Mineral Resources Development Act 1995* [ie. Maximum 10,000 cubic metres per annum]; and

- '6. Materials Handling.

  (a) Crushing, Grinding or Milling: processing (by crushing, grinding, milling or separating into different sizes by sieving, air elutriation or in any other manner) of … (ii) rock, ores or minerals at a rate in excess of 1 000 cubic metres per year' [ie. Maximum 10,000 cubic metres per annum].

Level 2 Activities must be referred by the Planning Authority (in this case, Flinders Council) to the Environment Protection Authority (the EPA), for assessment under EMPCA. Pursuant to s25(2), given the Activity includes Level 2 Activities prescribed by Schedule 2 of EMPCA, the following is noted for the assessment of environmental matters, such as noise, dust, biodiversity etc.:

> '(f) the planning authority, notwithstanding any enactment to the contrary, is not required to assess any matter addressed in the Board's assessment under paragraph (a) ; and
>
> (g) if, despite paragraph (f) , the planning authority does its own assessment of a matter addressed in the assessment under paragraph (a) , it is not entitled to recover the cost of its assessment from the applicant, the Crown or any other person.'

The EPA assessed the submitted EIS (**Attachments 10**) and concluded the Activity could be approved with conditions. The EPA's Environmental Assessment Report (EAR) produced from its assessment of the EIS is in **Attachment 11**.

[1] Everard, G. (1950). THE LIMESTONE RESOURCES AND GENERAL GEOLOGY AND GEOMORPHOLOGY OF FLINDERS ISLAND.

PART A – INTRODUCTION

A.1 DETAILS OF APPLICANT AND LANDOWNER

Name of Applicant and Landowner	Markarna Grazing Company Pty Ltd
Registered address of Applicant	129 Wellington Parade South, East Melbourne VIC 3002
Postal address of Applicant	129 Wellington Parade South, East Melbourne VIC 3002
ACN	063 634 444
Contact person's details	Mr George Adams (Director) Phone: (03) 9333 2400, Fax: (03) 9333 1258 cynthia.adams@adamsgroup.com.au
Consultant engaged to prepare the DA	Dr Richard Barnes, Van Diemen Consulting Pty Ltd 0438 588 695, rwbarnes73@gmail.com

A.2 PURPOSE OF REPORT

This report supports a request by Markarna Grazing Pty Ltd to the Planning Authority to issue a planning permit for extractive industry, storage shed, and ancillary infrastructure.

A.3 PLANNING INSTRUMENT

Tasmanian Planning Scheme – Flinders Island Local Provisions Schedule

PART B – DEVELOPMENT OVERVIEW

This section provides information about the development and use associated with the Extraction Pit.

B.1. PROPOSED ACTIVITY

New Activity Figures 1 and 2	The application is for a new Activity; Extractive Industry per the Use Class classifications in the Tasmanian Planning Scheme - Flinders. The application for a permit to extract, screen, and store lime sand (ready to be collected and delivered to land in agricultural use) applies to the Land shown in **Figures 1 and 2, and further spatially defined as the Development Area mapped in Figure 3.** The following Certificates of Title apply to the development and use associated with the Activity – • CT 215120/1, CT 230282/1 – private freehold (PID 3513143) • Reserved Road (Part of CID 1182402) – The Crown (vehicular access only)
Material to be extracted	The material to be extracted is lime sand destined for an agricultural use (soil ameliorant). Extracted (raw) sand will be screened if necessary to remove organic matter and contaminants (e.g., shells, rocks, and stones). Additional agricultural soil ameliorants/additives such as boron may be mixed (by screening) with some of the lime sands prior to carting to the location of use (i.e., spreading on paddocks).
Maximum extraction quantity	10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5. Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment.
Maximum Extraction Area Figures 2 and 3	The Maximum Extraction Area from where lime sands will be extracted is the *Initial Resource Area* depicted in **Figures 2 and 3.** The MEA is a part of the Development Area (the Development Area includes the ancillary infrastructure including the shed, laydown area, car park, access to Palana Road etc.). The MEA has an estimated 30-year supply if full production levels are achieved every year from the commencement of the Activity. The indicative location of the lime sand resource more broadly in the Land (Mining Lease 2117P/M) is shown in **Figure 2.**

Maximum processing quantity	Screening of up 10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5.
Material extraction and processing	The **extraction and handling of material** will be in accordance with the following: • surface site preparation by vegetation and topsoil stripping and stockpiling; • excavation of material with a bulldozer and/or excavator; • transport of sands to the storage shed for screening/storage and occasional mixing with other soil ameliorants/additives (e.g., additional micro-nutrients and essential plant nutrients such as boron). Some sand will be loaded at the pit into trucks for immediate delivery to agricultural lands; • screening (up to 10,000 cubic metres per annum) to remove any vegetative/root debris and/or rocks and stones; • loading trucks with wheel loader from the pit face and/or stockpile area; and the • transport of material by truck.
Transport Figures 3 and 5A	The maximum extraction volume of 15,000 tonnes equates to about 1,500 truckloads per annum based on 10 tonne loads (smaller loads are used given the material is to be spread on pastures and ploughed land). Lime sands are mainly required in summer and autumn (January to May) which coincide with the peak activity period of agricultural pasture improvement, maintenance, and establishment. Approximately 300 truck movements per week (150 truckloads) is expected for an 8 to 10-week period of carting (March to May). Over 5 days each week this equates to about 30 truckloads per day (or 60 truck movements per day). All traffic would enter and exit onto the sealed section of Palana Road using the now disused reserved road (unsealed) section of Palana Road – **Figures 3 and 5A**.
Stockpiling Figures 5A and 5B	Raw sand will be stockpiled in the pit, adjacent to the pit or at the storage shed ready for screening. Screened sands will be stored in the shed or on the hardstand ready for collection by trucks for transport to the delivery location.
Maximum area of disturbance	The removal of vegetation will occur as an area is required for pit expansion or the establishment of specific infrastructure, such as a cut-off drain, stockpile location etc. The management of vegetation removed to extract the resource will be in accordance with the QCP. The maximum area of disturbance, without any rehabilitation, is 5 hectares.

	To place this into perspective, given the size of the Mining Lease (364.1 hectares), the maximum area of disturbance at any one time represents 1.4% of the Mining Lease.
Major equipment	The equipment likely to be used at some stage (i.e., not all the below listed equipment would be used concurrently) of the Activity is as follows: • Vibratory screen • Wheel Loader • Excavator • Dozer D9N • Off-road haul truck • Transport trucks (medium combination truck & trailer) • 15,000L capacity water cart truck • Light vehicles for worker transport
Infrastructure Figures 3, 5A and 5B	An existing road off Palana Road (**Figure 3**) is to be used to access the pit and shed. The reserved road is held under licence with the Crown for use to access the Land. The junction with Palana Road will be sealed for a minimum distance of 25 m, measured from the current sealed road surface. Maintenance activities will be conducted on the unsealed section of the access road to improve table drains and the road surface (e.g., pothole filling). A shed (15000 x 60300 x 7700 mm) is proposed – see **Attachment 2** for design and **Attachments 3 and 4** for the layout of the shed internal crib room and amenities. Drains and a sediment pond will be installed to manage surface water flows. As the pit extends westwards additional sediment ponds will be constructed to collect and treat (for sand removal) surface flows prior to their discharge to the environment. The free draining nature of the sands means it is unlikely that sediment ponds would need to be very large, but they will be sized to suit the catchment size. A septic wastewater system (grey and black water) will be installed to dispose of toilet, shower, and crib room waste. The approximate location of the trenches is shown in **Figure 5A.** Tanks will be installed (likely to be 2 x 50,000 litre) to capture rainwater from the shed and to receive water from a groundwater bore.
Proposal timeline	It is anticipated that the activity will commence in the 2025-26 financial year.

Operating hours	0700 – 1900 hrs Monday to Friday
Workforce	The activity will utilise up to 5 staff per day when fully operational plus truck drivers. Most days will see only 2-3 staff at the site who would be loading trucks and carting lime sands from the active face to the shed.
Wastewater (septic) system	New on-site wastewater management system to treat and apply wastewater derived from workforce toilets and ablution facilities. It is proposed to install a septic tank absorption bed discharging to an in-ground absorption bed. The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day. The wastewater discharge from the premises will be broadly like domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of *AS/NZS 1547:2012 Domestic on-site waste-water management*. The site is underlain by Quaternary deposits of windblown sand of marine origin (coastal sand dunes); this is consistent with soil profiles observed on-site. The marine sands contain a high proportion of calcareous material (marine mollusc shell derived), which makes them attractive for extraction for agricultural usage, for soil pH modification. Calcium carbonate from shell grit present in the wind-blown beach sand id subject to solution by rainwater and redeposition as a calcareous matrix, cementing sand grains together, forming discrete layers of hardpan, which is considerably less permeable than the unconsolidated sands. This was encountered at a depth of 1100-1200mm (**Attachment 5**); however, it is likely that this hard pan could be present at varying depths, therefore, soil profile modifications to ensure uniform permeability under the land application area basal area will be required. This will be achieved by excavating absorption beds to a minimum depth of 1500mm and backfilling with loose, unconsolidated sand, prior to installing the absorption bed infrastructure.

Annexure: 16.2.3

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FIGURE 1: LOCATION OF MARKARNA PARK SAND PIT

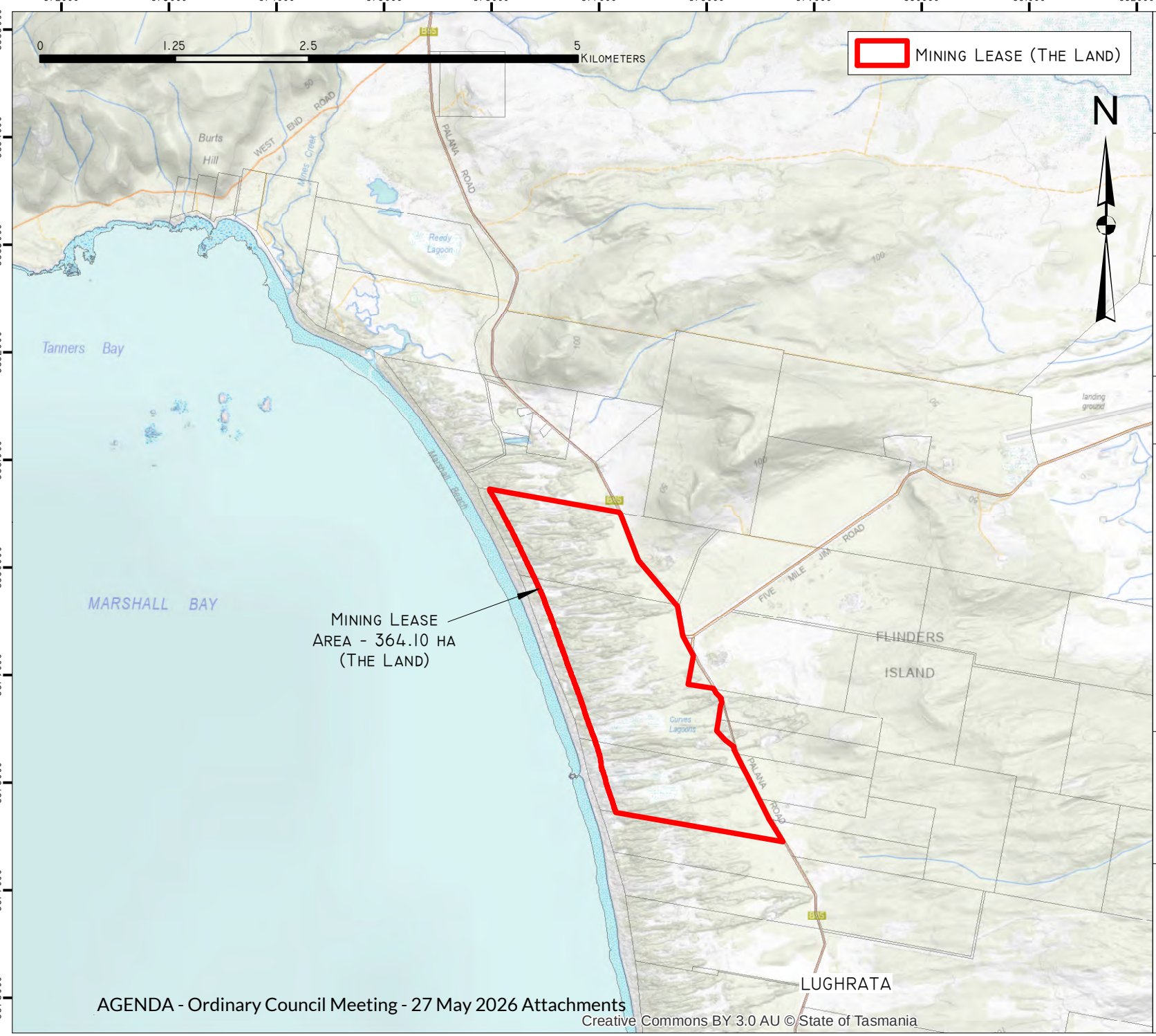

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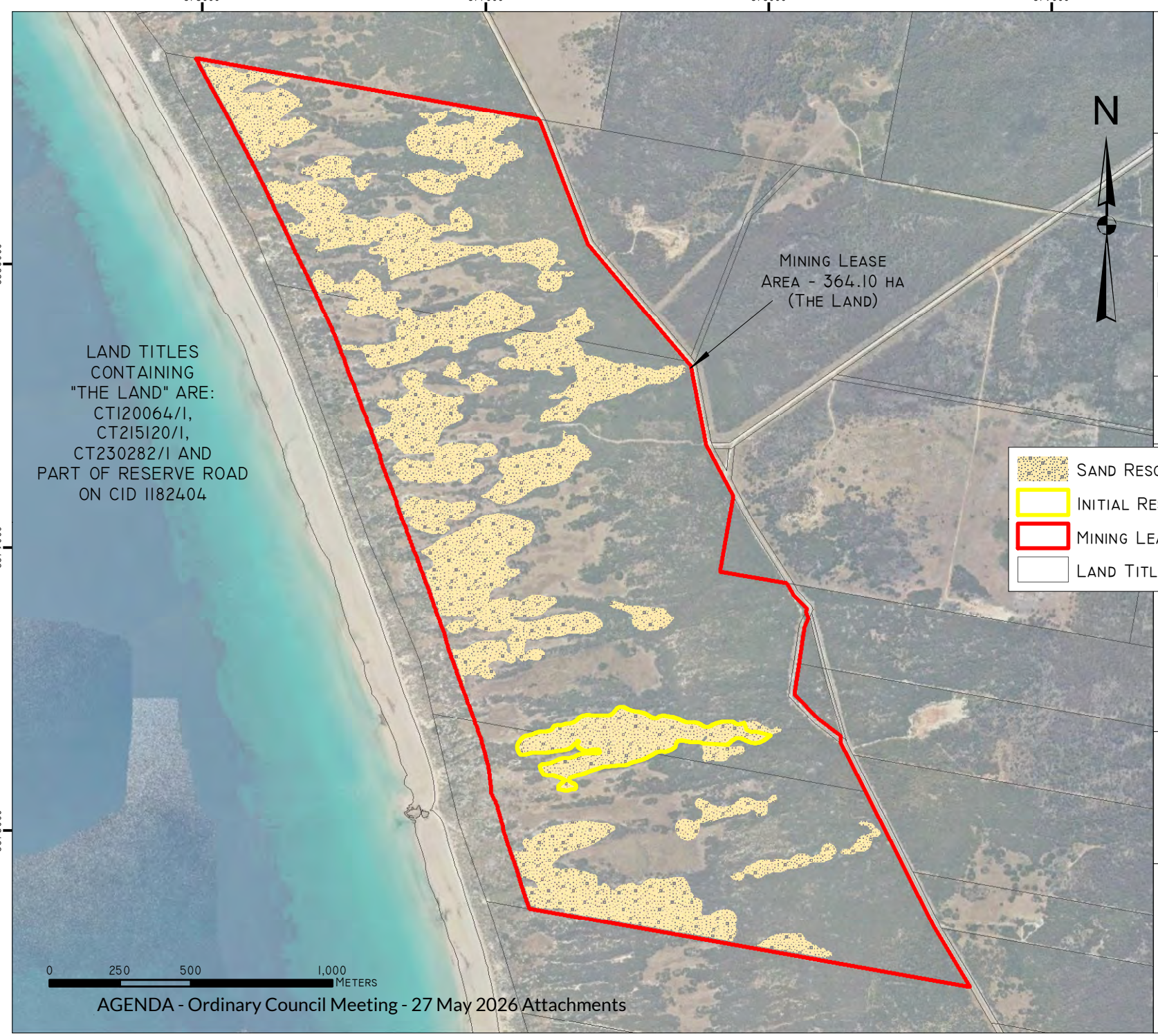
FIGURE 2: LOCATION OF MARKARNA PARK SAND PIT DEVELOPMENT AREA AND LAND TITLES



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- SAND RESOURCE (APPROX)
- INITIAL RESOURCE AREA (APPROX 30 YEAR SUPPLY)
- MINING LEASE (THE LAND)
- LAND TITLES (THE LIST)

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FIGURE 3: MARKARNA PARK SAND PIT DEVELOPMENT AREA AND ACCESS/EGRESS

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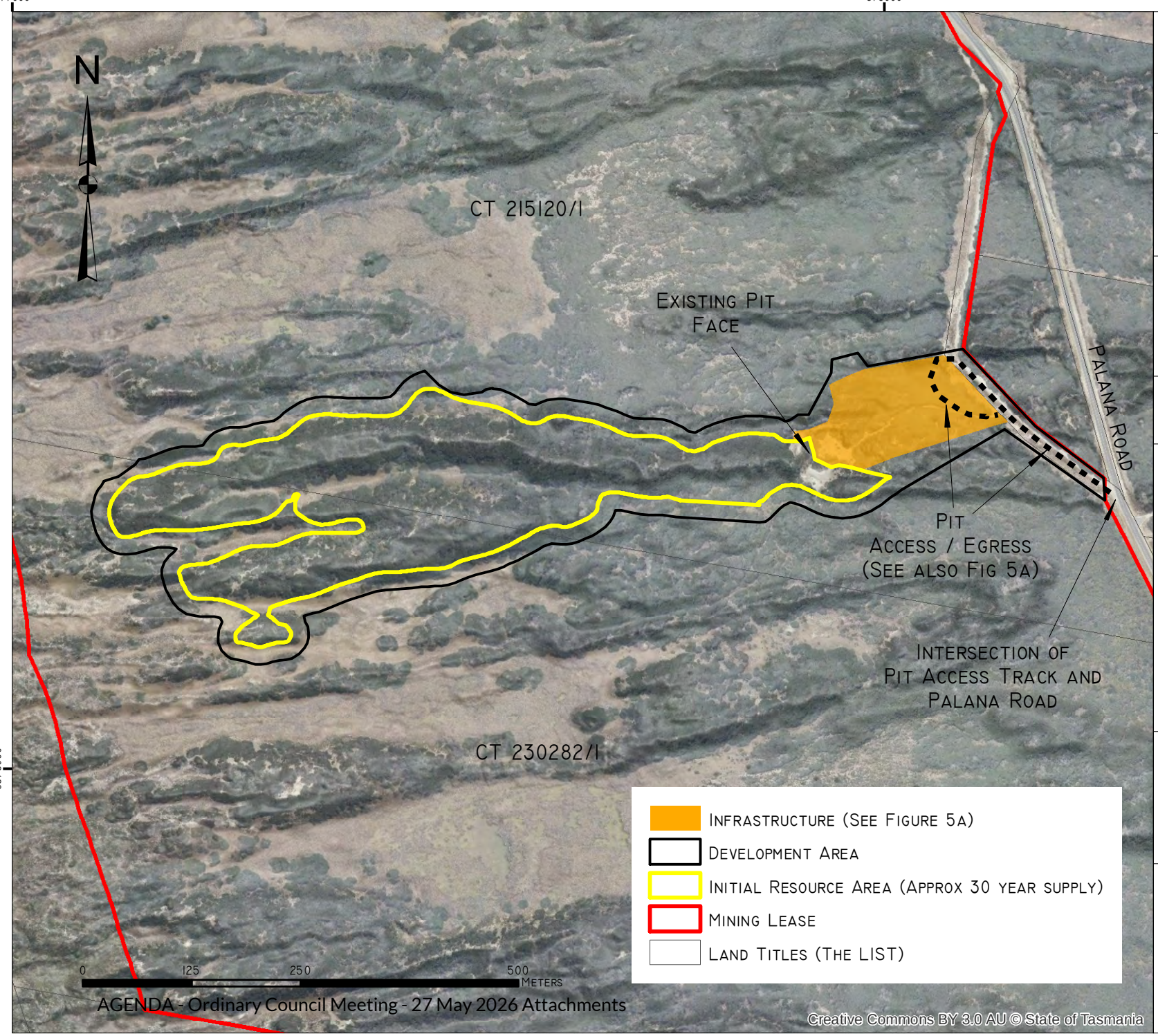

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B.2 LOCATION AND PLANNING CONTEXT

Location and Access Figures 1 to 3	The address for the Activity is – 'MARKANA PARK' - 368 FIVE MILE JIM RD MEMANA TAS 7255 Access is from Palana Road (sealed road section).
The Land Figures 1 and 2	Mining Lease 2117P/M which spatially includes the reserved road under licence with the Crown
Land Titles and PID Figure 2	The following Certificates of Title apply – • CT 215120/1, CT 230282/1 – private freehold (PID 3513143) • Reserved Road (Part of CID 1182402) – The Crown (vehicular access only)
Land tenure Figure 2	The Land is private freehold other than the Reserved Road at the eastern extent of the Land. The Reserved Road is under licence by the proponent, and is also spatially covered by ML2117P/M.
Land zoning Figures 4A and 4B	Tasmanian Planning Scheme – Flinders • Rural zone • Landscape Conservation zone (reserved road section only; only for vehicular access)
Planning overlays Figures 4B, 4-C1 to C4	Tasmanian Planning Scheme – Flinders • Waterway and Coastal Protection Area • Landslip Hazard • Priority Vegetation Area • Scenic Protection Code • Coastal Inundation
Use Class and Permissibility	The activity is consistent with the Extractive Industry Use Class. An Extractive Industry is listed as Permitted in Clause 20.2 Use Table for the Rural zone.
Mining Lease Figure 1	2117P/M (in force)
Mining Lease area	364.1 hectares

B.3 RATIONALE FOR PROPOSAL AND ALTERNATIVES

Rationale	Soil acidification is a naturally occurring process which is influenced by soil type, organic matter, fertiliser usage, rainfall and farming practices. Most of Tasmania's soils are naturally acidic, which compounds the problem of acidification. Over time soil pH decreases, with the rate of pH decline being quicker in light textured soils that have low organic matter. The processes which reduce pH levels in agricultural soils are primarily – 1. Organic matter accumulation which causes organic acids; 2. Removal of plant and animal material containing large amounts of cations (calcium, magnesium and potassium); 3. Leaching of cations due to high rainfall; 4. Leaching of nitrate and nitrogen from the root zone; and 5. The application of soil-acidifying fertilisers. The acidification of agricultural land is potentially a serious land degradation issue and without addressing the issue, agricultural productivity and sustainability will be negatively affected. The key soil productivity issues that are caused by soil acidification are: • A decrease in the availability of nutrients to plants; • Increasing the toxicity of aluminium and manganese; • Decreasing soil biological functions; • Reduce the ability for legumes to fix nitrogen; and • Make the soil more vulnerable to soil structure decline and erosion. Lime sands (material rich in calcium carbonate – $CaCO_3$) reduce acidity by neutralising the acid reaction in soils. The carbonate component of lime consumes hydrogen ions present in the soil solution and in doing so raises soil pH. The higher the Effective Neutralising Value (ENV) the more reactive the lime product is within the soil and the greater its ability for unit volume to neutralise acidity. 'Liming' is the only cost-effective way to manage low soil pH. It prevents loss of production and profitability in farming systems and reverses acidification. Lime is usually applied on the surface several months before sowing pasture or crops to allow time for the lime to react in the soil. Incorporation of the lime into the soil is recommended for the quickest results, as lime does not move readily down through the soil profile. Commonly used liming materials include for example – 1. Agricultural lime - Crushed and sieved natural limestone is mainly calcium carbonate. It is safe, cheap and effective.

	2. Lime sand - Lime sand is mined from natural deposits and is mainly calcium carbonate. It is safe and cheap but can on occasion be coarser and slower reacting than agricultural lime. 3. Dolomite - A mixture of calcium and magnesium carbonates. It is particularly valuable where magnesium is low. 4. By-product lime - This is a by-product from the production of soda ash. It contains mostly calcium carbonate, but with some calcium oxide and hydroxide. An RMCG report (2022)[2] recognised that soils on Flinders Island are highly variable ranging from acidic sandy loams to sandy alkaline, with limited organic matter. This variability and its impact on pasture and subsequent meat production and profitability, present a range of soil management challenges to maintaining their economic and environmental sustainability. One key consideration is the challenge and high cost of bringing farm inputs, such as lime, to the Island. By not applying lime to the soil a lessening of soil fertility and optimal growth characteristics will occur in the medium and to the long term undermining the productivity and viability of agriculture on the island. Agriculture is a critical employment and income generation activity on Flinders Island, so its longevity is of paramount importance to the social and economic well-being of the island. The Marshall Bay land parcels owned by Markarna Park were specifically purchased to provide ongoing lime sands for the agricultural lands on the property and associated properties, and to also provide some for sale to other agricultural enterprises on the island. The existing but now disused pit (which is the starting location for the new pit) was once used by many islanders to access lime sand due to its ease of access, extraction of high ENV. Sands will also be used to supply concrete production activities because most sand for such a purpose is brought to the island. Off-island supplies of lime are costly due to high freight charges which in the medium to long-term undermines the economic viability of agriculture on the island. That is, if lime is expensive then it is likely that inadequate levels would be used by agricultural operators (due to cost) that then has a long-term negative impact to the overall soil health and potential of agricultural lands to produce food.
Alternatives	The lime sand deposits at Marshall Bay are well known and proven in their ENV[3] on agricultural lands. No alternatives were considered as the lime sands are spatially limited on Flinders Island, are of very high quality, extensive in their geographic extent at Marshall Bay and can be extracted in a way and a rate that is sensitive to the Marshall Bay environment.

[2] RMCG (2022). Flinders LPS Rural Enterprise Concept Report. 5 January 2022.

[3] Everard, G. (1950). THE LIMESTONE RESOURCES AND GENERAL GEOLOGY AND GEOMORPHOLOGY OF FLINDERS ISLAND.

Annexure: 16.2.3

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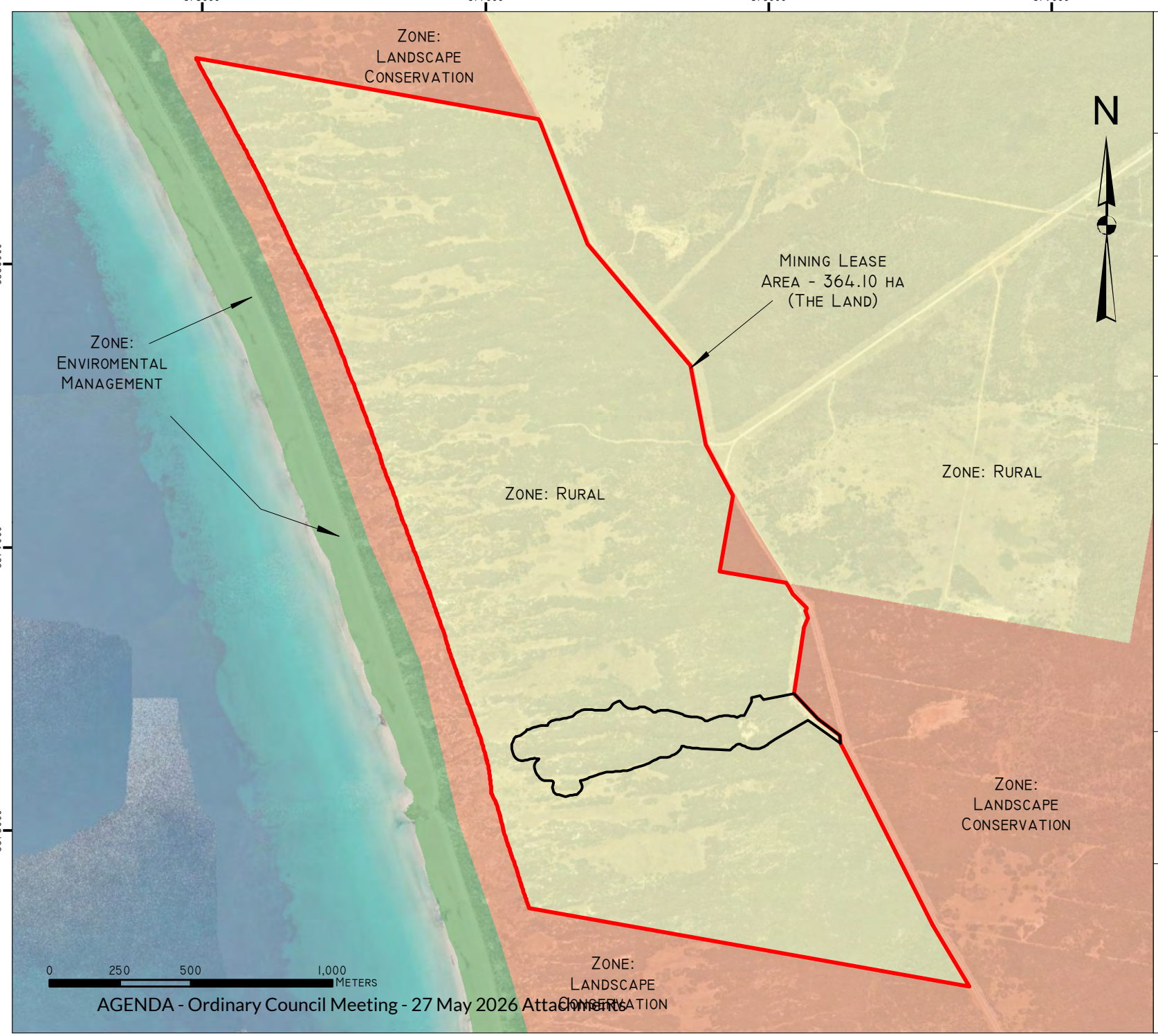
FIGURE 4A: ZONE MAP TASMANIAN PLANNING SCHEME LPS ZONES



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MINING LEASE (THE LAND)

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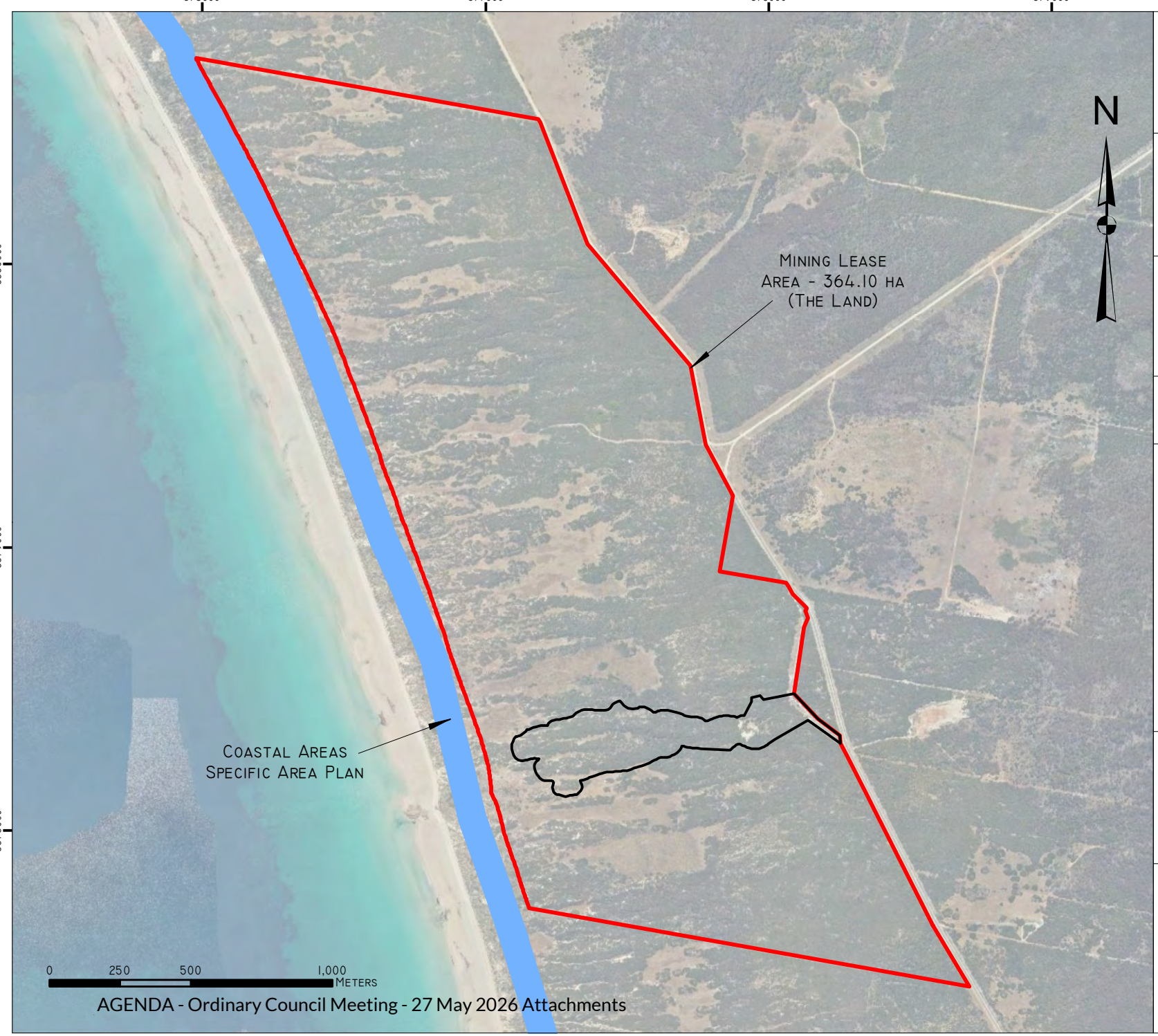
FIGURE 4B: GENERAL OVERLAY MAP - TASMANIAN PLANNING SCHEME - FLINDERS



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MINING LEASE (THE LAND)

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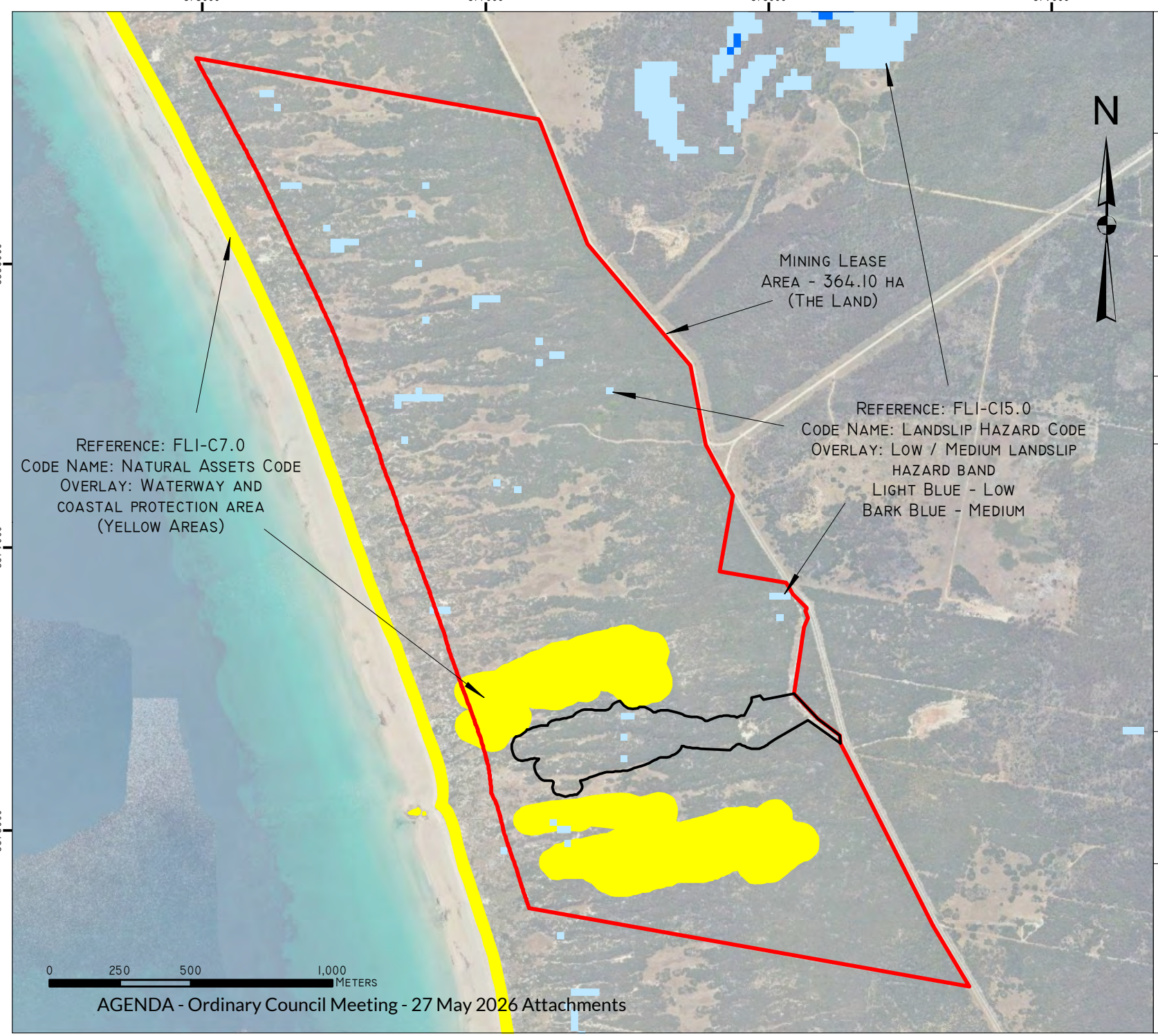
FIGURE 4C-1: CODE OVERLAY MAP - TASMANIAN PLANNING SCHEME - FLINDERS



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MINING LEASE (THE LAND)

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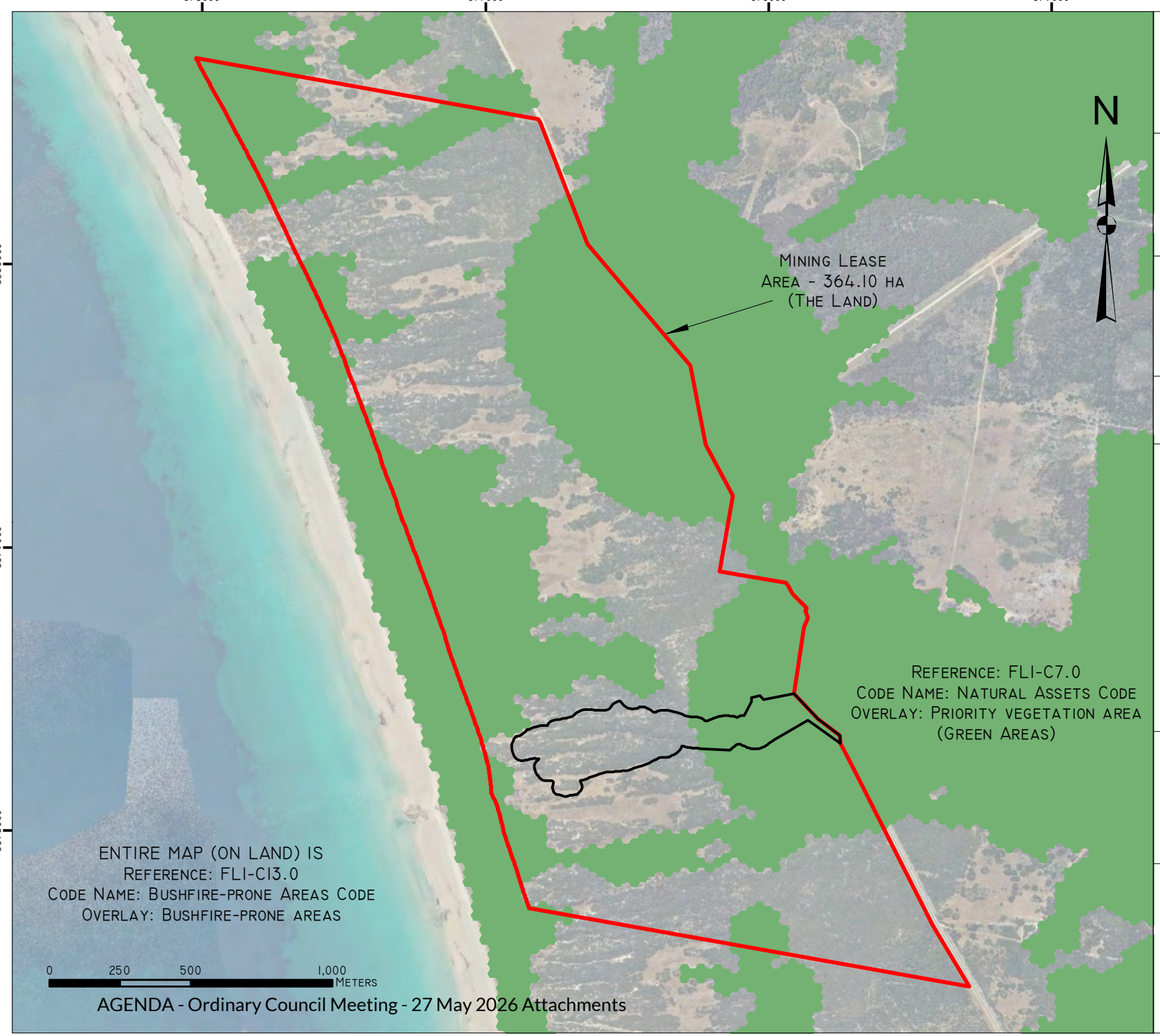
FIGURE 4C-2: CODE OVERLAY MAP - TASMANIAN PLANNING SCHEME - FLINDERS



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DEVELOPMENT AREA

MINING LEASE (THE LAND)

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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
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DATE: 10 APRIL 2023

Annexure: 16.2.3

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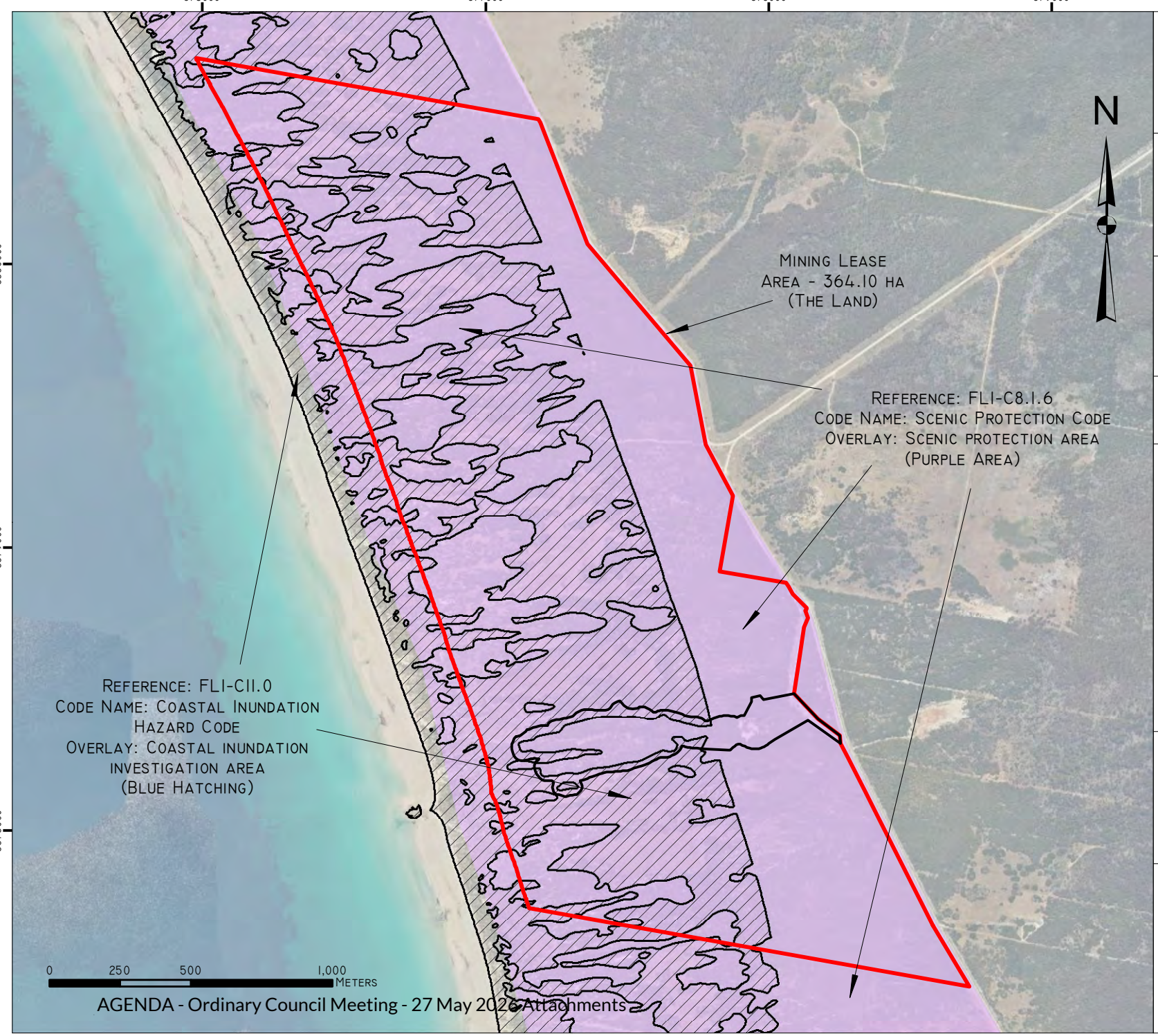
FIGURE 4C-3: CODE OVERLAY MAP - TASMANIAN PLANNING SCHEME - FLINDERS



TASMAP:	LGA:
TANNER EMITA	FLINDERS

DEVELOPMENT AREA

MINING LEASE (THE LAND)

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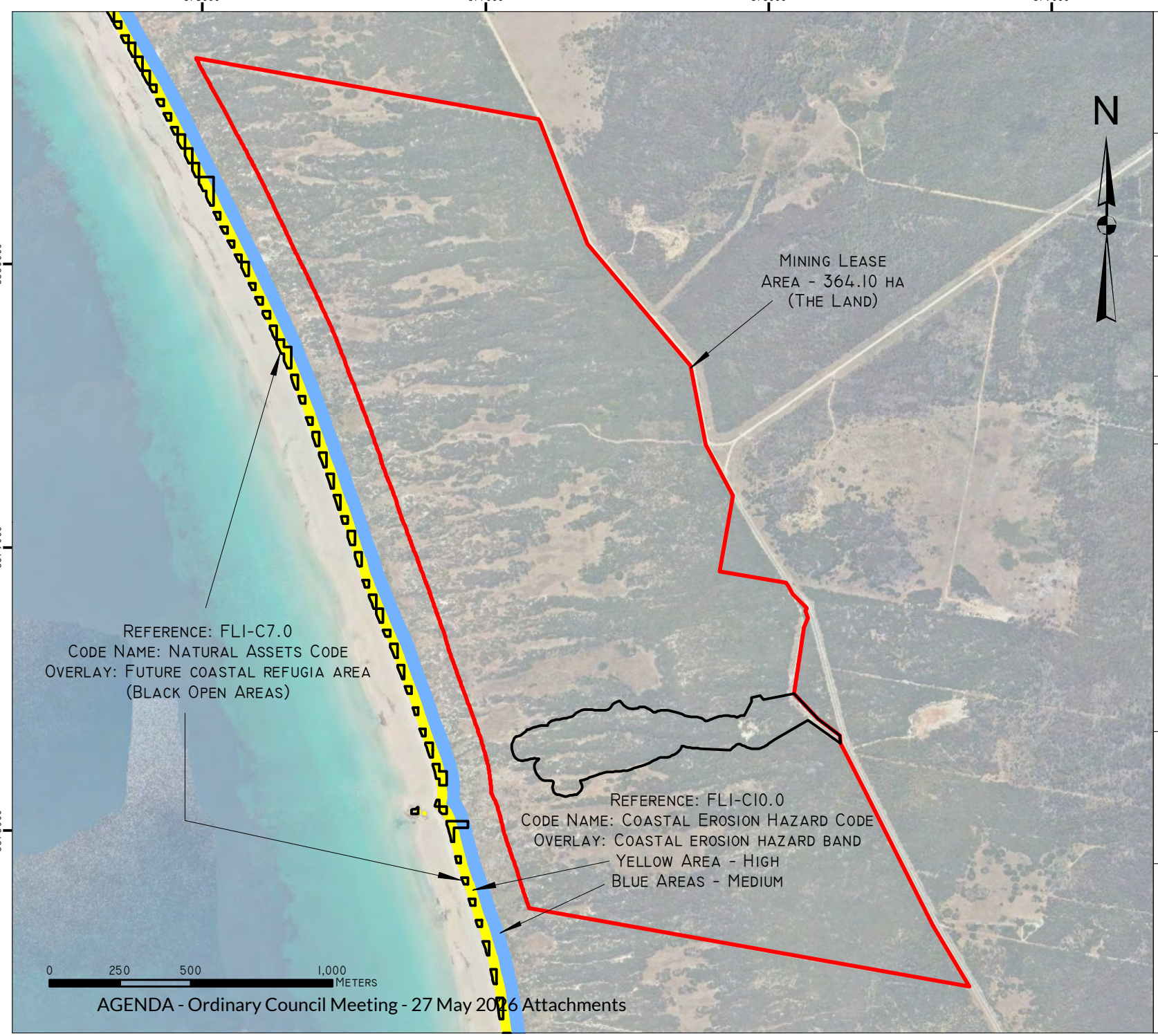
FIGURE 4C-4: CODE OVERLAY MAP - TASMANIAN PLANNING SCHEME - FLINDERS



TASMAP:	LGA:
TANNER EMITA	FLINDERS

DEVELOPMENT AREA

MINING LEASE (THE LAND)

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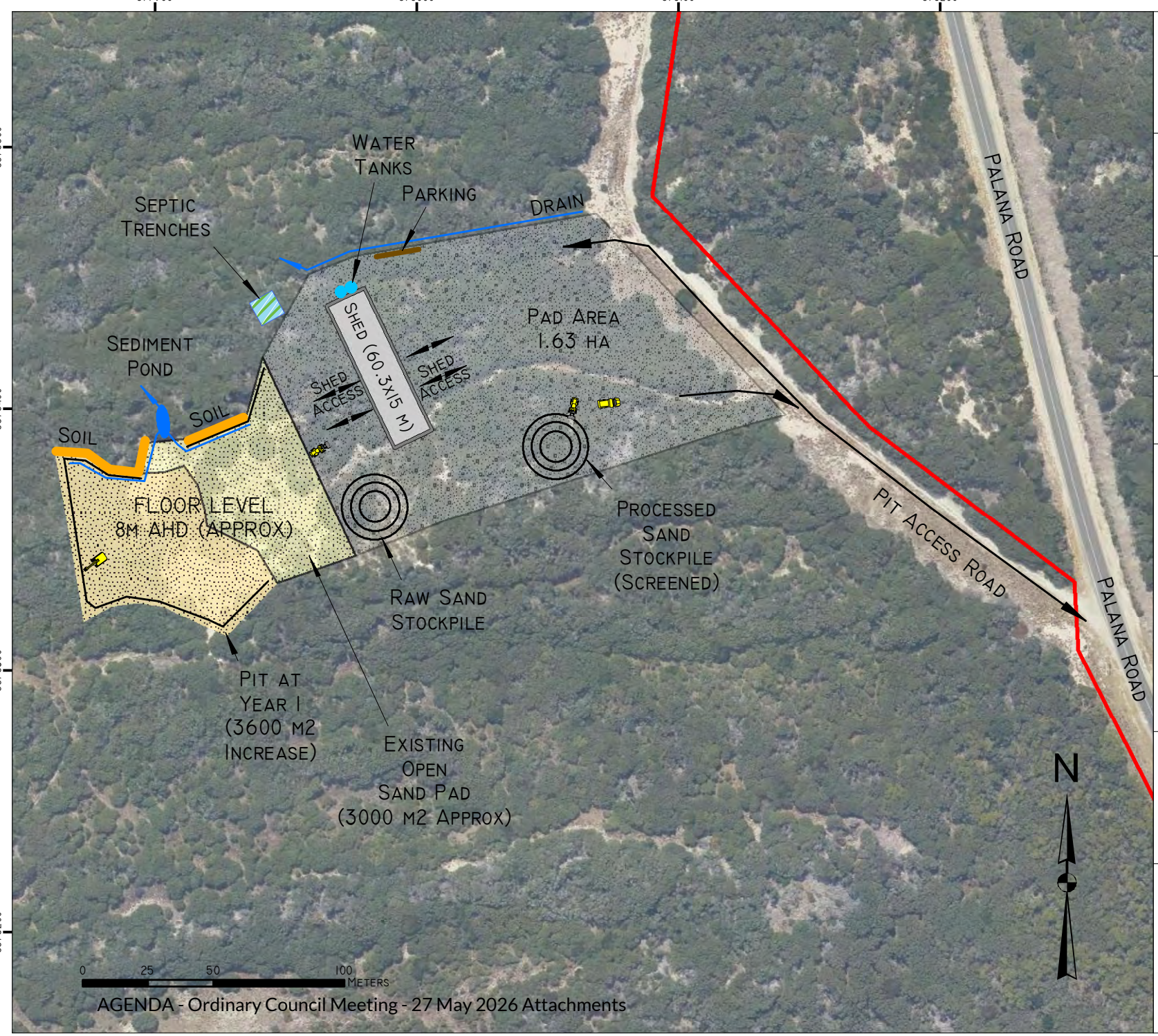

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Figure 5a: Mine Plan Site Set Up and Extraction to Year 1

TASMAP: TANNER EMITA	LGA: FLINDERS

- Clear Gravel Surface
- Existing Sand Surface
- Shed (60.3 x 15 m)
- Clear Gravel Surface
- Mining Lease

Base data by TASMAP. © State of Tasmania
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Annexure: 16.2.3

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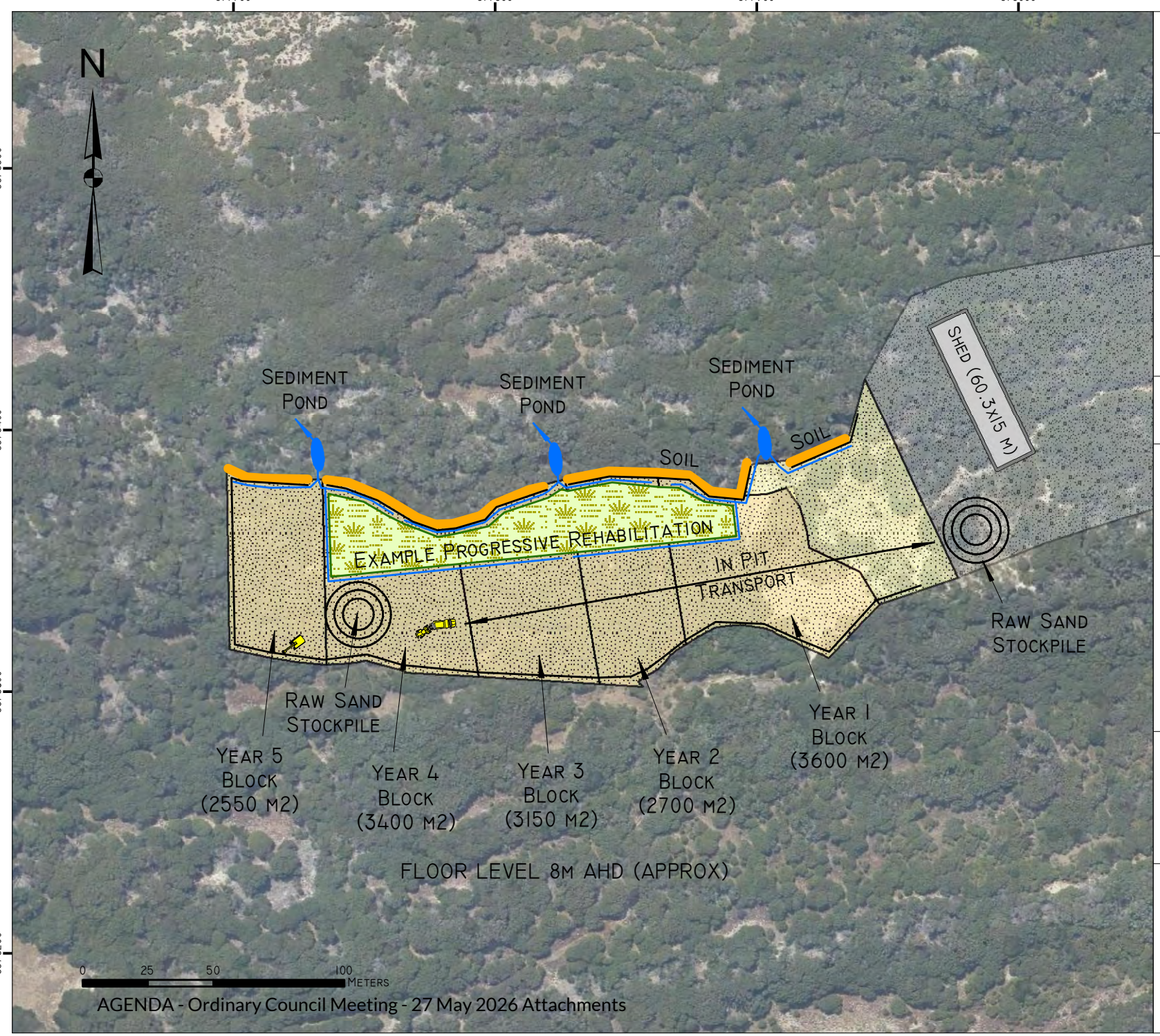
FIGURE 5B: MINE PLAN EXTRACTION (YEAR 1 TO 5)



TASMAP: TANNER EMITA

LGA: FLINDERS

- CLEAR GRAVEL SURFACE
- EXISTING SAND SURFACE
- SHED (60.3 X 15 M)
- CLEAR GRAVEL SURFACE

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PART C - PROJECT AREA

C.1 CLIMATE PARAMETERS

The nearest Bureau of Meteorology weather recording station is at Flinders Island Airport to the south of the Land.

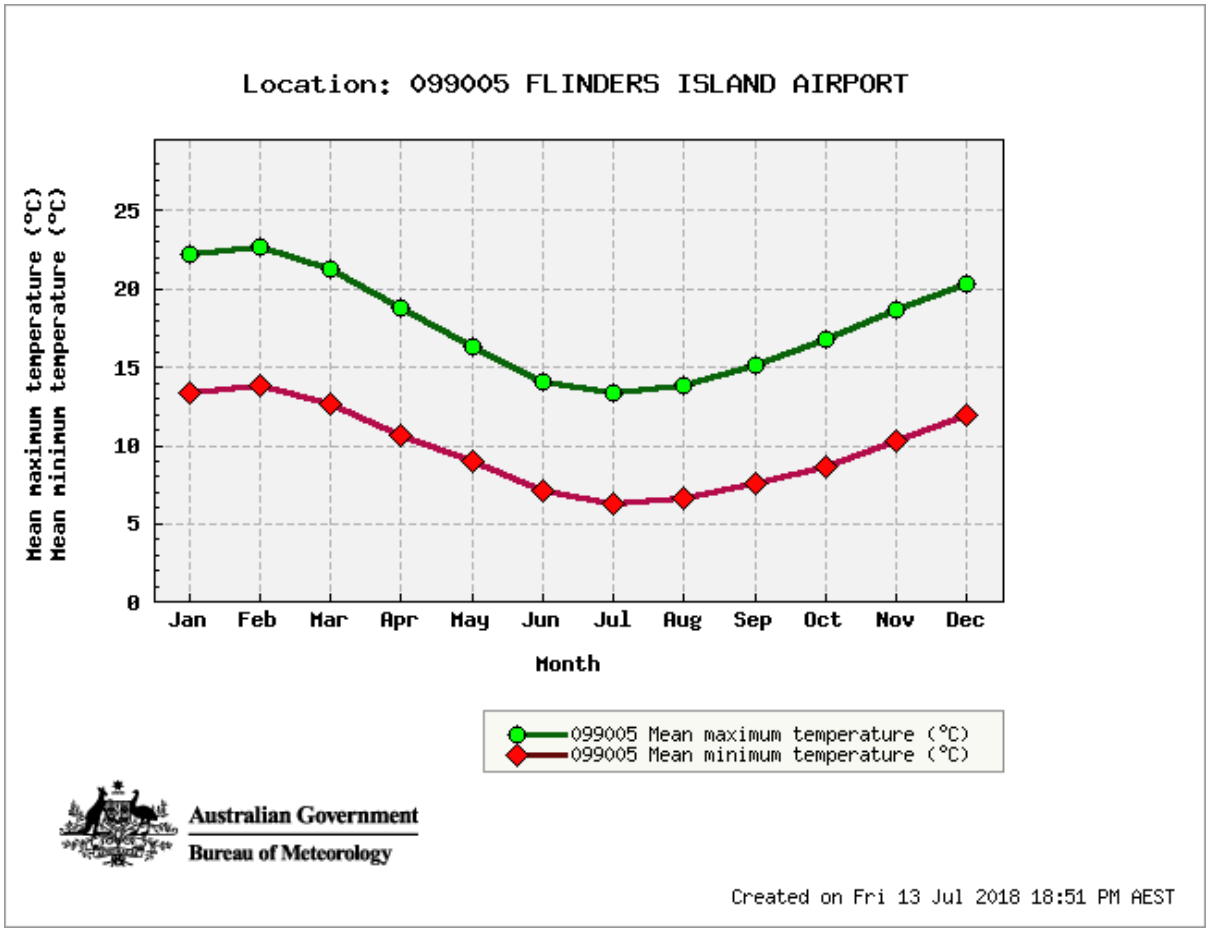
The station details for the Flinders Island Airport weather station are -

- **Site number:** 099005
- **Latitude:** 40.09 °S **Longitude:** 148.00 °E
- **Elevation:** 9 m

The development and use occur in a region with cool winters and warm summers (**Graph 1**), with most precipitation occurring in the winter and spring period (**Graph 2**).

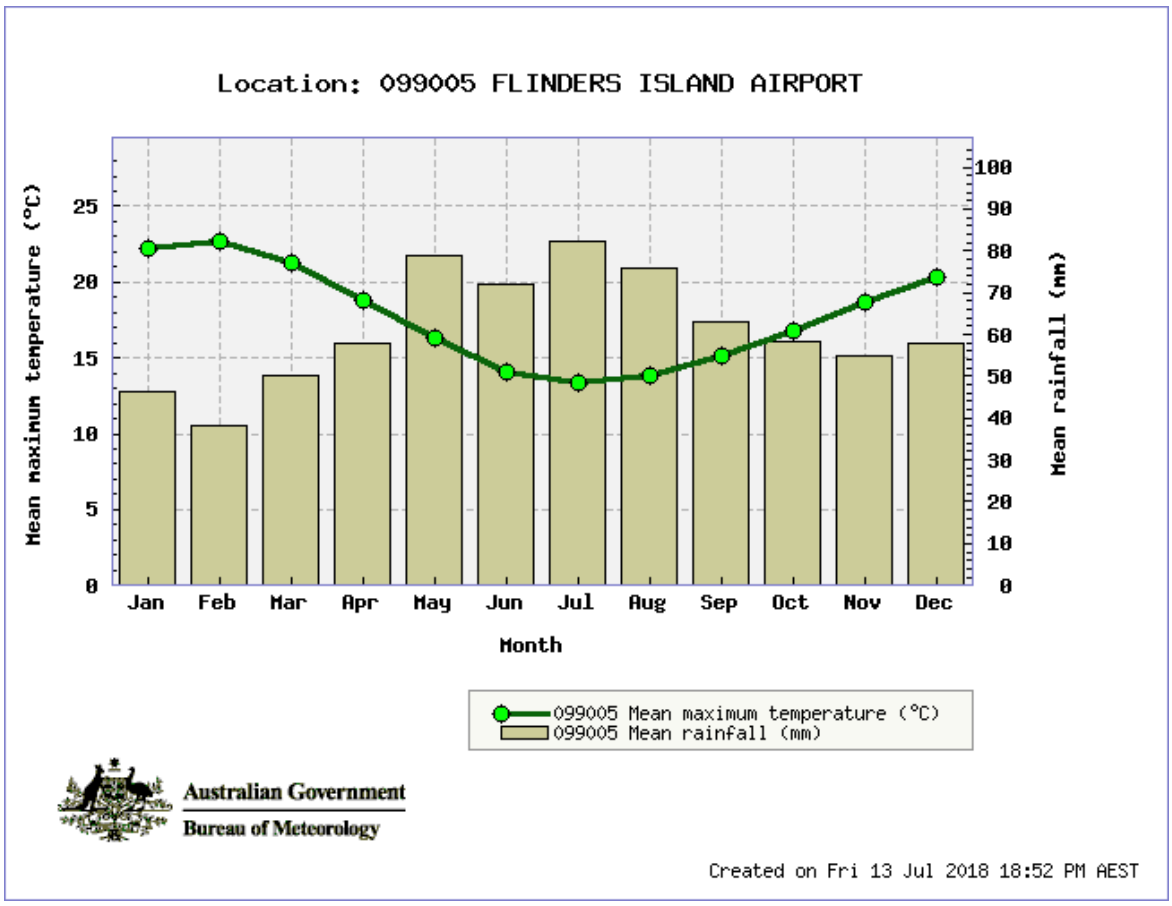
Graph 1. Mean minimum and maximum temperature for Flinders Island Airport

Source: Bureau of Meteorology 2018



Graph 2. Mean annual rainfall and mean maximum temperature for Flinders Island Airport

Source: Bureau of Meteorology 2018



C.2 GEOLOGY, SOILS AND LAND CAPABILITY

Base Geology

The geology of the Mining Lease (proposed) is sand, gravel, and mud of lacustrine and littoral origin (**Figure 6**). The sands to be extracted are of littoral origin and are highly calcareous in nature.

The underlying geology is a mosaic of lacustrine/littoral gravels and sands compacted/cemented in situ by the overlaying dune sequences. The base geology is highly fossiliferous (marine shells), compacted and easily distinguished from the dune sands (**Plate 1B**). The sands are white to yellow-white and unconsolidated generally with scrub dominated vegetation typical of alkaline sands.

Plate 1A illustrates the previously worked area of the existing but disused pit. All overlaying lime sand was extracted from the base geology at the now disused pit; there are no podsols present between the base sediments and overlaying sands.

The general and approximate location of the dunes that are the resource in the Mining Lease is shown in **Figure 2**.

The dunes formed by lime and other sands are of a **linear** type[4] based on the transgressive dune types described by Short and Nicholas (2011) (see also Plate 2). Linear dunes (e.g., **Figure 2 and 3**) are longer than they are wide with prominent snakelike ridges. Linear dunes do not migrate; they get longer over time, often up to several kilometres.

As noted by Slee (2024) (pp. 12-13 of **Attachment 9**), at the west of the Mining Lease are the modern foredune and back dunes behind Marshall Beach while inland are a series of elongated west-to-east trending parallel dunes that rise to 24 m above sea level. These inland dunes are largely vegetated and stable in comparison to the foredunes which are dominated by grasses, herbs, wind pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

The Development Area does not include beach, foredune, back dune, or modern dunes (**Attachment 9**).

Plate 1. Base geological formation and dune system at the disused sand pit

A – basement geology is a compacted/cemented mosaic of gravel, sand, and mud

B – a vegetated dune dominated by white to yellow-white lime dominated sands overlays the base geological formation

A

B

<u>Karst</u>

No karst landforms apart from very minor surface solution sculpture (karren) landforms were identified during the survey by Slee (**Attachment 9**). Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms

[4] Short & Nicholas 2011, Karst/Lacustrine/Aeolian/ Landforms, in Section 17 Use of Remote Sensing in Basic Science Studies I – Mega Geomorphology, viewed 24 August 2011,

are unlikely to be present. In the absence of evidence for significant karst formulation, mitigation measures are unnecessary.

Soils

A soil layer is absent, or simply represented by a slightly discoloured (grey, to grey brown) upper layer in the sandy soil profile. Dune systems of recent age tend not to be old enough to have formed a substantial or distinguishable topsoil layer, and even with a low to moderate fire frequency any organic matter that has accumulated may be quickly lost or substantially depleted during fire events.

There is a Low to Extremely Low likelihood of Potential Acid Sulfate Soils (coastal) in the Marshall Bay area (Figure 7) based on DPIPWE test pitting and sampling that generated the mapping layer.

The shoreline waterbodies mapped in **Figures 4-B and 8** are deflation basins dominated by native and exotic grasses and herbs. *Poa poiformis* and to a lesser degree *P. labillardierei* are the dominant species. They are not wetlands; however, they may be seasonally inundated in the winter months which keeps trees and other woody vegetation from colonising and dominating the shallow sand deposit environment. Unlike 'Arbothnots Lagoon' these deflection basins lack an organic underlying geology and sit over limestone bedrock and shallow sands – they are not PASS.

Well drained soils in the mining lease and specifically in the vicinity of the main proposed resource are strongly alkaline Calcarosols (Slee 2024). Acidic soils are unlikely to be present over extensive areas and may be totally absent from the mining lease. While organic topsoils, buried palaeosols and lake/swamp sediments are present in the Pit location, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands due to the abundance of acid neutralising carbonates. No further investigation of acid sulfate soils was deemed to be necessary by Slee (2024; **Attachment 9**).

Plate 2. Dune descriptions from Short & Nicholas 2011 noting (b) Linear dune form

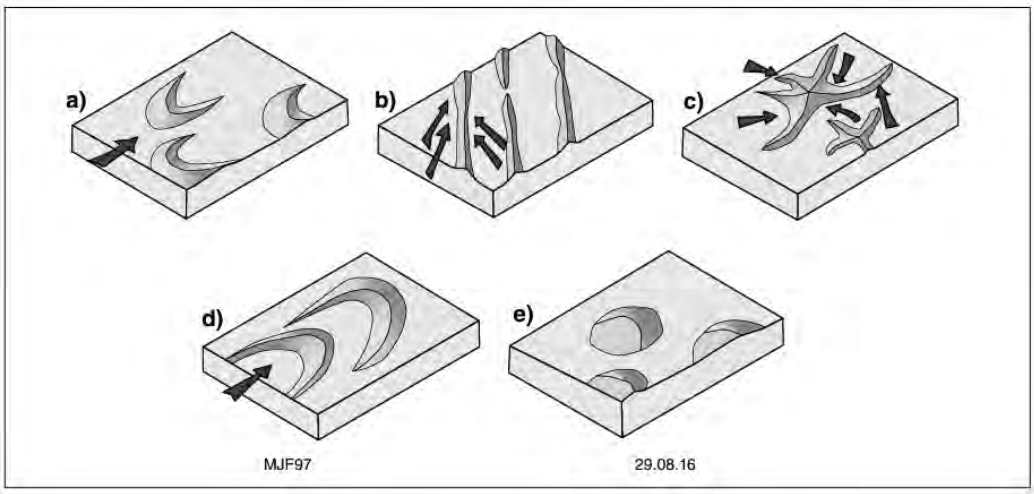


Plate 3. Coastal grasslands between linear dunes

Land Capability

The Land Capability is not recorded by DPIPWE however the sandy alkaline sands are likely to qualify as Land Class 5 to 6.

C.3 WATERCOURSES

There are no defined watercourses within the Land (see **Figure 8**). The sands to be extracted from the Mining Lease are well drained being formed by Quaternary sands.

The deflection basins are dominated by coastal grasslands (**Plate 3**) with any minor dune formation in the basins, even those of only 1-2 m high, are dominated by scrub or ex-pasture vegetation.

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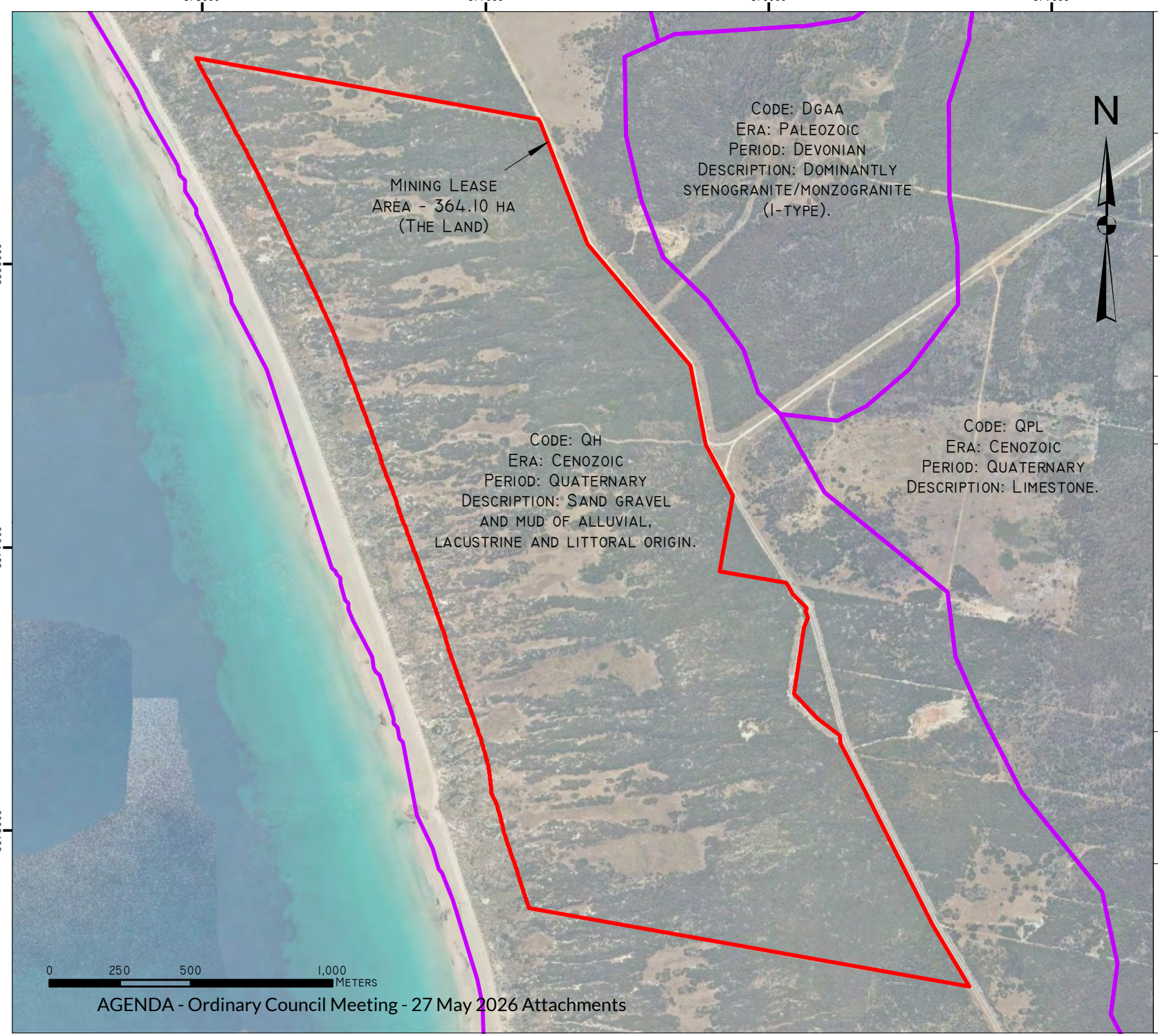

Figure 6: Geology
(1:250,000 – MRT)
around the Development Area

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Geology (1:250,000)

Mining Lease (The Land)

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COMPANY PTY LTD

DATE: 10 APRIL 2023

Annexure: 16.2.3

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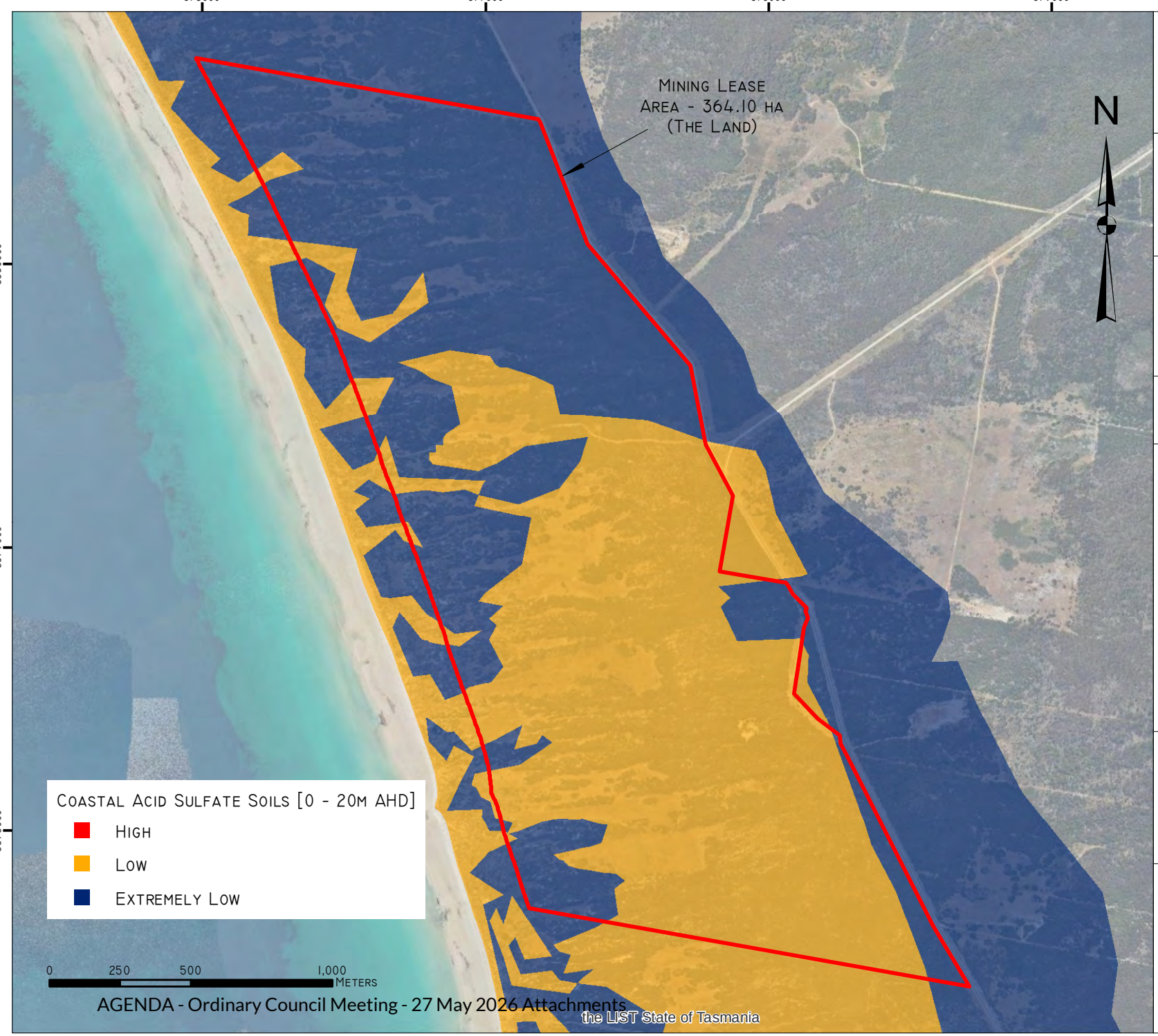
FIGURE 7: COASTAL ACID SULFATE SOILS (0-20M AHD)



TASMAP:	LGA:
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MINING LEASE (THE LAND)

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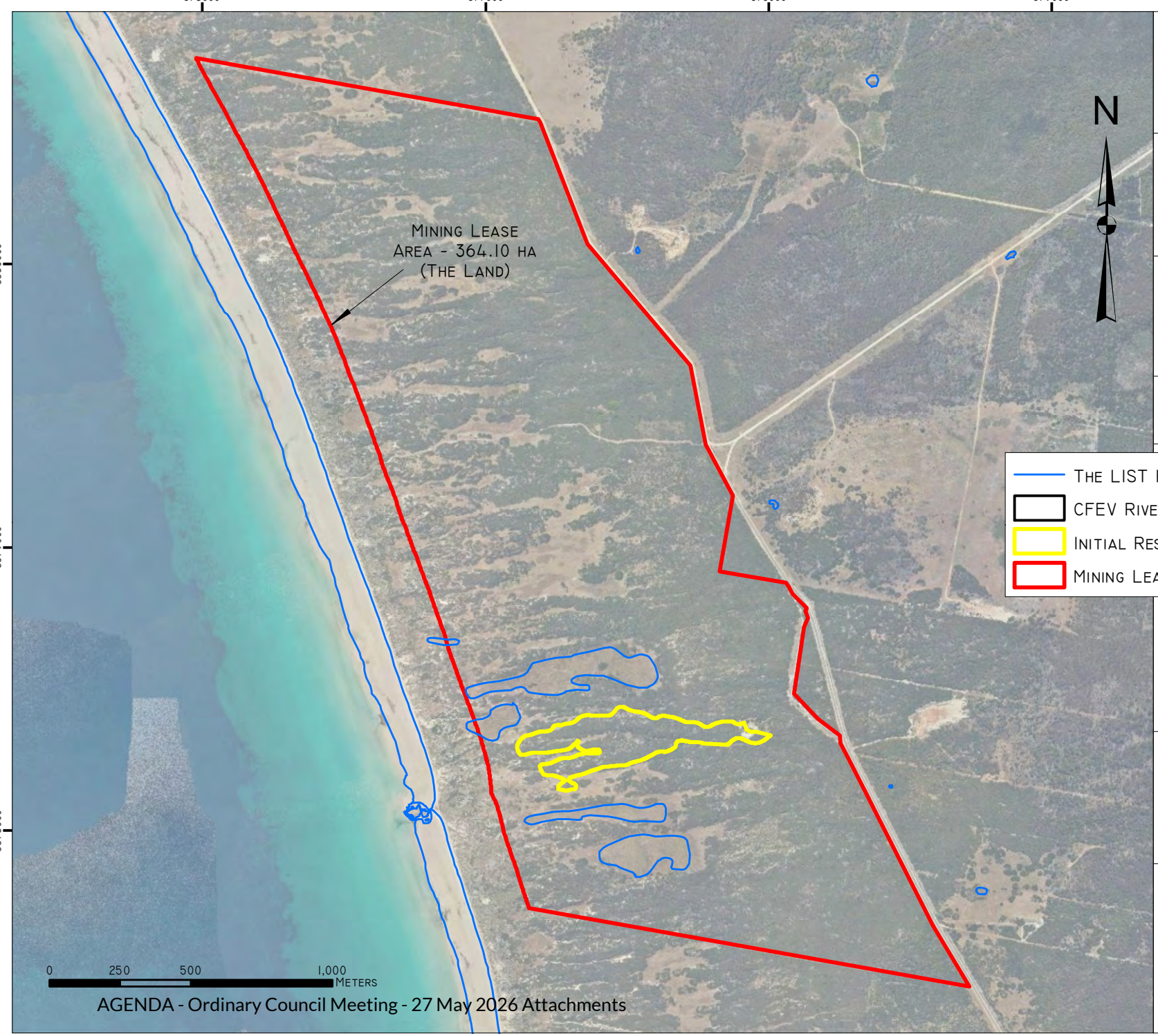
FIGURE 8: DRAINAGE AND CATCHMENT BOUNDARIES



TASMAP:	LGA:
TANNER EMITA	FLINDERS

- THE LIST HYDLINES
- CFEV RIVER SECTION CATCHMENTS
- INITIAL RESOURCE AREA (APPROX 30 YEAR SUPPLY)
- MINING LEASE (THE LAND)

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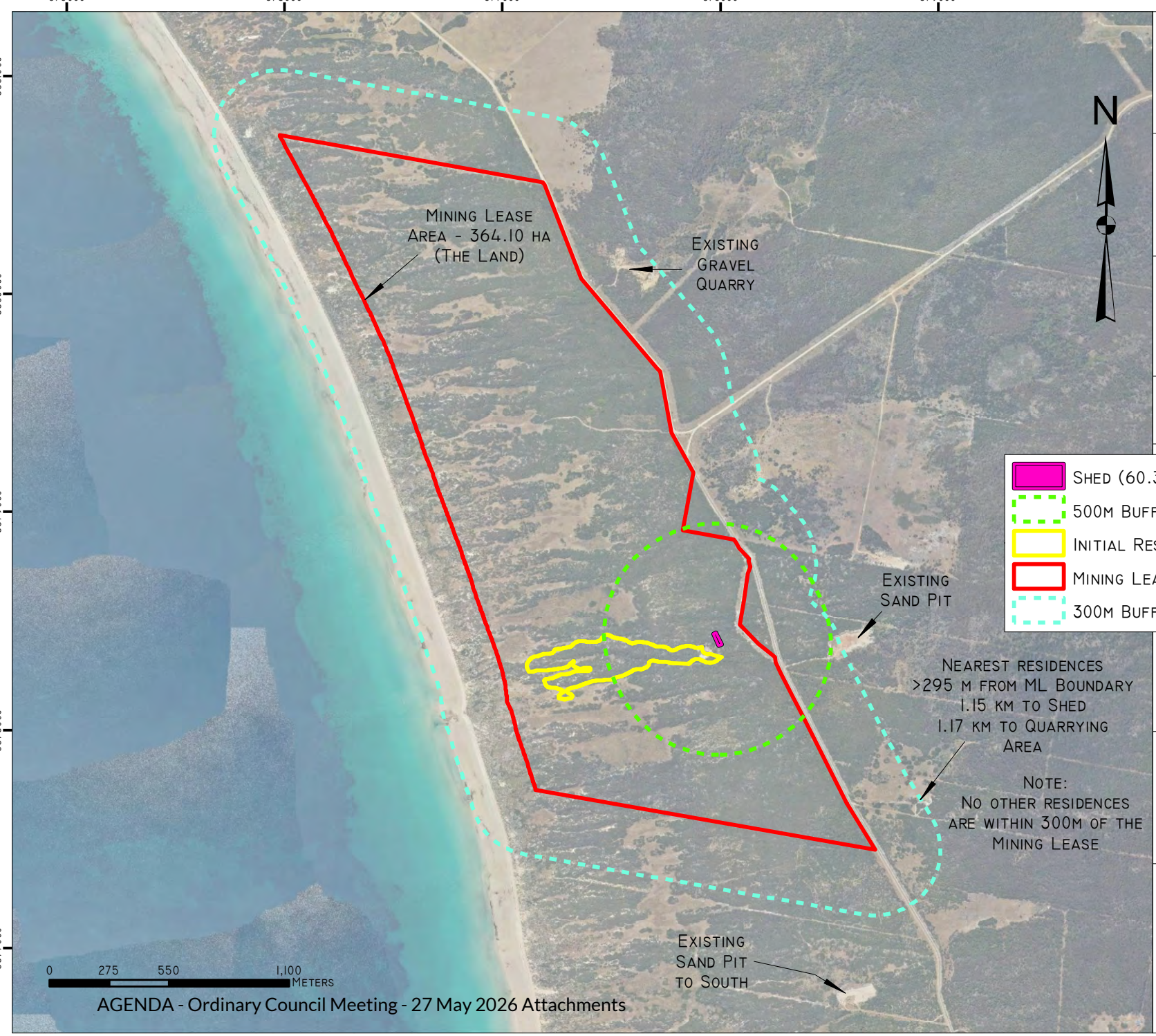
FIGURE 9: RESIDENCES NEAR TO THE DEVELOPMENT AREA

TASMAP: TANNER EMITA	LGA: FLINDERS



- SHED (60.3 X 15 M)
- 500M BUFFER ON SHED (SAND SCREENING)
- INITIAL RESOURCE AREA (APPROX 30 YEAR SUPPLY)
- MINING LEASE (THE LAND)
- 300M BUFFER ON ML

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PART D - PLANNING SCHEME REQUIREMENTS

D.1 CATEGORISATION OF USE/DEVELOPMENT

The Extraction Pit is best categorised into the *Extractive Industry* Use Class –

> '…. use of land for extracting or removing material from the ground, other than Resource Development, and includes the treatment or processing of those materials by crushing, grinding, milling or screening on, or adjoining the land from which it is extracted. Examples include mining, quarrying, and sand mining.'

D.2 ZONING

The Land upon which the lime sand extraction pit occurs is in the Rural Zone[5] of the Scheme (**Figure 4A**). Extractive Industry is listed in the Permitted Use section of the Clause 20.2 Use Table.

The access from Palana Road is over land in the Landscape Conservation zone and is already a lawful access to the Land (it is under licence with the Crown for that purpose).

Zone Purpose

The purpose of the Rural Zone is:

20.1.1	To provide for a range of use or development in a rural location: (a) where agricultural use is limited or marginal due to topographical, environmental or other site or regional characteristics; (b) that requires a rural location for operational reasons; (c) is compatible with agricultural use if occurring on agricultural land; (d) minimises adverse impacts on surrounding uses.
20.1.2	To minimise conversion of agricultural land for non-agricultural use.
20.1.3	To ensure that use or development is of a scale and intensity that is appropriate for a rural location and does not compromise the function of surrounding settlements.

The quality of the land for agricultural purposes is low, evident by the soil type and historical use of limited stock grazing.

The location of extractive industry is resource based that in this instance is in a rural area.

[5] The Rural zone is the basis of the assessment and assumes that the planning scheme amendment initiated to rezone land from Landscape Conservation to Rural was successful.

The proposed Activity will support the economic feasibility of the important rural industry found on Flinders Island. Because of the location and management controls of the Activity there will be no adverse impact on surrounding areas.

The areas where sand is extracted will be rehabilitated on a rolling basis to the extent that the land will revert to native vegetation.

No surrounding settlements will be affected. The nearest sensitive receptor is located 1.15 kms south-east of the area proposed to be initially extracted for lime sands and the associated shed, and approximately 295m east of the mining lease boundary (**Figure 9**). All other sensitive receptors are more than 2 km from the proposed activity.

The following Scheme Use Standards are reviewed.

Use Standard Clause 20.3.1 Discretionary use - as the Activity is a Permitted Use, no assessment is required.

Development Standards for Buildings and Works

Clause 20.4.1 Building height

Objective:	To provide for a building height that: (a) is necessary for the operation of the use; and (b) minimises adverse impacts on adjoining properties.	**Assessment of Development against Provision**
Acceptable Solution (A)	**Performance Criterion (P)**	
A1 Building height must be not more than 12m.	**P1** Building height must be necessary for the operation of the use and not cause an unreasonable impact on adjoining properties, having regard to: (a) the proposed height of the building; (b) the bulk and form of the building; (c) the separation from existing uses on adjoining properties; and (d) any buffers created by natural or other features.	**Complies with A1** Building height is 7.7m.

Clause 20.4.2 Setbacks

Objective:	That the siting of buildings minimises potential conflict with use on adjoining sites.	**Assessment of Development against Provision**
Acceptable Solution (A)	**Performance Criterion (P)**	
A1 Buildings must have a setback from all boundaries of:	**P1** Buildings must be sited to provide adequate vehicle access and not cause an unreasonable impact on existing use on adjoining properties, having regard to:	**Complies with A1** Building is setback more than 5m from all boundaries.

(a) not less than 5m; or (b) if the setback of an existing building is within 5m, not less than the existing building.	(a) the bulk and form of the building; (b) the nature of existing use on the adjoining properties; (c) separation from existing use on the adjoining properties; and (d) any buffers created by natural or other features.	
A2 Buildings for a sensitive use must be separated from an Agriculture Zone a distance of: (a) not less than 200m; or (b) if an existing building for a sensitive use on the site is within 200m of that boundary, not less than the existing building.	**P2** Buildings for a sensitive use must be sited so as not to conflict or interfere with an agricultural use within the Agriculture Zone, having regard to: (a) the size, shape and topography of the site; (b) the prevailing setbacks of any existing buildings for sensitive uses on adjoining properties; (c) the location of existing buildings on the site; (d) the existing and potential use of adjoining properties; (e) any proposed attenuation measures; and (f) any buffers created by natural or other features.	Provision not relevant, no sensitive use is proposed. **No assessment required.**

Clause 20.4.3 Access for new dwellings

Objective:	That new dwellings have appropriate vehicular access to a road maintained by a road authority.	**Assessment of Development against Provision**
Acceptable Solution (A)	**Performance Criterion (P)**	
A1 New dwellings must be located on lots that have frontage with access to a road	**P1** New dwellings must have legal access, by right of carriageway, to a road maintained by a road authority that is appropriate, having regard to:	Provision not relevant, no dwelling is proposed. **No assessment required.**

maintained by a road authority.	(a) the number of users of the access; (b) the length of the access; (c) the suitability of the access for use by the occupants of the dwelling; (d) the suitability of the access for emergency services vehicles; (e) the topography of the site; (f) the construction and maintenance of the access; (g) the construction, maintenance and usage of the road; and (h) any advice from a road authority.	

D.3 CODES

Table 1 provides a summary of which Codes apply to the Activity. The location of overlays associated with Codes are presented in **Figures 4C-1 to 4-C4.**

Table 1. Activity applicable Codes in the *Tasmanian Planning Scheme – Flinders*

Code Number	Code Name	Application to the Activity
C1.0	Signs	Not applicable; no signage proposed.
C2.0	**Parking and Sustainable Transport**	**Applies**
C3.0	**Road and Railway Assets**	**Applies**
C4.0	Electricity Transmission Infrastructure Protection	Not applicable; use and development not within the stipulated buffer areas
C5.0	Telecommunications	Not applicable; no telecommunications infrastructure is proposed.
C6.0	Local Historic Heritage	Not applicable; use or development of land is not: a) within a Heritage Precinct; b) a local heritage place; or c) a place of identified archaeological significance.
C7.0	Natural Assets	Exempt; the activity is development assessed as a Level 2 Activity by the Environmental Protection Authority.
C8.0	**Scenic Protection**	**Applies**
C9.0	Attenuation	Exempt; the Level 2 activity is to be assessed by the Environmental Protection Authority.
C10.0	Coastal Erosion Hazard	Not applicable; use and development does not intersect the overlay.
C11.0	Coastal Inundation Hazard	Not applicable; C11.2.3 applies (see **Attachment 6** for land survey; low hazard band is 3m AHD).
C12.0	Flood-Prone Areas Hazard	Not applicable; Sensitive use or conversion of a building into a habitable building are not proposed.
C13.0	Bushfire-Prone Areas	Not applicable; not a hazardous or vulnerable use and subdivision not proposed.

C14.0	Potentially Contaminated Land	Not applicable; sensitive use is not proposed.
C15.0	Landslip Hazard	Exempt; Mining Lease 2117P/M is in force.
C16.0	Safeguarding of Airports	Not applicable; use and development is not a sensitive use within an airport noise exposure area; and development within an airport obstacle limitation area.

Applicable Codes

As noted in **Table 1**, the following Codes apply –

C2.0 Parking and Sustainable Transport Code

C3.0 Road and Railway Assets Code

C8.0 Scenic Protection

C2.0 Parking and Sustainable Transport Code

The purpose of the Parking and Sustainable Transport Code is:

C2.1.1	To ensure that an appropriate level of parking facilities is provided to service use and development.
C2.1.2	To ensure that cycling, walking and public transport are encouraged as a means of transport in urban areas.
C2.1.3	To ensure that access for pedestrians, vehicles and cyclists is safe and adequate.
C2.1.4	To ensure that parking does not cause an unreasonable loss of amenity to the surrounding area.
C2.1.5	To ensure that parking spaces and accesses meet appropriate standards.
C2.1.6	To provide for parking precincts and pedestrian priority streets.

Unless stated otherwise in a particular purpose zone, or sub-clause C2.2.2, C2.2.3 or C2.2.4, this code applies to all use and development.

Clause 2.5.3, 2.5.4 and 2.5.5 do not apply as the Use Class is Extractive Industry.

Use Standards

Clause C2.5.1 Car parking numbers

Objective:	That an appropriate level of car parking spaces are provided to meet the needs of the use

Acceptable Solution (A)	**Comments in relation to Activity**
A1 The number of on-site car parking spaces must be no less than the number specified in Table 2.1, less the number of car parking spaces that cannot be provided due to the site including container refund scheme space, excluding if: (a) the site is subject to a parking plan for the area adopted by council, in which case parking provision (spaces or cash-in-lieu) must be in accordance with that plan; (b) the site is contained within a parking precinct plan and subject to Clause C2.7; (c) the site is subject to Clause C2.5.5; or (d) it relates to an intensification of an existing use or development or a change of use where: (i) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is greater than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case no additional on-site car parking is required; or (ii) the number of on-site car parking spaces for the existing use or development specified in Table C2.1 is less than the number of car parking spaces specified in Table C2.1 for the proposed use or development, in which case on-site car parking must be calculated as follows: N = A + (C- B) N = Number of on-site car parking spaces required A = Number of existing on-site car parking spaces B = Number of on-site car parking spaces required for the existing use or development specified in Table C2.1 C= Number of on-site car parking spaces required for the proposed use or development specified in Table C2.1.	**Complies.** Car parking requirements in Table C2.1. for Extractive Industry are one per 2 employees. There may be up to 5 staff at the activity at any one time. Three car spaces will be provided as per **Figure 5A** and drawings VDC/MSP/A/102 and VDC/MSP/A/104 in **Attachment 8.**

C2.5.2 Bicycle parking numbers

Objective:	That an appropriate level of bicycle parking spaces are provided to meet the needs of the use.

Acceptable Solution (A)	Comments in relation to Activity
A1 Bicycle parking spaces must: (a) be provided on the site or within 50m of the site; and (b) be no less than the number specified in Table C2.1.	**Provision not relevant.** There are no bicycle parking requirements for Extractive Industry in Table C2.1.

Development Standards

C2.6.1 Construction of parking areas

Objective:	That an appropriate level of bicycle parking spaces are provided to meet the needs of the use.

Performance Criterion	Comments in relation to Activity
P1 All parking, access ways, manoeuvring and circulation spaces must be readily identifiable and constructed so that they are useable in all weather conditions, having regard to: (a) the nature of the use; (b) the topography of the land; (c) the drainage system available; (d) the likelihood of transporting sediment or debris from the site onto a road or public place; (e) the likelihood of generating dust; and (f) the nature of the proposed surfacing.	**Complies with P1.** The pad area around the shed will be formed of gravel (a hard aggregate likely to be sourced from The Gums Quarry) over compacted road base to provide a suitable surface for the movement of trucks and machinery – see drawing VDC/MSP/A/102 in **Attachment 8.** The low relief topography of the land where the shed and hardstand are proposed to be installed is conducive to minimising earthworks and controlling drainage via spoon drains and a sediment pond. Sediment will not be transported off the site because sediment ponds will be installed and maintained for the life of the Activity. The lime sands being extracted are not dust generating. The hardstand surface and unsealed road access may generate dust, but this can be managed by the application of water when conditions are dry or windy.

C2.6.2 Design and layout of parking areas

Objective:	That parking areas are designed and laid out to provide convenient, safe and efficient parking.

Performance Criterion (P)	Comments in relation to Activity
P1	**Complies with P1.**

All parking, access ways, manoeuvring and circulation spaces must be designed and readily identifiable to provide convenient, safe and efficient parking, having regard to: (a) the characteristics of the site; (b) the proposed slope, dimensions and layout; (c) useability in all weather conditions; (d) vehicle and pedestrian traffic safety; (e) the nature and use of the development; (f) the expected number and type of vehicles; (g) the likely use of the parking areas by persons with a disability; (h) the nature of traffic in the surrounding area; (i) the proposed means of parking delineation; and (j) the provisions of Australian Standard AS 2890.1:2004 Parking facilities, Part 1: Off-street car parking and AS 2890.2 -2002 Parking facilities, Part 2: Offstreet commercial vehicle facilities.	The pad area around the shed will be formed of gravel (a hard aggregate likely to be sourced from The Gums Quarry over compacted road base to provide a suitable surface for the movement of trucks and machinery. This will facilitate access in all weather conditions. The low relief topography of the land where the shed and hardstand are proposed to be installed is conducive to minimising earthworks and controlling drainage via spoon drains and a sediment pond. Only truck drivers familiar with the site will be used to collect and deliver lime sands. The site is not open to the public so there would be no The access is onto Palana Road which is the main arterial road connecting northern and southern areas of Flinders Island. The use generally overlaps with the autumn months which is after tourist season has peaked which means fewer road users would be around on the road network. Formal parking spaces (3 at the shed, see **Figure 5A** and drawings VDC/MSP/A/102, VDC/MSP/A/104 and VDC/MSP/A/106 in **Attachment 8**) will be delineated with signage and road markers. Informal parking areas will be delineated by signage only.

C2.6.3 Number of accesses for vehicles

Objective:	That: (a) access to land is provided which is safe and efficient for users of the land and all road network users, including but not limited to drivers, passengers, pedestrians and cyclists by minimising the number of vehicle accesses; (b) accesses do not cause an unreasonable loss of amenity of adjoining uses; and (c) the number of accesses minimise impacts on the streetscape.
Acceptable Solution (A)	**Comments in relation to Activity**
A1 The number of accesses provided for each frontage must: (a) be no more than 1; or (b) no more than the existing number of accesses, whichever is the greater.	**Complies.** There are already two access to the frontage of CT215120/1 (see drawings VDC/MSP/A/107 and VDC/MSP/A/108 in **Attachment 8**). No further accesses are proposed.
A2 Within the Central Business Zone or in a pedestrian priority street no new access is provided unless an existing access is removed.	**Provision not relevant.** The Central Business Zone is not present.

C2.6.4 Lighting of parking areas within the General Business Zone and Central Business Zone

Objective:	That parking and vehicle circulation roads and pedestrian paths within the General Business Zone and Central Business Zone, which are used outside daylight hours, are provided with lighting to a standard which: (a) enables easy and efficient use; (b) promotes the safety of users; (c) minimises opportunities for crime or anti-social behaviour; and (d) prevents unreasonable light overspill impacts.

Acceptable Solution (A)	Comments in relation to Activity
A1 In car parks within the General Business Zone and Central Business Zone, parking and vehicle circulation roads and pedestrian paths serving 5 or more car parking spaces, which are used outside daylight hours, must be provided with lighting in accordance with Clause 3.1 "Basis of Design" and Clause 3.6 "Car Parks" in Australian Standard/New Zealand Standard AS/NZS 1158.3.1:2005 Lighting for roads and public spaces Part 3.1: Pedestrian area (Category P) lighting – Performance and design requirements.	**Provision not relevant.** There are no relevant zones present.

C2.6.5 Pedestrian access

Objective:	That pedestrian access within parking areas is provided in a safe and convenient manner.

Acceptable Solution (A)	Comments in relation to Activity
A1.1 Uses that require 10 or more car parking spaces must: (a) have a 1m wide footpath that is separated from the access ways or parking aisles, excluding where crossing access ways or parking aisles, by: (i) a horizontal distance of 2.5m between the edge of the footpath and the access way or parking aisle; or (ii) protective devices such as bollards, guard rails or planters between the footpath and the access way or parking aisle; and (b) be signed and line marked at points where pedestrians cross access ways or parking aisles. **A1.2** In parking areas containing accessible car parking spaces for use by persons with a disability, a footpath having a width not less than 1.5m and a gradient not steeper than 1 in 14 is required from those spaces to the main entry point to the building.	**Provision not relevant.** There is no requirement to provide 10 or more car parking spaces nor a parking area containing accessible car parking spaces for use by persons with a disability.

C2.6.6 Loading bays

Objective:	That the area and dimensions of loading bays are adequate to provide safe and efficient delivery and collection of goods.
Acceptable Solution (A)	**Comments in relation to Activity**
A1 The area and dimensions of loading bays and access way areas must be designed in accordance with Australian Standard AS 2890.2–2002, Parking facilities, Part 2: Offstreet commercial vehicle facilities, for the type of vehicles likely to use the site.	**Provisions not relevant.** There is no requirement to provide loading bays.
A2 The type of commercial vehicles likely to use the site must be able to enter, park and exit the site in a forward direction in accordance with Australian Standard AS 2890.2 – 2002, Parking Facilities, Part 2: Parking facilities Offstreet commercial vehicle facilities.	

C2.6.7 Bicycle parking and storage facilities within the General Business Zone and Central Business Zone

Objective:	That the area and dimensions of loading bays are adequate to provide safe and efficient delivery and collection of goods.
Acceptable Solution (A)	**Comments in relation to Activity**
A1 Bicycle parking for uses that require 5 or more bicycle spaces in Table C2.1 must: (a) be accessible from a road, cycle path, bicycle lane, shared path or access way; (b) be located within 50m from an entrance; (c) be visible from the main entrance or otherwise signed; and (d) be available and adequately lit during the times they will be used, in accordance with Table 2.3 of Australian/New Zealand Standard AS/NZS 1158.3.1: 2005 Lighting for roads and public spaces Pedestrian area (Category P) lighting Performance and design requirements.	**Provisions not relevant.** The development and use associated with the Activity is not in the relevant zone for the provision.
A2 Bicycle parking spaces must: (a) have dimensions not less than:	

(i) 1.7m in length; (ii) 1.2m in height; and (iii) 0.7m in width at the handlebars; (b) have unobstructed access with a width of not less than 2m and a gradient not steeper than 5% from a road, cycle path, bicycle lane, shared path or access way; and (c) include a rail or hoop to lock a bicycle that satisfies Australian Standard AS 2890.3-2015 Parking facilities Part 3: Bicycle parking.	

Clause C2.6.8 Siting of parking and turning areas

Objective:	That the siting of vehicle parking and access facilities in an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone, General Business Zone or Central Business Zone does not cause an unreasonable visual impact on streetscape character or loss of amenity to adjoining properties.
Acceptable Solution (A)	**Comments in relation to Activity**
A1 Within an Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone or General Business Zone, parking spaces and vehicle turning areas, including garages or covered parking areas must be located behind the building line of buildings, excluding if a parking area is already provided in front of the building line.	**Provisions not relevant.** The development and use associated with the Activity is not in the Inner Residential Zone, Village Zone, Urban Mixed Use Zone, Local Business Zone, General Business Zone, or Central Business Zone.
A2 Within the Central Business Zone, on-site parking at ground level adjacent to a frontage must: (a) have no new vehicle accesses, unless an existing access is removed; (b) retain an active street frontage; and (c) not result in parked cars being visible from public places in the adjacent roads.	

C3.0 Road and Rail Assets Code

The purpose of this provision is to:

C3.1.1	To protect the safety and efficiency of the road and railway networks; and
C3.1.2	To reduce conflicts between sensitive uses and major roads and the rail network.

This code applies to a use or development that (see Traffic Impact Assessment, **Attachment 7**):

(a) will increase the amount of vehicular traffic or the number of movements of vehicles longer than 5.5m using an existing vehicle crossing or private level crossing;

(b) will require a new vehicle crossing, junction or level crossing; or

(c) involves a subdivision or habitable building within a road or railway attenuation area if for a sensitive use.

The Code applies because the Activity will intensify the use of an access in excess of the figures stipulated in Table C3.1.

Use Standards

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction

Objective:	To minimise any adverse effects on the safety and efficiency of the road or rail network from vehicular traffic generated from the site at an existing or new vehicle crossing or level crossing or new junction.
Performance Criterion (P)	**Comments in relation to Activity**
P1 Vehicular traffic to and from the site must minimise any adverse effects on the safety of a junction, vehicle crossing or level crossing or safety or efficiency of the road or rail network, having regard to: (a) any increase in traffic caused by the use; (b) the nature of the traffic generated by the use; (c) the nature of the road; (d) the speed limit and traffic flow of the road; (e) any alternative access to a road; (f) the need for the use; (g) any traffic impact assessment; and (h) any advice received from the rail or road authority.	**Complies with P1.** Palana Road is sealed where the existing access enters the road network. Line of sight distances exceed the SISD (see TIA in **Attachment 7**). A seal (2 coat spray seal) will be applied from the current seal to 25m into the existing unsealed road. The traffic generated is seasonal, with most truck movements occurring in the autumn months when lime sands are needed for spreading on agricultural lands as a soil ameliorant. The access is using a reserved road section that was once part of Palana Road – it is well formed and fit for purpose with some widening and maintenance. It provides the most efficient access to the road network.

	Drawings of turning of rigid trucks and light vehicles are provided in VDC/MSP/A/107 and VDC/MSP/A/108 (**Attachment 8**) respectively. The use is necessary to provide sufficient cost-effective lime sands for the management of agricultural lands to achieve optimal pasture growth for stock grazing.

Development Standards

C3.6.1 Habitable buildings for sensitive uses within a road or railway attenuation area

Objective:	To minimise the effects of noise, vibration, light and air emissions on sensitive uses within a road or railway attenuation area, from existing and future major roads and the rail network.
Acceptable Solution	**Comments in relation to Activity**
A1 Unless within a building area on a sealed plan approved under this planning scheme, habitable buildings for a sensitive use within a road or railway attenuation area, must be: (a) within a row of existing habitable buildings for sensitive uses and no closer to the existing or future major road or rail network than the adjoining habitable building; (b) an extension which extends no closer to the existing or future major road or rail network than: (i) the existing habitable building; or (ii) an adjoining habitable building for a sensitive use; or (c) located or designed so that external noise levels are not more than the level in Table C3.2 measured in accordance with Part D of the *Noise Measurement Procedures Manual, 2nd edition, July 2008*.	**Provision not relevant.** No habitable buildings for sensitive use are proposed.

C8.0 Scenic Protection Code

The purpose of this provision is to:

C8.1.1	To recognise and protect landscapes that are identified as important for their scenic values.

This code applies to development on land within a scenic protection area or scenic road corridor and only if within the following zones:

(a) Rural Living Zone;

(b) Rural Zone;

(c) Agriculture Zone;

(d) Landscape Conservation Zone;

(e) Environmental Management Zone; or

(f) Open Space Zone.

The Marshall Bay area is the subject of FLI-C8.1.6 which is described in Table C8.1. The information extracted from the Scheme below is specifically for the Marshall Bay area and is to be used in conjunction with the applicable standards for the Activity.

Description	Scenic Value	Management Objectives
The area is prominent from the Emita lookout, from Port Davies Road at Emita, and from allotments at Leeka and West End. The area is a thin strip of ancient dune system running at right angles to the coast overlain with a later parallel system of mobile dunes. The entire area is exceptionally prone to wind erosion. There are several significant wetlands and only one public access to Marshall Bay beach.	• The undeveloped nature of the vista. • The largely intact native vegetation across the entire expanse links directly to the foreshore. This vegetation provides an uninterrupted panorama of the horseshoe-shaped bay, which has exceptional scenic qualities particularly when the tide is out and the vast expanse of sandy beach contrasts with the turquoise waters of the bay.	To: (a) retain the natural appearance of native vegetation and undisturbed landform, when viewed from public roads, the foreshore and coastal waters; (b) minimise visual the impact of development and works on native vegetation, the landform and the scenic values of the area, particularly by use of external building materials of a colour and reflectivity that minimise contrast with the natural environment; (c) minimise the extent of the footprint of development and works, and impacts to the integrity of the wider landscape; and (d) retain and restore (where possible) the natural vegetation cover.

Development Standards

C8.6.1 Development within a scenic protection area

Objective:	That: (a) destruction of vegetation does not cause an unreasonable reduction of the scenic value of a scenic protection area; and (b) buildings and works do not cause an unreasonable reduction of the scenic value of a scenic protection area.

Performance Criterion (P)	Comments in relation to Activity
P1.1 Destruction of vegetation within a scenic protection area must not cause an unreasonable impact on the scenic value of a scenic protection area, having regard to: (a) the nature of the vegetation to be removed; (b) the area of vegetation to be removed; (c) the topography of the site; (d) any visual impact on a skyline; (e) the nature of the reduction of the scenic value; and (f) the purpose of any management objectives identified in the relevant Local Provisions Schedule.	**Complies with P1.1** The maximum area of disturbance, without any rehabilitation, is 5 hectares. To place this into perspective, given the size of the Mining Lease (364.1 hectares), the maximum area of disturbance at any one time represents 1.4% of the Mining Lease. Vegetation will be removed and rehabilitated as the extraction pit progresses through the resource. The vegetation is scrub on deep lime sands typical of the Marshall Bay area; it is not a listed threatened community on the *Nature Conservation Act 2002* or a listed ecological community on the *Environment Protection and Biodiversity Conservation Act 1999*. The State threatened 'heathland on calcareous substrates' community (Community 26 – on Schedule 3A *Nature Conservation Act 2002*) in the Marshall Bay area is not lime sand producing, it is a community on shallow to rocky/broken calcareous substrates and not deep lime sands. The extraction area is not skyline. There is no reduction in scenic value: the vista will still appear as undisturbed, and the small area of vegetation to be impacted at any one time is so small it would not be perceivable when the bay is viewed from even the most obvious vantage point – for example, the lookout near Port Davie Road (**Plate 4**) or Emita.
P1.2 Buildings or works within a scenic protection area must not cause an unreasonable reduction of the scenic value of a scenic protection area, having regard to: (a) the topography of the site; (b) the location of, and materials used in construction of, driveways or access tracks; (c) proposed reflectance and colour of external finishes; (d) design and proposed location of the buildings or works; (e) the extent of any cut or fill required; (f) any visual impact on a skyline; (g) any existing or proposed screening; and (h) the purpose of any management objectives identified in the relevant Local Provisions Schedule.	**Complies with P1.2** The maximum area of disturbance, without any rehabilitation, is 5 hectares. To place this into perspective, given the size of the Mining Lease (364.1 hectares), the maximum area of disturbance at any one time represents 1.4% of the Mining Lease. Vegetation will be removed and rehabilitated as the extraction pit progresses through the resource. The vegetation is scrub on deep lime sands typical of the Marshall Bay area; it is not a listed threatened community on the *Nature Conservation Act 2002* or a listed ecological community on the *Environment Protection and Biodiversity Conservation Act 1999*. The State threatened 'heathland on calcareous substrates' community (Community 26 – on Schedule 3A *Nature Conservation Act 2002*) in the Marshall Bay area is not lime sand producing, it is a community on shallow to rocky/broken calcareous substrates and not deep lime sands. The extraction area is not skyline. There is no reduction in scenic value: the vista will still appear as undisturbed, and the small area of vegetation to be impacted at any one time is so small it would not be perceivable when the bay is viewed from even the most obvious vantage point – for example, the lookout near Port Davie Road (**Plate 4**) or Emita. Vegetation is to be retained along Palana Road so the pit and shed will be unseen from the Marshall bay section of the road.

The obvious location for any visual assessment is at the lookout (coordinates 578057E, 5571384N) just south of the junction of Palana and Port Davies Road.

Plate 4 is taken from the lookout with Marshall Bay at left of image. Within this viewfield are two existing lime sand extraction pits on Mining Leases – 2056P/M (CT's 141842/2 and 141842/1) and 2059P/M (CT's 154620/2 and 160313/1).

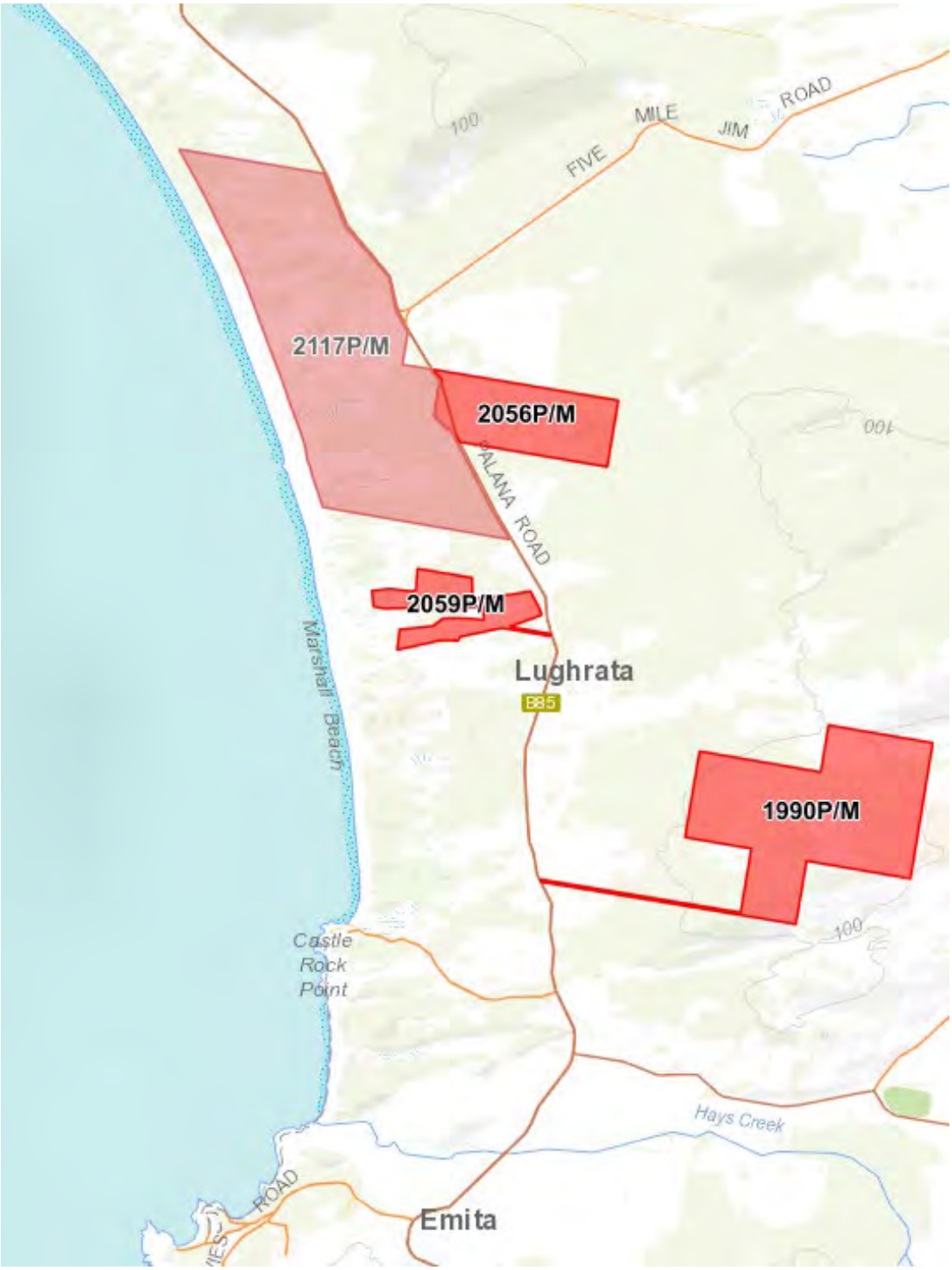
Existing lime sand pits

Plate 5 shows the Marshall Bay topographic area and the Mining Lease layer from TheLIST. It specifically shows the relative location of ML2117P/M which is the subject of this application (within which the 30-year supply of lime sands is further defined at **Figure 5B**), and the other Mining Leases.

The extraction of the 30 year supply the subject of this application is directly opposite the Nichols Pit (ML 2056P/M). That pit appears to not be visible from the lookout nor along Palana Road towards. Once on Palana Road at Memana and northwards to Tanners Bay the road sits low in the landscape, and nothing can be seen of the 'uninterrupted panorama of the horseshoe-shaped bay' because the vegetation is close to the road and even when vegetation is of low form the bay cannot be seen at all.

Plate 4. View from lookout near Port Davies Road looking towards Marshall Bay

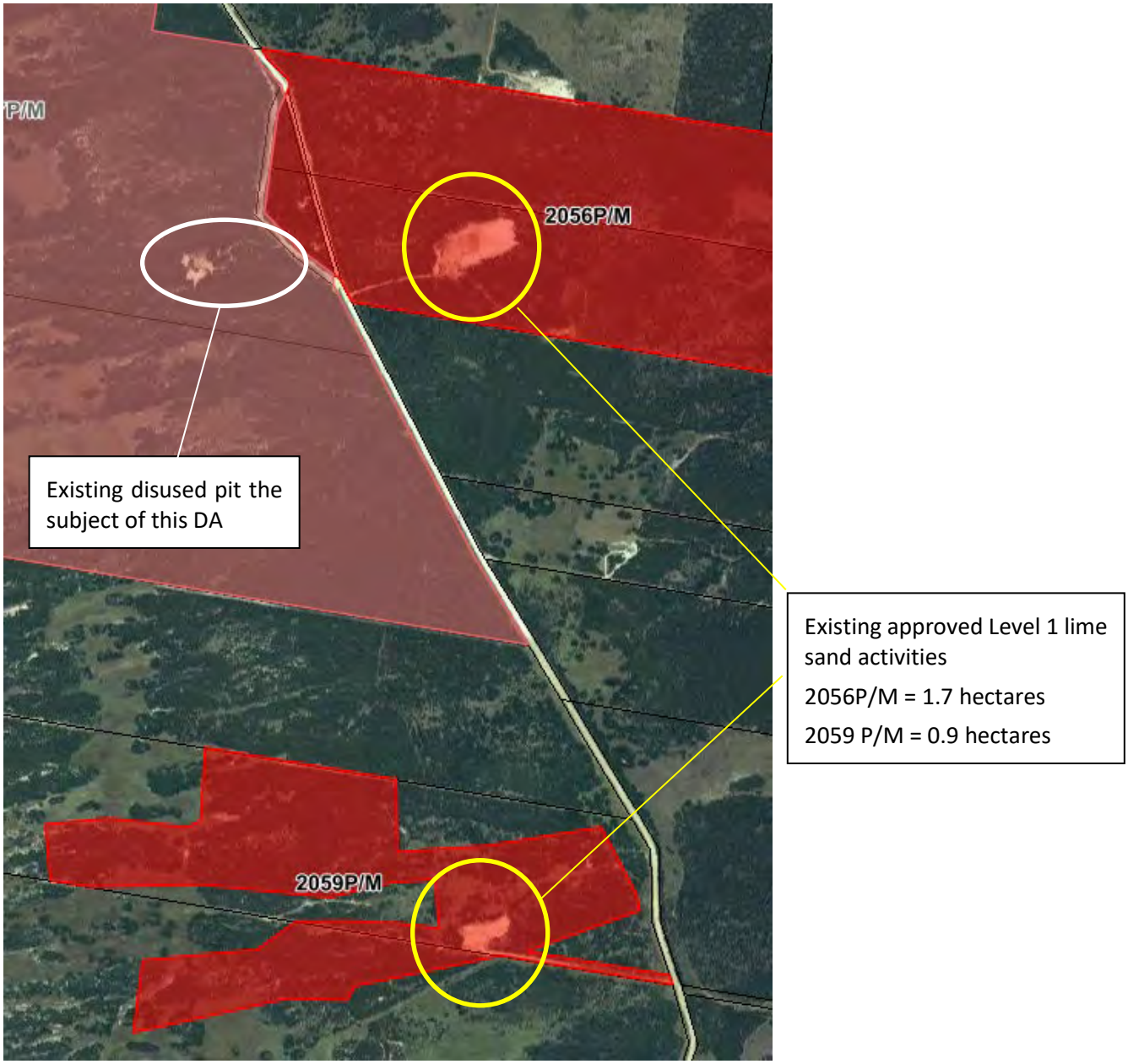
Plate 5. Mining Leases (applications and granted) at Marshall Bay



Source: The LIST (6 May 2022).

Plate 6 illustrates the existing disturbed areas (those open without rehabilitation underway) at the other two Mining Leases. The Activity is proposed to have a maximum of 5 hectares disturbed; however this includes those areas which are under rehabilitation – the disturbed area without rehabilitation underway is to be about 3 hectares (of which 1.6 hectares is the hardstand and shed).

Plate 6. Mining Leases (applications and granted) at Marshall Bay with State orthophoto



Source: The LIST (6 May 2022).

C8.6.2 Development within a scenic road corridor

Objective:	That: (a) destruction of native vegetation or exotic vegetation does not cause an unreasonable loss of scenic value of scenic road corridors; and (b) buildings and works do not cause an unreasonable loss of the scenic value of scenic road corridors.

Acceptable Solution (A)	Comments in relation to Activity
A1 Destruction of exotic trees with a height more than 10m, native vegetation, or hedgerows within a scenic road corridor must not be visible from the scenic road.	**Provision not relevant.** No scenic road corridor is intersected by the Activity.
A2 Buildings or works within a scenic road corridor must not be visible from the scenic road.	

PART E – SUMMARY

The proposed Activity is permitted in the Rural Zone and meets the requirements of the Scheme and zone.

Several specialist reports, including traffic management, environmental assessment, waste water, and geology and soils were conducted. None of the reports identified any reason for rejecting the request for a planning permit to conduct the use and development.

As the proposed Activity is a level 2 activity it was assessed by the EPA that concluded the Activity could be approved with conditions (see **Attachment 11**).

It is requested the Planning Authority grants approval for the site to be used as Extractive Industry where up to 10,000 cubic metres of material, per annum can be won.

ATTACHMENTS

ATTACHMENT 1. CERTIFICATES OF TITLE

R.P. 112

2580 64

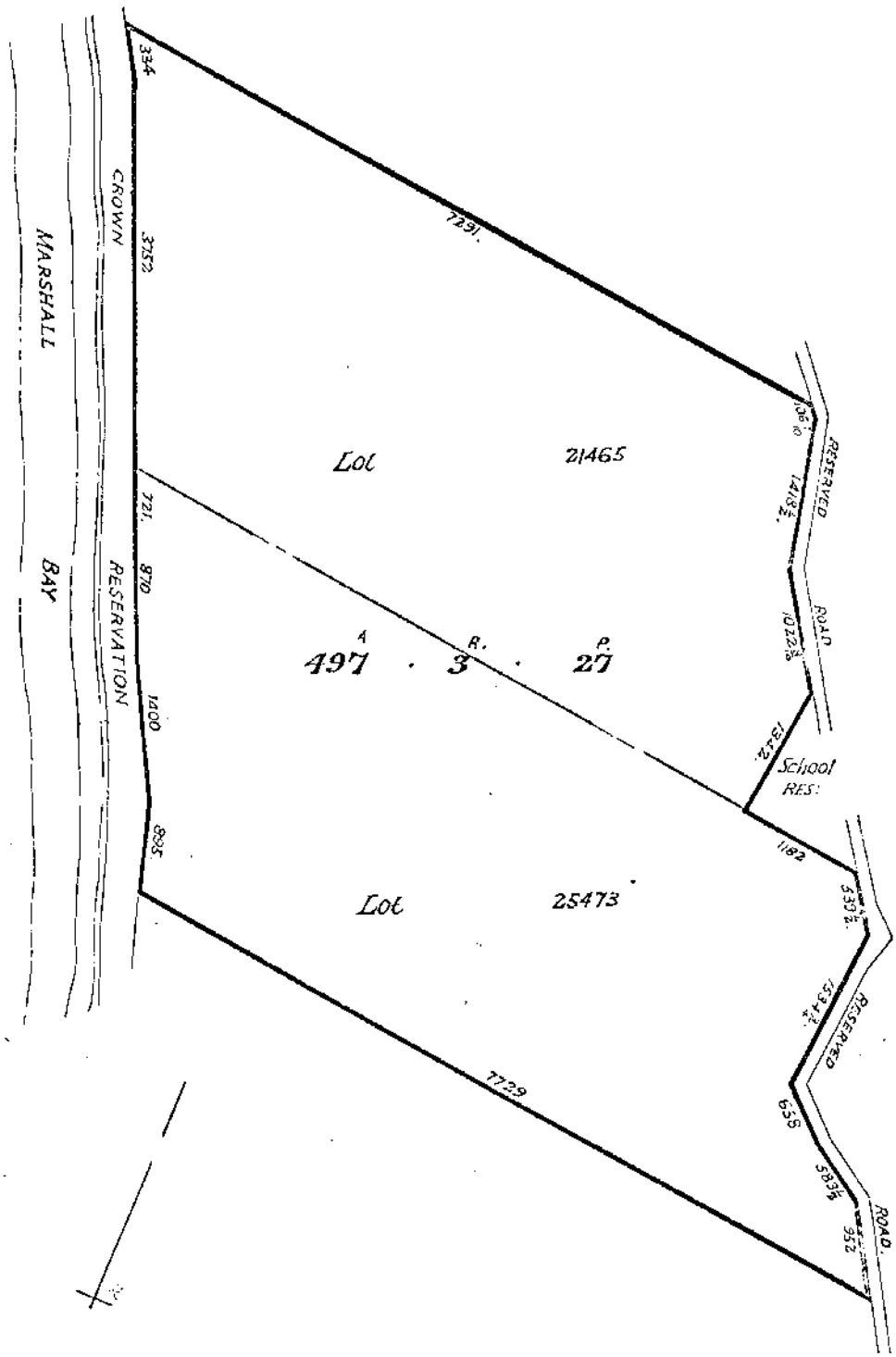
ANNEXURE TO CERTIFICATE OF TITLE VOL. FOL.

REGISTERED NUMBER

215120

Recorder of Titles

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
215120	1
EDITION	**DATE OF ISSUE**
4	14-May-2015

SEARCH DATE : 10-Apr-2023
SEARCH TIME : 04.47 PM

DESCRIPTION OF LAND

Parish of LUGHRATA, Land District of FLINDERS
Lot 1 on Plan 215120
Derivation : Whole of Lots 21465 and 25473 Gtd. to C.J. Robinson & J.H. Thompson respectively.
Prior CT 2580/64

SCHEDULE 1

C829114 TRANSFER to MARKARNA GRAZING COMPANY PTY LTD
Registered 27-Nov-2007 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
E10087 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 14-May-2015 at 12.05 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Department of Natural Resources and Environment Tasmania
www.thelist.tas.gov.au

VOL. FOL.

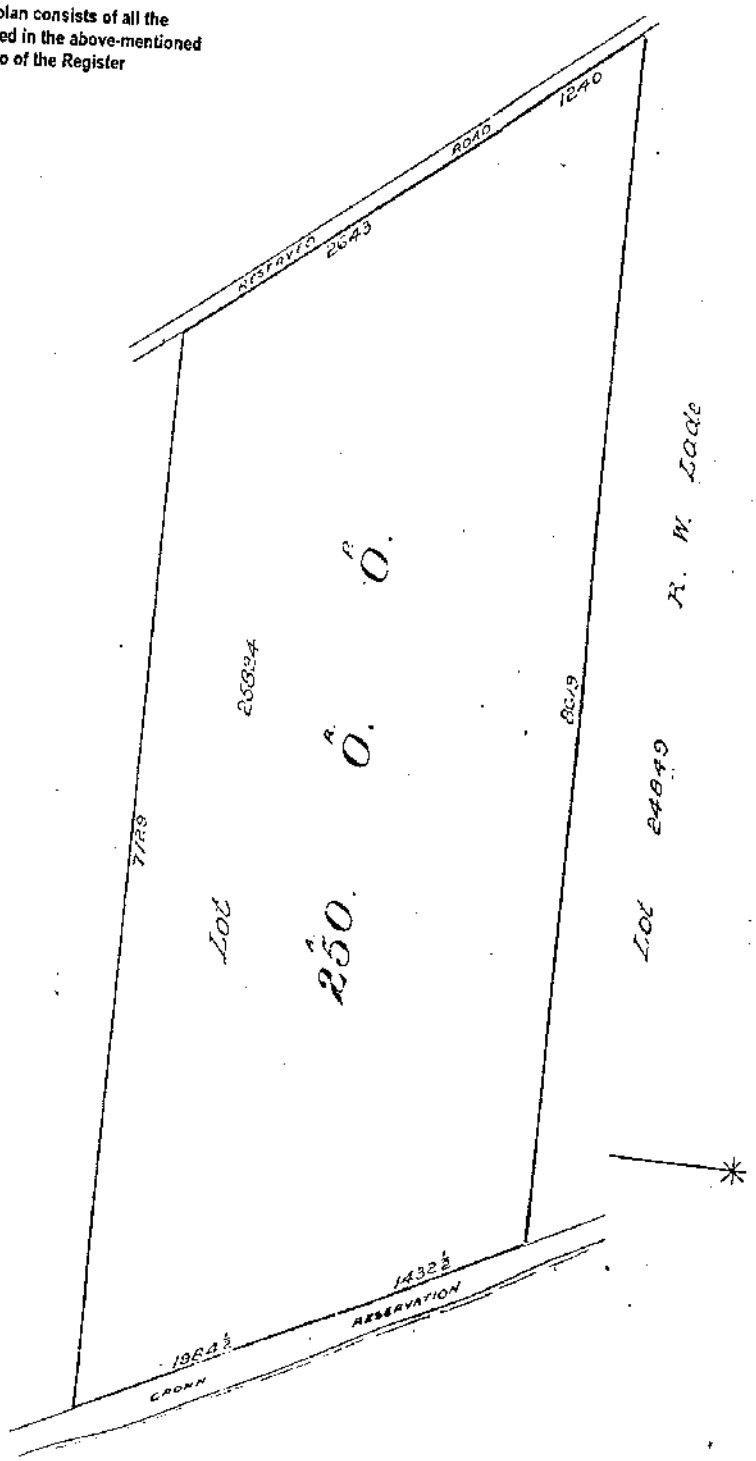
ANNEXURE TO CERTIFICATE OF TITLE

REGISTERED NUMBER

230282

Recorder of Titles

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register



NOTE

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
230282	1
EDITION	**DATE OF ISSUE**
4	14-May-2015

SEARCH DATE : 10-Apr-2023
SEARCH TIME : 04.47 PM

DESCRIPTION OF LAND

Parish of LUGHRATA, Land District of FLINDERS
Lot 1 on Plan 230282
Derivation : Whole of Lot 25824 Gtd. to J.R. Robinson.
Prior CT 2992/93

SCHEDULE 1

C829114 TRANSFER to MARKARNA GRAZING COMPANY PTY LTD
Registered 27-Nov-2007 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
E10087 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 14-May-2015 at 12.05 PM

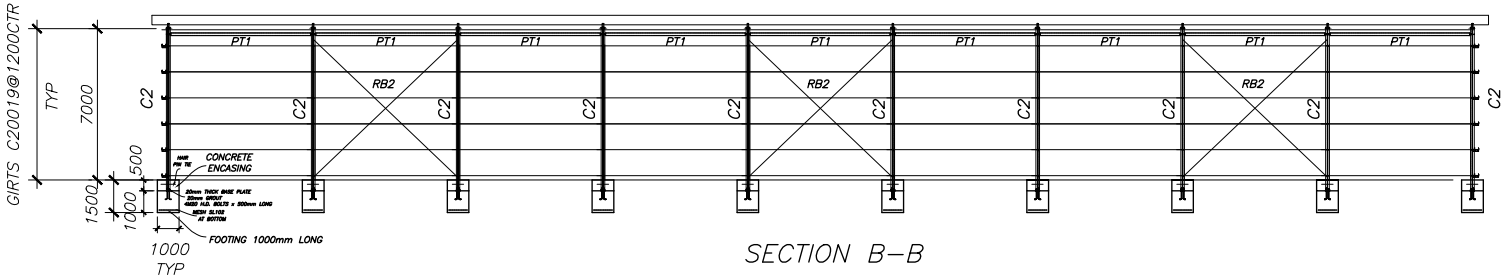
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Department of Natural Resources and Environment Tasmania
www.thelist.tas.gov.au

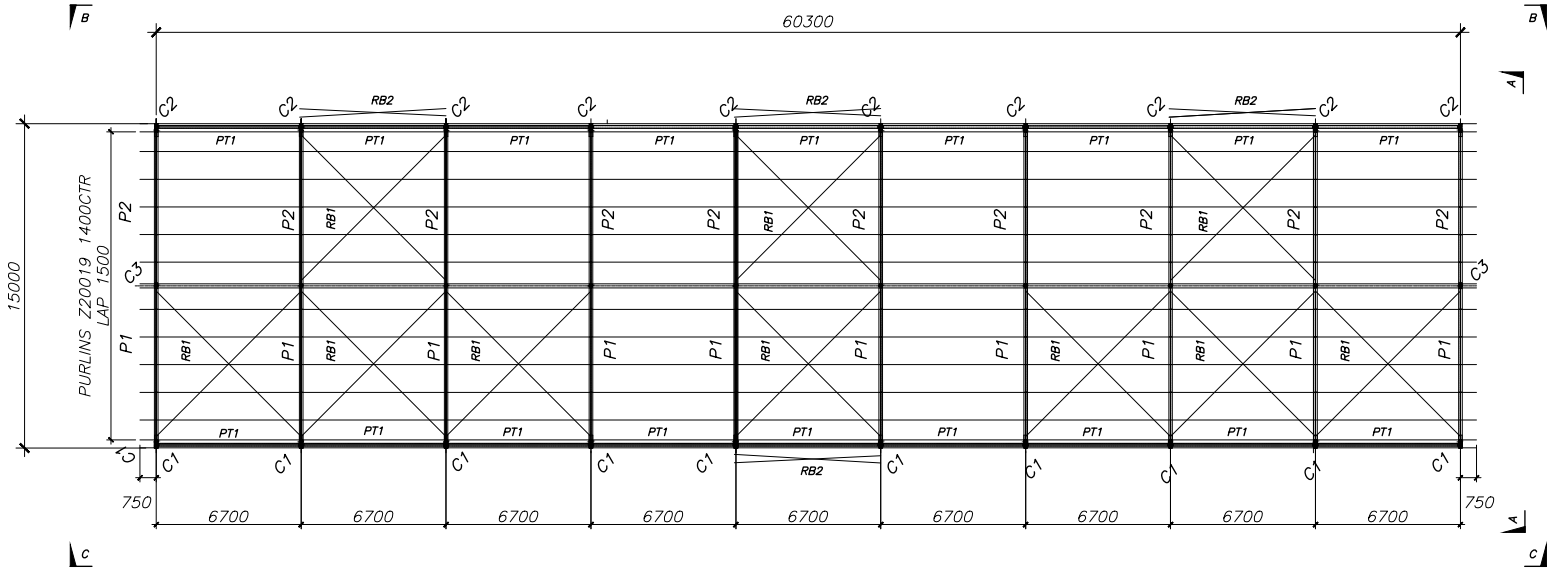
ATTACHMENT 2. SHED DESIGN AND INTERNAL LAYOUT

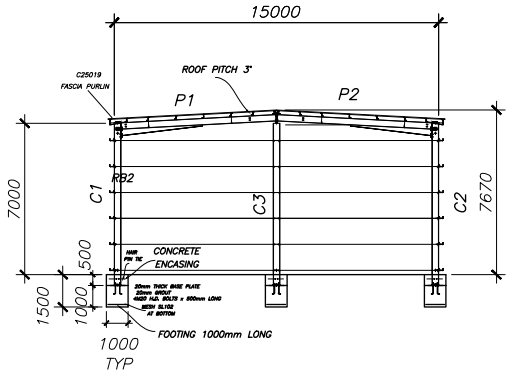
Annexure: 16.2.3



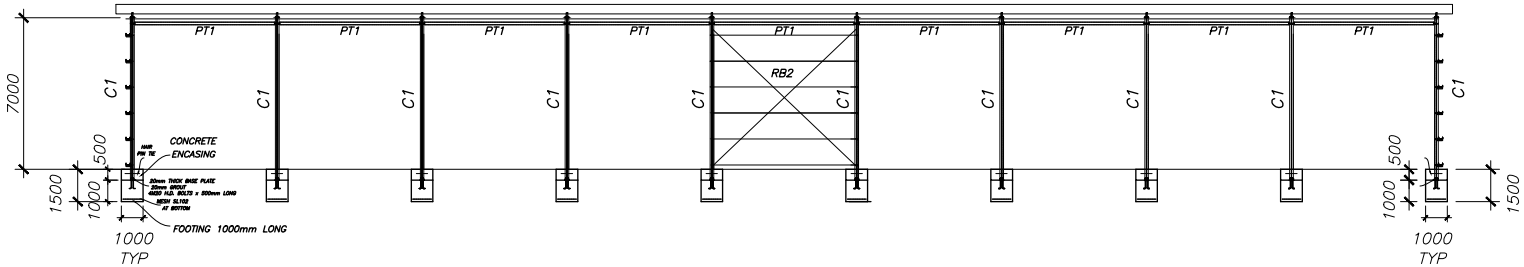
SECTION B–B

STEEL SCHEDULE	
MEMBER	SIZE
C1	310UB40
C2	310UB40
C3	250UB31
P1	310UB40
P2	310UB40
RB1–RB2	20 ROD
PT1	125X125X5 SHS
HAUNCH	360UB50 – 3800mm min
PURLINS	Z20019 1400 CTRL @ LAP 1500
GIRTS	C20019 1200 CTRL





SECTION A–A



SECTION C–C

PRELIMINARY FOR APPROVAL

AUS
Factory 2, 22a GALLI COURT
DANDENONG SOUTH 3175 VIC.
PH 03 9799 9922 FAX 03 9799 9913

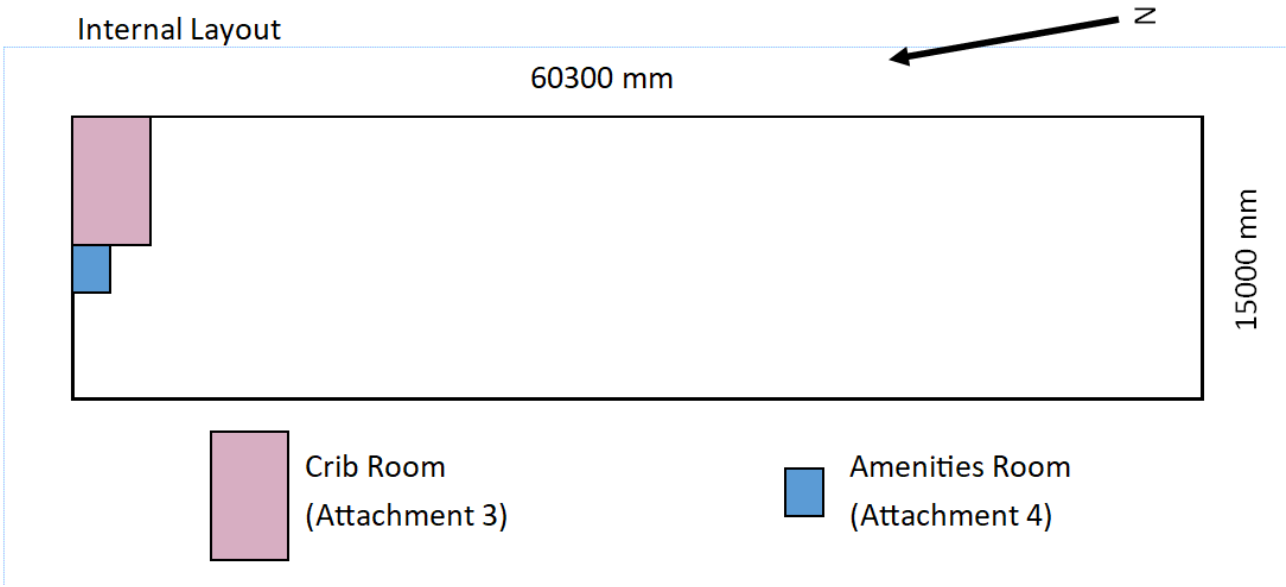
P1	PRELIMINARY	27.02.2019
P	PRELIMINARY	21.02.2019

AMENDMENTS

CLIENT: MARKANA PARK
PROJECT: MACHINERY & HAY SHED
FLINDERS ISLAND

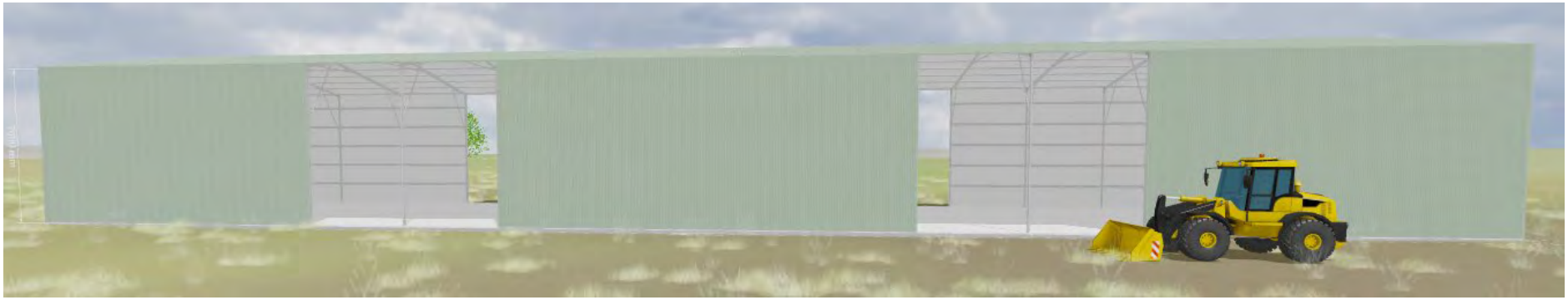
JOB:

WELD: 6FW | PAINT: | DRN: CT | DATE: FEB 19 | DWG No: MP01
HOLES: ø22 | PRIMER | CKD: DM | REV P1

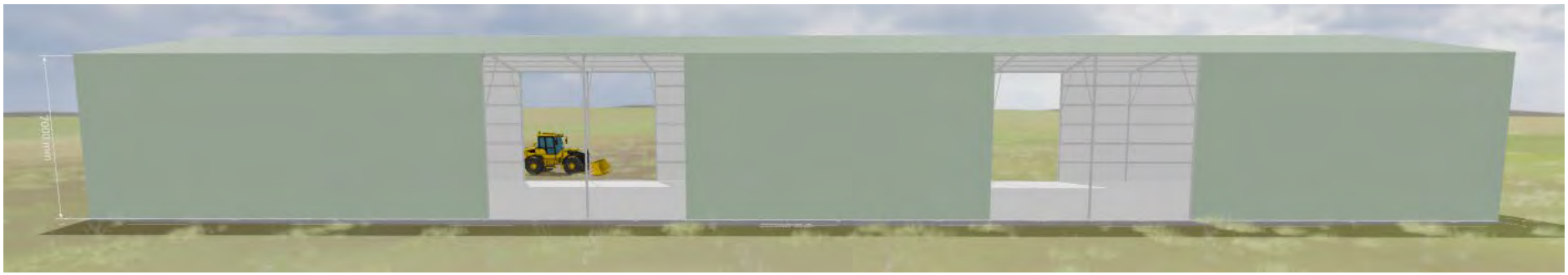

Internal Layout
N
60300 mm
15000 mm
Crib Room
(Attachment 3)
Amenities Room
(Attachment 4)

Elevations

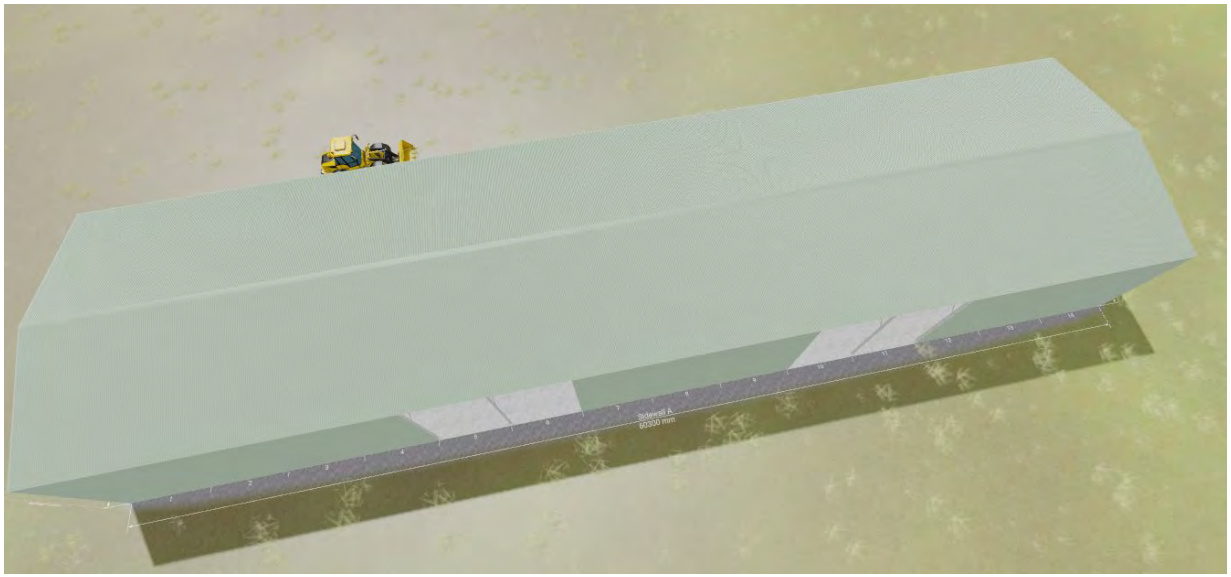
East view



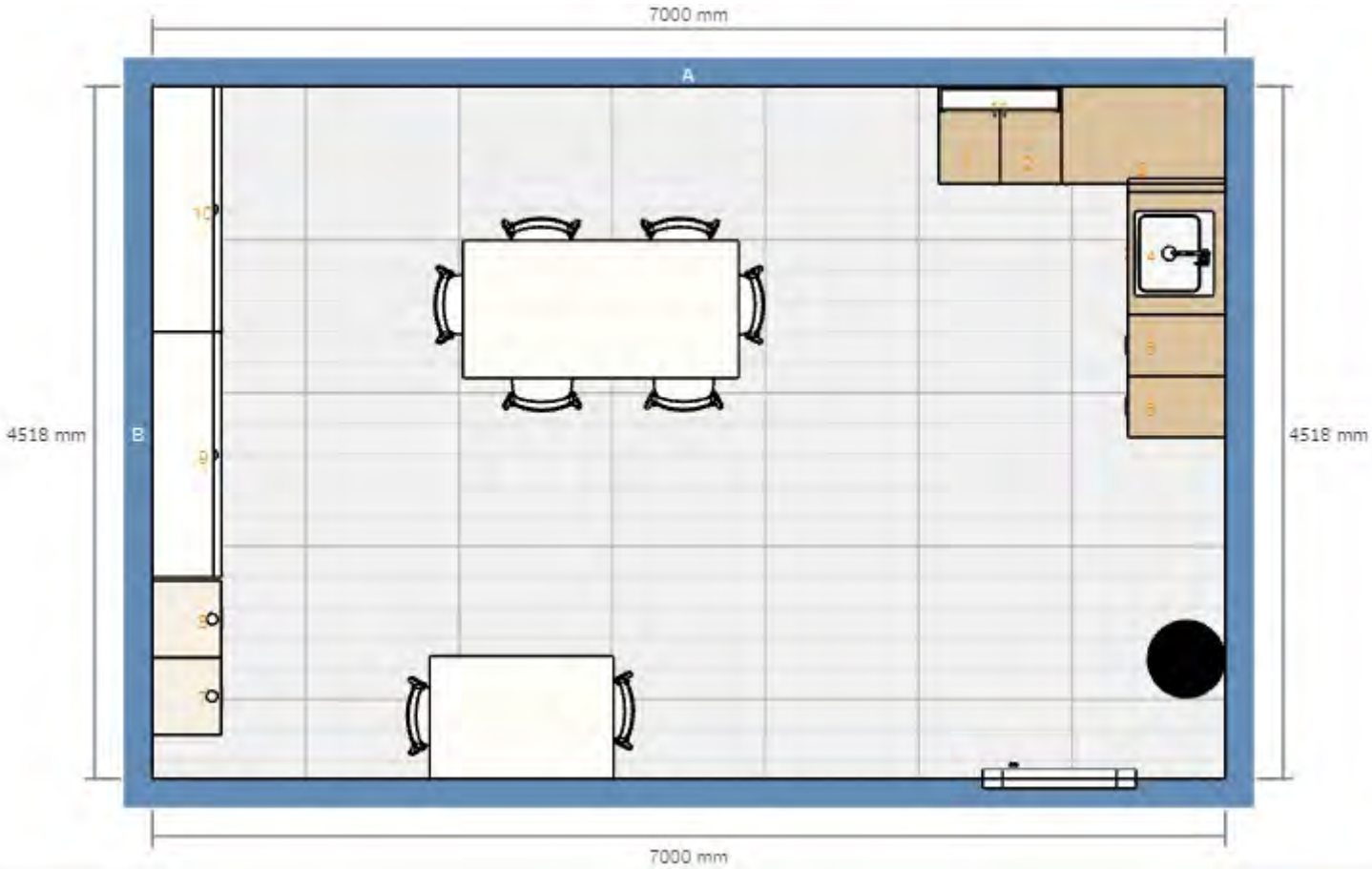
West view



Overviews

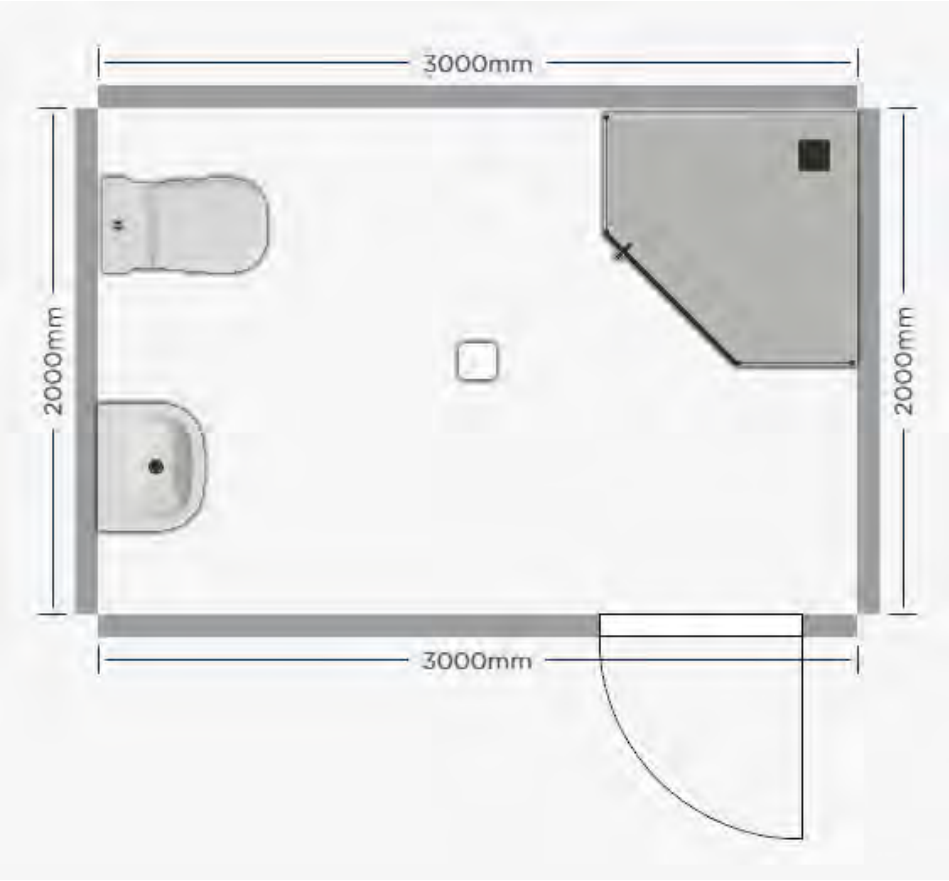


ATTACHMENT 3. CRIB ROOM DESIGN


7000 mm
A
B
4518 mm
4518 mm
7000 mm

ATTACHMENT 4. AMENITIES ROOM DESIGN

2D Layout



3D Render

ATTACHMENT 5. SITE & SOIL EVALUATION AND DESIGN REPORT

Site & soil evaluation and design report.

New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site)

Richard Mason, Onsite Assessments Tas

20 Adelong Drive, Kingston

richardmason@iprimus.com.au

Mobile 0418 589309

BACKGROUND

The information provided in this Report provides Design Information, Plans and Specifications suitable for inclusion in supporting documentation for a Plumbing Permit for installation of an on-site wastewater management system servicing a new machinery shed proposed to support an existing agricultural operation and proposed sand mining development on the site.

Part 1. Site and soil evaluation (S&SE)

Location: 368 Five Mile Jim Road, Memana, TAS 7255 (Sand mine - Southern site)

Developer: Markarna Grazing Company Pty Ltd

PID: 3513143

Title Ref: 215120/1

Project Summary: New on-site wastewater management system to treat and apply wastewater derived from workforce toilets and ablution facilities.

This assessment is for a machinery shed with cribroom and sanitary/ablution facilities located 220m to the East of Palana Road, at 39°56'25"S 147°54'45"E .

The building will service an expanded sand mine on the site.

It is proposed to install a septic tank absorption bed discharging to an in-ground absorption bed.

Soil profile sampling and assessment was undertaken using a 350mm diameter tractor PTO driven auger.

Site Area: 200+Ha.

Dominant Soil Categories:

(as per AS/NZS 1547-2012) Modified Emerson Test Required? **No**

1,....2,...3,...4,....5,....6 If Yes, Emerson Class No:

Soil Profile:

A horizon: 0-1000mm; sand, yellow 10YR 7/6, loose, damp, massive, Category 1

B horizon: 1100-1200mm; consolidated sand (calcareous cement) sand, yellow 10YR 7/6, damp, massive, Category 1

C horizon: 1200-2000mm+, sand, yellow 10YR 7/6, loose, damp, massive, Category 1.

Evidence of ground water was not encountered; depth to water table is believed to exceed 3m.

Measured or Estimated Soil Permeability (m/d)

Estimated from textural classification.

A Horizon: >3.0mm/day

B Horizon: 0.12-0.5m/day

C Horizon: >3.0mm/day

Effluent Application Rates

Absorption trench/bed	–	20mm/day (primary treated) 50mm/day (secondary treated)

Geology:
The site is underlain by Quaternary deposits of windblown sand of marine origin (coastal sand dunes); this is consistent with soil profiles observed on-site.

The marine sands contain a high proportion of calcareous material (marine mollusc shell derived), which makes them attractive for extraction for agricultural usage, for soil pH modification.

Calcium carbonate from shell grit present in the wind-blown beach sand id subject to solution by rainwater and redeposition as a calcareous matrix, cementing sand grains together, forming discrete layers of hardpan, which is considerably less permeable than the unconsolidated sands.

This was encountered at a depth of 1100-1200mm; however, it is likely that this hard pan could be present at varying depths, therefore, soil profile modifications to ensure uniform permeability under the land application area basal area will be required. This will be achieved by excavating absorption beds to a minimum depth of 1500mm and backfilling with loose, unconsolidated sand, prior to installing the absorption bed infrastructure.

Topography

Slopes: Sand dune topography, undulating but uniform gentle slope of less than 2° to east, in vicinity of land application area.

Drainage lines / water courses:
Wetland in swale approximately 335m WNW of the development site.

Vegetation: The site in the vicinity of the proposed land application area comprises coastal heath described as SHW – Scrub, heathland and coastal complexes, by Tas Veg 3.0.

Site History (land use)
Subdivided and developed for agriculture several decades ago, including historical sand mining activities; there are no previous known land uses or other activities

which would compromise the suitability of the site for use for onsite wastewater management.

Site Exposure and Climate.

Aspect: The site has open northerly aspect, experiencing day-round sun throughout the year.

Pre-dominant wind direction: South-west to north-west.

Climate: Annual rainfall averages 740mm/year (Flinders Airport)), with maximum daily average temperature of 22.7ºC and minimum of 13.4ºC, giving an annual point potential evapotranspiration of 1000mm+ and an annual rainfall deficit of 300mm.

Environmental Issues

Location of sensitive vegetation, high water table, swamps, waterways etc.

Disturbed site with coastal heath vegetation; the land application area will lie within vegetation cleared and managed for bushfire protection purposes.

The buffer distance of 350m to the nearest saltmarsh/wetland is consistent with the Acceptable Solutions under the Director's Guidelines for on-site wastewater management systems, for separation from surface water for a land application area for primary treated effluent.

Shallow slopes, significant distance to downslope boundary mitigates against risk of off-site runoff in the event of inground absorption system failure.

Site Stability
The site is gently sloping and unaffected by any Landslip Hazard banding on the Interim Planning Scheme overlay.

Drainage/Groundwater

Depth to seasonal groundwater (m)
Groundwater depth is believed to exceed 4m; vertical separation from base of land application area is consistent with Acceptable Solutions for application of primary treated effluent under the Director's Guidelines.

The MRT Groundwater Information Access Portal at http://wrt.tas.gov.au/groundwater-info/ indicates that there are no known operating water bores within 1600m of the site.

Primary and Reserve Land Application Area
Primary and reserve land application area is to be located 6m west of the NW corner of the serviced building and 10m south of the extant access track which tuns north of the building.

Water Supply
Tankwater derived from roof runoff. Any boreholes utilised for potable water extraction should be located at least 75m from the land application area.

Modification to Development Application Supporting Information Report
The site plan shown at Page 17 of the above report by Van Diemen Consulting should be modified to show the drain along the northern edge of the site, terminating approximately 40m east of its westerly end point, in order to permit installation of the land application area cross-slope of the ablutions/crib room portion of the machinery shed.

Existing onsite wastewater management system.
Not applicable.

Part 2. Design of on-site wastewater management system.

Proposed On Site Wastewater Management System.
Suitable on-site wastewater management systems for this site would include a septic tank discharging to an in-ground absorption bed.

Loadings.
The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day.

Design hydraulic loading - 200L/day.

See “Staff ablutions, workplace installations” in Appendix E “On-site wastewater systems Code” Dept of Health & Ageing, Govt of South Australia.

The premises will be used during periods of sand extraction on the site; this is a sporadic activity with anticipated usage considered to be less than 26 weeks per year.

Design loadings are therefore highly conservative, with actual loadings anticipated as 20% or less, when averaged out through the year.

Wastewater characteristics
The wastewater discharge from the premises will be broadly similar to domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of AS/NZS 1547:2012 Domestic on-site waste-water management.

DLR
A DLR of 20mm/day (Category 1 soil – conservative rate) is adopted.

Wastewater Land Application Area.

Absorption bed required basal area (minimum)

= daily wastewater loading / Design loading rate for bed/trench on Cat 1 soil

= 200 litres per day / 20mm day

= **10m²**

Design provides for an in-ground absorption bed 10m x 1.0m x 450mm deep, providing 2500mm vertical separation to groundwater.

Upslope drainage
Given the characteristics of the site, upslope cut-off drainage is not required, however, care should be taken to ensure that run-off from buildings, hard-standings, roads, rainwater tanks overflows etc do not discharge on or near to the septic tank land application area.

In particular, the proposed drain along the northern edge of the site, should be modified to terminate approximately 40m east of its westerly end point, in order to permit installation of the land application area cross-slope of the ablutions/crib room portion of the machinery shed.

Compliance with Directors Guidelines for On-Site Wastewater Management Systems (2017)

A modified onsite wastewater management system on this site can meet the requirements of the above Guidelines as follows:

Compliance Table	**Directors Guidelines for OSWM**	
Acceptable Solutions	Performance Criteria	Compliance achieved by
5.1 To ensure sufficient land is available for sustainable onsite wastewater management for buildings.		
A1 A new dwelling must be provided with a land application area that complies with Table 3.	P1 A new dwelling must be provided with a land application area that meets all of the following: a) The land application area is sized in accordance with the requirements of AS/NZS 1547; and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	N/A
5.2 To ensure sustainable onsite wastewater management for commercial and non-residential buildings (Class 3-9).		
A1 An onsite wastewater management system including the land application area for non-residential	P1 An onsite wastewater management system including the land application area for non-residential building must	A1(a) Land application area sized to 40L/person/day and

buildings must satisfy all of the following: (a) be sized based on the hydraulic and organic loadings contained in Table 4 and design loading or irrigation rates contained in AS/NZS 1547; (b) be located in accordance with clause 7.1	satisfy all of the following: a) A site and soil evaluation and design report prepared by a suitably person determined by the Director demonstrating that the land application area is of sufficient size to treat and manage the wastewater generated from the proposed building within the property boundaries. b) The SSE report and system design demonstrates the design is consistent with AS/NZS 1547 and uses appropriate hydraulic and organic loading rates for the proposed activity. c) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable. d) The land application area is to be located in accordance with the acceptable solution or performance criteria specified in clause 7.1.	15g/BOD/day and AS/NZS1547.2012 Table L1. A1(b) Land application area located in accordance with Acceptable Solution under Clause 7.1
6 Area required for on-site wastewater management – building extensions, alterations or outbuildings (Building Class 1-10)		
A2 An outbuilding, addition or alteration to an existing building, or change of use of that building, must not encroach onto or be within 2m (if upslope) or 6m (if downslope) of an existing land application area (including land reserved for a future land application area) or a wastewater treatment unit and comply with at least one of the following: a) not increase the number of bedrooms (or rooms reasonably capable of being used as a bedroom) or otherwise increase the potential volume of wastewater generated onsite; and b) not increase the number of bedrooms (or rooms reasonably capable of being used as a bedroom) or otherwise increase the potential volume of wastewater generated onsite to greater than that allowed for in the design of the existing OWMS.	P2 An outbuilding addition or alteration to an existing building or change of use of that building, must be provided with a land application area (including land reserved for a future land application area) that meets all of the following: a) The land application area is of sufficient size to comply with the either Appendix L, M or N and setback distances are consistent with Appendix R of AS/NZS 1547; and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	N/A
7. Standards for Wastewater Land Application Areas		

A1 Horizontal separation distance from a building to a land application area must comply with one of the following: a) be no less than 6m; b) be no less than: (i) 3m from an upslope boundary or level building; (ii) If primary treated effluent to be no less than 4m plus 1m for every degree of average gradient from a downslope building; (iii) If secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a downslope building.	P1 The land application area is located so that the risk of wastewater reducing the bearing capacity of a building's foundations is acceptably low.	P1 Land application area setback from building is 15m.
A2 Horizontal separation distance from downslope surface water to a land application area must comply with (a) or (b) (a) be no less than 100m; or (b) be no less than the following: (i) if primary treated effluent 15m plus 7m for every degree of average gradient to downslope surface water; or (ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient to down slope surface water.	P2 Horizontal separation distance from downslope surface water to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R; b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	A2(a) Land application area is 350m from nearest surface water.
A3 Horizontal separation distance from a property boundary to a land application area must comply with either of the following: (a) be no less than 40m from a property boundary; or (b) be no less than: (i) 1.5m from an upslope or level property boundary; and (ii) If primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or (iii) If secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary.	P3 Horizontal separation distance from a property boundary to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	A3(b)(i) 90m from eastern (cross-slope) boundary,
A4 Horizontal separation distance from a downslope bore, well or similar	P4 Horizontal separation distance from a downslope bore, well or similar	A4 No known bore within 1600m of land

water supply to a land application area must be no less than 50m and not be within the zone of influence of the bore whether up or down gradient.	water supply to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 demonstrates that the risk is acceptable.	application area.
A5 Vertical separation distance between groundwater and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.6m if secondary treated effluent	P5 Vertical separation distance between groundwater and a land application area must comply with the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 that demonstrates that the risk is acceptable	A5(a) 3500mm+ separation to groundwater.
A6 Vertical separation distance between a limiting layer and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.5m if secondary treated effluent	P6 Vertical setback must be consistent with AS/NZS1547 Appendix R.	A6(a) At least 3500mm separation.
A7 Nil	P7 A wastewater treatment unit must be located a sufficient distance from buildings or neighbouring properties so that emissions (odour, noise or aerosols) from the unit do not create an environmental nuisance to the residents of those properties Note: Part 6 of the Building Act 2016 specifies	P7 Septic tanks do not cause odour or other nuisances under normal operation.

Date of Site Visit: 25/05/2022

<u>Weather Conditions</u>:
(on the day of evaluation and during the last week)
Cool and fine, 75mm of rain fell at Flinders Island Airport since 01/05/2022.

Further Information.

For further detailed assessment and design information, together with operation and maintenance advice, please refer to the Appendices.

Statement.

I certify that this Site and Soil Evaluation and Design for an on-site wastewater management system at 368 Five Mile Jim Road, Memana (Sand mine - Southern site), has been has been undertaken in accordance with the relevant provisions of AS/NZS 1547:2012. Onsite Domestic Wastewater Management and also the requirements of the Director of Building's Guidelines for On-site Wastewater Management Systems and is therefore compliant with the deemed to satisfy requirements of the NCC Vol 3.

The design of this on-site wastewater system is suitable for the proposed residence referred to in this report.

This report is copyrighted to me as the author. I authorise Markarna Grazing Company Pty Ltd, Flinders Island Council and their respective agents and/or employees to make copies or extracts of this report for the purposes of Planning and/or Building Applications etc for the above-mentioned project on this site by or on behalf of Markarna Grazing Company Pty Ltd. It is not to be otherwise published or reproduced for the benefit of third parties without my explicit permission as author.

Please Note:
It is generally understood that the successful operation of an on-site wastewater disposal system is dependent upon a number of complex, interacting factors and that the operating life of in-ground absorption systems in particular may be limited. This system may require future maintenance or modification to ensure its continued satisfactory operation. The client is advised that such works are the responsibility of the property owner.

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This report should not be used for submission for Building or Development Application until OAT has been paid in full for its production. OAT accepts no liability for the contents of this report until full payment has been received.

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This report contains observations & interpretations based often on limited subsurface evaluation. Where interpretative information or evaluation has been reported, this information has been identified accordingly & is presented based on professional judgement. OAT does not accept responsibility for variations between interpreted conditions & those that may be subsequently revealed by whatever means.

Due to the possibility of variation in subsurface conditions & materials, the characteristics of materials can vary between sample & observation sites. OAT takes no responsibility for changed or unexpected variations in ground conditions that may affect any aspect of the project. The classifications in this report are based on samples taken from specific sites. The information is not transferable to different sites, no matter how close (ie if the development site is moved from the original assessment site an additional assessment will be required).

It is recommended to notify the author should it be revealed that the sub-surface conditions differ from those presented in this report, so additional assessment & advice may be provided.

Investigations are conducted to standards outlined in relevant Australian Standards, codes and guidelines, including:

- AS1547-2012: Onsite Domestic Wastewater Management
- AS3959.2009: Construction of Buildings in Bushfire Prone Areas
- Director's Guidelines for on-site wastewater management systems. (CBOS)
- Director's Determination – Requirements for Building in Bushfire-Prone Areas. (CBOS)

All new developments should subject to strict site maintenance. Attention is drawn to the relevant appendices of this report.

Any assessment that has included an onsite wastewater system design will require a further site visit once the system has been installed if certification of an installation/works is required (to verify that the system has been installed as per OAT's design). An additional fee may apply for the site visit & issuing the certificate.

OAT is not responsible for the correct installation of wastewater systems. Any wastewater installation is the sole responsibility of the owner/agent and certified plumber. Any variation to the wastewater design must be approved by OAT, and an amended Special Plumbing Permit obtained, if required from the relevant council. The registered plumber must obtain a copy and carefully follow the details in the council issued Plumbing Permit. Certification of completion of works will be based on surface visual inspection only, to verify the location of the system. All underground plumbing works are the responsibility of the certified plumber.

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SITE ASSESSOR AND SYSTEM DESIGNER

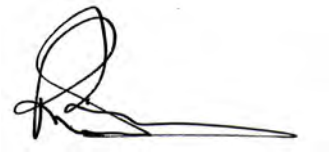
NAME: Richard Mason, Environmental Health Professional and Building Services Designer Hydraulic Restricted.

NAME OF ORGANISATION: Onsite Assessments Tas

ADDRESS: 20 Adelong Drive, Kingston, Tasmania, 7050

CONTACT DETAILS: 0418 589 309; richardmason@iprimus.com.au

SIGNED:



DATED: 22/08/2022

APPENDICES

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3 – Design plans	15
4 – Design specifications	19
5 – Advice to project manager and installer	21
6 – Loading certificate and O & M guidelines	22
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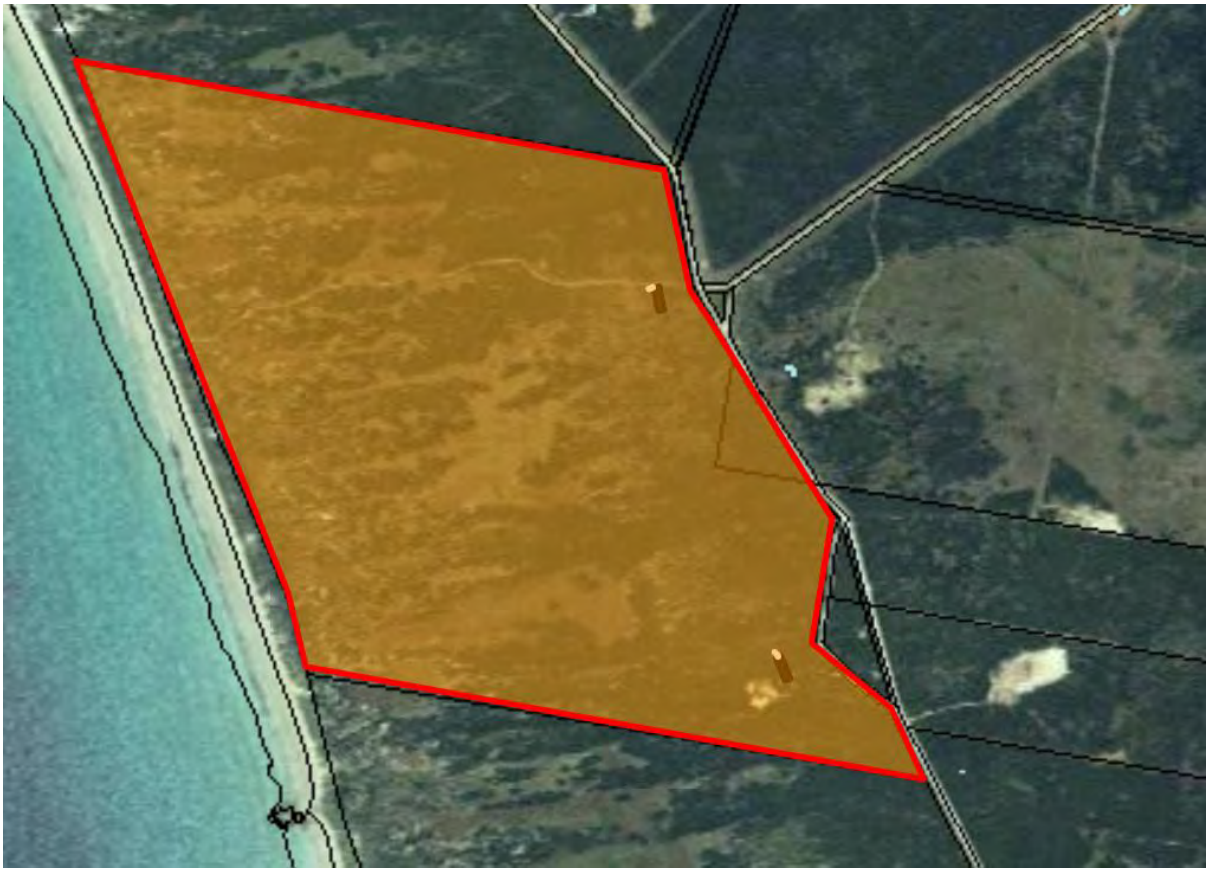
Appendix 1 - Site Location

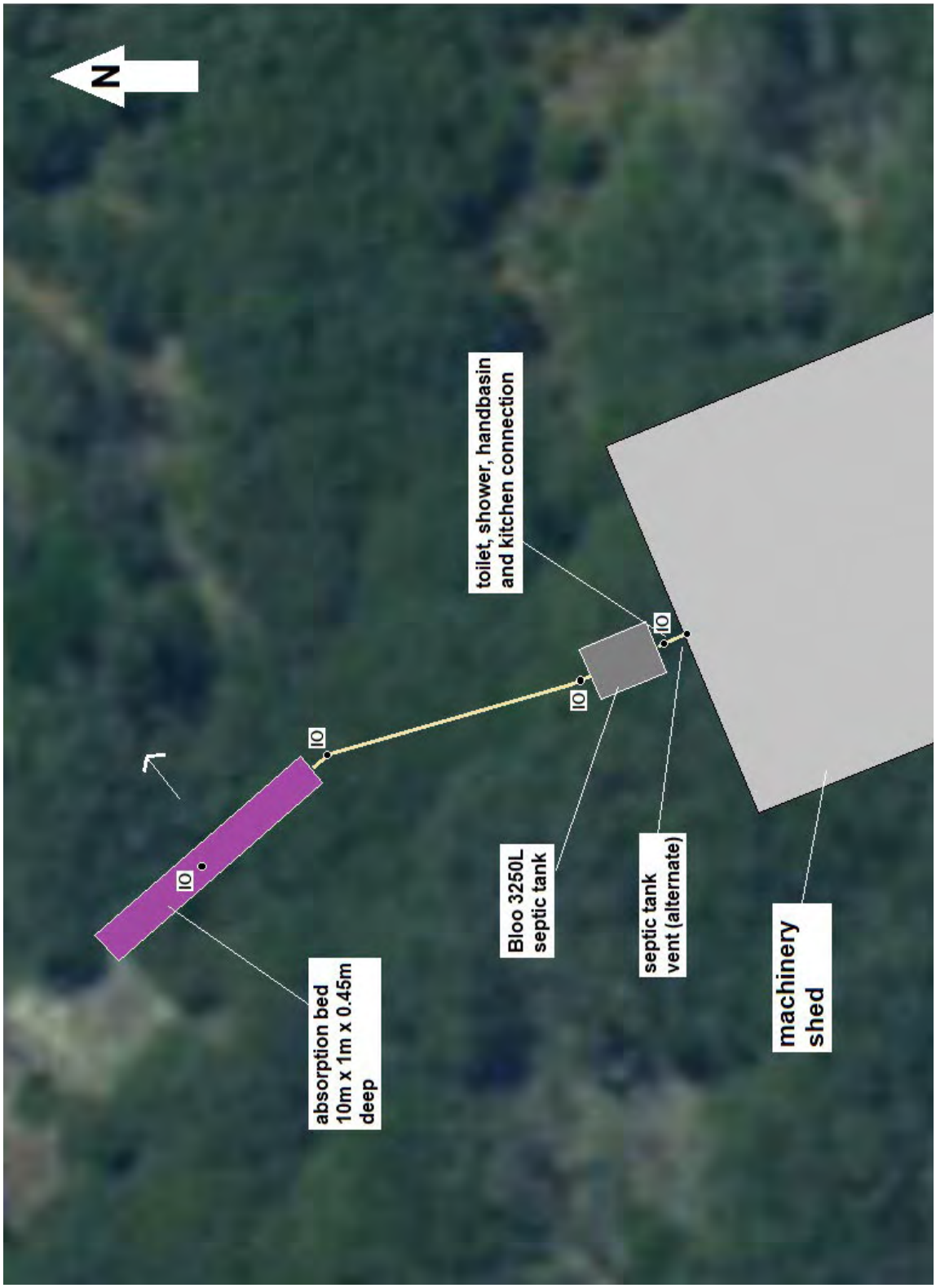


Appendix 2 – Soil testing

(above) Soil profile samples on auger.

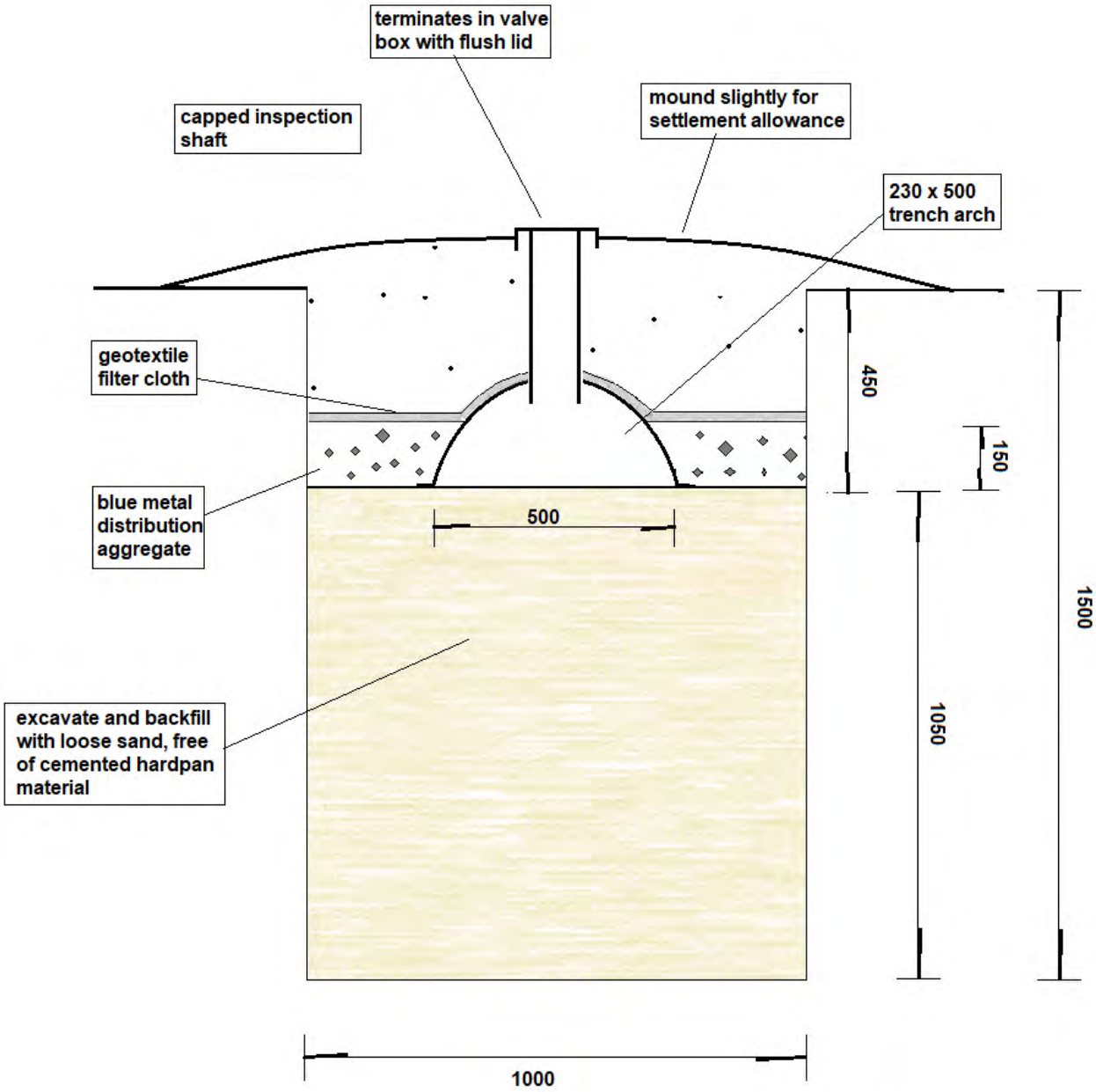
Appendix 3 – Design plans

Site Plan



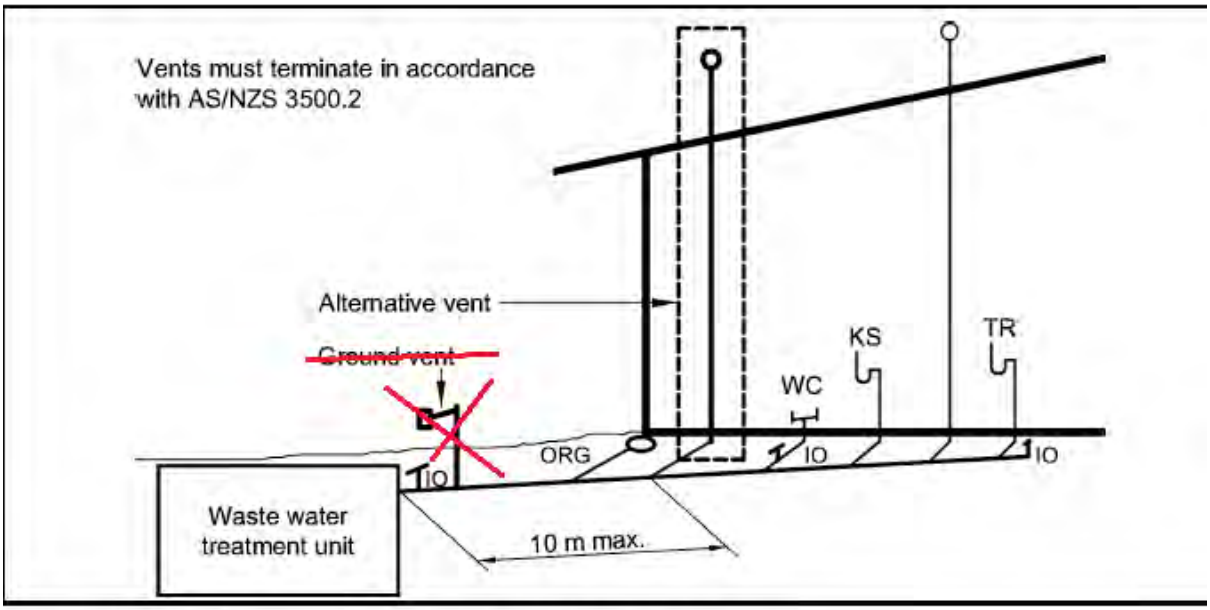
Drainage plan

Please note: Drain along northern boundary of parking area in Development Proposal Additional Information Report by Van Diemen Consulting is to terminate 40m to the East, well clear of the land application area.



Cross-section through proposed absorption bed (10m x 1.0m)

Note: Installation and venting to be in accordance with NCC Pt 3, Tas H101.2 and Tas Figure H101.2 and Parts C1 and C2



Tas Figure H101.2 Alternative venting arrangements

Please note: A septic tank ground level vent must not be installed

Septic tank venting detail – alternative vent configuration to be used to minimise odour impacts.

Appendix 4 – Design specifications.

Wastewater treatment.

- 3250L Bloo septic tank to be installed, receiving all wastes from toilet, handbasins, sinks etc.

- Septic tank outlet to discharge to land application area configured as in-ground absorption bed.

New absorption bed

- Single absorption bed, 10m long x 1.0m wide x 450mm deep.

- 500mm x 230mm high trench arch, 150mm depth of 20mm diameter blue metal distribution aggregate with geotextile filter cloth over, backfilled with sandy fill sourced on site.

- The land application area is to be excavated to a minimum depth of 1500mm and back-filled with clean, loose sand, free of hard pan or other cemented material, to a depth of 450mm of the surface.

- Capped IO to be provided and brought to surface midway along absorption bed, penetrating to full depth of bed with several 8mm perforations in lower 100mm to enable monitoring of wastewater depth in absorption bed.

Exclusion of surface/stormwater

- Cut-off drains are not required; however, care should be taken to ensure that run-off from buildings, hard-standings, roads, rainwater tanks overflows etc do not discharge on or near to the septic tank land application area.

- Drain along northern boundary of parking area in Development Proposal Additional Information Report by Van Diemen Consulting is to terminate 40m to the East, well clear of the land application area.

Attention is drawn to AS/NZS1547.2012 On-site domestic wastewater management, Part L7 Construction techniques which states the following:

L7 CONSTRUCTION TECHNIQUES

L7.1 Good construction technique
The following excavation techniques shall be observed so as to minimise the risk of damage to the soil:

- Plan to excavate only when the weather is fine;

- Avoid excavation when the soil has a moisture content above the plastic limit. This can be tested by seeing if the soil forms a ‘wire’ when rolled between the palms;

(c) During wet seasons or when construction cannot be delayed until the weather becomes fine,
smeared soil surfaces may be raked to reinstate a more natural soil surface, taking care to use
fine tines and only at the surface;

(d) When excavating by machine, fit the bucket with ‘raker teeth’ if possible, and excavate in small
‘bites’ to minimise compaction; and

(e) Avoid compaction by keeping people off the finished trench or bed floor.

In particular for trenches and beds:

(f) If rain is forecast then cover any open trenches, to protect them from rain damage;

(g) Excavate perpendicular to the line of fall or parallel to the contour of sloping ground; and

(h) Ensure that the inverts are horizontal.

CL7.1
Damage can be done by:
(a) Smearing, where the soil surface is smoothed, filling cracks and pores;

(b) Compacting, where the soil porosity is reduced; and

(c) Puddling, where washed clay settles on the base of the trench to form a relatively impermeable layer.

In particular, cohesive soils, or soils containing a significant quantity of clay, are susceptible to damage by excavation equipment during construction.

Appendix 5 – Advice to Project manager and installer

Important notes for Project Manager.

It is vitally important to the future of the on-site wastewater management system to avoid damage to soil structure on the site, which would reduce soil permeability, leading to possible early failure of the effluent absorption trenches.

Actions which may damage soil structure include:

- Compaction, which reduces soil porosity;

The Effluent Land Application Area must be carefully constructed to ensure its optimal operation.

Project Manager Responsibilities.

The Project Manager must ensure that:

- Before project construction work commences, the Effluent Absorption Area is properly identified on site and barricaded, fenced, roped or taped to prevent unauthorised access. This action should be documented both on the site plan and with the local Council.

- Vehicles, earth-moving plant etc do not park or manoeuvre on the Effluent Absorption Area.

- The Effluent Absorption Area is not used for the stockpiling of construction materials, excavated fill or other materials.

- All water runoff resulting from the construction of driveways, cut & fill and other excavations is directed to discharge well away from and downslope of the Effluent Absorption Area.

- The effluent absorption bed excavations etc are not left open and exposed to the weather.

Appendix 6 – Loading Certificate and Operation & Maintenance Requirements

This loading certificate is provided in accordance with Clause 7.4.2(d) of AS/NZS 1547.2012.

Loading Certificate for on-site wastewater management system at 368 Five Mile Jim Road, Memana.

i. **System capacity** (medium-long term) – up to 5 employees
ii. **Design criteria summary**:

- Effluent quality – septic tank, primary treated with septic tank outlet filter fitted.
- Soil category - Category 1 (and)
- Land application system - Absorption bed (see Appendix L of AS/NZS1547.2012)

iii. Reserve area.

Approximately 40m^2 of land in the vicinity of the proposed primary land application area should be reserved from further development (such as buildings, driveway, paths, paved areas, decks, importation of fill or excavations etc), for use as an alternate land application area in the event of a system failure which cannot be addressed without constructing a duplicate absorption bed. There is sufficient suitably located land available on the site for this purpose.

iv. Water efficient fittings etc

Design assumes use of water efficient fixtures and fittings, eg 3L/4.5L flush toilets, 9L/min (max) showerheads, aerator fittings on taps and clothes washing machines/dishwashers with WELSS star ratings of 4.5 stars or above. (See http://www.waterrating.gov.au/)

v. Variation from design flows etc.

The system should successfully manage additional peak loadings which may result from up to 10 workers on the site provided that this does not exceed 5 days in any 20 day period.

vi. Consequences of changing wastewater characteristics.

The building operator should avoid disposing of wastes which would be additional to those normally disposed in a household sewerage system; in particular increases, in organic loadings such as from the use of sink-waste disposal units are to be avoided.

Use of household disinfectants or bactericides in anything more than small amounts and at recommended rates of dilution should also be avoided, as should the disposal of solvents, antibiotics or antimicrobial pharmaceuticals and other chemicals which may kill bacteria and other microorganisms required for effective wastewater treatment.

vii. Consequences of overloading the system.

Long term use by more than four residents or equivalent may cause overloading of the system, surfacing of effluent, public and environmental health nuisances, pollution of surface waters etc.

viii. Avoid overloading the system by observing the following:

Installation of water conserving fittings (eg dual flush 4.5:3 litre toilets; shower flow restrictors; aerator taps and water conserving automatic washing machine).

ix. Consequences of underloading the system.

Nil.

x. **Consequences of lack of operation, maintenance and monitoring attention.**

The septic tank system requires minimal intervention; however it is not a zero-maintenance system; it will require regular desludging of the septic tank and periodic monitoring of wastewater depth in the absorption bed area.

Consequences of failure to observe these requirements may include any or all of the following:

- Spread of infectious diseases to your family and neighbours.
- Breeding of mosquitos and attraction of flies and rodents.
- Nuisance and unpleasant odours.
- Pollution of waterways.
- Contamination of bores, wells and groundwater.
- Excessive and unsightly weed growth.
- Alteration of local ecology

Operation & Maintenance Requirements

- Ensure that the septic tank is desludged by an authorised contractor at five-yearly intervals. Failure to do this at the required frequency may result in carry-over of solids into the absorption bed, causing failure of the land application area, which may then require expensive reconstruction works.
- Discourage access by visitors or pets to the land application area.
- Livestock should not be allowed on or near the absorption bed; if such animals are kept, the land application area should be fenced off to prevent system damage and/or soil compaction.
- Do not allow vehicles on or near the land application area.
- Keep the surface and sub-surface cut-off drain above the land application area open and clear of debris to prevent rainwater flowing into the effluent absorption area.

- Problems can occur with systems which have not been properly maintained and where absorption areas have become blocked or clogged. The warning signs are obvious and include:

- Effluent absorption area is wet or soggy with wastewater ponding on the surface of the ground.
- “Sewage” smells near the absorption bed area.

Appendix 7 – Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Markarna Grazing Company Pty Ltd (Owner /Agent)
Address:
Whitemark 7255 (Suburb/postcod)

Qualified person details:

Qualified person: Richard Mason
Address: 20 Adelong Drive
Kingston 7050
Phone No. 0418589309
Fax No.
Licence No: CC6157T
Email address: richardmason@iprimus.com.au

Qualifications and Insurance details: BSc Env Sciences (Salford)

Environmental Health Professional

Prof Indemnity Insurance: Arch Insurance Policy No. P0021114PI2022AU0

(description from Column 3 of the Director of Building Control's Determination)

Speciality area of expertise: Site and soil evaluation and land application system design.

(description from Column 4 of the Director of Building Control's Determination)

Details of work:

Address: 368 Five Mile Jim Road
Memana 7255
Certificate of title No: 215120/1

The assessable item related to this certificate:

Onsite wastewater management – Site and soil evaluation for onsite wastewater management capability;

including:

Characterisation of wastewater and predicted hydraulic loadings.

Selection of onsite wastewater treatment system

Selection of land application area.

Determination of design loading rate.

(description of the assessable item being certified)
Assessable item includes –
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

Certificate details:

Certificate type: On-site wastewater management - Site and soil evaluation

(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)

Director of Building Control – Date Approved 1 January 2017 | *Building Act 2016* - Approved Form No. 55

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work: ✓

or

a building, temporary structure or plumbing installation: ☐

In issuing this certificate the following matters are relevant –

Documents:	AS/NZS 1547. 2012: On-site domestic-wastewater management.
Relevant calculations:	
References:	AS/NZS 1547.2012: Onsite Domestic Wastewater Management. Directors Guidelines for on-site wastewater management systems - CBOS - 2017

Substance of Certificate: *(what it is that is being certified)*

Site & soil evaluation and design report - New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site), TAS 7255, by Richard Mason, Onsite Assessments Tas, dated 22/08/2022.

Scope and/or Limitations

I certify the matters described in this certificate.

	Signed:	*Certificate No:*	*Date:*
Qualified person:		N/A	22/08/2022

Director of Building Control – Date Approved 1 January 2017 *Building Act 2016* - Approved Form No. 55

Appendix 8 – Form 35

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

Form **35**

To:	Markarna Grazing Company Pty Ltd	*Owner name*
		Address
	Whitemark 7255	*Suburb/postcode*

Designer details:

Name:	Richard Mason	Category:	Building Services Designer Hydraulic - Restricted
Business name:	Onsite Assessments Tas	Phone No:	0418 589 309
Business address:	20 Adelong Drive		
	Kingston 7050	Fax No:	
Licence No:	CC6157T	Email address:	richardmason@iprimus.com.au

Details of the proposed work:

Owner/Applicant	Markarna Grazing Company Pty Ltd	Designer's project reference No.	
Address:	368 Five Mile Jim Road	Lot No:	215120/1
	Memana 7255		

Type of work: Building work ☐ Plumbing work ☒ *(X all applicable)*

Description of work:

Onsite wastewater management system

(new building / alteration / addition / repair / removal / re-erection water / sewerage / stormwater / on-site wastewater management system / backflow prevention / other)

Description of the Design Work (Scope, limitations or exclusions): *(X all applicable certificates)*

Certificate Type:	**Certificate**	**Responsible Practitioner**
	☒ Hydraulic design	Building Services Designer
	☐ Other (specify)	

Deemed-to-Satisfy: ☒ Performance Solution: ☐ *(X the appropriate box)*

Other details:

On site wastewater management system servicing farm buildings.

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

Design documents provided:

The following documents are provided with this Certificate –

Document description:

Drawing numbers:	Prepared by:	Date:
Appendix 3	Richard Mason	22/08/2022
Schedules:	Prepared by: Richard Mason	Date:
Specifications: Appendix 4	Prepared by: Richard Mason	Date: 22/08/2022
Computations: pages 5-6	Prepared by: Richard Mason	Date: 22/08/2022
Performance solution proposals:	Prepared by:	Date:
Test reports:	Prepared by:	Date:

Standards, codes or guidelines relied on in design process:

AS/NZS1547.2012 On site domestic waste water management

NCC Part 3

Director's Guidelines for On-site Wastewater Management Systems, Director of Building Control (Tasmania).

Any other relevant documentation:

Site & soil evaluation and design report - New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site), TAS 7255, by Richard Mason, Onsite Assessments Tas, dated 22/08/2022.

Form 55 dated 22/08/2022 certifying Site & Soil Evaluation and design report.

Attribution as designer:

I Richard Mason ..... am responsible for the design of that part of the work as described in this certificate;

The documentation relating to the design includes sufficient information for the assessment of the work in accordance with the *Building Act 2016* and sufficient detail for the builder or plumber to carry out the work in accordance with the documents and the Act;

This certificate confirms compliance and is evidence of suitability of this design with the requirements of the National Construction Code.

	Name: (print)	*Signed*	*Date*
Designer:	Richard Mason		22/08/2022
Licence No:	CC6157T		

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

Assessment of Certifiable Works: (TasWater)

Note: single residential dwellings and outbuildings on a lot with an existing sewer connection are not considered to increase demand and are not certifiable.

If you cannot check ALL of these boxes, LEAVE THIS SECTION BLANK.

TasWater must then be contacted to determine if the proposed works are Certifiable Works.

I confirm that the proposed works are not Certifiable Works, in accordance with the Guidelines for TasWater CCW Assessments, by virtue that all of the following are satisfied:

- [X] The works will not increase the demand for water supplied by TasWater
- [X] The works will not increase or decrease the amount of sewage or toxins that is to be removed by, or discharged into, TasWater's sewerage infrastructure
- [X] The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- [X] The works will not damage or interfere with TasWater's works
- [X] The works will not adversely affect TasWater's operations
- [X] The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- [X] I have checked the LISTMap to confirm the location of TasWater infrastructure
- [X] If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to TasWater.

Certification:

I Richard Mason being responsible for the proposed work, am satisfied that the works described above are not Certifiable Works, as defined within the *Water and Sewerage Industry Act 2008*, that I have answered the above questions with all due diligence and have read and understood the Guidelines for TasWater CCW Assessments.

Note: the Guidelines for TasWater Certification of Certifiable Works Assessments are available at: www.taswater.com.au

	Name: (print)	*Signed*	*Date*
Designer:	Richard Mason		22/08/2022

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

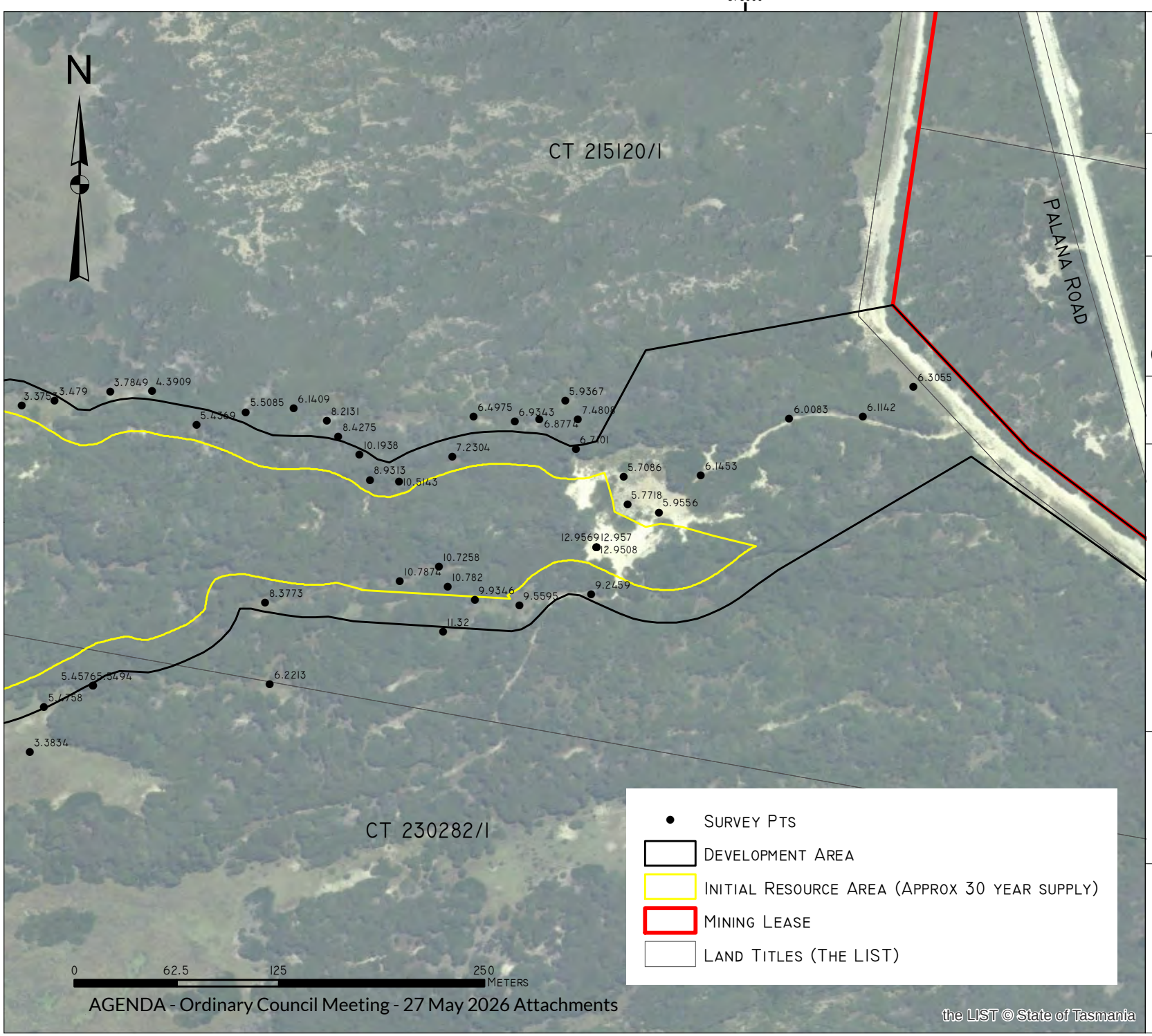
ATTACHMENT 6. LAND SURVEY (HEIGHTS AHD)

Annexure: 16.2.3

MARKARNA PARK PTY LTD

MARKARNA PARK SAND PIT

FIGURE 1: MARKARNA PARK SAND PIT DEVELOPMENT HEIGHT SURVEY (MIN RECORDED HT 2.994 M AHD)



TASMAP: TANNER EMITA

LGA: FLINDERS

NOTE:
SURVEY FOCUSED ON LOW POINT WITHIN AND AROUND THE DEVELOPMENT AREA

BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE BY TASMAP. © STATE OF TASMANIA

Van Diemen CONSULTING
PO BOX 1 NEW TOWN TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

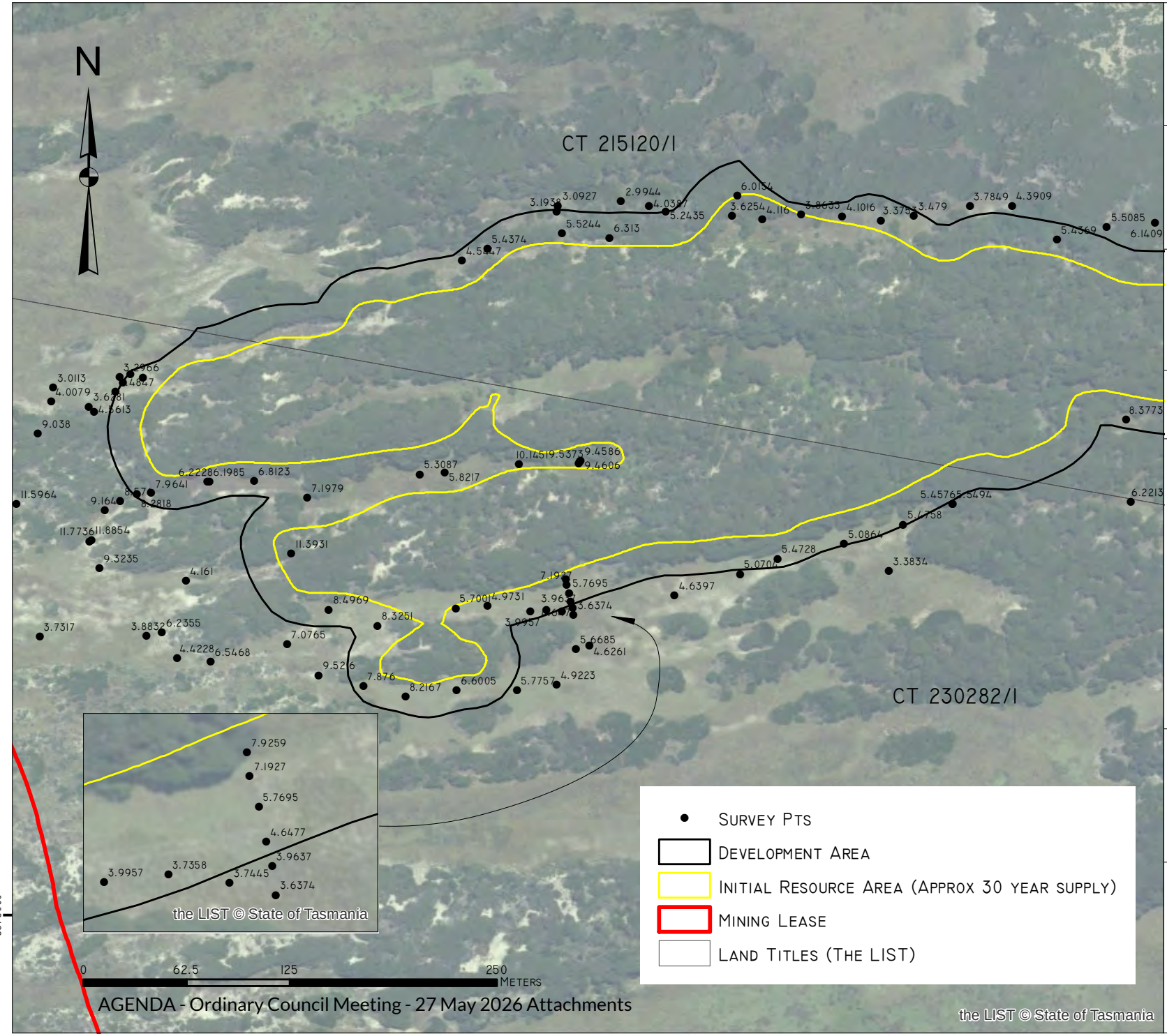
CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 16 JUNE 2023

MARKARNA PARK PTY LTD

MARKARNA PARK SAND PIT

FIGURE 2: MARKARNA PARK SAND PIT DEVELOPMENT HEIGHT SURVEY (MIN RECORDED HT 2.994 M AHD)



TASMAP:	LGA:
TANNER EMITA	FLINDERS

NOTE:
SURVEY FOCUSED ON LOW POINT WITHIN AND AROUND THE DEVELOPMENT AREA

BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE BY TASMAP. © STATE OF TASMANIA

Van Diemen CONSULTING
PO BOX 1 NEW TOWN TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 16 JUNE 2023

ATTACHMENT 7. TRAFFIC IMPACT ASSESSMENT

MARSHALL BAY LIME SAND PIT, PALANA ROAD

TRAFFIC IMPACT ASSESMENT

APPLICANT: MARKARNA GRAZING COMPANY PTY LTD

FEBRUARY 2025

REVISION HISTORY

Date	Rev	Prepared By	Reviewed By
24/02/2025	01	Janitha Senavirathna CPEng MIEAust NER	Sandun Ineshka Eng MIEAust

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DEFINITIONS AND ABBREVIATIONS

TIA	Traffic Impact Assessment
AADT	Annual Average Daily Traffic (means the number of vehicles per day averaged over all days in a calendar year)
Scheme	Tasmanian Planning Scheme - Flinders Local Provisions Schedule
(the) Pit	Marshall Bay Lime Sand Pit
Trip(s)	A one-way vehicular movement from one point to another
Major Road	For the purpose of this TIA, the major road is Palana Road
Road Category	As defined in Tasmanian State Road Hierarchy (DIER2017)

1 INTRODUCTION

The Marshall Bay Lime Sand Pit is located within the Mining Lease ML 2117 P/M on private freehold land (CT 120064/1, CT 215120/1, CT 230282/1) south of Lughrata in the Flinders Municipality.

The Mining Lease (and Pit) is accessed from Palana Road. The proponent of the project is Markarna Grazing Company Pty Ltd.

This Traffic Impact Assessment (herein referred to as TIA) has been prepared as a requirement of the Tasmanian Planning Scheme – Flinders in order to support the Council in assessing the development application.

This report evaluates current traffic, road, and other road use-related conditions along Palana Road and in the vicinity of the Pit. The assessment of trips generated from the activity and the impact on Palana Road was also evaluated.

Further, the site access conditions as well as sight distances to the entrance of the site were also assessed, and due advice is given.

The report has been prepared to satisfy the requirements laid out by –

- Guide to Traffic Management Part 12, Integrated Transport Assessments for Developments – Austroads;
- Traffic Impact Assessment Guidelines, August 2020 – Department of State Growth; and
- TIA Framework, Tasmania 2007 – Department of Infrastructure, Energy and Resources.

The assessment also references to the following information and resources –

- Tasmanian Planning Scheme - Flinders Local Provisions Schedule;
- Department of State Growth Crash database; and
- Google Earth Imagery.

2 SITE DESCRIPTION

The Marshall Bay Lime Sand Pit is located within Mining Lease 2117 P/M on private freehold land approximately 1.2 km to the south of Lughrata on Flinders Island. The Pit is accessed via an existing gravel road that branches off Palana Road as shown in **Figure 2.1**. There is approximately 0.4 km between the Pit and Palana Road.

This existing gravel road will be used as the access route to the Pit during the construction of the proposed infrastructure and also when operational.

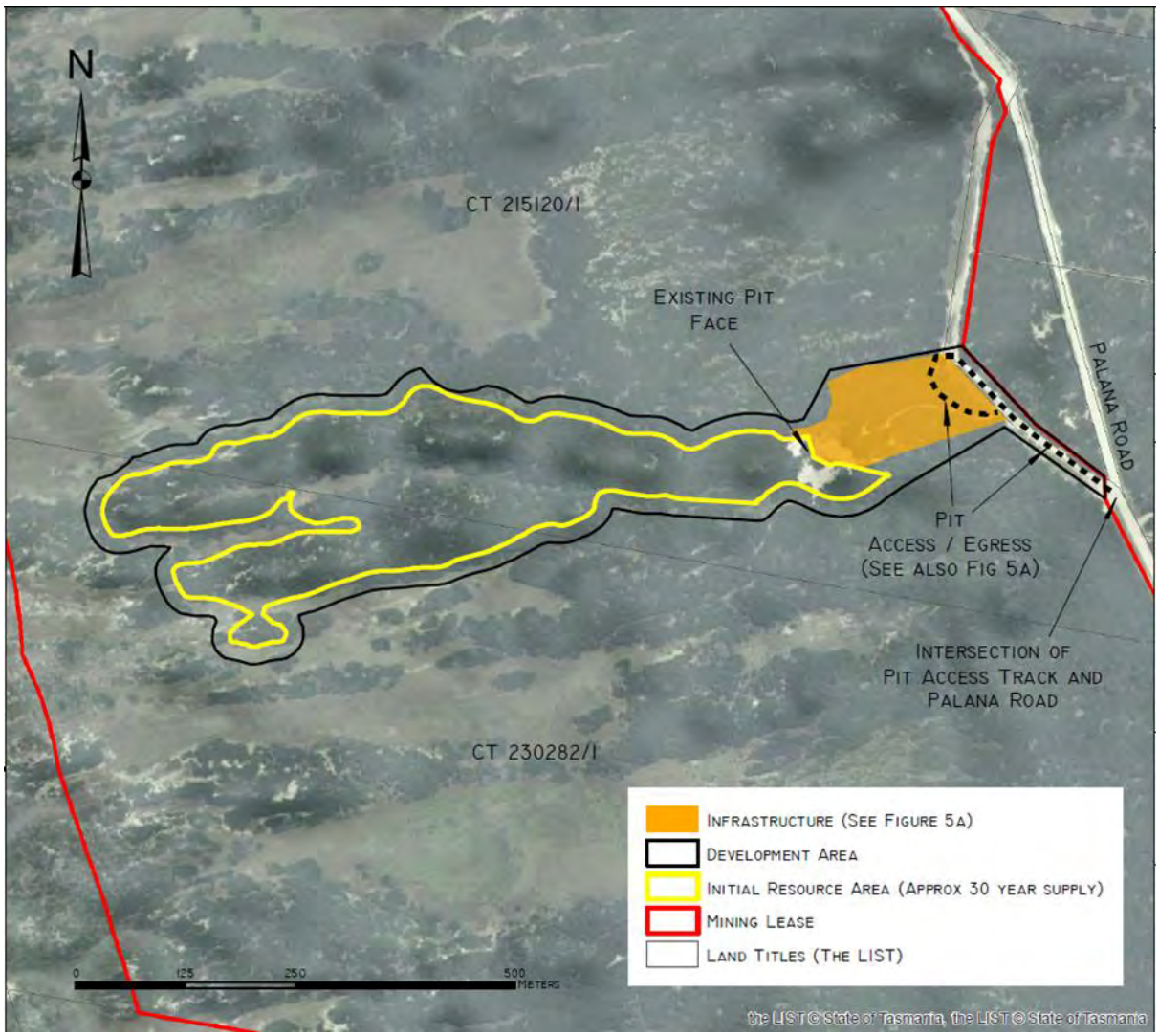


Figure 2.1: Location of Marshall Bay Lime Sand Pit

3 DEVELOPMENT PROPOSAL

The proposed development involves the extraction of lime sand from an existing dune series, for use as an agricultural soil ameliorant to enhance land (soil) quality.

The raw sand will be screened to remove any organic matter and physical contaminants, such as shells, rocks, and stones, ensuring its suitability for agricultural use. In some cases, additional soil additives, such as boron, may be mixed with the lime sands before transportation to the intended application sites, typically paddocks for spreading.

The extraction is planned at a maximum annual quantity of 10,000 cubic meters, equivalent to 15,000 tons, with a loose bulk density ratio of 1.5.

Due to the seasonal demands for pasture improvement, transportation of the material is expected to peak during the summer and autumn months. The extraction will take place within the designated Maximum Extraction Area (MEA), located within the broader Development Area. This MEA contains a resource estimated to last for up to 30 years at full production levels. Additionally, the processing capacity is set at 10,000 cubic meters per annum, ensuring the efficient preparation of the material for its intended agricultural use.

The use and development includes the following –

- Surface site preparation by vegetation and topsoil stripping and stockpiling;
- Excavation of material with a bulldozer and/or excavator;
- Transport of sands to the storage shed for screening/storage and occasional mixing with other soil ameliorants/additives (e.g., additional micro-nutrients and essential plant nutrients such as boron). Some sand will be loaded at the pit into trucks for immediate delivery to agricultural lands;
- Screening (up to 10,000 cubic metres per annum) to remove any vegetative/root debris and/or rocks and stones;
- Loading trucks with wheel loader from the pit face and/or stockpile area; and
- Transport of material by truck.

4 TRIP GENERATION AT THE PROPOSED ACCESS

A Trip in this report is defined as a one-way vehicular movement from one point to another, excluding the return journey. Therefore, a return trip to and from a land use is counted as two trips.

The maximum extraction volume of 15,000 tonnes corresponds to about 1,500 truckloads per annum based on 10-tonne loads (smaller loads are used given the material is to be spread on pastures and ploughed land). Lime sands are mainly required in summer and autumn (January to May) which coincides with the peak activity period of agricultural pasture improvement, maintenance, and establishment.

Approximately 300 Trips per week (150 truckloads) are expected for an 8 to 10-week period of carting (generally within the period March to May). Over 5 days each week this amounts to about 60 Trips per day (or 30 truckloads per day). All traffic would enter and exit onto the sealed section of Palana Road using the currently disused reserved road (unsealed) section of what was Palana Road.

5 EXISTING ROAD AND TRAFFIC CONDITIONS

All traffic accessing the Pit will need to travel along Palana Road, and this section of the assessment will examine the current traffic flow and condition.

5.1 Road Condition

The Pit is accessed via Palana Road. This part of the road is managed by the DSG. Under the Tasmanian State Road Hierarchy, it is classified as a Category 5 Road, which primarily provides safe access to private properties and some may be used for low frequency heavy freight vehicle transport.

At its junction with the Pit access road, Palana Road –

- is a sealed two-way road with a width of approximately 6m and has gravel shoulders on either side;
- generally has a flat terrain with a posted speed limit of 100 km/h; andhas guideposts on either side, but no other notable traffic controlling measures are in place.

Around 40 m south to Pit access, there is an existing access to an extraction piton the opposite side of Palana Road.

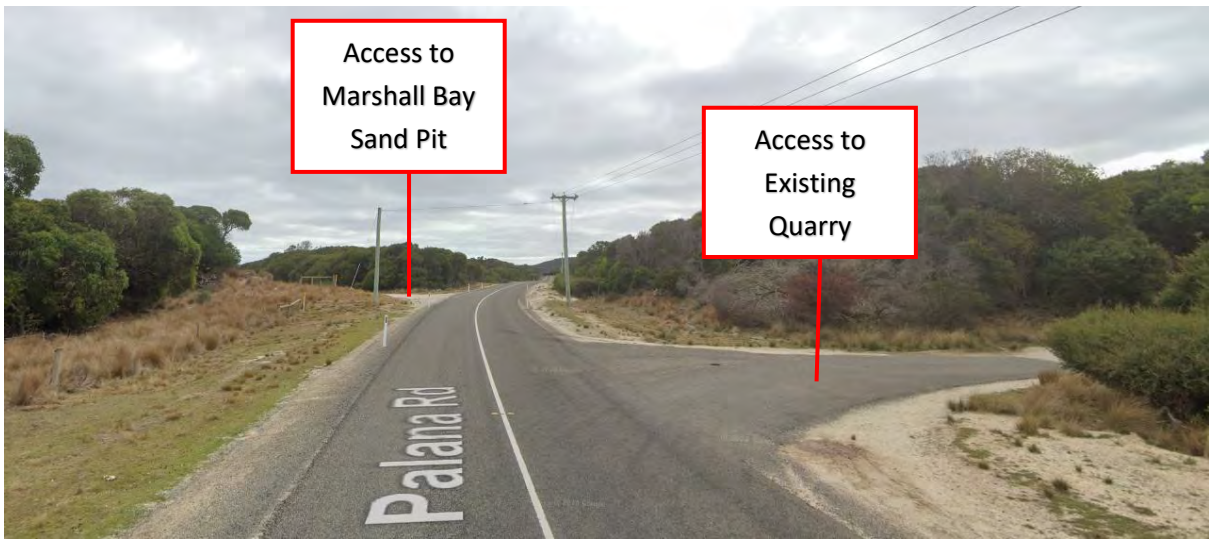


Figure 5.1: Existing Quarry Access and Marshall Bay Sand Pit Access.

Figures 5.2 and 5.3 show aerial view and the view of the road respectively.

Figure 5.2: Aerial view of the Proposed Pit Area

Figure 5.3: Access to the Pit

Figure 5.4: Existing Gravel Road

5.2 Traffic Condition

Traffic data were obtained from the DSG portal; GEOCOUNTS Traffic and other traffic impact assessment conducted on Flinders Island Road network.

According to the GEOCOUNTS traffic data there was 450 annual average daily traffic recorded in the area with 9.1% heavy vehicle in 2003.

This can be modified to match the current data with the assumption of 1.5% growth rate in the area.

Adjusted AADT=$AADT_{2003}$×(1+Growth Rate)$^{\text{Number of Years}}$

Where:

- $AADT_{2003}$=450
- Growth Rate = 1.5% or 0.015
- Number of Years = 2025 - 2003 = 22 years

Now, applying the values:

Adjusted AADT=450×$(1+0.015)^{22}$ = 624.

The adjusted AADT for 2025, with a growth rate of 1.5% per year, would be approximately 624 vehicles.

Peak hour traffic is calculated based on 12% AADT adjustment and therefore peak hour traffic on Palana Road is; Peak Hour Traffic=AADT×0.12; Peak Hour Traffic=624×0.12=74.88=75

This number is consistent with Lagoon Road peak hour traffic, which was 78Vph according to Matthew Moore, 2019 June, P 11. (Traffic Impact Assessment – 3 Robert Street Whitemark).

5.3 Crash Record

DSG maintains a database of reported road crashes. Crash record data was obtained through this database.

Interrogation of this database found, there has been 1 crash in the past five years since 2020 on the road;8 September 2023 at 2100H.

No crashes have happened involving vehicles leaving or entering the access road into the Pit.

Since the frequency of crashes is on the lower side as per the crash data, it can be concluded that no safety concerns related to crashes due to the proposed development exist.

6 IMPACT FROM TRAFFIC GENERATED BY THE DEVELOPMENT

As described in section 4 of this report, this development is expected to generate around 1,500 truck movements (trips) annually which would amount to a total of 3,000 trips per year.

6.1 Additional Traffic on Palana Road due to the Development

Average Annual Daily Traffic (two-way) is 624 as per adjusted and historical data available as stated in section 5.2 of this report.

Current AADT (vpd)	624
Average Vehicle Movements per Year (AADT X 365)	227,760
New Vehicle Movements by Development	3000
New Total Traffic Movements for Palana Road near Pit	230760
New AADT (vpd)	632.2
Increase in AADT (%)	1.32%

Table 6.1: AADT Comparison

Assuming constant trips between 7.00AM to 5.00PM shift, this will add 6 veh/hr (60 vehicles over 10hrs) to the peak flow. During the peak period of the year, the peak hour traffic flow is expected to rise up to 81 veh/hr on Palana Road including the peak traffic generated from the Pit. The increase in the value due to the traffic generated from the Pit is negligible.

Hence, it can be concluded that the impact of the additional traffic generated by the operation of the Pit on Palana Road is insignificant.

6.2 Sight Distance along Palana Road at Junction of Pit Access Road

An investigation was undertaken on Palana Road at the existing junction of the access road to the Pit to confirm the adequacy of available sight distances along Palana Road.

As per Austroads Part 4A, the Safe Intersection Sight Distance (SSID) is the minimum sight distance that should be provided on the major road at any intersection. The maximum posted speed on Palana Road is 100 km/h and the minimum SISD requirement for that speed considering an observation time of 3 seconds and a reaction time of 2.5 seconds, is 262 m on either side of the intersection.

Sight distance towards the Lughrata is approximately 430m while sight distance to the south towards Whitemark Township is about 730m (measured from the access where a truck would sit to check traffic on Palana Road). Hence, the available sight distances in both directions from the Pit access road junction satisfy the SISD requirements.

Figures 6.1 and 6.2 show view Lughrata and Whitemark respectively.

Figure 6.1: View to the North

Figure 6.2: View to the South

6.3 Turn Treatments on Palana Road

Austroads Part 6 provides guidelines and technical requirements that should be met when designing or evaluating a junction. On a rural road where design speed exceeds 100 km/h (≥100 km/h), the requirements for junction treatments are shown in Figure 6.3.

The peak hour vehicle flow on Palana Road is estimated at 81 veh/hr as per historical data. The number of vehicles turning from Palana Road to the pit site at the peak hour is expected to be 6 veh/hr, considering the peak flow traffic generation from the site. According to the graph, the conflicts created by left turning vehicles from Palana Road are insignificant. Hence, the necessity to provide a dedicated turning lane on Palana Road ceases to exist.

Turn volume pertaining to the peak hour traffic flow is shown in a blue circle on Figure 6.3.

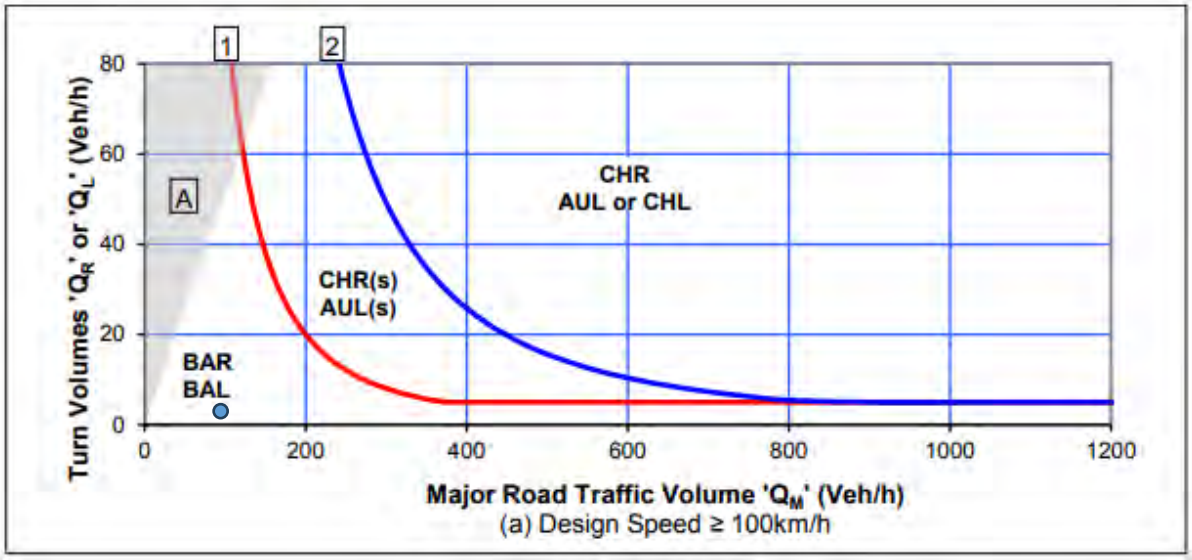


Figure 6.3: Austroads warrant on turning treatment for high speed rural roads

6.4 Other Considerations

Three (3) car parking bays and circulating arrangements will be provided on-site where the proposed hardstand area is located. Typically, sites like this have more open space for vehicle parking and maneuvering to meet all operational requirements.

Figure 6.4 shows the location of parking bays and truck maneuvering path at the Pit.

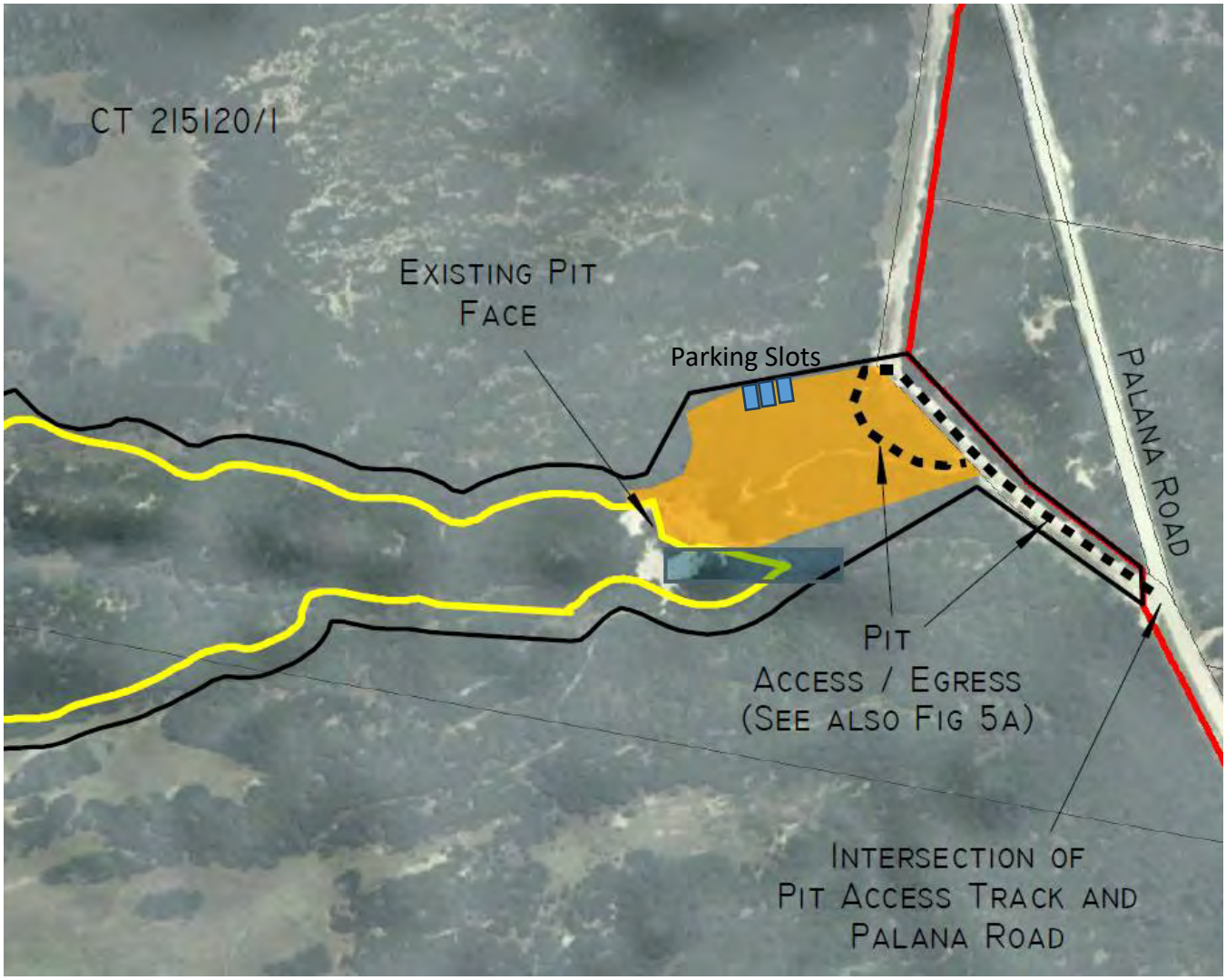


Figure 6.4: Parking bays and truck route.

7 PLANNING SCHEME

7.1 C3.0 Road and Railway Assets Code

C3.5.1 Traffic generation at a vehicle crossing, level crossing or new junction.

The property has an existing access to Palana Road which has a speed limit of 100km/h. The vehicle movement generation is not expected to exceed the AADT at the existing access more than by 10%.

Performance Criteria	Assessment
A1.4 Vehicular traffic to and from the site, using an existing vehicle crossing or private level crossing, will not increase by more than: (a) the amounts in Table C3.1; or (b) allowed by a licence issued under Part IVA of the Roads and Jetties	Amount of acceptable increase in annual average daily traffic to and from the site (total of ingress and egress) Vehicles up to 5.5m long 10% or 10 vehicle movements per day, whichever is the greater

Current AADT	624
Average Vehicle Movements per Year (AADT X 365)	227,760
New Vehicle Movements by Development	3000
New Total Traffic Movements	230760
New AADT (vpd)	632.2
Increase in AADT (%)	1.32%

Table 7.1: Performance Criteria C3.5.1

7.2 Car parking and Sustainable Transport Code

The development will not generate a parking demand. However, three (3) parking bays will be provided at the site as showed in Figure 6.4.

The area associated with the Pit working area is of sufficient size to accommodate parking of vehicles and will not cause any parking overflow outside of the property.

The area associated with the Pit working area is of sufficient size to allow turning of vehicles, so that all vehicles entering and leaving the property will travel in a forward direction.

The operation of the Pit, including during its construction phase, will not generate any active transport demands.

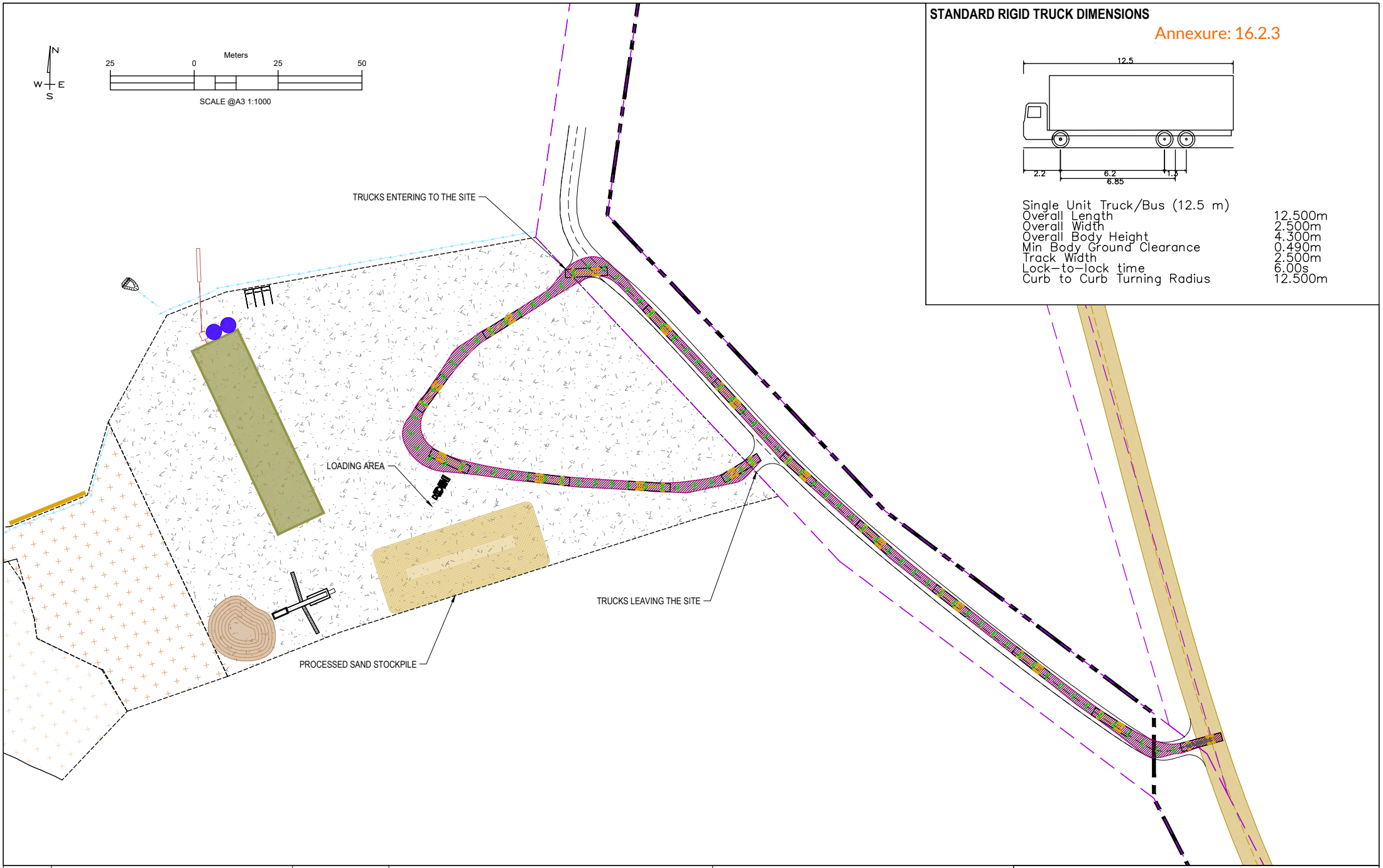
8 CONCLUSION

- The traffic generated from the operation of the Pit is insignificant and would not have any adverse impacts on the efficiency and safety of Palana Road, which is the major road connecting to the Pit;
- Traffic on the Palana Road will only be increased marginally due to the traffic generated from the Pit;
- The existing site access will be used to provide safe and efficient access from and to Palana Road;
- The existing Pit access is capable of accommodating heavy articulated vehicles, and a two-coat spray seal will be applied from the current sealed surface for 25 meters into the existing unsealed road, in compliance with Tasmania Standard Drawing TSD-RO5-V2;
- There is sufficient SSID at the Pit access for drivers to enter and leave safely, without adversely impacting other road users; and
- The frequency of the crashes on Palana Road in the vicinity of the site is very low.

This traffic impact assessment was carried out adhering to the relevant traffic engineering principles and available guidelines. It can be concluded that traffic generated from the operation of the Pit (including its construction phase) is not expected to create any adverse traffic related problem or a safety issue on Palana Road. Hence, this TIA found no reason for this development to not proceed further.

9 ATTACHMENTS

9.1 Internal Layout of the Site



STANDARD RIGID TRUCK DIMENSIONS

Annexure: 16.2.3

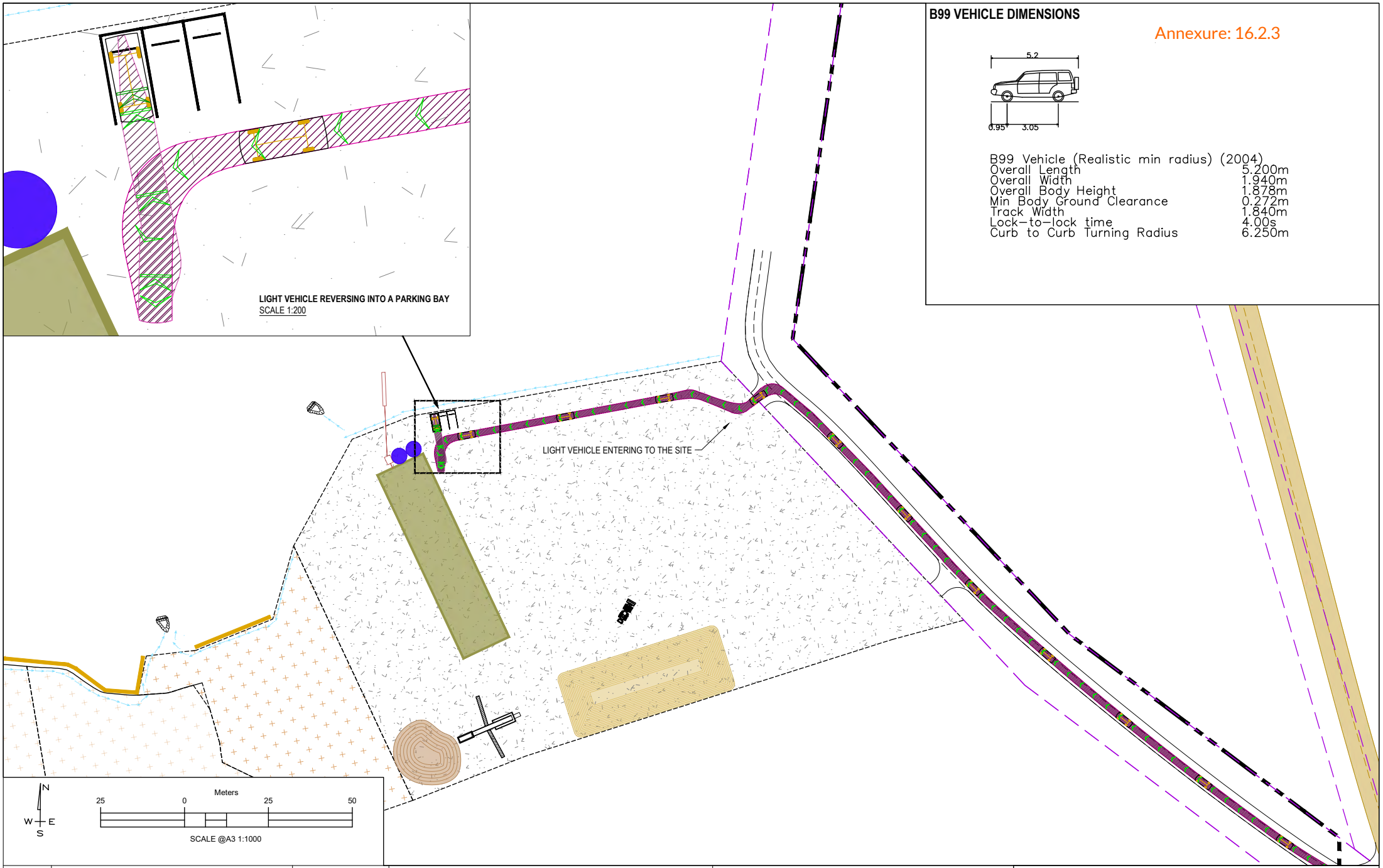
Single Unit Truck/Bus (12.5 m)	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SWEPT PATH ANALYSIS FOR RIGID TRUCK

DRAWING NUMBER: VDC/MSP/A/107

Van Diemen CONSULTING



B99 VEHICLE DIMENSIONS

Annexure: 16.2.3

B99 Vehicle (Realistic min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

SWEPT PATH ANALYSIS FOR LIGHT VEHICLE

DRAWING NUMBER: VDC/MSP/A/108

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ATTACHMENT 8. SITE LAYOUT AND ANALYSES

DRAWING LIST

	DRAWING NO.	REVISION	DESCRIPTION
1	VDC/MSP/A/101	1.0	COVER PAGE
2	VDC/MSP/A/102	0.0	SITE LAYOUT - PAD AREA AND SITE ENTRANCE
3	VDC/MSP/A/103	0.0	IMMEDIATE EXTRACTION AREA
4	VDC/MSP/A/104	0.0	ON-SITE WASTEWATER SYSTEM
5	VDC/MSP/A/105	0.0	PROPOSED SHED
6	VDC/MSP/A/106	0.0	LIGHT VEHICLE PARKING BAY
7	VDC/MSP/A/107	0.0	SWEPT PATH ANALYSIS FOR RIGID TRUCK
8	VDC/MSP/A/108	0.0	SWEPT PATH ANALYSIS FOR LIGHT VEHICLE
9	VDC/MSP/A/201	0.0	TITLE BOUNDARIES AND MINING LEASE
10	VDC/MSP/A/202	0.0	SETBACKS FROM EXTRACTION AREA TO TITLE BOUNDARIES
11	VDC/MSP/A/203	0.0	SETBACKS TO THE SHED AND PARKING BAY
12	VDC/MSP/A/204	0.0	EXISTING SURROUNDING PROPERTIES AND USES
13	VDC/MSP/A/205	0.0	SITE SOIL CONDITIONS AND SURROUNDING GEOLOGY
14	VDC/MSP/A/301	0.0	TOPOGRAPHY AND HYDROLOGICAL FEATURS
15	VDC/MSP/A/302	0.0	NATURAL HAZARDS - SULPHATE SOILS AND INUNDATION
16	VDC/MSP/A/303	0.0	NATURAL HAZARDS - BUSHFIRE AND LANDSLIP

MARSHALL BAY SAND PIT

SITE ANALYSIS AND SITE PLANS

Annexure: 16.2.3

LOCALITY MAP

SCALE: N.T.S.

DRAWING LIST

	DRAWING NO.	REVISION	DESCRIPTION
1	VDC/MSP/A/101	1.0	COVER PAGE
2	VDC/MSP/A/102	0.0	SITE LAYOUT - PAD AREA AND SITE ENTRANCE
3	VDC/MSP/A/103	0.0	IMMEDIATE EXTRACTION AREA
4	VDC/MSP/A/104	0.0	ON-SITE WASTEWATER SYSTEM
5	VDC/MSP/A/105	0.0	PROPOSED SHED
6	VDC/MSP/A/106	0.0	LIGHT VEHICLE PARKING BAY
7	VDC/MSP/A/107	0.0	SWEPT PATH ANALYSIS FOR RIGID TRUCK
8	VDC/MSP/A/108	0.0	SWEPT PATH ANALYSIS FOR LIGHT VEHICLE
9	VDC/MSP/A/201	0.0	TITLE BOUNDARIES AND MINING LEASE
10	VDC/MSP/A/202	0.0	SETBACKS FROM EXTRACTION AREA TO TITLE BOUNDARIES
11	VDC/MSP/A/203	0.0	SETBACKS TO THE SHED AND PARKING BAY
12	VDC/MSP/A/204	0.0	EXISTING SURROUNDING PROPERTIES AND USES
13	VDC/MSP/A/205	0.0	SITE SOIL CONDITIONS AND SURROUNDING GEOLOGY
14	VDC/MSP/A/301	0.0	TOPOGRAPHY AND HYDROLOGICAL FEATURS
15	VDC/MSP/A/302	0.0	NATURAL HAZARDS - SULPHATE SOILS AND INUNDATION
16	VDC/MSP/A/303	0.0	NATURAL HAZARDS - BUSHFIRE AND LANDSLIP

LEGEND

- MINING LEASE
- DEVELOPMENT AREA
- EXTRACTION AREA (APPROX. 30 YEAR SUPPLY)
- EXISTING (DISUSED) PIT
- PROPOSED MINING BLOCKS
- DIVERSION CHANNELS / DRAINS
- STORMWATER FLOW DIRECTION
- CADASTRAL PARCEL BOUNDARIES

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
REV 1.0	SETBACK PLANS, HAZARDS PLANS UPDATED	19/01/2026	ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE LAYOUTS AND VEHICLE SWEPT PATH ANALYSIS

DRAWING NUMBER: VDC/MSP/A/101

Van Diemen CONSULTING

PERMANENT DRAIN TO INTERCEPT STORMWATER RUNOFF FROM THE PAD AREA AND DIRECT TO BS-C1 SEDIMENT BASIN

SEPTIC TANK AND ABSORPTION BED

LIGHT VEHICLE PARKING BAY (X3)

PERMANENT SEDIMENT BASIN TO TREAT STORMWATER RUNOFF FROM THE PAD AREA (BS-C1)

2 X 50,000L WATER TANK

SHED

ACCESS / EGRESS TO PAD AREA

PALANA ROAD

SEDIMENT BASIN (BS-F1)

PAD AREA APPROX. 1.6ha

RAW SAND STOCKPILE

PROCESSED SAND STOCKPILE (SCREENED)

MOBILE SCREEN PLANT

EXISTING PIT AREA

SITE ACCESS FROM PALANA ROAD

N W E S

Meters 25 0 25 50

SCALE @A3 1:1000

NOTES - CONTOURS

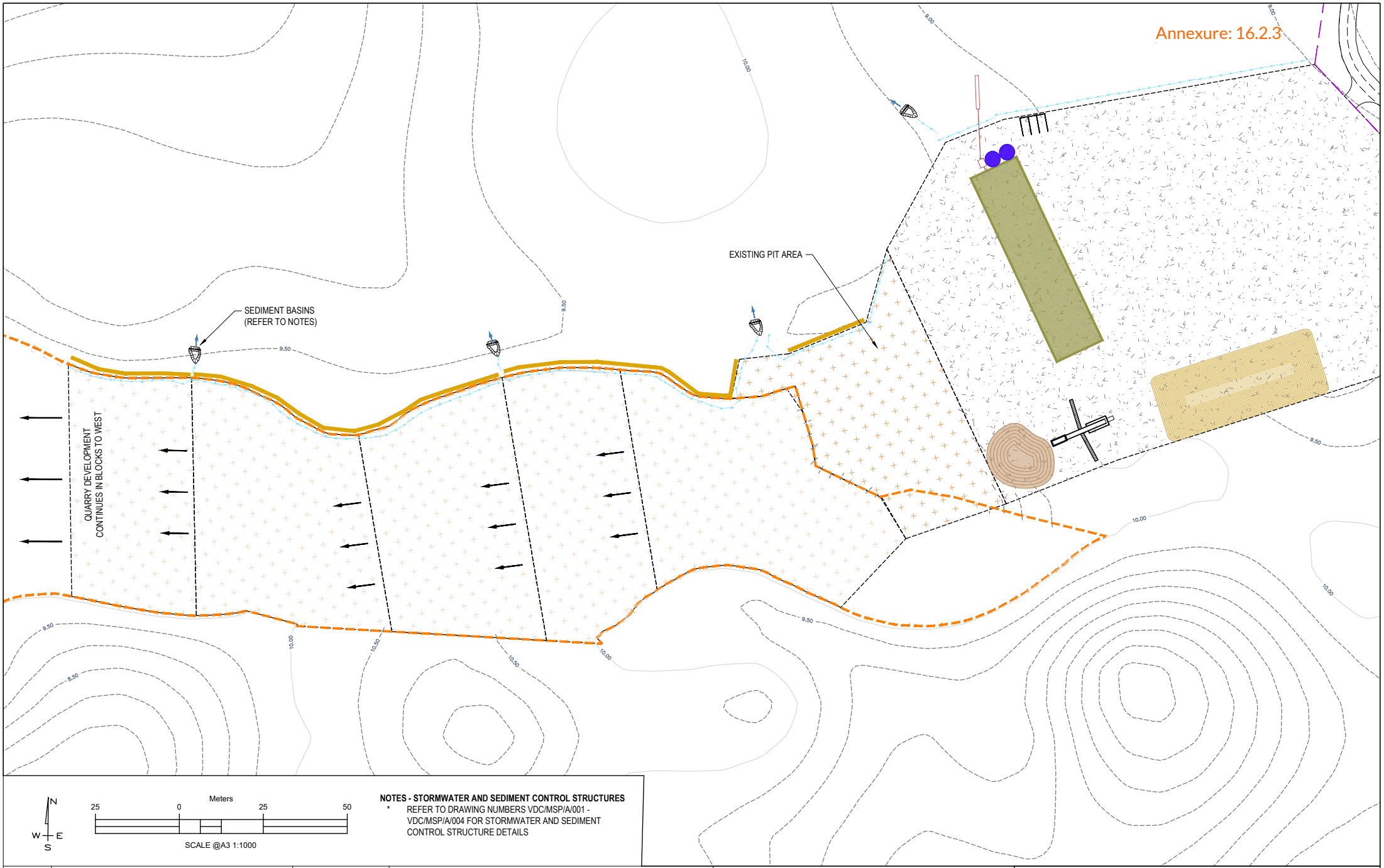
* CONTOUR INTERVAL : 0.5m
* DISPLAY CONTOUR TYPE : EXISTING

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE LAYOUT - PAD AREA AND SITE ENTRANCE

DRAWING NUMBER: VDC/MSP/A/102

Van Diemen CONSULTING



N
W E
S

Meters
25 0 25 50
SCALE @A3 1:1000

NOTES - STORMWATER AND SEDIMENT CONTROL STRUCTURES

* REFER TO DRAWING NUMBERS VDC/MSP/A/001 - VDC/MSP/A/004 FOR STORMWATER AND SEDIMENT CONTROL STRUCTURE DETAILS

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

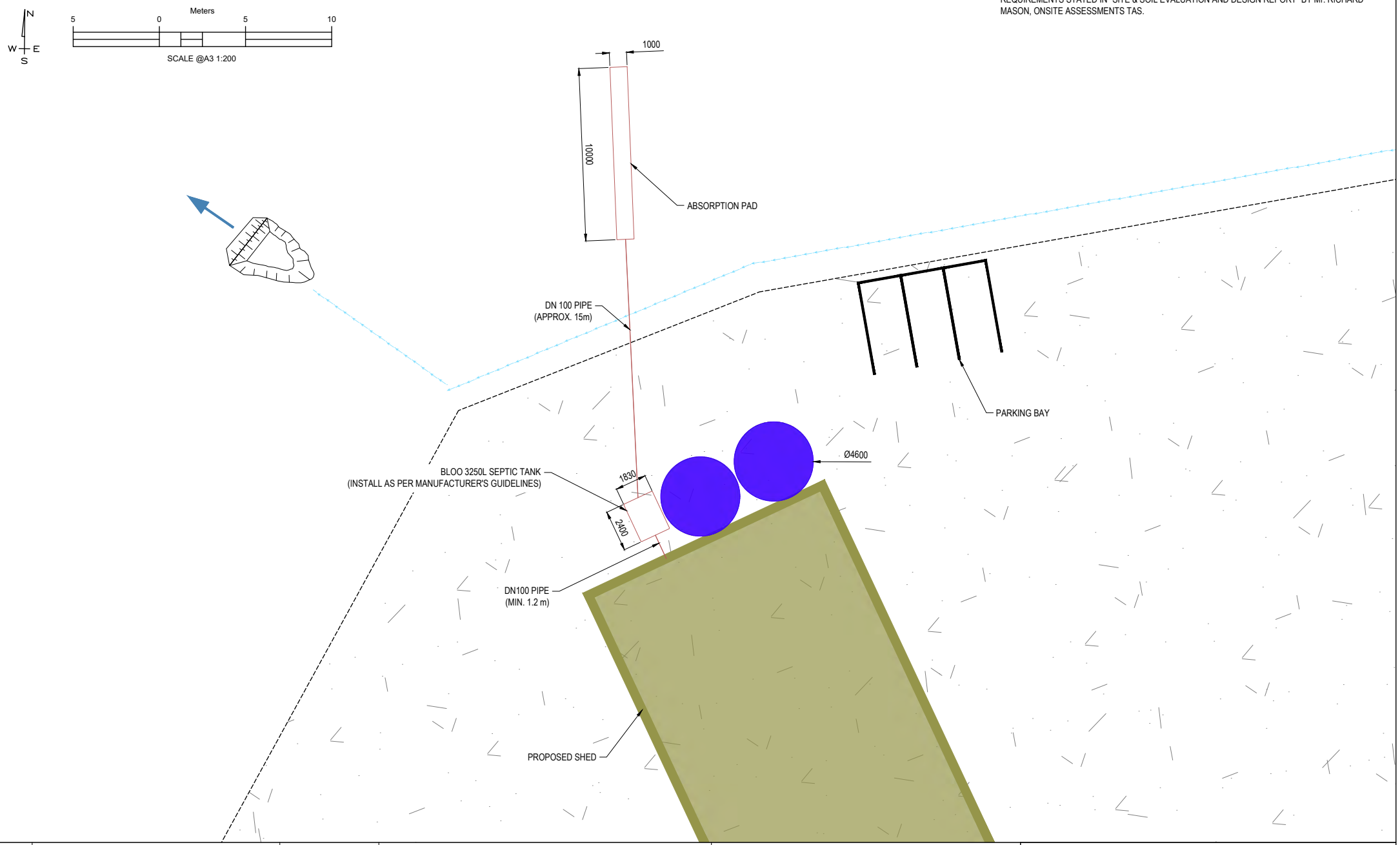
IMMEDIATE EXTRACTION AREA

DRAWING NUMBER: VDC/MSP/A/103

Van Diemen CONSULTING

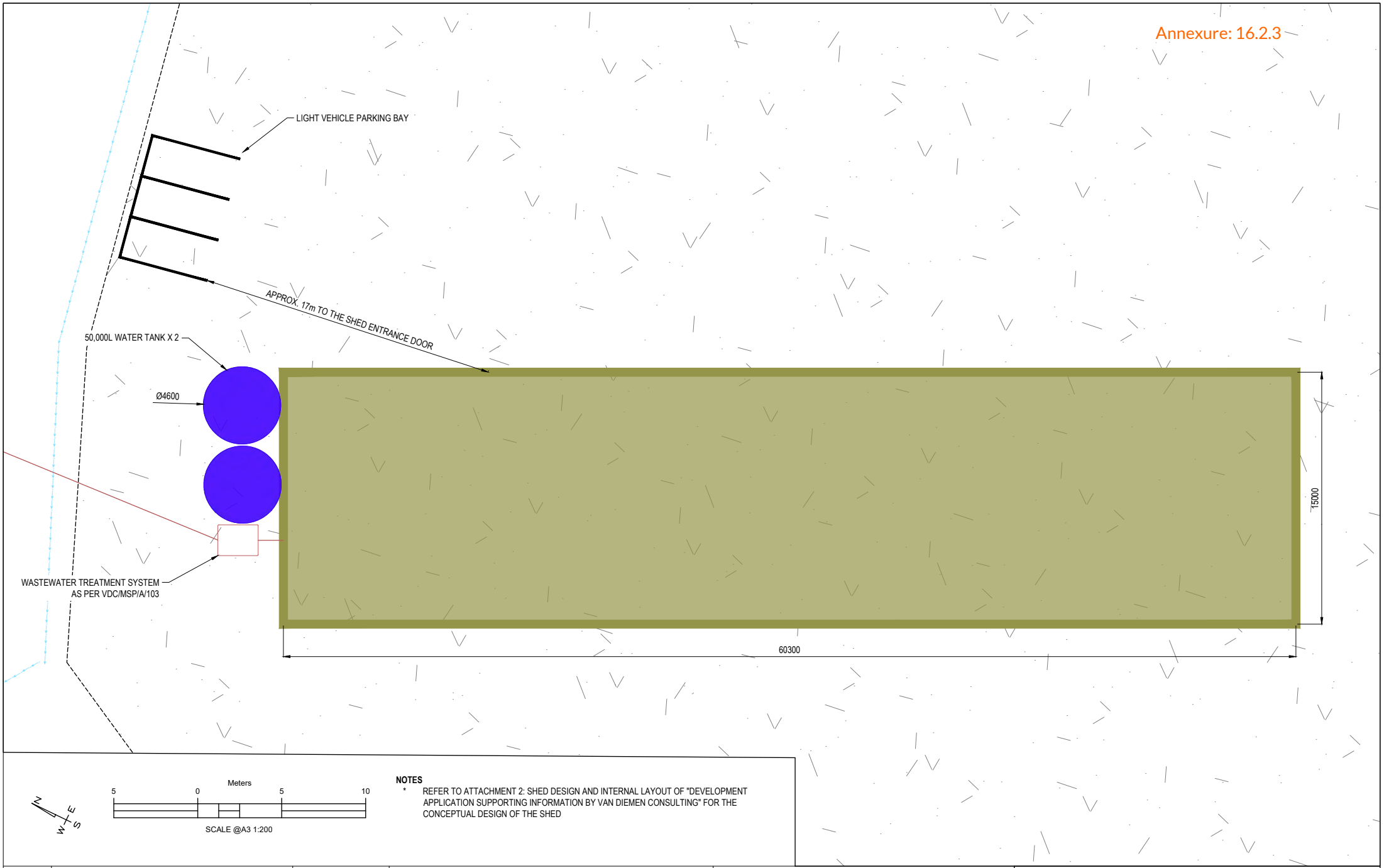
NOTES

* ONSITE WASTEWATER MANAGEMENT SYSTEM MUST BE CONSTRUCTED AS PER THE REQUIREMENTS STATED IN "SITE & SOIL EVALUATION AND DESIGN REPORT" BY Mr. RICHARD MASON, ONSITE ASSESSMENTS TAS.



			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**ON-SITE WASTEWATER MANAGEMENT SYSTEM**
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255	
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD	
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED	
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/104
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, BSc(Eng.)Hons*)	

Van Diemen CONSULTING



NOTES

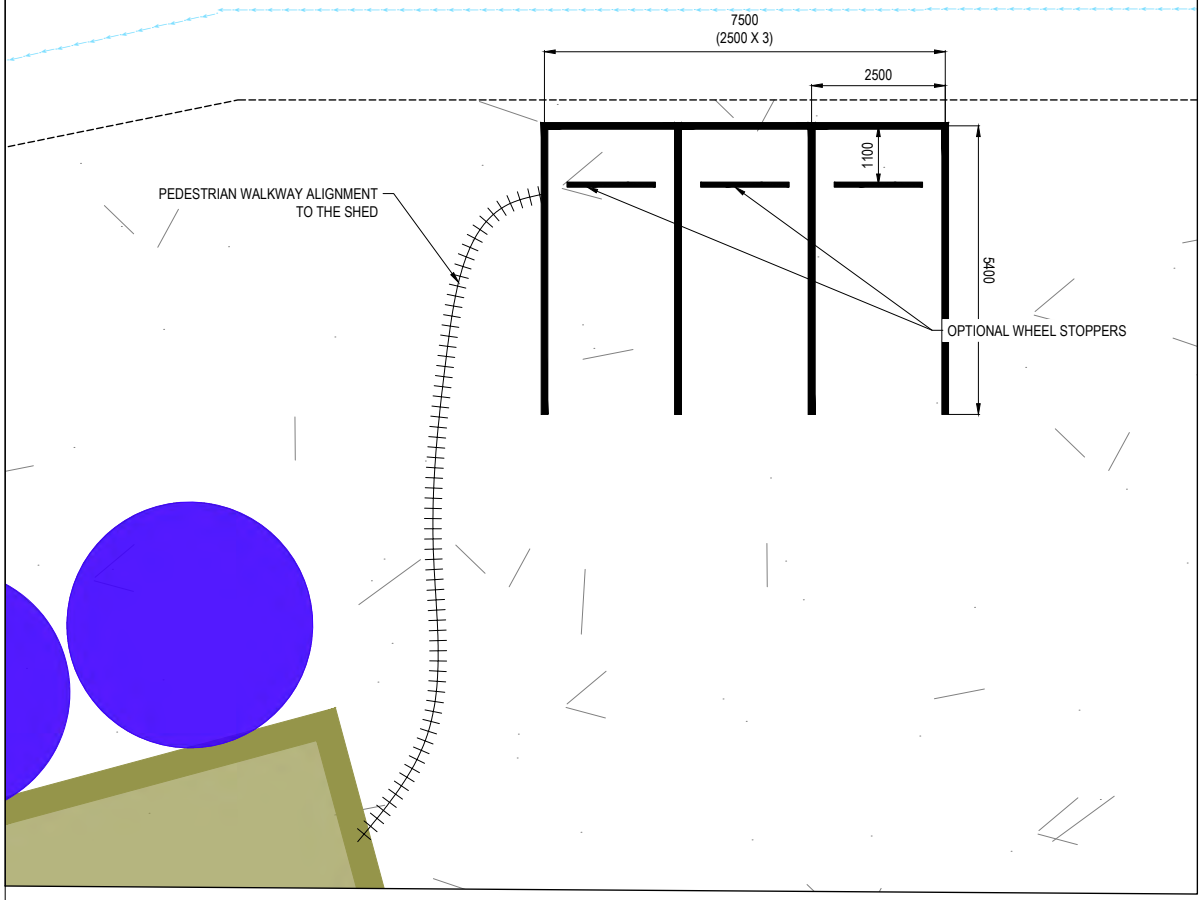
* REFER TO ATTACHMENT 2: SHED DESIGN AND INTERNAL LAYOUT OF "DEVELOPMENT APPLICATION SUPPORTING INFORMATION BY VAN DIEMEN CONSULTING" FOR THE CONCEPTUAL DESIGN OF THE SHED

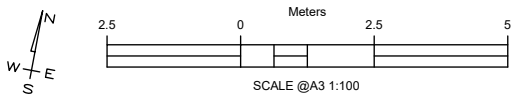
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

PROPOSED SHED

DRAWING NUMBER: VDC/MSP/A/105

Van Diemen CONSULTING





NOTES

1. PARKING SPACES ARE DESIGNED TO SUIT B99 VEHICLES
2. DESIGN STANDARD: AS 2890.1-2004
3. PARKING FACILITY USER CLASS: CLASS 01 AS PER AS 2890.1-2004 (EMPLOYEE AND COMMUTER PARKING)
4. PARKING ANGLE: 90 DEGREES
5. REVERSE PARKING ONLY
6. WHERE WHEEL STOPS ARE INSTALLED, WHEEL STOPS SHALL BE 100mm IN HEIGHT, AND 1650 ± 50 mm IN LENGTH.
7. PARKING BAYS TO BE DELINEATED USING PHYSICAL MARKERS SUITABLE FOR GRAVEL SURFACES, SUCH AS WHEEL STOPS IN LIEU OF PAINTED LINES AS PER AS 2890.1-4 REQUIREMENTS.
8. GRAVEL HARDSTAND AREA SUBJECT TO RE-GRADING AND COMPACTION AS REQUIRED TO MAINTAIN A LEVEL AND STABLE PARKING SURFACE.

DEFINITIONS

1. B99 VEHICLE: DEFINITION AS PER AS 2890.1-2004 (THE DESIGN MOTOR CAR WHOSE PHYSICAL DIMENSIONS REPRESENT THE 99.8TH PERCENTILE CLASS OF ALL CARS AND LIGHT VANS ON THE ROAD.

REFERENCES

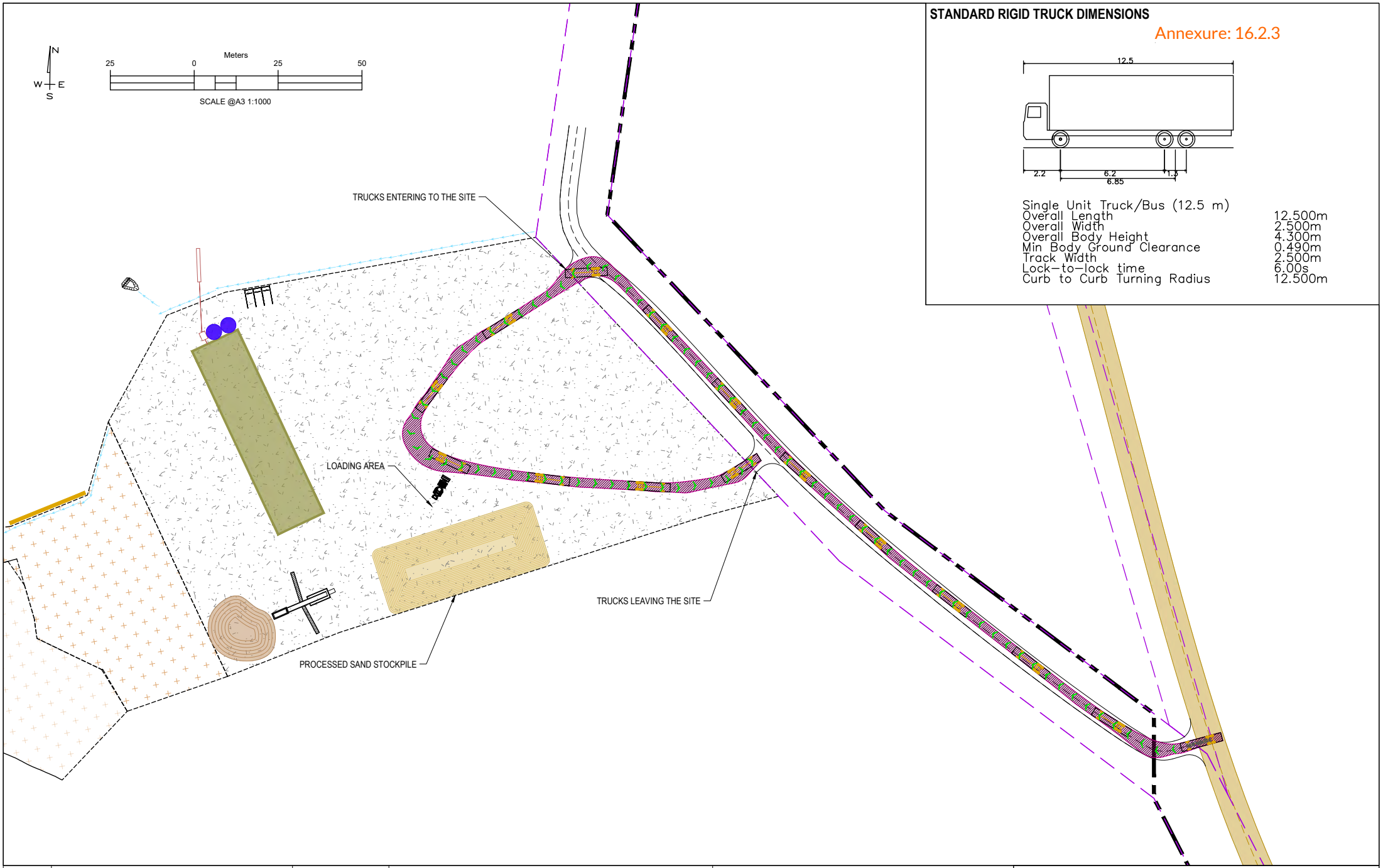
1. AUSTRALIAN STANDARD AS 2890.1-2004 PARKING FACILITIES; OFF STREET CAR PARKING.
2. AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 11: PARKING MANAGEMENT TECHNIQUES

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, BSc(Eng.)Hons*)

LIGHT VEHICLE PARKING BAY

DRAWING NUMBER: VDC/MSP/A/106

Van Diemen CONSULTING



STANDARD RIGID TRUCK DIMENSIONS

Annexure: 16.2.3

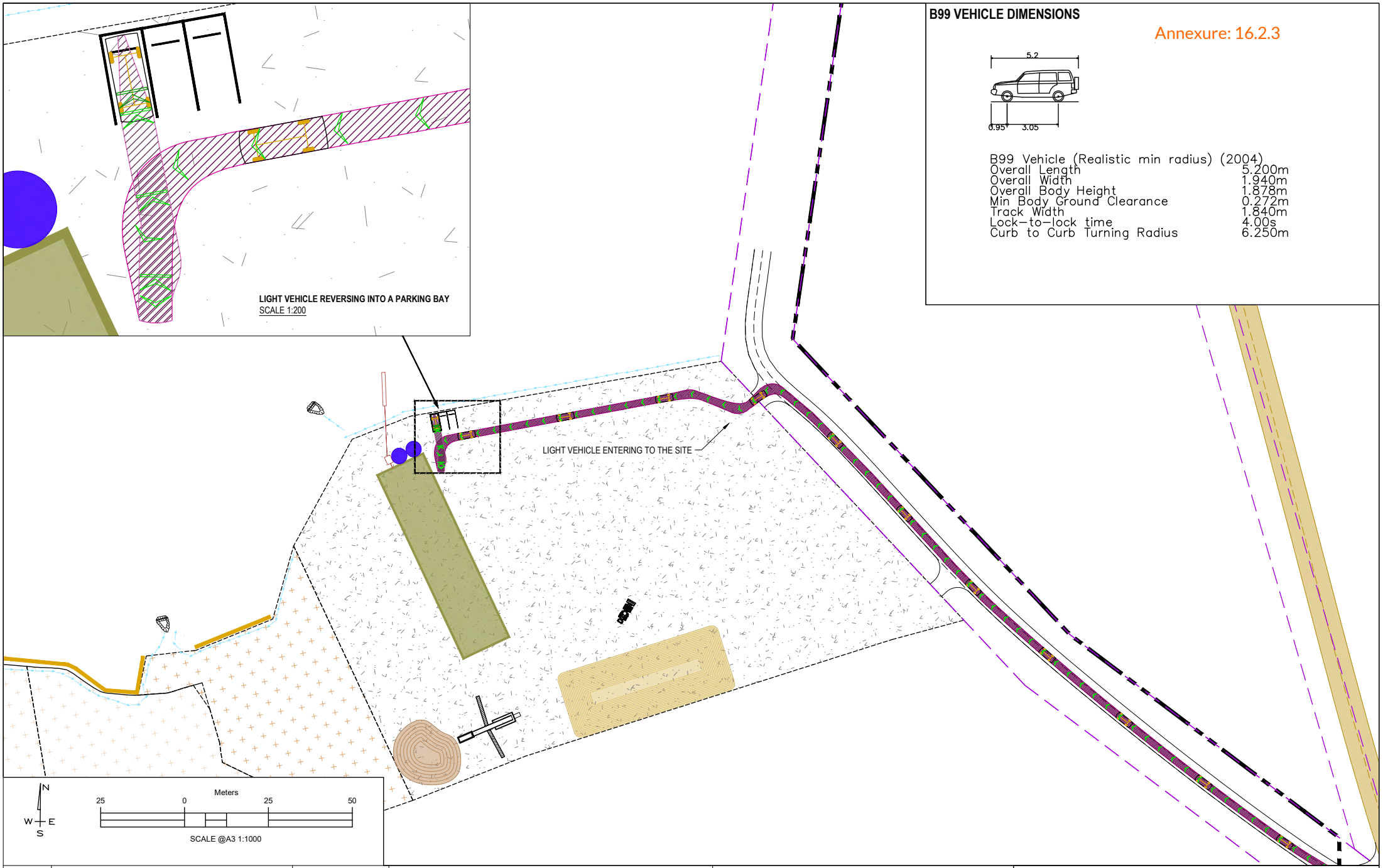
Single Unit Truck/Bus (12.5 m)	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

SWEPT PATH ANALYSIS FOR RIGID TRUCK

DRAWING NUMBER: VDC/MSP/A/107

Van Diemen CONSULTING



B99 VEHICLE DIMENSIONS

Annexure: 16.2.3

B99 Vehicle (Realistic min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

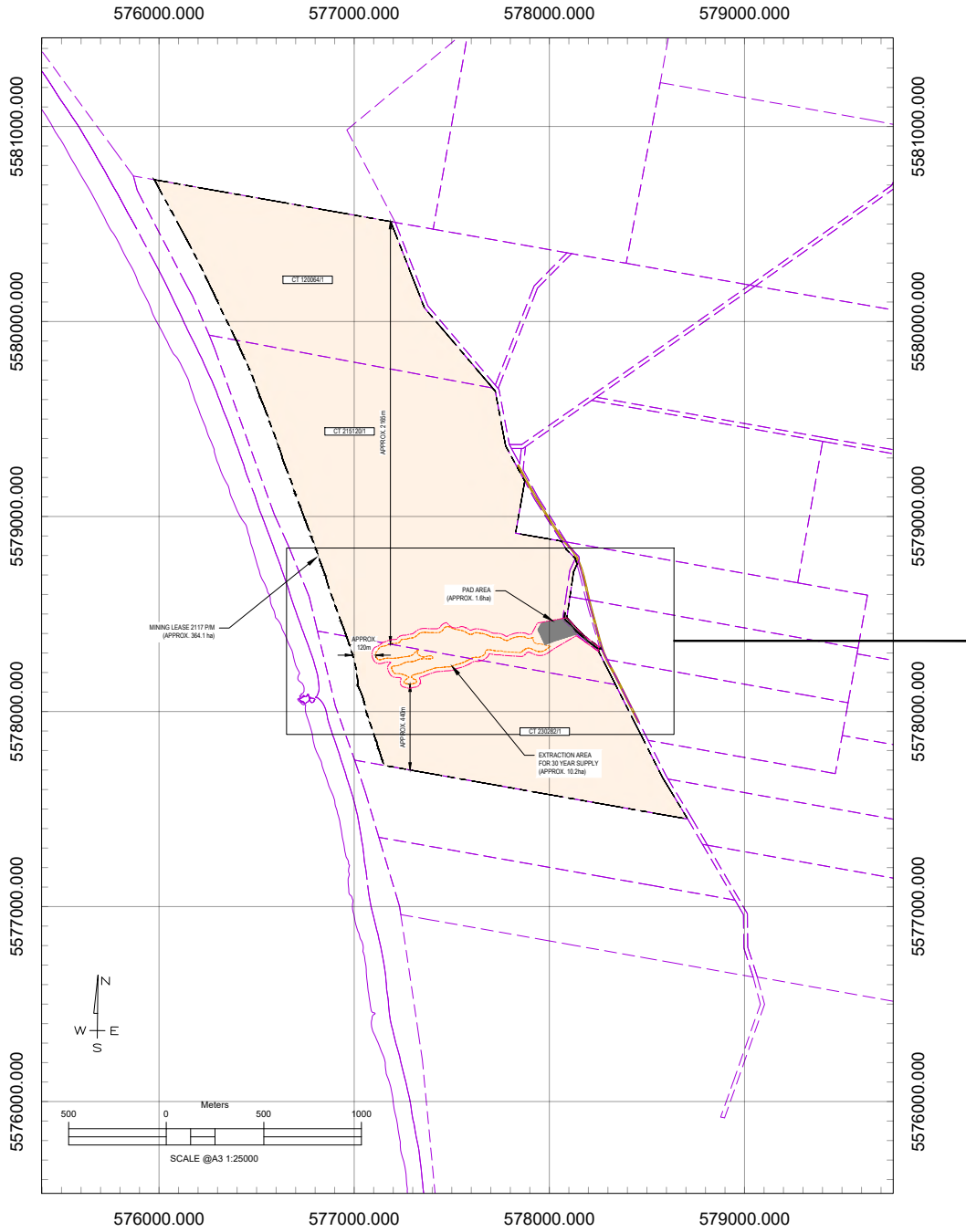
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

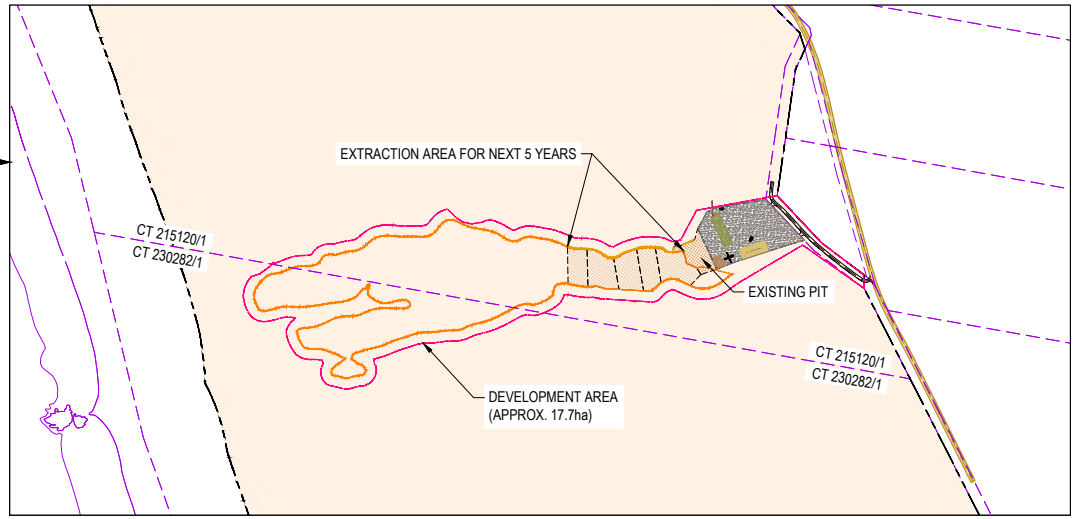
SWEPT PATH ANALYSIS FOR LIGHT VEHICLE

DRAWING NUMBER: VDC/MSP/A/108

Van Diemen CONSULTING

Annexure: 16.2.3

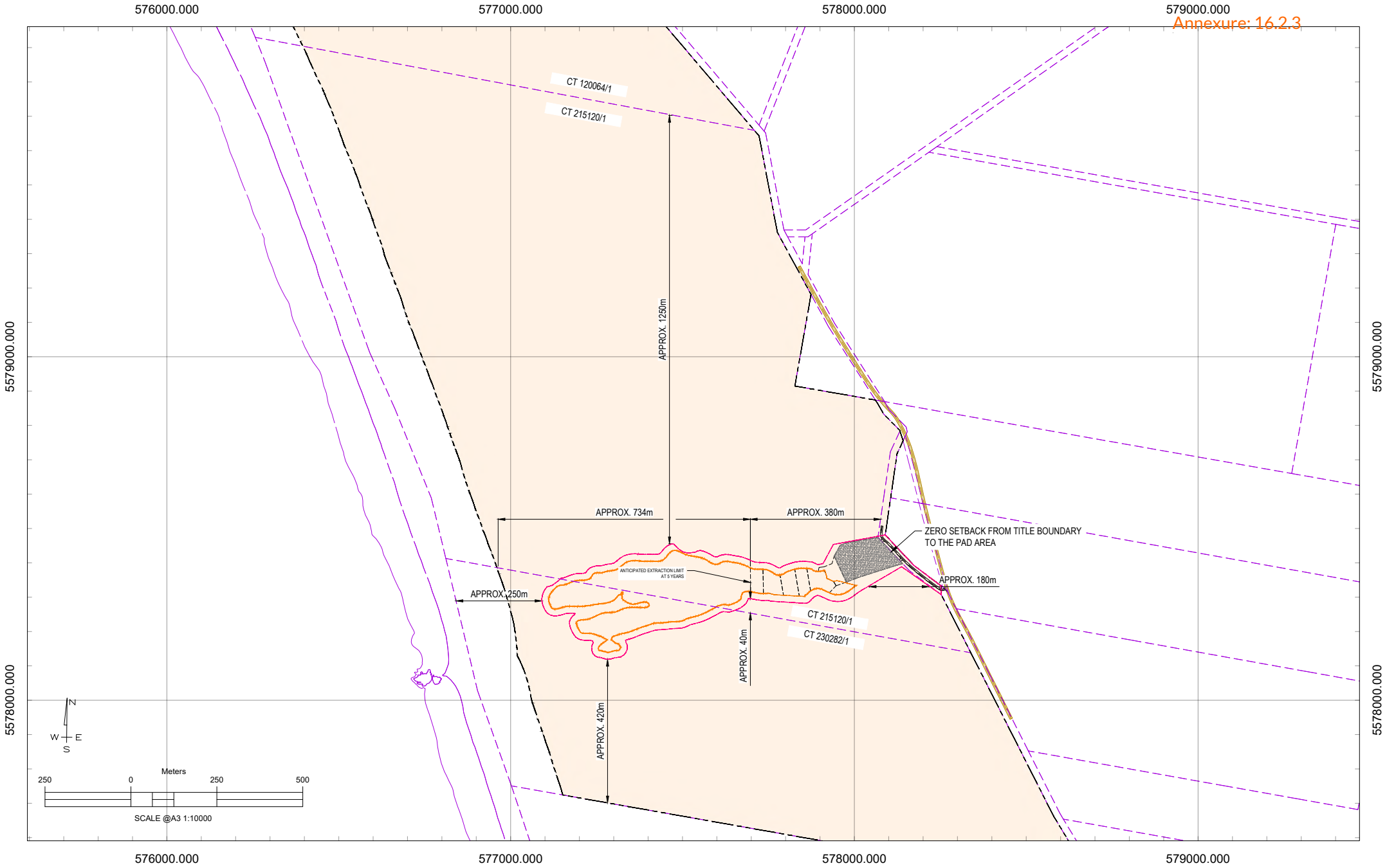




ZOOMED-IN VIEW OF EXTRACTION AREA

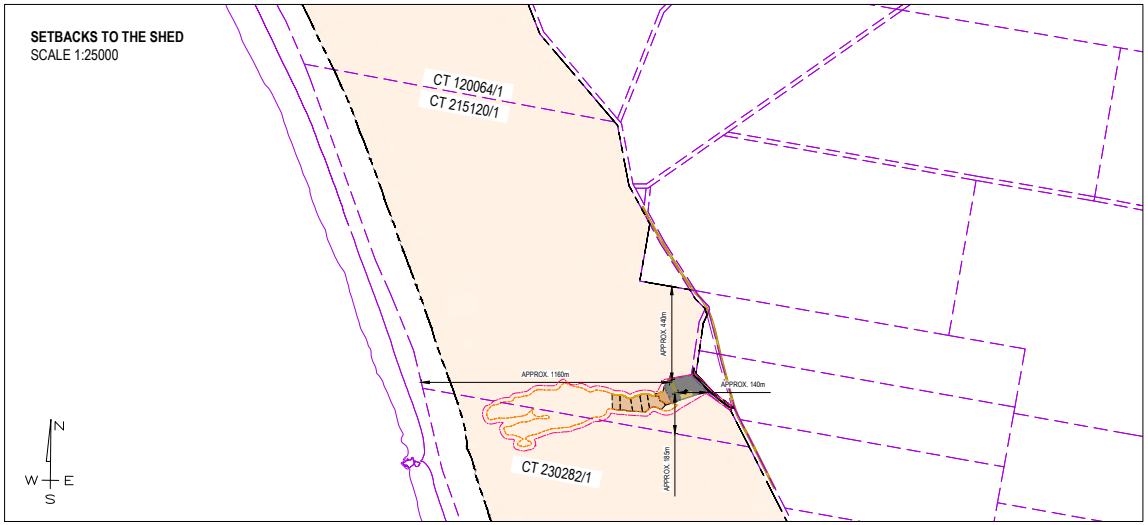
SCALE @A3 1:10000

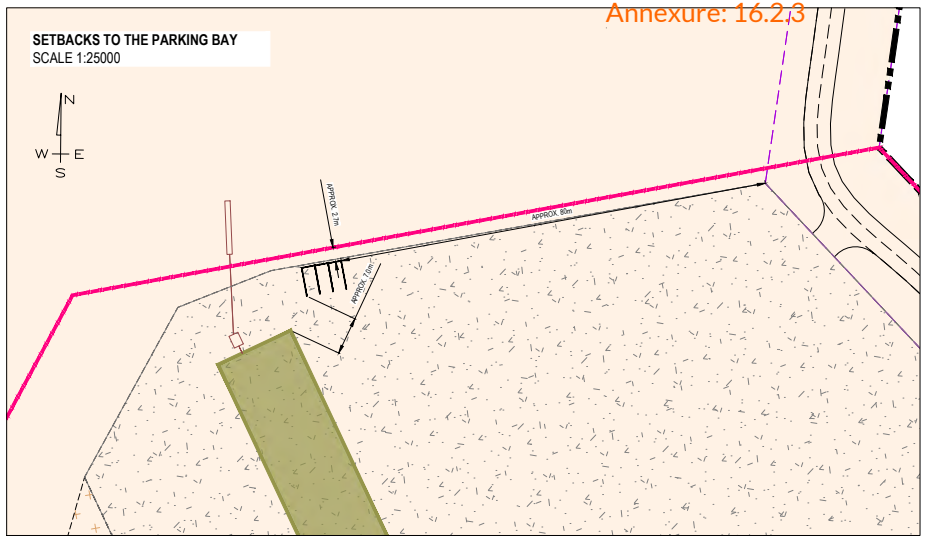
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**TITLE BOUNDARIES AND MINING LEASE**	Van Diemen CONSULTING
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255		
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD		
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED		
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/201	
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)		

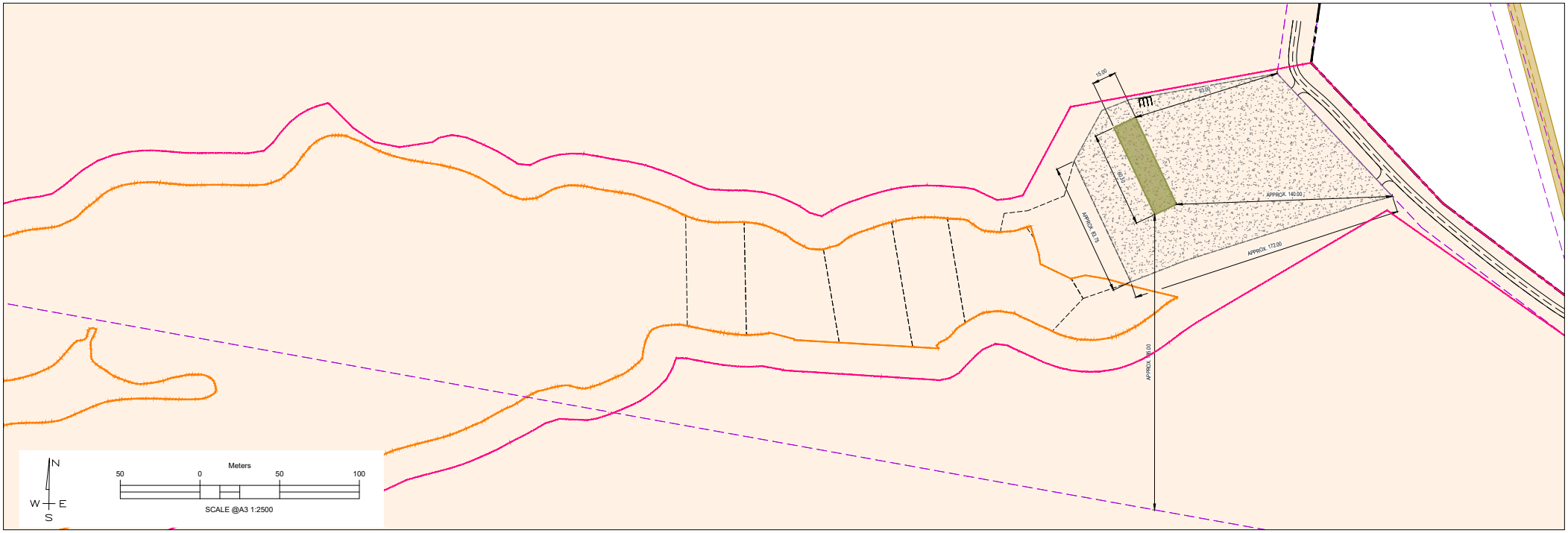


			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**SETBACKS FROM DEVELOPMENT AREA TO TITLE BOUNDARIES**
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255	
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD	
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED	
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/202
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)	

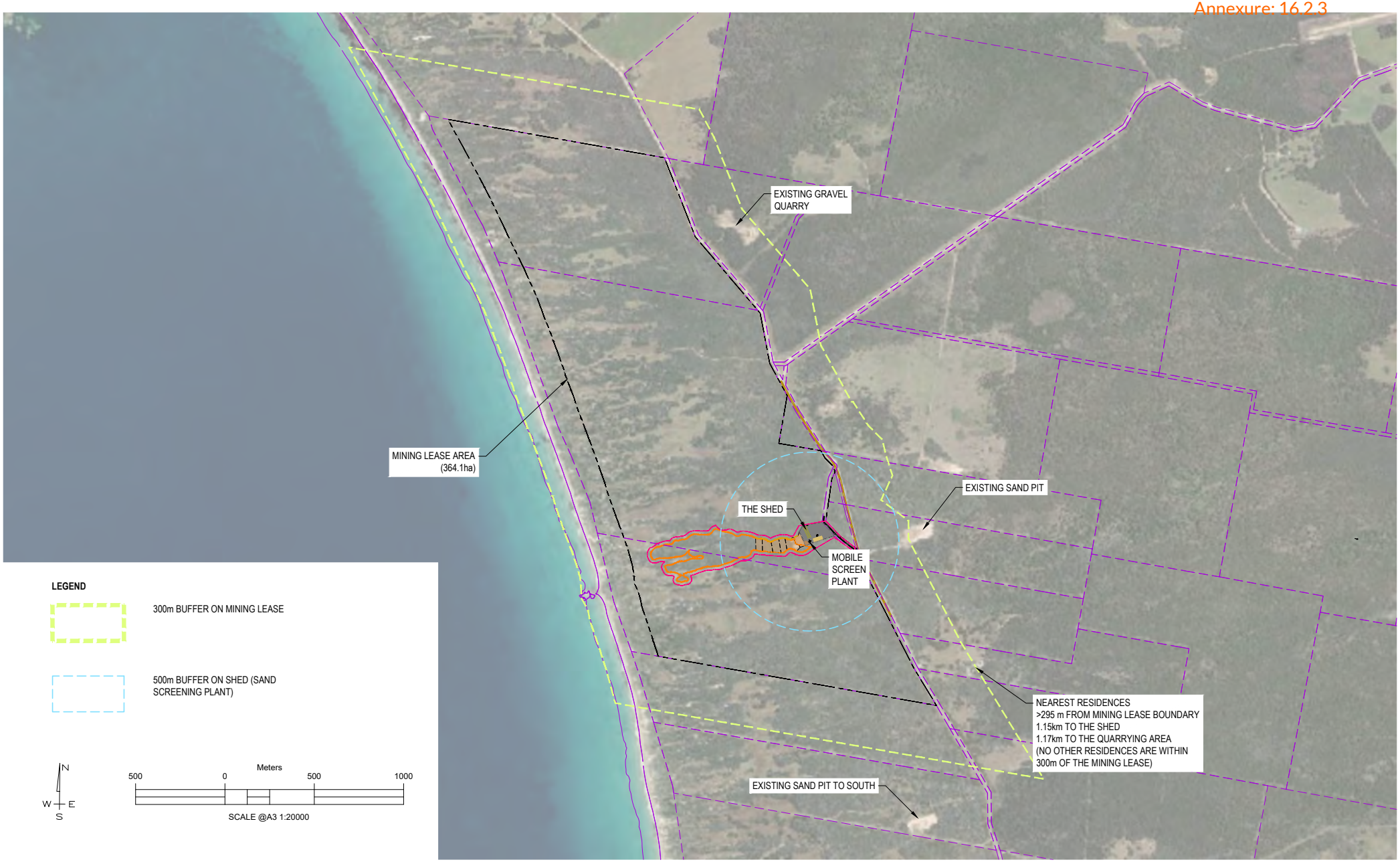
Van Diemen CONSULTING







			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**SETBACKS TO THE SHED AND PARKING BAY**	Van Diemen CONSULTING
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255		
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD		
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED		
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/203	
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, B.Sc(Eng.)Hons*)		



			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	23/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

EXISTING SURROUNDING PROPERTIES AND USES

DRAWING NUMBER: VDC/MSP/A/204

Van Diemen CONSULTING

SITE SOIL CONDITION

SOIL PROFILE DESCRIPTION

1. HORIZON LAYER - THIS LAYER EXTENDS FROM 0 TO 1000MM. IT CONSISTS OF YELLOW SAND (COLOR 10YR 7/6), WHICH IS LOOSE, DAMP, AND MASSIVE.
2. SUBSURFACE LAYER - THIS LAYER SPANS FROM 1100 TO 1200MM AND IS DESCRIBED AS CONSOLIDATED SAND WITH CALCAREOUS CEMENT. IT ALSO HAS A YELLOW SAND COMPOSITION (COLOR 10YR 7/6), IS DAMP, AND MASSIVE.
3. BASE LAYER - EXTENDING FROM 1200 TO 2000MM+, THIS LAYER COMPRISES LOOSE, DAMP, MASSIVE SAND WITH THE SAME COLOR AS THE OTHER HORIZONS.

GEOLOGICAL AND HYDROLOGICAL CONDITIONS

4. THE SITE IS UNDERLAIN BY QUATERNARY DEPOSITS OF WINDBLOWN SAND OF MARINE ORIGIN, FORMING COASTAL SAND DUNES. THE SANDS CONTAIN A HIGH PROPORTION OF CALCAREOUS MATERIAL (MARINE MOLLUSC SHELL DERIVED), WHICH IMPACTS SOIL STRUCTURE AND PERMEABILITY.
5. THERE IS EVIDENCE OF HARDPAN FORMATION AT A DEPTH OF 1100-1200MM, WHICH IS LESS PERMEABLE THAN THE SURROUNDING UNCONSOLIDATED SANDS.
6. THE WATER TABLE IS BELIEVED TO EXCEED 3 METERS

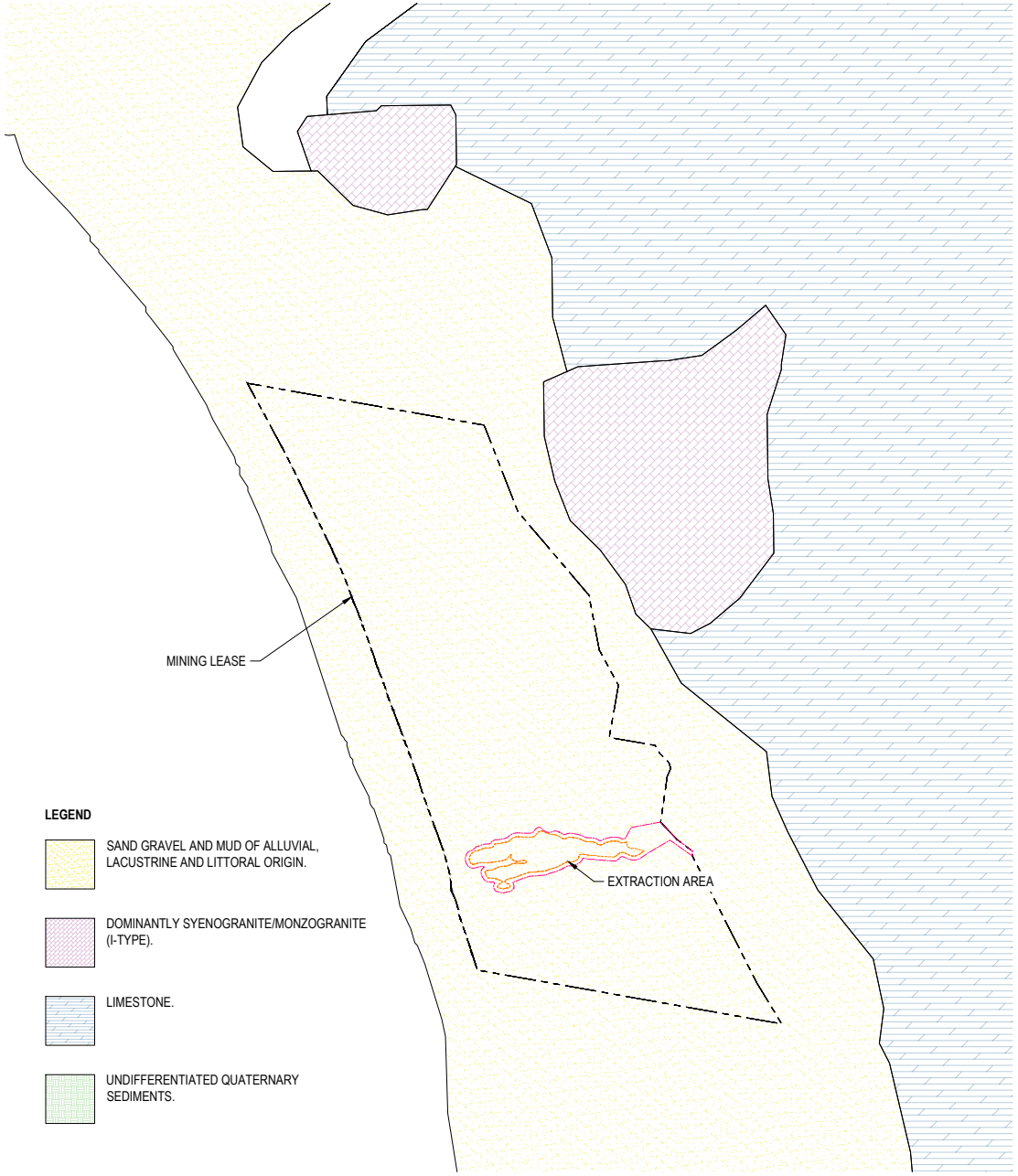
REFERENCE

- "SITE & SOIL EVALUATION AND DESIGN REPORT" BY RICHARD MASON, ONSITE ASSESSMENTS TAS.

FIGURE A: AN IMAGE OF SOIL PROFILE SAMPLES COLLECTED FROM THE SITE

LISTMAP OVERLAY - GEOLOGY UNITS 250k
SCALE 1:25000

Annexure: 16.2.3

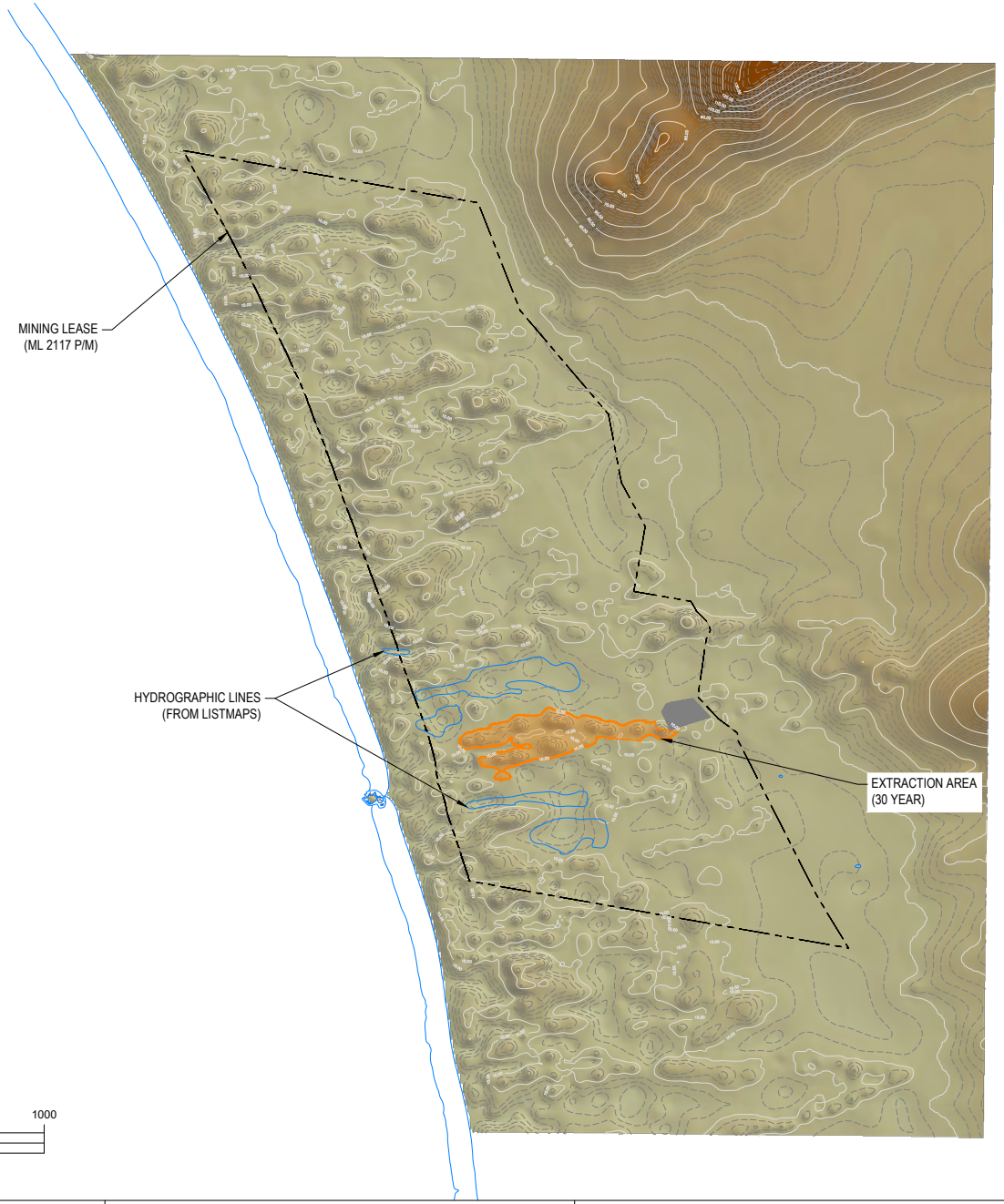


			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	23/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE SOIL CONDITIONS AND SURROUNDING GEOLOGY

DRAWING NUMBER: VDC/MSP/A/205

Van Diemen CONSULTING



NOTES
1. CONTOUR INTERVAL: 2m
2. VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
3. NO NATURAL DRAINAGE LINES ARE PRESENT IN THE SURROUNDING AREA

N
W E
S

Meters
500 0 500 1000

SCALE @A3 1:20000

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

TOPOGRAPHY AND HYDROLOGICAL FEATURES

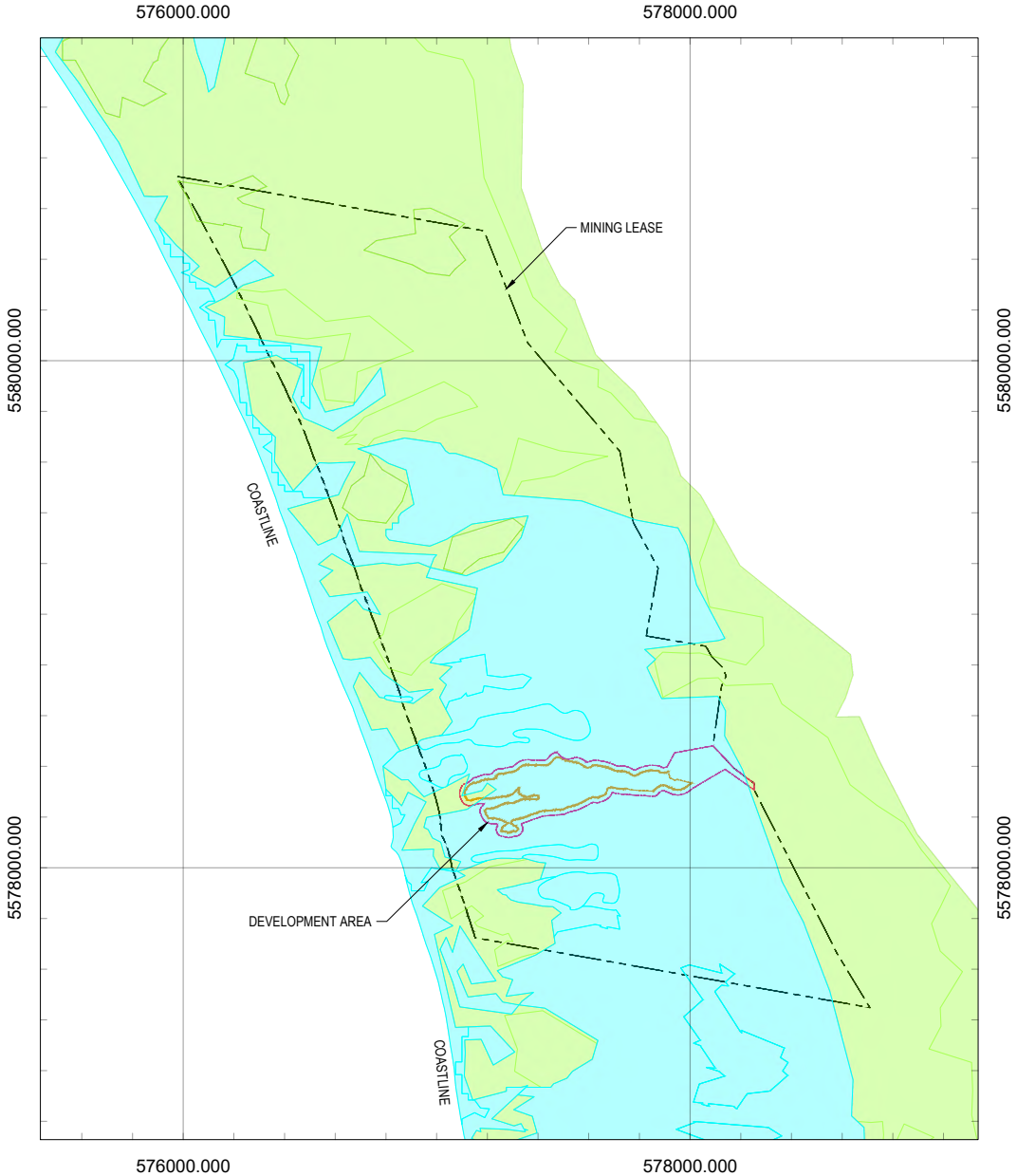
DRAWING NUMBER: VDC/MSP/A/301

Van Diemen CONSULTING

COASTAL ACID SULPHATE SOIL OVERLAY (LISTMAP)

LISTMAP NOTES - Extremely low probability of occurance (1-5% of mapping unit). with occurences in small areas. Sandplains and dunes 2-10m AHD, ASS generally below 1m from the surface.

LISTMAP NOTES - Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes >10m AHD, ASS generally below 1m from the surface.

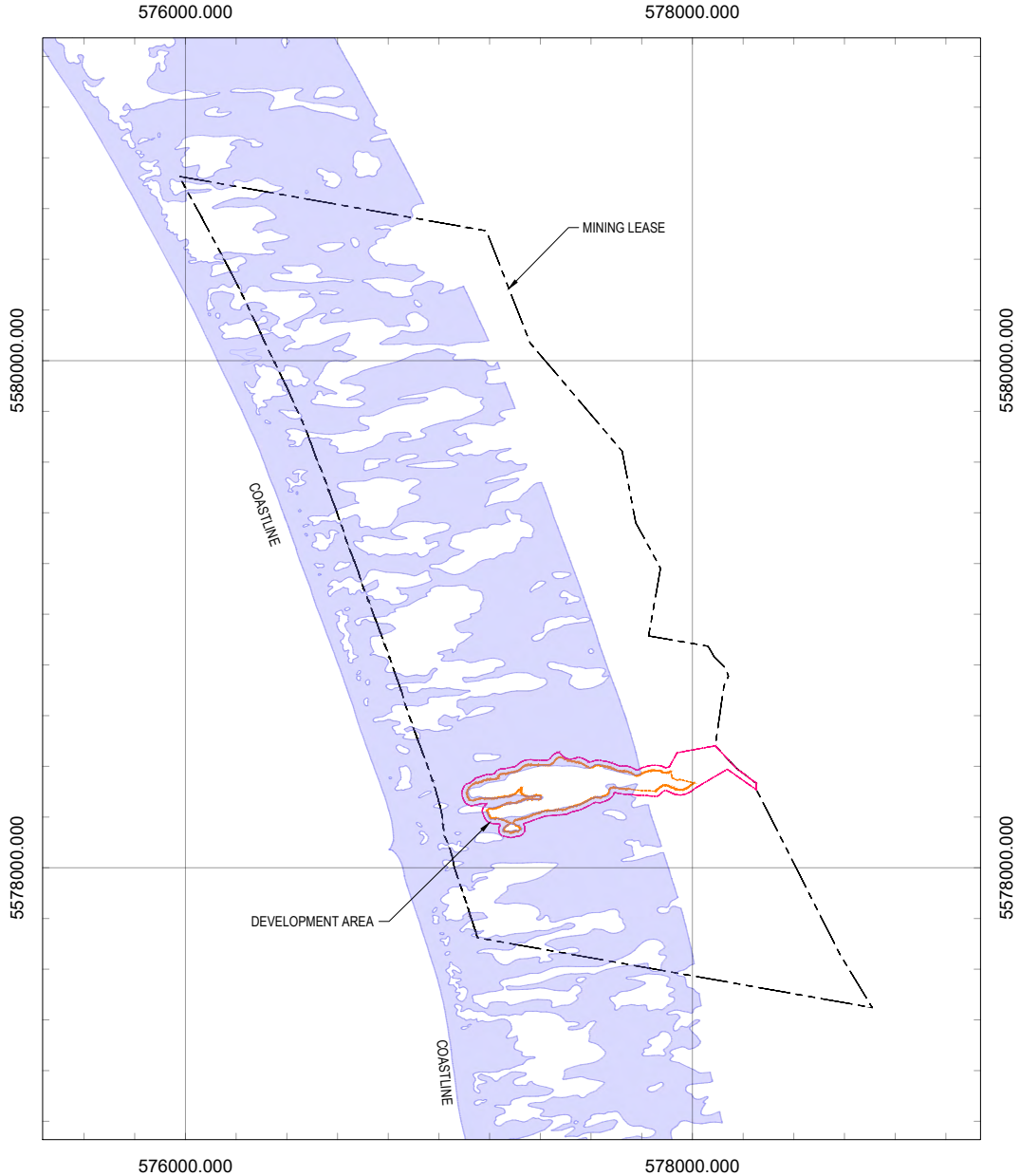


COASTAL INUNDATION HAZARD OVERLAY (LISTMAP)

INUNDATION INVESTIGATION AREA

LISTMAP NOTES

This area is outside the LiDAR-mapped area and as it is below the mapped 10 m contour may be partly vulnerable to sea level rise but data used for this analysis were not sufficient to further determine potential inundated areas.



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			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

NATURAL HAZARDS - COASTAL ACID SULPHATE SOILS AND COASTAL INUNDATION HAZARD

DRAWING NUMBER: VDC/MSP/A/302

Van Diemen CONSULTING

LANDSLIP HAZARD BAND (LISTMAP)

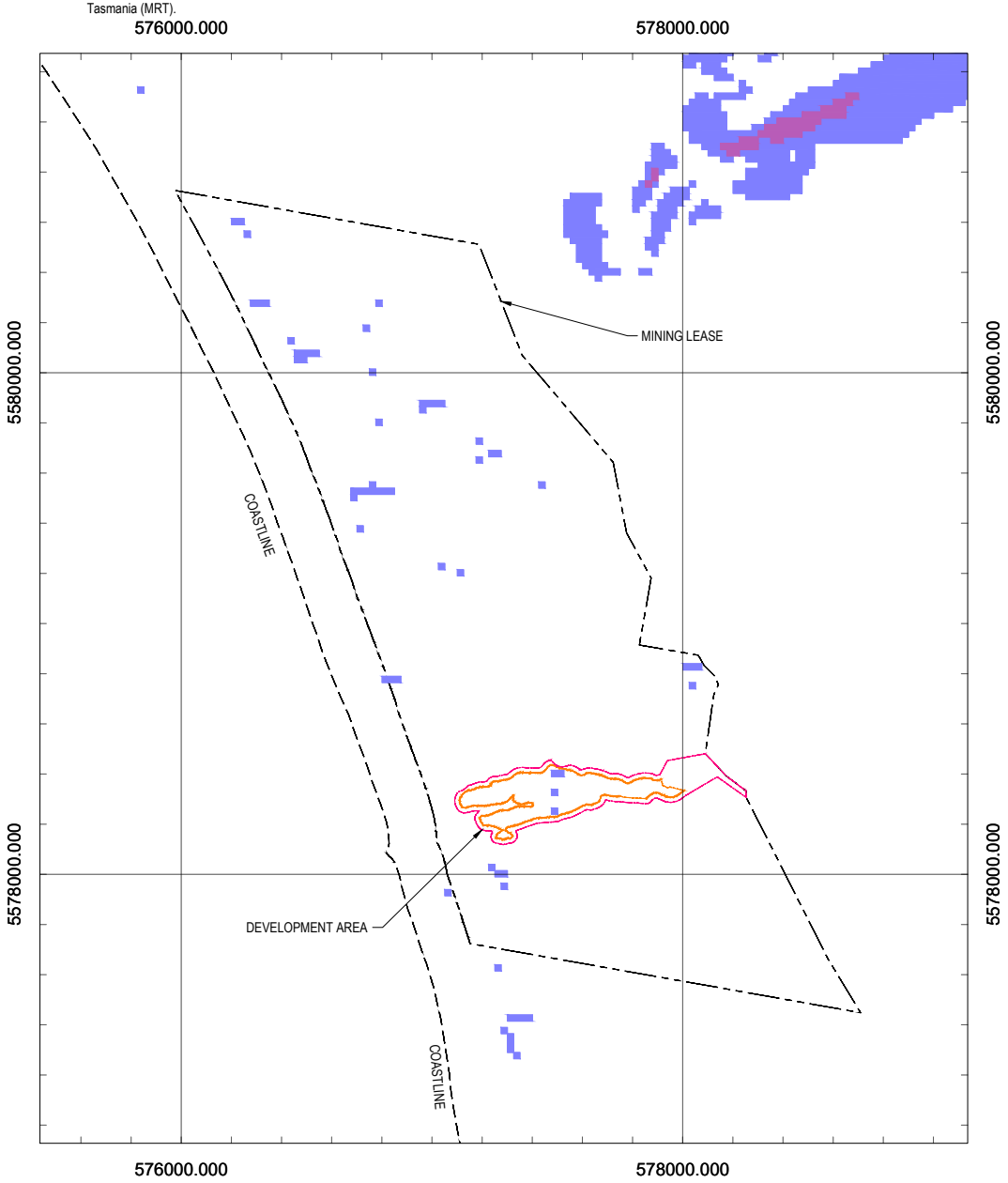
LOW
LISTMAP NOTES - This area has no known active landslides, however it has been identified as being susceptible to landslide by Mineral Resources Tasmania (MRT).

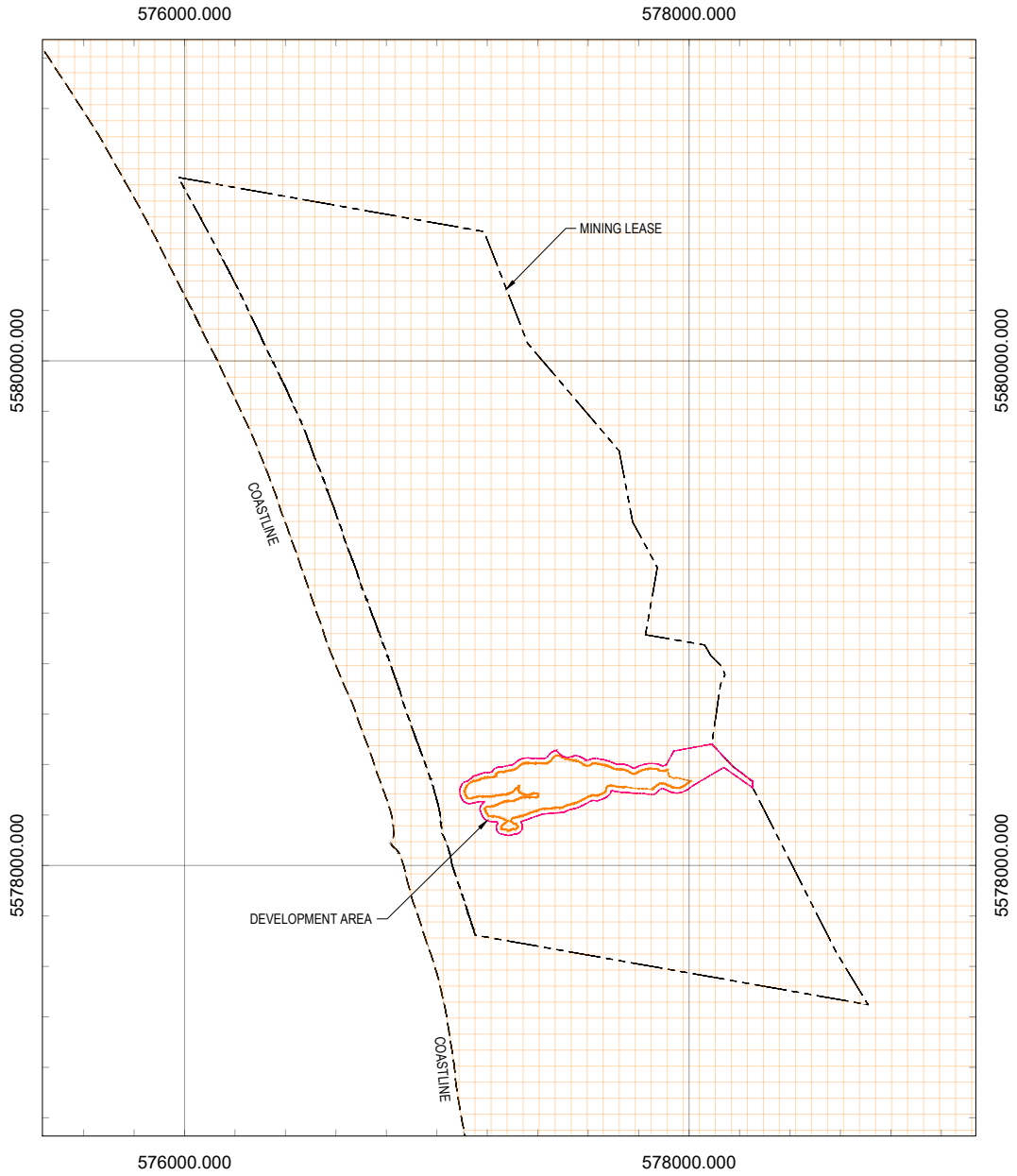
MEDIUM

BUSHFIRE PRONE AREAS (LISTMAP)

BUSHFIRE PRONE AREA

Annexure: 16.2.3





			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

NATURAL HAZARDS - BUSHFIRE HAZARD AND LANDSLIP HAZARD

DRAWING NUMBER: VDC/MSP/A/303

Van Diemen CONSULTING

ATTACHMENT 9. MARKANA LIME SANDS GEOMORPHOLOGY AND SOILS REPORT

Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island

18 January 2024

This report was compiled by Dr Adrian Slee, Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000

Email: adrian.slee@fpa.tas.gov.au

Citation

Slee, A. 2023. Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island, November 2023, Forest Practices Authority, Hobart 27p.

FPA file reference

D24-20638

Disclaimer for report

The advice contained in this document has been prepared for Markarna Grazing Company Pty Ltd and Van Diemen Consulting Pty Ltd only.

Whilst the Forest Practices Authority has used its best endeavours to ensure accuracy, it does not warrant that the material is free of error. Consequently, the advice is provided on the basis that the Forest Practices Authority will not be liable for any error or omission, in contract, tort or otherwise. However, should any error or omission be notified, the Forest Practices Authority will use its best endeavours to correct the advice.

Disclaimer for maps

While all reasonable care has been taken to ensure the information contained on the maps contained in this document is accurate and current at time of publication no guarantee is given by the Forest Practices Authority about the accuracy or suitability for use of the data contained in these maps. Consequently, the maps are provided on the basis that the Forest Practices Authority will not be liable for any error or omission. However, should any error or omission be notified, the Forest Practices Authority will use its best endeavours to correct the information.

Glossary

Optically Stimulated Luminescence (OSL) dating: A method of dating sand grains. This method measures the period of time since burial of the sand grains and therefore indicates the age of the host landform (i.e. dune ridge).

Tasmanian Geoconservation Database (TGD): A database that provides a source of information about geodiversity features, systems and processes of conservation significance in the State of Tasmania.

Cover Image (Image 1)

View eastwards from the coastal foredune backing Marshall Beach, looking across isolated outcrops of granite towards the large west-to-east orientated longitudinal dunes forming the main Markarna Lime Sands resource

1. Project scope and Aims

Van Diemen Consulting Pty Ltd engaged the Forest Practices Authority (FPA) to investigate the geomorphology and soils present on a 364.1 ha mining lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The proposal by Markarna Grazing Company is to develop and extend an existing old lime sand extraction pit located within the dune fields located between Palana Road and Marshall Beach near the settlement of Lughrata. The priority area is an 800 m long west to east oriented sand dune complex covering approximately 4 ha that forms a lime sand resource immediately west of the current old extraction pit.

The aim of the project was to provide a detailed report on the dune field and other landforms including swamps and potential Tertiary limestone karst features in the vicinity of the proposed extraction pit. Soils were also be investigated in this area. A secondary focus was a general documentation of the dune field and other sites of geomorphic significance in the overall mining lease in the event of expansion of operations in the future.

The report addresses the following issues:

- Documentation of any karst features present and management recommendations.
- Overview of the sand dunes present at the proposed pit site and mine lease in general and dune special values management recommendations.
- Comment on sand blow risks and mediation recommendations.
- Documentation of other geomorphic landforms.
- Soil observations and management.

2. Previous Work

Granite Bedrock

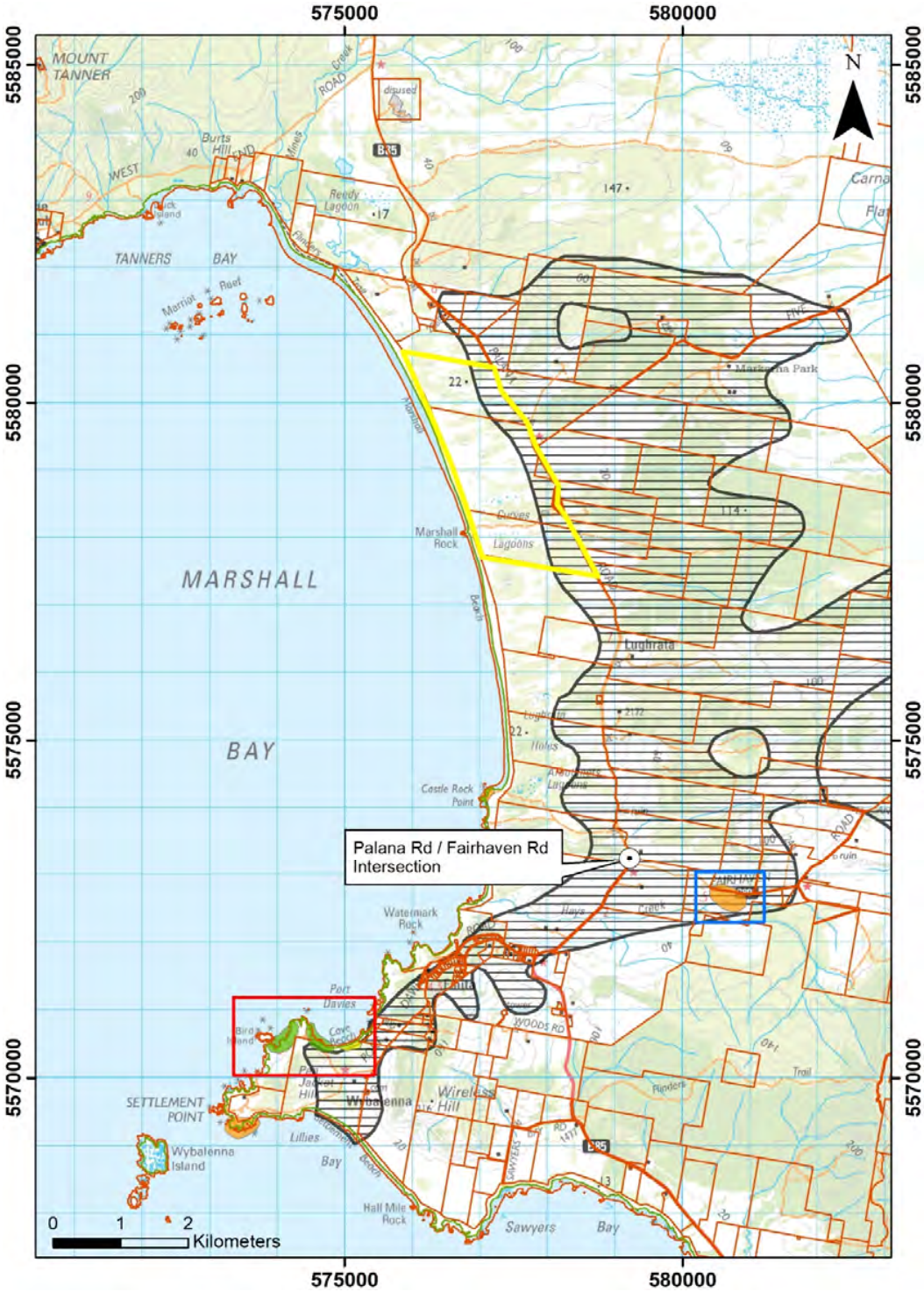
Devonian granite plutons are the dominant bedrock that floors Flinders Island and upon which the Tertiary Limestone and Quaternary deposits lie. White syenogranite/ monzogranite (I-type) granite outcrops in the vicinity of Five Mile Road immediately east of the study site. No granite was mapped on the 1:250,000 geological map (available on www.theList.tas.gov.au) within the study area (Mineral Resources Tasmania 2023). However aerial photographs clearly show that Marshall Rock (outcropping on Marshall Beach) is granitic.

Karst

Tertiary dune limestone is mapped on the 1:250,000 Tasmanian geological maps. It forms the hills rising east of Palana Road immediately inland of the Markarna Lime Sands mining lease. The hills are part of an extensive belt of limestone extending from the vicinity of Five Mile Road in the north, inland to the Memana district and south along the coast to Wybalenna. The area is listed as a category B karst area (Emita-Memana BS17) (Kiernan 1995; see also map 1, below). The karst B classification indicates that karst processes are active in the area. The area has received limited attention from geoscientists and cavers. Limestone has been mapped on the hills to the east of the study site to altitudes approaching 130 m asl. The limestone is likely to be mantling granite and possibly sedimentary rock at depth and may be quite thin i.e., in the order of tens of metres. However, the topographic relief of the limestone here is more than 100 m which is more than enough for significant karst landforms and processes to develop. Kiernan and the author have observed subtle sinkholes in the vicinity of Palana Road/Fairhaven Road intersection (Map 1 and Image 2). Some of these depressions could be dune swales, but the presence of exposed limestone outcrops around others suggest sinkhole development.

A low hill north of Hays Creek has limestone cliff outcrops. The most notable karst landforms occur at Cave Beach where significant limestone exposures in a coastal setting display very rugged limestone weathering pinnacles and solutional forms (karren) associated with several notches and small caves formed at or near the contact between the limestone and the underlying granite (Image 3). The karst landforms in the vicinity of Cave Bay (red box on map 1) and the sinkholes along Fairhaven Road (Blue box on map 1) are listed as Geoconservation sites ID:2254 and ID:2298 in the Tasmanian Geoconservation Database (TGD) accessible on the Tasmanian Natural Values Atlas (NVA.tas.gov.au).

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



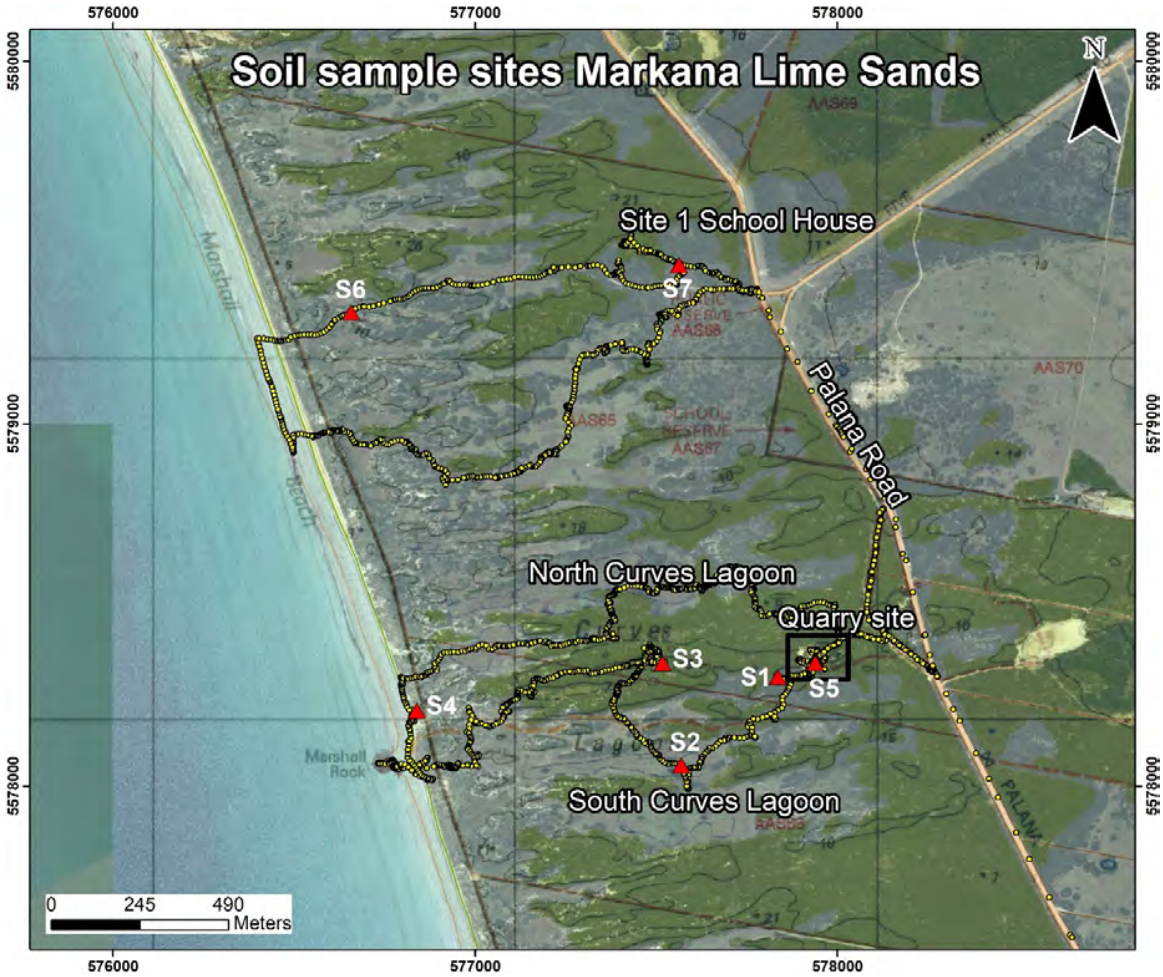
Map 1: Marshall Bay. The striped area is the mapped extent of the Emita – Memana (BS17) karst according to Kiernan 1995; yellow square is the lease area; red and blue squares highlight TGD sites with notable karst development.

Image 2: One of a large number of shallow basins (circled) associated with limestone outcrops (foreground and background) in the vicinity of the Palana Road/Fairhaven Road intersection (Map 1). The lack of dune cover and exposed outcrops suggest shallow soils and that these depressions are solution sinkholes associated with a subsurface karst aquifer.

Image 3: The Tertiary Limestone at Cave Bay features significant karst landforms including small caves, notches and solutional (karren) surface weathering forms. The area is a listed TGD site and the limestone outcrops are contiguous with the limestone bedrock in the vicinity of the mine lease.

3. METHODS

Observations of the site were made over two days of fieldwork on the 7th and 8th of November 2023. Waypoints and route tracking were recorded using a Garmin Etrex 22s. The route taken during the field work and the location of the soil samples taken are shown in Map 2. Maps were drawn using ARC-Map 10.8.1. Soil samples were taken using an Eijkelkamp auger. A sample for Optically Stimulated Luminescence (OSL) dating was taken from the lower dune horizon in the old pit face. This was done by cutting back and benching out the sand dune before a sample was taken using a PVC tube hammered vertically into a dug bench approximately 5 m below the top of the dune.



Map 2: Soil sample sites and survey route (yellow tracks) taken during fieldwork.

4. OBSERVATIONS

BEDROCK GEOLOGY OF THE SITE

Granite

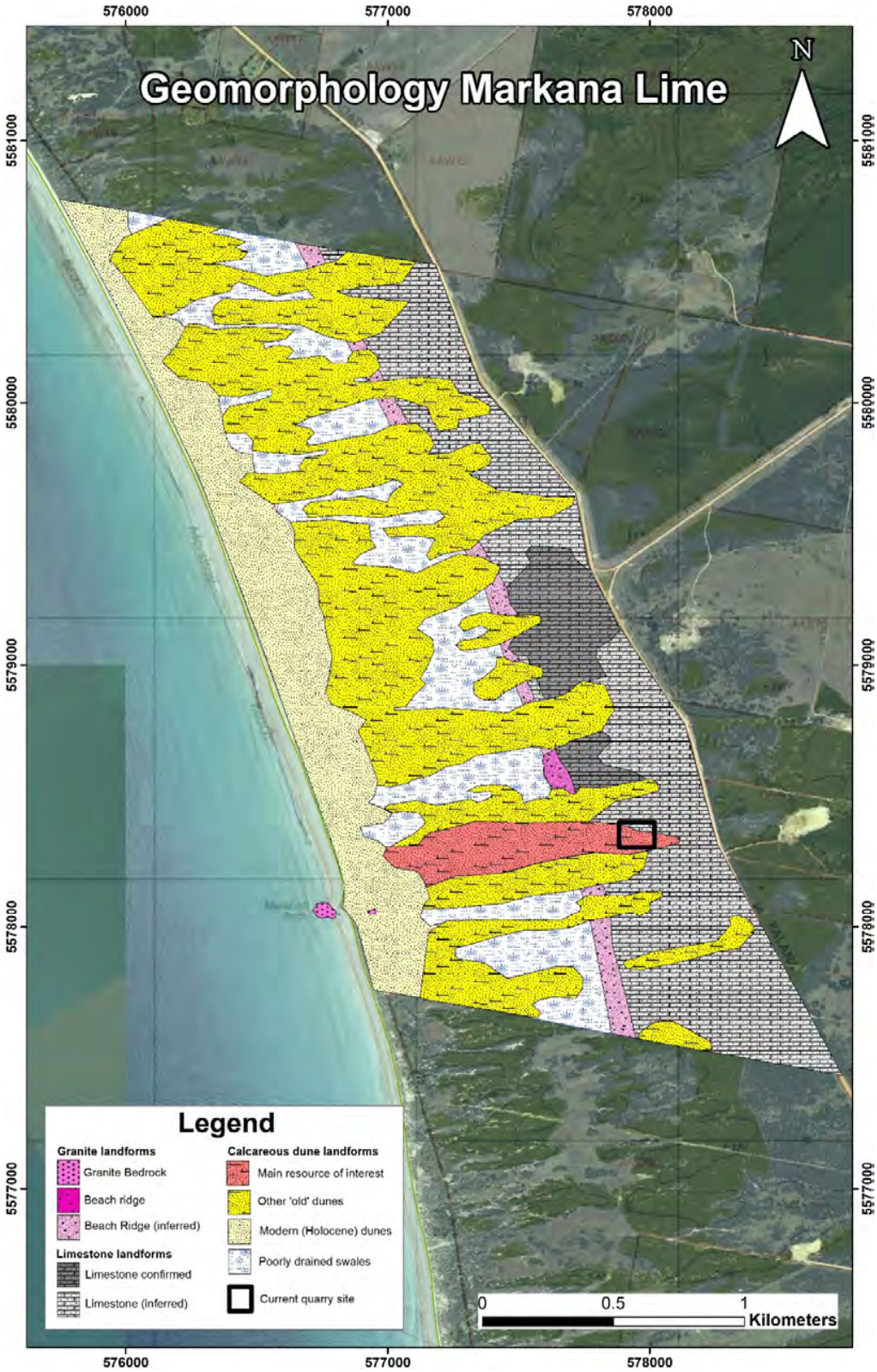
The general geomorphology of the mine lease is presented in Map 3. The Marshall Rock and other granite outcrops located within the sand dunes 150 m to the east of the pit and just within the lease (see Image 1) were visited during the survey. Both are unmapped on geological sheets and feature large, rounded outcrops of white crystalline granite. While the granites are not the focus of proposed operations on the mine lease their presence on the coast and in particularly within the foredunes indicates the likelihood that granite outcrops are present beneath the sand dunes on the property. Granite bedrock rarely forms flat surfaces but rather undulates quite substantially over short distances hence it is impracticable to define the depth of the dunes and further east Tertiary limestones above the granite contact. Exploration could help assess the depth of the lime sands. However, it would be costly over large areas, and possibly yield little additional information.

Limestone

A continuous flat bench approximately 15 m above sea level is present in the eastern section of the study area. In places this bench is overlain by dune sands. Significant lag deposits of fossiliferous limestone in the form of boulders and cobbles are found on this bench associated with a distinctive open vegetation community in contrast to the thicker vegetation associated with the younger dune sequences (Image 4). The bench appears to be the western edge of the limestone outcrop and its western margin may have once been a shoreline open to Bass Strait. It now forms a paleo-shoreline. Areas of outcropping limestone are very limited as most of the edges of the limestone plain appear to be buried by Quaternary coastal and dune deposits. Only one small in-situ outcrop of limestone was observed at 577509mE: 5579301mS. This was associated with the blowout of a low 1 m tall sand dune.

Image 4: Flat limestone bench in the east of the property.

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



Map 3: Geomorphology summary map.

KARST LANDFORMS

WEATHERING LANDFORMS (KARREN)

Very minor but sharp solutional karren weathering forms were located at the larger limestone outcrop (Image 5) and other smaller blocks in the area but no significant solutional karst landforms were observed.

Image 5: Small limestone outcrop

SINKHOLES

Large, elongated depressions are a feature of the property. Some of these are large enough to have warranted definition as enclosed basins on the 1:25,000 topographic map sheets of the area and the largest are defined as lagoons (e.g. Curves Lagoons to the immediate south of the proposed resource). These depressions are elongated. They are not flat floored but have rather undulating forms. Although a small intermittent pond appears to be present in the lowest basin of the northern Curves Lagoon, elsewhere flowing and pooling surface water appears to be very limited; surface water accumulation may be confined to times of intense rainfall. In contrast to enclosed rounded basins associated with limestone bedrock, outcrops interpreted to be probable sinkholes have been described by the author and others near the Palana Road/Fairhaven Road intersection and further south in paddocks north of Trousers Point. The depressions at the study site appear to be all related to either broad west-east oriented interdune swales or (closer to the coast) roughly square

depressions developed behind the active Marshall Beach foredune complex. Depressions of conclusive karstic origin were not identified and are considered unlikely to be present within the study area.

SPRINGS

No obvious streams or springs were located on the property. A possible very small spring rises from beneath Marshall Beach immediately east of Marshall Rock. Here at low tide a small stream flows for approximately 20 m to the ocean, dropping 20–40 cm in altitude. The scale and location of the spring does not imply karstic drainage in the Tertiary limestone several hundred meters inland but rather small-scale subsurface drainage out of the local beach-bordering Holocene dunes. The lack of surface streams is interesting as there are no inlets or obvious streams entering the ocean for the length of Marshall Beach between the outflow of Arbothnots Lagoon to the south and a small inlet to the north at 574850mE: 5582000mN. A series of disappearing stream channels are mapped in the limestone hills southeast and northeast of the study area. The absence of defined stream channels flowing off the limestone in the area does suggest subsurface drainage is occurring in karst.

SUMMARY OF KARST LANDFORMS

An extensive Tertiary dune limestone bench is present in the eastern section of the study area. This bench is overlain in locations by the Quaternary dunes and has open predominantly *Leptospermum laevigatum* dominated forest. The lack of streams (and channels) flowing from the higher limestone hills to the east of the property may indicate that a karst aquifer is present in the area. However, no obvious springs were noted. No sinkholes were observed on the property, and as the largest limestone outcrop observed covered only a few square meters, caves are unlikely to be present in the priority study area. However, the author did not cover the entire mining lease and LiDar coverage is not available for the area so the presence of isolated karst landforms including bedrock bluffs with karren, sinkholes or small caves cannot be entirely ruled out.

OLD BEACH RIDGE

North Curves Lagoon is a large dune swale basin. It is surrounded to the west, south and north by Quaternary and Holocene dune ridges and to the east by the low Tertiary limestone bench. On the eastern margin of the basin at 577625mE: 5578543mN approximately 6–10 m above sea level (asl) white sandy gravels are exposed (Image 6). These are not typical fine sands associated with the beach ridges in the area but are rounded coarse quartz sands that appear to mantle the lower western slopes of the limestone bench. The quartz-rich nature of the sediments suggests two potential sources

1. That granite bedrock is shallowly buried in the vicinity of the eastern end of north Curves Lagoon and the soils at the site are primary granitic soils (known as gruss) formed from weathered granite.

2. That the coarse quartzite sands that contain some shelly carbonate fragments carbonate were deposited on the western edge of the limestone bench in a high energy coastal environment (surf beach).

The latter explanation appears to be more likely as no granite bedrock was observed at the site. It can be assumed that the coastline of Bass Strait was once a high energy environment supplied with coarse sands sourced from offshore granite outcrops such as Marshall Rock or reworked sands from upslope granite sources east of Palana Road. The presence of this beach ridge indicates that the coastline has prograded (advanced) >900 m to the west while becoming a lower energy environment. Given the altitude of the beach it appears likely that it could have formed during the penultimate interglacial high stand, approximately 130,000 years ago when sea levels were 6-8 m higher than today. The presence of granitic soils in this area defines the northern margin of the economic resource in lime-rich dune sands to the south. It is likely that the beach ridge extends beneath the overlying Quaternary carbonate-rich sand dunes, as the dunes appear to have formed over the top of the older granite sands and Tertiary limestones in the east of the property. If this is the case a contact between the carbonate sand resource and the quartz sands may be encountered during mining.

Image 6: Beach ridge composed of quartzite gravel sands (inset) derived from granite bedrock immediately east of North Curves Lagoon.

SAND DUNES

Extensive sand dunes cover most of the mining lease. Except for the granitic sediments east of North Curves Lagoon described on page 8, the sand dunes are composed of fine-grained white quartz and carbonate deposits. Two significant sand dune assemblages are present. In the west are the modern foredune and back dunes behind Marshall Beach. Inland are a series of elongated west-to-east trending parallel dunes that rise up to 24 m above sea level.

These inland dunes are largely vegetated and stable in comparison to the foredunes that have fewer woody and tree species, instead being dominated by grasses, herbs, wind-pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

MAIN DUNE

The 1:25000 topographic map of the main dune (resource) shows a single large dune approximately 180 m wide and 10–25 m high. Two large internal depressions are present west of the current sand pit. The actual landscape is more complex than the contours suggest with at least 8 dune crests identified between North Curves Lagoon and South Curves Lagoon. The dune ridges have narrow rounded tops and steep side slopes, generally >30°. The multi-peaked nature of the dune ridges and the deep wide interdune swales are not well expressed on the 1:25000 topographic map.

The existing pit is located near the narrowest and easternmost part of the dune sequence. Here past pit operations have exposed a cutting through the main dune that has some scientific interest as described in the next section of this report.

EXISTING PIT

The existing pit is located at 577936mE: 5578343mN, 350 m west of Palana Road and is accessible by an overgrown FWD track. The pit exposes a 75 m wide section through the eastern limb of the main dune. Most of the exposure is either overgrown or of limited interest. The floor of the pit appears to be in solid Tertiary limestone bedrock. Some of the floor material could have been brought in by past operations to provide a solid working base. The best exposure through the dune is on the upper southern face of the pit where an approximately 5.5 m deep section is exposed. A modern topsoil and two buried paleosols are exposed in this face while calcified tree roots (rhizoliths) and branches are present within the dune below the lower of the two paleosols. The dune profile was described and photographed (Table 1 and Image 7) and samples were taken from the main horizons.

Table 1. Description of soil profile at the pit site.

Unit 1	Depth (cm)	Description
1	**0 – 20**	Grey sandy topsoil with abundant modern root mats
2	**20 – 95**	Yellow sands with abundant animal burrows
3	**95 – 110**	Dark grey / brown horizon in sands – paleosol 1
4	**110 – 260**	Light yellow to white sands
5	**260 – 280**	Grey / Brown horizon laterally extensive and forming a stratigraphic bench – paleosol 2.
6	**280 – 550 (approx.)**	White sands, predominantly carbonate; prominent surface carbonate cementation highlighting stratigraphic beds, calcified tree root and possible calcified small tree stump.
7	**Pit Floor**	Fossiliferous limestone (Tertiary)

Image 7: Annotated view looking east over the southern wall of the old pit showing dune and paleosol horizons.

PALEOSOLS

The term 'paleosol' refers to a buried soil horizon within a sedimentary profile. Paleosols are darker band of sediment which may or may not contain woody debris, organic matter and charcoal surrounded by lighter and less charcoal-rich sediments. Paleosols can be important indicators of past stability between depositional events. In this case organic topsoils (indicating stability) have been buried by a non-organic deposits (sand dunes). Two prominent paleosols are present in the exposure. The upper paleosol 1 (Image 8) lies between 95 cm and 115 cm depth and forms a prominent but laterally patchy dark brown organic-rich layer in the upper dune profile. The lower paleosol at 260 cm depth is a thinner and lighter compact sand unit that appears to not be as organic rich. However, this paleosol is laterally extensive and forms a prominent grey bench on the mid slope of the cutting. In the case of the dune systems the presence of paleosols indicates a substantial time of dune stability, allowing an organic topsoil to form prior to renewed dune instability resulting in topsoil burial. At the pit site at least three periods of dune stability can be inferred as indicated by the two buried paleosols and the darker modern topsoil associated with thick root mats on the crest of the dune.

Image 8: Top 1.5 m of the pit face showing prominent brown paleosol at about 1 m depth.

RHIZOLITHS

A feature of the main pit exposure is the rhizoliths located in Unit 6 of the profile (Table 1; Images 9 and 10) formed by dissolution of carbonate by percolating water and its subsequent precipitation around roots.

Rhizoliths observed at the pit include narrow straw-like tree root rhizoliths up to 20 cm long and 1–5 cm across many of which still contain inner woody root material and larger cylindrical-shaped rhizoliths up to 30 cm long and 15 cm thick, which may have formed around tree branches. Small columns are present at other locations in locations suggesting calcification of the stumps of *Melaleuca* and other small trees found at the site.

Images 9 and 10: Tree root rhizoliths exposed in the lower dune horizon in the pit face. These rhizoliths form from leached calcium carbonate which has precipitated around rough surfaces such as tree roots.

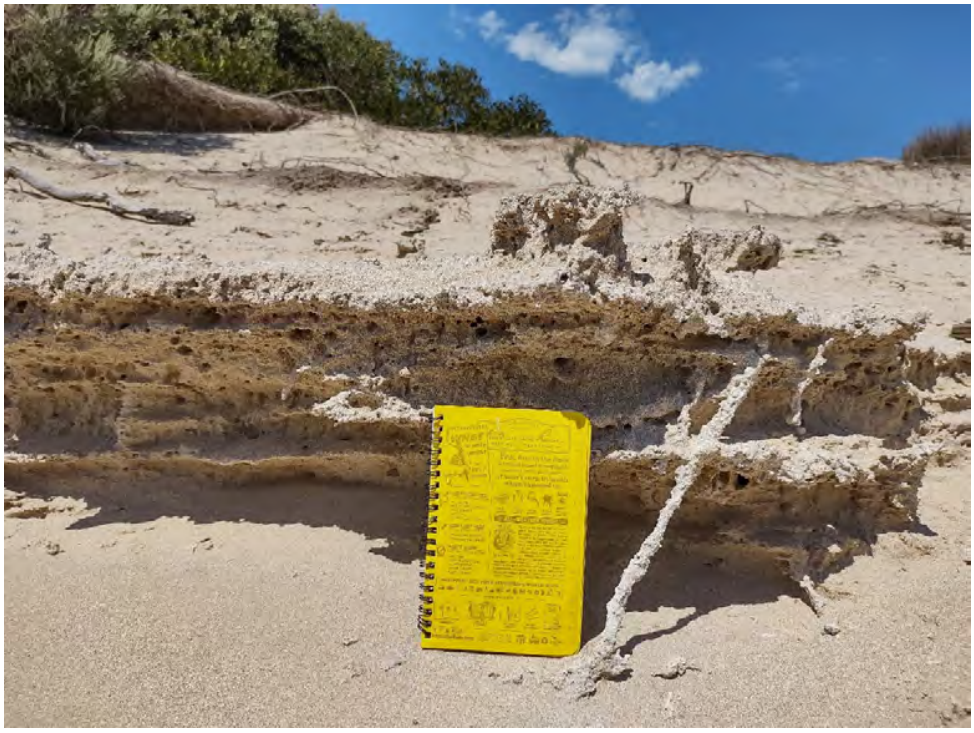


Image 11: Small carbonate benches have formed in the lower dune horizon but unlike the rhizoliths appear to have formed since the pit last operated.

The cut sand bank also features several distinct carbonate layers (poorly developed calcretes) that indicate slight differences in the carbonate content of the sand dune horizons (Image 11). These layers stand out as hard surfaces in the dune but on cutting back the surface exposure no stratigraphic difference was noted between these layers and those above and below (Image 12). It was concluded that these layers form by surface hardening by carbonate precipitation on the exposed surface since sediment exposure by past pit operations.

Image 12: A cut through the weakly developed calcrete on the cut surface of the pit revealed compact fairly uniform bedded sands.

DATING

A sample for Optically Stimulated Luminescence (OSL) dating was taken from a freshly cut bench in the lowermost dune unit, 1.5 m below the lower paleosol (Images 13 and 14). This sample will be submitted to the OSL laboratory at the University of Wellington (New Zealand) for dating. The date will provide a maximum age for the formation of the lower paleosol and will help establish whether the dunes formed during glacial or interglacial periods.

Image 13: Taped transect of the face from the top of the dune horizon to the sample site for OSL dating on the cut bench. Image 14: The sample was taken by hammering a sample tube into the cut bench vertically and then removing the sediment for extraction.

MODERN (LATE HOLOCENE DUNES)

Modern dune ridges run parallel to Marshall Beach for the length of the mining lease. They consist of an almost continuous elongated beach foredune backed by a complex of hummocky back dunes separated by roughly bowl-shaped dune swales (depressions). At the western margin of the main resource area these dunes intercept the older west – east longitudinal dunes considered above. The modern dunes are composed of fine loose sands with no evidence of significant calcite crust or rhizolith development; however the carbonate content of the dunes is high. No paleosols were observed in these dunes but thin buried soil horizons may be present. The lack of calcite cementation in the modern dunes suggests a significantly younger age for these deposits as may be expected from their near-coastal setting. Cuttings through the coastal foredune and a low back dune deposit on the main central access track were investigated. The coastal foredune (beach dune) was exposed in a blowout (Images 15 and 16) and displays a uniform profile composed of unconsolidated loose sands. The inland back dune was exposed where the access track cuts through the dune (images 17 and 18). The dune has three horizons: a slightly brown upper 55 cm: a white layer at approximately 55–70 cm and a yellowish layer at >70 cm depth. The profile development indicates a period of dune stability possibly extending back ~1000 years. The brown upper layer is an A1 horizon. The middle white layer is a leached A2 horizon. The deeper yellowish zone is a B horizon. Inappropriate track development and other activities associated with operations on the mining lease could lead to re-activation of these young dunes, which are more exposed to coastal winds than dunes further inland.

Image 15: Steep modern Marshall Beach foredune looking south from Marshall Rock.

Image 16: Natural windblow exposure through the foredune at soil sample site 6 map 2.

Image 17: The modern semi-stabilised back dune.

Image 18: The dune has a similar composition to the active foredune however has been stabilised for some time as a soil profile has developed.

SOIL SURVEY

Soils were sampled and bagged for transport from several locations in the vicinity of the main resource deposit (Map 2). Soils were sampled at depths of 30 cm, 50 cm and where possible 1 m using either natural cuttings or the Eijkelkamp soil auger. This was to identify any unusual characteristics of the soils and to sample for laboratory assessment of soil acidity (pH). pH was measured after shaking soils and water (1:25 ratio) and allowing the mixture to stand for 2 hours A Milwaukee MW 100 pH meter was used, calibrated at the time of analysis using standard solutions at pH 4 and pH 7.

Dune swale: Site 1

The centre of a low dune swale southwest of the pit was augered. Soil samples at 30 cm and 50 cm depth were taken from this site. No peat deposits were noted.

South Curved Lagoons Dune swale 2: Site 2

Soils were augered at the lowest point of South Curved Lagoons on a marsupial grazed lawn that appears to hold water at times forming a small pond. The upper 30 cm and 50 cm samples contained yellow white carbonate sands while dark brown swampy organic rich lacustrine sediments were encountered below about 80 cm.

Dune Swale 3: Site 3

The deepest part of the large dune swale that is visible on topographic maps (as an enclosed depression) was sampled at depths of 30, 50 cm and 1 m. The entire profile displayed fine white sands beneath a slightly browner topsoil and no sign of dark organic horizons or peat.

Modern active foredune Site 4:

A grab sample of a cutting in an active foredune exposed in a blowout was sampled at approximately 2.5m depth in a uniform unconsolidated sand with no topsoil.

Main dune exposure: Site 5

Grab samples were taken of the upper dune deposit, Paleosol 1, middle dune deposit, paleosol 2 and the lower dune deposit (Image 7).

Modern (Holocene) back dune Site 6

Three samples were taken from a track cutting through a low dune in the Marshall Beach back dune complex.

Limestone Bench Site 7

Two samples were taken from a thin soil developed on the Tertiary limestone bench.

pH RESULTS

The results of the pH analysis are presented in Table 2. Results for all samples indicated alkaline soil conditions with no indications of highly acidic soil horizons or acid sulphate soils being present in the vicinity of the proposed mining operations. The samples varied in pH between 7.4 and 8.6 with most soils sampled being classified as moderately to strongly alkaline (Blakemore et al. 1987). The topsoil at the large interdune swale (Site 3) returned a

pH of 7.4 that classifies as slightly alkaline (Acid soils have a pH of below 6.5 with strongly acidic soils having pH of <5.2 (Blakemore et al. 1987)).

Table 2. Results of pH determinations

Site	Description	Depth	pH
Site 1	Small swale in older dune Southwest of Pit Face	30 cm	**8.1**
	Small swale in older dune Southwest of Pit Face	50 cm	**8.2**
Site 2	Lowest point of South Curves Lagoon	30 cm	**8.0**
	Lowest point of South Curves Lagoon	50 cm	**8.0**
	Lowest point of South Curves Lagoon – Organic brown muds	100 cm	**7.7**
Site 3	Lowest point of large elongate dune swale brown topsoil	30 cm	**7.4**
	Lowest point of large elongate dune swale - gradational	50 cm	**7.9**
	Lowest point of large elongate dune swale – white sands	100 cm	**8.4**
Site 4	Holocene Foredune	~250 cm	**8.0**
Site 5	Course quartz rich sands (rocky base)	30 cm	**8.2**
	Course quartz rich sands	45 cm	**8.3**
Site 6	Main Pit profile – Upper sand unit	60 cm	**8.5**
	Main Pit profile – Paleosol 1	100 cm	**8.2**
	Main Pit profile – Middle sand unit	120 cm	**8.3**
	Main Pit profile – Paleosol 2	270 cm	**7.8**
	Main Pit profile – Lower sand unit (dating sample site)	430 cm	**8.1**
Site 7	Holocene dune – Upper topsoil	15 cm	**8.3**
	Holocene dune – Gradational soil (A2)	60 cm	**8.3**
	Holocene dune – Lower yellow / white sands	95 cm	**8.6**
Site 8	Shallow limestone soil profile	30 cm	**8.1**
	Shallow limestone soil profile (rocky base)	50 cm	**8.1**

The high pH values obtained from the soil samples indicate an alkaline environment where extensive acidic soils are unlikely to be present. The reason for this is that the entire region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone. Low pH conditions are usually associated with deep organic soils or forested areas. While topsoil development is present within the dune fields, they are weakly developed and do not have a significant organic component capable of producing acidic soils, particularly in a carbonate dominated environment. This can be clearly seen by the gradation of pH in the site 3 dune swale samples (Table 2). Here weakly developed topsoil has a pH of 7.4 and pH rises to 7.9 at 50 cm and 8.4 in the white dune sands at >80 cm.

It is notable that although both the site 2 dark organic soil at 100 cm in South Curves Lagoon and the granite-derived soils at site 5 are in locations that should potentially have low pH soils at neither site do pH values drop below pH 7. This is due to the abundance of carbonate in the environment. The lack of deep well-developed topsoils indicate that since the dune formation wet forests or large eucalypt dominated forests may have never been present in this dry landscape. Although the Holocene dune (site 7) clearly shows a period of stability and soil development, the soil is thin and low in organic content. It is notable that at the main pit face (site 5) the two paleosols are also poorly developed and show very limited changes in pH. Previous eucalypt forest cover at these sites is unlikely.

5. SUMMARY AND MANAGEMENT RECOMMENDATIONS

SCIENTIFIC VALUES

The dune field within the study site is a landscape of geoscientific interest which can be and should be managed appropriately to limit the footprint of any extraction activities. The main dune resource identified for extraction under the current development application (not the entire mining lease) is actually a series of up to 8–10 dunes formed between South and North Curves lagoons mapped on the 1:25000 map sheets of the area. Two dune ridges rising to altitudes of around 24 m asl are dominant in the centre of the resource site. The dune ridges have steep profiles and sharp crests indicative of their fairly young age. A central deep elongate depression (mapped as a sinkhole on topographic maps) is a dune swale around 15 m deep. The large dunes and their lower-relief companions (generally 2–4 m high) are oriented west-to-east across the lowland plain. On the eastern margins of the study area they climb onto a bench of Tertiary limestone. The existing pit is near the easternmost end of the two main dunes which at this location have combined into one ridge.

The current face of the old pit provides an interesting profile of dune stratigraphy and is of local scientific interest as it provides evidence of the history of formation of the dunes in this part of Flinders Island and could potentially be used to indicate paleoclimate conditions prevalent on the Island. While this is an interesting exposure, many of the other unimpacted dunes in the region are likely to host similar paleosols and rhizoliths and therefore the features of the pit face are likely to be fairly common within the landscape. The exposure is only visible because of past sand mining operations and has been photographed, sampled and described during this study. Obscuring of the exposure by erosion and tree overturn means that this exposure has a limited lifetime; formal preservation of this site is likely to be impractical.

Resumption of sand mining extending west from the current pit face will destroy and remove the studied deposits but equally it is likely that the mining activities will expose further paleosols and tree root and stump rhizoliths in the sand dune. There is also a remote potential for archaeological deposits to be found within the dune particularly owing to its carbonate-rich nature which is conducive to preserving organic material such as bones (e.g. there is a possibility that large bones associated with megafauna could be exhumed as could ancient human remains or evidence of occupation (fire hearths etc)). Therefore, I suggest that contractors keep an eye out for unusual deposits or large bones during operations. In summary I recommend the following:

Contractors should look out for:

- Thick dark continous bands within the dunes.
- Buried tree stumps or large calcareous deposits that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.

- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under he surface.

In the event notable examples of these deposits are encountered the first task should be to photograph the area and move operations away from the immediate working face until a suitably qualified person (in the context of the item/items discovered) can assess any values.

KARST MANAGEMENT (GENERAL)

While bedrock Tertiary Limestone is present in the east of the mine lease no karst landforms apart from very minor surface solution sculpture (karren) landforms have been identified during this survey. Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of evidence for significant karst formulation of mitigation measures is unnecessary.

SINKHOLES

It is difficult to differentiate shallow sinkhole depressions from dune swales and this is particularly so in the area of the mining lease. However, all the depressions noted were identified as dune swales so I do not believe they should be treated as karst.

Collapse sinkholes form steep sided depressions and are a sign of significant active karst erosion. In the event a steep sided depression forms during operations work should stop at this location and the area should be avoided during operations until expert advice is obtained. Collapse sinkholes can occur in random locations and are potentially hazardous to machinery and the environment as they may continue to expand following the initial collapse and could indicate changes in subsurface karst aquifer conditions.

CAVES

While highly unlikely, if any caves are located within the sand dune or in the mining lease, operations should avoid the area, advice from a suitably qualified person should be obtained before operations resume.

Karst recommendations

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.
- In the event a cave is located on site operations should avoid the area and seek expert advice.

EROSION RISKS

Blowouts of the coastal dunes backing the beach are quite common within the mine lease area. However, away from the coast most of the larger dunes appear to be stable. The blowout on the southern edge of the pit face has resulted in minor sand deposition and tree burial south of the highest point of the dune (Image 19). The current location of the pit in the leeward side of the main dune reduces the ability of westerly winds to significantly erode the exposed sands in the pit through deflation, although some loss of sand by wind deflation is likely to have occurred (and may still be occurring). There is a risk that once the operations extend to more of a windward face of the dune, dominant westerly winds may deflate (erode) the dune. This could lead to loss of resource and transport of the sediment. Maintaining a high vegetation cover above the working face and active efforts to revegetate the site away from the working face are key to minimising wind erosion. While easterly winds are common on Flinders Island, they are generally less strong than the westerly winds as evidenced by the strongly deformed vegetation caused by westerlies present at exposed locations on the mining lease (Image 20). Also, easterly winds are generally linked to low pressure systems in the Tasman Sea and rainfall, the wet conditions act to stabilise sand dunes and inhibit wind deflation. Deflation of the sand towards the Marshall Beach Conservation area to west of the proposed pit appears to be unlikely.

Recommendations to minimise wind erosion.

- Avoid, if possible, but otherwise minimise working on faces exposed to westerly winds.
- Maintain vegetation above and to the west of any active face
- Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree for covering exposed surface as operations progress.

Image 19: Sand blow deposition burying tree trunks immediately south of the old working face of the sand pit.

Image 20: Vegetation growth strongly impacted by the dominant westerlies.

SOIL MANAGEMENT

Well drained soils in the area of the Markarna lime sands mining lease in the vicinity of the main proposed resource are strongly alkaline Calcarosols. Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried paleosols and lake/swamp sediments are present, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands. However, it should be noted that this survey was not comprehensive, and it is possible that the some swampy depressions could host thicker organic horizons having a lower pH. These horizons however will not be directly impacted by sand mining of the high-relief dune ridges.

WETLANDS

The extent of wetlands at both North and South Curves Lagoons are significantly smaller than indicated on the topographic map and the TASVEG mapping. Significant areas of these features are undulating grassy dune fields. No wetlands (swamps) as defined by the Forest Practices Code 2020 (Forest Practices Authority 2020, page 98) were documented in the main resource area.

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ATTACHMENT 10. ENVIROMNMENTAL IMPACT STATEMENT, V3 31 MAY 2025

ENVIRONMENTAL IMPACT STATEMENT

LIME SAND EXTRACTION PIT

MARKARNA GRAZING COMPANY PTY LTD

PALANA ROAD, MEMANA, FLINDERS ISLAND

Van Diemen CONSULTING PO BOX 1, NEW TOWN, TAS 7008

Van Diemen Consulting Pty Ltd

PO Box 1
New Town, Tasmania

T: 0438 588 695 E: rwbarnes73@gmail.com

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Document Status

REV	Author	Review/Comments	Date
1	R Barnes C McCoull	R Barnes	19-11-2024
1	R Barnes C McCoull	Markarna Grazing Company Pty Ltd	22-11-2024
2		EPA comments	14-3-2025
2	R Barnes C McCoull	R Barnes	16-3-2025
2		EPA comments	17-4-2025 and 25-5-2025
3	R Barnes C McCoull	Markarna Grazing Company Pty Ltd	31-5-2025
3		EPA comments	

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ABBREVIATIONS

DA	Development Application
DNRET	Department of Natural Resources and Environment Tasmania
DPIPWE (now DNRET)	Department of Primary Industries, Parks, Water and Environment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EMPCA	*Environmental Management and Pollution Control Act 1994*
EMPCS	Environmental Management and Pollution Control System objectives to be found in Schedule 1 of EMPCA
ENV	Effective Neutralising Value (used in relation to the ability of a substance to neutralise acidity)
EPA	Environment Protection Authority
LUPAA	*Land Use Planning and Approvals Act 1993*
ML	Mining Lease, being ML 25M/2009
MRT	Mineral Resources Tasmania
NC Act	*Nature Conservation Act 2002*
NSP	Noise Sensitive Premise
PEV	Protected Environmental Value
QCP	means the Tasmanian *Quarry Code of Practice 2017 (3rd edition)*
RMPS	Resource Management and Planning System objectives to be found in Schedule 1 of EMPCA
WSP	Weed Spraying Program

GLOSSARY

Activity	10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5. Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment. All material won may be screened. The activity includes but is not limited to vegetation removal, soil stripping, ripping, vibratory screening (to blend the product and remove any vegetative matter and stones), stockpiling material, and transportation of material.
Air EPP	means the Environment Protection Policy (Air Quality) 2004
Best practice environmental management	Per EMPCA s(4) - (1) For the purposes of this Act, the best practice environmental management of an activity is the management of the activity to achieve an ongoing minimization of the activity's environmental harm through cost-effective measures assessed against the current international and national standards applicable to the activity. (2) In determining the best practice environmental management of an activity, regard must be had to the following measures: (a) strategic planning by the person carrying out, or proposing to carry out, the activity; (b) administrative systems implemented by the person, including staff training; (c) public consultation carried out by the person; (d) product and process design; (e) waste prevention, treatment and disposal. (3) Subsection (2) does not limit the measures to which regard may be had in determining the best practice environmental management of an activity.
Controlled Waste	Per EMPCA s(3) - (a) a substance that is controlled waste within the meaning of – (i) the National Environment Protection Measure entitled the Movement of Controlled Waste Between States and Territories made by the National Environment Protection Council on 26 June 1998, as amended from time to time; or (ii) any National Environment Protection Measure substituted for the Measure referred to in paragraph (a), as amended from time to time; and (b) a substance that is prescribed by the regulations to be controlled waste;
diffuse source pollution	means pollution which enters the receiving waters via a number of entry points or arises from a large number of dispersed sources.
Development Area	means the spatial area within which the Activity is to occur (excluding sediment basins, drains and the septic system absorption pad).

Disturbed Area	means the area disturbed (without rehabilitation) by the operation of the Pit in the Land and includes access roads and tracks.
Extraction Area	means the spatial area within which lime sands will be extracted, and is fully enclosed within the Development Area.
Groundwater	means any water contained in or occurring in a geological formation.
Mining Lease	means Mining Lease 2117P/M or another Mining Lease number(s) for the same spatial extent which may be generated by Mineral Resources Tasmania through the consolidation, or partial surrender, of Mining Lease(s).
Noise EPP	means the Tasmanian Environment Protection Policy (Noise) 2009
noise sensitive premise	means residences and residential zones (whether occupied or not), schools, hospitals, caravan parks and similar land uses involving the presence of individual people for extended periods, except in the course of their employment or for recreation (EPA supplied definition in the PSG's).
Pad Area	means the gravel hardstand area where the shed is located and the Raw/Processed sand stockpiled
Planning Authority	Flinders Council
pollutant	Has the meaning ascribed to it in Section 3 of EMPCA.
Point source pollution	means pollution, which is emitted at a discrete, identifiable location, usually via a discharge pipe or outfall, and which can be readily measured.
Proponent	means Markarna Grazing Company Pty Ltd
Protected Environmental Value	means the value or use for which it has been determined that a given area of the environment should be protected. There can, and often will be, more than one protected environmental value for a given area. A list of potential protected environmental values is given in clause 7.1 of the STATE POLICY ON WATER QUALITY MANAGEMENT 1997.
Rehabilitated	The result of Rehabilitation; a Disturbed Area deemed to have to a self-sustaining, stable, and non-polluting state, which is suitable for the proposed future land.

Rehabilitation	The process that encompasses all those measures, which seek to repair disturbed or degraded land, and to return such land to a self-sustaining, stable, and non-polluting state, which is suitable for the proposed future land.
(the) Scheme	Tasmanian Planning Scheme and Flinders LPS.
State Policy or State Policies	means a State Policy made under the *State Policies and Projects Act 1993*.
stormwater	In the context of stormwater management, means water traversing the surface of the as a result of rainfall but does not include wastewater
treated water	In the context of stormwater management, wastewater that has been captured and treated (by gravity removal) for sediment removal
Watercourse	means a natural depression carrying perennial or intermittent flows of surface water for part or all of the year in most years. Consisting of a defined channel, with banks and a bed along which water may flow (QCP definition).
wastewater	In the context of stormwater management, means water used or contaminated during carrying out the activity, including polluted stormwater

INTRODUCTION

This Environmental Impact Statement (EIS) contains supporting information for a Development Application (DA) that seeks a permit under the *Land Use Planning and Approvals Act 1993* for an Extraction Pit (lime sand) at Marshall Bay, Flinders Island.

The lime sand deposits at Marshall Bay are well known and proven in their ENV on agricultural lands.

Mining Lease 2117P/M is in force.

The DA is made, and permit under LUPAA sought, on the basis that the planning scheme amendment for the zone change to Rural from Landscape Conservation is approved by the Tasmanian Planning Commission.

LEVEL 2 ACTIVITY STATUS

The Pit includes two activities listed Schedule 2 of the *Environmental Management and Pollution Control Act 1994* ('EMPCA') –

- '5. Extractive Industries.

  (b) Extractive pits: the extraction of 5,000 cubic metres or more of sand or clay per year if the extraction is the subject of, or requires, a mining lease under the *Mineral Resources Development Act 1995* [i.e. Maximum 10,000 cubic metres per annum]; and

- '6. Materials Handling. (a) Crushing, Grinding or Milling: processing (by crushing, grinding, milling, or separating into different sizes by sieving, air elutriation or in any other manner) of … (ii) rock, ores or minerals at a rate in excess of 1 000 cubic metres per year'

Level 2 Activities must be referred by the Planning Authority (in this case, Flinders Council) to the Environment Protection Authority (the 'EPA'), for assessment under the EMPCA. The Environmental Impact Statement (EIS) has been prepared to support a Development Application to the Flinders Council (as the Planning Authority) for the establishment and operation of the use.

The EIS and associated assessments have considered impacts from the Activity within the Mining Lease and specifically the extraction of material from within the Development Area.

FUNCTION OF THE ENVIRONMENTAL IMPACT STATEMENT

The key function of the EIS is to provide sufficient information on the environmental impacts for the Board to make informed decisions about the proposal. The Board considers the EIS, as well as other relevant information, against the objectives of the RMPS and EMPCS objectives. These objectives focus on the concept of sustainable development, which requires consideration of the economic and social needs of people now and in the future, while sustaining the environment and avoiding or mitigating adverse effects.

The Board will consider the objectives and endeavour to make the decision which best furthers them, when considered together. That decision may be to approve the proposal with conditions, or in some cases, the Board may decide the objectives cannot be upheld and the proposal is rejected.

Pursuant to s25(2), given the Activity includes Level 2 Activities prescribed by Schedule 2 of EMPCA, the following is noted for the assessment of environmental matters, such as noise, dust, biodiversity etc.:

'(f) the planning authority, notwithstanding any enactment to the contrary, is not required to assess any matter addressed in the Board's assessment under paragraph (a); and

(g) if, despite paragraph (f), the planning authority does its own assessment of a matter addressed in the assessment under paragraph (a), it is not entitled to recover the cost of its assessment from the applicant, the Crown or any other person.'

GUIDANCE FROM THE EPA BOARD ON THE CONTENT OF THE EIS

EMPCA requires the Board of the Environment Protection Authority to provide guidance to an applicant about what should be included in an EIS. The Board has authorised EPA Tasmania (EPA) to establish the information base to inform decision making on its behalf.

The EPA requires the EIS to be prepared using a risk-based approach. Not all issues nominated in the guidelines will have the same degree of relevance to an activity. Depending on the nature of the proposed activity and its location, some of the issues may be more relevant than others, and some may not be applicable at all. The level of detail provided on each issue should be appropriate to the level of significance of that environmental issue to the proposal.

SPECIALIST STUDIES

The EIS is supported by specialist studies which are listed below and each document provided as an Attachments to the EIS: -

Report name and author	EIS Attachment Number
Flora/Fauna	
Lime Sand Extraction Pit, Palana Road, Memana, Flinders Island. Natural Values Report. Markarna Grazing Company Pty Ltd. *Van Diemen Consulting Pty Ltd, 20 October 2024.*	**4**
Marshall Bay Lime Sand Pit, Memana. Weed and Disease Management Plan. *Van Diemen Consulting Pty Ltd, November 2024.*	**8**
Wastewater disposal	
Site & soil evaluation and design report. New onsite wastewater management system at "Markarna Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine – Southern site). *Richard Mason, Onsite Assessments Tas, 20 Adelong Drive, Kingston. August 2022.*	**5**
Stormwater and sediment control measures	
Marshall Sand Pit, Memana. Stormwater Management and Sediment Control Measures Assessment Report. *Van Diemen Consulting Pty Ltd, November 2024.*	**7**

Geoconservation, Karst and Geomorphology	
Survey of the geomorphology and soil characteristics of the Markarna Grazing Company Pty Ltd property, Marshall Bay, Flinders Island. *Dr Adrian Slee, Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000. January 2024.*	**9**

STRUCTURE OF THE EIS

The EIS contains the following components –

Part	Description
Part A	*Proponent information* to the proposed development/activity including details for example of the proponent and activity location, rationale of the proposed activity, relevant environmental legislation standards and guidelines (including State Policies), and consultation conducted so far by the Proponent.
Part B	*Proposal Description* including details of the volume extracted, extraction process, bunding, machinery, and equipment to be used and timeframe for the activity. *Existing environment* information including climatic (temperature, rainfall, wind), catchment, geological and biodiversity information.
Part C	*Potential environmental impacts and their management* including an assessment of each relevant impact, its likelihood of occurrence, mitigation measures and net impact.
Part D	*A summary of the proposed management measures* for the activity to avoid or mitigate potential environmental impacts from the activity.
Part E	*Conclusion* about the proposed activity.
Part F	*References* cited in the EIS.
Part G	*Attachments* referenced in the EIS.

PART A – INTRODUCTION

A-1 PROPONENT DETAILS

The proponent is Markarna Grazing Company Pty Ltd which owns the land the subject of the DA. Details of this entity are provided in **Table 1.**

Table 1. Details of the Proponent

Item	Description
Name of proponent	Markarna Grazing Company Pty Ltd
Registered address of proponent	Level 3, 302-320 Burwood Road, HAWTHORN VIC 3122
Postal address of proponent	33-41 Agnes Street, East Melbourne VIC 3002
ACN	063 634 444
ABN	NA
Contact person's details	Mr George Adams (Director) Phone: (03) 9333 2400 Fax: (03) 9333 1258 cynthia.adams@adamsgroup.com.au

A-2 CONSULTANT DETAILS

The contact details for the consultant engaged to prepare the assessment are provided in **Table 2.**

Table 2. Details of the Consultant

Item	Description
Van Diemen Consulting Pty Ltd	Contact – Dr Richard Barnes Postal Address – PO Box 1 New Town 7008 Mobile – 0438 588 695 Email – rwbarnes73@gmail.com

A-3 PIT INFORMATION

The details for the Pit location, zoning and land tenure are provided in **Table 3.**

Table 3. Physical details and planning related matters of the Marshall Bay Sand Pit

Item	Description	Figure
Physical address	The address for the Activity is – 'MARKANA PARK' - 368 FIVE MILE JIM RD MEMANA TAS 7255 Access is from Palana Road (sealed road section).	A-4
Mining Lease	2117P/M (in force) - 364.1 hectares	A-1, A-2
The Land	Mining Lease 2117P/M which is further refined by the Development Area	A-1, A-2
Product	Lime sand (with some blending with soil ameliorants brought to the island)	NA
Services (power and water)	There is no reticulated water or sewer connections, and none are proposed. There is access to powerlines and poles along its eastern edge.	NA
Land Titles/PID	The following Certificates of Title apply – • CT 120064/1, CT 215120/1, CT 230282/1 – private freehold (PID 3513143) • Reserved Road (Part of CID 1182402) – The Crown (vehicular access only)	A-2
Land tenure	The Land is private freehold other than the Reserved Road at the eastern extent of the Land. The Reserved Road is under licence by the proponent, and is also spatially covered by ML 2117P/M.	E-5
Current zoning	Tasmanian Planning Scheme – Flinders - Landscape Conservation zone	E-1a
Proposed zoning	Tasmanian Planning Scheme – Flinders - Rural zone - Landscape Conservation zone (reserved road section only retained in this zone; only for vehicular access)	E-1b

Item	Description	Figure
Planning overlays	Tasmanian Planning Scheme – Flinders - Waterway and Coastal Protection Area - Landslip Hazard - Priority Vegetation Area - Scenic Protection Code - Coastal Inundation	E-2, E-3a to E-3d
Use Class and Permissibility	The activity is consistent with the Extractive Industry Use Class. An Extractive Industry is listed as Permitted in Clause 20.2 Use Table for the Rural zone (if the planning scheme amendment for the zone change to Rural from Landscape Conservation is approved by the Tasmanian Planning Commission).	NA

A-4 TIMEFRAME AND LONGEVITY OF DEVELOPMENT

It is anticipated that the activity will commence in the third quarter of the 2024-25 financial year (i.e., January to March 2025).

This timeline enables sufficient time for the necessary infrastructure to be installed and extraction to commence in readiness for the autumn 2025 lime sand spreading period. At full production every year, the Pit is expected to have a lifespan of at least 30 years.

A-5 PROJECT RATIONALE AND ALTERNATIVES

A-5-1 PROJECT RATIONALE

Soil acidification is a naturally occurring process which is influenced by soil type, organic matter, fertiliser usage, rainfall and farming practices. Most of Tasmania's soils are naturally acidic, which compounds the problem of acidification. Over time soil pH decreases, with the rate of pH decline being quicker in light textured soils that have low organic matter.

The processes which reduce pH levels in agricultural soils are primarily –

1. Organic matter accumulation which causes organic acids;
2. Removal of plant and animal material containing large amounts of cations (calcium, magnesium and potassium);
3. Leaching of cations due to high rainfall;
4. Leaching of nitrate and nitrogen from the root zone; and
5. The application of soil-acidifying fertilisers.

The acidification of agricultural land is potentially a serious land degradation issue and without addressing the issue, agricultural productivity and sustainability will be negatively affected. The key issue which are caused by soil acidification are:

- A decrease in the availability of nutrients to plants;
- Increasing the toxicity of aluminium and manganese;
- Decreasing soil biological functions;
- Reduce the ability for legumes to fix nitrogen; and
- Make the soil more vulnerable to soil structure decline and erosion.

Lime sands (material rich in calcium carbonate – $CaCO_3$) reduce acidity by neutralising the acid reaction in soils. The carbonate component of lime consumes hydrogen ions present in the soil solution and in doing so raises soil pH. The higher the Effective Neutralising Value (ENV) the more reactive the lime product is within the soil and the greater its ability for unit volume to neutralise acidity.

'Liming' is the only cost-effective way to manage low soil pH. It prevents loss of production and profitability in farming systems and reverses acidification. Lime is usually applied on the surface several months before sowing pasture or crops to allow time for the lime to react in the soil. Incorporation of the lime into the soil is recommended for the quickest results, as lime does not move readily down through the soil profile.

Commonly used liming materials include for example –

1. *'Agricultural lime'* - Crushed and sieved natural limestone is mainly calcium carbonate. It is safe, cheap and effective.
2. *Lime sand* - Lime sand is mined from natural deposits and is mainly calcium carbonate. It is safe and cheap but can on occasion be coarser such that it is slower reacting than agricultural lime.
3. *Dolomite* - A mixture of calcium and magnesium carbonates. It is particularly valuable where magnesium is low.
4. *By-product lime* - This is a by-product from the production of soda ash. It contains mostly calcium carbonate, but with some calcium oxide and hydroxide.

Agriculture is a critical employment and income generation activity on Flinders Island, so its longevity is of paramount importance to the social and economic well-being of the island.

The Marshall Bay land parcels owned by Markarna Park were specifically purchased to provide ongoing lime sands for the agricultural lands on the property and associated properties, and to also provide some for sale to other agricultural enterprises on the island. The existing but now disused pit (which is the starting location for the new pit) was once used by many islanders to access lime sand due to its ease of access, extraction of high ENV. Sands will also be used to supply concrete production activities because most sand for such a purpose is brought to the island.

Off-island supplies of lime are costly due to high freight charges which in the medium to long-term undermines the economic viability of agriculture on the island. That is, if lime is expensive then it is likely that inadequate levels would be used by agricultural operators (due to cost) that then has a long-term negative impact to the overall soil health and potential of agricultural lands to produce food.

A-5-2 PROJECT ALTERNATIVES

The lime sand deposits at Marshall Bay are well known and proven in their ENV on agricultural lands.

No alternatives were considered as the lime sands are spatially limited on Flinders Island, are of very high quality, extensive in their geographic extent at Marshall Bay and can be extracted in a way and a rate that is sensitive to the Marshall Bay environment.

A-6 ENVIRONMENTAL LEGISLATION, STANDARDS AND GUIDELINES

The Proponent will conduct the operation in compliance with relevant legislation, policies, codes of practice, and standards.

A-6-1 STATUTORY REQUIREMENTS

Relevant or ancillary legislation includes –

- *Environmental Management and Pollution Control Act 1994* (EMPCA)
- *Land Use Planning and Approvals Act 1993*
- *Mineral Resources Development Act 1995*
- *Threatened Species Protection Act 1995*
- *Environment Protection and Biodiversity Conservation Act 1999*
- *Road and Jetties Act 1935*
- *State Policies and Projects Act 1993*
- *Local Government (Highways) Act 1982*
- *Nature Conservation Act 2002*
- *Forest Practices Act 1985* and *Forest Practices Regulations 2017*

Relevant regulations made under EMPCA include –

- *Environmental Management and Pollution Control (General) Regulations 2017*
- *Environmental Management and Pollution Control (Noise) Regulations 2016*

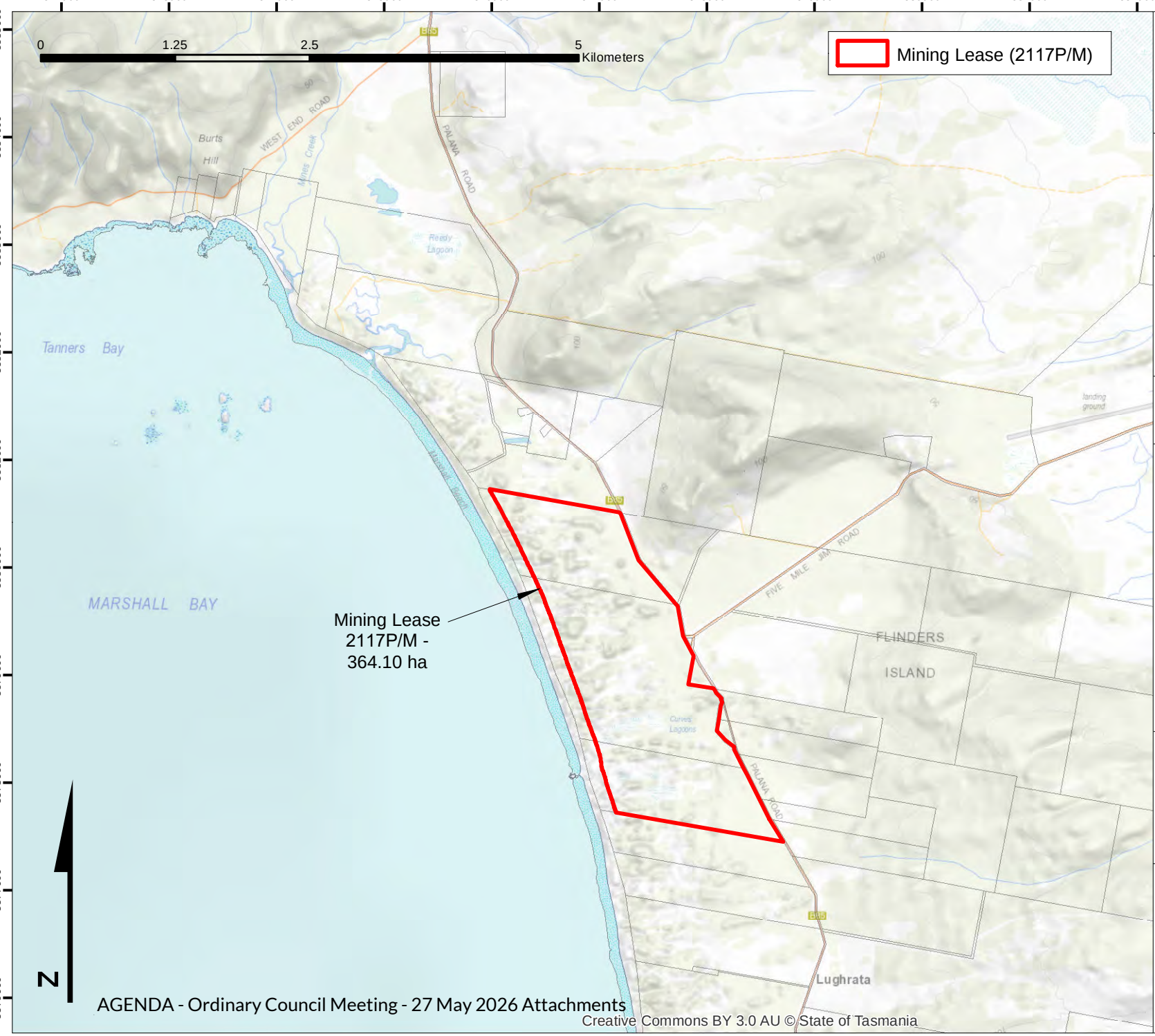
A-6-2 EXTRACTIVE INDUSTRY RELEVANT GUIDELINES AND BEST PRACTICE PRINCIPLES

There are several extractive industry relevant guidelines for the management of environmental practices and pollution control. Some of these are guidelines and codes have been developed by industry or the regulatory authorities of extractive industries to provide guidance on the expectations of environmental management and best practice.

Table 4 provides a summary of the documents considered in the preparation of this EIS.

Table 4. Extractive Industry relevant best practice guidelines and manuals

Document/Name	Focus/Content	Publisher
Tasmanian Quarry Code of Practice, 3rd Edition, May 2017	Provides detailed guidelines for the quarry industry covering planning through to site rehabilitation.	Tasmanian EPA (2017)
Decommissioning & Rehabilitation Plan (DRP) **A guideline for the Tasmanian mining industry**	A guideline for the preparation of a decommissioning and rehabilitation plan for the Tasmanian mining industry.	Tasmanian EPA (2011)
Bunding and Spill Management Guidelines	Provides guidance on best practice environmental management to operators of activities likely to store and handle environmentally hazardous substances.	Tasmanian EPA (2015)
Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania.	These guidelines establish a standard for washdown and a guide to prescribing its application where codes of practice or other environmental management plans are not in place.	DPIPWE (2015)
The Waterways and Wetlands Works Manual **Primarily Guidelines 1, 2 and 3**	The Waterways and Wetlands Works Manual provides environmental best practice guidelines for undertaking works in these sensitive areas. Guidelines are available on practical strategies to minimise environmental harm when undertaking works on waterways and wetlands in Tasmania.	DPIPWE (2003)
Best Practice Erosion and Sediment Control	Contains the necessary strategies and techniques to assist erosion and sediment control practitioners to reduce the degradation of land and water from uncontrolled erosion and sedimentation.	International Erosion and Sediment Control (Australasia), IECA (2008)
Forest Practices Code 2020	Provides a practical set of guidelines and standards for the management of forest practices	Forest Practices Authority, 30 Patrick Street, Hobart
MINE REHABILITATION **Leading Practice Sustainable Development Program for the Mining Industry**	Provides guidance on best practice environmental management for rehabilitation and mine closure planning, implementation, and monitoring.	Australian Government (2016)



AGENDA - Ordinary Council Meeting - 27 May 2026 Attachments

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Annexure: 16.2.3

MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure A-1: Location of Markarna Park Sand Pit Mining Lease

TASMAP:	LGA:
TANNER EMITA	FLINDERS

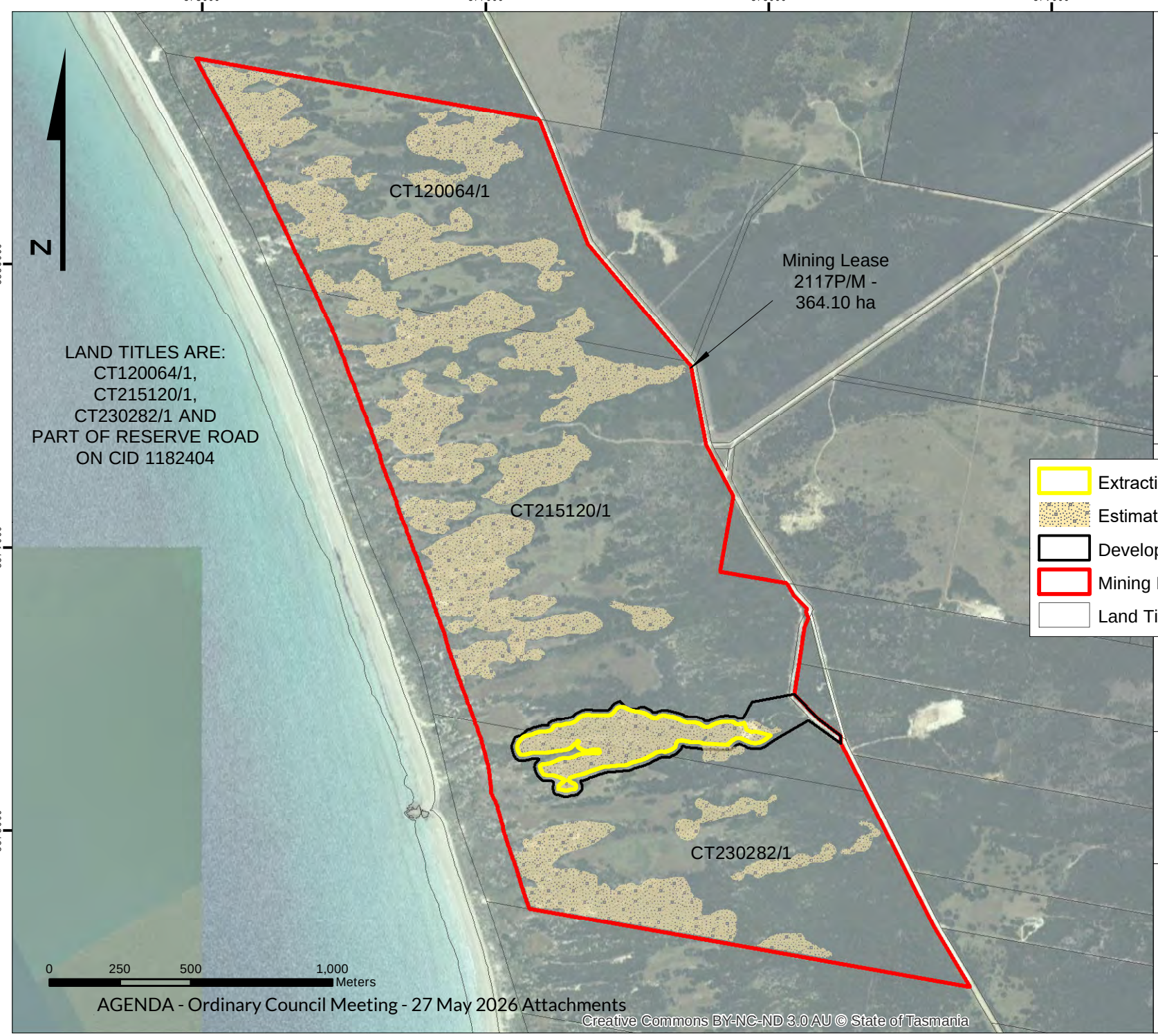
Base data by TASMAP. © State of Tasmania
Base image by TASMAP. © State of Tasmania

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024



MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure A-2: Location of Markarna Park Sand Pit Development Area and Land Titles

TASMAP:	LGA:
TANNER EMITA	FLINDERS

- Extraction Area (Approx 30 year supply)
- Estimated Resource in Mining Lease
- Development Area (The Land)
- Mining Lease (2117P/M)
- Land Titles (The LIST)

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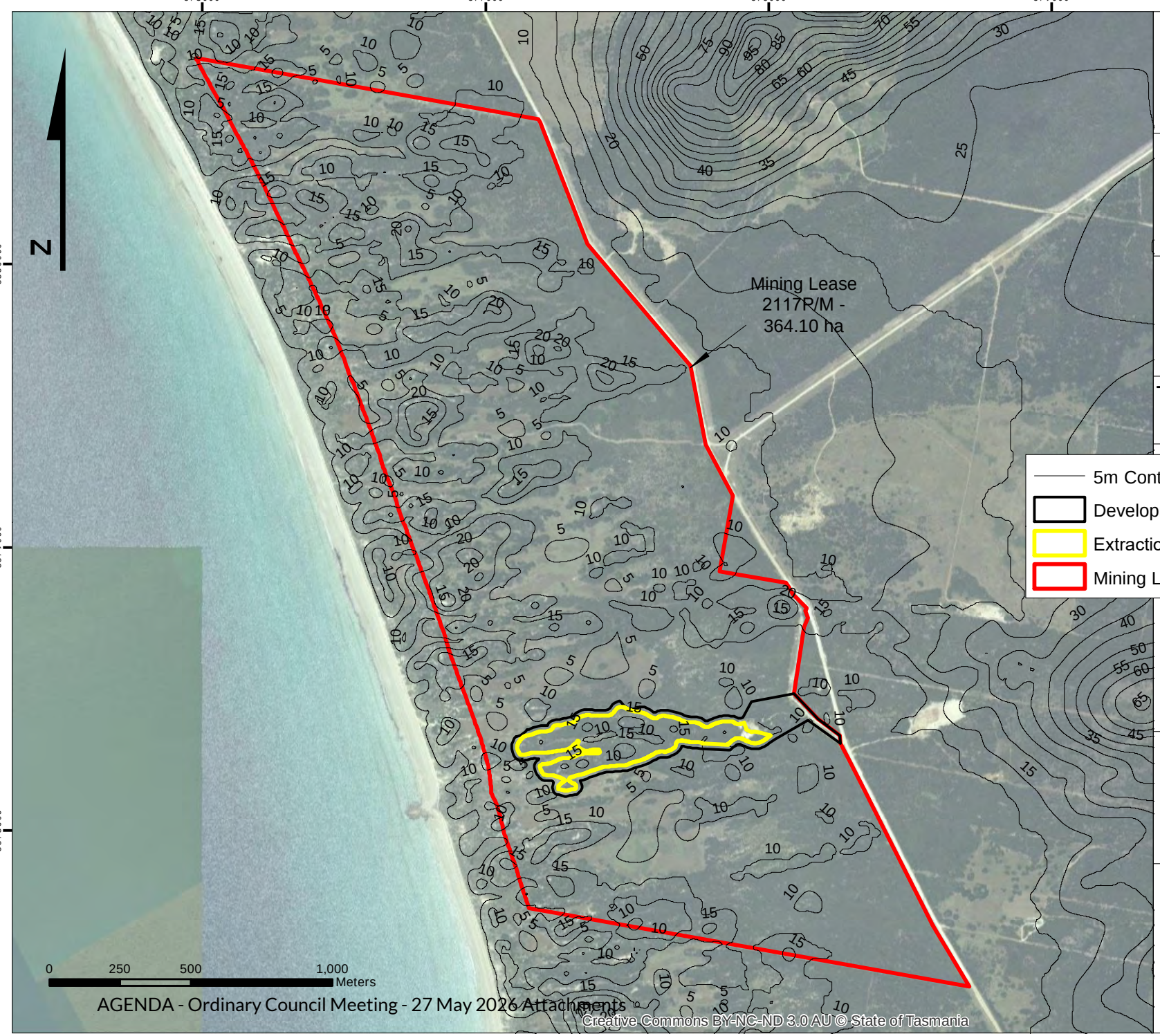
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure A-3: Topography at the Markarna Park Sand Pit Development Area and surrounds

TASMAP: TANNER EMITA

LGA: FLINDERS



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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

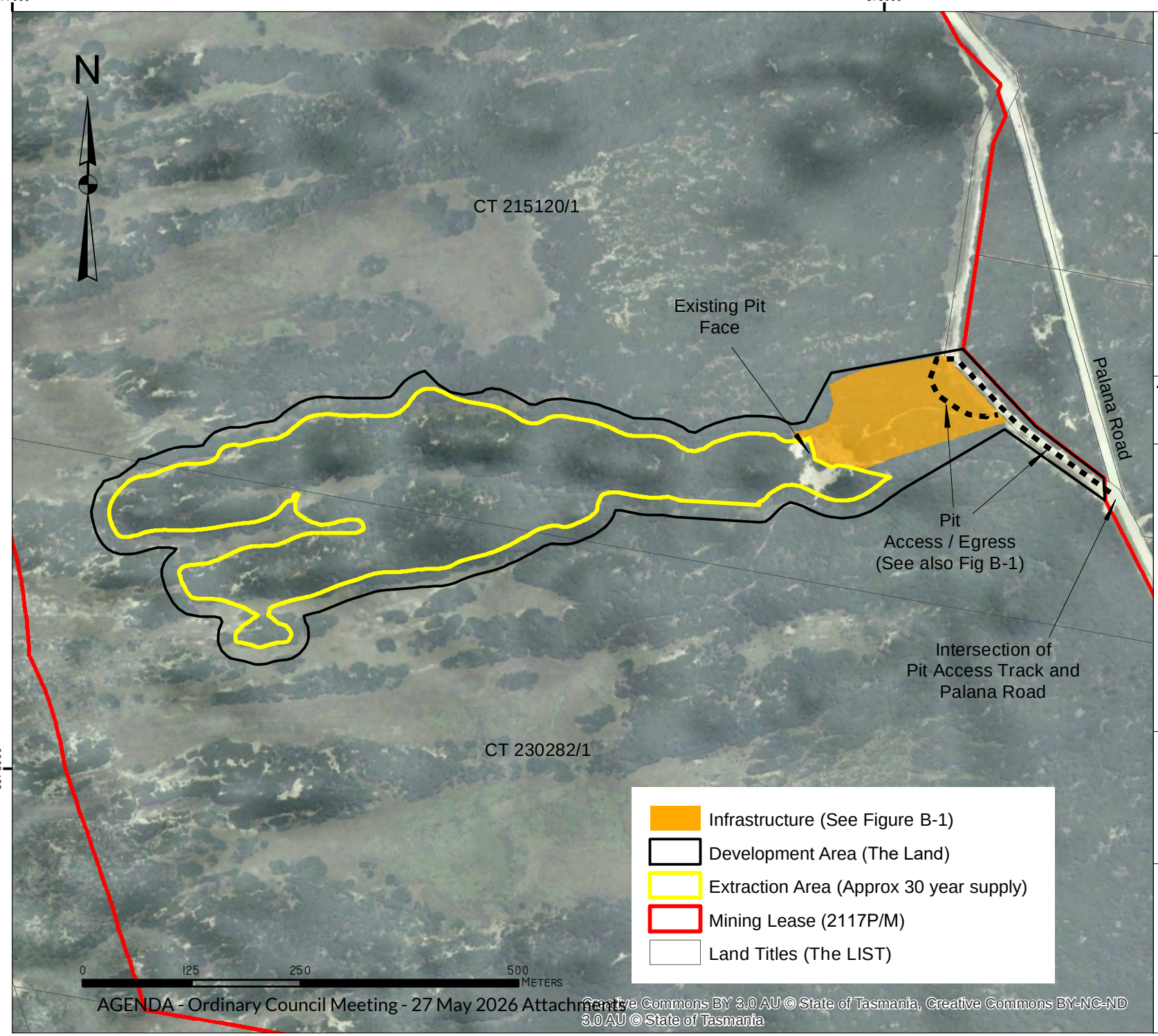
CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure A-4: Markarna Park Sand Pit Development Area and Access/Egress



TASMAP:	LGA:
TANNER EMITA	FLINDERS

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
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SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

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A-6-3 STATE POLICIES

A State Policy is a statutory document which is intermediate between the provisions of an Act and the lesser policies and provisions of planning schemes and other mechanisms identified in the relevant legislation comprising the System.

The *State Policies and Projects Act 1993* determines the functions of a State Policy and what it can contain:

> S.5(1) A State Policy -
>
> (a) must seek to further the objectives set out in Schedule 1; and
>
> (b) may be made only where there is, in the opinion of the Minister, a matter of State significance to be dealt with in the State Policy; and
>
> (c) must seek to ensure that a consistent and coordinated approach is maintained throughout the State with respect to the matters contained in the State Policy; and
>
> (d) must incorporate the minimum amount of regulation necessary to obtain its objectives.

The central objective of any State Policy is sustainable development. This means that it must address the use, development, and protection of natural and physical resources together with the objectives relating to public involvement and the sharing of responsibility in resource management and planning as well as those relating to economic development.

The following State Policies are made under the *State Policies and Projects Act 1993*:

- State Policy on the Protection of Agricultural Land 2009,
- State Policy on Water Quality Management 1997,
- Tasmanian State Coastal Policy 1996, and
- National Environmental Protection Measures (NEPMS).

<u>State Policy on Protection of Agricultural Land 2009</u>

The policy aims to conserve and protect agricultural land so that it remains available for the sustainable development of agriculture, recognising the importance of Prime Agricultural Land[1]. Specific objectives are to enable the sustainable development of agriculture by minimising: (a) conflict with or interference from other land uses; and (b) non-agricultural use or development on agricultural land that precludes the return of that land to agricultural use.

The Land is classified as Agricultural land[2] under the State Policy for the Protection of Agricultural Land. This matter is dealt with by the Scheme because it is not an environmentally relevant consideration for the EIS.

---

[1] "Prime agricultural land" means agricultural land classified as Class 1, 2 or 3 land based on the class definitions and methodology from the Land Capability Handbook, Second Edition, C J Grose, 1999, Department of Primary Industries, Water and Environment, Tasmania.

[2] "Agricultural land" means all land that is in agricultural use or has the potential for agricultural use, that has not been zoned or developed for another use or would not be unduly restricted for agricultural use by its size, shape and proximity to adjoining non-agricultural uses.

State Coastal Policy 1996

The purpose of these Policy principles is to guide the outcomes of the Tasmanian State Coastal Policy. The State Coastal Policy applies to the Pit because the Land is within the Coastal Zone to which the policy applies.

Table 5. Comments about the State Coastal Policy Outcomes and Objectives and the Activity

Document/Name	
1. PROTECTION OF NATURAL AND CULTURAL VALUES OF THE COASTAL ZONE	
1.1. NATURAL RESOURCES AND ECOSYSTEMS	
1.1.1. The coastal zone will be managed to ensure sustainability of major ecosystems and natural processes.	The Activity is in the coastal zone and proposes to extract lime sand for use in agricultural activities on Flinders Island. The Activity is to be conducted in a very small area of the coastal zone which does not support threatened native vegetation or under-reserved vegetation communities. The major ecosystem present – inland coastal dunes with scrub vegetation – is extensive in the Mining Lease and the natural processes that occur in the broader Marshall Bay region will be largely unaffected by the small-scale of the Activity. The Activity is consistent with this clause.
1.1.2. The coastal zone will be managed to protect ecological, geomorphological and geological coastal features and aquatic environments of conservation value.	A suitably qualified **geomorphologist** has assessed the Activity for hazards associated with acid sulphate soils, geological features, geoconservation values, karst, caves, and wind erosion/blowout potential (**Attachment 9**). No immediate or unmanageable hazards or risks were identified; mitigation and management measures are to be applied. Suitably qualified **ecologists** have assessed the Development Area for ecological values (**Attachment 4**); threatened vegetation and threatened fauna will not be impacted. Four threatened flora species will be affected – none of the flora species are listed on the EPBC Act, with most listed as rare on the TSP Act (only a small proportion of the estimated population of each is to be affected). The species to be affected are early colonisers of disturbed ground, so are likely to recolonise Pit rehabilitated areas. The Activity is consistent with this clause.
1.1.3. The coastal zone will be managed to conserve the diversity of all native flora and fauna and their habitats, including seagrass and seaweed beds, spawning and breeding areas. Appropriate conservation measures will be adopted for the protection of migratory species and the protection and recovery of rare, vulnerable and endangered	A Natural Values Assessment was completed (**Attachment 4**) which found that there would be nil to negligible impact to any rare, vulnerable and endangered species. Threatened native vegetation communities are absent from the Development Area. The marine environment will remain unaffected by the Activity. The Activity is consistent with this clause.

species in accordance with this Policy and other relevant Acts and policies.	
1.1.4. Exotic weeds within the coastal zone will be managed and controlled, where possible, and the use of native flora encouraged.	A DRAFT Weed and Disease Management Plan has been developed for the Activity with a focus on the control and eradication of weeds declared under the *Biosecurity Act 2019.* Rehabilitation will be with native indigenous species to reinstate, as far as practicable, comparable native vegetation community's post-closure. The Activity is consistent with this clause.
1.1.5. Water quality in the coastal zone will be improved, protected and enhanced to maintain coastal and marine ecosystems, and to support other values and uses, such as contact recreation, fishing and aquaculture in designated areas.	A stormwater management assessment was completed for the Activity, which provided recommendations for drainage and sediment control measure (**Attachment 7**). The assessment evaluated current drainage patterns, sediment generation potential of the Activity, and describes stormwater and sediment control measures tailored to the site's geological and operational conditions. Strategies were recommended to manage stormwater runoff, mitigate erosion, control sediment dispersion, and ensure compliance with local environmental regulations to minimise the impact of sand extraction operations on surrounding environment. All identified water quality impacts can be mitigated. The Activity is consistent with this clause.
1.1.9. Important coastal wetlands will be identified, protected, repaired and managed so that their full potential for nature conservation and public benefit is realised. Some wetlands will be managed for multiple use, such as recreation and aquaculture, provided conservation values are not compromised.	Coastal wetlands are not being affected by the Activity. The Activity is consistent with this clause.
1.1.10. The design and siting of buildings, engineering works and other infrastructure, including access routes in the coastal zone, will be subject to planning controls to ensure compatibility with natural landscapes.	The design and siting of buildings, engineering works (shed location), and other infrastructure (sediment basins, drainage network), including the access route are subject to planning controls and will be assessed under those controls.
1.2. CULTURAL AND HISTORIC RESOURCES	
1.2.1. Areas within which Aboriginal sites and relics are identified will be legally protected and conserved where appropriate.	Not an environmental matter assessed under EMPCA.
1.2.2. All Aboriginal sites and relics in the coastal zone are protected and will be identified and managed in consultation with Tasmanian Aboriginal people in accordance	Not an environmental matter assessed under EMPCA.

with relevant State and Commonwealth legislation.	
1.3. CULTURAL HERITAGE	
1.3.1. Places and items of cultural heritage will be identified, legally protected, managed and conserved where appropriate.	Not an environmental matter assessed under EMPCA. The Activity has conducted an AHT endorsed heritage survey of the Development Area.
1.4. COASTAL HAZARDS	
1.4.2. Development on actively mobile landforms such as frontal dunes will not be permitted except for works consistent with Outcome 1.4.1.	No frontal dunes are proposed to be extracted as part of the Activity. A suitably qualified geomorphologist assessed the Activity for hazards associated with acid sulphate soils, geoconservation values, karst, caves, and wind erosion/blowout potential (**Attachment 9**). No immediate or unmanageable hazards or risks were identified; therefore, no mitigation and management measures are to be applied.
1.4.1. Areas subject to significant risk from natural coastal processes and hazards such as flooding, storms, erosion, landslip, littoral drift, dune mobility and sea- level rise will be identified and managed to minimise the need for engineering or remediation works to protect land, property and human life.	An Engineers Australia accredited civil/mining engineer has assessed and designed the stormwater and sediment erosion control system for the Pit using IECA (2008) guidelines and the Blue Book (**Attachment 7**). A suitably qualified geomorphologist has assessed the Activity for hazards associated with acid sulphate soils, geoconservation values, karst, caves, and wind erosion/blowout potential (**Attachment 9**). No immediate or unmanageable hazards or risks were identified; mitigation and management measures are to be applied. Landslip risk has been assessed by Mineral Resources Tasmania as part of the granting process for a Mining Lease under the *Mineral Resources Development Act 1995.* Sea-level rise risk has been assessed under the Tasmanian Planning Scheme (Coastal Inundation Hazard Code) with the heights of the land being more than the minimum values prescribed in the Code to trigger a Coastal Inundation Hazard Report. The Activity is consistent with this clause.
2. SUSTAINABLE DEVELOPMENT OF COASTAL AREAS AND RESOURCES	
2.1. COASTAL USES AND DEVELOPMENT	
2.1.1. The coastal zone shall be used and developed in a sustainable manner subject to the objectives, principles and outcomes of this Policy. It is acknowledged that there are conservation reserves and other areas within the coastal zone which will not be available for development.	The Activity has been designed, and will be operated, in such a way that the coastal zone is being managed in a sustainable manner, consistent with the RMPS principles. The Marshall Beach Conservation Area will be unaffected by the Activity. The Activity is consistent with this clause.

2.1.2. Development proposals will be subject to environmental impact assessment as and where required by State legislation including the *Environmental Management and Pollution Control Act 1994.*	The Activity includes two activities on Schedule 2 of the *Environmental Management and Pollution Control Act 1994* ('EMPCA') – • '5. Extractive Industries. (b) Extractive pits: the extraction of 5,000 cubic metres or more of sand or clay per year if the extraction is the subject of, or requires, a mining lease under the *Mineral Resources Development Act 1995* [i.e. Maximum 10,000 cubic metres per annum]; and • '6. Materials Handling. (a) Crushing, Grinding or Milling: processing (by crushing, grinding, milling, or separating into different sizes by sieving, air elutriation or in any other manner) of … (ii) rock, ores or minerals at a rate in excess of 1 000 cubic metres per year' Level 2 Activities are assessed by the EPA under the EMPCA. The Activity is consistent with this clause.
2.1.3. Siting, design, construction and maintenance of buildings, engineering works and other infrastructure, including access routes within the coastal zone will be sensitive to the natural and aesthetic qualities of the coastal environment.	An Engineers Australia accredited civil/mining engineer has assessed and designed the stormwater and sediment erosion control system for the Pit using IECA (2008) guidelines and the Blue Book (**Attachment 7**). The Natural Values Assessment (**Attachment 4**) found that there would be nil to negligible impact to any rare, vulnerable and endangered species. Threatened native vegetation communities are absent from the Development Area. The Activity is consistent with this clause.
2.1.4. Competing demands for use and development in the coastal zone will be resolved by relevant statutory bodies and processes, in particular the Land Use Planning Review Panel, the Resource Management and Planning Appeal Tribunal and the Marine Farming Planning Review Panel. Planning schemes, marine farming development plans and other statutory plans will provide guidance for resource allocation and development in accordance with this Policy.	A Mining Lease granted under the MRD Act is in force, so the sand resource in the Development Area and broader ML area has been confirmed as meeting s78A(1)(a)[3], specifically that '…there is a sufficient quantity of minerals to justify mining'. The statutory planning process underway through the LUPA Act and EMPC Act provides the pathway for the assessment of the development in accordance with the policy. The Activity is consistent with this clause.
2.1.5. The precautionary principle will be applied to development which may pose serious or irreversible environmental damage to ensure that environmental degradation can be avoided, remedied or mitigated. Development proposals shall	The natural values assessment, geomorphological study, stormwater assessment and management plan, and the wastewater disposal system (septic) have confirmed that the Activity is not likely to cause serious or irreversible environmental damage. Measures are proposed in the EIS for the Activity to avoid or mitigate.

[3] 78A. When Minister may grant application
(1) The Minister may only grant an application for a lease if the Minister is satisfied that the applicant –
(a) has demonstrated that there is a sufficient quantity of minerals to justify mining; and

include strategies to avoid or mitigate potential adverse environmental effects.	The Activity is consistent with this clause.
2.1.6. In determining decisions on use and development in the coastal zone, priority will be given to those which are dependent on a coastal location for spatial, social, economic, cultural or environmental reasons.	The lime sand resource is spatially located in the coastal zone, so the Activity is dependent on this coastal location and will have significant social and economic benefits with minimal impact (mitigation measures are to be applied to further reduce the risk of environmental impact) to the environment. The Activity is consistent with this clause.
2.1.8. Extraction of construction materials, mineral, oil, and natural gas deposits in the coastal zone will be allowed provided access to areas is allowed under the provisions of the *Mining Act 1929*.	A Mining Lease is in force which allows access to the area under the provisions of the *Mineral Resources Development Act 1995* (*Mining Act 1929* has been repealed).
2.1.10. Extraction will be subject to the Quarry Code of Practice and environmental assessment as required by State legislation including the *Environmental Management and Pollution Control Act 1994*. Adequate rehabilitation shall be carried out.	The sand extraction includes two Level 2 Activities which are to be assessed by the EPA under the EMPCA. The Pit will be subject to the Quarry Code of Practice by permit conditions. Rehabilitation requirements will be required through permit conditions and are also required by the terms of the Mining Lease (a security deposit is held by MRT for rehabilitation). The Activity is consistent with this clause.
2.1.11. Extraction of sand will be provided for by zoning of appropriate areas in planning schemes	A PSA is sought with the development application to change the zoning of the Mining Lease (Landscape Conservation to Rural – Tasmanian Planning Scheme Flinders LPS) to one where extraction becomes a permissible use.
2.1.16. Water quality in the coastal zone and in ground water aquifers will accord with the requirements and guidelines established by the *Environmental Management and Pollution Control Act 1994* or the *Environment Protection (Sea Dumping) Act 1987* (as appropriate) and any other relevant State and Commonwealth Policies and statutes.	The quality of water discharged or generated by the Activity was a key aspect for the assessment of stormwater (**Attachment 7**) and the wastewater (septic) disposal system (**Attachment 5**). The Activity is consistent with this clause.

<u>State Policy on Water Quality Management 1997</u>

The policy is designed to achieve the sustainable management of Tasmania's surface water and groundwater resources by protecting or enhancing their qualities while allowing for sustainable development in accordance with the objectives of Tasmania's Resource Management and Planning System (Schedule 1 of the *State Policies and Projects Act 1993*).

The objectives of the State Policy on Water Quality Management 1997 are to:

(a) focus water quality management on the achievement of water quality objectives which will maintain or enhance water quality and further the objectives of Tasmania's Resource Management and Planning System;

(b) ensure that diffuse source and point source pollution does not prejudice the achievement of water quality objectives and that pollutants discharged to waterways are reduced as far as is reasonable and practical by the use of best practice environmental management;

(c) ensure that efficient and effective water quality monitoring programs are carried out and that the responsibility for monitoring is shared by those who use and benefit from the resource, including polluters, who should bear an appropriate share of the costs arising from their activities, water resource managers and the community;

(d) facilitate and promote integrated catchment management through the achievement of objectives (a) to (c) above; and

(e) apply the precautionary principle to Part 4 of this Policy.

Clause 12 of the State Policy on Water Quality Management 1997 requires that in giving effect to the policy, governments and other decision-makers must examine the most appropriate mix of regulatory measures, economic instruments, and communications strategies to achieve the objectives of the policy.

The Pit is a *diffuse source pollution*[4] because there are several points of stormwater and treated water discharging to the environment in a dispersive manner. The policy requires that emissions from diffuse sources of pollution should be reduced and managed through the development and implementation of best practice environmental management, and so as not to prejudice the achievement of water quality objectives.

Therefore, the most directly relevant provisions of the policy to the Pit can be found in Division 3 of the policy. **Table 6** provides the Pit relevant policy considerations taken from Division 3 and the associated management source document or guideline.

Table 6. Pit relevant water quality policy considerations and associated management source

Division 3 item number and description	Primary management Document/Guidelines
31. Control of erosion and stormwater runoff from land disturbance	
31.1 Planning schemes should require that development proposals with the potential to give rise to off-site polluted stormwater runoff which could cause environmental nuisance or material, or serious environmental harm should include, or be required to develop as a condition of approval, stormwater management strategies including appropriate safeguards to reduce the transport of pollutants off-site.	• Planning Scheme • Quarry Code of Practice

[4] means pollution which enters the receiving waters via a number of entry points, or arises from a large number of dispersed sources.

31.2 Stormwater management strategies required pursuant to clause 31.1 should address both the construction phase and operational phase of the development and use of land and have the maintenance of water quality objectives (where these have been defined) as a performance objective.	• Quarry Code of Practice • Bunding and Spill Management Guidelines • Specialist advice
31.3 To assist with the preparation of stormwater management strategies, the Board should facilitate the development or adoption of a code of practice or guidelines describing best practice environmental management for the control of erosion and stormwater runoff from construction activities, including roadworks.	• Quarry Code of Practice
31.4 Codes of practice or guidelines required by this Policy in respect of specific activities with the potential to impact on stream-side land should pay specific attention to defining appropriate stream-side buffer strips and acceptable management practices within these strips. Strategies and incentives, including economic instruments, to encourage the retention and/or improved management of streamside vegetation should be investigated.	• Quarry Code of Practice • Waterways and Wetlands manual
31.5 Planning schemes must require that land use and development is consistent with the physical capability of the land so that the potential for erosion and subsequent water quality degradation is minimised.	• Planning Scheme
35. Road construction, maintenance and drainage	
35.1 Road construction and maintenance operations will be carried out in accordance with the guidelines or code of practice developed pursuant to clause 31.3 of this Policy or employ other measures consistent with best practice environmental management, to prevent erosion and the pollution of streams and waterways by runoff from sites of road construction and maintenance.	• Quarry Code of Practice • Waterways and Wetlands manual • Forest Practices Code

National Environmental Protection Measures (NEPMs)

In Tasmania, NEPMs are State Policies in accordance with section 12A of the *State Policies and Projects Act 1993*. They are generally not directly enforceable and are implemented using a variety of mechanisms and approaches depending on the contents of each NEPM.

Current NEPMs include:

- Air Toxics NEPM
- Ambient Air Quality NEPM
- Assessment of Site Contamination NEPM
- Diesel Vehicle Emissions NEPM
- Movement of Controlled Waste between States and Territories NEPM
- National Pollutant Inventory (NPI) NEPM
- Used Packaging Materials NEPM

Relevant NEPMs have been considered when addressing matters of air quality, diesel vehicle emissions and site contamination.

Relevant Environment Protection Policies (EPP's)

EPPs are designed specifically to give effect to the objectives of EMPCA and define environmental objectives with programs to achieve them.

The following EPPs have been made and apply –

- Environment Protection Policy (Air Quality) 2004, and
- Environment Protection Policy (Noise) 2009.

No specialist studies were conducted for the Pit in respect of an EPP.

A-7 PUBLIC AND STAKEHOLDER CONSULTATION

The Flinders Council and the Environment Protection Authority (EPA) are some of the parties who have been contacted about the Activity.

A-7-1 FLINDERS COUNCIL

The Development Application was lodged with Council and the associated fee paid. The Development Application has been deemed a valid application by the Council per the *Land Use Planning and Approvals Act 1993.* A Request for Further Information was subsequently issued by Council.

A-7-2 ENVIRONMENT PROTECTION AUTHORITY

The Development Application was referred by the Council (acting as the Planning Authority) to the EPA given the environmentally relevant activity includes two Level 2 activities.

A-7-3 ABORIGINAL HERITAGE TASMANIA

Cultural Heritage Management Australia (CHMA) conducted an Aboriginal Heritage Assessment of the Land and report prepared to document their methods and findings. That report will remain confidential given it contains culturally sensitive information about Aboriginal heritage sites.

Officers at Aboriginal Heritage Tasmania were consulted by CHMA about the survey findings. The Proponent was advised by CHMA and AHT, as an outcome of consultation process, to implement the *Unanticipated Discovery Plan* procedure issued by AHT.

A-7-4 PUBLIC PARTICIPATION IN THE PLANNING PROCESS

The public will have an opportunity to provide written representation of the project when it is advertised under the relevant provisions of the *Land Use Planning and Approvals Act 1993*.

PART B - PROJECT DESCRIPTION

B.1 PROPOSED ACTIVITY

New activity	The application is for a new Activity; Extractive Industry per the Use Class classifications in the Tasmanian Planning Scheme - Flinders. The following Certificates of Title apply to the development and use associated with the Activity – • CT 120064/1, CT 215120/1, CT 230282/1 – private freehold (PID 3513143) • Reserved Road (Part of CID 1182402) – The Crown (vehicular access only) The application for a permit to extract, screen, and store lime sand (ready to be collected and delivered to land in agricultural use) applies to the Land shown in **Figures A-1 and A-2** and spatially defined as the Development Area mapped in **Figure A-3.**
Material to be extracted	The material to be extracted is lime sand destined for an agricultural use (soil ameliorant). Extracted (raw) sand will be screened if necessary to remove organic matter and contaminants (e.g., shells, rocks, and stones). Additional agricultural soil ameliorants/additives such as boron may be mixed (by screening) with some of the lime sands prior to carting to the location of use (i.e., spreading on paddocks).
Maximum extraction quantity	10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5. Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment.
Development Area and Extraction Area	The Activity is proposed to occur within the Development Area (**Figures B-1 to B-3**) excluding the septic system absorption pad (**Figure B-1**) and the temporary small sediment basis associated with sediment control from the Disturbed Area (see Site Layout in Attachment 1 of the EIS **Attachment 7**). The Disturbed Area is approximately 17.7 hectares; see Drawing VDC/MSP/A/201 in **Attachment 10.** The Extraction Area from where lime sands will be extracted is the Extraction Area depicted in **Figures A-4 and B-3** and Drawing VDC/MSP/A/201 in Attachment 10. The Extraction Area is a part of the Development Area; it is approximately 10.2 hectares. The EA has an estimated 30-year supply if full production levels are achieved every year from the commencement of the Activity. Any lime sand extraction outside the Extraction Area would require a new permit under LUPAA. The indicative location of the lime sand resource more broadly in the Land (Mining Lease 2117P/M) is shown in **Figure A-2.**

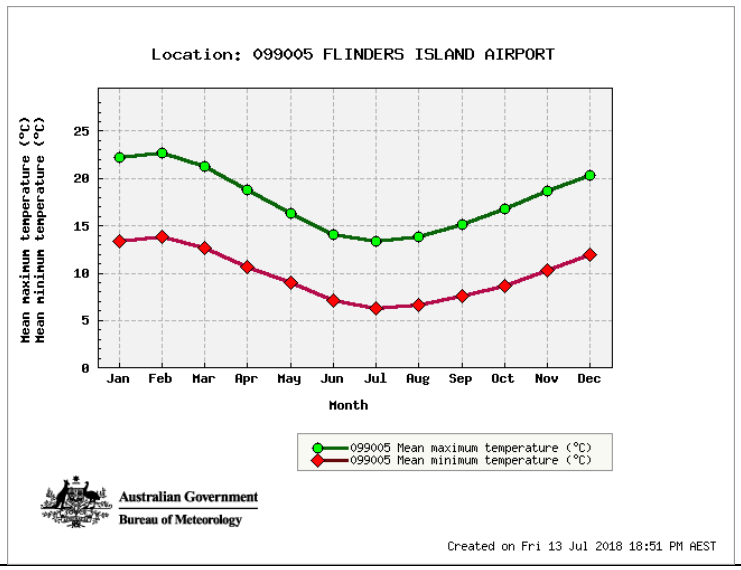
Maximum processing quantity	Screening (including blending) of up 10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5.
Material extraction and processing	The **extraction and handling of material** will be in accordance with the following: • surface site preparation by vegetation and topsoil stripping and stockpiling; • excavation of material with a bulldozer and/or excavator; • transport of sands to the storage shed for screening/storage and occasional mixing with other soil ameliorants/additives (e.g., additional micro-nutrients and essential plant nutrients such as boron). Some sand will be loaded at the pit into trucks for immediate delivery to agricultural lands; • screening (up to 10,000 cubic metres per annum) to remove any vegetative/root debris and/or rocks and stones; • loading trucks with wheel loader from the pit face and/or stockpile area; and the • transport of material by truck.
Extraction Method and Depth	The lime sands overlay a mosaic of lacustrine/littoral gravels and sands compacted/cemented in situ by the overlaying lime sand dune sequences. Only the lime sands are to be removed from the Extraction Area; no pit is to be created, nor is any extraction from the base sediments/bedrock proposed. The base geology is fossiliferous (marine shells) Tertiary limestone that is easily distinguished from the dune sands; it is consolidated, and contains pebbles, shells and/or fossils – see image below that shows the very flat limestone layer where lime sand has been removed (this is the existing disused pit).

	To aid Rehabilitation, a sand layer of approximately 1m depth will be retained over the base geology to ensure that there is a growth medium for plants to colonise and revegetate lime sand extracted areas.
Transport	The maximum extraction volume of 15,000 tonnes equates to about 1,500 truckloads per annum based on 10 tonne loads (smaller loads are used given the material is to be spread on pastures and ploughed land). All traffic would enter and exit onto the sealed section of Palana Road using the now disused reserved road (unsealed) section of Palana Road – **Figures A-4 and B-1.** Lime sands are mainly required in summer and autumn (January to May) which coincide with the peak activity period of agricultural pasture improvement, maintenance, and establishment. Winter rains aid the infiltration of the lime sands into the upper soil surface, which then has effect as it moves through the soil profile to facilitate enhanced spring and summer growth when plant activity is at its greatest. Annual campaigns to spread lime sands across larger areas of agricultural land would be approximately 300 truck movements per week (150 truckloads) is expected for an 8 to 10-week period of carting (March to May). If conducted over 5 days each week this equates to about 30 truckloads per day (or 60 truck movements per day). It is likely that for some periods of time, lime sand may be extracted, screened and blended without any concurrent loading and carting. For example, preceding a campaign, sufficient lime sands for the campaign would need to have been extracted, screened, and some blended with soil ameliorants (these would be determined by agricultural soil testing of the receiving pastures and expert agronomist advice) ready for carting and spreading. Lime sands would be screened and stored at the Pad or internal to the shed ready for a campaign, and to also enable ad hoc loading and spreading when the weather and pasture conditions allow; winter wet paddocks are not readily accessible on Flinders Island, so this severely constrains or in some cases prevents lime sand spreading at that time. The lime sand pit could fall completely silent for a few consecutive weeks or possible (but unlikely) months in any calendar year (e.g. July, August); it is very unlikely because small loads for specific areas of a paddock, or sales to other farmers on the island, requires the product to be sourced and carted for spreading at any time of the year. The example circumstances listed may not generate much activity at the pit, and it could simply be a day of small loads being carted from pre-existing lime sand stockpiles.
Stockpiling	Raw sand will be stockpiled in the pit, adjacent to the pit or at the storage shed ready for screening. Screened (or blended) sands will be stored in the shed or on the hardstand ready for collection by trucks for transport to the delivery location.
Maximum area of disturbance	The removal of vegetation will occur as an area is required for pit expansion or the establishment of specific infrastructure, such as a cut-off drain, stockpile location etc. The management of vegetation removed to extract the resource will be in accordance with the QCP.

	The maximum area of disturbance, without any Rehabilitation, is **5 hectares**. To place this into perspective, given the size of the Mining Lease (364.1 hectares), the maximum area of disturbance at any one time represents 1.4% of the Mining Lease. Progressive rehabilitation works would commence as early as possible in the life of the Activity, noting the operational requirement to maintain access from east to west to conduct sand extraction along the dune. **Figures B-1 and B-2** show some progressive rehabilitation occurring in the 1-to-5-year extraction plan (the mining plan used to support the granting of the Mining Lease with the Minister). There is about 3,500 square metres of land associated with the section of 'access road' through to Palana Road, and about 1.63 hectares open for the pad/stockpile area. Therefore, about 2 hectares is already open and will remain open until the closure of the Pit, leaving up to 3 hectares of operational area within which to have an area open to extract lime sands, including any internal haul road, sediment basins and areas under Rehabilitation. The operational 3 hectares is not excessive. It is likely that approximately 4 hectares would be disturbed at any one time (including the road access from the pad to Palana Road, and the pad itself), with around 0.5 to 1 hectare under Rehabilitation at any one time, pending sign-off by the regulatory authorities to achieve Rehabilitated land. The process of Rehabilitation (when the land is still considered in a regulatory sense to be 'disturbed' or 'open') may take 2-3 years to have sufficient growth of vegetation to warrant sign-off, such that the land is deemed to be self-sustaining, stable, and non-polluting state, which is suitable for the proposed future land.
Major equipment	The equipment likely to be used at some stage (i.e., not all the below listed equipment would be used concurrently) of the Activity is as follows: • Vibratory screen; • Wheel Loader; • Excavator; • Dozer D9N; • Off-road haul truck; • Transport trucks (medium combination truck & trailer, single trucks); • 15,000L capacity water cart truck; and • Light vehicles for worker transport
Infrastructure	An existing road off Palana Road (**Figure A-4**) is to be used to access the Pit and shed. The reserved road is held under licence by the Proponent with the Crown for use to access the Land. The junction with Palana Road will be sealed for a minimum distance of 25 m, measured from the existing sealed road surface. Standard road maintenance activities will be conducted on the unsealed section of the access road to improve table drains and the road surface (e.g., pothole filling). A shed (15000 x 60300 x 7700 mm) is proposed – see **Attachment 2** for its design and layout, and **Attachment 3** for the layout of the shed internal crib room and amenities.

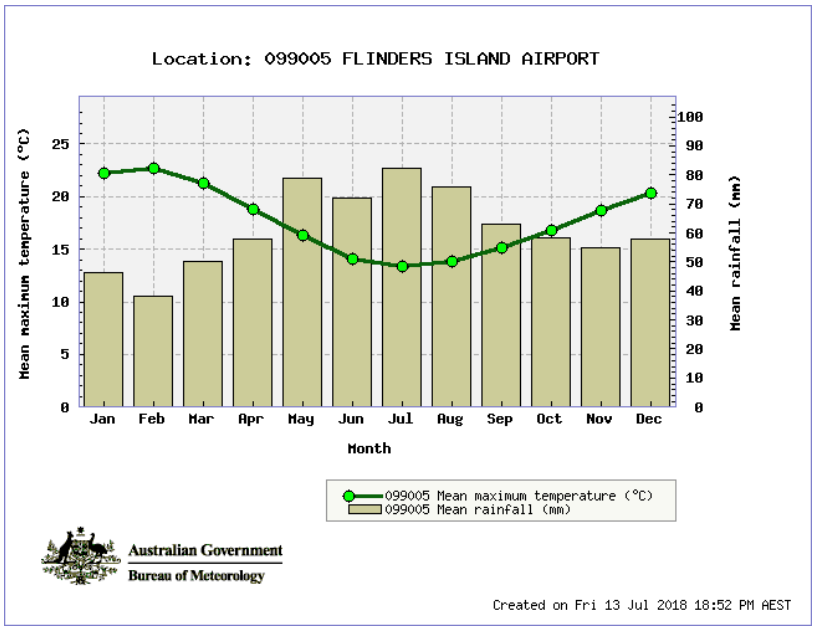
	Drains and a sediment pond will be installed to manage surface water flows. As the pit extends westwards additional sediment ponds will be constructed to collect and treat (for sand removal) surface flows prior to their discharge to the environment. The free draining nature of the sands means it is unlikely that sediment ponds would need to be very large, but they will be sized to suit the catchment size. A septic wastewater system (grey and black water) will be installed to dispose of toilet, shower, and crib room waste. The approximate location of the trenches is shown in **Figure B-1.** Tanks will be installed (likely to be 2 x 50,000 litre) to capture rainwater from the shed and to receive water from a groundwater bore that may be installed in the future via a permit under the *Water Management Act 1999* (see **Figure B-1**).
Operating hours	0700 – 1900 hrs Monday to Friday
Workforce	The activity will utilise up to 5 staff per day when fully operational plus truck drivers. Most days will see only 2-3 staff at the site who would be loading trucks and carting lime sands from the active face to the shed.
Wastewater (septic) system	New on-site wastewater management system to treat and apply wastewater derived from workforce toilets and ablution facilities. It is proposed to install a septic tank absorption bed discharging to an in-ground absorption bed. The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day. The wastewater discharge from the premises will be broadly like domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of *AS/NZS 1547:2012 Domestic on-site waste-water management*. The site is underlain by Quaternary deposits of windblown sand of marine origin (coastal sand dunes); this is consistent with soil profiles observed on-site. The marine sands contain a high proportion of calcareous material (marine mollusc shell derived), which makes them attractive for extraction for agricultural usage, for soil pH modification. Calcium carbonate from shell grit present in the wind-blown beach sand id subject to solution by rainwater and redeposition as a calcareous matrix, cementing sand grains together, forming discrete layers of hardpan, which is considerably less permeable than the unconsolidated sands. This was encountered at a depth of 1100-1200mm (**Attachment 5**); however, it is likely that this hard pan could be present at varying depths, therefore, soil profile modifications to ensure uniform permeability under the land application area basal area will be required. This will be achieved by excavating absorption beds to a minimum depth of 1500mm and backfilling with loose, unconsolidated sand, prior to installing the absorption bed infrastructure.

B.2 DESCRIPTION OF SITE AND SURROUNDS

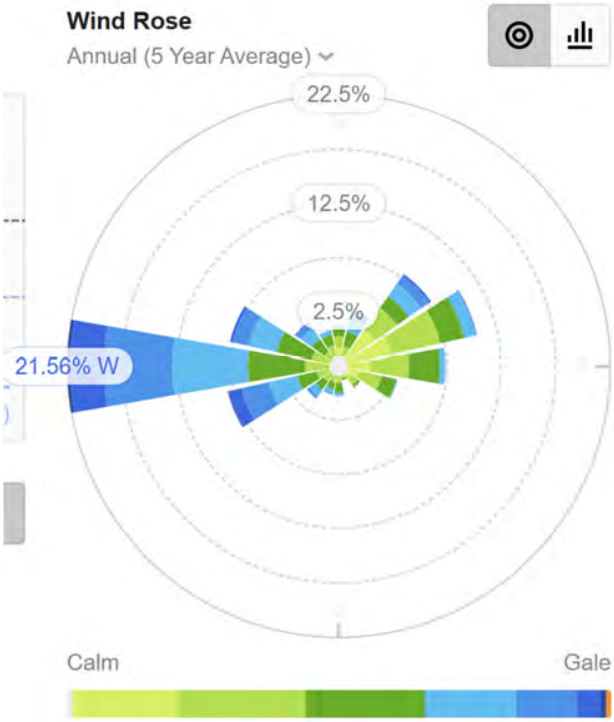
Land Use	The current land use is native vegetation and some stock grazing. Historically the land has been used more intensively for livestock grazing (some areas are dominated by agricultural grass and herb species with only minor recruitment of native species), and there was a school and associated outbuildings towards the northern end of the Mining Lease.
Topography	The Land is comprised of an east-west linear dune series that becomes two distinct ridges heading westwards, with a minor depression between the dunes. The sands to be extracted from the Mining Lease are well drained being formed by Quaternary sands. Accordingly, there are no defined watercourses within the Land (see **Figure E-4b**), and no formal surface drainage exists into the nearby wetlands (CFEV mapped – they are low-lying depressions of coastal grassland on sandy soils that are likely to never fill with water) that occur southwards and northwards of the Development Area (**Figure E-4a**). These deflection basins are dominated by coastal grasslands, with even minor dune formation in the basins, even those of only 1-2 m high, dominated by scrub or ex-pasture vegetation.
Climate	The nearest Bureau of Meteorology weather recording station is at Flinders Island Airport to the south of the Land. The station details for the Flinders Island Airport weather station are **Site number:** 099005, **Latitude:** 40.09 °S **Longitude:** 148.00 °E, **Elevation:** 9 m The development and use occur in a region with cool winters and warm summers (**Graph 1**), with most precipitation occurring in the winter and spring period (**Graph 2**). **Graph 1. Mean minimum and maximum temperature for Flinders Island Airport** Source: Bureau of Meteorology 2018 

Graph 2. Mean annual rainfall and mean maximum temperature for Flinders Island Airport

Source: Bureau of Meteorology 2018



Graph 3. Wind rose for Marshall Bay, Flinders Island



Geology	The geology of the Mining Lease is sand, gravel, and mud of lacustrine and littoral origin (**Figure E-6**). The sands to be extracted are of littoral origin and are highly calcareous in nature. The underlying geology is a mosaic of lacustrine/littoral gravels and sands compacted/cemented in situ by the overlaying dune sequences. The base geology is fossiliferous (marine shells) Tertiary limestone that is easily distinguished from the dune sands. The sands are white to yellow-white and unconsolidated generally with scrub dominated vegetation typical of alkaline sands. The general and approximate location of the dunes that are the resource in the Mining Lease is shown in **Figure A-2.** The dunes formed by lime and other sands are of a linear type based on the transgressive dune types described by Short and Nicholas (2011). Linear dunes are longer than they are wide with prominent snakelike ridges. Linear dunes do not migrate; they get longer over time, often up to several kilometres. The Marshall Bay dunes are highly stable on the leeward side of the bay (Slee, see Attachment 8 in **Attachment 4**) because they are vegetated with native scrub species and even where they are unvegetated they tend not to blow because of their calcareous content.
Soils	**Characteristics** A soil layer is absent, or simply represented by a slightly discoloured (grey, to grey, brown) upper layer in the sandy soil profile. Dune systems of recent age tend not to be old enough to have formed a substantial or distinguishable topsoil layer, and even with a low to moderate fire frequency any organic matter that has accumulated may be quickly lost or substantially depleted during fire events. Two prominent paleosols[5] are present in the exposure. Paleosols are darker band of sediment which may or may not contain woody debris, organic matter and charcoal surrounded by lighter and less charcoal-rich sediments. Paleosols can be important indicators of past stability between depositional events. In this case organic topsoils (indicating stability) have been buried by a non-organic deposit (sand dunes). The upper paleosol 1 lies between 95 cm and 115 cm depth and forms a prominent but laterally patchy dark brown organic-rich layer in the upper dune profile. The lower paleosol at 260 cm depth is a thinner and lighter compact sand unit that appears to not be as organic rich. However, this paleosol is laterally extensive and forms a prominent grey bench on the mid slope of the existing exposed cutting. In the case of the dune systems the presence of paleosols indicates a substantial time of dune stability, allowing an organic topsoil to form prior to renewed dune instability resulting in topsoil burial. At the disused pit site at least three periods of dune stability can be inferred as indicated by the two buried paleosols and the darker modern topsoil associated with thick root mats on the crest of the dune.

[5] the term 'paleosol' refers to a buried soil horizon within a sedimentary profile

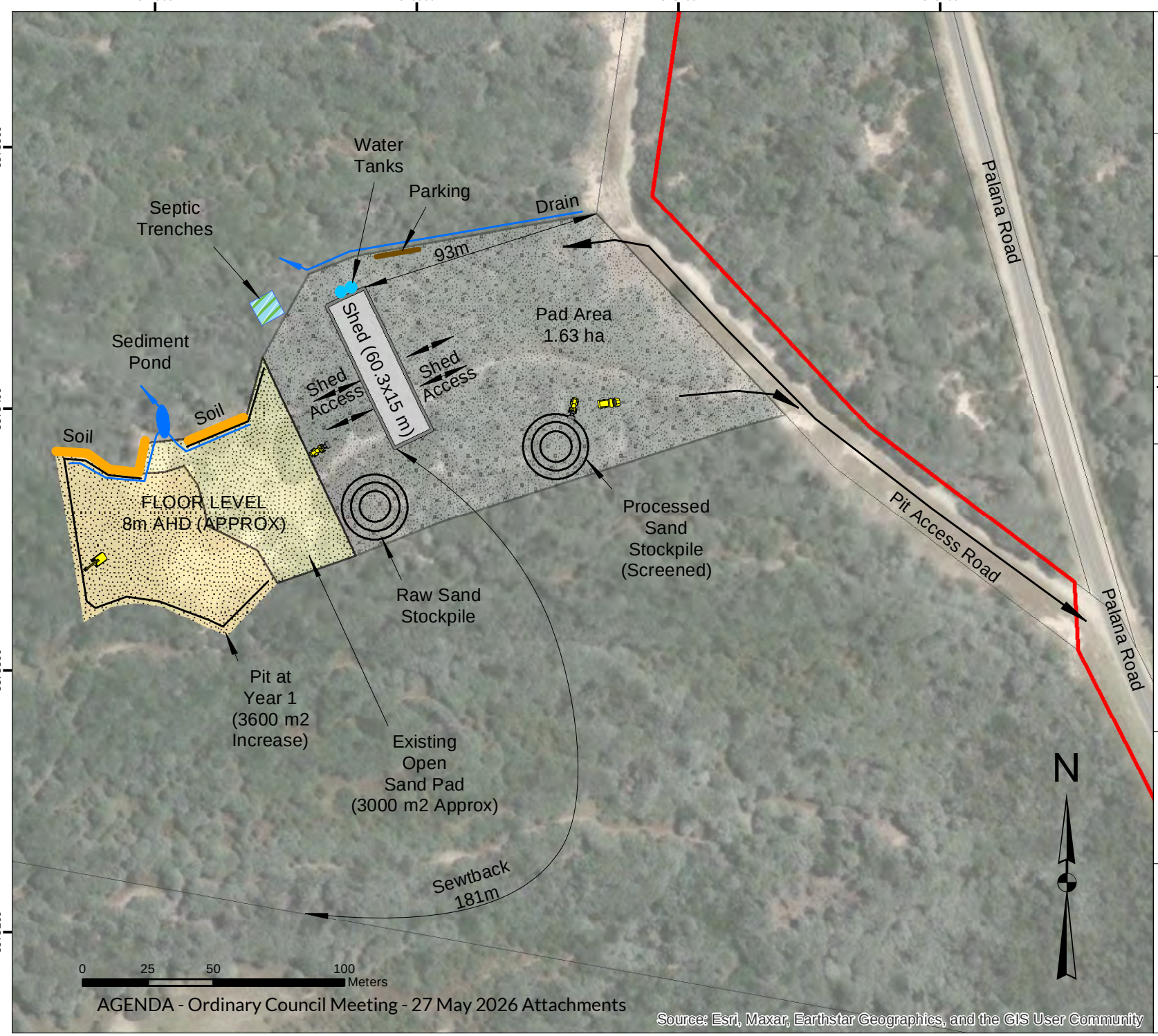
	Acid Sulphate Potential There is a Low to Extremely Low likelihood of Potential Acid Sulfate Soils (coastal) in the Marshall Bay area (**Figure E-7**) based on DPIPWE test pitting and sampling that generated the mapping layer. Slee (Attachment 8 in **Attachment 4**) notes that the high pH values obtained from his soil samples indicate an alkaline environment where extensive acidic soils are unlikely to be present. The reason for this is that the entire region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone. Low pH conditions are usually associated with deep organic soils or forested areas. While topsoil development is present within the dune fields, they are weakly developed and do not have a significant organic component capable of producing acidic soils, particularly in a carbonate dominated environment. **Land Capability** The Land Capability is not recorded by DPIPWE however the sandy alkaline sands are likely to qualify as Land Class 5 to 6.
Natural Values	VDC undertook surveys and observations of the Development Area, and surrounds, of the biodiversity values of the Development Area and surrounds. The report of their findings is provided in **Attachment 4** and summarised below. **Threatened native vegetation communities** None are present in the Development Area. **Threatened Flora Species** Six flora species protected by a statutory mechanism were observed during combined surveys in the Development Area (TSP Act and EPBC Act listing): • *Acacia uncifolia*, coast wirilda (r/-) • *Asperula minima*, mossy woodruff (r/-) • *Eutaxia microphylla*, spiny bushpea (r/-) • *Pimelea curviflora* var. *gracilis*, curved riceflower (r/-) • *Roepera billardierei*, coast twinleaf (r/-) • *Scaevola albida*, pale fanflower (v/-) All threatened flora species observed would have plants taken as part of the proposed Activity. No species listed on the *Environment Protection and Biodiversity Conservation Act 1999* were observed in the Development Area. **Threatened Fauna Species** No fauna species listed on the *Threatened Species Protection Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999* were directly observed in the Development Area during the surveys.

	No trees with the potential to support any hollow-dependent bird species, such as swift parrots or blue-winged parrots, were observed in the Development Area. Habitat for several threatened Fauna is present including: • wedge-tailed eagle (*Aquila audax subsp. fleayi* – Foraging habitat is present in the Development Area; • white-bellied sea-eagle (*Haliaeetus leucogaster*) – Foraging habitat is present in the Development Area; and • Tussock skink (*Pseudemoia pagenstecheri*) – potential low *Poa* coverage areas in buffer (the area that is not to be sand extracted) to the Development Area. VDC determined based on the nature of the activity, and location and quality of habitat, that the activity would not cause any significant impact to any listed fauna species. **Weeds and Disease** Two Declared Weed species listed on the *Biosecurity Act 2019* were observed in the Development Area; these include horehound (*Marrubium vulgare*) and slender thistle (*Carduus pycnocephalus*). No plants with PC symptoms were observed in the Development Area, and with the lack of susceptible species the water mould is unlikely to be present, or active, in the Development Area.

MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure B-1: Mine Plan Site Set Up / Extraction to Year 1 and Access



TASMAP: TANNER EMITA

LGA: FLINDERS

- Clear Gravel Surface
- Existing Sand Surface
- Shed (60.3 x 15 m)
- Clear Gravel Surface
- Mining Lease (2117P/M)
- Land Titles (The LIST)

Base data by TASMAP. © State of Tasmania
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PO Box I New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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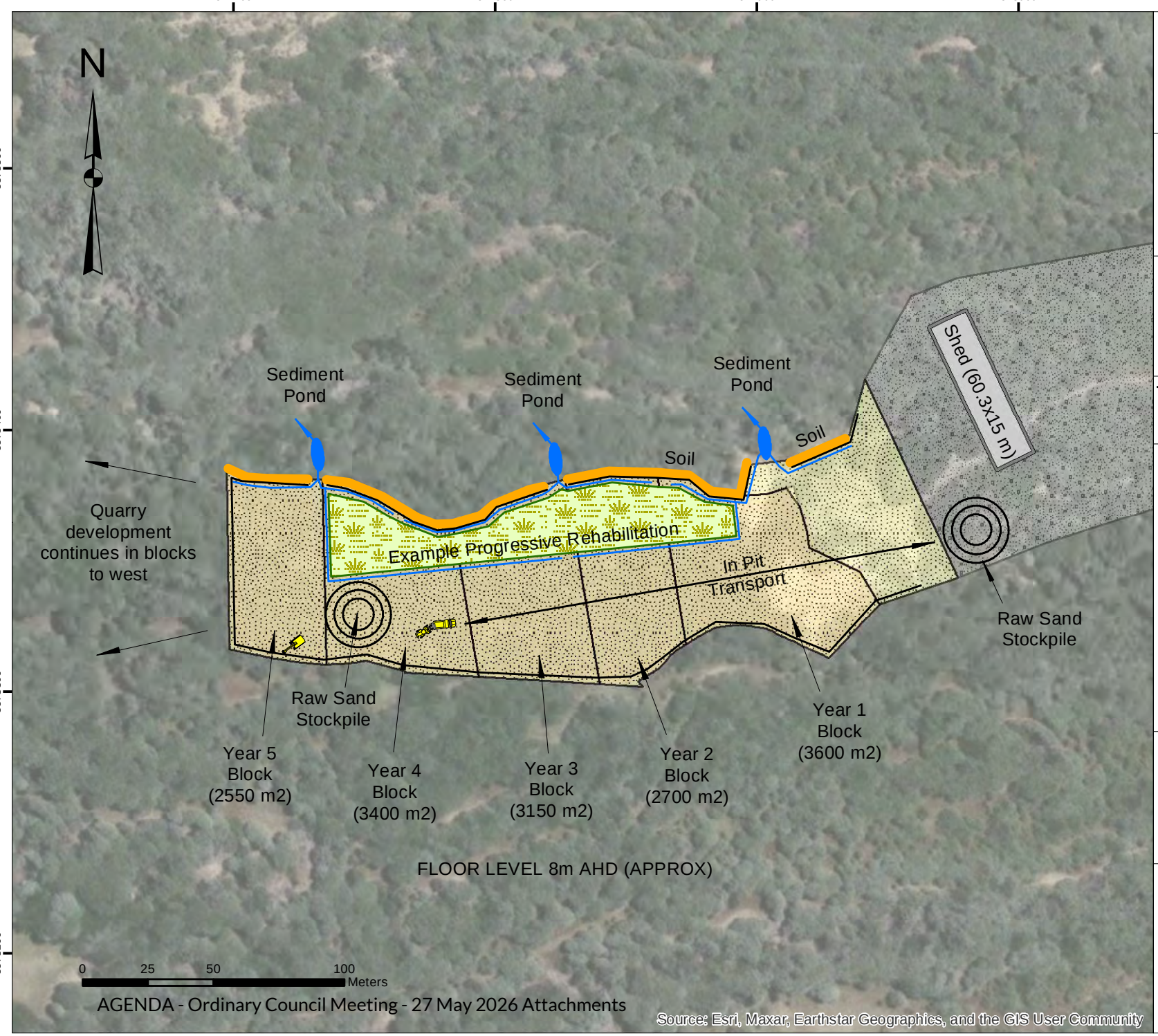
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure B-2: Mine Plan Extraction (Year 1 to 5)



TASMAP: TANNER EMITA

LGA: FLINDERS

- Clear Gravel Surface
- Existing Sand Surface
- Shed (60.3 x 15 m)
- Clear Gravel Surface

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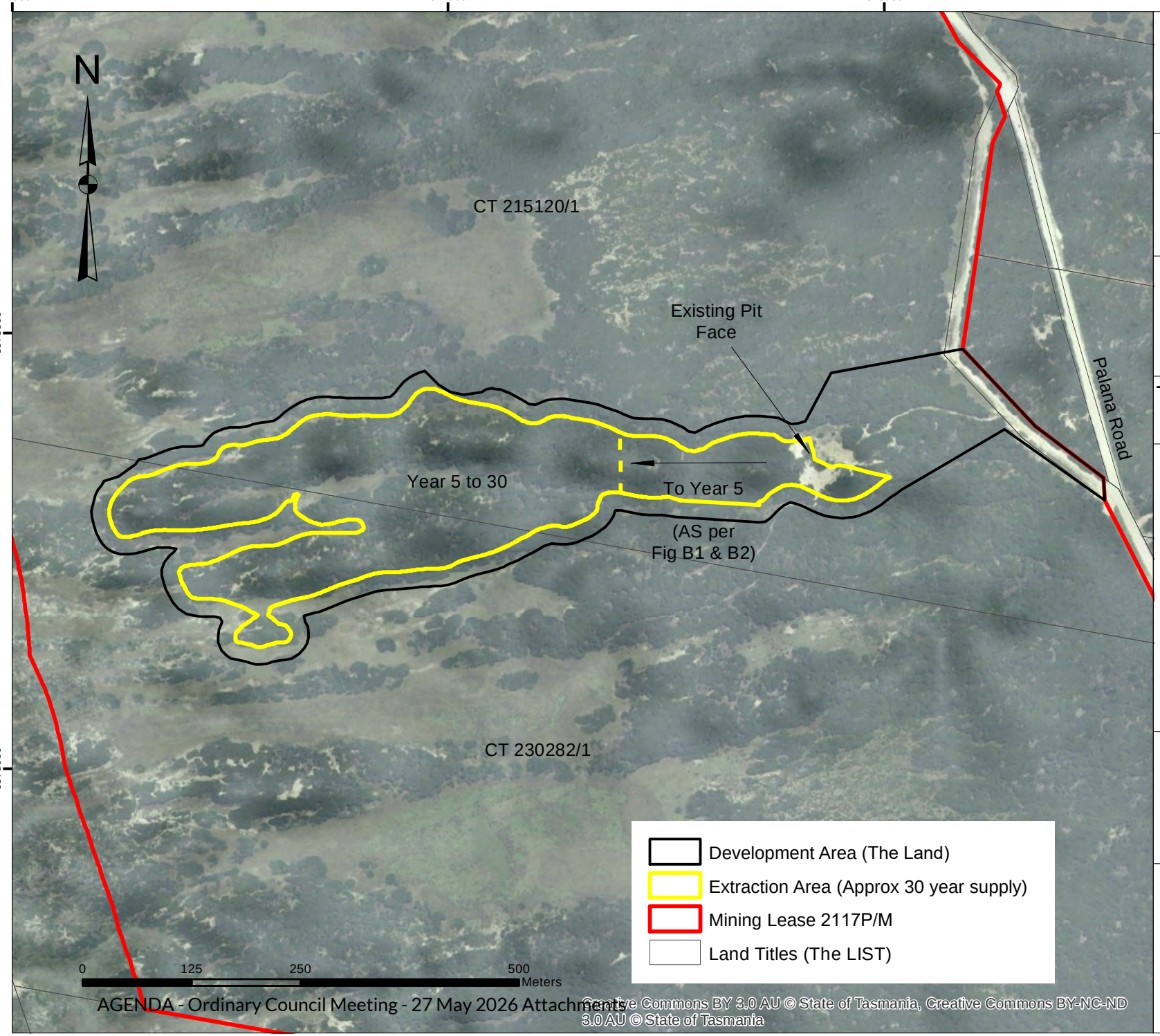
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure B-3: Maximum Extraction Area



TASMAP:	LGA:
TANNER EMITA	FLINDERS

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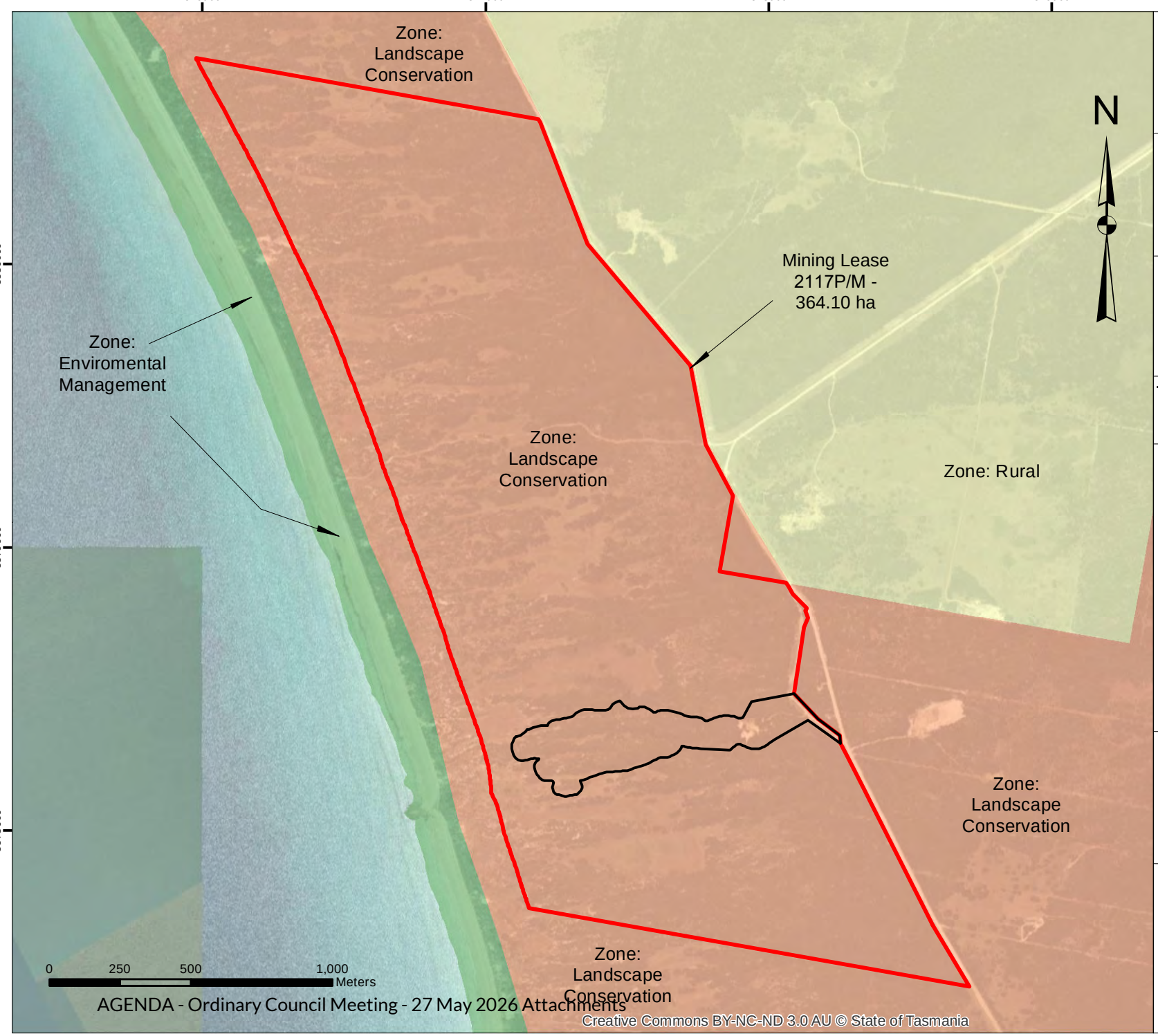

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-1a: Zone Map
Tasmanian Planning Scheme
LPS Zones

TASMAP:	**LGA:**
TANNER EMITA	FLINDERS

Development Area (The Land)
Mining Lease (2117P/M)

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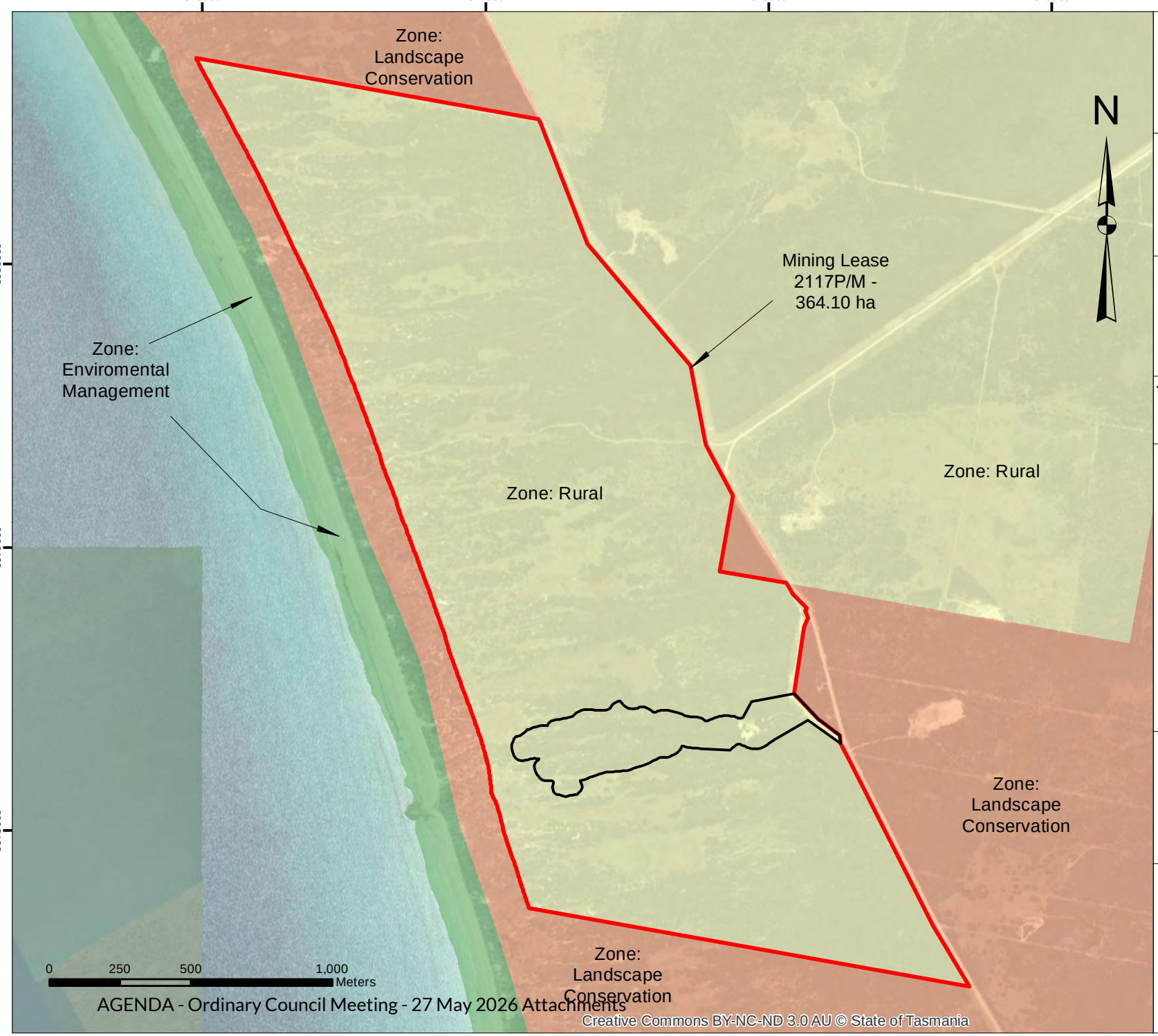

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-1b: Zone Map
Tasmanian Planning Scheme
LPS Zones

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)
Mining Lease 2117P/M

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DATUM: GDA94
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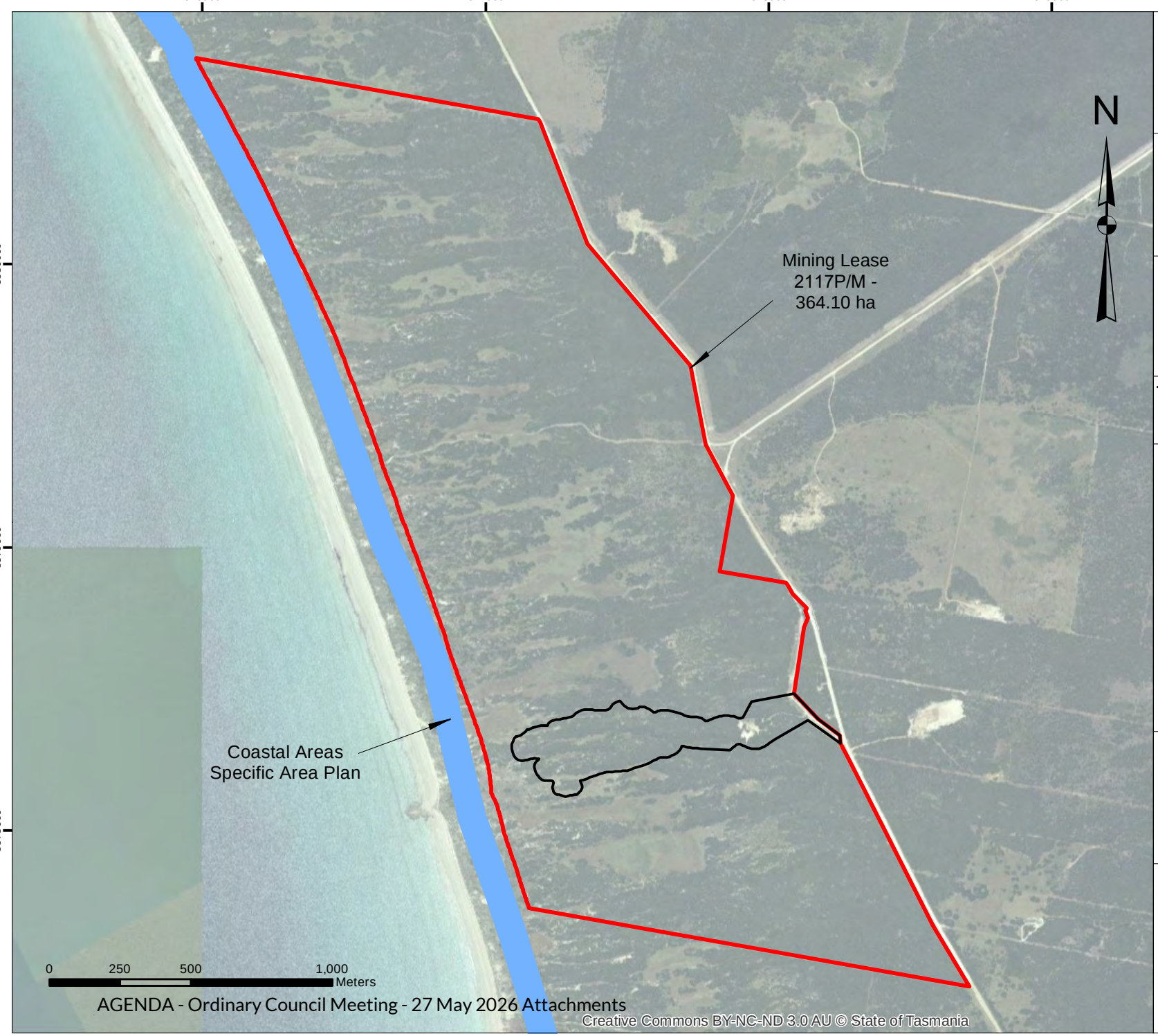

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-2: General Overlay Map - Tasmanian Planning Scheme - Flinders

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

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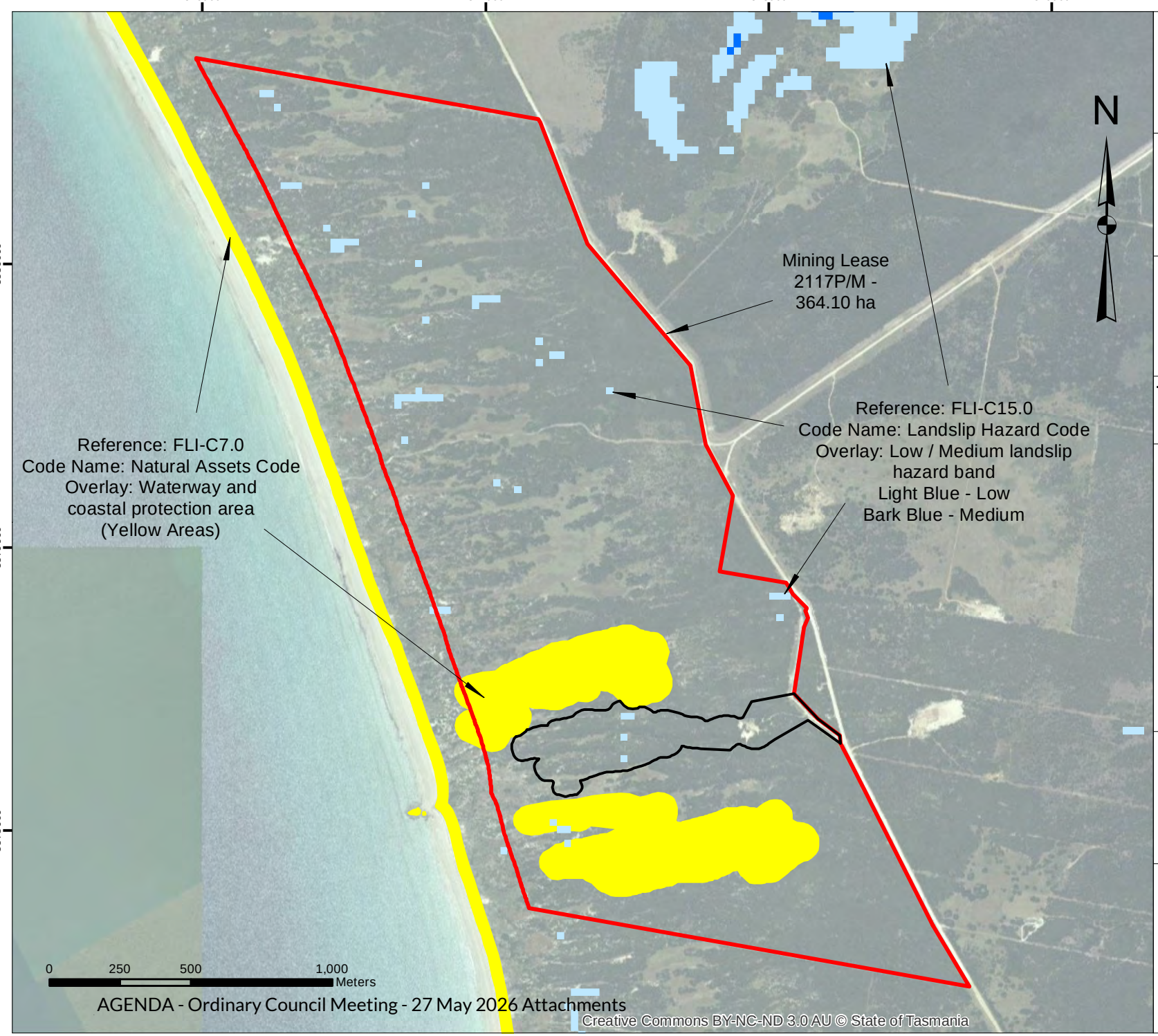

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-3a: Code Overlay Map - Tasmanian Planning Scheme - Flinders

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)
Mining Lease 2117P/M

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PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
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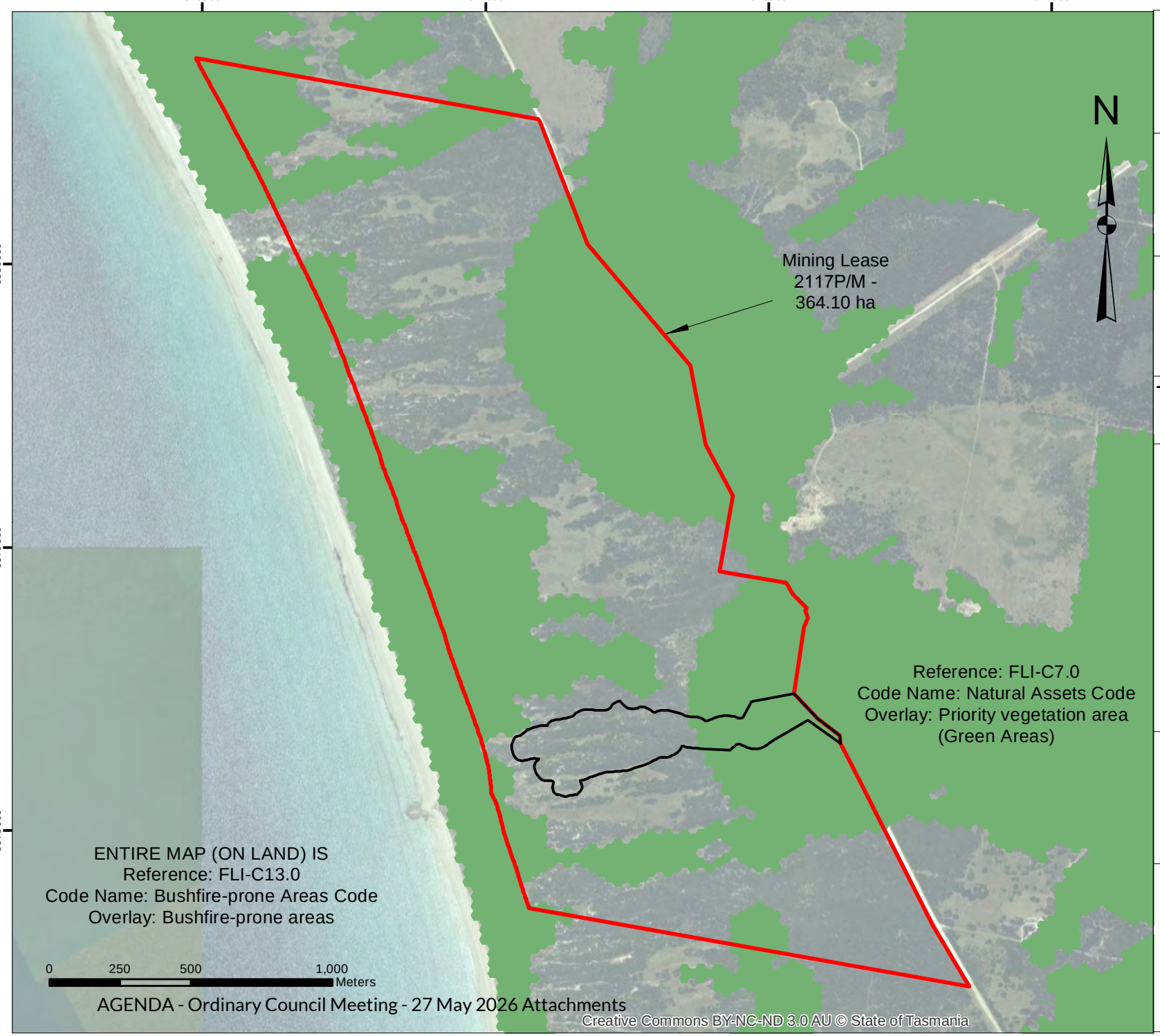
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-3b: Code Overlay Map - Tasmanian Planning Scheme - Flinders



TASMAP: TANNER EMITA

LGA: FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
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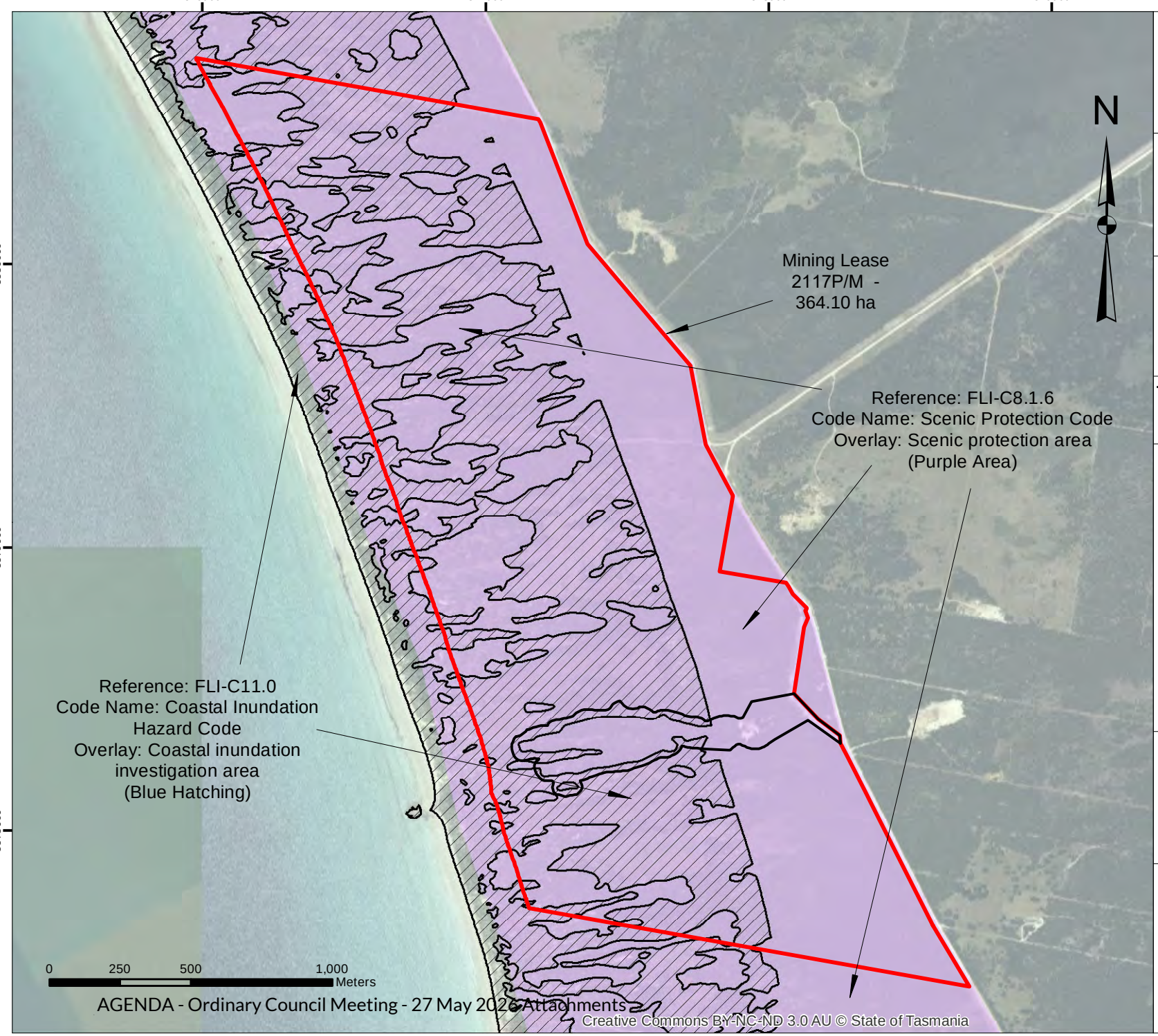

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-3c: Code Overlay Map - Tasmanian Planning Scheme - Flinders

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

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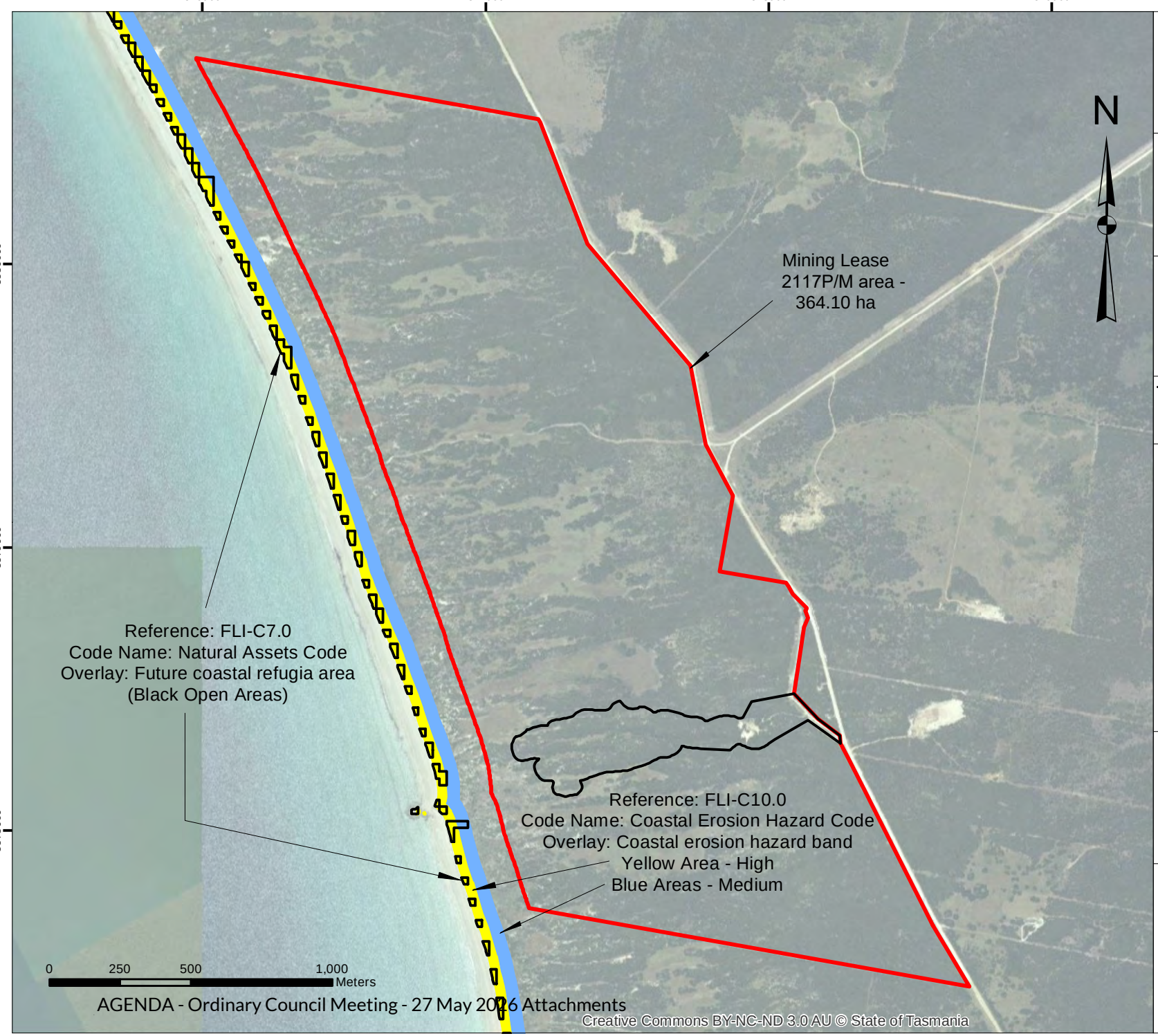

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-3d: Code Overlay Map - Tasmanian Planning Scheme - Flinders

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

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MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

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PART C – POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The following sections describe and assess the potential environmental impacts that may be caused by the Activity.

For each potential environmental impact that has a risk to cause environmental harm or nuisance, such as dust and noise, the risk matrix provided in **Plate 1** was used to assess the risk of prior to and then after the implementation of controls. Mitigation measures are described in this section to mitigate or manage the risk of causing environmental nuisance.

Plate 1. Risk Assessment Matrix for environmental matters relevant to the Marshall Bay Sand Pit

RISK MATRIX

IMPACT →

PROBABILITY ↑

	NEGLIGIBLE	MINOR	MODERATE	MAJOR	CATASTROPHIC
ALMOST CERTAIN	LOW MED	MEDIUM	MED HIGH	HIGH	HIGH
LIKELY	LOW	LOW MED	MEDIUM	MED HIGH	HIGH
POSSIBLE	LOW	LOW MED	MEDIUM	MED HIGH	MED HIGH
UNLIKELY	LOW	LOW MED	LOW MED	MEDIUM	MED HIGH
VERY UNLIKELY	LOW	LOW	LOW MED	MEDIUM	MEDIUM

C-1 AIR EMISSIONS – DUST

Specialist Report – Geomorphology including karst

Van Diemen Consulting Pty Ltd engaged Dr Adrian Slee of the Forest Practices Authority (FPA) to investigate the geomorphology, and soils present (and their potential for a blowout to occur, which may create or exacerbate dust emissions) on the Mining Lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The field work and report were completed by Dr Adrian Slee, with the report (Slee, 2024) provided in **Attachment 9**. The report forms part of this EIS and the following section should be read in conjunction with it.

C-1-1 EXISTING CONDITIONS

Dust can be a nuisance to neighbours and may be a safety hazard to Pit employees. Generally, the emission of visible dust should be confined within the boundary of the premises, except in remote areas as is the case here, where the effects beyond the site may not cause an environmental nuisance or harm.

There are other sources of dust and fugitive air emissions in the surrounding landscape, including agricultural uses, other sand pits, and conservation management activities (e.g., ecological burns).

There are no residences or other sensitive receptors within 1km of the Development Area.

The nearest residence is 1.15km to the south-east of the Development Area, and 1.17km to the closest point of the Extraction Area (**Figure E-8**). The same residence is marginally within 300m of the edge of the Mining Lease. There are two other lime sand pits (ML 2059P/M, and 2056P/M; both pits are Level 1 activities and are permitted to extract up to 4,999 cubic metres per annum) that are closer to the residence than the Marshall Bay Lime Sand Extraction Pit (see **Figure E-8**).

C-1-2 PERFORMANCE REQUIREMENTS

Document	Requirements/Guidance
Environment Protection Policy (Air Quality) 2004	**Part 5 - MANAGING DIFFUSE SOURCES OF AIR CONTAMINANTS** **Management of diffuse sources of air pollution** **16. (1)** Regulatory authorities should manage and regulate diffuse sources of air pollution that have the potential to cause material or serious environmental harm or an environmental nuisance in such a manner as will protect the environmental values identified in this Policy. **(2)** Diffuse sources of air pollution should be managed using best practice environmental management so as to: **(a)** minimise emissions; and **(b)** manage those emissions that are unavoidable in a manner that minimises impacts on health, safety or amenity. **(3)** Diffuse sources of air pollution should be managed in accordance with any relevant guidelines published, adopted or endorsed by the Board for the purposes of this clause. **(4)** Diffuse sources of air pollution must be managed in accordance with any regulations made under the Act. The Air EPP is supported by the EPA Board Statement January 2022 'Update to Air Pollutant Design Criteria used in the Environmental Impact Assessment Process' which clarifies how the EPA Board uses and implements the Environment Protection Policy (Air Quality) 2004 (Air EPP) during the environmental impact assessment (EIA) process and provides important updates to air pollutant design criteria. The EPA did not require atmospheric dispersion modelling which indicates that the emission of air pollutants from the Activity is unlikely to cause environmental harm or nuisance.
Quarry Code of Practice	Key considerations include: • Dust should not normally be visible crossing the boundary of the premises. • Environmental factors, such as wind conditions, may on occasion, make the retention of all visible dust on the site impossible. In such cases, the operator must take all reasonable actions to ensure that the emission of dust from the premises is minimised.

	• Roads within the boundary of the premises must be watered or sealed when necessary or when directed by the approval authority, to minimise environmental nuisance. • Trucks must utilise effective dust control measures such as tarpaulins, load dampening when travelling by public roads and carrying loads containing a significant quantity of material that passes a 4-millimetre sieve. • Dust produced by the operation of the Pit or by transport, crushing and screening plant must be effectively controlled to the satisfaction of the approval authority.

C-1-3 POTENTIAL SOURCES OF DUST EMISSIONS AND IMPACTS

The risk of dust emissions from the Activity causing environmental nuisance is low due to the lack of any nearby sensitive premise (**Figure E-8**) and any other area where people congregate.

Sources of fugitive emissions

The most likely source of fugitive dust is from internal road use.

Other potential sources of fugitive dust at the Pit are from:

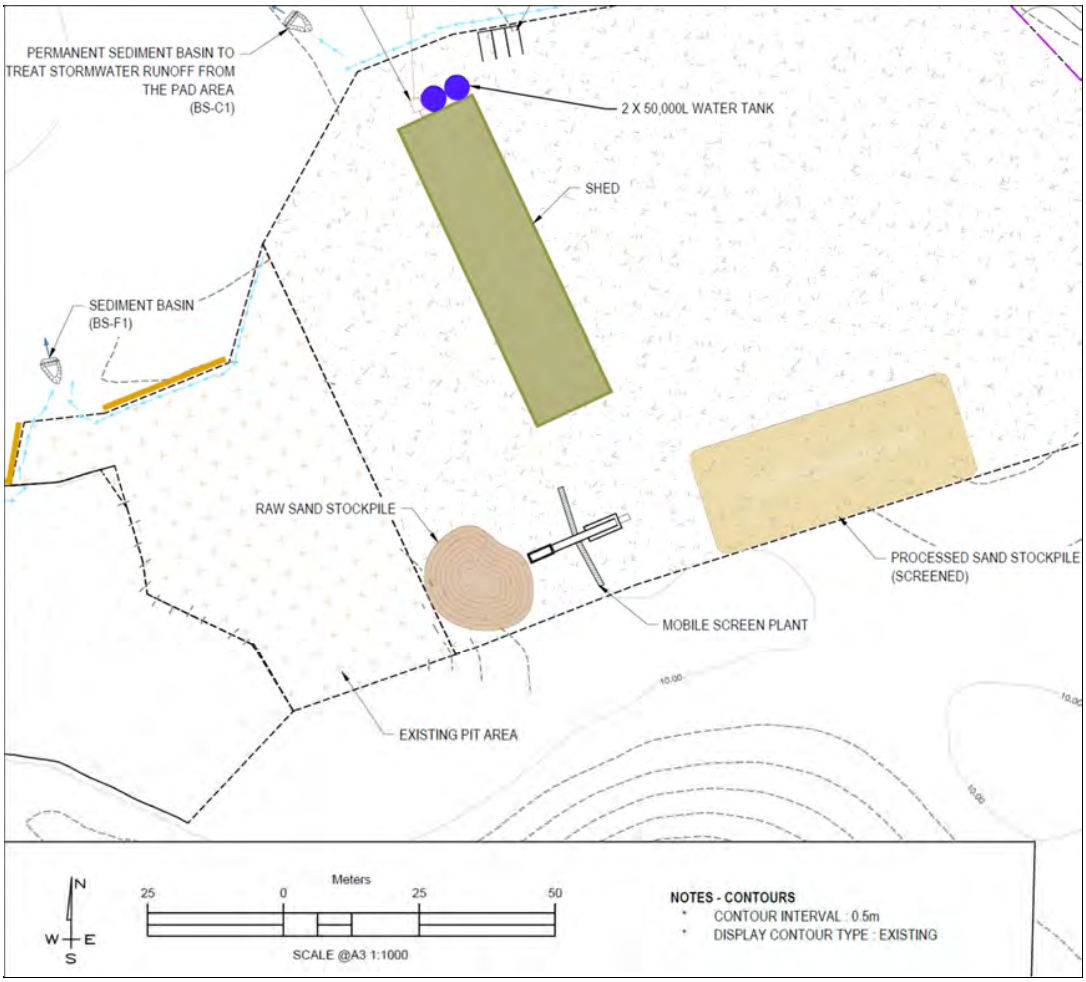
- the clearing of vegetation;
- the stripping of topsoil (extremely limited as the amount of topsoil is low to absent[6]);
- the ripping and movement of sands during dry windy conditions (especially in the summer months);
- screening of raw sand to remove organic matter and any pebbles, rocks or other inorganic debris;
- access road (gravel) use in and out of the Pit; and the
- stockpiles of sand, and the loading of sand into trucks from the stockpiles.

The act of blending (incorporating ameliorants into the limes sands, such as boron or copper sulphate) may generate dust. Blending of soil ameliorants will only occur in the shed owing to the extremely high cost of the soil ameliorants (so loss from wind or fugitive emissions is unacceptable) and their fine particle size which makes them the higher risk item for generating fugitive emissions. The use of the shed for blending avoids fugitive emissions.

The screening of raw sands would likely be conducted at the Pad using a standard mobile screening unit to produce a processed sand stockpile from which lime sands would be loaded into trucks for haulage to paddocks for spreading. The location of the screen is approximately depicted within **Plate 2** which is an extract of the technical drawing 'SITE LAYOUT - PAD AREA AND SITE ENTRANCE' (Drawing VDC/MSP/A/102) in **Attachment 10.**

Plate 2. Extract of Site Layout showing mobile screen plant location

[6] Slee (2024, pg 22) notes the soil to be '…thin and low in organic content'



Sand characteristics and potential to blowout

With any broad-scale vegetation removal of a dune sequence there is the potential for a blowout to occur. Blowouts can expand over time and possibly become a source of fugitive dust emissions. Slee (2024, **Attachment 9**) notes that blowouts of the coastal dunes backing the beach are quite common within the Mining Lease (NB. these areas are not in the Development Area). However, away from the coast most of the larger dunes appear to be stable.

He notes that the blowout on the southern edge of the existing pit face has resulted in minor sand deposition and tree burial south of the highest point of the dune. The current location of the pit in the leeward side of the main dune reduces the ability of westerly winds to significantly erode the exposed sands in the pit through deflation, although some loss of sand by wind deflation is likely to have occurred (and may still be occurring). Westerly winds are the dominant wind source (**Graph 3**).

Slee (2024) states that there is a risk that once the operations extend to more of a windward face of the dune, dominant westerly winds may deflate (erode) the dune. This could lead to loss of resource and the wind transport of the sediment.

Maintaining a high vegetation cover above the working face and active efforts to revegetate the site away from the working face are key to minimising wind erosion, especially with the prevailing westerly winds. While easterly winds are common on Flinders Island, they are generally less strong than the westerly winds as evidenced by the strongly deformed vegetation caused by westerlies present at exposed locations on the Mining Lease (**Graph 3**). Also, easterly winds are generally linked to low pressure systems in the Tasman Sea and rainfall, the wet conditions act to stabilise sand dunes and inhibit wind deflation. According to Slee (2024), deflation of the sand towards the Marshall Beach Conservation area to west of the proposed Pit would be an unlikely event.

C-1-4 RISK ASSESSMENT, MITIGATION, AND MANAGEMENT

Dust emissions will be managed to the extent necessary to prevent environmental nuisance. **Table 7** provides a risk assessment of the potential impacts caused by fugitive dust emissions from the Activity. The risk assessment is conducted before and after the implementation of control measures, with mitigation measures described.

The mitigation measures outlined in **Table 7** will be implemented.

Measures used to **suppress dust** include the following extractive industry standard environmental practices:

- Retention of vegetation along the access road corridor where possible;
- Retention of vegetation (when possible) around the Pit working area to reduce the likelihood of strong winds liberating fine particles into the air;
- Utilisation of slash/mulch obtained from cleared areas to stabilise the soil surface and to limit wind action on dust generation at the soil/sand surface;
- Covering of trucks with tarpaulins and/or load dampening; and
- Minimising the geographic extent of areas of exposed soil.

Water can be accessed from the on-site water tanks or possible groundwater bore that may be installed in the future via a permit under the *Water Management Act 1999*.

Measures recommended by Slee to **minimise the risk of wind erosion** include the following:

- Avoid, if possible, but otherwise minimise working on faces exposed to westerly winds;
- Maintain vegetation above and to the west of any active face; and
- Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree and other scrub species for covering exposed surface as operations progress.

C-1-5 ASSESSMENT OF NET IMPACTS

The overall net impacts of dust emissions on local air quality are assessed to be low because emissions can be actively managed through mitigation and avoidance strategies. The mitigation measures outlined in **Table 7** are consistent with the intent of Part 5 of the Air EPP; primarily, clauses 2(a) and (b).

The risk of dust emissions from the Activity causing environmental nuisance is low due to the following combined factors –

1. the lack of any nearby sensitive premise (**Figure E-8**);
2. the reduction of risk by the progressive rehabilitation works to occur as the Pit progresses westwards;
3. implementation of mitigation measures (**Table 7**); and
4. the use of the shed (which enables the effects of wind on generating dust emissions to be removed) for the blending of sands with other soil ameliorants/additives such as boron.

Table 7. Risk assessment for fugitive dust emissions from the Pit and associated activities and proposed control measures

Location	Activity	Pre-Control Risk Assessment	Control Measures	Final Risk Assessment
The Land	• The clearing of trees and other vegetation. • The stripping of topsoil (limited as the amount of topsoil is low). • The ripping of sands during dry windy conditions (especially in the summer months). • The movement of sand by machinery. • Stockpiles of sand, and the loading of sand into trucks from the stockpiles.	**Medium** **(Likely – Moderate)**	• Minimising the geographic extent of areas of exposed soil. • Retention of vegetation along the access road corridor where possible. • Retention of vegetation (when possible) around the Pit working area to reduce the likelihood of strong winds liberating fine particles into the air. • Utilisation of slash/mulch obtained from cleared areas to stabilise the soil surface and to limit wind action on dust generation at the soil surface.	**Low** **(Possible – Negligible)**
	• Vibratory screening (and blending of sand and soil ameliorants) of sand material.	**Medium** **(Likely – Moderate)**	• Vibratory screening to be avoided outside the shed on high wind days (winds >60km/hr). • Blending of sands and other products to occur within the shed.	**Low** **(Unlikely – Negligible)**
	• Wind erosion.	**Medium** **(Likely – Moderate)**	• Road dampening, progressive rehabilitation, limiting or avoiding extraction on a westerly exposed slope.	**Low** **(Unlikely – Negligible)**
Transport	• Dust emissions from loads in trucks.	**Low Med** **(Possible – Minor)**	• Tarpaulins and load dampening.	**Low** **(Unlikely – Negligible)**
	• Access road (gravel) use in and out of the Pit	**Low Med** **(Possible – Minor)**	• Road dampening during campaigns. • Speed limit of 40km/hr on access road.	**Low** **(Unlikely – Negligible)**

C-2 SURFACE WATER MANAGEMENT AND GROUNDWATER

Specialist Report – Stormwater Management and Sediment Control Measures Assessment Report

Van Diemen Consulting Pty Ltd (VDC) was engaged by Markarna Grazing Company Pty Ltd, to carry out a stormwater management assessment and recommend drainage and sediment control measures for the Pit. The assessment evaluated current drainage patterns, sediment generation potential of the Activity, and describes stormwater and sediment control measures tailored to the site's geological and operational conditions. Strategies are recommended to manage stormwater runoff, mitigate erosion, control sediment dispersion, and ensure compliance with local environmental regulations to minimize the impact of sand extraction operations on surrounding environment. The report forms part of this EIS and is in **Attachment 7** and the following section, which should be read in conjunction with it.

Specialist Report – Site & soil evaluation and design report. New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site)

Markarna Grazing Company Pty Ltd engaged Onsite Assessments Tas (Richard Mason) to (i) investigate a site for the installation of an on-site wastewater treatment system and (ii) document design Information, plans, and specifications suitable for inclusion in supporting documentation for a Plumbing Permit. The report forms part of this EIS and is in **Attachment 5** and the following section, which should be read in conjunction with it.

C-2-1 EXISTING CONDITIONS

The Development Area is comprised of at least 8 dune crests between North Curves Lagoon and South Curves Lagoon. The dune ridges have narrow rounded tops and steep side slopes, generally >30°. The multi-peaked nature of the dune ridges and the deep wide interdune swales are not well expressed on the 1:25000 topographic map. The existing disused pit is located near the narrowest and easternmost part of the dune sequence.

The Mining Lease features extensive sand dunes, composed predominantly of fine-grained quartz and carbonate deposits (see **Attachment 9**). These dunes are a result of dynamic sedimentary processes, shaped by both wind and water. The top sand layer, which is particularly important for stormwater and sediment management, has high permeability, which influences infiltration rates and stormwater runoff patterns.

The lime sand deposit to be extracted from the Mining Lease are well drained and are formed by Quaternary sands (Slee 2024, pg 24) of high pH value (see Table 2 of Slee (2024)). The high pH values obtained from the soil samples collected by Slee (2024) indicate an alkaline environment where extensive acidic soils are unlikely to be present. The reason for this is because the region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone.

<u>Watercourses and wetlands</u>

There are no defined watercourses within the Development Area (see **Figure E-4b**), and no formal drainage exists into the nearby wetlands (North and South Curves lagoons, **Figure E-4a**, CFEV mapped – they are low-lying depressions of coastal grassland on sandy soils that are likely to never fill with water) that occur southwards and northwards of the Development Area (**Figure E-4a**); these are actually smaller than they are shown on topographic maps and TASVEG mapping. The deflection basins (Curves Lagoons) are dominated by

coastal grasslands, with even minor dune formation in the basins, even those of only 1-2 m high, dominated by scrub or ex-pasture vegetation.

Groundwater

Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present.

Soil augering for the wastewater disposal site (**Attachment 5**) found a calcareous matrix, cementing sand grains together, that created a hardpan considerably less permeable than the unconsolidated sands at a depth of 1.1 to 1.2m. Below 1.2m were loose and damp yellow sands which is the aquifer layer accessed by bore drillers to access water.

Groundwater depth is likely to be in the range of the nearest bore (bore 42804, Palana Rd, about 3 kms north northwest of the Pit) on comparable sediments (i.e. Undifferentiated Cenozoic sequences>Undifferentiated Quaternary sediments>Holocene alluvial, lacustrine and littoral deposits) which had a standing water level of 4.7m (bore depth of 16m) when it was capped in late 2024.

C-2-2 PERFORMANCE REQUIREMENTS

Document	Requirements/Guidance
Quarry Code of Practice	Drainage – The requirements outlined in Section 7.9.2.1 of the QCP • Cut-off drains, contour drains and diversion banks shall be installed where necessary. • Machine movements should not be through water courses. • Minimise exposed areas and ensure access tracks have well maintained table drains and culverts. • Drainage works will, when possible, seek to mimic natural drainage patterns and utilise natural drainage lines with retained vegetation. • Contour banks and contour drains may be used, if necessary, to capture and slow down water that would otherwise gather momentum as it travels down the slope. • Working areas will be kept in as dry condition as possible (mud areas should be avoided), and machinery should avoid be driven through flowing water. • Rate of run-off increases dramatically following vegetation removal, hence the total area exposed will be kept to a minimum. • Tracks and the access road will be constructed to control the grade, have table drains installed, and with regular cross drains or culverts installed. Culverts should discharge into natural drainage lines that are stable and vegetated via properly constructed spillways, ripraps, or culverts. Sediment Control – The requirements outlined in Section 7.9.2.2 of the QCP • Run-off from working areas should be collected in settling ponds before discharging.

	• Settlement ponds should be utilised to remove sediment in run-off. • Run-off should be directed through existing vegetation where possible. • Sediment ponds are to be maintained as necessary to remove sediment build-up. • Sediment ponds should discharge into natural drainage lines. Water Quality – The requirements outlined in Section 7.9.2.3 of the QCP • Discharge should be visibly free of oil and grease. • Onsite reuse of stormwater run-off can be used for watering roads, washing, promoting revegetation etc.
Best Practice Erosion & Sediment Control	The Best Practice Erosion & Sediment Control (IECA, 2008) guidelines suggest capacity of drainage networks should be capable of conveying run-off from storms with a recurrence interval up to 1 in 10 years.
Tasmanian Waterways and Wetlands Works Manual (2003)	Aspects of this manual are relevant, especially the following points – • 2.2 Minimise sediment disturbance and control erosion, • 3.7 Protect stream-entry points, and • 3.9 Revegetate.

C-2-3 RISK ASSESSMENT AND POTENTIAL IMPACTS

Table 8 provides a risk assessment of the potential impacts caused by stormwater emissions from the Activity. The assessment is conducted before and after the implementation of control measures.

Polluted Stormwater

Disturbed areas (unvegetated) have the potential to generate sediment in runoff during heavy (high intensity) and/or sustained periods of rainfall. Sources of sediment from uncontrolled or high-volume surface runoff including for example unsealed roads and tracks, partly rehabilitated or areas under Rehabilitation, and the Pit which includes the active working surface.

Operations may also be a source of hydrocarbons that if unmanaged or poorly managed could enter waterways and impact aquatic life. Accidental releases or seepages of environmentally harmful substances like hydrocarbons (such as fuels, oils, and lubricants), herbicides, or different types of waste streams pose a risk to ground and surface waters either directly or through stormwater drainage, or seepage when not appropriately handled. When these substances enter water bodies in substantial concentrations, they can cause severe harm to aquatic plants and animals, either through direct toxicity or by adversely affecting water quality and habitat through secondary effects.

There are no watercourses in or adjacent to the Development Area (**Figure E-4a and E-4b**) so the risk of existing watercourses being polluted by sediment or hydrocarbons from the Activity is effectively nil. The sands are freely draining, with little to no water ponding or accumulation into drainage features (watercourses are absent) but infiltration may cause very minor contamination of groundwater.

Sediment Basin discharge

When overflowing, the sediment basins would not discharge to a watercourse. The environmental risk from the proposed stormwater discharge arrangement is two-fold:

1. Establishment of a concentrated flow of stormwater when the sediment basins do discharge to the environment that may cause surface erosion, scouring and/or displacement of leaf litter from the sand surface (if present) below the outlet structure; and/or
2. Sediment accumulation on vegetation below the outlet structure(s).

Practically, the stormwater discharged if it contained sediment (which ius unlikely) is to overland flow through vegetation and not into a receiving waterway, and that vegetation itself is growing on lime sands which are identical to the sediment that may be released from the sediment basins. The risk of any harm is negligible to nil.

Liquid waste (septic)

The installation of an on-site wastewater management system is proposed to treat and dispose of wastewater derived from toilets and ablution facilities. It is proposed to install a septic tank absorption bed discharging to an in-ground absorption bed. The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day.

Attachment 5 provides a detailed assessment of the location of the proposed on-site wastewater management system and a design to cater for the intended level of use. The wastewater discharge from the premises into the absorption trenches will be broadly like domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of *AS/NZS 1547:2012 Domestic on-site waste-water management*.

The location of the installation and trenches are shown in **Figure B-1.**

The site is underlain by Quaternary deposits of windblown sand of marine origin (coastal sand dunes); this is consistent with soil profiles observed on-site (see Appendix 2 of **Attachment 5**). The marine sands contain a high proportion of calcareous material (marine mollusc shell derived), which makes them attractive for extraction for agricultural usage, for soil pH modification. Calcium carbonate from shell grit present in the wind-blown beach sand is subject to solution by rainwater and redeposition as a calcareous matrix, cementing sand grains together, forming discrete layers of hardpan, which is considerably less permeable than the unconsolidated sands. A hardpan was encountered at a depth of 1,100-1,200mm (**Attachment 5**); however, it is likely that this hard pan could be present at varying depths, therefore, soil profile modifications to ensure uniform permeability under the land application basal area will be required. This will be achieved by excavating absorption beds to a minimum depth of 1,500mm and backfilling with loose, unconsolidated sand, prior to installing the absorption bed infrastructure.

The buffer distance of 350m to the nearest saltmarsh/wetland is consistent with the Acceptable Solutions under the Director's Guidelines for on-site wastewater management systems, for separation from surface water for a land application area for primary treated effluent.

Groundwater depth is believed to exceed 4m; vertical separation from base of land application area is consistent with Acceptable Solutions for application of primary treated effluent under the Director's Guidelines.

System installation and associated pipework and trenches will be performed by qualified personnel.

Water Tanks

Tanks will be installed (likely to be 2 x 50,000 litre) to capture rainwater from the shed. The tanks may also receive water from a groundwater bore that may be installed in the future via a permit granted under the *Water Management Act 1999* (see **Figure B-1**). Overflow from the tanks will be directed to the permanent sediment basin to be installed for the Pad Area (**Attachment 7**, pg. 14).

C-2-4 MITIGATION AND MANAGEMENT

Stormwater emissions will be controlled and managed to remove pollutants (by gravity) to the extent necessary to prevent environmental nuisance. Mitigation measures in **Table 8** will be implemented.

Sediment Basins

All rainfall that falls onto disturbed areas will be collected into sediment basins, treated for sediment removal (gravitational removal treatment only, no use of flocculants or other additives is proposed), and subsequently discharged to the environment if basins overflow.

The treated stormwater runoff accumulated in basins may be repurposed for operational activities within the Pit and shed, including sand screening and blending, and road dampening. Due to high water infiltration of the soil (evident by the lack of ponding and surface water accumulation even during heavy and sustained rainfall events), the total demand for these basins to treat captured stormwater will be relatively low; supported by calculations in Table 3.2 of **Attachment 7.**

A set of Technical Drawings illustrate the sediment basins and other drainage features to be installed, which are listed below (see Attachment 1 of **Attachment 7**).

DRAWING LIST

	DRAWING NO.	REVISION	DESCRIPTION
1	VDC/MSP/A/001	0.0	COVER PAGE
2	VDC/MSP/A/002	0.0	SITE LAYOUT
3	VDC/MSP/A/003	0.0	CONCEPTUAL TYPE F SEDIMENT BASIN DESIGN
4	VDC/MSP/A/004	0.0	SEDIMENT BASIN BS-C1 DESIGN

Pad Area

The Pad Area surface will be constructed of compacted graded gravel with a semi-permeable finish. Sediment generation from such a compacted gravel surface is likely to be relatively low. However, over time, the top layer of the gravel may loosen and be carried away with stormwater runoff, especially during intense rainfall events such as a thunderstorm.

To avoid clean stormwater entering the Pad Area (**Figure B-1**), a diversion drain shall be installed along the northern extent with the pad surface sloping (approx. 1%) towards that drain (see flow indicators in **Plate 3**). The diversion drain will direct stormwater to the sediment basin (see also **Figure B-1**).

A Type C sediment basin is proposed for the Pad Area, with a design in Drawing Number VDC/MSP/A/004 (see extract of Plan View in **Plate 4**), which may be operated as either "dry" or "wet" basins depending on the requirement for stormwater reuse on the site. The basin design criteria were set to capture 0.1mm particles during a 1 in 20 years stormwater event. The risk of not precisely knowing the particle size distribution of the sands and other possible sediments contributing to 'polluted stormwater' is very low to negligible because when discharged, treated wastewater (i.e., polluted stormwater that has been captured and detained to facilitate sediment removal) is to be directed through vegetation. The basin design specifically includes an outlet structure to dissipate water (to prevent the erosive forces of a concentrated flow) and encourage overland flow and rapid infiltration.

The critical parameter in a Type C basin is the effective surface area. It is not expected the size of the proposed Pad Area (hard stand area) will significantly change over the life of the Activity so the sizing of $32m^2$ of surface area, and $22m^3$ of volume, shouldn't change over time (see Table 4.3 of **Attachment 7**).

Pit

Based on the soil characteristics described in the *Geomorphology and Soil Characteristics Survey Report* (Table 1 of Slee 2024) it was decided to implement Type F basins for collecting and treating stormwater runoff (sediment removal by gravity) from the Pit. These basins are generally suitable for fine grained soils that can readily settle without the need for flocculating agents. The critical design parameter for a Type F basin is the volume of the settling pond. Type F basins are typically designed for a maximum 5-day cycle; the filling, treatment (sediment removal by gravity), and discharge of the basin within a maximum of 5-day period. Table B4, Book 02 of IECA Guidelines suggests an 80th percentile 5-day rainfall depth to calculate settling zone volume of the sediment basin for basins with design life greater than 6 months. Table B8 of IECA Book 2, provides the guidelines to size the sediment storage volume of a sediment basin.

Indicative sediment basin locations for the initial 5 years of extraction activities are shown in **Figure B-2** and Drawing Number VDC/MSP/A/002 (see extract of plan view in **Plate 5**).

As the sand extraction area of the Pit advances and rehabilitation occurs, BS-F1 and BS-F2 will become redundant, and new basins will be installed to treat stormwater (sediment removal by gravity) runoff from new disturbed areas as required. The Pit Manager is to refer to Table 4.3 (**Attachment 7**) to determine the size of the basins which are to be constructed per the conceptual design in the Drawing Number VDC/MSP/A/003 (see extract of conceptual 3D visualisation in **Plate 6**).

Monitoring structures and basin discharge impacts

Regular visual monitoring (monthly) is to be undertaken to ensure the effectiveness of the installed stormwater management and sediment control structures. Repairs and remedial works (including basin cleaning) are to be performed to maintain sediment settling zones to those required and ensure that stormwater is entering and leaving the basin as planned.

The effect on vegetation and the soil surface from basin runoff is to be monitored, and remedial actions taken if the soil surface becomes scoured or vegetation becomes covered by discharged sediment. Remedial works include for example, the expansion of the outlet structure (additional rock), and/or the installation of surface protection measures like jute mesh, and/or vegetation slash.

Water quality testing is not proposed.

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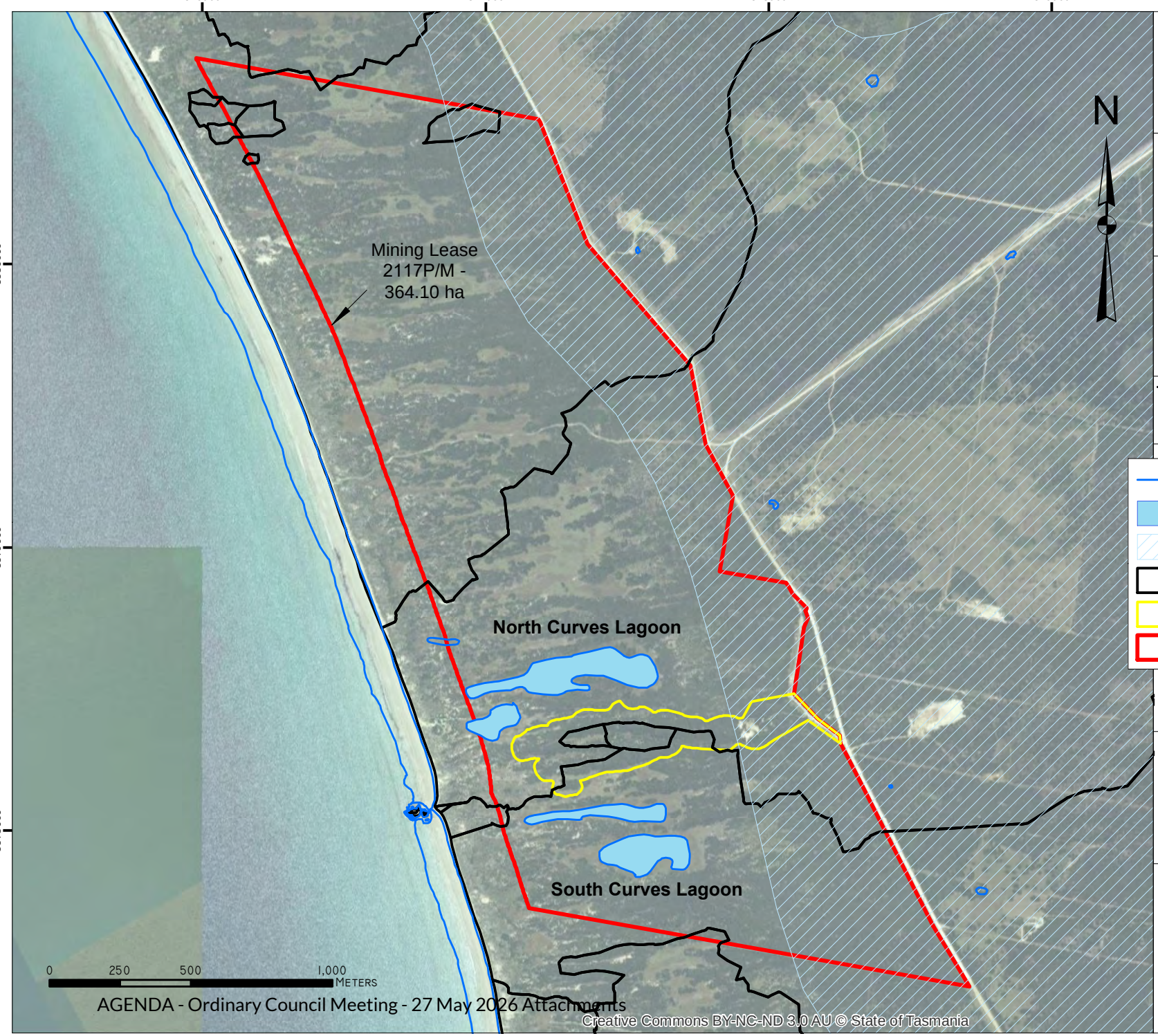
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-4a: Current drainage, catchment boundaries and CFEV areas



TASMAP: TANNER EMITA

LGA: FLINDERS

- The LIST Hydlines
- CFEV Wetlands
- CFEV Karst
- CFEV River Section Catchments
- Development Area (The Land)
- Mining Lease 2117P/M

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Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
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DATE: 4 JULY 2024

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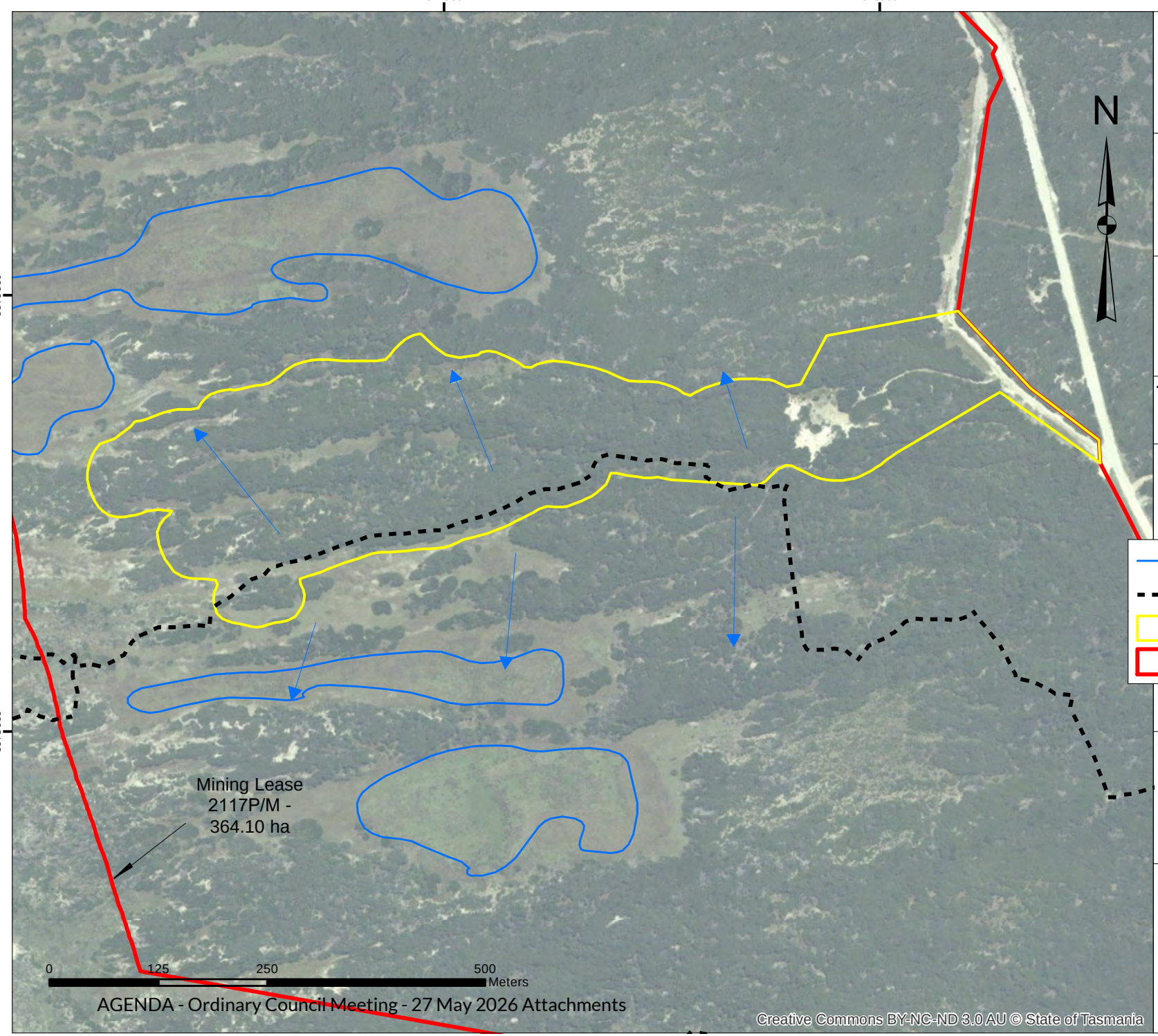

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-4b: Final drainage and catchment boundaries

TASMAP: TANNER EMITA

LGA: FLINDERS

- The LIST Hydlines
- Final River Section Catchments
- Development Area (The Land)
- Mining Lease 2117P/M

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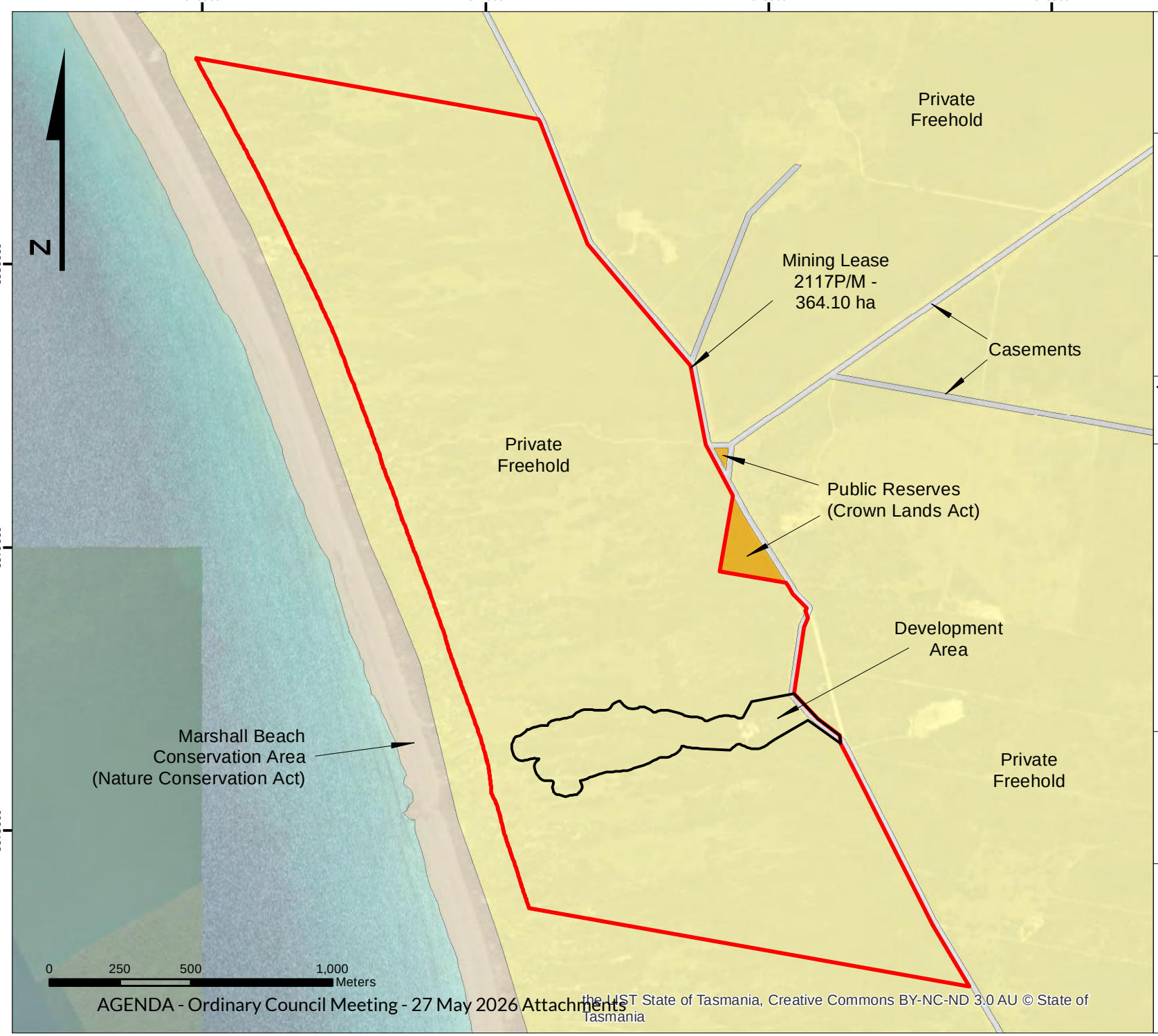

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-5: Land tenure (including Reserves) around Markarna Park Sand Pit

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

Base data by TASMAP. © State of Tasmania
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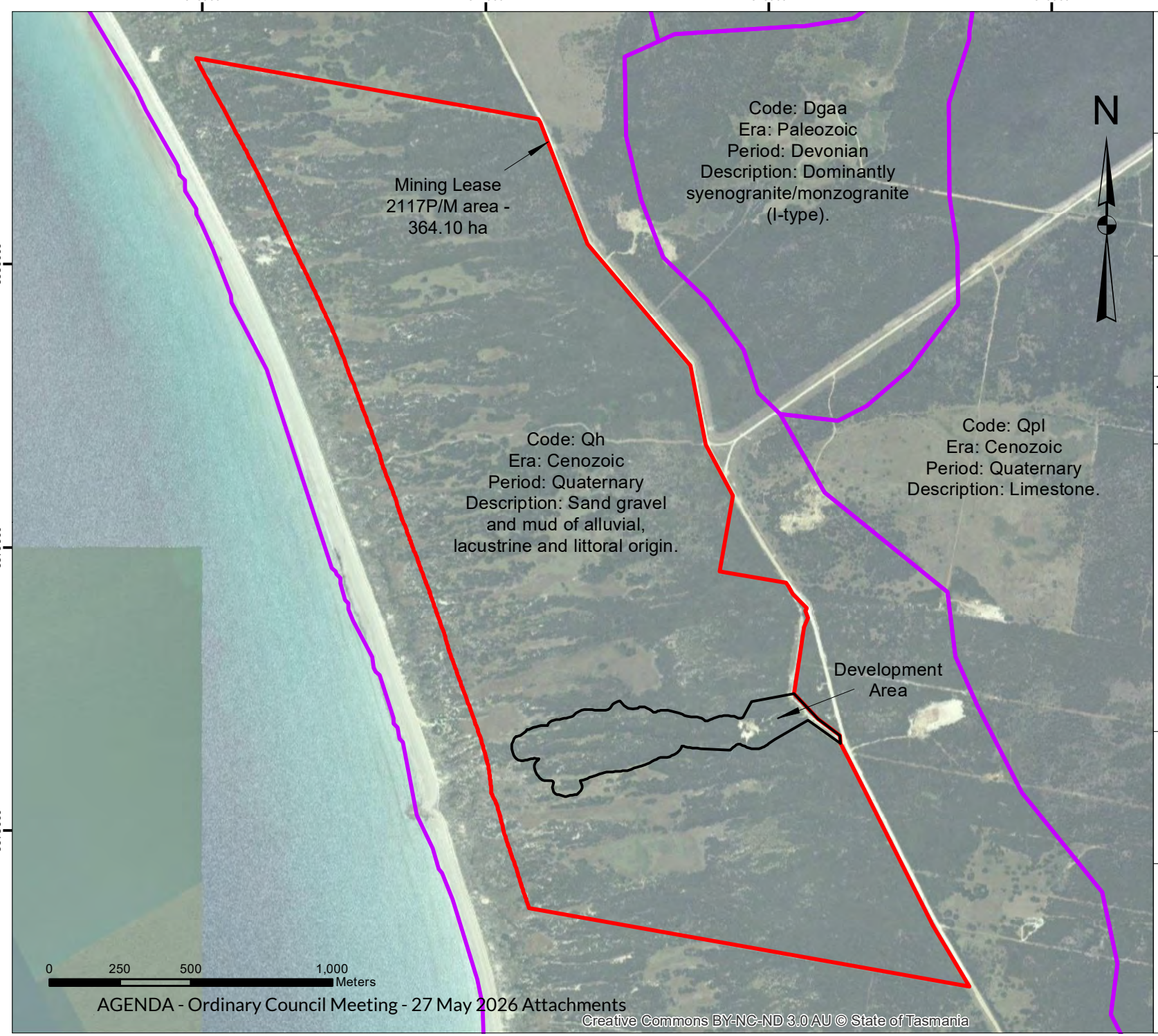

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-6: Geology (1:250,000 – MRT) around the Development Area

TASMAP:	LGA:
TANNER EMITA	FLINDERS

- Geology(1:250,000)
- Development Area (The Land)
- Mining Lease 2117 P/M

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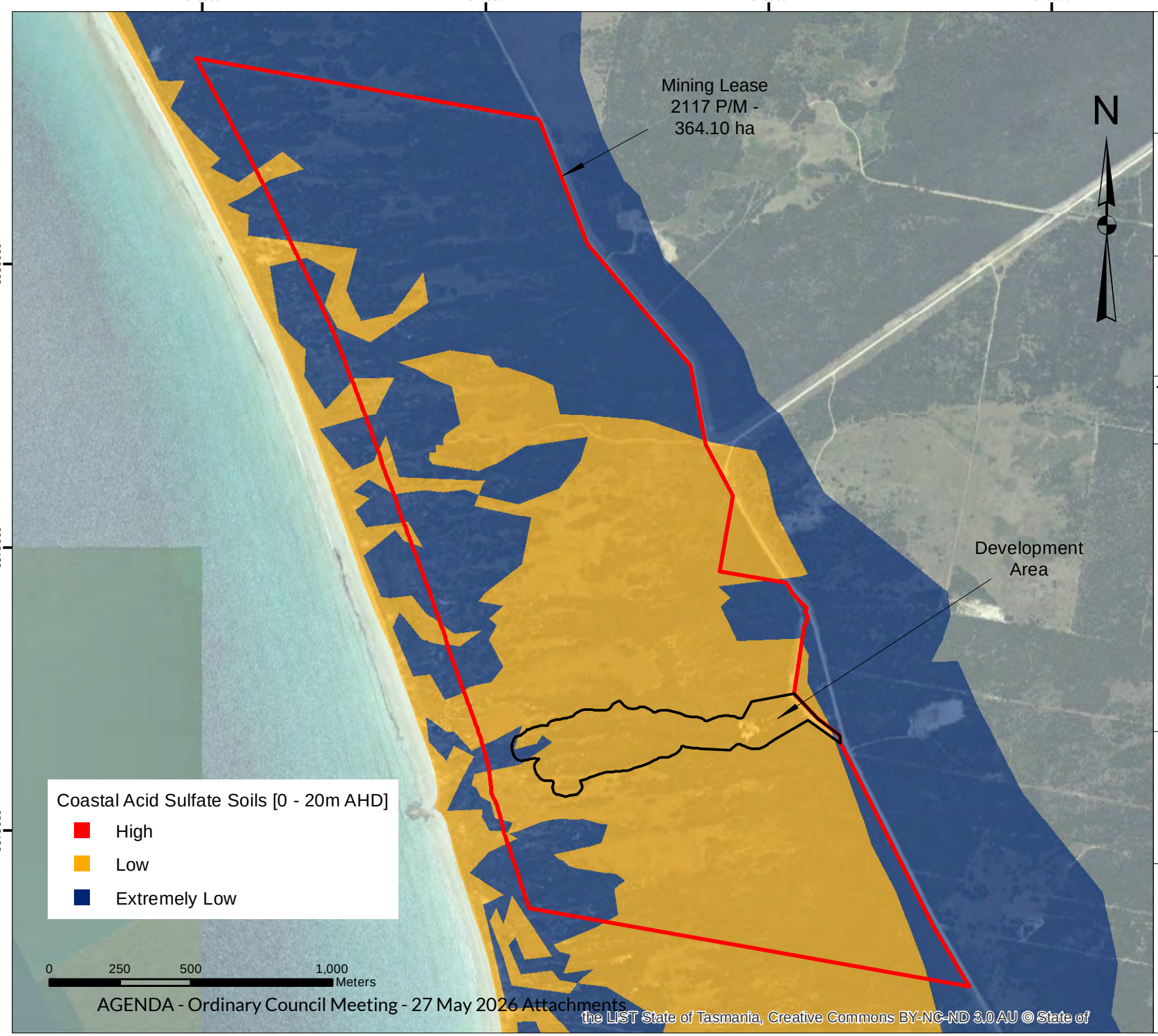

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-7: Coastal Acid Sulfate Soils (0-20m AHD)

TASMAP:	**LGA:**
TANNER EMITA	FLINDERS

Development Area (The Land)

Mining Lease 2117P/M

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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
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DATE: 4 JULY 2024

Plate 3. Proposed drainage measures at the Pad Area of the Marshall Bay Sand Pit

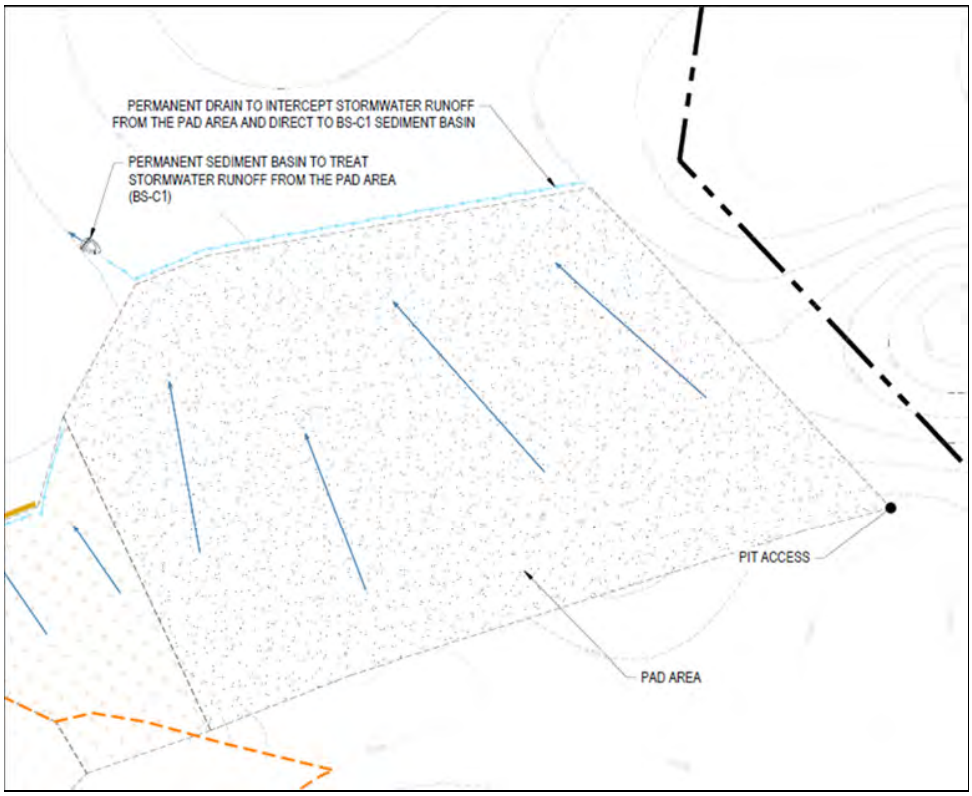


Plate 4. Proposed sediment basin at the Pad Area of the Marshall Bay Sand Pit

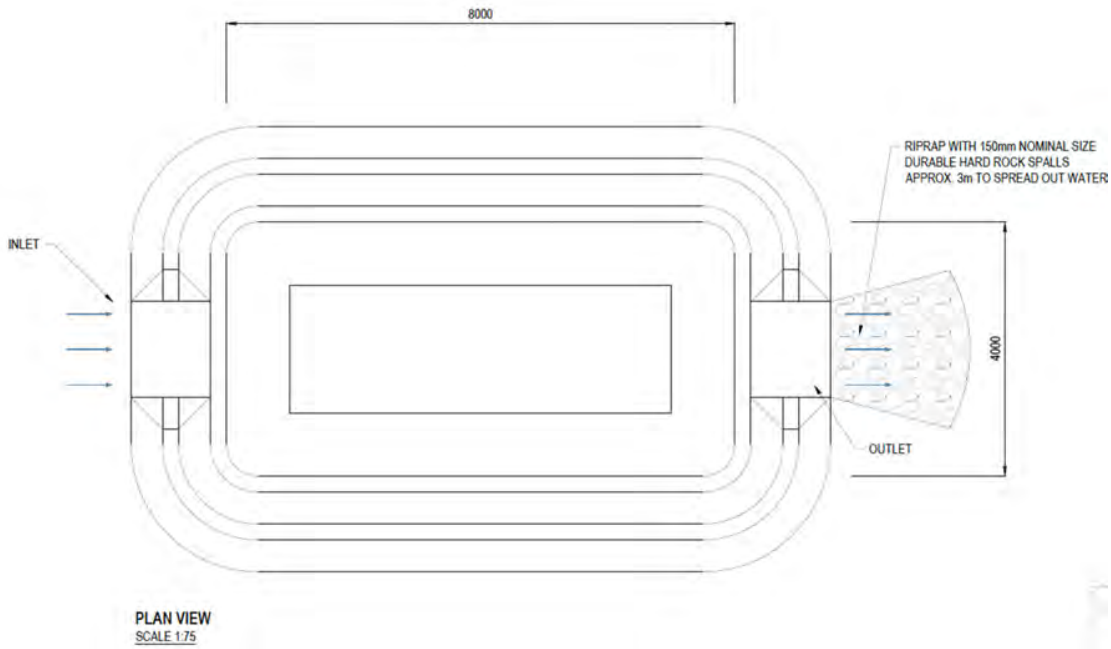


Table 8. Risk assessment for stormwater emissions from the Pit and associated activities and proposed control measures

Location	Activity or action that may cause impact	Pre-Control Risk Assessment	Control Measures	Final Risk Assessment
The Land	• The clearing of vegetation that increases the area of exposed soil susceptible to water erosion. • Uncontrolled discharge of polluted stormwater.	**Medium** **(Likely – Moderate)**	• Minimising the geographic extent of exposed soil. • Establishment of sediment basins, diversion drains, and other drainage systems at the Activity.	**Low** **(Possible – negligible)**
	<u>Sediment Basins</u> Establishment of a concentrated flow of stormwater when the sediment basins do discharge to the environment that may cause surface erosion, scouring and/or displacement of leaf litter from the sand surface (if present).	**Medium** **(Likely – Moderate)**	• Sediment basin designed to have outlet structure inclusive of rock to disperse overland flow. • Utilisation of slash obtained from cleared areas or other product (jute mesh) to stabilise the soil surface, and to limit the spread of sediment. • Visual monitoring of flow and the effects of high concentration flow including scouring and displacement of leaf litter and sand.	**Low** **(Possible – negligible)**
	<u>Sediment Basins</u> Sediment accumulation on vegetation below the discharge outlet caused by high flows, and/or failure of basin to trap sediment.	**Low** **(Possible – negligible)**	• More frequent cleaning and visual monitoring of the sediment settling zone, enlargement of sediment basin. • Utilisation of slash obtained from cleared areas to stabilise the soil surface, and to limit the spread of sediment.	**Low** **(Possible – negligible)**

Location	Activity or action that may cause impact	Pre-Control Risk Assessment	Control Measures	Final Risk Assessment
	Contamination of groundwater by the infiltration of spilled hydrocarbon products	**Low** **(Possible – negligible)**	• Readily available spill kits on site; • Store products in suitably sized bunded containers; • Train personnel to use spill kits and establish emergency procedures in the event of a spill; • Refuel only in bunded and/or hardstand area; and • Daily pre-start checks on machinery to minimise the risk of spills; ensure machinery and equipment is functional, hoses are correctly fitted and secure, and caps on fluid tanks are tightened.	**Low** **(Possible – negligible)**

Plate 5. Sediment basin locations for the sand extraction area of the Marshall Bay Sand Pit

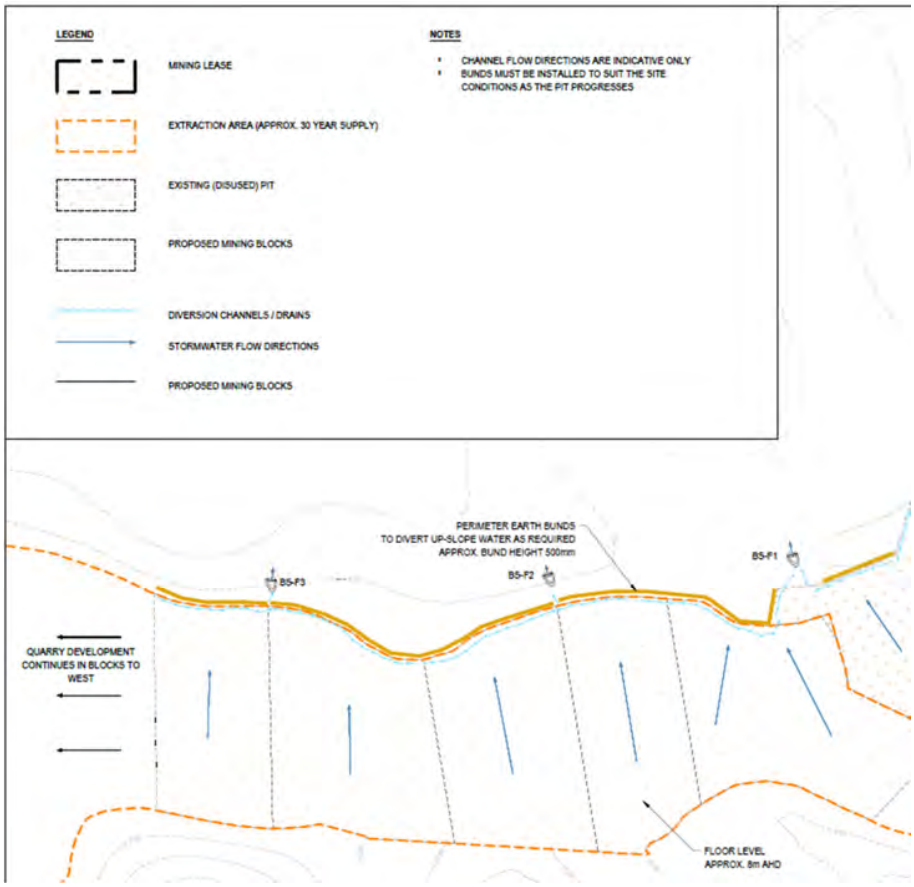
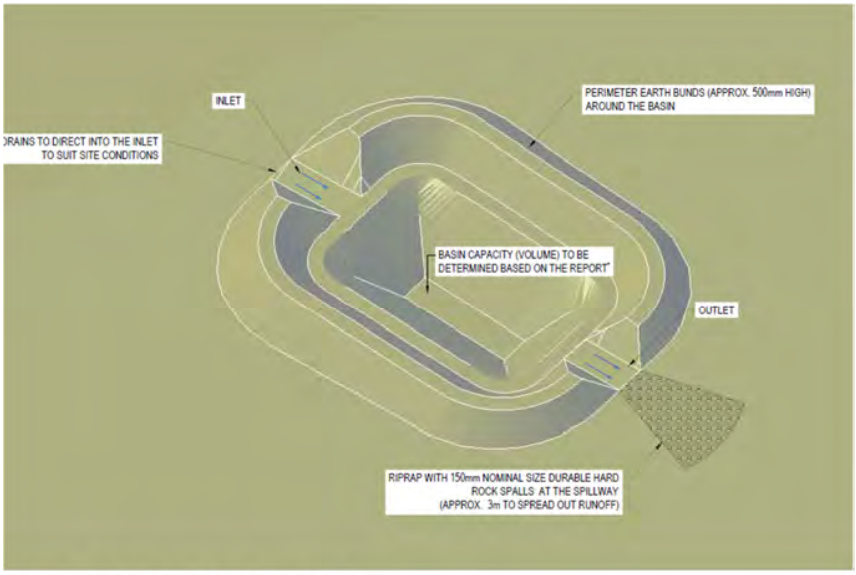


Plate 6. Proposed sediment basin design for the sand extraction area of the Marshall Bay Sand Pit



CONCEPTUAL 3D VISUALIZATION OF TYPE F SEDIMENT BASIN
SCALE N.T.S.

Groundwater (karst) management

Due to the high infiltration rates of water, all necessary controls must be implemented to prevent spills or hazardous substances from entering the groundwater.

Environmental management controls will be -

- Readily available spill kits on site;
- Storage of products in suitably sized bunded containers;
- Training personnel to use spill kits and establish emergency procedures in the event of a spill; and
- Daily pre-start checks on machinery to minimise the risk of spills; ensure machinery and equipment is functional, hoses are correctly fitted and secure, and caps on fluid tanks are tightened.

C-3 NOISE EMISSIONS

The Pit will operate intermittently, with sand likely to be transported in greater volumes during summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment. There would be little to no carting activity in winter as truck access to pastures for the spreading of lime sand is difficult to impossible.

No blasting is proposed, nor is it required to conduct the Activity.

C-3-1 NOISE GENERATING EQUIPMENT

Type and Assumed Sound Power Levels

Table 9 lists the assumed sound power level for the machinery and equipment to be used at the Activity. The actual equipment used at the Pit will vary over time as equipment is replaced.

Location, duration of use, and possible period of peak activity

Tasks for the Activity at the Pit can be grouped, with each task generally having its own suite of machines and equipment to perform it. For example, the sand excavation process would involve the use of a bulldozer, excavator, water truck and haulage truck.

Table 9 groups machinery and equipment to be used at the Activity with the corresponding likely location of their use, and the period (total) that the task may be conducted for each year. **Figures B-1 and B-2** provide reference to the terms used in **Table 9**.

A possible peak period for each task is also nominated, which reflects the operational requirement to strip and clear areas, excavate lime sands and then have those sands ready for carting to agricultural lands by March (at the latest) each year. Carting could occur at anytime of the year, with a peak in March to May.

C-3-2 NOISE SENSITIVE PREMISES

There are no residences or other NSPs within 1 km of the Development Area.

The nearest residence is 1.15km to the south-east, and 1.17km to the Extraction Area (**Figure E-8**). The same residence is marginally within 300m of the Mining Lease.

There are two other lime sand pits (ML 2059P/M, and 2056P/M; both pits are Level 1 activities and are permitted to extract up to 4,999 cubic metres per annum) that are closer to the residence than the Marshall Bay Lime Sand Extraction Pit (see **Figure E-8**).

Table 9. Assumed sound power level for machinery and equipment and primary areas of their use and activity levels

CATEGORY OF ACTIVITY	EQUIPMENT/MACHINERY	ASSUMED SOUND POWER (dBA)	PRIMARY USE LOCATION AT PIT (REFER FIGURES B-1 AND B-2)	POSSIBLE TOTAL DURATION OF USE AND PEAK ACTIVITY
Stripping/clearing/Rehabilitation	CAT D9H Bulldozer	110	**Development Area** with sand extraction limited to the Extraction Area	Weeks to several months per annum after initial clearing and establishment of infrastructure.
	CAT 140G Grader	109		
Sand excavation	CAT D9H Bulldozer	110	**Development Area** with sand extraction limited to the Extraction Area	Several months per annum (likely peak from December to March)
	CAT 329D Excavator	99		
	Water truck and haulage truck	107		
Screening/blending	Powerscreen 2 & 3 deck screens	113	**Shed** and associated Pad area, with some in Pit screening of organic debris and rocks (limited to the Extraction Area)	Several months per annum (likely peak from December to March)
	CAT 966H Loader	107		
Loading/stockpiling	CAT 966H Loader	107	**Shed** and associated Pad area and Raw stockpiles in Extraction Area	Several months per annum (likely peak from December to March)
Cartage	Truck (with or without trailer)	107	**Shed** and associated Pad area and access road	Most of the year at varying levels of intensity (peak from March to May)

C-3-3 PERFORMANCE REQUIREMENTS

Document	Requirements/Guidance
Quarry Code of Practice	Key considerations in the QCP include – • Under certain circumstances, it is appropriate for the regulatory authority to differentiate between certain activities taking place on the land. • Enclosures may be required around crushing and screening plants. • Solid barriers, such as bund walls and topographical features, provide the most effective 'in line' reduction of sound levels. Reliance on a barrier of vegetation alone will result in only marginal reduction in noise levels. • Access tracks and haul roads should be well maintained to prevent corrugation that contributes to truck noise, and truck drivers should be encouraged, where possible, to use access roads which have the least impact on the community. • Machinery should be well maintained and lubricated. Modern equipment is generally quieter than ageing machinery. • Compressors, noisy engines, generators, and exhausts should be fitted with silencers. Noise emission limits set by the QCP are: Noise from quarrying and associated activities, including equipment maintenance, when measured at any neighbouring sensitive use must not exceed the greater of: • the A-weighted 10 minute L90, excluding noise from the quarry, plus 5 dB(A), or • the following levels: ▪ 45 dB(A) from 0700 to 1900 hours (daytime) ▪ 40 dB(A) from 1900 to 2200 hours (evening), and ▪ 35 dB(A) from 2200 to 0700 hours the following day (night time) when measured as a 10 minute L_{eq}. Only the daytime emission level (45dB(A)) is relevant as works at the Pit are not proposed outside these hours.

Tasmanian Environment Protection Policy (Noise) 2009	The objectives of this policy are – (a) to further the objectives of the Act as they relate to the acoustic environment; and (b) to protect the environmental values specified in clause 7. The environmental values to be protected under the Noise EPP are the qualities of the acoustic environment that are conducive to: • the wellbeing of the community or a part of the community, including its social and economic amenity; or • the wellbeing of an individual, including the individual's – - health; and - opportunity to work and study and to have sleep, relaxation and conversation without unreasonable interference from noise. The following Pit relevant provisions and clauses are reproduced below from the policy. *PART 4 – TRANSPORT INFRASTRUCTURE* The policy recognises that although the operation or use of public roads, railways, ports or airports may prejudice protection of the environmental values, the function the transport network serves is necessary for the community's economic, environmental and social wellbeing. Notwithstanding this, it is intended that – (a) transport planning initiatives for freight and passenger movement and new transport infrastructure be developed in a systematic way to achieve an optimal balance of economic, environmental and social benefits and costs with a major criterion of minimising the number of people exposed to noise levels that would prejudice protection of the environmental values; and (b) where environmental values are acutely prejudiced, existing transport infrastructure noise should be reduced to the greatest extent that is reasonably practical, consistent with achieving an optimal balance of economic, environmental and social benefits and costs. *PART 5 – COMMERCIAL AND INDUSTRIAL ACTIVITIES* Regulatory authorities should assess, manage and regulate proposed commercial and industrial activities that are sources of noise with the objective of protecting the environmental values. Best practice environmental management should be employed in every activity to reduce noise emissions to the greatest extent that is reasonably practical. Dominant or intrusive noise characteristics of noise emissions from an activity should be reduced to the greatest extent that is reasonably practical.

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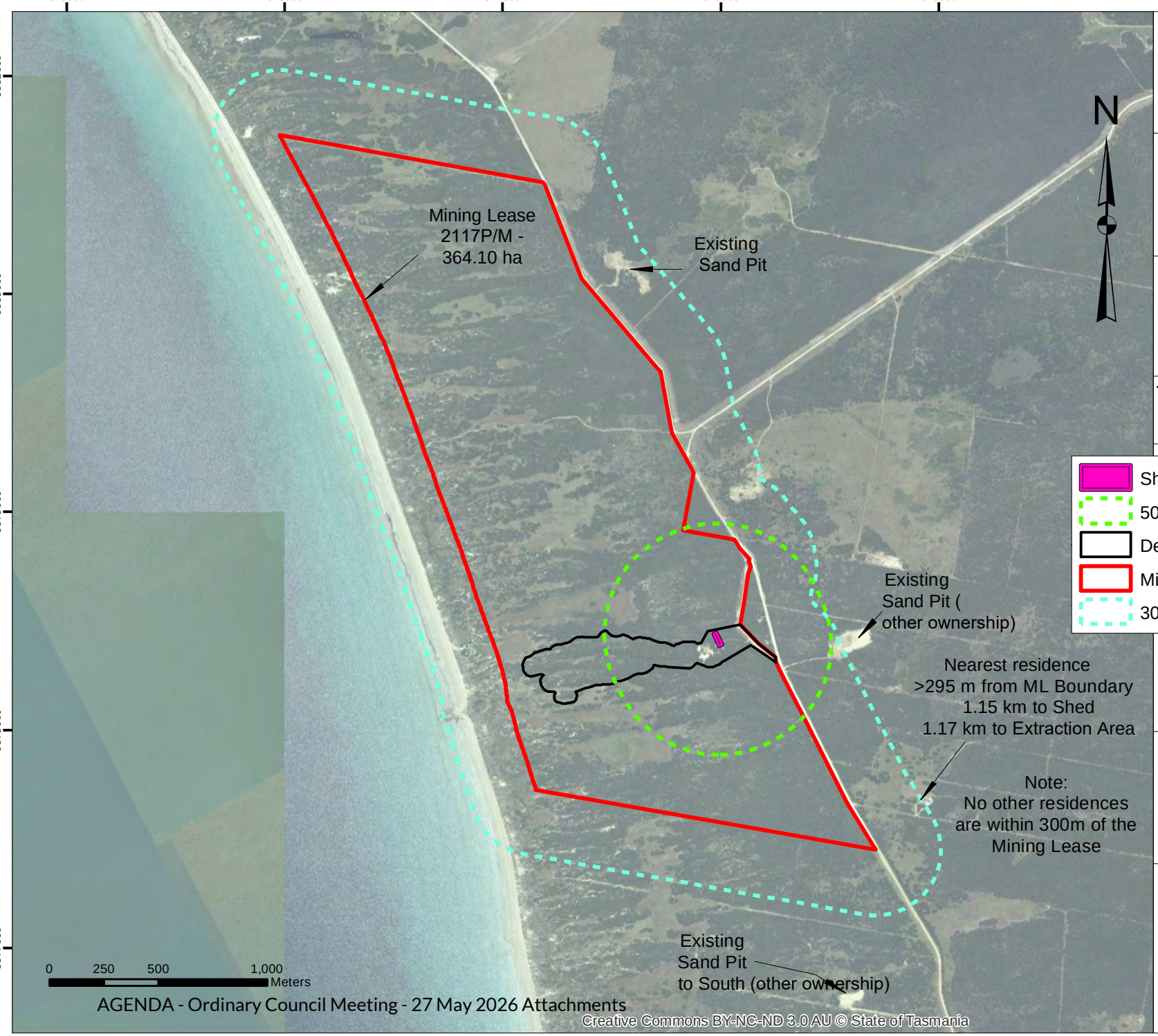
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-8: Residences near to the Development Area



TASMAP:	LGA:
TANNER EMITA	FLINDERS

- Shed (60.3 x 15 m)
- 500m Buffer on Shed (Sand Screening)
- Development Area (The Land)
- Mining Lease 2117P/M
- 300m Buffer on ML

Base data by TASMAP. © State of Tasmania
Base image by TASMAP. © State of Tasmania

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

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C-3-4 RISK ASSESSMENT AND POTENTIAL SOURCES

All earth-moving operations have the potential to produce noise. Where residences exist adjacent to a Pit, which is not the case here, precautions are to be taken to reduce the impact of noise and vibration.

The major noise sources from the Pit have been identified as follows: -

- clearing of vegetation and the stockpiling of soil into bunds and vegetation into stockpiles;
- establishment of tracks, sediment basins, drains and associated infrastructure (i.e. shed and septic system);
- rehabilitation works;
- screening and blending of sand; and
- use of ancillary equipment; excavators, screens (vibratory/mechanised), use of a loader, and truck movements.

The exclusion of high noise emitting tasks from the Activity, such as drilling, blasting, and crushing, combined with the large distance of the Activity to the nearest NSP (see C-3-2 NOISE SENSITIVE PREMISES) effectively reduces the risk of generating a noise nuisance to low or negligible levels.

C-3-5 MITIGATION, MANAGEMENT AND NET IMPACT ASSESSMENT

The Pit is ideally located in an area without nearby NSP such that there is virtually no potential for any impact arising from noise generated by the Activity, including the haulage of sands onto the road network.

Equipment will be well maintained and late model machines with proprietary exhaust silencers fitted to ensure noise emissions are as low as possible.

Pit operations will occur during normal daytime hours of 0700 – 1900 hrs Monday to Friday.

No specific noise attenuation management measures are warranted, and the intent/requirements of the Noise EPP are satisfied.

C-4 NATURAL VALUES

Specialist Report – Natural Values Assessment

VDC was engaged by Markarna Grazing Company Pty Ltd, to carry out a Natural Values Assessment to survey, assess, and document for example, the occurrence and status of vegetation communities and habitat for threatened flora and fauna species in the Development Area and relevant surrounds.

Specialist Report – Geomorphology including karst

Van Diemen Consulting Pty Ltd engaged Dr Adrian Slee of the Forest Practices Authority (FPA) to investigate the geomorphology, present on the Mining Lease owned by the Markarna Grazing Company. The field work and report were completed by Dr Adrian Slee, with the report (Slee, 2024) provided in **Attachment 9**. The report forms part of this EIS and the following section should be read in conjunction with it.

The VDC (2024a) and Slee (2024) assessment reports form part of this EIS and are in **Attachment 4** and **9** respectively and should be read in conjunction with this section.

C-4-1 EXISTING CONDITIONS

The natural values present in the Development Area and relevant surrounds to the proposed activity were assessed and reported by Van Diemen Consulting Pty Ltd (2024a; **Attachment 4**).

Vegetation Communities

Two native vegetation types occur in the Development Area (**Figure E-9**); *Coastal scrub on alkaline sands* (TASVEG code - SCA) and *Coastal grassland and herbfield* (TASVEG code – GCH).

The remainder of the Survey Area is comprised of access tracks (some currently used and others not), roads, and a disused sand pit and its associated historical disturbance (naturally regenerating) area. **Table 10** provides a list of the TASVEG 4.0 codes mapped in the Development Area.

Table 10. TASVEG 4.0 mapping categories recorded in the Survey Area

TASVEG CODE	TASVEG COMMUNITY NAME	Threatened native vegetation community#	EPBC-listed or equivalent ecological community	Extent in the Survey Area (hectares)
SCA	Coastal scrub on alkaline sands	**No**	**No**	14.356
GHC	Coastal grassland and herbfield	**No**	**No**	2.470
FUM	Extra urban miscellaneous	NA	NA	0.887

Threatened native vegetation communities are those listed in Schedule 3A of the *Nature Conservation Act 2002*

Threatened Flora Species

Six flora species protected by a statutory mechanism ('Threatened flora') were observed during combined surveys in the Survey Area (TSP Act and EPBC Act listed) with observations shown in **Figure E-10**:

- *Acacia uncifolia*, coast wirilda (r/-)
- *Asperula minima*, mossy woodruff (r/-)
- *Eutaxia microphylla*, spiny bushpea (r/-)
- *Pimelea curviflora* var. *gracilis*, curved riceflower (r/-)
- *Roepera billardierei*, coast twinleaf (r/-)
- *Scaevola albida*, pale fanflower (v/-)

All threatened flora species observed would have plants taken as part of the development. No species listed on the *Environment Protection and Biodiversity Conservation Act 1999* were observed in the Development Area.

Threatened Fauna Species

No fauna species listed on the *Threatened Species Protection Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999* were directly observed in the Survey Area during the surveys.

Habitat for several threatened fauna is present in the Development Area including:

- wedge-tailed eagle (*Aquila audax subsp. fleayi* – Foraging habitat is present.
- white-bellied sea-eagle (*Haliaeetus leucogaster*) – Foraging habitat is present.
- tussock skink (*Pseudemoia pagenstecheri*) – potential low *Poa* coverage areas in the buffer to the Survey Area (the part of the Disturbance Area that is not to be impacted by sand extraction and associated works).

No trees with the potential to support any hollow-dependent bird species, such as swift parrots or blue-winged parrots, were observed in the Development Area. It was determined based on the nature of the activity, and location and quality of habitat, that the activity would not cause any significant impact to any TSP Act or EPBC Act listed fauna species.

Weeds and Disease

Two Declared Weed species listed on the *Biosecurity Act 2019* were observed in the Development Area; horehound (*Marrubium vulgare*) and slender thistle (*Carduus pycnocephalus*).

No plants with PC symptoms were observed in the Development Area, and with the lack of susceptible species the water mould is unlikely to be present, or active, in the Development Area.

Geoconservation

Slee (2024) found that the main dune resource identified for extraction under the current development application (not the entire Mining Lease) is a series of up to 8–10 dunes formed between South and North Curves lagoons mapped on the 1:25000 map sheets of the area.

The current face of the old pit is noted by Slee (2024) to provide an interesting profile of dune stratigraphy and is of local scientific interest as it provides evidence of the history of formation of the dunes in this part of Flinders Island and could potentially be used to indicate paleoclimate conditions prevalent on the Island. However, while interesting exposure, many of the other unimpacted dunes in the region are likely to host similar paleosols and rhizoliths and therefore the features of the pit face are likely to be common within the landscape. The exposure is only visible because of past sand mining operations and has been photographed, sampled and described during the study by Slee (2024). Obscuring of the exposure by erosion and tree overturn means that this exposure has a limited lifetime; formal preservation of this site is likely to be impractical.

Resumption of sand extraction will destroy and remove the studied deposits but equally it is likely that extraction activities will expose further paleosols and tree root and stump rhizoliths in the sand dune. There is also a remote potential for archaeological deposits to be found within the dune particularly owing to its

carbonate-rich nature which is conducive to preserving organic material such as bones (e.g. there is a possibility that large bones associated with megafauna could be exhumed as could ancient human remains or evidence of occupation (fire hearths etc)).

Wetlands

Curves Lagoons are wetlands (which may be groundwater dependent in full or part) according to the GDE BOM[7] atlas. In contrast, CFEV mapping does not identify Curves Lagoons as GDEs (relevant CFEV layer accessed via TheLIST.tas.gov.au).

Curves Lagoons (North and South) are outside the Development Area (**Figure E-4a**) which was confirmed by the site surveys by VDC (2024a). Slee (2024) also noted that the extent of the wetlands at both North and South Curves Lagoons are significantly smaller than indicated on the 1:25000 topographic map and the TASVEG mapping. Significant areas of these features are undulating grassy dune fields. Slee (2024) also noted that no wetlands (swamps) as defined by the Forest Practices Code 2020 (Forest Practices Authority 2020, page 98) were documented in the main resource area (Slee 2024, **Attachment 9**).

Seabirds and Shorebirds

The Development Area was found to not contain a short-tailed shearwater (*Ardenna tenuirostris*) colony, or any evidence of occupation by shearwaters (i.e. no burrow systems). The Development Area is well inland of the immediate coast, with the nearest known short-tailed shearwater colonies at Marriott Reef (see Tanners Bay Offshore islands mapped on Figure 17 of **Attachment 4**) and a group to the south including Wybalena Island, Bird Island and Settlement Point (near Emita) (Skira *et al.* 1996).

Several other bird species are associated with beach habitats (e.g., dune, beach and back dune environments associated with modern/recent dunes), with several having been recorded at or near Marshall Bay (**Figure E-11**) including those listed in **Table 11.**

There will be no activities that would generate noise, dust, or other form of emissions that may or would disturb nesting and foraging beach dwelling bird species.

Table 11. Summary table of Survey Area relevant avifauna and associated statutory conservation listings

Scientific Name	Common Name	EPBC Act-listed	TSP Act-listed
Australian Fairy Tern	*Sternula nereis nereis*	Vulnerable	vulnerable
Eastern Hooded Plover	*Thinornis cucullatus cucullatus*	Vulnerable	-
Little Tern	*Sternula albifrons*	Migratory	-
Short-tailed Shearwater	*Ardenna tenuirostris*	Migratory	-

[7] Groundwater Dependent Ecosystems Atlas. http://www.bom.gov.au/water/groundwater/gde/

Marshall Bay has a typical beach profile of beach, and dunes (**Plate 7**). As noted by Slee (2024) (pp. 12-13 of **Attachment 9**), at the west of the Mining Lease are the modern foredune and back dunes behind Marshall Beach while inland are a series of elongated west-to-east trending parallel dunes that rise to 24 m above sea level. These inland dunes are largely vegetated and stable in comparison to the foredunes which are dominated by grasses, herbs, wind pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

The Development Area does not include beach, foredune, back dune, or modern dunes (**Attachment 9**).

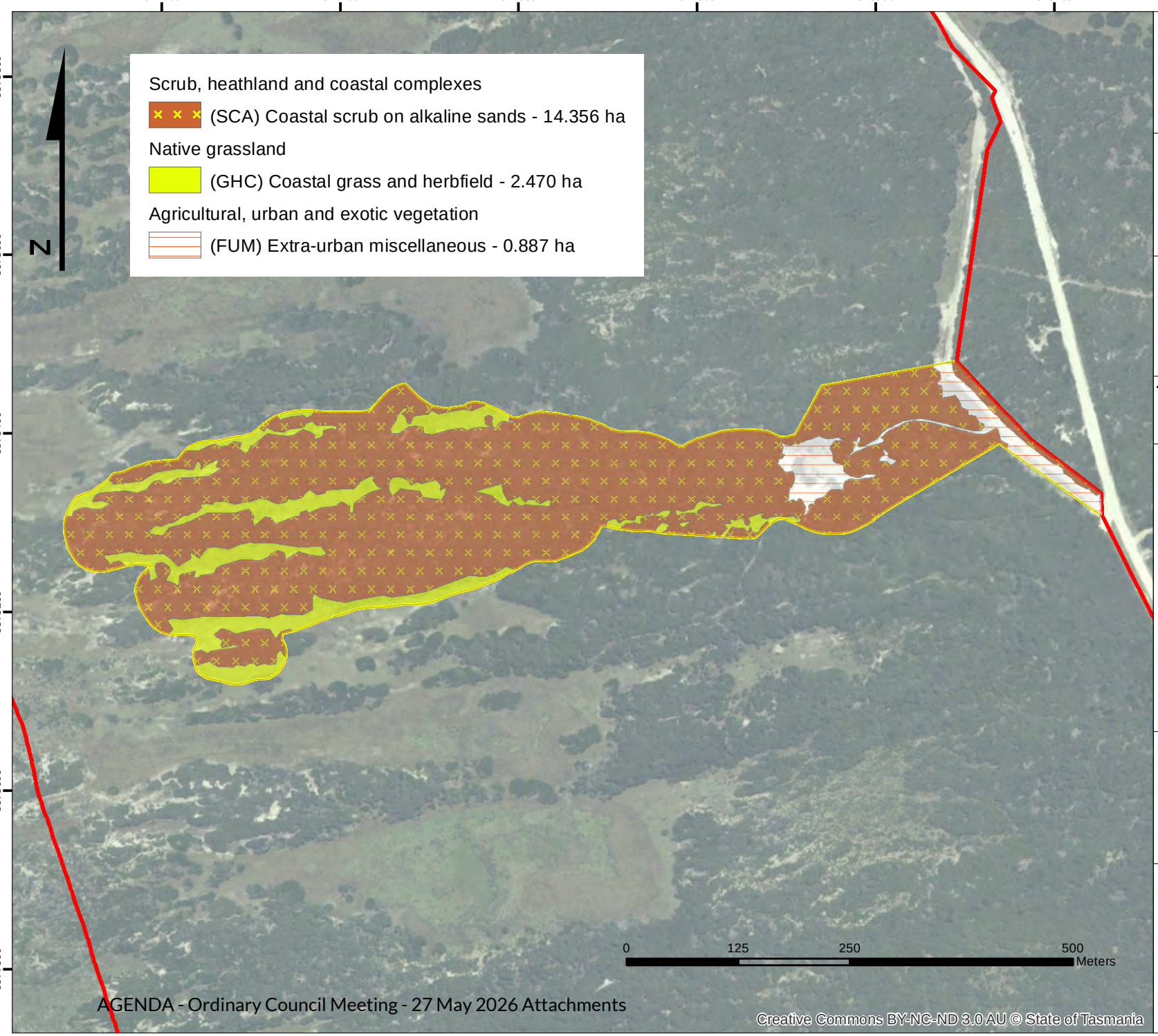
There will be no activities that would generate noise, dust, or other form of emissions (e.g. light) that may or would disturb nesting and foraging beach dwelling bird species. Lighting is to be provided in the shed where sand would be screened and/or stored. Machinery, vehicles, and other road-using equipment will be fitted with lights as required by law.

Plate 7. Marshall Bay beach and dune 'sea bird' habitat outside the Mining Lease

Karst

No karst landforms apart from very minor surface solution sculpture (karren) landforms were identified during the survey by Slee (**Attachment 9**). Given the extensive nature and relief of the limestone on the hills east of

the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of any evidence for significant karst formulation, mitigation measures are unnecessary.



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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-9: TASVEG 4.0 observed communities within the Development Area

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Mining Lease 2117P/M

Development Area (The Land)

Van Diemen CONSULTING
PO Box I New Town TAS 7008

DATUM: GDA94
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CLIENT:
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DATE: 2 JUNE 2024

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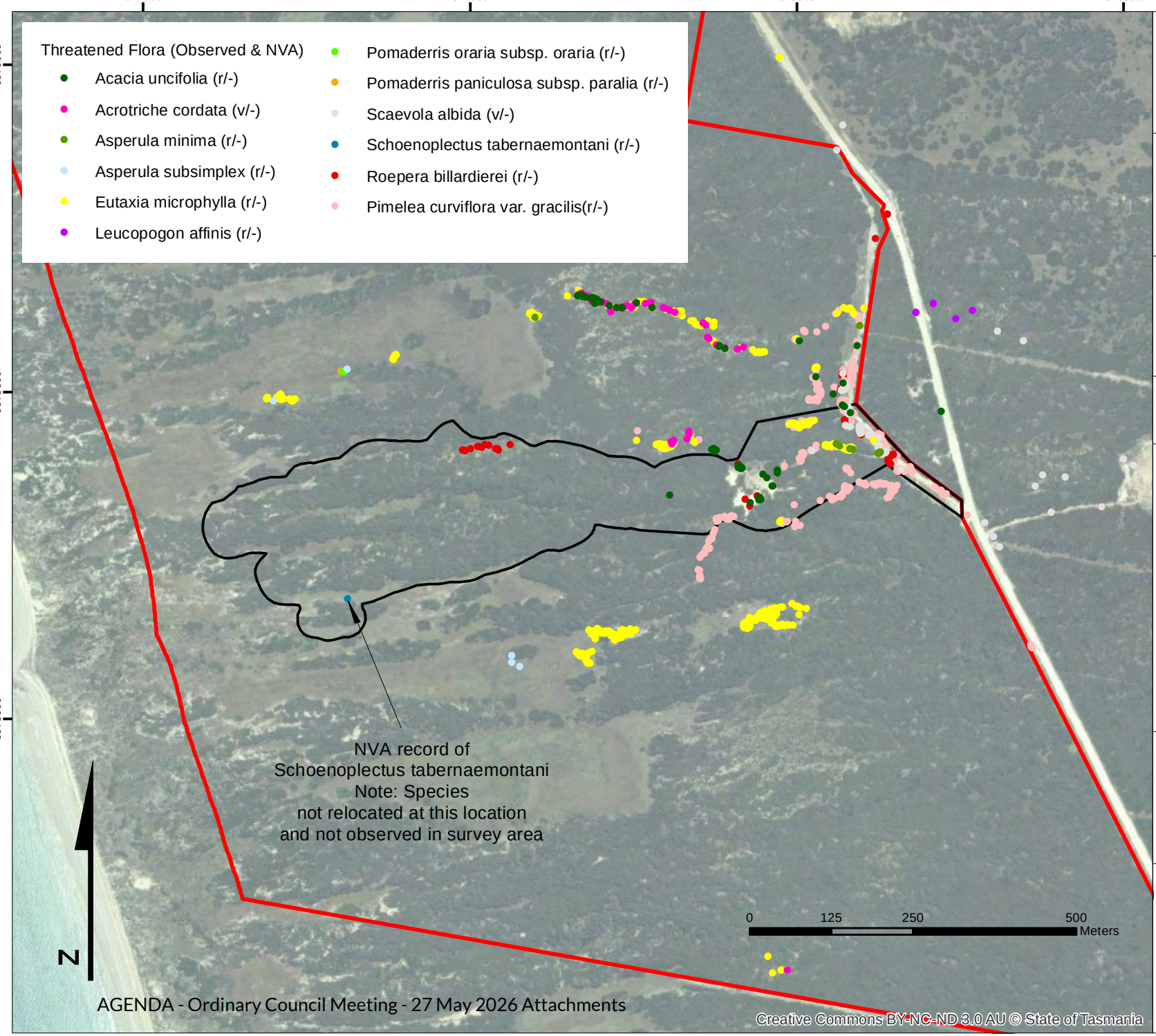
MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-10: Threatened flora species within and surrounding the Development Area



TASMAP: TANNER EMITA

LGA: FLINDERS

Survey Area (Development Area)

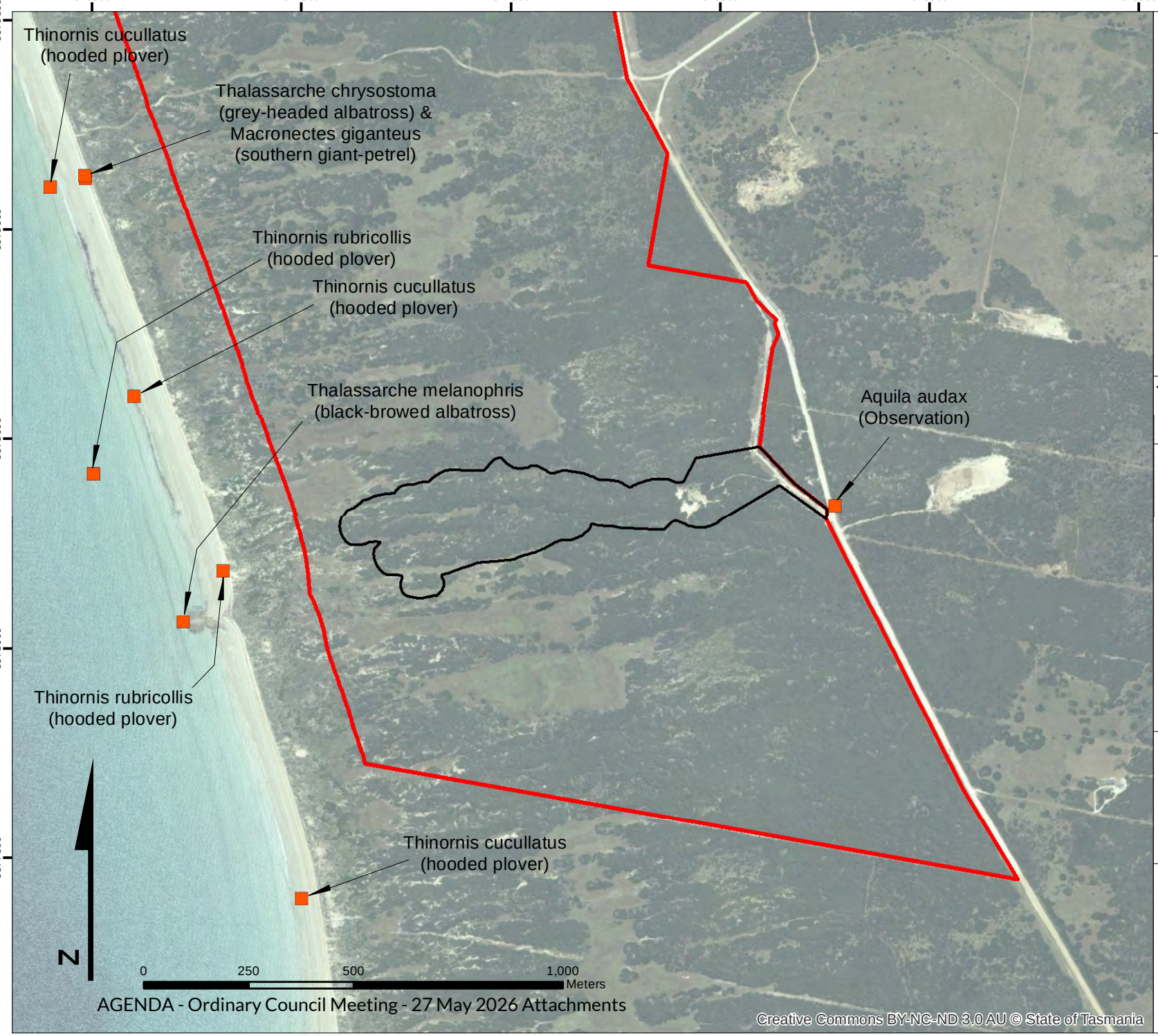
Mining Lease 2117P/M

Van Diemen CONSULTING
PO Box I New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 2 JUNE 2024



MARKARNA GRAZING COMPANY PTY LTD

MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure E-11: Threatened fauna species within and surrounding the Survey Area

TASMAP:	**LGA:**
TANNER EMITA	FLINDERS

Threatened Fauna Point

Development Area (The Land)

Mining Lease 2117P/M

Van Diemen CONSULTING

PO Box 1 New Town TAS 7008

DATUM: GDA94
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Acid Sulfate Soils

Well drained soils in the mining lease and specifically in the vicinity of the main proposed resource are strongly alkaline Calcarosols. Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried palaeosols and lake/swamp sediments are present in the Pit location, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands due to the abundance of acid neutralising carbonates.

No further investigation of acid sulfate soils was deemed to be necessary by Slee (2024; **Attachment 9**).

Reserved Lands

No land reserved under the *Nature Conservation Act 2002* is covered by the Development Area or broader Mining Lease. The Marshall Beach Conservation Area is located westwards of the Development Area (**Figure E-5**) but is not within the Mining Lease.

C-4-2 POTENTIAL IMPACTS

Vegetation

Impacts (clearing followed by progressive rehabilitation back to scrub/grassland) will occur to two native vegetation types present; *Coastal scrub on alkaline sands* (TASVEG code - SCA) and *Coastal grassland and herbfield* (TASVEG code – GCH).

No threatened vegetation communities were identified within the Development Area and therefore no impacts to listed (either under the EPBC Act or the NC Act) communities are anticipated.

Threatened Flora Species

Four of the six flora species protected by a statutory mechanism ('Threatened flora') are likely or certain to have plants impacted by the Activity. The estimated number of plants in the Development Area (including the Extraction Area and the buffer) and the approximate number to be taken/impacted by species are provided in **Table 12.**

Table 12. Approximate numbers of threatened flora species to be taken by the Marshall Bay Sand Pit

Species	Common Name	Estimated number in Development Area	Approximate number to be taken over life of Pit
Eutaxia microphylla	spiny bushpea	700+	200
Pimelea curviflora* var. *gracilis	curved riceflower	700+	200
Roepera billardierei	coast twinleaf	45+	18
Scaevola albida	pale fanflower	400+	200

Threatened Fauna Species

No fauna species listed on the *Threatened Species Protection Act 1995* or *Environment Protection and Biodiversity Conservation Act 1999* were directly observed in the Development Area during the surveys.

No trees with the potential to support any hollow-dependent bird species, such as swift parrots or blue-winged parrots, were observed in the Development Area. It was determined based on the nature of the activity, and location and quality of habitat present, that the Activity would not cause any significant impact to any TSP Act or EPBC Act listed fauna species.

There will be no activities that would generate noise, dust, or other form of emissions (e.g. light) that may or would disturb nesting and foraging beach dwelling bird species. Lighting is to be provided in the shed where sand would be screened and/or stored. Machinery, vehicles, and other road-using equipment will be fitted with lights as required by law.

Material could be carted, and other vehicle movements could occur to and from the site, between one hour prior to sunset until one hour after sunrise – noting that operating hours are 0700 to 1900 hrs.

Flinders Island does not currently support the Tasmanian devil, spotted-tailed quoll, eastern barred bandicoot, or eastern quoll. Eastern barred bandicoot is not listed on the *Threatened Species Protection Act 1995* and the Wombat (Bass Strait) is also not listed on the *Threatened Species Protection Act 1995* and it was delisted from the EPBC Act. There is no possibility for a direct impact to the Tasmanian devil or quoll species as these do not exist on the island, and there is also no indirect impact from roadkill effects where these species may become secondary deaths as they scavenge on road killed animals. Occasional wallabies and wombats may be impacted during the months of May, June and July.

C-4-3 MITIGATION AND MANAGEMENT

Vegetation

The accurate, appropriate, and timely marking of boundaries, operational areas and the monitoring of disturbed and rehabilitated areas is critical to the success of the Pit. The delineation of operational areas for continuous extraction and processing is important to ensure the disturbed area is kept within that permitted. The following is information about the methods and purpose of marking and monitoring relative to the spatial expansion and gradual extraction, and subsequent rehabilitation of areas in the Pit.

The Proponent will include as part of its induction and operational management system a process for staff, management and contractors working at the Pit to mark clearing and working areas to identify permitted operational areas and exclusion zones.

No offsets are proposed for the clearing (and then Rehabilitation) of the two non-threatened vegetation types; *Coastal scrub on alkaline sands* (TASVEG code - SCA) and *Coastal grassland and herbfield* (TASVEG code – GCH).

Threatened Fauna Species

No specific fauna management measures are warranted, and none are proposed.

Weed Management

A DRAFT Weed and Disease Management Plan (WDMP) is submitted with the EIS (**Attachment 8**).

The plan was guided by the *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania* (Department of Primary Industries, Parks, Water and Environment, 2015).

The WDMP provides two key aspects to weed control and mitigating the spread of weeds and disease to and from the Pit:

- *A Weed Spraying Program –*

  Annual assessments of weed occurrence and location will be conducted to guide the weed spraying program to control and possibly eradicate weeds that may be in or near the Pit.

- *Clean Vehicle Policy –*

  Transport trucks and light vehicles pose less risk to the transportation of weed propagules if they remain on the hard surface of the roads and the gravel loading area and that these areas are managed to exclude weeds. The highest risk of transporting propagules into the Pit is from heavy machinery, such as excavators, as these can carry large clods of dirt and mud in which seed propagules can be lodged. Heavy machinery will be brought into the Pit in a clean condition; free of weed propagules, clods of dirt and vegetative matter.

Geoconservation

In the event notable examples of significant geomorphological features are encountered (i.e. any of the features listed below) the first task will be to photograph the area and move operations away from the feature until a suitably qualified person (in the context of the item/items discovered) can assess any geomorphological/cultural values.

Contractors are to look out for:

- Thick dark continuous bands within the dunes.
- Buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.
- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under the surface.

Karst

Despite there being no evidence of significant karst formulation in the Development Area, the following is to be applied:

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.

- In the event a cave is located on site operations should avoid the area and seek expert advice.

Acid Sulfate Soils

Acidic soils are unlikely to be present over extensive areas and may be totally absent. No further investigation of acid sulfate soils was deemed to be necessary by Slee (2024; **Attachment 9**) given the very low to negligible risk of their occurrence in the Development Area. Accordingly, no management measures are proposed.

Reserved Lands

The Marshall Beach Conservation Area is located westwards of the Development Area (**Figure E-5**). No impact to the reserve is anticipated.

C-5 WASTE

The Activity generate solid wastes of two main streams –

1. a typical 'domestic' stream such as food scraps, wrappers and other wastes from the office/crib room and food consumption by workers in their working day, and
2. a semi-industrial stream typical of an extractive industry including for example empty drums (e.g., motor oils, hydraulic and brake fluid, other machinery, and brake oil), plastics (wrapping on parts, replacement belts, etc.), and rags (may be contaminated with oils, fuel, grease or other hydrocarbon-based product and batteries.

Machinery related 'solid wastes', such as oil filters, are generally not be produced on site as machinery/equipment servicing will generally not be done at the Pit (except for emergency repairs or service requirements).

All waste is to be collected in suitably labelled bins/containers and then removed from the Pit.

C-5-1 PERFORMANCE REQUIREMENTS

Waste management measures must be in accordance with the following hierarchy of waste management, arranged in decreasing order of desirability: -

- avoidance
- recycling/reclamation
- re-use
- treatment to reduce potentially adverse impacts
- disposal.

C-5-2 POTENTIAL IMPACTS

Solid and General Wastes

Domestic stream wastes such as food scraps, wrappers and other wastes from the office/amenities block if not collected, stored, and disposed of appropriately could cause an unnecessary localised nuisance from attracting vermin, native animals (possums), feral cats, and potential odour.

Other solid wastes such as machinery filters (not in the Controlled Waste category – includes for example engine air filters, fan belts, conveyor belts, HDPE air filters for machinery cabs), PPE (e.g., disposable ear plugs), and office type waste streams (e.g., electronics, paper, other consumables) will be generated. These items if allowed to accumulate at the Pit beyond reasonable levels could create habitat for vermin and represent an elevated fire risk to assets if a fire were to occur in or approach the Pit.

Liquid Wastes

The only liquid wastes generated by the Pit are those described in Controlled Waste (i.e., oils, hydraulic fluids) and the septic system (**Attachment 5**).

Controlled Waste

Tasmania has adopted the terminology of the *National Environment Protection (Movement of Controlled Waste between States and Territories) Measure 1998* (Controlled Waste NEPM) which uses the term Controlled Waste.

Controlled waste is the most hazardous category of waste and includes those wastes that exhibit toxicity, chemical or biological reactivity, environmental persistence, or the ability to bio-accumulate or enter the food chain. The handling of controlled waste (production, receipt, storage, reuse, recycling, reprocessing, salvage, incineration, treatment, disposal or use for energy recovery) requires approval in accordance with the Environmen*tal Management and Pollution Control (Waste Management) Regulations 2020*.

Table 13 provides a list of the potential Controlled Waste categories generated from time to time at the Pit, the possible source of that generation and the disposal method.

Table 13. Controlled Waste potential production source at Pit and disposal method

Code	Description	Potential source at Pit	Disposal Method
J120	Waste oil/water, hydrocarbons/water mixtures or emulsions	Hydraulic oils and engine oils	Disposed of at the Council operated Whitemark Waste Facility (419 Memana Road, Whitemark).
K130	Sewage sludge, sewage residue, nightsoil or sludge from an on-site wastewater management system	Toilets and shower	Wastewater system (septic based, **Attachment 5**)

N100	Containers which are contaminated with residues of substances referred to in this list	Containers that are used to collect and store Waste oil/water, hydrocarbons/water mixtures or emulsions (J120)	Disposed of at the Council operated Whitemark Waste Facility (419 Memana Road, Whitemark).
N120	Soils contaminated with a controlled waste	Soils that may have been the subject of a spill of hydrocarbons, oils or hydraulic fluid	Contaminated site handling facility; may need to be treated on site given the lack of a facility on Flinders Island (this approach has occurred elsewhere on the island, such as the diesel spillage at the Lady Barron Port).
N140	Fire debris and fire washwaters	Only if a fire event occurs	Contaminated site handling facility; may need to be treated on site given the lack of a facility on Flinders Island (this approach has occurred elsewhere on the island, such as the diesel spillage at the Lady Barron Port).
T140	Tyres	Waste tyres will be generated as old tyres are replaced	Disposed of at the Council operated Whitemark Waste Facility (419 Memana Road, Whitemark).

C-5-3 MITIGATION AND MANAGEMENT

Waste will be managed in accordance with the following for each waste stream: –

General Refuse

Waste generated by workers from general refuse (e.g., lunch wrappers) at the Pit will be collected in waste bins provided on-site – at the amenities/crib room. The bins will be emptied at least once per fortnight and the material disposed of at a permitted refuse disposal site. Waste bins that receive food scraps will be fitted with preventative access measures to discourage native animals and feral cats attending the Pit.

On-site Machinery and Equipment Servicing Waste

Waste will be generated at the Pit from the repair of equipment breakdowns, general replacement of filters (air and oil) and conveyor belts (screen) or emergency repairs/maintenance. Waste bins will be located at the Pit and labelled with the types of waste each bin is to receive. Waste will be sorted based on the classification of the type of waste, with Controlled Waste (see **Table 13**) separated from all other waste streams and disposed of at least fortnightly at the Council operated Whitemark Waste Facility (419 Memana Road, Whitemark).

Off-site Machinery and Equipment Servicing Waste

Waste generated by maintenance works, repairs and/or schedule servicing of equipment and machinery off the Pit location will be managed by the service provider at the location where they have been engaged by the

Proponent to complete the required works. This in most cases will be a machinery workshop, truck/equipment repair facility or tyre facility.

C-6 ENVIRONMENTALLY HAZARDOUS SUBSTANCES

The Activity will utilise diesel fuel, and other hydrocarbons such as lubricants and oils, and herbicides for weed control. Hazardous materials are known to pose serious risks if released to the environment.

The management of hazardous materials will include the appropriate storage of these materials, and preparation for accidental leaks and spills to ensure that the risk of hazardous materials being released into the environment is minimised.

C-6-1 PERFORMANCE REQUIREMENTS

The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations and relevant Codes thereunder, including:

- *Work Health and Safety Act 2012* and subordinate regulations,
- *Explosives Act 2012* and subordinate regulations,
- *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations,
- EPA Tasmania's *Bunding and Spill Management Guidelines December 2015*,
- Australian Dangerous Goods Code (7th edition), and
- Relevant Australian Standards (e.g., AS 1940 and AS 3780).

<u>Diesel Vehicle Emissions NEPM</u>

The objective of this NEMP is to reduce exhaust emissions from diesel vehicles, by facilitating compliance with in-service emissions standards for diesel vehicles. This NEPM is applied to vehicles sold in the country.

<u>Volume limitations for storage</u>

The volume of stored hazardous chemicals on the site will not exceed the manifest quantity as specified in the *Work Health and Safety Regulations 2012*. Explosives are not required for the Activity.

<u>Chemicals (Herbicides)</u>

The use, storage, and disposal of chemicals for weed spraying (herbicides) must be in accordance with the *Agricultural and Veterinary Chemicals (Tasmania) Act 1994* and the *Agricultural and Veterinary Chemicals (Control of Use) Act 1995*.

C-6-2 POTENTIAL IMPACTS

<u>Hydrocarbon storage and use</u>

Diesel fuel will be used in the machinery and equipment on the site. Workers attending the Pit will use 100-200l portable diesel tanks that fit into the tray of a 4WD utility to provide fuel to the Pit. These pods/tanks

have become mainstream and are now best-practice for small volume fuel transport to refill machinery at quarries, mines, and other work sites.

Other chemicals

Chemicals for weed spraying used at the Pit may be spilt into the environment by leakage, an accidental spillage, or inappropriate use and/or disposal by staff or contractors.

C-6-3 MITIGATION AND MANAGEMENT

Contamination of the environment by the release of fuels, lubricants and/or hazardous will be prevent as far as reasonable to do so by the application of effective, industry standard avoidance and mitigation management measures.

Hydrocarbon storage and use

All fuels, lubricants and/or hazardous materials are stored in accordance with the relevant requirements of *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*.

Refuelling activities will only occur when machinery is within a bunded/hardstand area on the Site.

Hazardous materials storage areas will be managed in accordance with EPA Tasmania's *Bunding and Spill Management Guidelines December 2015* and the following principles –

- Design and install bunding and surface sealing of fuel storage areas.
- Provide high-performance grease traps and oil traps near workshops and places where vehicles and machinery are parked.
- Locate storage areas away from waterways and areas prone to flooding.
- Install bund walls or diversion drains to divert surface water away from areas dedicated for the storage of hazardous materials.
- Line bunded storage areas with impervious material.
- The volume of bunded areas must be at least 125 per cent of the maximum volume of the fuel and lubricant capable of being stored.
- Bund heights will be at least 150 millimetres.
- Bunded areas will be drained to a sump if the volume of the hydrocarbons exceeds 1,200 litres.

Other chemicals

Chemicals for weed spraying are to be used at the Pit. They will be stored, handled, used, and disposed of in accordance with the manufacturer's directions and relevant regulations.

Spill and leak prevention and response

The Proponent will ensure that spill prevention and clean-up equipment is readily available and accessible in the vicinity of all plant and machinery, including mobile and fixed fuel storages.

Spill prevention and clean-up procedures will be in accordance with the following principles –

- Minimise the volume of hazardous substances kept onsite.
- Develop contingency plans to address spills and leaks.
- Install trays, thick plastic mats or similar beneath stationary machinery to protect the soil from oil or fuel spills and leaks.
- Install spill trays immediately if there is any potential for, or evidence of, leakage.
- Ensure that appropriate clean-up equipment is readily accessible.
- Maintain a supply of oil-absorbent material.
- Contain and treat spills and leaks.
- Notify relevant authorities of significant spills or leaks.
- Ensure that drainage from areas where spills may occur like a refuelling area is diverted through a sump or interceptor trap to remove hydrocarbon contamination.

C-7 SITE CONTAMINATION

The Mining Lease, and specifically the Development Area, is not known to have been used in the past for activities which may have caused soil or groundwater contamination.

C-8 ENVIRONMENTAL IMPACTS OF TRAFFIC

The area surrounding the Development Area is mainly native vegetation (bushland) with intermittent cleared areas of degraded pasture (some of these are previously farmed land that is now less intensively farmed, other lime sand pits, and residences (the closest NSP is 1.2km to the shed).

The extraction areas and internal gravel access road are lined with scrub and grassland vegetation. There are no sources of dust from the use of Palana Road because it is sealed from Whitemark to its junction with Five Mile Jim Road.

C-8-1 TRAFFIC GENERATION AND ROUTES

All traffic would enter and exit onto the sealed section of Palana Road using the now disused reserved road (unsealed) section of Palana Road – **Figures A-4 and B-1.**

The maximum extraction volume of 15,000 tonnes equates to about 1,500 truckloads per annum based on 10 tonne loads (smaller loads are likely to be used given the material is to be spread on pastures and ploughed land). Lime sands are mainly required in summer and autumn (January to May) which coincide with the peak activity period of agricultural pasture improvement, maintenance, and establishment.

Approximately 300 truck movements per week (150 truckloads) is expected for an 8 to 10-week period of carting (March to May); deliveries may occur outside this period but if they do occur the campaigns would be less intensive. Over 5 days each week this equates to about 30 truckloads per day (or 60 truck movements per day). Trucks delivering lime sand will use the existing road network to gain access to the agricultural lands upon which the lime sands are to be spread.

Light vehicles will access the Pit when it is operating, and some trucks will attend the Pit to deliver bulka bags of soil additives, such as boron.

C-8-2 POTENTIAL IMPACTS

Noise Emissions

Trucks can cause excessive noise on uneven road surfaces; emissions can affect dwellings if they are located close to the road. The impact of noise emissions from light vehicles on an unsealed road is substantially less.

Dust Emissions

Trucks can cause dust plumes from the use of unsealed roads; emissions can affect dwellings if they are located close to the road. The impact of dust emissions from light vehicles on an unsealed road is substantially less. Fugitive dust emissions can also be generated because of poorly covered or dry product in a truck tray.

Biodiversity

Indirect potential impacts of traffic comprise road mortality of fauna (i.e. vehicle strikes).

C-8-3 MITIGATION AND MANAGEMENT

Noise Emissions

Equipment will be well maintained and late model machines with proprietary exhaust silencers fitted to ensure noise emissions are as low as possible.

Pit operations will occur during normal daytime hours of 0700 – 1900 hrs Monday to Friday.

Dust Emissions

Loads in trucks will be covered with a tarpaulin or dampened to reduce the risk of fugitive dust emissions during transport. Unsealed roads internal to the Pit will be dampened during campaigns.

Biodiversity

On public roads all wildlife speed reduction warning signs will be obeyed, and education and awareness training will be provided to drivers.

C-9 OTHER OFF-SITE IMPACTS

No off-site impacts are anticipated. Trucks generated by the Activity will be travelling on the public road network and their presence will be constrained by the stipulated operating hours.

C-9-1 MONITORING APPROACH

The Pit Manager will conduct regular and routine monitoring to ensure compliance with environmental conditions. The small scale of the Pit doesn't warrant a suite of management plans to be developed to describe the approach for the on-ground management of potential environmental impacts.

C-9-2 ENVIRONMENTAL MONITORING

The broad environmental monitoring program for the Activity is provided in **Table 14.**

Table 14. Environmental monitoring regimes for the Marshall Bay Sand Extraction Pit

EIS Attachment	Management Plan
Stormwater Infrastructure	The Operator will observe the level of accumulated sediment in the sediment basins and drainage channels. Once the level of accumulated sediment in the traps or drains has risen to half the full water level the sump and drains will be cleaned out. The spoil gathered from clearing the sediment basins and drains will be stored with rehabilitation materials for use in future rehabilitation activities. Sediment basin outlets will be monitored (at least monthly) for scouring, and excessive volumes of sediment in the discharged water.
Weeds	The DRAFT *Weed and Disease Management Plan* (**Attachment 8**) provides details for weed monitoring and plan review.
Dust and air quality impacts	The Pit Manager will observe dust conditions in dry and windy conditions during extractive or processing campaigns. If dust is observed crossing the operations area boundary suppression activities will be implemented including: • Water cart deployed on trafficked surfaces; • Ceasing the Activity until weather conditions improve so dust suppression measures are effective, or temporarily ceasing aspects of the Activity (e.g., cease outside activities at the Pit and focus on carting or screening/blending of sands in the shed).
Environmentally hazardous substances	Ongoing inspection of the storage and handling of environmentally hazardous substances and the use/replenishment of spill kits. Ongoing inspection and management of wastes stored at the Pit, and their disposal at regular intervals.
Rehabilitation	Rehabilitated areas (and those under rehabilitation) will be monitored for – a. weed infestation, b. germination success and growth in seed distributed species, and c. landform stability.

C-10 MARINE AREAS AND COASTAL ZONE

A detailed assessment of the Activity relative to the State Coastal Policy is provided at section *A-6-3 STATE POLICIES.*

The Natural Values Report (**Attachment 4**) and section *C-4 Natural Values* provides information on the biodiversity values in the marine and coastal zones.

C-11 DECOMMISSIONING AND REHABILITATION

It is the aim of the Proponent to minimise the area of land 'open' at the Pit. When closed, the Pit will be rehabilitated to scrub and grassland vegetation dominated by native flora species.

C-11-1 PROGRESSIVE REHABILITATION

'Progressive rehabilitation' can only be applied at the Pit once areas have been extracted and are no longer needed or used for Pit operation. Stabilisation of disturbed areas of the landform will be conducted prior to rehabilitation and revegetation to ensure landform stability to minimise sediment movement from source. Temporary vegetative cover of native scrub and grass species (e.g., drooping sheoak, *Poa* species) may be established on areas (e.g., soil stockpiles) to prevent weed infestation and erosion by wind or water.

Aims

The primary aims of rehabilitation work would be to:

- achieve long term stabilisation of worked out areas to minimise the risk of ongoing erosion by wind and water;
- revegetate worked out areas with native species that will eventually grow to form native vegetation communities (scrub and/or grassland); and
- ensure that worked out areas are safe for a future land use.

Vegetation Management – clearing and stockpiling

The extent and form of the scrub to be harvested and cleared is comparable to a very small-scale land clearing activity. The small-scale clearing associated with each progressive area for lime sand extraction (see **Figure B-2**) is not likely to generate a high number of logs (there are some larger tea-trees, she-oaks, and wattles but no eucalypt within the vegetation). Most cleared vegetation will be used in Rehabilitation works which are likely to commence at around Year 2 of the Activity. Therefore, for at least the first 2 years of the Activity and for the construction of infrastructure (e.g. shed, sediment basin, pad area), vegetative material will need to be cleared and removed from the Development Area or burnt on site following the fire permit period conditions that prevail at the time.

No more than 10 cubic metres of vegetative debris generated by clearing works will be stored in any one stockpile, with stockpiles separated by at least 20 m of open bare ground ready for burning when conditions are suitable. The stockpiled material will be stored only within the Disturbed Area of the Development Area.

Rehabilitation – reuse of cleared vegetation

Once progressive rehabilitation has commenced, the vegetation cleared from areas being opened for sand extraction can be reused on areas that have been fully extracted. This reduces the possibility of needing to remove vegetation from the site or to burn the vegetation on the site, however there may still be times when

excess vegetation has been generated for the rehabilitation works underway so some vegetation may need to be burnt or removed from the site. If this were to be the case then, no more than 10 cubic metres of vegetative debris generated by clearing works will be stored in any one stockpile, with stockpiles separated by at least 20 m of open bare ground ready for burning when conditions are suitable. The stockpiled material will be stored only within the Disturbed Area of the Development Area.

The Rehabilitation of areas that are no longer being extracted or used for another purpose (such as a stockpile holding area, vegetation stockpile etc.) will be based on the following principles:

1. Surface levelled, and if available, sediment collected from sediment basins and applied to prepared surfaces.
2. Application of native tree/shrub/grass seed or the application of slash (generated by clearing works in the site) that contains fruits with seed (e.g., *Melaleuca, Leptospermum, Allocasuarina*). Tubestock is unlikely to be needed given the plant species to be used for revegetation readily recruit from seed.
3. Monitoring of the following factors –
    d. weed infestation,
    e. germination success and growth in seed distributed species, and
    f. landform stability.
4. Remedial works which may include but not necessarily be limited to –
    a. weed control works,
    b. additional native species seed spreading,
    c. landform stabilisation works, and
    d. erosion control measures and/or repair works.

Figure B-3 provides an example area for Rehabilitation as the Pit progresses westwards, with the area easily accessible for weed control works, surface water erosion/drainage monitoring, and for the direct placement of soil and slash cleared from areas further westwards. The area depicted could be under Rehabilitation at about Year 2 or 3 of the Activity.

C-11-2 PERMANENT CLOSURE PLANNING

In the event of permanent closure of the Pit prior to complete extraction of the resource a Decommissioning and Rehabilitation Plan (DRP) will be developed and submitted to the EPA for approval.

The DRP would include discussion and describe procedures to: -

- Facilitate the orderly and safe removal of machinery, infrastructure, and other equipment;
- Establish sufficient and appropriate tree/shrub/grass/herb ('native vegetation') cover to minimise the risk of ongoing dust generation and soil erosion; and
- Establish a monitoring regime to assess the success or otherwise of the rehabilitation to sign-off parameters.

C-11-3 FINAL LANDFORM

Specific attention will be given to the final landform in the DRP. Slopes will be contoured.

- Rehabilitation works will be undertaken by Markarna Grazing Company Pty Ltd employees/contractors and overseen by the Pit Manager;
- The aim of the rehabilitation is to return the landscape to a stable landform that supports native vegetation (scrub) comparable to that of pre-extraction works;
- The extraction areas will be stabilised following extraction to remove any unstable materials, and to ensure the perimeter cut-off drains are operational and follow the localised contour;
- Slash from areas being cleared to facilitate the advancement of the extraction area will be placed onto those areas to be rehabilitated;
- Fertiliser application is not likely to be necessary, and advice will need to be sought from a suitably qualified person *prior* to its application; and
- The Pit Manager will engage with specialist sub-consultants to undertake weed identification and, if weeds are established after rehabilitation, weed control will be completed by Markarna Grazing Company Pty Ltd employees/contractors.

C-12 GREENHOUSE GASES AND OZONE DEPLETING COMPOUNDS

C-12-1 EXISTING CONDITIONS

Operation of mobile plant, trucks, and associated activities at any extractive industry which operate hydrocarbon-based fuel machinery and equipment causes greenhouse gas emissions from the burning of those fuels.

C-12-2 PERFORMANCE REQUIREMENTS

The impacts of climate change and greenhouse gas emissions and targets are set in the *Climate Change State Action Act 2008* and *Climate Change Action Plan 2017 – 2021*. The *Climate Change (State Action) Act 2008* sets a limit of 60% below the 1990 greenhouse gas emissions baseline by 2050[8].

The Pit does not meet the thresholds for reporting under the *National Greenhouse and Energy Reporting Act 2007*.

C-12-3 POTENTIAL IMPACTS

<u>Environmental Impacts</u>

The operation of mobile plant, trucks and associated activities will cause greenhouse gas emissions from the burning of hydrocarbon-based fuels.

[8] The State's 2050 target under this Act is to reduce, by 31 December 2050, greenhouse gas emissions in Tasmania to at least 60% below 1990 levels.

Sea-level rise may result in the loss, either in full or part, of the lime sand resource within the Development Area but this is very unlikely to occur within the projected lifespan of Pit. The Scheme identifies management layers that consider a different climate future including sea-level rise and greater storm events (i.e. the application of the coastal inundation and coastal erosion overlays) which do not intersect the Development Area.

Increased frequency or prolonged periods of dry may cause additional wildfires or altered wildfire regimes to occur in the Development Area – these would only temporarily affect the Activity, including Rehabilitated areas, as areas can be remediated and then allowed to continue to grow.

Social Impacts

Exhaust emissions will generate greenhouse gasses within the proposal area and the road corridors approaching the area of proposed operations. Impacts include respiratory effects on workers and surrounding residents.

C-12-4 MITIGATION AND MANAGEMENT

The following guiding principles will be used by the Proponent in operating the Pit to minimise and/or reduce greenhouse gas emissions when economically and practical to do so. This is in keeping with the goal of *best practice environmental management* practices.

Energy efficiency

Machinery operated will be modern and well maintained, which will ensure that emissions of greenhouse gases per operating hour of machinery/equipment use will be minimised. Greenhouse gas emission profiles will be considered when procuring new equipment and machinery, as well as engaging other entities for access to a truck fleet, to preferentially adopt low energy (and low emission) options where cost effective to do so relative to the environmental risk reduction those options provide.

Emissions efficiency

The use of fuel-efficient trucks, loaders and light vehicles with regular maintenance schedules will work towards the goal of lower emissions per operating hour.

PART D – MANAGEMENT MEASURES SUMMARY

Best practice management is important to the project proponent to minimise the risk of environmental nuisance/harm from the activity.

In the preceding Sections of this EIS, the potential environmental effects which may arise from the Activity have been detailed and, where appropriate, actions documented to prevent and or minimise potential adverse impacts.

The management measures made by the Proponent are summarised in **Table 15.**

Table 15. Environmental Management Measures for the Marshall Bay Sand Pit

No	Measure	Timeframe	EIS Section
1	Measures to **suppress dust** include the following extractive industry standard environmental practices: • Retention of vegetation along the access road corridor where possible, • Retention of vegetation (when possible) around the Pit working area to reduce the likelihood of strong winds liberating fine particles into the air, • Utilisation of slash/mulch obtained from cleared areas to stabilise the soil surface and to limit wind action on dust generation at the soil surface, • Covering of trucks with tarpaulins and/or load dampening, and • Minimising the geographic extent of areas of exposed soil.	Ongoing	C-1 Air Emissions - Dust
2	Measures to **minimise the risk of wind erosion** include the following: • Avoid, if possible, but otherwise minimise working on faces exposed to westerly winds; • Maintain vegetation above and to the west of any active face; and • Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree and other scrub species for covering exposed surface as operations progress.	Ongoing	
3	Measures to **minimise the risk of water caused erosion** include the following: • Minimising the geographic extent of exposed soil. • Establishment of sediment basins, diversion drains, and other drainage systems at the Activity. • Utilisation of slash obtained from cleared areas or other product (jute mesh) to stabilise the soil surface, and to limit the spread of sediment.	Ongoing	C.2 Surface Water Management

4	Regular monitoring (monthly) is to be undertaken to ensure the effectiveness of the installed stormwater management and sediment control structures. Repairs and remedial works (including basin cleaning) are to be performed to maintain sediment settling zones to those required and ensure that stormwater is entering and leaving the basin as planned.	Ongoing	
5	Groundwater environmental management controls will be - • Readily available spill kits on site; • Storage of products in suitably sized bunded containers; • Training personnel to use spill kits and establish emergency procedures in the event of a spill; and • Daily pre-start checks on machinery to minimise the risk of spills; ensure machinery and equipment is functional, hoses are correctly fitted and secure, and caps on fluid tanks are tightened.	Ongoing	
6	Equipment will be well maintained and late model machines with proprietary exhaust silencers fitted to ensure noise emissions are as low as possible. Pit operations will occur during normal daytime hours of 0700 – 1900 hrs Monday to Friday.		C-3 Noise Emissions
7	<u>Weed and Disease Management</u> A DRAFT Weed and Disease Management Plan (WDMP) is submitted with the EIS (**Attachment 8**).		C-4 Natural Values
8	<u>Geoconservation</u> In the event notable examples of significant geomorphological features are encountered (i.e. any of the features listed below) the first task should be to photograph the area and move operations away from the feature until a suitably qualified person (in the context of the item/items discovered) can assess any geomorphological/cultural values. Contractors should look out for: • Thick dark continuous bands within the dunes. • Buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree. • Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand. • Large accumulations of shells.		

	• Large bones and accumulations of smaller bones buried >1m under the surface.		
9	<u>Karst</u> In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained. In the event a cave is located on site operations should avoid the area and seek expert advice.		
10	General refuse waste generated by workers (e.g., lunch wrappers) at the Pit will be collected in waste bins provided on-site – at the amenities/crib room. The bins will be emptied at least once per fortnight and the material disposed of at a permitted refuse disposal site. Waste bins that receive food scraps will be fitted with preventative access measures to discourage native animals and feral cats.	Ongoing	C-5 Waste Management
11	Waste generated by maintenance works, repairs and/or schedule servicing of equipment and machinery off the Pit location will be managed by the service provider at the location where they have been engaged by the Proponent to complete the required works.		
12	Waste will be sorted based on the classification of the type of waste, with Controlled Waste (see **Table 13**) separated from all other waste streams and disposed of at the Council operated Whitemark Waste Facility (419 Memana Road, Whitemark).		
13	All fuels, lubricants and/or hazardous materials are stored in accordance with the relevant requirements of *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*. Refuelling activities will only occur when machinery is within a bunded/hardstand area.	Ongoing	D.6 DANGEROUS AND ENVIRONMENTALLY HAZARDOUS GOODS
14	Spill prevention and clean-up equipment is to be readily available and accessible in the vicinity of all plant and machinery, including mobile and fixed fuel storages.		

PART E – CONCLUSION

The proposed intensification of use is to extract up to 10,000 cubic metres (approx. 15,000 tonnes) of material per annum. All material won may be screened, and/or blended with other soil ameliorants/additives such as boron. Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment.

The activity includes but is not limited to vegetation removal, soil stripping, ripping, vibratory screening (to blend the product and remove any vegetative matter and stones), stockpiling material, and transportation of material.

This EIS follows the generic EIS Guidelines and the EIS Project Specific Guidelines issued by the EPA and provides information on -

1. the present environment of the site, including such matters as zoning, land use, flora, fauna, soils, and climate. It also describes the proposed operational activities in detail, the potential emissions sources, and the development timetable, and on
2. each of the potential environmental issues associated with the Pit and details of the mitigation measures to address each issue.

There are environmental impacts that are likely or potential from the activity, including noise, vibration, dust, and sediment discharge in uncontrolled stormwater discharge. Management measures have been proposed and will be implemented to mitigate the effects of the identified environmental impacts.

It is concluded that:

1. the RMPS and EMPCS objectives have been duly and properly pursued while sourcing and compiling information on the proposal,
2. the EIS for the Activity has been prepared in accordance with the Environmental Impact Assessment Principles, and
3. the proposed activity is capable of being managed in an environmentally acceptable manner such that it is unlikely that the objectives of the *Environmental Management and Pollution Control Act 1994* (the RMPS and EMPCS objectives) would be compromised.

PART F - REFERENCES

Department of Primary Industries, Parks, Water and Environment (2015). *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania*. (Eds.) Karen Stewart and Michael Askey-Doran. Department of Primary Industries, Parks, Water and Environment, Hobart, Tasmania.

Skira, I. J., Brothers, N. P., and Pemberton, D. (1996). Distribution, Abundance and Conservation Status of Short-tailed Shearwaters Puffinus Tenuirostris in Tasmania, Australia. *Marine Ornithology*: **24**:1, Article 1. Available at: https://digitalcommons.usf.edu/marine_ornithology/vol24/iss1/1

Slee, A. (2024). Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island. 18 January 2024. Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000

VDC (2024a). Lime Sand Extraction Pit, Palana Road, Memana, Flinders Island. Natural Values Report. Van Diemen Consulting Pty Ltd, 20 October 2024.

VDC (2024b). Lime Sand Extraction Pit, Palana Road, Memana, Flinders Island. Natural Values Report. Van Diemen Consulting Pty Ltd, 20 October 2024.

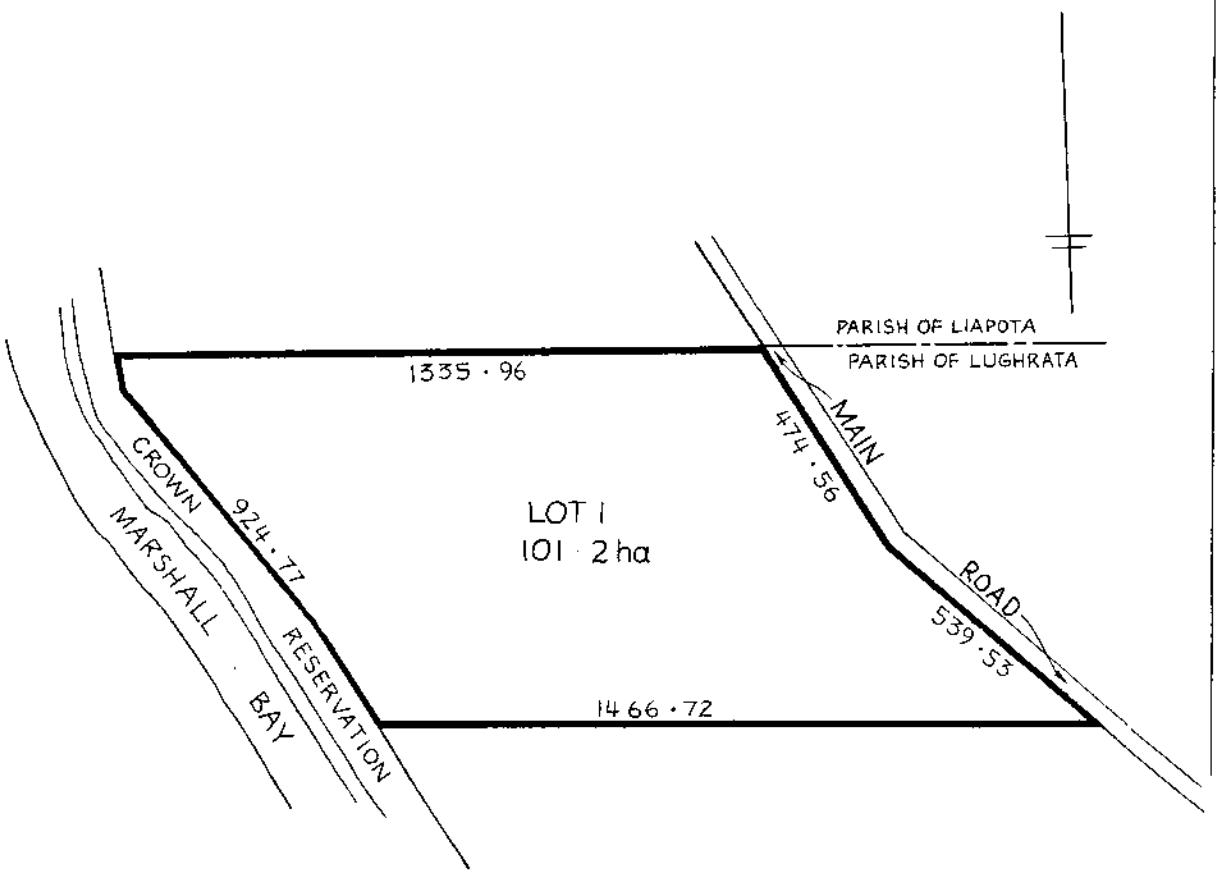
PART G – ATTACHMENTS

ATTACHMENT 1. LAND TITLES

OWNER FOLIO REFERENCE C.T. 2914/ 55 GRANTEE	PLAN OF TITLE LOCATION FLINDERS./LUGHRATA FIRST SURVEY PLAN No. COMPILED BY L T O SCALE 1: 900 LENGTHS IN METRES	REGISTERED NUMBER P 120064 APPROVED 16 AUG 1995 Recorder of Titles

MAPSHEET MUNICIPAL CODE No.	LAST UPI No	LAST PLAN No.	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

BALANCE PLAN



RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
120064	1
EDITION	**DATE OF ISSUE**
4	14-May-2015

SEARCH DATE : 10-Apr-2023
SEARCH TIME : 04.46 PM

DESCRIPTION OF LAND

Parish of LUGHRATA, Land District of FLINDERS
Lot 1 on Plan 120064
Derivation : Whole of Lot 25441 Gtd to T McKenzie
Prior CT 2914/55

SCHEDULE 1

C829114 TRANSFER to MARKARNA GRAZING COMPANY PTY LTD
Registered 27-Nov-2007 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
E10087 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 14-May-2015 at 12.05 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Department of Natural Resources and Environment Tasmania
www.thelist.tas.gov.au

R.P. 112

ANNEXURE TO CERTIFICATE OF TITLE VOL. 2580 FOL. 64

REGISTERED NUMBER

215120

Recorder of Titles

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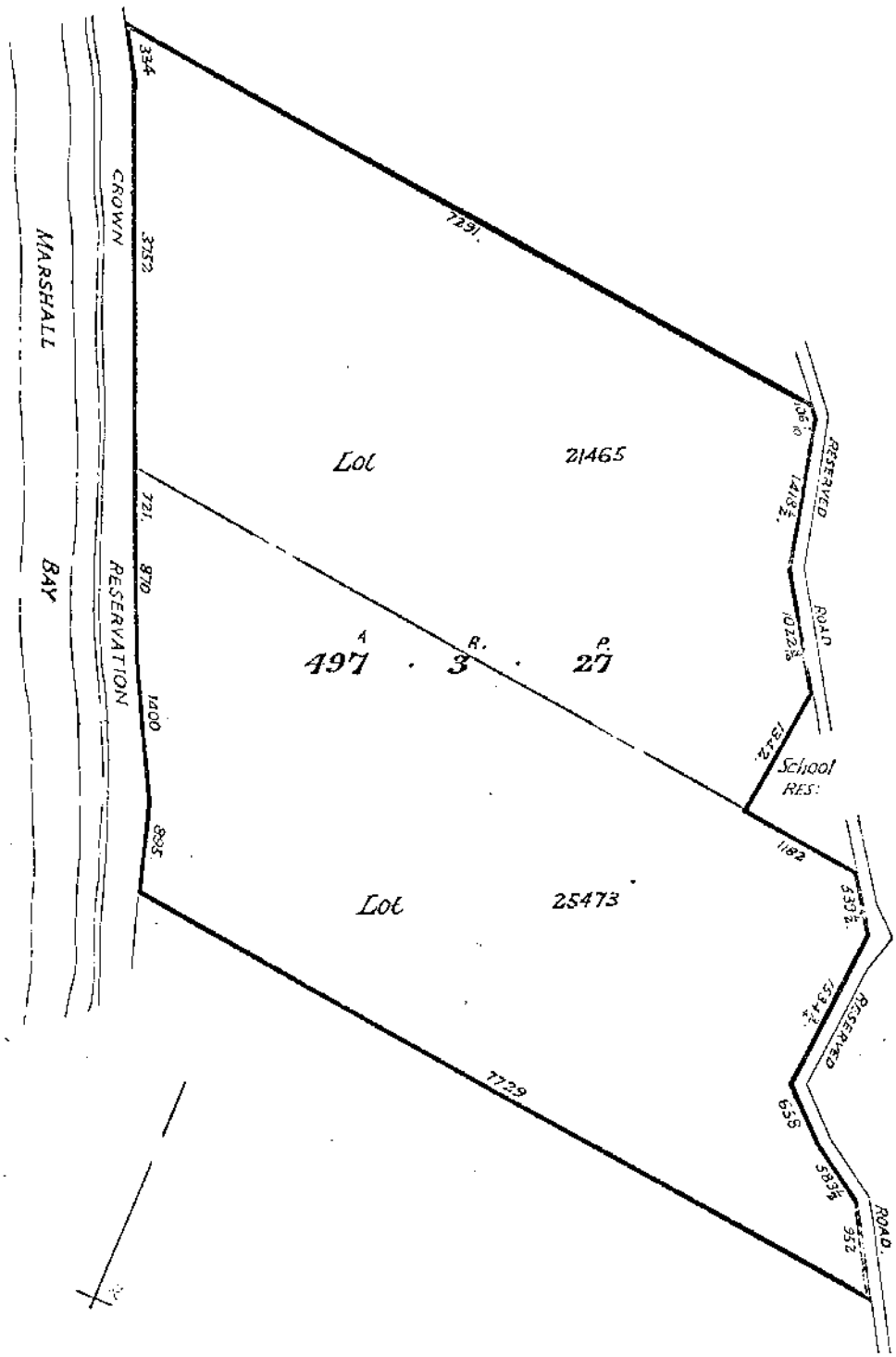

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
215120	1
EDITION	**DATE OF ISSUE**
4	14-May-2015

SEARCH DATE : 10-Apr-2023
SEARCH TIME : 04.47 PM

DESCRIPTION OF LAND

Parish of LUGHRATA, Land District of FLINDERS
Lot 1 on Plan 215120
Derivation : Whole of Lots 21465 and 25473 Gtd. to C.J. Robinson & J.H. Thompson respectively.
Prior CT 2580/64

SCHEDULE 1

C829114 TRANSFER to MARKARNA GRAZING COMPANY PTY LTD
Registered 27-Nov-2007 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
E10087 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 14-May-2015 at 12.05 PM

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Department of Natural Resources and Environment Tasmania
www.thelist.tas.gov.au

VOL. FOL.

ANNEXURE TO CERTIFICATE OF TITLE

REGISTERED NUMBER

230282

Recorder of Titles

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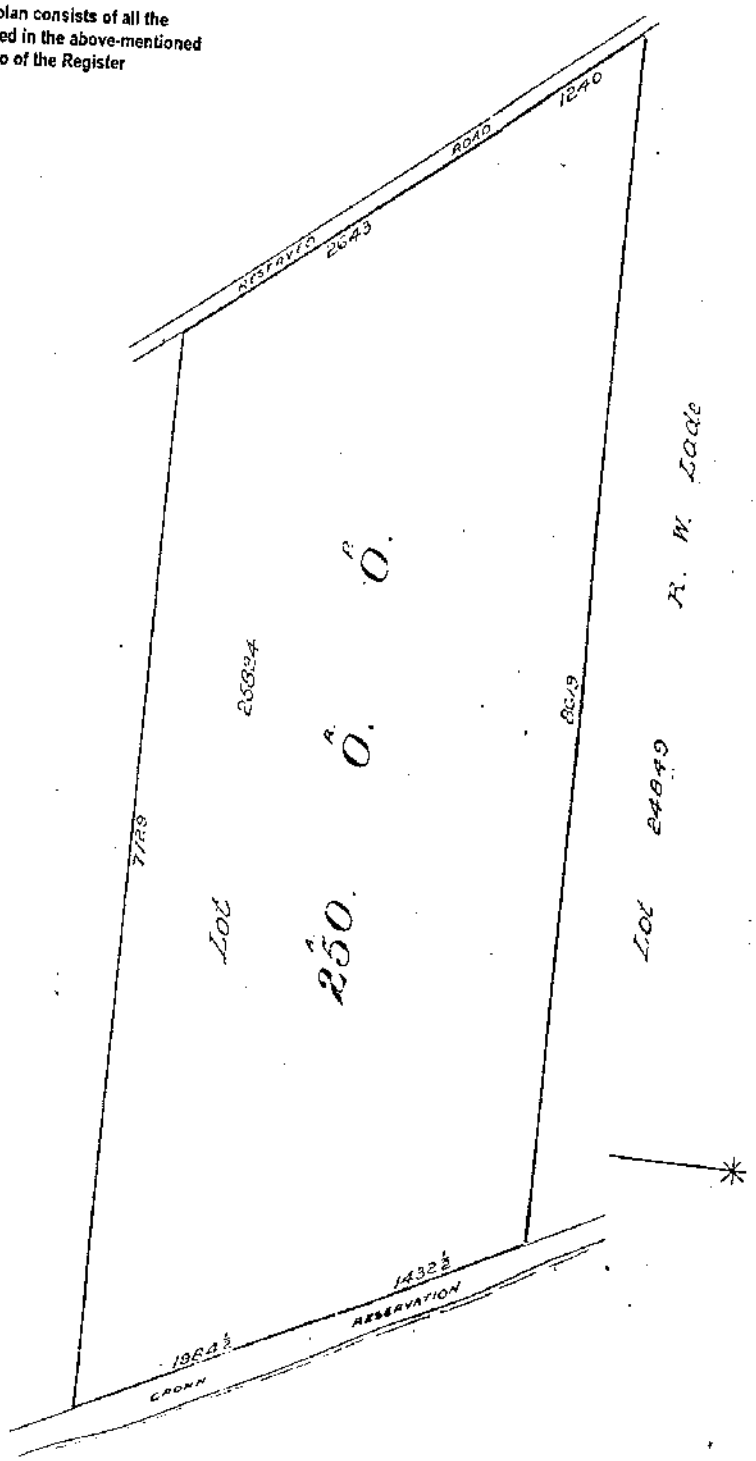


NOTE

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
230282	1
EDITION	**DATE OF ISSUE**
4	14-May-2015

SEARCH DATE : 10-Apr-2023
SEARCH TIME : 04.47 PM

DESCRIPTION OF LAND

Parish of LUGHRATA, Land District of FLINDERS
Lot 1 on Plan 230282
Derivation : Whole of Lot 25824 Gtd. to J.R. Robinson.
Prior CT 2992/93

SCHEDULE 1

C829114 TRANSFER to MARKARNA GRAZING COMPANY PTY LTD
Registered 27-Nov-2007 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
E10087 MORTGAGE to Australia and New Zealand Banking Group Limited Registered 14-May-2015 at 12.05 PM

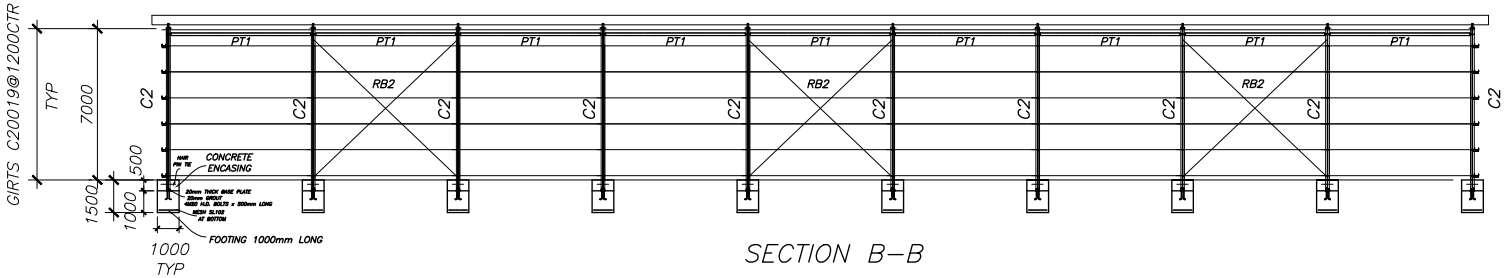
UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

Department of Natural Resources and Environment Tasmania
www.thelist.tas.gov.au

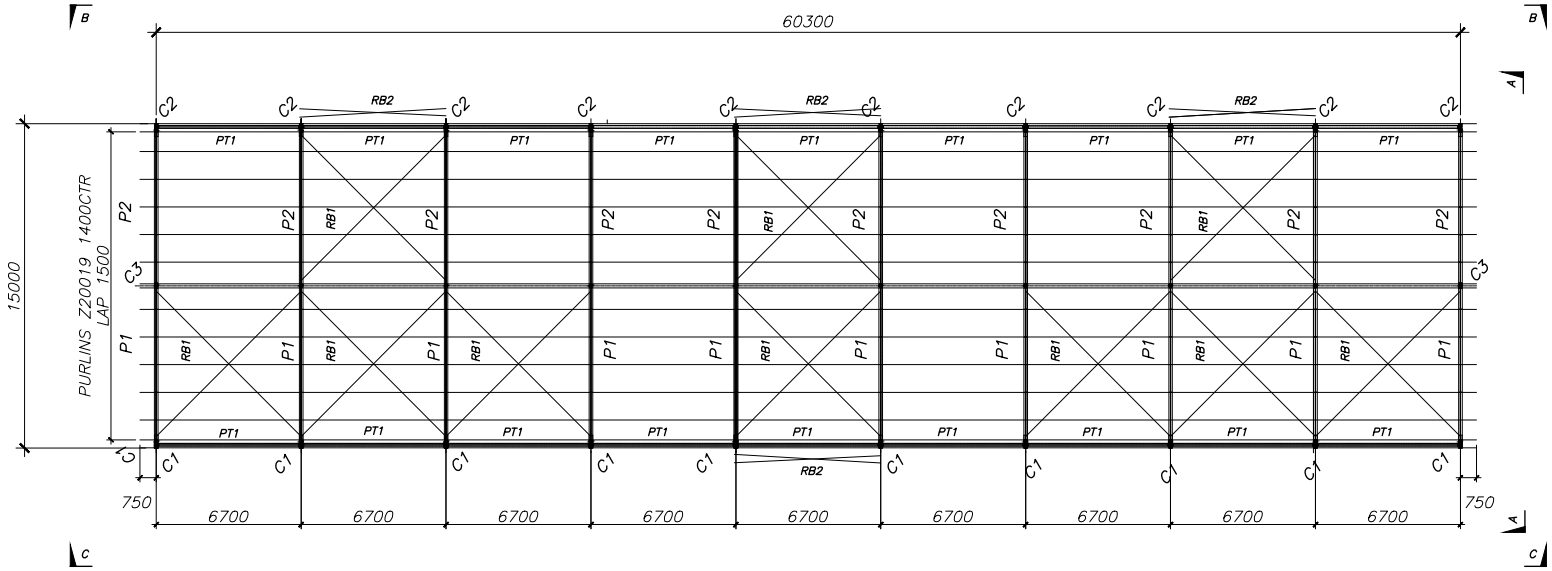
ATTACHMENT 2. SHED DESIGN

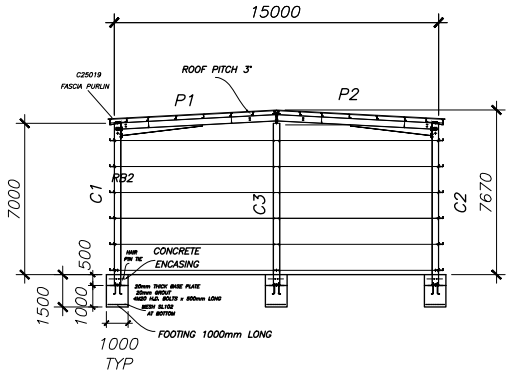
Annexure: 16.2.3



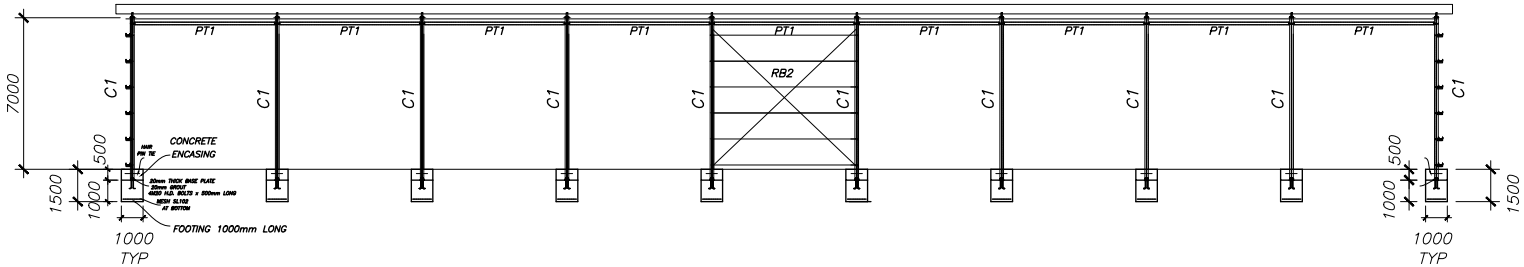
SECTION B–B

STEEL SCHEDULE	
MEMBER	SIZE
C1	310UB40
C2	310UB40
C3	250UB31
P1	310UB40
P2	310UB40
RB1–RB2	20 ROD
PT1	125X125X5 SHS
HAUNCH	360UB50 – 3800mm min
PURLINS	Z20019 1400 CTRL @ LAP 1500
GIRTS	C20019 1200 CTRL





SECTION A–A



SECTION C–C

PRELIMINARY FOR APPROVAL

AUS
Factory 2, 22a GALLI COURT
DANDENONG SOUTH 3175 VIC.
PH 03 9799 9922 FAX 03 9799 9913

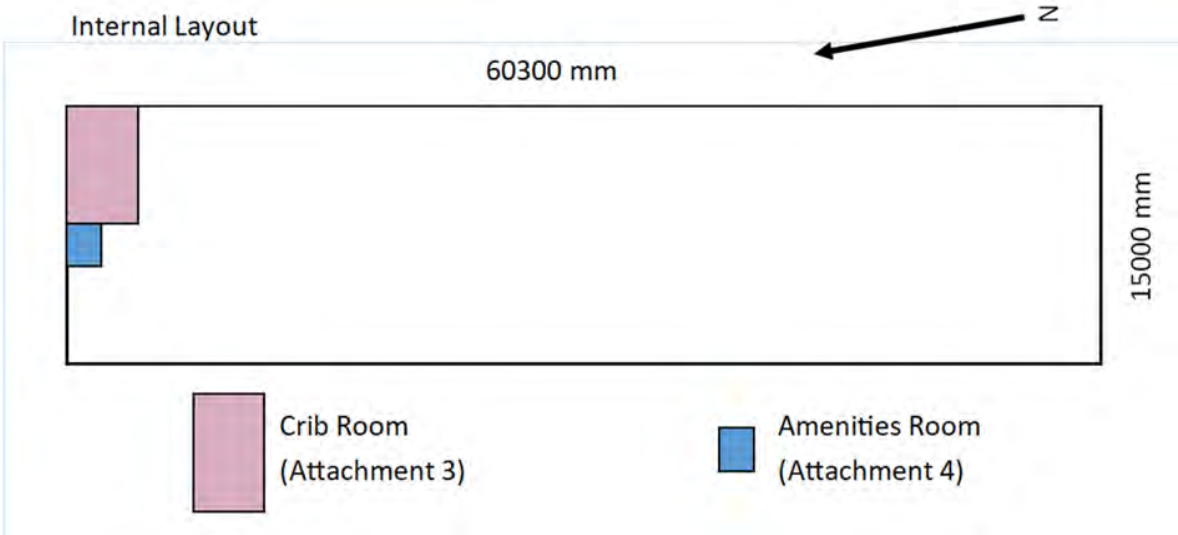
P1	PRELIMINARY	27.02.2019
P	PRELIMINARY	21.02.2019

AMENDMENTS

CLIENT: MARKANA PARK
PROJECT: MACHINERY & HAY SHED
FLINDERS ISLAND

JOB:

WELD: 6FW | PAINT: | DRN: CT | DATE: FEB 19 | DWG No: MP01
HOLES: ø22 | PRIMER | CKD: DM | REV P1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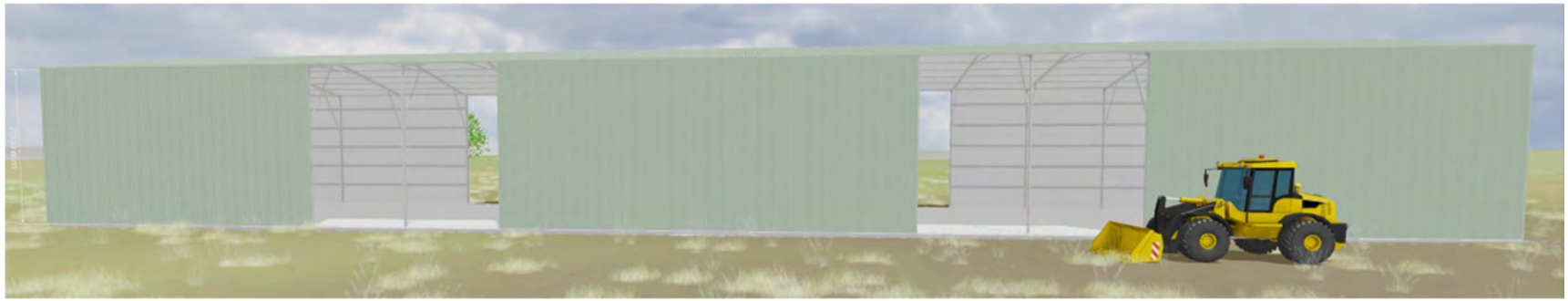
Crib Room
(Attachment 3)
Amenities Room
(Attachment 4)

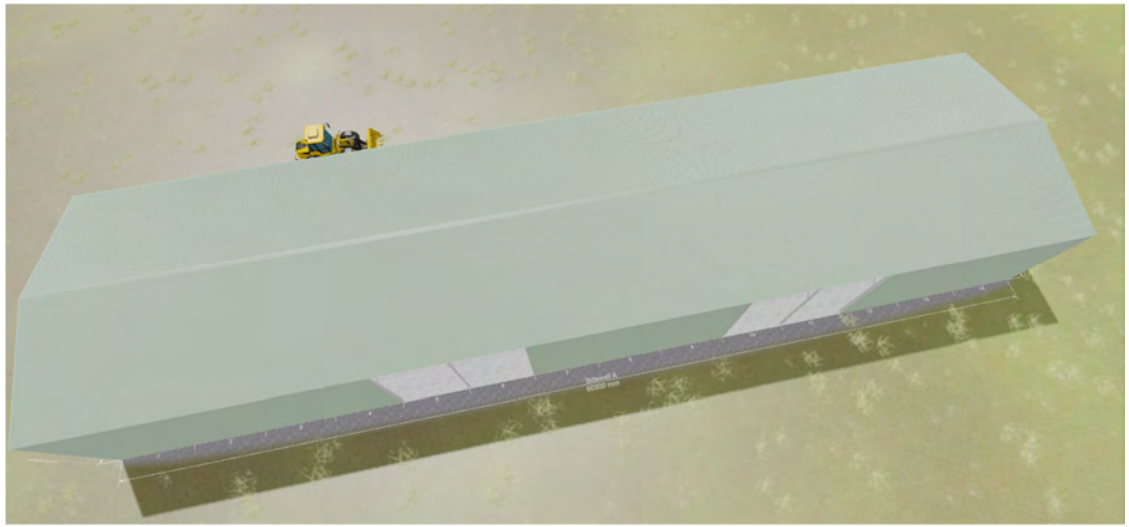
Elevations

East view

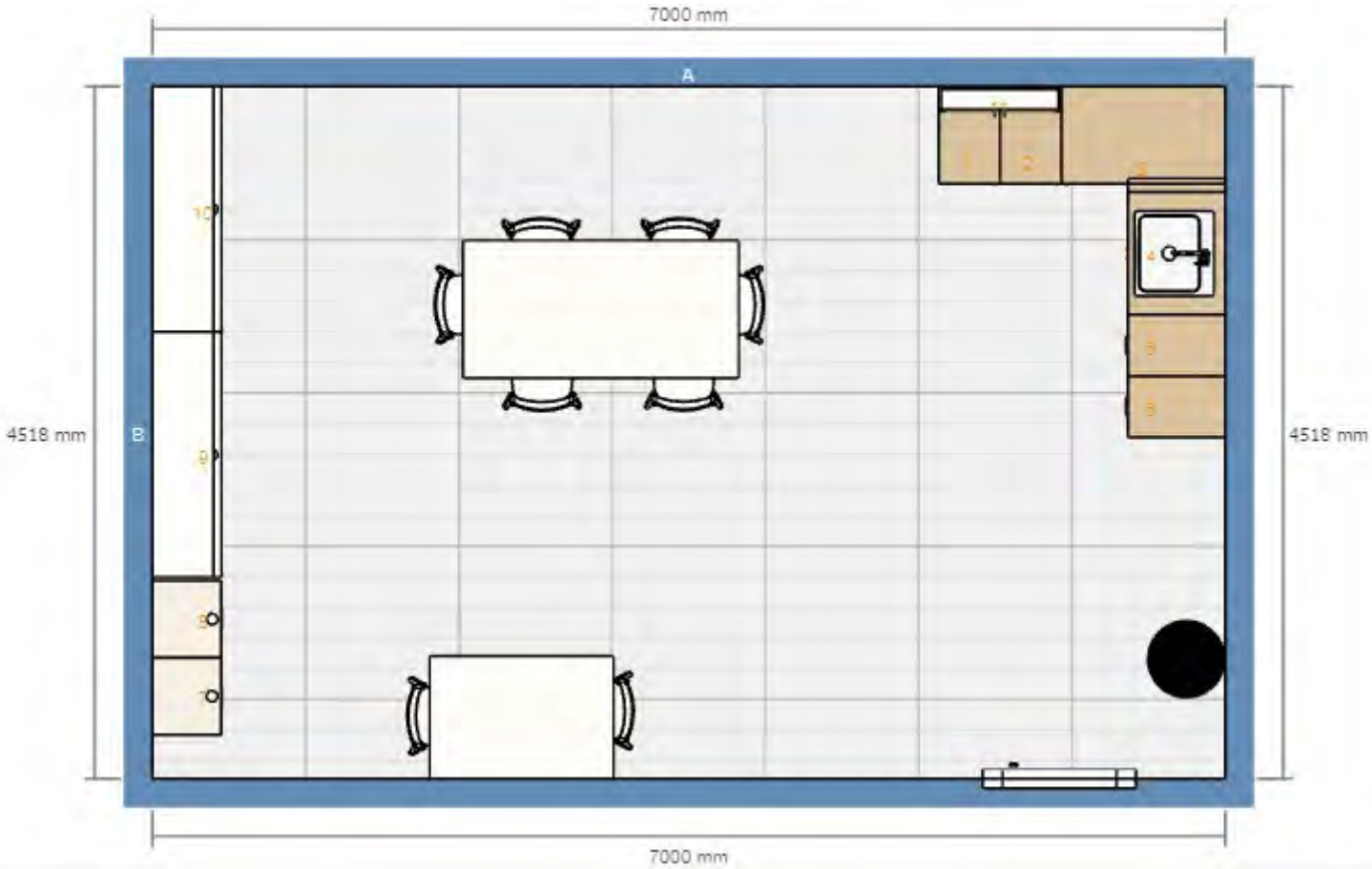


West view

Overviews



ATTACHMENT 3. CRIB ROOM AND AMENITIES DESIGN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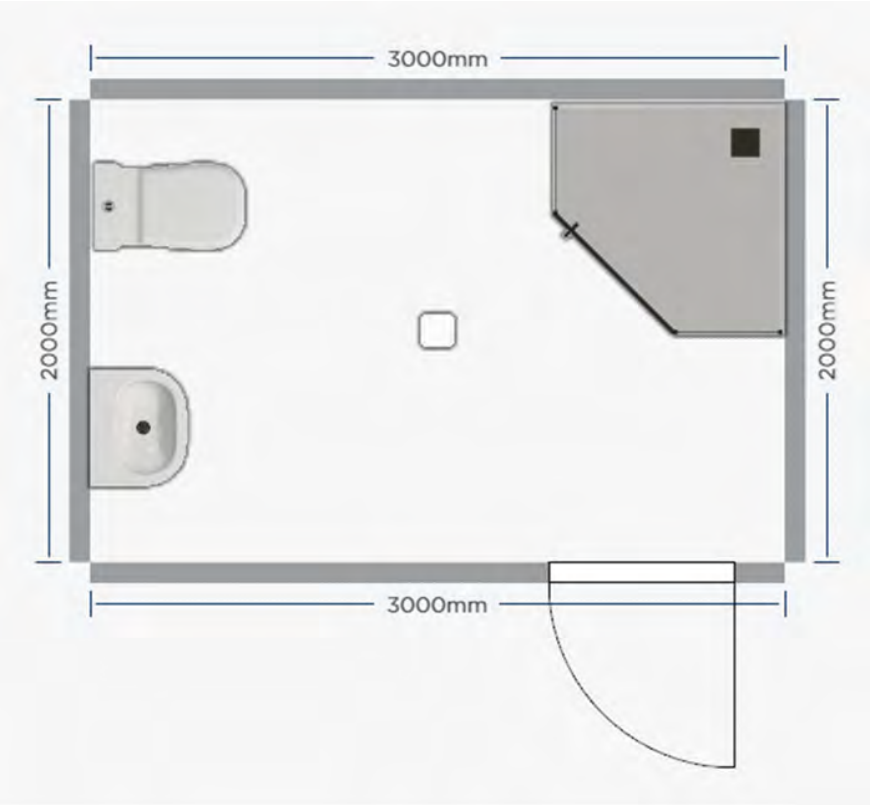
Amenities - 2D Layout



Amenities - 3D Render

ATTACHMENT 4. MARSHALL BAY LIME SAND PIT NATURAL VALUES ASSESSMENT REPORT V1

LIME SAND EXTRACTION PIT, PALANA ROAD MEMANA, FLINDERS ISLAND

NATURAL VALUES REPORT

MARKARNA GRAZING COMPANY PTY LTD

Van Diemen CONSULTING PO BOX 1, NEW TOWN, TAS 7008

Van Diemen Consulting Pty Ltd
PO Box 1
New Town, Tasmania

T: 0438 588 695 E: rwbarnes73@gmail.com

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Document Status

Revision	Author	Review	Date	Purpose
1	R Barnes C McCoull	R Barnes	30-9-2024	Review
1	R Barnes C McCoull	Markarna Grazing Company Pty Ltd	20-10-2024	Review
2	R Barnes C McCoull			
2	R Barnes C McCoull			

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EXECUTIVE SUMMARY

Markarna Grazing Company Pty Ltd has sought a permit under the *Land Use Planning and Approvals Act 1993* for an Extraction Pit (lime sand; the 'Activity') at Marshall Bay, Flinders Island.

The Activity, which is an Extractive Industry per the Use Class classifications in the Tasmanian Planning Scheme - Flinders, is a prohibited use in the current zone (Landscape Conservation). An Amendment was therefore sought to rezone Certificates of Titles CT 120064/1, CT 215120/1, CT 230282/1 – private freehold (PID 3513143) to *Zone 20. Rural* to facilitate the current development application and provide for future extraction opportunities (permissible use) for the agriculturally significant lime sand resource at Marshall Bay.

The EPA issued Project Specific Guideline (see **Attachment 1** for an extract) required the investigation of Natural Values as part of the assessment process for the Activity including Threatened Flora, Threatened Fauna – Terrestrial, and Seabirds and Shorebirds. Natural Values related matters are also identified in the PSGs, such as Water quality, Geoconservation and Wetlands, Karst, and Acid Sulfate Soils. This Report provides information about these themes in response to the PSG's. The key findings are summarised below.

<table>
<tr><th colspan="2">Threatened native vegetation communities</th></tr>
<tr><td>Threatened Ecological Communities (EPBC Act)</td><td rowspan="2">None are present in the Survey Area.</td></tr>
<tr><td>Threatened Native Vegetation Communities (NCA)</td></tr>
<tr><th colspan="2">Threatened Flora Species</th></tr>
<tr><td colspan="2">Six flora species protected by a statutory mechanism ('Threatened flora') were observed during combined surveys in the Survey Area (TSP Act and EPBC Act listing):
- Acacia uncifolia, coast wirilda (r/-)
- Asperula minima, mossy woodruff (r/-)
- Eutaxia microphylla, spiny bushpea (r/-)
- Pimelea curviflora var. gracilis, curved riceflower (r/-)
- Roepera billardierei, coast twinleaf (r/-)
- Scaevola albida, pale fanflower (v/-)
All threatened flora species observed would have plants taken as part of the development. No species listed on the Environment Protection and Biodiversity Conservation Act 1999 were observed in the Study Area.</td></tr>
<tr><th colspan="2">Threatened Fauna Species</th></tr>
<tr><td colspan="2">No fauna species listed on the Threatened Species Protection Act 1995 or Environment Protection and Biodiversity Conservation Act 1999 were directly observed in the Survey Area during the surveys.
No trees with the potential to support any hollow-dependent bird species, such as swift parrots or blue-winged parrots, were observed in the Survey Area.
Habitat for several threatened Fauna is present including:
• wedge-tailed eagle (Aquila audax subsp. fleayi – Foraging habitat is present in Survey Area.</td></tr>
</table>

- white-bellied sea-eagle (*Haliaeetus leucogaster*) – Foraging habitat is present in Survey Area.
- Tussock skink (*Pseudemoia pagenstecheri*) – potential low Poa coverage areas in buffer to the Survey Area.

It was determined based on the nature of the activity, and location and quality of habitat, that the activity would not cause any significant impact to any listed fauna species.

Weeds and Diseases

Two Declared Weed species listed on the *Biosecurity Act 2019* were observed in the Survey Area; these include horehound (*Marrubium vulgare*) and slender thistle (*Carduus pycnocephalus*).

No plants with PC symptoms were observed in the Survey Area, and with the lack of susceptible species the water mould is unlikely to be present, or active, in the Survey Area.

Geomorphology and soils

Van Diemen Consulting Pty Ltd engaged the Forest Practices Authority (FPA) to investigate the geomorphology and soils present on a 364.1 ha mining lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The field work and report were completed by Dr Adrian Slee, with the report (Slee) generated from the engagement provided in **Attachment 8**.

Karst

Slee observed no karst landforms apart from very minor surface solution sculpture (karren) landforms have been identified during his survey. Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of evidence for significant karst formulation of mitigation measures is unnecessary.

Karst recommendations

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.
- In the event a cave is located on site operations should avoid the area and seek expert advice.

Sand Dunes

In the event notable examples of significant geomorphological features are encountered (i.e. any of the features listed below) the first task should be to photograph the area and move operations away from the feature until a suitably qualified person (in the context of the item/items discovered) can assess any geomorphological/cultural values.

Contractors should look out for:

- Thick dark continuous bands within the dunes.
- Buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.
- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under the surface.

Soils

Well drained soils in the mining lease and specifically in the vicinity of the main proposed resource are strongly alkaline Calcarosols.

Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried paleosols and lake/swamp sediments are present in the pit location, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands due to the abundance of acid neutralising carbonates.

DEFINITIONS

Declared Weed	means a plant species listed on the *Biosecurity Act 2019*
(the) Activity	means all use and development associated with the lime sand extraction pit in the Development Area including the screening of extracted sands and ancillary infrastructure such as the storage shed (including crib room), sediment ponds and drains, road and access tracks, hardstand, and wastewater (septic) infrastructure.
Report	This report
Survey Area	The area identified as Survey Area in Figures 1 to 3 and includes the area out to 1km from the edge of the Survey Area for the purpose of eagle nest searching (see Section *C.1.4 Targeted Flora and Fauna Species Surveys*).
Mining Lease	means Mining Lease 2117P/M (in force)
Natural Values	The Natural and Cultural Heritage Division (2015) Guidelines define this as 'biological and geodiversity values of conservation significance, being those species, vegetation communities and other values that have significance and/or statutory protection under the Tasmanian *Threatened Species Protection Act 1995* (TSPA), *Nature Conservation Act 2002* (NCA) and other relevant policies and regulations.
TASVEG	A comprehensive digital map of Tasmania's vegetation, including sub-Antarctic Macquarie Island. The map depicts the extent of more than 150 vegetation communities, including coastal heathlands, eucalypt forest and alpine communities. To assist with using the map, these communities are fully described in the accompanying technical manual - *From Forest to Fjaeldmark: Descriptions of Tasmania's Vegetation* (Edition 2). Available to the public via LISTmap and can be requested as a standalone file for use within a Geographic Information System (GIS).
Threatened fauna	Species of fauna listed on the – • Tasmanian *Threatened Species Protection Act 1995,* or the • Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Threatened flora	Species of flora listed on the – • Tasmanian *Threatened Species Protection Act 1995,* or the • Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Threatened ecological communities	Ecological communities listed under s 181 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
Threatened native vegetation communities	Native vegetation communities listed under Schedule 3A of the Tasmanian *Nature Conservation Act 2002*.

ACRONYMS

DPIPWE (now NRE Tas)	Department of Primary Industries, Parks, Water and Environment
ENV	effective neutralising value
(the) EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPA	Environment Protection Authority
LUPAA	*Land Use Planning and Approvals Act 1993*
ML	Mining Lease 2117P/M
MRT	Mineral Resources Tasmania
NCA	*Nature Conservation Act 2002*
PASS	Potentially Acid Sulphate Soils
QCP	Tasmanian Quarry Code of Practice 2017
NRE Tas	Department of Natural Resources and Environment Tasmania
NVA	Natural Values Atlas (a database of natural values information maintained by NRE Tas)
PSA	Planning scheme amendment
(the) TSPA	*Threatened Species Protection Act 1995*

PART A – INTRODUCTION

A.1 BACKGROUND

Markarna Grazing Company Pty Ltd has sought a permit under the *Land Use Planning and Approvals Act 1993* for an Extraction Pit (lime sand; the 'Activity') at Marshall Bay, Flinders Island.

The Activity, which is an Extractive Industry per the Use Class classifications in the Tasmanian Planning Scheme - Flinders, is a prohibited use in the current zone (Landscape Conservation). An Amendment was therefore sought to rezone Certificates of Titles CT 120064/1, CT 215120/1, CT 230282/1 – private freehold (PID 3513143) to *Zone 20. Rural* to facilitate the current development application and provide for future extraction opportunities (permissible use) for the agriculturally significant lime sand resource at Marshall Bay.

A permit under LUPAA is currently sought on the basis that the planning scheme amendment for the zone change to Rural from Landscape Conservation is approved by the Tasmanian Planning Commission.

A.2 LIME SAND AND AGRICULTURAL PRODUCTION ON FLINDERS ISLAND

Agriculture is a critical employment and income generation activity on Flinders Island, so its longevity is of paramount importance to the social and economic well-being of the island.

The lime sand deposits at Marshall Bay are well known, highly significant to the agricultural productivity of Flinders Island, and proven in their ENV on agricultural lands (Everard 1950, Pryor 1967, Sutherland and Kershaw 1971). A Mining Lease is in force; 2117P/M.

The Marshall Bay land parcels owned by Markarna Park were specifically purchased to provide ongoing lime sands for the agricultural lands on the property and associated properties, and to also provide some for sale to other agricultural enterprises on the island.

The existing but now disused pit (which is the starting location for the new pit) was once used by many islanders to access lime sand due to its ease of access, extraction of high ENV (effective neutralising value). Sands will also be used to supply concrete production activities because most sand for such a purpose is brought to the island.

Off-island supplies of lime are costly due to high freight charges which in the medium to long-term undermines the economic viability of agriculture on the island. That is, if lime is expensive then it is likely that inadequate levels would be used by agricultural operators (due to cost) that then has a long-term negative impact to the overall soil health and potential of agricultural lands to produce food.

A.3 SCOPE

The EPA issued Project Specific Guideline (see **Attachment 1** for an extract) required the investigation of Natural Values as part of the assessment process for the Activity including Threatened Flora, Threatened Fauna – Terrestrial, and Seabirds and Shorebirds. Natural Values related matters are also identified in the PSGs, such as Water quality, Geoconservation and Wetlands, Karst, and Acid Sulfate Soils.

The following tasks were undertaken as part of the Natural Values (biodiversity) assessment and Report:

1. A review of biodiversity values recorded previously within and adjacent to the Study Area including Natural Values Atlas held data, and available reports and maps,

2. The potential for the occurrence of threatened fauna species listed under the TSP Act and EPBC Act in the Study Area was evaluated using the Natural Values Atlas Database (NVA, Department of Natural Resources and Environment Tasmania),

3. Field surveys were undertaken to investigate and verify the potential biodiversity values identified in the desktop assessment. The field surveys included:

   (a) The ground-truthing and mapping of vegetation communities at an appropriate geographic scale in the Study Area using TASVEG 4.0 mapping units (and ecological communities listed under the EPBC Act);

   (b) Targeted searches of areas for terrestrial and riparian flowering annual and perennial plants and aquatic flora[1], including potential habitat for conservation significant species;

   (c) Habitat assessment for threatened raptor and mammal species; and

   (d) The identification and mapping of declared and weeds listed on the schedules of the *Biosecurity Act 2019* within the Study Area, and

4. Provide recommendations for the management of any identified conservation significant matters.

A.4 PROPOSED ACTIVITY

This section provides information about the Activity.

Material to be extracted	The material to be extracted is lime sand destined for an agricultural use (soil ameliorant). Extracted (raw) sand will be screened if necessary to remove organic matter and contaminants (e.g., shells, rocks, and stones). Additional agricultural soil ameliorants/additives such as boron may be mixed (by screening) with some of the lime sands prior to carting to the location of use (i.e., spreading on paddocks).
Maximum extraction quantity	10,000 cubic metres per annum (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5. Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment. Raw sand will be stockpiled in the pit, adjacent to the pit or at the storage shed ready for screening. Screened sands will be stored in the shed or on the hardstand ready for collection by trucks for transport to the delivery location.

[1] Excluding micro-flora such as algae, lichen, fungi.

Material extraction and processing	The **extraction and handling of material** will be in accordance with the following: • surface site preparation by vegetation and topsoil stripping and stockpiling; • excavation of material with a bulldozer and/or excavator; • transport of sands to the storage shed for screening/storage and occasional mixing with other soil ameliorants/additives (e.g., additional micro-nutrients and essential plant nutrients such as boron). Some sand will be loaded at the pit into trucks for immediate delivery to agricultural lands; • screening (up to 10,000 cubic metres per annum) to remove any vegetative/root debris and/or rocks and stones; • loading trucks with wheel loader from the pit face and/or stockpile area; and the • transport of material by truck.
Operating hours	0700 – 1900 hrs Monday to Friday
Transport	The maximum extraction volume of 15,000 tonnes equates to about 1,500 truckloads per annum based on 10 tonne loads (smaller loads are used given the material is to be spread on pastures and ploughed land). All traffic would enter and exit onto the sealed section of Palana Road using the now disused reserved road (unsealed) section of Palana Road.
Maximum area of disturbance	The removal of vegetation will occur as an area is required for pit expansion or the establishment of specific infrastructure, such as a cut-off drain, stockpile location etc. The management of vegetation removed to extract the resource will be in accordance with the QCP. The maximum area of disturbance, without any rehabilitation, is 5 hectares. To place this into perspective, given the size of the Mining Lease (364.1 hectares), the maximum area of disturbance at any one time represents 1.4% of the Mining Lease.
Infrastructure	An existing road off Palana Road is to be used to access the pit and shed. The reserved road is held under licence with the Crown for use to access the Land. A shed (15000 x 60300 x 7700 mm) is proposed. A septic wastewater system (grey and black water) will be installed to dispose of toilet, shower, and crib room waste. The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day. The wastewater discharge from the premises will be broadly like domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of *AS/NZS 1547:2012 Domestic on-site waste-water management*. Tanks will be installed (likely to be 2 x 50,000 litre) to capture rainwater from the shed and to receive water from a groundwater bore.
Workforce	The activity will utilise up to 5 staff per day when fully operational plus truck drivers. Most days will see only 2-3 staff at the site who would be loading trucks and carting lime sands from the active face to the shed.

A.5 ASSOCIATED REPORTS

Natural Values includes 'geodiversity values' which were assessed and documented for the Survey Area and broader Mining Lease in a separate study and report.

VDC commissioned the Forest Practices Authority to investigate the Survey Area and broader Mining Lease for its geomorphology and soils. The EPA issued Project Specific Guideline (see **Attachment 1** for an extract) also required the investigation of various matters as part of the assessment process for the Activity including Geoconservation and Wetlands, Karst, and Acid Sulfate Soils.

The aim of the geomorphological aspect of the project inter alia was to provide a detailed report on the dune field and other landforms including swamps and potential Tertiary limestone karst features in the vicinity of the proposed extraction pit (i.e. the Survey Area as identified in **Figure 3**). Soils were also be investigated in this area. A secondary focus was a general documentation of the dune field and other sites of geomorphic significance in the overall Mining Lease in the event of expansion of operations in the future.

The Slee (2023) report addressed the EPA PSGs and specifically included the following:

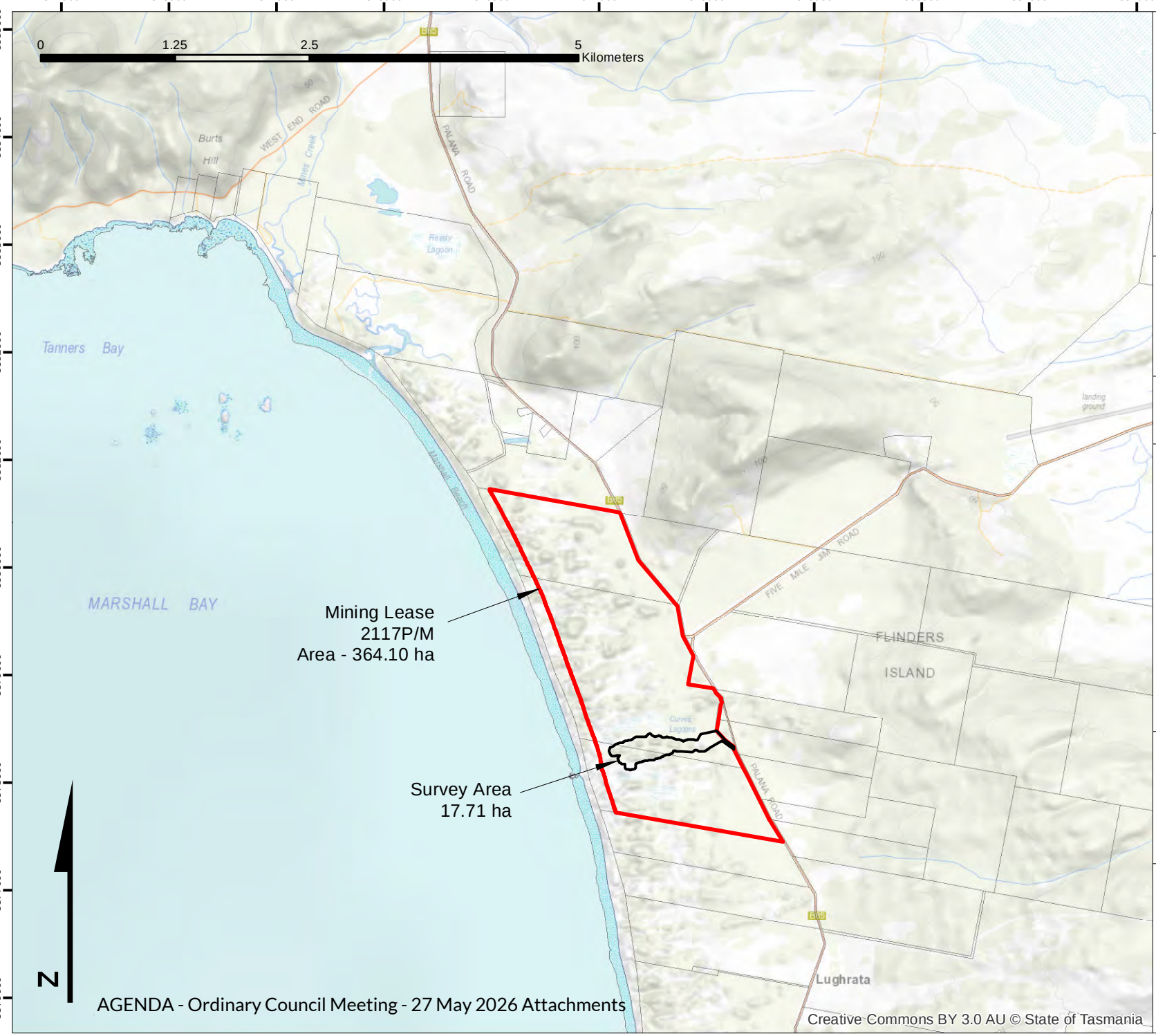
- Documentation of karst features present (if any) and provide management recommendations.
- Overview of the sand dunes present at the proposed pit site and mine lease in general and dune special values management recommendations.
- Comment on sand blow risks and mediation recommendations.
- Documentation of other geomorphic landforms (if any).
- Soil observations and management.

The Slee (2023) report is provided in **Attachment 8**, with reference made to it in this Report where relevant.

MARKARNA GRAZING COMPANY PTY LTD

NATURAL VALUES REPORT

Figure 1: Location of Markarna Park Sand Pit Mining Lease and Natural Values Survey Area



TASMAP: TANNER EMITA

LGA: FLINDERS

Survey Area

ML 2117P/M

Base data by TASMAP. © State of Tasmania
Base image by TASMAP. © State of Tasmania

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 2 JUNE 2024

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NATURAL VALUES REPORT

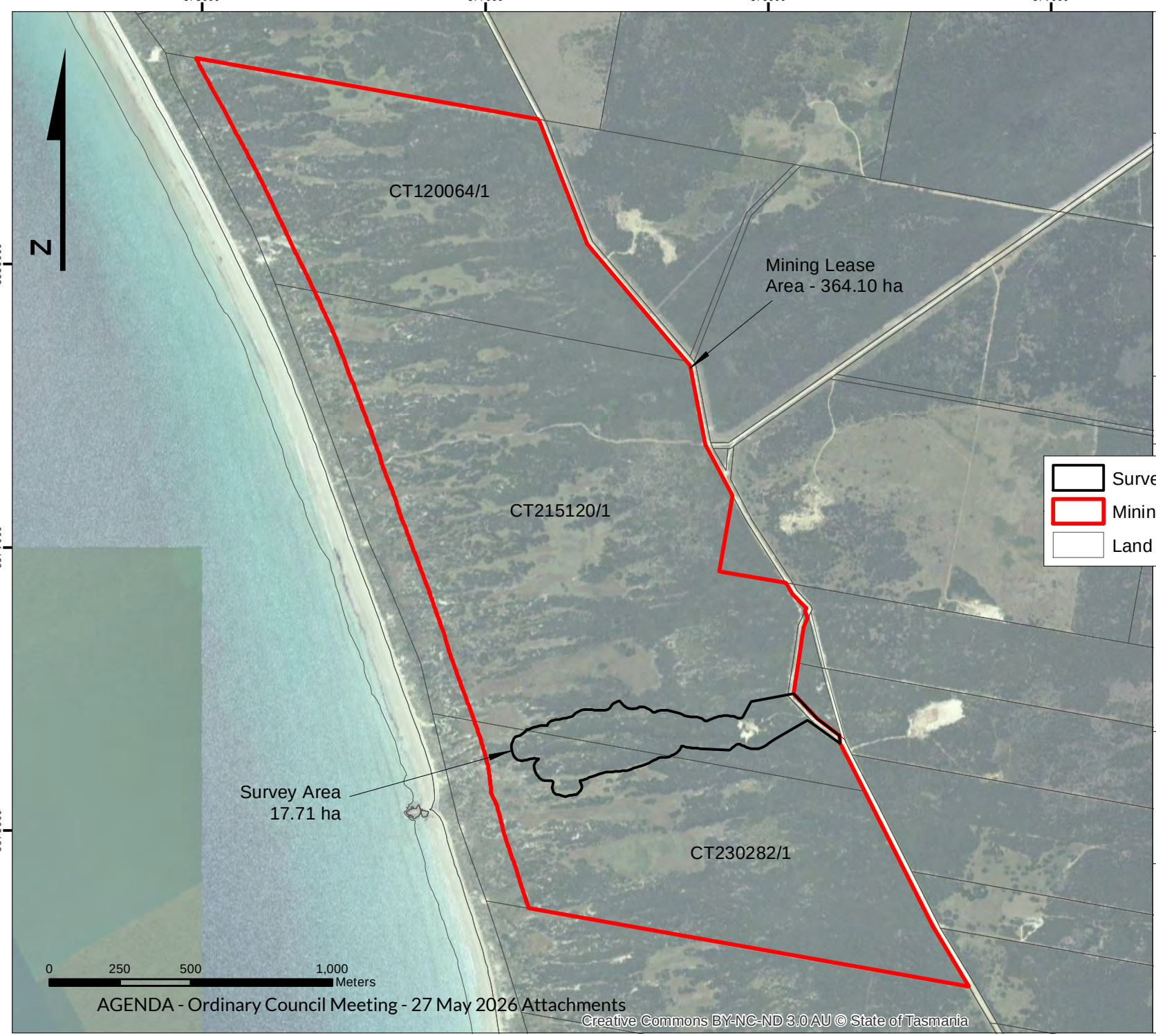

Figure 2: Location of Markarna Park Sand Pit Development Area and Land Titles

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

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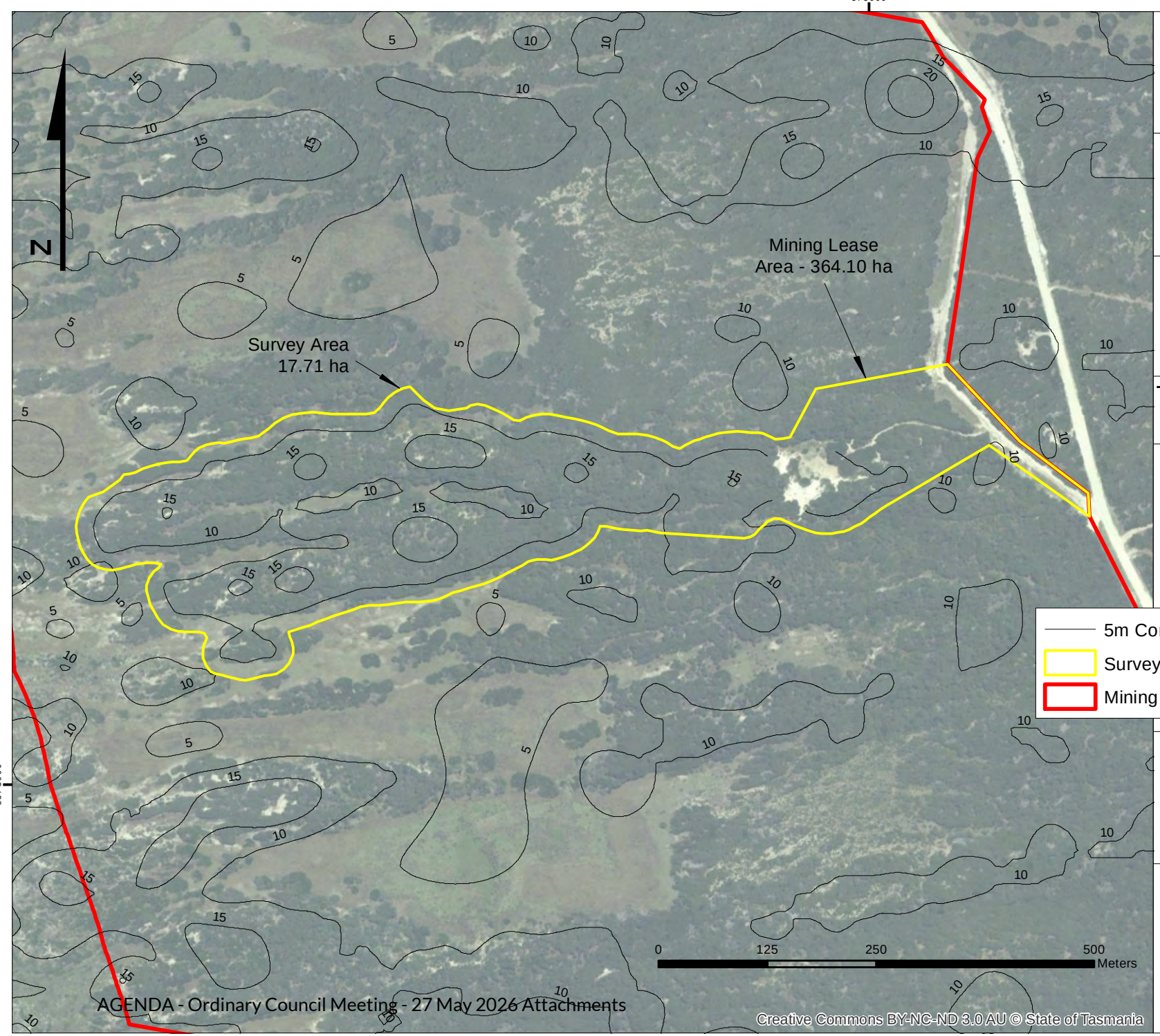
NATURAL VALUES REPORT

Figure 3: Topography at the Markarna Park Sand Pit Development Area and surrounds

TASMAP:	LGA:
TANNER EMITA	FLINDERS



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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 2 JUNE 2024

PART B – EXISTING ENVIRONMENT

B.1 LOCATION AND ACCESS

The Activity is proposed for land described in **Table 1** and is to be accessed via Palana Road, a sealed road which connects the northern and southern sections of the island.

Traffic would enter and exit onto the sealed section of Palana Road using the now disused reserved road (unsealed) section of Palana Road. This reserved road section is licensed with The Crown as the access to the Activity.

Table 1. Location and Certificate of Title Details for the Activity

Certificates of Title	CT 215120/1, CT 230282/1
PID	3513143
Physical Address	'MARKANA PARK' - 368 FIVE MILE JIM RD MEMANA TAS 7255
Access	Access is from Palana Road (sealed road section) over Crown Land under licence
Mining Lease	(approx. 364.10 hectares)

B.2 CLIMATE PARAMETERS

The nearest Bureau of Meteorology weather recording station is at Flinders Island Airport to the south of the Land. The station details for the Flinders Island Airport weather station are -

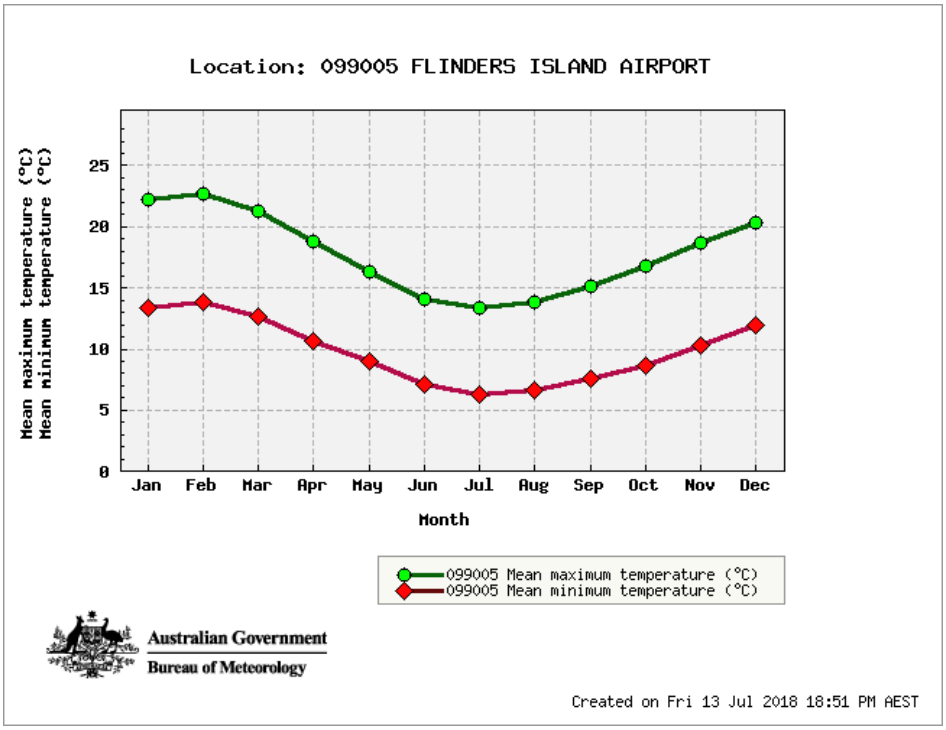
- **Site number:** 099005,
- **Latitude:** 40.09 °S **Longitude:** 148.00 °E,
- **Elevation:** 9 m

The development and use occur in a region with cool winters and warm summers (**Graph 1**), with most precipitation occurring in the winter and spring period (**Graph 2**).

Winds are predominantly from the west (**Graph 3**), as is usual for the Bass Strait islands because of their location in the path of the Roaring 40's. Winds from the east and south-east reflect the 'east coast low' weather patterns that occasionally affect the island, which are often associated with strong winds and heavy and/or sustained periods of rainfall.

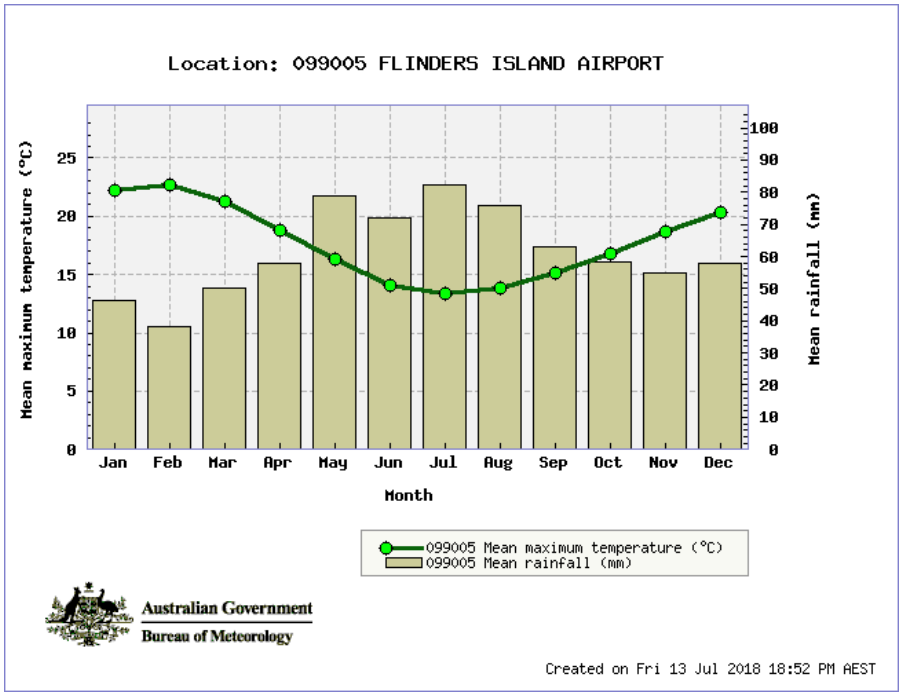
Graph 1. Mean minimum and maximum temperature for Flinders Island Airport

Source: Bureau of Meteorology 2018



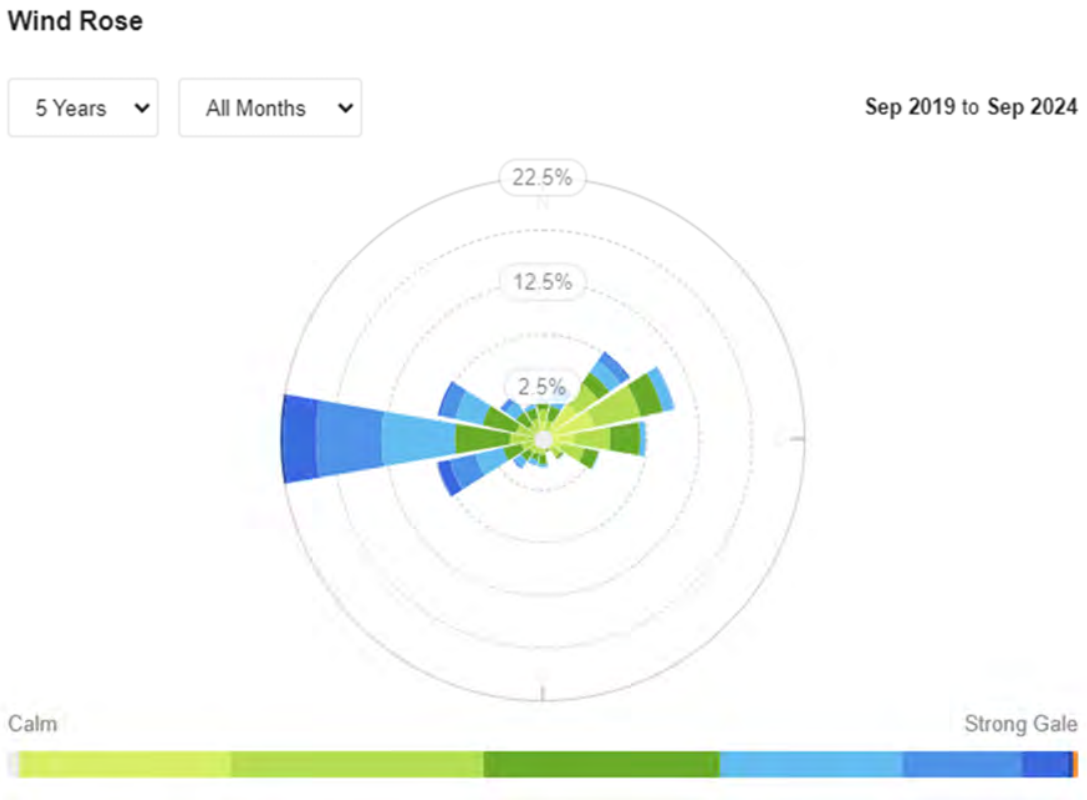
Graph 2. Mean annual rainfall and mean maximum temperature for Flinders Island Airport

Source: Bureau of Meteorology 2018



Graph 3. Annual wind rose for Flinders Island Airport

Source: Willy weather 2024



B.3 GEOLOGY, SOILS AND LAND CAPABILITY

B.3.1 Base Geology

The geology of the Survey Area and broader Mining Lease is sand, gravel, and mud of lacustrine and littoral origin (**Figure 4**). The sands to be extracted are of littoral origin and are highly calcareous in nature.

The underlying geology is a mosaic of lacustrine/littoral gravels and sands compacted/cemented in situ by the overlaying dune sequences. The base geology is highly fossiliferous (marine shells), compacted and easily distinguished from the dune sands. The sands are white to yellow-white and unconsolidated generally with scrub dominated vegetation typical of alkaline sands.

Plate 1 illustrates the previously worked area of the existing but disused pit. All overlaying lime sand was extracted from the base geology at the now disused pit; there are no podsols present between the base sediments and overlaying sands.

B.3.2 Soils

A soil layer is absent, or simply represented by a slightly discoloured (grey, to grey brown) upper layer in the sandy soil profile. Dune systems of recent age tend not to be old enough to have formed a substantial or

distinguishable topsoil layer, and even with a low to moderate fire frequency any organic matter that has accumulated may be quickly lost or substantially depleted during fire events.

Plate 1. Base geological formation and dune system at the disused sand pit

A

A – basement geology is a compacted/cemented mosaic of gravel, sand, and mud

B

B – a vegetated dune dominated by white to yellow-white lime dominated sands overlays the base geological formation

There are deflation basins present (see also Slee (2023)) dominated by native and exotic grasses and herbs. *Poa poiformis* and to a lesser degree *P. labillardierei* are the dominant species. They are not wetlands; however, they may be seasonally inundated in the winter months which keeps trees and other woody vegetation from colonising and dominating the shallow sand deposit environment. Unlike 'Arbothnots Lagoon' which is located to the south of the Mining Lease these deflection basins lack an organic underlying geology and sit over limestone bedrock and shallow sands – they are not Potentially Acid Sulphate Soils (PASS). There is a Low to Extremely Low likelihood of Potential Acid Sulfate Soils (coastal) in the Marshall Bay area based on DPIPWE test pitting and sampling that generated the mapping layer.

B.4 WATERCOURSES

There are no watercourses within the Survey Area or Mining Lease generally. The sands to be extracted from the Mining Lease are well drained being formed by Quaternary sands.

B.5 LAND USES

The Land Capability is not recorded by DPIPWE however the sandy alkaline sands are likely to qualify as Land Class 5 to 6. Historical and current land uses include livestock grazing (cattle).

Plate 2. Dune descriptions from Short & Nicholas 2011 noting (b) Linear dune form

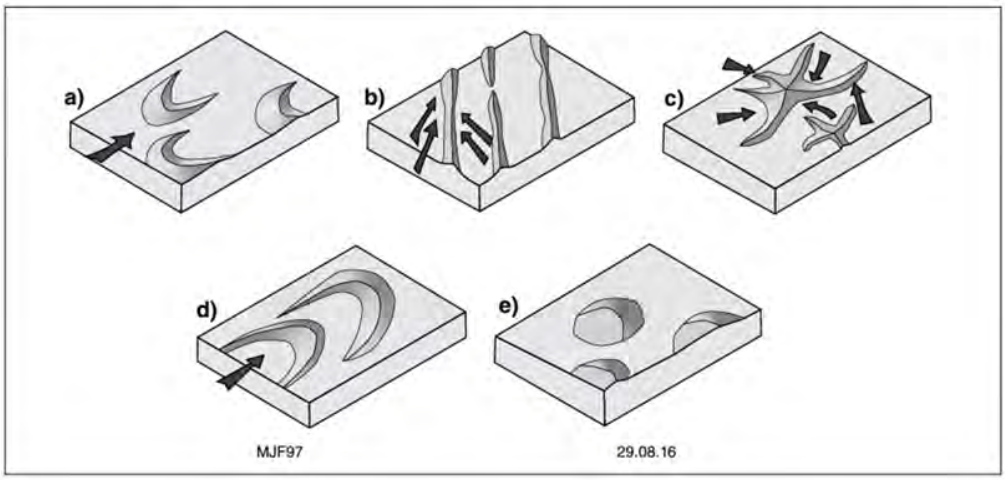
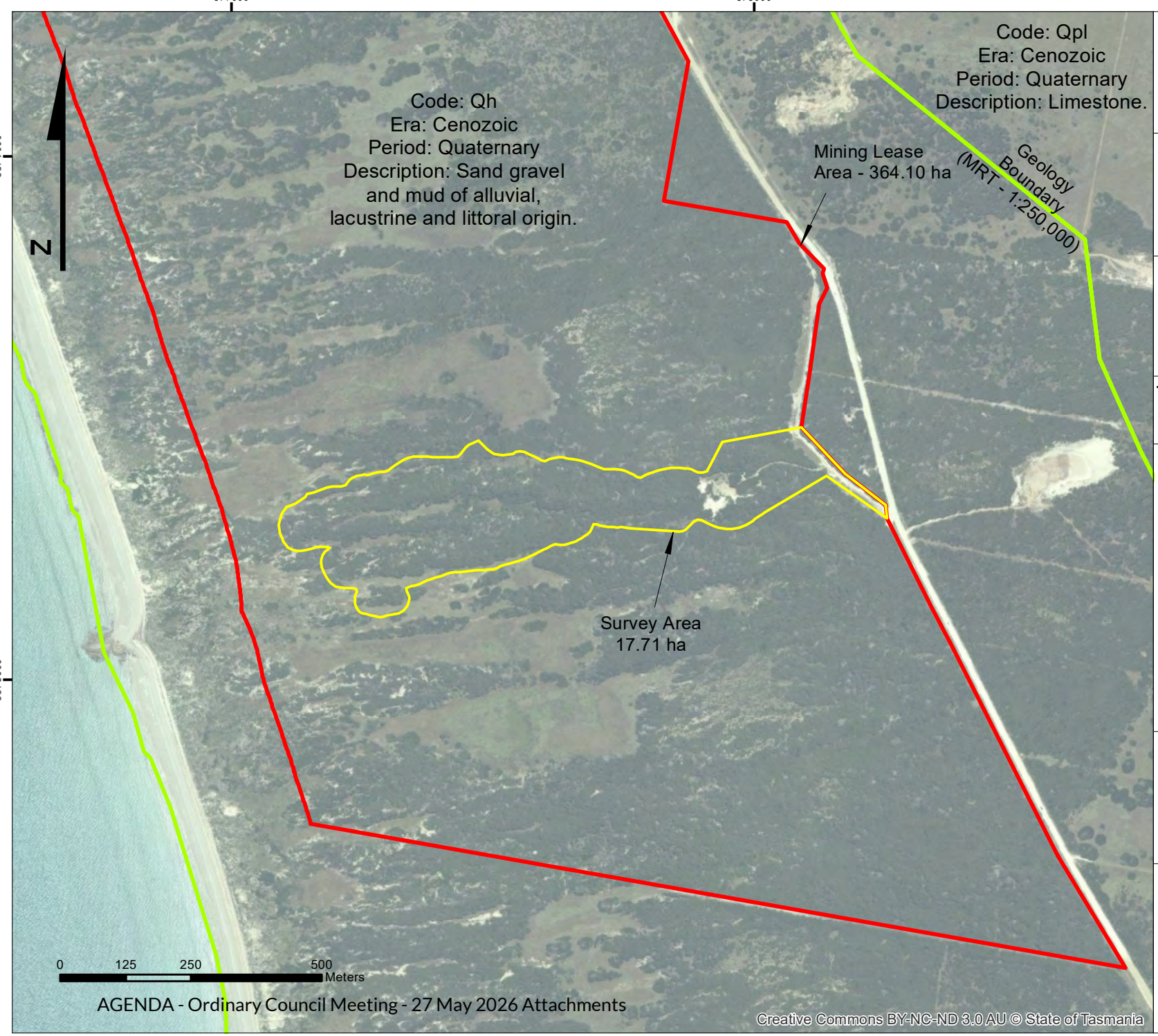


Plate 3. Coastal grasslands between linear dunes outside the Survey Area



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NATURAL VALUES REPORT

Figure 4: Geology
(1:250,000 – MRT)
around the SurveyArea

TASMAP:	LGA:
TANNER EMITA	FLINDERS

Survey Area
Mining Lease (The Land)
Geology (1:250,000)

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PART C – SURVEY METHODS AND ASSESSMENT TOOLS

This section provides details of the survey techniques applied for the studies conducted in the Survey Area, and the planning and assessment tools/documents used to identify the natural values, if any, of significance in the Site.

C.1 SURVEY TECHNIQUES AND METHODS

C.1.1 Qualifications of personnel

The Natural and Cultural Heritage Division (2015[2]) note that -

> 'The proponent or their representative must ensure that the personnel undertaking surveys and preparing reports have appropriate skills, qualifications and experience in identification and documentation of all natural values of interest, including a knowledge of Tasmanian species, their habitat and other ecological requirements, and vegetation communities.'

In this case, the surveyors of the natural values each hold a PhD in a relevant field of science – zoology and botany – and over 50 years of combined field expertise in natural values assessment, identification, mapping, reporting and ecological impact assessment/mitigation.

C.1.2 Vegetation Classification and Mapping

Classification

Vegetation communities were identified and attributed to Tasmanian Vegetation Mapping Units (Kitchener and Harris 2013, 2nd Edition and with revisions in April 2019). All vegetation types in the Survey Area were assessed and the variation within each explored. Flora species were recorded as they were encountered in a meandering survey.

Mapping

An iPhone was also used to navigate and assist with the interpretation of vegetation types using Google Earth overlain with shapefiles of the Survey Area. Aerial photography both in the field and in the office was used to further interpret vegetation boundaries.

C.1.3 General Flora and Fauna Species Survey

A query of the Natural Values Atlas (NVA, **Attachment 2**) was used to generate a report to identify previous recorded locations of species (flora and fauna) and range boundaries for significant or threatened fauna species. A query of the Protected Matters Search Tool (PMST, **Attachment 3**) provided through DCCEEW was

[2] Natural and Cultural Heritage Division (2015). Guidelines for Natural Values Surveys - Terrestrial Development Proposals. Department of Primary Industries, Parks, Water and Environment. Version 1.1 – 13th August 2019 (minor updates to links in document).

also generated to provide an overview of the Matters of National Environmental Significance that may or are likely to occur in or near the Survey Area.

The conservation status of flora and fauna species follow the:

- Tasmanian *Threatened Species Protection Act 1995,*
- Tasmanian *Nature Conservation Act 2002,* and
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The surveys directly assessed the range of habitat types present in the Survey Area and were conducted in January, March, August and October 2022, and June and October 2023.

C.1.4 Targeted Flora and Fauna Species Surveys

Flora

Flora species of particular focus were those listed in the Natural Values Atlas report as having known records, or potential habitat, within and near the Site. The flora surveys were limited to vascular species: species of mosses, lichens and liverworts were not recorded. However, consideration was made of species (vascular and non-vascular) likely to be present based on available habitat information and database records.

Flinders Island has a diversity of threatened orchid species, some of which may not be fully understood in terms of their distribution on the island itself let alone the offshore islands. To maximise the likelihood of detection of threatened orchid species, if present, several surveys were conducted to overlap with peak flowering periods. **Table 2** provides the survey periods where specific surveys were done of the Survey Area (limited to suitable habitat for the relevant species in the Survey Area).

Table 2. Survey periods for target threatened orchid species

Survey Period	Target threatened orchid species	Comments
Winter 2022 (June and August)	*Cyrtostylis robusta* (robust gnat orchid) *Pterostylis sanguinea* (banded greenhood)	2 days for 2 people. Species not detected.
Summer 2022/2023 (December 2022, January 2023)	*Orthoceras strictum* (horned orchid) *Thelymitra holmesii* (blue-star sun orchid)	2 days for 2 people. Species not detected.
Spring 2023 (October and November)	*Caladenia campbellii* (thick-stem fairy fingers) *Caladenia caudata* (tailed spider-orchid) *Caladenia filamentosa* (daddy longlegs) *Caladenia pusilla* (tiny fingers) *Calochilus campestris* (copper beard-hood)	3 days for 2 people. Species not detected.

	Diuris palustris (swamp doubletail) *Microtidium atratum* (yellow onion orchid) *Paraprasophyllum secutum* (northern leek-orchid) *Thelymitra malvina* (mauvetuft sun-orchid)	

Fauna

Potential habitat for threatened fauna was assessed by reference to the vegetation communities present and the associated characteristics of the habitat values each provided to fauna species - assessments were made by comparing the characteristics of known fauna habitat with the habitat present in the Site. **Table 3** provides specific comments about the survey effort and techniques applied to target fauna species.

Table 3. Survey effort and method for selected fauna species

Natural Value	Comments about survey effort and methods
Eagles	The Site is within the potential range (foraging and breeding) of the Tasmanian wedge-tailed eagle (*Aquila audax fleayi*) and white-bellied sea eagle (*Haliaeetus leucogaster*). No nests of either species have been recorded within 1km of the Survey (see **Attachment 2; Figure 8**) nor is there any NRE modelled habitat within 1km of the Survey Area.
Mammals	New Holland Mouse (*Pseudomys novaehollandiae*; **Figure 9**) potential presence was considered by an assessment of the habitat type and floristic composition of the vegetation. Trapping with Elliot traps or similar, the use of baited wildlife cameras, or hair traps were not deployed.
Frogs	Green and gold frog (*Litoria raniformis;* **Figure 10**) and the striped marsh frog (*Limnodynastes peroni*, **Figure 13**) were not assessed using bioacoustic techniques because suitable habitat (i.e. wetlands, swamps, dams) is absent from the Survey Area.
Reptiles	Tussock skink (*Pseudemoia pagenstecheri;* **Figure 15**) presence was considered by habitat type, composition, and abundance. In accordance with advice from CAS, pitfall and/or noose trapping was not conducted.

578000

5578000

Scrub, heathland and coastal complexes

(SCA) Coastal scrub on alkaline sands - 14.356 ha

Native grassland

(GHC) Coastal grass and herbfield - 2.470 ha

Agricultural, urban and exotic vegetation

(FUM) Extra-urban miscellaneous - 0.887 ha

N

0 125 250 500 Meters

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NATURAL VALUES REPORT

Figure 5: TASVEG 4.0 observed communities within the Survey Area

TASMAP: TANNER EMITA

LGA: FLINDERS

Mining Lease (The Land)

Survey Area

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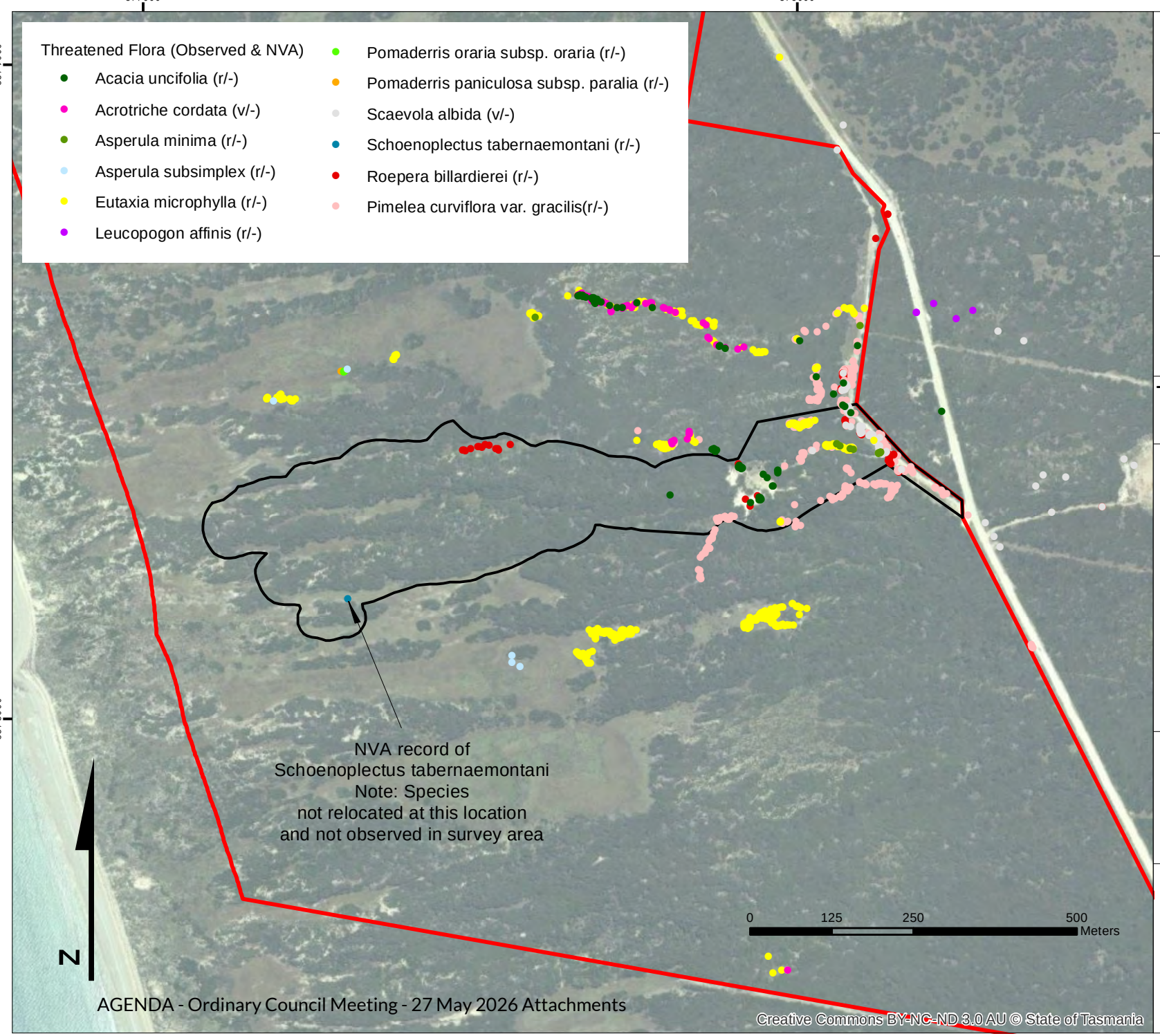
NATURAL VALUES REPORT

Figure 6: Threatened flora species within and surrounding the Survey Area

TASMAP: TANNER EMITA

LGA: FLINDERS



Survey Area

Mining Lease (The Land)

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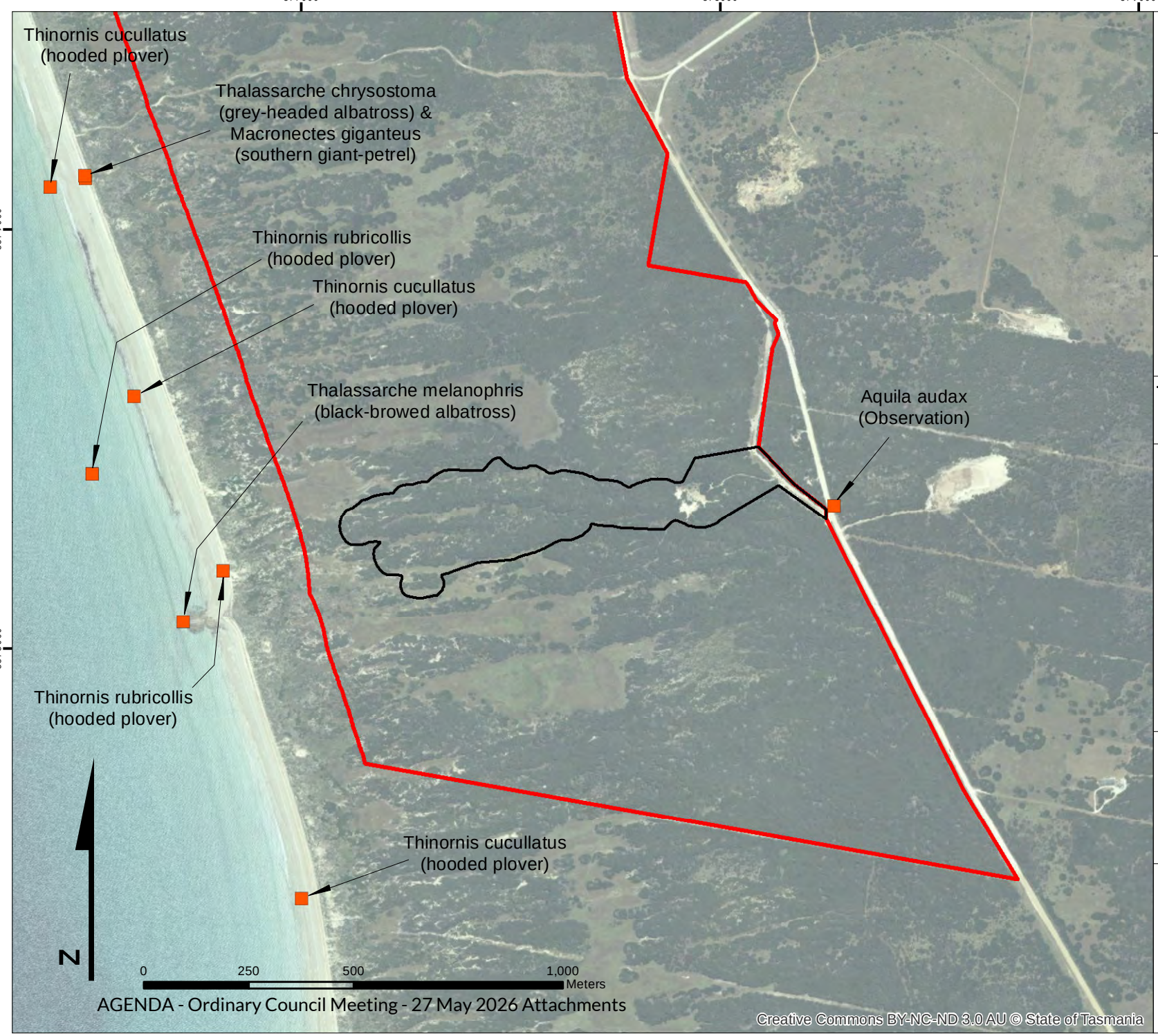
NATURAL VALUES REPORT

Figure 7: Threatened fauna species within and surrounding the Survey Area



TASMAP: TANNER EMITA

LGA: FLINDERS

Threatened Fauna Point

Survey Area

Mining Lease (The Land)

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C.1.5 Fauna Habitat Assessment – State based criteria

Fauna species with potential or known habitat in the Survey Area were considered in the context of habitat ranges/descriptions provided in **Table 4** (FPA 2022b).

Table 4. Fauna habitat ranges/descriptions applied in the study

Habitat Descriptor	Definition
Core Range	Encompasses the area, within the known range, known to support the highest densities of the species and/or thought to be of highest importance for the maintenance of breeding populations of the species.
Potential Range	Encompasses the area, within the known range, known to support the highest densities of the species and/or thought to be of highest importance for the maintenance of breeding populations of the species.
Known Range	is the area within which the species is most likely to occur, being the area of land within a minimum convex polygon of all known localities of the species. This term is synonymous with 'extent of occurrence' as referred to in the *Guidelines for Eligibility for Listing under the* Threatened Species Protection Act 1995 (DPIW 2009).
Potential habitat	is all habitat types within the potential range of a species that are likely to support that species in the short and/or long term. It may not include habitats known to be occupied intermittently (e.g. occasional foraging habitat only). Potential habitat is determined from published and unpublished scientific literature and/or expert opinion and is agreed by the Threatened Species Section (DPIPWE) in consultation with species' specialists.
Significant habitat	is habitat within the known or core range of a species that (1) is known to be of high priority for the maintenance of breeding populations throughout the species' range and/or (2) conversion of which to non-native vegetation is considered to result in a long-term negative impact on breeding populations of the species. It may include areas that do not currently support breeding populations of the species but that need to be maintained to ensure the long-term future of the species. Significant habitat is determined from published and unpublished scientific literature and/or expert opinion, and is agreed by the Threatened Species Section (DPIPWE) in consultation

C.1.6 Fauna Habitat Assessment – EPBC Significant Impact Criteria

For relevant EPBC-listed species (those identified in **Appendix 4** as requiring further consideration in the surveys) the guidelines and reports listed in **Table 5** were considered.

Table 5. EPBC relevant assessment documents and guidelines

Publication/Theme	Description	Species or species groups
EPBC Act Significant Impact Guidelines	General Significant Impact Guidelines Species or Species groups Significant Impact Guidelines	All species. Specific guidelines also considered – • EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. • Draft referral guideline for 14 birds listed as migratory species under the EPBC Act, Commonwealth of Australia 2015.
Conservation Advice	Advice prepared and published under the *Environment Protection and Biodiversity Conservation Act 1999* (s266B)	All EPBC-listed species considered in this assessment.
Light Pollution	'National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds, Commonwealth of Australia 2020'.	Seabirds and Migratory Shorebirds (not relevant as no shed external lighting is proposed).
Recovery Plans	Recovery Plans adopted under the *Environment Protection and Biodiversity Conservation Act 1999*	All species where a Recovery Plan exists such as - • Wedge-tailed eagle (*Aquila audax fleayi*) • White-bellied sea eagle (*Haliaeetus leucogaster*) • Swift parrot (*Lathamus discolor*) • Australian Fairy Tern (*Sternula nereis nereis*)

C.1.7 Limitations

<u>Flora</u>

Due to varying flowering times and seasonality of occurrence not all flora species that occur in the Site may have been recorded during the on-ground surveys. Short lived annuals, orchids and lilies that may be present

at the Survey Area which may have been missed because they were not able to be identified (they were not flowering) or they were not evident at this time of year (they were annual plants that had died back or not emerged at the time of survey).

As noted in section *C.1.4 Targeted Flora and Fauna Species Surveys*, and specifically **Table 3**, additional effort was applied to survey for threatened orchid species during their likely peak flowering period. Overall, it is unlikely that species of conservation significance were not appropriately considered in the survey/assessment.

Fauna

The fauna assessment (except for direct searches of nests and dens etc as outlined above) was limited to a habitat assessment for fauna species, including the ground truthing of potential habitats for significant fauna species that were identified in database searches.

Micro Flora and Fauna

The flora and fauna surveys excluded micro-flora and micro-invertebrates such as algae, zooplankton, and cave-dwelling fauna.

PART D – RESULTS

D.1 VEGETATION COMMUNITY IDENTIFICATION, DESCRIPTIONS AND CONSERVATION STATUS

Two native vegetation types occur in the Survey Area (**Figure 5**); Coastal scrub on alkaline sands (TASVEG code - SCA) and Coastal grassland and herbfield (TASVEG code – GCH). The remainder of the Survey Area is comprised of access tracks (some currently used and others not), roads, and a disused sand pit and its associated historical disturbance (naturally regenerating) area.

Table 6 provides a list of the TASVEG 4.0 codes mapped in the Survey Area.

The plant species observed within the Survey Area during surveys are listed in **Attachment 5.**

Table 6. TASVEG 4.0 mapping categories recorded in the Survey Area

TASVEG CODE	TASVEG COMMUNITY NAME	Threatened native vegetation community#	EPBC-listed or equivalent ecological community	Extent in the Survey Area (hectares)
SCA	Coastal scrub on alkaline sands	**No**	**No**	14.356
GHC	Coastal grassland and herbfield	**No**	**No**	2.470
FUM	Extra urban miscellaneous			0.887

Threatened native vegetation communities are those listed in Schedule 3A of the *Nature Conservation Act 2002*

Comments are provided below for each vegetation type and mapping unit recorded in the Survey Area.

D.1.1 Coastal scrub on alkaline sands (TASVEG code - SCA)

The dominant species are *Leptospermum laevigatum* and *Myoporum insulare*. In the Survey Area this mapping unit is represented by a relatively species poor scrub community dominated by *Leptospermum laevigatum* with sub-dominant to occasional *Allocasuarina verticillata*, *Acacia longifolia* subsp. *sophorae* and sparse numbers (and canopy coverage) of *Myoporum insulare*.

The ground layer species diversity is low to very with most of the ground covered by leaf litter, mosses and lichens and/or exposed lime sands. Common herbs include *Tetragonia implexicoma*, *Parietaria cardiostegia*, *Threlkeldia diffusa*, *Ajuga australis, Podolepis jaceoides, Dichondra repens, Senecio biserratus*, *Wahlenbergia gracilenta*, and *Urtica incisa*.

A few rush and sedge species occur in the ground layer where there are canopy openings and include *Juncus pallidus, J. pauciflora*, and *Lepidosperma concavum*.

The following images depict the various forms of this scrub type in the Survey Area.

D.1.2 Coastal grassland and herbfield (TASVEG code – GCH)

This community is dominated by *Austrofestuca littoralis, Austrostipa stipoides, Poa poiformis* and *P. labillardierei*. Common non-dominant grasses include *Distichlis distichophylla* and the sedge *Ficinia nodosa*. Herbs include *Acaena nova-hollandiae, Carpobrotus rossii, Centaurium erythraea, Pelargonium australe, Ranunculus lappaceus, Samolus repens, Apium prostratum, Dichondra repens, Tetragonia tetragonioides, Rhagodia candolleana* and *Selliera radicans*.

The *Lowland Native Grasslands of Tasmania* ecological community was not identified in the PMST but is considered here given the presence of a TASVEG potential analogue - Coastal grassland and herbfield (TASVEG – Code GCH).

In this case, the GCH in the Survey Area –

(1) has less than 50% *Poa labillardierei* coverage of the native perennial tussock grasses (it is 0 to 20%) present in the GCH patches, and/or

(2) Patch size is less than 1 hectare, and/or

(3) Weeds (perennial) make up 20% or more than the total ground cover of the patch.

- which excludes it from *the Lowland Native Grasslands of Tasmania* ecological community listed on the EPBC Act[3].

The following images depict the various forms of this vegetation type in the Survey Area.

[3] Department of the Environment, Water, Heritage and the Arts (2010). Lowland Native Grasslands of Tasmania — a nationally threatened ecological community. Environment Protection and Biodiversity Conservation Act 1999 Policy Statement 3.18. Australian Government, Canberra.

D.1.3 Extra-urban miscellaneous (TASVEG code – FUM)

Areas of previous disturbance such as roadways, roadsides, access tracks and the disused sand pit are included in this mapping unit. Native species are present and include for example *Austrofestuca littoralis, Austrostipa stipoides, Poa poiformis* and *P. labillardierei*. Common non-dominant grasses include *Distichlis distichophylla* and the sedge *Ficinia nodosa*. Herbs include *Acaena nova-hollandiae, Carpobrotus rossii, Centaurium erythraea, Pelargonium australe, Ranunculus lappaceus, Samolus repens, Dichondra repens, Tetragonia tetragonioides,* and *Selliera radicans*.

Species listed on the TSPA are occasionally present, especially in areas where the canopy allows sunlight to penetrate to the ground layer, and include *Eutaxia microphylla*, *Scaevola albida* and .

The following images depict the various forms of this mapping unit in the Survey Area.

D.2 THREATENED FLORA SPECIES

D.2.1 Overview of listed species in Survey Area

There are several threatened flora species recorded within 5,00m of the Survey Area based on data contained within the Natural Values Atlas (**Attachment 2**) and PMST (**Attachment 3**). **Table 7** provides a list of the listed threatened flora species recorded nearby or in Survey Area based on the results of surveys and NVA records.

D.2.2 Species Assessments

Six flora species protected by a statutory mechanism ('Threatened flora') were observed during combined surveys in the Survey Area (TSP Act and EPBC Act listing):

- *Acacia uncifolia*, coast wirilda (r/-)
- *Asperula minima*, mossy woodruff (r/-)
- *Eutaxia microphylla*, spiny bushpea (r/-)
- *Pimelea curviflora* var. *gracilis*, curved riceflower (r/-)
- *Roepera billardierei*, coast twinleaf (r/-)
- *Scaevola albida*, pale fanflower v/-)

Comments are provided below for each of the species present in the Survey Area.

<u>Coast wirilda (*Acacia uncifolia*)</u>

This shrub or small tree flowers summer to mid-autumn. It can be identified from its leaves. In Tasmania, *Acacia uncifolia* is found on soils derived from calcareous limestone in coastal heath, heathy scrub and dry open woodland with *Allocasuarina verticillata* emergents. Occurrences on mainland Tasmania are assumed to have originated from ornamental plantings. The observed population is not a 'new' location for the species; the species is already known to be widespread and locally abundant in the Marshall Bay – Leeka – Memana – West End area and also at Lady Barron and surrounding coastal flats which still support scrub vegetation.

It is estimated that the population (including seedlings) is 35 plants, with 16 plants requiring progressive removal to facilitate the Activity.

Plate 4. Photos of *Acacia uncifolia* and its habitat in the Survey Area

Table 7. Threatened flora species recorded within 5km of the Survey Area based on the NVA and PMST Reports

Species	Common Name	TSPA	EPBCA	Observation Count	Last Recorded	Comments about species in the Survey Area
Acacia uncifolia	coast wirilda	r		40	15-Mar-2018	**Present**. Generally associated with disturbed sand pit and tracks that connect to it.
Acrotriche cordata	coast groundberry	v		3	24-Nov-2015	**Not observed,** calcarenite absent, deep lime sands present. Observed in scrub on calcarenite to the north of the Survey Area.
Asperula minima	mossy woodruff	r		4	06-Nov-2018	**Present**. Localised in regenerating grassland adjacent to the disused section of Palana Road.
Asperula subsimplex		r		-	-	**Not observed.** Absent from Survey Area. Southwards of the Survey Area the species was observed in wet drainage area on GCH.
Banksia serrata	saw banksia	r		6	25-Mar-2014	**Not observed**. Habitat absent, species unlikely to have been overlooked.
Carex gunniana	mountain sedge	r		1	01-Jan-1000	**Not observed**. Habitat absent, species unlikely to have been overlooked. Recorded location on Flinders Island may be an error.
Diuris palustris	swamp doubletail	e		2	24-Nov-2022	**Not observed.** GCH habitat present. Surveys conducted during peak flowering period; no plants observed. Survey Area has been stock grazed for decades. Species observed in flower at Reedy Lagoon near West End Road when survey conducted at the Survey Area. Unlikely to have been overlooked.
Drosera glanduligera	scarlet sundew	r		1	08-Sep-2021	**Not observed.** Low nutrient, sandy or loamy soils in heathlands and woodlands are absent from the Survey Area.

Eutaxia microphylla	spiny bushpea	r	22	19-Nov-2019	**Present**. Widespread and locally abundant in the Marshall Bay area, with most locations in the Survey Area associated with old access tracks and roads near Palana Road.
Hydrocotyle comocarpa	fringefruit pennywort	r	1	10-Sep-2006	**Not observed.** Suitable habitat is present, and locally widespread along the edge of scrub. Surveys were conducted in October 2022 and 2023 to coincide with the species short flowering period.
Isopogon ceratophyllus	horny conebush	v	5	21-Mar-2014	**Not observed.** Habitat is marginally suitable, but the species prefers acidic sands in heathland which are absent from the Survey Area. This distinctive species was not observed and is unlikely to have been overlooked in the Survey Area.
Lasiopetalum baueri	slender velvetbush	r	1	01-Jan-1985	**Not observed.** No suitable low coastal scrub and heathland present.
Lepilaena patentifolia	spreading watermat	r	1	30-Oct-1972	**Not observed.** Habitat (wetlands, drains etc.) is absent.
Leucopogon affinis	lanceleaf beardheath	r	19	26-Sep-2017	**Not observed.** Habitat is suitable, but this distinctive species was not observed and is unlikely to have been overlooked in the Survey Area. Species recorded to the east of Palana Road in scrub.
Parietaria debilis	shade pellitory	r	3	29-Sep-2005	**Not observed.** The closely related *Parietaria cardiostegia* was observed to widespread and abundant in and adjacent to the drip zone of the scrub edge around the lime sand dunes.
Pimelea curviflora* var. *gracilis	curved riceflower	r	60	06-Nov-2018	**Present.** Widespread and locally abundant in the Marshall Bay area, with most locations in the Survey Area associated with old access tracks and roads near Palana Road.
Pomaderris intermedia	lemon dogwood	r	3	20-Nov-2017	**Not observed.** Habitat is suitable, but this distinctive species was not observed and is unlikely to have been overlooked in the Survey Area.
Pomaderris oraria* subsp. *oraria	bassian dogwood	r	5	20-Nov-2017	**Not observed.** Observed in scrub to the north of the Survey Area. Unlikely to have been overlooked in the Survey Area.

Pomaderris paniculosa* subsp. *paralia	shining dogwood	r		2	29-Sep-2005	**Not observed.** Observed in scrub to the north of the Survey Area. Unlikely to have been overlooked in the Survey Area.
Pterostylis cucullata* subsp. *cucullata	leafy greenhood	e	VU	4	13-Nov-2008	**Not observed**. GCH habitat present. Surveys conducted during peak flowering period; no plants observed. Survey Area has been stock grazed for decades. Species observed in flower at Reedy Lagoon near West End Road when survey conducted at the Survey Area. Unlikely to have been overlooked.
Ranunculus pumilio* var. *pumilio	ferny buttercup	r		1	26-Aug-2017	**Not observed.** Habitat absent (no seasonally wet areas).
Roepera billardierei	coast twinleaf	r		22	19-Nov-2019	**Present**. Locally abundant in open areas adjacent to scrub near the disused section of Palana Road, at the disused lime sand pit, and on the northern edge of a scrub patch on the edge of the Survey Area.
Scaevola albida	pale fanflower	v		79	19-Nov-2019	**Present.** Locally abundant in open areas adjacent to scrub near the disused section of Palana Road, at the disused lime sand pit, and on the access track that connects these areas.
Schenkia australis	spike centaury	r		1	15-Nov-1981	**Not observed.** GCH and SCA habitat present. Surveys conducted during peak flowering period; no plants observed. Unlikely to have been overlooked.
Schoenoplectus tabernaemontani	river clubsedge	r		1	01-Jan-1979	**Not observed.** Species recorded in NVA at a location recorded in 1979 by an unknown observer (see **Attachment** 7). The record has a 250m accuracy. The recorded location, and surrounds, was searched but the species was not relocated or observed more broadly.
Scleranthus fasciculatus	spreading knawel	v		1	30-Sep-2005	**Not observed**. Species may be present in GCH, or open areas adjacent to dense scrub. This distinctive species was not observed and is unlikely to have been overlooked in the Survey Area.

Spyridium parvifolium* var. *parvifolium	coast dustymiller	r	1	18-Oct-1976	**Not observed**. Habitat is suitable, but this distinctive species was not observed and is unlikely to have been overlooked in the Survey Area.
Styphelia esquamata	swamp beardheath	r	1	09-Dec-2012	**Not observed**. Habitat is suitable, but this distinctive species was not observed and is unlikely to have been overlooked in the Survey Area.

Key: TSP Act listings e = endangered, v = vulnerable, r = rare; EPBC Act listings CR = critically endangered, EN = endangered, VU = vulnerable

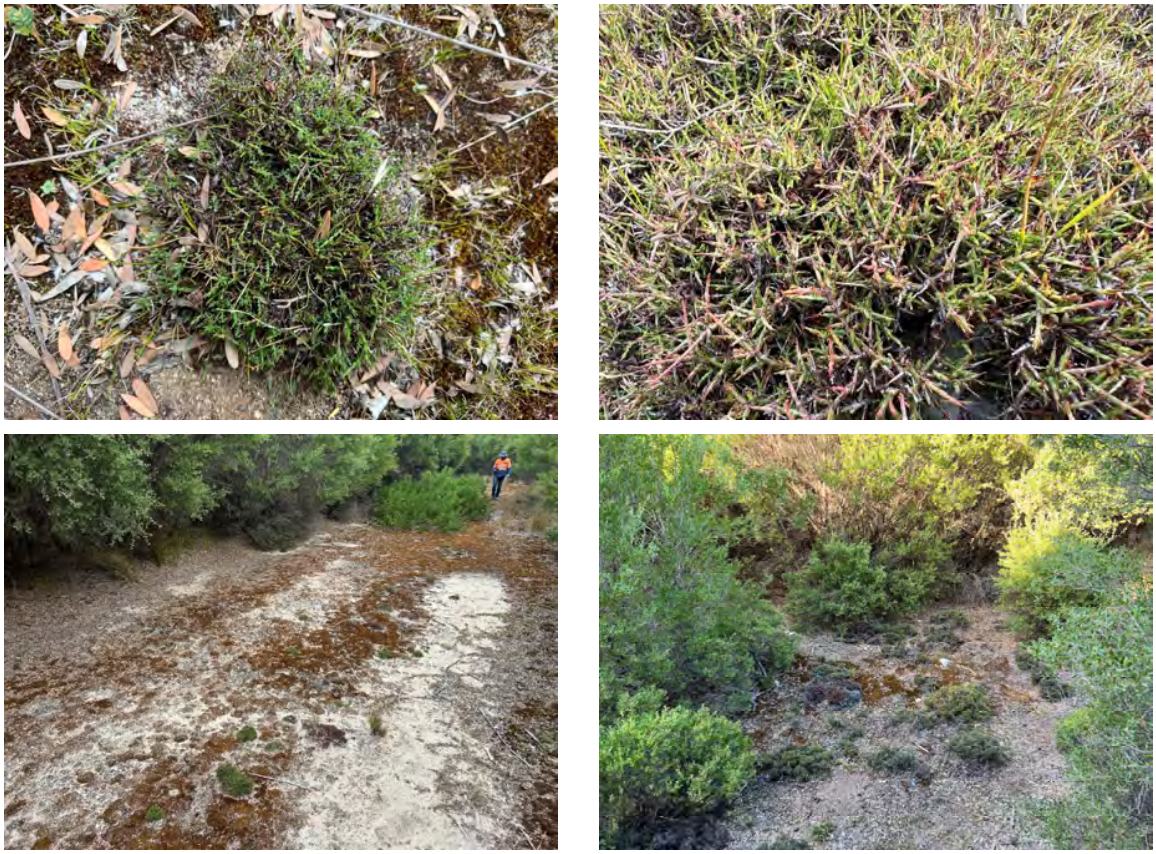
Spiny bushpea (*Eutaxia microphylla*)

Plants grow to between 30 and 40 centimetres high. The small, grey green, narrow to ovate leaves are 2.3 to 4 mm long and 0.6 to 0.9 mm wide. The single pea flowers have dark red keels, yellow-orange wings, and a yellow-orange standard with red markings on the rear. These are produced between July and October. On Flinders Island, *Eutaxia microphylla* mainly occurs in windswept coastal heathland on calcarenite. On mainland Tasmania, the species usually occurs in low open coastal shrubbery and on cliff edges (various substrates).

The observed populations are not a 'new' location for the species; the species is already known to be widespread and locally abundant in the Marshall Bay – Leeka – Memana – West End area with it being especially prominent in open grassy areas on various substrates such as stabilised dunes formed by lime sands, older dunes and calcarenite. Most occurrences in the Survey Area were observed in canopy openings associated with old or current tracks, open areas between scrub patches, and on the edge of scrub into the coastal herbfield and grasslands community (see **Plate 5**).

It is estimated that the population (including seedlings) is +700 plants, with approximately 200 plants requiring progressive removal to facilitate the Activity.

Plate 5. Photos of *Eutaxia microphylla* and its habitat in the Survey Area



Curved riceflower (Pimelea curviflora var. gracilis)

Pimelea curviflora var. *gracilis*, also known as curved rice-flower, is a shrub in the family Thymelaeaceae and is endemic to Australia. It is a small, hairy shrub with greenish-yellow or red tubular flowers.

The observed populations are not a 'new' location for the entity; it is already known to be locally abundant in the Marshall Bay – Five Mile Jim Road – Leeka – Memana – West End area with it being especially prominent in open grassy areas on various substrates such as stabilised dunes formed by lime sands, older dunes and calcarenite. Many occurrences in the Survey Area were observed in canopy openings associated with old or current tracks, open areas between scrub patches, and on the edge of scrub into the coastal herbfield and grasslands community (see **Plate 6**) but does extend in very low numbers into the closed the scrub vegetation. The species is restricted to the eastern side of the Survey Area, on the older stabilised dune systems.

It is estimated that the population (including seedlings) is +700 plants, with approximately 200 plants requiring progressive removal to facilitate the Activity.

Plate 6. Photos of *Pimelea curviflora* var. *gracilis* and its habitat in the Survey Area

Pale fanflower (*Scaevola albida*)

A cushion-forming herb that spreads vegetatively by root suckers. In Tasmania the species is known from Flinders Island and on the northwest coast near Temma. The habitat of pale fanflower in Tasmania includes near-coastal scrubs, woodlands and grasslands, usually on calcareous sands, and it has also been observed colonising road margins. The species responds positively to disturbance, including fire, slashing or physical disturbance.

The observed populations are not a 'new' location for the species; the species is already known to be widespread and locally abundant in the Marshall Bay area. It is especially prominent in disturbed vegetation areas (access tracks, disused cleared areas etc.) and in open grassy areas on various substrates such as stabilised dunes formed by lime sands, older dunes and calcarenite (see **Plate 7**).

It is estimated that the population (including seedlings) is +400 plants, with approximately 200 plants requiring immediate removal to facilitate the Activity (track and shed construction).

Plate 7. Photos of *Scaevola albida* and its habitat in the Survey Area

Twin leaf (*Roepera billardierei*) syn. *Zygophyllum billardierei*

A perennial herb with ground spreading stems that are very branched and between 2040 mm long. It has distinctive flattened leaves divided into two oblong to wedge-shaped leaflets of 1-3 cm long (see **Figure 8**). Flowers are pale to bright yellow (fading to white with age) and of 4 petals, 8-15 mm long. Fruit is a 4-angled capsule, containing 1-2 brown, wrinkled to granular seeds in each cell. In Tasmania, it is only known from calcareous sands, forests, wetland and heath communities on the Furneaux Group.

The observed populations are not a 'new' location for the species; the species is already known to be localised in the Marshall Bay – Leeka – Memana – West End area It is especially prominent in open areas (mainly the edge of scrub vegetation where it meets coastal grassland, agricultural lands and wetlands/marshes).

It is estimated that the population (including seedlings) is +45 plants, with approximately 18 plants requiring immediate removal to facilitate the Activity.

Plate 8. Photos of *Roepera billardierei* and its habitat in the Survey Area

D.3 THREATENED FAUNA SPECIES

D.3.1 Overview of listed species in Survey Area

There are several threatened fauna species recorded within 5,000 m of the Survey Area based on data contained within the Natural Values Atlas (**Attachment 2**) and PMST (**Attachment 3**).

Table 8 provides a list of the State listed threatened fauna species recorded near the Survey Area, and/or those species which are identified in the PMST that based on the initial assessment in **Attachment 4** required further assessment as to their occurrence or likely occurrence in the Survey Area.

No threatened fauna species were directly observed during the survey of the Survey Area.

Table 8. Threatened and conservation significant fauna species considered in the assessment

Common name *Species name*	**Habitat present?** **If yes, comments about likelihood of presence.**
Birds	
blue-winged parrot *Neophema chrysostoma*	**No.** No eucalypt forest or woodland present.
forty-spotted pardalote *Pardalotus quadragintus*	**No.** No eucalypt forest or woodland present. Not a known colony (see **Figure 12**).
swift parrot *Lathamus discolor*	**No.** Key foraging species absent and not a known nesting site, no eucalypt forest or woodland (for nesting) is present.

wedge-tailed eagle *Aquila audax* subsp. *fleayi*	**Yes.** Foraging habitat is present in Survey Area.
white-bellied sea-eagle *Haliaeetus leucogaster*	**Yes.** Foraging habitat is present in Survey Area.
Mammals	
New Holland Mouse *Pseudomys novaehollandiae*	**Possibly**. Some vegetation present at the western edge of the Mining Lease, but is outside (and buffered), contains floristic components that may represent possible foraging habitat; vegetated dunes. While not directly impacted, the species ought to be further considered to provide an impact determination.
Amphibians	
Green and gold frog *Litoria raniformis*	**No** suitable habitat (i.e. freshwater wetlands, coastal freshwater lagoons and swamps, freshwater dams) in the Survey Area. The Survey Area is within the potential range (**Figure 10**) but habitat (breeding and overwintering) is absent.
Striped Marsh Frog *Lymnodynastes peroni*	**No** suitable habitat (i.e. freshwater wetlands, coastal freshwater lagoons and swamps, freshwater dams) in the Survey Area. The Survey Area is within the potential range (**Figure 13**) but habitat is absent.
Fish	
Australian grayling *Prototroctes maraena*	**No.** A migratory freshwater and marine species. The Survey Area is within the potential range (**Figure 16**) but habitat (waterways, creeks and/or streams) is absent.
Eastern Dwarf Galaxias *Galaxiella pusilla*	**No.** On Flinders Island the species is known from wet heathlands, swamps, backwaters of streams and rivers, and drains. The Survey Area is within the potential range (**Figure 14**) but habitat is absent.
Invertebrates	
chaostola skipper *Antipodia chaostola*	**No.** No food source (*Gahnia* species) is present in the Survey Area, and this invertebrate species is not known from Flinders island. The Survey Area is within the potential range (**Figure 11**) but habitat is absent.
Reptiles	
Tussock skink *Pseudemoia pagenstecheri*	**Possibly**. Some vegetation present at the western edge of the Mining Lease, but is outside (and buffered), contains floristic components that may represent possible foraging habitat; vegetated dunes. While not directly impacted, the species ought to be further considered to provide a impact determination.. Grassland with *Poa* tussock is present.

D.3.2 Threatened Fauna Habitat Assessment – Aves

Bird species

Table 9 provides a list of the avifauna which were considered in more detail as to the potential impact the Activity may have on them directly (e.g., physical impact to individuals, impacts to their habitat) or indirectly (e.g., secondary impacts such as changes to their breeding behaviour).

Table 9. Summary table of Survey Area relevant avifauna and associated statutory conservation listings

Scientific Name	Common Name	EPBC Act-listed	TSP Act-listed
Australian Fairy Tern	*Sternula nereis nereis*	Vulnerable	vulnerable
Eastern Hooded Plover	*Thinornis cucullatus cucullatus*	Vulnerable	-
Little Tern	*Sternula albifrons*	Migratory	-
Short-tailed Shearwater	*Ardenna tenuirostris*	Migratory	-
Wedge-tailed Eagle	*Aquila audax fleayi*	Endangered	endangered
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Marine	vulnerable

<u>Beach associated avifauna</u>

Several bird species are associated with beach habitats (e.g., dune, beach and back dune environments associated with modern/recent dunes), with several having been recorded at or near Marshall Bay (Figures 7 and 17) including:

- Australian Fairy Tern
- Eastern Hooded Plover
- Little Tern.

Marshall Bay has a typical beach profile of beach, and dunes. As noted by Slee (pp. 12-13 of **Attachment 8**), at the west are the modern foredune and back dunes behind Marshall Beach while inland are a series of elongated west-to-east trending parallel dunes that rise to 24 m above sea level. These inland dunes are largely vegetated and stable in comparison to the foredunes which are dominated by grasses, herbs, wind pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

The Survey Area does not include beach, foredune, back dune, or modern dunes (pg. 18 of **Attachment 8**). Furthermore, the Mining Lease largely excluded these features when granted.

There will be no activities that would generate noise, dust, or other form of emissions (e.g. light) that may or would disturb nesting and foraging beach dwelling bird species. Lighting is to be provided in the shed where sand would be screened and/or stored. Machinery, vehicles, and other road-using equipment will be fitted with lights as required by law.

Plate 9. Marshall Bay beach and dune habitat outside the Mining Lease

Short-tailed Shearwater (*Ardenna tenuirostris*)

The short-tailed shearwater or slender-billed shearwater (*Ardenna tenuirostris*; formerly *Puffinus tenuirostris*), also called yolla or moonbird, and commonly known as the muttonbird in Australia, is the most abundant seabird species in Australian waters, and is one of the few Australian native birds in which the chicks are commercially harvested. It is a migratory species that breeds mainly on small islands in Bass Strait and Tasmania and migrates to the Northern Hemisphere for the boreal summer.

The largest breeding colonies of Short-Tailed Shearwaters are in the Furneaux Islands and every year the birds make a 30,000 km round trip between Alaska and breeding sites in South-Eastern Australia. By mid-April, the new fledglings are strong enough to make their migration north to Alaska.

The Survey Area was found to not contain a short-tailed shearwater colony, or any evidence of occupation by shearwaters (i.e. no burrow systems). The Survey Area is well inland of the immediate coast, with the nearest

known short-tailed shearwater colonies at Marriott Reef (see Tanners Bay Offshore islands mapped on **Figure 17** which are north-west of the Survey Area) and a group to the south including Wybalena Island, Bird Island and Settlement Point (near Emita) (Skira *et al.* 1996).

There will be no activities that would generate noise, dust, or other form of emissions that may or would disturb nesting and foraging beach dwelling bird species.

Wedge-tailed eagle (*Aquila audax fleayi*)

This eagle subspecies is found only in Tasmania and occurs throughout the State including large offshore islands. It hunts over a wide range of habitats, but nests only in old-growth trees in native forests. Bird densities are highest in areas with mosaics of forest, farmland, grassland, wetlands, and rivers. Eagles feed mainly on rabbits, hares, wallabies, possums, birds such as native hens and ravens and carrion.

Nests are usually in tall eucalypt trees in large tracts (more than 10 ha) of old-growth eucalypt or mixed forest. Nest trees are amongst the largest in a locality. They are in sheltered positions on leeward slopes, between the lower and mid slopes and with the top of the tree usually lower than the ground level of the top of the ridge.

The Recovery Plan (2006-2010) states for this species (emphasis added):

> '*Habitat critical to the survival* of the Tasmanian Wedge-tailed Eagle is defined by nesting habitat (see Mooney & Holdsworth 1991, Brown & Mooney 1997), as forests of predominantly old growth trees greater than 10ha in area and occurring on sites sheltered from prevailing strong winds. Trees selected for nesting are greater than 27 m in height, with few exceptions. Most nest sites have an eastern, south-eastern or southern aspect and the height of the nest is usually positioned below that of the ridge to the windward side.'

The Range and Habitat descriptors for the species (FPA 2022b) are below with comments about the Survey Area.

Range Type	Description	Comments about Survey Area
Core Range	N/A	NA
Potential Range	The whole of Tasmania including islands.	Flinders island
Known Range	N/A	NA
Potential habitat	Potential habitat for the wedge-tailed eagle comprises potential nesting habitat and potential foraging habitat. Potential foraging habitat is a wide variety of forest (including areas subject to native forest silviculture) and non-forest habitats. Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest. Nest trees are usually amongst the largest in a locality. They are generally in sheltered positions on leeward slopes,	**Potential foraging habitat PRESENT** The Survey Area and the area adjacent contains a wide variety of non-forest and non-forest habitats. **Potential nesting habitat ABSENT**

	between the lower and mid sections of a slope and with the top of the tree usually lower than the ground level of the top of the ridge, although in some parts of the State topographic shelter is not always a significant factor (e.g. parts of the northwest and Central Highlands). Nests are usually not constructed close to sources of disturbance and nests close to disturbance are less productive. More than one nest may occur within a territory but only one is used for breeding in any one year. Breeding failure often promotes a change of nest in the next year. [see FPA's Fauna Technical Note 1 and FPA's Fauna Technical Note 6 for more information].	There are no tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest.
Significant Habitat	Is all native forest and native non-forest vegetation within 500m or 1 km line-of-sight of known nest sites (where the nest tree is still present).	**Absent.** No known nest site within 500 m or 1 km line-of-sight.

Survey results and assessment of presence in the Survey Area

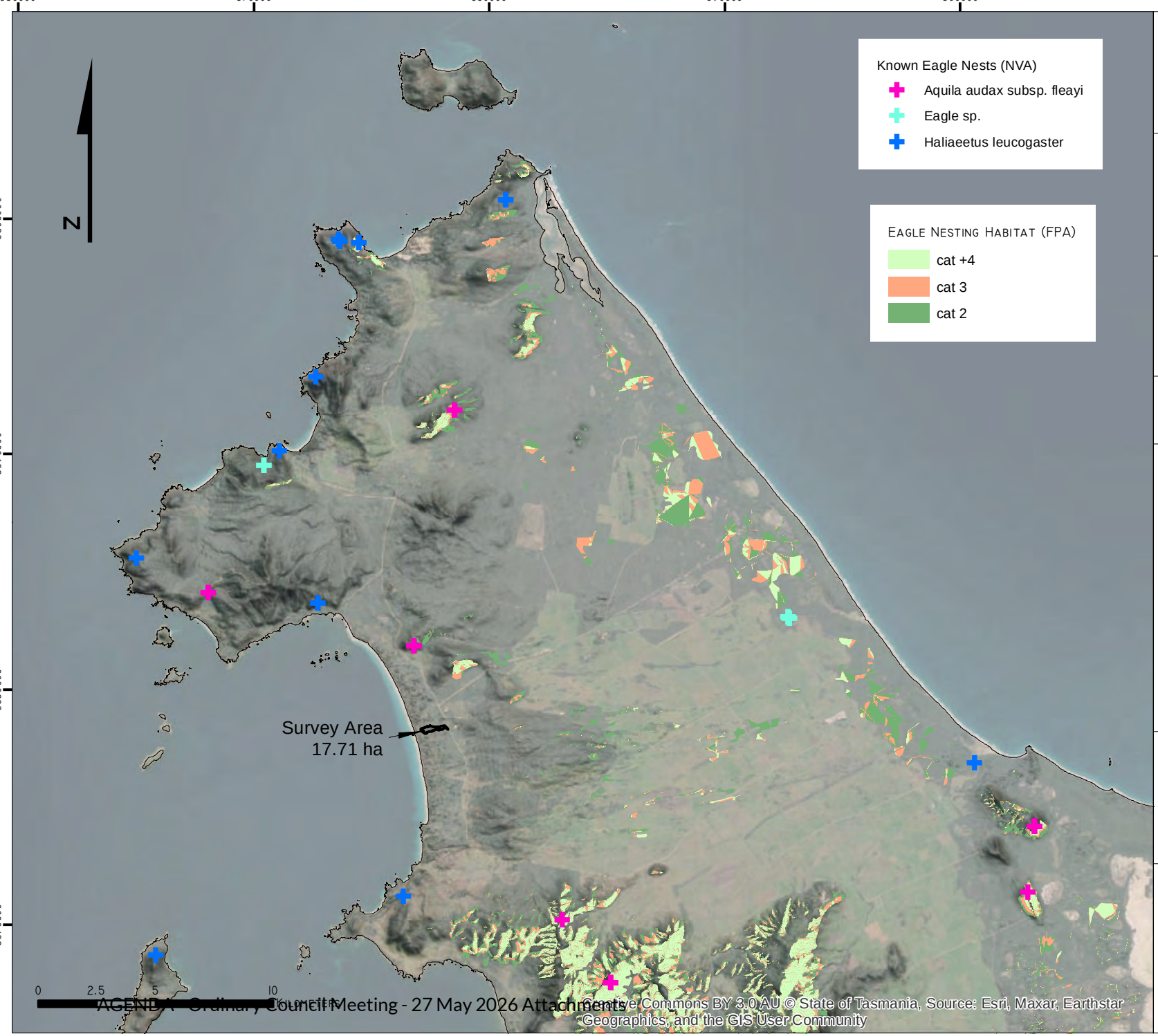
No wedge-tailed eagle nests occur on or near the Survey Area. Foraging habitat is present, and the species may use the broader landscape to forage and display.

There are few raptor nests in the region attributed to wedge-tailed eagle (see **Figure 8**), none of which occur within 1,000 m line-of-sight or 500 m of the Site. Significant habitat is therefore absent. There is also no modelled suitable nesting habitat within 2.5 kms of the Survey Area.

The nearest recorded nest is located on the slopes of a small hill eastwards of Palana Road, about 3.5kms north-northwest of the Survey Area. The pair of birds that use this nest, as part of a territory, are the pair likely to use the Marshall Bay area to forage and display.

Assessment of likely impact, management recommendations and offsets

The Activity is unlikely to cause any impact to the species. Accordingly, no management recommendations or offsets are made as none are warranted.



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NATURAL VALUES REPORT

Figure 8: Regional Eagle Nests and Nesting Habitat

TASMAP:

LGA: FLINDERS

Base data by TASMAP. © State of Tasmania
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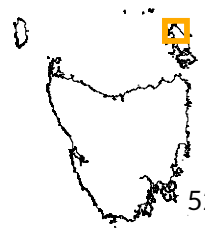

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SCALE: @A4 - NA

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DATE: 2 JUNE 2024

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NATURAL VALUES REPORT

Figure 9: Regional New Holland Mouse (Pseudomys novaehollandiae) Observations and Range

TASMAP:	LGA: FLINDERS

BASE DATA BY TASMAP. © STATE OF TASMANIA
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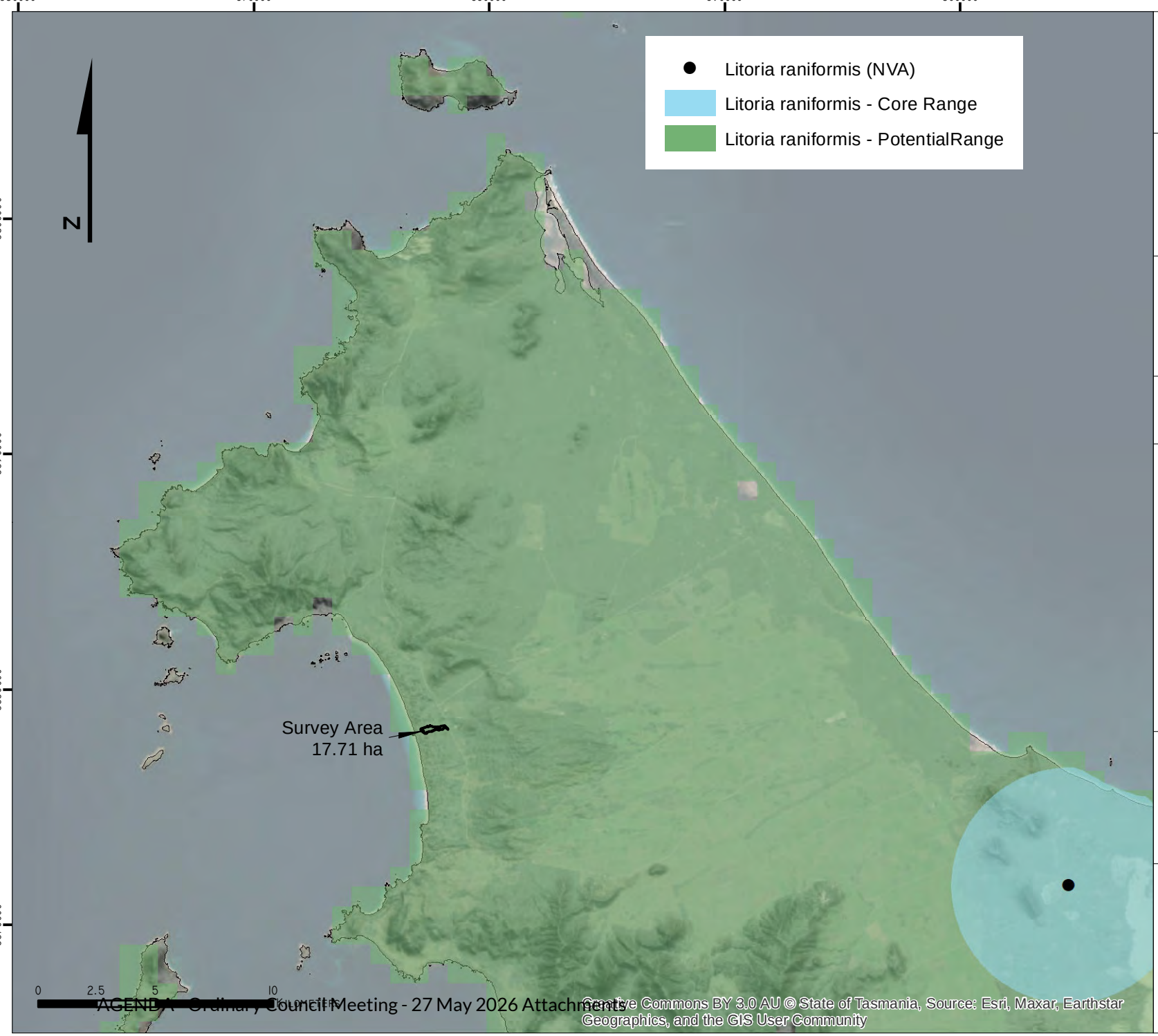

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Figure 10: Regional Green and Gold Frog (Litoria raniformis) Observations and Range

TASMAP:	LGA: FLINDERS

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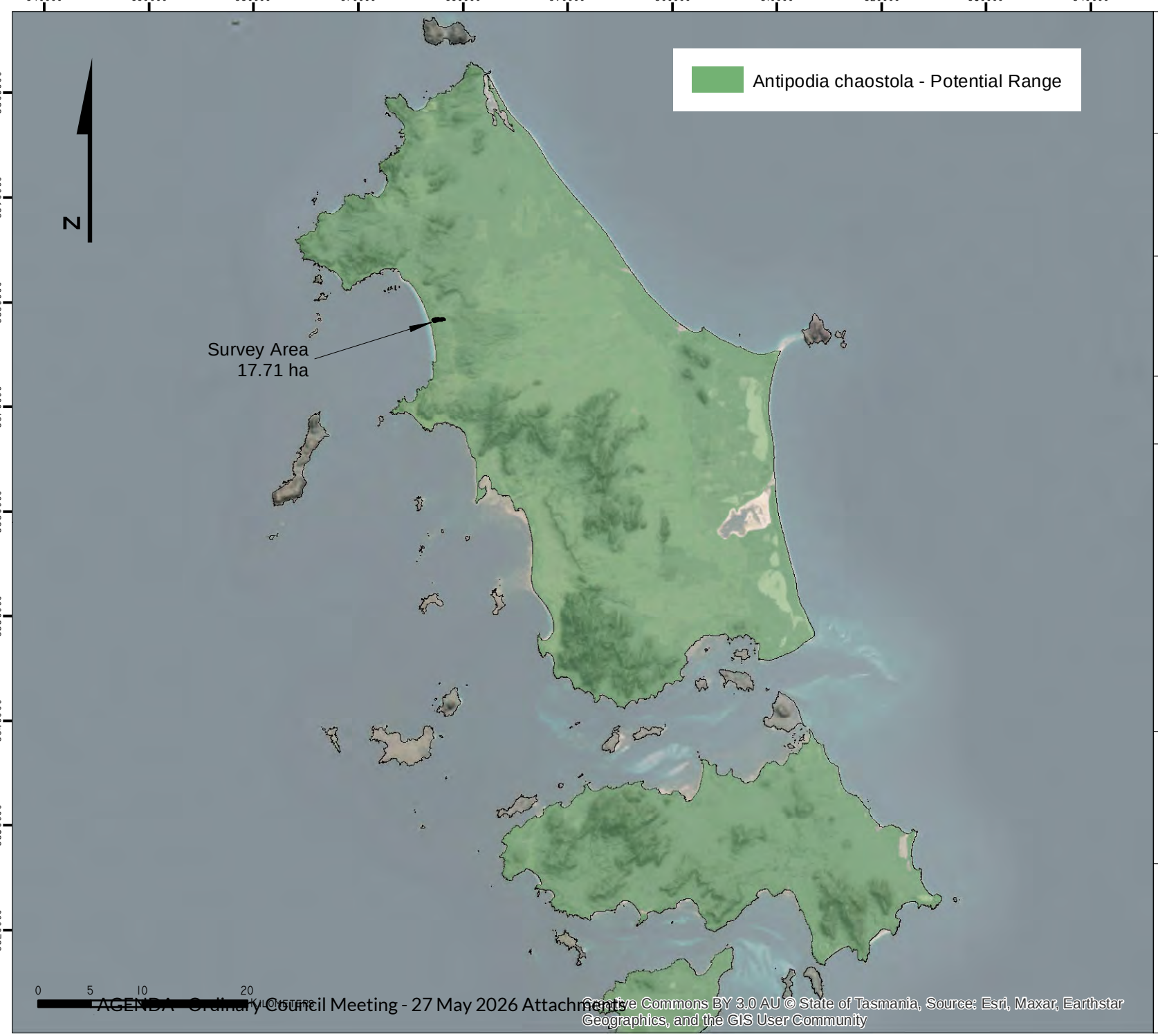

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NATURAL VALUES REPORT

Figure 11: Regional Chaostola Skipper (Antipodia chaostola) Observations and Range

TASMAP:	LGA: FLINDERS

NOTE:
Chaostola Skipper not recorded from Flinders Island

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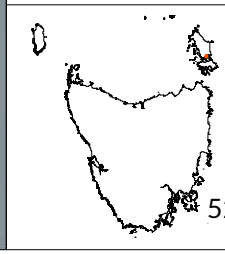

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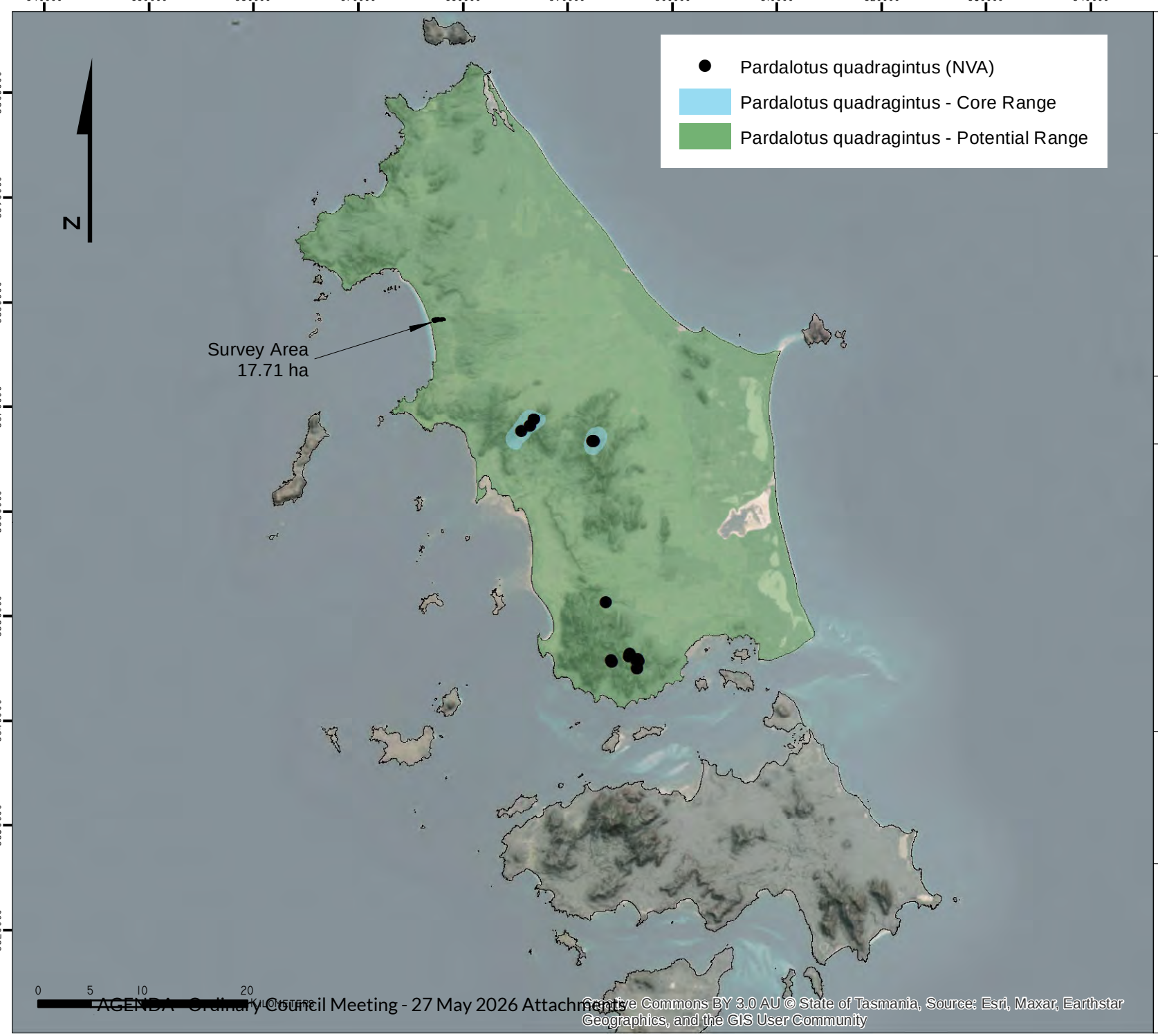

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NATURAL VALUES REPORT

Figure 12: Regional Forty-Spotted Pardalote (Pardalotus quadragintus) Observations and Range

TASMAP:	LGA: FLINDERS

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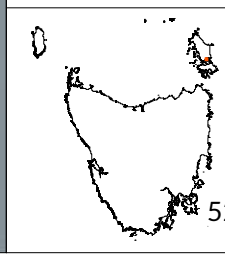

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
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DATE: 2 JUNE 2024

White-bellied sea eagle (Haliaeetus leucogaster)

The white-bellied sea eagle is widely distributed from India to Australia. Key sites in Tasmania include the Tamar River estuary, Tasman Peninsula, and the Bass Strait Islands. They nest and forage mainly near the coast but will also live near large rivers and lakes inland, often moving on a seasonal basis.

The nest of the white-bellied sea eagle is similar in construction to the wedge-tailed eagle and when resources are limited, competition for nest sites between the two species can occur. As with the wedge-tailed eagle, the white-bellied sea eagle nests are traditional. More than one nest may occur within a territory, but only one is used in any one year. The breeding season occurs between August and January inclusive with eagles being particularly sensitive to disturbance early in this period.

The Range and Habitat descriptors for the species (FPA 2020) are below with comments about the Survey Area.

Range Type	Description	Comments about Survey Area
Core Range	N/A	NA
Potential Range	The whole of Tasmania including islands.	Flinders island
Known Range	N/A	NA
Potential habitat	Potential habitat for the white-bellied sea-eagle species comprises potential nesting habitat and potential foraging habitat. Potential foraging habitat is any large waterbody (including sea coasts, estuaries, wide rivers, lakes, impoundments and even large farm dams) supporting prey items (fish). Potential nesting habitat is tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest within 5 km of the coast (nearest coast including shores, bays, inlets and peninsulas), large rivers (Class 1), lakes or complexes of large farm dams. Scattered trees along river banks or pasture land may also be used. The species nests and forages mainly near the coast but will also live near rivers, lakes and farm dams. Nest trees are amongst the largest in a locality. Nests are not usually constructed close to sources of disturbance and nests close to disturbance are less productive. More than one nest may occur within a territory but only one is used for breeding in any one year. Breeding failure often promotes a change of nest in the next year. [see Part I of the BVD, and FPA's Fauna Technical Note 1 for more information]	**Potential foraging habitat PRESENT** The Survey Area is inland more than 900m of the sea coast which is likely to be used as a foraging resource for fish. **Potential nesting habitat ABSENT** There are no tall eucalypt trees in large tracts (usually more than 10 ha) of eucalypt or mixed forest. There are no scattered trees along river banks or pasture land that may be used.

Significant Habitat	All native forest and native non-forest vegetation within 500 m or 1 km line-of-sight of known nest sites (where nest tree still present).	**Absent.** No known nest site within 500 m or 1 km line-of-sight.

Survey results and assessment of presence in the Survey Area

No white-bellied sea eagle nests occur on or near the Survey Area. Foraging habitat is present at Marshall Bay to the west of the Survey Area but not within or immediately adjacent to the Survey Area. Nests are recorded about 7 kms to the south-west (near Emita) and 9 kms to the north-northwest at Tanners Bay to the east of Pine Scrub (**Figure 8**). There is also no modelled suitable nesting habitat within 2.5 kms of the Survey Area.

Assessment of likely impact, management recommendations and offsets

The Activity is unlikely to cause any impact to the species even with it utilising the sea coast to forage. Accordingly, no management recommendations or offsets are made as none are warranted.

D.3.3 Threatened Fauna Habitat Assessment – Mammalia

New Holland Mouse (Pseudomys novaehollandiae)

The New Holland Mouse (*Pseudomys novaehollandiae*) is a small, nocturnal native rodent found in a small number of disjunct populations on the north and north-east coast of Tasmania including Flinders Island. It is similar in appearance to the introduced and relatively common House Mouse (*Mus musculus*) but can be distinguished by its relatively large eyes and lack of a 'mousey' odour. In Tasmania, it has been found in open heathlands, heathy woodlands, and vegetated sand dunes.

Habitat for the New Holland Mouse includes the following elements: coastal open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes, particularly where the following indicator species also occur: Common Aotus (*Aotus ericoides*), Tassel Rope Rush (*Hypolaena fastigiata*), Sand Sword sedge (*Lepidosperma concavum*) and grasstree (*Xanthorrhoea* species).

The Range and Habitat descriptors for the species (FPA 2022b) are below with comments about the Survey Area.

Range Type	Description	Comments about Survey Area
Core Range	The core range of the New Holland mouse is a 3 km (radius) buffer centred on the known sites (see **Figure 9**).	Survey Area is not in the Core Range.
Potential Range	The potential range of the New Holland mouse includes the core range and specialist-defined extensions of the core range that may support the species but are as yet largely unsurveyed (extends to within c. 15 km inland) from between Boltons	Flinders island

	Beach (east coast) around to East Devonport (north coast), including the Furneaux islands.	
Known Range	N/A	NA
Potential habitat	Potential habitat for the New Holland mouse is heathlands (mainly dry heathlands but also where dry heathlands form a mosaic with other heathland, moorland and scrub complexes), heathy woodlands (i.e. eucalypt canopy cover 5-20%), *Allocasuarina*-dominated forests on sandy substrates (not dolerite or basalt), and vegetated sand dunes. Key indicator plant species include (but are not restricted to) *Aotus ericoides, Lepidosperma concavum, Hypolaena fastigiata* and *Xanthorrhoea* spp.	**Potential foraging habitat ABSENT** The Survey Area does not support heathlands, heathy woodlands, or *Allocasuarina*-dominated forests (*A. verticillata* is present as a species, but it is not the canopy dominant) on sandy substrates. Vegetated sand dunes are present at the western side of the Mining Lease but these are outside the Survey Area. Of note is that the key foraging species of *Aotus ericoides, Lepidosperma concavum, Hypolaena fastigiata and Xanthorrhoea* spp. are absent or sparse (only *Lepidosperma concavum* has any coverage but is sparse because the dominant sedge is *Lepidosperma gladiatum* due to the proximity to Marshall Beach coastal dune system).
Significant Habitat	Significant habitat for the New Holland mouse is all potential habitat within the core range of the species.	**Absent.** The Survey Area is not in the Core Range (see **Figure 9**), and it also supports no 'potential habitat'.

Survey results and assessment of presence in the Survey Area

There are no known records of New Holland Mouse within 5 kms of the Site. Core habitat is therefore absent, because there are no known sites within 3 km of the Survey Area (see **Figure 9**).

The Survey Area does not support heathlands, heathy woodlands, or *Allocasuarina*-dominated forests (*A. verticillata* is present, but is not the canopy dominant) on sandy substrates.

Vegetated sand dunes are present at the western side of the Mining Lease, but these are outside the Survey Area. Of note is that the key foraging species of *Aotus ericoides, Lepidosperma concavum, Hypolaena fastigiata and Xanthorrhoea* spp. are absent or sparse (only *Lepidosperma concavum* has any coverage but is sparse because the dominant sedge is *Lepidosperma gladiatum* due to the proximity to Marshall Beach coastal dune system).

Given this, New Holland Mouse is unlikely to be present even in the vegetated dunes that occur at the far western side of the Mining Lease. Vegetated dunes extend beyond the Mining Lease on private land (same landowner as the Mining Lease is located) and into the Marshall Bay Conservation Area which protects the beach, foredune and some back dune environment.

Assessment of likely impact, management recommendations and offsets

The Activity is unlikely to cause any impact to the species. Accordingly, no management recommendations or offsets are made as none are warranted.

D.3.4 Threatened Fauna Habitat Assessment – Reptiles and Amphibians

Tussock skink (*Pseudemoia pagenstecheri*)

In Tasmania, the Tussock Skink, a ground-dwelling lizard, occurs in grassland and grassy woodland habitats at a range of elevations. Records of the species in Tasmania are in small, disconnected patches of habitat in the Midlands, inland near Cradle Mountain and the eastern Bass Strait islands.

Habitat includes the following elements: treeless tussock grassland and grassy open woodland at virtually any elevation where suitable habitat is present; typical habitat in the warmer lowland part of the range is native grassland dominated by *Poa labillardierei* (tussock grass) and species of *Rytidosperma* (wallaby grasses), *Themeda triandra* (kangaroo grass) and *Microlaena stipoides* (weeping grass).

The Range and Habitat descriptors for the species (FPA 2022b) are below with comments about the Survey Area.

Range Type	Description	Comments about Survey Area
Core Range	Is a 500 m (radius) buffer centred on the known sites.	No known sites within 500m of the Survey Area.
Potential Range	Includes the core range and specialist defined extensions of the core range that may support the species based on habitat characteristics but are as yet largely unsurveyed (includes the majority of mapped native lowland and highland grasslands throughout the Midlands, Fingal Valley and northwest grasslands).	Flinders island
Known Range	N/A	NA
Potential habitat	Grassland and grassy woodland (including rough pasture with paddock trees), generally with a greater than 20% cover of native grass species, especially where medium to tall tussocks are present.	**Potential habitat PRESENT in Survey Area** Grassy woodlands absent. Grassland is present in the Survey Area which supports patches of the GCH mapped vegetation. These are described at section *C.1.2 Coastal grassland and herbfield (TASVEG code – GCH).* Within the Survey Area (i.e. those areas to be affected by the Activity plus a buffer), and as indicated in **Plate 8**, the grasslands present are not dominated by *Poa* tussocks.

Significant Habitat	N/A	N/A

Survey results and assessment of presence in the Survey Area

Suitable habitat is absent because there is no *Poa labillardierei* grasslands, or grassy forests dominated by *Poa* species. There are no known locations within 500 m of the Survey Area, so the Survey Area is not within the Core Range, but it is within the Potential Range (**Figure 15**).

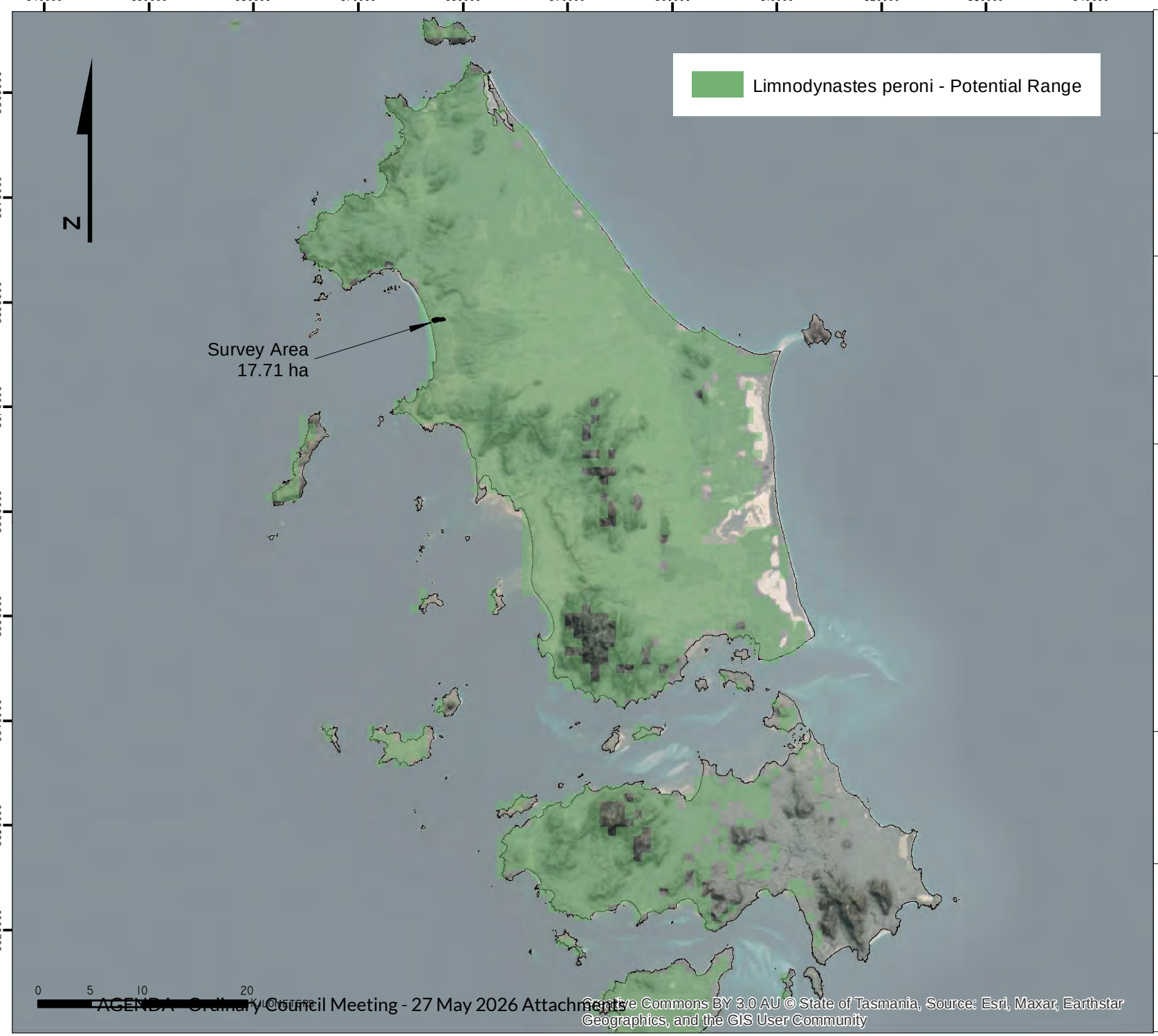
The coastal grasslands and herbfield (described at section *C.1.2 Coastal grassland and herbfield (TASVEG code – GCH)* present in the Survey Area are dominated by *Austrofestuca littoralis, Austrostipa stipoides, Poa poiformis* and to a much lesser extent, *P. labillardierei*. *Poa labillardierei* is no more than 20% of the native perennial tussock cover, with its foliage cover ranging from 0 up to 20% (the site is not stock grazed, so this cover reflects natural herbivory pressures). Within the Survey Area (i.e. those areas to be affected by the Activity plus a buffer), and as indicated in **Plate 8**, the grasslands present are not dominated by *Poa* tussocks.

Common non-dominant grasses include *Distichlis distichophylla* and the sedge *Ficinia nodosa*. Herbs include *Acaena nova-hollandiae, Carpobrotus rossii, Centaurium erythraea, Pelargonium australe, Ranunculus lappaceus, Samolus repens, Apium prostratum, Dichondra repens, Tetragonia tetragonioides, Rhagodia candolleana* and *Selliera radicans*.

Grasslands with a greater *Poa* coverage do occur in the Mining Lease (see **Plate 3**) but these are northwards and south-westwards of the Survey Area in other landscape depressions.

Assessment of likely impact, management recommendations and offsets

There is unlikely to be any significant impact to the species because suitable habitat is largely absent from the Survey Area; areas with a higher percentage of *Poa* cover mainly occur in the buffer area applied to the resource to be extracted (areas outside the Survey Area were observed to have upwards of 90% *Poa* coverage). No management recommendations or offsets are made as none are warranted.



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NATURAL VALUES REPORT

Figure 13: Regional Striped Marsh Frog (Limnodynastes peroni) Observations and Range

TASMAP:	LGA: FLINDERS

NOTE:
Striped Marsh Frog not recorded from Flinders Island

BASE DATA BY TASMAP. © STATE OF TASMANIA
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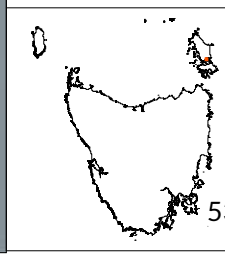

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DATE: 2 JUNE 2024

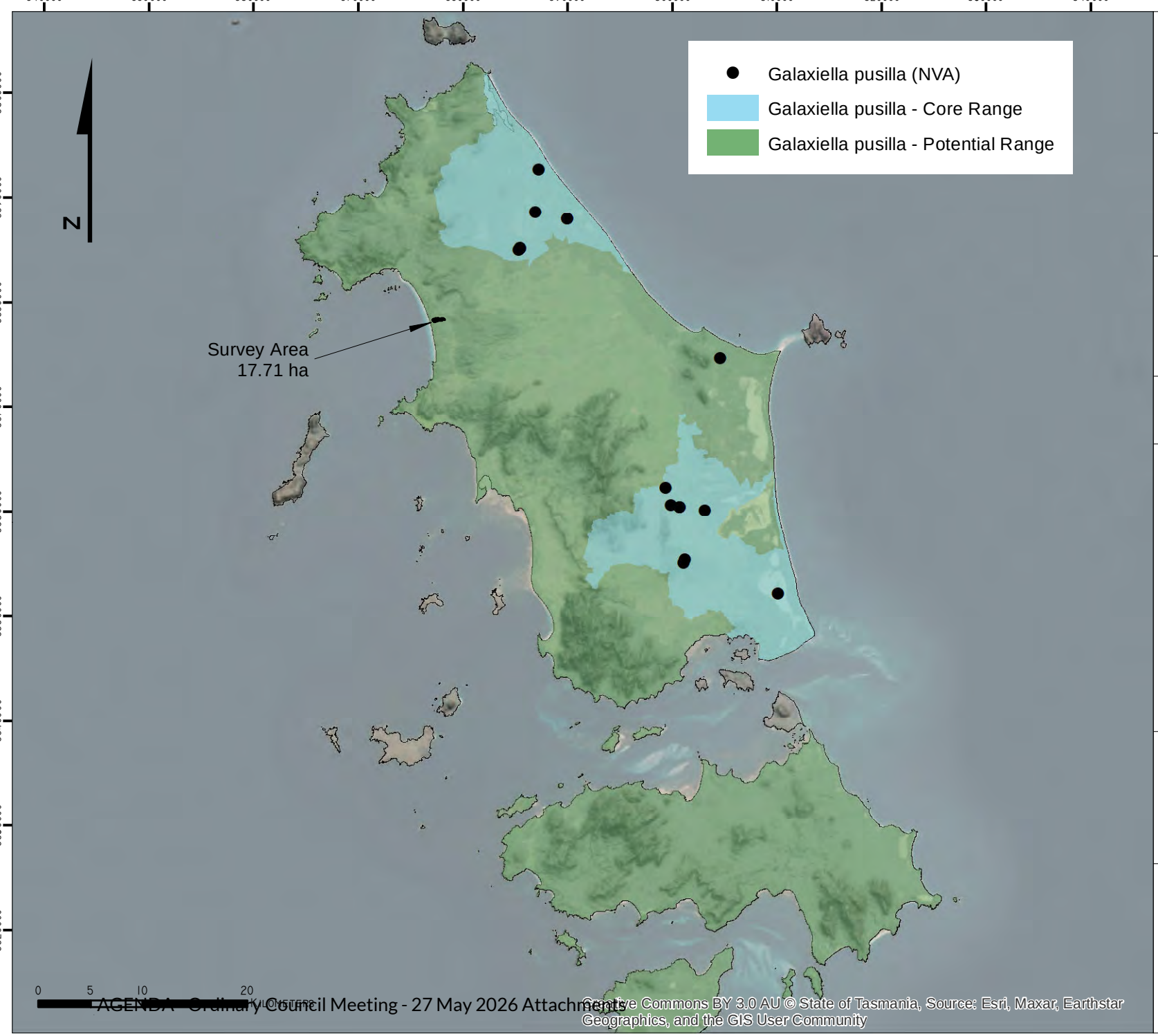

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Figure 14: Regional Eastern Dwarf Galaxias (Galaxiella pusilla) Observations and Range

TASMAP:	LGA: FLINDERS

BASE DATA BY TASMAP. © STATE OF TASMANIA
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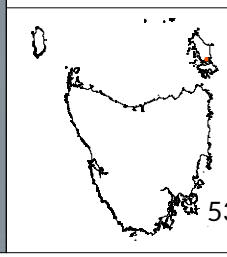

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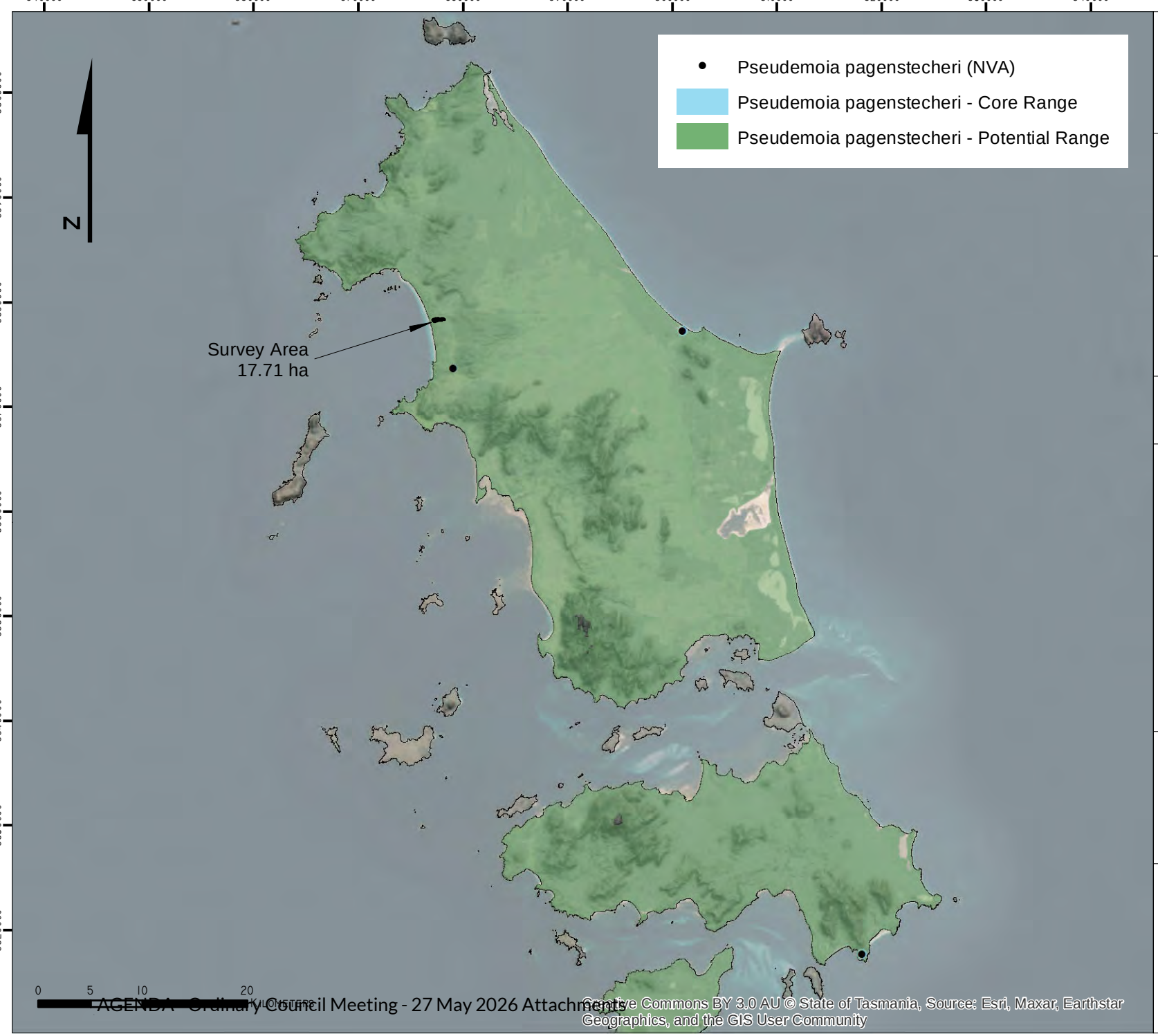

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NATURAL VALUES REPORT

Figure 15: Regional Tussock Skink (Pseudemoia pagenstecheri) Observations and Range

TASMAP:	LGA: FLINDERS

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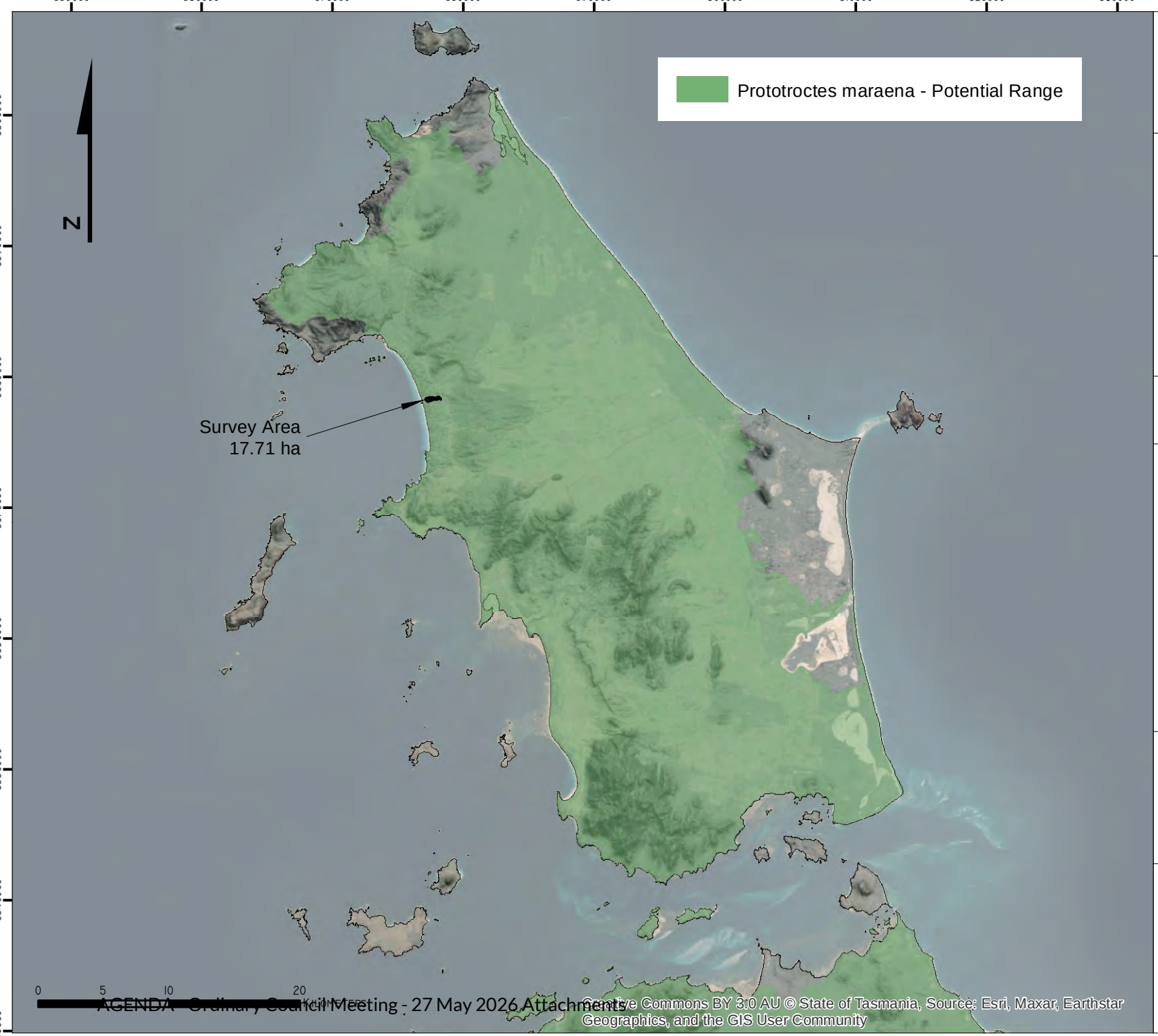

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NATURAL VALUES REPORT

Figure 16: Regional Australian Grayling (Prototroctes maraena) Observations and Range

TASMAP:	LGA: FLINDERS

NOTE:
Australian grayling not recorded from Flinders Island

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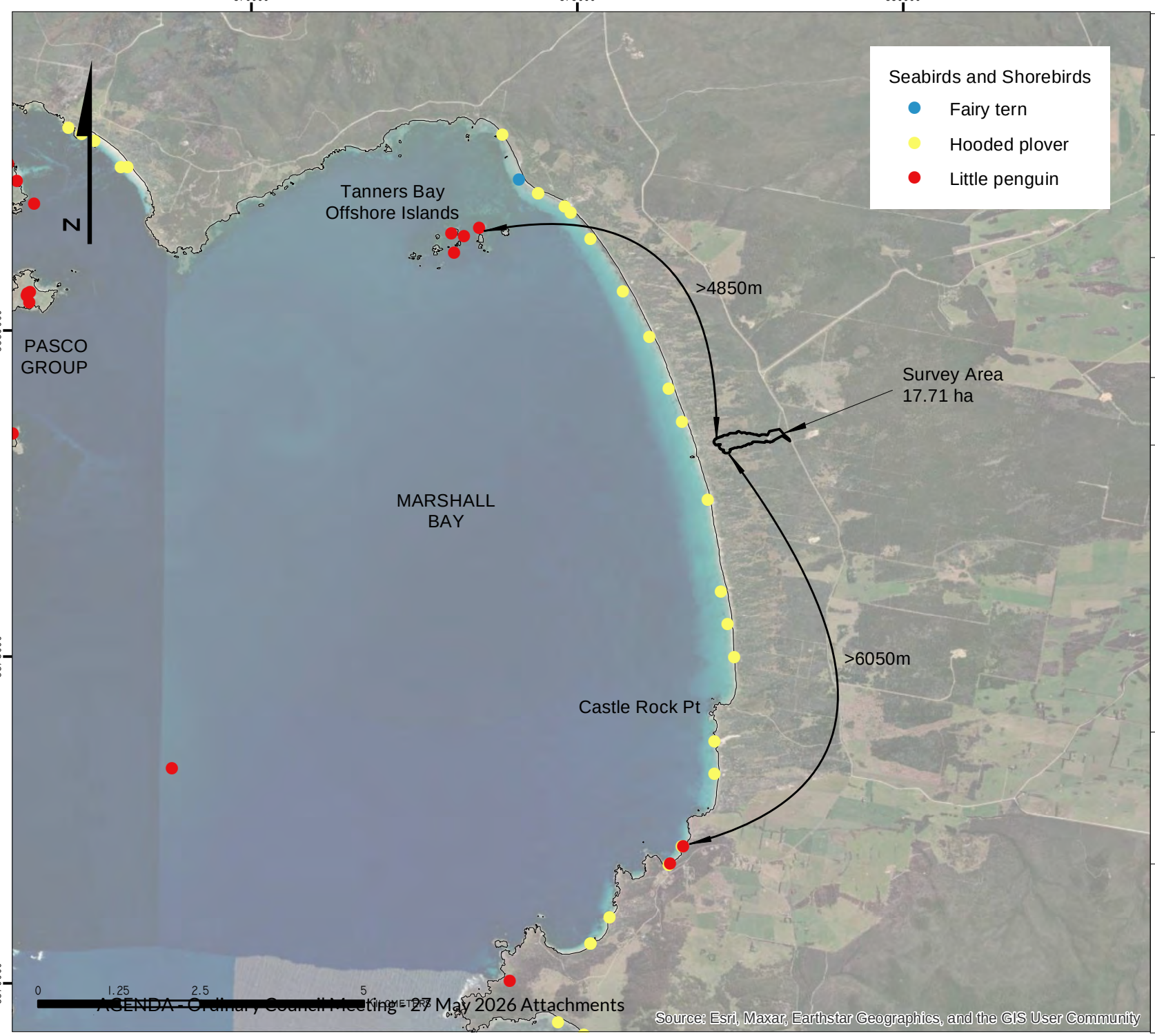

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Figure 17: Seabird and Shorebird Observations

TASMAP:	LGA: FLINDERS

BASE DATA BY TASMAP. © STATE OF TASMANIA
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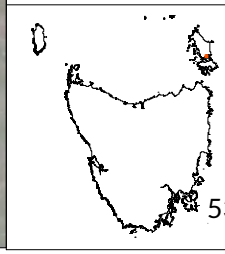

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 2 JUNE 2024

D.4 DECLARED AND ENVIRONMENTAL WEEDS

Two plant species listed as a *Declared Weed* on the *Biosecurity Act 2019* were recorded in the Survey Area, all were associated with the disused section of Palana Road:

- Horehound, *Marrubium vulgare*, and
- Slender thistle, *Carduus pycnocephalus*.

These species are widespread and occasionally locally abundant in the Marshall Bay – Emita area.

D.5 *PHYTOPHTHORA CINNAMOMI (PC)*

Root-rot fungus (*Phytophthora cinnamomi,* PC) is a soil borne pathogen that causes death in a wide range of native plant species often leading to floristic and structural changes in susceptible plant communities.

PC evolved in tropical areas and requires warm, as well as moist, soils for at least some time of the year to produce sporangia and release zoospores (Rudman 2005). Only those areas of the State that are below an altitude of about 700m above sea level have soils sufficiently warm for this to occur (Podger *et al* 1990). Vegetation types below 700m elevation may not be wholly or partly susceptible if closed canopies keep soil temperatures cool during the summer months, such as tall wet eucalypt forests over rainforest species, or rainforest communities.

PC can be spread through the movement of infected soil or plant material by people or animals and can even be transported by water percolating through soil or via surface water, such as in creeks and other drainage lines. Transport of PC to new areas is usually through soil/dirt adhering to vehicles and machinery. Transport into non-roaded areas of high human usage is mainly via bushwalking items such as tents or footwear but can also occur by bird activity. The fungus is not always evident in the landscape as it attacks root systems of susceptible species, usually causing death in new growth or the yellowing of leaves followed by loss of vigour and, in most cases, death. The fungus can inhabit the root systems of resistant species without any visible signs of infection within the host plant.

Samples to directly survey for PC were not collected. Instead, areas within and around the Survey Area were inspected in detail for signs of infection by PC which included areas of water accumulation such as spoon drains, culverts, and other drainage features. No plants with PC symptoms were observed in the Survey Area.

PART E – GEOMORPHOLOGICAL VALUES

E.1 SCOPE

Van Diemen Consulting Pty Ltd engaged the Forest Practices Authority (FPA) to investigate the geomorphology and soils present on a 364.1 ha mining lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The field work and report were completed by Dr Adrian Slee, with the report (Slee) generated from the engagement provided in **Attachment 8**.

This section provides a summary of the scope, observations, and recommendations made by Slee.

The priority area for the survey and assessments was an 800 m long west to east oriented sand dune complex covering approximately 4 ha that forms a lime sand resource immediately west of the current old extraction pit.

The aim of the investigations on site was to provide a detailed report on the dune field and other landforms including swamps and potential Tertiary limestone karst features in the vicinity of the proposed extraction pit. Soils were also be investigated in this area. A secondary focus was a general documentation of the dune field and other sites of geomorphic significance in the overall Mining Lease in the event of expansion of operations in the future.

The report addressed the following issues:

- Documentation of any karst features present and management recommendations.
- Overview of the sand dunes present at the proposed pit site and mine lease in general and dune special values management recommendations.
- Comment on sand blow risks and mediation recommendations.
- Documentation of other geomorphic landforms.
- Soil observations and management.

E.2 KARST VALUES

E.2.1 Findings

An extensive Tertiary dune limestone bench is present in the eastern section of the study area. This bench is overlain in locations by the Quaternary dunes and has open predominantly *Leptospermum laevigatum* dominated forest. The lack of streams (and channels) flowing from the higher limestone hills to the east of the property may indicate that a karst aquifer is present in the area. However, Slee did not observe any obvious springs were. Furthermore, Slee observed no sinkholes on the property, and as the largest limestone outcrop observed covered only a few square meters, caves are unlikely to be present in the priority study area. However, as Slee did not cover the entire Mining Lease, and LiDar coverage is not available for the area, the presence of isolated and/or discrete karst landforms including bedrock bluffs with karren, sinkholes, or small caves cannot be entirely ruled out (excluding the area assessed for the proposed lime sand pit).

E.2.2 Management Recommendations

While bedrock Tertiary Limestone is present in the east of the mine lease Slee observed no karst landforms apart from very minor surface solution sculpture (karren) landforms have been identified during this survey. Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of evidence for significant karst formulation of mitigation measures is unnecessary.

Karst recommendations

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.
- In the event a cave is located on site operations should avoid the area and seek expert advice.

E.3 SAND DUNE SYSTEMS AND BLOW RISK

E.3.1 Findings

Extensive sand dunes cover most of the Mining Lease. With the exception for the granitic sediments east of North Curves Lagoon described on page 8 of **Attachment 8**, the sand dunes are composed of fine-grained white quartz and carbonate deposits.

Two significant sand dune assemblages are present. In the west are the modern foredune and back dunes behind Marshall Beach. Inland are a series of elongated west-to-east trending parallel dunes that rise up to 24 m above sea level. These inland dunes are largely vegetated and stable in comparison to the foredunes that have fewer woody and tree species, instead being dominated by grasses, herbs, wind pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

Two prominent paleosols are present in the exposure at the now disused sand pit. The upper paleosol 1 lies between 95 cm and 115 cm depth and forms a prominent but laterally patchy dark brown organic-rich layer in the upper dune profile. The lower paleosol at 260 cm depth is a thinner and lighter compact sand unit that appears to not be as organic rich. However, this paleosol is laterally extensive and forms a prominent grey bench on the mid slope of the cutting. In the case of the dune systems the presence of paleosols Slee states this indicates a substantial time of dune stability, allowing an organic topsoil to form prior to renewed dune instability resulting in topsoil burial. At the pit site at least three periods of dune stability can be inferred as indicated by the two buried paleosols and the darker modern topsoil associated with thick root mats on the crest of the dune.

Slee noted a feature of the main pit exposure is the rhizoliths located in Unit 6 of the profile formed by dissolution of carbonate by percolating water and its subsequent precipitation around roots. Rhizoliths observed at the pit include narrow straw-like tree root rhizoliths up to 20 cm long and 1–5 cm across many of which still contain inner woody root material and larger cylindrical-shaped rhizoliths up to 30 cm long and 15 cm thick, which may have formed around tree branches. Slee noted that small columns are present at other locations suggesting calcification of the stumps of *Melaleuca* and other small trees found at the site.

Modern dune ridges run parallel to Marshall Beach for the length of the mining lease. They were found by Slee to consist of an almost continuous elongated beach foredune backed by a complex of hummocky back dunes separated by roughly bowl-shaped dune swales (depressions). At the western margin of the main resource area these dunes intercept the older west – east longitudinal dunes considered above. Slee also noted that the modern dunes are composed of fine loose sands with no evidence of significant calcite crust or rhizolith development; however the carbonate content of the dunes is high. No paleosols were observed by Slee in these dunes but thin buried soil horizons may be present. The lack of calcite cementation in the modern dunes suggests a significantly younger age for these deposits as may be expected from their nearcoastal setting.

E.3.2 Management Recommendations

The current face of the old pit provides an interesting profile of dune stratigraphy and is of local scientific interest as it provides evidence of the history of formation of the dunes in this part of Flinders Island and could potentially be used to indicate paleoclimate conditions prevalent on the Island. While this is an interesting exposure, many of the other unimpacted dunes in the region are likely to host similar paleosols and rhizoliths and therefore the features of the pit face are likely to be common within the landscape. The exposure is only visible because of past sand mining operations and has been photographed, sampled and described during this study. Obscuring of the exposure by erosion and tree overturn means that this exposure has a limited lifetime; formal preservation of this site is likely to be impractical as noted by Slee.

Resumption of sand mining extending west from the current pit face will destroy and remove the studied deposits but equally it is likely that the mining activities will expose further paleosols and tree root and stump rhizoliths in the sand dune. Slee notes that there is also a remote potential for archaeological deposits to be found within the dune particularly owing to its carbonate-rich nature which is conducive to preserving organic material such as bones (e.g. there is a possibility that large bones associated with megafauna could be exhumed as could ancient human remains or evidence of occupation (fire hearths etc)). Therefore, Slee provides the following recommendations that features of potential interest be flagged during operations.

In the event notable examples of these deposits are encountered (i.e. any of the features listed below) the first task should be to photograph the area and move operations away from the feature until a suitably qualified person (in the context of the item/items discovered) can assess any geomorphological/cultuyral values.

Contractors should look out for:

- Thick dark continuous bands within the dunes.
- Buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.
- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under the surface.

E.4 SOILS

E.4.1 Findings

Slee sampled soils from several locations in the vicinity of the main resource deposit (see Map 2 of **Attachment 8**). Soils were sampled at depths of 30 cm, 50 cm and where possible 1 m using either natural cuttings or the Eijkelkamp soil auger. This was to identify any unusual characteristics of the soils and to sample for laboratory assessment of soil acidity (pH). pH was measured by Slee after shaking soils and water (1:25 ratio) and allowing the mixture to stand for 2 hours A Milwaukee MW 100 pH meter was used, calibrated at the time of analysis using standard solutions at pH 4 and pH 7.

Results for pH tests for all samples indicated alkaline soil conditions with no indications of highly acidic soil horizons or acid sulphate soils being present in the vicinity of the proposed sand pit. The samples varied in pH between 7.4 and 8.6 with most soils sampled being classified as moderately to strongly alkaline.

The high pH values obtained from the soil samples indicate an alkaline environment where extensive acidic soils are unlikely to be present. Slee states that the reason for this is that the entire region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone. Low pH conditions are usually associated with deep organic soils or forested areas. While topsoil development is present within the dune fields, they are weakly developed and do not have a significant organic component capable of producing acidic soils, particularly in a carbonate dominated environment. This can be clearly seen by the gradation of pH in the site 3 dune swale samples (see Table 2 of **Attachment 8**). Slee found that here weakly developed topsoil has a pH of 7.4 and pH rises to 7.9 at 50 cm and 8.4 in the white dune sands at >80 cm.

It is notable that although both the site 2 dark organic soil at 100 cm in South Curves Lagoon and the granite-derived soils at site 5 are in locations that should potentially have low pH soils at neither site do pH values drop below pH 7. Slee states that this is due to the abundance of carbonate in the environment. The lack of deep well-developed topsoils indicate that since the dune formation wet forests or large eucalypt dominated forests may have never been present in this dry landscape. Although the Holocene dune (site 7 of **Attachment 8**) clearly shows a period of stability and soil development, Slee notes that the soil is thin and low in organic content. He also notes that at the main pit face (site 5) the two paleosols are also poorly developed and show very limited changes in pH. Previous eucalypt forest cover at these sites is unlikely.

E.4.2 Management Recommendations

Well drained soils in the mining lease and specifically in the vicinity of the main proposed resource are strongly alkaline Calcarosols.

Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried paleosols and lake/swamp sediments are present, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands. However, Slee noted that his survey was not comprehensive, and it is possible that some swampy depressions could host thicker organic horizons having a lower pH. These horizons however will not be directly impacted by sand mining of the high-relief dune ridges. Furthermore, they provide no calcium rich sands that are sought to be progressively mined and by consequence they will always remain undisturbed (i.e. no extraction of sands would ever occur there).

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ATTACHMENTS

ATTACHMENT 1: EXTRACT OF EPA ISSUED PROJECT SPECIFIC GUIDELINES

Part C – Environmental Impacts and Management

The report should evaluate all potential impacts of the proposal, with the level of detail provided on each issue reflecting its level of significance. For each issue, describe how the impact assessment has been performed (for example, surveys or desktop studies). Describe the existing environment in relation to the impact, including the vulnerability of the potentially affected environment. Clearly articulate the potential impacts, identifying plausible worst-case scenarios and the reversibility of the impact. Then, describe the management or contingency measures proposed to avoid, mitigate or offset potential adverse impacts. Detail any specialist recommendations which have / will be implemented or justify otherwise. Finally, analyse how and to what degree the impacts will have been avoided, minimised or offset, and any residual impacts.

1 Air quality

- Describe the potential sources of air emissions, including dust that may arise from loading, unloading and transport.
- Evaluate the potential for environmental nuisance or harm to air quality, taking into consideration the:
  - distance to nearest residences;
  - acceptable standards described in section 7 of the *Quarry Code of Practice*[3]*;*
  - prevailing winds and other climatic factors;
  - nature of the material excavated;
  - method of excavation and processing/handling on site; and
  - site layout (refer to the Site Plan).
- Describe the measures that will be employed to reduce the potential for environmental nuisance or harm to air quality.
- Is the proposal consistent with the *Tasmanian Environment Protection Policy (Air Quality) 2004*?

2 Water quality (surface, discharge and groundwater)

- Describe the potential impacts of the activity on the receiving environment, with specific consideration of sediment and waterway disturbance, environmental values and downstream water uses.
- Describe the management measures that will be employed to control surface water and reduce the potential for erosion and sediment loss. Control measures include: minimisation of areas of disturbance; minimisation of stormwater ingress and sediment mobilisation through the use of perimeter drains, cut-off drains and bunding; sediment basins or stilling areas to capture entrained sediment; and swales, rock filters, wetlands or vegetated discharge zones to remove fine suspended sediment.
- Describe any other management measures proposed to minimise impact on waterways and aquatic values.
- Identify the dimensions, capacity and other relevant design features of key stormwater infrastructure such as drains and sediment basins, with reference to design rainfall frequency (average recurrence interval) and intensity. For sediment basins provide the sediment capture particle size, settling volume and surface area calculations and design rationale[4].

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[3] Available at: https://epa.tas.gov.au/business-industry/regulation/industrial-activities/mining-and-extractive

[4] Suitable design approaches for sediment basins include those detailed in Best Practice Erosion and Sediment Control – Appendix B (June 2018 revision), International Erosion Control Association (Australasia) and Managing Urban Stormwater: Soils and Construction - Volume 2e: Mines and Quarries, Department of Environment and Climate Change, NSW Government (2008).

- Describe the waterbodies and aquatic values on site and in the surrounding area, including relevant Protected Environmental Values as per the *State Policy on Water Quality Management 1997*: https://epa.tas.gov.au/environment/water/pevs-for-tasmanian-surface-waters.
- State the distance from the activity to the nearest waterbody.
- Provide details of any proposed water monitoring activities.
- Is the proposal consistent with the *State Policy on Water Quality Management 1997*?
- Identify and characterise any other liquid emissions which could arise from the proposal. Provide details of the nature of the effluent (estimated volume and characteristics), proposed treatment, monitoring (as relevant) and likely impact on the receiving environment (provide water quality data where available).

3 Noise emissions and blasting

- Describe all noise sources, including the size and sound power level for each main piece of equipment (e.g. crusher / screen, loader, excavator, haul truck, rock drill).
- Provide a map of the location of all major sources of noise and any noise sensitive premises[5] within 1 km of the boundary of the Land.
- Describe the potential impacts of noise generated by the activity.
- Evaluate the potential for the activity to create a noise nuisance, taking into consideration the:
  - distance to nearest residences and other noise sensitive premises;
  - acceptable standards described in section 7 of the *Quarry Code of Practice*[6];
  - hours of operation;
  - method of excavation and processing / handling on site;
  - topography; and
  - site layout showing locations of activities (refer to the Site Plan).
- Describe the noise attenuation measures that will be implemented.
- Is the proposal consistent with the *Environment Protection Policy (Noise) 2009* [7]?

4 Natural values

The Report must detail the proposed clearing / disturbance of native vegetation or potential habitat for native fauna as part of the proposal, including details of the nature of vegetation and habitat values to be cleared or disturbed, and the area of vegetation / habitat affected (in hectares).

The Report must describe the potential impacts to threatened fauna, flora and vegetation communities, taking into account:

- The clearance or disturbance of native vegetation or other potential habitat; and
- Movement, noise, or lights during sensitive avifauna breeding seasons.

The Report must describe the management measures that will be implemented to mitigate or avoid impacts to threatened fauna, flora and vegetation communities or other natural values.

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[5] 'Noise sensitive premise' is defined as: residences and residential zones (whether occupied or not), schools, hospitals, caravan parks and similar land uses involving the presence of individual people for extended periods, except in the course of their employment or for recreation.

[6] Available at: https://epa.tas.gov.au/business-industry/regulation/industrial-activities/mining-and-extractive

[7] Available at: https://epa.tas.gov.au/policy/statutory-policies/state-policies-and-environment-protection-policies/environment-protection-policy-(noise)-2009

A natural values survey should be undertaken by a suitably qualified person in accordance with the NRE Tasmania *Guidelines for Natural Values Surveys relate to Development Applications*[8].

The Conservation Assessment Section identified several threatened flora and fauna species located within 5 km of the proposed activity, including several species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Please ensure you are aware of your obligations under the EPBC Act.

The mining lease has areas within it that are mapped as Coastal grass and herbfield areas (TASVEG 4.0 code GHC), which may meet the criteria for the EPBC Act listed *Lowland Native Grasslands of Tasmania*. The survey needs to determine whether the GHC community exists within the proposed development area. If it is identified within the development area, or may be impacted by the proposed development, consideration needs to be given as to whether it meets the EPBC Act criteria for classification as *Lowland Native Grasslands of Tasmania*.

Threatened Flora

Threatened flora species have been observed within 5 km of the development area footprint, several of which occur within 500 m, including within the mining lease and along Palana Road. The table below shows those threatened flora species that have been recorded within 500 m of the development footprint.

Species name	Common name	TSP Act*
Acacia uncifolia	coast wirilda	rare
Eutaxia microphylla	spiny bushpea	rare
Scaevola albida	pale fanflower	vulnerable
Schoenoplectus tabernaemontani	River clubsedge	rare
Zygophyllum billardierei	coast twinleaf	rare

*Tasmanian *Threatened Species Protection Act 1995*.

Threatened Fauna – Terrestrial

Terrestrial threatened fauna species have been recorded within 5 km or are within range boundary of the mining lease as shown in the table below. The survey must determine if any potential habitat for these species is present. Of particular note, the New Holland Mouse has not been observed in Tasmania for over 17 years until its re-discovery in 2021 on Flinders Island within 5 km of the mining lease.

Species name	Common name	TSP Act	EPBC Act
Pseudomys novaehollandiae	New Holland Mouse	endangered	Vulnerable
Litoria raniformis	Green and Gold Frog	vulnerable	Vulnerable
Antipodia chaostola	Chaostola Skipper	endangered	Endangered
Pardalotus quadragintus	Forty-spotted Pardalote	endangered	Endangered
Lymnodynastes peroni	Striped Marsh Frog	endangered	-
Galaxiella pusilla	Eastern Dwarf Galaxias	vulnerable	Vulnerable
Pseudemoia pagenstecheri	Tussock Skink	vulnerable	-
Aquila audax subsp. fleayi	Tasmanian Wedge-tailed Eagle	endangered	Endangered
Haliaeetus leucogaster	White-bellied Sea-eagle	vulnerable	-

[8] Available at: https://nre.tas.gov.au/conservation/development-planning-conservation-assessment/survey-guidelines-for-development-assessments

Seabirds and Shorebirds

The proposal is located within a coastal area and located approximately 200 m from Marshall Beach. Several seabirds and shorebirds have been recorded along the beach, including two listed threatened species:

- Hooded Plover (*Thinornis cucullatus*), vulnerable under the EPBC Act, and
- Fairy Tern (*Sternula nereis subsp. nereis*), vulnerable under both the TSP Act and the EPBC Act.

Little Penguins (*Eudyptula minor*) have also been recorded south of Castle Rock Point and on the offshore islands across Marshall Bay.

The potential impacts on seabirds and shorebirds from the proposal need to be considered and discussed, including an assessment of potential nesting habitat and indirect impacts resulting from disturbance within the development area.

Geoconservation and Wetlands

Describe the potential impacts to geoconservation sites, aquatic or riparian environments and other natural values, and the management measures proposed to mitigate these impacts.

The proposal is located within a coastal and wetland area. Wetlands are listed as Threatened Native Vegetation Communities under Schedule 3A of the *Nature Conservation Act 2002*. The report must address the potential impacts of the activity on geomorphology and hydrology, including dune systems, wetlands, and other relevant landforms, including but not limited to:

- existing and modified sediment budgets;
- sand transport potential, before, during and after mining and methods proposed to minimise erosion and sedimentation;
- stability of interim and final landforms, including dunes, swales, and wetlands; and
- whether the dunes are considered mobile and the potential for vegetation removal within the development area to mobilise dunes and impact the Marshall Beach Conservation Area.

Proposed measures to avoid / minimise disturbance to vegetated or mobile landforms, hydrology and water quality should be detailed, including the use of buffers. Where disturbance will occur, proposed rehabilitation measures should be outlined.

Karst

It is noted that a karst area is mapped extending eastwards from the eastern third of the mining lease. The potential impacts on karst from the activity must be considered and discussed. Consideration should be given to undertaking a survey for karst within the development area and detailing any recommended mitigation measures as necessary.

Acid Sulfate Soils

The entire mining lease is mapped as having Potential Acid Sulfate Soils (PASS). The Tasmanian Acid Sulfate Soil Management Guidelines[9] and the National Acid Sulfate Soil Guidelines[10] should be reviewed in relation to the proposed activity. The Tasmanian ASS Guidelines indicate that a management plan is likely to be required for the proposal. The Report must consider the requirements of the Tasmanian ASS Guidelines and determine whether further investigation and management of acid sulfate soils at the site is required.

[9] Available at: https://nre.tas.gov.au/agriculture/land-management-and-soils/soil-management/acid-sulfate-soils
[10] Available at: https://www.waterquality.gov.au/issues/acid-sulfate-soils

5 Weeds, pests and pathogens

- A Weed and Disease Management Plan must be developed and implemented for the activity. The Plan must be developed in accordance with the NRE (2015) *Weed and Disease planning and Hygiene Guidelines: Preventing the spread of weeds and disease in Tasmania*[11].
- The Report should:
  - List the weeds[12], pests and pathogens occurring on or near the site.
    - Three weed species declared under the *Weeds Management Act 1999* have been recorded within 5 km of the mining lease.
    - *Phytophthora cinnamomi* (PC) is recorded as present along Palana Road north of the mining lease.
    - Frog chytrid fungus (*Batrachochytrium dendrobatidis*) has been recorded on Flinders Island and is of relevance to this proposal noting the mapped wetland areas within and adjacent to the development proposal footprint.
  - Evaluate the potential for the activity to introduce or spread weeds and diseases to, from and within the site.
  - Discuss the proposed management measures for preventing the spread of weeds, pests and pathogens (e.g. vehicle washdown procedures).
- Practical information on how to minimise the risks of introducing and spreading PC and chytrid fungus can be found in the manual *Keeping it clean - A Tasmanian field hygiene manual to prevent the spread of freshwater pests and pathogens*[13].

6 Waste

- Describe the solid and liquid waste that will be produced by the activity (e.g., overburden, Potentially Acid Forming material, metal, and machinery service wastes, used oils, general refuse).
- Describe the proposed methods for avoidance, reuse, recycling, treatment, and disposal of waste.

7 Environmentally hazardous substances

- Detail the nature and quantity of any environmentally hazardous substances[14] that will be stored (permanently or temporarily) and/or handled on site. This includes fuels, oils, waste and chemicals.
- Describe the storage method and location of any environmentally hazardous substances and discuss the proposed management measures to prevent release and respond to accidental spills (e.g., provision of spill kits).
- Identify any dangerous goods[15] and controlled wastes[16] that will be present on the site, with reference to standard classification. Detail how they will be managed.

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[11] Available at: https://nre.tas.gov.au/invasive-species/weeds/weed-hygiene/weed-and-disease-planning-and-hygiene-guidelines

[12] Plant species declared as a weed under the *Weed Management Act 1999*.

[13] Available at: https://nre.tas.gov.au/invasive-species/weeds/weed-hygiene/keeping-it-clean-a-tasmanian-field-hygiene-manual

[14] 'Environmentally hazardous substance' is defined as: any substance or mixture of substances of a nature or held in quantities which present a reasonably foreseeable risk of causing serious or material environmental harm if released to the environment.

[15] As defined in the Australian Code for the Transport of Dangerous Goods by Road and Rail.

[16] Information on controlled waste identification and classification is available at: https://epa.tas.gov.au/business-industry/regulation/waste-management/controlled-waste

8 Site contamination

- Has the site on which the activity is to be located been used in the past for activities which may have caused soil or groundwater contamination? If so, provide details. Include details of any assessments of soil or groundwater contamination on the site.

9 Environmental impacts of traffic

- Provide details of the vehicle types, number of vehicle movements, times of movements and route(s).
- Evaluate the potential for transport to and from the site to cause a noise nuisance to residences and other noise sensitive premises in proximity to the Land, considering the type, volume and time of traffic associated with the proposal.
- Evaluate the potential to cause a dust nuisance as a result of traffic in proximity to the Land.

10 Other off-site impacts

- Does the activity have the potential to generate any other off-site impacts that may affect the amenity of residences or other sensitive uses (such as schools and hospitals)? If yes, provide details. The location of all nearby residences or other sensitive uses must be clearly shown on the area map.

11 Monitoring

- Describe any proposed environmental monitoring and reporting for the activity.
- Show all proposed monitoring points on the site plan.

12 Marine areas and coastal zone

- Describe the potential impact to sensitive marine areas, conservation areas, or areas used extensively for recreational or commercial fishing activities.
- Provide details of any surveys undertaken in accordance with the *Guidelines for Marine and Estuarine Natural Values Surveys related to Development Proposals*[17].
- Discuss how the proposal is consistent with the *Tasmanian State Coastal Policy 1996*.

13 Decommissioning and rehabilitation

- Describe the proposed decommissioning and rehabilitation measures in the event of cessation of the activity.
- Describe any proposed progressive rehabilitation measures, with reference to the staged development of the quarry/extractive pit (refer to the Site Plans as relevant).

14 Greenhouse gas emissions and climate change

- Describe how the proposal will implement best practice environmental management in energy consumption and in transport of materials to and from the proposed activity, to minimise greenhouse gas emissions.

[17] Available at: Guidelines for Marine and Estuarine Natural Values Surveys related to Development Proposals.pdf (nre.tas.gov.au)

Markarna Grazing – additional comments from other Government Agencies

Heritage Tasmania (HT)

- Page 17 (Table 5) of the report cites the objectives of the Planning Process Established by LUPAA but does not advise of the presence or absence of historic cultural heritage sites.
- That specific detail should be included to demonstrate that consideration has been given to potential impacts on sites or places of historic cultural heritage significance (i.e., archaeological or built features and deposits of heritage value from the period post 1788).
- The Proponent should be aware that coastal areas in this region may contain other archaeological or built features and deposits of potential heritage value relating to past extractive industry such as quarries, tramways, lime kilns; settlement sites relating to pastoral or fishing activities including on-shore whaling activity; early maritime infrastructure such as jetties and associated yards, buildings, roads or tramways.
- Page 20 of the report, addressing the Tasmanian State Coastal Policy Section 1.2 relating to *Cultural and Historic Resources,* only covers Aboriginal sites and relics.
- Reference should be made to the Flinders Island Local Planning Scheme's Local Heritage Places code list (ref: FLI-Table C6.1), Local Historic Landscape Precincts (FLI-Table C6.3). It does refer to the areas identified in FLI-Table C8.1 - Scenic Protection Areas.

Parks & Wildlife Service (PWS)

PWS noted that the priority vegetation overlay in the Tasmanian Planning Scheme – Flinders Local Provision Schedule extends from the proposal area into the adjoining Marshall Beach Conservation Area. PWS expressed concern that the removal of vegetation within the proposed development area has the potential to cause westward movement of dunes that would impact on the Conservation Area.

ATTACHMENT 2: NATURAL VALUES ATLAS (NVA) REPORT

Natural Values Atlas Report

Authoritative, comprehensive information on Tasmania's natural values.

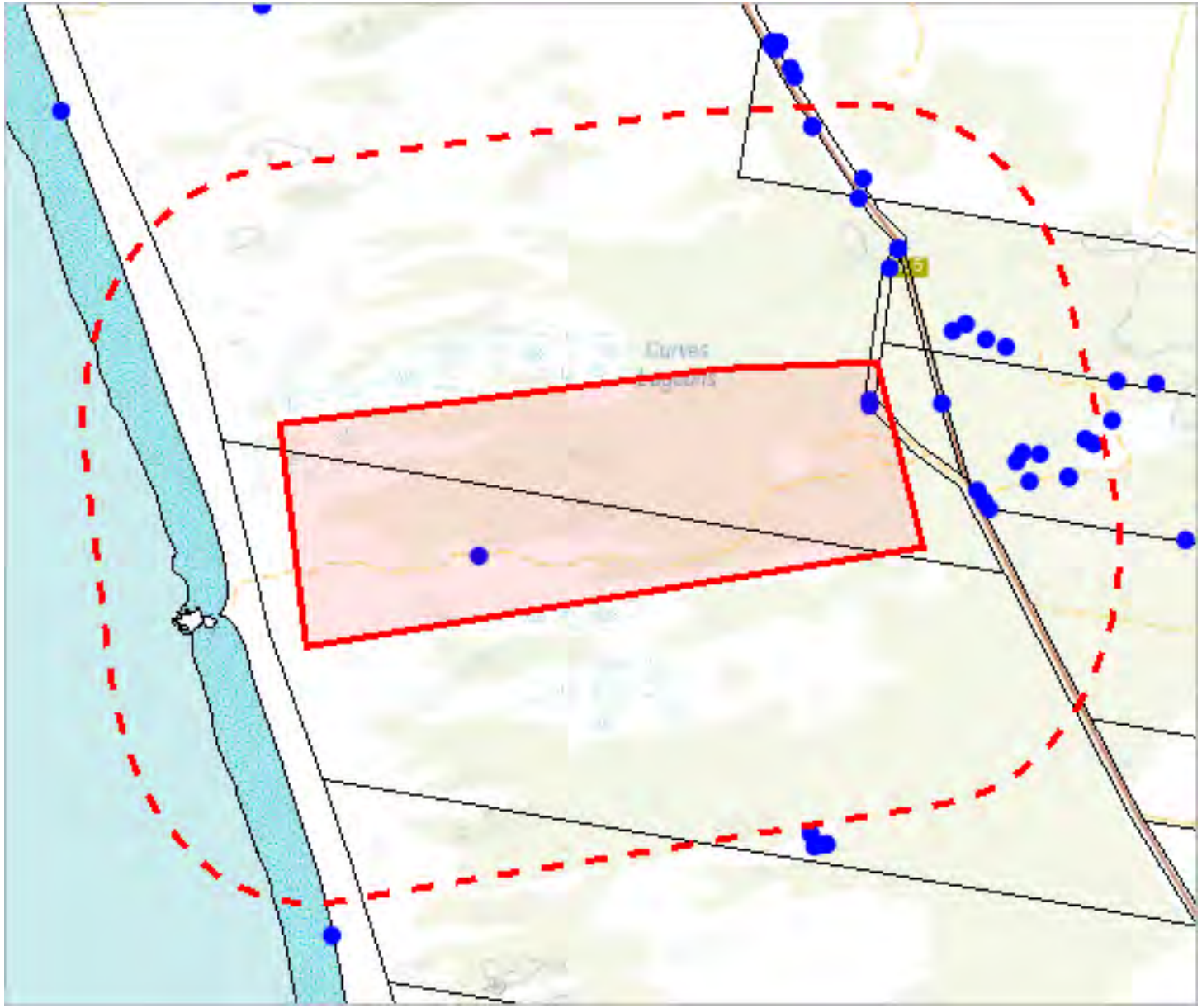
Reference:	
Requested For:	
Report Type:	Summary Report
Timestamp:	08:50:01 PM Tuesday 04 June 2024
Threatened Flora:	buffers Min: 500m Max: 5000m
Threatened Fauna:	buffers Min: 500m Max: 5000m
Raptors:	buffers Min: 500m Max: 5000m
Tasmanian Weed Management Act Weeds:	buffers Min: 500m Max: 5000m
Priority Weeds:	buffers Min: 500m Max: 5000m
Geoconservation:	buffer 1000m
Acid Sulfate Soils:	buffer 1000m
TASVEG:	buffer 1000m
Threatened Communities:	buffer 1000m
Fire History:	buffer 1000m
Freshwater Ecosystem Values:	buffer 1000m
Freshwater Ecosystem Values displayed:	
	Rivers
	Lakes
	Wetlands
	Saltmarshes
	Estuaries
	Karst
	Other freshwater ecosystem values
Tasmanian Reserve Estate:	buffer 1000m
Biosecurity Risks:	buffer 1000m

The centroid for this query GDA94: 577530.0, 5578300.0 falls within:

Property: 3513143

Threatened flora within 500 metres

578728, 5579268



576375, 5577294

Please note that some layers may not display at all requested map scales

Threatened flora within 500 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened flora within 500 metres

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Acacia uncifolia	coast wirilda	r		n	1	10-Jan-2007
Eutaxia microphylla	spiny bushpea	r		n	1	17-Nov-2008
Leucopogon affinis	lanceleaf beardheath	r		n	2	07-Sep-2013
Pimelea curviflora var. sericea	silky curved riceflower	r		n	1	17-Nov-2008
Scaevola albida	pale fanflower	v		n	18	19-Nov-2019
Schoenoplectus tabernaemontani	river clubsedge	r		n	1	01-Jan-1979
Zygophyllum billardierei	coast twinleaf	r		n	4	20-Nov-2018

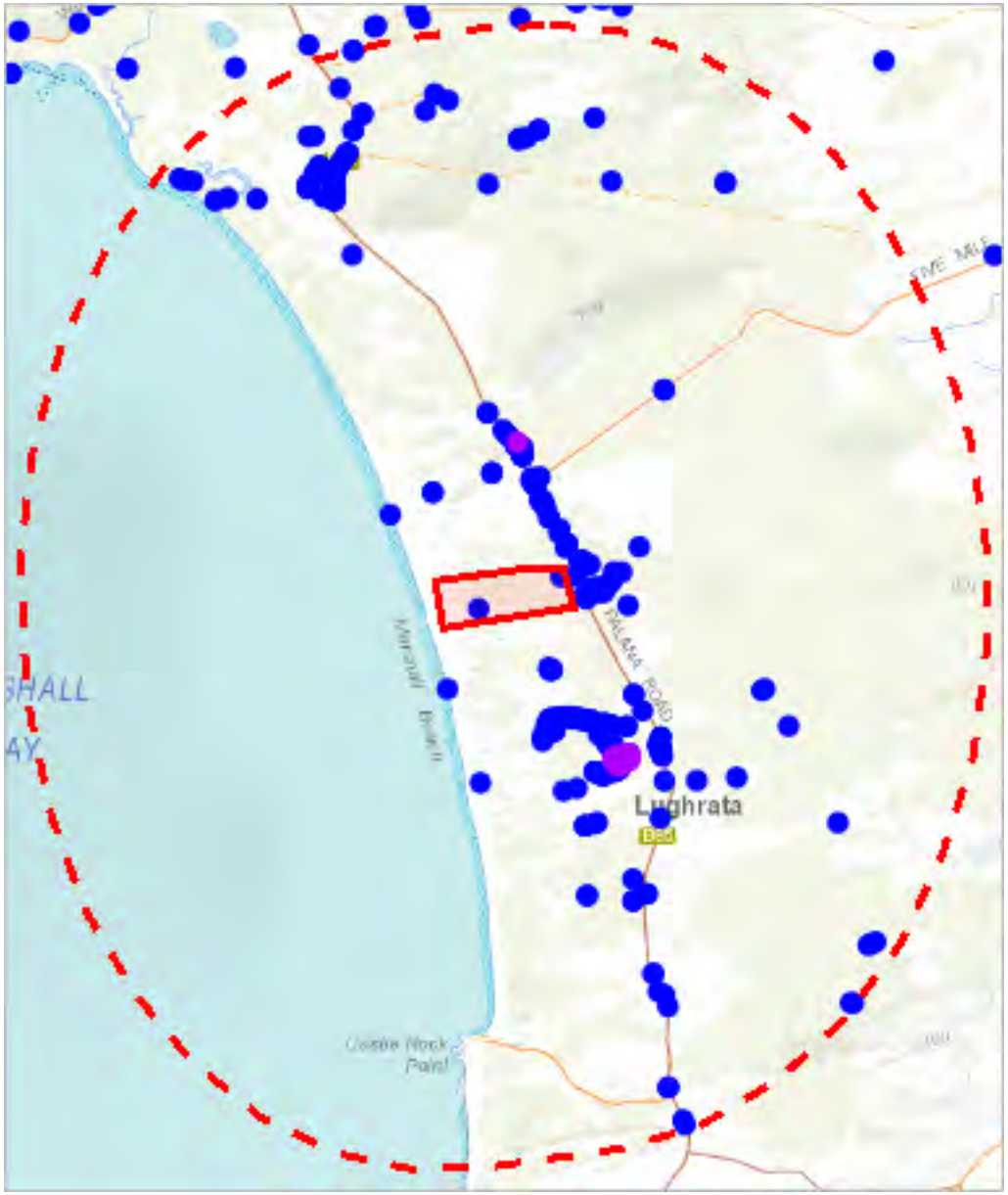
Unverified Records

No unverified records were found!

For more information about threatened species, please contact Threatened Species Enquiries.
Telephone: 1300 368 550
Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened flora within 5000 metres

582227, 5583798



572873, 5572771

Please note that some layers may not display at all requested map scales

Threatened flora within 5000 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened flora within 5000 metres

Annexure: 16.2.3

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Acacia uncifolia	coast wirilda	r		n	40	15-Mar-2018
Acrotriche cordata	coast groundberry	v		n	3	24-Nov-2015
Asperula minima	mossy woodruff	r		n	4	06-Nov-2018
Banksia serrata	saw banksia	r		n	6	25-Mar-2014
Carex gunniana	mountain sedge	r		n	1	01-Jan-1000
Diuris palustris	swamp doubletail	e		n	2	24-Nov-2022
Drosera glanduligera	scarlet sundew	r		n	1	08-Sep-2021
Eutaxia microphylla	spiny bushpea	r		n	22	19-Nov-2019
Hydrocotyle comocarpa	fringefruit pennywort	r		n	1	10-Sep-2006
Isopogon ceratophyllus	horny conebush	v		n	5	21-Mar-2014
Lasiopetalum baueri	slender velvetbush	r		n	1	01-Jan-1985
Lepilaena patentifolia	spreading watermat	r		n	1	30-Oct-1972
Leucopogon affinis	lanceleaf beardheath	r		n	19	26-Sep-2017
Parietaria debilis	shade pellitory	r		n	3	29-Sep-2005
Pimelea curviflora	curved riceflower	p		n	60	06-Nov-2018
Pimelea curviflora var. gracilis	slender curved riceflower	r		n	1	07-May-1966
Pimelea curviflora var. sericea	silky curved riceflower	r		n	23	15-Mar-2018
Pomaderris intermedia	lemon dogwood	r		n	3	20-Nov-2017
Pomaderris oraria subsp. oraria	bassian dogwood	r		n	5	20-Nov-2017
Pomaderris paniculosa subsp. paralia	shining dogwood	r		n	2	29-Sep-2005
Pterostylis cucullata subsp. cucullata	leafy greenhood	e	VU	n	4	13-Nov-2008
Ranunculus pumilio var. pumilio	ferny buttercup	r		n	1	26-Aug-2017
Scaevola albida	pale fanflower	v		n	79	19-Nov-2019
Schenkia australis	spike centaury	r		n	1	15-Nov-1981
Schoenoplectus tabernaemontani	river clubsedge	r		n	1	01-Jan-1979
Scleranthus fasciculatus	spreading knawel	v		n	1	30-Sep-2005
Spyridium parvifolium var. parvifolium	coast dustymiller	r		n	1	18-Oct-1976
Styphelia esquamata	swamp beardheath	r		n	1	09-Dec-2012
Zygophyllum billardierei	coast twinleaf	r		n	22	19-Nov-2019

Unverified Records

Species	Common Name	SS	NS	Bio	Observation Count
Pimelea curviflora	curved riceflower	p		n	1
Pomaderris oraria subsp. oraria	bassian dogwood	r		n	1
Scaevola albida	pale fanflower	v		n	1
Zygophyllum billardierei	coast twinleaf	r		n	114

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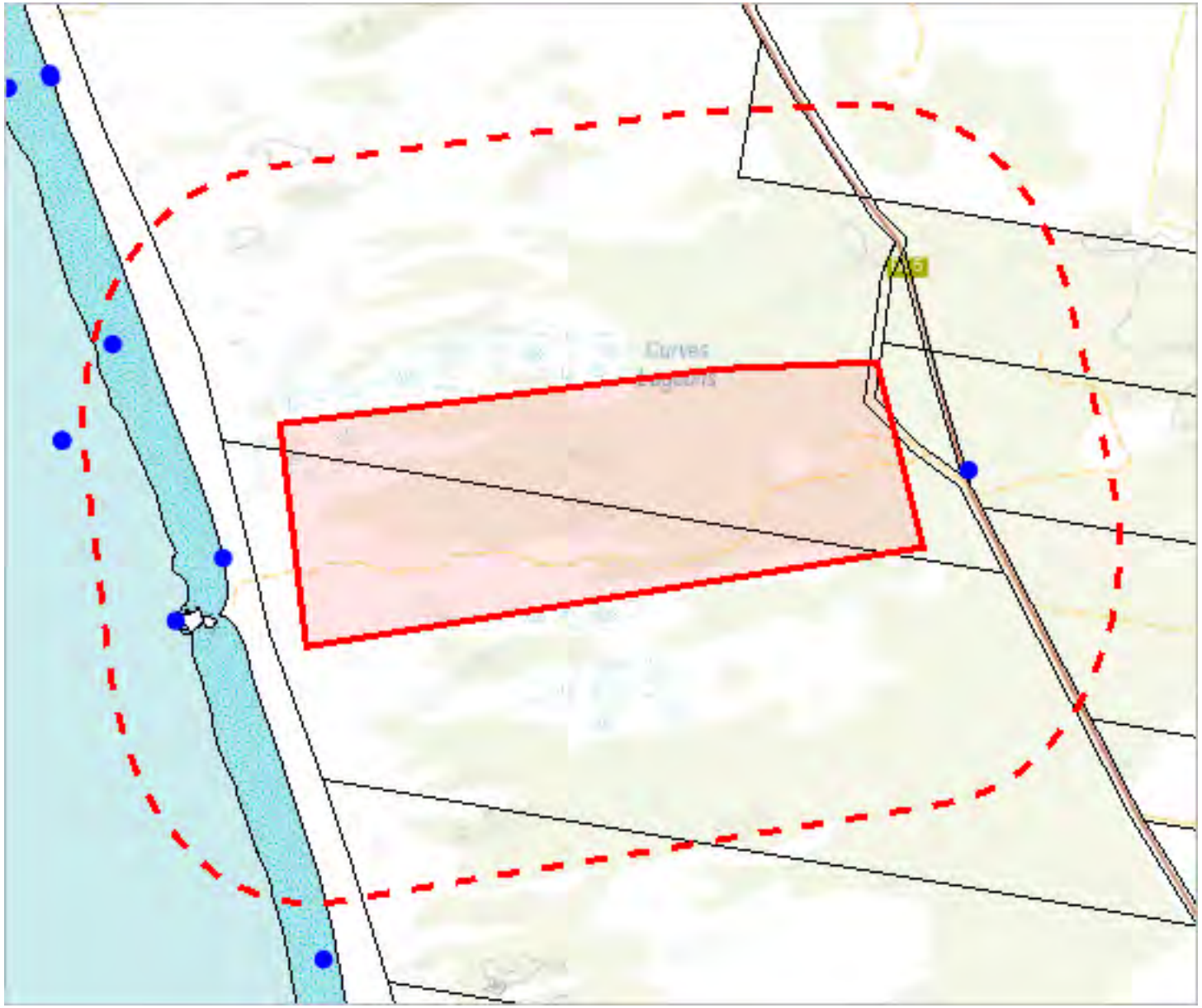
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened fauna within 500 metres

578728, 5579268



576375, 5577294

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Threatened fauna within 500 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened fauna within 500 metres

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Aquila audax	wedge-tailed eagle	pe	PEN	n	1	17-Feb-2014
Thalassarche melanophris	black-browed albatross	e	VU	n	1	03-Jul-1969
Thinornis cucullatus	hooded plover		PVU	ae	1	06-Nov-2004
Thinornis rubricollis	hooded plover		VU	n	3	19-Dec-1998

Unverified Records

No unverified records were found!

Threatened fauna within 500 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	BO	Potential	Known	Core
Pseudomys novaehollandiae	new holland mouse	e	VU	n	1	0	0
Litoria raniformis	green and gold frog	v	VU	n	1	0	0
Prototroctes maraena	australian grayling	v	VU	ae	3	0	0
Antipodia chaostola	chaostola skipper	e	EN	ae	1	0	0
Pseudemoia pagenstecheri	tussock skink	v		n	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	2	0	0
Limnodynastes peroni	striped marsh frog	e		n	1	0	0
Galaxiella pusilla	eastern dwarf galaxias	v	VU	n	3	0	0
Pardalotus quadragintus	forty-spotted pardalote	e	EN	e	1	0	0
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	1	0	0

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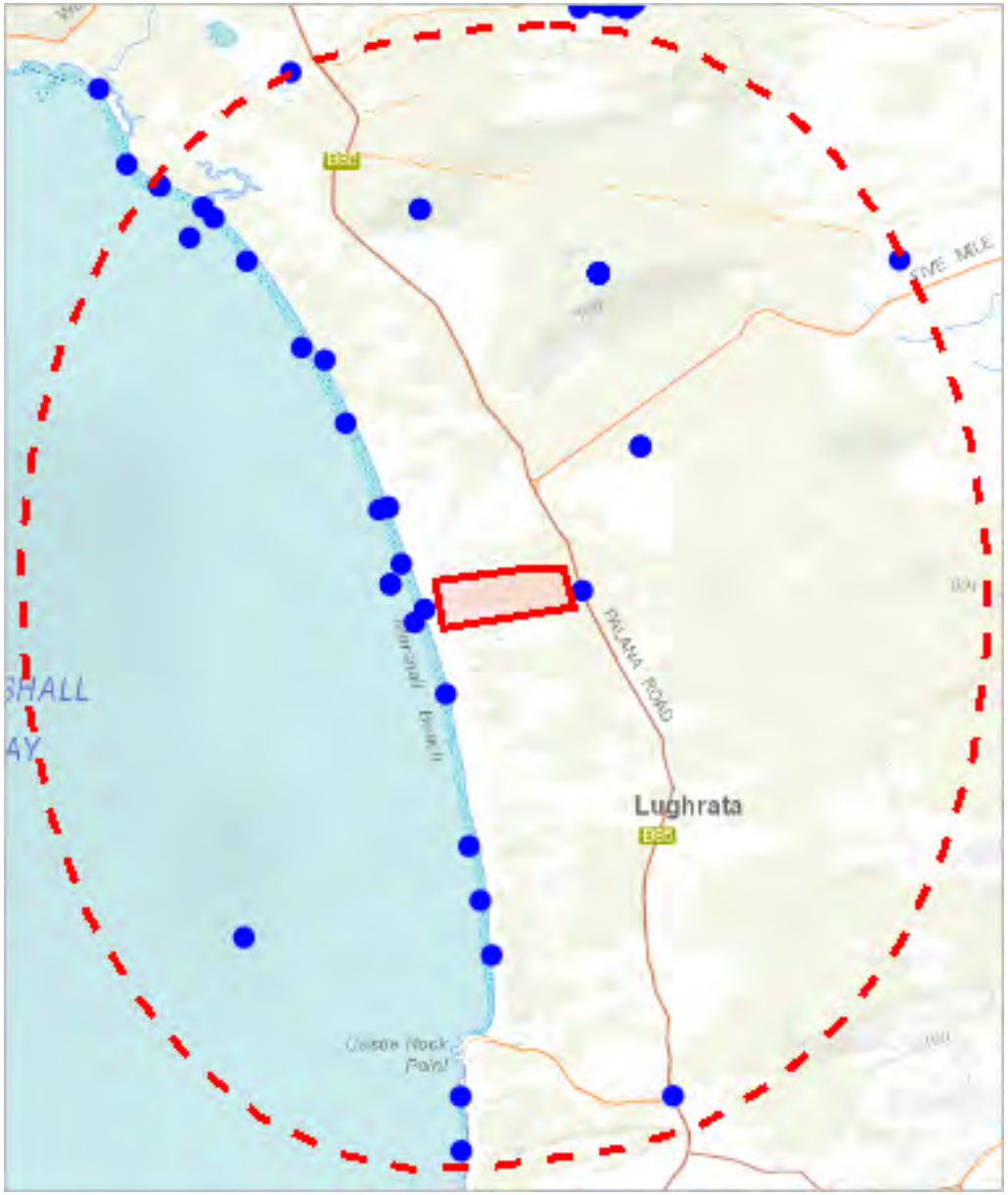
Threatened fauna within 5000 metres

582227, 5583798



572873, 5572771

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Threatened fauna within 5000 metres

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- Polygon Unverified

Legend: Cadastral Parcels

Threatened fauna within 5000 metres

Annexure: 16.2.3

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Aquila audax	wedge-tailed eagle	pe	PEN	n	2	30-Aug-2020
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	5	08-Dec-2004
Botaurus poiciloptilus	australasian bittern		EN	n	1	14-Jan-1979
Diomedea cauta subsp. cauta	shy albatross	pv	PVU		1	14-Nov-1981
Eubalaena australis	southern right whale	e	EN	m	1	26-Aug-2014
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	3	30-Aug-2020
Hirundapus caudacutus	white-throated needletail		VU	n	2	27-Mar-2014
Macronectes giganteus	southern giant-petrel	v	EN	n	1	25-Jul-1988
Pseudemoia pagenstecheri	tussock skink	v		n	1	02-Nov-1988
Pseudomys novaehollandiae	new holland mouse	e	VU	n	1	13-May-1982
Sternula nereis subsp. nereis	fairy tern	v	VU	n	1	06-Nov-2004
Thalassarche chrysostoma	grey-headed albatross	e	EN	n	1	09-Jul-1971
Thalassarche melanophris	black-browed albatross	e	VU	n	1	03-Jul-1969
Thinornis cucullatus	hooded plover		PVU	ae	15	26-Apr-2021
Thinornis rubricollis	hooded plover		VU	n	6	19-Dec-1998

Unverified Records

No unverified records were found!

Threatened fauna within 5000 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	BO	Potential	Known	Core
Pseudomys novaehollandiae	new holland mouse	e	VU	n	1	0	2
Litoria raniformis	green and gold frog	v	VU	n	1	0	0
Prototroctes maraena	australian grayling	v	VU	ae	18	0	0
Antipodia chaostola	chaostola skipper	e	EN	ae	1	0	0
Pseudemoia pagenstecheri	tussock skink	v		n	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	2	0	0
Limnodynastes peroni	striped marsh frog	e		n	1	0	0
Galaxiella pusilla	eastern dwarf galaxias	v	VU	n	18	0	0
Pardalotus quadragintus	forty-spotted pardalote	e	EN	e	1	0	0
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	1	0	0

For more information about threatened species, please contact Threatened Species Enquiries.

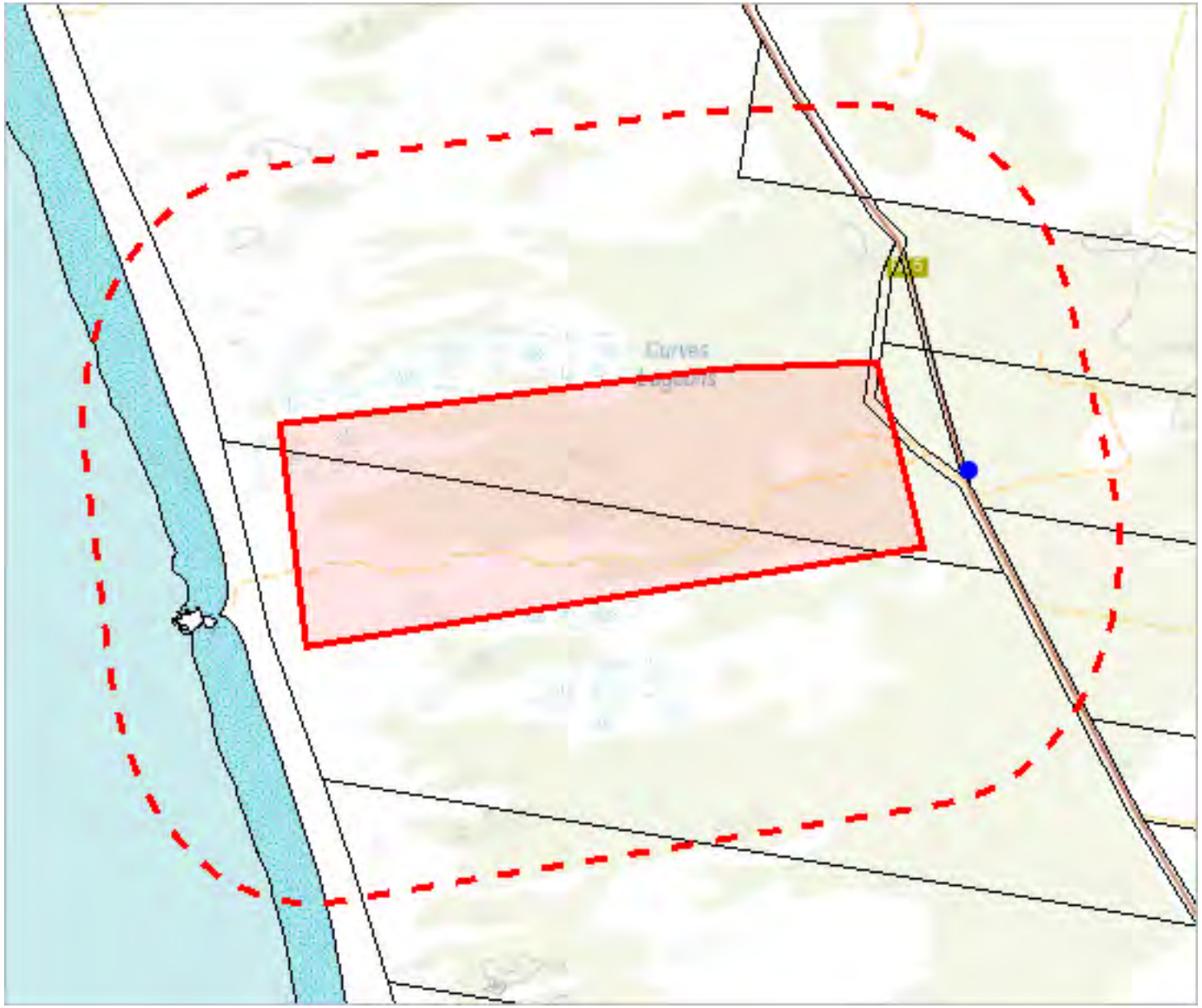
Telephone: 1300 368 550

Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au

Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Raptor nests and sightings within 500 metres

578728, 5579268



576375, 5577294

Please note that some layers may not display at all requested map scales

Raptor nests and sightings within 500 metres

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Raptor nests and sightings within 500 metres

Verified Records

Nest Id/Location Foreign Id	Species	Common Name	Obs Type	Observation Count	Last Recorded
	Aquila audax	wedge-tailed eagle	Not Recorded	1	17-Feb-2014

Unverified Records

No unverified records were found!

Raptor nests and sightings within 500 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	Potential	Known	Core
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		2	0	0

For more information about raptor nests, please contact Threatened Species Enquiries.

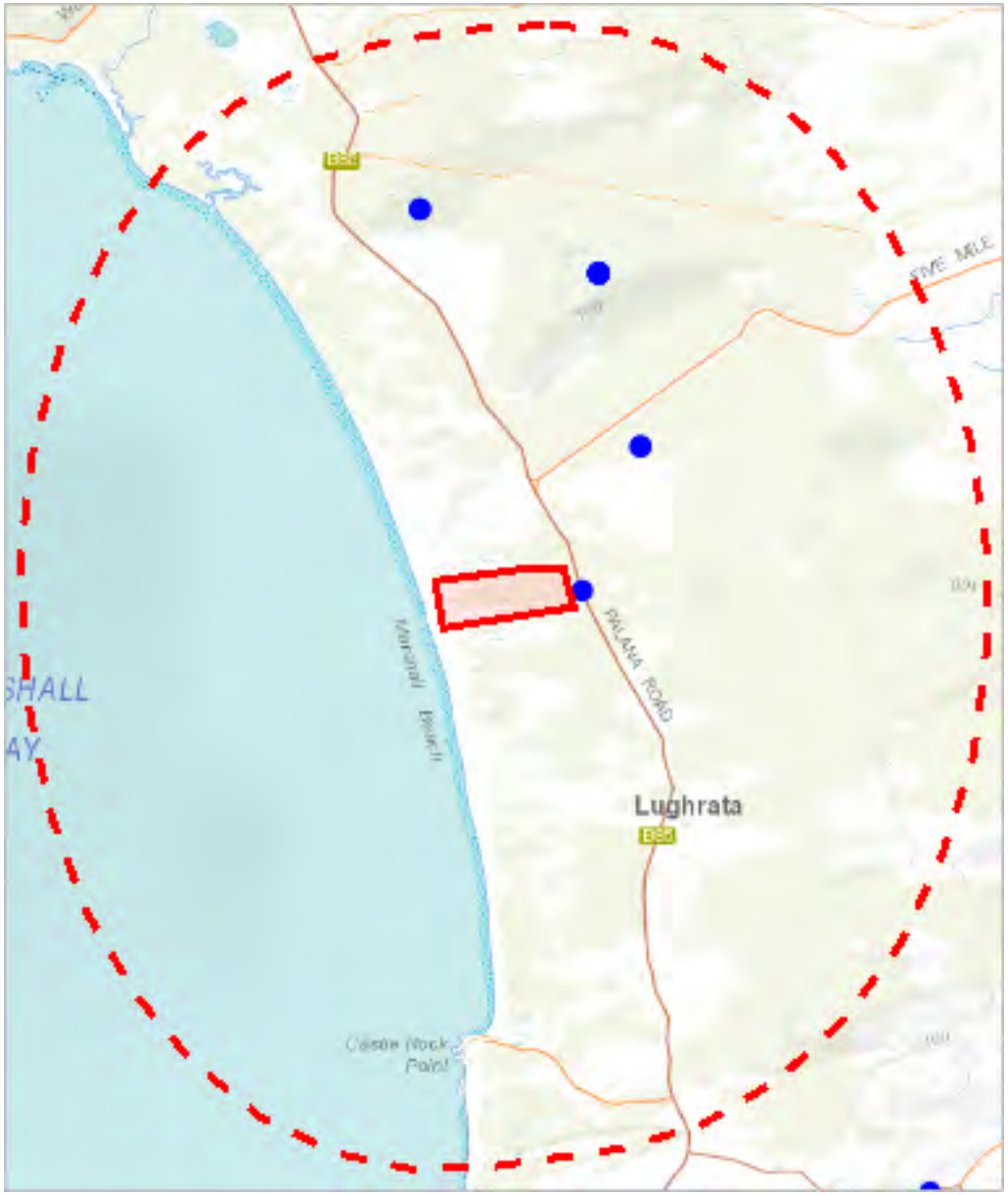
Telephone: 1300 368 550

Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au

Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Raptor nests and sightings within 5000 metres

582227, 5583798



572873, 5572771

Please note that some layers may not display at all requested map scales

Raptor nests and sightings within 5000 metres

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Raptor nests and sightings within 5000 metres

Verified Records

Nest Id/Location Foreign Id	Species	Common Name	Obs Type	Observation Count	Last Recorded
603	Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	Nest	2	08-Dec-2004
	Aquila audax	wedge-tailed eagle	Camera Trap	1	30-Aug-2020
	Aquila audax	wedge-tailed eagle	Not Recorded	1	17-Feb-2014
	Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	Sighting	3	01-Mar-1979
	Falco cenchroides	nankeen kestrel	Sighting	4	09-Jan-1981
	Haliaeetus leucogaster	white-bellied sea-eagle	Camera Trap	1	30-Aug-2020
	Haliaeetus leucogaster	white-bellied sea-eagle	Sighting	2	14-Nov-1981

Unverified Records

No unverified records were found!

Raptor nests and sightings within 5000 metres

(based on Range Boundaries)

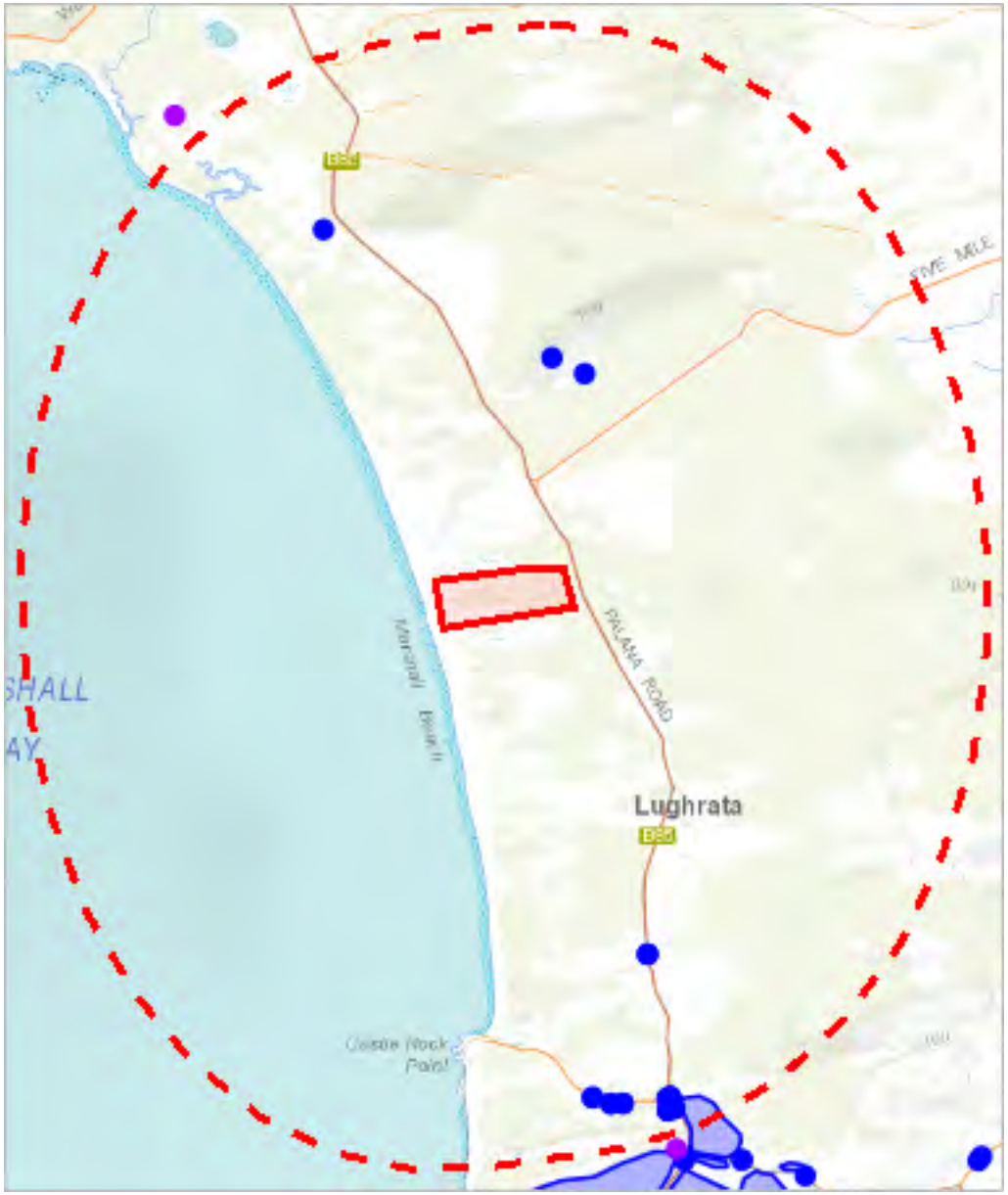
Species	Common Name	SS	NS	Potential	Known	Core
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		2	0	0

For more information about raptor nests, please contact Threatened Species Enquiries.
Telephone: 1300 368 550
Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

*** No Tas Management Act Weeds found within 500 metres ***

Tas Management Act Weeds within 5000 m

582227, 5583798



572873, 5572771

Please note that some layers may not display at all requested map scales

Tas Management Act Weeds within 5000 m

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Tas Management Act Weeds within 5000 m

Verified Records

Species	Common Name	Observation Count	Last Recorded
Echium plantagineum	patersons curse	3	01-Nov-2001
Lycium ferocissimum	african boxthorn	3	16-Feb-2017
Marrubium vulgare	white horehound	16	12-Jul-2016

Unverified Records

Species	Common Name	Observation Count
Senecio jacobaea	ragwort	1

For more information about introduced weed species, please visit the following URL for contact details in your area:

https://www.nre.tas.gov.au/invasive-species/weeds

*** No Priority Weeds found within 500 metres ***

Priority Weeds within 5000 m

582227, 5583798

572873, 5572771

Please note that some layers may not display at all requested map scales

Priority Weeds within 5000 m

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Priority Weeds within 5000 m

Verified Records

Species	Common Name	Observation Count	Last Recorded
Reseda luteola	weld	1	04-Dec-2012

Unverified Records

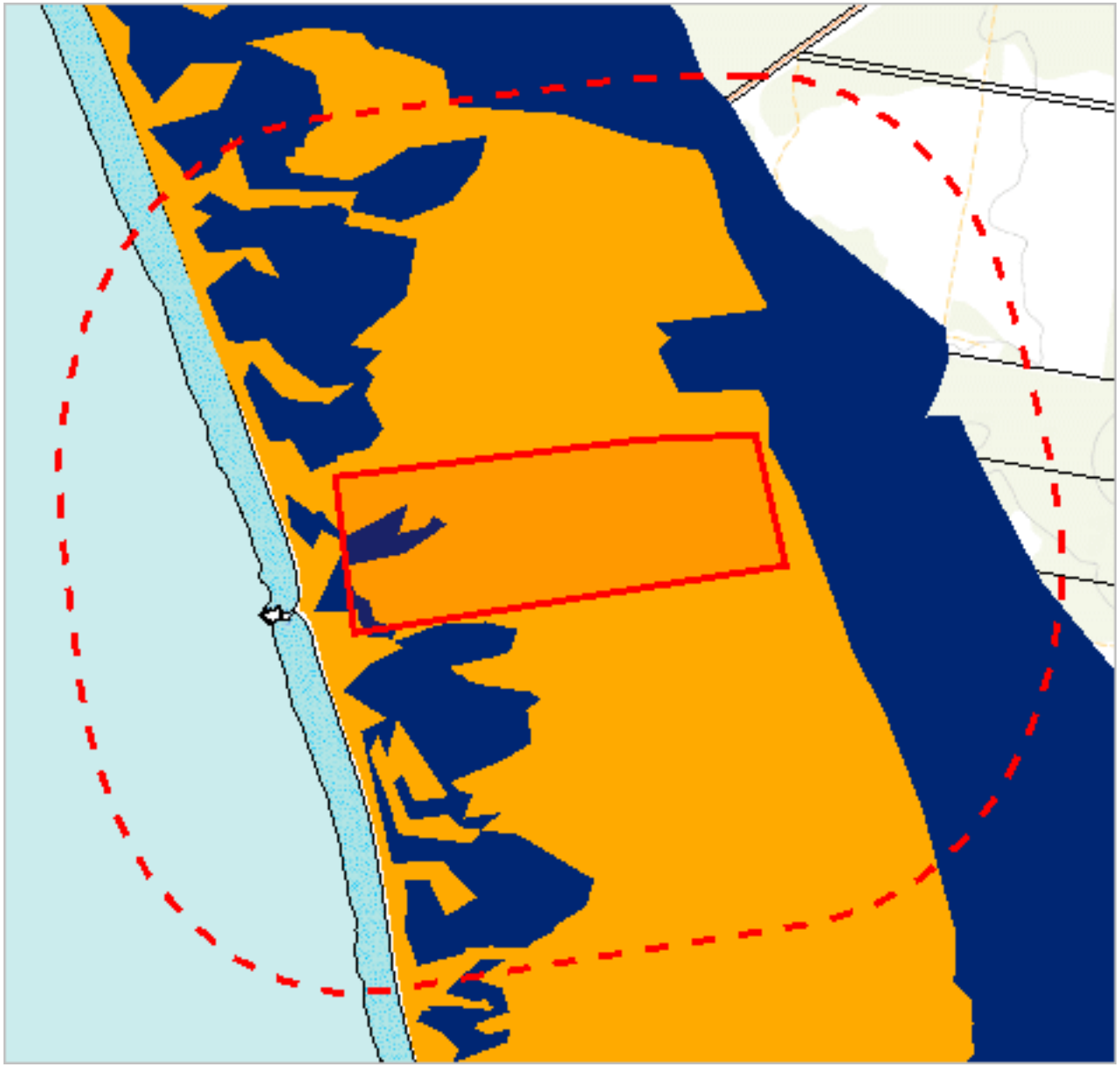
For more information about introduced weed species, please visit the following URL for contact details in your area:

https://www.nre.tas.gov.au/invasive-species/weeds

*** No Geoconservation sites found within 1000 metres. ***

Acid Sulfate Soils within 1000 metres

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

Acid Sulfate Soils within 1000 metres

Legend: Coastal Acid Sulfate Soils (0 - 20m AHD)

High | Low | Extremely Low

Legend: Inland Acid Sulfate Soils (>20m AHD)

High | Low | Extremely Low

Legend: Marine Subaqueous/Intertidal Acid Sulfate Soil

High (Intertidal) | High (Subtidal)

Legend: Cadastral Parcels

Acid Sulfate Soils within 1000 metres

Dataset Name	Acid Sulfate Soil Probability	Acid Sulfate Soil Atlas	Description
Coastal Acid Sulfate Soils	Extremely Low	Ci(p3)	Extremely low probability of occurance (1-5% of mapping unit). with occurences in small areas. Sandplains and dunes 2-10m AHD, ASS generally below 1m from the surface. Heath, forests. Holocene or Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). No necessary analytical data are available but confidence is fair, based on a knowledge of similar soils in similar environments.
Coastal Acid Sulfate Soils	Extremely Low	Cj(p3)	Extremely low probability of occurance (1-5% of mapping unit). with occurences in small areas. Sandplains and dunes >10m AHD, ASS generally below 1m from the surface. Heath, forests. Mainly Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). No necessary analytical data are available but confidence is fair, based on a knowledge of similar soils in similar environments.
Coastal Acid Sulfate Soils	Low	Bh(p2)	Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes <2m AHD, ASS generally within 1m of the surface. Often wet heath. Holocene or Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). Analytical data are incomplete but are sufficient to classify the soil with a reasonable degree of confidence.
Coastal Acid Sulfate Soils	Low	Bi(p2)	Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes 2-10m AHD, ASS generally below 1m from the surface. Heath, forests. Holocene or Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). Analytical data are incomplete but are sufficient to classify the soil with a reasonable degree of confidence.
Coastal Acid Sulfate Soils	Low	Bi(p3)	Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes 2-10m AHD, ASS generally below 1m from the surface. Heath, forests. Holocene or Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). No necessary analytical data are available but confidence is fair, based on a knowledge of similar soils in similar environments.
Coastal Acid Sulfate Soils	Low	Bj(p3)	Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes >10m AHD, ASS generally below 1m from the surface. Heath, forests. Mainly Pleistocene. Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). No necessary analytical data are available but confidence is fair, based on a knowledge of similar soils in similar environments.
Coastal Acid Sulfate Soils	Low	Bm(p3)	Low probability of occurance (6-70% chance of occurrence in mapping unit). Hydrosols, ASS generally within upper 1m in wet/riparian areas with Hydrosols (Isbell 1996). Potential acid sulfate soil (PASS) = sulfidic material (Isbell 1996 p.122). No necessary analytical data are available but confidence is fair, based on a knowledge of similar soils in similar environments.

For more information about Acid Sulfate Soils, please contact Land Management Enquiries.

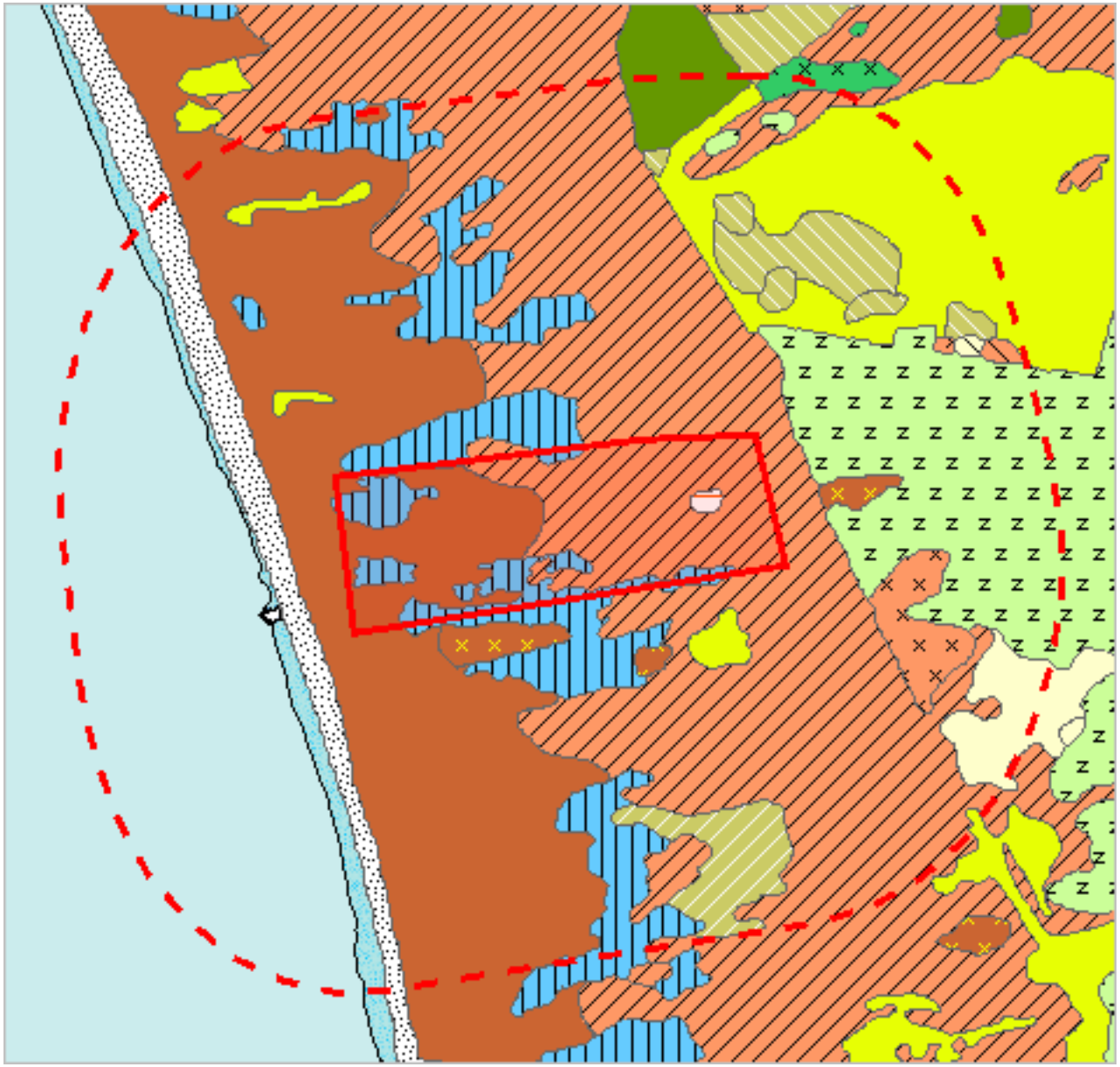
Telephone: (03) 6777 2227

Email: LandManagement.Enquiries@nre.tas.gov.au

Address: 171 Westbury Road, Prospect, Tasmania, Australia, 7250

TASVEG 4.0 Communities within 1000 metres

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

TASVEG 4.0 Communities within 1000 metres

Annexure: 16.2.3

Legend: TASVEG 4.0

- (AAP) Alkaline pans
- (AHF) Freshwater aquatic herbland
- (AHL) Lacustrine herbland
- (AHS) Saline aquatic herbland
- (ARS) Saline sedgeland / rushland
- (ASF) Fresh water aquatic sedgeland and rushland
- (ASP) Sphagnum peatland
- (ASS) Succulent saline herbland
- (AUS) Saltmarsh (undifferentiated)
- (AWU) Wetland (undifferentiated)
- (DAC) Eucalyptus amygdalina coastal forest and woodland
- (DAD) Eucalyptus amygdalina forest and woodland on dolerite
- (DAM) Eucalyptus amygdalina forest on mudstone
- (DAS) Eucalyptus amygdalina forest and woodland on sandstone
- (DAZ) Eucalyptus amygdalina inland forest and woodland on Cainozoic deposits
- (DBA) Eucalyptus barberi forest and woodland
- (DCO) Eucalyptus coccifera forest and woodland
- (DCR) Eucalyptus cordata forest
- (DDE) Eucalyptus delegatensis dry forest and woodland
- (DDP) Eucalyptus dalrympleana - Eucalyptus pauciflora forest and woodland
- (DGL) Eucalyptus globulus dry forest and woodland
- (DGW) Eucalyptus gunnii woodland
- (DKW) King Island Eucalypt woodland
- (DMO) Eucalyptus morrisbyi forest and woodland
- (DMW) Midlands woodland complex
- (DNF) Eucalyptus nitida Furneaux forest
- (DNI) Eucalyptus nitida dry forest and woodland
- (DOB) Eucalyptus obliqua dry forest
- (DOV) Eucalyptus ovata forest and woodland
- (DOW) Eucalyptus ovata heathy woodland
- (DPD) Eucalyptus pauciflora forest and woodland on dolerite
- (DPE) Eucalyptus perriniana forest and woodland
- (DPO) Eucalyptus pauciflora forest and woodland not on dolerite
- (DPU) Eucalyptus pulchella forest and woodland
- (DRI) Eucalyptus risdonii forest and woodland
- (DRO) Eucalyptus rodwayi forest and woodland
- (DSC) Eucalyptus amygdalina - Eucalyptus obliqua damp sclerophyll forest
- (DSG) Eucalyptus sieberi forest and woodland on granite
- (DSO) Eucalyptus sieberi forest and woodland not on granite
- (DTD) Eucalyptus tenuiramis forest and woodland on dolerite
- (DTG) Eucalyptus tenuiramis forest and woodland on granite
- (DTO) Eucalyptus tenuiramis forest and woodland on sediments
- (DVC) Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland
- (DVF) Eucalyptus viminalis Furneaux forest and woodland
- (DVG) Eucalyptus viminalis grassy forest and woodland
- (FAC) Improved pasture with native tree canopy
- (FAG) Agricultural land
- (FMG) Marram grassland
- (FPE) Permanent easements
- (FPF) Pteridium esculentum fernland
- (FPH) Plantations for silviculture - hardwood
- (FPS) Plantations for silviculture - softwood
- (FPU) Unverified plantations for silviculture
- (FRG) Regenerating cleared land
- (FSM) Spartina marshland
- (FUM) Extra-urban miscellaneous
- (FUR) Urban areas
- (FWU) Weed infestation
- (GCL) Lowland grassland complex

TASVEG 4.0 Communities within 1000 metres

(GHC) Coastal grass and herbfield
(GPH) Highland Poa grassland
(GPL) Lowland Poa labillardierei grassland
(GRP) Rockplate grassland
(GSL) Lowland grassy sedgeland
(GTL) Lowland Themeda triandra grassland
(HCH) Alpine coniferous heathland
(HCM) Cushion moorland
(HHE) Eastern alpine heathland
(HHW) Western alpine heathland
(HSE) Eastern alpine sedgeland
(HSW) Western alpine sedgeland/herbland
(HUE) Eastern alpine vegetation (undifferentiated)
(MBE) Eastern buttongrass moorland
(MBP) Pure buttongrass moorland
(MBR) Sparse buttongrass moorland on slopes
(MBS) Buttongrass moorland with emergent shrubs
(MBU) Buttongrass moorland (undifferentiated)
(MBW) Western buttongrass moorland
(MDS) Subalpine Diplarrena latifolia rushland
(MGH) Highland grassy sedgeland
(MRR) Restionaceae rushland
(MSW) Western lowland sedgeland
(NAD) Acacia dealbata forest
(NAF) Acacia melanoxylon swamp forest
(NAL) Allocasuarina littoralis forest
(NAR) Acacia melanoxylon forest on rises
(NAV) Allocasuarina verticillata forest
(NBA) Bursaria - Acacia woodland
(NBS) Banksia serrata woodland
(NCR) Callitris rhomboidea forest
(NLA) Leptospermum scoparium - Acacia mucronata forest
(NLE) Leptospermum forest
(NLM) Leptospermum lanigerum - Melaleuca squarrosa swamp forest
(NLN) Subalpine Leptospermum nitidum woodland
(NME) Melaleuca ericifolia swamp forest
(OAQ) Water, sea
(ORO) Lichen lithosere
(OSM) Sand, mud
(RCO) Coastal rainforest
(RFE) Rainforest fernland
(RFS) Nothofagus gunnii rainforest scrub
(RHP) Lagarostrobos franklinii rainforest and scrub
(RKF) Athrotaxis selaginoides - Nothofagus gunnii short rainforest
(RKP) Athrotaxis selaginoides rainforest
(RKS) Athrotaxis selaginoides subalpine scrub
(RKX) Highland rainforest scrub with dead Athrotaxis selaginoides
(RML) Nothofagus - Leptospermum short rainforest
(RMS) Nothofagus - Phyllocladus short rainforest
(RMT) Nothofagus - Atherosperma rainforest
(RMU) Nothofagus rainforest (undifferentiated)
(RPF) Athrotaxis cupressoides - Nothofagus gunnii short rainforest
(RPP) Athrotaxis cupressoides rainforest
(RPW) Athrotaxis cupressoides open woodland
(RSH) Highland low rainforest and scrub
(SAL) Acacia longifolia coastal scrub
(SBM) Banksia marginata wet scrub
(SBR) Broad-leaf scrub
(SCA) Coastal scrub on alkaline sands
(SCH) Coastal heathland
(SCL) Heathland on calcareous substrates

TASVEG 4.0 Communities within 1000 metres

(SED) Eastern scrub on dolerite
(SHS) Subalpine heathland
(SHW) Wet heathland
(SKA) Kunzea ambigua regrowth scrub
(SLG) Leptospermum glaucescens heathland and scrub
(SLL) Leptospermum lanigerum scrub
(SLS) Leptospermum scoparium heathland and scrub
(SMM) Melaleuca squamea heathland
(SMP) Melaleuca pustulata scrub
(SMR) Melaleuca squarrosa scrub
(SRE) Eastern riparian scrub
(SRF) Leptospermum with rainforest scrub
(SRH) Rookery halophytic herbland
(SSC) Coastal scrub
(SSK) Scrub complex on King Island
(SSW) Western subalpine scrub
(SSZ) Spray zone coastal complex
(SWR) Western regrowth complex
(SWW) Western wet scrub
(WBR) Eucalyptus brookeriana wet forest
(WDA) Eucalyptus dalrympleana forest
(WDB) Eucalyptus delegatensis forest with broad-leaf shrubs
(WDL) Eucalyptus delegatensis forest over Leptospermum
(WDR) Eucalyptus delegatensis forest over rainforest
(WDU) Eucalyptus delegatensis wet forest (undifferentiated)
(WGK) Eucalyptus globulus King Island forest
(WGL) Eucalyptus globulus wet forest
(WNL) Eucalyptus nitida forest over Leptospermum
(WNR) Eucalyptus nitida forest over rainforest
(WNU) Eucalyptus nitida wet forest (undifferentiated)
(WOB) Eucalyptus obliqua forest with broad-leaf shrubs
(WOL) Eucalyptus obliqua forest over Leptospermum
(WOR) Eucalyptus obliqua forest over rainforest
(WOU) Eucalyptus obliqua wet forest (undifferentiated)
(WRE) Eucalyptus regnans forest
(WSU) Eucalyptus subcrenulata forest and woodland
(WVI) Eucalyptus viminalis wet forest

Legend: Cadastral Parcels

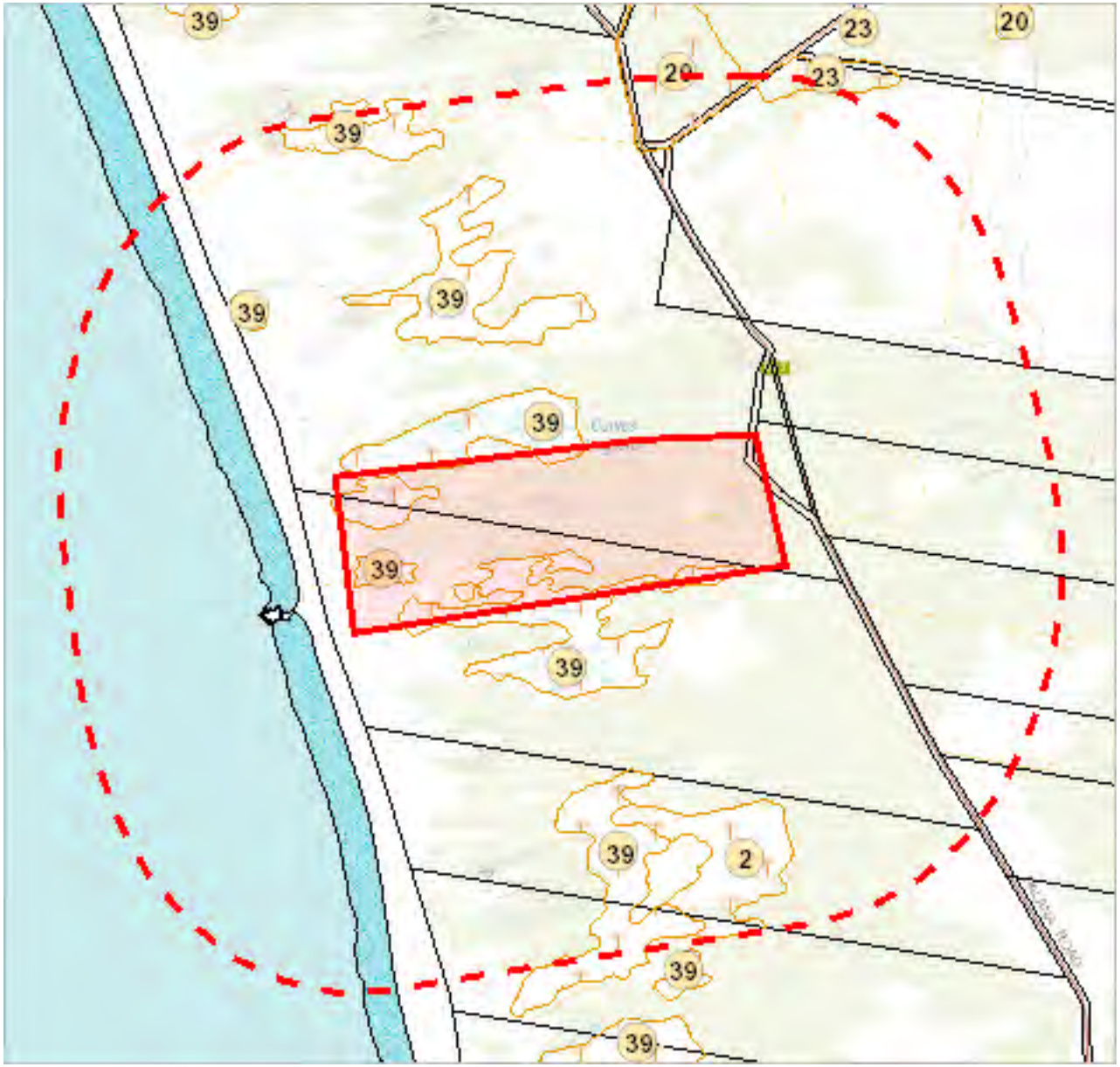
TASVEG 4.0 Communities within 1000 metres

Code	Community	Canopy Tree
AHL	(AHL) Lacustrine herbland	
DNF	(DNF) Eucalyptus nitida Furneaux forest	
DOW	(DOW) Eucalyptus ovata heathy woodland	
DVC	(DVC) Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland	
FAG	(FAG) Agricultural land	
FRG	(FRG) Regenerating cleared land	
FUM	(FUM) Extra-urban miscellaneous	
GHC	(GHC) Coastal grass and herbfield	
NAL	(NAL) Allocasuarina littoralis forest	
NAV	(NAV) Allocasuarina verticillata forest	
OSM	(OSM) Sand, mud	
SAL	(SAL) Acacia longifolia coastal scrub	
SCA	(SCA) Coastal scrub on alkaline sands	
SLG	(SLG) Leptospermum glaucescens heathland and scrub	
SLL	(SLL) Leptospermum lanigerum scrub	
SLS	(SLS) Leptospermum scoparium heathland and scrub	EL
SLS	(SLS) Leptospermum scoparium heathland and scrub	

For more information contact: Coordinator, Tasmanian Vegetation Monitoring and Mapping Program.
Telephone: (03) 6165 4320
Email: TVMMPSupport@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened Communities (TNVC 2020) within 1000 metres

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

Threatened Communities (TNVC 2020) within 1000 metres

Legend: Threatened Communities

- 1 - Alkaline pans
- 2 - Allocasuarina littoralis forest
- 3 - Athrotaxis cupressoides/Nothofagus gunnii short rainforest
- 4 - Athrotaxis cupressoides open woodland
- 5 - Athrotaxis cupressoides rainforest
- 6 - Athrotaxis selaginoides/Nothofagus gunnii short rainforest
- 7 - Athrotaxis selaginoides rainforest
- 8 - Athrotaxis selaginoides subalpine scrub
- 9 - Banksia marginata wet scrub
- 10 - Banksia serrata woodland
- 11 - Callitris rhomboidea forest
- 13 - Cushion moorland
- 14 -Eucalyptus amygdalina forest and woodland on sandstone
- 15 - Eucalyptus amygdalina inland forest and woodland on cainozoic deposits
- 16 - Eucalyptus brookeriana wet forest
- 17 - Eucalyptus globulus dry forest and woodland
- 18 - Eucalyptus globulus King Island forest
- 19 - Eucalyptus morrisbyi forest and woodland
- 20 - Eucalyptus ovata forest and woodland
- 21 - Eucalyptus risdonii forest and woodland
- 22 - Eucalyptus tenuiramis forest and woodland on sediments
- 23 - Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland
- 24 - Eucalyptus viminalis Furneaux forest and woodland
- 25 - Eucalyptus viminalis wet forest
- 26 - Heathland on calcareous substrates
- 27 - Heathland scrub complex at Wingaroo
- 28 - Highland grassy sedgeland
- 29 - Highland Poa grassland
- 30 - Melaleuca ericifolia swamp forest
- 31 - Melaleuca pustulata scrub
- 32 - Notelaea - Pomaderris - Beyeria forest
- 33 - Rainforest fernland
- 34 - Riparian scrub
- 35 - Seabird rookery complex
- 36 - Sphagnum peatland
- 36A - Spray zone coastal complex
- 37 - Subalpine Diplarrena latifolia rushland
- 38 - Subalpine Leptospermum nitidum woodland
- 39 - Wetlands

Legend: Cadastral Parcels

Threatened Communities (TNVC 2020) within 1000 metres

Scheduled Community Id	Scheduled Community Name
2	Allocasuarina littoralis forest
20	Eucalyptus ovata forest and woodland
23	Eucalyptus viminalis - Eucalyptus globulus coastal forest and woodland
39	Wetlands

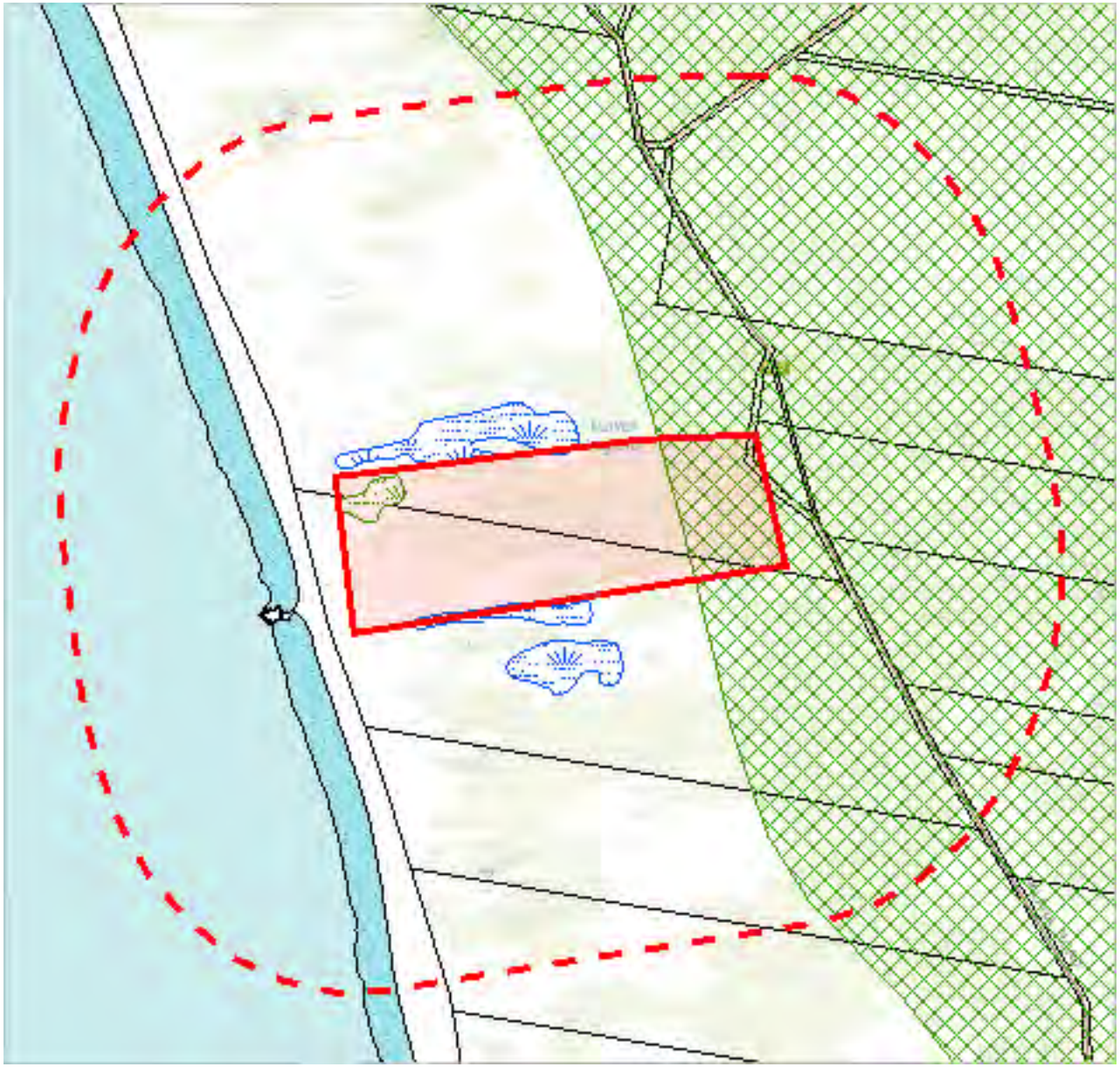
For more information contact: Coordinator, Tasmanian Vegetation Monitoring and Mapping Program.
Telephone: (03) 6165 4320
Email: TVMMPSupport@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

*** No Fire History (All) found within 1000 metres ***

*** No Fire History (Last Burnt) found within 1000 metres ***

Freshwater Ecosystem Values within 1000 metres

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

Freshwater Ecosystem Values within 1000 metres

Annexure: 16.2.3

Legend: CFEV Rivers - Integrated Conservation Value

- Very High
- High
- Medium
- Low
- Artificial drainage

Legend: CFEV Waterbodies - Integrated Conservation Value

- Very High
- High
- Medium
- Low

Legend: CFEV Wetlands - Integrated Conservation Value

- Very High
- High
- Medium
- Low

Legend: CFEV Saltmarshes - Integrated Conservation Value

- Very High
- High
- Medium

Legend: CFEV Estuaries - Integrated Conservation Value

- Very High
- High
- Medium

Legend: CFEV Karst - Integrated Conservation Value

- Very High
- High
- Medium

Legend: CFEV Groundwater Dependent Ecosystems (GDEs)

Legend: Cadastral Parcels

Rivers

No River features found within 1000 metres

Waterbodies

No Waterbody features found within 1000 metres

Wetlands

Id	Name	Naturalness	Integrated Conservation Value	Conservation Management Priority	Number of Special Values
22122.0		High	H	VH	1.0
22124.0		High	VH	VH	1.0
22128.0		High	VH	VH	1.0
22129.0		High	VH	VH	2.0

Saltmarshes

No Saltmarsh features found within 1000 metres

Estuaries

No Estuary features found within 1000 metres

Karst

Id	Name	Naturalness	Integrated Conservation Value	Conservation Management Priority	Number of Special Values
61.0	Emita - Memana (1)	Medium	H	VH	0.0

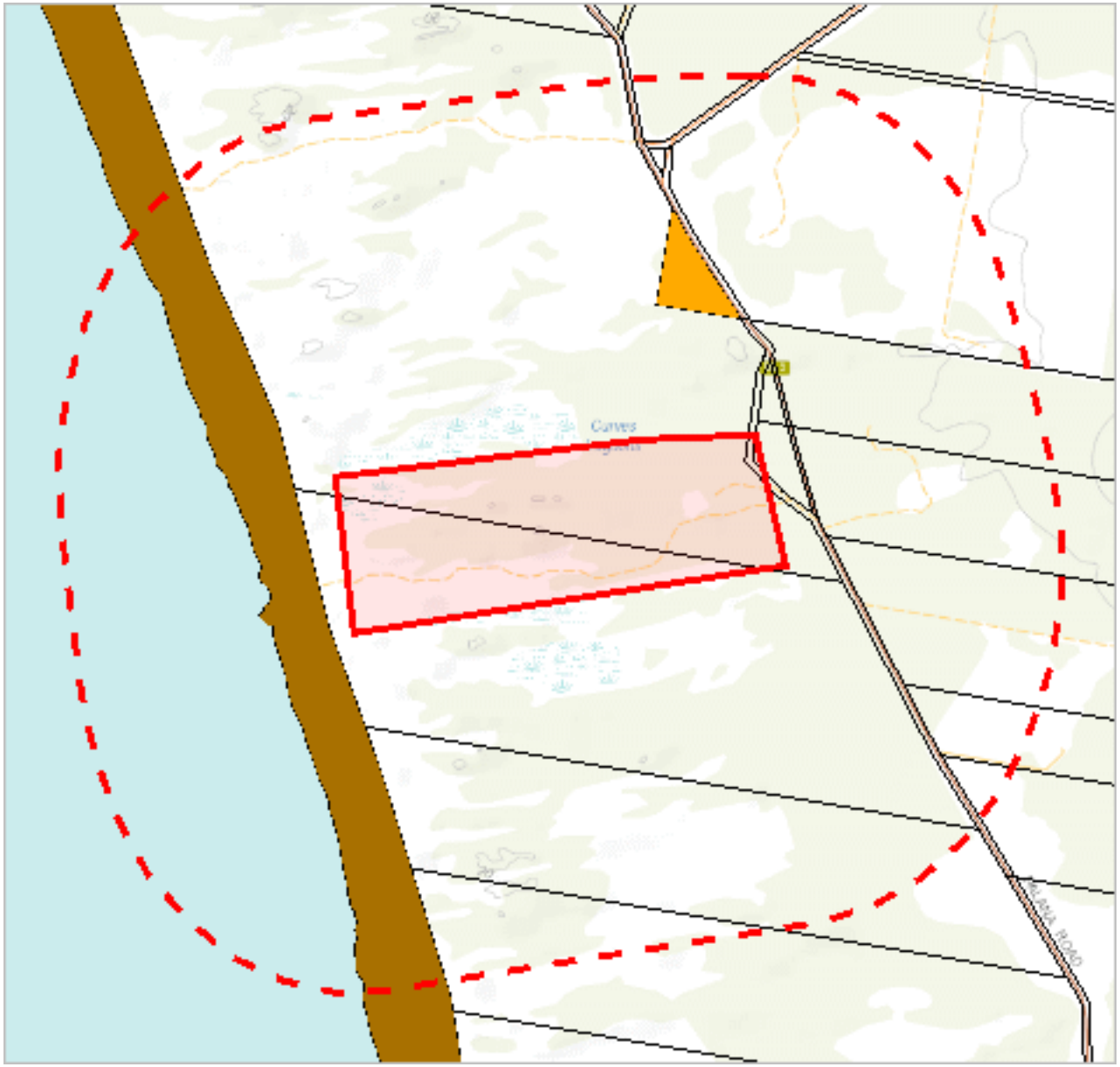
Groundwater Dependent Ecosystems

No Groundwater Dependent Ecosystem features found within 1000 metres

For more information about Freshwater Ecosystem Values, please contact the Conservation of Freshwater Ecosystem Values Program.
Telephone: (03) 6165 53271
Email: cfev@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000
Website: https://www.nre.tas.gov.au/cfev
For more detailed information on freshwater ecosystems, see the Conservation of Freshwater Ecosystem Values (CFEV) database: https://wrt.tas.gov.au/cfev

Reserves within 1000 metres

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

Reserves within 1000 metres

Legend: Tasmanian Reserve Estate

- Conservation Area
- Conservation Area and Conservation Covenant (NCA)
- Game Reserve
- Historic Site
- Indigenous Protected Area
- National Park
- Nature Reserve
- Nature Recreation Area
- Regional Reserve
- State Reserve
- Wellington Park
- Public authority land within WHA
- Future Potential Production Forest
- Informal Reserve on Permanent Timber Production Zone Land or STT managed land
- Informal Reserve on other public land
- Roadside Conservation Site
- Conservation Covenant (NCA)
- Private Nature Reserve and Conservation Covenant (NCA)
- Private Sanctuary and Conservation Covenant (NCA)
- Private Sanctuary
- Private land within WHA
- Management Agreement
- Stewardship Agreement
- Part 5 Agreement (Meander Dam Offset)
- Other Private Reserve

Legend: Cadastral Parcels

Reserves within 1000 metres

Name	Classification	Status	Area (HA)
Marshall Beach Conservation Area	Conservation Area	Other Formal Reserve	0.04421803
Marshall Beach Conservation Area	Conservation Area	Other Formal Reserve	0.13924016
Marshall Beach Conservation Area	Conservation Area	Other Formal Reserve	91.37099684
Marshall Beach Conservation Area	Conservation Area	Other Formal Reserve	120.36868549
	Informal Reserve on other public land	Informal Reserve	3.12065496

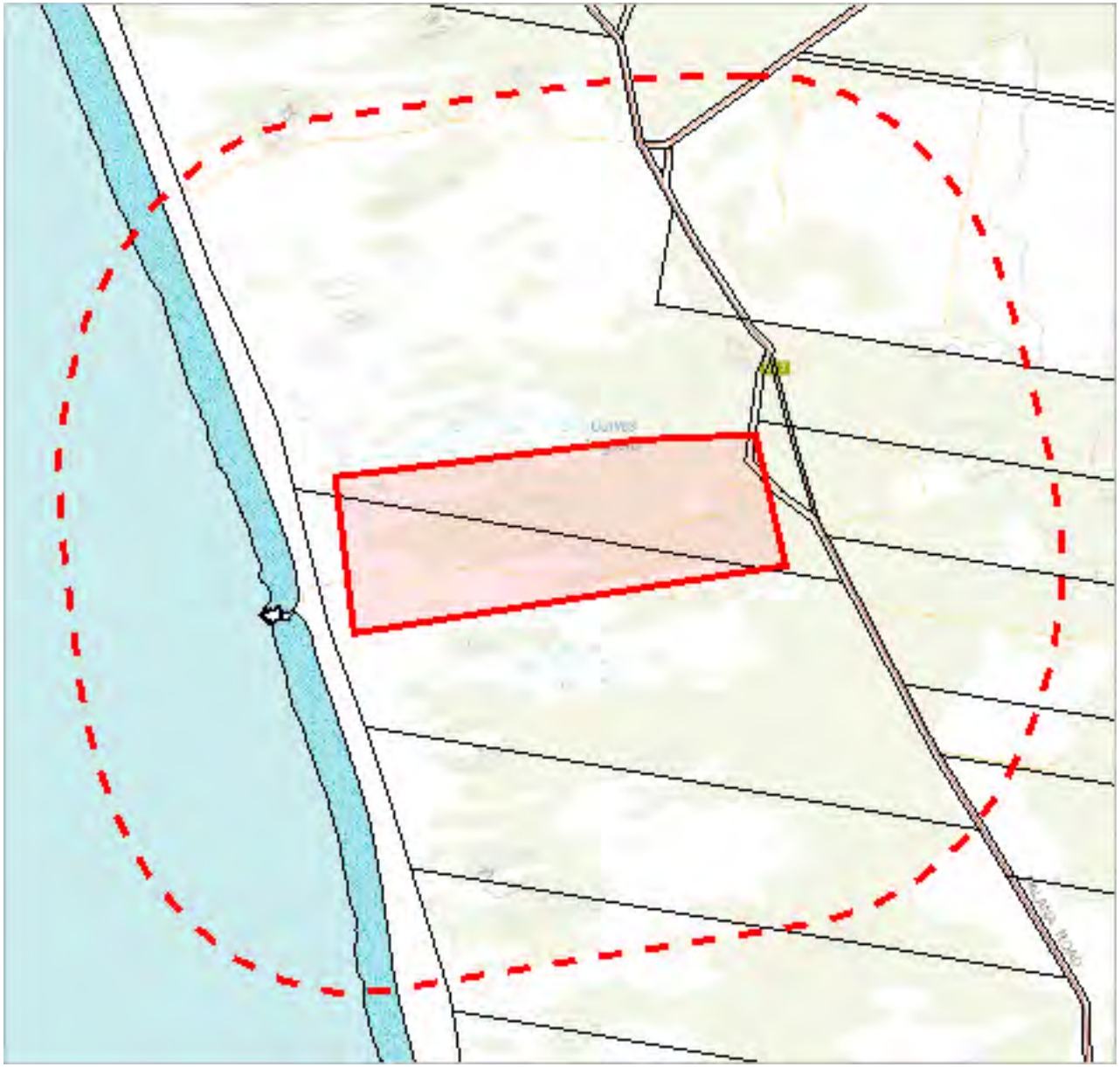
For more information about the Tasmanian Reserve Estate, please contact the Natural Values Science Services Branch.

Email: LandManagement.Enquiries@nre.tas.gov.au

Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Known biosecurity risks within 1000 meters

579117, 5579771



575986, 5576792

Please note that some layers may not display at all requested map scales

Known biosecurity risks within 1000 meters

Annexure: 16.2.3

Legend: Biosecurity Risk Species

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Hygiene infrastructure

- Location Point Verified
- Location Point Unverified
- Location Line Verified
- Location Line Unverified
- Location Polygon Verified
- Location Polygon Unverified

Legend: Cadastral Parcels

Known biosecurity risks within 1000 meters

Verified Species of biosecurity risk

No verified species of biosecurity risk found within 1000 metres

Unverified Species of biosecurity risk

No unverified species of biosecurity risk found within 1000 metres

Generic Biosecurity Guidelines

The level and type of hygiene protocols required will vary depending on the tenure, activity and land use of the area. In all cases adhere to the land manager's biosecurity (hygiene) protocols. As a minimum always Check / Clean / Dry (Disinfect) clothing and equipment before trips and between sites within a trip as needed https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene/keeping-it-clean-a-tasmanian-field-hygiene-manual

On Reserved land, the more remote, infrequently visited and undisturbed areas require tighter biosecurity measures.

In addition, where susceptible species and communities are known to occur, tighter biosecurity measures are required.

Apply controls relevant to the area / activity:

- Don't access sites infested with pathogen or weed species unless absolutely necessary. If it is necessary to visit, adopt high level hygiene protocols.
- Consider not accessing non-infested sites containing known susceptible species / communities. If it is necessary to visit, adopt high level hygiene protocols.
- Don't undertake activities that might spread pest / pathogen / weed species such as deliberately moving soil or water between areas.
- Modify / restrict activities to reduce the chance of spreading pest / pathogen / weed species e.g. avoid periods when weeds are seeding, avoid clothing/equipment that excessively collects soil and plant material e.g. Velcro, excessive tread on boots.
- Plan routes to visit clean (uninfested) sites prior to dirty (infested) sites. Do not travel through infested areas when moving between sites.
- Minimise the movement of soil, water, plant material and hitchhiking wildlife between areas by using the Check / Clean / Dry (Disinfect when drying is not possible) procedure for all clothing, footwear, equipment, hand tools and vehicles https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene
- Neoprene and netting can take 48 hours to dry, use non-porous gear wherever possible.
- Use walking track boot wash stations where available.
- Keep a hygiene kit in the vehicle that includes a scrubbing brush, boot pick, and disinfectant https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene/keeping-it-clean-a-tasmanian-field-hygiene-manual
- Dispose of all freshwater away from natural water bodies e.g. do not empty water into streams or ponds.
- Dispose of used disinfectant ideally in town though a treatment or septic system. Always keep disinfectant well away from natural water systems.
- Securely contain any high risk pest / pathogen / weed species that must be collected and moved e.g. biological samples.

Hygiene Infrastructure

No known hygiene infrastructure found within 1000 metres

ATTACHMENT 3: PROTECTED MATTERS SEARCH TOOL (MNES) REPORT

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 19-Sep-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	53
Listed Migratory Species:	43

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	79
Whales and Other Cetaceans:	10
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	7
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	1
Key Ecological Features (Marine):	None
Biologically Important Areas:	8
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Giant Kelp Marine Forests of South East Australia	Endangered	Community may occur within area	In buffer area only
Tasmanian Forests and Woodlands dominated by black gum or Brookers gum (Eucalyptus ovata / E. brookeriana)	Critically Endangered	Community likely to occur within area	In feature area
Tasmanian white gum (Eucalyptus viminalis) wet forest	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aquila audax fleayi Tasmanian Wedge-tailed Eagle, Wedge-tailed Eagle (Tasmanian) [64435]	Endangered	Breeding likely to occur within area	In feature area
Ardenna grisea Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris canutus			Annexure: 16.2.3
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni			
Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi			
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Fregetta grallaria grallaria			
White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Halobaena caerulea			
Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In feature area
Lathamus discolor			
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Limosa lapponica baueri			
Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Endangered	Species or species habitat may occur within area	In feature area
Macronectes giganteus			
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli			
Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Neophema chrysostoma			
Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur subantarctica			
Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area	In feature area
Pardalotus quadragintus			
Forty-spotted Pardalote [418]	Endangered	Foraging, feeding or related behaviour may occur within area	In feature area
Pterodroma leucoptera leucoptera			
Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sternula nereis nereis			Annexure: 16.2.3
Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche bulleri			
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei			
Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma			
Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thinornis cucullatus cucullatus			Annexure: 16.2.3
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only
CRUSTACEAN			
Engaeus martigener			
Furneaux Burrowing Crayfish [67220]	Endangered	Species or species habitat may occur within area	In feature area
FISH			
Galaxiella pusilla			
Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Endangered	Species or species habitat likely to occur within area	In feature area
Seriolella brama			
Blue Warehou [69374]	Conservation Dependent	Species or species habitat known to occur within area	In feature area
FROG			
Litoria raniformis			
Southern Bell Frog,, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Pseudomys novaehollandiae			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat known to occur within area	In feature area
PLANT			
Caladenia caudata			
Tailed Spider-orchid [17067]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Glycine latrobeana			Annexure: 16.2.3
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area	In feature area
Pterostylis cucullata			
Leafy Greenhood [15459]	Vulnerable	Species or species habitat known to occur within area	In feature area
Senecio psilocarpus			
Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
SHARK			
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Galeorhinus galeus			
School Shark, Eastern School Shark, Snapper Shark, Tope, Soupfin Shark [68453]	Conservation Dependent	Species or species habitat may occur within area	In buffer area only

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Ardenna carneipes			
Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ardenna grisea			Annexure: 16.2.3
Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Ardenna tenuirostris			
Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi			
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes giganteus			
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli			
Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons			
Little Tern [82849]		Breeding known to occur within area	In feature area
Thalassarche bulleri			
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma			
Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche melanophris			
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Migratory Marine Species			
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata			
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area
Carcharodon carcharias			
White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caretta caretta			Annexure: 16.2.3
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area
Eubalaena australis as Balaena glacialis australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Lagenorhynchus obscurus			
Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Lamna nasus			
Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area	In feature area
Megaptera novaeangliae			
Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca			
Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat likely to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata			Annexure: 16.2.3
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris alba			
Sanderling [875]		Species or species habitat likely to occur within area	In feature area
Calidris canutus			
Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Limosa lapponica			
Bar-tailed Godwit [844]		Species or species habitat may occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Ardenna carneipes as Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Ardenna grisea as Puffinus griseus Sooty Shearwater [82651]	Vulnerable	Species or species habitat may occur within area	In feature area
Ardenna tenuirostris as Puffinus tenuirostris Short-tailed Shearwater [82652]		Breeding known to occur within area	In buffer area only
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris alba Sanderling [875]		Species or species habitat likely to occur within area	In feature area
Calidris canutus Red Knot, Knot [855]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea			Annexure: 16.2.3
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Charadrius leschenaultii			
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Diomedea antipodensis			
Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea antipodensis gibsoni as Diomedea gibsoni			
Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea epomophora			
Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea exulans			
Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Diomedea sanfordi			
Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Eudyptula minor			
Little Penguin [1085]		Breeding known to occur within area	In buffer area only
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Haliaeetus leucogaster			Annexure: 16.2.3
White-bellied Sea-Eagle [943]		Breeding known to occur within area	In feature area
Halobaena caerulea			
Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Larus pacificus			
Pacific Gull [811]		Breeding known to occur within area	In buffer area only
Lathamus discolor			
Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Limosa lapponica			
Bar-tailed Godwit [844]		Species or species habitat may occur within area	In feature area
Macronectes giganteus			
Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Macronectes halli			
Northern Giant Petrel [1061]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat likely to occur within area overfly marine area	In feature area
Neophema chrysostoma			
Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pachyptila turtur			
Fairy Prion [1066]		Species or species habitat known to occur within area	In feature area
Stercorarius antarcticus as Catharacta skua			
Brown Skua [85039]		Species or species habitat may occur within area	In buffer area only
Sterna striata			
White-fronted Tern [799]		Foraging, feeding or related behaviour likely to occur within area	In feature area
Sternula albifrons as Sterna albifrons			
Little Tern [82849]		Breeding known to occur within area	In feature area
Thalassarche bulleri			
Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche bulleri platei as Thalassarche sp. nov.			
Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area	In feature area
Thalassarche carteri			
Indian Yellow-nosed Albatross [64464]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Thalassarche cauta			
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche chrysostoma			
Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area	In feature area
Thalassarche impavida			
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thalassarche melanophris			Annexure: 16.2.3
Black-browed Albatross [66472]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche salvini			
Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area	In feature area
Thalassarche steadi			
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
Thinornis cucullatus as Thinornis rubricollis			
Hooded Plover, Hooded Dotterel [87735]		Species or species habitat known to occur within area overfly marine area	In feature area
Thinornis cucullatus cucullatus as Thinornis rubricollis rubricollis			
Eastern Hooded Plover, Eastern Hooded Plover [90381]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only
Fish			
Heraldia nocturna			
Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area	In feature area
Hippocampus abdominalis			
Big-belly Seahorse, Eastern Potbelly Seahorse, New Zealand Potbelly Seahorse [66233]		Species or species habitat may occur within area	In feature area
Hippocampus breviceps			
Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area	In feature area
Hippocampus minotaur			
Bullneck Seahorse [66705]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Histiogamphelus briggsii			Annexure: 16.2.3
Crested Pipefish, Briggs' Crested Pipefish, Briggs' Pipefish [66242]		Species or species habitat may occur within area	In feature area
Histiogamphelus cristatus			
Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area	In feature area
Hypselognathus rostratus			
Knifesnout Pipefish, Knife-snouted Pipefish [66245]		Species or species habitat may occur within area	In feature area
Kaupus costatus			
Deepbody Pipefish, Deep-bodied Pipefish [66246]		Species or species habitat may occur within area	In feature area
Kimblaeus bassensis			
Trawl Pipefish, Bass Strait Pipefish [66247]		Species or species habitat may occur within area	In feature area
Leptoichthys fistularius			
Brushtail Pipefish [66248]		Species or species habitat may occur within area	In feature area
Lissocampus caudalis			
Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area	In feature area
Lissocampus runa			
Javelin Pipefish [66251]		Species or species habitat may occur within area	In feature area
Maroubra perserrata			
Sawtooth Pipefish [66252]		Species or species habitat may occur within area	In feature area
Mitotichthys semistriatus			
Halfbanded Pipefish [66261]		Species or species habitat may occur within area	In feature area
Mitotichthys tuckeri			
Tucker's Pipefish [66262]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Notiocampus ruber			Annexure: 16.2.3
Red Pipefish [66265]		Species or species habitat may occur within area	In feature area
Phycodurus eques			
Leafy Seadragon [66267]		Species or species habitat may occur within area	In feature area
Phyllopteryx taeniolatus			
Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area	In feature area
Pugnaso curtirostris			
Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area	In feature area
Solegnathus robustus			
Robust Pipehorse, Robust Spiny Pipehorse [66274]		Species or species habitat may occur within area	In feature area
Solegnathus spinosissimus			
Spiny Pipehorse, Australian Spiny Pipehorse [66275]		Species or species habitat may occur within area	In feature area
Stigmatopora argus			
Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area	In feature area
Stigmatopora nigra			
Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area	In feature area
Stipecampus cristatus			
Ringback Pipefish, Ring-backed Pipefish [66278]		Species or species habitat may occur within area	In feature area
Urocampus carinirostris			
Hairy Pipefish [66282]		Species or species habitat may occur within area	In feature area
Vanacampus margaritifer			
Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Vanacampus phillipi			Annexure: 16.2.3
Port Phillip Pipefish [66284]		Species or species habitat may occur within area	In feature area
Vanacampus poecilolaemus			
Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area	In feature area
Mammal			
Arctocephalus forsteri			
Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area	In feature area
Arctocephalus pusillus			
Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat may occur within area	In feature area
Reptile			
Caretta caretta			
Loggerhead Turtle [1763]	Endangered	Breeding likely to occur within area	In feature area
Chelonia mydas			
Green Turtle [1765]	Vulnerable	Species or species habitat may occur within area	In feature area
Dermochelys coriacea			
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area	In feature area

Whales and Other Cetaceans

[Resource Information]

Current Scientific Name	Status	Type of Presence	Buffer Status
Mammal			
Balaenoptera acutorostrata			
Minke Whale [33]		Species or species habitat may occur within area	In feature area
Balaenoptera musculus			
Blue Whale [36]	Endangered	Species or species habitat likely to occur within area	In feature area
Caperea marginata			
Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area	In feature area

Current Scientific Name	Status	Type of Presence	Buffer Status
Delphinus delphis			Annexure: 16.2.3
Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area	In feature area
Eubalaena australis			
Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area	In feature area
Grampus griseus			
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area	In feature area
Lagenorhynchus obscurus			
Dusky Dolphin [43]		Species or species habitat may occur within area	In feature area
Megaptera novaeangliae			
Humpback Whale [38]		Species or species habitat known to occur within area	In feature area
Orcinus orca			
Killer Whale, Orca [46]		Species or species habitat likely to occur within area	In feature area
Tursiops truncatus s. str.			
Bottlenose Dolphin [68417]		Species or species habitat may occur within area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Emita	Nature Recreation Area	TAS	In buffer area only
Lughrata	Conservation Covenant	TAS	In buffer area only
Marriott Reef	Conservation Area	TAS	In buffer area only
Marshall Beach	Conservation Area	TAS	In feature area
Mount Tanner	Nature Recreation Area	TAS	In buffer area only
Reedy Lagoon	Private Nature Reserve	TAS	In buffer area only
Wingaroo	Nature Reserve	TAS	In buffer area only

Regional Forest Agreements [Resource Information]

Annexure: 16.2.3

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
Tasmania RFA	Tasmania	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area

Biologically Important Areas [Resource Information]

Scientific Name	Behaviour	Presence	Buffer Status
Seabirds			
Ardenna tenuirostris Short-tailed Shearwater [82652]	Breeding	Known to occur	In buffer area only
Ardenna tenuirostris Short-tailed Shearwater [82652]	Foraging	Known to occur	In feature area
Eudyptula minor Little Penguin [1085]	Foraging	Known to occur	In buffer area only
Pelagodroma marina White-faced Storm-petrel [1016]	Foraging	Known to occur	In feature area
Pelecanoides urinatrix Common Diving-petrel [1018]	Foraging	Known to occur	In feature area
Phalacrocorax fuscescens Black-faced Cormorant [59660]	Foraging	Known to occur	In feature area
Thalassarche cauta cauta Shy Albatross [82345]	Foraging likely	Likely to occur	In feature area
Whales			
Balaenoptera musculus brevicauda Pygmy Blue Whale [81317]	Foraging	Likely to be present	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

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Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

ATTACHMENT 4: MATTERS OF NATIONAL SIGNIFICANCE - OVERVIEW ASSESSMENT

ATTACHMENT 4

Overview Assessment of MNES and Other EPBC Act Protected Matters

MNES (and other matters protected by the Act)	Description of MNES identified in PMST Report	Potential or Likely Significant Impact	Comments
World Heritage Properties			
None	Nil identified in PMST report	No	None identified.
National Heritage Places			
None	Nil identified in PMST report	No	None identified
Wetlands of International Importance (Ramsar)			
None	Nil identified in PMST report	No	None identified.
Great Barrier Reef Marine Park			
None	Nil identified in PMST report	No	None identified.
Commonwealth Marine Area			
None	Nil identified in PMST report	No	None identified.
Listed Threatened Ecological Communities			
3	▪ Tasmanian Forests and Woodlands dominated by black gum or Brooker's gum (*Eucalyptus ovata / E. brookeriana*) ▪ Tasmanian white gum (*Eucalyptus viminalis*) wet forest. ▪ Giant Kelp Marine Forests of South East Australia. ▪ Lowland Native Grasslands of Tasmania (not identified in the PMST but is considered here given the presence of a TASVEG potential analogue - Coastal grassland and herbfield (TASVEG – Code GCH)	No	None of the 3 PMST Report identified ecological communities are present in or are adjacent to the Survey Area or could be affected (directly or indirectly) by the Activity. No other Listed Threatened Ecological Communities are present in the Survey Area, are adjacent to the Survey Area or could be affected (directly or indirectly) by the Activity. The *Lowland Native Grasslands of Tasmania* ecological community was not identified in the PMST but is considered here given the presence of a TASVEG potential analogue - Coastal grassland and herbfield (TASVEG – Code GCH). In this case, the GCH (1) contains *Poa labillardierei* at less than 50% of the native perennial tussock cover (it is 0 to 20%), and/or (2) Patch size is less than 1 hectare, and/or (3) Weeds (perennial) make up 20% or more than the total ground cover of the patch which excludes it from *the Lowland Native Grasslands of Tasmania* ecological community listed on the EPBC Act

Listed Threatened Species

53

The following species were identified in the PMST Report. Those marked by the blue highlight were specifically considered in more detail, and specifically in the field assessments, as habitat potentially suitable for their occupation and persistence may be present.

Further comments for those highlighted species are provided in **Attachment 5.**

Scientific Name	Common Name	Class
Seriolella brama	Blue Warehou	Fish
Galeorhinus galeus	School Shark	Shark
Numenius madagascariensis	Eastern Curlew	Bird
Lathamus discolor	Swift Parrot	Bird
Calidris ferruginea	Curlew Sandpiper	Bird
Balaenoptera musculus	Blue Whale	Mammal
Pardalotus quadragintus	Forty-spotted Pardalote	Bird
Thalassarche chrysostoma	Grey-headed Albatross	Bird
Tringa nebularia	Common Greenshank	Bird
Macronectes giganteus	Southern Giant-Petrel	Bird
Limosa lapponica baueri	Nunivak Bar-tailed Godwit	Bird
Caretta caretta	Loggerhead Turtle	Reptile
Dermochelys coriacea	Leatherback Turtle	Reptile
Galaxiella pusilla	Eastern Dwarf Galaxias	Fish
Eubalaena australis	Southern Right Whale	Mammal
Pterodroma leucoptera leucoptera	Gould's Petrel	Bird
Engaeus martigener	Furneaux Burrowing Crayfish	Crustacean
Thalassarche cauta	Shy Albatross	Bird
Botaurus poiciloptilus	Australasian Bittern	Bird
Diomedea sanfordi	Northern Royal Albatross	Bird
Aquila audax fleayi	Wedge-tailed Eagle	Bird
Pachyptila turtur subantarctica	Fairy Prion (southern)	Bird
Thinornis cucullatus cucullatus	Eastern Hooded Plover	Bird
Thalassarche melanophris	Black-browed Albatross	Bird
Glycine latrobeana	Clover Glycine, Purple Clover	Plant
Senecio psilocarpus	Swamp Fireweed	Plant
Carcharodon carcharias	Great White Shark	Shark
Pterostylis cucullata	Leafy Greenhood	Plant
Macronectes halli	Northern Giant Petrel	Bird
Litoria raniformis	Green and Golden Frog	Frog
Hirundapus caudacutus	White-throated Needletail	Bird
Chelonia mydas	Green Turtle	Reptile
Halobaena caerulea	Blue Petrel	Bird

Yes, further assessment is required for some species (those highlighted in blue)**.**

See section *C.3.1 Overview of listed species in Survey Area*

Species considered were those where there are recorded locations nearby, such as at Marshall Bay (**Figure 5**), or there is likely to be suitable habitat present at least in or near the Survey Area.

Most listed species are of no relevance to the Activity because they are:

(1) highly specialised in their habitat requirements which are absent from the Survey Area (e.g. Furneaux burrowing crayfish), and/or are

(2) marine and/or terrestrial migratory (e.g. albatross species, fairy prion) where the Activity will not affect them nor their habitat, and/or are

(3) inhabitants of large wetland systems (e.g., Australasian bittern), or the tidal and aquatic marine environment neither of which are in or adjacent to the Survey Areat, and/or are

(4) shark, whale, semi-aquatic reptile (turtles), estuarine/mudflat, and fully marine(pelagic)/migratory species that are not to be affected by the Activity.

	Thalassarche carteri	Indian Yellow-nosed Albatross	Bird		
	Thalassarche steadi	White-capped Albatross	Bird		
	Thalassarche salvini	Salvin's Albatross	Bird		
	Thalassarche bulleri	Buller's Albatross	Bird		
	Thalassarche bulleri platei	Northern Buller's Albatross	Bird		
	Neophema chrysostoma	Blue-winged Parrot	Bird		
	Gallinago hardwickii	Latham's Snipe	Bird		
	Charadrius leschenaultii	Greater Sand Plover	Bird		
	Calidris acuminata	Sharp-tailed Sandpiper	Bird		
	Caladenia caudata	Tailed Spider-orchid	Plant		
	Diomedea antipodensis gibsoni	Gibson's Albatross	Bird		
	Pseudomys novaehollandiae	New Holland Mouse	Mammal		
	Ardenna grisea	Sooty Shearwater	Bird		
	Diomedea exulans	Wandering Albatross	Bird		
	Diomedea epomophora	Southern Royal Albatross	Bird		
	Fregetta grallaria grallaria	White-bellied Storm-Petrel	Bird		
	Calidris canutus	Red Knot, Knot	Bird		
	Thalassarche impavida	Campbell Albatross	Bird		
	Diomedea antipodensis	Antipodean Albatross	Bird		
	Sternula nereis nereis	Australian Fairy Tern	Bird		
Listed Migratory Species					
43	The following species were identified in the PMST Report. Those marked by blue highlights were specifically considered in the field assessments as habitat potentially suitable for their occupation and persistence may be present. Comments for those highlighted species are also provided in **Attachment 5.**			No	The listed species either have – • highly specialised habitat requirements which are absent from the Survey Area, • are marine (including estuarine based and fully aquatic) and/or terrestrial migratory, and/or are • species of large wetland systems which are absent from the Survey Area. The action is unlikely to cause any impact to most of these species or their habitat.

Scientific Name	Common Name	Class
Caperea marginata	Pygmy Right Whale	Mammal
Numenius madagascariensis	Eastern Curlew	Bird
Balaenoptera musculus	Blue Whale	Mammal
Megaptera novaeangliae	Humpback Whale	Mammal
Thalassarche melanophris	Black-browed Albatross	Bird
Thalassarche chrysostoma	Grey-headed Albatross	Bird
Carcharodon carcharias	White Shark, Great White Shark	Shark
Tringa nebularia	Common Greenshank	Bird
Actitis hypoleucos	Common Sandpiper	Bird
Macronectes giganteus	Southern Giant-Petrel	Bird
Macronectes halli	Northern Giant Petrel	Bird
Apus pacificus	Fork-tailed Swift	Bird
Hirundapus caudacutus	White-throated Needletail	Bird

	Chelonia mydas	Green Turtle	Reptile		
	Caretta caretta	Loggerhead Turtle	Reptile		
	Dermochelys coriacea	Leatherback Turtle	Reptile		
	Lamna nasus	Porbeagle, Mackerel Shark	Shark		
	Thalassarche carteri	Indian Yellow-nosed Albatross	Bird		
	Thalassarche steadi	White-capped Albatross	Bird		
	Thalassarche salvini	Salvin's Albatross	Bird		
	Thalassarche bulleri	Buller's Albatross	Bird		
	Sternula albifrons	Little Tern	Bird		
	Myiagra cyanoleuca	Satin Flycatcher	Bird		
	Gallinago hardwickii	Latham's Snipe	Bird		
	Charadrius leschenaultii	Greater Sand Plover	Bird		
	Calidris acuminata	Sharp-tailed Sandpiper	Bird		
	Orcinus orca	Killer Whale, Orca	Mammal		
	Eubalaena australis	Southern Right Whale	Mammal		
	Calidris alba	Sanderling	Bird		
	Lagenorhynchus obscurus	Dusky Dolphin	Mammal		
	Limosa lapponica	Bar-tailed Godwit	Bird		
	Ardenna tenuirostris	Short-tailed Shearwater	Bird		
	Thalassarche cauta	Shy Albatross	Bird		
	Ardenna grisea	Sooty Shearwater	Bird		
	Diomedea exulans	Wandering Albatross	Bird		
	Diomedea epomophora	Southern Royal Albatross	Bird		
	Calidris melanotos	Pectoral Sandpiper	Bird		
	Calidris ferruginea	Curlew Sandpiper	Bird		
	Ardenna carneipes	Flesh-footed Shearwater	Bird		
	Calidris canutus	Red Knot, Knot	Bird		
	Diomedea sanfordi	Northern Royal Albatross	Bird		
	Thalassarche impavida	Campbell Albatross	Bird		
	Diomedea antipodensis	Antipodean Albatross	Bird		
Commonwealth Land					
None	Nil identified in PMST report			No	None identified.
Commonwealth Heritage Places					
None	Nil identified in PMST report			No	None identified.

Listed Marine Species

79

The following species were identified in the PMST Report:

Scientific Name	Common Name	Class
Stigmatopora argus	Spotted Pipefish, Gulf Pipefish	Fish
Maroubra perserrata	Sawtooth Pipefish	Fish
Sterna striata	White-fronted Tern	Bird
Stigmatopora nigra	Widebody Pipefish	Fish
Numenius madagascariensis	Eastern Curlew	Bird
Thinornis cucullatus cucullatus	Eastern Hooded Plover	Bird
Kimblaeus bassensis	Trawl Pipefish	Fish
Kaupus costatus	Deepbody Pipefish	Fish
Thalassarche melanophris	Black-browed Albatross	Bird
Hippocampus minotaur	Bullneck Seahorse	Fish
Thalassarche chrysostoma	Grey-headed Albatross	Bird
Stercorarius antarcticus	Brown Skua	Bird
Tringa nebularia	Common Greenshank	Bird
Solegnathus spinosissimus	Spiny Pipehorse	Fish
Solegnathus robustus	Robust Pipehorse	Fish
Lissocampus runa	Javelin Pipefish	Fish
Arctocephalus pusillus	Australian Fur-seal	Mammal
Actitis hypoleucos	Common Sandpiper	Bird
Arctocephalus forsteri	New Zealand Fur-seal	Mammal
Larus pacificus	Pacific Gull	Bird
Stipecampus cristatus	Ringback Pipefish	Fish
Histiogamphelus cristatus	Rhino Pipefish	Fish
Macronectes giganteus	Southern Giant-Petrel	Bird
Hypselognathus rostratus	Knifesnout Pipefish	Fish
Leptoichthys fistularius	Brushtail Pipefish	Fish
Macronectes halli	Northern Giant Petrel	Bird
Lissocampus caudalis	Australian Smooth Pipefish	Fish
Apus pacificus	Fork-tailed Swift	Bird
Pachyptila turtur	Fairy Prion	Bird
Histiogamphelus briggsii	Crested Pipefish	Fish
Hirundapus caudacutus	White-throated Needletail	Bird
Chelonia mydas	Green Turtle	Reptile
Caretta caretta	Loggerhead Turtle	Reptile
Halobaena caerulea	Blue Petrel	Bird
Dermochelys coriacea	Leatherback Turtle	Reptile
Haliaeetus leucogaster	White-bellied Sea-Eagle	Bird
Phyllopteryx taeniolatus	Common Seadragon	Fish

No.

The Activity is not taking place in the Commonwealth marine (aquatic) environment.

Marine species which are also listed as a threatened species under the EPBC Act will be protected under the threatened species provisions, rather than the marine species provisions, e.g. a development which is likely to have a significant impact on a threatened species will trigger the environmental impact assessment provisions of the EPBC Act.

	Phycodurus eques	Leafy Seadragon	Fish		
	Pugnaso curtirostris	Pugnose Pipefish	Fish		
	Notiocampus ruber	Red Pipefish	Fish		
	Mitotichthys tuckeri	Tucker's Pipefish	Fish		
	Mitotichthys semistriatus	Halfbanded Pipefish	Fish		
	Thalassarche carteri	Indian Yellow-nosed Albatross	Bird		
	Thalassarche steadi	White-capped Albatross	Bird		
	Thalassarche salvini	Salvin's Albatross	Bird		
	Thalassarche bulleri	Buller's Albatross	Bird		
	Sternula albifrons	Little Tern	Bird		
	Thalassarche bulleri platei	Northern Buller's Albatross	Bird		
	Myiagra cyanoleuca	Satin Flycatcher	Bird		
	Lathamus discolor	Swift Parrot	Bird		
	Neophema chrysostoma	Blue-winged Parrot	Bird		
	Gallinago hardwickii	Latham's Snipe	Bird		
	Charadrius leschenaultii	Greater Sand Plover	Bird		
	Calidris acuminata	Sharp-tailed Sandpiper	Bird		
	Diomedea antipodensis gibsoni	Gibson's Albatross	Bird		
	Calidris alba	Sanderling	Bird		
	Hippocampus abdominalis	Big-belly Seahorse	Fish		
	Bubulcus ibis	Cattle Egret	Bird		
	Limosa lapponica	Bar-tailed Godwit	Bird		
	Ardenna tenuirostris	Short-tailed Shearwater	Bird		
	Thalassarche cauta	Shy Albatross	Bird		
	Ardenna grisea	Sooty Shearwater	Bird		
	Diomedea exulans	Wandering Albatross	Bird		
	Diomedea epomophora	Southern Royal Albatross	Bird		
	Eudyptula minor	Little Penguin	Bird		
	Vanacampus phillipi	Port Phillip Pipefish	Fish		
	Calidris melanotos	Pectoral Sandpiper	Bird		
	Hippocampus breviceps	Short-head Seahorse	Fish		
	Calidris ferruginea	Curlew Sandpiper	Bird		
	Ardenna carneipes	Flesh-footed Shearwater	Bird		
	Thinornis cucullatus	Hooded Plover	Bird		
	Calidris canutus	Red Knot, Knot	Bird		
	Heraldia nocturna	Upside-down Pipefish	Fish		
	Diomedea sanfordi	Northern Royal Albatross	Bird		
	Thalassarche impavida	Campbell Albatross	Bird		
	Diomedea antipodensis	Antipodean Albatross	Bird		
	Urocampus carinirostris	Hairy Pipefish	Fish		
	Vanacampus poecilolaemus	Longsnout Pipefish	Fish		

	Vanacampus margaritifer Mother-of-pearl Pipefish Fish		
Whales and Other Cetaceans			
10	The following species were identified in the PMST Report. **Scientific Name** / **Common Name** / **Class** *Caperea marginata* / Pygmy Right Whale / Mammal *Balaenoptera musculus* / Blue Whale / Mammal *Balaenoptera acutorostrata* / Minke Whale / Mammal *Megaptera novaeangliae* / Humpback Whale / Mammal *Orcinus orca* / Killer Whale, Orca / Mammal *Eubalaena australis* / Southern Right Whale / Mammal *Lagenorhynchus obscurus* / Dusky Dolphin / Mammal *Grampus griseus* / Risso's Dolphin / Mammal *Delphinus delphis* / Common Dolphin / Mammal *Tursiops truncatus* s. str. / Bottlenose Dolphin / Mammal	No	Whales, dolphins and porpoises (marine mammals or cetaceans) enjoy special protection under the EPBC Act through the Australian Whale Sanctuary and under a specialised permit system. The Activity is not taking place in the marine (aquatic) environment and is therefore not within the Australian Whale Sanctuary.
Critical Habitats			
None	Nil identified in PMST report	No	None identified.
Commonwealth Reserves Terrestrial			
None	Nil identified in PMST report	No	None identified.
Australian Marine Parks			
None	Nil identified in PMST report.	No	None identified.
Habitat Critical to the Survival of Marine Turtles			
None	Nil identified in PMST report.	No	None identified.
State and Territory Reserves			
7	The following were identified in the PMST Report: **Protected Area ID** / **Protected Area Name** / **Reserve Type** TAS_20461 / Lughrata / Conservation Covenant TAS_50733 / Marshall Beach / Conservation Area TAS_50356 / Wingaroo / Nature Reserve TAS_50368 / Reedy Lagoon / Private Nature Reserve TAS_50272 / Mount Tanner / Nature Recreation Area TAS_50260 / Emita / Nature Recreation Area 327 / Marriott Reef / Conservation Area	No	None of the identified places intersect the Site.

<table>
<tr><td colspan="4">Regional Forest Agreements</td></tr>
<tr><td>1</td><td>Tasmanian RFA</td><td>Not relevant</td><td>The action has no requirement for a Forest Practices Plan, which is administered under the Tasmanian Forest Practices Act 1985.</td></tr>
<tr><td colspan="4">Nationally Important Wetlands</td></tr>
<tr><td>None</td><td>Nil identified in PMST report.</td><td>No</td><td>Nil identified in PMST report</td></tr>
<tr><td colspan="4">EPBCA Act Referrals</td></tr>
<tr><td>1</td><td>The following were identified in the PMST Report:
2015/7522 Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia</td><td>No</td><td>None of the identified referrals are related to the action.</td></tr>
<tr><td colspan="4">Key Ecological Features (Marine)</td></tr>
<tr><td>None</td><td>Nil identified in PMST report</td><td>No</td><td>None identified.</td></tr>
<tr><td colspan="4">Biologically Important Areas (BIAs)</td></tr>
<tr><td>8</td><td>The following species were identified in the PMST Report:
<table>
<tr><th>Scientific Name</th><th>Common Name</th><th>Behaviour</th><th>Presence</th></tr>
<tr><td>Ardenna tenuirostris</td><td>Short-tailed Shearwater</td><td>Breeding</td><td>Known to occur</td></tr>
<tr><td>Ardenna tenuirostris</td><td>Short-tailed Shearwater</td><td>Foraging</td><td>Known to occur</td></tr>
<tr><td>Eudyptula minor</td><td>Little Penguin</td><td>Foraging</td><td>Known to occur</td></tr>
<tr><td>Pelagodroma marina</td><td>White-faced Storm-petrel</td><td>Foraging</td><td>Known to occur</td></tr>
<tr><td>Pelecanoides urinatrix</td><td>Common Diving-petrel</td><td>Foraging</td><td>Known to occur</td></tr>
<tr><td>Phalacrocorax fuscescens</td><td>Black-faced Cormorant</td><td>Foraging</td><td>Known to occur</td></tr>
<tr><td>Thalassarche cauta cauta</td><td>Shy Albatross</td><td>Foraging likely</td><td>Likely to occur</td></tr>
<tr><td>Balaenoptera musculus brevicauda</td><td>Pygmy Blue Whale</td><td>Foraging</td><td>Likely to be present</td></tr>
</table></td><td>No</td><td>BIAs are areas and times used by protected marine species for carrying out critical life functions, such as reproduction, feeding, migration or resting.
BIAs are designated for marine species protected under the EPBC Act. Protected marine species include species listed nationally as marine, threatened (Critically Endangered, Endangered, Vulnerable, Conservation Dependent), migratory, and all cetaceans. The action is not taking place in the marine (aquatic) environment, nor is the action likely to cause any direct or indirect impacts to the aquatic marine environment.
There are no BIAs in or adjacent to the Survey Area.</td></tr>
<tr><td colspan="4">Bioregional Assessments</td></tr>
<tr><td>None</td><td>Nil identified in PMST report</td><td>No</td><td>None identified.</td></tr>
<tr><td colspan="4">Geological and Bioregional Assessments</td></tr>
<tr><td>None</td><td>Nil identified in PMST report</td><td>No</td><td>None identified.</td></tr>
</table>

ATTACHMENT 5: FLORA SPECIES (OBSERVED) LIST FOR THE SITE

INTRO	ENDEMIC	APGIV	FULLNAME
		Aizoaceae	Carpobrotus rossii (Haw.) Schwantes
		Aizoaceae	Disphyma crassifolium subsp. clavellatum (Haw.) Chinnock
		Aizoaceae	Tetragonia implexicoma (Miq.) Hook.f.
		Alstroemeriaceae	Drymophila cyanocarpa R.Br.
		Amaranthaceae	Atriplex cinerea Poir.
		Amaranthaceae	Atriplex paludosa R.Br. subsp. paludosa
i		Amaranthaceae	Chenopodium album L.
		Amaranthaceae	Einadia nutans (R.Br.) A.J.Scott subsp. nutans
		Amaranthaceae	Rhagodia candolleana Moq. subsp. candolleana
		Amaranthaceae	Threlkeldia diffusa R.Br.
		Apiaceae	Apium insulare P.S.Short
		Apiaceae	Apium prostratum Labill. ex Vent. var. prostratum
		Apiaceae	Daucus glochidiatus (Labill.) Fisch., C.A.Mey. & Avé-Lall.
		Apiaceae	Xanthosia pilosa Rudge
		Apiaceae	Xanthosia tasmanica Domin
		Apiaceae	Xanthosia ternifolia J.M.Hart & Henwood
		Apocynaceae	Alyxia buxifolia R.Br.
		Araliaceae	Hydrocotyle hirta R.Br. ex A.Rich.
		Araliaceae	Hydrocotyle muscosa R.Br. ex A.Rich.
		Araliaceae	Hydrocotyle sibthorpioides Lam.
		Asphodelaceae	Bulbine glauca (Raf.) E.M.Watson
		Asphodelaceae	Dianella tasmanica Hook.f.
		Asteraceae	Actites megalocarpus (Hook.f.) Lander
		Asteraceae	Apalochlamys spectabilis (Labill.) Steud.
i		Asteraceae	Arctotheca calendula (L.) K.Lewin
		Asteraceae	Argentipallium dealbatum (Labill.) Paul G.Wilson
	e	Asteraceae	Bedfordia linearis var. oblongifolia Orchard
i		Asteraceae	Carduus tenuiflorus Curtis
		Asteraceae	Cassinia aculeata (Labill.) R.Br. subsp. aculeata
i		Asteraceae	Cirsium vulgare (Savi) Ten.
		Asteraceae	Coronidium scorpioides (Labill.) Paul G.Wilson
i		Asteraceae	Hypochaeris glabra L.
i		Asteraceae	Hypochaeris radicata L.
		Asteraceae	Lagenophora stipitata (Labill.) Druce
i		Asteraceae	Leontodon rhagadioloides (L.) Enke & Zidorn
		Asteraceae	Leucophyta brownii Cass.
		Asteraceae	Olearia axillaris (DC.) F.Muell. ex Benth.
		Asteraceae	Olearia glutinosa (Lindl.) Benth.
	e	Asteraceae	Olearia phlogopappa (Labill.) DC. subsp. phlogopappa
		Asteraceae	Ozothamnus cinereus (Labill.) Sw.
		Asteraceae	Podolepis jaceoides (Sims) Voss
		Asteraceae	Senecio biserratus Belcher
i		Asteraceae	Sonchus oleraceus L.
		Boraginaceae	Hackelia suaveolens (R.Br.) Dimon & M.A.M.Renner
		Campanulaceae	Lobelia anceps L.f.
i		Caryophyllaceae	Cerastium glomeratum Thuill.

INTRO	ENDEMIC	APGIV	FULLNAME
		Caryophyllaceae	Scleranthus biflorus (J.R.Forst. & G.Forst.) Hook.f.
		Casuarinaceae	Allocasuarina verticillata (Lam.) L.A.S.Johnson
		Celastraceae	Stackhousia monogyna Labill.
		Convolvulaceae	Dichondra repens J.R.Forst. & G.Forst.
		Crassulaceae	Crassula sieberiana (Schult. & Schult.f.) Druce
		Cyperaceae	Carex appressa R.Br.
		Cyperaceae	Ficinia nodosa (Rottb.) Goetgh., Muasya & D.A.Simpson
		Cyperaceae	Isolepis cernua (Vahl) Roem. & Schult.
		Cyperaceae	Isolepis fluitans (L.) R.Br.
		Cyperaceae	Lepidosperma concavum R.Br.
		Cyperaceae	Lepidosperma elatius Labill.
		Cyperaceae	Lepidosperma gladiatum Labill.
		Cyperaceae	Lepidosperma longitudinale Labill.
		Cyperaceae	Uncinia flaccida S.T.Blake
		Dennstaedtiaceae	Hypolepis rugosula (Labill.) J.Sm.
		Dennstaedtiaceae	Pteridium esculentum (G.Forst.) Cockayne subsp. esculentum
		Dilleniaceae	Hibbertia sericea (R.Br. ex DC.) Benth. var. sericea
		Droseraceae	Drosera macrantha subsp. planchonii (Hook.f. ex Planch.) N.G.Marchant
		Ericaceae	Acrotriche serrulata R.Br.
		Ericaceae	Leucopogon parviflorus (Andrews) Lindl.
		Ericaceae	Styphelia humifusa (Cav.) Pers.
		Euphorbiaceae	Amperea xiphoclada (Sieber ex Spreng.) Druce var. xiphoclada
		Euphorbiaceae	Beyeria lechenaultii (DC.) Baill.
i		Euphorbiaceae	Euphorbia paralias L.
		Fabaceae	Acacia longifolia subsp. sophorae (Labill.) Court
		Fabaceae	Acacia melanoxylon R.Br.
	e	Fabaceae	Acacia mucronata Willd. ex H.L.Wendl. subsp. mucronata
		Fabaceae	Acacia uncifolia (J.M.Black) O'Leary
		Fabaceae	Acacia verticillata (L'Hér.) Willd. subsp. verticillata
		Fabaceae	Bossiaea cinerea R.Br.
		Fabaceae	Bossiaea cordigera Benth. ex Hook.f.
		Fabaceae	Goodia lotifolia Salisb.
i		Fabaceae	Vicia sativa L. subsp. sativa
i		Gentianaceae	Centaurium erythraea Rafn
		Geraniaceae	Pelargonium australe Willd.
		Goodeniaceae	Goodenia lanata R.Br.
		Haloragaceae	Gonocarpus teucrioides DC.
		Hypericaceae	Hypericum gramineum G.Forst.
		Juncaceae	Juncus australis Hook.f.
		Juncaceae	Juncus caespiticius E.Mey.
		Juncaceae	Juncus kraussii subsp. australiensis (Buchenau) Snogerup
		Juncaceae	Juncus pallidus R.Br.
		Juncaceae	Juncus pauciflorus R.Br.
		Juncaceae	Luzula densiflora (H.Nordensk.) Edgar
		Juncaceae	Luzula flaccida (Buchenau) Edgar
		Lamiaceae	Ajuga australis R.Br.

INTRO	ENDEMIC	APGIV	FULLNAME
i		Lamiaceae	Marrubium vulgare L.
		Lauraceae	Cassytha melantha R.Br.
		Lauraceae	Cassytha pubescens R.Br.
		Mazaceae	Mazus pumilio R.Br.
		Myrtaceae	Eucalyptus willisii Ladiges, Humphries & Brooker
		Myrtaceae	Kunzea ambigua (Sm.) Druce
	e	Myrtaceae	Leptospermum glaucescens S.Schauer
		Myrtaceae	Leptospermum laevigatum (Gaertn.) F.Muell.
		Myrtaceae	Leptospermum lanigerum (Sol. ex Aiton) Sm.
		Myrtaceae	Leptospermum scoparium J.R.Forst. & G.Forst.
		Onagraceae	Epilobium billardiereanum Ser. ex DC. subsp. billardiereanum
		Orchidaceae	Acianthus caudatus R.Br.
		Orchidaceae	Acianthus pusillus D.L.Jones
		Orchidaceae	Caladenia carnea R.Br.
		Orchidaceae	Caladenia latifolia R.Br.
		Orchidaceae	Caleana major R.Br.
		Orchidaceae	Cyrtostylis reniformis R.Br.
		Orchidaceae	Eriochilus cucullatus (Labill.) Rchb.f.
		Orchidaceae	Gastrodia procera G.W.Carr
		Orchidaceae	Microtis unifolia (G.Forst.) Rchb.f.
		Orchidaceae	Pterostylis nutans R.Br.
		Orchidaceae	Pterostylis pedunculata R.Br.
		Oxalidaceae	Oxalis perennans Haw.
		Phyllanthaceae	Phyllanthus gunnii Hook.f.
		Phyllanthaceae	Poranthera microphylla Brongn.
		Pittosporaceae	Bursaria spinosa Cav. subsp. spinosa
i		Plantaginaceae	Plantago coronopus L. subsp. coronopus
		Plantaginaceae	Plantago varia R.Br.
i		Poaceae	Agrostis capillaris L.
i		Poaceae	Agrostis stolonifera L.
i		Poaceae	Aira caryophyllea L. subsp. caryophyllea
		Poaceae	Austrostipa flavescens (Labill.) S.W.L.Jacobs & J.Everett
		Poaceae	Austrostipa stipoides (Hook.f.) S.W.L.Jacobs & J.Everett
i		Poaceae	Briza maxima L.
i		Poaceae	Briza minor L.
i		Poaceae	Cynosurus echinatus L.
i		Poaceae	Dactylis glomerata L.
		Poaceae	Deyeuxia quadriseta (Labill.) Benth.
		Poaceae	Dichelachne crinita (L.f.) Hook.f.
		Poaceae	Distichlis distichophylla (Labill.) Fassett
i		Poaceae	Holcus lanatus L.
i		Poaceae	Hordeum marinum Huds.
		Poaceae	Lachnagrostis filiformis (G.Forst.) Trin.
		Poaceae	Microlaena stipoides (Labill.) R.Br. var. stipoides
		Poaceae	Poa labillardierei Steud. var. labillardierei
		Poaceae	Poa poiformis (Labill.) Druce var. poiformis

INTRO	ENDEMIC	APGIV	FULLNAME
		Poaceae	**Poa rodwayi Vickery**
		Poaceae	**Poa tenera F.Muell. ex Hook.f.**
i		**Polygonaceae**	**Acetosella vulgaris Fourr.**
		Polypodiaceae	**Microsorum pustulatum (G.Forst.) Copel. subsp. pustulatum**
		Proteaceae	**Banksia marginata Cav.**
		Ranunculaceae	**Ranunculus lappaceus Sm.**
		Ranunculaceae	**Ranunculus sessiliflorus R.Br. ex DC. var. sessiliflorus**
		Rosaceae	**Acaena novae-zelandiae Kirk**
		Rutaceae	**Correa alba Andrews var. alba**
		Rutaceae	**Correa reflexa (Labill.) Vent. var. reflexa**
		Solanaceae	**Solanum laciniatum Aiton**
		Stylidiaceae	**Stylidium graminifolium Sw.**
		Thymelaeaceae	**Pimelea curviflora R.Br.**
		Urticaceae	**Parietaria cardiostegia Greuter**
		Urticaceae	**Urtica incisa Poir.**
		Violaceae	**Viola hederacea Labill.**
		Zygophyllaceae	**Roepera billardierei (DC.) G.Don**

ATTACHMENT 6: WINTER ORCHID SURVEY – AUGUST 2022

Van Diemen Consulting
PO Box 1
New Town TAS 7008
Mob: 0438 588 695
Email: rwbarnes73@gmail.com

MEMO

To: Mr George Adams, Markarna Grazing Company Pty Ltd

From: Drs Richard Barnes and Colin McCoull, Van Diemen Consulting

Date: August 22, 2022

Re: Orchid Survey – winter flowering period August 2022

BACKGROUND AND SCOPE

Van Diemen Consulting Pty Ltd (VDC) was engaged to conduct a survey of the 30-year extraction extent of the proposed lime sand pit in Mining Lease 2117P/M (the Development). The survey area also included the associated infrastructure location of the shed and access road depicted in the DA.

Other areas of the Mining Lease are proposed to be used to extract lime sand (as noted in the DA) in the future. These areas were not the focus of this survey given the proposed timeframe to commence the extraction of sand exceeds 30 years.

FIELD ASSESSMENT METHODS

Timing and personnel

The survey was conducted on 12 to 13 August 2022 by Drs McCoull and Barnes. The survey focused on the 30-year extraction footprint of the Development and occasionally areas outside that to determine if orchids were present in other locations (e.g., other areas of scrub on alkaline sands, coastal grasslands on the edge of wet areas).

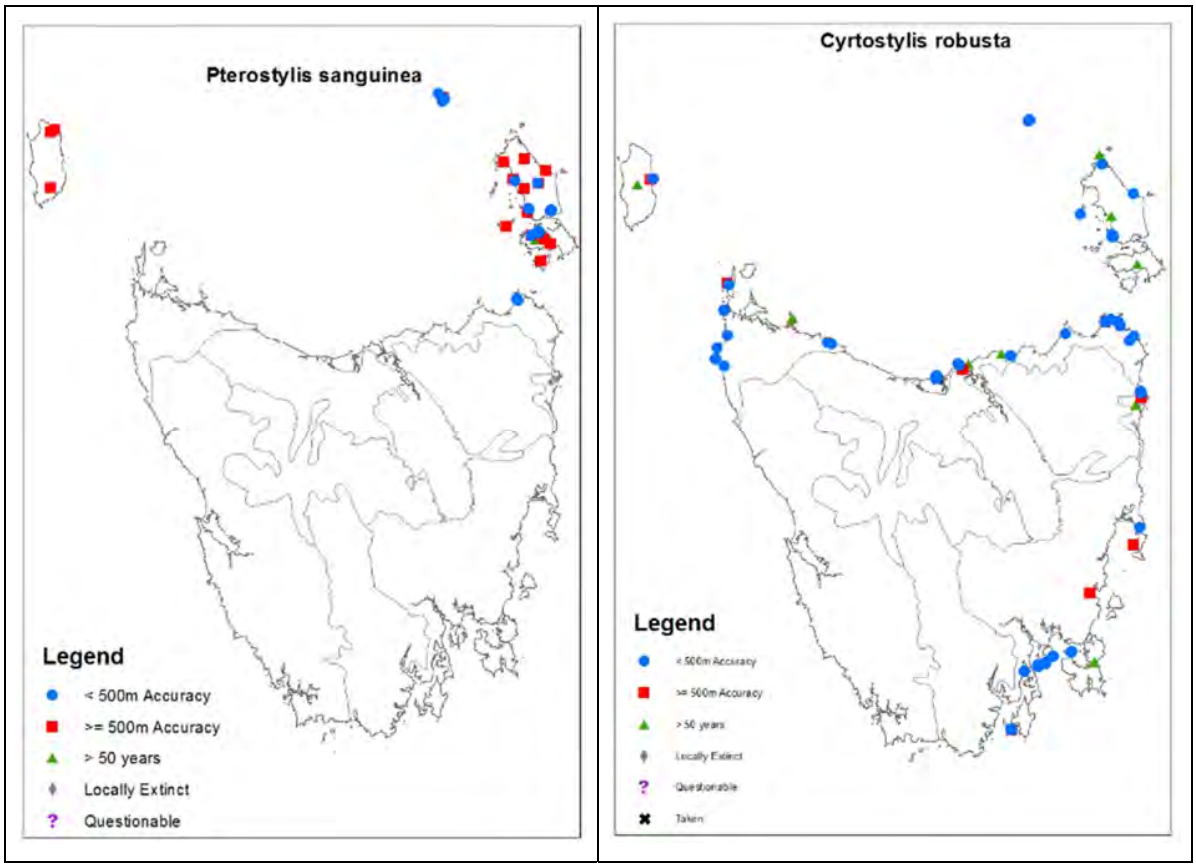
Conservation significant flora species

The Natural Values Atlas Report in **Attachment 1** provides a list of the other threatened/conservation significant species observed in the Survey Area and nearby. In addition to those in the NVA Report, several conservation significant orchid species are known from Flinders Island, with some flowering during the winter to early spring season. Examples include those listed in **the table below**, with listing statements in **Attachment 1**. **Table 2** provides information about the flowering periods with the peak period) for the significant orchids and other species that may have been flowering or preparing to flower.

Species name	Common name	Status (TSPA/EPBC)[1]	Vegetation types in the Survey Area most likely to support species (if present)
Cyrtostylis robusta	Large gnat orchid	r/-	Coastal grassland – scrub interface Disturbed (windthrow) areas in scrub
Pterostylis sanguinea	Banded greenhood	r/-	Scrub vegetation on alkaline sands

Recorded locations of ***Pterostylis sanguinea*** on Flinders Island (see image below left – NVA held data) are widespread and predominantly occur in forest and woodland (eucalypt) vegetation but some are associated with non-eucalypt woodlands and scrub. *Pterostylis sanguinea* is an orchid of well-drained gravelly to sandy soils often in association with deep organic litter.

Cyrtostylis robusta is a very coastal to near-coastal species in Tasmania (see recorded locations in figure below right – NVA held data), rarely occurring more than 100 m from the coastal edge. It generally grows on sandy soils in dune vegetation which includes heathland, scrub, grasslands, and grassy woodlands.



[1] TSPA – *Threatened Species Protection Act 1995*, EPBC – *Environment Protection and Biodiversity Conservation Act 1999*

Survey areas and associated vegetation types

The Survey Area included the Development footprint, but a greater focus was given to the vegetation types (in and adjacent to the Development footprint) that could support the species of significance. Of particular focus was the interface between the scrub on alkaline sands and the coastal grassland vegetation as these areas often support orchids which receive higher light levels than in the scrub but also receive some protection from herbivores by growing amongst tussock grasses (mainly *Poa poiformis* and *P. labillardierei*).

Two vegetation communities in the Development represent potential habitat for conservation significant orchid species and possibly other species not detected in the March 2022 survey.

Coastal scrub on alkaline sands (TASVEG code - SCA)

The dominant species in eastern Bass Strait for this community type are typically *Beyeria lechenaultii* var. *latifolia, Leptospermum laevigatum* and *Myoporum insulare*, although the structure and exact composition depends on biogeography, disturbance regime and, to some extent, soil depth.

The Survey Area supports a very low species diversity form of this scrub type. It is dominated by *Leptospermum laevigatum* with only sporadic and occasional *Allocasuarina verticillata* and *Bursaria spinosa. Myoporum insulare* becomes more common towards the western side of the Survey Area (towards the Marshall bay littoral zone) however it never becomes more than a minor component of the vegetation structure (i.e., <10% of foliage cover).

Leaf litter is of variable depth, and in some areas it is absent due to mammal activity (e.g., wombat and wallaby runs). The canopy cover is mostly 100% with only occasional open areas where there is a disused vehicle track or windthrow damage to the trees – these areas have less foliage cover and therefore have grasses, herbs and some sedges in the ground layer.

The *Leptospermum laevigatum* scrub generally has a closed canopy with little vegetation as the ground layer.

Leptospermum laevigatum dominates the scrub canopy.

Coastal grassland and herbfield (TASVEG code – GCH)

This community is dominated by *Austrofestuca littoralis, Austrostipa stipoides, Poa poiformis*, *P. rodwayi* and *P. labillardierei*.

Common non-dominant grasses include *Distichlis distichophylla* and the sedge *Ficinia nodosa*. Herbs include *Acaena nova-hollandiae, Carpobrotus rossii, Centaurium erythraea, Pelargonium australe, Ranunculus lappaceus, Samolus repens, Apium prostratum, Dichondra repens, Tetragonia tetragonioides, Rhagodia candolleana* and *Selliera radicans*.

Costal grassland and moss areas (areas where there is little direct sunlight during the winter months) occur in the hollows and flat areas between the drier ridgelines of scrub and in some cases also extend onto the slope itself.

Results

Orchid Flora Species Observed

Three species of orchid were located and identified during the survey, which include the following:

Species	Occurrence and observational comments	Status (TSPA/EPBC)[2]
Acianthus caudatus	Prolific but colonial on unburnt peaty soils over granite gravels, full flower to partial flower, some early capsule development. Not observed on burnt soils/fire damaged soils – only on undisturbed soils with leaf litter/lichen coverage.	- / -
Acianthus pusillus	Leaf and developing capsules were observed sporadically in areas where there was a deep litter layer over sand.	- / -
Cyrtostylis reniformis	Prolific but colonial on unburnt peaty soils over granite gravels, full flower to partial flower, some early capsule development. Mainly observed on undisturbed soils with leaf litter/lichen coverage but occasional plants observed in fire affected areas (soil partly burnt, leaf litter removed etc).	- / -
Caladenia latifolia (Leaf and habitat identification only – no flowers present)	Numerous leaves (very lax, hairy) were observed in sporadic locations around the Survey Area. Most patches were observed in canopy gaps in the scrub where the ground layer receives more light) and areas of grassland on the south-facing slopes of the dunes. The leaves are hairy, lax and broadly lanceolate and likely represent the common *pink fairies* which inhabits the type of environments present (coastal or near-coastal sands, often under tea-tree thickets), and is in leaf in August – flowers September to October.	- / -

None of the orchid species observed are listed on the Tasmanian *Threatened Species Protection Act 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

[2] TSPA – *Threatened Species Protection Act 1995*, EPBC – *Environment Protection and Biodiversity Conservation Act 1999*

Table 2. Flowering periods for selected winter – early spring orchids recorded from Flinders Island (from Wapstra 2018)

Acianthus caudatus	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
This species often forms quite massive colonies, but not all plants may produce flowers. The species has a wide flowering period but there is a definite peak in early to mid-spring (September).																								
Acianthus pusillus	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
While there is no overlap in the main flowering period of the two species, old flowers of *A. pusillus* may still be detectable during the flowering period of *A. caudatus*. However, the two species are so distinct as to make identification easy, even if the two species co-occur (which is common).																								
Caladenia latifolia	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
Populations of this species appear to produce flowering plants over a long period, with an apparent peak in October with records from September through to early November. Plants can be identified prior to flowering from the rather lax, broadly lanceolate leaf that is very hairy on both surfaces. Mainland populations are reported from August through to December.																								
Cyrtostylis reniformis	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
This is the more widespread of the two species. Where the two species co-occur, *C. robusta* tends to begin flowering about two weeks earlier than *C. reniformis*. However, differentiation is easy because of their distinctive leaves: *C. reniformis* has dull grey-green leaves and *C. robusta* has bright green (and often larger) leaves. This character is so consistent and obvious that identification is possible many weeks before and after flowering.																								
**** Cyrtostylis robusta***	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
See comments under *C. reniformis* and also note the earlier peak and overall shorter flowering period, which can be a further aid to identification. It is an extremely coastal species, often confined to a few hundred metres from the shoreline.																								
**** Pterostylis sanguinea***	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
A winter-flowering greenhood from the far northeast and Bass Strait islands distinguished by its large red flowers and leafy stem, but rosettes absent at flowering time. In Tasmania, flowering is mainly in late June to late July.																								

Potential habitat for *Pterostylis cucullata* ssp. *cucullata*

Leafy greenhood (*Pterostylis cucullata* ssp. *cucullata)* has been recorded at the northern end of Marshall Bay, where it grows in coastal grassland vegetation adjacent to *Leptospermum laevigatum* scrub on alkaline sands – a vegetation type that supports the species elsewhere in its range (e.g., Hunter Island, King Island).

The species is listed as vulnerable on the Tasmanian *Threatened Species Protection Act 1995* and Vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*

The image below shows the emergence of leaves of leafy greenhood at the known site (north of Marshall Bay) on Flinders Island taken on 11 August 2022. The site was attended to determine if the species is still extant there, and if so, at what life-cycle stage were the plants (e.g., slight leaf emergence, partial or full emergence).

The species has a peak flowering period in late October into early November but can be identified into December by the seed pods. Leaves can be hard to find in grassy habitats but if flowers are found then that area can be more intensively searched to count the number of plants present.

* *Pterostylis cucullata*	S	S	O	O	N	N	D	D	J	J	F	F	M	M	A	A	M	M	J	J	J	J	A	A
A late spring species that forms massive colonies but is surprisingly difficult to detect because plants can occur amongst dense grass and beneath low coastal scrub. Once found, however, even in the absence of flowering plants, the distinctive rosettes can be easily counted. There is a peak in flowering between mid-October and mid-November but often within one colony there are plants from early bud through to fully fertilised flowers. The most recent colony detected near Temma flowers as early as mid-August.																								

The confirmed presence of the species at its known location near Marshall Bay meant that it was possible to at least look for emerging leaves in the Survey Area. High to moderate quality habitat is present in the Survey Area – being alkaline sands with grassland vegetation (south facing slopes) adjacent to scrub dominated by *Leptospermum laevigatum*. Plants may be present, but none were observed. The cryptic nature of the species when in early leaf emergence makes it difficult o detect in its typically grassy habitat.

The images below show the type of potential habitat present.

Poa rodwayi dominated slope on the south-facing side of a dune of lime sands with *Leptospermum laevigatum* dominating the scrub canopy	
Poa labillardierei grassland on the edge of a dune dominated by *Leptospermum laevigatum* scrub	

Conclusions

A survey for *Pterostylis sanguinea* and *Cyrtostylis robusta* was conducted in suitable habitat associated with the Development footprint in proposed ML 2117P/M at Marshall Bay on Flinders Island. No *Pterostylis sanguinea* and *Cyrtostylis robusta* plants were found, but suitable habitat is present. Given the absence of the two species based on the survey effort, a permit issued under the *Threatened Species Protection Act 1995* is not required.

Suitable habitat for the leafy greenhood (*Pterostylis cucullata* ssp. *cucullata*) occurs in the Survey Area in the form of grassland around the southern edge of the scrub dominated ridges and dunes. The species is listed as vulnerable on the Tasmanian *Threatened Species Protection Act 1995* and Vulnerable on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.* Given the listing status the species It is recommended that another survey be conducted in late October to determine if any flowering plants can be seen, and then numbers counted of the population present (if any).

ATTACHMENT 1

Natural Values Atlas Report

Authoritative, comprehensive information on Tasmania's natural values.

Reference:
Requested For:
Report Type: Summary Report
Timestamp: 01:34:09 PM Monday 22 August 2022

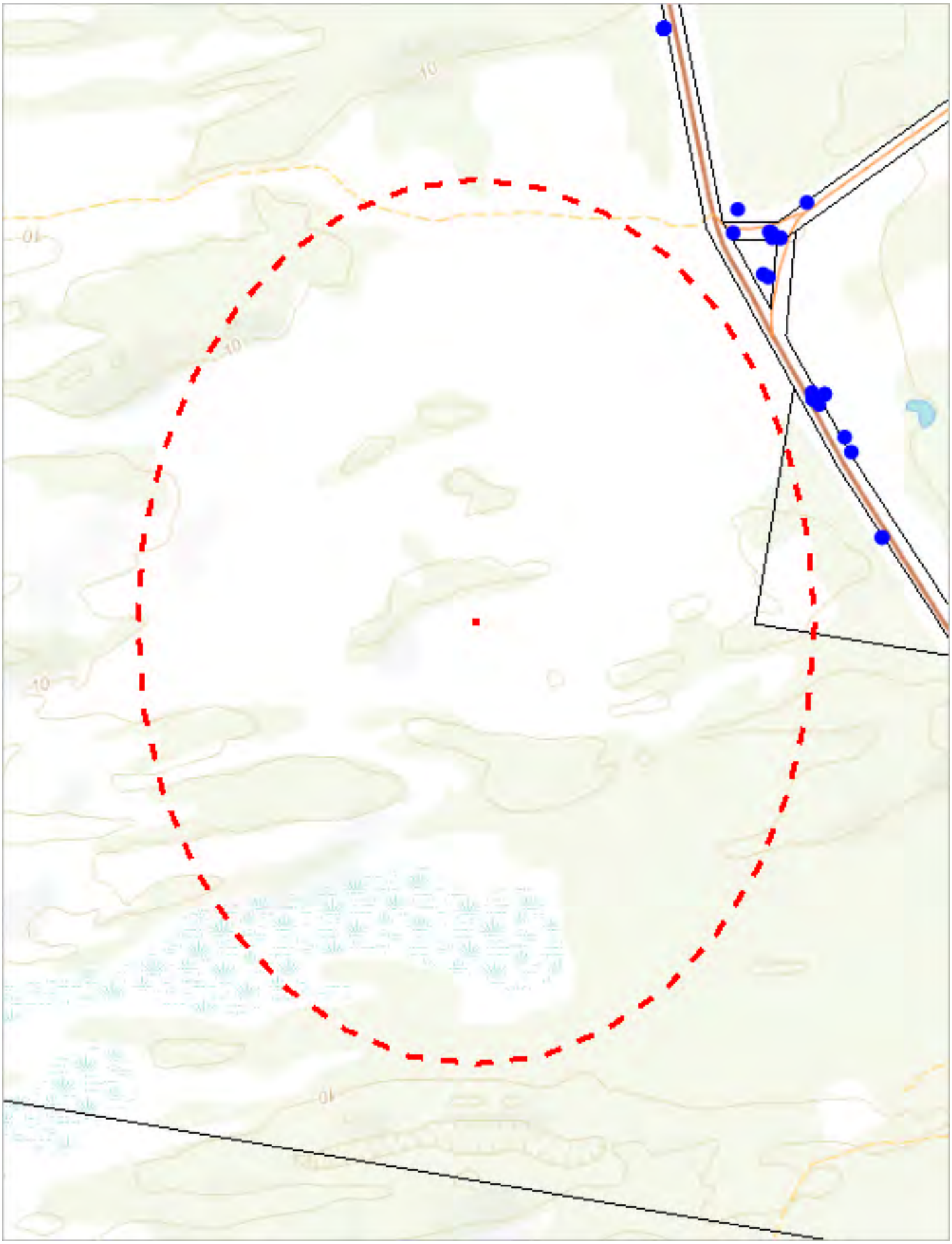
Threatened Flora: buffers Min: 500m Max: 5000m
Threatened Fauna: buffers Min: 500m Max: 5000m
Raptors: buffers Min: 500m Max: 5000m
Fire History: buffer 1000m

The centroid for this query GDA94: 577510.0, 5578920.0 falls within:

Property: 3513143

Threatened flora within 500 metres

578056, 5579625



576964, 5578215

Please note that some layers may not display at all requested map scales

Threatened flora within 500 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened flora within 500 metres

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Eutaxia microphylla	spiny bushpea	r		n	1	17-Nov-2008
Pimelea curviflora var. sericea	silky curved riceflower	r		n	4	15-Mar-2018
Pomaderris oraria subsp. oraria	bassian dogwood	r		n	1	20-Nov-2017
Scaevola albida	pale fanflower	v		n	5	03-Nov-2019

Unverified Records

No unverified records were found!

For more information about threatened species, please contact Threatened Species Enquiries.

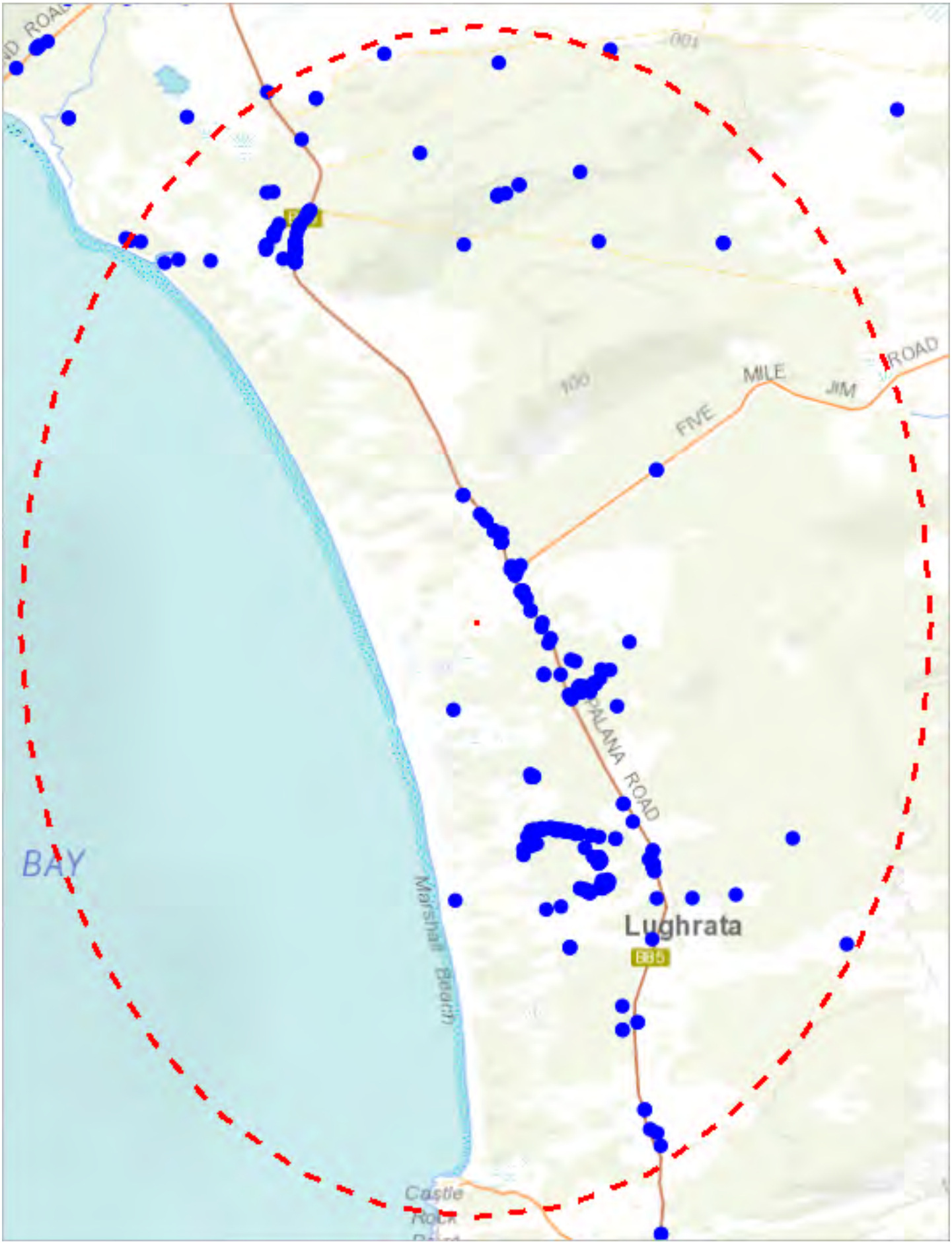
Telephone: 1300 368 550

Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au

Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened flora within 5000 metres

581567, 5584158



573458, 5573680

Please note that some layers may not display at all requested map scales

Threatened flora within 5000 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened flora within 5000 metres

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Acacia uncifolia	coast wirilda	r		n	36	15-Mar-2018
Acrotriche cordata	coast groundberry	v		n	1	24-Nov-2015
Asperula minima	mossy woodruff	r		n	4	06-Nov-2018
Banksia serrata	saw banksia	r		n	6	25-Mar-2014
Drosera glanduligera	scarlet sundew	r		n	2	08-Sep-2021
Eutaxia microphylla	spiny bushpea	r		n	21	19-Nov-2019
Hydrocotyle comocarpa	fringefruit pennywort	r		n	1	10-Sep-2006
Isopogon ceratophyllus	horny conebush	v		n	8	21-Mar-2014
Lasiopetalum baueri	slender velvetbush	r		n	1	01-Jan-1985
Leucopogon affinis	lanceleaf beardheath	r		n	1	29-Sep-2005
Parietaria debilis	shade pellitory	r		n	3	29-Sep-2005
Pimelea curviflora	curved riceflower	p		n	60	06-Nov-2018
Pimelea curviflora var. sericea	silky curved riceflower	r		n	23	15-Mar-2018
Pomaderris intermedia	lemon dogwood	r		n	3	20-Nov-2017
Pomaderris oraria subsp. oraria	bassian dogwood	r		n	6	20-Nov-2017
Pomaderris paniculosa subsp. paralia	shining dogwood	r		n	2	29-Sep-2005
Pterostylis cucullata subsp. cucullata	leafy greenhood	e	VU	n	4	13-Nov-2008
Scaevola albida	pale fanflower	v		n	78	19-Nov-2019
Schenkia australis	spike centaury	r		n	1	15-Nov-1981
Schoenoplectus tabernaemontani	river clubsedge	r		n	1	01-Jan-1979
Scleranthus fasciculatus	spreading knawel	v		n	1	30-Sep-2005
Styphelia esquamata	swamp beardheath	r		n	1	09-Dec-2012
Zygophyllum billardierei	coast twinleaf	r		n	19	19-Nov-2019

Unverified Records

No unverified records were found!

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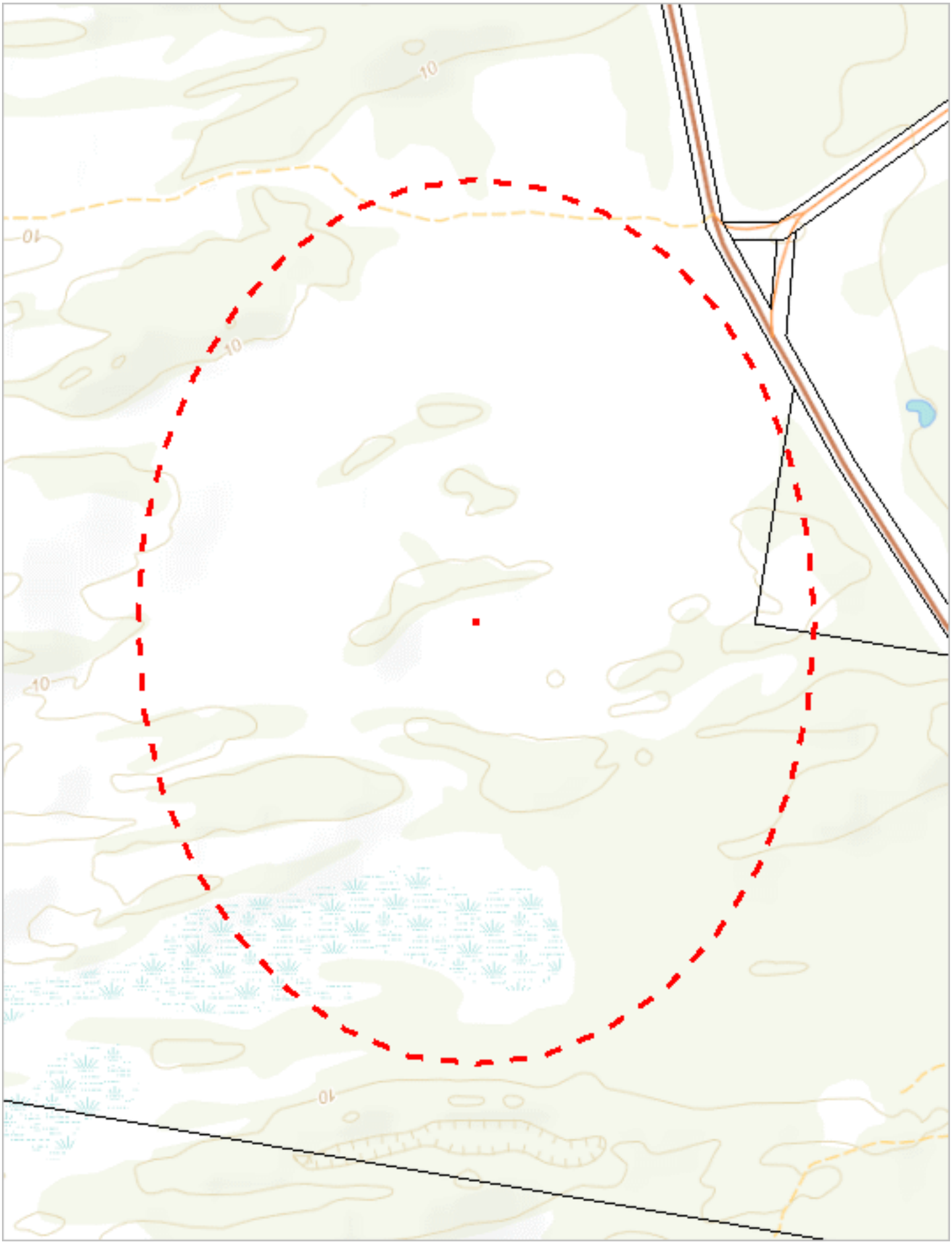
Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened fauna within 500 metres

578056, 5579625



576964, 5578215

Please note that some layers may not display at all requested map scales

Threatened fauna within 500 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened fauna within 500 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	BO	Potential	Known	Core
Pseudomys novaehollandiae	new holland mouse	e	VU	n	1	0	0
Litoria raniformis	green and gold frog	v	VU	n	1	0	0
Prototroctes maraena	australian grayling	v	VU	ae	1	0	0
Antipodia chaostola	chaostola skipper	e	EN	ae	1	0	0
Pseudemoia pagenstecheri	tussock skink	v		n	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	2	0	0
Limnodynastes peroni	striped marsh frog	e		n	1	0	0
Galaxiella pusilla	eastern dwarf galaxias	v	VU	n	1	0	0
Pardalotus quadragintus	forty-spotted pardalote	e	EN	e	1	0	0
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	1	0	0

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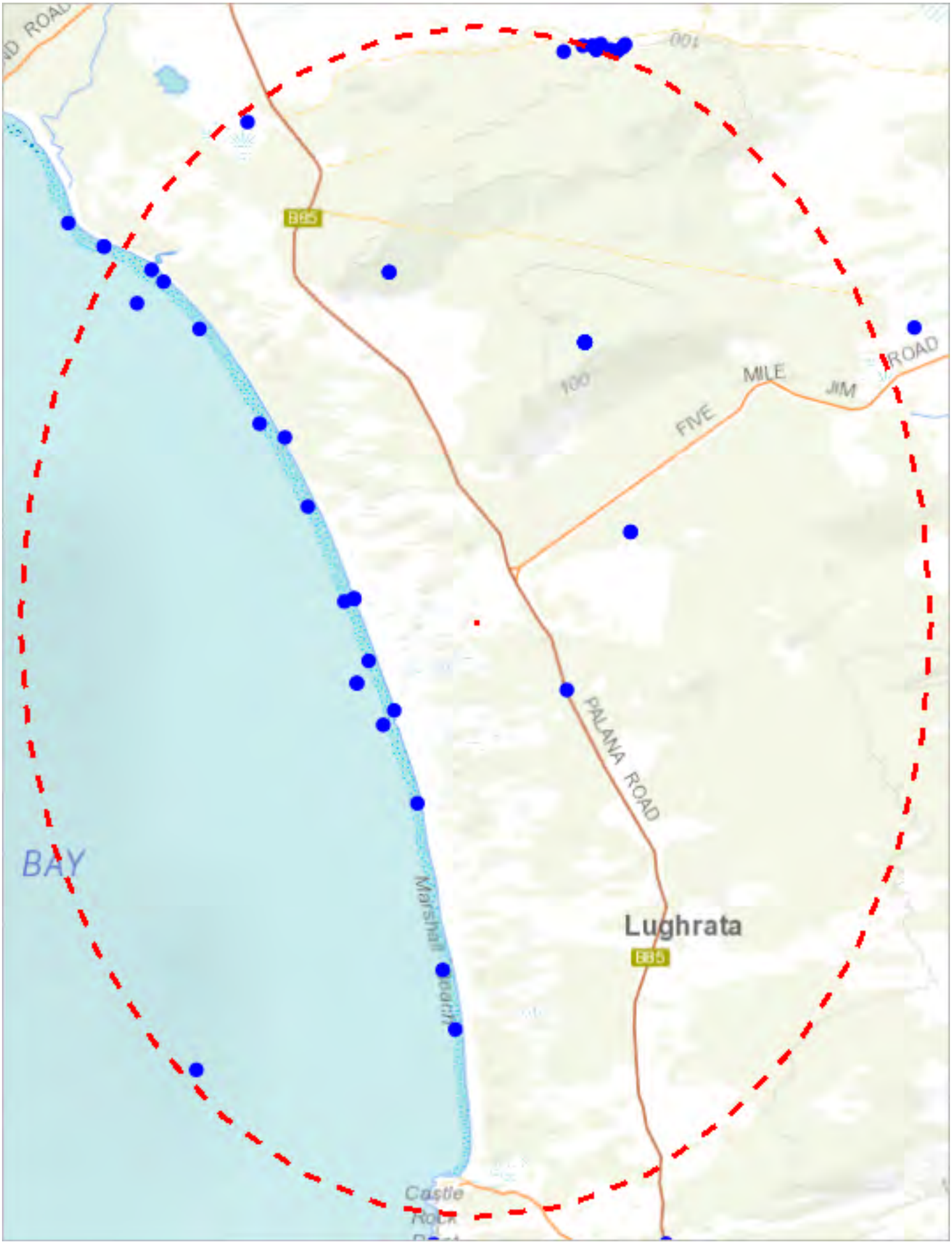
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

Threatened fauna within 5000 metres

581567, 5584158



573458, 5573680

Please note that some layers may not display at all requested map scales

Threatened fauna within 5000 metres

Annexure: 16.2.3

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Threatened fauna within 5000 metres

Verified Records

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
Aquila audax	wedge-tailed eagle	pe	PEN	n	2	30-Aug-2020
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	5	08-Dec-2004
Botaurus poiciloptilus	australasian bittern		EN	n	1	14-Jan-1979
Diomedea cauta subsp. cauta	shy albatross	pv	PVU		1	14-Nov-1981
Eubalaena australis	southern right whale	e	EN	m	1	26-Aug-2014
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	3	30-Aug-2020
Hirundapus caudacutus	white-throated needletail		VU	n	2	27-Mar-2014
Macronectes giganteus	southern giant-petrel	v	EN	n	1	25-Jul-1988
Pseudomys novaehollandiae	new holland mouse	e	VU	n	10	11-Nov-2021
Sternula nereis subsp. nereis	fairy tern	v	VU	n	1	06-Nov-2004
Thalassarche chrysostoma	grey-headed albatross	e	EN	n	1	09-Jul-1971
Thalassarche melanophris	black-browed albatross	e	VU	n	1	03-Jul-1969
Thinornis cucullatus	hooded plover		PVU	n	12	07-Nov-2011
Thinornis rubricollis	hooded plover		VU	n	6	19-Dec-1998

Unverified Records

No unverified records were found!

Threatened fauna within 5000 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	BO	Potential	Known	Core
Pseudomys novaehollandiae	new holland mouse	e	VU	n	1	0	2
Litoria raniformis	green and gold frog	v	VU	n	1	0	0
Prototroctes maraena	australian grayling	v	VU	ae	14	0	0
Antipodia chaostola	chaostola skipper	e	EN	ae	1	0	0
Pseudemoia pagenstecheri	tussock skink	v		n	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		n	2	0	0
Limnodynastes peroni	striped marsh frog	e		n	1	0	0
Galaxiella pusilla	eastern dwarf galaxias	v	VU	n	14	0	0
Pardalotus quadragintus	forty-spotted pardalote	e	EN	e	1	0	0
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	e	1	0	0

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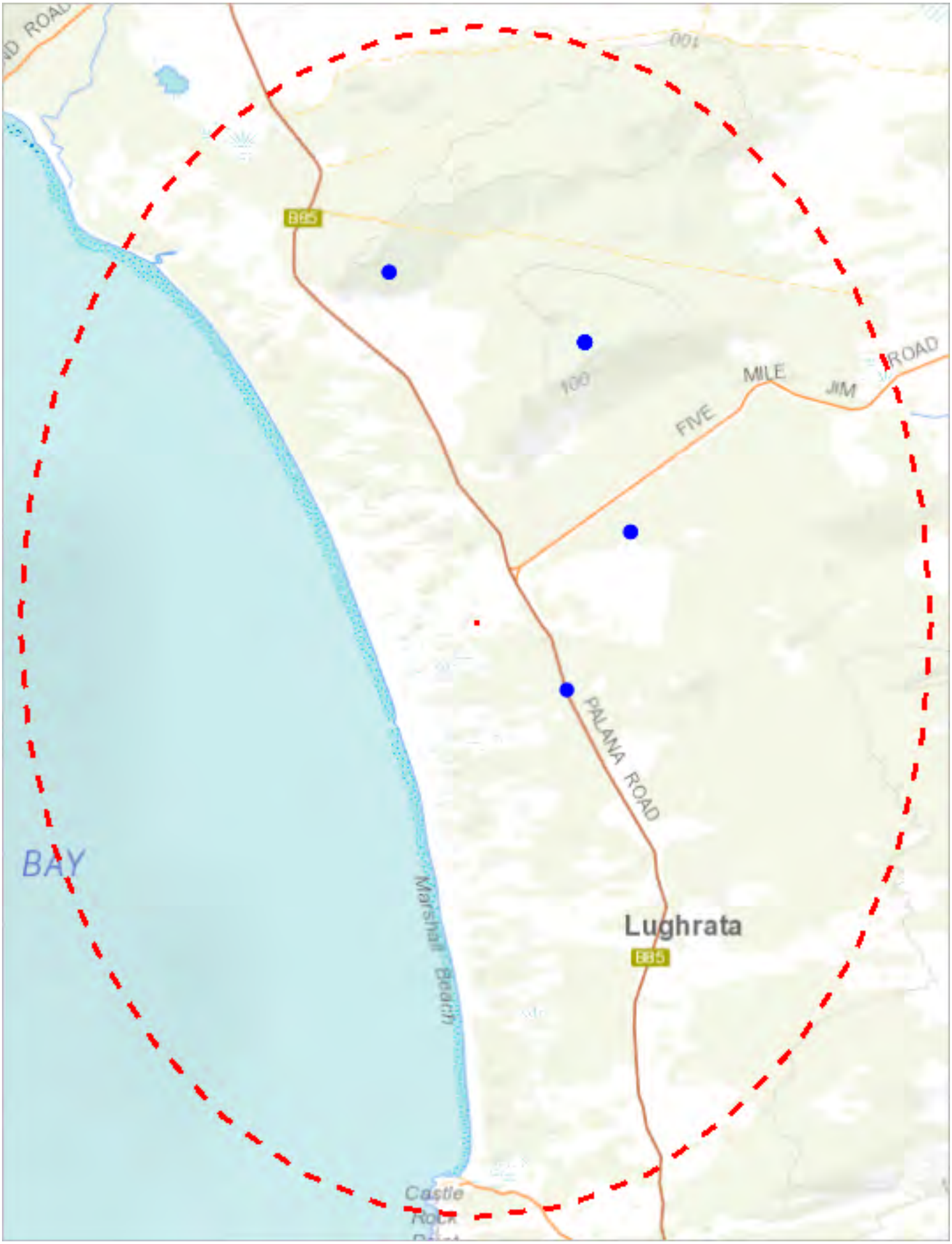
Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

*** No Raptor nests or sightings found within 500 metres. ***

Raptor nests and sightings within 5000 metres

581567, 5584158



573458, 5573680

Please note that some layers may not display at all requested map scales

Raptor nests and sightings within 5000 metres

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

Raptor nests and sightings within 5000 metres

Verified Records

Nest Id/Location Foreign Id	Species	Common Name	Obs Type	Observation Count	Last Recorded
603	Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	Nest	2	08-Dec-2004
	Aquila audax	wedge-tailed eagle	Camera Trap	1	30-Aug-2020
	Aquila audax	wedge-tailed eagle	Not Recorded	1	17-Feb-2014
	Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	Sighting	3	01-Mar-1979
	Falco cenchroides	nankeen kestrel	Sighting	4	09-Jan-1981
	Haliaeetus leucogaster	white-bellied sea-eagle	Camera Trap	1	30-Aug-2020
	Haliaeetus leucogaster	white-bellied sea-eagle	Sighting	2	14-Nov-1981

Unverified Records

No unverified records were found!

Raptor nests and sightings within 5000 metres

(based on Range Boundaries)

Species	Common Name	SS	NS	Potential	Known	Core
Aquila audax subsp. fleayi	tasmanian wedge-tailed eagle	e	EN	1	0	0
Haliaeetus leucogaster	white-bellied sea-eagle	v		2	0	0

For more information about raptor nests, please contact Threatened Species Enquiries.
Telephone: 1300 368 550
Email: ThreatenedSpecies.Enquiries@nre.tas.gov.au
Address: GPO Box 44, Hobart, Tasmania, Australia, 7000

*** No Fire History (All) found within 1000 metres ***

*** No Fire History (Last Burnt) found within 1000 metres ***

ATTACHMENT 2

Pterostylis sanguinea

Pterostylis sanguinea.
H & A Wapstra.

FAMILY: ORCHIDACEAE

BOTANICAL NAME: *Pterostylis sanguinea*, D.L.Jones & M.A.Clem., *Austral. Orchid Res*. 1: 126 (1989)

COMMON NAME: Banded greenhood

COMMONWEALTH STATUS: (*EPBC Act*) Not Listed

TASMANIAN STATUS: (*TSP Act*) rare

This species was previously known as *Pterostylis vittata* (*sensu* W.M. Curtis 1979). A listing statement is currently being compiled for this species. Please refer to page 239 of *'The Orchids of Tasmania'* by David Jones, Hans Wapstra, Peter Tonelli & Stephen Harris (1999) for further information.

Note: A taxonomic review of the greenhoods has split *Pterostylis* into several new genera. This species has been renamed *Urochilus sanguineus*. Until this change becomes widely accepted, for management purposes the Threatened Species Unit has chosen to continue dealing with this species as part of the *Pterostylis* genus.

Cyrtostylis robusta

Cyrtostylis robusta.
H & A Wapstra.

FAMILY: ORCHIDACEAE

BOTANICAL NAME: *Cyrtostylis robusta*, D.L.Jones & M.A.Clem., *Lindleyana* 2(3): 157 (1987)

COMMON NAME: Large gnat orchid

COMMONWEALTH STATUS: (*EPBC Act*) Not Listed

TASMANIAN STATUS: (*TSP Act*) rare

A listing statement is currently being compiled for this species. Please refer to page 129 of *'The Orchids of Tasmania'* by David Jones, Hans Wapstra, Peter Tonelli & Stephen Harris (1999) for further information.

Image by Matt Larcombe

Pterostylis cucullata subsp. *cucullata*

leafy greenhood

TASMANIAN THREATENED SPECIES LISTING STATEMENT

Scientific name:	***Pterostylis cucullata*** R.Br., *Prodr.* 327 (1810) **subsp. *cucullata***
Common name:	leafy greenhood (Wapstra et al. 2005)
Group:	vascular plant, monocotyledon, family **Orchidaceae**
Name history:	*Pterostylis cucullata*
Status:	*Threatened Species Protection Act 1995*: **endangered** *Environment Protection and Biodiversity Conservation Act 1999*: **Vulnerable**
Distribution:	Endemic status: **Not endemic to Tasmania** Tasmanian NRM Regions: **Cradle Coast, North**

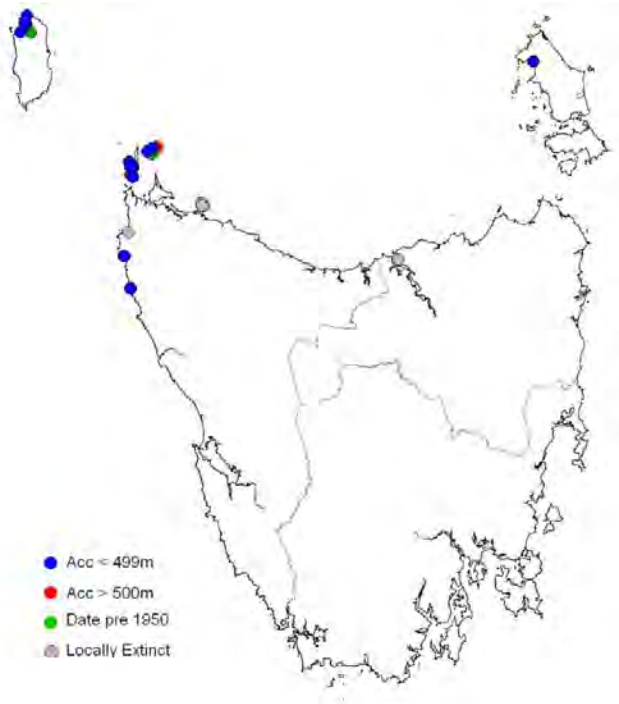


Figure 1. Distribution of *Pterostylis cucullata* subsp. *cucullata* within Tasmania

Plate 1. *Pterostylis cucullata* subsp. *cucullata* (image by Richard Schahinger)

IDENTIFICATION AND ECOLOGY

Pterostylis cucullata subsp. *cucullata* is a terrestrial orchid with a loose basal rosette of large dark-green, elliptical leaves and an underground tuber. It has a flowering stem up to 12 cm tall with a solitary semi-nodding flower (Jones 2006). The species can be identified when flowering from October to November, with a peak in early November (Wapstra et al. 2008).

Pterostylis cucullata subsp. *cucullata* belongs to a group of orchids commonly known as greenhoods because the dorsal sepal and petals are united to form a predominantly green, hood-like structure that dominates the flower. When triggered by touch, the labellum flips inwards towards the column, trapping any insect inside the flower, thereby facilitating pollination as the insect struggles to escape (Jones et al. 1999).

The specific pollination vector for the species is unknown, although greenhood flowers in general are pollinated by gnats and occasionally by mosquitoes in larger species. Some species may also be self-pollinating.

Pterostylis cucullata subsp. *cucullata* grows on calcareous dunes in near-coastal areas, and generally occurs in shaded sites. Wind and salt pruning contribute to the maintenance of habitat suitable for the species in more exposed areas, while grazing by native animals and fire are likely to play significant roles in suppressing potentially invasive dune scrubs.

Description

Pterostylis cucullata subsp. *cucullata* has 5 to 7 fleshy dark green leaves in a loose, stem-encircling basal rosette. The leaves are oblong to elliptical, 40 to 100 mm long and 15 to 30 mm wide. The solitary, semi-nodding flower is 35 to 40 mm long and 20 to 25 mm wide, on a stout stem, 5 to 12 cm tall, with the uppermost leaf sheathing the base of the flower. The flowers are green, white and dark reddish brown. The hood is curved forward in a semicircle with the shortly hairy, lateral sepals, loosely embracing the hood. The lateral sepals are fused at the base, with the free ends often curved and 9 to 12 mm long. The labellum is dark brown, oblong and 14 to 17 mm long, and is shortly curved near the apex. [description by Jones et al. 1999, Jones 2006]

Taxonomic issues

Pterostylis cucullata subsp. *cucullata* is a short coastal subspecies of *Pterostylis cucullata*, a taxon described originally from a specimen collected at Port Dalrymple in northern Tasmania sometime prior to 1810 (Jones et al. 1999). *Pterostylis cucullata* is now considered to comprise three subspecies (DEWHA 2009) including a tall subspecies from forests in inland Victoria and South Australia (*Pterostylis cucullata* subsp. *sylvicola*), and a yet to be described species from Barrington Tops, New South Wales.

Confusing species

None in Tasmania (Jones et al. 1999).

DISTRIBUTION AND HABITAT

On mainland Australia *Pterostylis cucullata* subsp. *cucullata* occurs in southern Victoria where it is considered to be extremely rare and in South Australia where it is thought to be extinct (Jones 2006, DEWHA 2009).

In Tasmania *Pterostylis cucullata* subsp. *cucullata* is known from near-coastal areas in the northwest, including King Island, Hunter Island and Three Hummock Island, with an outlying occurrence on Flinders Island (Figure 1). There are also nineteenth century records from the north coast at Circular Head and George Town, though these sites are now presumed to be extinct (Table 1).

Pterostylis cucullata subsp. *cucullata* grows on near-coastal calcareous dunes and sand-sheets, within closed scrubs dominated by either *Leptospermum laevigatum* (coast teatree) or *Beyeria lechenaultii* var. *latifolia* (pale turpentine-bush). Associated species include *Leucopogon parviflorus* (coast beardheath), *Poa poiformis* var. *poiformis* (coastal tussockgrass) and *Poa rodwayi* (velvet tussockgrass). The sites are typically sheltered, facing south or south-easterly to westerly, with seasonally damp but well-drained humus-rich sandy loams, often with moss and deep leaf litter.

In Tasmania the species grows within an altitude range of 10 to 30 m above sea level. It has a linear range of 350 km, an extent of occurrence of 31,400 km^2 (which includes large areas of sea), and an area of occupancy of about 80 ha (Table 1).

Plate 2. *Pterostylis cucullata*: coast teatree habitat on King Island (image by Richard Schahinger)

POPULATION ESTIMATE

Pterostylis cucullata subsp. *cucullata* is known from at least 16 extant subpopulations in Tasmania, with a total of around 10,000 to 11,000 plants (Table 1). The subpopulations on King Island appear to be the most extensive, with an absolute count of over 6,500 individuals in 2008/2009 (Branson 2008; Threatened Species Section surveys). Flowering plants typically comprise about 10% of any given subpopulation, with fewer flowers in more exposed situations.

The plant numbers cited above are considered to be conservative due to the difficulties associated with locating the species in its shrubby habitat. It is also likely that additional subpopulations occur in large areas of unsurveyed potential habitat on private property on both King and Flinders Island, and in large areas of reserved habitat on Three Hummock Island.

RESERVATION STATUS

Pterostylis cucullata subsp. *cucullata* is reserved in Arthur-Pieman Conservation Area, Hunter Island Conservation Area and Three Hummock Island State Reserve.

CONSERVATION ASSESSMENT

Pterostylis cucullata subsp. *cucullata* was listed as rare (as *Pterostylis cucullata*) on the original schedules of the Tasmanian *Threatened Species Protection Act 1995*. It was uplisted to endangered in 2002 when the species was thought to be extinct on mainland Tasmania (Jones et al. 1999).

THREATS, LIMITING FACTORS AND MANAGEMENT ISSUES

The greatest threats to the known *Pterostylis cucullata* subpopulations in northwestern Tasmania and the Bass Strait islands are land clearance, cattle grazing and inappropriate fire regimes. Climate change and stochastic events also pose a threat to the species, while browsing by garden snails may have a local impact.

Habitat loss: Considerable areas of potential habitat on the northwest coasts of Tasmania are likely to have been lost in the past as a result of dune destabilisation in the 19th century triggered by a combination of cattle and fire (Stockton 1982), with the subsequent planting of the introduced marram grass (*Arenaria ammophila*) creating habitat unsuitable for the species. In addition, available habitat along Tasmania's northern coastal strip has been reduced significantly as a result of past agricultural and urban development.

All known subpopulations on King Island and Flinders Island are on private land, and consequently are at risk from a range of activities that can lead to degradation and loss of habitat.

Cattle grazing and fire: Much of the species' preferred habitat in Tasmania has been burnt at frequent intervals to maintain grasslands and grassy shrublands suitable for cattle grazing. Cattle grazing and associated activities may lead to physical trampling of the species, as well as causing dune destabilisation, nutrient enrichment and the introduction of weeds. Cattle continue to be an issue of concern for the subpopulations on King and Hunter Islands, as well as the Possum Banks subpopulation in Arthur-Pieman Conservation Area.

Table 1. Population summary for *Pterostylis cucullata* subsp. *cucullata* in Tasmania

	Subpopulation	Tenure	NRM region	1:25 000 mapsheet	Year last (first) seen *	Area of occupancy (ha)	Number of plants
1	King Island (Rocky Point)	Private	Cradle Coast	Wickham	2009 (2009)		1
2	King Island (Cape Wickham)	Private	Cradle Coast	Wickham	2009 (1998)	1 ^	1700–1900
3	King Island (Yellow Rock north)	Private	Cradle Coast	New Year	2008 (2008)	5 ^	2000
4	King Island (Yellow Rock middle)	Private	Cradle Coast	New Year	2009 (2009)	27 ^	1700
5	King Island (Yellow Rock south)	Private	Cradle Coast	New Year	2009 (1998)	21 ^	1060
6	Three Hummock Island (North)	State Reserve	Cradle Coast	Rochon	2002	0.12	76
7	Three Hummock Island (South)	State Reserve	Cradle Coast	Kerauden	2002	0.02	20
8	Three Hummock Island (West Telegraph)	State Reserve	Cradle Coast	Kerauden	2008	1	32
9	Hunter Island (Lighthouse Dune system)	Conservation Area	Cradle Coast	Cuvier	2002	0.02	150 (3 sites)
10	Hunter Island (Cuvier Bay track)	Conservation Area	Cradle Coast	Cuvier	2002	0.001	10
11	Hunter Island (Homestead Lagoon)	Conservation Area	Cradle Coast	Cuvier	2002		100
12	Hunter Island (Homestead Dune system)	Conservation Area	Cradle Coast	Cuvier	2002	9 ^	900 (7+ sites)
13	Hunter Island (South)	Conservation Area	Cradle Coast	Cuvier	2001		2+
14	Arthur-Pieman (Gardiner Point)	Conservation Area	Cradle Coast	Bluff	2007 (2001)	0.004	23
15	Arthur-Pieman (Possum Banks)	Conservation Area	Cradle Coast	Temma	2007 (2002)	9 ^	2000–3000
16	Flinders Island (Tanners Bay)	Private	North	Tanner	2008 (2005)	0.0004	11
17	Marrawah		Cradle Coast	Marrawah	1906 (1906)	Presumed extinct	
18	Circular Head		Cradle Coast	Stanley	1900? (1837)	Presumed extinct	
19	Near George Town		North	Bell Bay	1844 (prior to 1810)	Presumed extinct	

* first collected from King Island in 1888, Three Hummock Island in 1944 and Hunter Island in 1971; ^ Area of occupancy taken to be the subpopulation's extent of occurrence.

Cattle grazing on Hunter Island is currently the subject of negotiations between the Tasmanian Parks and Wildlife Service and a preferred leaseholder, while the agistment of cattle in the Arthur-Pieman Conservation Area is governed by prescriptions in the *Arthur-Pieman Conservation Area Management Plan* (PWS 2002).

Fire management of the species' coastal dune habitat may be a pertinent issue in less exposed sites, with the likely development of invasive scrub vegetation in the absence of targeted ecological burns. In terms of those subpopulations on public land, only those within the Arthur-Pieman Conservation Area have a fire management plan in place (PWS 2003). Prescriptions are being developed for Hunter Island Conservation Area as part of a grazing lease, while passive fire management is expected to continue into the foreseeable future for Three Hummock Island State Reserve.

Browsing by garden snails: The introduced brown garden snail (*Helix aspersa*) was cited as a threat to the Hunter Island subpopulations by Jones et al. (1999), though more recent surveys by Threatened Species Section personnel have not revealed any substantive impact (Dalgleish & Schahinger 2006).

Climate change & stochastic events: A reduction in rainfall associated with global climate change may lead to a diminution of suitable habitat and also exacerbate the risk of fire, while the small size of some of the subpopulations exposes them to a stochastic risk of extinction.

MANAGEMENT STRATEGY

What has been done?

- Baseline surveys of known sites were conducted in 2002 (Dalgleish & Schahinger 2006).
- The Possum Banks site in the Arthur-Pieman Conservation Area has been identified as a cattle exclusion area (Schahinger 2002). It is anticipated that an area containing about half the known plants will be fenced in the near future.
- A management plan and fire management plan has been published for the Arthur-Pieman Conservation Area (PWS 2002, 2003).
- Potential habitat in the Arthur-Pieman Conservation Area between Preminghana and the Interview River was surveyed in 2001 and 2004 (Schahinger 2002, 2005).
- Extension surveys of suitable habitat were undertaken in 2007, 2008 and 2009. Target areas included the Arthur-Pieman Conservation Area, King Island, Three Hummock Island and Flinders Island. The surveys revealed the presence of significant new subpopulations on King Island and Three Hummock Island, and increased the number of known plants in the Arthur-Pieman Conservation Area.
- The species was included in the *Flora Recovery Plan: Threatened Tasmanian Orchids 2006–2010* (TSU 2006).

Management objectives

The main objective for the recovery of *Pterostylis cucullata* subsp. *cucullata* is to prevent the inadvertent destruction of subpopulations, maintain the viability of existing subpopulations, and promote conditions for its successful recruitment.

What is needed?

- provide information and extension support to the Cradle Coast and Northern Natural Resource Management committees, relevant local councils, government agencies and the local community on the locality, significance and management of known *Pterostylis cucullata* subsp. *cucullata* subpopulations and areas of potential habitat;
- undertake extension surveys to determine the species' full extent on King, Three Hummock and Flinders islands (including determining the status of all reported but undescribed subpopulations, and the identification of management issues);
- pursue increased security and improved management of subpopulations on private land through private land conservation programs;

- prepare and implement fire and grazing management plans for Hunter Island and Three Hummock Island to take the requirements of the species into account;
- monitor known subpopulations at two-yearly intervals to determine the level of recruitment and/or plant loss and to better inform management prescriptions;
- implement the threatened orchid recovery plan (TSU 2006) and include the species in any revision of the plan.

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Prepared in 2009 under the provisions of the Tasmanian *Threatened Species Protection Act 1995.* Approved by the Secretary and published in July 2010.

Cite as: Threatened Species Section (2010) *Listing Statement for* Pterostylis cucullata *subsp.* cucullata *(leafy greenhood),* Department of Primary Industries, Parks, Water and Environment, Tasmania.

View: www.dpipwe.tas.gov.au/threatenedspecieslists

Contact details: Threatened Species Section, Department of Primary Industries, Parks, Water and Environment, GPO Box 44, Hobart, Tasmania, Australia 7001. Ph (03) 6233 6556; fax (03) 6233 3477.

Permit: It is an offence to collect, disturb, damage or destroy this species unless under permit.

ATTACHMENT 7: *SCHOENOPLECTUS TABERNAEMONTANI* NVA RECORD

Annexure: 16.2.3

Tasmanian Government

www.tas.gov.au

Natural Values Atlas

Authoritative, comprehensive information on Tasmania's natural values

Version 3.12.8

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Species

Species Home

Species Search
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Individuals Search
Sample Search
Populations
Populations Search
Taxonomy Tree

Range Boundary Metadata
Conservation Significance
Definitions
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Lookups

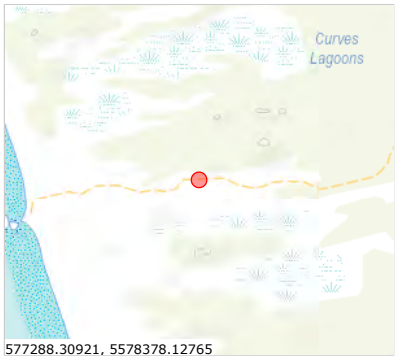
Reports

Natural Values Report
Natural Values Report Help
Raptor Report
Biosecurity Report
Census Report
View Completed Reports

Species Observation

Back Refresh

Observation details

Id	919339
Source	*Department of Natural Resources and Environment, Tasmania (NRE) (dpipwe)
Program	
Project	Wetlands Database
Activity	
Observation Foreign Id	wl:wl:423/4
Individual	
Estimated Birth Date	
Gender	
Original Name	Schoenoplectus validus
Species Name	Schoenoplectus tabernaemontani
Host Species Name	
Population	
Position	**GDA94 Zone 55 Easting/Northing** POINT(577312 5578183)  577288.30921, 5578378.12765 717129.03100, 5209904.45596 Click on the map to open a large version
Position Accuracy (m)	250
Location Desc	
Collection Method	
Mapping Method	
Observation Date	01-Jan-1979
Date Accuracy	Unknown
Observation Time	
Observer Names	Unknown Unknown (23130)
Reporter Names	
Reported Date	
Identified By	
Investigator Names	
Investigation Date	
Observation Type	Sighting
Observation Type Qualifier	
Observation State	Present
Observation State Qualifier	
Record Status	Accepted
Questionable Record?	No
Notes	

Report data issues

You can enter a comment to highlight any issues about this record

Annexure: 16.2.3

Send Comment

Data quality tests

Test Name	Result
Species has a complete name	Passed
Position accuracy is valid	Passed
Position accuracy is within 100 metres	Failed
Observation date is valid	Passed
Observation date is current	Passed
Date accuracy is valid	Failed
Date accuracy is to the day	Failed
Location description has been provided	Failed
Mapping method has been provided	Failed
Observer name is a valid name	Failed
Observer verified expert	Failed
Reporter name is a valid name	Unchecked (no data available)
Reporter verified expert	Unchecked (no data available)
Identifier name is a valid name	Unchecked (no data available)
Identifier is a verified expert	Unchecked (no data available)
Investigator name is a valid name	Unchecked (no data available)
Investigator is a verified expert	Unchecked (no data available)
Record hasn't been flagged as questionable	Passed

Attachments

Attachment	Description	File Name	Uploaded Date	Restricted?	Preferred Image?

There was no data found for your request

Abundance details

Reproduction Status

Individuals Count

Individuals Count Variation (+/-)

Individuals Count Notes

Adult %

Juvenile %

Coverage Area (m²)

Coverage %

Area Occupied Notes

Recruitment?

Average Height (m)

Habitat details

Habitat Extent Area (Ha)

Vegetation Community

Vegetation Notes

Landform

Geology

Substrate Type

Drainage

Rock %

Bare Ground %

Shading %

Aspect

Slope (°)

Altitude (m)

Land Use

Disturbance Type

Disturbance Date

Permit Number

Disturbance Notes

Threat Notes

Samples

Annexure: 16.2.3

	Id	Accession No	Sample Type	Sampler Names	Lodgement Location	Lodgement Date	Analysis Result Count

There was no data found for your request

Page: 1 of 0 1-1 of 0

Record details

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Tasmanian Government

ATTACHMENT 8: SURVEY OF THE GEOMORPHOLOGY AND SOIL CHARACTERISTICS OF THE MARKARNA GRAZING COMPANY PTY LTD PROPERTY, MARSHALL BEACH, FLINDERS ISLAND

Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island

18 January 2024

This report was compiled by Dr Adrian Slee, Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000

Email: adrian.slee@fpa.tas.gov.au

Citation

Slee, A. 2023. Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island, November 2023, Forest Practices Authority, Hobart 27p.

FPA file reference

D24-20638

Disclaimer for report

The advice contained in this document has been prepared for Markarna Grazing Company Pty Ltd and Van Diemen Consulting Pty Ltd only.

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Glossary

Optically Stimulated Luminescence (OSL) dating: A method of dating sand grains. This method measures the period of time since burial of the sand grains and therefore indicates the age of the host landform (i.e. dune ridge).

Tasmanian Geoconservation Database (TGD): A database that provides a source of information about geodiversity features, systems and processes of conservation significance in the State of Tasmania.

Cover Image (Image 1)

View eastwards from the coastal foredune backing Marshall Beach, looking across isolated outcrops of granite towards the large west-to-east orientated longitudinal dunes forming the main Markarna Lime Sands resource

1. Project scope and Aims

Van Diemen Consulting Pty Ltd engaged the Forest Practices Authority (FPA) to investigate the geomorphology and soils present on a 364.1 ha mining lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The proposal by Markarna Grazing Company is to develop and extend an existing old lime sand extraction pit located within the dune fields located between Palana Road and Marshall Beach near the settlement of Lughrata. The priority area is an 800 m long west to east oriented sand dune complex covering approximately 4 ha that forms a lime sand resource immediately west of the current old extraction pit.

The aim of the project was to provide a detailed report on the dune field and other landforms including swamps and potential Tertiary limestone karst features in the vicinity of the proposed extraction pit. Soils were also be investigated in this area. A secondary focus was a general documentation of the dune field and other sites of geomorphic significance in the overall mining lease in the event of expansion of operations in the future.

The report addresses the following issues:

- Documentation of any karst features present and management recommendations.
- Overview of the sand dunes present at the proposed pit site and mine lease in general and dune special values management recommendations.
- Comment on sand blow risks and mediation recommendations.
- Documentation of other geomorphic landforms.
- Soil observations and management.

2. Previous Work

Granite Bedrock

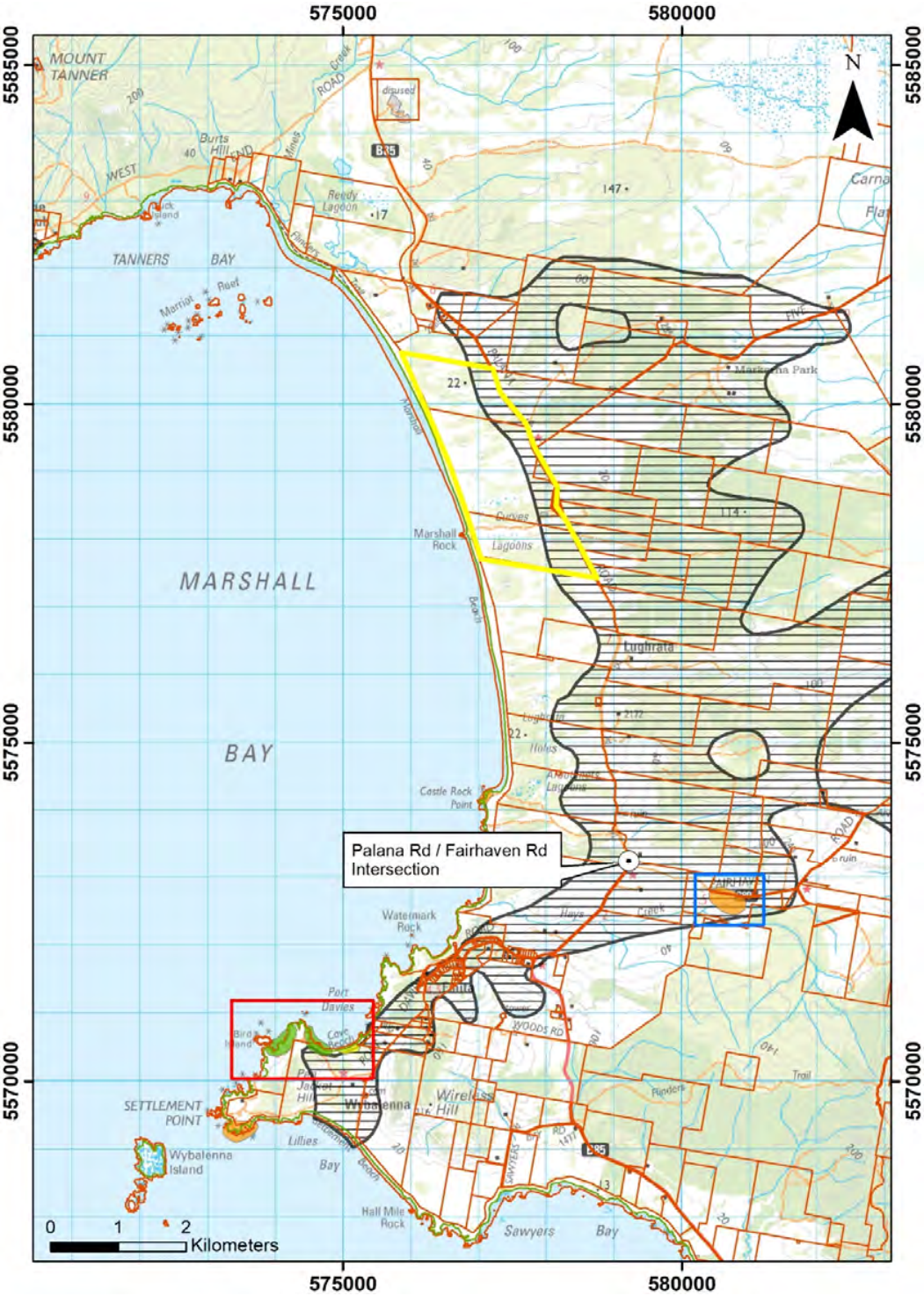
Devonian granite plutons are the dominant bedrock that floors Flinders Island and upon which the Tertiary Limestone and Quaternary deposits lie. White syenogranite/ monzogranite (I-type) granite outcrops in the vicinity of Five Mile Road immediately east of the study site. No granite was mapped on the 1:250,000 geological map (available on www.theList.tas.gov.au) within the study area (Mineral Resources Tasmania 2023). However aerial photographs clearly show that Marshall Rock (outcropping on Marshall Beach) is granitic.

Karst

Tertiary dune limestone is mapped on the 1:250,000 Tasmanian geological maps. It forms the hills rising east of Palana Road immediately inland of the Markarna Lime Sands mining lease. The hills are part of an extensive belt of limestone extending from the vicinity of Five Mile Road in the north, inland to the Memana district and south along the coast to Wybalenna. The area is listed as a category B karst area (Emita-Memana BS17) (Kiernan 1995; see also map 1, below). The karst B classification indicates that karst processes are active in the area. The area has received limited attention from geoscientists and cavers. Limestone has been mapped on the hills to the east of the study site to altitudes approaching 130 m asl. The limestone is likely to be mantling granite and possibly sedimentary rock at depth and may be quite thin i.e., in the order of tens of metres. However, the topographic relief of the limestone here is more than 100 m which is more than enough for significant karst landforms and processes to develop. Kiernan and the author have observed subtle sinkholes in the vicinity of Palana Road/Fairhaven Road intersection (Map 1 and Image 2). Some of these depressions could be dune swales, but the presence of exposed limestone outcrops around others suggest sinkhole development.

A low hill north of Hays Creek has limestone cliff outcrops. The most notable karst landforms occur at Cave Beach where significant limestone exposures in a coastal setting display very rugged limestone weathering pinnacles and solutional forms (karren) associated with several notches and small caves formed at or near the contact between the limestone and the underlying granite (Image 3). The karst landforms in the vicinity of Cave Bay (red box on map 1) and the sinkholes along Fairhaven Road (Blue box on map 1) are listed as Geoconservation sites ID:2254 and ID:2298 in the Tasmanian Geoconservation Database (TGD) accessible on the Tasmanian Natural Values Atlas (NVA.tas.gov.au).

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



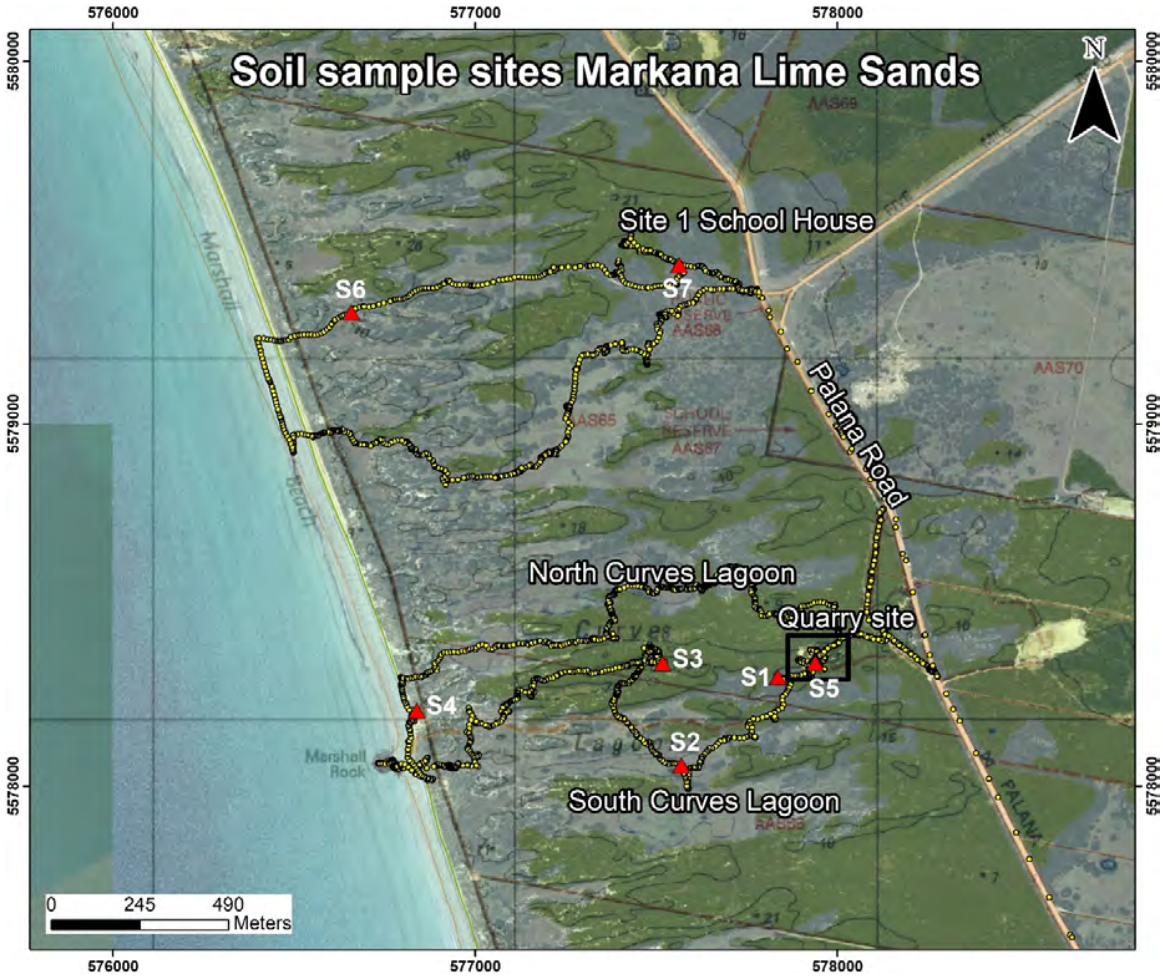
Map 1: Marshall Bay. The striped area is the mapped extent of the Emita – Memana (BS17) karst according to Kiernan 1995; yellow square is the lease area; red and blue squares highlight TGD sites with notable karst development.

Image 2: One of a large number of shallow basins (circled) associated with limestone outcrops (foreground and background) in the vicinity of the Palana Road/Fairhaven Road intersection (Map 1). The lack of dune cover and exposed outcrops suggest shallow soils and that these depressions are solution sinkholes associated with a subsurface karst aquifer.

Image 3: The Tertiary Limestone at Cave Bay features significant karst landforms including small caves, notches and solutional (karren) surface weathering forms. The area is a listed TGD site and the limestone outcrops are contiguous with the limestone bedrock in the vicinity of the mine lease.

3. METHODS

Observations of the site were made over two days of fieldwork on the 7th and 8th of November 2023. Waypoints and route tracking were recorded using a Garmin Etrex 22s. The route taken during the field work and the location of the soil samples taken are shown in Map 2. Maps were drawn using ARC-Map 10.8.1. Soil samples were taken using an Eijkelkamp auger. A sample for Optically Stimulated Luminescence (OSL) dating was taken from the lower dune horizon in the old pit face. This was done by cutting back and benching out the sand dune before a sample was taken using a PVC tube hammered vertically into a dug bench approximately 5 m below the top of the dune.



Map 2: Soil sample sites and survey route (yellow tracks) taken during fieldwork.

4. OBSERVATIONS

BEDROCK GEOLOGY OF THE SITE

Granite

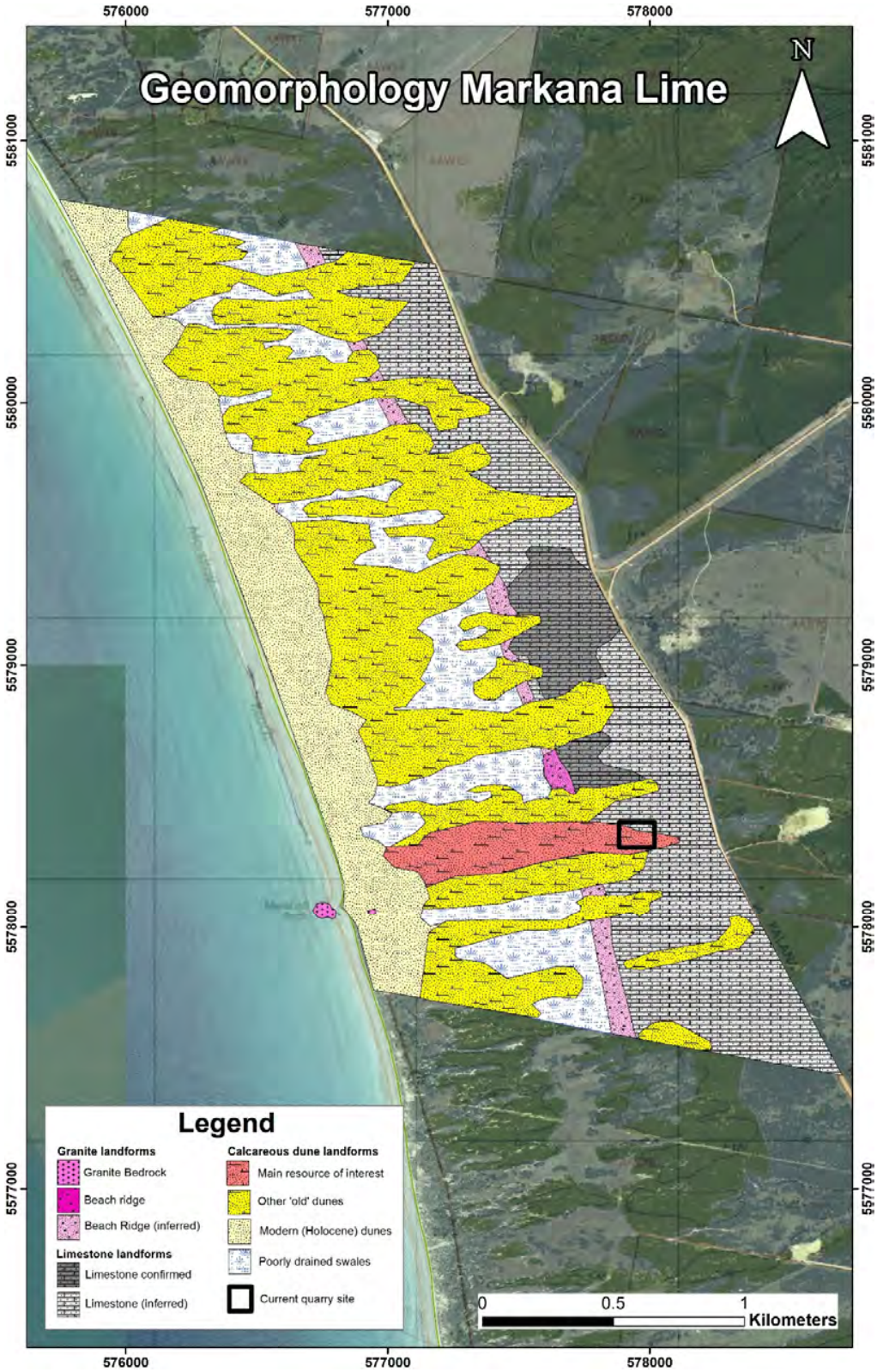
The general geomorphology of the mine lease is presented in Map 3. The Marshall Rock and other granite outcrops located within the sand dunes 150 m to the east of the pit and just within the lease (see Image 1) were visited during the survey. Both are unmapped on geological sheets and feature large, rounded outcrops of white crystalline granite. While the granites are not the focus of proposed operations on the mine lease their presence on the coast and in particularly within the foredunes indicates the likelihood that granite outcrops are present beneath the sand dunes on the property. Granite bedrock rarely forms flat surfaces but rather undulates quite substantially over short distances hence it is impracticable to define the depth of the dunes and further east Tertiary limestones above the granite contact. Exploration could help assess the depth of the lime sands. However, it would be costly over large areas, and possibly yield little additional information.

Limestone

A continuous flat bench approximately 15 m above sea level is present in the eastern section of the study area. In places this bench is overlain by dune sands. Significant lag deposits of fossiliferous limestone in the form of boulders and cobbles are found on this bench associated with a distinctive open vegetation community in contrast to the thicker vegetation associated with the younger dune sequences (Image 4). The bench appears to be the western edge of the limestone outcrop and its western margin may have once been a shoreline open to Bass Strait. It now forms a paleo-shoreline. Areas of outcropping limestone are very limited as most of the edges of the limestone plain appear to be buried by Quaternary coastal and dune deposits. Only one small in-situ outcrop of limestone was observed at 577509mE: 5579301mS. This was associated with the blowout of a low 1 m tall sand dune.

Image 4: Flat limestone bench in the east of the property.

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



Map 3: Geomorphology summary map.

KARST LANDFORMS

WEATHERING LANDFORMS (KARREN)

Very minor but sharp solutional karren weathering forms were located at the larger limestone outcrop (Image 5) and other smaller blocks in the area but no significant solutional karst landforms were observed.

Image 5: Small limestone outcrop

SINKHOLES

Large, elongated depressions are a feature of the property. Some of these are large enough to have warranted definition as enclosed basins on the 1:25,000 topographic map sheets of the area and the largest are defined as lagoons (e.g. Curves Lagoons to the immediate south of the proposed resource). These depressions are elongated. They are not flat floored but have rather undulating forms. Although a small intermittent pond appears to be present in the lowest basin of the northern Curves Lagoon, elsewhere flowing and pooling surface water appears to be very limited; surface water accumulation may be confined to times of intense rainfall. In contrast to enclosed rounded basins associated with limestone bedrock, outcrops interpreted to be probable sinkholes have been described by the author and others near the Palana Road/Fairhaven Road intersection and further south in paddocks north of Trousers Point. The depressions at the study site appear to be all related to either broad west-east oriented interdune swales or (closer to the coast) roughly square

depressions developed behind the active Marshall Beach foredune complex. Depressions of conclusive karstic origin were not identified and are considered unlikely to be present within the study area.

SPRINGS

No obvious streams or springs were located on the property. A possible very small spring rises from beneath Marshall Beach immediately east of Marshall Rock. Here at low tide a small stream flows for approximately 20 m to the ocean, dropping 20–40 cm in altitude. The scale and location of the spring does not imply karstic drainage in the Tertiary limestone several hundred meters inland but rather small-scale subsurface drainage out of the local beach-bordering Holocene dunes. The lack of surface streams is interesting as there are no inlets or obvious streams entering the ocean for the length of Marshall Beach between the outflow of Arbothnots Lagoon to the south and a small inlet to the north at 574850mE: 5582000mN. A series of disappearing stream channels are mapped in the limestone hills southeast and northeast of the study area. The absence of defined stream channels flowing off the limestone in the area does suggest subsurface drainage is occurring in karst.

SUMMARY OF KARST LANDFORMS

An extensive Tertiary dune limestone bench is present in the eastern section of the study area. This bench is overlain in locations by the Quaternary dunes and has open predominantly *Leptospermum laevigatum* dominated forest. The lack of streams (and channels) flowing from the higher limestone hills to the east of the property may indicate that a karst aquifer is present in the area. However, no obvious springs were noted. No sinkholes were observed on the property, and as the largest limestone outcrop observed covered only a few square meters, caves are unlikely to be present in the priority study area. However, the author did not cover the entire mining lease and LiDar coverage is not available for the area so the presence of isolated karst landforms including bedrock bluffs with karren, sinkholes or small caves cannot be entirely ruled out.

OLD BEACH RIDGE

North Curves Lagoon is a large dune swale basin. It is surrounded to the west, south and north by Quaternary and Holocene dune ridges and to the east by the low Tertiary limestone bench. On the eastern margin of the basin at 577625mE: 5578543mN approximately 6–10 m above sea level (asl) white sandy gravels are exposed (Image 6). These are not typical fine sands associated with the beach ridges in the area but are rounded coarse quartz sands that appear to mantle the lower western slopes of the limestone bench. The quartz-rich nature of the sediments suggests two potential sources

1. That granite bedrock is shallowly buried in the vicinity of the eastern end of north Curves Lagoon and the soils at the site are primary granitic soils (known as gruss) formed from weathered granite.

2. That the coarse quartzite sands that contain some shelly carbonate fragments carbonate were deposited on the western edge of the limestone bench in a high energy coastal environment (surf beach).

The latter explanation appears to be more likely as no granite bedrock was observed at the site. It can be assumed that the coastline of Bass Strait was once a high energy environment supplied with coarse sands sourced from offshore granite outcrops such as Marshall Rock or reworked sands from upslope granite sources east of Palana Road. The presence of this beach ridge indicates that the coastline has prograded (advanced) >900 m to the west while becoming a lower energy environment. Given the altitude of the beach it appears likely that it could have formed during the penultimate interglacial high stand, approximately 130,000 years ago when sea levels were 6-8 m higher than today. The presence of granitic soils in this area defines the northern margin of the economic resource in lime-rich dune sands to the south. It is likely that the beach ridge extends beneath the overlying Quaternary carbonate-rich sand dunes, as the dunes appear to have formed over the top of the older granite sands and Tertiary limestones in the east of the property. If this is the case a contact between the carbonate sand resource and the quartz sands may be encountered during mining.

Image 6: Beach ridge composed of quartzite gravel sands (inset) derived from granite bedrock immediately east of North Curves Lagoon.

SAND DUNES

Extensive sand dunes cover most of the mining lease. Except for the granitic sediments east of North Curves Lagoon described on page 8, the sand dunes are composed of fine-grained white quartz and carbonate deposits. Two significant sand dune assemblages are present. In the west are the modern foredune and back dunes behind Marshall Beach. Inland are a series of elongated west-to-east trending parallel dunes that rise up to 24 m above sea level.

These inland dunes are largely vegetated and stable in comparison to the foredunes that have fewer woody and tree species, instead being dominated by grasses, herbs, wind-pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

MAIN DUNE

The 1:25000 topographic map of the main dune (resource) shows a single large dune approximately 180 m wide and 10–25 m high. Two large internal depressions are present west of the current sand pit. The actual landscape is more complex than the contours suggest with at least 8 dune crests identified between North Curves Lagoon and South Curves Lagoon. The dune ridges have narrow rounded tops and steep side slopes, generally >30°. The multi-peaked nature of the dune ridges and the deep wide interdune swales are not well expressed on the 1:25000 topographic map.

The existing pit is located near the narrowest and easternmost part of the dune sequence. Here past pit operations have exposed a cutting through the main dune that has some scientific interest as described in the next section of this report.

EXISTING PIT

The existing pit is located at 577936mE: 5578343mN, 350 m west of Palana Road and is accessible by an overgrown FWD track. The pit exposes a 75 m wide section through the eastern limb of the main dune. Most of the exposure is either overgrown or of limited interest. The floor of the pit appears to be in solid Tertiary limestone bedrock. Some of the floor material could have been brought in by past operations to provide a solid working base. The best exposure through the dune is on the upper southern face of the pit where an approximately 5.5 m deep section is exposed. A modern topsoil and two buried paleosols are exposed in this face while calcified tree roots (rhizoliths) and branches are present within the dune below the lower of the two paleosols. The dune profile was described and photographed (Table 1 and Image 7) and samples were taken from the main horizons.

Table 1. Description of soil profile at the pit site.

Unit 1	Depth (cm)	Description
1	**0 – 20**	Grey sandy topsoil with abundant modern root mats
2	**20 – 95**	Yellow sands with abundant animal burrows
3	**95 – 110**	Dark grey / brown horizon in sands – paleosol 1
4	**110 – 260**	Light yellow to white sands
5	**260 – 280**	Grey / Brown horizon laterally extensive and forming a stratigraphic bench – paleosol 2.
6	**280 – 550 (approx.)**	White sands, predominantly carbonate; prominent surface carbonate cementation highlighting stratigraphic beds, calcified tree root and possible calcified small tree stump.
7	**Pit Floor**	Fossiliferous limestone (Tertiary)

Image 7: Annotated view looking east over the southern wall of the old pit showing dune and paleosol horizons.

PALEOSOLS

The term 'paleosol' refers to a buried soil horizon within a sedimentary profile. Paleosols are darker band of sediment which may or may not contain woody debris, organic matter and charcoal surrounded by lighter and less charcoal-rich sediments. Paleosols can be important indicators of past stability between depositional events. In this case organic topsoils (indicating stability) have been buried by a non-organic deposits (sand dunes). Two prominent paleosols are present in the exposure. The upper paleosol 1 (Image 8) lies between 95 cm and 115 cm depth and forms a prominent but laterally patchy dark brown organic-rich layer in the upper dune profile. The lower paleosol at 260 cm depth is a thinner and lighter compact sand unit that appears to not be as organic rich. However, this paleosol is laterally extensive and forms a prominent grey bench on the mid slope of the cutting. In the case of the dune systems the presence of paleosols indicates a substantial time of dune stability, allowing an organic topsoil to form prior to renewed dune instability resulting in topsoil burial. At the pit site at least three periods of dune stability can be inferred as indicated by the two buried paleosols and the darker modern topsoil associated with thick root mats on the crest of the dune.

Image 8: Top 1.5 m of the pit face showing prominent brown paleosol at about 1 m depth.

RHIZOLITHS

A feature of the main pit exposure is the rhizoliths located in Unit 6 of the profile (Table 1; Images 9 and 10) formed by dissolution of carbonate by percolating water and its subsequent precipitation around roots.

Rhizoliths observed at the pit include narrow straw-like tree root rhizoliths up to 20 cm long and 1–5 cm across many of which still contain inner woody root material and larger cylindrical-shaped rhizoliths up to 30 cm long and 15 cm thick, which may have formed around tree branches. Small columns are present at other locations in locations suggesting calcification of the stumps of *Melaleuca* and other small trees found at the site.

Images 9 and 10: Tree root rhizoliths exposed in the lower dune horizon in the pit face. These rhizoliths form from leached calcium carbonate which has precipitated around rough surfaces such as tree roots.

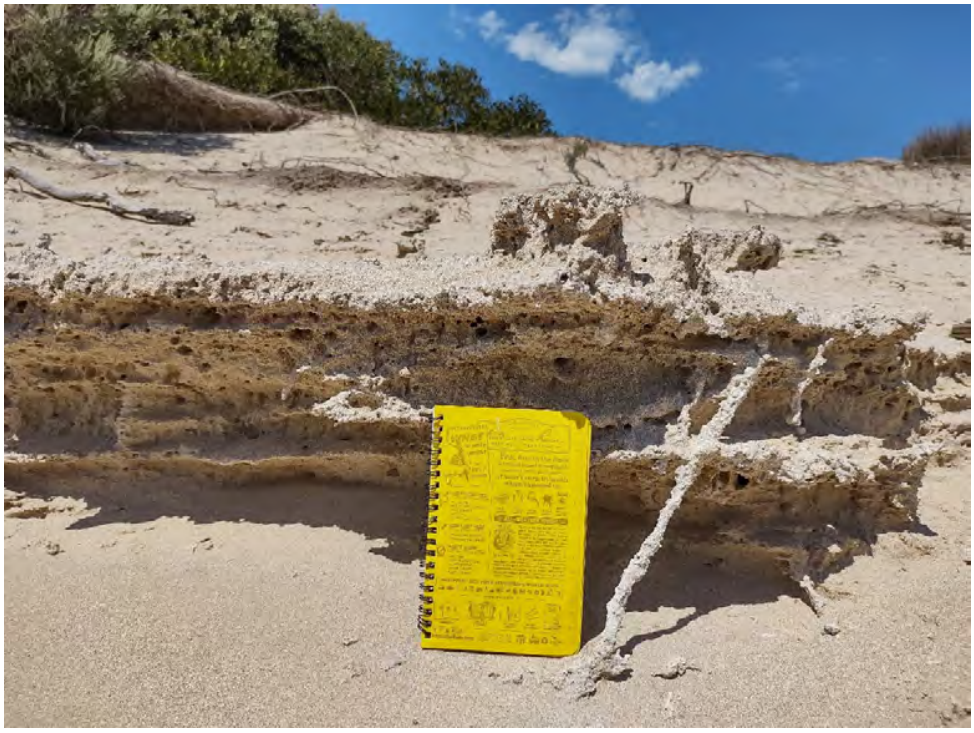


Image 11: Small carbonate benches have formed in the lower dune horizon but unlike the rhizoliths appear to have formed since the pit last operated.

The cut sand bank also features several distinct carbonate layers (poorly developed calcretes) that indicate slight differences in the carbonate content of the sand dune horizons (Image 11). These layers stand out as hard surfaces in the dune but on cutting back the surface exposure no stratigraphic difference was noted between these layers and those above and below (Image 12). It was concluded that these layers form by surface hardening by carbonate precipitation on the exposed surface since sediment exposure by past pit operations.

Image 12: A cut through the weakly developed calcrete on the cut surface of the pit revealed compact fairly uniform bedded sands.

DATING

A sample for Optically Stimulated Luminescence (OSL) dating was taken from a freshly cut bench in the lowermost dune unit, 1.5 m below the lower paleosol (Images 13 and 14). This sample will be submitted to the OSL laboratory at the University of Wellington (New Zealand) for dating. The date will provide a maximum age for the formation of the lower paleosol and will help establish whether the dunes formed during glacial or interglacial periods.

Image 13: Taped transect of the face from the top of the dune horizon to the sample site for OSL dating on the cut bench. Image 14: The sample was taken by hammering a sample tube into the cut bench vertically and then removing the sediment for extraction.

MODERN (LATE HOLOCENE DUNES)

Modern dune ridges run parallel to Marshall Beach for the length of the mining lease. They consist of an almost continuous elongated beach foredune backed by a complex of hummocky back dunes separated by roughly bowl-shaped dune swales (depressions). At the western margin of the main resource area these dunes intercept the older west – east longitudinal dunes considered above. The modern dunes are composed of fine loose sands with no evidence of significant calcite crust or rhizolith development; however the carbonate content of the dunes is high. No paleosols were observed in these dunes but thin buried soil horizons may be present. The lack of calcite cementation in the modern dunes suggests a significantly younger age for these deposits as may be expected from their near-coastal setting. Cuttings through the coastal foredune and a low back dune deposit on the main central access track were investigated. The coastal foredune (beach dune) was exposed in a blowout (Images 15 and 16) and displays a uniform profile composed of unconsolidated loose sands. The inland back dune was exposed where the access track cuts through the dune (images 17 and 18). The dune has three horizons: a slightly brown upper 55 cm: a white layer at approximately 55–70 cm and a yellowish layer at >70 cm depth. The profile development indicates a period of dune stability possibly extending back ~1000 years. The brown upper layer is an A1 horizon. The middle white layer is a leached A2 horizon. The deeper yellowish zone is a B horizon. Inappropriate track development and other activities associated with operations on the mining lease could lead to re-activation of these young dunes, which are more exposed to coastal winds than dunes further inland.

Image 15: Steep modern Marshall Beach foredune looking south from Marshall Rock.

Image 16: Natural windblow exposure through the foredune at soil sample site 6 map 2.

Image 17: The modern semi-stabilised back dune.

Image 18: The dune has a similar composition to the active foredune however has been stabilised for some time as a soil profile has developed.

SOIL SURVEY

Soils were sampled and bagged for transport from several locations in the vicinity of the main resource deposit (Map 2). Soils were sampled at depths of 30 cm, 50 cm and where possible 1 m using either natural cuttings or the Eijkelkamp soil auger. This was to identify any unusual characteristics of the soils and to sample for laboratory assessment of soil acidity (pH). pH was measured after shaking soils and water (1:25 ratio) and allowing the mixture to stand for 2 hours A Milwaukee MW 100 pH meter was used, calibrated at the time of analysis using standard solutions at pH 4 and pH 7.

Dune swale: Site 1

The centre of a low dune swale southwest of the pit was augered. Soil samples at 30 cm and 50 cm depth were taken from this site. No peat deposits were noted.

South Curved Lagoons Dune swale 2: Site 2

Soils were augered at the lowest point of South Curved Lagoons on a marsupial grazed lawn that appears to hold water at times forming a small pond. The upper 30 cm and 50 cm samples contained yellow white carbonate sands while dark brown swampy organic rich lacustrine sediments were encountered below about 80 cm.

Dune Swale 3: Site 3

The deepest part of the large dune swale that is visible on topographic maps (as an enclosed depression) was sampled at depths of 30, 50 cm and 1 m. The entire profile displayed fine white sands beneath a slightly browner topsoil and no sign of dark organic horizons or peat.

Modern active foredune Site 4:

A grab sample of a cutting in an active foredune exposed in a blowout was sampled at approximately 2.5m depth in a uniform unconsolidated sand with no topsoil.

Main dune exposure: Site 5

Grab samples were taken of the upper dune deposit, Paleosol 1, middle dune deposit, paleosol 2 and the lower dune deposit (Image 7).

Modern (Holocene) back dune Site 6

Three samples were taken from a track cutting through a low dune in the Marshall Beach back dune complex.

Limestone Bench Site 7

Two samples were taken from a thin soil developed on the Tertiary limestone bench.

pH RESULTS

The results of the pH analysis are presented in Table 2. Results for all samples indicated alkaline soil conditions with no indications of highly acidic soil horizons or acid sulphate soils being present in the vicinity of the proposed mining operations. The samples varied in pH between 7.4 and 8.6 with most soils sampled being classified as moderately to strongly alkaline (Blakemore et al. 1987). The topsoil at the large interdune swale (Site 3) returned a

pH of 7.4 that classifies as slightly alkaline (Acid soils have a pH of below 6.5 with strongly acidic soils having pH of <5.2 (Blakemore et al. 1987)).

Table 2. Results of pH determinations

Site	Description	Depth	pH
Site 1	Small swale in older dune Southwest of Pit Face	30 cm	**8.1**
	Small swale in older dune Southwest of Pit Face	50 cm	**8.2**
Site 2	Lowest point of South Curves Lagoon	30 cm	**8.0**
	Lowest point of South Curves Lagoon	50 cm	**8.0**
	Lowest point of South Curves Lagoon – Organic brown muds	100 cm	**7.7**
Site 3	Lowest point of large elongate dune swale brown topsoil	30 cm	**7.4**
	Lowest point of large elongate dune swale - gradational	50 cm	**7.9**
	Lowest point of large elongate dune swale – white sands	100 cm	**8.4**
Site 4	Holocene Foredune	~250 cm	**8.0**
Site 5	Course quartz rich sands (rocky base)	30 cm	**8.2**
	Course quartz rich sands	45 cm	**8.3**
Site 6	Main Pit profile – Upper sand unit	60 cm	**8.5**
	Main Pit profile – Paleosol 1	100 cm	**8.2**
	Main Pit profile – Middle sand unit	120 cm	**8.3**
	Main Pit profile – Paleosol 2	270 cm	**7.8**
	Main Pit profile – Lower sand unit (dating sample site)	430 cm	**8.1**
Site 7	Holocene dune – Upper topsoil	15 cm	**8.3**
	Holocene dune – Gradational soil (A2)	60 cm	**8.3**
	Holocene dune – Lower yellow / white sands	95 cm	**8.6**
Site 8	Shallow limestone soil profile	30 cm	**8.1**
	Shallow limestone soil profile (rocky base)	50 cm	**8.1**

The high pH values obtained from the soil samples indicate an alkaline environment where extensive acidic soils are unlikely to be present. The reason for this is that the entire region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone. Low pH conditions are usually associated with deep organic soils or forested areas. While topsoil development is present within the dune fields, they are weakly developed and do not have a significant organic component capable of producing acidic soils, particularly in a carbonate dominated environment. This can be clearly seen by the gradation of pH in the site 3 dune swale samples (Table 2). Here weakly developed topsoil has a pH of 7.4 and pH rises to 7.9 at 50 cm and 8.4 in the white dune sands at >80 cm.

It is notable that although both the site 2 dark organic soil at 100 cm in South Curves Lagoon and the granite-derived soils at site 5 are in locations that should potentially have low pH soils at neither site do pH values drop below pH 7. This is due to the abundance of carbonate in the environment. The lack of deep well-developed topsoils indicate that since the dune formation wet forests or large eucalypt dominated forests may have never been present in this dry landscape. Although the Holocene dune (site 7) clearly shows a period of stability and soil development, the soil is thin and low in organic content. It is notable that at the main pit face (site 5) the two paleosols are also poorly developed and show very limited changes in pH. Previous eucalypt forest cover at these sites is unlikely.

5. SUMMARY AND MANAGEMENT RECOMMENDATIONS

SCIENTIFIC VALUES

The dune field within the study site is a landscape of geoscientific interest which can be and should be managed appropriately to limit the footprint of any extraction activities. The main dune resource identified for extraction under the current development application (not the entire mining lease) is actually a series of up to 8–10 dunes formed between South and North Curves lagoons mapped on the 1:25000 map sheets of the area. Two dune ridges rising to altitudes of around 24 m asl are dominant in the centre of the resource site. The dune ridges have steep profiles and sharp crests indicative of their fairly young age. A central deep elongate depression (mapped as a sinkhole on topographic maps) is a dune swale around 15 m deep. The large dunes and their lower-relief companions (generally 2–4 m high) are oriented west-to-east across the lowland plain. On the eastern margins of the study area they climb onto a bench of Tertiary limestone. The existing pit is near the easternmost end of the two main dunes which at this location have combined into one ridge.

The current face of the old pit provides an interesting profile of dune stratigraphy and is of local scientific interest as it provides evidence of the history of formation of the dunes in this part of Flinders Island and could potentially be used to indicate paleoclimate conditions prevalent on the Island. While this is an interesting exposure, many of the other unimpacted dunes in the region are likely to host similar paleosols and rhizoliths and therefore the features of the pit face are likely to be fairly common within the landscape. The exposure is only visible because of past sand mining operations and has been photographed, sampled and described during this study. Obscuring of the exposure by erosion and tree overturn means that this exposure has a limited lifetime; formal preservation of this site is likely to be impractical.

Resumption of sand mining extending west from the current pit face will destroy and remove the studied deposits but equally it is likely that the mining activities will expose further paleosols and tree root and stump rhizoliths in the sand dune. There is also a remote potential for archaeological deposits to be found within the dune particularly owing to its carbonate-rich nature which is conducive to preserving organic material such as bones (e.g. there is a possibility that large bones associated with megafauna could be exhumed as could ancient human remains or evidence of occupation (fire hearths etc)). Therefore, I suggest that contractors keep an eye out for unusual deposits or large bones during operations. In summary I recommend the following:

Contractors should look out for:

- Thick dark continous bands within the dunes.
- Buried tree stumps or large calcareous deposits that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.

- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under he surface.

In the event notable examples of these deposits are encountered the first task should be to photograph the area and move operations away from the immediate working face until a suitably qualified person (in the context of the item/items discovered) can assess any values.

KARST MANAGEMENT (GENERAL)

While bedrock Tertiary Limestone is present in the east of the mine lease no karst landforms apart from very minor surface solution sculpture (karren) landforms have been identified during this survey. Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of evidence for significant karst formulation of mitigation measures is unnecessary.

SINKHOLES

It is difficult to differentiate shallow sinkhole depressions from dune swales and this is particularly so in the area of the mining lease. However, all the depressions noted were identified as dune swales so I do not believe they should be treated as karst.

Collapse sinkholes form steep sided depressions and are a sign of significant active karst erosion. In the event a steep sided depression forms during operations work should stop at this location and the area should be avoided during operations until expert advice is obtained. Collapse sinkholes can occur in random locations and are potentially hazardous to machinery and the environment as they may continue to expand following the initial collapse and could indicate changes in subsurface karst aquifer conditions.

CAVES

While highly unlikely, if any caves are located within the sand dune or in the mining lease, operations should avoid the area, advice from a suitably qualified person should be obtained before operations resume.

Karst recommendations

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.
- In the event a cave is located on site operations should avoid the area and seek expert advice.

EROSION RISKS

Blowouts of the coastal dunes backing the beach are quite common within the mine lease area. However, away from the coast most of the larger dunes appear to be stable. The blowout on the southern edge of the pit face has resulted in minor sand deposition and tree burial south of the highest point of the dune (Image 19). The current location of the pit in the leeward side of the main dune reduces the ability of westerly winds to significantly erode the exposed sands in the pit through deflation, although some loss of sand by wind deflation is likely to have occurred (and may still be occurring). There is a risk that once the operations extend to more of a windward face of the dune, dominant westerly winds may deflate (erode) the dune. This could lead to loss of resource and transport of the sediment. Maintaining a high vegetation cover above the working face and active efforts to revegetate the site away from the working face are key to minimising wind erosion. While easterly winds are common on Flinders Island, they are generally less strong than the westerly winds as evidenced by the strongly deformed vegetation caused by westerlies present at exposed locations on the mining lease (Image 20). Also, easterly winds are generally linked to low pressure systems in the Tasman Sea and rainfall, the wet conditions act to stabilise sand dunes and inhibit wind deflation. Deflation of the sand towards the Marshall Beach Conservation area to west of the proposed pit appears to be unlikely.

Recommendations to minimise wind erosion.

- Avoid, if possible, but otherwise minimise working on faces exposed to westerly winds.
- Maintain vegetation above and to the west of any active face
- Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree for covering exposed surface as operations progress.

Image 19: Sand blow deposition burying tree trunks immediately south of the old working face of the sand pit.

Image 20: Vegetation growth strongly impacted by the dominant westerlies.

SOIL MANAGEMENT

Well drained soils in the area of the Markarna lime sands mining lease in the vicinity of the main proposed resource are strongly alkaline Calcarosols. Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried paleosols and lake/swamp sediments are present, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands. However, it should be noted that this survey was not comprehensive, and it is possible that the some swampy depressions could host thicker organic horizons having a lower pH. These horizons however will not be directly impacted by sand mining of the high-relief dune ridges.

WETLANDS

The extent of wetlands at both North and South Curves Lagoons are significantly smaller than indicated on the topographic map and the TASVEG mapping. Significant areas of these features are undulating grassy dune fields. No wetlands (swamps) as defined by the Forest Practices Code 2020 (Forest Practices Authority 2020, page 98) were documented in the main resource area.

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ATTACHMENT 5. SITE & SOIL EVALUATION AND DESIGN REPORT (WASTEWATER DISPOSAL)

Site & soil evaluation and design report.

New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site)

Richard Mason, Onsite Assessments Tas

20 Adelong Drive, Kingston

richardmason@iprimus.com.au

Mobile 0418 589309

BACKGROUND

The information provided in this Report provides Design Information, Plans and Specifications suitable for inclusion in supporting documentation for a Plumbing Permit for installation of an on-site wastewater management system servicing a new machinery shed proposed to support an existing agricultural operation and proposed sand mining development on the site.

Part 1. Site and soil evaluation (S&SE)

Location: 368 Five Mile Jim Road, Memana, TAS 7255 (Sand mine - Southern site)

Developer: Markarna Grazing Company Pty Ltd

PID: 3513143

Title Ref: 215120/1

Project Summary: New on-site wastewater management system to treat and apply wastewater derived from workforce toilets and ablution facilities.

This assessment is for a machinery shed with cribroom and sanitary/ablution facilities located 220m to the East of Palana Road, at 39°56'25"S 147°54'45"E .

The building will service an expanded sand mine on the site.

It is proposed to install a septic tank absorption bed discharging to an in-ground absorption bed.

Soil profile sampling and assessment was undertaken using a 350mm diameter tractor PTO driven auger.

Site Area: 200+Ha.

Dominant Soil Categories:

(as per AS/NZS 1547-2012) Modified Emerson Test Required? **No**

1,....2,...3,...4,....5,....6 If Yes, Emerson Class No:

Soil Profile:

A horizon: 0-1000mm; sand, yellow 10YR 7/6, loose, damp, massive, Category 1

B horizon: 1100-1200mm; consolidated sand (calcareous cement) sand, yellow 10YR 7/6, damp, massive, Category 1

C horizon: 1200-2000mm+, sand, yellow 10YR 7/6, loose, damp, massive, Category 1.

Evidence of ground water was not encountered; depth to water table is believed to exceed 4m.

Measured or Estimated Soil Permeability (m/d)

Estimated from textural classification.

A Horizon: >3.0mm/day

B Horizon: 0.12-0.5m/day

C Horizon: >3.0mm/day

Effluent Application Rates

Absorption trench/bed	–	20mm/day (primary treated) 50mm/day (secondary treated)

Geology:
The site is underlain by Quaternary deposits of windblown sand of marine origin (coastal sand dunes); this is consistent with soil profiles observed on-site.

The marine sands contain a high proportion of calcareous material (marine mollusc shell derived), which makes them attractive for extraction for agricultural usage, for soil pH modification.

Calcium carbonate from shell grit present in the wind-blown beach sand id subject to solution by rainwater and redeposition as a calcareous matrix, cementing sand grains together, forming discrete layers of hardpan, which is considerably less permeable than the unconsolidated sands.

This was encountered at a depth of 1100-1200mm; however, it is likely that this hard pan could be present at varying depths, therefore, soil profile modifications to ensure uniform permeability under the land application area basal area will be required. This will be achieved by excavating absorption beds to a minimum depth of 1500mm and backfilling with loose, unconsolidated sand, prior to installing the absorption bed infrastructure.

Topography

Slopes: Sand dune topography, undulating but uniform gentle slope of less than 2° to east, in vicinity of land application area.

Drainage lines / water courses:
Wetland in swale approximately 335m WNW of the development site.

Vegetation: The site in the vicinity of the proposed land application area comprises coastal heath described as SHW – Scrub, heathland and coastal complexes, by Tas Veg 3.0.

Site History (land use)
Subdivided and developed for agriculture several decades ago, including historical sand mining activities; there are no previous known land uses or other activities

which would compromise the suitability of the site for use for onsite wastewater management.

Site Exposure and Climate.

Aspect: The site has open northerly aspect, experiencing day-round sun throughout the year.

Pre-dominant wind direction: South-west to north-west.

Climate: Annual rainfall averages 740mm/year (Flinders Airport)), with maximum daily average temperature of 22.7ºC and minimum of 13.4ºC, giving an annual point potential evapotranspiration of 1000mm+ and an annual rainfall deficit of 300mm.

Environmental Issues

Location of sensitive vegetation, high water table, swamps, waterways etc.

Disturbed site with coastal heath vegetation; the land application area will lie within vegetation cleared and managed for bushfire protection purposes.

The buffer distance of 350m to the nearest saltmarsh/wetland is consistent with the Acceptable Solutions under the Director's Guidelines for on-site wastewater management systems, for separation from surface water for a land application area for primary treated effluent.

Shallow slopes, significant distance to downslope boundary mitigates against risk of off-site runoff in the event of inground absorption system failure.

Site Stability
The site is gently sloping and unaffected by any Landslip Hazard banding on the Interim Planning Scheme overlay.

Drainage/Groundwater

Depth to seasonal groundwater (m)
Groundwater depth is believed to exceed 4m; vertical separation from base of land application area is consistent with Acceptable Solutions for application of primary treated effluent under the Director's Guidelines.

The MRT Groundwater Information Access Portal at http://wrt.tas.gov.au/groundwater-info/ indicates that there are no known operating water bores within 1600m of the site.

Primary and Reserve Land Application Area
Primary and reserve land application area is to be located 6m west of the NW corner of the serviced building and 10m south of the extant access track which tuns north of the building.

Water Supply
Tankwater derived from roof runoff. Any boreholes utilised for potable water extraction should be located at least 75m from the land application area.

Modification to Development Application Supporting Information Report
The site plan shown at Page 17 of the above report by Van Diemen Consulting should be modified to show the drain along the northern edge of the site, terminating approximately 40m east of its westerly end point, in order to permit installation of the land application area cross-slope of the ablutions/crib room portion of the machinery shed.

Existing onsite wastewater management system.
Not applicable.

Part 2. Design of on-site wastewater management system.

Proposed On Site Wastewater Management System.
Suitable on-site wastewater management systems for this site would include a septic tank discharging to an in-ground absorption bed.

Loadings.
The on-site wastewater management system design caters for a daily design loading of up to 5 persons with a per capita loading of 40L/person/day.

Design hydraulic loading - 200L/day.

See “Staff ablutions, workplace installations” in Appendix E “On-site wastewater systems Code” Dept of Health & Ageing, Govt of South Australia.

The premises will be used during periods of sand extraction on the site; this is a sporadic activity with anticipated usage considered to be less than 26 weeks per year.

Design loadings are therefore highly conservative, with actual loadings anticipated as 20% or less, when averaged out through the year.

Wastewater characteristics
The wastewater discharge from the premises will be broadly similar to domestic wastewater; there will be no industrial or trade-waste discharge to the installation; this is consistent with Clause 1.2.1 of AS/NZS 1547:2012 Domestic on-site waste-water management.

DLR
A DLR of 20mm/day (Category 1 soil – conservative rate) is adopted.

Wastewater Land Application Area.

Absorption bed required basal area (minimum)

= daily wastewater loading / Design loading rate for bed/trench on Cat 1 soil

= 200 litres per day / 20mm day

= **10m²**

Design provides for an in-ground absorption bed 10m x 1.0m x 450mm deep, providing 2500mm vertical separation to groundwater.

Upslope drainage
Given the characteristics of the site, upslope cut-off drainage is not required, however, care should be taken to ensure that run-off from buildings, hard-standings, roads, rainwater tanks overflows etc do not discharge on or near to the septic tank land application area.

In particular, the proposed drain along the northern edge of the site, should be modified to terminate approximately 40m east of its westerly end point, in order to permit installation of the land application area cross-slope of the ablutions/crib room portion of the machinery shed.

Compliance with Directors Guidelines for On-Site Wastewater Management Systems (2017)

A modified onsite wastewater management system on this site can meet the requirements of the above Guidelines as follows:

Compliance Table	**Directors Guidelines for OSWM**	
Acceptable Solutions	Performance Criteria	Compliance achieved by
5.1 To ensure sufficient land is available for sustainable onsite wastewater management for buildings.		
A1 A new dwelling must be provided with a land application area that complies with Table 3.	P1 A new dwelling must be provided with a land application area that meets all of the following: a) The land application area is sized in accordance with the requirements of AS/NZS 1547; and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	N/A
5.2 To ensure sustainable onsite wastewater management for commercial and non-residential buildings (Class 3-9).		
A1 An onsite wastewater management system including the land application area for non-residential	P1 An onsite wastewater management system including the land application area for non-residential building must	A1(a) Land application area sized to 40L/person/day and

buildings must satisfy all of the following: (a) be sized based on the hydraulic and organic loadings contained in Table 4 and design loading or irrigation rates contained in AS/NZS 1547; (b) be located in accordance with clause 7.1	satisfy all of the following: a) A site and soil evaluation and design report prepared by a suitably person determined by the Director demonstrating that the land application area is of sufficient size to treat and manage the wastewater generated from the proposed building within the property boundaries. b) The SSE report and system design demonstrates the design is consistent with AS/NZS 1547 and uses appropriate hydraulic and organic loading rates for the proposed activity. c) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable. d) The land application area is to be located in accordance with the acceptable solution or performance criteria specified in clause 7.1.	15g/BOD/day and AS/NZS1547.2012 Table L1. A1(b) Land application area located in accordance with Acceptable Solution under Clause 7.1
6 Area required for on-site wastewater management – building extensions, alterations or outbuildings (Building Class 1-10)		
A2 An outbuilding, addition or alteration to an existing building, or change of use of that building, must not encroach onto or be within 2m (if upslope) or 6m (if downslope) of an existing land application area (including land reserved for a future land application area) or a wastewater treatment unit and comply with at least one of the following: a) not increase the number of bedrooms (or rooms reasonably capable of being used as a bedroom) or otherwise increase the potential volume of wastewater generated onsite; and b) not increase the number of bedrooms (or rooms reasonably capable of being used as a bedroom) or otherwise increase the potential volume of wastewater generated onsite to greater than that allowed for in the design of the existing OWMS.	P2 An outbuilding addition or alteration to an existing building or change of use of that building, must be provided with a land application area (including land reserved for a future land application area) that meets all of the following: a) The land application area is of sufficient size to comply with the either Appendix L, M or N and setback distances are consistent with Appendix R of AS/NZS 1547; and b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	N/A
7. Standards for Wastewater Land Application Areas		

A1 Horizontal separation distance from a building to a land application area must comply with one of the following: a) be no less than 6m; b) be no less than: (i) 3m from an upslope boundary or level building; (ii) If primary treated effluent to be no less than 4m plus 1m for every degree of average gradient from a downslope building; (iii) If secondary treated effluent and subsurface application, no less than 2m plus 0.25m for every degree of average gradient from a downslope building.	P1 The land application area is located so that the risk of wastewater reducing the bearing capacity of a building's foundations is acceptably low.	P1 Land application area setback from building is 15m.
A2 Horizontal separation distance from downslope surface water to a land application area must comply with (a) or (b) (a) be no less than 100m; or (b) be no less than the following: (i) if primary treated effluent 15m plus 7m for every degree of average gradient to downslope surface water; or (ii) if secondary treated effluent and subsurface application, 15m plus 2m for every degree of average gradient to down slope surface water.	P2 Horizontal separation distance from downslope surface water to a land application area must comply with all of the following: a) Setbacks must be consistent with AS/NZS 1547 Appendix R; b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	A2(a) Land application area is 350m from nearest surface water.
A3 Horizontal separation distance from a property boundary to a land application area must comply with either of the following: (a) be no less than 40m from a property boundary; or (b) be no less than: (i) 1.5m from an upslope or level property boundary; and (ii) If primary treated effluent 2m for every degree of average gradient from a downslope property boundary; or (iii) If secondary treated effluent and subsurface application, 1.5m plus 1m for every degree of average gradient from a downslope property boundary.	P3 Horizontal separation distance from a property boundary to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment in accordance with Appendix A of AS/NZS 1547 has been completed that demonstrates that the risk is acceptable.	A3(b)(i) 90m from eastern (cross-slope) boundary,
A4 Horizontal separation distance from a downslope bore, well or similar	P4 Horizontal separation distance from a downslope bore, well or similar	A4 No known bore within 1600m of land

water supply to a land application area must be no less than 50m and not be within the zone of influence of the bore whether up or down gradient.	water supply to a land application area must comply with all of the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 demonstrates that the risk is acceptable.	application area.
A5 Vertical separation distance between groundwater and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.6m if secondary treated effluent	P5 Vertical separation distance between groundwater and a land application area must comply with the following: (a) Setback must be consistent with AS/NZS 1547 Appendix R; and (b) A risk assessment completed in accordance with Appendix A of AS/NZS 1547 that demonstrates that the risk is acceptable	A5(a) 3500mm+ separation to groundwater.
A6 Vertical separation distance between a limiting layer and a land application area must be no less than: (a) 1.5m if primary treated effluent; or (b) 0.5m if secondary treated effluent	P6 Vertical setback must be consistent with AS/NZS1547 Appendix R.	A6(a) At least 3500mm separation.
A7 Nil	P7 A wastewater treatment unit must be located a sufficient distance from buildings or neighbouring properties so that emissions (odour, noise or aerosols) from the unit do not create an environmental nuisance to the residents of those properties Note: Part 6 of the Building Act 2016 specifies	P7 Septic tanks do not cause odour or other nuisances under normal operation.

Date of Site Visit: 25/05/2022

<u>Weather Conditions</u>:
(on the day of evaluation and during the last week)
Cool and fine, 75mm of rain fell at Flinders Island Airport since 01/05/2022.

Further Information.

For further detailed assessment and design information, together with operation and maintenance advice, please refer to the Appendices.

Statement.

I certify that this Site and Soil Evaluation and Design for an on-site wastewater management system at 368 Five Mile Jim Road, Memana (Sand mine - Southern site), has been has been undertaken in accordance with the relevant provisions of AS/NZS 1547:2012. Onsite Domestic Wastewater Management and also the requirements of the Director of Building's Guidelines for On-site Wastewater Management Systems and is therefore compliant with the deemed to satisfy requirements of the NCC Vol 3.

The design of this on-site wastewater system is suitable for the proposed residence referred to in this report.

This report is copyrighted to me as the author. I authorise Markarna Grazing Company Pty Ltd, Flinders Island Council and their respective agents and/or employees to make copies or extracts of this report for the purposes of Planning and/or Building Applications etc for the above-mentioned project on this site by or on behalf of Markarna Grazing Company Pty Ltd. It is not to be otherwise published or reproduced for the benefit of third parties without my explicit permission as author.

Please Note:
It is generally understood that the successful operation of an on-site wastewater disposal system is dependent upon a number of complex, interacting factors and that the operating life of in-ground absorption systems in particular may be limited. This system may require future maintenance or modification to ensure its continued satisfactory operation. The client is advised that such works are the responsibility of the property owner.

CONDITIONS OF INVESTIGATION

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This report should not be used for submission for Building or Development Application until OAT has been paid in full for its production. OAT accepts no liability for the contents of this report until full payment has been received.

The results & interpretation of conditions presented in this report are current at the time of the investigation only. The investigation has been conducted in accordance with the specific client's requirements &/or with their servants or agent's instructions.

This report contains observations & interpretations based often on limited subsurface evaluation. Where interpretative information or evaluation has been reported, this information has been identified accordingly & is presented based on professional judgement. OAT does not accept responsibility for variations between interpreted conditions & those that may be subsequently revealed by whatever means.

Due to the possibility of variation in subsurface conditions & materials, the characteristics of materials can vary between sample & observation sites. OAT takes no responsibility for changed or unexpected variations in ground conditions that may affect any aspect of the project. The classifications in this report are based on samples taken from specific sites. The information is not transferable to different sites, no matter how close (ie if the development site is moved from the original assessment site an additional assessment will be required).

It is recommended to notify the author should it be revealed that the sub-surface conditions differ from those presented in this report, so additional assessment & advice may be provided.

Investigations are conducted to standards outlined in relevant Australian Standards, codes and guidelines, including:

- AS1547-2012: Onsite Domestic Wastewater Management
- AS3959.2009: Construction of Buildings in Bushfire Prone Areas
- Director's Guidelines for on-site wastewater management systems. (CBOS)
- Director's Determination – Requirements for Building in Bushfire-Prone Areas. (CBOS)

All new developments should subject to strict site maintenance. Attention is drawn to the relevant appendices of this report.

Any assessment that has included an onsite wastewater system design will require a further site visit once the system has been installed if certification of an installation/works is required (to verify that the system has been installed as per OAT's design). An additional fee may apply for the site visit & issuing the certificate.

OAT is not responsible for the correct installation of wastewater systems. Any wastewater installation is the sole responsibility of the owner/agent and certified plumber. Any variation to the wastewater design must be approved by OAT, and an amended Special Plumbing Permit obtained, if required from the relevant council. The registered plumber must obtain a copy and carefully follow the details in the council issued Plumbing Permit. Certification of completion of works will be based on surface visual inspection only, to verify the location of the system. All underground plumbing works are the responsibility of the certified plumber.

Copyright: The concepts & information contained in this report are the Copyright of Onsite Assessments Tas.

SITE ASSESSOR AND SYSTEM DESIGNER

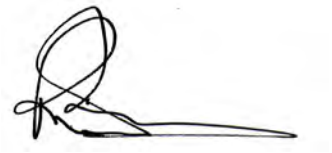
NAME: Richard Mason, Environmental Health Professional and Building Services Designer Hydraulic Restricted.

NAME OF ORGANISATION: Onsite Assessments Tas

ADDRESS: 20 Adelong Drive, Kingston, Tasmania, 7050

CONTACT DETAILS: 0418 589 309; richardmason@iprimus.com.au

SIGNED:



DATED: 22/08/2022

APPENDICES

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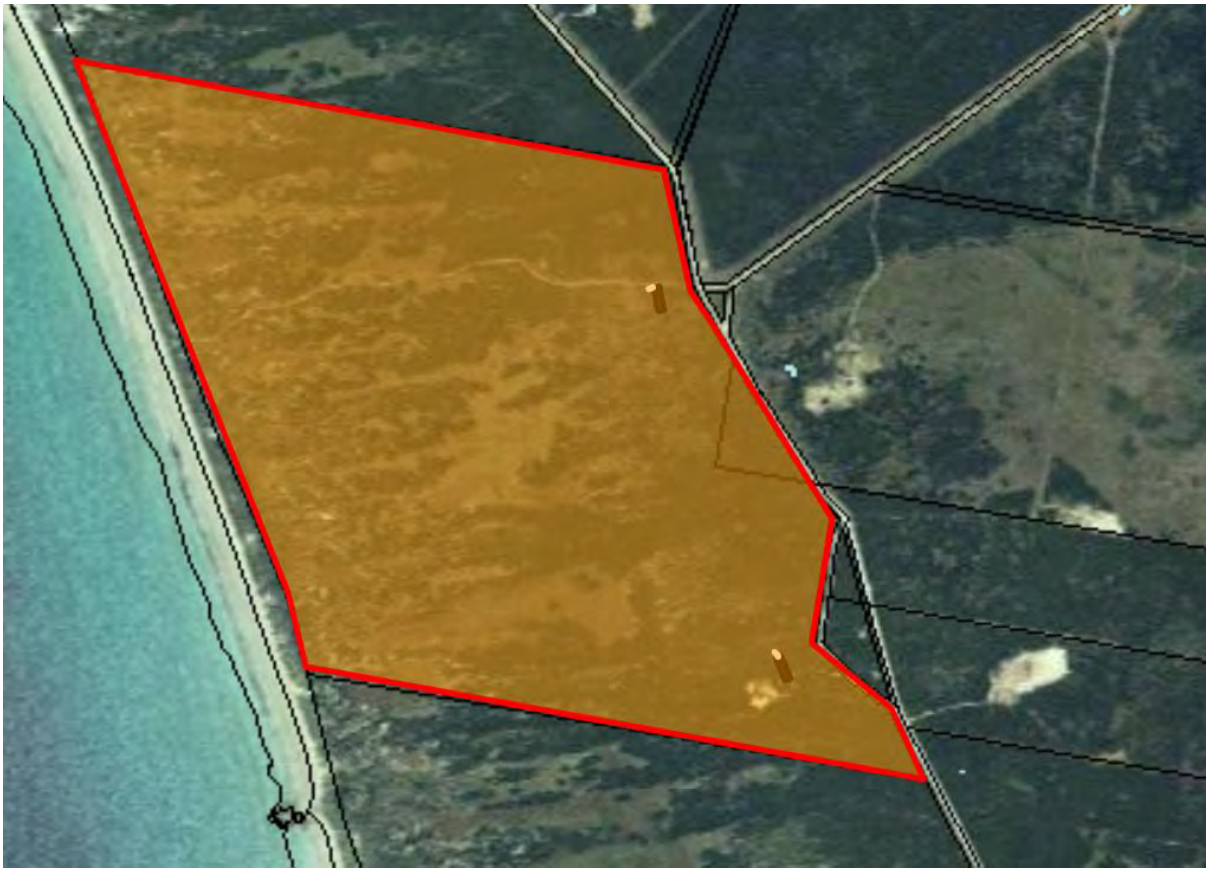
Appendix 1 - Site Location

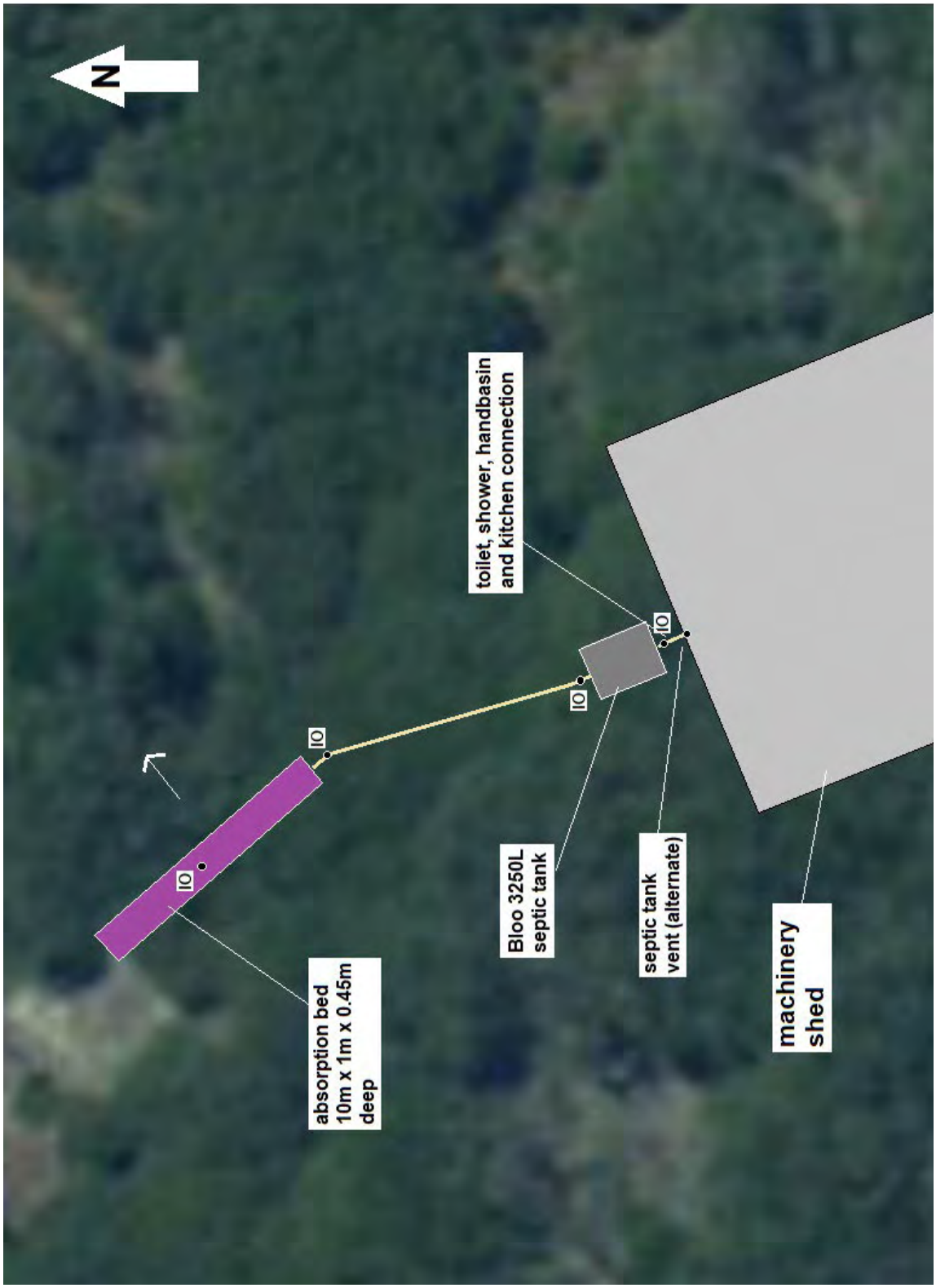


Appendix 2 – Soil testing

(above) Soil profile samples on auger.

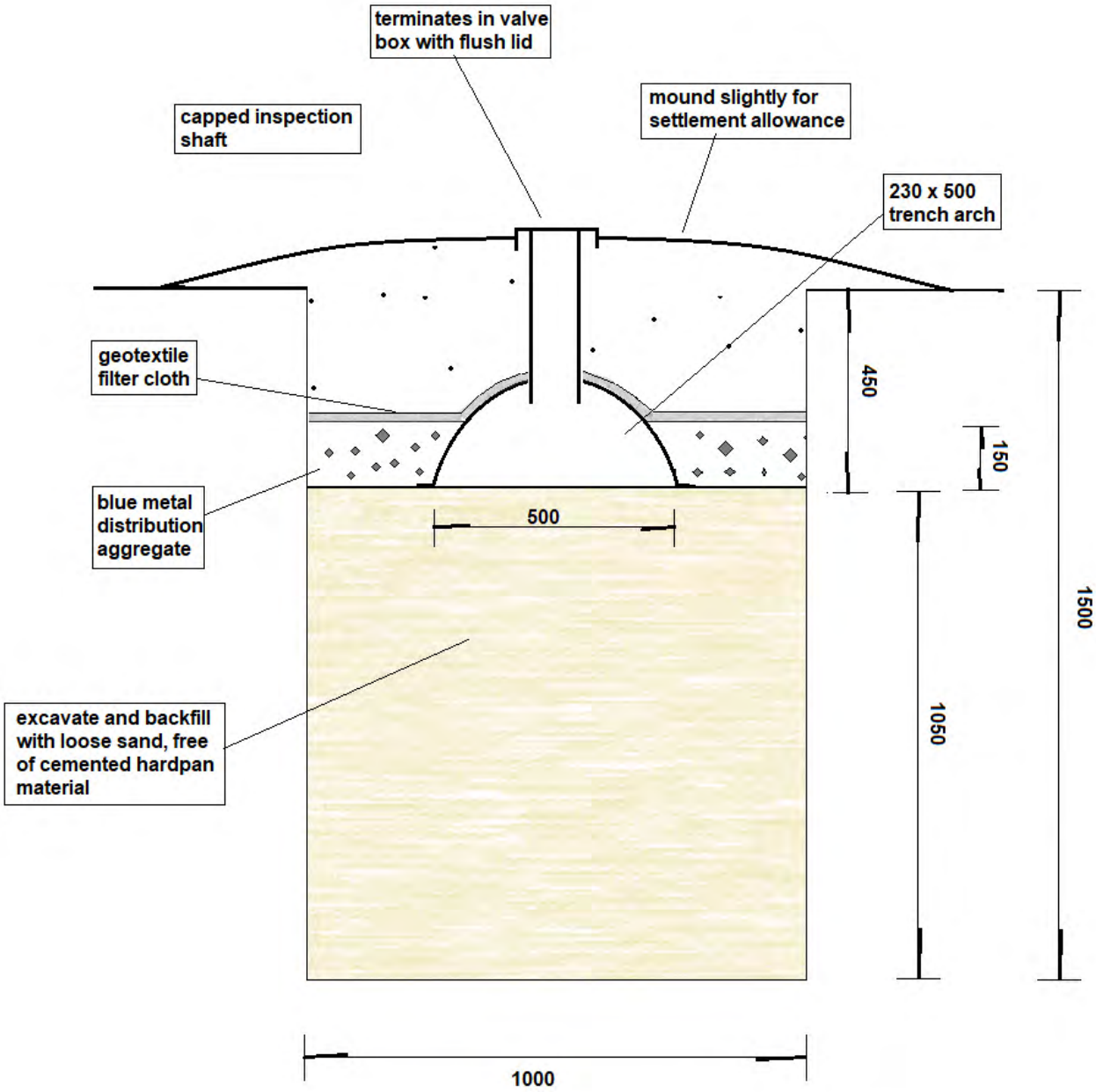
Appendix 3 – Design plans

Site Plan



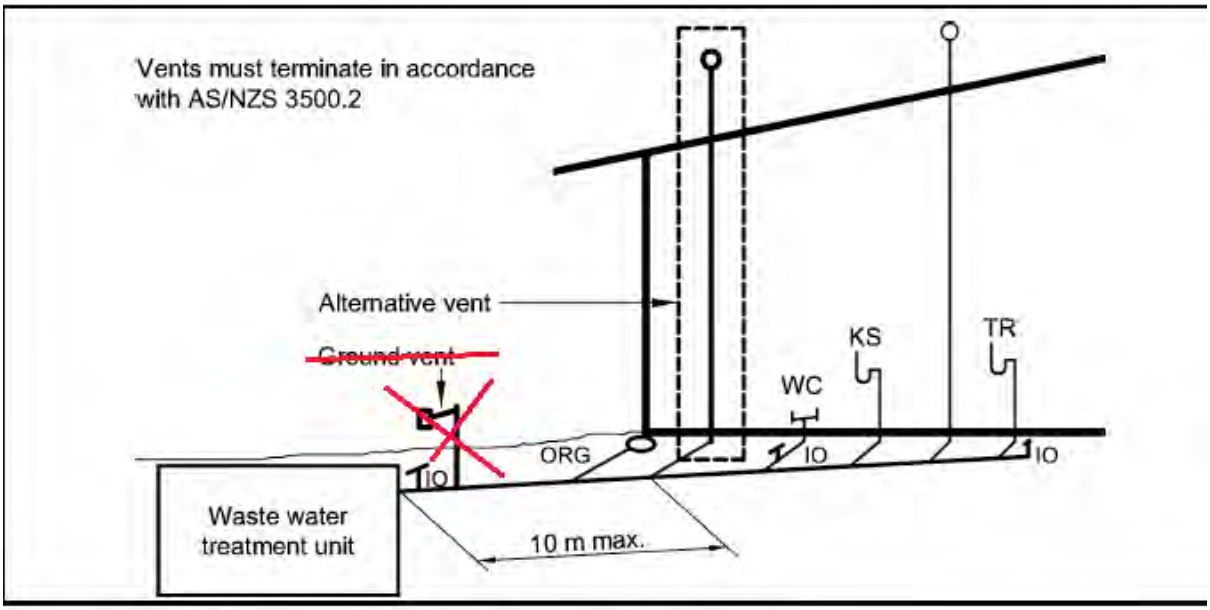
Drainage plan

Please note: Drain along northern boundary of parking area in Development Proposal Additional Information Report by Van Diemen Consulting is to terminate 40m to the East, well clear of the land application area.



Cross-section through proposed absorption bed (10m x 1.0m)

Note: Installation and venting to be in accordance with NCC Pt 3, Tas H101.2 and Tas Figure H101.2 and Parts C1 and C2



Tas Figure H101.2 Alternative venting arrangements

Please note: A septic tank ground level vent must not be installed

Septic tank venting detail – alternative vent configuration to be used to minimise odour impacts.

Appendix 4 – Design specifications.

Wastewater treatment.

- 3250L Bloo septic tank to be installed, receiving all wastes from toilet, handbasins, sinks etc.

- Septic tank outlet to discharge to land application area configured as in-ground absorption bed.

New absorption bed

- Single absorption bed, 10m long x 1.0m wide x 450mm deep.

- 500mm x 230mm high trench arch, 150mm depth of 20mm diameter blue metal distribution aggregate with geotextile filter cloth over, backfilled with sandy fill sourced on site.

- The land application area is to be excavated to a minimum depth of 1500mm and back-filled with clean, loose sand, free of hard pan or other cemented material, to a depth of 450mm of the surface.

- Capped IO to be provided and brought to surface midway along absorption bed, penetrating to full depth of bed with several 8mm perforations in lower 100mm to enable monitoring of wastewater depth in absorption bed.

Exclusion of surface/stormwater

- Cut-off drains are not required; however, care should be taken to ensure that run-off from buildings, hard-standings, roads, rainwater tanks overflows etc do not discharge on or near to the septic tank land application area.

- Drain along northern boundary of parking area in Development Proposal Additional Information Report by Van Diemen Consulting is to terminate 40m to the East, well clear of the land application area.

Attention is drawn to AS/NZS1547.2012 On-site domestic wastewater management, Part L7 Construction techniques which states the following:

L7 CONSTRUCTION TECHNIQUES

L7.1 Good construction technique
The following excavation techniques shall be observed so as to minimise the risk of damage to the soil:

- Plan to excavate only when the weather is fine;

- Avoid excavation when the soil has a moisture content above the plastic limit. This can be tested by seeing if the soil forms a ‘wire’ when rolled between the palms;

(c) During wet seasons or when construction cannot be delayed until the weather becomes fine,
smeared soil surfaces may be raked to reinstate a more natural soil surface, taking care to use
fine tines and only at the surface;

(d) When excavating by machine, fit the bucket with ‘raker teeth’ if possible, and excavate in small
‘bites’ to minimise compaction; and

(e) Avoid compaction by keeping people off the finished trench or bed floor.

In particular for trenches and beds:

(f) If rain is forecast then cover any open trenches, to protect them from rain damage;

(g) Excavate perpendicular to the line of fall or parallel to the contour of sloping ground; and

(h) Ensure that the inverts are horizontal.

CL7.1
Damage can be done by:
(a) Smearing, where the soil surface is smoothed, filling cracks and pores;

(b) Compacting, where the soil porosity is reduced; and

(c) Puddling, where washed clay settles on the base of the trench to form a relatively impermeable layer.

In particular, cohesive soils, or soils containing a significant quantity of clay, are susceptible to damage by excavation equipment during construction.

Appendix 5 – Advice to Project manager and installer

Important notes for Project Manager.

It is vitally important to the future of the on-site wastewater management system to avoid damage to soil structure on the site, which would reduce soil permeability, leading to possible early failure of the effluent absorption trenches.

Actions which may damage soil structure include:

- Compaction, which reduces soil porosity;

The Effluent Land Application Area must be carefully constructed to ensure its optimal operation.

Project Manager Responsibilities.

The Project Manager must ensure that:

- Before project construction work commences, the Effluent Absorption Area is properly identified on site and barricaded, fenced, roped or taped to prevent unauthorised access. This action should be documented both on the site plan and with the local Council.

- Vehicles, earth-moving plant etc do not park or manoeuvre on the Effluent Absorption Area.

- The Effluent Absorption Area is not used for the stockpiling of construction materials, excavated fill or other materials.

- All water runoff resulting from the construction of driveways, cut & fill and other excavations is directed to discharge well away from and downslope of the Effluent Absorption Area.

- The effluent absorption bed excavations etc are not left open and exposed to the weather.

Appendix 6 – Loading Certificate and Operation & Maintenance Requirements

This loading certificate is provided in accordance with Clause 7.4.2(d) of AS/NZS 1547.2012.

Loading Certificate for on-site wastewater management system at 368 Five Mile Jim Road, Memana.

i. **System capacity** (medium-long term) – up to 5 employees
ii. **Design criteria summary**:

- Effluent quality – septic tank, primary treated with septic tank outlet filter fitted.
- Soil category - Category 1 (and)
- Land application system - Absorption bed (see Appendix L of AS/NZS1547.2012)

iii. Reserve area.

Approximately 40m^2 of land in the vicinity of the proposed primary land application area should be reserved from further development (such as buildings, driveway, paths, paved areas, decks, importation of fill or excavations etc), for use as an alternate land application area in the event of a system failure which cannot be addressed without constructing a duplicate absorption bed. There is sufficient suitably located land available on the site for this purpose.

iv. Water efficient fittings etc

Design assumes use of water efficient fixtures and fittings, eg 3L/4.5L flush toilets, 9L/min (max) showerheads, aerator fittings on taps and clothes washing machines/dishwashers with WELSS star ratings of 4.5 stars or above. (See http://www.waterrating.gov.au/)

v. Variation from design flows etc.

The system should successfully manage additional peak loadings which may result from up to 10 workers on the site provided that this does not exceed 5 days in any 20 day period.

vi. Consequences of changing wastewater characteristics.

The building operator should avoid disposing of wastes which would be additional to those normally disposed in a household sewerage system; in particular increases, in organic loadings such as from the use of sink-waste disposal units are to be avoided.

Use of household disinfectants or bactericides in anything more than small amounts and at recommended rates of dilution should also be avoided, as should the disposal of solvents, antibiotics or antimicrobial pharmaceuticals and other chemicals which may kill bacteria and other microorganisms required for effective wastewater treatment.

vii. Consequences of overloading the system.

Long term use by more than four residents or equivalent may cause overloading of the system, surfacing of effluent, public and environmental health nuisances, pollution of surface waters etc.

viii. Avoid overloading the system by observing the following:

Installation of water conserving fittings (eg dual flush 4.5:3 litre toilets; shower flow restrictors; aerator taps and water conserving automatic washing machine).

ix. Consequences of underloading the system.

Nil.

x. **Consequences of lack of operation, maintenance and monitoring attention.**

The septic tank system requires minimal intervention; however it is not a zero-maintenance system; it will require regular desludging of the septic tank and periodic monitoring of wastewater depth in the absorption bed area.

Consequences of failure to observe these requirements may include any or all of the following:

- Spread of infectious diseases to your family and neighbours.
- Breeding of mosquitos and attraction of flies and rodents.
- Nuisance and unpleasant odours.
- Pollution of waterways.
- Contamination of bores, wells and groundwater.
- Excessive and unsightly weed growth.
- Alteration of local ecology

Operation & Maintenance Requirements

- Ensure that the septic tank is desludged by an authorised contractor at five-yearly intervals. Failure to do this at the required frequency may result in carry-over of solids into the absorption bed, causing failure of the land application area, which may then require expensive reconstruction works.
- Discourage access by visitors or pets to the land application area.
- Livestock should not be allowed on or near the absorption bed; if such animals are kept, the land application area should be fenced off to prevent system damage and/or soil compaction.
- Do not allow vehicles on or near the land application area.
- Keep the surface and sub-surface cut-off drain above the land application area open and clear of debris to prevent rainwater flowing into the effluent absorption area.

- Problems can occur with systems which have not been properly maintained and where absorption areas have become blocked or clogged. The warning signs are obvious and include:

- Effluent absorption area is wet or soggy with wastewater ponding on the surface of the ground.
- “Sewage” smells near the absorption bed area.

Appendix 7 – Form 55

CERTIFICATE OF QUALIFIED PERSON – ASSESSABLE ITEM

Section 321

Form **55**

To: Markarna Grazing Company Pty Ltd (Owner /Agent)
Address:
Whitemark 7255 (Suburb/postcod:)

Qualified person details:

Qualified person: Richard Mason
Address: 20 Adelong Drive
Kingston 7050
Phone No. 0418589309
Fax No.
Licence No: CC6157T
Email address: richardmason@iprimus.com.au

Qualifications and Insurance details: BSc Env Sciences (Salford)

Environmental Health Professional

Prof Indemnity Insurance: Arch Insurance Policy No. P0021114PI2022AU0

(description from Column 3 of the Director of Building Control's Determination)

Speciality area of expertise: Site and soil evaluation and land application system design.

(description from Column 4 of the Director of Building Control's Determination)

Details of work:

Address: 368 Five Mile Jim Road
Memana 7255
Certificate of title No: 215120/1

The assessable item related to this certificate:

Onsite wastewater management – Site and soil evaluation for onsite wastewater management capability;

including:

Characterisation of wastewater and predicted hydraulic loadings.

Selection of onsite wastewater treatment system

Selection of land application area.

Determination of design loading rate.

(description of the assessable item being certified)
Assessable item includes –
- *a material;*
- *a design*
- *a form of construction*
- *a document*
- *testing of a component, building system or plumbing system*
- *an inspection, or assessment, performed*

Certificate details:

Certificate type: On-site wastewater management - Site and soil evaluation

(description from Column 1 of Schedule 1 of the Director of Building Control's Determination)

Director of Building Control – Date Approved 1 January 2017 — *Building Act 2016* - Approved Form No. 55

This certificate is in relation to the above assessable item, at any stage, as part of - *(tick one)*

building work, plumbing work or plumbing installation or demolition work: ✓

or

a building, temporary structure or plumbing installation: ☐

In issuing this certificate the following matters are relevant –

Documents:	AS/NZS 1547. 2012: On-site domestic-wastewater management.
Relevant calculations:	
References:	AS/NZS 1547.2012: Onsite Domestic Wastewater Management. Directors Guidelines for on-site wastewater management systems - CBOS - 2017

Substance of Certificate: *(what it is that is being certified)*

Site & soil evaluation and design report - New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site), TAS 7255, by Richard Mason, Onsite Assessments Tas, dated 22/08/2022.

Scope and/or Limitations

I certify the matters described in this certificate.

	Signed:	*Certificate No:*	*Date:*
Qualified person:		N/A	22/08/2022

Director of Building Control – Date Approved 1 January 2017 *Building Act 2016* - Approved Form No. 55

Appendix 8 – Form 35

CERTIFICATE OF THE RESPONSIBLE DESIGNER

Section 94
Section 106
Section 129
Section 155

Form **35**

To:	Markarna Grazing Company Pty Ltd	*Owner name*
		Address
	Whitemark 7255	*Suburb/postcode*

Designer details:

Name:	Richard Mason	Category:	Building Services Designer Hydraulic - Restricted
Business name:	Onsite Assessments Tas	Phone No:	0418 589 309
Business address:	20 Adelong Drive		
	Kingston 7050	Fax No:	
Licence No:	CC6157T	Email address:	richardmason@iprimus.com.au

Details of the proposed work:

Owner/Applicant	Markarna Grazing Company Pty Ltd	Designer's project reference No.	
Address:	368 Five Mile Jim Road	Lot No:	215120/1
	Memana 7255		

Type of work: Building work ☐ Plumbing work ☒ *(X all applicable)*

Description of work:

Onsite wastewater management system

(new building / alteration / addition / repair / removal / re-erection water / sewerage / stormwater / on-site wastewater management system / backflow prevention / other)

Description of the Design Work (Scope, limitations or exclusions): *(X all applicable certificates)*

Certificate Type:	**Certificate**	**Responsible Practitioner**
	☒ Hydraulic design	Building Services Designer
	☐ Other (specify)	

Deemed-to-Satisfy: ☒ Performance Solution: ☐ *(X the appropriate box)*

Other details:

On site wastewater management system servicing farm buildings.

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

Design documents provided:

The following documents are provided with this Certificate –

Document description:

Drawing numbers:	Prepared by:	Date:
Appendix 3	Richard Mason	22/08/2022
Schedules:	Prepared by: Richard Mason	Date:
Specifications: Appendix 4	Prepared by: Richard Mason	Date: 22/08/2022
Computations: pages 5-6	Prepared by: Richard Mason	Date: 22/08/2022
Performance solution proposals:	Prepared by:	Date:
Test reports:	Prepared by:	Date:

Standards, codes or guidelines relied on in design process:

AS/NZS1547.2012 On site domestic waste water management

NCC Part 3

Director's Guidelines for On-site Wastewater Management Systems, Director of Building Control (Tasmania).

Any other relevant documentation:

Site & soil evaluation and design report - New onsite wastewater management system at "Markana Park," 368 Five Mile Jim Road, Memana TAS 7255. (Sand mine - Southern site), TAS 7255, by Richard Mason, Onsite Assessments Tas, dated 22/08/2022.

Form 55 dated 22/08/2022 certifying Site & Soil Evaluation and design report.

Attribution as designer:

I Richard Mason ..... am responsible for the design of that part of the work as described in this certificate;

The documentation relating to the design includes sufficient information for the assessment of the work in accordance with the *Building Act 2016* and sufficient detail for the builder or plumber to carry out the work in accordance with the documents and the Act;

This certificate confirms compliance and is evidence of suitability of this design with the requirements of the National Construction Code.

	Name: (print)	*Signed*	*Date*
Designer:	Richard Mason		22/08/2022
Licence No:	CC6157T		

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

Assessment of Certifiable Works: (TasWater)

Note: single residential dwellings and outbuildings on a lot with an existing sewer connection are not considered to increase demand and are not certifiable.

If you cannot check ALL of these boxes, LEAVE THIS SECTION BLANK.

TasWater must then be contacted to determine if the proposed works are Certifiable Works.

I confirm that the proposed works are not Certifiable Works, in accordance with the Guidelines for TasWater CCW Assessments, by virtue that all of the following are satisfied:

- [X] The works will not increase the demand for water supplied by TasWater
- [X] The works will not increase or decrease the amount of sewage or toxins that is to be removed by, or discharged into, TasWater's sewerage infrastructure
- [X] The works will not require a new connection, or a modification to an existing connection, to be made to TasWater's infrastructure
- [X] The works will not damage or interfere with TasWater's works
- [X] The works will not adversely affect TasWater's operations
- [X] The work are not within 2m of TasWater's infrastructure and are outside any TasWater easement
- [X] I have checked the LISTMap to confirm the location of TasWater infrastructure
- [X] If the property is connected to TasWater's water system, a water meter is in place, or has been applied for to TasWater.

Certification:

I Richard Mason being responsible for the proposed work, am satisfied that the works described above are not Certifiable Works, as defined within the *Water and Sewerage Industry Act 2008*, that I have answered the above questions with all due diligence and have read and understood the Guidelines for TasWater CCW Assessments.

Note: the Guidelines for TasWater Certification of Certifiable Works Assessments are available at: www.taswater.com.au

	Name: (print)	*Signed*	*Date*
Designer:	Richard Mason		22/08/2022

Director of Building Control - date approved: 2 August 2017 *Building Act 2016* - Approved Form No 35

ATTACHMENT 6. LAND HEIGHT SURVEY – COASTAL INUNDATION HAZARD

Annexure: 16.2.3

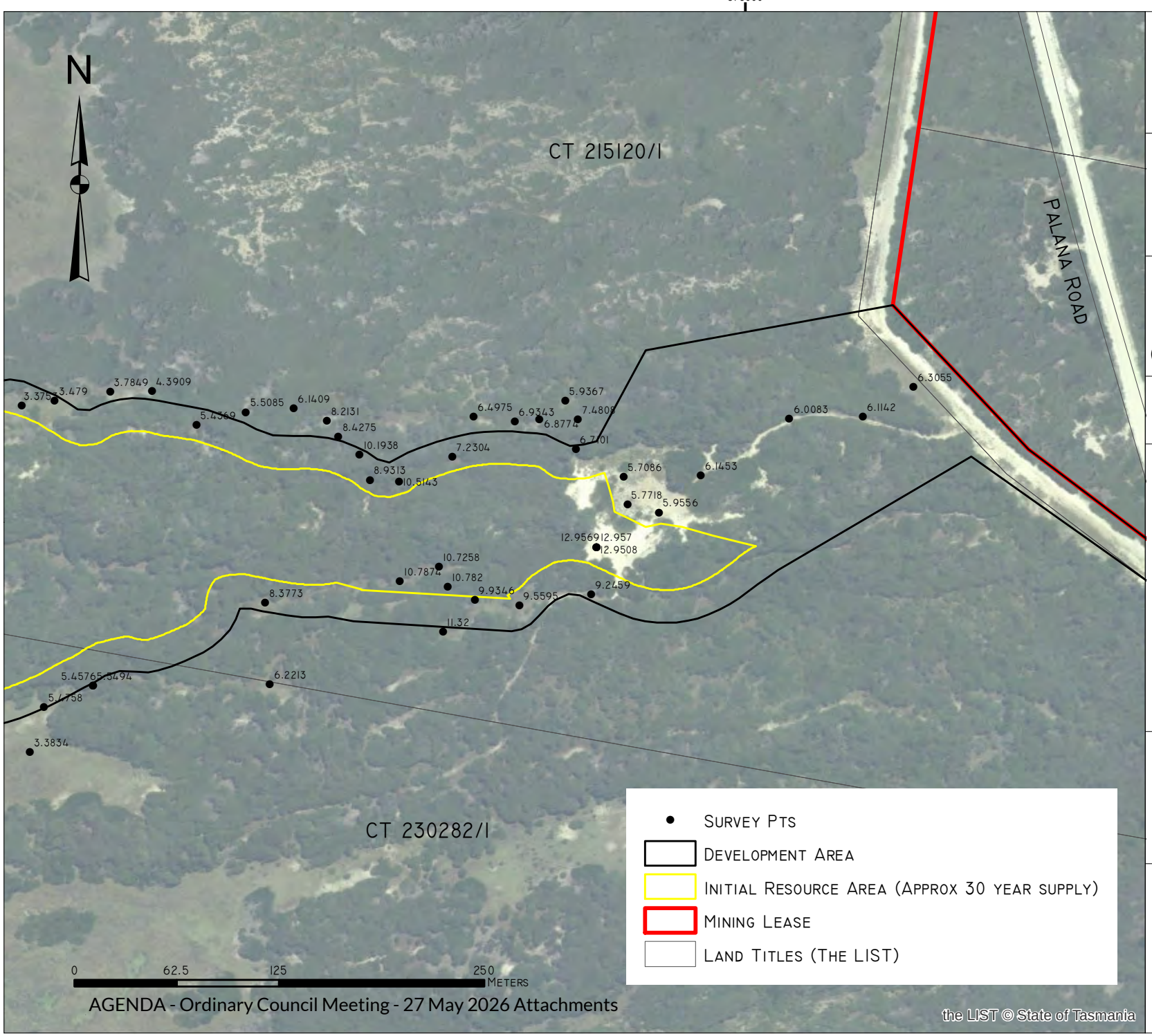
MARKARNA PARK PTY LTD

MARKARNA PARK SAND PIT

FIGURE 1: MARKARNA PARK SAND PIT DEVELOPMENT HEIGHT SURVEY (MIN RECORDED HT 2.994 M AHD)

TASMAP:	LGA:
TANNER EMITA	FLINDERS

NOTE:
SURVEY FOCUSED ON LOW POINT WITHIN AND AROUND THE DEVELOPMENT AREA



BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE BY TASMAP. © STATE OF TASMANIA

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

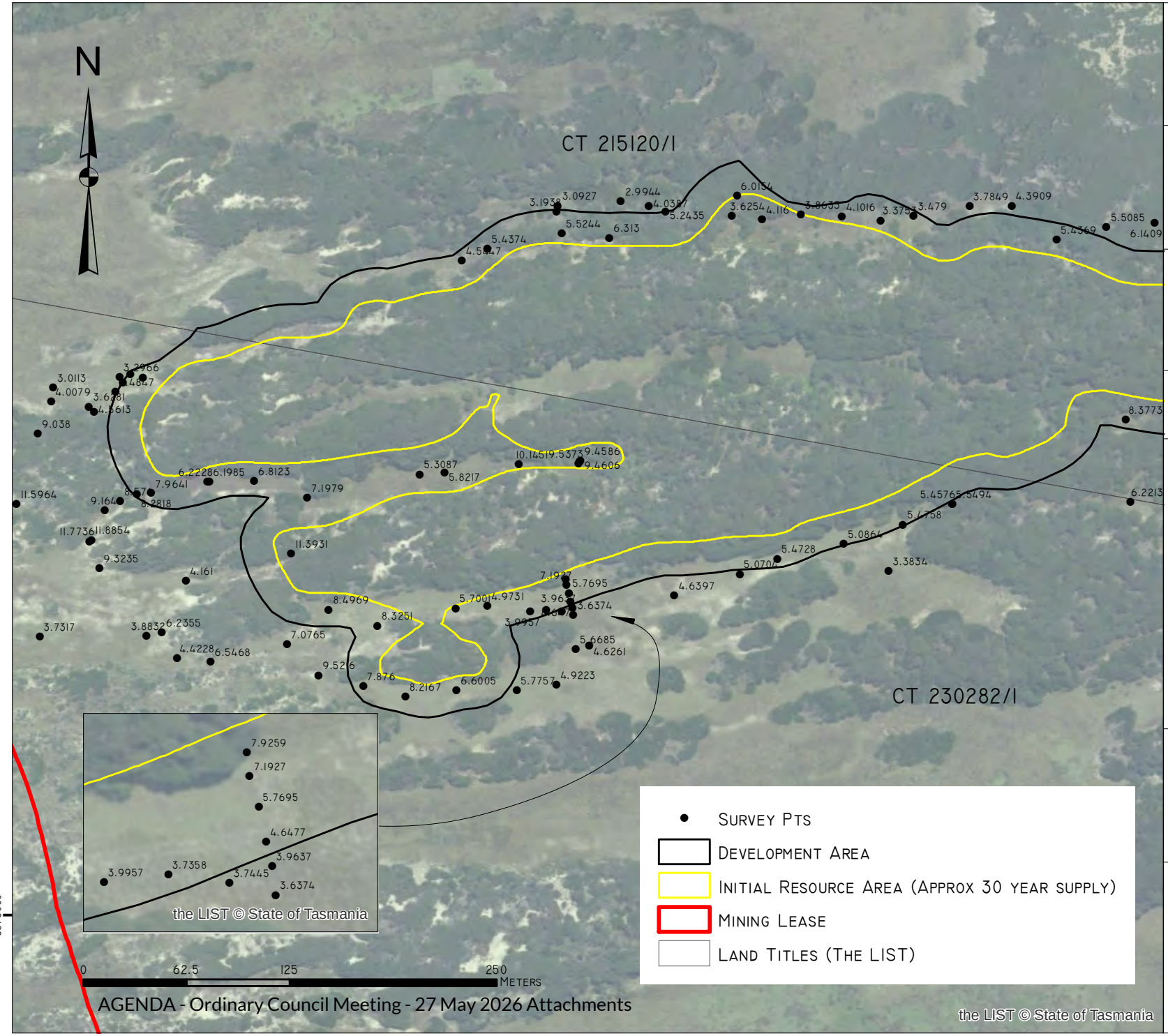
DATE: 16 JUNE 2023

Annexure: 16.2.3

MARKARNA PARK PTY LTD

MARKARNA PARK SAND PIT

FIGURE 2: MARKARNA PARK SAND PIT DEVELOPMENT HEIGHT SURVEY (MIN RECORDED HT 2.994 M AHD)



TASMAP:	LGA:
TANNER EMITA	FLINDERS

NOTE:
SURVEY FOCUSED ON LOW POINT WITHIN AND AROUND THE DEVELOPMENT AREA

BASE DATA BY TASMAP. © STATE OF TASMANIA
BASE IMAGE BY TASMAP. © STATE OF TASMANIA

Van Diemen CONSULTING
PO BOX 1 NEW TOWN TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 16 JUNE 2023

ATTACHMENT 7. STORMWATER MANAGEMENT AND SEDIMENT CONTROL MEASURES REPORT

MARSHALL SAND PIT, MEMANA

STORMWATER MANAGEMENT AND SEDIMENT CONTROL MEASURES ASSESSMENT REPORT

NOVEMBER 2024

Van Diemen CONSULTING PO BOX 1, NEW TOWN, TAS 7008

Van Diemen Consulting Pty Ltd

PO Box 1

New Town, Tasmania

T: 0438 588 695 E: rwbarnes73@gmail.com

This document has been prepared in accordance with the scope of services agreed upon between Van Diemen Consulting (VDC) and the Client. To the best of VDC's knowledge, the report presented herein represents the Client's intentions at the time of completing the document. However, the passage of time, manifestation of latent conditions or impacts of future events may result in changes to matters that are otherwise described in this document. In preparing this document VDC has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other individuals and organisations referenced herein. Except as otherwise stated in this document, VDC has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

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Document Status

REV	Author	Review	Date
1	S Ineshka	R Barnes	18.11.2024

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ACRONYMS

DNRET	Department of Natural Resources and Environment Tasmania
ASS	Acid Sulphate Soils
DPIPWE (now DNRET)	Department of Primary Industries, Parks, Water and Environment
EMPCA	the *Environmental Management and Pollution Control Act 1994*
EPA	Environment Protection Authority
LUPAA	the *Land Use Planning and Approvals Act 1993*
MRT	Mineral Resources Tasmania, within the Department of State Growth
MRDA	the *Mineral Resources Development Act 1995*
PASS	Potential Acid Sulphate Soils
QCP	the Tasmanian Quarry Code of Practice 2017 and includes any subsequent versions of this document.
VDC	Van Diemen Consulting Pty Ltd

GLOSSARY OF TERMS

(the) Report	Stormwater Management and Sediment Control Assessment Report at Marshall Sand Pit, Flinders Island
Acceptable Standard	Applied in the context of the Quarry Code of Practice which defines the term as: These are commonly agreed standards which will normally ensure that acceptable environmental performance is achieved. Where a specific issue requires attention at a quarry, the acceptable standard may be modified by the approval authority for inclusion in a Permit or Environment Protection Notice.
Bund	An earthen mound wall which may be used for noise attenuation or visual screens. Bunds may also be used to contain spillage of liquid materials. In the context of this document, a bund is a sloped embankment or bund constructed from earth designed to withhold, collect and/or direct/divert surface water flows.
Contour bank	An earth mound or similar, constructed approximately along the contour and which is designed to control and/or direct water run-off.
Contour drain	Drainage channel constructed approximately along the contour, and which is designed to permit the flow of water to a control feature/sediment trap on site.

Contractor	the entity/person contracted by the Proponent to operate/manage the quarry on their behalf
Cut-off drain	A ditch and earth bank constructed to prevent water from building up, for example, along a track, and allowing redirection of running water into surrounding areas.
Disturbed Area	Means the area of the Land disturbed by the operation of the quarry and includes roads, access tracks, bunds, sediment basins and other ancillary infrastructure.
IECA Guideline	International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guidelines 2008
Blue Book	Managing Urban Stormwater, Volume 1 – Soils and Construction, 4th Edition, March 2004 (Landcom 2004)
(the) Land	means the land on which the activity to which this document relates may be carried out and includes buildings and other structures permanently fixed to the land, any part of the land covered with water, and any water covering the land. The Land is the area defined by Mining Lease ML 2117 P/M
Mining Lease(s), ML	the Mining Lease 2117 P/M
Lessee	Markarna Grazing Company Pty Ltd
Pad Area	The gravel hardstand area where the shed is located and the Raw/Processed sand stockpiled
Pit	The area of the sand pit where extraction is occurring and is to occur and includes the Pad Area, internal roading to the working area and stockpiles. The Pit is generally devoid of vegetation and topsoil.
Rehabilitated	the **result** of Rehabilitation; a Disturbed Area deemed to have to a self-sustaining, stable, and non-polluting state, which is suitable for the proposed future land.
Rehabilitation	the **process** that encompasses all those measures which seek to repair disturbed or degraded land, and to return such land to a self-sustaining, stable, and non-polluting state, which is suitable for the proposed future land.
Sediment Basin	A dam (basin) used to capture and retain sediment-laden runoff from a land disturbance primarily through the actions of sedimentation.
stormwater	means water traversing the surface of The Land because of rainfall falling onto pervious and impervious surfaces
watercourse	a natural depression carrying perennial or intermittent flows of surface water for part or all of the year in most years. Consisting of a defined channel, with banks and a bed along which water may flow.

1. BACKGROUND

1.1. Introduction

The purpose of this Report is to assess proposed stormwater and sediment control measures at Marshall Sand Pit located at 368 Five Mile Jim Road, Memana TAS 7255. The mining activities, including sand extraction and processing, can generate significant amounts of sediment and influence surface water runoff.

This assessment evaluates the current drainage patterns, sediment generation potential, and proposes new stormwater and sediment control measures tailored to the site's geological and operational conditions.

The Report recommend strategies to manage stormwater runoff, mitigate erosion, control sediment dispersion, and ensure compliance with local environmental regulations to minimize the impact of sand extraction operations on surrounding environment.

1.2. Proposed Activity

The proposed activity is to extract up to 10,000 cubic metres per annum of material.

The Pit is located on Palana Road, approximately 22 kilometre north of Flinders Island Airport.

Figure 1.1: Site Location

2. SITE CHARACTERISTICS AND ENVIRONMENTAL PARAMETERS

2.1. Site Geology and Soil Conditions

A detailed survey was undertaken in January 2024 by the Forest Practices Authority[1] of the geomorphology and soils present in the Pit area, and broader the Mining Lease.
A map extract from the FPA report is presented in **Figure 2.1.**

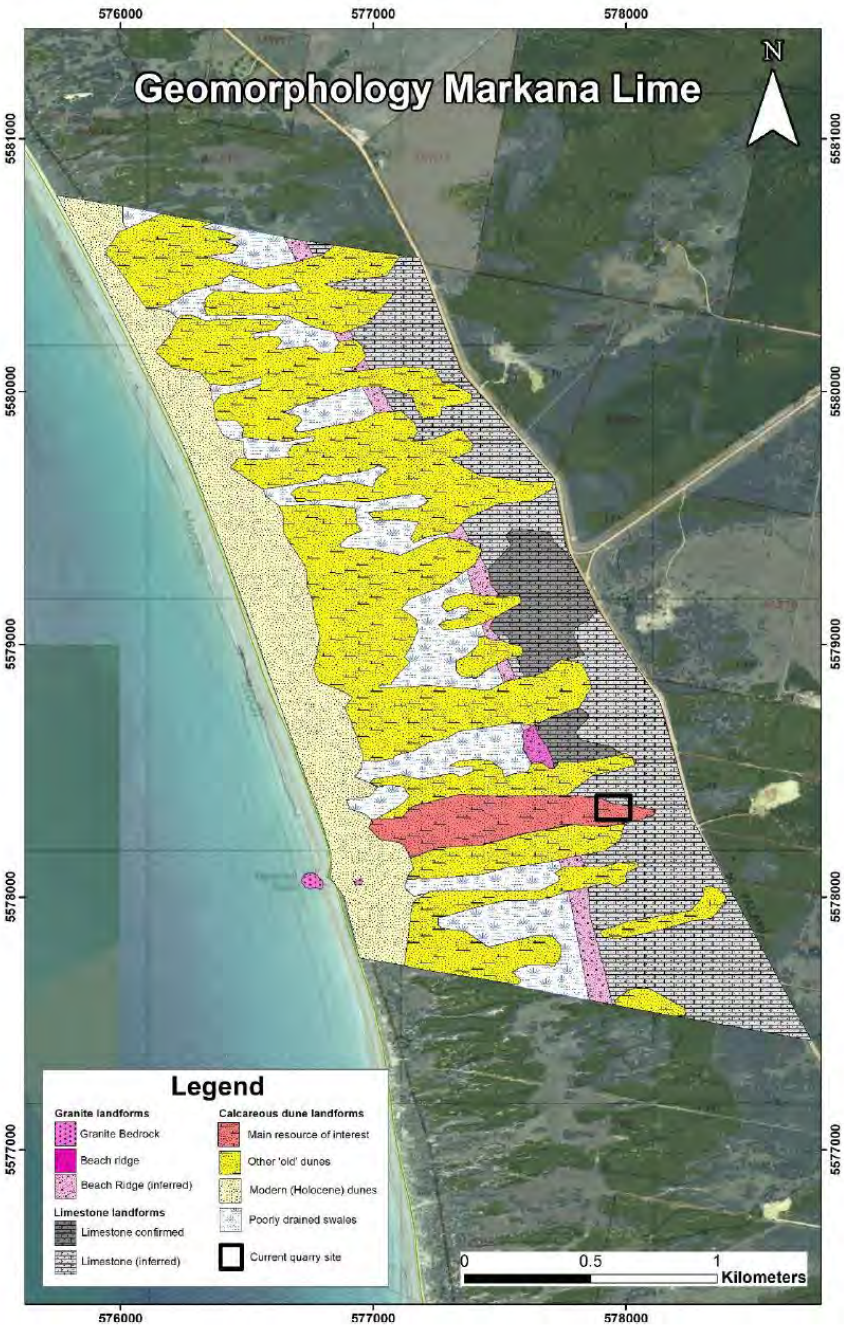


Figure 2.1: Geomorphology Summary Map from FPA (2024)

[1] SURVEY OF THE GEOMORPHOLOGY AND SOIL CHARACTERISTICS OF THE MARKARNA GRAZING COMPANY PTY LTD PROPERTY, MARSHALL BEACH, FLINDERS ISLAND. Dr Adrian Slee, Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000. January 2024.

The Mining Lease features extensive sand dunes, composed predominantly of fine-grained quartz and carbonate deposits. These dunes are a result of dynamic sedimentary processes, shaped by both wind and water. The top sand layer, particularly important for stormwater and sediment management, is characterised by its high permeability, which influences infiltration rates and stormwater runoff patterns.

2.1.1. Soil Hydrologic Group

Based on infiltration and permeability characteristics of soil, Both Blue Book and the IECA Guidelines group soils into four categorises because of their likely effect on the generation of runoff.

Group A	very low runoff potential. Water moves into and through these soil materials relatively quickly, when thoroughly wetted. Usually, they consist of deep (>1.0 metres), well-drained sandy loams, sands or gravels. They shed runoff only in extreme storm events.
Group B	low to moderate runoff potential. Water moves into and through these soil materials at a moderate rate when thoroughly wetted. Usually, they consist of moderately deep (>0.5 metres), well-drained soils with medium, loamy textures or clay loams with moderate structure. They shed runoff only infrequently.
Group C	soils with a low to moderate infiltration capacity. Usually consists of moderately fine clay loams, or loamy clays, or more porous soils that are impeded by poor surface conditions, shallow depth or a low porosity subsoil horizon.
Group D	Soils with a low porosity. Usually consists of fine-textured clays, soils with poor structure, surface-sealing (dispersive/sodic) soils, or expansive clays. Included in this group would be soils with a permanent high-water table.

Table 2.1: Soil Hydrologic Groups

For the purpose of this Report, the site was divided into three (03) zones based on their potential to runoff generation and sediment generation characteristics.

Sediment and Runoff generating zone	Description	Infiltration potential	Sediment Generation Potential	Soil Hydrologic Group
Type 01	Disturbed Areas - Most of the disturbed area will be associated with the Pit floor. Production stockpiles will also occupy this area for storage purposes.	Very High	Low to medium	A
Type 02	Undisturbed and Rehabilitated Areas - The sections of the land within the Mining Lease that have remained unaffected by extraction activities and areas which are rehabilitated using stored topsoil/overburden.	High	Low	B
Type 03	Pad Area - Gravel hardstand area where the shed is installed and the Raw/Processed sand stockpiled	Medium to Low	Low	C

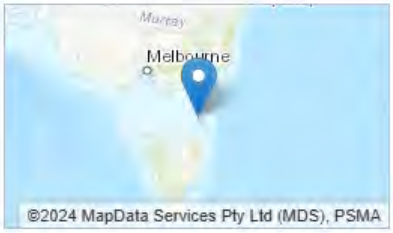
Table 2.2: Sediment and Runoff Generating Zones

2.2. Site specific Rainfall Data

Site specific rainfall intensity data was obtained from the Bureau of Meteorology's (BOM) rainfall Intensity-Frequency Duration (IFD) tables.

Location

Label: Marshall Sand Pit
Easting: 577928.126
Northing: 5578359.909
Zone: 55
Latitude: Nearest grid cell: 39.9375 (S)
Longitude: Nearest grid cell: 147.9125 (E)



IFD Design Rainfall Intensity (mm/h)

Issued: 13 November 2024

Rainfall intensity for Durations, Exceedance per Year (EY), and Annual Exceedance Probabilities (AEP).
FAQ for New ARR probability terminology

Table | Chart

Unit: mm/h

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	93.3	104	141	168	197	238	272
2 min	81.3	90.7	120	141	161	186	204
3 min	72.3	80.6	107	126	145	169	187
4 min	65.4	73.0	97.8	116	134	158	177
5 min	60.1	67.0	90.2	107	124	148	168
10 min	44.3	49.4	67.0	80.3	94.4	115	133
15 min	36.1	40.3	54.7	65.7	77.4	94.8	110
20 min	31.0	34.6	46.9	56.3	66.2	80.9	93.3
25 min	27.4	30.6	41.5	49.6	58.3	70.9	81.4
30 min	24.7	27.6	37.4	44.6	52.3	63.3	72.4

Figure 2.2: IFD Table

There are several BOM stations in the vicinity of Marshall Sand Pit which have historically collected rainfall accumulations. Data from following stations was assessed.

STATION NO.	STATION NAME	DISTANCE FROM THE SITE	YEARS OF DATA	5-DAY 80TH PERCENTILE DEPTH (mm)	5-DAY 85TH PERCENTILE DEPTH (mm)	5-DAY 90TH PERCENTILE DEPTH (mm)
099028	Wingaroo	3.4km	6	15.8	20.0	25.2
099005	Flinders Island Airport	18.5km	82	16.4	20.1	25.6
099019	Killiecrankie	12.5km	48	16.0	20.0	25.2

Table 2.3: BOM stations data

Rainfall data from the Flinders Island Airport station was considered for the calculation of total rainfall (mm) on site.

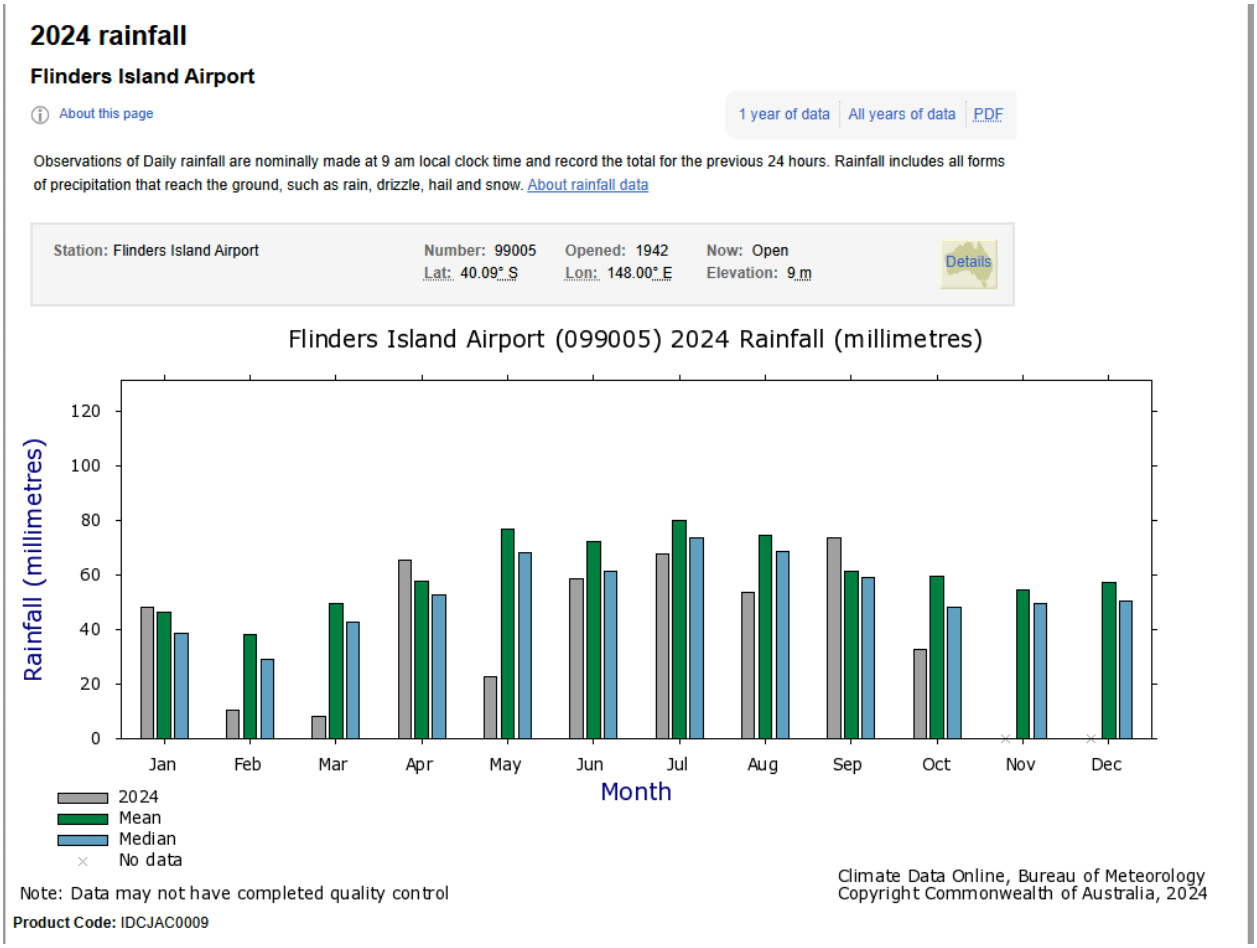


Figure 2.3: Rainfall (mm) data from Flinders Island Airport station

3. STORMWATER MANAGEMENT

3.1. Stormwater Management Principles

In the hierarchy of best practice, as depicted below, effective stormwater management takes precedence, followed by best erosion control practices, and then simply the enactment of sediment control practices. The highest performance of pollution prevention is via the implementation of an effective stormwater management system that integrates all elements; sediment, erosion, and stormwater.

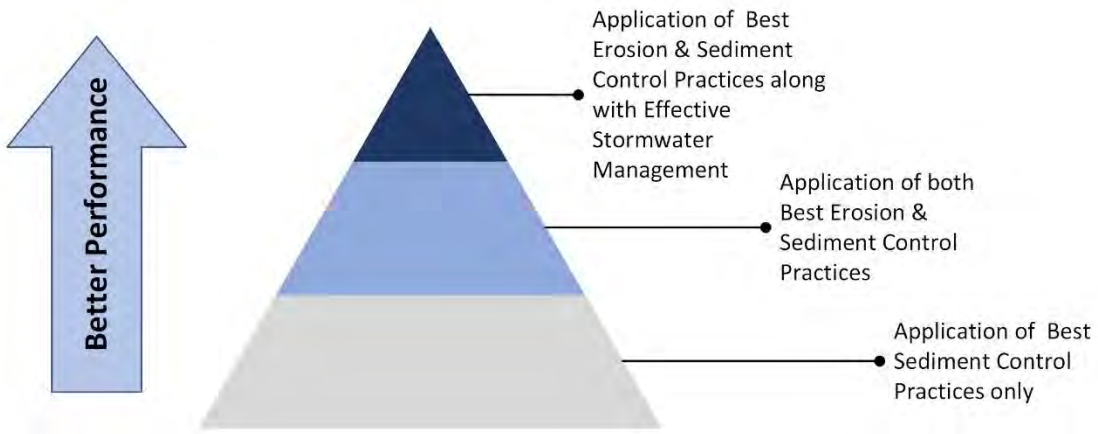


Figure 3.1: Hierarchy of Best Practice

The total Rainfall and subsequent on the Mining Lease will be managed using diversion channels, cutoff drains, and diversion banks.

It will be prioritised to divert any rainfall on undisturbed area to prevent entering in to disturbed areas; in effect, a perimeter or cut-off drain (or perimeter bund) which is standard practice for a sand pit. Rainfall on to disturbed areas will be directed into sediment ponds (using surface slope, bunds, drains, etc.), treated, subsequently reused and with any excess discharge into the environment.

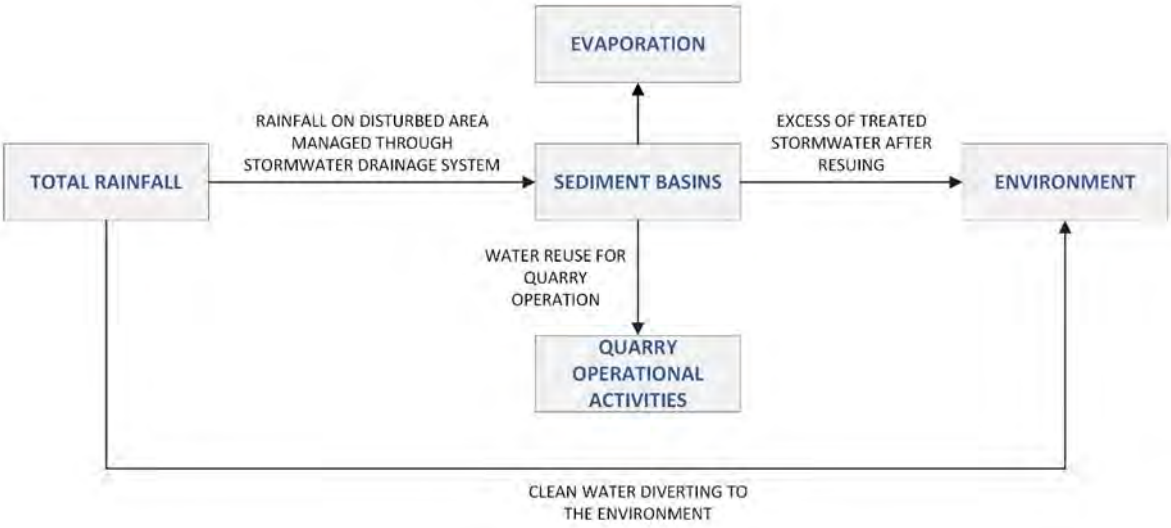


Figure 3.2: Stormwater Management Principles

3.2. Stormwater Management Structures Design Criteria

The stormwater management structures identified in this Report, including diversion channels and cut-off drains, have been designed to have sufficient capacity to contain runoff that could reasonably be expected to arise during a 1 in 20-year rainfall event.

Maximum channel flow rates are to be determined in accordance with Tables A23 to A28 in the Book 2 of IECA Guidelines to prevent erosion for various channel linings. For those cases where achieving the desirable flow velocity is unfeasible, a channel lining will need to be chosen based on site-specific conditions.

3.3. Estimated Peak Runoff Flow Rates

Rainfall falling onto the Extraction Zone will generally flow from the Sand pit into the drains as sheet flow. This will be achieved by sloping the pit floor during material extraction, which is standard practice.

Peak Runoff Flow rates were calculated as per the guidelines stated in Book 2 of IECA Guidelines and Blue Book. Peak flow rates that could be generated at different stages of the sand pit were calculated under difference scenarios. Refer to **Table 3.1** for estimated peak runoff flow rates.

SCENARIO	NOTES / COMMENTS	TOTAL AREA (ha)	COMPOSITE RUNOFF COEFFICIENT	RAINFALL INTENSITY (mm/hr)	PEAK FLOW RATE (m^3/s)
1	Pad Area (excluding roof area of the shed)	1.47	0.725	124	0.37
2	Existing (disused) Pit	0.30	0.210	124	0.02
3	Sand extraction area of the Pitat year 1	0.66	0.210	124	0.05
4	Sand extraction area of the Pit at year 2	0.93	0.210	124	0.07
5	Pit with a disturbed area of 1.5ha	1.50	0.210	124	0.11

6	Pit with a disturbed area of 2.0ha	2.00	0.210	124	0.14
7	Pit with a disturbed area of 3.0ha	3.00	0.210	124	0.22
8	1ha of Rehabilitated Area	1.00	0.480	124	0.17
9	2ha or Rehabilitated Area	2.00	0.480	124	0.33

Table 3.1: Estimated Peak Runoff Flow Rates

3.4. Estimated Runoff Volumes

Total runoff volume that can be predicted during an 80th percentile 5-day rainfall event was calculated for the purpose of this Report and designing of sediment basins.

SENARIO	NOTES/COMMENTS	TOTAL AREA (ha)	COMPOSITE VOLUMETRIC COEFFICIENT (C_v)	TOTAL RUNOFF VOLUME (m^3)
1	Total runoff from Pad Area	1.47	0.27	65
2	Runoff from the existing Pit	0.30	0.02	1
3	Runoff reporting to the sediment basin BS-F1 at year 01	0.66	0.02	2
4	Runoff reporting to the sediment basin BS-F1 at year 02	0.93	0.02	3
5	Runoff reporting to the sediment basin BS-F2 at year 03	0.32	0.02	1
6	Runoff reporting to the sediment basin BS-F2 at year 04	0.66	0.02	2
7	Runoff reporting to the sediment basin BS-F2 at year 05	0.26	0.02	1
8	Runoff from 1ha of disturbed area	1.00	0.02	3
9	Runoff from 1.5ha of disturbed area	1.50	0.02	5

Table 3.2: Estimated Runoff Volumes

3.5. Drainage Specifications

As described in **Section 3.1** of this Report, rainfall falling onto the undisturbed area will be diverted using perimeter bunds or cutoff drains. Subsequently, rainfall falling onto the disturbed areas (sand pit) will flow

into the diversion channels and then to the sediment basins, as shown in the technical drawings in Attachment 1.

Diversion channels and drains will be designed to have maximum flow velocities under 1.0 m/s.

Maximum flow capacities of proposed drains are as follows,

CHANNEL	CHANNEL LINING TYPE	SLOPE (m/m)	PEAK FLOW VELOCITY DURING A 1 IN 20 YEAR STORMWATER EVENT (ms^{-1})	MAX FLOW RATE CAPACITY (m^3s^{-1})
The permanent drain intercepting stormwater runoff from the Pad Area	Grassed	0.02	1	0.13
All other drains/channels	Grassed	0.01	0.7	0.09

Table 3.3: Maximum Designed Flow Capacities of channels

It should be noted that rainfall falling onto the shed roof will be collected by water tanks connected to the gutters. Rainfall falling onto the hardstand area will flow towards the diversion channel (swale drain) formed along the northern boundary of the hardstand area as sheet flow. This will be achieved by slightly sloping the finished ground towards the swale drain.

It is anticipated that the alignments of the drainage systems will be modified periodically as the Pit advances to accommodate evolving site conditions. Once established, the Pad Area is unlikely to change in shape or area for the life of the activity.

4. SEDIMENT CONTROL

4.1. Sediment Basins

All rainfall that falls onto disturbed areas will be collected into sediment basins, treated, and subsequently discharged to the environment. The treated stormwater runoff accumulated in basins will be repurposed for operational activities within the sand pit, including sand processing. Only surplus discharge from sediment basins will be released into the environment.

Book 02 of IECA Guidelines outlines three types of sediment basins, with the design criteria primarily dictated by the soil properties of the site.

Type C Basin	These basins are mostly suitable for coarse grained, good settling soils. Type C basins may be operated as either "dry" or "wet" basins depending on the requirement for stormwater reuse on the site. The critical design parameter in a Type C basin is the effective surface area of the settling pond.
Type F Basin	These basins are generally suitable for fine grained soils that can readily settle without the need for flocculating agents. Type F basins can only be operated as wet basins. The critical design parameter for a Type F basin is the volume of the settling pond.
Type D Basin	These basins are required for the treatment of dispersive soils that do not readily settle without the use of flocculating agents. Type D basins can only be operated as wet basins. The critical design parameter for a Type D basin is the volume of the settling pond

Based on the soil data detailed in the 'Geomorphology and Soil Characteristics Survey Report (FPA 2024)' it was decided to implement Type F basins for collecting and treating stormwater runoff from the sand pit area. It should also be noted that, due to the high infiltration properties of the soil, the total demand for these basins will be relatively low. This is supported by the calculations shown in **Table 3.2**.

The pad area will consist of compacted graded gravel to form a semi-permeable finish. Sediment generation from such compacted gravels is relatively low. However, over time, the top layer of the compacted gravel may loosen and be carried away with stormwater runoff. Therefore, a Type C sediment basin has been proposed to treat the runoff leaving the pad area.

4.2. Settling Zone Volume

Sediment basins are typically divided into two functional zones: the upper settling zone and the lower sediment storage zone. The settling zone is designed to provide sufficient volume for the effective settlement of fine particles during a specified design rainfall event. The sediment storage zone, located below, is intended to store the accumulated sediment until it is removed during scheduled clean-outs.

Type F basins are proposed to treat the sand extraction area of the Pit and those are typically designed for a maximum of 5-day cycle, that being the filling, treatment, and discharge of the basin within a maximum of 5-day period. Table B4, Book 02 of IECA Guidelines suggests 80th percentile 5-day rainfall depth to calculate settling zone volume of the sediment basin for basins with design life greater than 6 months. **Table 4.1** details the settling zone volume requirements for different scenarios.

A Type C basin is proposed to treat runoff from the pad area and this type of basins may be operated as either "dry" or "wet" basins depending on the requirement for stormwater reuse on the site. The critical parameter in a Type C basin is the effective surface area.

CATCHMENT AREA	REPORTING SEDIMENT BASIN	SETTLING ZONE VOLUME REQUIREMENT (m^3)	EFFECTIVE SURFACE AREA REQUIREMENT (m^2)
Sand extraction area of the Pit (disturbed area) up to year 02 – Approx. 1ha	BS-F1	3	NA
Sand extraction area of the Pitat year 04 – Approx. 0.66ha	BS-F2	2	NA
Pad Area – Approx. 1.47ha	BS-C1	11	32

Table 4.1: Settling Zone Volume Requirement

4.3. Sediment Storage Zone Volume

The "sediment storage zone" lies below the "settling zone". Table B8 of IECA Book 2, provides the guidelines to size the sediment storage volume.
Expected clean out frequency is 6 months.

SCENARIO	SEDIMENT BASIN	SEDIMENT STORAGE ZONE VOLUME (m^3)
1	BS-F1	1.5
2	BS-F2	1.0
3	BS-C1	11.0

Table 4.2: Estimated Sediment Storage Zone Volumes

4.4. Total Sediment Basin Volumes

It is not expected the size of the proposed Pad Area (hard stand area) will be significantly changed during the near future. Therefore, the sizing detailed in the **Table 4.3** for BS-C1 will remain unchanged unless otherwise.

However, as the sand extraction area of the Pit advances BS-F1 and BS-F2 will become redundant, and new basins will be installed to treat stormwater runoff from new disturbed areas as required. The Pit operator must refer to the **Table 4.3** to determine the sizes of the basins. Type F basins will be installed as per the conceptual design provided in the **Attachment 1.**

SCENARIO	COMMENTS	SEDIMENT BASIN NAME	SURFACE AREA (m^2)	TOTAL VOLUME (m^3)
1	To capture sediments generated from the Pad Area	BS-C1	32	22
2	To capture sediments generated from the sand extraction area of the Pit Area up to year 2	BS-F1	NA	4.5
3	To capture sediments generated from the sand extraction area of the Pit Area up to year 04	BS-F2	NA	3.5
4	To capture sediments generated from the sand extraction area of the Pit Area at year 05	BS-F3	NA	1.5
5	To capture sediments from a disturbed area of 1ha	-	NA	5.0
6	To capture sediments from a disturbed area of 1.5ha	-	NA	7.4
7	To capture sediments from a disturbed area of 2.0ha	-	NA	10.0
8	To capture sediments from a disturbed area of 2.5ha	-	NA	12.3
9	To capture sediments from a disturbed area of 3.0ha	-	NA	15.0

Table 4.3: Proposed Sediment Basin Volumes

5. CONCLUSION

1. Total rainfall falling on to the Land will be managed using a combination of perimeter bunds, diversion channels, and surface slopes.

2. Clean up-slope water will be diverted to prevent it from entering the disturbed areas.

3. Diversion channels have been designed for sufficient capacity to contain runoff that could reasonably be expected to arise during a 1 in 20-year rainfall event.

4. Low to medium infiltration rates are expected from the Pad Area, and the floor should be sloped (approx. 1%) towards the diversion channels. These channels will then direct the runoff into the permanent sediment basin (BS-C1)

5. Rainfall falling onto the shed roof will be collected in stormwater tanks. Any overflow from the stormwater tanks will be directed to BS-C1 basin. However, it is highly unlikely that the tanks would overflow due to the water requirement for sand processing activities and the use of the amenities on the site; supplementary water to the activity is to be provided by a water bore.

6. Due to the high infiltration rates in the sand pit area, all necessary controls must be implemented to prevent spills or hazardous substances from entering the groundwater. Environmental controls will be but not limited to;

    - Readily available spill kits on site;

    - Training work personnel to use spill kits and establish emergency procedures; and

    - Daily pre-start checks on machinery.

7. A Type C sediment basin is proposed to treat the stormwater runoff from Pad Area.

8. Type F sediment basins are proposed to treat the stormwater runoff from the exposed (extraction areas) of the Pit . New sediment basins will need to be installed as the Pit advances westwards. The operator must decide the size of the basins using the details in **Table 4.3.**

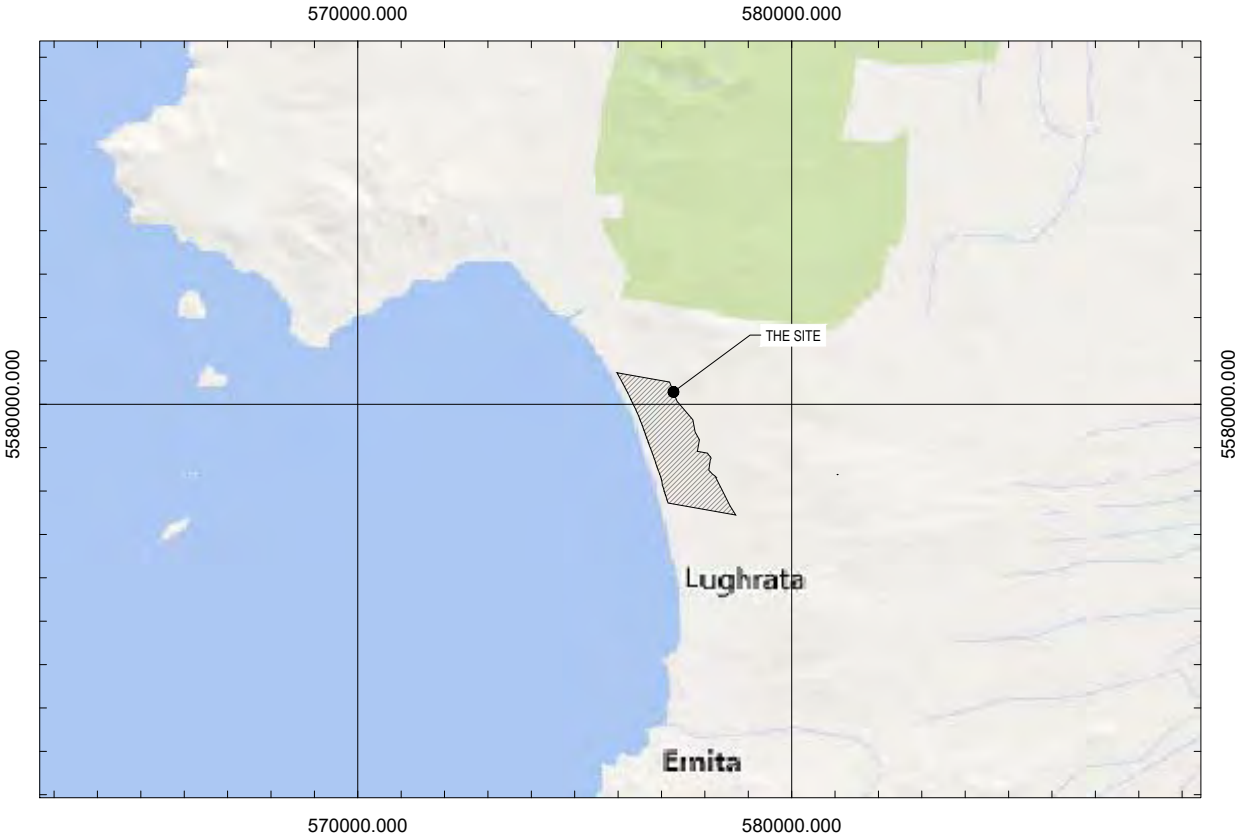
9. Regular monitoring should be undertaken to ensure the effectiveness of the installed stormwater management and sediment control structures.

6. ATTACHMENTS

6.1. ATTACHMENT 1

MARSHAL SAND PIT

STORMWATER MANAGEMENT AND SEDIMENT CONTROL MEASURES TECHNICAL DRAWINGS



LOCALITY MAP

SCALE: N.T.S.

DRAWING LIST

	DRAWING NO.	REVISION	DESCRIPTION
1	VDC/MSP/A/001	0.0	COVER PAGE
2	VDC/MSP/A/002	0.0	SITE LAYOUT
3	VDC/MSP/A/003	0.0	CONCEPTUAL TYPE F SEDIMENT BASIN DESIGN
4	VDC/MSP/A/004	0.0	SEDIMENT BASIN BS-C1 DESIGN

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	17/11/2024	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, BSc(Eng.)Hons*)

STORMWATER MANAGEMENT AND SEDIMENT CONTROL MEASURES ASSESSMENT

DRAWING NUMBER: VDC/MSP/A/001

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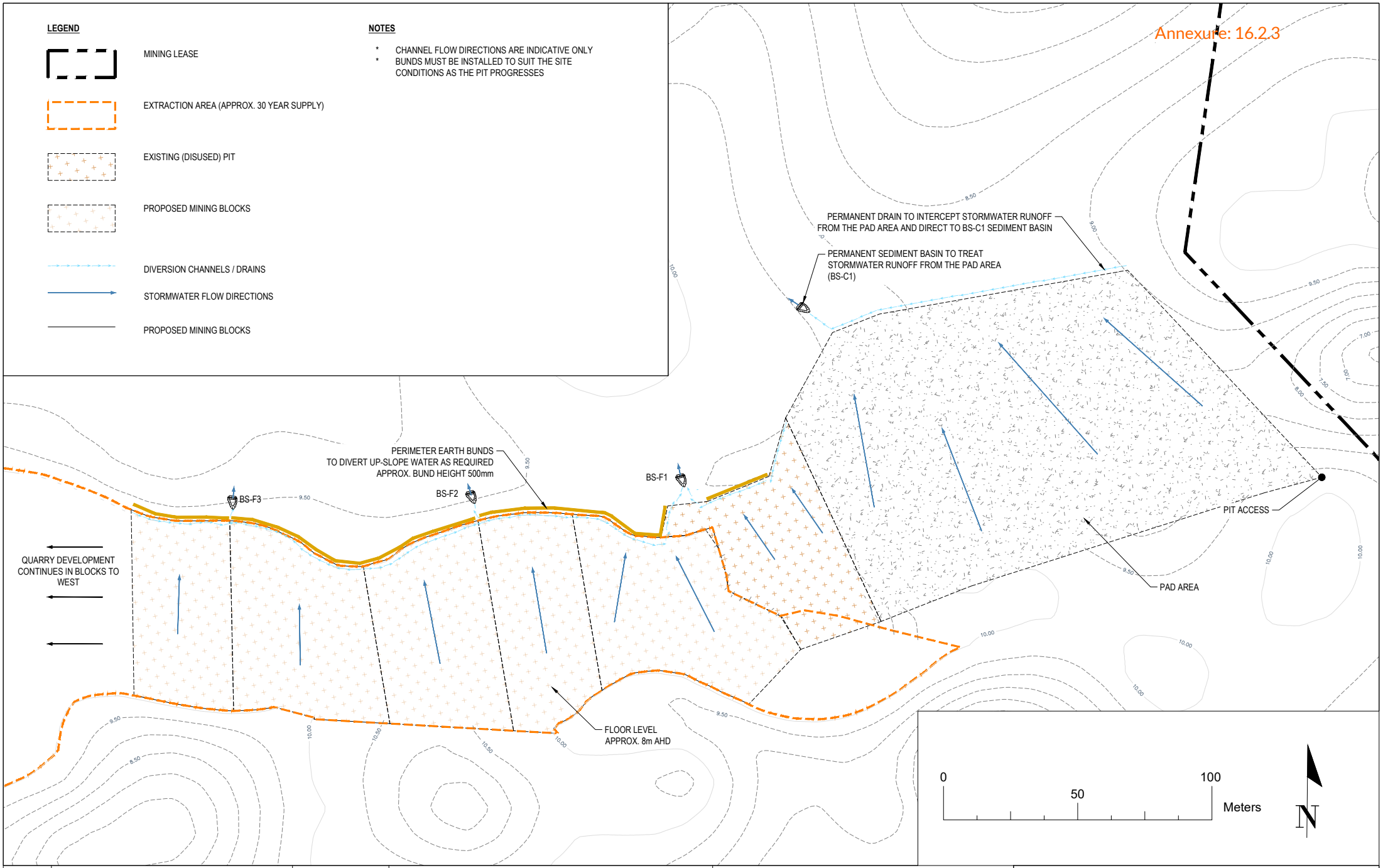
LEGEND

- MINING LEASE
- EXTRACTION AREA (APPROX. 30 YEAR SUPPLY)
- EXISTING (DISUSED) PIT
- PROPOSED MINING BLOCKS
- DIVERSION CHANNELS / DRAINS
- STORMWATER FLOW DIRECTIONS
- PROPOSED MINING BLOCKS

NOTES

* CHANNEL FLOW DIRECTIONS ARE INDICATIVE ONLY
* BUNDS MUST BE INSTALLED TO SUIT THE SITE CONDITIONS AS THE PIT PROGRESSES



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			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
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REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE LAYOUT

DRAWING NUMBER: VDC/MSP/A/002

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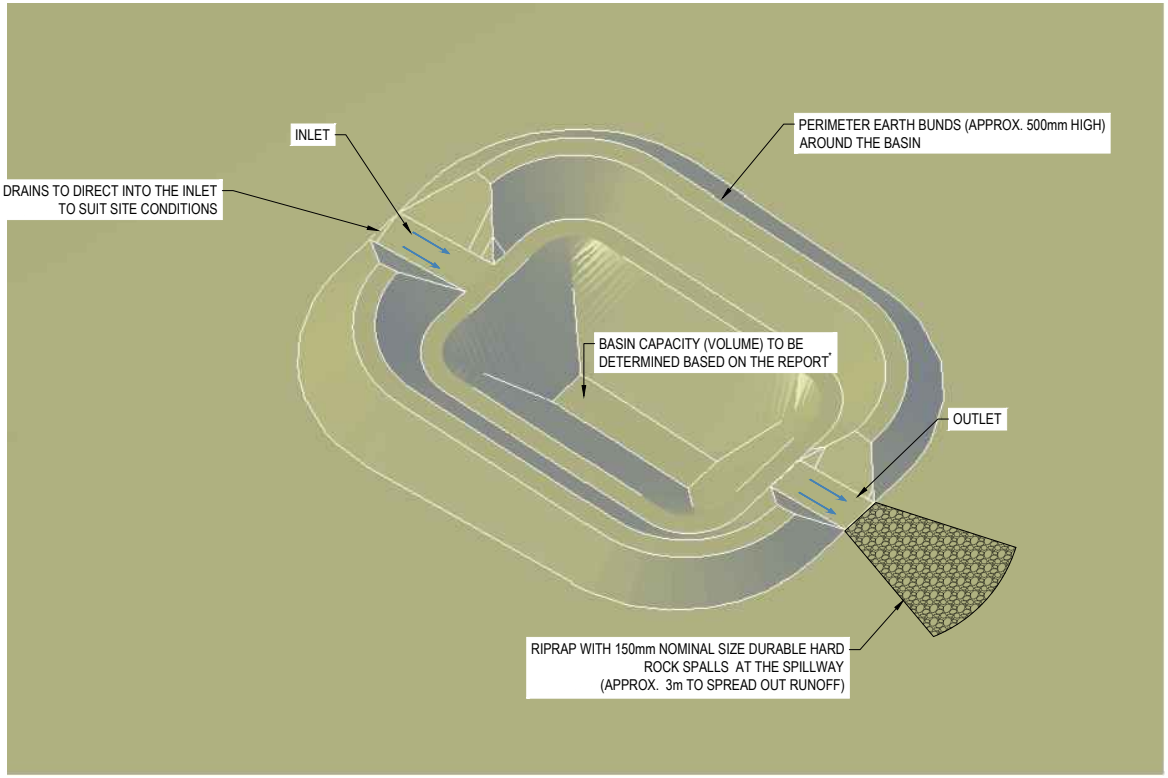


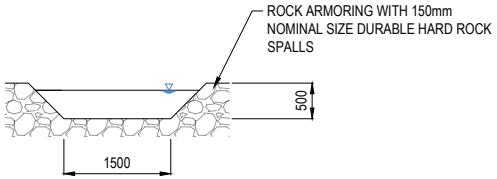
CONCEPTUAL 3D VISUALIZATION OF TYPE F SEDIMENT BASIN
SCALE N.T.S.

NOTES - GENERAL

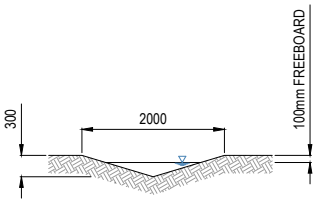
1. REPORT* - STORMWATER AND SEDIMENT CONTROL ASSESSMENT REPORT
2. BASIN CAPACITIES (VOLUMES) MUST BE DETERMINED BASED ON THE GUIDELINES PROVIDED IN THE REPORT (TABLE 4.3)

NOTES - SEDIMENT BASIN

1. SEDIMENT BASIN TYPE: TYPE 'F' AS PER IECA GUIDELINES
2. BASIN DESIGN CRITERIA: VOLUME TO RETAIN RAINFALL FROM 5-DAY 80TH PERCENTILE RAINFALL EVENT.
3. SPILLWAY DESIGN CRITERIA: 1 IN 100 YEAR EVENT
4. CLEAN OUT FREQUENCY: 06 MONTHS
5. CLEAN OUT ACCUMULATED SEDIMENT WHEN IT REACHES TO THE SETTLING ZONE, AND RESTORE THE ORIGINAL STORAGE VOLUME.
6. DEPTH TO THE SEDIMENT STORAGE ZONE MUST BE DETERMINE WHEN INSTALLING THE BASIN.
7. AFTER INSTALLATION OF THE POND, INSPECTIONS TO BE CARRIED OUT DURING AND AFTER (OR AS REQUIRED) LARGE STORMWATER EVENTS TO CHECK THE PERFORMANCE OF THE SEDIMENT BASIN.
8. FOLLOWING A RAINFALL EVENT, COLLECTED STORMWATER MUST BE PUMPED OR SIPHONED OUT IN A MANNER THAT DOES NOT DISTURBED SETTLED SEDIMENT. POND WILL BE EMPTIED OUT ONLY WHEN WATER IS CLEAR. IF WATER REMAINS MUDDY AFTER 3 DAYS, VDC'S ENGINEER MUST BE NOTIFIED BEFORE ANY CHEMICAL (FLOCCULANT) TREATMENT IS APPLIED.
9. BASIN LOCATIONS MUST BE SELECTED STRATEGICALLY TO SUIT SITE CONDITIONS AND MUST HAVE ACCESS TO AN EXCAVATOR OF SUITABLE SIZE TO CLEAN SEDIMENTS OUT WHEN NEEDED.



INLET / SPILLWAY
SCALE 1:75



DIVERSION CHANNEL - SECTIONAL VIEW
SCALE 1:75

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**CONCEPTUAL TYPE F SEDIMENT BASIN DESIGN**
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255	
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD	
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED	
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REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)	

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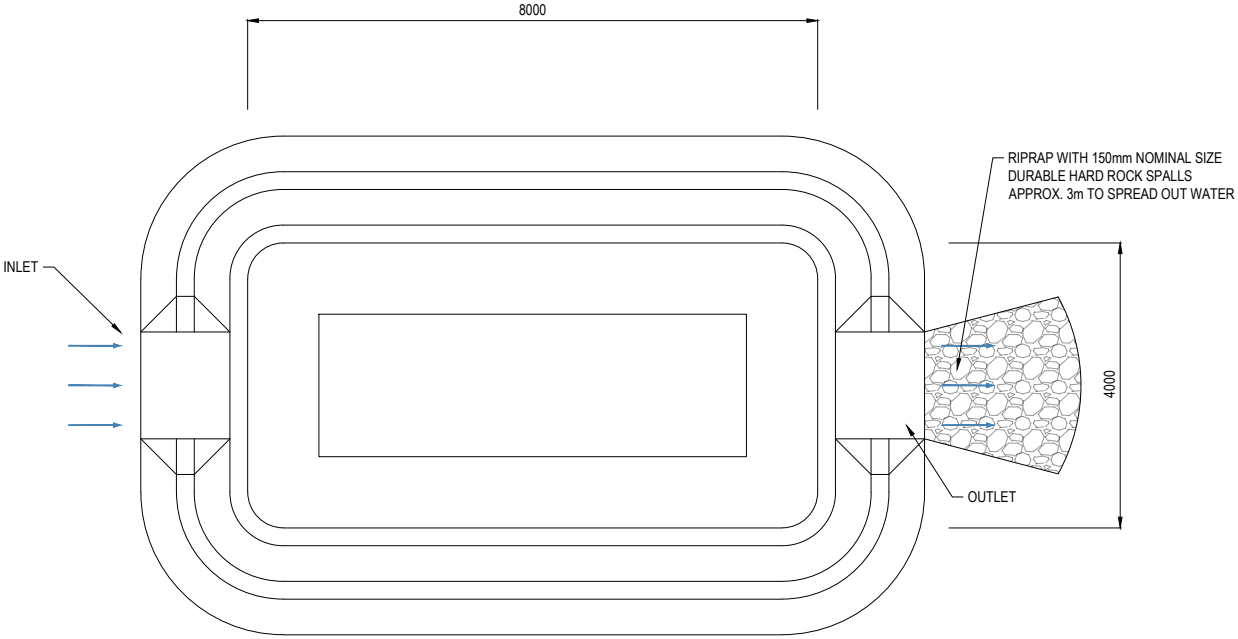
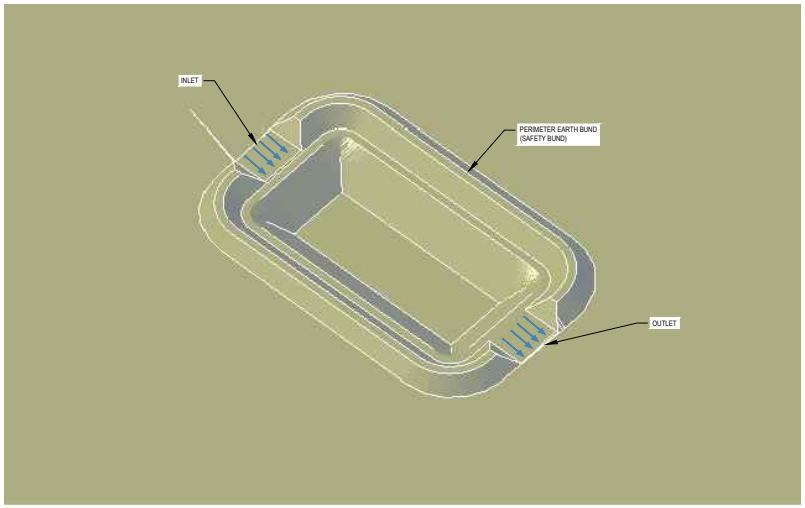
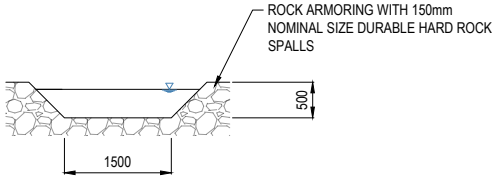


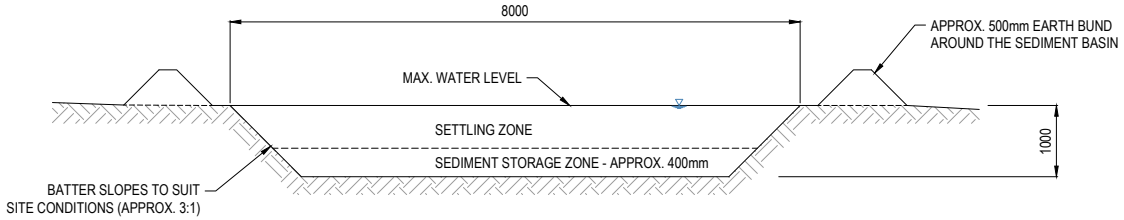
PLAN VIEW
SCALE 1:75

CONCEPTUAL 3D VISUALIZATION OF THE SEDIMENT BASIN
SCALE 1:75





INLET / SPILLWAY
SCALE 1:75



SECTIONAL VIEW - LONGITUDINAL
SCALE 1:75

NOTES

1. SEDIMENT BASIN TYPE: TYPE 'C' AS PER IECA GUIDELINES
2. BASIN DESIGN CRITERIA: CAPTURE UP TO 0.1mm PARTICLES (CRITICAL PARTICLE SIZE) DURING A 1 IN 20 YEAR STORMWATER EVENT
3. INLET AND SPILLWAY DESIGN CRITERIA: 1 IN 100 YEAR ARI EVENT
4. CLEAN OUT FREQUENCY: 06 MONTHS
5. CLEAN OUT ACCUMULATED SEDIMENTS WHEN IT REACHES TO THE SEDIMENT SETTLING ZONE, AND RESTORE THE ORIGINAL SEDIMENT STORAGE VOLUME
6. SEDIMENT SHOULD BE PLACED OUT IN A DISPOSAL AREA OR IF APPROPRIATE MIX WITH RAW SAND FOR PROCESSING
7. AFTER INSTALLATION OF THE POND, INSPECTIONS MUST BE CARRIED OUT DURING AND AFTER (OR AS REQUIRED) LARGE STORMWATER EVENTS TO CHECK THE PERFORMANCE OF THE SEDIMENT BASIN
8. SEDIMENT BASIN CAN BE USED AS A DRY OR WET BASIN DEPENDING ON THE REQUIREMENT

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REV 0.0	INITIAL PLAN	17/11/2024	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SEDIMENT BASIN BS-C1 DESIGN

DRAWING NUMBER: VDC/MSP/A/004

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6.2. ATTACHMENT 2

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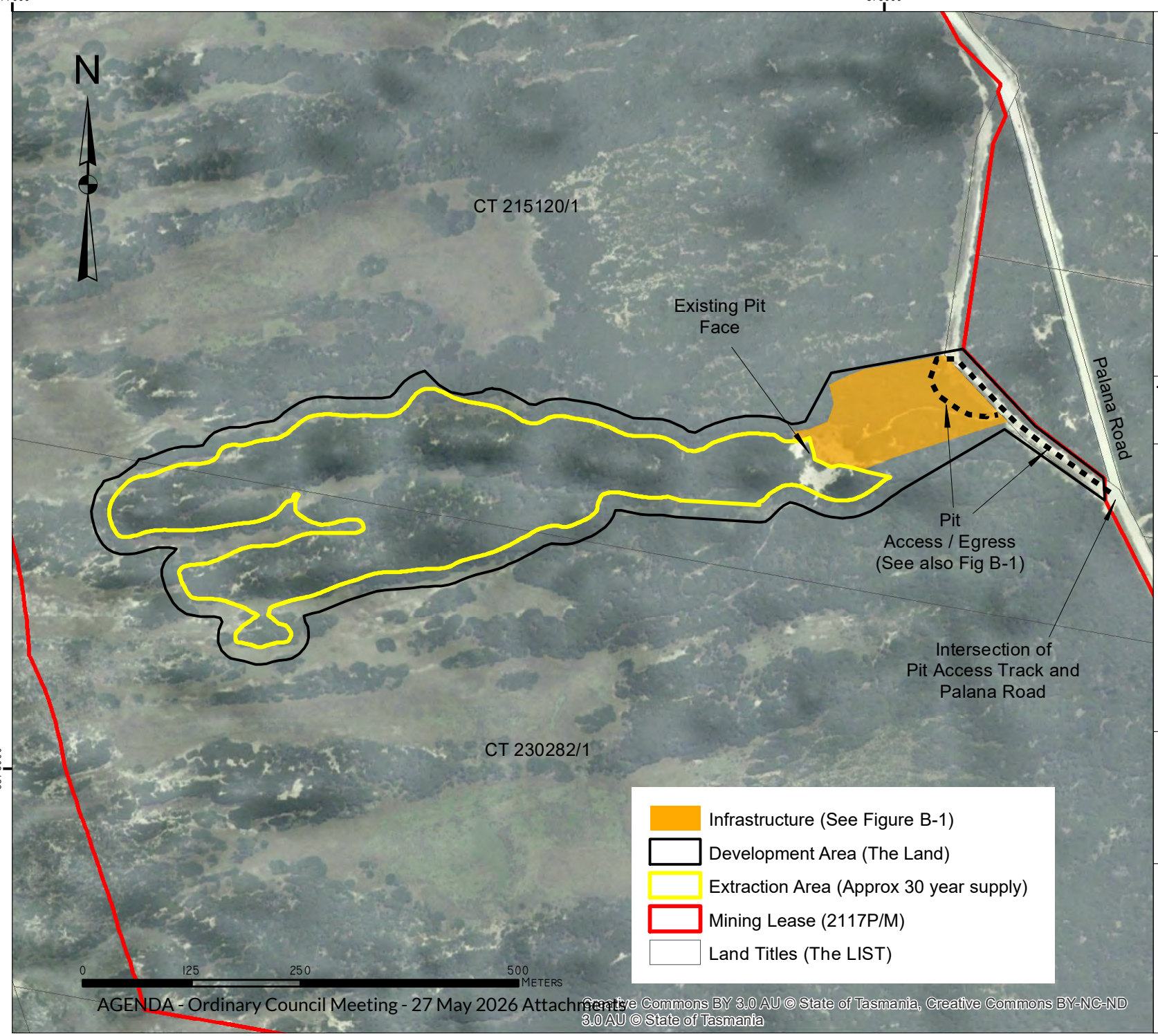
MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure A-4: Markarna Park Sand Pit Development Area and Access/Egress



TASMAP:	LGA:
TANNER EMITA	FLINDERS

Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

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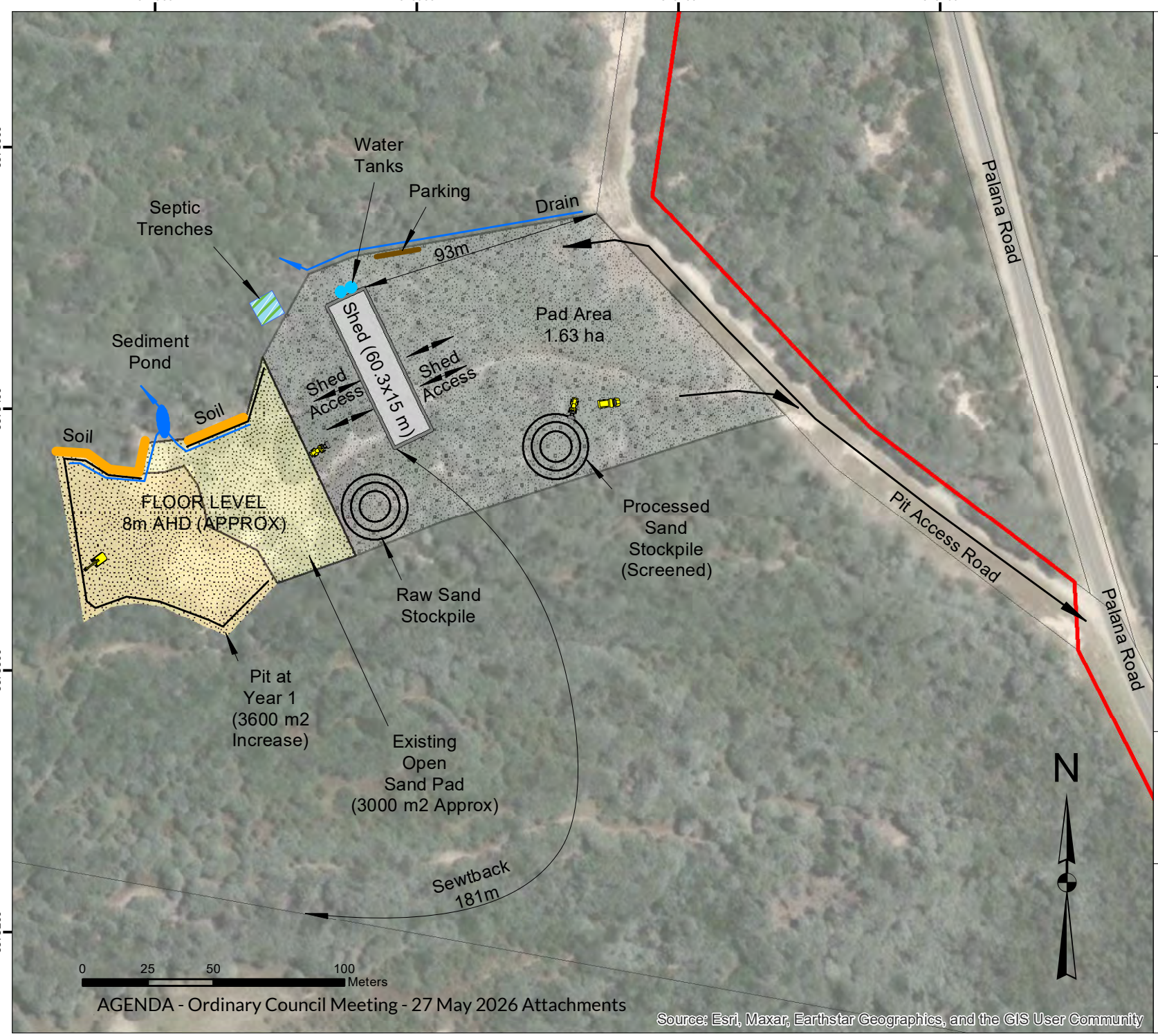

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure B-1: Mine Plan Site Set Up / Extraction to Year 1 and Access

TASMAP:	LGA:
TANNER EMITA	FLINDERS

- Clear Gravel Surface
- Existing Sand Surface
- Shed (60.3 x 15 m)
- Clear Gravel Surface
- Mining Lease (2117P/M)
- Land Titles (The LIST)

Base data by TASMAP. © State of Tasmania
Base image by TASMAP. © State of Tasmania

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DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

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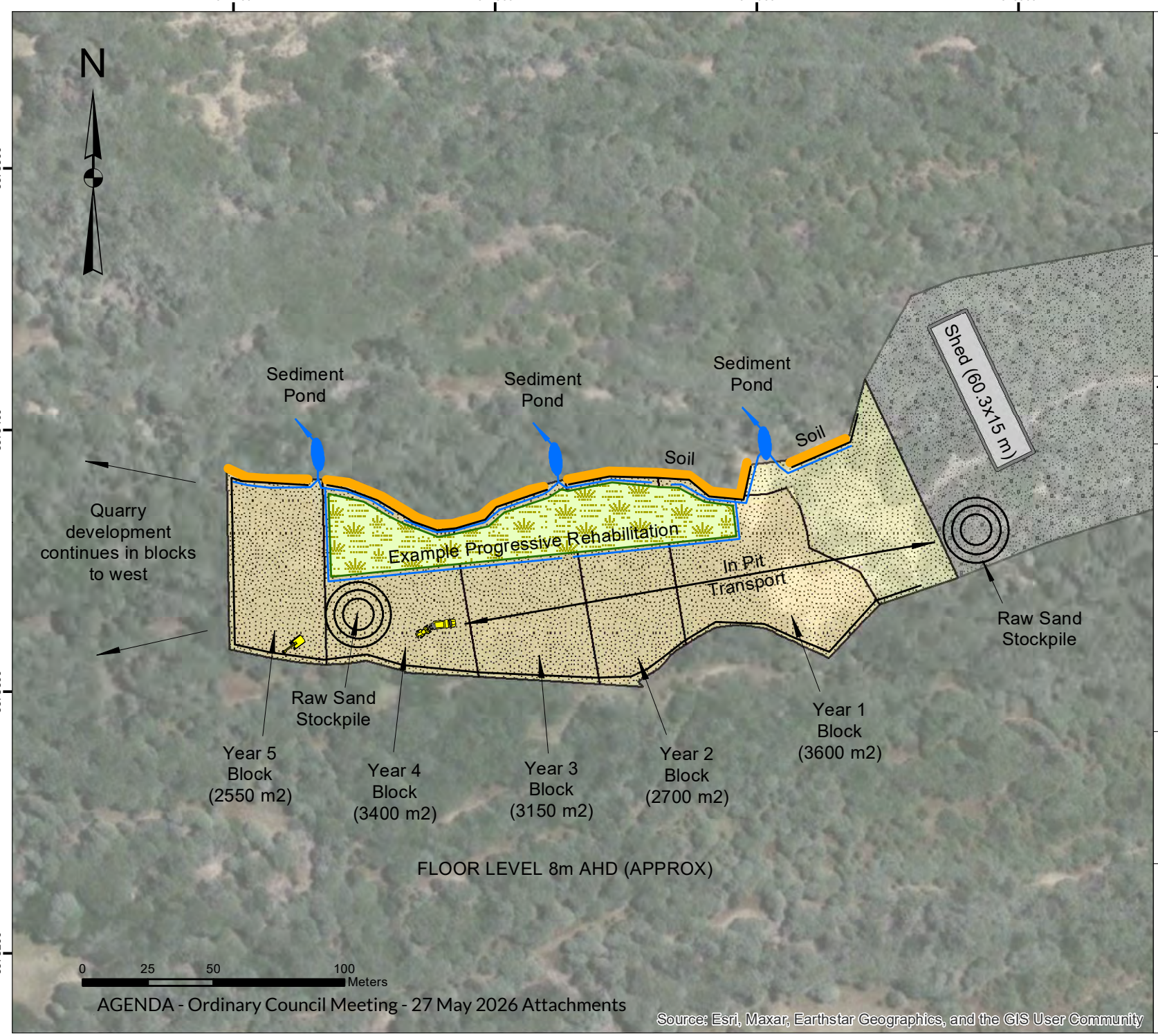

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MARKARNA PARK SAND PIT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Figure B-2: Mine Plan Extraction (Year 1 to 5)

TASMAP:	LGA:
TANNER EMITA	FLINDERS

- Clear Gravel Surface
- Existing Sand Surface
- Shed (60.3 x 15 m)
- Clear Gravel Surface

Base data by TASMAP. © State of Tasmania
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GRID: MGA ZONE 55
SCALE: @A4 - NA

CLIENT:
MARKARNA GRAZING COMPANY PTY LTD

DATE: 4 JULY 2024

ATTACHMENT 8. DRAFT WEED AND DISEASE MANAGEMENT PLAN, NOVEMBER 2024

MARSHALL BAY LIME SAND EXTRACTION PIT

PALANA ROAD, MEMANA, FLINDERS ISLAND

WEED AND DISEASE MANAGEMENT PLAN

DRAFT FOR EIS ESSMENT

Van Diemen Consulting

PO Box 1, New Town, TAS 7008

DOCUMENT CONTROL

Version	Description	Prepared By	Date
1	Draft	Van Diemen Consulting Pty Ltd	10-11-2024
1	Comments		
2			
2			

DRAFT FOR EIS ASSESSMENT

Van Diemen Consulting Pty Ltd

PO Box 1

New Town, Tasmania

T: 0438 588 695 E: rwbarnes73@gmail.com

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To the best of VDC's knowledge, the report presented herein represents the Client's intentions at the time of completing the document. However, the passage of time, manifestation of latent conditions or impacts of future events may result in changes to matters that are otherwise described in this document. In preparing this document VDC has relied upon data, surveys, analysis, designs, plans and other information provided by the client, and other individuals and organisations referenced herein. Except as otherwise stated in this document, VDC has not verified the accuracy or completeness of such data, surveys, analysis, designs, plans and other information.

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ACRONYMS	
DPIPWE (now NRET)	Department of Primary Industries, Parks, Water and Environment
EMPCA	*Environmental Management and Pollution Control Act 1994*
EPA	Environment Protection Authority
GBD	General Biosecurity Duty
NRET	Department of Natural Resources and Environment Tasmania
PC	*Phytophthora cinnamomi*
WDMP	Weed and Disease Management Plan
WoNS	Weeds of National Significance
WSP	Weed Spraying Program

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TERMS	
Disease	Means a condition of the living animal or plant body or of one of its parts that impairs normal functioning and is typically manifested by distinguishing signs and symptoms. For this WDMP, disease includes its cause such as pathogens (living microorganism such as bacterium, virus or fungi that causes diseases in plants and animals). Examples include cinnamon fungus (*Phytophthora cinnamomi*), and chytrid fungus (*Batrachochytrium dendrobatidis*).
Equipment	Means the set of tools needed to achieve a goal is "equipment". Equipment includes for example cranes, generators, ablutions block, site office, compressors etc.
(the) Lessee	Markarna Grazing Company Pty Ltd
Machinery Hygiene Inspection Sheet	Means the form to be completed by a suitably qualified person for Machinery (machines) and Equipment prior to being floated to the Pit to record that it is clean prior to entering the site.
Machinery	Means a collection or group of machines.
Machines	Means an apparatus using mechanical power and having several parts, each with a definite function and together performing a task. Machines include bulldozers, diggers, trenchers, heavy-trucks (with or without trailers), excavators and other earth-moving motorised apparatus.
Permit Conditions	Means those conditions in Permit Part B. Permit Conditions – Environmental No. 10320.
Pit	Marshall Bay Lime Sand Extraction Pit, Palana Road (in Mining Lease 2117 P/M)
SWMP	Means statutory weed management plans
vehicle	Means a motorised thing used for transporting people or goods. This includes 4WD vehicles, light trucks and passenger vans and cars.
Weed	Means a plant species that has, or is likely to have, an adverse impact on the environment because of the introduction, spread or increase in population size of the species in an area; and includes a declared weed as defined in the *Biosecurity Act 2019* and subordinate regulations (this definition is consistent with the Permit Conditions).
Weed And Disease Guidelines	Means the document titled *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania*, by the Department of Primary Industries, Parks, Water and Environment, dated March 2015, and any amendment to or substitution of this document (this definition is consistent with the Permit Conditions).
Record	Means to write an observation. All records will be handed to the Site Supervisor and will be kept on file. All records are to be clearly legible.

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SECTION 1 - INTRODUCTION

1.1 PURPOSE AND SCOPE

The Marshal Bay Lime Sand Extraction Pit is located at Memana and is accessed from Palana Road (**Figure 1**).

This WDMP identifies measures to control, eradicate and prevent the spread of declared and environmental weeds and the soil pathogen *Phytophthora cinnamomi* (PC) and other pathogens like chytrid fungus. It is consistent with the Natural Resources and Environment Tasmania (NRET, formerly DPIPWE) *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania.*

The broad scope of the WDMP is to provide information on the following:

1. Weed and disease management objectives for the Marshal Bay Lime Sand Extraction Pit (the Pit);
2. The legal and other requirements associated with Weed and Disease management;
3. Roles and responsibilities for persons and/or entities implementing the WDMP;
4. Existing and potential Weed and Disease occurrences at the Pit and management information for staff and contractor inductions;
5. Management measures to mitigate or minimise the risk of introducing and/or transferring weeds and disease; and
6. Incident reporting, performance monitoring, and a plan review mechanism.

1.2 BACKGROUND, PLAN STRUCTURE AND OBJECTIVES

This WDMP identifies site-specific mitigation measures and environmental controls to ensure weeds and diseases are effectively managed at the Pit. It is also a practical tool to manage risk associated with weed and disease introduction and spread in the Pit.

Activities such as haulage of material, material stockpiling, vegetation clearance and rehabilitation can increase the spread and exposure of weed seedbanks and weeds and diseases to surrounding soil. Good hygiene practices around the use and movement of vehicles, plant machinery and equipment can minimise the risk of introducing and/or transferring weeds and disease.

1.2.1 OBJECTIVES

The objectives of the WDMP for the Pit are to:

- Record the presence and distribution of Weeds declared under the *Biosecurity Act 2019*;
- Record the presence and distribution of significant, non-declared, environmental and agricultural Weeds;
- Record the presence and distribution of Diseases;
- Describe control measures to manage identified Weeds and Diseases, and to prevent as far as possible the entry and establishment of Weeds and Diseases into the Pit;

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- Establish an ongoing monitoring, control and improvement program at the Pit for Weeds and Diseases.

1.2.2 PLAN STRUCTURE

The structure of the Weed and Disease Management Plan is outlined in **Table 1.**

Table 1. Structure of the Weed and Disease Management Plan

Section	Content
1	Provides an overview of the purpose and objectives of the WDMP for the Pit.
2	Details the statutory requirements and permit conditions for Weed and Disease Management
3	Details the roles and responsibilities for WDMP implementation
4	Describes the existing environment at the Pit, the existing and potential occurrence of Weeds, and a risk assessment of each Weed to the local environment
5	Describes the Weed and Disease Management measures including preventative and responses actions
6	Outlines monitoring requirements such as weed spraying inspections and surveillance surveys
7	Outlines the information recording and review requirements
8	Lists references and attachments

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1.2.3 AREA COVERED BY THE PLAN

The WDMP applies to the Development Area shown in **Figure 2** which includes the Extraction Area, and access road to Palana Road.

The access road is included because the road is a potential corridor for the spread of Weeds and Disease from Palana Road.

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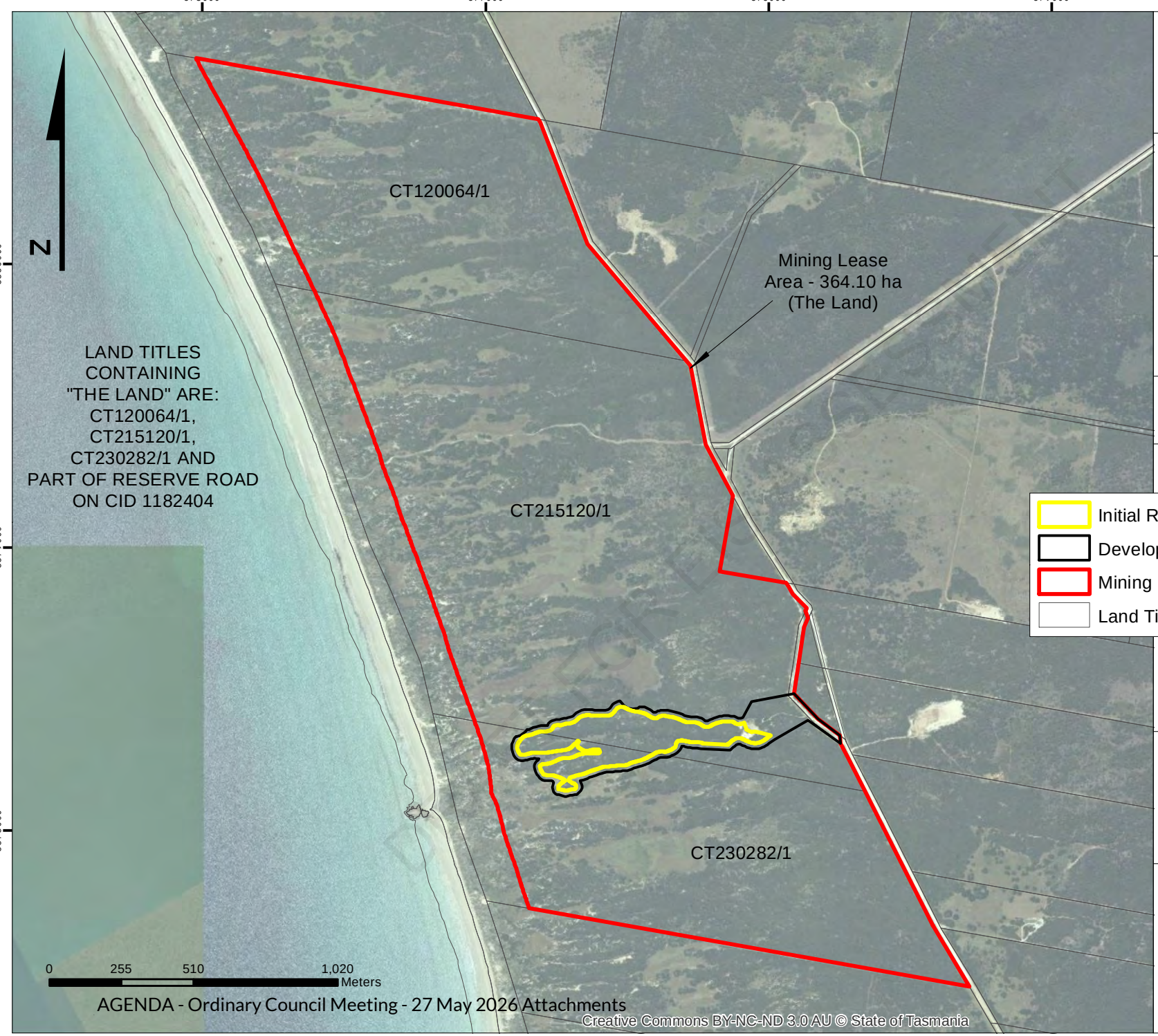
Weed and Disease Management Plan Marshall Bay Sand Pit

Figure 1: Location of Markarna Park Sand Pit Development Area and Land Titles

TASMAP: TANNER EMITA

LGA: FLINDERS



Van Diemen CONSULTING
PO Box 1 New Town TAS 7008

DATUM: GDA94
GRID: MGA ZONE 55
SCALE: @A4 - NA

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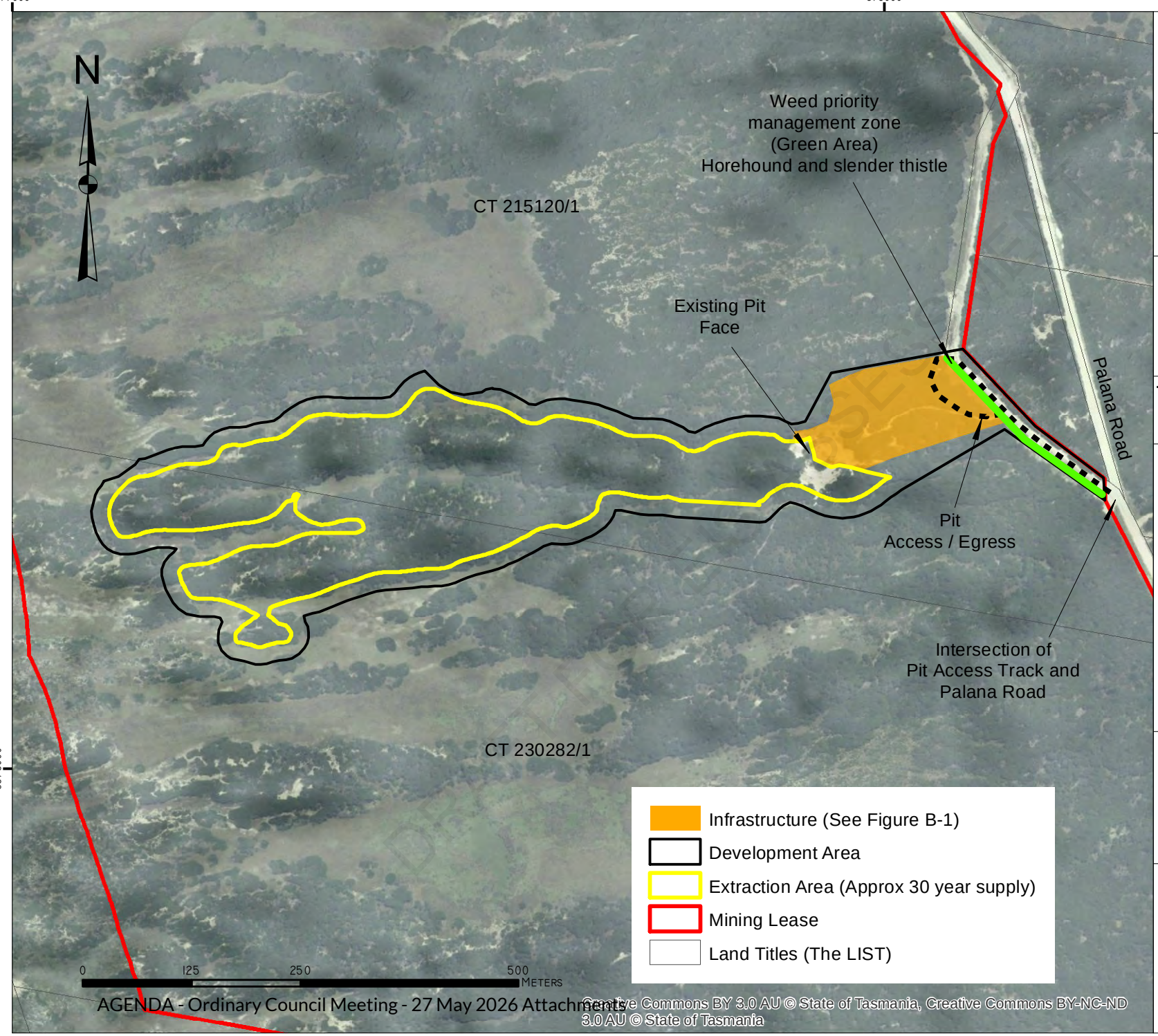
Weed and Disease Management Plan Marshall Bay Sand Pit

Figure 2: Markarna Park Sand Pit Development Area and Access/Egress



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1.3 PIT DESCRIPTION AND LOCATION

1.3 THE PIT

The Marshall Bay Lime Sand Pit can extract up to 10,000 cubic metres (equivalent is 15,000 tonnes per annum). Loose bulk density ratio is 1.5) of lime sands per annum.

The material to be extracted is lime sand destined for an agricultural use (soil ameliorant). The lime sand deposits at Marshall Bay are well known and proven in their ENV on agricultural lands.

Extracted (raw) sand will be screened if necessary to remove organic matter and contaminants (e.g., shells, rocks, and stones). Additional agricultural soil ameliorants/additives such as boron may be mixed (by screening) with some of the lime sands prior to carting to the location of use (i.e., spreading on paddocks).

Material is likely to be transported in greater volumes in summer and autumn because these seasons coincide with the peak activity periods for agricultural pasture improvement, maintenance, and establishment.

The Pit has infrastructure at its north-eastern extent, adjacent to the access road which connects it to Palana Road, and includes a hardstand area (made of compacted gravel), shed and amenities (crib room, shower, and toilet).

Weeds of greatest risk of entry to the Pit include slender thistle, horehound, and other species with wind-blown (e.g., thistles) or bird dispersed seed (e.g., *Pittosporum*). Strict hygiene measures applied to vehicle and equipment entry to the Pit are generally ineffective for Weeds that spread by uncontrollable vectors such as birds/mammals, and wind.

Details of the Pit are provided in **Table 2.**

Table 2. Marshall Bay Lime Sand Extraction Pit location and permit information

Item	Description
Address	368 Five Mile Jim Road, Memana, Flinders Island, TAS 7255
Mining Lease	2117 P/M
Lessee	Markarna Grazing Company Pty Ltd
Current Approvals	Pending

1.3 LESSEE

Markarna Grazing Company Pty Ltd is the Lessee of Mining Lease 2117 P/M. Information about the Lessee and their contact details or provided in **Table 3.**

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Table 3. Lessee information and contact details

Item	Description
Name of proponent	Markarna Grazing Company Pty Ltd
Registered address of proponent	Level 3, 302-320 Burwood Road, HAWTHORN VIC 3122
Postal address of proponent	33-41 Agnes Street, East Melbourne VIC 3002
ACN	063 634 444
ABN	NA
Contact person's details	Mr George Adams (Director) Phone: (03) 9333 2400 Fax: (03) 9333 1258 cynthia.adams@adamsgroup.com.au

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SECTION 2 – LEGISLATIVE AND MANAGEMENT CONTEXT

The legislative status of specific weed species determines statutory obligations for weed management. The *Biosecurity Act 2019*[1] (the Act) and supporting *Biosecurity Regulations 2022* provide guidance on weed status and allow for statutory weed management plans (SWMP) to be developed for declared weeds.

The Department of Natural Resources and Environment Tasmania (NRET), formerly the Department of Primary Industries, Parks, Water and Environment (DPIPWE), is responsible for the administration of the Act and its supporting Regulations.

The General Biosecurity Duty (GBD) came into effect in March 2021 as part of the Act, which operates as a legal obligation or "duty of care" in respect to biosecurity. This means that a person (which includes all levels of Government, individuals, and private corporate entities) must take all reasonable and practical measures to prevent, eliminate, or minimise biosecurity risks, including the containment, reduction, and eradication (if possible) of environmental and declared weeds.

Environmental weeds are not listed under legislation, and are not legally required to be controlled, although they have the potential to pose a threat to ecological values and need to be considered in the WDMP.

This WDMP categorises weeds observed into two groups;

1. declared, and
2. pasture/environmental.

Each declared weed has a SWMP that details the regulatory framework for the control and eradication of that weed under the Act. The plans identify zones (eradication – Zone A or containment – Zone B) based on weed prevalence and location within a municipality.

2.1 WHAT IS A WEED?

For this WDMP, the definition of weed has been adopted from the Permit Conditions, being:

> 'a plant species that has, or is likely to have, an adverse impact on the environment because of the introduction, spread or increase in population size of the species in an area; and includes a declared weed as defined in the *Biosecurity Act 2019* and subordinate regulations.'

The broad definition includes species introduced to Tasmania, as well as native species because they can sometimes cause an adverse impact to the environment if they have been introduced to and established in areas outside their natural geographic range. Notwithstanding this, and in a general sense, weeds are often

[1] Note the *Biosecurity Act 2019* has replaced the *Weed Management Act 1999*, however the *Weed Management Act 1999* and its regulations is still the primary regulatory regime that applies to weed management in Tasmania. While the SWMP for declared weeds will be changed in name to 'Biosecurity Management Plans' under the *Biosecurity Act 2019*, the content of the management plans for declared weed will remain the same as those that are currently available at the time of writing this WDMP.

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referred to as invasive plants because they often displace or reduce the coverage of native species in native vegetation communities. Some weeds of concern have been listed for priority management or in legislation.

Weeds typically produce large numbers of seeds, assisting their spread. They are often excellent at surviving and reproducing in disturbed environments and are commonly the first species to colonise and dominate in these conditions. A weed can be an exotic species or a native species that colonises and persists in an ecosystem in which it did not previously exist.

The broad categories of weeds adopted for this WDMP are provided below.

WEEDS OF NATIONAL SIGNIFICANCE

Weeds of National Significance (WoNS) have been identified by the Australian governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social, and economic impacts. The classification of a species as of WoNS also considered its ability to be successfully managed.

DECLARED WEEDS

The *Biosecurity Act 2019* is the principal legislation concerned with the identification and management of Declared Weeds in Tasmania. A SWMP includes the name of the target weed, area of the State covered by the plan, distribution and extent of the weed, the reasons for declaring the weed and include restrictions and measures required to control, eradicate, or restrict the spread of a weed. While the SWMP for declared weeds will be changed in name to 'Biosecurity Management Plans' under the *Biosecurity Act 2019*, the content of the management plans for declared weed will remain the same as those that are currently available at the time of writing this WDMP.

ENVIRONMENTAL WEEDS

Environmental weeds are non-local plants that invade and change our landscapes, threatening the survival of native plants and animals but they may not be listed as a Declared Weed. They often include 'garden escape' species, and plants that have been introduced through the importation of materials to Tasmania (e.g., straw, hay, seeds).

2.2 CONTEXT OF WEED AND DISEASE MANAGEMENT

WEED AND DISEASE PLANNING AND HYGIENE GUIDELINES

The Weed and Disease Planning and Hygiene Guidelines (the 'Weed and Disease Guidelines') provide management guidance to those undertaking developments in Tasmania that may result in the introduction, spread and establishment of weeds and diseases.

The Weed and Disease Guidelines aim to:

- Improve weed and disease management planning in Tasmania;
- Increase the number of industry-based plans covering weed and hygiene management that are being implemented;

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- Improve weed and disease hygiene practices at the planning and operational level; and
- Provide the necessary tools to allow for effective and informed planning tailored to the situation.

In accordance with the Permit Conditions, the Weed and Disease Guidelines were used to develop this WDMP.

2.3 PERMIT REQUIREMENTS

The WDMP relevant Permit Conditions are provided below.

Permit Conditions
TBC

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SECTION 3 - ROLES AND RESPONSIBILITIES

The WDMP is to be implemented by Markarna Grazing Company Pty Ltd (the Lessee).

Table 4 provides a detailed list of tasks and responsibilities for key staff who perform a role in the management and operation of the Pit.

Broadly, the General Manager has responsibility for implementing the WDMP with a focus on providing the financial resources to implement it, and to conduct reporting and review functions. The Pit Manager has day-to-day responsibility for implementation including the provision of training and inductions to Pit Personnel.

A suitably qualified and experienced person/entity will be engaged on an ad hoc basis to provide advice and information to support the General Manager and Pit Manager with WDMP implementation.

Table 4. Roles and responsibilities for WDMP implementation at the Marshall Bay Lime Sand Pit

Role	Tasks and responsibilities for WDMP implementation
General Manager	• Ensure financial resources are available to fully implement the WDMP. • Review and endorse revisions of the WDMP(s). • Liaise with the Pit Manager to discuss WDMP implementation, and to identify breaches, areas for improvement and/or reviews. • Approve monitoring and compliance reports for submission to regulators (if required). • Notify (in writing) the Environment Protection Authority of any significant breaches of the WDMP.
Pit Manager	• Manage the implementation of the Weed Spraying Program. • Coordinate the implementation of, and assure compliance with, the WDMP, including the preparation of compliance reports. • Implement training and awareness of weed and disease management measures to Pit Personnel through site induction and tool-box meetings. • Ensure that all personnel and contractors that conduct work at the Pit are aware of their obligations under the WDMP. • Engage external advice providers/consultant(s) to conduct weed surveys of the Pit. • Review risk mitigation and management controls and apply adaptive management techniques to meet compliance with WDMP.
Pit Personnel	• Apply weed hygiene measures at the Pit for which they have received training.

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Role	Tasks and responsibilities for WDMP implementation
	• Report breaches of the WDMP to the Pit Manager as soon as practical, providing written details of the breach, and any measures that were immediately taken to reduce the likelihood of any environmental harm. • Report new occurrences of Weeds to the Pit Manager within 5 business days of their detection.
Weed Contractor (if an external contractor is used to conduct weed control works)	• Treat (herbicide) declared and pasture/environmental weeds when requested to do so by the Pit Manager. • Provide written documentation of each spraying event to the Pit Manager within 10 business days of the completion of the spraying program. • Utilise a Weed Spraying Record template to record the following: - areas treated for weeds, - weeds treated (names, abundance, growth stage) - chemicals used and the application rate, - additives/surfactants used and their application rate, - weather conditions at the time during and after the spraying, and - any other comments about the spraying event.
External advice providers and/or consultants	On an as needs basis at the request of the Pit Manager, provide expert advice and information including for example – • Conduct Weed surveys as required. • Provide location data of Weed species and advice on control methods. • Provide on-site assistance and advice with the implementation and performance auditing of the WDMP. • Notify (in writing) the Pit Manager or General Manager of any known or likely WDMP breaches observed when in the Pit within 5 business days of detection.

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SECTION 4 – EXISTING CONDITIONS AND WEED AND DISEASE RISKS

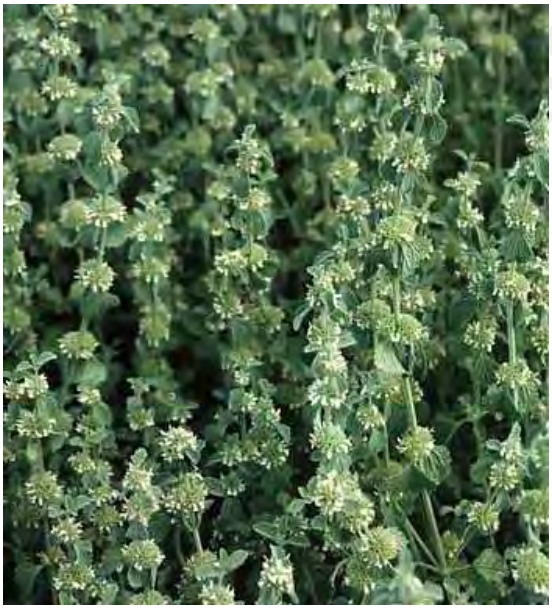
4.1 EXISTING CONDITIONS

The Pit is free of Weeds, with only localised occurrences of Weed species of concern, such as declared weeds like horehound (*Marrubium vulgare*) and slender thistle (*Carduus tenuiflorus*) near the access from Palana Road. See **Plate 1** for images of these two weed species.

This area is mapped as a Priority Weed Management Zone – see **Figure 2.**

The Development Area does support other introduced species, but these are generally agricultural weeds which include grasses and herbs from when the area was more actively used for livestock grazing (e.g. *Briza minor, Poa annua, Vulpia bromoides*, *Cerastium glomeratum*, *Acetosella vulgaris, Hypochaeris radicata, H. glabra, Leontodon saxatilis*). These exotic species are widespread on Flinders Island in the locations where the lime sands are to be spread (i.e. agricultural land).

Plate 1. Images of some Weeds observed in the Marshall Bay Lime Sand Extraction Pit

Horehound	Slender thistle
	

4.2 WEEDS

4.2.1 IDENTIFICATION

Various sources of information were compiled to identify those species with known or potential occurrences at the Pit and adjoining land.

The sources of information included:

- Site surveys conducted in mid-2023 and early 2024 by Dr Richard Barnes; and
- Existing recorded locations held in the Natural Values Atlas (see **Attachment 1**).

'Weed Groups' are also identified because it is likely that species of exotic herbs and grasses are likely to be present (but may not be listed as a Declared Weed) but were not specifically detected in previous surveys; many of these 'pasture' weeds can be treated as a functional group for management purposes.

4.2.2 RISK ASSESSMENT

To identify the most significant or likely problematic weed species in the Pit, a risk category rating was developed and applied to each Weed listed in **Table 6.** **Table 5** provides a list of the risk categories developed for this WDMP.

Table 5. Risk categories developed and used for Weed species in the Pit

Risk Category	Description of category	Example of Weed and primary actions for management
1	Declared Weed and/or WONS, **known** to be present in Pit and/or on adjoining land.	Highly invasive species, often produces high number of seeds, hardy and can persist to the detriment of desirable plant species; examples are slender thistles, and horehound. Detection and eradication are the WDMP management objectives.
2	All other Declared Weed/WONS species.	Often invasive, to highly invasive species, can establish rapidly if left unmanaged; example is Paterson's curse. Monitoring/surveillance and then eradication if detected are the WDMP management objectives.
3	A highly to moderately invasive environmental weed known to be present in the Pit, on adjoining land and/or in the region.	Monitoring/surveillance followed by eradication (Declared Weeds) or control (other Weeds) if the species is detected. The level of control effort ought to be commensurate with the species (Weed) and the level of risk specifically posed to the Pit and surrounding lands; advice may need to be sought from a suitably qualified person on a case-by-case basis.

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4	Includes known occurrences of common pasture grasses, herbs and other exotic species that on balance pose little to no threat to the environment in the Pit. Species that are common and/or naturalised in many environments in Tasmania are also included in this category.	Common, widespread, or naturalised species which include pasture grasses, exotic herbs, ornamental species; example is cocksfoot, sheep sorrel, dock, spear thistle, dandelion.

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Table 6. Compiled weed list and assessment of risk and management requirements for the Marshall Bay Lime Sand Extraction Pit

Common name	*Scientific name*	WoNS?	Declared? (SWMP Flinders Municipality objective*)	Type of occurrence in Development Area		Risk category for this WDMP
				Access Road to Pad (WPMZ[2])	Extraction Pit	
blackberry	*Rubus fruticosus* agg.	**Y**	**Y (A)**	Absent	Absent	**2**
briar rose	*Rosa rubiginosa*	N	N	Absent	Absent	3
bridle creeper	*Asparagus asparagoides*		**Y (A)**	Absent	Absent	**2**
Californian thistle	*Cirsium arvense*	N	**Y (A)**	Absent	Absent	**2**
capeweed	*Arctotheca calendula*	N	N	**Present**	**Present**	3
Cat's ear (smooth and rough)	*Hypochaeris radicata* and *H. glabra*	N	N	**Present**	**Present**	4
chickweed	*Stellaria media*	N	N	**Present**	**Present**	4
chilean needlegrass	*Nassella neesiana*	N	**Y (A)**	Absent	Absent	**2**
Clover (including sweet clover)	*Trifolium* spp.	N	N	**Present**	**Present**	4
cocksfoot	*Dactylis glomerata*	N	N	Absent	**Present**	4

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[2] Weed Priority Management Zone

espartillo	*Amelichloa caudata*	N	**Y (A)**	Absent	Absent	**2**
Fennel	*Foeniculum vulgare*	N	**Y (A)**	Absent	Absent	**2**
gorse	*Ulex europaeus*	**Y**	**Y (A)**	Absent	Absent	**2**
hawkbit	*Leontodon saxatilis*	N	N	**Present**	**Present**	4
Horehound	*Marrubium vulgare*	N	**Y (B)**	**Present**	Absent	**1**
Montpelier broom	*Genista monspessulana*	**Y**	**Y (A)**	Absent	Absent	**2**
patersons curse	*Echium plantagineum*	**Y**	**Y (A)**	Absent	Absent	**2**
radiata pine	*Pinus radiata*	N	N	Absent	Absent	3
ragwort	*Senecio jacobea*	N	**Y (A)**	Absent	Absent	**2**
sheep sorrel	*Acetosella vulgaris*	N	N	**Present**	**Present**	4
slender thistle	*Carduus tenuiflorus*	N	**Y (B)**	**Present**	Absent	**1**
spear thistle	*Cirsium vulgare*	N	N	**Present**	**Present**	**3**
wild mignonette	*Reseda luteola*	N	N	Absent	Absent	**3**
Yorkshire fog grass	*Holcus lanatus*	N	N	Absent	**Present**	4

* **A** = Eradication is the most appropriate management objective for Zone A municipalities, or when a credible plan for eradicating existing infestations is being developed and implemented. The ultimate management outcome for Zone A municipalities is achieving and maintaining the total absence of the weed from within municipal boundaries. **B** = Containment within municipal boundaries, protection of specified areas within municipal boundaries, prevention of spread to Zone A municipalities. This applies to all Zone B municipalities).

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4.3 DISEASES AND PATHOGENS

Pathogens and the diseases can be very difficult to eradicate, and once detected, containment may be the only practical management solution. Prevention is the most effective management strategy, and that can be best achieved by having robust hygiene measures in place.

4.3.1 PHYTOPHTHORA CINNAMOMI, PC

Phytophthora dieback is an introduced pathogenic water mould. Water moulds were once included in the fungi kingdom and, as a result, *Phytophthora* dieback has been called a fungus in earlier interpretation literature. Its scientific name is *Phytophthora cinnamomi,* but it is also known by the names root rot, cinnamon fungus, jarrah dieback (Western Australia) and wildflower dieback.

It is one of the worst invasive plant pathogens in the world, and in Australia is recognised as a Key Threatening Process that severely degrades susceptible vegetation communities and kills susceptible plants. It is believed to have been introduced to Tasmania during early European settlement and is now well established in many areas of moorland, heathland, and dry Eucalypt forest in Tasmania. Some threatened plant species in Tasmania are known to be declining because of *Phytophthora* dieback and more threatened species could also be affected should the fungus be introduced to their populations. People can transport the pathogen into new areas in dirt adhering to vehicles, items they are carrying or footwear.

BIOLOGY AND IDENTIFICATION

PC belongs to a group of micro-organisms known as water moulds – these have a motile or animal-like stage which fungi do not. Water moulds require moist conditions to thrive. Its food source is the root and basal stem tissue of living plants where PC grows as microscopic sized filaments (mycelium) in susceptible host plants. It consumes the host plant causing lesions (areas that appear rotten) which weaken or kill the plants by reducing or stopping the movement of water and nutrients within the plant. Infected plants often have dead new growth, or wilting tips of new foliage.

PC may reproduce through production of microscopic spores. Two types of spores, zoospores and chlamydospores, are most likely to be formed in Tasmanian habitats:

1. Zoospores are released in very large numbers under moist soil conditions. They have flagella (tails), which are used to propel the spore through the soil water towards other plant roots. The movement of water down slope, through or over the soil, can also passively disperse these spores over considerable distances. Zoospores are attracted by the root secretions of some plants. They then penetrate the root, germinate and the cycle repeats itself.

2. Chlamydospores are larger, long-lived spores with thick protective walls. These spores can withstand dry conditions for months, germinating when warm moist soil conditions re-occur. They are one of the mechanisms the fungus has developed to help it survive adverse conditions. These spores may survive being transported long distances in dry soil.

PC may also spread through mycelial growth along roots and spread between closely connecting plant roots within the soil. There are many diseases which occur in native vegetation and the majority of these are natural events which play an important ecological role. The patterns of disease expression in time and space as well as the species affected, and dieback symptoms need to be assessed to identify potential PC infestations.

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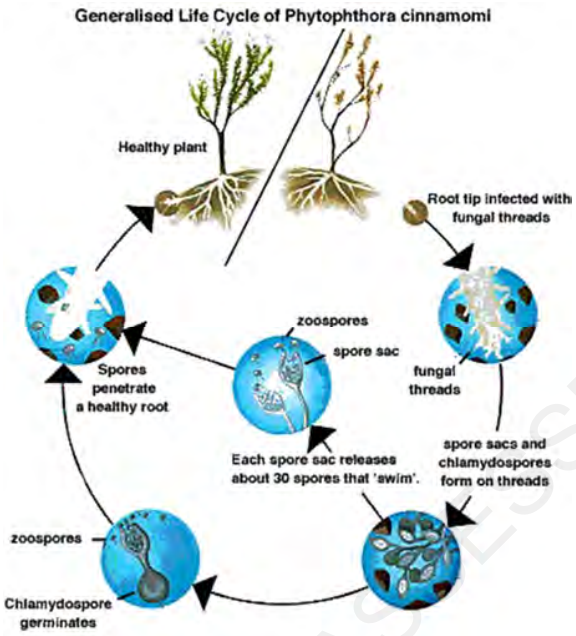
Conclusive identification of PC as the cause of disease requires analysis of soil or root samples in a laboratory, but soil/root samples are pointless to have assessed if there are no plant host species present.



Source: DPIPWE.

Good indicators for recent or active PC are:

- Death or disease in known susceptible species (note: not all individual plants will be attacked simultaneously in a diseased area),
- Diseased plants show discolouration of the foliage (especially new foliage), most commonly reds and yellows,
- Known resistant species remain healthy,
- There is a temporal sequence of disease across a site (e.g., the oldest death in the centre or towards the uphill end of infections on slopes), and
- Sharp disease fronts or boundaries between healthy and diseased vegetation may be present.

In the absence of plant host species (especially resistant species) it is likely that PC can disappear or become inactive at a site until a suitable host plant recolonises the PC affected area.

DISTRIBUTION AND IMPACT

PC requires warm moist soils if it is to reproduce and spread which its distribution in Tasmania to areas that are generally below about 700 m in altitude and prevents it affecting low rainfall areas such as the Tasmanian midlands. The figure below provides an indication of the occurrence of PC in Tasmania (NVA held data). Cold soil conditions can also occur at altitudes below 700 metres where a dense forest canopy shades the ground. For this reason, wet forest and rainforest communities are not susceptible to PC in their undisturbed state.

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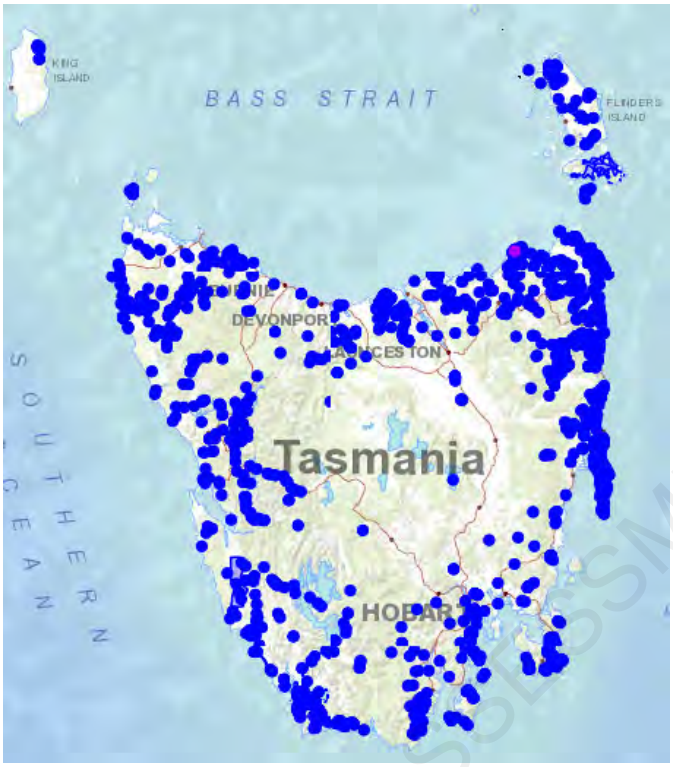

The vegetation types most affected in Tasmania are heathland, moorland, dry sclerophyll forest. These vegetation types occur within the climatically susceptible areas and contain susceptible plant species. Moorland and heathland communities are perhaps the most severely affected as many of the shrub species present in these communities are susceptible to *P. cinnamomi*.

Because of this management environment, the approach taken has been to focus on protecting plant species and communities that are most at risk, where goals are practicable and achievable in the long term. It is accepted that the disease epidemic will inevitably run its course in many areas through wildlife and water mediated spread. Preventing infestation of disease-free areas is the primary goal for managing biodiversity assets. The assets identified for management are threatened species that are susceptible to disease, large disease-free areas of susceptible native vegetation and highly susceptible communities.

The report *Conservation of Tasmanian Plant Species & Communities Threatened by Phytophthora cinnamomi* (Schahinger *et al.* 2003) identifies all the priority areas for management of the biodiversity assets at risk in Tasmania. These sites capture the large disease-free areas and biographically representative sites for the highly susceptible communities and at least three populations where possible for each PC susceptible threatened species.

Prescriptions that apply to prevent the introduction of Phytophthora root rot to uninfected areas include:

- managing developments and works that increase the risk of introduction e.g., roads and walking tracks,
- track rerouting, track hardening and drainage management, one-way tracks and access management sourcing materials to be used in management works from PC-free stock,
- sequencing and timing operations to reduce risk of introduction, and

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- hygiene prescriptions such as washdown requirements.

PC AND THE PIT

Previous Information

The Natural Values Atlas holds one historical location of PC to the north of the Pit, in an area of heathland on the side of Palana Road (i.e., confirmed location). PC symptoms in susceptible species have not been observed in the Pit over the past 3 years of attendance by ecologists at the site for surveys and assessments of the available resource.

The Pit is not within a ***P. cinnamomi* Management Area**[3] hence, the recommendations and management requirements stipulated in Schahinger *et al.* (2003) are not relevant to the Pit.

Vegetation

There is native forest vegetation adjacent to working areas. The vegetation is dry coastal scrub on alkaline sands which is generally not highly susceptible to PC in an undisturbed state[4].

Drier vegetation with a scrubby understorey occurs to the north of the Active Management Zone and there are numerous susceptible species present, and some have a high percentage of coverage in the vegetation community (e.g. species of Ericaceae, Proteaceae, and Fabaceae).

No symptoms of PC have been observed in the susceptible species present in the adjacent and surrounding vegetation since 2019.

Conclusion

The risk assessment conducted indicates that the potential for PC to be present and/or active at the Pit is small. No specific recommendations are made for the management of PC because management measures, such as vehicle/hygiene measures described in this WDMP, are adequate to keep the risk to a low level.

4.3.2 MYRTLE WILT

Myrtle wilt, caused by a wind-borne fungus (*Chalara australis*), occurs naturally in rainforest where myrtle beech (*Nothofagus cunninghamii*) is present. The fungus enters wounds in the tree, usually caused by damage from wood-boring insects, wind damage and forest clearing. The incidence of myrtle wilt often increases forest clearing events such as windthrow and wildfire.

Nothofagus cunninghamii is not present within the Pit nor on Flinders Island (it is naturally absent). As such, no special management measures are considered warranted.

[3] Report on Conservation of Tasmanian Plant Species & Communities Threatened by *Phytophthora cinnamomi*. Copyright Government of Tasmania 2003. Written by Schahinger, R., Rudman T., and Wardlaw, T. J. (DPIWE). ISSN 1441-0680.

[4] Flora Technical Note No. 8: Management of Phytophthora cinnamomi in production forest. Version 2.4 August 2019

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4.3.3 MYRTLE RUST

Myrtle rust is a disease limited to plants in the Myrtaceae family. This plant disease is a member of the guava rust complex caused by *Austropuccinia psidii*, a known significant pathogen of Myrtaceae plants outside Australia. Infestations are currently limited to NSW, Victoria, Queensland, and Tasmania (DPIPWE 2015).

Based on database records, there is no evidence of myrtle rust ever being observed or formally recorded at or near the Pit. As such, no special management measures are considered warranted.

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SECTION 5 – MANAGEMENT CONTROLS

5.1 INDUCTIONS AND AWARENESS TRAINING

To reduce the risk of weeds entering and establishing within the Pit, staff and contractors should be aware of the required weed control measures for the Pit.

Training and inductions for staff and contractors, as well as the provision of information/posters at the site office, will enhance the knowledge of those working on the site which in turn should improve outcomes for early detection and an appropriate response. Weed 'detection' surveys conducted by a suitably qualified person will complement these measures.

All personnel and contractors and their employees must undergo an induction which is to include basic weed and disease management awareness training.

Additional information will be provided to Pit Personnel and contractors where there are specific Weed related issues associated with their roles on the site, including for example –

- The floating of machinery and equipment to and from the Pit;
- Operating, moving, and/or cleaning heavy machinery and equipment; and
- Handling earth-based material.

The Pit Manager is responsible for including appropriate information into the induction process.

ACTIONS

Management Measure	Description	Guidance for implementation
1	**Provide a hard copy of the WDMP at the Site Office at the Pit.** The location of the WDMP in the Site Office is to form part of the Site Induction process.	A hard copy of the WDMP is to be stored at the Site Office in the Pit and is replaced with newer versions as they are approved by the EPA.
2	**Provide images/posters of the highest risk Weeds at the Site Office.** The highest risk weeds are to be discussed with staff during the Site Induction and resources provided to enable Pit Personnel to know what some of the highest risk weeds look like.	Provide information/posters at the Site Office for the following species: • Horehound • Slender thistle • Spear thistle

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5.2 PREVENTATIVE MEASURES

The best approach to Weed and Disease management is to –

1. minimise the spread of known Weed occurrences within the Pit;
2. prevent the introduction of Weeds to the Pit that are not already present or on adjoining land; and to
3. prevent the introduction of PC to the Pit.

VEHICLE AND MACHINERY FLOATED TO SITE – 'CLEAN POLICY'

A 'Clean Policy' is to be applied for all Machinery and Equipment entering the Pit.

Heavy machinery, such as excavators and bulldozers, can carry large clods of dirt and mud in which propagules (e.g. seeds, rhizome) can be lodged. Clods can fall of at the Pit, and the propagules or PC spores are then able to commence germination and colonisation of the disturbed ground at the Pit.

The highest risk of transporting propagules is from heavy machinery, such as excavators, as these can carry clods of dirt and mud in which seed propagules can be lodged. Transport trucks pose little risk to the transportation of Weed propagules if they remain on the hard surface of the roads (even if they are unsealed) and loading area **and** that these areas are managed to exclude Weeds.

A suitably qualified person is to inspect Machinery and Equipment prior to it entering the Pit.

Specific inspection locations on If the Machinery or Equipment fails to pass an inspection, it will be refused entry to the Weed Management Area and sent away for further cleaning.

A **Machinery Hygiene Inspection Sheet** is to be used to record the machine/equipment brought into the Pit, and from where it has been floated.

ACTIONS

Management Measure	Description	Guidance for implementation
3	**Machinery (e.g. excavators, bulldozers, cranes, etc) must be brought to the Pit in a clean condition;** free of weed propagules, clods of dirt and vegetative matter. If the Machinery or Equipment fails an inspection, it will be refused entry to the Weed Management Area until it has undergone additional cleaning.	See **Attachment 3** for key inspection points when examining Machinery and Equipment.
4	A **Machinery Hygiene Inspection Sheet** is to be used to record the machine/equipment brought into the Weed Management Area, and from where it has been floated.	See **Attachment 3** for example Inspection Sheets for each type of Machinery or Equipment.

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VEHICLE TRAVELLING TO THE PIT ON PUBLIC ROADS

Transport trucks (excluding those carting earth-based materials) pose little risk of transporting Weed propagules or Disease if they remain on the hard surface of the roads (even if they are unsealed). Accordingly, heavy and light vehicles travelling on public roads to the Pit do not need to be washed down as the risk of transporting Weed propagules to the Pit is very low.

SOIL IMPORTATION

No earth-based material including for example topsoil, roadside excavated spoil, overburden, and/or clay, is to be brought into the Pit.

5.3 RESPONSIVE MEASURES

If Weeds are spread within or introduced to the Pit then it is critical that an appropriate response is initiated as soon as possible. Early detection is the key to successful control/eradication measures for the lowest possible price. Weeds left undetected or unmanaged can become a major problem and their impact may cost time and funds to ameliorate.

Table 7 provides a summary of the key Weed species for early detection and subsequent management at the Pit.

Table 7. Main dispersal vectors and management options for significant Weeds

Common Name	Scientific name	Main dispersal vector	Options for management and control
pampas grass	*Cortaderia* sp.	Seed (prolific)	Spraying Physical removal
Californian thistle	*Cirsium arvense*	Rhizome and seed	Spraying
English broom	*Cytisus scoparius*	Seed	Spraying Physical removal
Ragwort	*Senecio jacobea*	Seed	Spraying Physical removal
slender thistle	*Carduus tenuiflorus* and *Carduus pycnocephalus*	Seed (prolific)	Spraying
gorse	*Ulex europaeus*	Seed	Spraying
Montpelier broom	*Genista monspessulana*	Seed	Spraying

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capeweed	*Arctotheca calendula*	Seed	Spraying
blackberry	*Rubus fruticosus* agg.	Seed	Spraying
Fennel	*Foeniculum vulgare*	Seed	Spraying
Horehound	*Marrubium vulgare*	Seed	Spraying Physical removal
spear thistle	*Cirsium vulgare*	Seed (prolific)	Spraying
wild mignonette	*Reseda luteola*	Seed (prolific)	Spraying Physical removal

PHYSICAL REMOVAL

In some cases, it may be possible to physically remove and/or dispose of Weeds.

Such cases are likely to be possible where there are few plants and/or they cover a small area, or they are weeds which can be easily pulled out without leaving a rhizome or rootstock behind – any rhizome or rootstock left behind may reshoot and cause higher number of plants to be present (e.g., Californian thistle spreads well by rhizome). This method of control can be very time consuming, and labour intensive for large areas.

Weeds physically removed should be bagged and placed into a suitable disposal bin or they can be buried.

If weeds have seeds or flowerheads present then these can be removed, bagged, and disposed of prior to the main part of the plant being sprayed or excavated and buried. The removal of flowerheads and/or seed (e.g., thistles can produce thousands of seeds per mature plant) can assist with reducing the number of weed propagules that may otherwise spread in the Pit.

WEED SPRAYING PROGRAM

Despite preventative measures, it is inevitable that Weeds will establish and grow somewhere in the Pit, especially for seed dispersed seeds where birds and wind are the primary dispersal vectors. Weeds will continue to sporadically recruit and grow as expected for any disturbed/modified landscape with a moderate to high abundance of weed propagule sources in adjoining areas. Weed for example may include thistles, woody weeds, and pasture herbs and grasses.

A Weed Spraying Program (the 'WSP') will be implemented at the Pit.

The weed spraying program will be in accordance with the Rivercare 'Guideline for Safe and Effective Herbicide Use near Water' (**Attachment 2**).

The WSP will be reviewed each growing season (September to October) and updated as new information about the occurrence of Weeds within the Pit become available.

The Program each year will take the form of a Works Plan which will comprise the following –

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1. **A map showing the areas where weeds occur**, what species they are and a works area number (to reference to the associated spreadsheet); and

2. **A spreadsheet to identify the works area**, weed(s) of concern and the management of that weed or group of weeds (see **Attachment 4** for an example).

The WSP spreadsheet will be updated electronically with a new worksheet for each Work Plan to maintain a record of the works recorded and completed. The printed version of the Works Plan once implemented will be signed by the officer responsible for the works and filed at the site office for future reference and/or auditing.

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SECTION 6 – MONITORING

This section details the monitoring program for the WDMP.

6.1 WEED SPRAYING PROGRAM

The areas where weed spraying has occurred will be assessed no more 3 weeks after the treatment was applied to determine if the measures implemented were successful or likely to be effective if the effect is delayed due to colder or inclement weather.

Where measures have proved unsuccessful, repetition and/or modification of the weed control technique(s) will be employed.

6.2 WEED SURVEILLANCE

The early detection of Weeds is important to ensure that any control or eradication program has the highest likelihood of success.

6.2.1 SURVEY FREQUENCY

Surveillance surveys are to be conducted to identify Weeds within the Pit at regular intervals (at least once annually) that coincide with the peak weed growth periods and/or the weed spraying season. This approach should enable the early detection of Weeds before they reach an extent where control and eradication are costly and/or difficult to achieve. **Table 8** provides the minimum frequency at which surveillance surveys are to be conducted for each management zone.

Table 8. Management zones for weed and disease management at the Marshall Bay Lime Sand Pit

Zone	Zone Name	Survey frequency and recommended timing
1	Weed Priority Management Zone	Monthly
2	Remainder of Development Area	At least once every two years; generally, between October and January.

6.2.2 SURVEY METHODS

The following survey regime will be applied to each zone:

1. Surveys and assessments by a suitably qualified person are to –
    a. identify, record, and map any new weed species not previously recorded;

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b. assess and map the extent of known Weed infestations to determine if they are becoming larger and/or more significant such that control measures can be modified; and

c. review/assess the control works that have been conducted and provide advice on the management of Weeds.

2. Areas where Weed control/eradication works have occurred (e.g., spraying) will also be assessed during a surveillance survey to determine if the measures implemented were successful. Where measures have proved unsuccessful, repetition and/or modification of the weed control technique(s) will be employed.

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SECTION 7 – RECORDS AND REVIEW

7.1 RECORDS

Compliance and corrective actions taken to address any non-compliances with the WDMP will be managed by operational management, which includes the collection and keeping of records.

WEED SPRAYING RECORDS

Details of each WSP (see section 6.1) are to be provided to the Pit Manager by the Weed Contractor (if engaged to provide weed spraying services) which are to include as a minimum:

- the date of spraying, and general weather conditions;
- the name of the herbicide/chemical mix applied, volumes of each chemical used, and the weeds targeted with each herbicide/chemical mix; and
- a map (hand-drawn is acceptable) of the area sprayed with each chemical mix (if different chemical mixes were applied).

Records will be stored and retained by the Pit Manager for at least 5 years.

WEED SURVEILLANCE RECORDS

Details of each Weed surveillance monitoring event (see section 6.2) will be recorded in the form of a report (to be prepared by the person conducting the surveillance survey).

A Weed surveillance report prepared under this WDMP must include the following:

- a list of the Weed species observed;
- a map of the observed Weed locations; and
- management recommendations to control or eradicate the Weeds identified in the report.

Reports will be submitted to and retained by the Pit Manager for at least 5 years.

7.2 REVIEW

CONTINUAL IMPROVEMENT

Opportunities for improvement of Weed management measures will be discussed internally at toolbox meetings and in conjunction with other personnel, contractors, and consultants.

PLAN REVIEW

The WDMP is to be reviewed every 3 years from the date of EPA approval.

A review may be of short duration and not result in any change to the WDMP, especially if there are no non-compliances to report.

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If necessary, to improve environmental performance, cater for a modification, or comply with a direction, this WDMP must be revised, to the satisfaction of the EPA and submitted to the Director for approval.

The existing EPA approved WDMP would continue to apply until a new WDMP is approved by the EPA Director.

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SECTION 8 - ATTACHMENTS

ATTACHMENT 1 – NATURAL VALUES ATLAS REPORT JULY 2024

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Natural Values Atlas Report

Authoritative, comprehensive information on Tasmania's natural values.

Reference:
Requested For:
Report Type: Summary Report
Timestamp: 06:13:44 PM Saturday 16 November 2024

Tasmanian Weed Management Act Weeds: buffers Min: 500m Max: 5000m
Priority Weeds: buffers Min: 500m Max: 5000m
Biosecurity Risks: buffer 1000m

The centroid for this query GDA94: 577284.0, 5578649.0 falls within:

Property: 3513143

*** No Tas Management Act Weeds found within 500 metres ***

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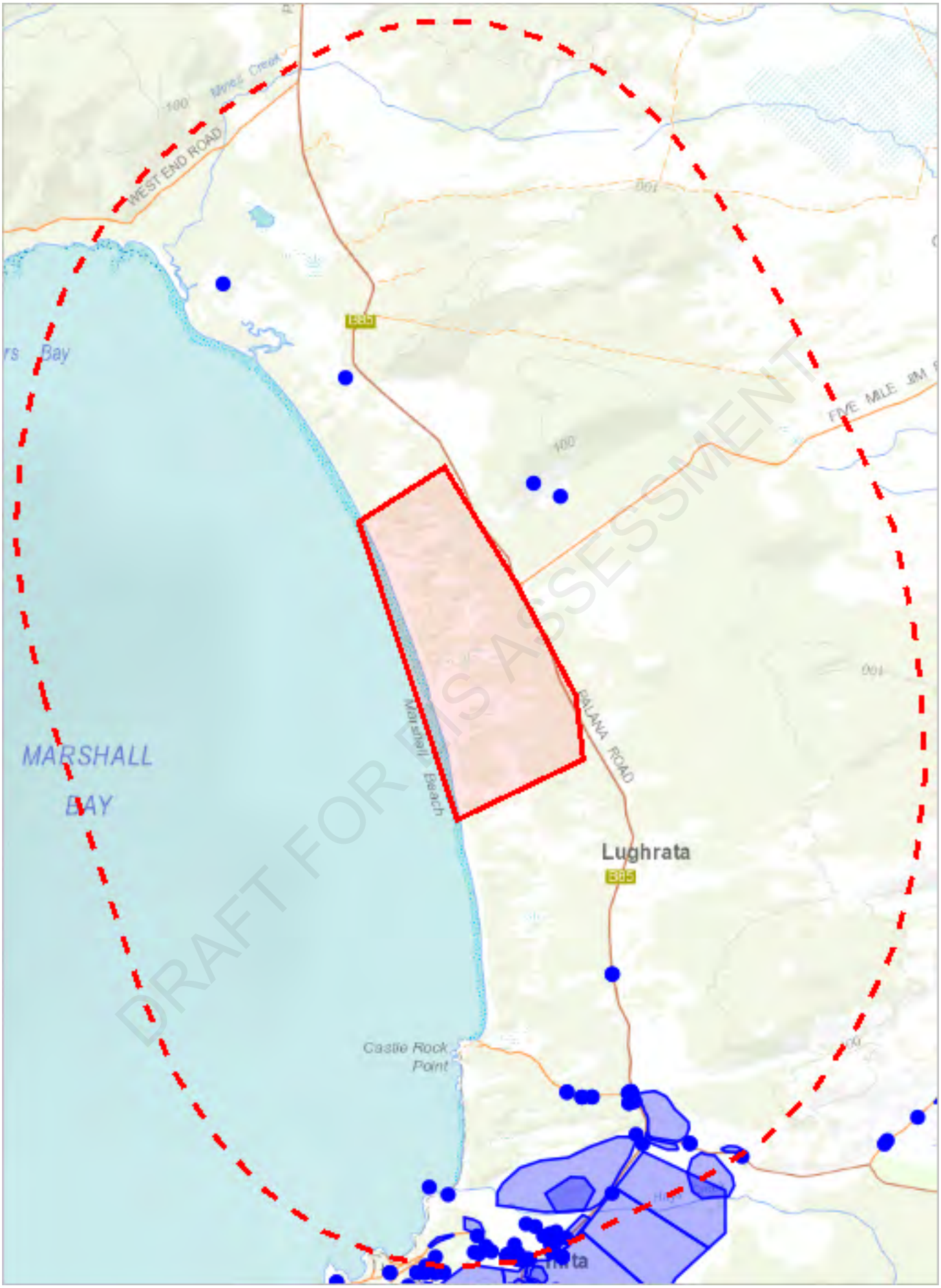
Tas Management Act Weeds within 5000 m

582624, 5585914



571959, 5571480

Please note that some layers may not display at all requested map scales

Tas Management Act Weeds within 5000 m

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

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Tas Management Act Weeds within 5000 m

Verified Records

Species	Common Name	Observation Count	Last Recorded
Amelichloa caudata	espartillo	15	11-Sep-2023
Asparagus asparagoides	bridal creeper	2	06-May-2023
Echium plantagineum	patersons curse	5	01-Nov-2001
Foeniculum vulgare	fennel	2	05-Dec-2012
Genista monspessulana	montpellier broom or canary broom	1	05-Dec-2012
Lycium ferocissimum	african boxthorn	20	05-Nov-2019
Marrubium vulgare	white horehound	21	18-Aug-2022
Nassella neesiana	chilean needlegrass	12	18-Aug-2022
Senecio jacobaea	ragwort	1	09-Sep-2023

Unverified Records

For more information about introduced weed species, please visit the following URL for contact details in your area:

https://www.nre.tas.gov.au/invasive-species/weeds

*** No Priority Weeds found within 500 metres ***

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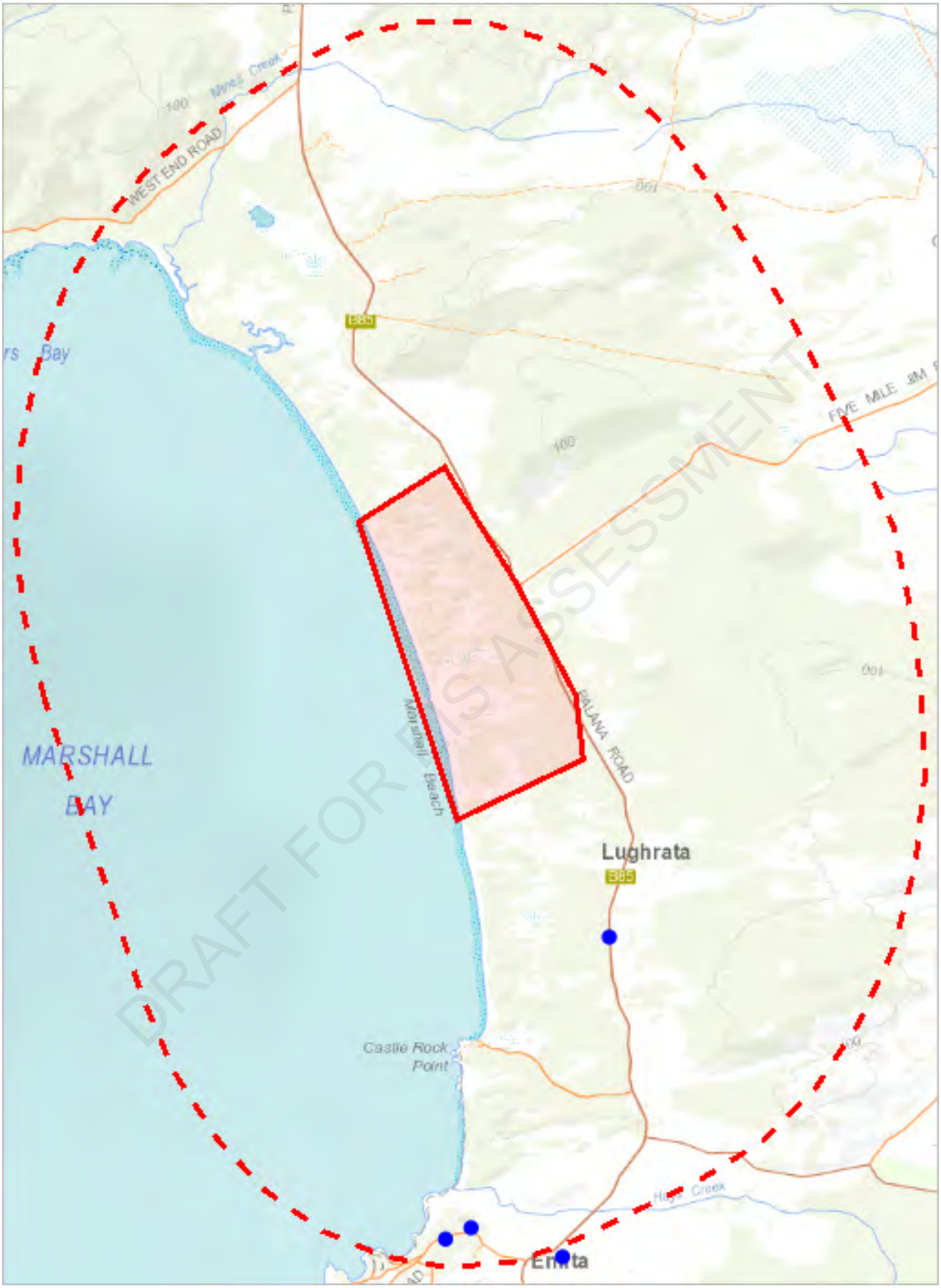
Priority Weeds within 5000 m

582624, 5585914



571959, 5571480

Please note that some layers may not display at all requested map scales

Priority Weeds within 5000 m

Legend: Verified and Unverified observations

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Cadastral Parcels

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Priority Weeds within 5000 m

Annexure: 16.2.3

Verified Records

Species	Common Name	Observation Count	Last Recorded
Billardiera heterophylla	bluebell creeper	1	24-Jun-2023
Polygala myrtifolia	myrtleleaf milkwort	1	13-May-2023
Reseda luteola	weld	1	04-Dec-2012

Unverified Records

For more information about introduced weed species, please visit the following URL for contact details in your area:

https://www.nre.tas.gov.au/invasive-species/weeds

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Known biosecurity risks within 1000 meters

579504, 5581895

575072, 5575510

Please note that some layers may not display at all requested map scales

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Known biosecurity risks within 1000 meters

Annexure: 16.2.3

Legend: Biosecurity Risk Species

- Point Verified
- Point Unverified
- Line Verified
- Line Unverified
- Polygon Verified
- Polygon Unverified

Legend: Hygiene infrastructure

- Location Point Verified
- Location Point Unverified
- Location Line Verified
- Location Line Unverified
- Location Polygon Verified
- Location Polygon Unverified

Legend: Cadastral Parcels

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Known biosecurity risks within 1000 meters

Verified Species of biosecurity risk

No verified species of biosecurity risk found within 1000 metres

Unverified Species of biosecurity risk

No unverified species of biosecurity risk found within 1000 metres

Generic Biosecurity Guidelines

The level and type of hygiene protocols required will vary depending on the tenure, activity and land use of the area. In all cases adhere to the land manager's biosecurity (hygiene) protocols. As a minimum always Check / Clean / Dry (Disinfect) clothing and equipment before trips and between sites within a trip as needed https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene/keeping-it-clean-a-tasmanian-field-hygiene-manual

On Reserved land, the more remote, infrequently visited and undisturbed areas require tighter biosecurity measures.

In addition, where susceptible species and communities are known to occur, tighter biosecurity measures are required.

Apply controls relevant to the area / activity:

- Don't access sites infested with pathogen or weed species unless absolutely necessary. If it is necessary to visit, adopt high level hygiene protocols.
- Consider not accessing non-infested sites containing known susceptible species / communities. If it is necessary to visit, adopt high level hygiene protocols.
- Don't undertake activities that might spread pest / pathogen / weed species such as deliberately moving soil or water between areas.
- Modify / restrict activities to reduce the chance of spreading pest / pathogen / weed species e.g. avoid periods when weeds are seeding, avoid clothing/equipment that excessively collects soil and plant material e.g. Velcro, excessive tread on boots.
- Plan routes to visit clean (uninfested) sites prior to dirty (infested) sites. Do not travel through infested areas when moving between sites.
- Minimise the movement of soil, water, plant material and hitchhiking wildlife between areas by using the Check / Clean / Dry (Disinfect when drying is not possible) procedure for all clothing, footwear, equipment, hand tools and vehicles https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene
- Neoprene and netting can take 48 hours to dry, use non-porous gear wherever possible.
- Use walking track boot wash stations where available.
- Keep a hygiene kit in the vehicle that includes a scrubbing brush, boot pick, and disinfectant https://www.nre.tas.gov.au/invasive-species/weeds/weed-hygiene/keeping-it-clean-a-tasmanian-field-hygiene-manual
- Dispose of all freshwater away from natural water bodies e.g. do not empty water into streams or ponds.
- Dispose of used disinfectant ideally in town though a treatment or septic system. Always keep disinfectant well away from natural water systems.
- Securely contain any high risk pest / pathogen / weed species that must be collected and moved e.g. biological samples.

Hygiene Infrastructure

No known hygiene infrastructure found within 1000 metres

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ATTACHMENT 2 – GUIDELINES FOR SAFE AND EFFECTIVE HERBICIDE USE NEAR WATERWAYS

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Photograph: Lynn Broos

Guidelines for Safe and Effective Herbicide Use Near Waterways

The control and management of weeds near waterbodies is a challenge faced by many landholders across Tasmania. Waterbodies are particularly sensitive to herbicide contamination, so the decision to apply herbicides in the vicinity must be taken with great care.

Weed control near waterbodies requires a long-term commitment to eradication, perhaps 5–10 years or more, as the seed banks of many 'woody' weed species (eg blackberries, gorse) may remain viable for decades. Weeds can also spread along watercourses, making their control difficult. A staged, planned approach to weed control, alongside a program to re-establish native riparian species, is necessary to ensure the safe restoration of riparian areas. Restoring native vegetation helps to reduce the presence of weed species, ensures the stability of banks, shades the waterway (which helps prevent future weed invasion), and provides habitat for local fauna.

Definitions

For the purposes of this guideline, the following definitions apply:

Riparian land	Any land that adjoins, directly influences, or is influenced by a body of water at any time of the year.
Waterbody	Includes natural watercourses (streams, creeks, rivers), natural wetlands, ponds, lagoons, constructed drainage channels, dams and ponds, reservoirs and lakes.
Permanently inundated/perennial	These areas have water all year round.
Occasionally inundated/ intermittent	These areas have water some time of the year.
Rarely inundated/ephemeral	These are areas that rarely contain water (eg areas that flood on rare occasions).
Toxicity	The inherent poisonous quality/qualities of a substance, measured by what size dose is likely to cause harm (acute toxicity is measured by the amount of active ingredient - mg/kg live body weight - required to kill 50% of a test group of animals - this is called LD50).

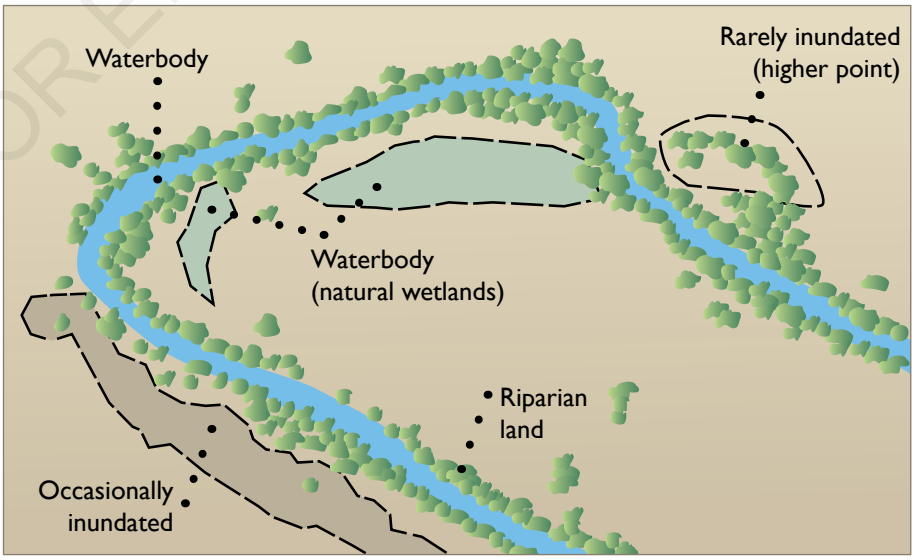

Figure 1: Appropriate and effective herbicide usage near water requires consideration of specific situations

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A Planned Approach

Assess your site

What type of waterbody is it?

If your site is permanently inundated, you need to consider very carefully the choice of herbicide, recognising the risk to your aquatic ecosystem and the danger that the herbicide may pose to the surrounding environment. You also need to identify points of access to the site.

If your site is occasionally or rarely inundated, choose a time when the chance of rainfall is low and therefore the risk of runoff contaminated with herbicide is likely to be low. Figure 1. illustrates the different zones found in aquatic situations which may affect herbicide use.

What types of weeds are present?

Identify the species of weed and the extent of the infestation. Table 2 details the recommended herbicide control for a number of riparian weeds, the method and time of year for application. It also suggests alternatives to the use of chemicals.

Do the weeds have value at the site?

Consider whether the weeds are serving a useful purpose at the site. They may be acting as a buffer to control erosion, or as a filter to promote water quality. They may have a value to animal species as a source of food or shelter.

If you believe that you have native plants or animals that might be adversely affected by your proposed weed control, seek professional advice.

You may be able to stage the removal of weeds to minimise any impact on erosion or on animal life. You will almost certainly need to restore the habitat once weeds have been eradicated.

Are native species present at the site?

Identify any native plant species at your site. You may need to protect these species from overspray or mark them to prevent accidental spraying. These native plants will be the starting point to restoring the riparian zone.

Choose your control method

Landholders should always consider non-chemical solutions as a preferred option before deciding to use herbicides. These include biological control (eg by introduction of gorse mite, see photo below), slashing, mulching, controlled grazing (controlling timing, intensity and frequency), or hand removal. Often a combination of chemical and non-chemical methods is most appropriate. Whichever method or combination of methods is used, it is important to consider the potential negative impacts on the environment and limit these as much as possible.

Biological agents such as Gorse spider mite may be options for use near waterways, courtesy of Tasmanian Institute of Agriculture.

Understanding herbicides

Herbicides are designed to control and eradicate pest plants ('weeds'). However, it is important to realise that many herbicides have toxic effects in aquatic ecosystems. Native plants, invertebrates, frogs and fish may be harmed by herbicides. The inappropriate use of herbicides may also cause significant risks to human health where water is pumped from a bore for domestic use, or flows to reservoirs.

Herbicides can enter waterbodies either directly through spray or spray drift, or they can move into waterbodies via surface water run-off or leaching and sub-surface draining.

Herbicides can be broadly classified according to their chemical structures and modes of action. Table 1 shows the three major types of herbicide.

Table 1: Herbicide classification

Pre-emergent (residual)	These herbicides are designed to inhibit the germination of pest plants. They are therefore applied before the pest plant germinates and are often residual in the soil for long periods. They are generally not considered to be safe for use near waterbodies and are not recommended for use due to their persistence in the environment.
Knockdown non-selective	These herbicides are designed to be applied directly to the target pest plant, either through being sprayed onto foliage or applied directly to the cambium layer using any of the direct application methods described in Table 3. They may vary in mode of action and some may persist as residues in the environment.
Selective	Selective herbicides are designed to act on only one type of pest plant. Generally, selective herbicides will control either broadleaf (eg capeweed), grasses (eg phalaris) or woody weeds (eg broom). These herbicides are useful when the focus may be on controlling a particular weed species (eg phalaris amongst native shrubs). These herbicides may persist as residues in the environment.

Herbicides applied to the edge of a waterbody, or in wetted areas around its edge, must be registered for use in aquatic environments by the Australian Pesticides & Veterinary Medicines Authority (APVMA).

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Consider the tools available to mitigate against offsite movement of your pesticide

PIRI-Tas

PIRI-Tas is a simple screen tool that predicts the off-site migration potential of pesticides into surface or ground-water. PIRI-Tas assesses both the likelihood of off-site-migration and the risk to different species based on the toxicity of the pesticide to a range of aquatic organisms.

PIRI-Tas is a risk indicator and uses a risk-based approach to decision making by taking into consideration a range of factors associated with site conditions, soil and environmental scenarios, pesticide properties, application rates and time of spraying as well as considering impacts on target species being protected by receiving environments. PIRI-Tas outputs can also be used to construct annual spray schedules to assist with future planning.

PIRI was first developed by CSIRO and is being used both nationally and internationally by a number of organisations. PIRI-Tas CD's and onsite training are available for free through the DPIPWE to key users of chemical pesticides, including those in the agriculture, forestry, amenity, glasshouse and municipal sectors.

Further information is available at http://www.dpipwe.tas.gov.au/inter.nsf/WebPages/SSKA-7JA3N4?open

Consider integrated pest management (IPM)

Integrated pest management (IPM) is a planned approach that coordinates environmentally acceptable methods of pest control with careful and minimal use of toxic pesticides. IPM programs are based on a comprehensive assessment of local conditions, including factors such as climate, season, the biology of the pest species, and government regulations.

Strategies employed may include the staged removal of weeds, biological control and re-planting of riparian areas with native species to discourage the regeneration of weeds.

Consult and plan

Draw up a calendar for action. The time of year when herbicides will be most effective on the weed should be a major influence on the make-up of this calendar. Herbicides are generally most effective during the growing season of the weed rather than when it is dormant or approaching dormancy. The staged removal of weeds over several seasons may be less disturbing to your aquatic environment and minimise any adverse impact on fauna.

Consult with neighbours who may be affected by your weed control operation, especially if you think there is any risk of spray drift to adjoining properties or downstream. You may also decide to seek advice from experts before taking further action, or approach commercial spray contractors to assess your particular situation.

If the work involves a significant length of river or multiple properties it is advisable to develop a plan that covers all aspects of the weed control work and restoration, including potential risks. You should also be mindful of:

- feasibility/practicability of the work
- physical characteristics of the job site
- optimal pest control method, including alternatives to herbicides
- characteristics of the herbicide (physical, chemical and environmental)
- buffer zones
- the possibility of spray drift and other off-target migration
- weather conditions.

Do you need to spray?

It is recommended that only trained, licensed contractors carry out spraying operations near waterbodies because of the sensitivity of these environments. Check that they have experience and an understanding of the issues around using herbicides near aquatic environments.

The following points are critical to the application of herbicides near waterbodies:

- Always follow the label
- When you are working near the edge of a waterbody, direct the spray away from the waterbody where possible.
- Spray only to the extent of covering foliage with droplets.
- Spray when weather is calm; strong winds may carry herbicide drift into waterbodies.
- Use a flat fan nozzle and a low pump/spray pressure to reduce the likelihood of spray drift.
- Do not spray when rainfall is forecast within four hours as herbicide can be washed off the pest plant and run off into aquatic ecosystems.

Appropriate herbicides and application

The type of weed problem will determine both the type of herbicide and its application method. Table 2 shows recommended herbicide and application methods for some common weeds, along with alternatives to herbicide use. Table 3 illustrates application techniques and equipment need to undertake control works.

Uses described in this table are either covered by the respective product label or Off-label Permit No. 13160 issued by the Australian Pesticides and Veterinary Medicines Authority.

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Table 2. Common weeds and recommended treatment and herbicides

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Permanently inundated/ perennial	**Submerged and partially submerged plants**				
	Parrot's feather (*Myriophyllum aquaticum*)	Glyphosate (registered for aquatic use only **Don't add surfactants!**	Roundup Biactive® or Weedmaster Duo®	Foliar spray	Hand removal and excavation (with roots/rhizomes) can be used as part of a well planned approach. Care must be taken to avoid losing fragments
	Egeria (*Egeria densa*)				
	Canadian Pondweed (*Elodea canadensis*)				
	Cumbungi (*Typha* spp)				Hand removal (small plants) Excavation (with roots/rhizomes) Cultivation (expose roots/rhizomes to frosts) Cut into soil surface regularly (to cut rhizomes) Drowning by cutting stems and leaves below water surface
	Glyceria (syn. Poa aquatica or reed sweet grass) (*Glyceria maxima*) NB Take extreme caution not to spread Glyceria seed through soil transport (eg on machinery)			Foliar spray (combine with dense local native species revegetation for long-term results through stream shading) Wiper	Clearance or drainage of growth area (combine with dense re-vegetation of local native species for long-term results through stream shading)
	Woody weeds				
	Blackberry (*Rubus fruticosus*)	Glyphosate (registered for aquatic use only) **Don't add surfactants!**	Roundup Biactive® or Weedmaster Duo®	Cut and paint with Roundup Biactive® or Weedmaster Duo®	Hand removal (small plants) Controlled grazing (goats or sheep only) can be effective Bio-control (eg gorse mite, blackberry rust) where other techniques are not suitable Gorse mulching combined with follow-up grazing and revegetation on mulched sites
	Gorse (*Ulex europaeus*)				
	Trees				
	Hawthorn (*Crataegus monogyna*)	Glyphosate (registered for aquatic use only) **Don't add surfactants!**	Roundup Biactive® or Weedmaster Duo®	Cut and paint Drill or stem injection Axe or frill and paint Foliar spray hawthorn and crack willow (only spray to a height of 2m)	Hand removal (small plants) Controlled grazing can assist in limiting Hawthorn regrowth and thicket density
	Crack Willow (*Salix fragilis*)				
	Sycamore (*Acer pseudoplatanus*)				

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The product trade names in this publication are supplied on the understanding that no preference between equivalent products is intended and that the inclusion of a product does not imply endorsement by DPIPWE over any other equivalent product from another manufacturer.

Table 2. Common weeds and recommended treatment and herbicides continued

Area	Weed	Permitted Herbicide (active ingredient)	Example of commercial product (concentration of active ingredient)	Recommended Herbicide Control Technique	Non-chemical Alternatives
Occasionally or rarely inundated sites	**Woody weeds**				
	Blackberry (*Rubus fruticosus*)	Metsulfuron-methyl Triclopyr Triclopyr + Picloram	eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Foliar spray	Hand removal (small infestations) Controlled grazing by goats can be effective Bulldoze and deep cultivate (in suitable circumstances) Bio-control (a rust with limited impact)
	Gorse (*Ulex europaeus*)	Glyphosate (registered for aquatic use only) Triclopyr Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600®	Mulching/bulldozing/slashing combined with follow-up grazing and revegetate on mulched sites Bio-control (e.g gorse mite) where other techniques are not suitable
	English Broom (*Cytisus scoparius*) Montpellier Broom (*Genista monspessulana*)	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint. Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal. Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Trees				
	Hawthorn (*Crataegus monogyna*)	Glyphosate (registered for aquatic use only). Metsulfuron-methyl Triclopyr herbicide Triclopyr + Picloram	eg Roundup Biactive® or Weedmaster Duo® eg Associate or Brush-Off® eg Garlon 600® eg Grass-up™ or Grazon Extra®)	Cut and paint Foliar spray, preferably Garlon 600® (only if under 2m in height)	Hand removal Mechanical removal (eg rip or bulldoze) Mulching/bulldozing/slashing of hawthorn combined with follow-up grazing and revegetate on mulched sites
	Sycamore (*Acer pseudoplatanus*)	Glyphosate (registered for aquatic use only)	eg Roundup Biactive® or Weedmaster Duo®	Stem injection, cut and paint (plus foliar spray for young plants)	Hand removal Bulldoze and revegetate Plough-in small plants
	Herbaceous plants				
	Ragwort (*Senecio jacobaea*) Paterson's curse (*Echium plantagineum*) Thistles (*eg Cirsium arvense*)	MCPA Metsulfuron-methyl	eg MCPA 500 or L.V.E Agritone eg Associate or Brush-Off®	Foliar spray	Hand removal Controlled grazing (sheep) Ploughing/cultivation (combine with dense revegetation of local native plants for long-term results through shading)

More information on weed identification and weed control can be found at **www.dpipwe.tas.gov.au/weeds**

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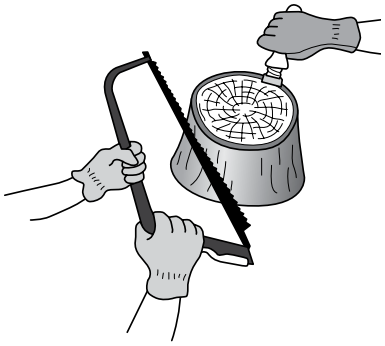
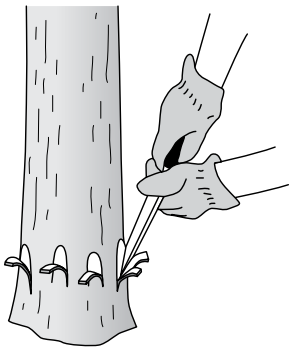
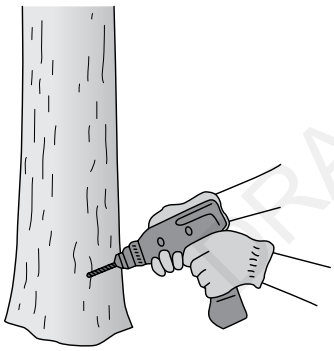
Table 3. Herbicide application techniques

Illustration	Method	Type of weed	Equipment Required	Notes
	Foliar Spray	Herbaceous plants, Woody weeds	Knapsack Vehicle mounted tank Herbicide mix Personal protective equipment (see product label)	Ensure herbicide is being applied at right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat fan nozzle and low pump pressure will assist in reducing spray drift
	Cut and paint	Woody weeds, shrubs and trees	Saw, chainsaw, loppers Herbicide mix Personal protective equipment (goggles and gloves as a minimun) Bush/sponge for herbicide application	Ensure herbicide is applied quickly to cut stump (within 15 seconds in most cases) Apply during active growth period of plant for best results Do not apply herbicide to the point of run-off
	Frilling	Shrubs and trees	Axe, hatchet Herbicide mix Personal protective equipment (goggles and gloves as a minimum) Brush for herbicide application	Frill trunk thoroughly, also treat major surface roots where visible Expose sapwood and apply herbicide to it immediately For deciduous species, apply during active growth period
	Drill and poison	Shrubs and trees	Drill Application bottle, injection gun Herbicide Personal protective equipment (goggles and gloves as a minimun)	Drill to sapwood only and apply herbicide to drill hole immediately Drill and fill major surface roots where appropriate For deciduous species, apply during active growth period

Illustrations: Brett Littleton ILS Design Unit

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After Spraying

Clean up

Equipment should always be cleaned in a safe location where spills can be contained and will not result in environmental harm. Using water to clean equipment will further dilute any residual herbicide to low levels, and the resulting solution is best sprayed onto a lawned area or bare ground taking the following precautions:

- Do not apply wash-water to the point of saturation so that run-off occurs.
- Do not apply wash-water along boundary fence lines as this will increase the chance of herbicides escaping from your property.
- Do not dispose of wastewater into areas where children play, or pets have access, as low levels of herbicide are still likely to be present.
- Do not deposit wastewater where it will run into waterways, drainage lines or stormwater systems.

Disposal

If you do happen to have surplus spray mix or herbicide waste, label it with the herbicide name, including any risk and safety information displayed on the original label. Store it safely until it can be disposed of appropriately. Contact a chemical collection organisation eg Chem Clear.

You must follow label directions for the disposal of wastes and herbicide containers. Only dispose of waste herbicides at authorised collection centres, such as licensed waste disposal centres.

Do not dispose herbicide waste:

- through sewerage systems, where it can interfere with the sewage treatment process
- down the drain or gutter, where it can pass through the stormwater system and into waterways
- to landfill via dumping or domestic waste, as it can contaminate soil and leach into groundwater and stormwater.

Monitor, evaluate and follow up

Monitor

Observe and keep records of your weed problems and the impact of any measures you take to control them. This could involve:

- the use of visual records, including property maps, aerial and other photography
- the use of a calendar or diary to record when actions were taken.

Evaluate

Evaluate the success of any weed control program by considering the current extent of the weed problem and reviewing your control measures. Important questions might include:

- Is my weed control work going to plan, or do my goals need reviewing?
- What is the appropriate weed control measure now?
- Is there a need for external (expert) assistance?

Follow up

Re-implement weed control actions following the results of your monitoring and evaluation. Continue to monitor this follow-up work, and so begin an ongoing cycle of weed management.

These guidelines have been updated by Kiowa Fenner and are based on guidelines prepared by Michael Noble and Janice Miller.

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Important disclaimer

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Design and layout - ILS Design Unit, DPIPWE

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CONTACT DETAILS

Invasive Species Branch

1300 668 550

www.dpipwe.tas.gov.au/weeds

ATTACHMENT 3 – HYGIENE PROTOCOLS AND INSPECTION SHEETS MACHINERY AND VEHICLES

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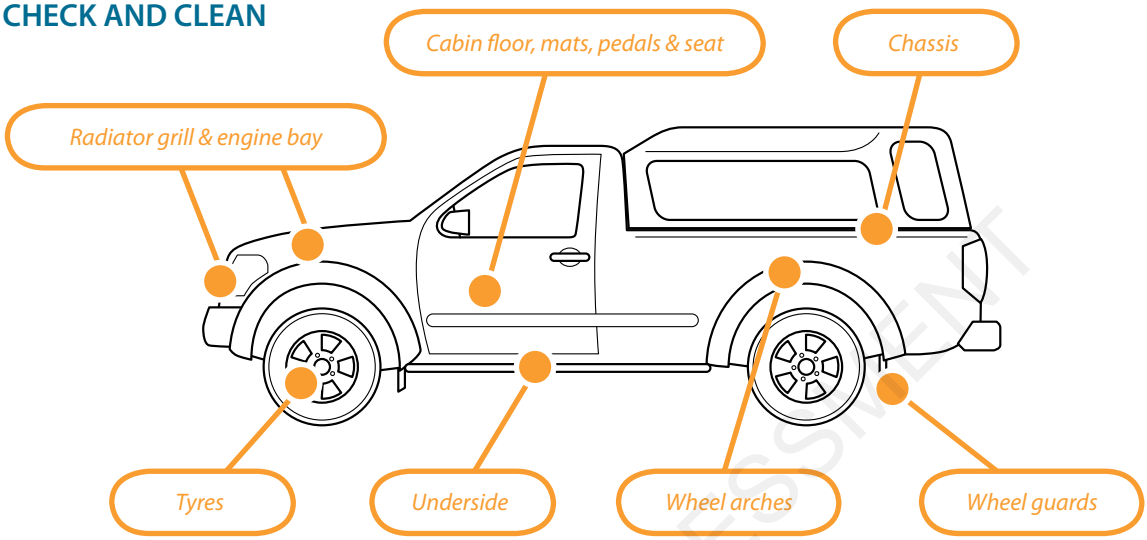
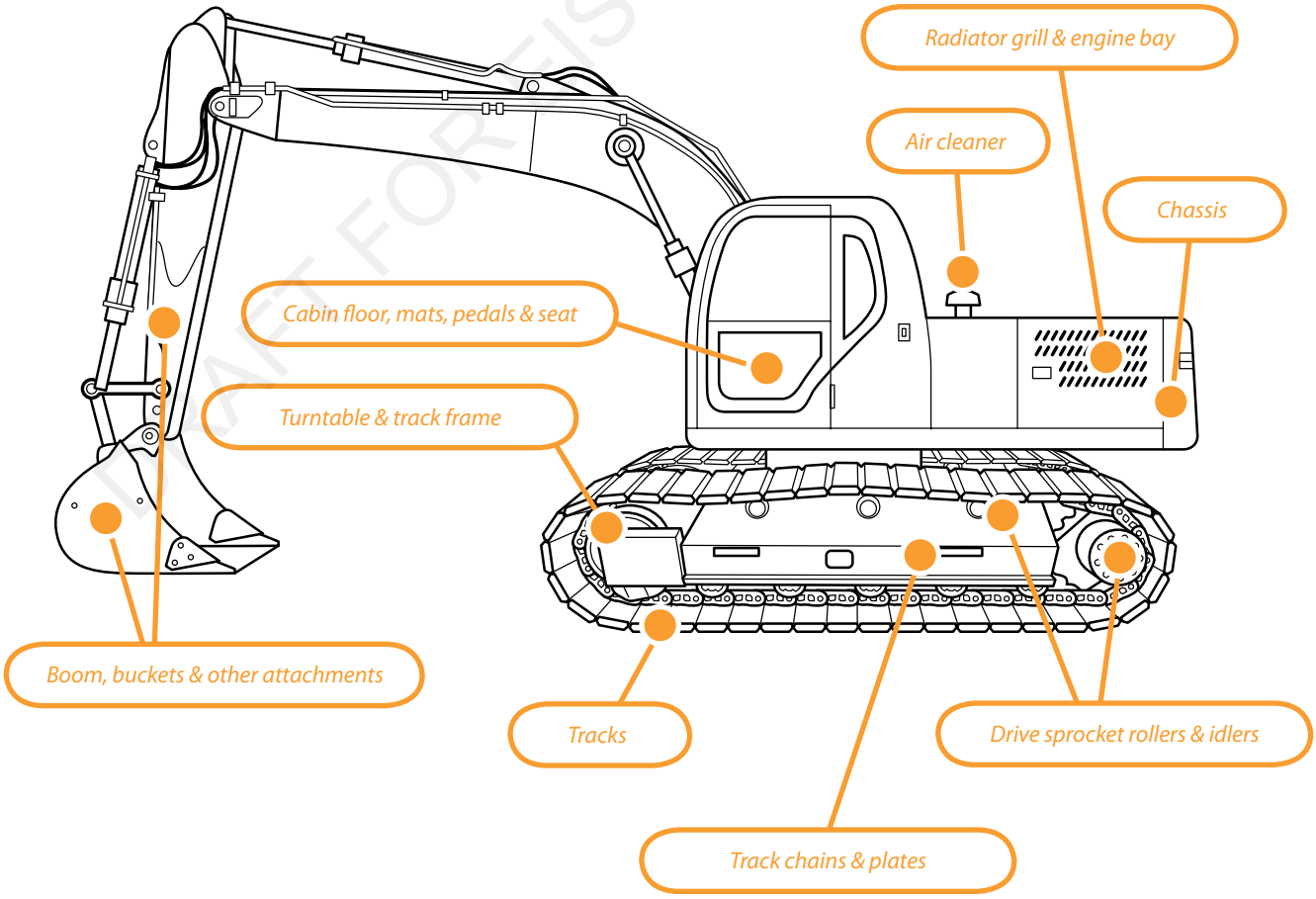
4WD VEHICLE WITH KEY SPOTS TO CHECK AND CLEAN



EXCAVATOR WITH KEY SPOTS TO CHECK AND CLEAN



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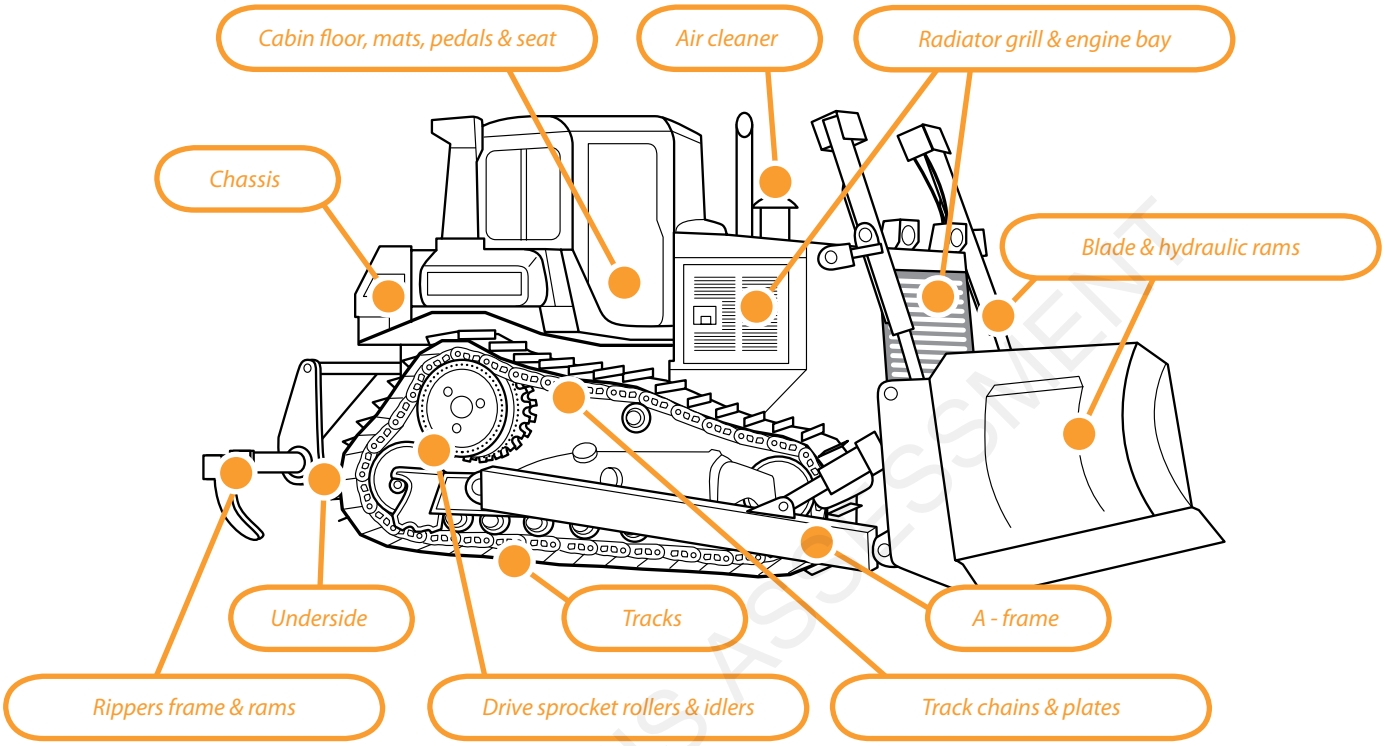
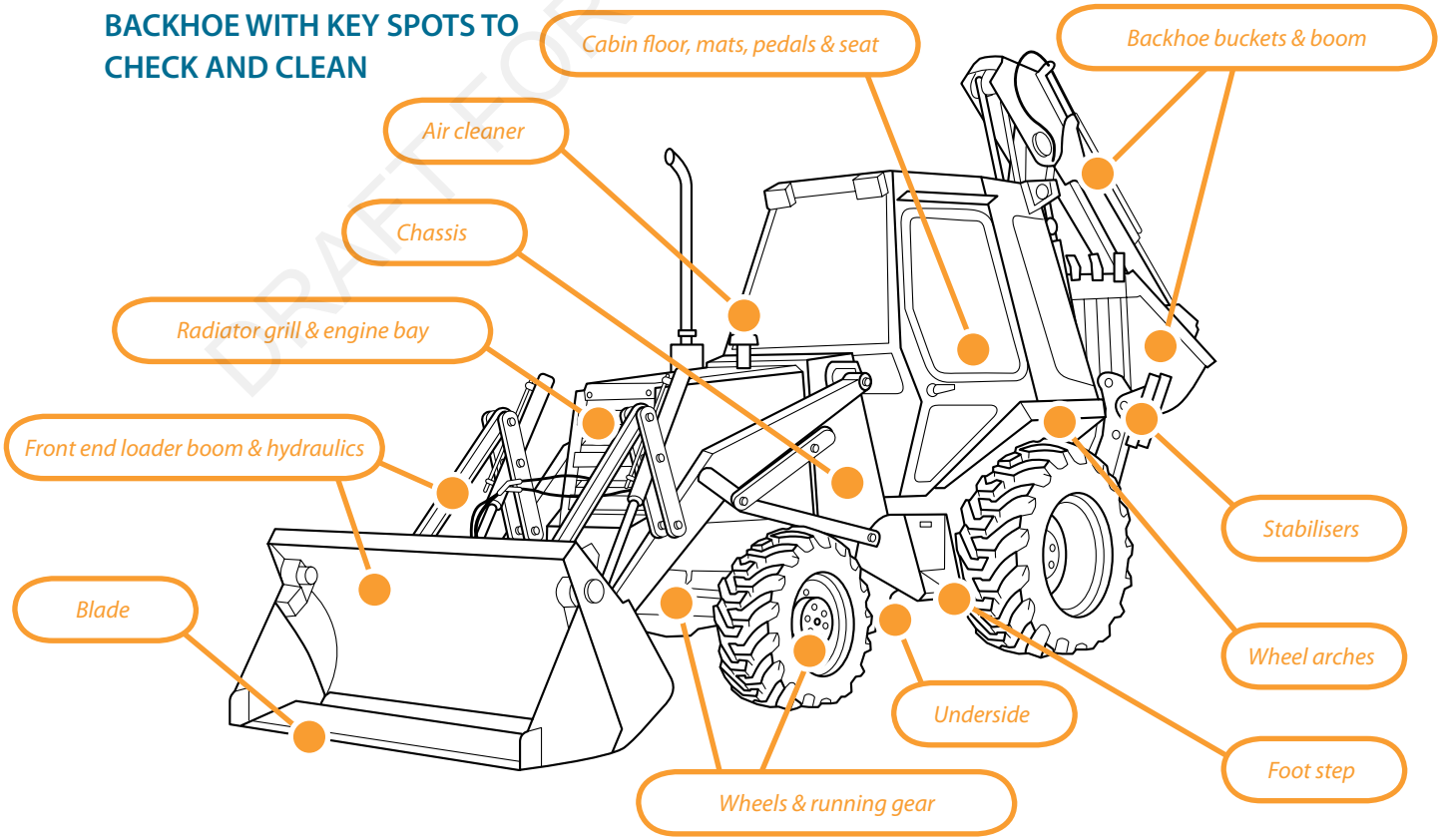
BULLDOZER WITH KEY SPOTS TO CHECK AND CLEAN



BACKHOE WITH KEY SPOTS TO CHECK AND CLEAN



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CLEANING/INSPECTION LIST FOR UTILITY/4WD				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine bay	Front grill			
	Radiator and other cooling cores or fins			
	Grill or recess under wipers			
	Engine mounts			
	Top of gearbox			
	Battery recess/tray			
	Any recesses on engine or manifold			
	Air cleaner (including element)			
Cabin	Footwells			
	Carpets and mats			
	Seats			
	Tool boxes			
	Air vents			
Wheels and arches	Tyre treads			
	Rims and wheel caps			
	Wheel arches			
	Mud flaps and brackets			
	Brakes			
Tray	Body of tray (especially any recesses)			
	Mats and toolboxes			
	Around fuel tank caps			
Under carriage	Chassis rails			
	Struts and stabilisers			
	Steering components			
	Axels and differentials			
	Spare tyre and mounts			
	Guards			
	Fuel Tank			
Attachments	Bull bar			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

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CLEANING/INSPECTION LIST FOR AN EXCAVATOR				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine bay	Engine bay floor			
	Fan shroud and radiator cores			
	Air filters (shake/tap filters to determine if clean)			
	Glacier plate (near radiator)			
Cabin	Footwells			
	Carpets and mats			
	Seats			
	Tool boxes			
	Air vents			
Excavation body	Hollow section chassis channels			
	Channels for hydraulic hoses from driven motor			
	Counterweight void spaces			
	Removable track adjuster guards and lubrication points			
	Turret pivot area			
	Arms/booms - pivot points			
Bucket/Blade	Between teeth of adapters			
	Wear plates			
Rear blade (Stabiliser)	Wear plates			
	Hollow section arms			
	Hollow section blade			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

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CLEANING/INSPECTION LIST FOR TRACK TYPE DOZERS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine	Check radiator core and engine area for residues.			
	Remove and check the air filter/cleaner (these often require destruction where they are clogged with QRM).			
	Check carefully the void space between the oil and radiator cores.			
	Battery Box - Lift/remove the battery to check for contamination (battery box may be at side/rear or under seat).			
Drivers cab	Check externally under and around driver's cab.			
	Check under mats in cab.			
	Remove/lift seat; remove/lift floor pans to allow checking to top of transmission.			
	Check air conditioner filter (if fitted) – shake/tap filter to check if clean			
	Check externally under and around driver's cab.			
	Check under mats in cab.			
Body	Belly plates should be removed to allow inspection and cleaning			
	Rear plates at back of dozer should be removed to allow inspection and cleaning.			
	Hydraulic cover plates should be removed to allow inspection and cleaning.			
Tracks/track frame	Examine tracks carefully.			
	Ensure inspection/cover plates are removed to allow inside track area.			
	Check idler wheels (these support the tracks).			
Fuel cells	Are removable therefore dirt etc can pack between the tank and the frame.			
Blade	Ensure that edge of blade top/bottom is not split – this allows soil to be packed very tightly in the hollow.			
	Check cutter points/wear blades.			
	Check carefully the pivot points and adaptors at the rear of the front blade – these allow the blade to change height and angle. Sometimes soil has compacted and is difficult to dislodge.			

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Area	Contamination point	Inspected	Cleaned	Method
	Check trunction arms			
	Check all hollow sections			
Ripper support frame is usually hollow	Check carefully if any contaminants have entered this section. The tynes may need to be removed.			
Tynes	Tynes need careful inspection. Contamination may often be removed by water blasting, but tynes may need to be removed in some cases.			
Ripper points	A pin holds on the ripper points. Dirt can compact under the ripper points.			
All areas	Check if any sections or channels are hollow and determine if there is a possible entry point for contamination. Check if plates are covering a compartment or space that may have collected dirt/trash.			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

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CLEANING/INSPECTION LIST FOR WHEELED LOADERS & COMPACTORS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine and running gear	Air cleaner and air filters			
	Air conditioner unit			
	Under and around removable fuel cells			
	Brake assemblies			
Canopy/cabin	Hollow channels			
	Void space between cab and body (bird's nests have been found here)			
	Footwells			
	Carpets and mats			
	Seats			
Body	Feet of adaptors on compactors			
	Hydraulic points			
	Articulation points of hydraulics			
	Counterweight void spaces			
	Between dual wheels			
Bucket/Blades	Blade wear plates			
	Blade teeth and adaptors			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

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CLEANING/INSPECTION LIST FOR DUMP TRUCKS				
Date:		**Site:**		
Vehicle:		**Registration/ID:**		
Area	**Contamination point**	**Inspected**	**Cleaned**	**Method**
Engine and running gear	Air cleaner			
	Air conditioner unit			
Cabin	Footwells			
	Carpets and mats			
	Behind and under seats			
	Tool boxes			
	Air vents			
Body	Hollow channels in tray frame			
	Between dual wheels (where applicable)			
Cleaning method: Mechanical (M), Compressed Air (CA), Vacuum (V), High Pressure Water (HPW), Low Pressure Water (LPW)				
Inspected by:		**Signature:**		
Cleaned by:		**Signature:**		

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ATTACHMENT 4 – WEED SPRAYING PROGRAM SPREADSHEET (EXAMPLE)

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Date -

Marshall Bay Lime Sand Extraction Pit
Weed Spraying Program Work Plan

Zones on Maps	Weeds Present	Actions required	Responsible person	Estimated start date	Estimated completion date	Tasks conducted	Date Completed	Signed

NOTES

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ATTACHMENT 9. SURVEY OF THE GEOMORPHOLOGY AND SOIL CHARACTERISTICS OF THE MARKARNA GRAZING COMPANY PTY LTD PROPERTY, MARSHALL BAY, FLINDERS ISLAND

Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island

18 January 2024

This report was compiled by Dr Adrian Slee, Earth Sciences and Cultural Heritage, Forest Practices Authority, 30 Patrick Street, Hobart 7000

Email: adrian.slee@fpa.tas.gov.au

Citation

Slee, A. 2023. Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island, November 2023, Forest Practices Authority, Hobart 27p.

FPA file reference

D24-20638

Disclaimer for report

The advice contained in this document has been prepared for Markarna Grazing Company Pty Ltd and Van Diemen Consulting Pty Ltd only.

Whilst the Forest Practices Authority has used its best endeavours to ensure accuracy, it does not warrant that the material is free of error. Consequently, the advice is provided on the basis that the Forest Practices Authority will not be liable for any error or omission, in contract, tort or otherwise. However, should any error or omission be notified, the Forest Practices Authority will use its best endeavours to correct the advice.

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Glossary

Optically Stimulated Luminescence (OSL) dating: A method of dating sand grains. This method measures the period of time since burial of the sand grains and therefore indicates the age of the host landform (i.e. dune ridge).

Tasmanian Geoconservation Database (TGD): A database that provides a source of information about geodiversity features, systems and processes of conservation significance in the State of Tasmania.

Cover Image (Image 1)

View eastwards from the coastal foredune backing Marshall Beach, looking across isolated outcrops of granite towards the large west-to-east orientated longitudinal dunes forming the main Markarna Lime Sands resource

1. Project scope and Aims

Van Diemen Consulting Pty Ltd engaged the Forest Practices Authority (FPA) to investigate the geomorphology and soils present on a 364.1 ha mining lease owned by the Markarna Grazing Company between Palana Road and Marshall Beach near the settlement of Lughrata on Flinders Island. The proposal by Markarna Grazing Company is to develop and extend an existing old lime sand extraction pit located within the dune fields located between Palana Road and Marshall Beach near the settlement of Lughrata. The priority area is an 800 m long west to east oriented sand dune complex covering approximately 4 ha that forms a lime sand resource immediately west of the current old extraction pit.

The aim of the project was to provide a detailed report on the dune field and other landforms including swamps and potential Tertiary limestone karst features in the vicinity of the proposed extraction pit. Soils were also be investigated in this area. A secondary focus was a general documentation of the dune field and other sites of geomorphic significance in the overall mining lease in the event of expansion of operations in the future.

The report addresses the following issues:

- Documentation of any karst features present and management recommendations.
- Overview of the sand dunes present at the proposed pit site and mine lease in general and dune special values management recommendations.
- Comment on sand blow risks and mediation recommendations.
- Documentation of other geomorphic landforms.
- Soil observations and management.

2. Previous Work

Granite Bedrock

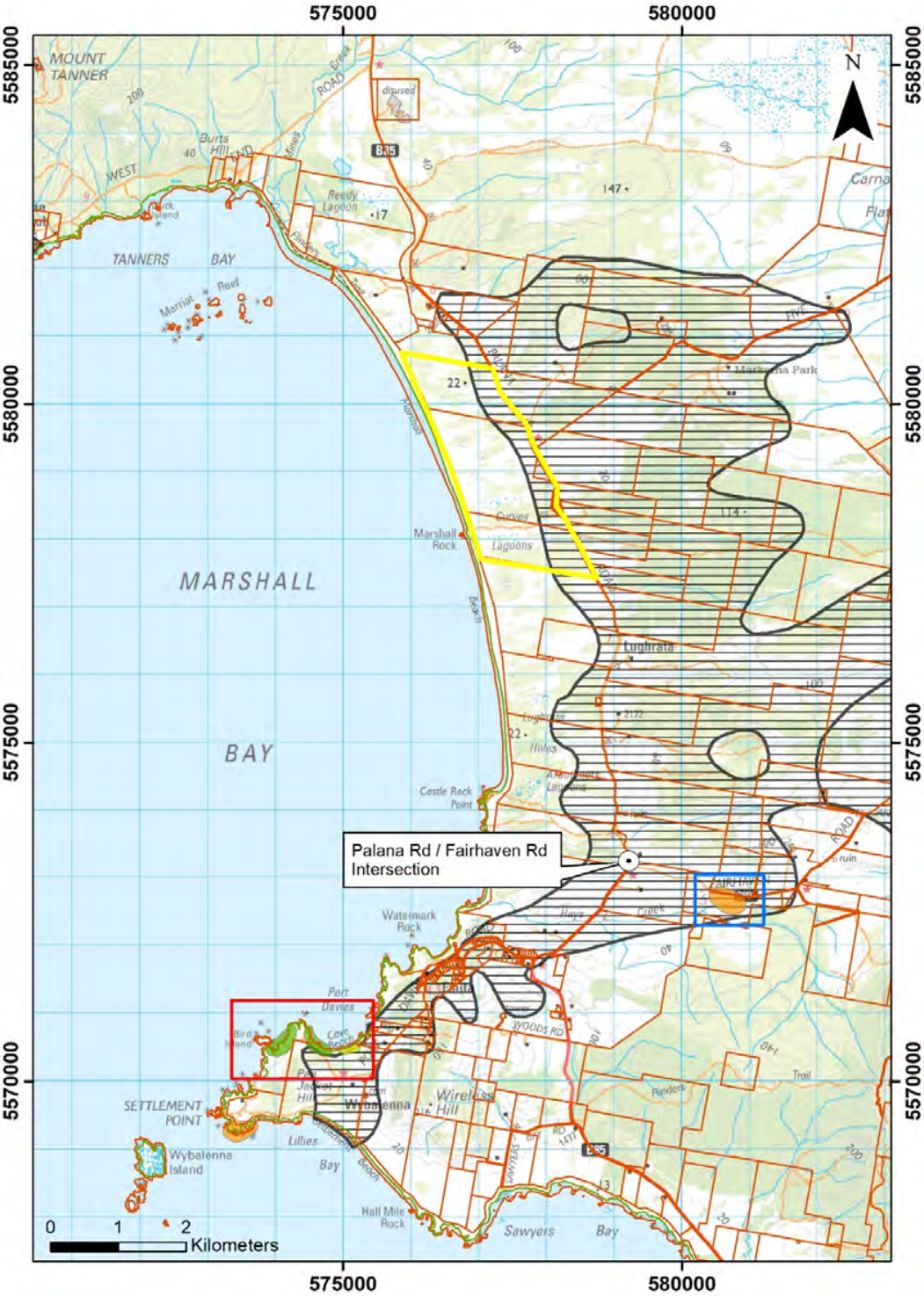
Devonian granite plutons are the dominant bedrock that floors Flinders Island and upon which the Tertiary Limestone and Quaternary deposits lie. White syenogranite/ monzogranite (I-type) granite outcrops in the vicinity of Five Mile Road immediately east of the study site. No granite was mapped on the 1:250,000 geological map (available on www.theList.tas.gov.au) within the study area (Mineral Resources Tasmania 2023). However aerial photographs clearly show that Marshall Rock (outcropping on Marshall Beach) is granitic.

Karst

Tertiary dune limestone is mapped on the 1:250,000 Tasmanian geological maps. It forms the hills rising east of Palana Road immediately inland of the Markarna Lime Sands mining lease. The hills are part of an extensive belt of limestone extending from the vicinity of Five Mile Road in the north, inland to the Memana district and south along the coast to Wybalenna. The area is listed as a category B karst area (Emita-Memana BS17) (Kiernan 1995; see also map 1, below). The karst B classification indicates that karst processes are active in the area. The area has received limited attention from geoscientists and cavers. Limestone has been mapped on the hills to the east of the study site to altitudes approaching 130 m asl. The limestone is likely to be mantling granite and possibly sedimentary rock at depth and may be quite thin i.e., in the order of tens of metres. However, the topographic relief of the limestone here is more than 100 m which is more than enough for significant karst landforms and processes to develop. Kiernan and the author have observed subtle sinkholes in the vicinity of Palana Road/Fairhaven Road intersection (Map 1 and Image 2). Some of these depressions could be dune swales, but the presence of exposed limestone outcrops around others suggest sinkhole development.

A low hill north of Hays Creek has limestone cliff outcrops. The most notable karst landforms occur at Cave Beach where significant limestone exposures in a coastal setting display very rugged limestone weathering pinnacles and solutional forms (karren) associated with several notches and small caves formed at or near the contact between the limestone and the underlying granite (Image 3). The karst landforms in the vicinity of Cave Bay (red box on map 1) and the sinkholes along Fairhaven Road (Blue box on map 1) are listed as Geoconservation sites ID:2254 and ID:2298 in the Tasmanian Geoconservation Database (TGD) accessible on the Tasmanian Natural Values Atlas (NVA.tas.gov.au).

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



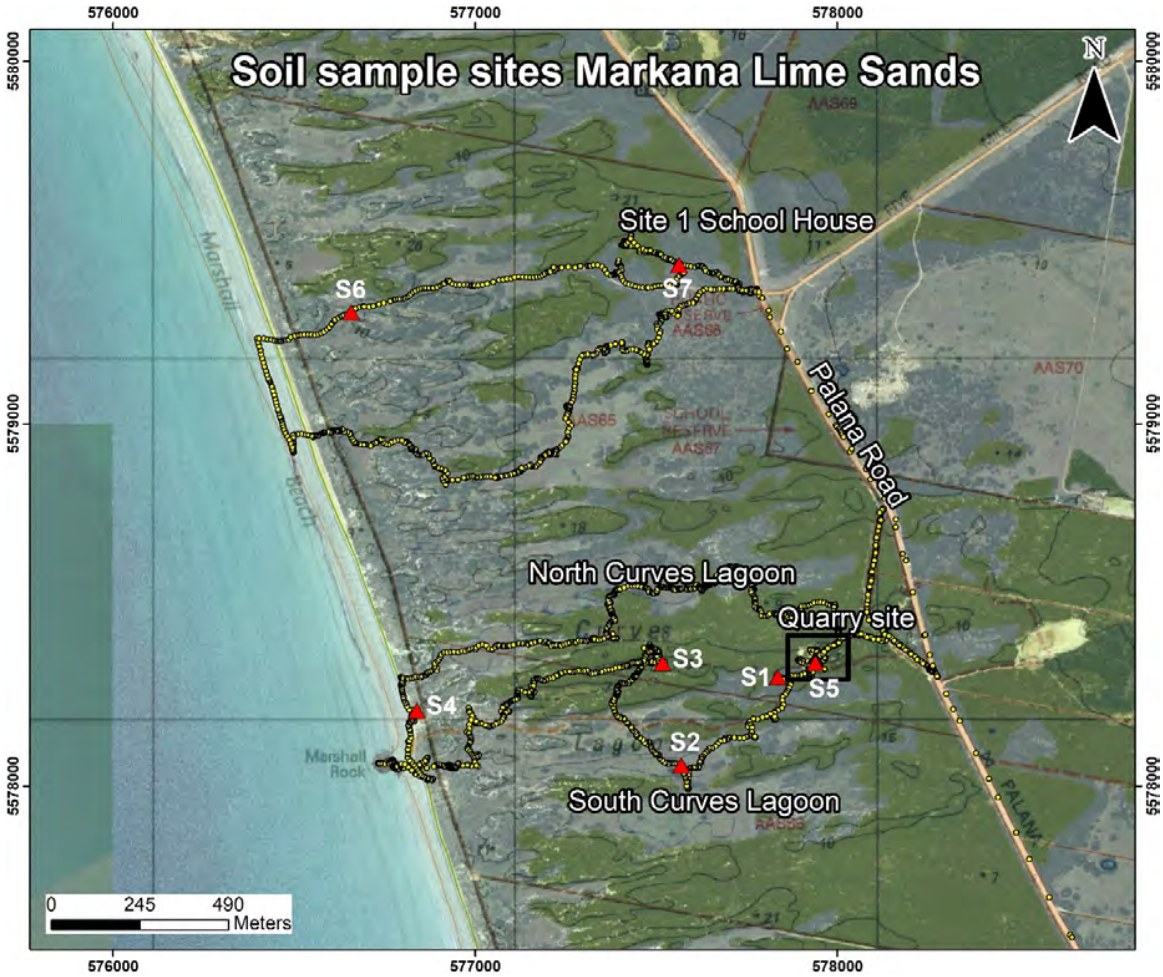
Map 1: Marshall Bay. The striped area is the mapped extent of the Emita – Memana (BS17) karst according to Kiernan 1995; yellow square is the lease area; red and blue squares highlight TGD sites with notable karst development.

Image 2: One of a large number of shallow basins (circled) associated with limestone outcrops (foreground and background) in the vicinity of the Palana Road/Fairhaven Road intersection (Map 1). The lack of dune cover and exposed outcrops suggest shallow soils and that these depressions are solution sinkholes associated with a subsurface karst aquifer.

Image 3: The Tertiary Limestone at Cave Bay features significant karst landforms including small caves, notches and solutional (karren) surface weathering forms. The area is a listed TGD site and the limestone outcrops are contiguous with the limestone bedrock in the vicinity of the mine lease.

3. METHODS

Observations of the site were made over two days of fieldwork on the 7th and 8th of November 2023. Waypoints and route tracking were recorded using a Garmin Etrex 22s. The route taken during the field work and the location of the soil samples taken are shown in Map 2. Maps were drawn using ARC-Map 10.8.1. Soil samples were taken using an Eijkelkamp auger. A sample for Optically Stimulated Luminescence (OSL) dating was taken from the lower dune horizon in the old pit face. This was done by cutting back and benching out the sand dune before a sample was taken using a PVC tube hammered vertically into a dug bench approximately 5 m below the top of the dune.



Map 2: Soil sample sites and survey route (yellow tracks) taken during fieldwork.

4. OBSERVATIONS

BEDROCK GEOLOGY OF THE SITE

Granite

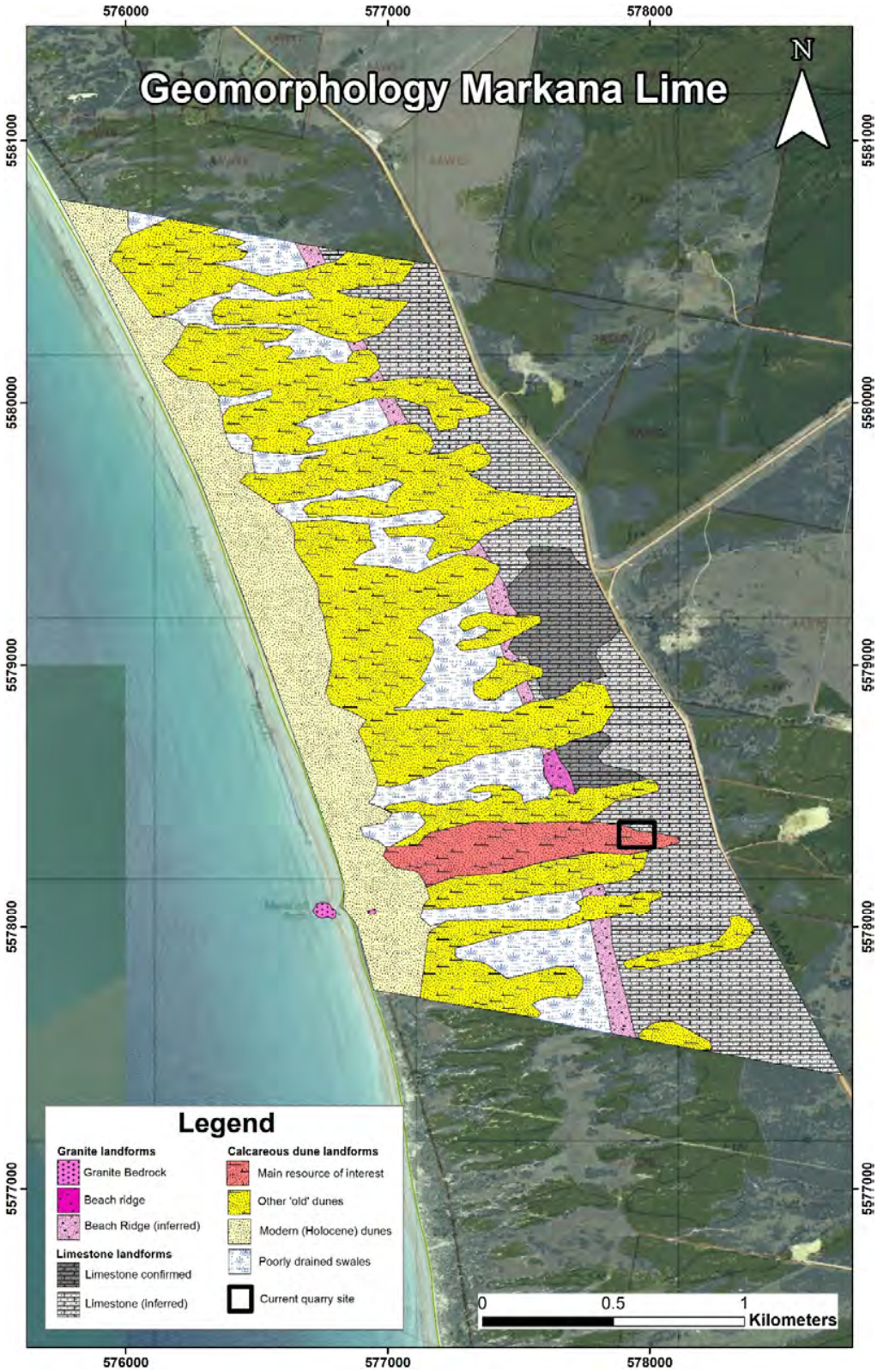
The general geomorphology of the mine lease is presented in Map 3. The Marshall Rock and other granite outcrops located within the sand dunes 150 m to the east of the pit and just within the lease (see Image 1) were visited during the survey. Both are unmapped on geological sheets and feature large, rounded outcrops of white crystalline granite. While the granites are not the focus of proposed operations on the mine lease their presence on the coast and in particularly within the foredunes indicates the likelihood that granite outcrops are present beneath the sand dunes on the property. Granite bedrock rarely forms flat surfaces but rather undulates quite substantially over short distances hence it is impracticable to define the depth of the dunes and further east Tertiary limestones above the granite contact. Exploration could help assess the depth of the lime sands. However, it would be costly over large areas, and possibly yield little additional information.

Limestone

A continuous flat bench approximately 15 m above sea level is present in the eastern section of the study area. In places this bench is overlain by dune sands. Significant lag deposits of fossiliferous limestone in the form of boulders and cobbles are found on this bench associated with a distinctive open vegetation community in contrast to the thicker vegetation associated with the younger dune sequences (Image 4). The bench appears to be the western edge of the limestone outcrop and its western margin may have once been a shoreline open to Bass Strait. It now forms a paleo-shoreline. Areas of outcropping limestone are very limited as most of the edges of the limestone plain appear to be buried by Quaternary coastal and dune deposits. Only one small in-situ outcrop of limestone was observed at 577509mE: 5579301mS. This was associated with the blowout of a low 1 m tall sand dune.

Image 4: Flat limestone bench in the east of the property.

Geomorphology and soils of the Markana Grazing Company Pty Ltd Property



Map 3: Geomorphology summary map.

KARST LANDFORMS

WEATHERING LANDFORMS (KARREN)

Very minor but sharp solutional karren weathering forms were located at the larger limestone outcrop (Image 5) and other smaller blocks in the area but no significant solutional karst landforms were observed.

Image 5: Small limestone outcrop

SINKHOLES

Large, elongated depressions are a feature of the property. Some of these are large enough to have warranted definition as enclosed basins on the 1:25,000 topographic map sheets of the area and the largest are defined as lagoons (e.g. Curves Lagoons to the immediate south of the proposed resource). These depressions are elongated. They are not flat floored but have rather undulating forms. Although a small intermittent pond appears to be present in the lowest basin of the northern Curves Lagoon, elsewhere flowing and pooling surface water appears to be very limited; surface water accumulation may be confined to times of intense rainfall. In contrast to enclosed rounded basins associated with limestone bedrock, outcrops interpreted to be probable sinkholes have been described by the author and others near the Palana Road/Fairhaven Road intersection and further south in paddocks north of Trousers Point. The depressions at the study site appear to be all related to either broad west-east oriented interdune swales or (closer to the coast) roughly square

depressions developed behind the active Marshall Beach foredune complex. Depressions of conclusive karstic origin were not identified and are considered unlikely to be present within the study area.

SPRINGS

No obvious streams or springs were located on the property. A possible very small spring rises from beneath Marshall Beach immediately east of Marshall Rock. Here at low tide a small stream flows for approximately 20 m to the ocean, dropping 20–40 cm in altitude. The scale and location of the spring does not imply karstic drainage in the Tertiary limestone several hundred meters inland but rather small-scale subsurface drainage out of the local beach-bordering Holocene dunes. The lack of surface streams is interesting as there are no inlets or obvious streams entering the ocean for the length of Marshall Beach between the outflow of Arbothnots Lagoon to the south and a small inlet to the north at 574850mE: 5582000mN. A series of disappearing stream channels are mapped in the limestone hills southeast and northeast of the study area. The absence of defined stream channels flowing off the limestone in the area does suggest subsurface drainage is occurring in karst.

SUMMARY OF KARST LANDFORMS

An extensive Tertiary dune limestone bench is present in the eastern section of the study area. This bench is overlain in locations by the Quaternary dunes and has open predominantly *Leptospermum laevigatum* dominated forest. The lack of streams (and channels) flowing from the higher limestone hills to the east of the property may indicate that a karst aquifer is present in the area. However, no obvious springs were noted. No sinkholes were observed on the property, and as the largest limestone outcrop observed covered only a few square meters, caves are unlikely to be present in the priority study area. However, the author did not cover the entire mining lease and LiDar coverage is not available for the area so the presence of isolated karst landforms including bedrock bluffs with karren, sinkholes or small caves cannot be entirely ruled out.

OLD BEACH RIDGE

North Curves Lagoon is a large dune swale basin. It is surrounded to the west, south and north by Quaternary and Holocene dune ridges and to the east by the low Tertiary limestone bench. On the eastern margin of the basin at 577625mE: 5578543mN approximately 6–10 m above sea level (asl) white sandy gravels are exposed (Image 6). These are not typical fine sands associated with the beach ridges in the area but are rounded coarse quartz sands that appear to mantle the lower western slopes of the limestone bench. The quartz-rich nature of the sediments suggests two potential sources

1. That granite bedrock is shallowly buried in the vicinity of the eastern end of north Curves Lagoon and the soils at the site are primary granitic soils (known as gruss) formed from weathered granite.

2. That the coarse quartzite sands that contain some shelly carbonate fragments carbonate were deposited on the western edge of the limestone bench in a high energy coastal environment (surf beach).

The latter explanation appears to be more likely as no granite bedrock was observed at the site. It can be assumed that the coastline of Bass Strait was once a high energy environment supplied with coarse sands sourced from offshore granite outcrops such as Marshall Rock or reworked sands from upslope granite sources east of Palana Road. The presence of this beach ridge indicates that the coastline has prograded (advanced) >900 m to the west while becoming a lower energy environment. Given the altitude of the beach it appears likely that it could have formed during the penultimate interglacial high stand, approximately 130,000 years ago when sea levels were 6-8 m higher than today. The presence of granitic soils in this area defines the northern margin of the economic resource in lime-rich dune sands to the south. It is likely that the beach ridge extends beneath the overlying Quaternary carbonate-rich sand dunes, as the dunes appear to have formed over the top of the older granite sands and Tertiary limestones in the east of the property. If this is the case a contact between the carbonate sand resource and the quartz sands may be encountered during mining.

Image 6: Beach ridge composed of quartzite gravel sands (inset) derived from granite bedrock immediately east of North Curves Lagoon.

SAND DUNES

Extensive sand dunes cover most of the mining lease. Except for the granitic sediments east of North Curves Lagoon described on page 8, the sand dunes are composed of fine-grained white quartz and carbonate deposits. Two significant sand dune assemblages are present. In the west are the modern foredune and back dunes behind Marshall Beach. Inland are a series of elongated west-to-east trending parallel dunes that rise up to 24 m above sea level.

These inland dunes are largely vegetated and stable in comparison to the foredunes that have fewer woody and tree species, instead being dominated by grasses, herbs, wind-pruned shrubs and sedges. The coastal foredunes climb onto the older dunes but can be broadly demarcated by their hummocky forms and presence of sand blow-outs that contrast to the more elongated uniform stabilised ridges of the older dunes.

MAIN DUNE

The 1:25000 topographic map of the main dune (resource) shows a single large dune approximately 180 m wide and 10–25 m high. Two large internal depressions are present west of the current sand pit. The actual landscape is more complex than the contours suggest with at least 8 dune crests identified between North Curves Lagoon and South Curves Lagoon. The dune ridges have narrow rounded tops and steep side slopes, generally >30°. The multi-peaked nature of the dune ridges and the deep wide interdune swales are not well expressed on the 1:25000 topographic map.

The existing pit is located near the narrowest and easternmost part of the dune sequence. Here past pit operations have exposed a cutting through the main dune that has some scientific interest as described in the next section of this report.

EXISTING PIT

The existing pit is located at 577936mE: 5578343mN, 350 m west of Palana Road and is accessible by an overgrown FWD track. The pit exposes a 75 m wide section through the eastern limb of the main dune. Most of the exposure is either overgrown or of limited interest. The floor of the pit appears to be in solid Tertiary limestone bedrock. Some of the floor material could have been brought in by past operations to provide a solid working base. The best exposure through the dune is on the upper southern face of the pit where an approximately 5.5 m deep section is exposed. A modern topsoil and two buried paleosols are exposed in this face while calcified tree roots (rhizoliths) and branches are present within the dune below the lower of the two paleosols. The dune profile was described and photographed (Table 1 and Image 7) and samples were taken from the main horizons.

Table 1. Description of soil profile at the pit site.

Unit 1	Depth (cm)	Description
1	**0 – 20**	Grey sandy topsoil with abundant modern root mats
2	**20 – 95**	Yellow sands with abundant animal burrows
3	**95 – 110**	Dark grey / brown horizon in sands – paleosol 1
4	**110 – 260**	Light yellow to white sands
5	**260 – 280**	Grey / Brown horizon laterally extensive and forming a stratigraphic bench – paleosol 2.
6	**280 – 550 (approx.)**	White sands, predominantly carbonate; prominent surface carbonate cementation highlighting stratigraphic beds, calcified tree root and possible calcified small tree stump.
7	**Pit Floor**	Fossiliferous limestone (Tertiary)

Image 7: Annotated view looking east over the southern wall of the old pit showing dune and paleosol horizons.

PALEOSOLS

The term 'paleosol' refers to a buried soil horizon within a sedimentary profile. Paleosols are darker band of sediment which may or may not contain woody debris, organic matter and charcoal surrounded by lighter and less charcoal-rich sediments. Paleosols can be important indicators of past stability between depositional events. In this case organic topsoils (indicating stability) have been buried by a non-organic deposits (sand dunes). Two prominent paleosols are present in the exposure. The upper paleosol 1 (Image 8) lies between 95 cm and 115 cm depth and forms a prominent but laterally patchy dark brown organic-rich layer in the upper dune profile. The lower paleosol at 260 cm depth is a thinner and lighter compact sand unit that appears to not be as organic rich. However, this paleosol is laterally extensive and forms a prominent grey bench on the mid slope of the cutting. In the case of the dune systems the presence of paleosols indicates a substantial time of dune stability, allowing an organic topsoil to form prior to renewed dune instability resulting in topsoil burial. At the pit site at least three periods of dune stability can be inferred as indicated by the two buried paleosols and the darker modern topsoil associated with thick root mats on the crest of the dune.

Image 8: Top 1.5 m of the pit face showing prominent brown paleosol at about 1 m depth.

RHIZOLITHS

A feature of the main pit exposure is the rhizoliths located in Unit 6 of the profile (Table 1; Images 9 and 10) formed by dissolution of carbonate by percolating water and its subsequent precipitation around roots.

Rhizoliths observed at the pit include narrow straw-like tree root rhizoliths up to 20 cm long and 1–5 cm across many of which still contain inner woody root material and larger cylindrical-shaped rhizoliths up to 30 cm long and 15 cm thick, which may have formed around tree branches. Small columns are present at other locations in locations suggesting calcification of the stumps of *Melaleuca* and other small trees found at the site.

Images 9 and 10: Tree root rhizoliths exposed in the lower dune horizon in the pit face. These rhizoliths form from leached calcium carbonate which has precipitated around rough surfaces such as tree roots.

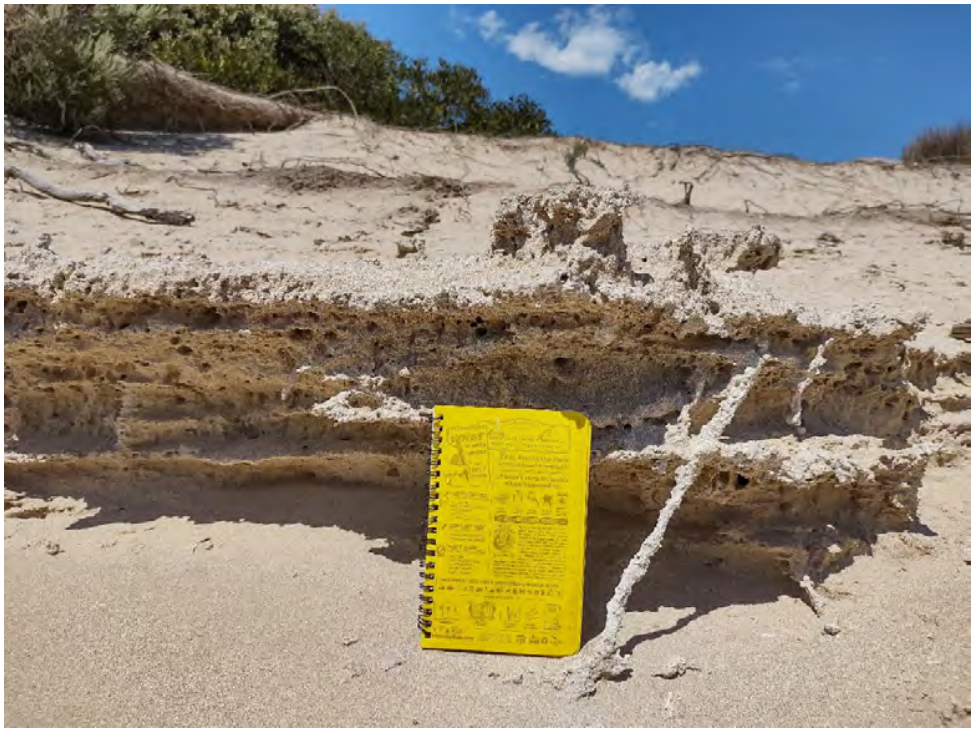


Image 11: Small carbonate benches have formed in the lower dune horizon but unlike the rhizoliths appear to have formed since the pit last operated.

The cut sand bank also features several distinct carbonate layers (poorly developed calcretes) that indicate slight differences in the carbonate content of the sand dune horizons (Image 11). These layers stand out as hard surfaces in the dune but on cutting back the surface exposure no stratigraphic difference was noted between these layers and those above and below (Image 12). It was concluded that these layers form by surface hardening by carbonate precipitation on the exposed surface since sediment exposure by past pit operations.

Image 12: A cut through the weakly developed calcrete on the cut surface of the pit revealed compact fairly uniform bedded sands.

DATING

A sample for Optically Stimulated Luminescence (OSL) dating was taken from a freshly cut bench in the lowermost dune unit, 1.5 m below the lower paleosol (Images 13 and 14). This sample will be submitted to the OSL laboratory at the University of Wellington (New Zealand) for dating. The date will provide a maximum age for the formation of the lower paleosol and will help establish whether the dunes formed during glacial or interglacial periods.

Image 13: Taped transect of the face from the top of the dune horizon to the sample site for OSL dating on the cut bench. Image 14: The sample was taken by hammering a sample tube into the cut bench vertically and then removing the sediment for extraction.

MODERN (LATE HOLOCENE DUNES)

Modern dune ridges run parallel to Marshall Beach for the length of the mining lease. They consist of an almost continuous elongated beach foredune backed by a complex of hummocky back dunes separated by roughly bowl-shaped dune swales (depressions). At the western margin of the main resource area these dunes intercept the older west – east longitudinal dunes considered above. The modern dunes are composed of fine loose sands with no evidence of significant calcite crust or rhizolith development; however the carbonate content of the dunes is high. No paleosols were observed in these dunes but thin buried soil horizons may be present. The lack of calcite cementation in the modern dunes suggests a significantly younger age for these deposits as may be expected from their near-coastal setting. Cuttings through the coastal foredune and a low back dune deposit on the main central access track were investigated. The coastal foredune (beach dune) was exposed in a blowout (Images 15 and 16) and displays a uniform profile composed of unconsolidated loose sands. The inland back dune was exposed where the access track cuts through the dune (images 17 and 18). The dune has three horizons: a slightly brown upper 55 cm: a white layer at approximately 55–70 cm and a yellowish layer at >70 cm depth. The profile development indicates a period of dune stability possibly extending back ~1000 years. The brown upper layer is an A1 horizon. The middle white layer is a leached A2 horizon. The deeper yellowish zone is a B horizon. Inappropriate track development and other activities associated with operations on the mining lease could lead to re-activation of these young dunes, which are more exposed to coastal winds than dunes further inland.

Image 15: Steep modern Marshall Beach foredune looking south from Marshall Rock.

Image 16: Natural windblow exposure through the foredune at soil sample site 6 map 2.

Image 17: The modern semi-stabilised back dune.

Image 18: The dune has a similar composition to the active foredune however has been stabilised for some time as a soil profile has developed.

SOIL SURVEY

Soils were sampled and bagged for transport from several locations in the vicinity of the main resource deposit (Map 2). Soils were sampled at depths of 30 cm, 50 cm and where possible 1 m using either natural cuttings or the Eijkelkamp soil auger. This was to identify any unusual characteristics of the soils and to sample for laboratory assessment of soil acidity (pH). pH was measured after shaking soils and water (1:25 ratio) and allowing the mixture to stand for 2 hours A Milwaukee MW 100 pH meter was used, calibrated at the time of analysis using standard solutions at pH 4 and pH 7.

Dune swale: Site 1

The centre of a low dune swale southwest of the pit was augered. Soil samples at 30 cm and 50 cm depth were taken from this site. No peat deposits were noted.

South Curved Lagoons Dune swale 2: Site 2

Soils were augered at the lowest point of South Curved Lagoons on a marsupial grazed lawn that appears to hold water at times forming a small pond. The upper 30 cm and 50 cm samples contained yellow white carbonate sands while dark brown swampy organic rich lacustrine sediments were encountered below about 80 cm.

Dune Swale 3: Site 3

The deepest part of the large dune swale that is visible on topographic maps (as an enclosed depression) was sampled at depths of 30, 50 cm and 1 m. The entire profile displayed fine white sands beneath a slightly browner topsoil and no sign of dark organic horizons or peat.

Modern active foredune Site 4:

A grab sample of a cutting in an active foredune exposed in a blowout was sampled at approximately 2.5m depth in a uniform unconsolidated sand with no topsoil.

Main dune exposure: Site 5

Grab samples were taken of the upper dune deposit, Paleosol 1, middle dune deposit, paleosol 2 and the lower dune deposit (Image 7).

Modern (Holocene) back dune Site 6

Three samples were taken from a track cutting through a low dune in the Marshall Beach back dune complex.

Limestone Bench Site 7

Two samples were taken from a thin soil developed on the Tertiary limestone bench.

pH RESULTS

The results of the pH analysis are presented in Table 2. Results for all samples indicated alkaline soil conditions with no indications of highly acidic soil horizons or acid sulphate soils being present in the vicinity of the proposed mining operations. The samples varied in pH between 7.4 and 8.6 with most soils sampled being classified as moderately to strongly alkaline (Blakemore et al. 1987). The topsoil at the large interdune swale (Site 3) returned a

pH of 7.4 that classifies as slightly alkaline (Acid soils have a pH of below 6.5 with strongly acidic soils having pH of <5.2 (Blakemore et al. 1987)).

Table 2. Results of pH determinations

Site	Description	Depth	pH
Site 1	Small swale in older dune Southwest of Pit Face	30 cm	**8.1**
	Small swale in older dune Southwest of Pit Face	50 cm	**8.2**
Site 2	Lowest point of South Curves Lagoon	30 cm	**8.0**
	Lowest point of South Curves Lagoon	50 cm	**8.0**
	Lowest point of South Curves Lagoon – Organic brown muds	100 cm	**7.7**
Site 3	Lowest point of large elongate dune swale brown topsoil	30 cm	**7.4**
	Lowest point of large elongate dune swale - gradational	50 cm	**7.9**
	Lowest point of large elongate dune swale – white sands	100 cm	**8.4**
Site 4	Holocene Foredune	~250 cm	**8.0**
Site 5	Course quartz rich sands (rocky base)	30 cm	**8.2**
	Course quartz rich sands	45 cm	**8.3**
Site 6	Main Pit profile – Upper sand unit	60 cm	**8.5**
	Main Pit profile – Paleosol 1	100 cm	**8.2**
	Main Pit profile – Middle sand unit	120 cm	**8.3**
	Main Pit profile – Paleosol 2	270 cm	**7.8**
	Main Pit profile – Lower sand unit (dating sample site)	430 cm	**8.1**
Site 7	Holocene dune – Upper topsoil	15 cm	**8.3**
	Holocene dune – Gradational soil (A2)	60 cm	**8.3**
	Holocene dune – Lower yellow / white sands	95 cm	**8.6**
Site 8	Shallow limestone soil profile	30 cm	**8.1**
	Shallow limestone soil profile (rocky base)	50 cm	**8.1**

The high pH values obtained from the soil samples indicate an alkaline environment where extensive acidic soils are unlikely to be present. The reason for this is that the entire region is buffered by the abundance of dissolved calcium carbonate within the soil profiles and sand dunes and the underlying Tertiary limestone. Low pH conditions are usually associated with deep organic soils or forested areas. While topsoil development is present within the dune fields, they are weakly developed and do not have a significant organic component capable of producing acidic soils, particularly in a carbonate dominated environment. This can be clearly seen by the gradation of pH in the site 3 dune swale samples (Table 2). Here weakly developed topsoil has a pH of 7.4 and pH rises to 7.9 at 50 cm and 8.4 in the white dune sands at >80 cm.

It is notable that although both the site 2 dark organic soil at 100 cm in South Curves Lagoon and the granite-derived soils at site 5 are in locations that should potentially have low pH soils at neither site do pH values drop below pH 7. This is due to the abundance of carbonate in the environment. The lack of deep well-developed topsoils indicate that since the dune formation wet forests or large eucalypt dominated forests may have never been present in this dry landscape. Although the Holocene dune (site 7) clearly shows a period of stability and soil development, the soil is thin and low in organic content. It is notable that at the main pit face (site 5) the two paleosols are also poorly developed and show very limited changes in pH. Previous eucalypt forest cover at these sites is unlikely.

5. SUMMARY AND MANAGEMENT RECOMMENDATIONS

SCIENTIFIC VALUES

The dune field within the study site is a landscape of geoscientific interest which can be and should be managed appropriately to limit the footprint of any extraction activities. The main dune resource identified for extraction under the current development application (not the entire mining lease) is actually a series of up to 8–10 dunes formed between South and North Curves lagoons mapped on the 1:25000 map sheets of the area. Two dune ridges rising to altitudes of around 24 m asl are dominant in the centre of the resource site. The dune ridges have steep profiles and sharp crests indicative of their fairly young age. A central deep elongate depression (mapped as a sinkhole on topographic maps) is a dune swale around 15 m deep. The large dunes and their lower-relief companions (generally 2–4 m high) are oriented west-to-east across the lowland plain. On the eastern margins of the study area they climb onto a bench of Tertiary limestone. The existing pit is near the easternmost end of the two main dunes which at this location have combined into one ridge.

The current face of the old pit provides an interesting profile of dune stratigraphy and is of local scientific interest as it provides evidence of the history of formation of the dunes in this part of Flinders Island and could potentially be used to indicate paleoclimate conditions prevalent on the Island. While this is an interesting exposure, many of the other unimpacted dunes in the region are likely to host similar paleosols and rhizoliths and therefore the features of the pit face are likely to be fairly common within the landscape. The exposure is only visible because of past sand mining operations and has been photographed, sampled and described during this study. Obscuring of the exposure by erosion and tree overturn means that this exposure has a limited lifetime; formal preservation of this site is likely to be impractical.

Resumption of sand mining extending west from the current pit face will destroy and remove the studied deposits but equally it is likely that the mining activities will expose further paleosols and tree root and stump rhizoliths in the sand dune. There is also a remote potential for archaeological deposits to be found within the dune particularly owing to its carbonate-rich nature which is conducive to preserving organic material such as bones (e.g. there is a possibility that large bones associated with megafauna could be exhumed as could ancient human remains or evidence of occupation (fire hearths etc)). Therefore, I suggest that contractors keep an eye out for unusual deposits or large bones during operations. In summary I recommend the following:

Contractors should look out for:

- Thick dark continous bands within the dunes.
- Buried tree stumps or large calcareous deposits that appear to be parts of a tree.
- Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.

- Large accumulations of shells.
- Large bones and accumulations of smaller bones buried >1m under he surface.

In the event notable examples of these deposits are encountered the first task should be to photograph the area and move operations away from the immediate working face until a suitably qualified person (in the context of the item/items discovered) can assess any values.

KARST MANAGEMENT (GENERAL)

While bedrock Tertiary Limestone is present in the east of the mine lease no karst landforms apart from very minor surface solution sculpture (karren) landforms have been identified during this survey. Given the extensive nature and relief of the limestone on the hills east of the mining lease subsurface water flow through karst aquifers is likely but significant karst landforms are unlikely to be present. In the absence of evidence for significant karst formulation of mitigation measures is unnecessary.

SINKHOLES

It is difficult to differentiate shallow sinkhole depressions from dune swales and this is particularly so in the area of the mining lease. However, all the depressions noted were identified as dune swales so I do not believe they should be treated as karst.

Collapse sinkholes form steep sided depressions and are a sign of significant active karst erosion. In the event a steep sided depression forms during operations work should stop at this location and the area should be avoided during operations until expert advice is obtained. Collapse sinkholes can occur in random locations and are potentially hazardous to machinery and the environment as they may continue to expand following the initial collapse and could indicate changes in subsurface karst aquifer conditions.

CAVES

While highly unlikely, if any caves are located within the sand dune or in the mining lease, operations should avoid the area, advice from a suitably qualified person should be obtained before operations resume.

Karst recommendations

- In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained.
- In the event a cave is located on site operations should avoid the area and seek expert advice.

EROSION RISKS

Blowouts of the coastal dunes backing the beach are quite common within the mine lease area. However, away from the coast most of the larger dunes appear to be stable. The blowout on the southern edge of the pit face has resulted in minor sand deposition and tree burial south of the highest point of the dune (Image 19). The current location of the pit in the leeward side of the main dune reduces the ability of westerly winds to significantly erode the exposed sands in the pit through deflation, although some loss of sand by wind deflation is likely to have occurred (and may still be occurring). There is a risk that once the operations extend to more of a windward face of the dune, dominant westerly winds may deflate (erode) the dune. This could lead to loss of resource and transport of the sediment. Maintaining a high vegetation cover above the working face and active efforts to revegetate the site away from the working face are key to minimising wind erosion. While easterly winds are common on Flinders Island, they are generally less strong than the westerly winds as evidenced by the strongly deformed vegetation caused by westerlies present at exposed locations on the mining lease (Image 20). Also, easterly winds are generally linked to low pressure systems in the Tasman Sea and rainfall, the wet conditions act to stabilise sand dunes and inhibit wind deflation. Deflation of the sand towards the Marshall Beach Conservation area to west of the proposed pit appears to be unlikely.

Recommendations to minimise wind erosion.

- Avoid, if possible, but otherwise minimise working on faces exposed to westerly winds.
- Maintain vegetation above and to the west of any active face
- Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree for covering exposed surface as operations progress.

Image 19: Sand blow deposition burying tree trunks immediately south of the old working face of the sand pit.

Image 20: Vegetation growth strongly impacted by the dominant westerlies.

SOIL MANAGEMENT

Well drained soils in the area of the Markarna lime sands mining lease in the vicinity of the main proposed resource are strongly alkaline Calcarosols. Acidic soils are unlikely to be present over extensive areas and may be totally absent. While organic topsoils, buried paleosols and lake/swamp sediments are present, none of these soils contain adequate organic material to significantly reduce the pH within the dune sands. However, it should be noted that this survey was not comprehensive, and it is possible that the some swampy depressions could host thicker organic horizons having a lower pH. These horizons however will not be directly impacted by sand mining of the high-relief dune ridges.

WETLANDS

The extent of wetlands at both North and South Curves Lagoons are significantly smaller than indicated on the topographic map and the TASVEG mapping. Significant areas of these features are undulating grassy dune fields. No wetlands (swamps) as defined by the Forest Practices Code 2020 (Forest Practices Authority 2020, page 98) were documented in the main resource area.

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ATTACHMENT 10. SITE ANALYSIS AND SITE PLANS

MARSHALL BAY SAND PIT

SITE ANALYSIS AND SITE PLANS

Annexure: 16.2.3

LOCALITY MAP

SCALE: N.T.S.

DRAWING LIST

	DRAWING NO.	REVISION	DESCRIPTION
1	VDC/MSP/A/101	1.0	COVER PAGE
2	VDC/MSP/A/102	0.0	SITE LAYOUT - PAD AREA AND SITE ENTRANCE
3	VDC/MSP/A/103	0.0	IMMEDIATE EXTRACTION AREA
4	VDC/MSP/A/104	0.0	ON-SITE WASTEWATER SYSTEM
5	VDC/MSP/A/105	0.0	PROPOSED SHED
6	VDC/MSP/A/106	0.0	LIGHT VEHICLE PARKING BAY
7	VDC/MSP/A/107	0.0	SWEPT PATH ANALYSIS FOR RIGID TRUCK
8	VDC/MSP/A/108	0.0	SWEPT PATH ANALYSIS FOR LIGHT VEHICLE
9	VDC/MSP/A/201	0.0	TITLE BOUNDARIES AND MINING LEASE
10	VDC/MSP/A/202	0.0	SETBACKS FROM EXTRACTION AREA TO TITLE BOUNDARIES
11	VDC/MSP/A/203	0.0	SETBACKS TO THE SHED AND PARKING BAY
12	VDC/MSP/A/204	0.0	EXISTING SURROUNDING PROPERTIES AND USES
13	VDC/MSP/A/205	0.0	SITE SOIL CONDITIONS AND SURROUNDING GEOLOGY
14	VDC/MSP/A/301	0.0	TOPOGRAPHY AND HYDROLOGICAL FEATURS
15	VDC/MSP/A/302	0.0	NATURAL HAZARDS - SULPHATE SOILS AND INUNDATION
16	VDC/MSP/A/303	0.0	NATURAL HAZARDS - BUSHFIRE AND LANDSLIP

LEGEND

- MINING LEASE
- DEVELOPMENT AREA
- EXTRACTION AREA (APPROX. 30 YEAR SUPPLY)
- EXISTING (DISUSED) PIT
- PROPOSED MINING BLOCKS
- DIVERSION CHANNELS / DRAINS
- STORMWATER FLOW DIRECTION
- CADASTRAL PARCEL BOUNDARIES

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
REV 1.0	SETBACK PLANS, HAZARDS PLANS UPDATED	19/01/2026	ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE LAYOUTS AND VEHICLE SWEPT PATH ANALYSIS

DRAWING NUMBER: VDC/MSP/A/101

Van Diemen CONSULTING

PERMANENT DRAIN TO INTERCEPT STORMWATER RUNOFF FROM THE PAD AREA AND DIRECT TO BS-C1 SEDIMENT BASIN

SEPTIC TANK AND ABSORPTION BED

LIGHT VEHICLE PARKING BAY (X3)

PERMANENT SEDIMENT BASIN TO TREAT STORMWATER RUNOFF FROM THE PAD AREA (BS-C1)

2 X 50,000L WATER TANK

SHED

ACCESS / EGRESS TO PAD AREA

PALANA ROAD

SEDIMENT BASIN (BS-F1)

PAD AREA APPROX. 1.6ha

RAW SAND STOCKPILE

PROCESSED SAND STOCKPILE (SCREENED)

MOBILE SCREEN PLANT

EXISTING PIT AREA

SITE ACCESS FROM PALANA ROAD

N W E S

Meters 25 0 25 50

SCALE @A3 1:1000

NOTES - CONTOURS

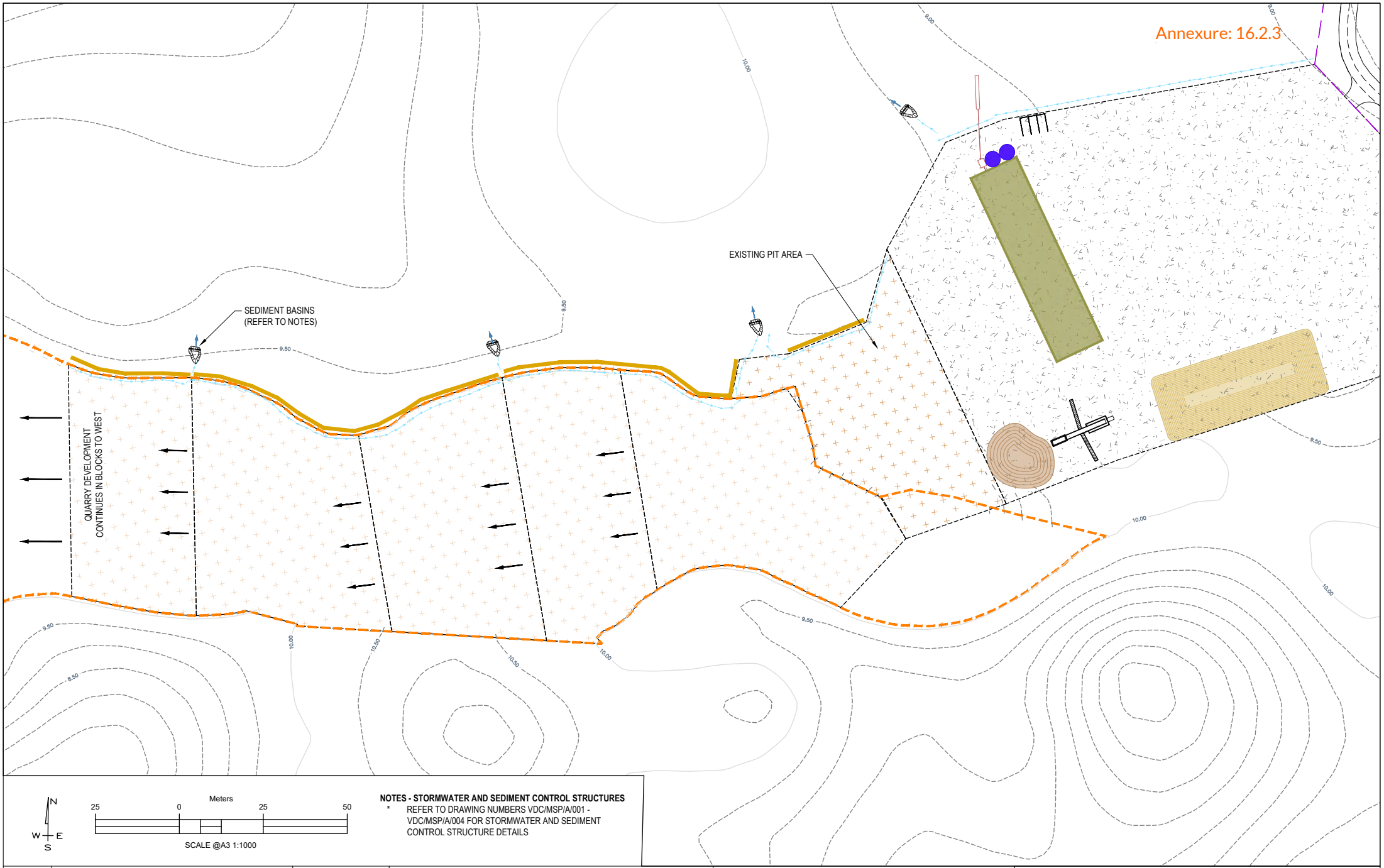
* CONTOUR INTERVAL : 0.5m
* DISPLAY CONTOUR TYPE : EXISTING

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

SITE LAYOUT - PAD AREA AND SITE ENTRANCE

DRAWING NUMBER: VDC/MSP/A/102

Van Diemen CONSULTING



NOTES - STORMWATER AND SEDIMENT CONTROL STRUCTURES

* REFER TO DRAWING NUMBERS VDC/MSP/A/001 - VDC/MSP/A/004 FOR STORMWATER AND SEDIMENT CONTROL STRUCTURE DETAILS

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

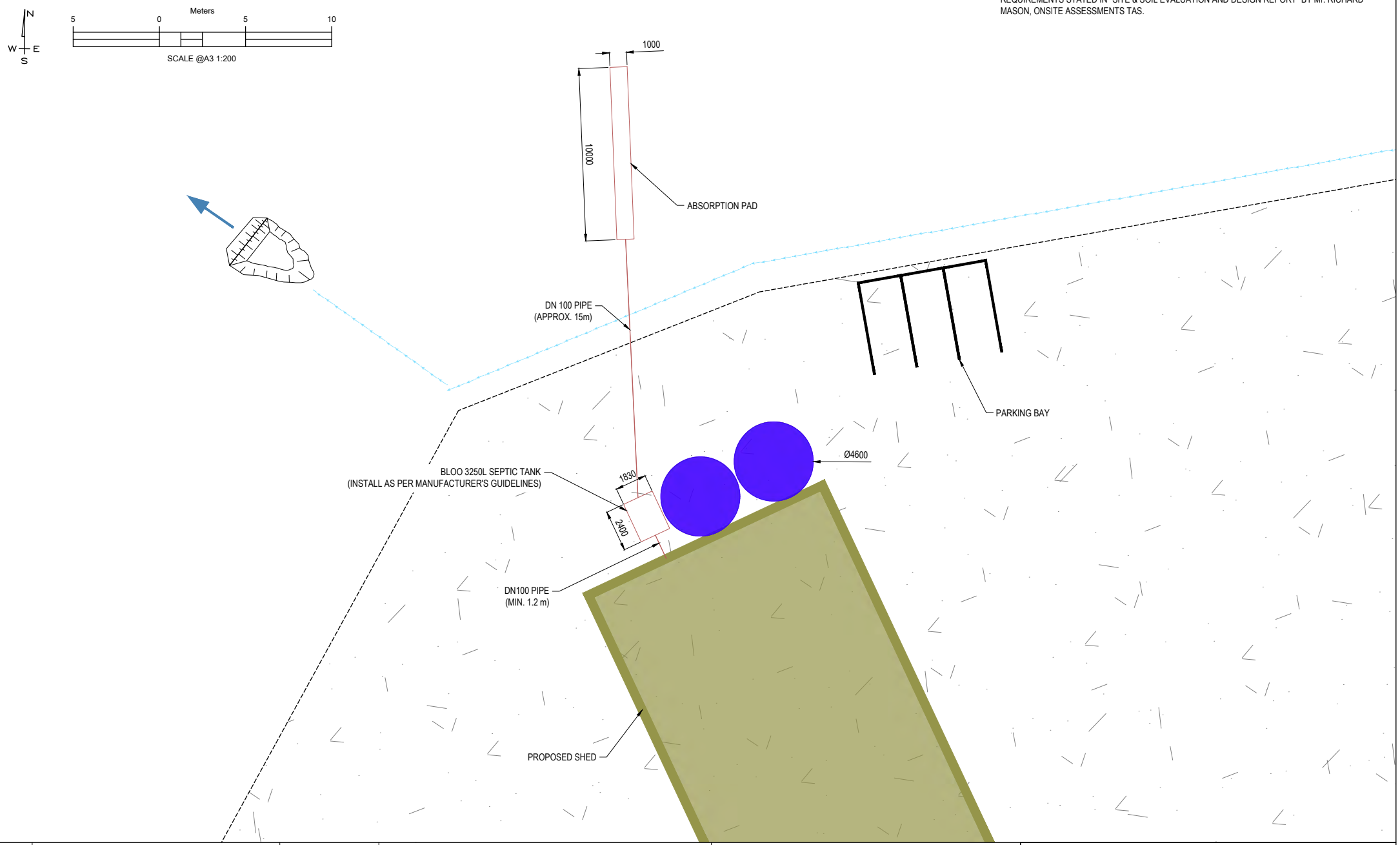
IMMEDIATE EXTRACTION AREA

DRAWING NUMBER: VDC/MSP/A/103

Van Diemen CONSULTING

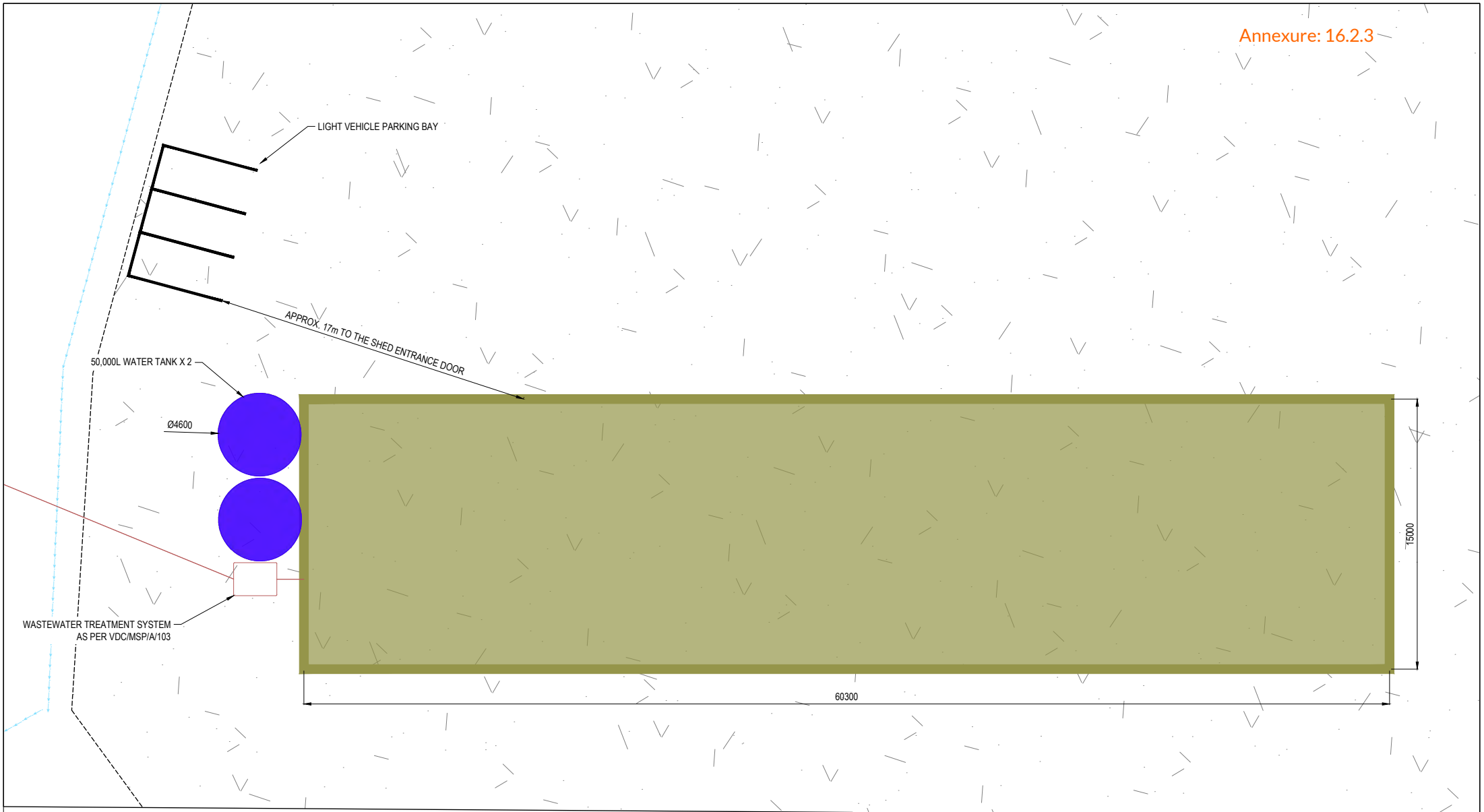
NOTES

* ONSITE WASTEWATER MANAGEMENT SYSTEM MUST BE CONSTRUCTED AS PER THE REQUIREMENTS STATED IN "SITE & SOIL EVALUATION AND DESIGN REPORT" BY Mr. RICHARD MASON, ONSITE ASSESSMENTS TAS.



			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**ON-SITE WASTEWATER MANAGEMENT SYSTEM**
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255	
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD	
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED	
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/104
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, BSc(Eng.)Hons*)	

Van Diemen CONSULTING



Meters

5 0 5 10

SCALE @A3 1:200

NOTES

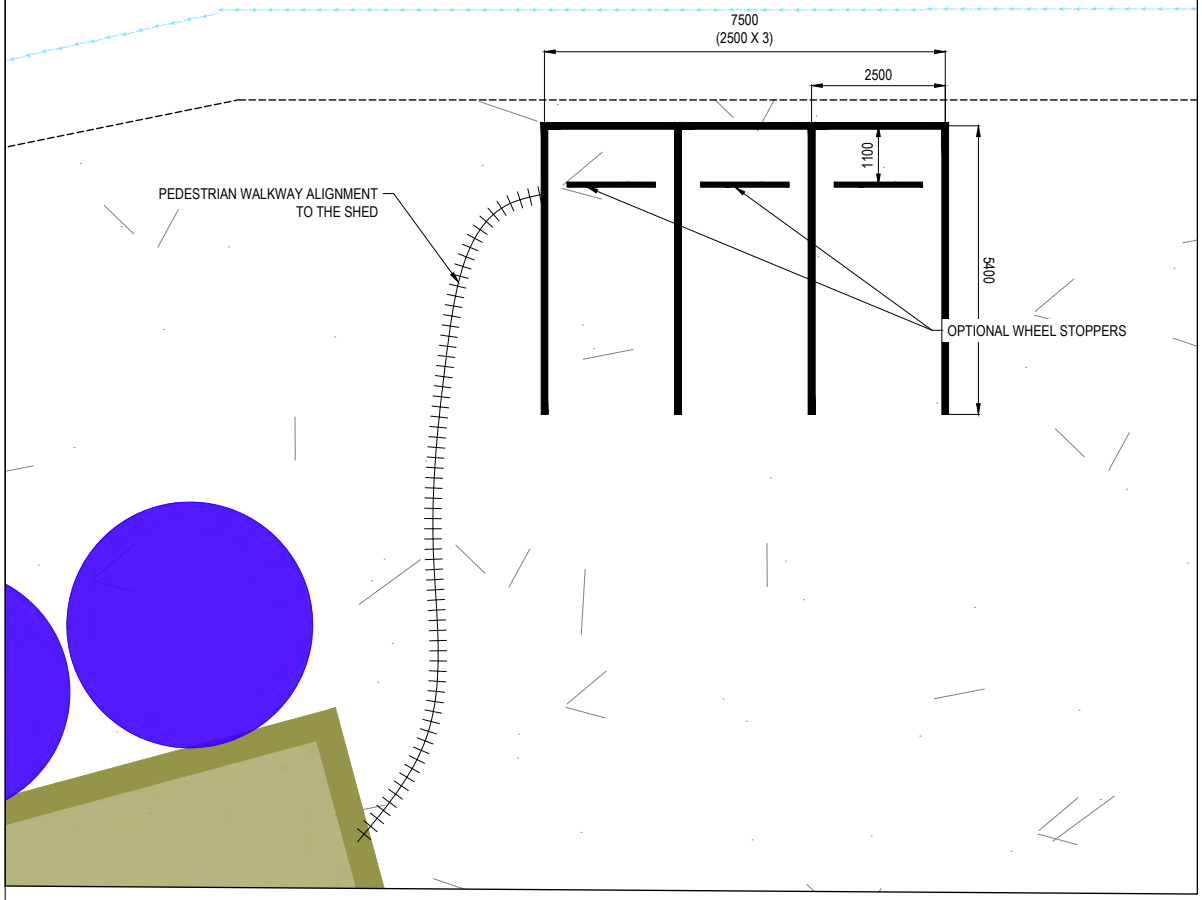
* REFER TO ATTACHMENT 2: SHED DESIGN AND INTERNAL LAYOUT OF "DEVELOPMENT APPLICATION SUPPORTING INFORMATION BY VAN DIEMEN CONSULTING" FOR THE CONCEPTUAL DESIGN OF THE SHED

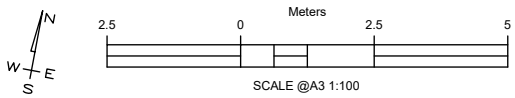
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

PROPOSED SHED

DRAWING NUMBER: VDC/MSP/A/105

Van Diemen CONSULTING





NOTES

1. PARKING SPACES ARE DESIGNED TO SUIT B99 VEHICLES
2. DESIGN STANDARD: AS 2890.1-2004
3. PARKING FACILITY USER CLASS: CLASS 01 AS PER AS 2890.1-2004 (EMPLOYEE AND COMMUTER PARKING)
4. PARKING ANGLE: 90 DEGREES
5. REVERSE PARKING ONLY
6. WHERE WHEEL STOPS ARE INSTALLED, WHEEL STOPS SHALL BE 100mm IN HEIGHT, AND 1650 ± 50 mm IN LENGTH.
7. PARKING BAYS TO BE DELINEATED USING PHYSICAL MARKERS SUITABLE FOR GRAVEL SURFACES, SUCH AS WHEEL STOPS IN LIEU OF PAINTED LINES AS PER AS 2890.1-4 REQUIREMENTS.
8. GRAVEL HARDSTAND AREA SUBJECT TO RE-GRADING AND COMPACTION AS REQUIRED TO MAINTAIN A LEVEL AND STABLE PARKING SURFACE.

DEFINITIONS

1. B99 VEHICLE: DEFINITION AS PER AS 2890.1-2004 (THE DESIGN MOTOR CAR WHOSE PHYSICAL DIMENSIONS REPRESENT THE 99.8TH PERCENTILE CLASS OF ALL CARS AND LIGHT VANS ON THE ROAD.

REFERENCES

1. AUSTRALIAN STANDARD AS 2890.1-2004 PARKING FACILITIES; OFF STREET CAR PARKING.
2. AUSTROADS GUIDE TO TRAFFIC MANAGEMENT PART 11: PARKING MANAGEMENT TECHNIQUES

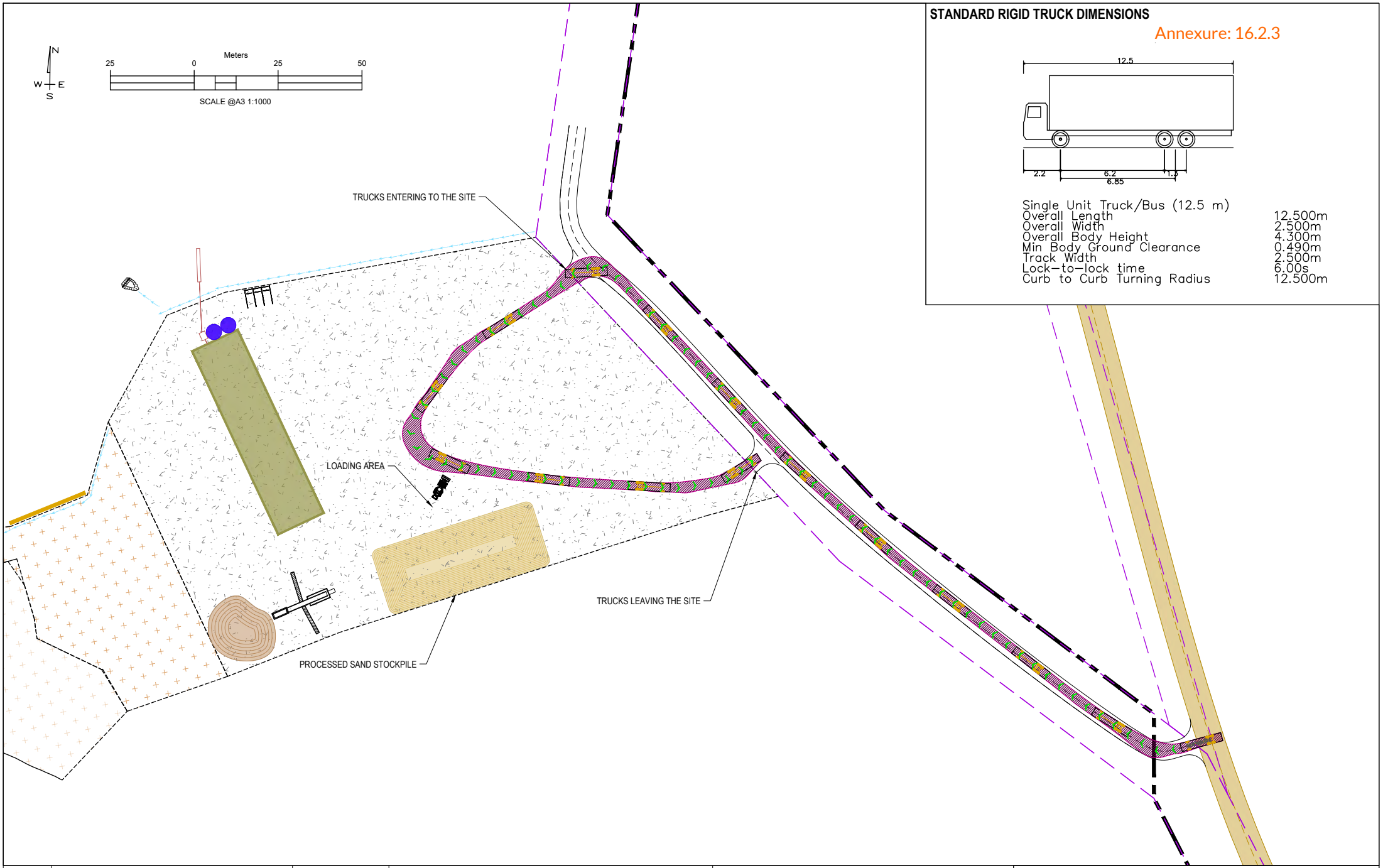
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (*MIEAust, BSc(Eng.)Hons*)

LIGHT VEHICLE PARKING BAY

DRAWING NUMBER: VDC/MSP/A/106

Van Diemen CONSULTING

AGENDA - Ordinary Council Meeting - 27 May 2026 Attachments



STANDARD RIGID TRUCK DIMENSIONS

Annexure: 16.2.3

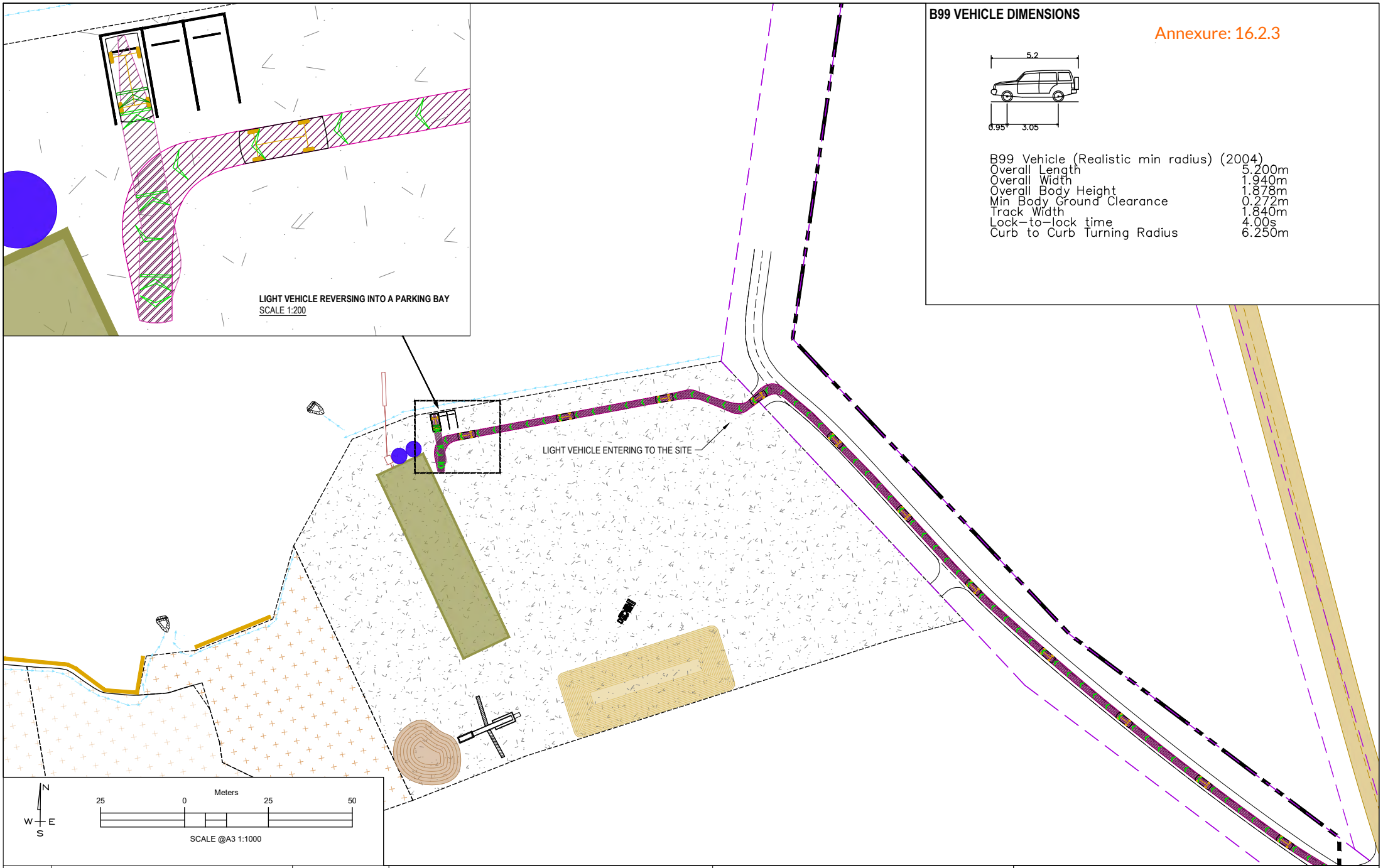
Single Unit Truck/Bus (12.5 m)	
Overall Length	12.500m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.490m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SWEPT PATH ANALYSIS FOR RIGID TRUCK

DRAWING NUMBER: VDC/MSP/A/107

Van Diemen CONSULTING



B99 VEHICLE DIMENSIONS

Annexure: 16.2.3

B99 Vehicle (Realistic min radius) (2004)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	1.878m
Min Body Ground Clearance	0.272m
Track Width	1.840m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	6.250m

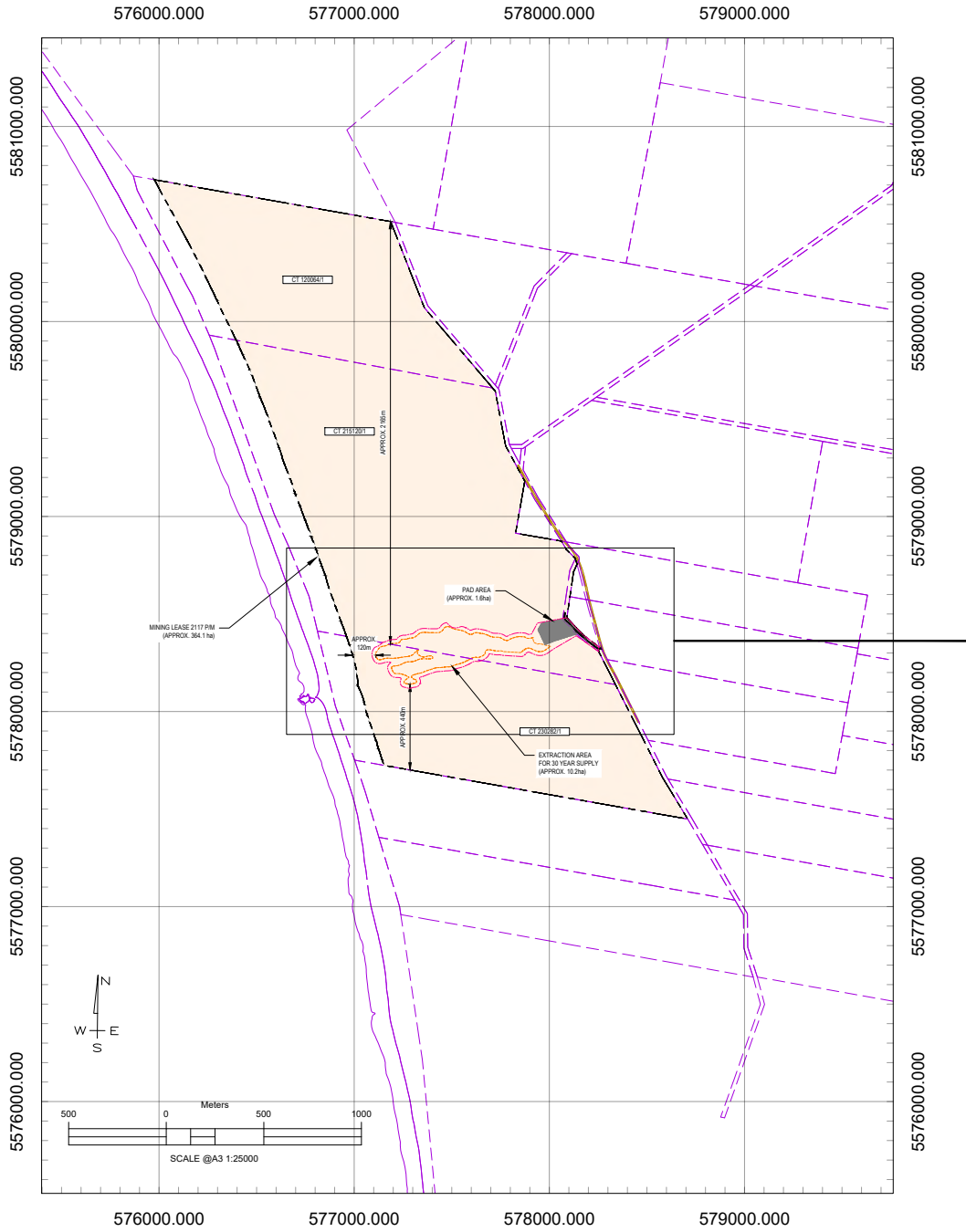
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

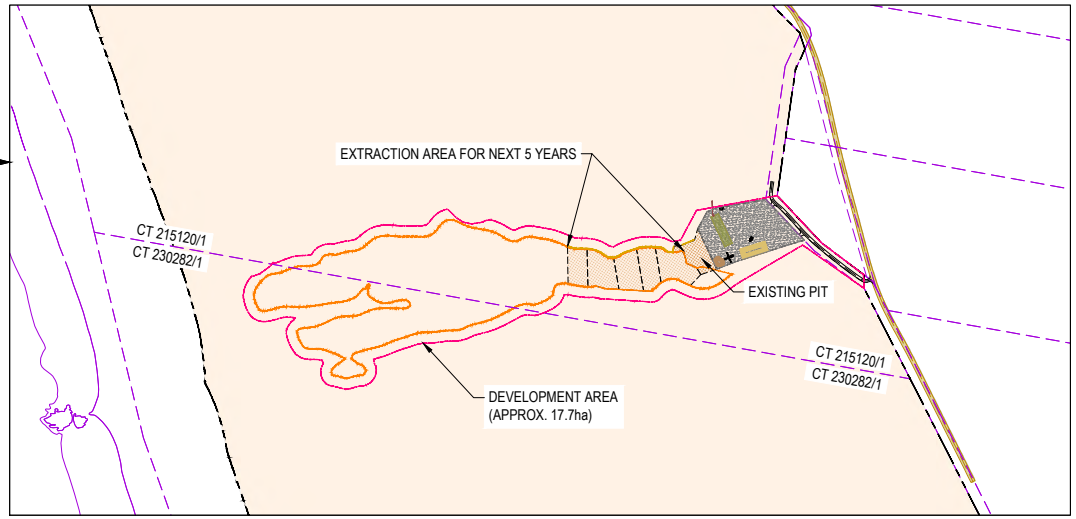
SWEPT PATH ANALYSIS FOR LIGHT VEHICLE

DRAWING NUMBER: VDC/MSP/A/108

Van Diemen CONSULTING

Annexure: 16.2.3

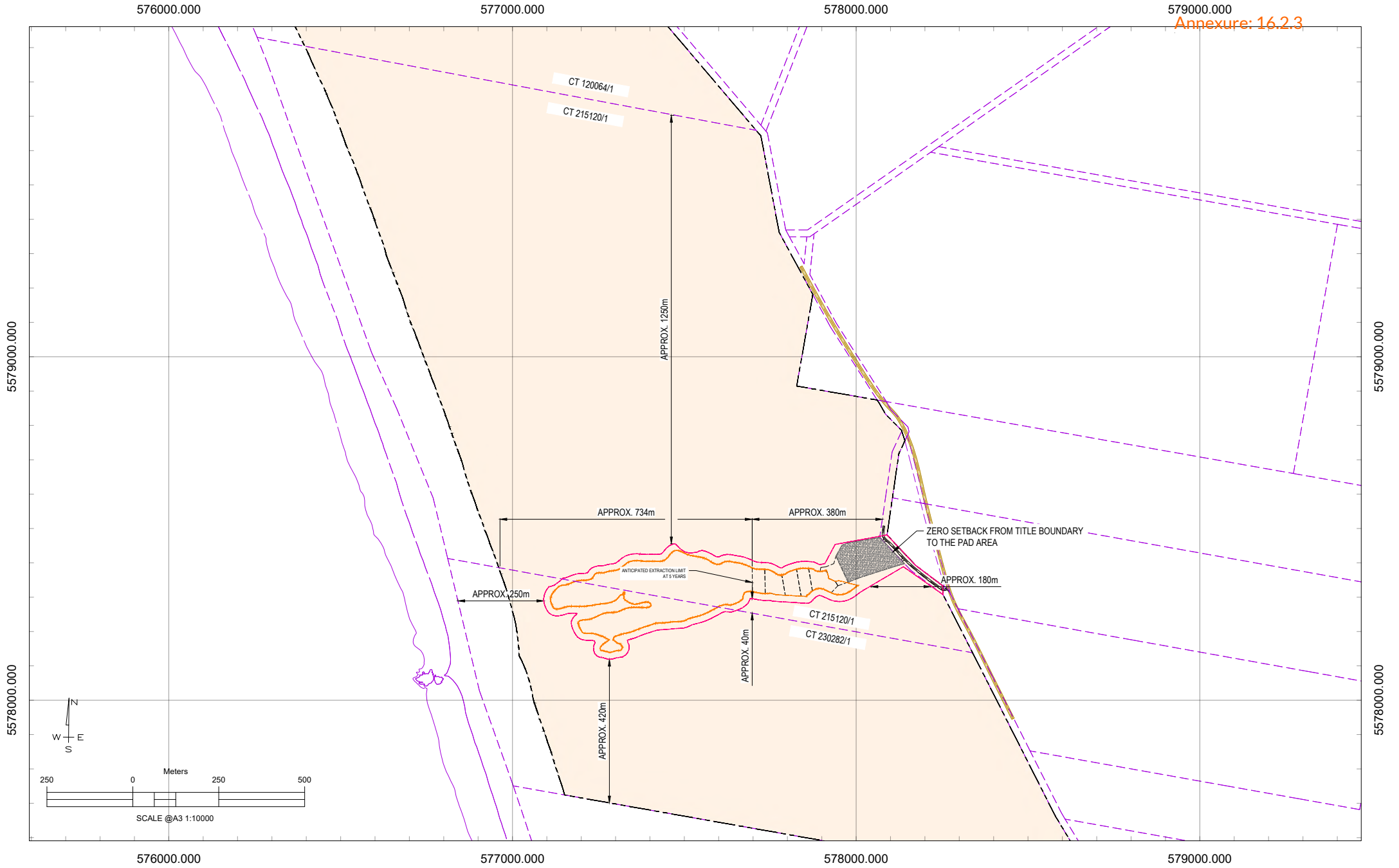




ZOOMED-IN VIEW OF EXTRACTION AREA

SCALE @A3 1:10000

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**TITLE BOUNDARIES AND MINING LEASE**	Van Diemen CONSULTING
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255		
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD		
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED		
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/201	
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)		

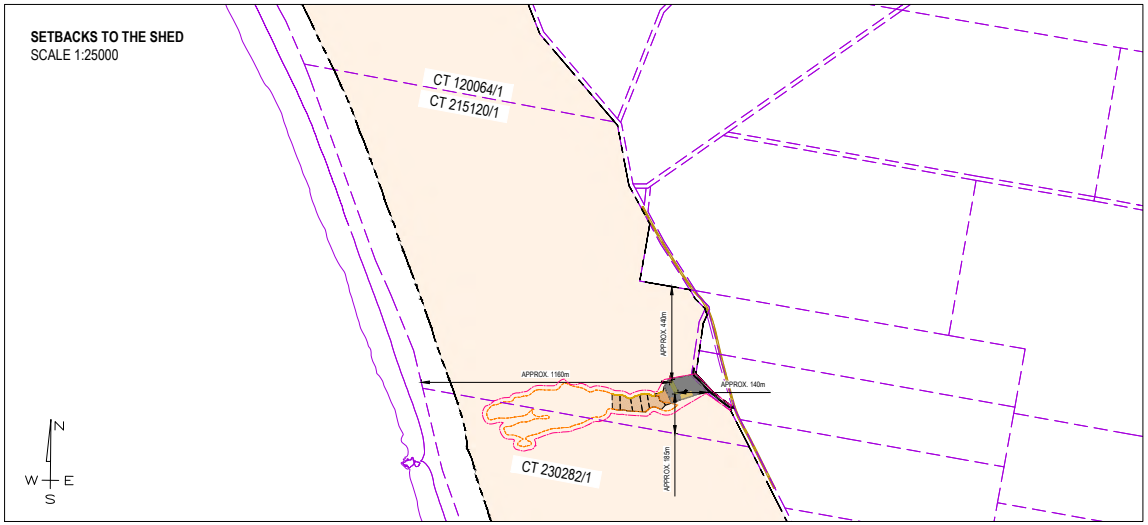


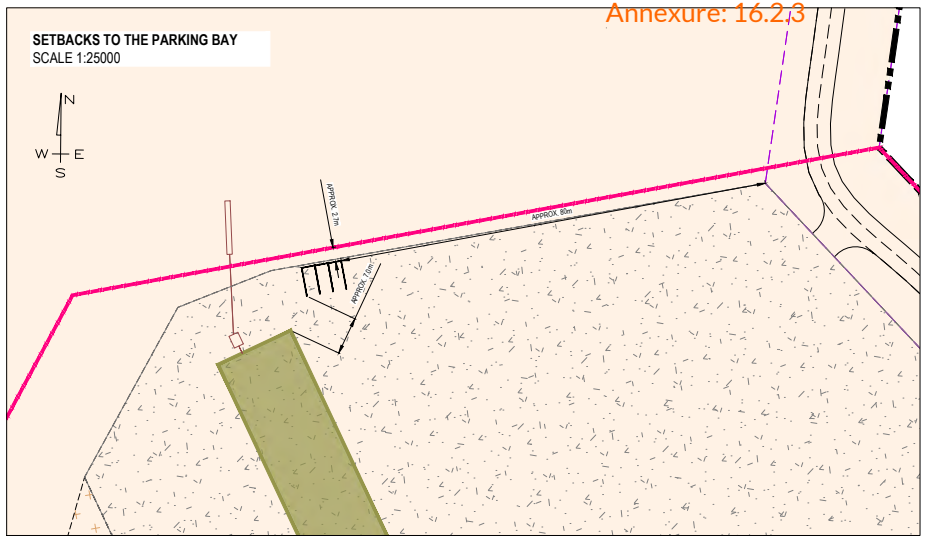
			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, B.Sc(Eng.)Hons)

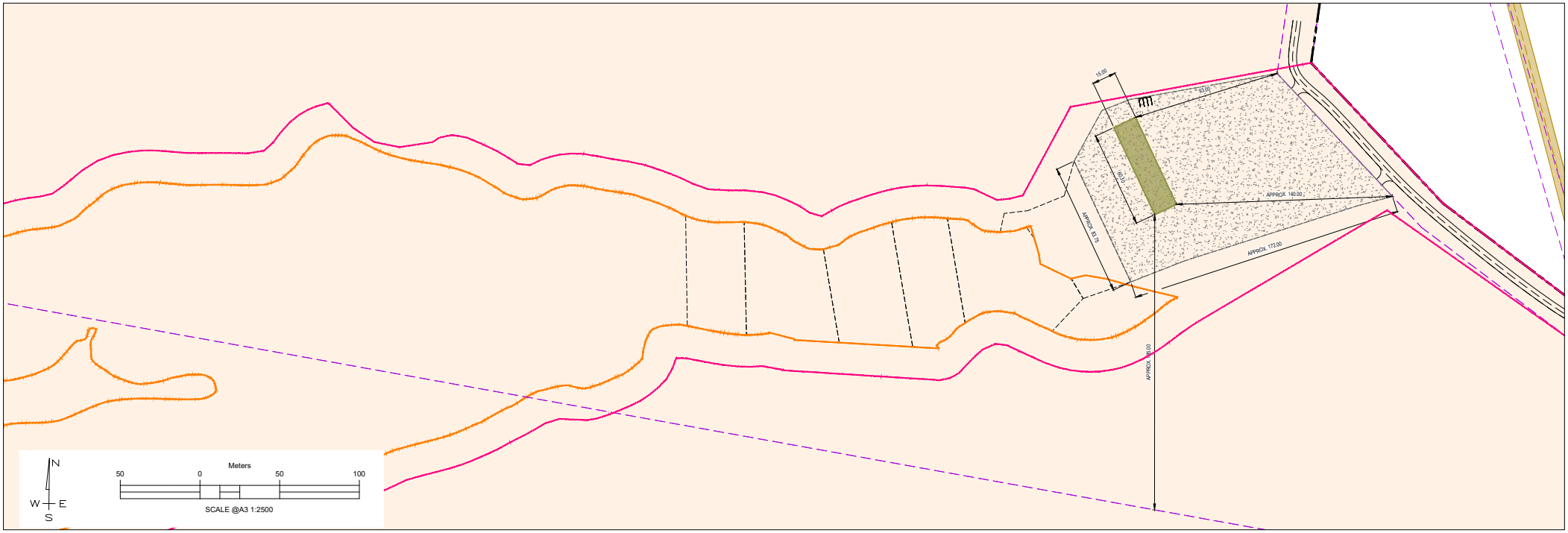
SETBACKS FROM DEVELOPMENT AREA TO TITLE BOUNDARIES

DRAWING NUMBER: VDC/MSP/A/202

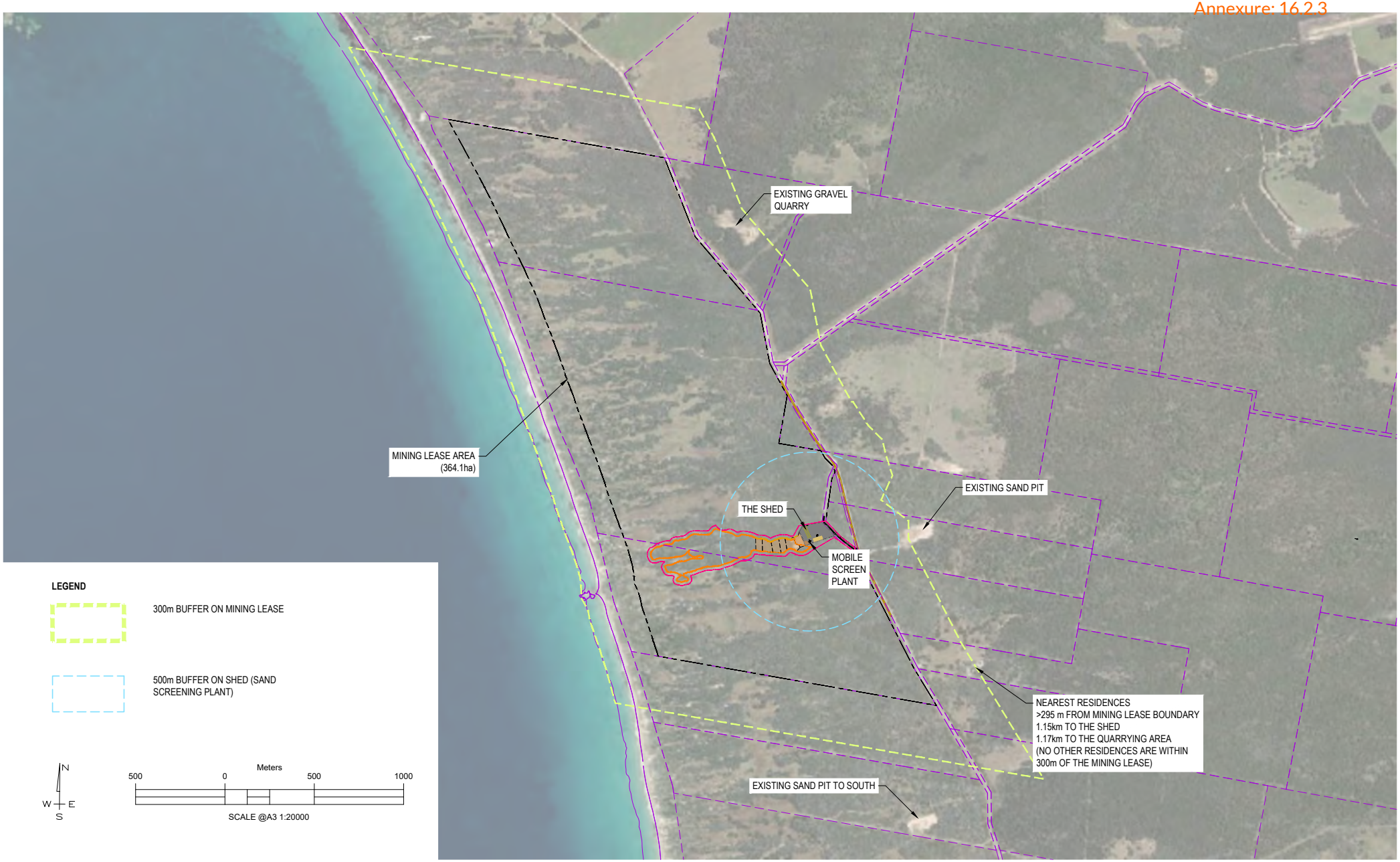
Van Diemen CONSULTING







			CLIENT: MARKARNA GRAZING COMPANY PTY LTD	**SETBACKS TO THE SHED AND PARKING BAY**	Van Diemen CONSULTING
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255		
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD		
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED		
REV 0.0	INITIAL PLAN	13/01/2025	DO NOT SCALE FROM THE DRAWING.	DRAWING NUMBER: VDC/MSP/A/203	
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)		



			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	23/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

EXISTING SURROUNDING PROPERTIES AND USES

DRAWING NUMBER: VDC/MSP/A/204

Van Diemen CONSULTING

SITE SOIL CONDITION

SOIL PROFILE DESCRIPTION

1. HORIZON LAYER - THIS LAYER EXTENDS FROM 0 TO 1000MM. IT CONSISTS OF YELLOW SAND (COLOR 10YR 7/6), WHICH IS LOOSE, DAMP, AND MASSIVE.
2. SUBSURFACE LAYER - THIS LAYER SPANS FROM 1100 TO 1200MM AND IS DESCRIBED AS CONSOLIDATED SAND WITH CALCAREOUS CEMENT. IT ALSO HAS A YELLOW SAND COMPOSITION (COLOR 10YR 7/6), IS DAMP, AND MASSIVE.
3. BASE LAYER - EXTENDING FROM 1200 TO 2000MM+, THIS LAYER COMPRISES LOOSE, DAMP, MASSIVE SAND WITH THE SAME COLOR AS THE OTHER HORIZONS.

GEOLOGICAL AND HYDROLOGICAL CONDITIONS

4. THE SITE IS UNDERLAIN BY QUATERNARY DEPOSITS OF WINDBLOWN SAND OF MARINE ORIGIN, FORMING COASTAL SAND DUNES. THE SANDS CONTAIN A HIGH PROPORTION OF CALCAREOUS MATERIAL (MARINE MOLLUSC SHELL DERIVED), WHICH IMPACTS SOIL STRUCTURE AND PERMEABILITY.
5. THERE IS EVIDENCE OF HARDPAN FORMATION AT A DEPTH OF 1100-1200MM, WHICH IS LESS PERMEABLE THAN THE SURROUNDING UNCONSOLIDATED SANDS.
6. THE WATER TABLE IS BELIEVED TO EXCEED 3 METERS

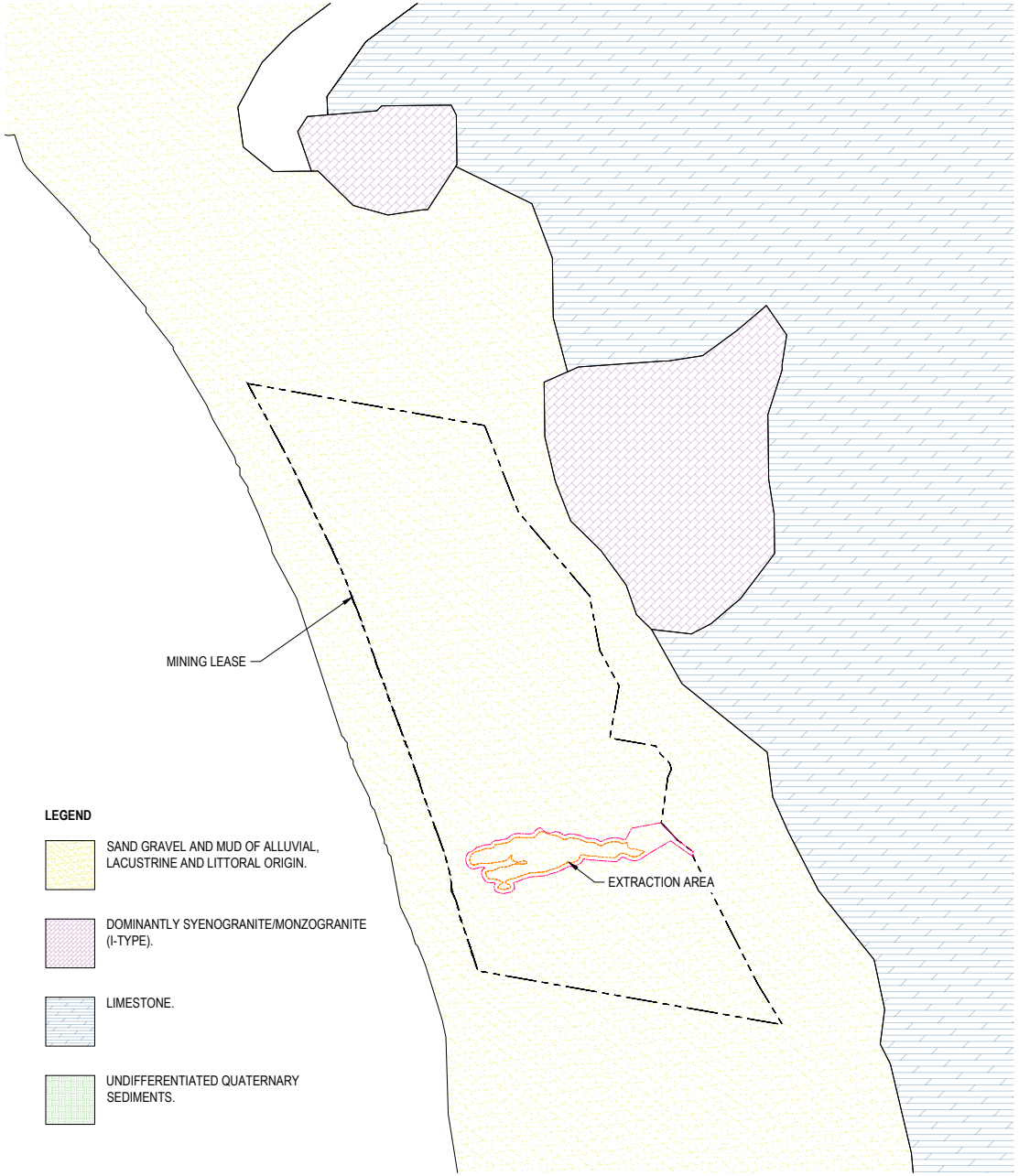
REFERENCE

- "SITE & SOIL EVALUATION AND DESIGN REPORT" BY RICHARD MASON, ONSITE ASSESSMENTS TAS.

FIGURE A: AN IMAGE OF SOIL PROFILE SAMPLES COLLECTED FROM THE SITE

LISTMAP OVERLAY - GEOLOGY UNITS 250k
SCALE 1:25000

Annexure: 16.2.3

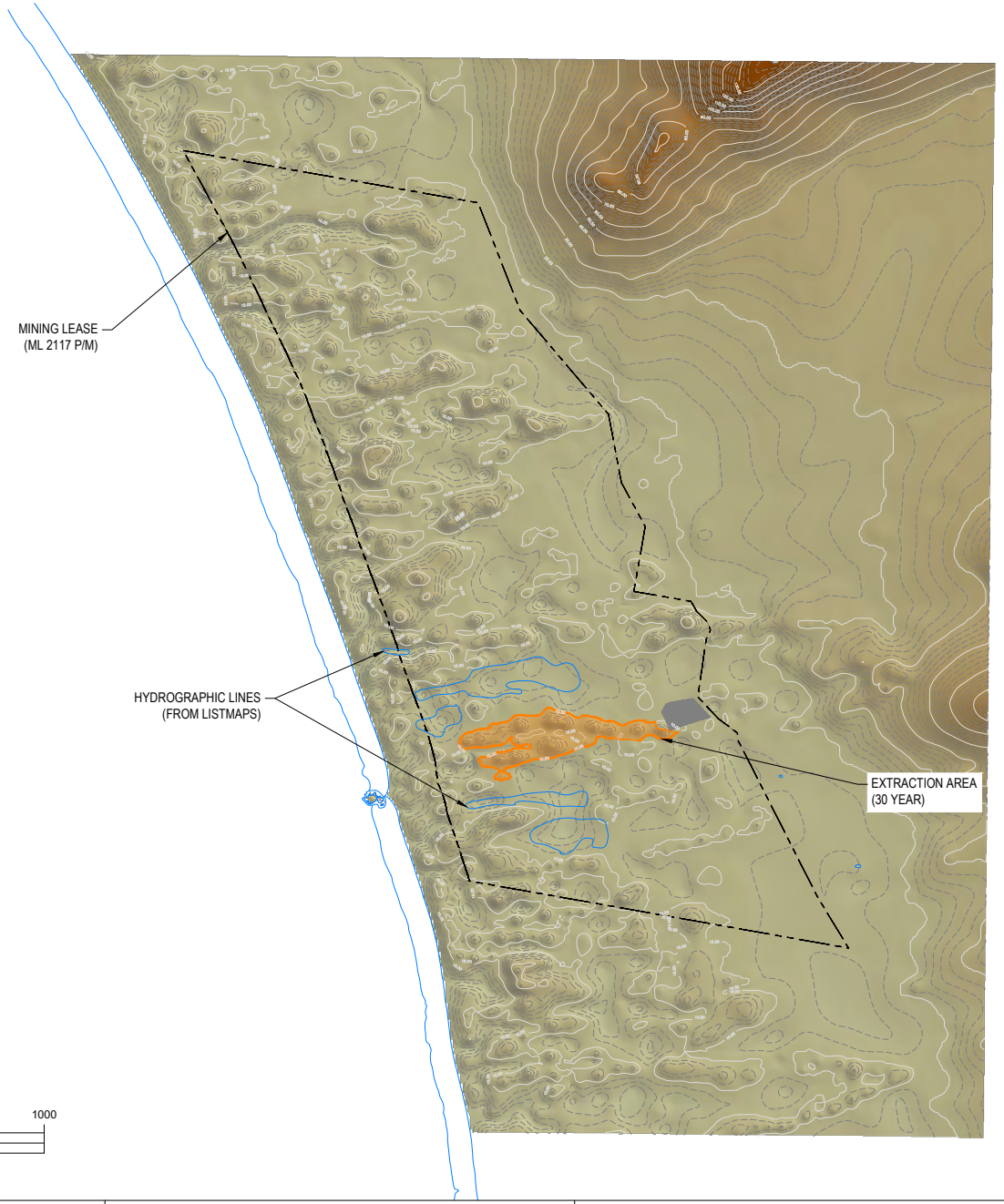


			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	23/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

SITE SOIL CONDITIONS AND SURROUNDING GEOLOGY

DRAWING NUMBER: VDC/MSP/A/205

Van Diemen CONSULTING



NOTES
1. CONTOUR INTERVAL: 2m
2. VERTICAL DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
3. NO NATURAL DRAINAGE LINES ARE PRESENT IN THE SURROUNDING AREA

N
W E
S

Meters
500 0 500 1000

SCALE @A3 1:20000

			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

TOPOGRAPHY AND HYDROLOGICAL FEATURES

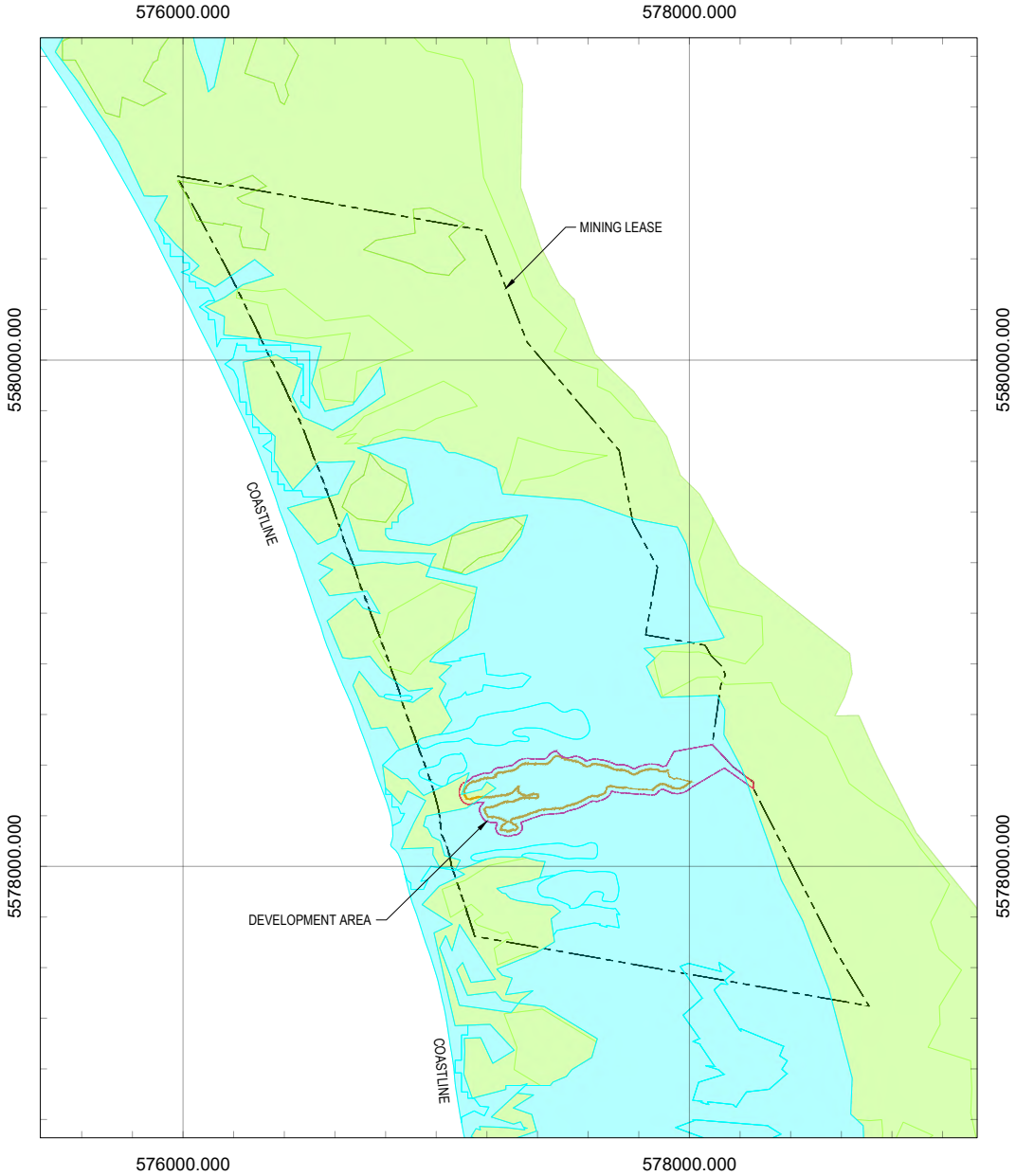
DRAWING NUMBER: VDC/MSP/A/301

Van Diemen CONSULTING

COASTAL ACID SULPHATE SOIL OVERLAY (LISTMAP)

LISTMAP NOTES - Extremely low probability of occurance (1-5% of mapping unit). with occurences in small areas. Sandplains and dunes 2-10m AHD, ASS generally below 1m from the surface.

LISTMAP NOTES - Low probability of occurance (6-70% chance of occurrence in mapping unit). Sandplains and dunes >10m AHD, ASS generally below 1m from the surface.

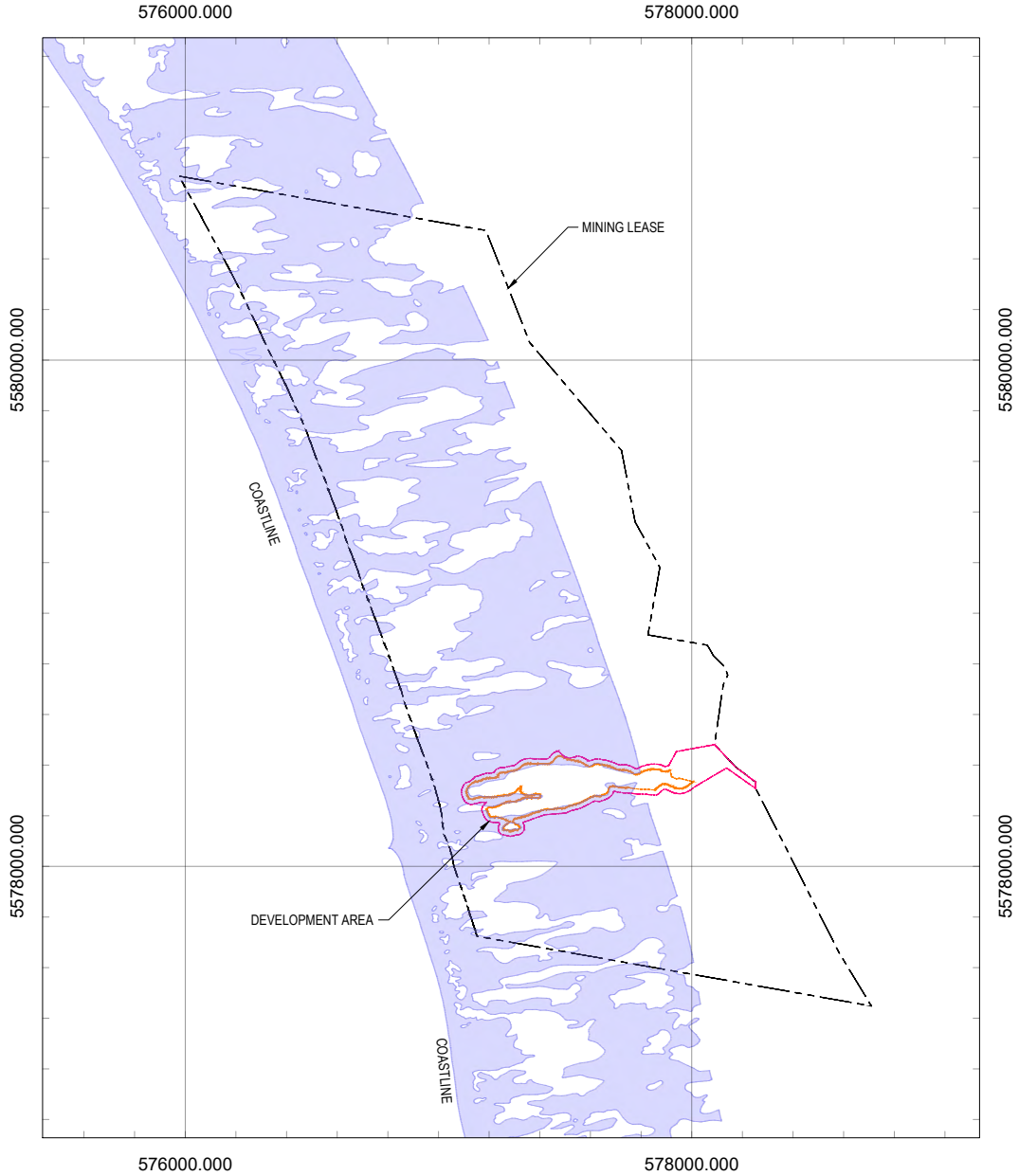


COASTAL INUNDATION HAZARD OVERLAY (LISTMAP)

INUNDATION INVESTIGATION AREA

LISTMAP NOTES

This area is outside the LiDAR-mapped area and as it is below the mapped 10 m contour may be partly vulnerable to sea level rise but data used for this analysis were not sufficient to further determine potential inundated areas.



			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

NATURAL HAZARDS - COASTAL ACID SULPHATE SOILS AND COASTAL INUNDATION HAZARD

DRAWING NUMBER: VDC/MSP/A/302

Van Diemen CONSULTING

LANDSLIP HAZARD BAND (LISTMAP)

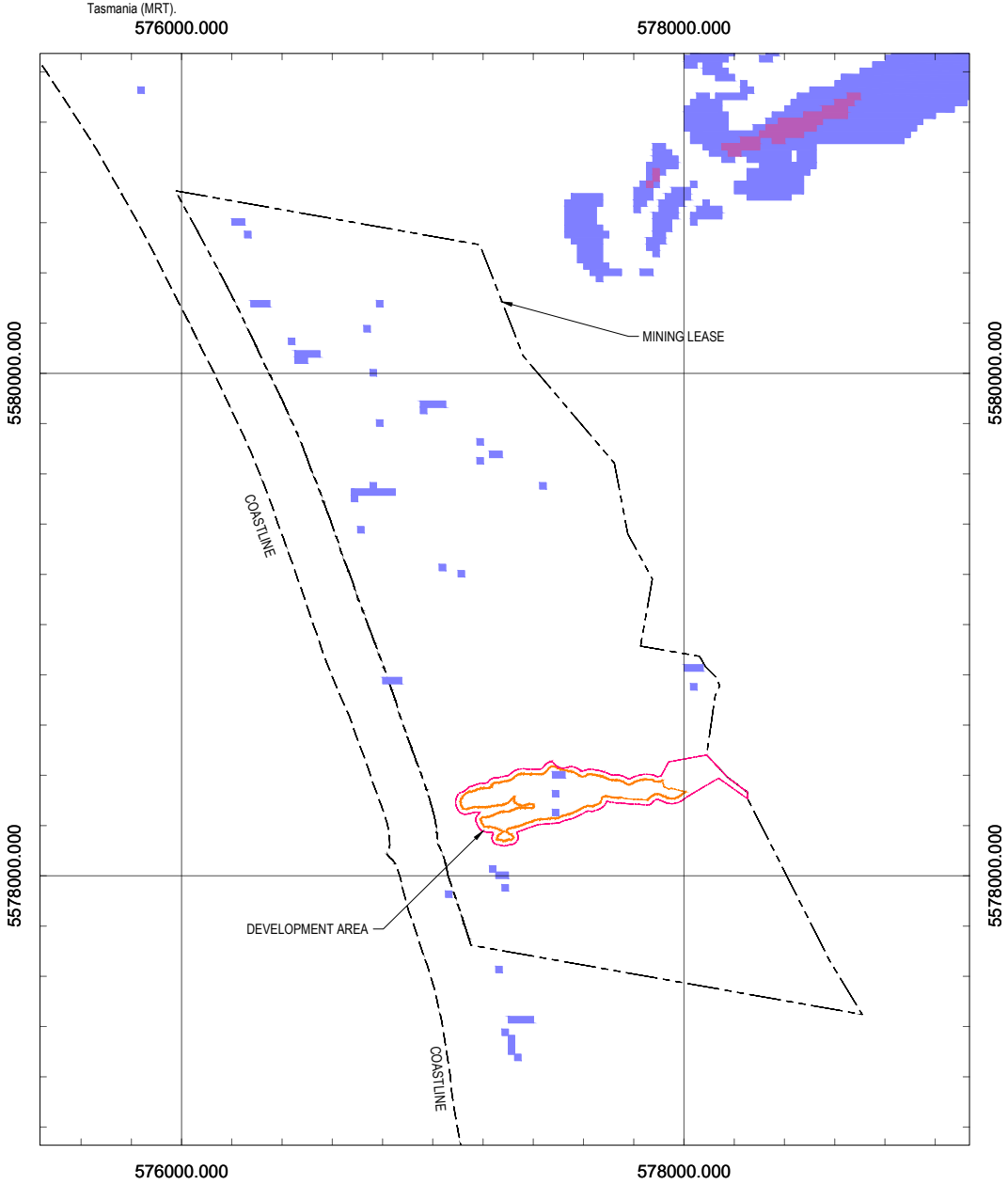
LOW
LISTMAP NOTES - This area has no known active landslides, however it has been identified as being susceptible to landslide by Mineral Resources Tasmania (MRT).

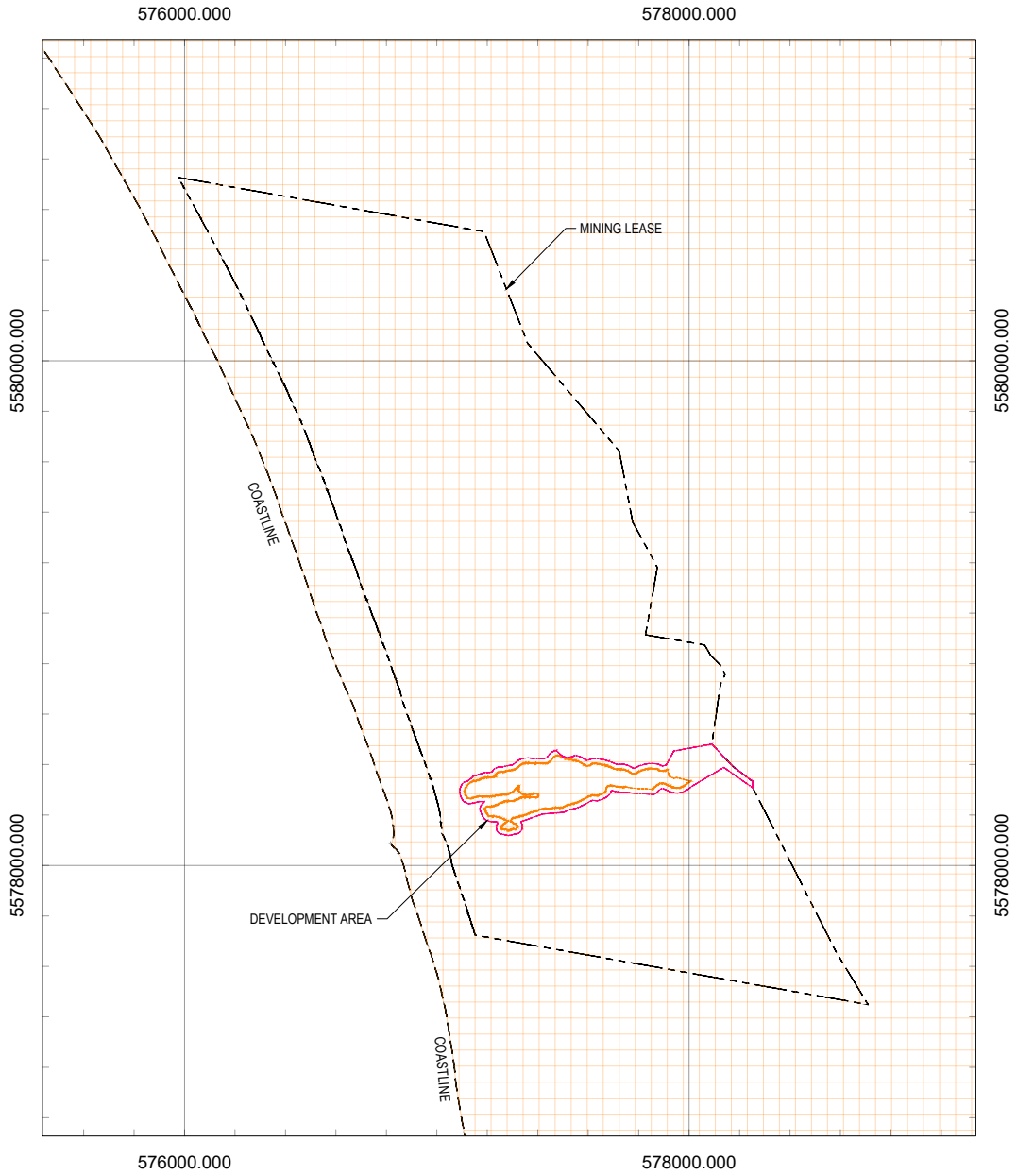
MEDIUM

BUSHFIRE PRONE AREAS (LISTMAP)

BUSHFIRE PRONE AREA

Annexure: 16.2.3





			CLIENT: MARKARNA GRAZING COMPANY PTY LTD
			ADDRESS/LOCATION: 368 FIVE MILE JIM ROAD, MEMANA TAS 7255
			HORIZONTAL/VERTICAL DATUM: MGA ZONE 55 GDA94 / AHD
			ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED
REV 0.0	INITIAL PLAN	22/01/2025	DO NOT SCALE FROM THE DRAWING.
REVISION HISTORY			PREPARED BY: SANDUN INESHKA (MIEAust, BSc(Eng.)Hons)

NATURAL HAZARDS - BUSHFIRE HAZARD AND LANDSLIP HAZARD

DRAWING NUMBER: VDC/MSP/A/303

Van Diemen CONSULTING

ATTACHMENT 11. MARKARNA GRAZING COMPANY PTY LTD, PALANA ROAD SAND PIT, MEMANA - EAR

Environmental Assessment Report

Markarna Grazing Company Pty Ltd

Lime Sand Extraction Pit
368 Five Mile Jim Road, Memana
Flinders Island

August 2025

ENVIRONMENT PROTECTION AUTHORITY

Environmental Assessment Report

Proponent	Markarna Grazing Company Pty Ltd
Proposal	Lime Sand Extraction Pit
Location	368 Five Mile Jim Road, Memana, Flinders Island
Class of Assessment	This EMPCA Section 25A process does not require classing the assessment
PCE no.	11576
Permit Application No.	DA 2023 / 00038 (Flinders Council) Combined development and planning scheme amendment (rezoning) application Section 40T Application under LUPAA Section 25A Assessment under EMPCA
myDAS Folder No.	23/5219
myDAS Document No.	D25-109017

Assessment Process Milestones

Date	Milestone
19 June 2023	Permit Application submitted to Council
25 July 2023	Referral received by the Board
9 August 2023	Request for additional information issued
24 June 2025	Additional information accepted
8 July 2025	Date draft conditions issued to proponent
19 August 2025	Statutory period for assessment ends

Glossary/Acronyms

Term	Detail
Activity Area	Refer to Figure 3 of the EAR
Additional information	Provided in the form of an Environmental Impact Statement
AHD	Australian Height Datum
Board	Board of the Environment Protection Authority
EAR	Environmental Assessment Report (this report)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EMPCA	*Environmental Management and Pollution Control Act 1994*
EMPCS	Environmental Management and Pollution Control System
EPBCA	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
Extractive Area	Refer to Figure 3 of the EAR
IECA	*International Erosion Control Association's Best Practice Erosion and Sediment Control 2018 documents*
LUPAA	*Land Use Planning and Approvals Act 1993*
NCA	*Nature Conservation Act 2002*
NRE	Department of Natural Resources and Environment Tasmania
Pad Area	Refer to Figure 5 of the EAR
QCP	Quarry Code of Practice (EPA 2017)
RMPS	Resource Management and Planning System of Tasmania
SD	Sustainable Development
TSPA	*Threatened Species Protection Act 1995*

Report Summary

This report provides an environmental assessment of a proposed lime sand extractive pit, including materials handling (screening) by Markarna Grazing Company Pty Ltd.

The proposal involves extraction of lime sand from a west-to-east parallel dune system adjacent to Marshall Bay at Memana on Flinders Island. Up to 10,000 cubic metres per year is proposed to be extracted by bulldozer and/or excavator. Up to 10,000 cubic metres per year of raw sand may be screened to remove organic matter and to mix in soil ameliorants where necessary, as most of the sand will be applied to agricultural land on Flinders Island to help improve land capability for cropping and grazing.

The permit application for this proposal is combined with a planning scheme amendment (rezoning) application under Section 40T of LUPAA and hence was referred to the EPA Board (the Board) under section 25A of EMPCA for assessment.

The Board assessment process for a combined permit application / rezoning application differs to the more common EMPCA section 25 assessment in several ways:

- Upon referral of the proposal from Council, the Board requested additional information on the activity and its potential impacts and associated mitigation measures. This mirrors the process normally used by the Board in issuing Environmental Effects Report / Environmental Impact Statement Guidelines to assist a Proponent in developing a satisfactory case for assessment, except that assessment classing was not required.
- The additional information was provided by the Proponent in an Environmental Impact Statement (EIS). This replicates the process a proponent typically undertakes in developing a case for assessment under section 25.
- Once the Board accepted the additional information, the assessment must be completed within 10 weeks and Flinders Council notified of the decision. This aligns with the usual process for a section 25 assessment, noting that the environmental permit conditions are *recommended* rather than *required* as would usually be the case under section 25(8).
- After completion of the Board's assessment Council decides whether to initiate the proposed rezoning. If Council decides to initiate and certify the rezoning it will then need to determine the permit application, including any conditions and restrictions recommended by the Board, and place the permit and rezoning documents on public exhibition for 28 days. This differs from a section 25 assessment where public exhibition is undertaken prior to the Board's consideration of this report.
- If representations are received, Council and EPA may be required to prepare a report for the Commission on the merits of any relevant representations. The Commission is then provided with those reports, the representations, any amendments recommended and the permit. The Commission may choose to hold public hearings before making its decision to approve, modify or reject the rezoning and permit application.

This report has been prepared based on information provided in the permit application and additional information provided in the EIS. The area defined as the Development Area at page 8 and Figure A-4 of the EIS has been adopted as the Activity Area within this EAR, with the inclusion of the drains, sediment basins and septic system absorption pad excluded by the EIS definition (refer Figure 3 of this EAR).

Relevant government agencies were consulted, and their comments considered as part of the assessment.

Appendix 1 contains a table of the proponent's proposed management measures.

Appendix 2 contains the environmental permit conditions for the proposal.

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1. Approval Process

A combined permit and rezoning application under the *Land Use Planning and Approvals Act 1993* (LUPAA) for the proposal was submitted to Flinders Council on 19 June 2023.

This proposal is defined as a 'level 2 activity' under clauses 5(b) and 6(a)(ii), Schedule 2 of the *Environmental Management and Pollution Control Act 1994* (EMPCA), being a sand extractive pit with materials handling (screening).

Section 25A(1A) of the EMPCA required Council to refer the application to the Board of the Environment Protection Authority (the Board) for assessment under the Act. The application was received by the Board on 25 July 2023.

The Board required the applicant to provide additional information for the purposes of the assessment on 9 August 2023. This was provided in the form of an Environmental Impact Statement (EIS). Several drafts of the EIS were submitted to the EPA for review against the request for additional information prior to finalisation and acceptance on behalf of the Board on 24 June 2025.

The EIS was referred to relevant government agencies for comment.

2. SD Objectives and EIA Principles

The proposal must be considered by the Board in the context of the objectives of the Resource Management and Planning System of Tasmania (RMPS), and the Environmental Management and Pollution Control System (EMPCS). Both sets of objectives are specified in Schedule 1 of EMPCA.

The functions of the Board are to administer and enforce the provisions of EMPCA, and to use its best endeavours to further the RMPS and EMPCS objectives. The Board must assess the proposal in accordance with the Environmental Impact Assessment Principles defined in Section 74 of EMPCA, except for subsections (6) requiring public consultation and (7) regarding public disclosure of all information relating to the environmental impact of a proposal (as per section 25A(4) of EMPCA).

3. The Proposal

The main characteristics of the proposal are summarised below. A detailed description of the proposal is provided in Part B of the EIS.

Summary of the proposal's main characteristics

Activity

The proposal involves extraction of lime sand from a west-to-east parallel dune system adjacent to Marshall Bay at Memana on Flinders Island. Up to 10,000 cubic metres per year of lime sand is to be extracted by bulldozer and/or excavator. Up to 10,000 cubic metres per year of raw lime sand may be screened to remove organic matter and to mix in soil ameliorants where necessary, as most of the sand will be applied to agricultural land on Flinders Island to help improve land capability for cropping and grazing.

Location and planning context

Location	'Markana Park' 368 Five Mile Jim Road, Memana, as shown in Figure 1.
Land zoning	Currently zoned as Landscape Conservation. The rezoning application seeks to change the zone to Rural.
Land tenure	Private freehold with a small section of reserved road (Crown land). A crown licence is currently held by the Proponent for access to the site via the reserved road.
Mining lease	ML 2117P/M granted on 20 July 2023.
Lease area	365 ha
Bond	$50,000 based on an unrehabilitated area of 5 ha.

Activity site

Land Use	Most of the mining lease area is currently native vegetation used for limited livestock grazing. In the past the mining lease has been used for more intense livestock grazing. There is also a small extractive pit, at the proposed location of this extractive pit, that has historically been used for small-scale sand extraction.
Topography	The Activity Area is comprised of a west-to-east parallel dune system which becomes two distinct steep sided dune ridges, with deep, wide swales between the ridges. Marshall Beach and Bay are located west of the Activity Area. From the Activity Area elevation is gained to the east forming low hills to around 150 m AHD.
Geology	Sand, gravel and mud of lacustrine and littoral origin. Sands to be extracted are of littoral origin and are highly calcareous. Underlying geology is a mosaic of lacustrine / littoral gravels and sands cemented / compacted in situ. Base geology is fossiliferous (marine shells) Tertiary limestone.
Soils	A soil layer is largely absent or is represented by a slightly discoloured upper layer in the sandy soil profile. There have been two prominent paleosols identified in the profile exposed at the historic extraction pit face.
Hydrology	No identified surface waterways within the Activity Area. Possible areas where lagoons may form north and south of the Activity Area (North and South Curves Lagoons). Potential for karst in the area to influence subsurface hydrology.
Natural Values	Six flora species listed under the *Threatened Species Protection Act 1995* (TSPA) were identified within the Activity Area, including: • Coast wirilda (*Acacia uncifolia*); • Mossy woodruff (*Asperula minima*); • Spiny bushpea (*Eutaxia microphylla*); • Curved riceflower (*Pimelea curviflora* var. *gracilis*);

	• Coast twinleaf (*Roepera billardierei*); and • Pale fanflower (*Scaevola albida*). Habitat for several threatened fauna species is present within or adjacent to the Activity Area, including: • Wedge-tailed eagle (*Aquila audax subsp. fleayi*); • White-bellied sea-eagle (*Haliaeetus leucogaster*); • New Holland mouse (*Pseudomys novaehollandiae*); and • Tussock skink (*Pseudemoia pagenstecheri*). Two Declared Weed species (horehound (*Marrubium vulgare*) and slender thistle (*Carduus pycnocephalus*)) listed under the *Biosecurity Act 2019* were observed within the Activity Area.

Location region

Climate	Rainfall is approximately 735 mm per year. Wind direction is predominantly from the west with lighter winds from the east-north-east being sub-dominant.
Surrounding land zoning, tenure and uses	Zoning to the north is environmental management and to the east and south is a mix of environmental management, landscape conservation, rural and agriculture. Land surrounding the Activity Area is private freehold and is mostly vegetated immediately east of the proposed extractive pit, with extensive agricultural lands further inland to the east. To the north is a private nature reserve, the Mount Tanner Nature Recreation Area, and the Wingaroo Nature Reserve. Nearby to the east and south are three other mining leases. There is also a private conservation covenant just to the east on an area of private freehold land (refer to Figure 4 of this EAR). To the south is the Mulligans Hill Conservation Area, Emita Nature Recreation Area, Settlement Point Conservation Area and two other public reserves. Immediately to the west and south-west is the Marshall Beach Conservation Area. The mining lease is almost adjacent to the Marshall Beach Conservation Area with a small (approx. 130 m) strip of coastal dunes between the Conservation Area and mining lease boundary. The proposed Activity Area is an additional 100 m further east of the mining lease boundary.

Proposed infrastructure

Major equipment	The EIS proposes the use of the following equipment: • vibratory screen (Powerscreen 2 & 3 deck); • wheel Loader (966H); • grader (140G); • excavator (329D); • dozer (D9N); • off-road haul truck; • transport trucks (medium combination truck & trailer, single trucks); • 15,000 L capacity water cart truck; and • light vehicles for worker transport.
Other infrastructure	The EIS states that other infrastructure will be required, including: • a shed (15 m x 60.3 m x 7.77 m) with internal crib room and amenities; • two 50,000 L water tanks; • access roads for accessing the site and extraction areas; • drains and sediment ponds for surface water management; and

	• a septic wastewater system (septic tank discharging to an in-ground absorption bed) for grey and black water.

Inputs

Water	Water will be required for the water cart.
Energy	The EIS notes that there is access to powerlines and poles along the eastern boundary. However a power connection is not intended at this stage.
Other raw materials	Soil ameliorants (such as boron) may be blended with screened sand, based on the needs of each individual property where the material will be applied.

Wastes and emissions

Liquid	Stormwater runoff from extraction areas, pad / stockpile areas and the shed roof. Grey water from crib room and amenities and black water from septic tank discharged through in-ground absorption beds.
Atmospheric	Dust from internal and external traffic, open extraction areas and blow-off from stockpiles.
Solid	General refuse including food scraps, wrappers and other wastes from the office and crib areas. Other wastes generated by the activity may include: • empty drums (oils (motor, hydraulic and brake); • machinery filters (not in the controlled waste category); • disposable PPE (e.g. ear plugs); • plastics; • rags; and • batteries.
Controlled wastes	According to the EIS the activity may generate the following controlled wastes: • waste oil / water, hydrocarbon / water mixtures or emulsions (e.g. hydraulic or engine oils); • sewage sludge, residue or nightsoil from the on-site wastewater management system; • containers contaminated with residues of substances (used for collection or storage of waste oil / water, hydrocarbon / water mixtures or emulsions); • soils contaminated with a controlled waste (e.g. oil or fuel leak); • fire debris and fire wash water (in the event of a fire); and • used tyres.
Noise	From screening equipment, mobile machinery (wheel loader, excavator, dozer, grader, water truck) and vehicles (light vehicles and haul trucks) moving within, on and off site.
Greenhouse gases	Operation of hydrocarbon-based plant, trucks and light vehicles will all produce greenhouse gas emissions.

Construction and operations

Proposal timetable	The EIS notes that once approval is granted, construction of the pad, shed and stormwater infrastructure would need to occur prior to extraction occurring. Figure B-2 of the EIS provides a breakdown of the proposed extraction stages year by year, out to 5-years.
Operating hours (ongoing)	0700 to 1900 hours Monday to Friday. No activity will occur on Saturdays or Sundays.

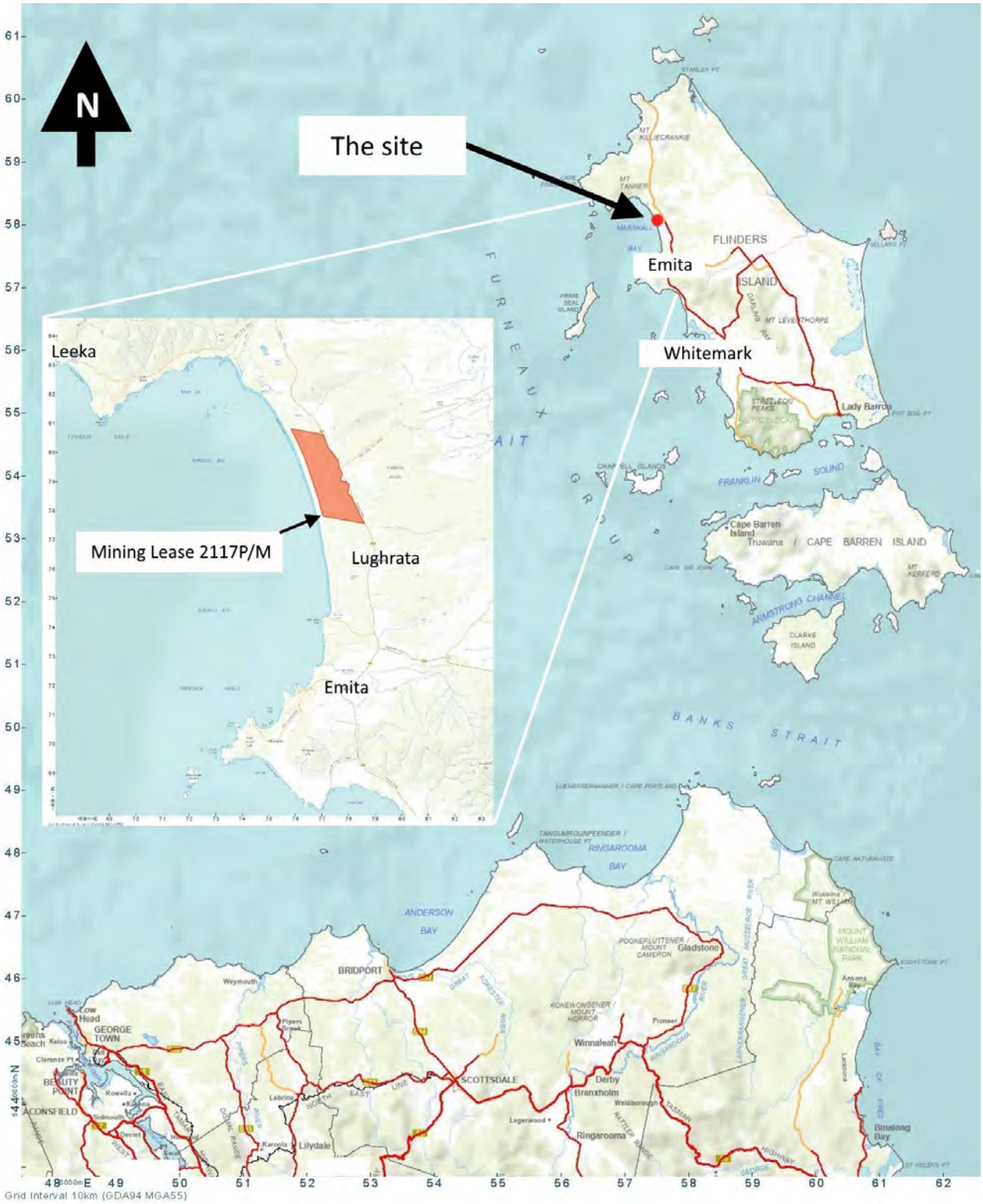

Figure 1: Mining lease 2117P/M location (topographic basemap from the LIST © State of Tasmania).

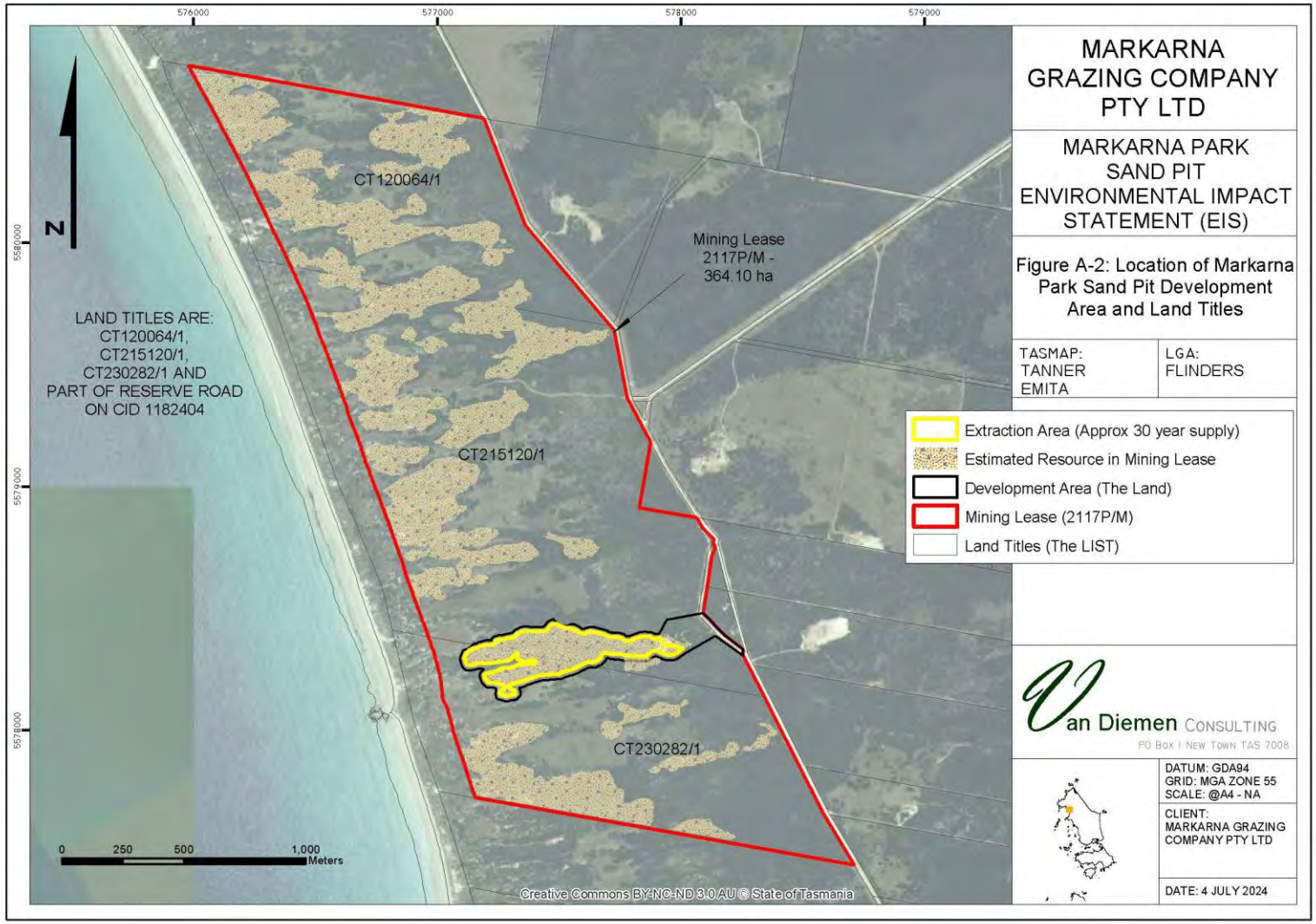

Figure 2: Mining Lease 2117P/M, development & extraction areas (Figure A-2 of the EIS).

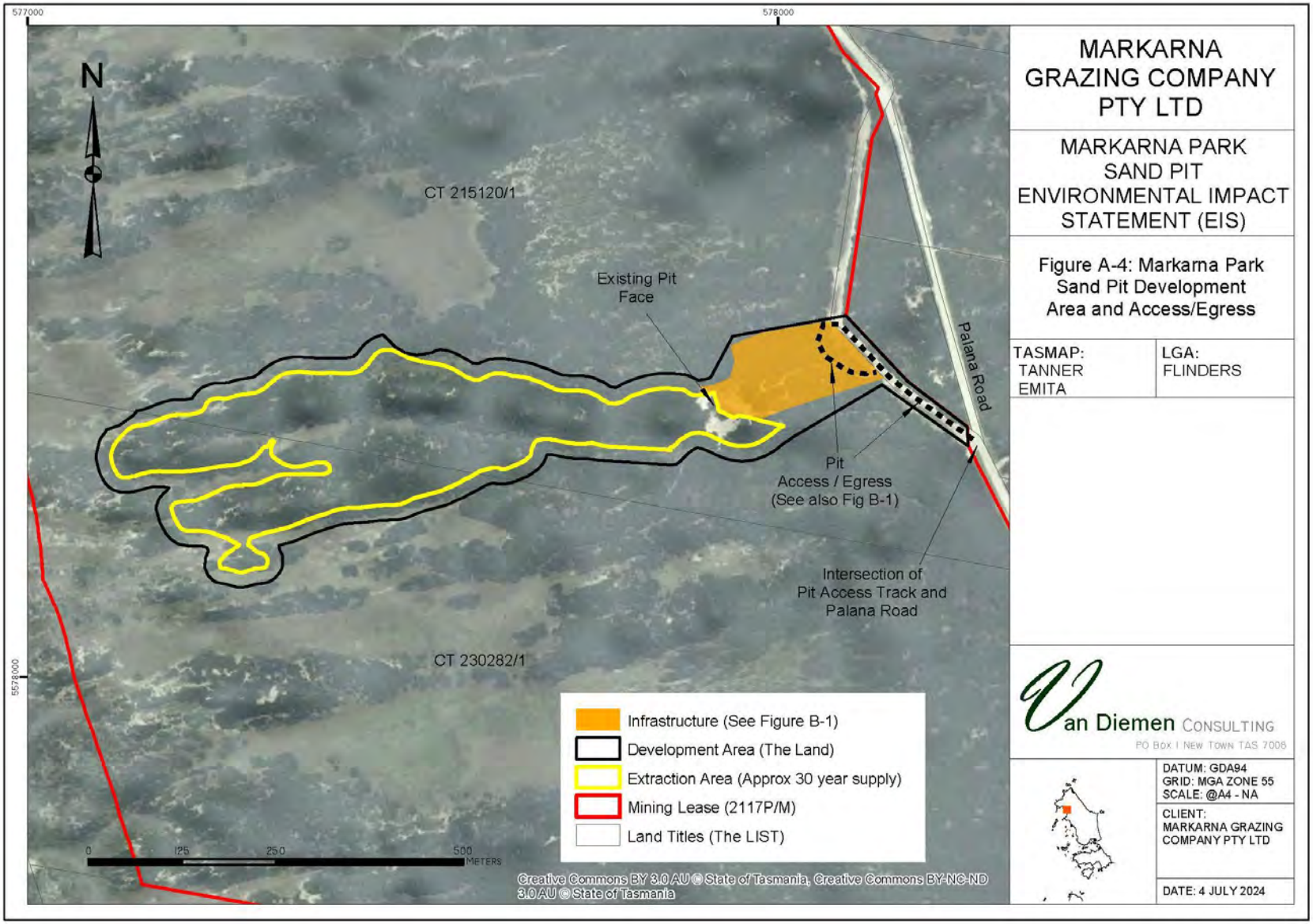

Figure 3: Site overview and access (Figure A-4 of the EIS). The area shown as the Development Area is the Activity Area in this EAR.

Figure 4: Land tenure map, including conservation covenant.

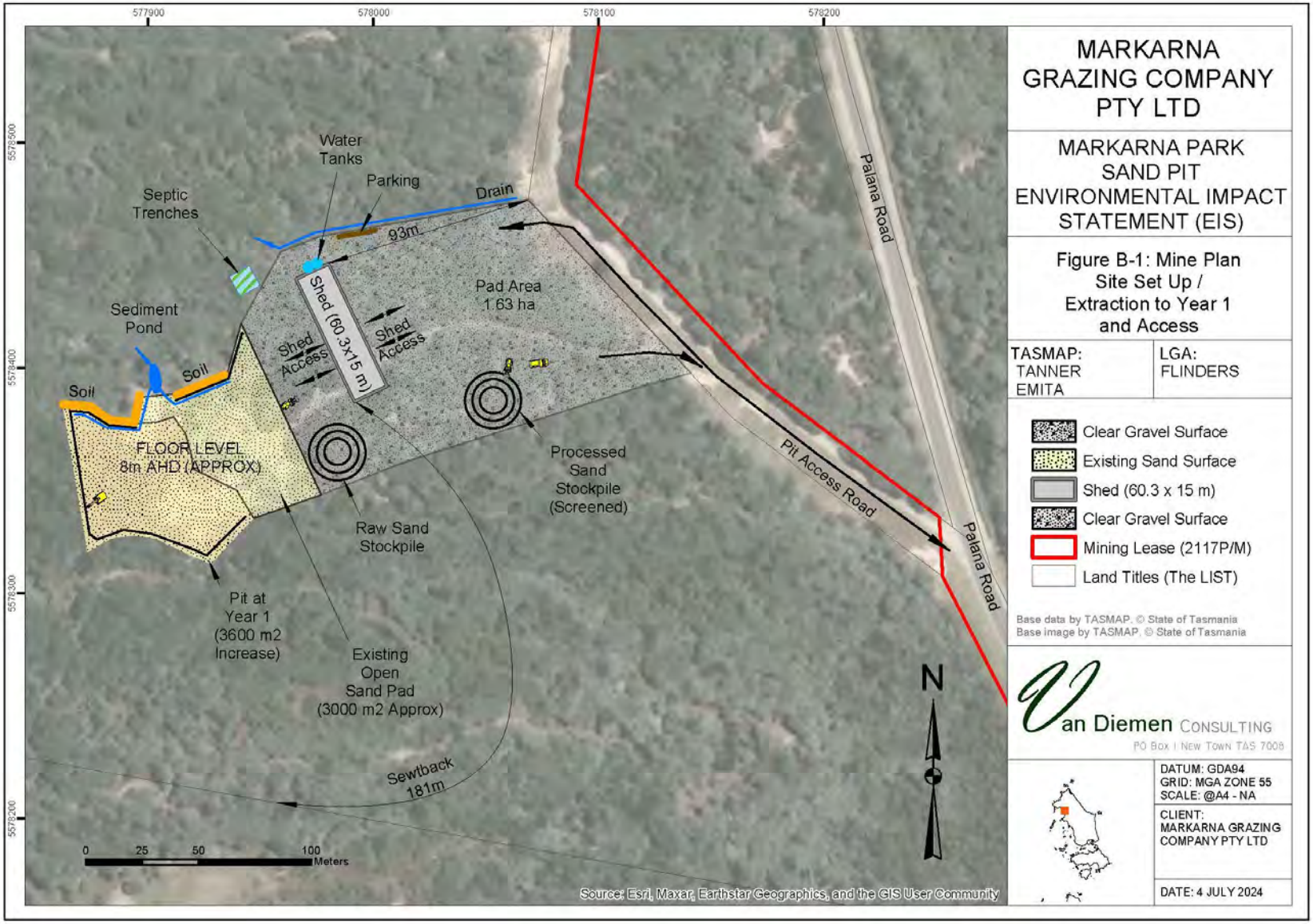

Figure 5: Mine Plan – Set Up and Extraction Year 1 (Figure B-1 of the EIS).

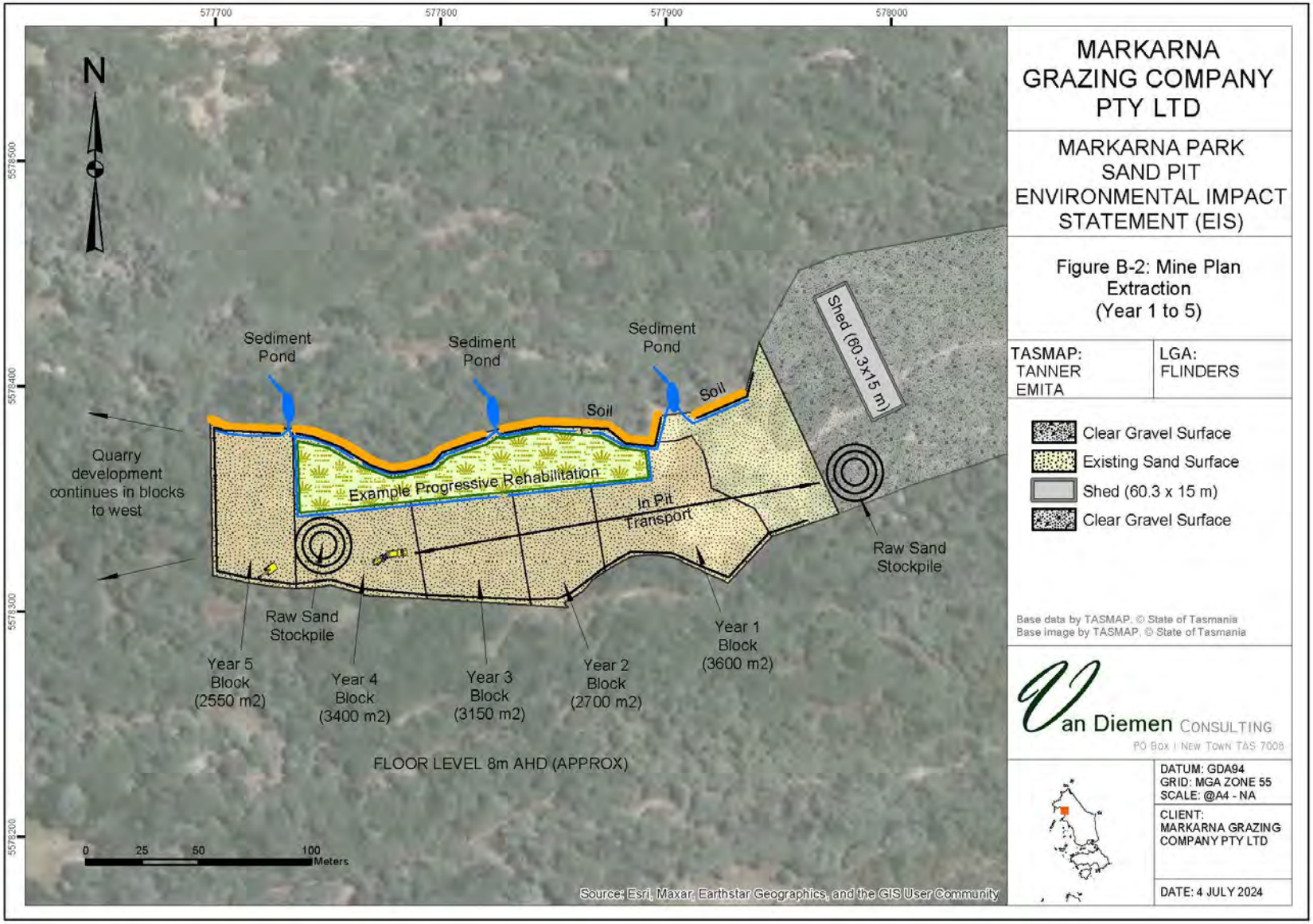

Figure 6: Mine Plan – Extraction Year 1 to 5 (Figure B-2 of the EIS).

4. Project Rationale and Alternatives

The EIS states that soil acidification is a naturally occurring process influenced by numerous factors and is compounded by most of Tasmania's soils being naturally acidic.

The EIS notes that acidification of agricultural land is a significant land degradation issue that can negatively affect productivity and sustainability of agricultural activities through:

- Decreasing the availability of nutrients to plants;
- Increasing the toxicity of aluminium and manganese;
- Decreasing soil biological functions;
- Reducing the ability of legumes to fix nitrogen; and
- Making the soil more vulnerable to soil structure decline and erosion.

The EIS notes that lime sands which are rich in calcium carbonate can reduce soil acidity by neutralising the acid reaction, thus raising pH.

According to the EIS 'liming' is the most cost-effective way to manage low soil pH, to help prevent loss of production and profitability in farming systems and reverse acidification. Liming involves applying lime to the soil surface several months before sowing pasture or crops..

According to the EIS commonly used liming materials include:

- Agricultural lime - crushed and sieved natural limestone which is mainly calcium carbonate. Safe, cheap and effective.
- Lime sand - mined from natural deposits that are mainly calcium carbonate. Safe and cheap but can be coarser and react slower with soil than agricultural lime.
- Dolomite - a mixture of calcium and magnesium carbonates. Particularly valuable where soils are low in magnesium.
- By-product lime - by-product from the production of soda ash, which contains mostly calcium carbonate, but with some calcium oxide and hydroxide.

The EIS identifies agriculture as a critical employment and income generation activity on Flinders Island, therefore its longevity is important to the social and economic well-being of the island.

The EIS states that the Marshall Bay land parcels owned by the Markarna Grazing Company ('Markana Park') were purchased to provide ongoing lime sands for use on the broader Markana Park land parcels and to sell to other agricultural enterprises as well as for use in making concrete for construction projects on the island. The EIS notes that the existing, but now disused pit, was once used by many islanders to access lime sand due to its ease of access and quality sand with a high effective neutralising value.

According to the EIS, off-island supplies of lime / sand are costly due to high freight charges. This undermines the economic viability of agriculture on the island in the medium to long-term due to inadequate levels of lime being applied which affects long term soil health and productivity of agricultural land on the island.

The EIS states that no alternative locations were considered as the lime sands are spatially limited on Flinders Island, are of very high quality, extensive in their geographic extent at Marshall Bay and can be extracted in a way and at a rate that is sensitive to the Marshall Bay environment.

5. Public and Agency Consultation

The process for a section 40T LUPAA combined permit and rezoning application does not provide for public consultation to be undertaken prior to the Council determining the permit application. Public consultation occurs when the permit application has been determined by the Council and forwarded, along with the rezoning application, to the Tasmanian Planning Commission.

The EIS was referred to several government agencies with potential interest in the proposal, including:

- Conservation Assessment Section, Natural Resources and Environment Tasmania
- Parks and Wildlife Service, Natural Resources and Environment Tasmania
- Aboriginal Heritage Tasmania, Natural Resources and Environment Tasmania
- Heritage Tasmania, Natural Resources and Environment Tasmania
- Mineral Resources Tasmania, Department of State Growth
- Public Health Services, Department of Health
- Flinders Council

The following also provided specialist advice on the EIS:

- Regulatory Officer, Environment Protection Authority
- Air Section, Environment Protection Authority
- Water Section, Environment Protection Authority
- Noise Section, Environment Protection Authority

6. General Permit Conditions

The following general conditions are recommended for the activity:

G1 Activity Area

G2 Access to and awareness of conditions and associated documents

G3 Incident response

G4 Proposed change to activity

G5 Change of responsibility

G6 Change of ownership

G7 Complaints register

G8 Quarry Code of Practice

G9 Amendment of required plans and reports

7. Evaluation of Environmental Issues

The following environmental issues are considered relevant to the proposal and are evaluated in this section:

1. Air quality
2. Surface and ground water quality
3. Noise emissions
4. Natural values
5. Weed and disease management
6. Waste management, dangerous goods and environmentally hazardous materials
7. Decommissioning and rehabilitation

7.1 Issue 1: Air quality

7.1.1 Potential impacts

The primary air emission of concern from the proposed activity is dust. Quartz based materials, which may be present in or under the calcareous sands, have the potential to impact human health through producing respirable crystalline silica.

Various activities with potential to produce dust will be undertaken, including vegetation clearing and burning, excavation of topsoil and sand, screening / adding ameliorants, loading and carting of product. Stockpiles, disturbed ground and use of internal roads by vehicles and machinery can also generate dust. If not managed appropriately, these activities have the potential to cause environmental nuisance beyond the boundary of the Activity Area. It is noted that the screening plant is mobile and may be operated both inside and outside the proposed shed depending on operational requirements.

According to the EIS there are also other potential sources of air emissions in the general area including from agricultural activities, other sand pits and conservation management activities (e.g. ecological burns).

Directly to the north, south and west of the Activity Area is land owned by the Proponent (approx. 2 km to the northern boundary and 400 m to the southern boundary). Surrounding land tenure is shown in Figure 4 above.

Immediately west of the property is the Marshall Bay Conservation Area which is comprised of a narrow strip of land covering Marshal Beach.

There is one sensitive receptor located approximately 1.15 km south-east of the Activity Area (see Figure 7). No other sensitive receptors are located within a 2 km radius of the Activity Area.

The land east of the property is mostly vegetated private land. There is a conservation covenant located on private property approximately 1.3 km east of the Activity Area (refer Figure 4 of this EAR). There are two other mining leases immediately east and just south of the Activity Area.

The prevailing wind direction is from the west with subdominant lighter winds from the east-north-east. The report notes that while easterly winds are common, they are usually lighter and often associated with rainfall thus reducing the risk of dust being blown from the Activity Area.

In reference to potential for dust emissions Attachment 9 of the EIS indicates that the younger modern dunes which run parallel to Marshall Beach along the western boundary of the mining lease are more susceptible to disturbance and blow outs, which may result in fugitive dust emissions, however, the proposed activity relates to extraction from the older west-to-east parallel dunes which are relatively stable and vegetated (see Map 3 of the EIS).

The EIS notes that removal of vegetation on these west-to-east dunes increase the risk of blow outs occurring, which may result in dust emissions, and recommended that where possible the working face should be directed to the east, away from the stronger prevailing westerly winds. The EIS also recommended that as far as practical vegetation should be retained above the working face of the pit and that worked out areas should be progressively rehabilitated.

7.1.2 Management measures proposed in EIS

The EIS states the following measures will be implemented to minimise the risk of wind erosion occurring:

- Avoid where possible, but otherwise minimise, working on faces exposed to westerly winds;
- Maintain vegetation above and to the west of any active extraction face; and
- Re-establish vegetation on a progressive basis.

The EIS also states that dust emissions will be managed to the extent necessary to prevent environmental nuisance by implementing industry standard environmental practices for dust suppression, including:

- Retention of vegetation along the access road corridor where possible;

- Retention of vegetation (when possible) around the pit working area to reduce the likelihood of strong winds liberating fine particles into the air;
- Utilisation of slash / mulch obtained from cleared areas to stabilise the soil surface and to limit wind action on dust generation at the soil / sand surface;
- Covering of trucks with tarpaulins and / or load dampening;
- Minimising the geographic extent of areas of exposed soil; and
- Road dampening and implementing a speed limit of 40 km/hr on the access road.

The EIS notes that soil ameliorants that will be added to some of the sand prior to delivery will be added by screening within the shed only, due to their cost and fine particle size.

In addition, the EIS states that screening of material on high wind days (i.e. winds >60 km/hr) outside of the shed will be avoided.

According to the EIS machinery operated as part of the activity will be modern, well maintained and fuel efficient to ensure that emissions are low per operating hour. It also notes that greenhouse gas emission profiles will be considered when procuring new machinery and that low emission machinery will be preferentially selected where possible and cost effective.

7.1.3 Agency comment

No agency comments were received in relation to air quality.

7.1.4 Evaluation

The potential for quartz-based sands to produce respirable crystalline silica particles was considered along with the potential for impacts on members of the public. Comments from the Proponent noted that the underlying quartz sand is not the target material for this proposal and will not be intentionally disturbed. The Proponent also noted that untreated beach sand particles would usually be considered too coarse to be inhaled.

Advice was sought from the Department of Health's Public Health Services regarding this issue. They noted that as no crushing or blasting was proposed, the proposed management measures were considered adequate and that permit conditions should seek to ensure dust emissions are contained within the site.

Based on information contained in the EIS, impacts from dust emissions on local air quality are likely be minor given the 1.15 km distance to the nearest sensitive receptor, and can be readily managed through the proposed management measures which are standard for smaller scale extractive activities. The proposed management measures are considered appropriate for the site.

While there are no nearby sensitive receptors, it is best practice to retain air emissions within the boundary of the Activity Area and therefore it is appropriate to impose conditions **A1** and **A2**.

Condition **A1** requires that any vehicles carrying loads of material that have the potential to blow, or spill must be equipped with effective control measures to prevent the escape of material. The control measure(s) must be implemented prior to leaving the Activity Area.

Condition **A2** requires that dust emissions from within the Activity Area must be controlled to the extent necessary to prevent environmental nuisance beyond the boundary of the Activity Area.

7.1.5 Conditions

The proponent will be required to comply with the following conditions:

A1 Containment of loads

A2 Control of dust emissions

7.2 Issue 2: Surface and ground water quality

7.2.1 Potential impacts

The proposal involves activities such as clearing of vegetation, excavation, screening, carting of material, stockpile creation, weed management, and refuelling / maintenance of equipment and machinery, all of which have the potential to be sources of pollutants (e.g. sediments, fuel / oil, and other chemicals) that may impact surface and ground water quality if not managed appropriately.

In addition, the EIS proposes a maximum disturbed area at any given time of up to 5 ha that may be comprised of access roads, stormwater infrastructure, stockpiles, the pad area, partly rehabilitated extraction areas and the active pit area. This means there is potential for sediments to be entrained in stormwater during storm events.

A survey of the geomorphology and soil characteristics of the mining lease was undertaken, and the subsequent report is contained in Attachment 9 of the EIS (the Geomorphology Report). According to the report, extensive sand dunes cover most of the mining lease and are composed of fine-grained white quartz and carbonate deposits, with two significant sand dune assemblages present. In the western part of the mining lease are the modern foredunes and back dunes directly behind Marshall Beach. Inland of this are a series of elongated west-to-east trending parallel dunes that rise to approximately 24 m above sea level.

The report describes the inland dunes, some of which will be extracted under this proposal (see Map 3 of the Geomorphology Report), as being largely vegetated and stable in comparison to the foredunes. The report notes that the dune system being targeted for extraction is not well expressed on topographic maps and that it is comprised of a series of at least eight dune ridges with steep sides and wide, deep interdune swales, rather than the single dune system shown on most topographic maps.

Surface water

The EIS states that the top layer of lime sand being targeted by this proposal has high permeability, which influences infiltration rates and subsequently stormwater runoff patterns.

The EIS notes that there are no defined water courses within the Activity Area and no formal drainage exists into the nearby wetlands (North and South Curves Lagoons). It also notes that the onsite survey determined the wetlands areas were significantly smaller than mapping suggests (see Issue 4 below for further details).

Groundwater

The EIS states that given the extensive nature of limestone on the hills east of the mining lease, subsurface water flow through karst aquifers is likely, but that significant karst landforms are unlikely to be present within the Activity Area, as detailed in the Geomorphology Report.

The EIS notes that groundwater depth is likely to be in the range of the nearest bore located approximately 3 km northwest of the Activity Area in comparable sediments. This bore recorded a standing water level of 4.7 m below ground level.

The EIS notes that during soil sampling for the wastewater management system absorption bed site, a hardpan was identified at around 1.2 m below ground level. This hardpan was described as considerably less permeable than the overlying unconsolidated lime sands, but it was noted that the hardpan was likely to be present at varying depths across the Activity Area. The material underlying the hardpan was described as loose and damp yellow sand associated with the water table.

The EIS states that this hardpan layer will not be targeted, only the overlying unconsolidated lime sands. The EIS makes a commitment that a sand layer of approximately 1 m in depth will be retained over the base geology (i.e., the hardpan / limestone) to facilitate re-establishment of vegetation once worked out areas are to be rehabilitated. The EIS also notes that no pit / depression will be created from extraction of material.

Onsite wastewater management system

The EIS states that an onsite wastewater management system is proposed to treat and dispose of wastewater from the ablution / kitchen facilities located within the proposed shed. The system will be

comprised of a septic tank which discharges to an in-ground absorption bed with a design capacity for five people per day. The Site & Soil Evaluation and Design Report, contained in Attachment 5 to the EIS, details the evaluation of the location and recommended design of the proposed wastewater management system, which if not installed and managed appropriately has the potential to impact water quality.

7.2.2 Management measures proposed in EIS

According to the EIS stormwater runoff from the Activity Area will be captured and treated by sediment ponds to remove sediments to the extent necessary to prevent environmental nuisance.

Perimeter drains will be installed to direct clean stormwater away from disturbed areas of the activity. One of the perimeter drains will be installed along the northern extent of the pad area (see Figure 5) to intersect any stormwater draining off the semi-permeable pad area and direct it to the permanent Type-C (refer to IECA, 2018) sediment basin, as shown in Plate 2 of the EIS. The basin outflow will be directed to overland flow dispersed through vegetation to minimise the risk of concentrated flows and erosion.

A series of Type-F sediment basins will be installed as extraction progresses. Figure 6 shows indicative locations of basins for years 1 to 5 of extraction. These basins are designed to collect and treat any stormwater runoff generated within the active extraction areas and any partly rehabilitated areas. Once extraction and rehabilitation of an area has been completed, the corresponding sediment basin will be redundant and a new sediment basin will be constructed for the next area of extraction. The basin outflows will also be directed to overland flow dispersed through vegetation.

Stormwater falling onto the shed roof will be captured in water tanks (likely 2 x 50,000 litres) and any overflow from those tanks will be directed to the permanent sediment basin for the pad area.

Due to the high infiltration of water through the sand, it is anticipated that the total demand for these basins to treat stormwater will be relatively low. Should there be an accumulation of treated stormwater in the basins or in the tanks, it may be repurposed for operational activities, such as for dampening roads or sand to be screened / blended.

The EIS also includes commitments to minimise the extent of exposed areas and to utilise slash obtained from vegetation clearing, or other products such as jute mesh, to stabilise soil surfaces.

The EIS notes several of the management measures applied to the use and storage of hazardous substances (e.g. bunding, spill kits, pre-start checks of machinery etc.) are also important in preventing spills and leaks that could impact karst or groundwater.

According to the EIS regular visual monitoring (monthly) will be undertaken to ensure the effectiveness of the installed stormwater management and sediment control structures. Repair and remedial works (including sediment basin cleaning) will be performed to maintain appropriate sediment settling zones and to ensure that stormwater is entering and leaving the basins as planned. The effect of sediment basin discharge on vegetation and the soil surface will be monitored and remedial actions taken if the soil surface becomes scoured, or vegetation becomes covered by discharged sediment.

7.2.3 Agency comment

No agency comments were received in relation to surface and ground water quality.

7.2.4 Evaluation

The proposed installation and maintenance of perimeter cut off drains to prevent clean stormwater from entering the extractive areas / pad is considered appropriate. To reflect these commitments, standard condition **SW1** requires construction of perimeter cut off drains / bunds and any other stormwater management infrastructure required (such as sediment ponds) to ensure stormwater is managed appropriately.

In addition, condition **SW2** sets out the required minimum standards for the design and maintenance of any sediment basins constructed for managing stormwater.

SW3 is a standard condition requiring all reasonable measures to be implemented to ensure solids entrained in stormwater are retained within the Activity Area, and that any polluted stormwater discharged

from the Activity Area is first collected and treated to the extent necessary to prevent environmental harm or nuisance. It also requires that any discharge does not degrade the visual quality of any receiving waters.

While the EIS suggests that intersection of groundwater is unlikely, no detailed study of groundwater has been undertaken, and it is considered appropriate to include condition **GW1** to ensure that an appropriate buffer is maintained should shallow groundwater be encountered.

Condition **GW1** requires that in the event groundwater is intersected, or standing water is observed within the extraction area, machinery must be prevented from entering the area and extracted material must be used to raise the base level of the extractive activity to prevent the occurrence of groundwater intersection within the Activity Area.

The design, installation and operation of the proposed wastewater management system is a matter that will be assessed by the planning authority under the planning scheme and will also require a plumbing permit. The wastewater discharge will be broadly similar to domestic wastewater and will not include industrial or trade wastes. It is anticipated that if the wastewater management system is designed, installed and maintained as detailed and meets the planning authority's requirements that the risk of causing environmental nuisance or harm is low.

The EIS lists the relevant acceptable standards of the QCP applied to the quarry in relation to water quality, sediment control and drainage. These measures are considered appropriate and condition **G8** requires the activity to be undertaken in compliance with the acceptable standards provisions of the QCP.

Based on the information provided, the commitments made in the EIS, and the conditions imposed as detailed above, it is considered the potential environmental risks can be adequately managed to ensure that environmental harm or nuisance is not caused by proposed extractive pit.

7.2.5 Conditions

The proponent will be required to comply with the following conditions:

SW1 Perimeter drains or bunds

SW2 Design and maintenance of settling ponds

SW3 Stormwater

GW1 Groundwater

G8 Quarry Code of Practice

7.3 Issue 3: Noise emissions

7.3.1 Potential impacts

The following operations will occur as part of the activity and may generate noise emissions with the potential to travel beyond the boundary of the Activity Area and cause environmental nuisance:

- Construction activities associated with installation of the shed, tracks, sediment basins, drains and the septic system;
- Removal of vegetation;
- Excavation associated with extraction;
- Screening of sand (both in the shed and external to the shed);
- Loading of material into trucks;
- Carting of material within and from the Activity Area; and
- Movement of vehicles and other ancillary equipment associated with the activity.

Table 9 of the EIS provides a list of equipment and machinery to be used, and the assumed sound power levels associated with each item. The EIS notes that the actual equipment used may vary over time as equipment is replaced. In addition, Figures B-1 and B-2 of the EIS show indicative locations where plant and equipment will be used.

According to the EIS noise producing equipment and machinery that will be used includes a bulldozer, grader, excavator, frontend loader, water truck, cartage trucks, light vehicles, and mobile screen.

The EIS states the nearest sensitive receptor is located 1.15 km south-east of the shed within the Activity Area and approximately 295 m east of the mining lease boundary (see Figure 7). All other sensitive receptors are more than 2 km from the proposed Activity Area.

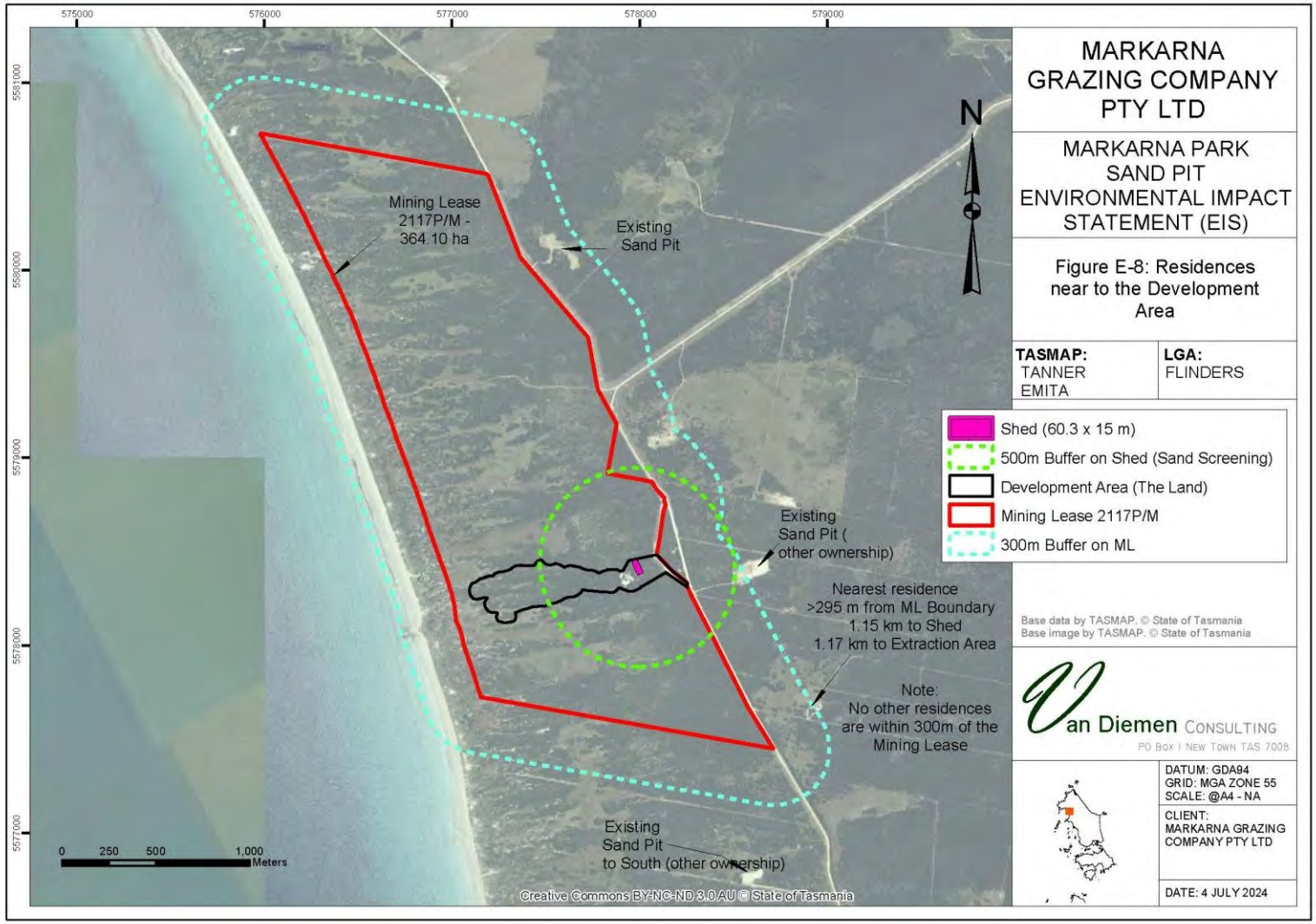

Figure 7: Nearest noise sensitive receptors (Figure E-8 of the EIS).

The EIS notes that the activity will operate intermittently with a likely peak transport period of March to May which may vary depending on seasonal factors and individual agricultural needs. This is the typical period when lime sand is required for spreading on agricultural lands. The proposed hours of operation are 0700 to 1900 hours Monday to Friday.

There is likely to be some level of activity on the site throughout most of the year, for example excavation and stockpiling prior to the main lime sand spreading period (likely December to March) and on an as needs basis for other uses, such as for offsite concrete production for construction projects.

7.3.2 Management measures proposed in EIS

According to the EIS the pit is located in an area with no nearby noise sensitive receptors and the potential for impacting the closest receptors is considered to be very low, including from noise generated during carting of material onto the external road network.

Nevertheless, the EIS states that late model machines with proprietary exhaust silencers will be used and machines will be maintained in good condition to reduce the potential for noise emissions.

The EIS also states that operations will only occur Monday to Friday between 0700 and 1900 hours.

7.3.3 Agency comment

No agency comments were received in relation to noise emissions.

7.3.4 Evaluation

The nearest noise sensitive receptor is located over 1 km from the Activity Area. Furthermore, the activity is for the extraction of lime sand which will not require ripping rock or any other method of liberation (e.g., blasting) that typically produces a higher level of noise emissions. Although screening is proposed to remove organic matter, removal of rocks via screening is not required and therefore significant noise is not expected to be generated during this process.

No extractive activities, apart from carting of material offsite, are permitted outside of the Activity Area as defined in Attachment 1 of the permit conditions. Given the separation distances and proposed operating hours, noise emissions from the activity are unlikely to impact on noise sensitive receptors. To ensure that operational hours are adhered to, condition **N1** is included, which restricts the operational hours to those proposed in the EIS and specifically prohibits activities occurring on Saturdays, Sundays or public holidays that are observed statewide, except Easter Tuesday.

7.3.5 Conditions

The proponent will be required to comply with the following condition:

N1 Operating hours

7.4 Issue 4: Natural values

7.4.1 Potential impacts

Activities associated with operation of an extractive pit have the potential to disturb, injure or kill threatened fauna or flora species and vegetation communities if not managed appropriately. Activities, if not managed appropriately, also have the potential to adversely impact geomorphological features and processes, including coastal dune systems and any karst present.

Flora

The EIS states that there are two native vegetation communities present within the Activity Area (see Figure 8) and that neither of these communities are listed under the *Nature Conservation Act 2002* (NCA) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA).

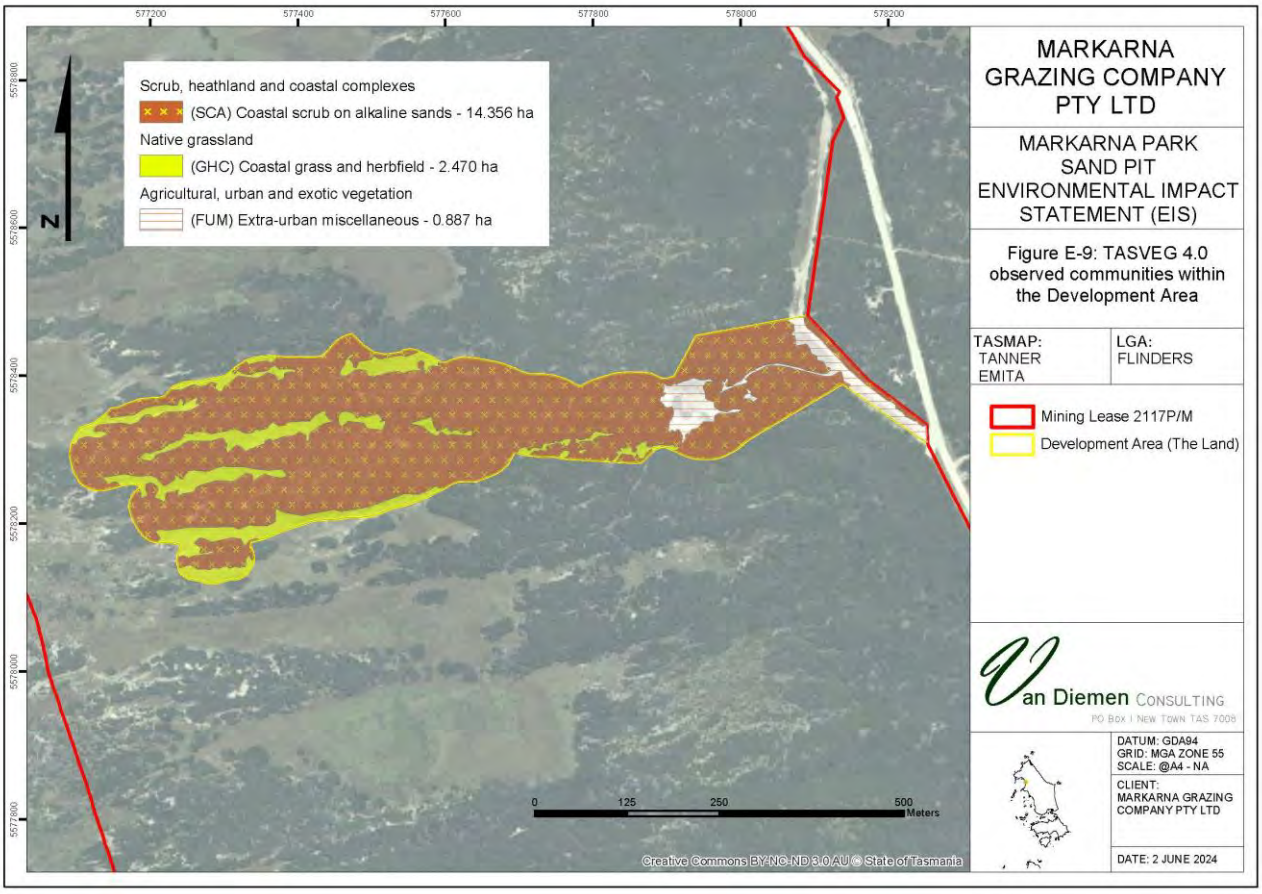

Figure 8: Observed vegetation communities within the Activity Area (Figure E-9 of the EIS).

A natural values assessment was undertaken within and adjacent to the Activity Area (Attachment 4 of the EIS). The NVA Report identified six plant species within the Activity Area (Figure 9) that are listed under the *Threatened Species Protection Act 1995* (TSPA). The report states that all six species will be impacted by the proposal and details the expected number of individual plants that will require removal. The maps in the report indicate that the majority of these species are located in and around the proposed infrastructure area and access road corridor (see Figure 9 below).

The NVA Report considers the potential for the coastal grass and herb field community to represent the EPBCA listed lowland native grasslands of Tasmania ecological community but determined that it does not satisfy the relevant criteria for that community.

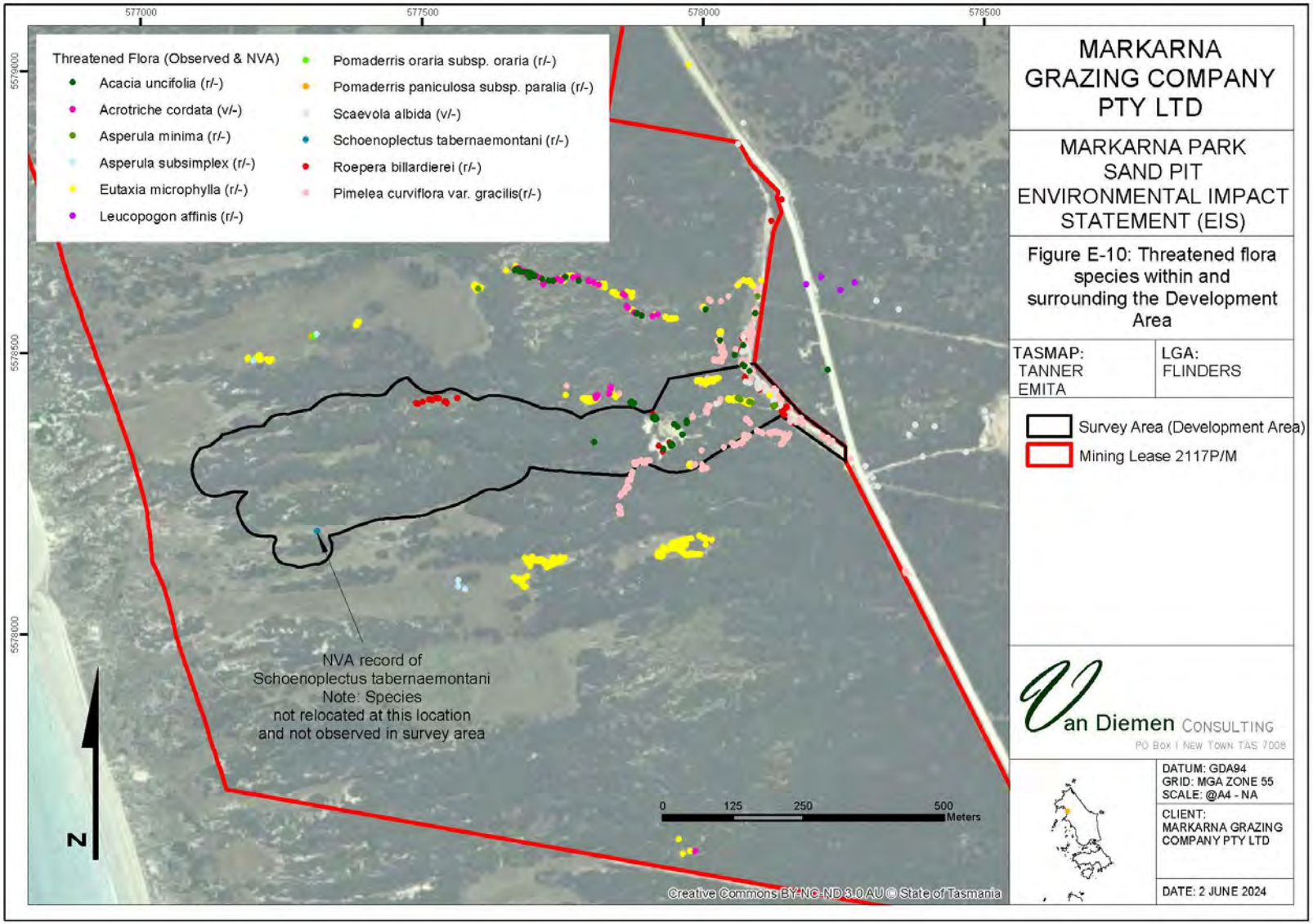

Figure 9: Threatened flora species within and surrounding the Activity Area (Figure E-10 of the EIS).

Fauna

The NVA Report notes that there are threatened fauna species records within 5,000 m of the Activity Area based on Natural Values Atlas (NVA) and Protected Matter Search Tool (PMST) data (refer to Tables 8 & 9 of the NVA Report).

Eagles

According to the NVA Report no threatened fauna species were observed onsite during the survey, however, there is potential foraging habitat for the wedge-tailed eagle (*Aquila audax subsp. fleayi*) and white-bellied sea eagle (*Haliaeetus leucogaster*) within the Activity Area. It is noted there is no potential nesting habitat for either species onsite or within 2.5 km of the Activity Area.

Mammals

The NVA Report states there is potential habitat for the New Holland mouse (*Pseudomys novaehollandiae*) adjacent to the western edge of the mining lease, which is outside of the Activity Area. It also notes the Activity Area itself does not support suitable habitat for the species and it is not within the known core range of the species.

Devils and quolls are not located on the island and therefore impacts from nighttime vehicle movements were not considered as there is no potential to impact on these species.

Reptiles / amphibians

The NVA Report states that while grassland (e.g., coastal grassland and herb field) is potential habitat for the tussock skink (*Pseudemoia pagenstecheri*), the lack of significant areas of *Poa labillardierei* tussocks means that suitable habitat is largely absent for the species within the Activity Area. It is noted that there are areas which support suitable habitat within the mining lease but outside of the Activity Area.

Beach associated avifauna

The NVA Report specifically considered beach associated avifauna given the proximity of the proposal to the Marshall Beach Conservation Area, identifying six species listed under the TSPA and EPBCA with potential ranges on or near the Activity Area.

The NVA Report notes that of the species identified, the Australian fairy tern (*Sternula nereis nereis*), eastern hooded plover (*Thinornis cucullatus cucullatus*) and little tern (*Sternula albifrons*) have been observed at or near Marshall Beach, based on available data.

The NVA Report states the Activity Area does not include beach, foredune, back dune or modern dune habitat and that the activity is unlikely to have a direct or indirect impact on beach dwelling avifauna.

Geomorphology and soils

A survey of the geomorphology and soil characteristics of the mining lease was undertaken (Attachment 9 of the EIS (the Geomorphology Report)).Map 3 of the report summarises the geomorphology of the mining lease.

Karst

The Geomorphology Report notes that while bedrock Tertiary limestone is present in the east of the mining lease, no karst landforms, apart from very minor surface solution sculpture (karren) landforms, have been identified. It also notes that given the extensive nature and relief of the limestone on the hills east of the mining lease, subsurface water flow through karst aquifers is likely, however, significant karst landforms are unlikely to be present based on observations made.

The report states that while sinkholes are difficult to differentiate from dune swales, all the depressions observed within the Activity Area were determined to be dune swales and therefore should not be treated as karst features.

Sand dunes

According to the Geomorphology Report, extensive sand dunes cover most of the mining lease and are composed of fine-grained white quartz and carbonate deposits, with two significant sand dune assemblages

present. In the western part of the mining lease are the modern foredunes and back dunes directly behind Marshall Beach. Inland of this are a series of elongated west-to-east trending parallel dunes that rise to approximately 24 m above sea level.

The report describes the inland dunes, some of which will be extracted under this proposal, as being largely vegetated and stable in comparison to the foredunes. In reference to the dune system being targeted by this proposal, the report notes that it is not well expressed on topographic maps and that it is comprised of a series of at least eight dune ridges with steep sides and wide, deep interdune swales, rather than the single dune system shown on topographic maps.

The report states that blowouts of the coastal dunes backing Marshall Beach were observed to be quite common within the mining lease, but away from the coast most of the larger dunes appear to be stable. It goes on to note that the current pit face being on the leeward side of the dune system limits the potential for the prevailing westerly winds to significantly erode sands and that there is a risk that if / when extraction extends to more of a windward face wind erosion could increase significantly.

The report notes that the dune field within the mining lease is a landscape of geoscientific interest which can and should be managed appropriately to limit the footprint of any extractive activities.

Acid soils

The report provides details of the soil characteristics and results of limited soil sampling that was undertaken to identify any unusual soil characteristics, focusing on soil acidity.

The report notes that soils within the Activity Area are generally well drained strongly alkaline calcarosols (i.e., lime sand) and that while organic topsoils, buried paleosols and lake / swamp sediments are present within the mining lease none of these contain adequate organic material to significantly reduce pH within the dune sands. The report concluded that acidic soils are unlikely to be present over extensive areas or may be totally absent, as supported by the sample results.

The report notes that the survey was not comprehensive and that it is possible some swampy depressions may host thicker organic horizon having a lower pH. However, these areas will not be directly impacted by the proposal, which targets only the elevated lime sand dune system detailed in the EIS.

Wetlands

The report notes that the extent of wetlands at North and South Curves Lagoons is significantly smaller than indicated on the topographic map and the TASVEG mapping, with significant areas of these features being undulating grassy dune fields. The report states that no wetlands (swamps), as defined by the *Forest Practices Code 2020* were identified within the Activity Area.

7.4.2 Management measures proposed in EIS

The EIS states that the Proponent will include as part of its induction and operational management system, a process for staff, management and contractors working at the pit to mark clearing and working areas to identify permitted operational areas and exclusion zones.

The EIS states that in the event notable examples of significant geomorphological features are encountered (i.e., any of the features listed below) the area will be photographed and operations moved away from the feature until a suitably qualified person (in the context of the item / items discovered) can assess any geomorphological / cultural values.

Contractors will be instructed to look out for:

- thick dark continuous bands within the dunes.
- buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree.
- stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand.
- large accumulations of shells.

- large bones and accumulations of smaller bones buried >1 m under the surface.

According to the EIS in the event a steep sided depression forms during operations that has signs of collapse, or a cave is located, they will be recorded, and operations will avoid the area until expert advice is sought.

The EIS states that in order to reduce the risk of wind erosion causing blow outs the following measures will be implemented where practical:

- avoid, if possible, but otherwise minimise working on faces exposed to westerly winds.
- maintain vegetation above and to the west of any active face where possible.
- re-establish vegetation on a progressive basis which could include stockpiling of cleared vegetation for covering exposed surfaces as the operation progresses.

7.4.3 Agency comment

The Department of Natural Resources and Environment (NRE Tas) advised that the mitigation measures outlined in Section C-4-3 of the EIS were generally supported.

NRE Tas also noted that:

- several species listed under the TSPA will require removal and advised that a Permit to Take will be required for any threatened flora to be taken as part of the development.
- some potential habitat for the listed tussock skink was observed during the survey but was outside the Activity Area.
- the survey did not identify any suitable habitat within the Activity Area for threatened shorebird species and that the survey concluded that "*there will be no activities that would generate noise, dust, or other form of emissions (e.g. light) that may or would disturb nesting and foraging beach dwelling bird species*" on Marshall Beach.
- if it is likely the development will require lighting to be operational during nighttime hours, the principles outlined in the Department of Climate Change, Energy, the Environment and Water's *National Light Pollution Guidelines for Wildlife 2023* should be incorporated into the lighting design, in particular Appendix A - Best Practice Lighting Design, to reduce the potential impacts of artificial light on shorebirds.
- the survey did not identify any threatened vegetation communities and confirmed that there were no wetlands within the Activity Area.
- as mentioned in the EIS there is a potential for the dunes to erode once vegetation is removed and that the proposed mitigation measures are supported for reducing the risk of wind erosion.
- the Geomorphology Report did not identify any significant karst features, and that only very minor surface solution sculpture (karren) landforms were identified.
- the Geomorphology Report did not identify any significant areas likely to produce acid sulfate soils.

7.4.4 Evaluation

The area surrounding the Activity Area supports a diverse range of natural values, including threatened flora species, habitat for threatened fauna species and geomorphological landforms / processes.

The Natural Values Survey did not identify any threatened native vegetation communities present within the Activity Area, nor did it identify any nesting / denning habitat for threatened fauna species. It did however identify several threatened flora species that will be impacted within the Activity Area.

The advice from NRE Tasmania regarding the need to obtain a Permit to Take under the TSPA for all threatened flora species that will be taken was provided to the Proponent.

While it was identified the mining lease exists within a karst landscape, only minor surface features were identified during the survey. It is not anticipated that any significant karst features will be encountered

within the Activity Area, such as caves and sinkholes, however, the EIS includes management measures to ensure that appropriate steps are put in place if a significant karst feature is identified.

The Geomorphology Report also discusses the risk of blow outs when disturbing the sand dune system, noting that the west-to-east parallel dunes are most at risk when exposed to the prevailing westerly winds. The EIS proposes several management measures to reduce the exposure of the working face to the westerly winds and to minimise the amount of ground exposed, both of which could result in dune erosion and loss of resource.

As detailed above, the EIS proposes a suite of management measures in relation to the natural values identified; these are considered relevant and adequate to manage the potential risks to natural values. It is noted that a Permit to Take may be required under the TSPA. No specific natural value conditions are considered necessary.

7.4.5 Conditions

While no conditions directly relating to natural values are considered necessary, other conditions imposed, such as those related to water and air quality as well as rehabilitation are considered relevant and assist indirectly in preventing environmental harm or nuisance related to natural values.

7.5 Issue 5: Weed and disease management

7.5.1 Potential impacts

Movement of vehicles, plant, and equipment on and offsite associated with the activity has the potential to introduce or spread weeds and diseases to, from or around the site if not managed appropriately. Product stockpiles can also be contaminated with weeds or diseases which may then be transported to other areas if not managed appropriately.

According to the EIS two weed species, horehound (*Marrubium vulgare*) and slender thistle (*Carduus tenuiflorus*)), listed as declared weeds under the *Biosecurity Act 2019,* have been observed within the Activity Area along the access track off Palana Road (see Figure 2 of the draft Weed and Disease Management Plan, Attachment 8 of the EIS).

The EIS includes a draft Weed and Disease Management Plan at Attachment 8 which notes that the Activity Area supports other introduced species, considered to be agricultural weeds, and that these weeds are generally widespread in the areas where lime sands will be utilised (i.e., agricultural lands).

The EIS states that no plants with symptoms of phytophthora (*Phytophthora cinnamomi*) were observed within the Activity Area. It also notes that there is a lack of susceptible species within the Activity Area and therefore phytophthora is unlikely to be present or active.

7.5.2 Management measures proposed in EIS

The EIS notes the development of the Weed and Disease Management Plan was guided by the *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania* (Department of Primary Industries, Parks, Water and Environment, 2015).

The Plan provides two key aspects to the management of weeds and diseases, including:

- an annual assessment of weed occurrences and locations to guide the implementation of the annual weed spraying program aimed at controlling or possibly eradicating weeds within or adjacent to the Activity Area.
- a clean vehicle policy will be implemented to ensure heavy machinery will be brought to the activity in a clean condition, free of weed propagules, clods of dirt and vegetative matter.

7.5.3 Agency comment

No agency comments were received in relation to weed and disease management.

7.5.4 Evaluation

It is acknowledged that two declared weed species are already present on the access road off Palana Road, and that ongoing management of these weeds is critical to ensure they do not spread any further due to the activity.

The commitment to implement a clean vehicle policy is supported. Condition **OP1** requires that, prior to entering the Activity Area, machinery must be washed in accordance with the Weed and Disease Guidelines.

The implementation of the draft Weed and Disease Management Plan is also supported. Condition **OP2** requires that the activity must be undertaken in accordance with the Weed and Disease Management Plan, as provided in Attachment 8 of the EIS, dated 10 November 2024 and prepared by Van Diemen Consulting Pty Ltd. It is acknowledged that a minor update will be required to add in any relevant permit conditions. The condition also allows for the plan to be updated and approved by the Director should the need arise; this will ensure the plan remains relevant and effective in achieving its objectives.

The commitments made in the EIS and draft Weed Management Plan are considered appropriate and inclusion of the above conditions will ensure they are implemented to minimise the risk of introducing or spreading weeds and diseases to and from the site.

7.5.5 Conditions

The proponent will be required to comply with the following conditions:

OP1 Machinery washdown

OP2 Weed and Disease Management Plan

7.6 Issue 6: Waste management, dangerous goods and environmentally hazardous substances

7.6.1 Potential impacts

Solid wastes generated by the activity that are not collected, stored and disposed of appropriately have the potential to cause environmental nuisance or harm through attracting vermin, native and feral animals, causing odour, increasing fire risk and litter blowing offsite. Inappropriate storage, handling and disposal of environmentally hazardous substances including fuels, oils and herbicides, has the potential to contaminate soil, surface and ground waters.

The EIS identifies two main solid waste streams from the activity which are typical 'domestic' wastes (i.e. food scraps / wrappers and other wastes from the office and crib rooms); and semi-industrial wastes, such as, small empty drums (e.g., from motor oils, hydraulic and brake fluids, herbicides), plastics (wrapping on parts, replacement belts), rags (may be contaminated with hydrocarbon-based products), tyres and batteries.

The EIS also identifies that some solid wastes likely to be generated by the activity are likely to be classed as controlled wastes. The potential controlled wastes include contaminated soils from hydrocarbon-based product spills during refuelling or maintenance works, tyres if replacement is required, and the empty chemicals containers. Table 13 (section C.5.2) of the EIS lists the potential sources of controlled wastes for the activity and their proposed disposal method.

In addition, the EIS states that there will likely be an excess of cleared vegetative matter that will not be able to be used for rehabilitation / land stabilisation purposes. The Proponent has indicated that if needed, they will burn excess vegetative matter. It was noted that there are limited options for disposal of green waste at the three waste disposal sites on the island and that transport off the island is impractical. The Proponent has noted that there are potentially other options, such as seeking agreements with other landowners in need of vegetative matter for rehabilitation (e.g., other quarries), but that this is not a reliable option.

According to the EIS the use of hazardous substances is required at the activity. Fuel, oils and lubricants will be used to operate and maintain functional machinery and herbicides will be used for the control of weeds on site. Fuel will be brought onsite as required in portable pods / tanks mounted on the back of a utility vehicle. The other chemicals such as lubricants, oils and herbicides will be stored onsite within the shed.

7.6.2 Management measures proposed in EIS

According to the EIS waste management measures will be in accordance with the best practice hierarchy of waste management (i.e., avoidance, recycling / reclamation, re-use, treatment to reduce potentially adverse impacts, disposal).

The EIS also states that solid wastes will be managed in accordance with the following:

- general domestic wastes (e.g., lunch wrappers) generated at the site will be collected in waste bins provided in the amenities / crib room. The bins will be emptied at least once per fortnight and the material disposed of at a permitted refuse disposal site. Waste bins that receive food scraps will be fitted with preventative access measures to discourage wildlife from seeking out food scraps.
- Waste bins will be located at the activity for the semi-industrial wastes and will be labelled with the types of waste each bin is to receive. The waste will be sorted based on the classification of the type of waste, with controlled waste separated from all other waste streams and disposed of at least fortnightly at the Council operated Whitemark Waste Facility.
- Where possible repair and maintenance works will be undertaken off-site and wastes generated by those activities will be managed by the service provider (e.g. workshop, tyre replacement facility, repair shop).

The EIS states that no more than 10 cubic meters of vegetative material generated by clearing works will be stored in any one stockpile, with stockpiles separated by at least 20 m of open bare ground ready for

burning when conditions are suitable and following the fire permit period conditions that prevail at the time.

The EIS states that contamination of the environment by the release of fuels, lubricants and/or hazardous substances will be prevented as far as reasonable to do so by the application of effective, industry standard avoidance and mitigation management measures, including:

- All fuels, lubricants and/or hazardous materials are stored in accordance with the relevant requirements of *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*.
- Refuelling activities will only occur when machinery is within a bunded / hardstand area on the site.
- Hazardous materials storage areas will be managed in accordance with EPA Tasmania's *Bunding and Spill Management Guidelines*, December 2015.
- Chemicals used for weed control will be stored, handled, used, and disposed of in accordance with the manufacturer's directions and relevant regulations.
- Spill prevention and clean-up equipment (i.e., spill kits) will be readily available and accessible in the vicinity of all plant and machinery, including mobile and fixed fuel storages.
- Spill prevention and clean-up procedures will be in accordance with the following principles:
  - minimise the volume of hazardous substances kept onsite.
  - develop contingency plans to address spills and leaks.
  - install trays, thick plastic mats or similar beneath stationary machinery to protect the soil from oil or fuel spills and leaks.
  - install spill trays immediately if there is any potential for, or evidence of, leakage.
  - ensure that appropriate clean-up equipment is readily accessible.
  - maintain a supply of oil-absorbent material.
  - contain and treat spills and leaks.
  - notify relevant authorities of significant spills or leaks.
  - ensure that drainage from areas where spills may occur like a refuelling area is diverted through a sump or interceptor trap to remove any potential hydrocarbon contamination.

7.6.3 Agency comment

No agency comments were received in relation to waste management, dangerous goods and environmentally hazardous substances.

7.6.4 Evaluation

While burning of cleared vegetation is not a preferred method of disposal, the difficulty of dealing with vegetative waste as outlined in the EIS and additional information is noted. The preference to seek other reuse or disposal options in the first instance, in line with the waste management hierarchy principles outlined in **O11**, is supported.

The Proponent will be required to comply (**G8**) with the Acceptable Standards provisions of the Quarry Code of Practice, including for waste disposal and storage of chemicals. No specific waste management conditions are considered necessary.

Condition **H1** requires appropriate spill kits to be kept, and maintained in functional condition, in appropriate locations within the Activity Area. Conditions **H2** and **H3** require hazardous materials to be contained and managed appropriately to prevent contamination of soil, groundwater, and waterways.

Standard information items **LO2** and **O11** are included to ensure the proponent is aware of legislation relating to storage and handling of dangerous goods and substances, and best practice in relation to waste management.

Based on the information provided in the EIS, the management measures proposed and the inclusion of the above-mentioned conditions, it is considered that the potential risks from waste, dangerous goods and environmentally hazardous substances can be appropriately managed to limit the potential for environmental harm or nuisance to occur.

7.6.5 Conditions

The proponent will be required to comply with the following conditions:

H1 Spill kits

H2 Storage and handling of hazardous materials

H3 Handling of hazardous materials – mobile

Other information included in the permit:

LO2 Storage and handling of dangerous goods, explosives, and dangerous substances

OI1 Waste management hierarchy

7.7 Issue 7: Decommissioning and rehabilitation

7.7.1 Potential impacts

Temporary or permanent cessation of extractive operations have the potential to cause ongoing impacts to the environment if rehabilitation is not managed appropriately. Rehabilitation is necessary to ensure the long-term stability of the site, prevent erosion and sedimentation, reduce uncontrolled dust emissions, provide native flora and fauna habitat, and to minimise the potential for establishment of weeds.

According to the EIS the aim of rehabilitation will be to return the landscape to a stable landform that supports native vegetation (scrub and grassland) comparable to that currently found within the Activity Area.

7.7.2 Management measures proposed in EIS

The EIS states that the primary aims of rehabilitation work will be to:

- achieve long term stabilisation of worked out areas to minimise the risk of ongoing erosion by wind and water;
- revegetate worked out areas with native species that will eventually grow to form native vegetation communities; and
- ensure that worked out areas are safe for future land use(s).

The EIS also states that upon permanent closure of the activity a Decommissioning and Rehabilitation Plan (DRP) will be developed and submitted to the EPA for approval.

According to the EIS the DRP will include discussion and describe procedures to:

- facilitate the orderly and safe removal of machinery, infrastructure, and other equipment;
- establish sufficient and appropriate native vegetation cover to minimise the risk of ongoing dust generation and soil erosion; and
- establish a monitoring regime to assess the success or otherwise of the rehabilitation to sign-off parameters.

The Proponent aims to minimise the area of land disturbed, with a maximum disturbed area at any given time of 5 ha proposed in the EIS. Progressive rehabilitation of areas that are no longer being extracted or used for another purpose (e.g., sand or vegetation stockpile areas etc.) will commence around year 2 or 3 of extraction with the following actions being implemented to help achieve the primary aims of rehabilitation:

- surfaces will be levelled, and if available, sediment collected from sediment basins will be applied to the prepared surfaces.
- application of native tree / shrub / grass seed or the application of slash (generated by clearing works on the site) that contain fruits with seed (e.g., *Melaleuca, Leptospermum, Allocasuarina* – species which readily recruit from seed).
- monitoring for weed infestations, germination success / growth of seed distributed species and landform stability.
- remedial works may include but not necessarily be limited to weed control works, additional native species seed spreading, landform stabilisation works and erosion control measures and/or repair works.

The EIS also notes that temporary vegetative cover (native scrub and/or grass species such as *Allocasuarina & Poa*) may be established on disturbed areas (e.g., soil stockpiles) to prevent weed infestations and erosion by wind or water.

7.7.3 Agency comment

No agency comments were received in relation to decommissioning and rehabilitation.

7.7.4 Evaluation

Given the inherent mobility of sand-based landscapes the appropriate ongoing management of the activity and long-term rehabilitation and stabilisation of the Activity Area is critical to ensuring environmental nuisance or harm does not occur.

The management measures proposed in the EIS and development of a DRP for approval by the Director is appropriate. To ensure these measures are implemented, a suite of standard conditions is recommended.

Condition **DC1** requires surface soils to be removed prior to opening new areas of the extractive pit and stockpiled separate to other overburden for future use in rehabilitation of the extractive pit. Furthermore, the stockpiles must be protected from erosion and other disturbance.

Condition **DC2** requires that worked out or disused areas of Activity Area must be rehabilitated concurrently with other extractive activities occurring within the Activity Area in accordance with the QCP and sets the maximum area of disturbed land that is allowed at any one time at 5 ha.

Conditions **DC3** and **DC4** set out the requirements for when either temporary suspension or permanent cessation of quarrying activities are proposed respectively. Permanent cessation also triggers condition **DC5** which requires the submission of a Decommissioning and Rehabilitation Plan for the Director's approval. Condition **DC6** sets out the broad steps that must be undertaken upon permanent cessation of the activity, including the implementation of an approved DRP. Furthermore, condition **DC7** prohibits the activity from recommencing once the Director has confirmed in writing that decommissioning and rehabilitation have been satisfactorily completed.

Based on the commitments made in the EIS and the above conditions being imposed, it is considered that the risks associated with improper decommissioning and rehabilitation can be adequately managed to ensure environmental harm or nuisance is unlikely to occur upon temporary or permanent cessation of the activity.

7.7.5 Conditions

The proponent will be required to comply with the following conditions:

DC1 Stockpiling of surface soil

DC2 Progressive rehabilitation

DC3 Temporary suspension of activity

DC4 Notification of cessation

DC5 DRP requirements

DC6 Rehabilitation following cessation

DC7 Activity to cease following decommissioning and rehabilitation

8. Report Conclusions

This assessment has been based on the information provided by the proponent, Markarna Grazing Company Pty Ltd, in the permit application and additional information (the EIS).

This report incorporates specialist advice provided by EPA scientific and regulatory staff, the Department of Natural Resources and Environment Tasmania, and other government agencies.

It is concluded that:

1. the RMPS and EMPCS objectives have been duly and properly pursued in the assessment of the proposal; and
2. the assessment of the proposal has been undertaken in accordance with the Environmental Impact Assessment Principles, except for those excluded under Section 25A(4); and
3. the proposal is capable of being managed in an environmentally acceptable manner such that it is unlikely that the RMPS and EMPCS objectives would be compromised, provided that the Permit Conditions - Environmental No. 11576 appended to this report are imposed and duly complied with.

Report Approval

Environmental Assessment Report and conclusions, including environmental conditions, adopted:

Andrew Paul

CHAIRPERSON, BOARD OF THE ENVIRONMENT PROTECTION AUTHORITY

Meeting date: 05 August, 2025

9. References

Slee, A. (2023) *Survey of the Geomorphology and Soil characteristics of the Markarna Grazing Company Pty Ltd Property, Marshall Beach, Flinders Island*, (dated November 2023), Forest Practices Authority, Hobart, Tasmania (the Geomprphology Report).

Van Diemen Consulting Pty Ltd (2024) *Lime Sand Extraction Pit, Palana Road – Memana, Flinders Island – Natural Values Report – Markarna Grazing Company Pty Ltd* (dated 20 October 2024); New Town, Tasmania (the NVA Report).

Van Diemen Consulting Pty Ltd (2025) *Environmental Impact Assessment – Lime Sand Extraction Pit – Markarna Grazing Company Pty Ltd – Palana Road, Memana, Flinders Island* (dated 31 May 2025); New Town, Tasmania (the EIS).

10. Appendices

Appendix 1 Table of proponent management measures

Appendix 2 Permit conditions - Environmental No: 11576

Appendix 1: Table of proponent management measures

Table 1: Proponent management measures (Table 15 of the EIS)

No.	Action	Timing
1	Measures to suppress dust include the following extractive industry standard environmental practices: • Retention of vegetation along the access road corridor where possible; • Retention of vegetation (when possible) around the Pit working area to reduce the likelihood of strong winds liberating fine particles into the air; • Utilisation of slash / mulch obtained from cleared areas to stabilise the soil surface and to limit wind action on dust generation at the soil surface; • Covering of trucks with tarpaulins and / or load dampening; and • Minimising the geographic extent of areas of exposed soil.	Ongoing
2	Measures to minimise the risk of wind erosion include the following: • Avoid, if possible, but otherwise minimise, working on faces exposed to westerly winds; • Maintain vegetation above and to the west of any active face; and • Re-establish vegetation on a progressive basis, this could include stockpiling cleared tea tree and other scrub species for covering exposed surface as operations progress.	Ongoing
3	Measures to minimise the risk of water caused erosion include the following: • Minimising the geographic extent of exposed soil. • Establishment of sediment basins, diversion drains, and other drainage systems at the activity. • Utilisation of slash obtained from cleared areas or other product (jute mesh) to stabilise the soil surface, and to limit the spread of sediment.	Ongoing
4	Regular visual monitoring (monthly) is to be undertaken to ensure the effectiveness of the installed stormwater management and sediment control structures. Repairs and remedial works (including basin cleaning) are to be performed to maintain sediment settling zones to those required and ensure that stormwater is entering and leaving the basin as planned.	Ongoing
5	Groundwater environmental management controls will be - • Readily available spill kits on site; • Storage of products in suitably sized bunded containers; • Training personnel to use spill kits and establish emergency procedures in the event of a spill; and • Daily pre-start checks on machinery to minimise the risk of spills; ensure machinery and equipment is functional, hoses are correctly fitted and secure, and caps on fluid tanks are tightened.	Ongoing
6	Equipment will be well maintained and late model machines with proprietary exhaust silencers fitted to ensure noise emissions are as low as possible. Pit operations will occur during normal daytime hours of 0700 – 1900 hrs Monday to Friday.	Ongoing

No.	Action	Timing
7	A draft Weed and Disease Management Plan is submitted with the EIS (Attachment 8).	Ongoing
8	In the event notable examples of significant geomorphological features are encountered (i.e. any of the features listed below) the first task should be to photograph the area and move operations away from the feature until a suitably qualified person (in the context of the item(s) discovered) can assess any geomorphological and / or cultural values. Contractors should look out for: • Thick dark continuous bands within the dunes; • Buried tree stumps or large calcareous deposits (not rhizoliths of modern age such as those created by tree roots from recently deceased vegetation) that appear to be parts of a tree; • Stone deposits within the dunes particularly granite boulders out of place or deposits associated with evidence of fire in the form of charcoal or reddened ash layers or hardened sand; • Large accumulations of shells; and • Large bones and accumulations of smaller bones buried >1 m under the surface.	Ongoing
9	In the event a steep sided depression forms during operations that has signs of collapse these should be recorded and avoided during operations until expert advice is obtained. In the event a cave is located on site, operations should avoid the area and seek expert advice.	Ongoing
10	General refuse waste generated by workers (e.g., lunch wrappers) at the Pit will be collected in waste bins provided on-site – at the amenities / crib room. The bins will be emptied at least once per fortnight and the material disposed of at a permitted refuse disposal site. Waste bins that receive food scraps will be fitted with preventative access measures to discourage native animals and feral cats.	Ongoing
11	Waste generated by maintenance works, repairs and / or schedule servicing of equipment and machinery off the Pit location will be managed by the service provider at the location where they have been engaged by the Proponent to complete the required works.	Ongoing
12	Waste will be sorted based on the classification of the type of waste, with Controlled Waste separated from all other waste streams and disposed of at the Council operated Whitemark Waste Facility.	Ongoing
13	All fuels, lubricants and / or hazardous materials are stored in accordance with the relevant requirements of *AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids*. Refuelling activities will only occur when machinery is within a bunded / hardstand area.	Ongoing
14	Spill prevention and clean-up equipment is to be readily available and accessible in the vicinity of all plant and machinery, including mobile and fixed fuel storages.	Ongoing

Appendix 2: Permit conditions – Environmental No: 11576

PERMIT PART B
PERMIT CONDITIONS - ENVIRONMENTAL No. 11576

Issued under the *Environmental Management and Pollution Control Act 1994*

Activity: **The operation of a sand extractive pit with materials handling (screening) (ACTIVITY TYPE: Crushing, grinding, milling or separating into different sizes (rocks, ores or minerals))**
SAND EXTRACTION PIT, 368 FIVE MILE JIM ROAD
MEMANA TAS 7255

The above activity has been assessed as a level 2 activity under the *Environmental Management and Pollution Control Act 1994*.

Acting under Section 25A(3) of the EMPCA, the Board of the Environment Protection Authority has recommended that this Permit Part B be included in any Permit granted under the *Land Use Planning and Approvals Act 1993* with respect to the above activity.

Municipality: **FLINDERS**
Permit Application Reference: **DA 2023 / 00038**
EPA file reference: **23/5219**

Date conditions approved: 05 August 2025

Signed:

CHAIRPERSON, BOARD OF THE ENVIRONMENT PROTECTION AUTHORITY

DEFINITIONS

Unless the contrary appears, words and expressions used in this Permit Part B have the meaning given to them in **Schedule 1** of this Permit and in the EMPCA. If there is any inconsistency between a definition in the EMPCA and a definition in this Permit Part B, the EMPCA prevails to the extent of the inconsistency.

ENVIRONMENTAL CONDITIONS

The person responsible for the activity must comply with the conditions contained in **Schedule 2** of this Permit Part B.

INFORMATION

Attention is drawn to **Schedule 3**, which contains important additional information.

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Schedule 1: Definitions

In this Permit Part B:-

10,000 cubic metres is considered equivalent to 15,000 tonnes.

Aboriginal Relic has the meaning described in section 2(3) of the *Aboriginal Heritage Act 1975*.

Activity means any environmentally relevant activity (as defined in section 3 of EMPCA) to which this document relates and includes more than one such activity.

Activity Area means the area to be used for the Activity when these conditions take effect, as depicted in Attachment 1.

Authorized Officer means an authorized officer under section 20 of EMPCA.

Best Practice Erosion and Sediment Control means the document with this title by the International Erosion Control Association, dated November 2008, and any amendment to or substitution of this document.

Director means the Director, Environment Protection Authority holding office under section 18 of EMPCA and includes a delegate or person authorised in writing by the Director to exercise a power or function on the Director's behalf.

DRP means Decommissioning and Rehabilitation Plan.

EMPCA means the *Environmental Management and Pollution Control Act 1994*.

Environmental Harm and **Material Environmental Harm** and **Serious Environmental Harm** each have the meanings ascribed to them in section 5 of EMPCA.

Environmental Nuisance has the meanings ascribed to it in section 3 of EMPCA.

Environmentally Hazardous Material means any substance or mixture of substances of a nature or held in quantities which present a reasonably foreseeable risk of causing serious or material environmental harm if released to the environment and includes fuels, oils, waste and chemicals but excludes sewage.

EPA Board means the Board of the Environment Protection Authority established under section 13 of EMPCA and includes a delegate or person authorised in writing by the EPA Board to exercise a power or function on the EPA Board's behalf.

Maximum Disturbed Area means the area disturbed to facilitate the activity and includes but is not limited to; vegetation disturbance, soil disturbance, access roads, hardstand, working area, vehicle parking and infrastructure (i.e. buildings, site office, sheds etc).

Person Responsible is any person who is or was responsible for the environmentally relevant activity to which this document relates and includes the officers, employees, contractors, joint venture partners and agents of that person and includes a body corporate.

Planning Authority means the Council(s) for the municipal area(s) in which the Activity Area is situated.

Pollutant has the meaning ascribed to it in section 3 of EMPCA.

Quarry Code of Practice means the document of this title published by the Environment Protection Authority in May 2017, and includes any subsequent versions of this document.

Stormwater means water runoff as a consequence of a rainfall event, whether surface flow, piped flow, or flow within conduits, including any contaminants collected by the water during its passage.

Weed means a plant species that has, or is likely to have, an adverse impact on the environment because of the introduction, spread or increase in population size of the species in an area; and includes a declared weed as defined in the *Biosecurity Act 2019* and subordinate regulations.

Weed And Disease Guidelines means the document titled *Weed and Disease Planning and Hygiene Guidelines - Preventing the spread of weeds and diseases in Tasmania*, by the Department of Primary Industries, Parks, Water and Environment, dated March 2015, and any amendment to or substitution of this document.

Weed and Disease Management Plan means the Weed and Disease Management Plan as provided in Attachment 8 of the EIS, dated 10 November 2024 and prepared by Van Diemen Consulting Pty Ltd, or any subsequent variation or substitution of the plan.

Schedule 2: Conditions

Maximum Quantities

Q1 Regulatory limits

1 The activity must not exceed the following limits :

1.1 10,000 cubic metres per year of rocks, ores or minerals processed.

1.2 10,000 cubic metres per year of sand extracted.

General

G1 Activity Area

The activity must be confined to the Activity Area.

G2 Access to and awareness of conditions and associated documents

A copy of these conditions and any associated documents referred to in these conditions must be held in a location that is known to and accessible to the person responsible for the activity. The person responsible for the activity must ensure that all persons who are responsible for undertaking work within the Activity Area, including contractors and sub-contractors, are familiar with these conditions to the extent relevant to their work.

G3 Incident response

If an incident causing or threatening environmental nuisance, serious environmental harm or material environmental harm from pollution occurs in the course of the activity, then the person responsible for the activity must immediately take all reasonable and practicable action to minimise any adverse environmental effects from the incident.

G4 Proposed change to activity

1 The person responsible must notify the Director in writing prior to implementing any change to the activity authorised by this document that may cause or increase the emission of a pollutant or which may result in environmental harm or environmental nuisance (even temporarily). A change includes, but is not limited to, any of the following:

1.1 an increase in the discharge of a pollutant, or the location of its discharge.

1.2 the construction, installation, alteration or removal of any structure or equipment used in the course of carrying out the activity.

1.3 any clearance of native vegetation or earthworks.

1.4 a change in the quantity or characteristics of materials used in carrying out the activity.

2 The notification must be in an approved form and include the following:

2.1 details of the proposed change;

2.2 an assessment of the environmental impacts that may result from the change;

2.3 any relevant approvals held by the person responsible; and

2.4 any advice from the relevant planning authority to the effect that approval is not required.

3 The person responsible must provide additional information as requested by an Authorized Officer.

4 The proposed change must not be implemented until the Director has confirmed in writing that they are satisfied that no other approval or variation of this document is required.

5 For the avoidance of doubt, a notification of a proposed change under this provision is not required if the proposed change is part of a referral to the EPA Board for assessment under sections 24, 25, 27 or 27AA of EMPCA.

G5 Change of responsibility

If the person responsible for the activity intends to cease to be responsible for the activity, that person must notify the Director in writing of the full particulars of any person who will become the person responsible for the activity, before such cessation.

G6 Change of ownership

If the owner of the Activity Area changes or is to change, then, as soon as reasonably practicable but no later than 30 days after becoming aware of the change or intended change in the ownership of the Activity Area, the person responsible must notify the Director in writing of the change or intended change of ownership.

G7 Complaints register

1 A public complaints register must be maintained. The public complaints register must, as a minimum, record the following detail in relation to each complaint received in which it is alleged that environmental harm (including an environmental nuisance) has been caused by the activity:

1.1 the date and time at which the complaint was received;

1.2 contact details for the complainant (where provided);

1.3 the subject matter of the complaint;

1.4 any investigations undertaken with regard to the complaint; and

1.5 the manner in which the complaint was resolved, including any mitigation measures implemented.

2 Complaint records must be retained for a period of at least 3 years.

G8 Quarry Code of Practice

Unless otherwise required by these conditions or required in writing by the Director, the activity (or activities) undertaken within the Activity Area must comply with the Acceptable Standards provisions of the *Quarry Code of Practice*.

G9 Amendment of required plans and reports

1 The plans and reports required by these conditions must be amended to address any matter required by the Director, as advised by notice in writing.

2 Amended plans and reports must be resubmitted within the timeframe that the Director specifies.

<u>Atmospheric</u>

A1 Containment of loads

Vehicles carrying loads of material which may blow or spill must be equipped with an effective control measure(s) to prevent escape of the materials. The control measure(s) must be implemented prior to leaving the Activity Area.

A2 Control of dust emissions from crushing and screening plant

1 Dust produced by the operation of all crushing and/or screening plant must be controlled by the use of one or more of the following methods to the extent necessary to prevent environmental nuisance:

1.1 the installation of fixed water sprays at all crushers and/or screening plant and at all necessary points where processed material changes direction due to belt transfer;

1.2 the installation of dust extraction equipment at all crushers and/or screening plant and at all necessary points where processed material changes direction due to belt transfer;

1.3 the enclosure of the crushing and/or screening plant and the treatment of atmospheric emissions by dust extraction equipment; or

1.4 any other method that has been approved in writing by the Director.

A3 Control of dust emissions

Dust emissions from within the Activity Area must be controlled to the extent necessary to prevent environmental nuisance beyond the boundary of the Activity Area.

<u>Decommissioning And Rehabilitation</u>

DC1 Stockpiling of surface soil

Prior to commencement of extractive activities on any portion of the Activity Area, surface soils must be removed in that portion of the Activity Area to be disturbed by the conduct of the activity and stockpiled for later use in rehabilitation of the Activity Area. Topsoil must be kept separate from other overburden and protected from erosion or other disturbance.

DC2 Progressive rehabilitation

Worked out or disused sections of the Activity Area must be rehabilitated concurrently with extractive activities on other sections of the Activity Area. Progressive rehabilitation must be carried out in accordance with the relevant provisions of the *Quarry Code of Practice*, unless otherwise approved in writing by the Director. The maximum disturbed area of land which may remain, at any time, without rehabilitation is five hectares.

DC3 Temporary suspension of activity

1 Within 30 days of becoming aware of any event or decision which is likely to give rise to the temporary suspension of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to suspend or has suspended.

2 During temporary suspension of the activity the Activity Area must be managed and monitored by the person responsible for the activity to ensure that emissions from the Activity Area do not cause serious environmental harm, material environmental harm or environmental nuisance.

3 If required by the Director, a Care and Maintenance Plan for the activity must be submitted to the Director for approval, by a date specified in writing by the Director. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition.

3.1 The plan must be prepared in accordance with any guidelines provided by the Director.

3.2 Once approved the person responsible must act in accordance with the approved Care and Maintenance Plan.

3.3 The person responsible may apply to the Director to vary or substitute the Care and Maintenance Plan. Any variation or substitution of the plan approved by the Director, by notice in writing, replaces the earlier approval with effect from the date specified in the notice.

4 Unless otherwise approved in writing by the Director, if the activity on the Activity Area has substantially ceased for 2 years, decommissioning of the activity and rehabilitation of the Activity Area must be carried out in accordance with the requirements of these conditions as if the activity has permanently ceased.

DC4 Notification of cessation

Within 30 days of becoming aware of any event or decision which is likely to give rise to the permanent cessation of the activity, the person responsible for the activity must notify the Director in writing of that event or decision. The notice must specify the date upon which the activity is expected to cease or has ceased.

DC5 DRP requirements

1 Unless otherwise approved in writing by the Director, a Decommissioning and Rehabilitation Plan (DRP) for the activity must be submitted for approval to the Director within 30 days of the Director being notified of the planned cessation of the activity. The DRP must be prepared in accordance with any guidelines provided by the Director. This requirement will be deemed to be satisfied only when the Director indicates in writing that the submitted document adequately addresses the requirements of this condition.

2 The person responsible may apply to the Director to vary or substitute the DRP. Any variation or substitution of the plan approved by the Director, by notice in writing, replaces the earlier approval with effect from the date specified in the notice.

DC6 Rehabilitation following cessation

1 Following permanent cessation of the activity, and unless otherwise approved in writing by the Director, the Activity Area must be rehabilitated including:

1.1 stabilisation of any land surfaces that may be subject to erosion;

1.2 removal or mitigation of all environmental hazards or land contamination, that might pose an ongoing risk of causing environmental harm; and

1.3 decommissioning of any equipment that has not been removed.

2 Where a Decommissioning and Rehabilitation Plan (DRP) has been approved by the Director, decommissioning and rehabilitation must be carried out in accordance with that plan.

3 The person responsible may apply to the Director to vary or substitute the DRP. Any variation or substitution of the plan approved by the Director, by notice in writing, replaces the earlier approval with effect from the date specified in the notice.

DC7 Activity to cease following decommissioning and rehabilitation

1 Following written notification by the Director confirming the completion of decommissioning of the Activity and rehabilitation of the Activity Area in accordance with these conditions:

1.1 the Activity must not recommence; and

1.2 the Person Responsible is not required to undertake monitoring, reporting and/or notification condition requirements relating to the activity, unless otherwise specified in writing by the Director.

Groundwater

GW1 Groundwater

1 Should there be evidence that groundwater has been intersected, or standing water is observed, within the Activity Area, the following measures must be taken:

1.1 machinery is not permitted to operate in standing water; and

1.2 the base level of the extractive activity must be raised by the addition of extracted material to prevent the occurrence of groundwater intersection within the Activity Area.

Hazardous Substances

H1 Spill kits

Spill kits appropriate for the types and volumes of materials handled within the Activity Area must be kept in appropriate locations and maintained in a functional condition to assist with the containment of spilt environmentally hazardous materials.

H2 Storage and handling of hazardous materials

1 Unless otherwise approved in writing by the Director, environmentally hazardous materials held within the Activity Area must be:

1.1 stored within maintained and functional impervious bunded areas, spill trays or other containment systems; and

1.2 managed to prevent unauthorised discharge, emission or deposition of pollutants:

1.2.1 to soils within the boundary of the Activity Area in a manner that is likely to cause serious or material environmental harm;

1.2.2 to groundwater;

1.2.3 to waterways; or

1.2.4 beyond the boundary of the Activity Area.

H3 Handling of hazardous materials - mobile

1 Where mobile containment of environmentally hazardous materials is utilised for the fuelling or servicing of mobile or fixed plant within the Activity Area, all reasonable measures must be implemented to prevent unauthorised discharge, emission or deposition of pollutants:

1.1 to soils within the boundary of the Activity Area in a manner that is likely to cause serious or material environmental harm;

1.2 to groundwater;

1.3 to waterways; or

1.4 beyond the boundary of the Activity Area.

2 Reasonable measures may include spill kits, spill trays/bunds or absorbent pads, and automatic cut-offs on any pumping equipment.

Noise Control

N1 Operating hours

1 Unless otherwise approved in writing by the Director, activities associated with the extraction of rock, gravel, sand, clay or minerals, and loading of product, and screening must not be undertaken outside the hours of 0700 hours to 1900 hours on weekdays.

2 Notwithstanding the above paragraph, activities must not be carried out on Saturdays, Sundays or on public holidays that are observed Statewide (Easter Tuesday excepted).

Operations

OP1 Machinery washdown

Prior to entering the Activity Area, machinery must be washed in accordance with the Weed and Disease Guidelines, or any subsequent revisions of that document.

OP2 Weed and Disease Management Plan

1 Unless otherwise specified in these conditions, the activity must be undertaken in accordance with the approved Weed and Disease Management Plan.

2 The person responsible may apply to the Director to vary or substitute the Weed and Disease Management Plan. Any variation or substitution of the plan approved by the Director, by notice in writing, replaces the earlier approval with effect from the date specified in the notice.

Stormwater Management

SW1 Design and maintenance of settling ponds

1 Sediment settling ponds must be designed and maintained in accordance with the following requirements:

1.1 ponds must be designed to successfully mitigate reasonably foreseeable sediment loss which would result from a 1 in 20 year storm event;

1.2 discharge from ponds must occur via a stable spillway that is not subject to erosion;

1.3 all pond walls must be stable and treated with topsoil and vegetated or otherwise treated in such a manner as to prevent erosion; and

1.4 sediment settling ponds must be periodically cleaned out to ensure that the pond design capacity is maintained. Sediment removed during this cleaning must be securely deposited such that sediment will not be transported off the Activity Area by surface run-off.

SW2 Perimeter drains or bunds

1 Perimeter cut-off drains, or bunds, must be constructed at strategic locations within the Activity Area to prevent surface run-off from entering the area used or disturbed in carrying out the activity. All reasonable measures must be implemented to ensure that sediment transported along these drains, or bunds, remains within the Activity Area. Such measures may include provision of strategically located sediment fences, appropriately sized and maintained sediment settling ponds, vegetated swales, detention basins and other measures designed and operated in accordance with *Best Practice Erosion and Sediment Control* or similar.

2 Drains, or bunds, must have sufficient capacity to contain run-off that could reasonably be expected to arise during a 1 in 20 year rainfall event. Maintenance activities must be undertaken regularly to ensure that this capacity does not diminish.

SW3 Stormwater

1 Polluted stormwater that will be discharged from the Activity Area must be collected and treated prior to discharge to the extent necessary to prevent serious or material environmental harm, or environmental nuisance.

2 Notwithstanding the above, all stormwater that is discharged from the Activity Area must not carry pollutants such as sediment, oil and grease in quantities or concentrations that are likely to degrade the visual quality of any receiving waters outside the Activity Area.

3 All reasonable measures must be implemented to ensure that solids entrained in stormwater are retained within the Activity Area. Such measures may include appropriately sized and maintained sediment settling ponds or detention basins.

Schedule 3: Information

Legal Obligations

LO1 EMPCA

The activity must be conducted in accordance with both the conditions in this document and the obligations of the *Environmental Management and Pollution Control Act 1994* (EMPCA) and subordinate regulations. The conditions of this document do not replicate legislated obligations; therefore, you should ensure you are aware of your obligations under EMPCA and subordinate regulations.

LO2 Storage and handling of dangerous goods, explosives and dangerous substances

1 The storage, handling and transport of dangerous goods, explosives and dangerous substances must comply with the requirements of relevant State Acts and any regulations thereunder, including:

1.1 *Work Health and Safety Act 2012* and subordinate regulations;

1.2 *Explosives Act 2012* and subordinate regulations; and

1.3 *Dangerous Goods (Road and Rail Transport) Act 2010* and subordinate regulations.

LO3 Aboriginal relics requirements

1 Aboriginal relics, objects, sites, places and human remains regardless of whether they are located on public or private land, are protected under the *Aboriginal Heritage Act 1975*.

2 Unanticipated discoveries of Aboriginal heritage must be reported to Aboriginal Heritage Tasmania on **1300 487 045** as soon as possible.

LO4 MRDA

Operations must be undertaken in accordance with a mining plan approved by the Director of Mines and a Mining Lease issued under the *Mineral Resources Development Act 1995* (MRDA).

Other Information

OI1 Waste management hierarchy

1 Wastes should be managed in accordance with the following hierarchy of waste management:

1.1 waste should be minimised, that is, the generation of waste must be reduced to the maximum extent that is reasonable and practicable, having regard to best practice environmental management;

1.2 waste should be re-used or recycled to the maximum extent that is practicable; and

1.3 waste that cannot be re-used or recycled must be disposed of at a waste depot site or treatment facility that has been approved in writing by the relevant planning authority or the Director to receive such waste.

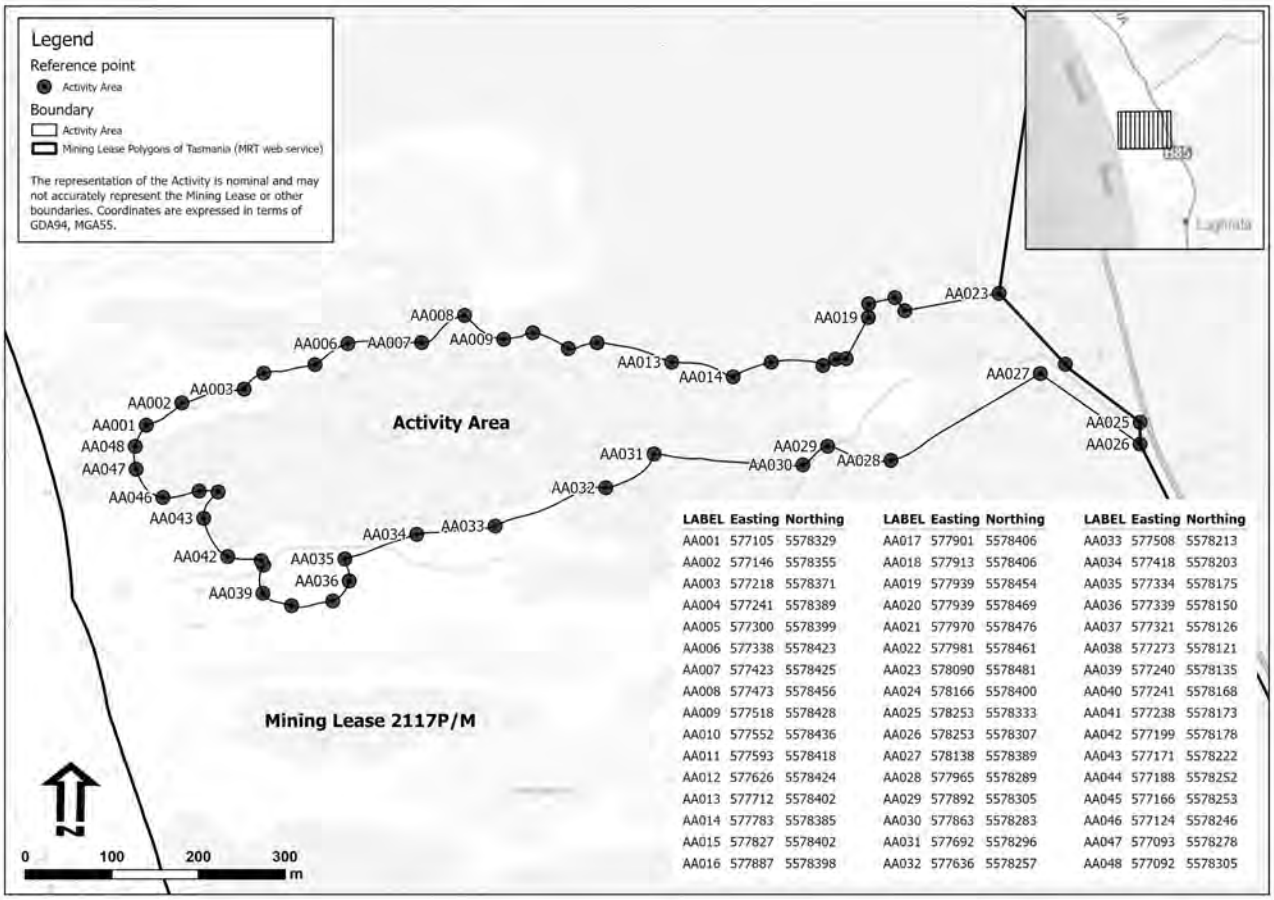
OI2 Notification of incidents under section 32 of EMPCA

Where a person is required by section 32 of EMPCA to notify the Director of the release of a pollutant, the Director can be notified by telephoning **1800 005 171** (a 24-hour emergency telephone number).

OI3 Release of Relevant Information

Under the provisions of section 23AA of EMPCA relevant information relating to monitoring of environmental impacts required under these conditions may be subject to publishing or public release by the Director.

Attachment 1: Activity Area



LABEL	Easting	Northing	LABEL	Easting	Northing	LABEL	Easting	Northing
AA001	577105	5578329	AA017	577901	5578406	AA033	577508	5578213
AA002	577146	5578355	AA018	577913	5578406	AA034	577418	5578203
AA003	577218	5578371	AA019	577939	5578454	AA035	577334	5578175
AA004	577241	5578389	AA020	577939	5578469	AA036	577339	5578150
AA005	577300	5578399	AA021	577970	5578476	AA037	577321	5578126
AA006	577338	5578423	AA022	577981	5578461	AA038	577273	5578121
AA007	577423	5578425	AA023	578090	5578481	AA039	577240	5578135
AA008	577473	5578456	AA024	578166	5578400	AA040	577241	5578168
AA009	577518	5578428	AA025	578253	5578333	AA041	577238	5578173
AA010	577552	5578436	AA026	578253	5578307	AA042	577199	5578178
AA011	577593	5578418	AA027	578138	5578389	AA043	577171	5578222
AA012	577626	5578424	AA028	577965	5578289	AA044	577188	5578252
AA013	577712	5578402	AA029	577892	5578305	AA045	577166	5578253
AA014	577783	5578385	AA030	577863	5578283	AA046	577124	5578246
AA015	577827	5578402	AA031	577692	5578296	AA047	577093	5578278
AA016	577887	5578398	AA032	577636	5578257	AA048	577092	5578305

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