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ENVIRONMENTAL REVIEW DOCUMENT

LAKE MACLEOD SOLAR SALT PROJECT EXPANSION

26 February 2026

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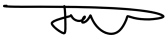

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Preston Consulting acknowledges the Traditional Owners of the lands on which it works, in particular the Whadjuk People of the Noongar Nation and, the Baiyungu People, the Traditional Owners of the land on which the activity is proposed. Preston Consulting pays its respects to Aboriginal and Torres Strait Islander Peoples Past and Present, and recognise their continuing connection to land, waters, sky, culture, and community.



DOCUMENT CONTROL

Document Title	Lake MacLeod Solar Salt Project Expansion – Environmental Review Document		
Document Number	LEI-LMS-DOC-01		
Revision Number	0		26/02/2026
Status	FINAL		26/02/2026
Author	Jenna Aylmore Environmental Consultant Preston Consulting Pty Ltd		26/02/2026
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1 PROPOSAL

1.1 PROPOSAL DESCRIPTION

Lake MacLeod Pty Ltd (LMPL) is proposing to expand the Lake MacLeod Solar Salt Operation (Lake MacLeod Project) through the development of:

- Additional crystalliser ponds on the surface of Lake MacLeod;
- Upgrades to pumps and pump stations;
- New northern flood levee;
- Borrow pits; and
- Access roads.

The items listed above constitutes the Proposal - the items subject to this referral under Part IV of the *Environmental Protection Act 1986* (WA; EP Act).

The Proposal is to construct approximately 330 hectares (ha) of new crystalliser ponds adjacent to the existing crystalliser ponds comprising 811 ha.

As part of the crystalliser expansion works, LMPL is also seeking to relocate the existing northern flood levee further to the north. This will protect the newly constructed crystalliser cells from flood events as well as future proofing any further expansions of the crystalliser field that may be required in the years to come. It is only the flood levee that will be relocated further to the north and not the bitterns holding pond.

The Proposal will result in a mean annual abstraction of approximately 20.6 gigalitres (GL) of saturated brine. Production of salt will remain within the currently approved Prescribed Premises Licence limit of 6.1 Mtpa. No change to the groundwater abstraction rate is being proposed.

The Proposal will require up to 381.7 ha of Disturbance Footprint (DF) within a 653.0 ha Development Envelope (DE) (Figure 1). This disturbance will consist of up to 43 ha of native vegetation clearing for the borrow pits and access roads. The crystallisers and flood levee will be constructed on the bare salt lake and therefore no vegetation clearing is required.



753000E

756000E

759000E

7305000N

7305000N

7302000N

7302000N

7299000N

7299000N

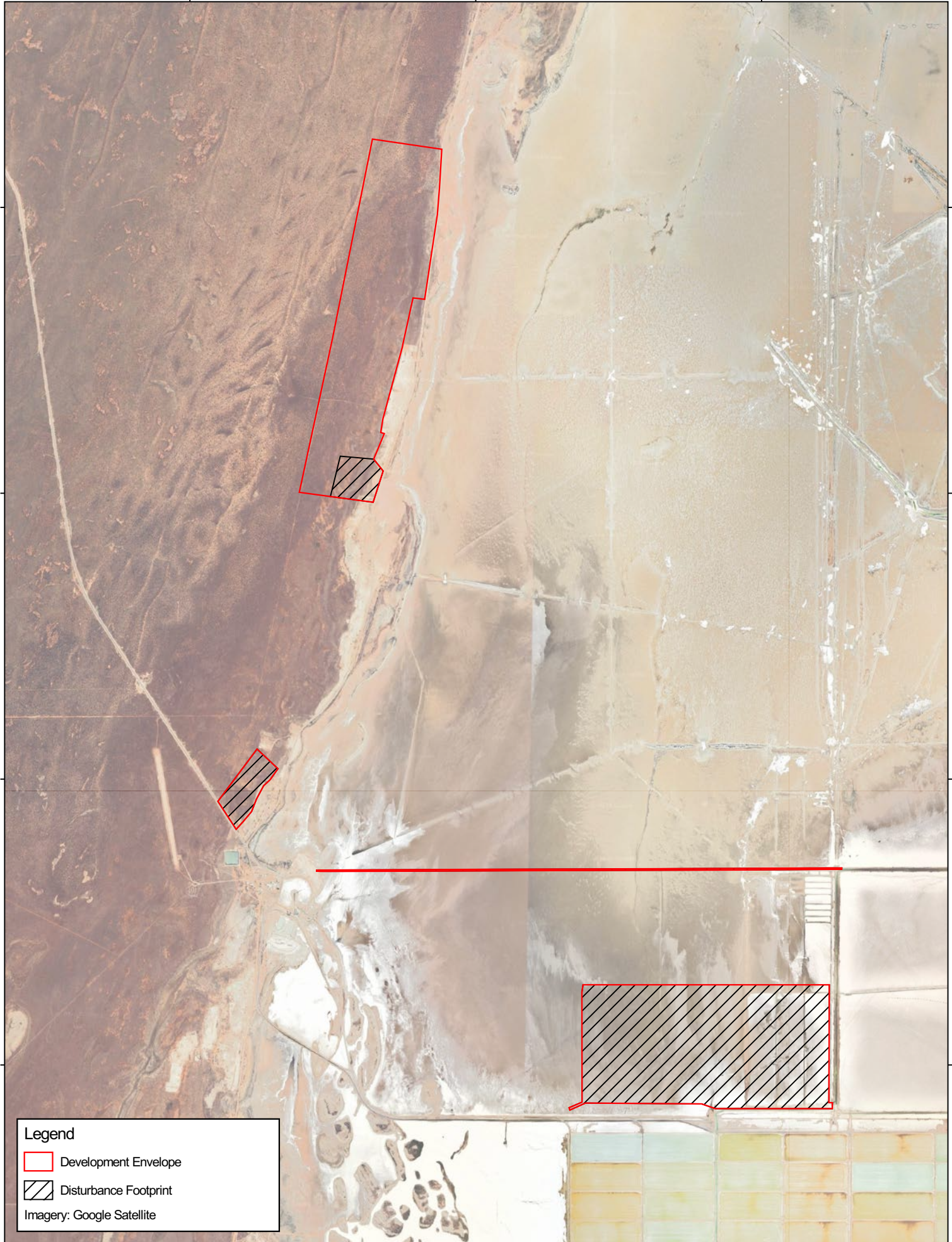
7296000N

7296000N


753000E

756000E

759000E



Legend

 Development Envelope

 Disturbance Footprint

Imagery: Google Satellite

0 0.8 1.6 km

GDA2020 / MGA zone 49

1:50,000



Project: 0659_LMS_018
Date: 20/02/2026
Size: A4
Author: ASmithers



Figure 1: Development Envelope and Disturbance footprint

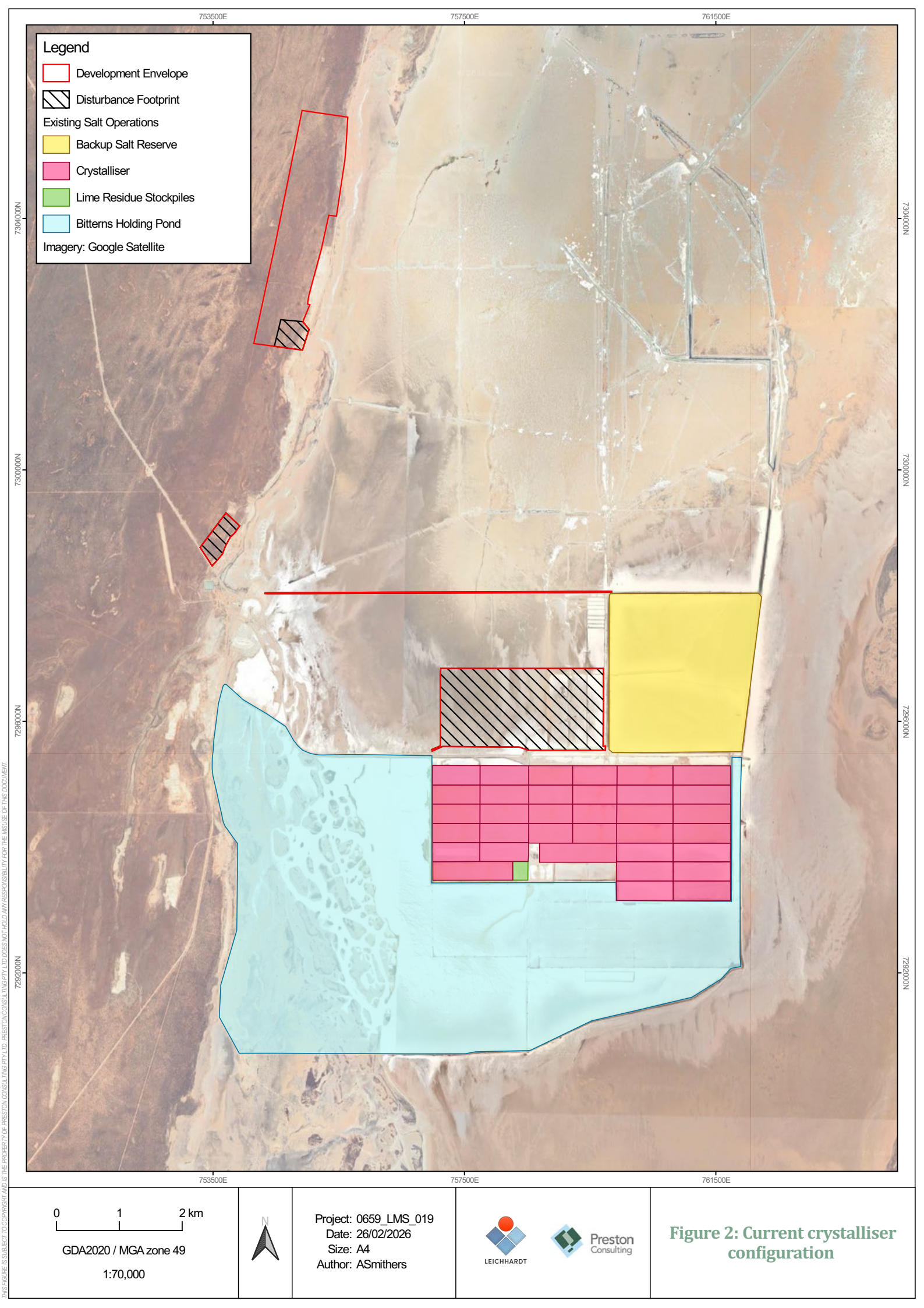
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1.1.1 DETAILED DESCRIPTION

Crystallisers

The Lake MacLeod Project crystalliser area currently contains 35 crystallisers (Figure 2) and the Proposal is proposing new crystallisers (Figure 3). The new crystallisers will be constructed and operated as a single series (batch process) crystalliser similar to the few larger existing crystallisers. Up to six crystallisers will be installed across an area of 330 ha (Figure 3). The bunds would be in the order of 1.2 m high, allowing for a salt floor and up to 600 mm of product salt.





Legend

- Development Envelope
- Disturbance Footprint
- Existing Salt Operations
- Backup Salt Reserve
- Crystalliser
- Lime Residue Stockpiles
- Bitterns Holding Pond
- Imagery: Google Satellite

0 1 2 km
 GDA2020 / MGA zone 49
 1:70,000



Project: 0659_LMS_019
 Date: 26/02/2026
 Size: A4
 Author: ASmithers



Figure 2: Current crystalliser configuration



LOCATION PLAN
SCALE 1 : 50,000



STORMWATER LEVEL
SCALE 1 : 10,000

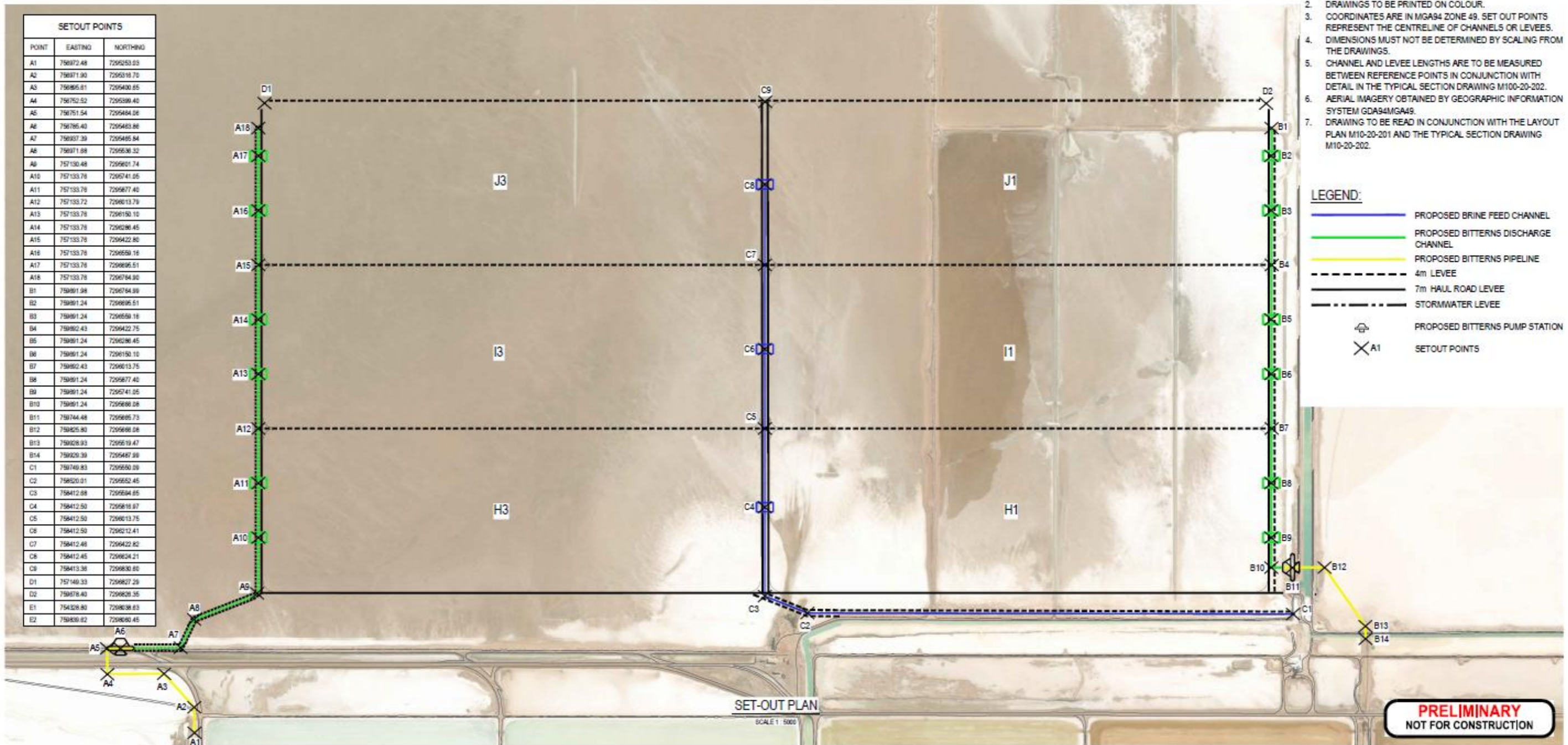
NOTES:

1. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
2. DRAWINGS TO BE PRINTED ON COLOUR.
3. COORDINATES ARE IN MGSA4 ZONE 49. SET OUT POINTS REPRESENT THE CENTRELINE OF CHANNELS OR LEVEES. DIMENSIONS MUST NOT BE DETERMINED BY SCALING FROM THE DRAWINGS.
4. CHANNEL AND LEVEE LENGTHS ARE TO BE MEASURED BETWEEN REFERENCE POINTS IN CONJUNCTION WITH DETAIL IN THE TYPICAL SECTION DRAWING M100-20-202.
5. AERIAL IMAGERY OBTAINED BY GEOGRAPHIC INFORMATION SYSTEM GDA94MGA49.
6. DRAWING TO BE READ IN CONJUNCTION WITH THE LAYOUT PLAN M10-20-201 AND THE TYPICAL SECTION DRAWING M10-20-202.

LEGEND:

- PROPOSED BRINE FEED CHANNEL
- PROPOSED BITTERNS DISCHARGE CHANNEL
- PROPOSED BITTERNS PIPELINE
- 4m LEVEE
- 7m HAUL ROAD LEVEE
- STORMWATER LEVEE
- PROPOSED BITTERNS PUMP STATION
- SETOUT POINTS

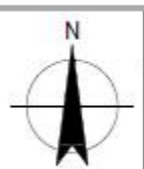
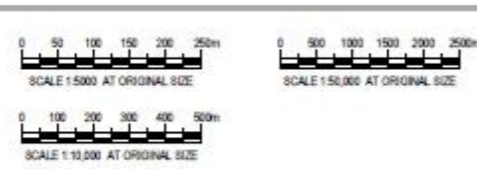
SETOUT POINTS		
POINT	EASTING	NORTHING
A1	756972.48	7295253.03
A2	756971.90	7295219.70
A3	756965.81	7295400.85
A4	756752.52	7295599.40
A5	756751.54	7295484.28
A6	756765.40	7295483.86
A7	756937.39	7295485.84
A8	756971.88	7295536.32
A9	757130.48	7296601.74
A10	757133.79	7295741.05
A11	757133.79	7296677.40
A12	757133.72	7296813.79
A13	757133.79	7296150.10
A14	757133.79	7296286.45
A15	757133.79	7296422.80
A16	757133.79	7296559.16
A17	757133.79	7296695.51
A18	757133.79	7296784.90
B1	756971.98	7296794.99
B2	756991.24	7296895.51
B3	756991.24	7296959.18
B4	756992.43	7296422.75
B5	756991.24	7296286.45
B6	756991.24	7296150.10
B7	756992.43	729613.75
B8	756991.24	7296677.40
B9	756991.24	7295741.05
B10	756991.24	7295688.28
B11	756744.48	7295685.73
B12	756925.80	7295688.28
B13	756928.93	7295619.47
B14	756929.39	7295487.98
C1	756749.83	7295650.59
C2	756920.01	7295652.45
C3	756412.88	7295594.85
C4	756412.50	7295818.87
C5	756412.50	729613.75
C6	756412.50	7296212.41
C7	756412.49	7296422.80
C8	756412.45	7296624.21
C9	756413.38	7296830.80
D1	757149.33	7296827.29
D2	756978.40	7296826.35
E1	754328.80	7296838.83
E2	756939.82	7296830.45



SET-OUT PLAN
SCALE 1 : 5000

PRELIMINARY
NOT FOR CONSTRUCTION

A ISSUED FOR 15% DESIGN		JN	JN	15.05.25
Rev	Description	Checked	Approved	Date
Author	J. CARRIO	Drafting Check	S. TULLY	
Designer	E. BARNES	Design Check	J. NELSON	



Client LEIGHARDT INDUSTRIALS
Project LAKE MACLEOD SALT EXPANSION
Status PRELIMINARY
Project No. 12545802

Drawing Title LAKE MACLEOD PROJECT SET OUT PLAN
Drawing No. M10-20-200
Rev A

Figure 3: Proposed Crystalliser and Flood Levee Layout

Flood Levees

The flood levee to the north of the salt operations is proposed to be extended further north so that it protects the new crystalliser field.

Approximately 525,000 m³ of material will be sourced from borrow areas to the west of the lake to construct the required levees (Figure 4). It is anticipated that all levee material can be sourced from these defined borrow areas and waste gypsum material.

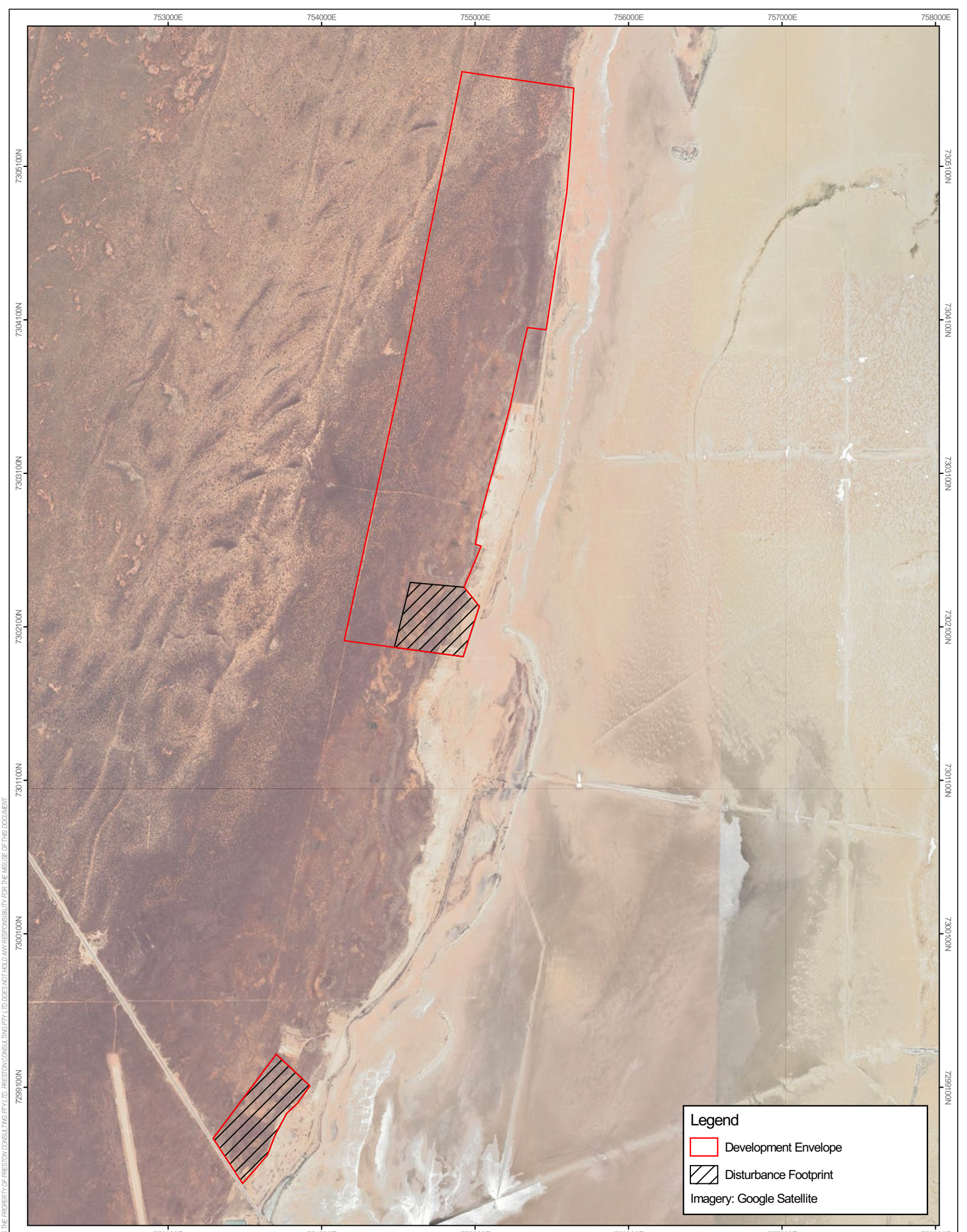
The general earthworks design will include:

- Internal levee height – set by the required freeboard above the 1.2 m diameter culverts. This will result in a levee height from pavement level on the internal cell side of 1.725 m and on the channel side, 2.325 m;
- Levees are proposed to be constructed from gravel from nearby borrow pits and/or waste gypsum material; and
- Levees on the outside of the new crystalliser system are proposed to be 4 m top width levees, as they will not be required for access for harvest vehicles to the cell pavements.

Borrow Pits

Two borrow pits are being proposed as part of the referral (Figure 4). The construction material required for the flood levee and the new crystallisers will be sourced from these pits. Up to 20 ha of disturbance is being proposed within the northern borrow pit and 23 ha within the southern borrow pit. Disturbance associated with the northern borrow pit is indicative and may vary slightly depending on whether the material in the proposed location is suitable.





Legend

- Development Envelope
- Disturbance Footprint

Imagery: Google Satellite

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0 0.5 1 km

GDA2020 / MGA zone 49

1:30,000



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 Author: ASmithers



Figure 4: Location of the borrow pits

1.2 PROPOSAL ALTERNATIVES

Table 1 provides an analysis of the alternatives considered in the development of the Proposal. Figure 5 illustrates the location options of potential crystalliser expansions.

Table 1: Proposal alternatives

Alternative	Discussion
Activity	LMPL has investigated various Proposal designs and operational methods. The Proposal presented in this ERD has considered technical and environmental risks and is the preferred feasible option.
Element	The Proposal will involve best practice methods for salt production in the region. Proposal elements have been strategically designed to reduce impacts on heritage sites and vegetation. As such any changes to the Proposal elements would result in increased impact to the surrounding environment.
Location	Five locations were originally considered for the Proposal, with two locations considered in detail.
No Development	The Proposal has been and will be subject to thorough feasibility studies to ensure that financial aspects are considered, and potential profits justify the capital and operational expenditure. Based on this outlook, LMPL predicts a strong demand for its product. The 'do nothing' approach to the Proposal represents a lost commercial opportunity to LMPL. Therefore the 'do nothing' approach is not considered appropriate.
Technology	The Proposal will utilise best practice technology where practicable.
Timeline	See "No Development"

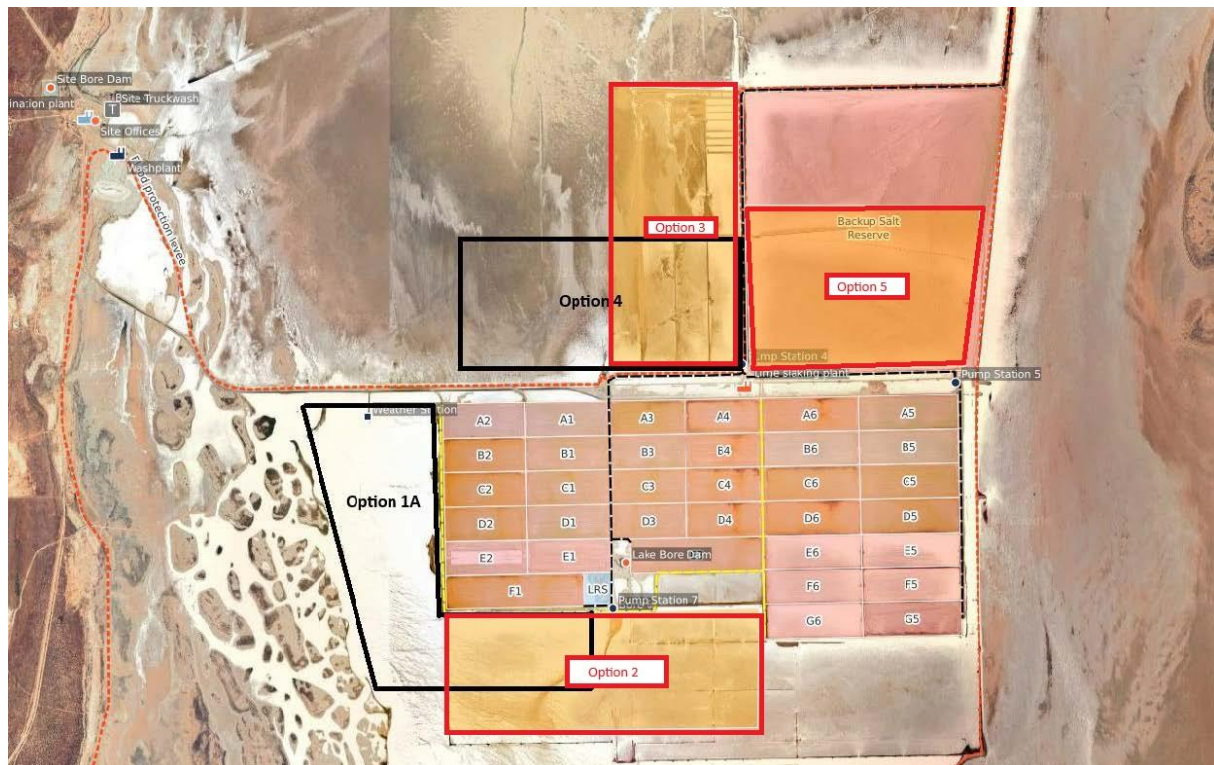


Figure 5: Options for the expansion of crystallisers



1.3 LOCAL AND REGIONAL CONTEXT

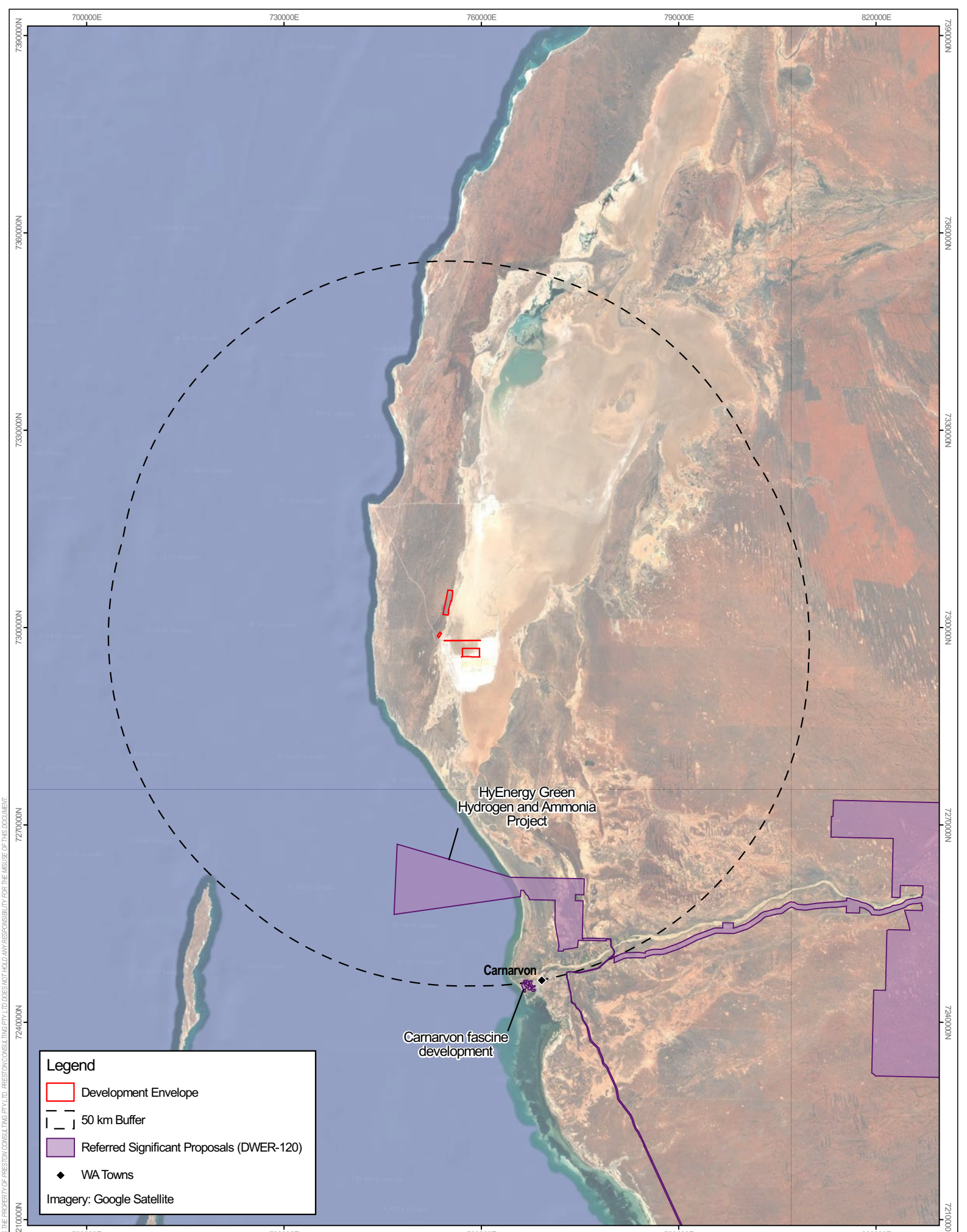
1.3.1 LAND USE AND OTHER DEVELOPMENTS

Lake MacLeod is a 1,500 km² marine salt lake and significant wetland in the Gascoyne region of Western Australia. The Proposal is located within the Shire of Carnarvon, and the nearest town is Carnarvon, which is located approximately 50 km south of the DE.

Currently, land use within the Proposal is predominately the salt lakebed comprised of salt mining and gypsum operations in the southern region of Lake MacLeod, which are serviced by a number of access roads and connected to the ship loading area at Cape Cuvier.

Apart from the existing Lake MacLeod Project, there is one proposed project within 50 km of the Proposal, the HyEnergy Green Hydrogen Project (Figure 6).





Legend

- Development Envelope
- 50 km Buffer
- Referred Significant Proposals (DWER-120)
- ◆ WA Towns

Imagery: Google Satellite

0 10 20 km

GDA2020 / MGA zone 49

1:700,000



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Figure 6: Projects in the surrounding area

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1.3.2 TENURE AND NATIVE TITLE DETERMINATIONS

The Proposal is located within the mining lease ML245SA granted under the *Evaporites (Lake MacLeod) Agreement Act 1967* (State Agreement), and miscellaneous licences granted under the *Mining Act 1978*.

The Proposal lies within the Yinggarda, Baiyungu and Thalanyji People Native Title Determination Area (WCD2019/016). The native title holders of the area are represented by the Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC) which holds the native title rights and interests of the Baiyungu People on trust. A Heritage Agreement was negotiated between LMPL and NTGAC to enable surveys to be conducted on previously unsurveyed areas of the project in September of 2025. Heritage surveys under the agreement were conducted on site from 6-11 November 2025 and did not find any Aboriginal Cultural Heritage (ACH) places or isolated artefacts and the work was cleared to proceed. LMPL will continue to follow the processes set out in the Heritage Agreement until such time that a revised heritage process through the Relationship Management Agreement (RMA) with the Baiyungu People is finalised and an agreed transition is in place. Engagement on the new RMA will be conducted with NTGAC.

1.3.3 ENVIRONMENTAL SETTING

Lake MacLeod is a large (188,145 ha) coastal salt lake connected to the Indian Ocean via subterranean seepage and has a range of widely recognised ecosystem values. The lake is currently listed in the Directory of Important Wetlands in Australia (Environment Australia, 2001) and is a proposed Ramsar site (Department of Environment and Conservation, 2009).

The permanent saline water is maintained by subterranean connection to the Indian Ocean, with the northern end forming the area known as the Northern Ponds. The Northern Ponds is a permanent wetland system, covering an area of approximately 6,000 ha (2.5% of the lake), and is comprised of two distinct lakes; Cygnet and Ibis Ponds. These wetlands support the largest inland mangrove population of *Avicennia marina* and provide an important refuge for migratory birds (Halse et al., 2000). The Northern Ponds are located approximately 38 km from the DE.

In contrast, the southern part of the lake tends to remain dry, and there is little information available on the significance of this area as aquatic habitat (Outback Ecology, 2009).

Freshwater enters Lake MacLeod from the catchments of the Lyndon River, Cardabia Creek, Minilya River, Gascoyne River and Boolathana Creek following substantial rainfall. Flooding from the Gascoyne River in particular can lead to extensive inundation of Lake MacLeod, which on average occurs approximately one year in six (Logan, 2003).

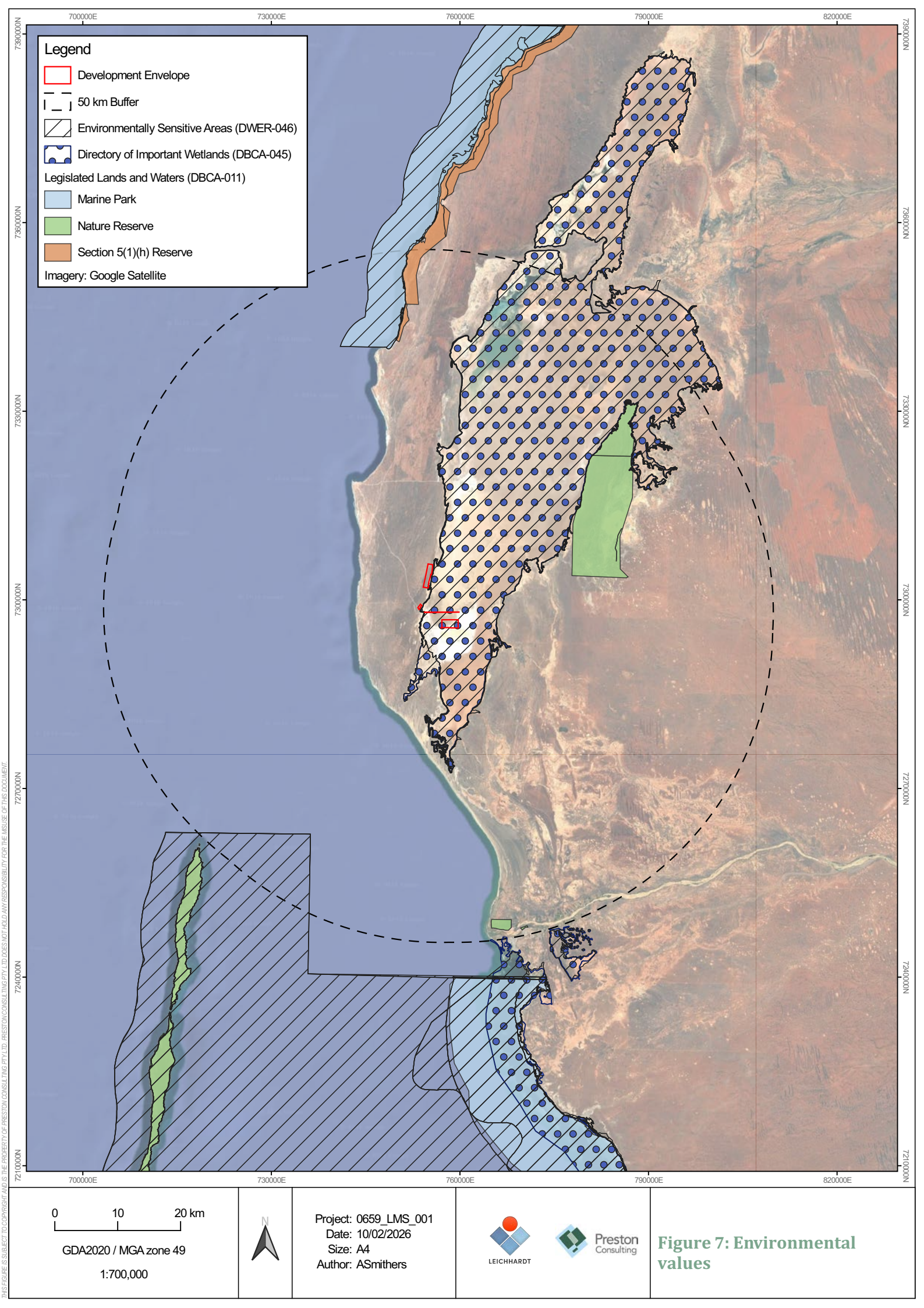
Other managed lands within 50 km of the Proposal are presented in Table 2. Environmental values are shown in Figure 7.



Table 2: Managed land within 50 km of the Proposal

Classification	Name	Proximity to DE
Legislated Lands and Waters		
Nature Reserve	Boologooro Nature Reserve	19 km
Nature Reserve	Chinamans Pool Nature Reserve	49 km
LA Act Marine Reserve	Ningaloo Marine Park	35 km
Section 5(1)(h) Reserve	Nynggulu (Ningaloo) Coastal Reserves	36 km
Nature Reserve	One Tree Point Nature Reserve	47 km
Environmentally Sensitive Areas		
Important Wetlands of Australia	Lake MacLeod	0 km
World Heritage Property	Ningaloo Marine Park	35 km
Register of the National Estate and World Heritage Property	Marine Park/Nature Reserve	39 km
Directory of Important Wetlands		
N/A	Lake MacLeod	0 km
N/A	Shark Bay East	49 km





Legend

- Development Envelope
- 50 km Buffer
- Environmentally Sensitive Areas (DWER-046)
- Directory of Important Wetlands (DBCA-045)
- Legislated Lands and Waters (DBCA-011)
- Marine Park
- Nature Reserve
- Section 5(1)(h) Reserve

Imagery: Google Satellite

0 10 20 km

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Figure 7: Environmental values

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2 STAKEHOLDER ENGAGEMENT

The Commonwealth Government, WA Government, Local Government, community groups, Traditional Owners, nearby mining companies and landowners are considered key stakeholders for the Proposal.

The following stakeholders have been or will be consulted with regarding the Proposal:

State Government:

- Department of Mines, Petroleum and Exploration (DMPE);
- Department of Water and Environmental Regulation (DWER);
- Department of Energy and Economic Diversification (DEED); and
- Environmental Protection Authority (EPA).

Local Government:

- Shire of Carnarvon.

Other:

- Nganhurra Thanardi Garrbu Aboriginal Corporation (NTGAC);
- Yamatji Marrlpa Aboriginal Corporation (YMAC); and
- Quobba Station.

2.1 STAKEHOLDER ENGAGEMENT PROCESS

LMPL has a consultation strategy which identifies key external stakeholders and is proactively engaging with these stakeholders regarding the potential implementation and resulting impacts of the Proposal. The strategy includes consultation to secure the statutory approvals necessary for the construction and operation of the Proposal.

LMPL has consulted with NTGAC/YMAC, as well as relevant Local and State Government stakeholders. LMPL has held pre-referral meetings with DWER and DMPE regarding the Proposal, and feedback has been incorporated into this ERD where applicable.

2.2 STAKEHOLDER CONSULTATION OUTCOMES

LMPL has a Stakeholder Consultation Register which maintains records of all consultation. The Register summarises key issues raised by stakeholders during the consultation process and describes how LMPL has responded to those issues. A copy of the register can be found in Appendix 4.

Further information regarding consultation with the Traditional Owners has been provided in Section 6.



3 FLORA AND VEGETATION

3.1 EPA ENVIRONMENTAL FACTOR AND OBJECTIVES

The EPA Objective for this Key Environmental Factor is to protect flora and vegetation so that biological diversity and ecological integrity are maintained.

3.2 RELEVANT POLICY AND GUIDANCE

Relevant State and Commonwealth Government guidance documents for flora and vegetation are summarised in Table 3.

Table 3: Policy and guidance relevant to the Flora and Vegetation Key Environmental Factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of Environmental Impact Assessment (EIA; EPA, 2023b)	This document was considered in the preparation of this ERD and to inform EIA.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document was considered in the preparation of this ERD and to inform EIA
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document was considered in the preparation of this ERD and to inform EIA
Instructions on how to prepare an Environmental Review Document (EPA, 2025a)	This document was considered in the preparation of this ERD and to inform EIA
EIA Practice Guide (EPA, 2025b)	This document was considered in the preparation of this ERD and to inform EIA
Relevant EPA Factor Guidelines	
Environmental Factor Guideline - Flora and Vegetation (EPA, 2016a)	This document was considered in the preparation of this section (Section 4) of the ERD.
Relevant EPA Technical Guidance	
Technical Guidance – Flora and Vegetation Surveys for EIA (EPA, 2016b)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced throughout the Flora and Vegetation report for the Proposal.
Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems (EPA, 2006)	This document has been considered in the design and planning of the Proposal, it has also been considered in the preparation of mitigation measures for the Proposal.
Other Policy and Guidance	
Guideline for preparing Mining Development and Closure Proposals (DMPE, 2025a)	This document has been considered in the design and planning of the Proposal, it has also been considered in the preparation of mitigation measures for the Proposal.
<i>Biosecurity and Agriculture Management Act 2007</i> (BAM Act)	This document was considered during the assessment of weeds recorded in the Survey Area.
Conservation Advice for Subtropical and Temperate Coastal Saltmarsh (DCCEEW, 2025)	This document was considered during the assessment of Threatened Ecological Communities (TECs) in the areas surrounding the Survey Area.



3.3 RECEIVING ENVIRONMENT

Information within this section has been sourced from the Reconnaissance Flora & Vegetation Survey/Basic Vertebrate Fauna Survey (Onshore Environmental, 2025; Appendix 5.1), undertaken for the Proposal.

3.3.1 SURVEYS AND STUDIES

A reconnaissance flora and vegetation survey was conducted by Onshore Environmental Consultants Pty Ltd (Onshore Environmental) for the Proposal. The purpose of the survey was to delineate key flora values for the Proposal to inform the environmental assessment and approvals process, as well as provide context for the preparation of EIA documentation. The field survey was completed by a Principal Botanist, Principal Ecologist and Ecologist from Onshore Environmental over six days in May 2025. A total of six survey areas were searched surrounding the Proposal.

The crystalliser and the flood levee were not surveyed as these areas occur within an unvegetated portion of the salt lake. All vegetation mapping is in relation to the two borrow pits.

Desktop Assessment

A desktop assessment of relevant databases, literature and spatial data preceded the field assessments to:

- Produce a species list that represents the likely flora assembly of the Survey Area;
- Identify the possible occurrence of threatened and priority flora; and
- Identify the possible occurrence of Threatened Ecological Communities (TEC) and Priority Ecological Communities (PEC).

The databases and literature used to inform the objectives of the desktop assessment were:

- DBCA Threatened and Priority Flora Database;
- DBCA TEC/PEC and Environmentally Sensitive Areas database;
- Atlas of Living Australia (ALA) database;
- DCCEEW (2025) Protected Matters Search Tool;
- International Union for Conservation of Nature database; and
- Previous studies and scientific literature.

Field Assessment

The field survey was conducted between 13 - 18 May 2025 in the Survey Area shown in Figure 8 (Survey Area). The field survey involved opportunistic sampling using relevé sites to confirm vegetation type boundaries and provide site descriptions for points of interest. The Survey Area was ground-truthed at approximately 250 m intervals to describe and map vegetation types, vegetation condition, and identify opportunistic records of significant flora species.



Relevés, vegetation notes, and opportunistic collections

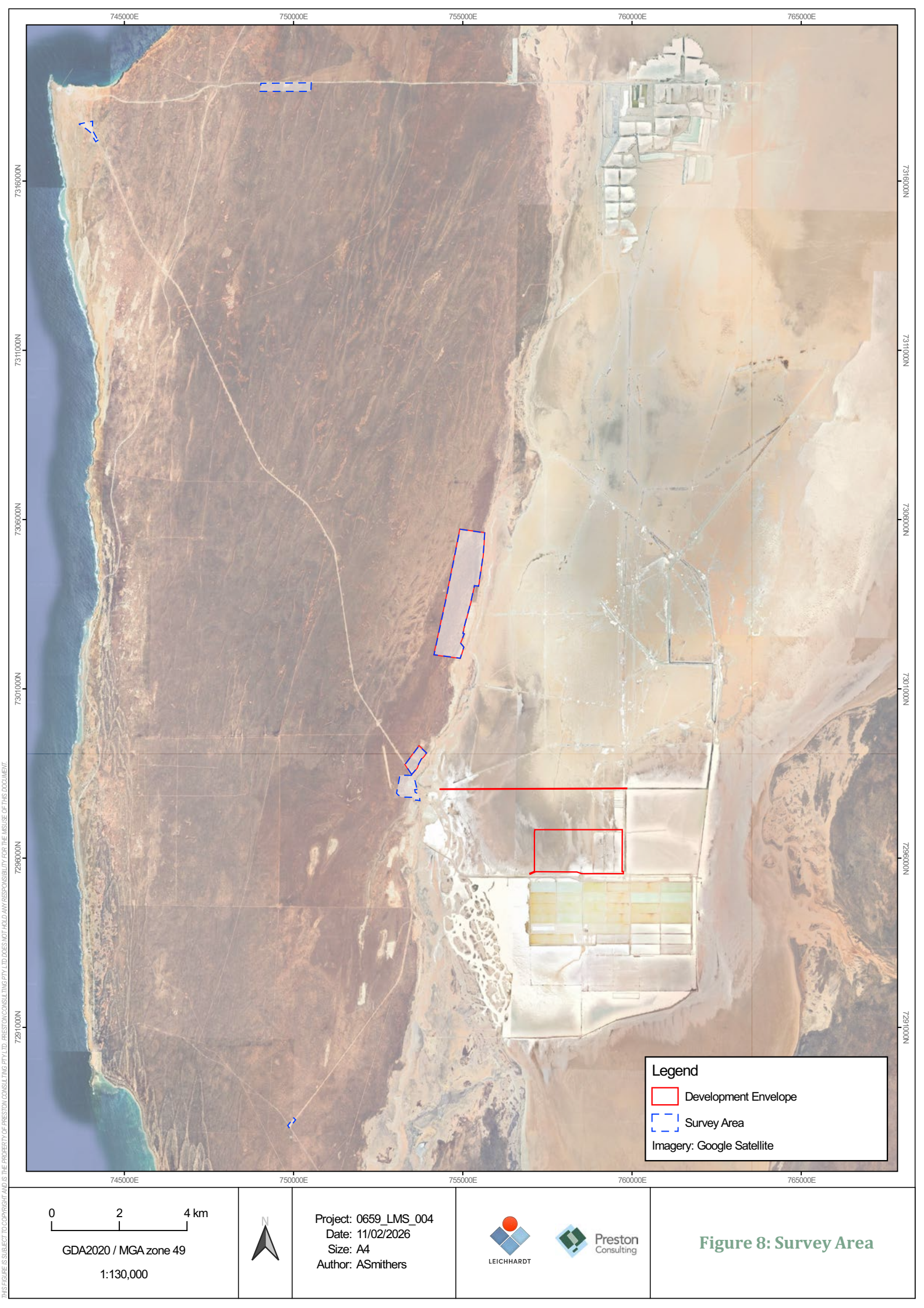
The classification of vegetation types within the Survey Area follows the height, life form and density classes of Aplin. Vegetation type mapping utilised high-resolution aerial photography at a scale of 1:5,000, with definition of vegetation polygons based on contrasting shading patterns. Ground-truthing of the Survey Area was completed during the field survey to confirm vegetation polygons and boundaries.

Where ground-truthing revealed new vegetation types not observable from a prior analysis of aerial photography, these were described and demarcated accordingly. The field survey also provided vegetation descriptions for selected vegetation polygons to confirm dominant structural layers and associated plant taxa. Relevé points were overlaid on aerial photography and associated flora, and vegetation data was used to update vegetation type descriptions for the individual polygons. Vegetation condition was determined using a recognised rating scale based on Keighery (1994).

Targeted Searches

Targeted searches for significant flora were completed in areas based on habitat preference (according to the database searches) and from previous knowledge of the local flora, vegetation and habitats. Habitats likely to support significant species were intensively targeted during the field survey.





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Alignment with Technical Guidance

Onshore Environmental designed and implemented field assessments based on the relevant State legislation and guidelines, as well as EPA technical guidance. Further detail on survey limitations is provided in Onshore Environmental (2025; Appendix 5.1).

Table 4: Flora and vegetation survey limitations

Potential Survey Limitation	Impact on Survey
Availability of contextual information at a regional and local scale	Not a limitation. The Survey Area occurs within the Wooramel subregion. There are a number of publicly available flora and vegetation survey reports completed within the area and these provide an excellent local database.
Competency/experience of the team carrying out the survey, including experience in bioregion surveyed	Not a limitation. The Principal Botanist working on the survey (Dr Jerome Bull) has more than 20 years' experience working in the region and across Western Australia.
Proportion of flora recorded and/or collected, any identification issues	Limitation. The targeted flora survey was undertaken during May 2025 within the recommended survey period for the Eremaean Botanical Province. However the survey was conducted under dry seasonal conditions and as a result, much of the annual and ephemeral flora component was absent, reducing the proportion of total flora recorded.
Was the appropriate area fully surveyed (effort and extent)	Not a limitation. A Principal Botanist, Principal Ecologist and Ecologist spent six days covering the entire Survey Area searching for conservation significant flora species and mapping vegetation types.
Access restrictions within the Survey Area	Not a limitation. The Survey Area was accessed on foot, noting that vegetation mapping was facilitated by high-resolution aerial photography. Access did not pose any restrictions to undertaking the field survey.
Survey timing, rainfall, season of survey	Limitation. The targeted flora survey was undertaken during May 2025 within the recommended survey period for the Eremaean Botanical Province. However the survey was conducted under dry seasonal conditions and as a result, much of the annual and ephemeral flora component was absent, reducing the proportion of total flora recorded.
Disturbances that may have affected the results of the survey (e.g. fire, flooding, clearing)	Not a limitation. There were no disturbances recorded within the Survey Area that influenced survey outcomes. Disturbances included grazing, presence of weeds, infrastructure roads and tracks. Disturbances did not impact on the ability to complete the field survey.

3.3.2 EXISTING ENVIRONMENT

Biogeographic Regions

The Interim Biogeographic Regionalisation for Australia (IBRA) describes a system of 89 “biogeographic regions” (bioregions) and 419 subregions covering the entire Australian continent (IBRA7). Bioregions are defined on the basis of climate, geology, landforms, vegetation and fauna. The DE occurs in the Wooramel subregion of the Carnarvon Bioregion.

The Carnarvon Bioregion covers 83,747 km² of gently undulating landscape supporting vegetation of *Acacia* shrublands and saltbush/bluebush (ACRIS Management Committee and Bastin, 2008). The Wooramel subregion covers the alluvial plains of the Gascoyne, Minilya and Wooramel Rivers and includes Lake MacLeod and the Kennedy Range (Desmond & Chant, 2001) (Figure 9). Coastal areas of the bioregion are described as “saline alluvial plains with samphire and saltbush low shrublands”.



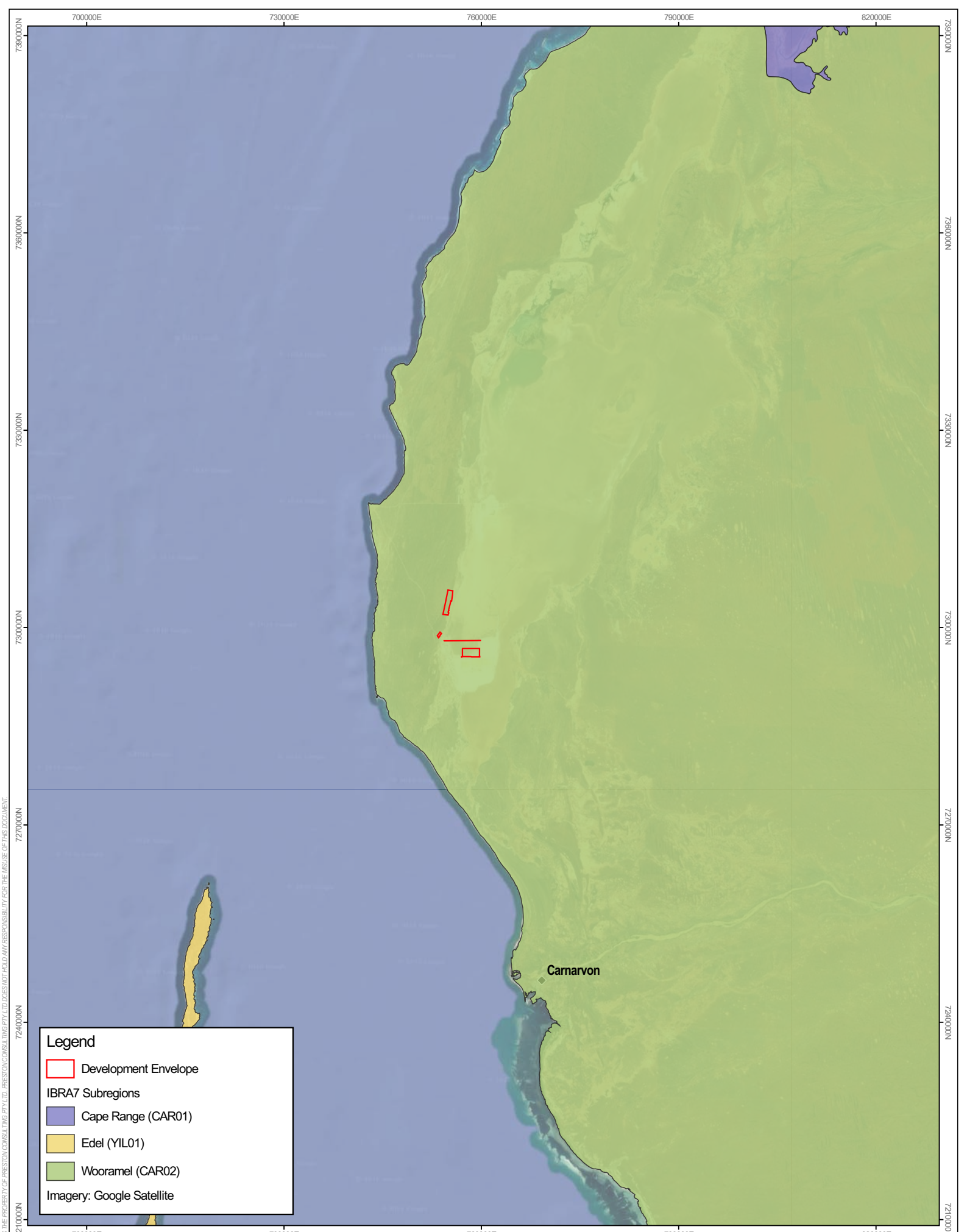
Land Systems

The land systems of the Gascoyne region are classified according to similarities in landform, soil, vegetation, geology, and geomorphology. Local rangeland surveys cover the Gascoyne and Carnarvon Basins. Three land systems intersected the DE broadly associated with sandy plains (Cardabia land systems) and saline plains (MacLeod and Warroora land systems) (Table 5; Figure 10).

Table 5: Land systems of the Proposal

System	Description	Total continuous area	Extent within DE
Cardabia	Undulating sandy plains with linear dunes, minor limestone plains and low rises, supporting mainly soft spinifex hummock grasslands with scattered acacias and other shrubs.	55,243.9 ha	147.1 ha
MacLeod	Broad saline plains, with sandy banks and low rises above saline slopes and bare mudflats; bare surfaces and low shrublands of samphire and saltbush.	9,302.2 ha	342.6 ha
Warroora	Flat to gently sloping saline alluvial plains, with minor areas of sand and limestone, supporting tall acacia shrublands and low shrublands of saltbush, bluebush and samphire.	2,526.6 ha	163.2 ha





Legend

- Development Envelope
- IBRA7 Subregions
- Cape Range (CAR01)
- Edel (YIL01)
- Wooramel (CAR02)
- Imagery: Google Satellite

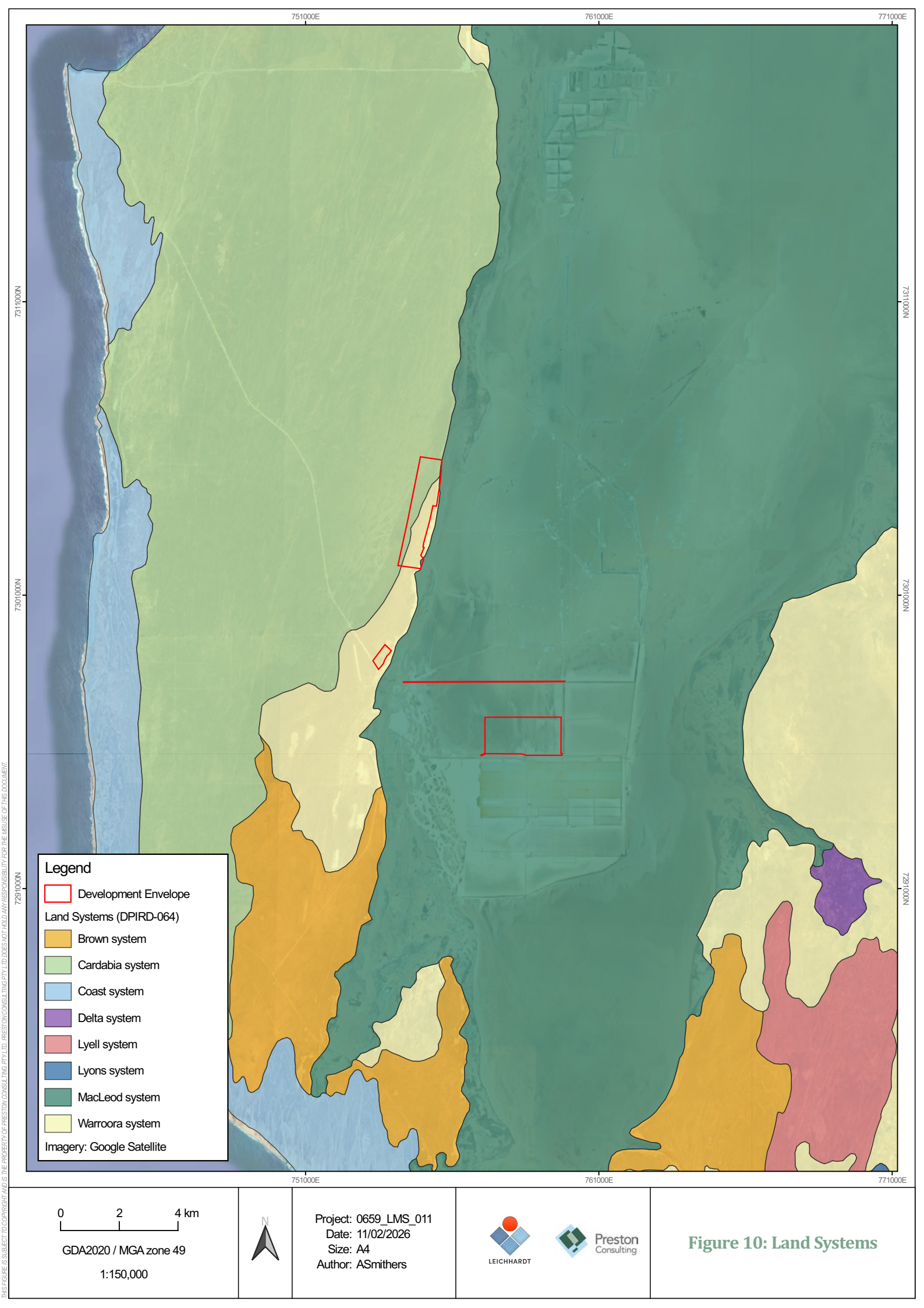
0 10 20 km
 GDA2020 / MGA zone 49
 1:700,000



Project: 0659_LMS_001
 Date: 11/02/2026
 Size: A4
 Author: ASmithers



Figure 9: IBRA subregions



Flora

Significant Flora

No Threatened flora listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Biodiversity Conservation Act 2016* (BC Act) were identified within the 40 km search radius. The desktop review identified 29 significant flora that may potentially occur within the Survey Area, all of which were Priority Flora species.

One Priority flora species was confirmed to have previously been recorded within the Survey Area (outside of the DE), five species were considered likely to occur, four species may possibly occur, and 19 species were considered unlikely to occur. Priority taxa that were considered possible to occur or higher are detailed in Table 6.

Two Priority flora, one range extension and one species of interest were recorded within the Survey Area (Figure 11), however all of these records were in the northern portions of the Survey Area, more than 10 km from the Proposal:

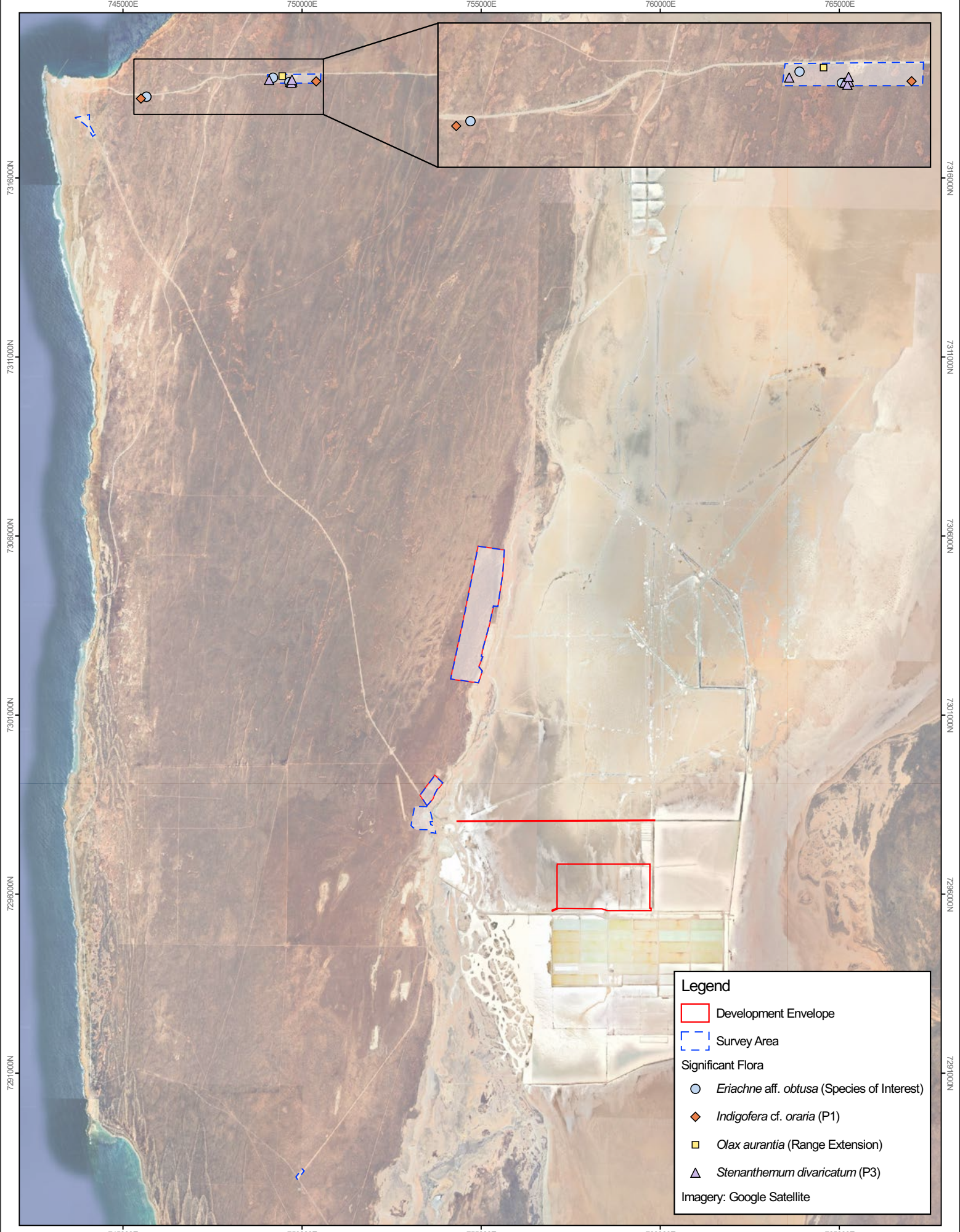
- *Indigofera cf. oraria* (Priority 1 (P1) and range extension);
- *Stenanthemum divaricatum* (Priority 3 (P3));
- *Olox aurantia* (range extension); and
- *Eriachne aff. obtusa* (species of interest).

No Threatened or Priority Flora listed under the EPBC Act and/or BC Act were recorded within the DE.

Table 6: Priority flora potentially occurring within the Survey Area

Species	Likelihood of Occurrence
Priority 1	
<i>Indigofera cf. oraria</i>	Confirmed
<i>Swainsona ecallosa</i>	Possible
Priority 2	
<i>Abutilon sp. Quobba</i> (H. Demarz 3858)	Likely
<i>Acacia ryaniana</i>	Likely
Priority 3	
<i>Abutilon sp. Pritzelianum</i> (S. van Leeuwen 5095)	Possible
<i>Chthonocephalus spathulatus</i>	Possible
<i>Lepidium biplicatum</i>	Possible
<i>Lysiandra fuernrohrii</i>	Likely
<i>Ptilotus alexandri</i>	Likely
<i>Stackhousia clementii</i>	Likely
<i>Stenanthemum divaricatum</i>	Confirmed





Legend

- Development Envelope
- Survey Area

Significant Flora

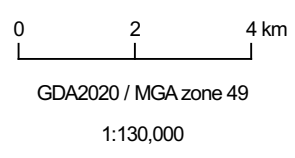
- *Eriachne* aff. *obtus* (Species of Interest)
- ◇ *Indigofera* cf. *oraria* (P1)
- *Olax aurantia* (Range Extension)
- △ *Stenanthemum divaricatum* (P3)

Imagery: Google Satellite

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 Date: 10/02/2026
 Size: A4
 Author: ASmithers



Figure 11: Significant flora recorded at the Proposal by Onshore Environmental (2025)

Introduced Species

Five introduced flora taxa (weeds) were recorded. One weed species recorded is listed a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act); *Tamarix aphylla* (Athel Tree). This species is widely planted as a shade tree in dry areas. It was present as planted trees around mine infrastructure at the administration area. The diversity of weed species would likely be higher under good seasonal conditions following rainfall.

Vegetation

Regional Native Vegetation Extent

Native vegetation within 10, 50 and 100 km of the DE was mapped using DPIRD's Native Vegetation Dataset and is shown in Table 7. The extent of native vegetation surrounding the DE is shown in Figure 12.

Table 7: Native vegetation surrounding the Proposal

Radius (km)	Area of native vegetation remaining (ha)	% of native vegetation remaining
DE	540.1	83
10	57,527.7	93
15	99,271.4	87
20	141,484.6	77

Vegetation Associations

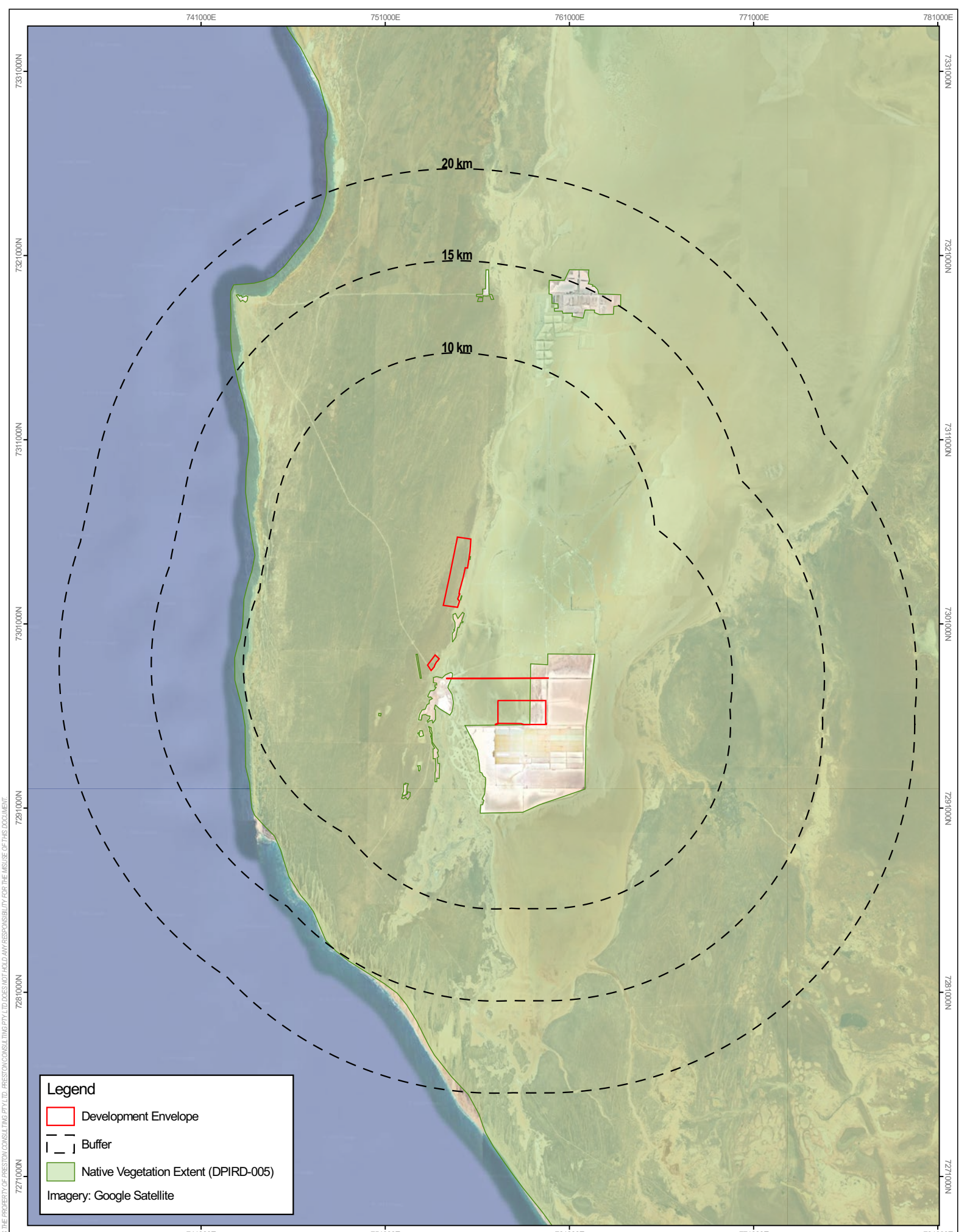
The Survey Areas are comprised of three vegetation associations which are shown in Figure 13 and detailed in Table 8 and are based on the Pre-European Vegetation (DPIRD, 2019) dataset and the Native Vegetation Extent dataset (DPIRD, 2025).

Table 8: Vegetation Associations of the Proposal

Vegetation Association	Description	State-wide Pre-European Extent (ha)	Current extent (ha)	% Remaining	Extent within DE (ha)
95	Hummock grasslands, shrub steppe; acacia and grevillea over <i>Triodia basedowii</i>	1,224,626.6	1,223,593.7	99.9	95.0
125	Salt lake, lagoon, clay pan	3,485,785.5	3,146,487.2	90.0	339.0
328	Succulent steppe with scrub; waterwood and <i>Acacia sclerosperma</i> over saltbush samphire	10,236.9	9,954.7	97.2	219.0

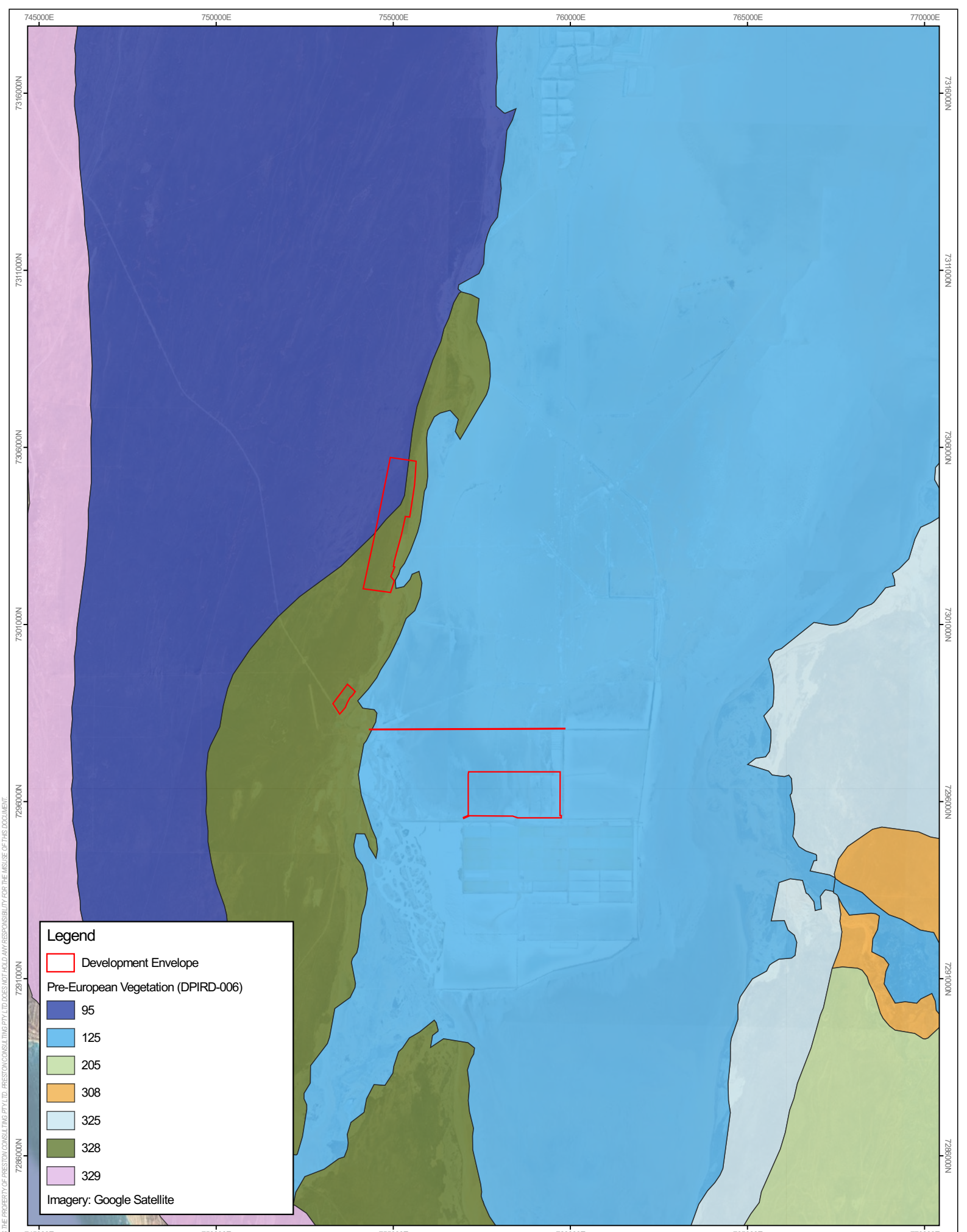
All vegetation associations were determined to be well represented at all levels, state-wide, bioregional (IBRA region and IBRA sub-region), and local government authority, with >96% of the pre-European extent remaining. However, vegetation associations were determined not to be well reserved with none of the current extent occurring within formal reserves at the IBRA level and Local Government level. At the state level vegetation association 95 has 1.5% of its current extent reserved.





<p>0 4 8 km</p> <p>GDA2020 / MGA zone 49</p> <p>1:250,000</p>		<p>Project: 0659_LMS_007</p> <p>Date: 10/02/2026</p> <p>Size: A4</p> <p>Author: ASmithers</p>		<p>Figure 12: Native vegetation surrounding the Proposal</p>
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Legend

- Development Envelope
- Pre-European Vegetation (DPIRD-006)**
- 95
- 125
- 205
- 308
- 325
- 328
- 329

Imagery: Google Satellite

0 2 4 km
 GDA2020 / MGA zone 49
 1:130,000



Project: 0659_LMS_006
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 Size: A4
 Author: ASmithers



Figure 13: Vegetation Associations

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Vegetation Communities

No TECs or PECs were identified within the DE. Three PECs were identified within the 40 km search radius of the Survey Area (Figure 14):

- Lyell Land System (P3): sandplains with reticulate dunes and saline interdunal plains with *Acacia* shrublands and saltbush;
- Lake MacLeod invertebrate assemblages (Priority 4 (P4)): saline aquatic community comprised of a rich birrida community with strong marine and terrestrial components; and
- Barrabiddy Land System (P3): flood plains and broad channelled drainage zones with shallow acacia shrublands, saltbush and tussock grasses.

Onshore Environmental (2025) recorded 13 vegetation types within the DE (Figure 15 and Figure 16). Four broad landform types were present including calcrete outcrops/plains, drainage areas/floodplains, low undulating hills and hillslopes, sandy/stony plains and sand dunes, and saltmarshes. Vegetation types associated with sandy/stony plains and sand dunes were the most commonly occurring vegetation types (Table 9).

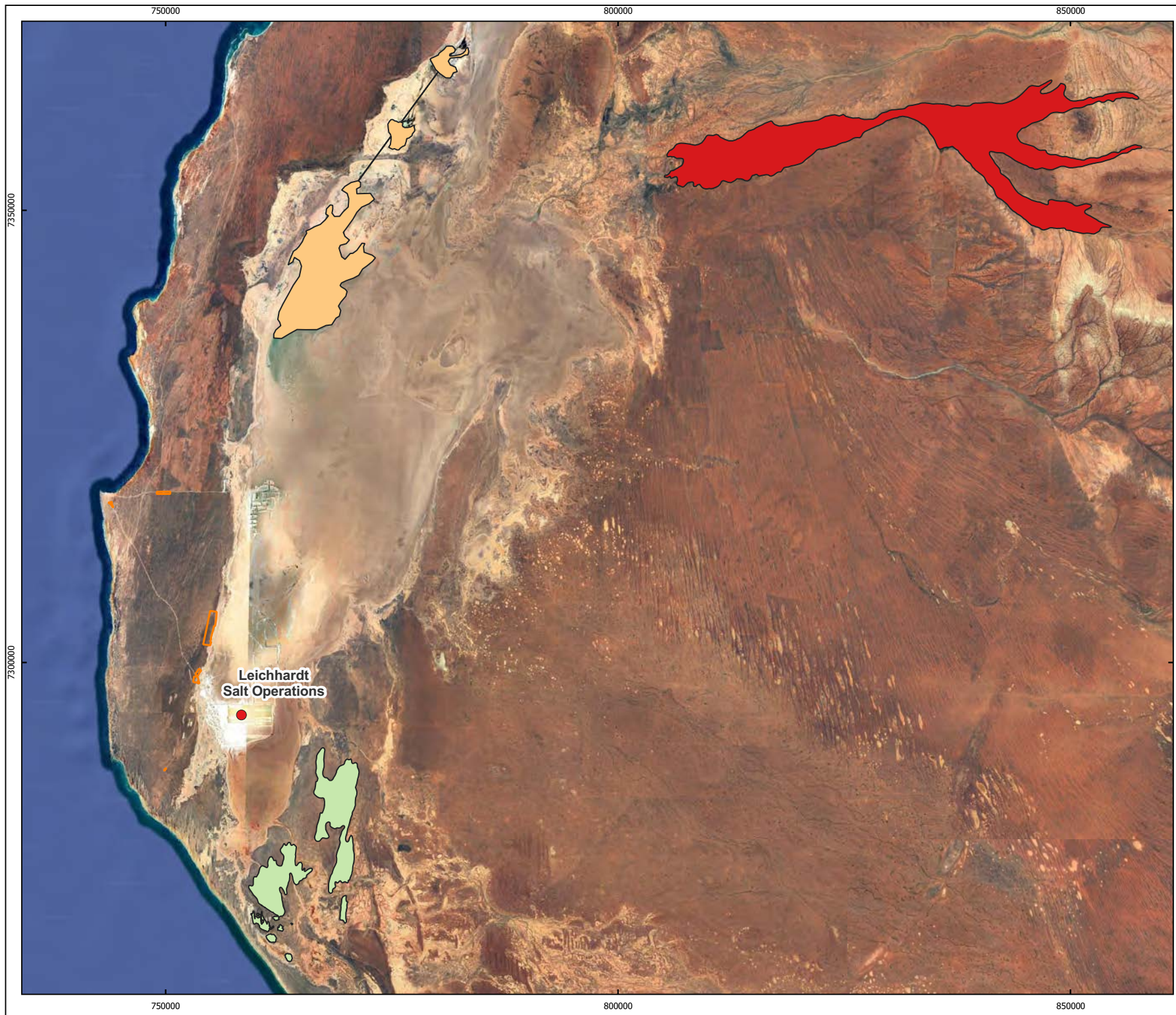
While the EPBC Act Protected Matters Search indicated that TEC may occur within a 40 km radius of the Survey Area, none of the recorded vegetation met key diagnostic characteristics of the community as described in the Conservation Advice and therefore no vegetation type was considered to be a TEC.



Table 9: Vegetation types

Code	Description	Extent within Survey Area	Extent within DE	Extent with DF
CA AbFp Cc	Low Heath D of <i>Atriplex bunburyana</i> , <i>Atriplex paludosa</i> subsp. <i>baudinii</i> and <i>Frankenia pauciflora</i> (with <i>Threlkeldia diffusa</i> , <i>Ptilotus obovatus</i> and <i>Dissocarpus paradoxus</i>) over Very Open Low Grass of <i>Cenchrus ciliaris</i> in brown silty loam and sandy loam on limestone outcrops.	45.6	35.9	18.4
CA AsyRll PoElTd	Scattered Shrubs of <i>Acacia synchronicia</i> (with <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i>) over Scattered Low Shrubs of <i>Acacia synchronicia</i> and <i>Rhagodia latifolia</i> subsp. <i>latifolia</i> over Open Dwarf Scrub D of <i>Ptilotus obovatus</i> , <i>Eremophila</i> cf. <i>latrobei</i> and <i>Sclerolaena recurvicauspis</i> over Low Grass of <i>Cenchrus ciliaris</i> in brown sandy loam on limestone plain.	37.5	37.5	3.4
CA FpPoAs Cc	Open Dwarf Scrub C of <i>Rhagodia latifolia</i> subsp. <i>latifolia</i> and <i>Atriplex bunburyana</i> over Dwarf Scrub D of <i>Frankenia pauciflora</i> , <i>Ptilotus obovatus</i> , <i>Atriplex semilunaris</i> (with <i>Solanum lasiophyllum</i> , <i>Dissocarpus paradoxus</i> and <i>Sclerolaena recurvicauspis</i>) over Open Low Grass of <i>Cenchrus ciliaris</i> over Very Open Herbs of <i>Asphodelus fistulosus</i> and <i>Mesembryanthemum crystallinum</i> in orange sandy loam on limestone plain.	17.8	4.9	4.9
SA CocPoSs Te	Open Scrub (to Scrub) of <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Acacia tetragonophylla</i> and <i>Alectryon oleifolius</i> subsp. <i>oleifolius</i> over Open Low Scrub A of <i>Rhagodia preissii</i> subsp. <i>obovata</i> and <i>Exocarpos aphyllus</i> over Dwarf Scrub D of <i>Corchorus crozophorifolius</i> , <i>Ptilotus obovatus</i> and <i>Stylobasium spathulatum</i> (with <i>Dipteracanthus australasicus</i> subsp. <i>corynothecus</i> , <i>Eremophila</i> cf. <i>latrobei</i> and <i>Thryptomene dampieri</i> subsp. <i>dampieri</i>) over Mid-Dense Hummock Grass of <i>Triodia epactia</i> over Very Open Low Grass of <i>Cenchrus ciliaris</i> in pink loamy sand on undulating sand plain.	32.2	32.2	0
SA RpoRllPm PoSlFp	Scrub to Open Scrub of <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Acacia tetragonophylla</i> and <i>Alectryon oleifolius</i> subsp. <i>oleifolius</i> over Low Scrub A to Open Low Scrub A of <i>Rhagodia preissii</i> subsp. <i>obovata</i> , <i>Rhagodia latifolia</i> subsp. <i>latifolia</i> and <i>Pimelea microcephala</i> over Dwarf Scrub D of <i>Ptilotus obovatus</i> , <i>Solanum lasiophyllum</i> and <i>Frankenia pauciflora</i> (with <i>Ptilotus divaricatus</i> , <i>Stylobasium spathulatum</i> and <i>Corchorus crozophorifolius</i>) over Open Low Grass of <i>Cenchrus ciliaris</i> over Very Open Herbs of <i>Asphodelus fistulosus</i> in orange or cream brown sand on sand plain.	110.9	109.6	2.4
SD CocTddSs Te	Open Scrub of <i>Acacia coriacea</i> subsp. <i>coriacea</i> , <i>Banksia ashbyi</i> and <i>Acacia tetragonophylla</i> over Open Low Scrub A of <i>Alectryon oleifolius</i> subsp. <i>oleifolius</i> , <i>Rhagodia preissii</i> subsp. <i>obovata</i> and <i>Exocarpos aphyllus</i> (with <i>Banksia ashbyi</i>) over Dwarf Scrub D of <i>Corchorus crozophorifolius</i> , <i>Thryptomene dampieri</i> subsp. <i>dampieri</i> and <i>Stylobasium spathulatum</i> over Hummock Grass of <i>Triodia epactia</i> over Very Open Low Grass of <i>Cenchrus ciliaris</i> and <i>Eragrostis eriopoda</i> in light pink sand on sand dune.	2.7	2.7	0
SM Th Sv	Low Heath D of <i>Tecticornia</i> cf. <i>halocnemoides</i> (with <i>Muellerolimon salicorniaceum</i> , <i>Tecticornia indica</i> subsp. <i>bidens</i> and <i>Tecticornia pterygosperma</i> subsp. <i>denticulata</i>) over Very Open Low Grass of <i>Sporobolus virginicus</i> in brown light clay on saline flats and marsh.	4.7	2.9	1.4

Code	Description	Extent within Survey Area	Extent within DE	Extent with DF
SM TpTibTh	Low Heath D of <i>Tecticornia pruinosa</i> , <i>Tecticornia indica</i> subsp. <i>bidens</i> , <i>Tecticornia pterygosperma</i> subsp. <i>denticulata</i> and <i>Tecticornia</i> cf. <i>halocnemoides</i> over Scattered Herbs in brown clay loam on saline flats and marsh.	4.1	0.7	0.7
SP AooAsyAt EaPmRll PoMp	Thicket of <i>Alectryon oleifolius</i> subsp. <i>oleifolius</i> , <i>Acacia synchronicia</i> and <i>Acacia tetragonophylla</i> over Low Scrub A of <i>Exocarpos aphyllus</i> , <i>Pimelea microcephala</i> and <i>Rhagodia latifolia</i> subsp. <i>latifolia</i> over Dwarf Scrub D of <i>Ptilotus obovatus</i> and <i>Maireana polypterygia</i> over Very Open Low Grass of <i>Cenchrus ciliaris</i> in brown sandy clay loam on sandy/stony plain.	2.7	2.7	0.8
SP AsyAi Mp Cc	Scattered Shrubs of <i>Acacia synchronicia</i> and <i>Atriplex</i> sp. over Dwarf Scrub D of <i>Maireana polypterygia</i> (with <i>Solanum lasiophyllum</i> , <i>Dissocarpus paradoxus</i> and <i>Ptilotus obovatus</i>) over Scattered Low Grass of <i>Cenchrus ciliaris</i> over Scattered Herbs (dead) in orange silty loam and loamy sand on sandy/stony plain.	57.1	57.1	9.2
SP PoFpSl Cc	Open Low Scrub A of <i>Acacia synchronicia</i> over Dwarf Scrub D of <i>Ptilotus obovatus</i> , <i>Frankenia pauciflora</i> and <i>Solanum lasiophyllum</i> (with <i>Corchorus crozophorifolius</i>) over Low Grass of <i>Cenchrus ciliaris</i> in cream silty loam on stony plain (rehabilitated borrow pit vegetation).	4.7	4.7	
SP PoSlCoc Cc	Scattered Tall Shrubs (to Open Scrub) of <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> , <i>Hakea preissii</i> and <i>Acacia synchronicia</i> (with <i>Acacia tetragonophylla</i> and <i>Alectryon oleifolius</i> subsp. <i>oleifolius</i>) over Open Low Scrub A of <i>Rhagodia latifolia</i> subsp. <i>latifolia</i> , <i>Acacia sclerosperma</i> subsp. <i>sclerosperma</i> and <i>Acacia synchronicia</i> (with <i>Rhagodia preissii</i> subsp. <i>obovata</i> and <i>Exocarpos aphyllus</i>) over Open Dwarf Scrub C of <i>Eremophila</i> cf. <i>latrobei</i> and <i>Atriplex bunburyana</i> over Dwarf Scrub D (to Open Dwarf Scrub D) of <i>Ptilotus obovatus</i> , <i>Solanum lasiophyllum</i> and <i>Corchorus crozophorifolius</i> (with <i>Frankenia pauciflora</i>) over Low Grass of <i>Cenchrus ciliaris</i> in orange loamy sand on sandy/stony plain.	21.0	21.0	
SP TpTibFp Cc	Dwarf Scrub D of <i>Tecticornia pruinosa</i> (and/or <i>T. indica</i> subsp. <i>bidens</i> and <i>Frankenia pauciflora</i>) over Very Open Low Grass of <i>Cenchrus ciliaris</i> in cream brown silty loam on stony plain (rehabilitated borrow pit vegetation).	1.7	1.7	1.7

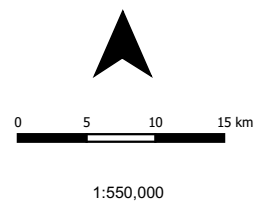


LEICHHARDT LAKE MACLEOD OPERATIONS

**Figure 14: Threatened
and Priority Ecological
Communities**

Legend

- Study Area
- TECs and PECS**
- Barrabiddy Land System
- Lake MacLeod invertebrate assemblages
- Lyell Land System



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Date:	4th June 2025
Status:	Final
Figure:	7
Sheet Size:	A4
File Reference:	LM_Figure6_TEC
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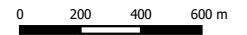
LEICHHARDT LAKE MACLEOD OPERATIONS

**Figure 15:
Vegetation north
borrow pit**

Legend

Vegetation Types

- CAAbFp Cc
- CAAsyRII PoEITd
- SA CocPoSs Te
- SA RpoRIIPm PoSIFp
- SD CocTddSs Te
- SM Th Sv
- SP AooAsyAt EaPmRII PoMp
- SP AsyAi Mp Cc
- SP PoFpSI Cc
- SP PoSICoc Cc
- SP TpTibFp Cc



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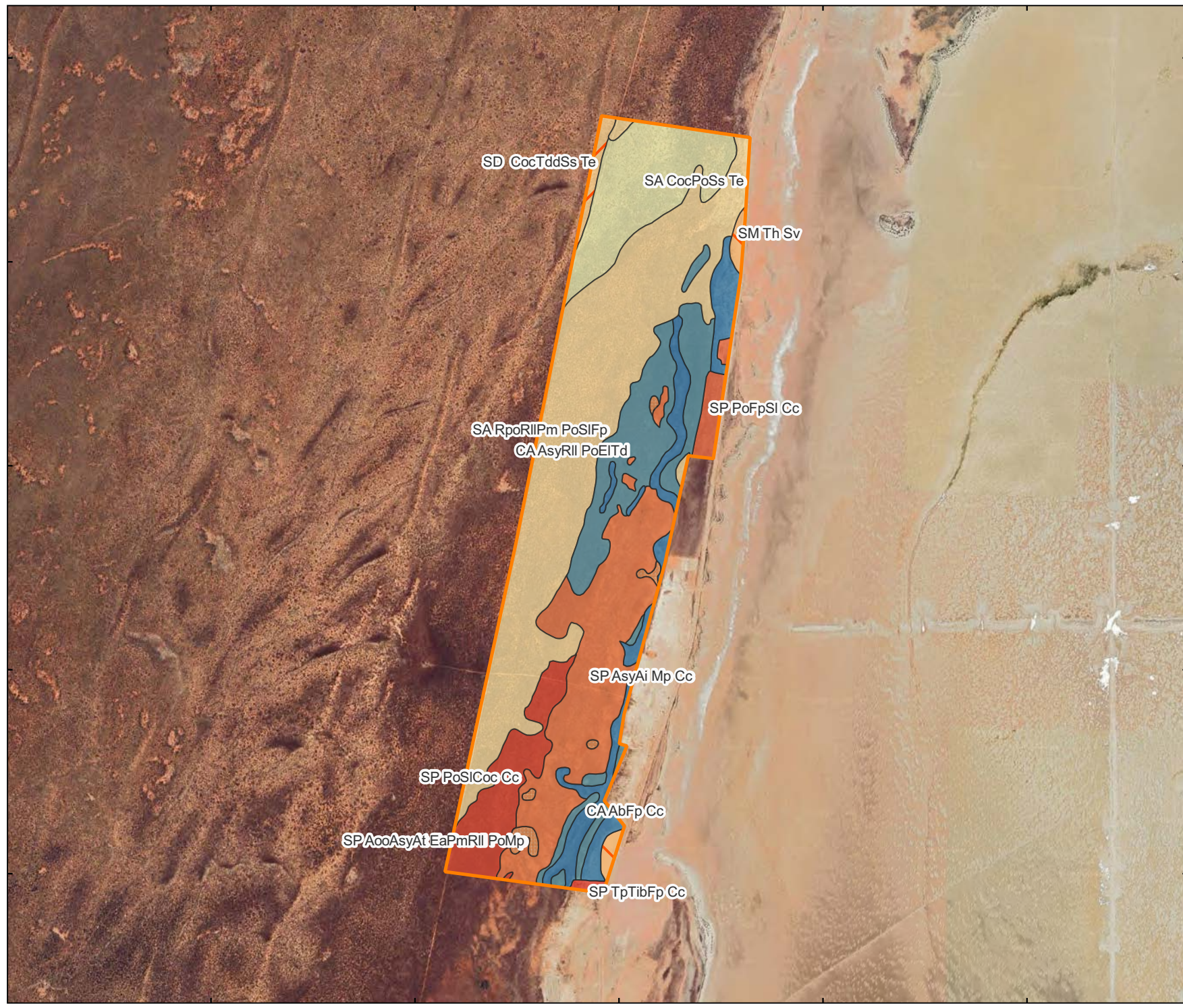
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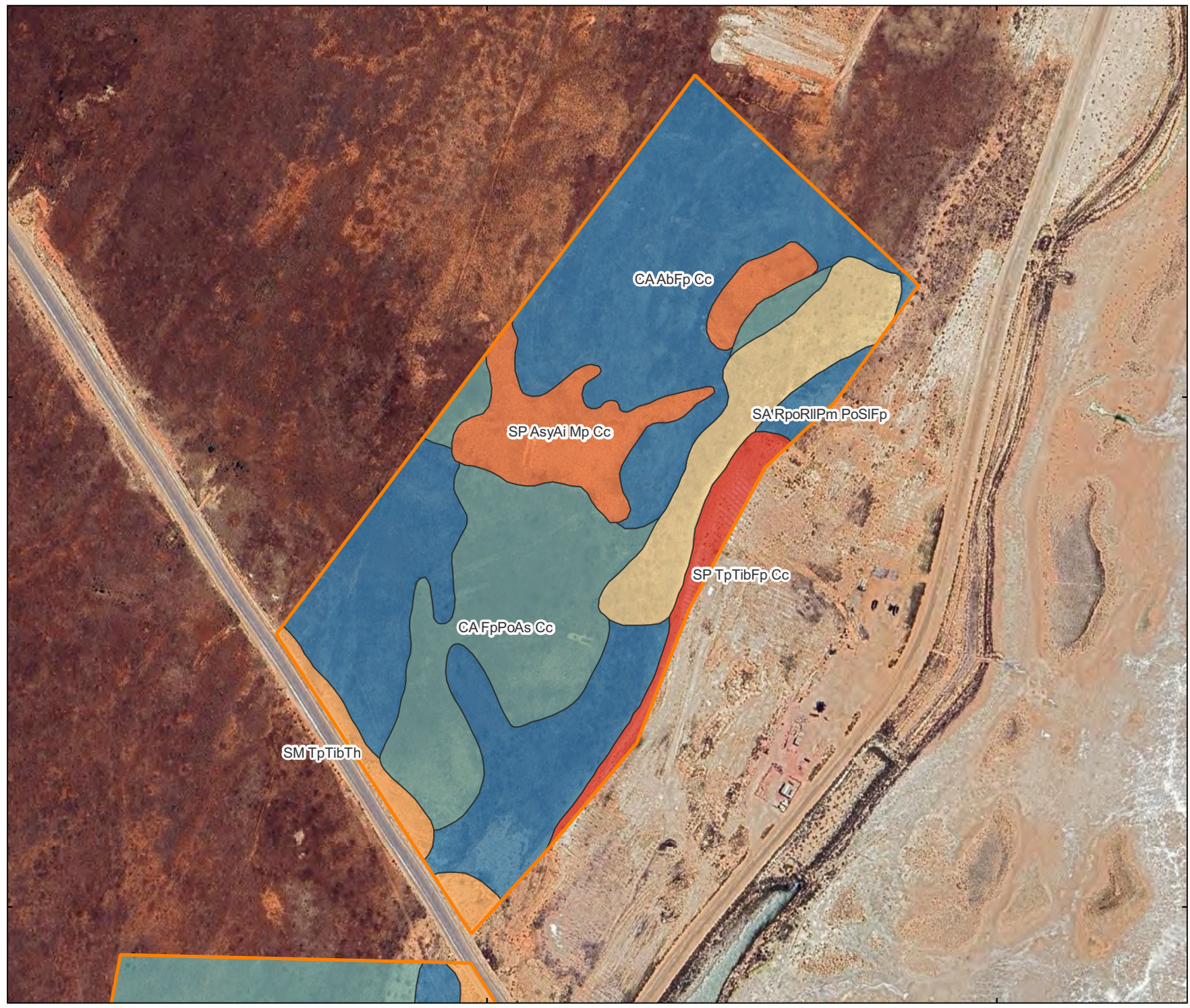
LEICHHARDT LAKE MACLEOD OPERATIONS

Figure 16: Vegetation types south borrow pit

Legend

Vegetation Types

- CAAbFp Cc
- CA FpPoAs Cc
- SA RpoRIIPm PoSIFp
- SM TpTibTh
- SP AsyAi Mp Cc
- SP TpTibFp Cc



7299000

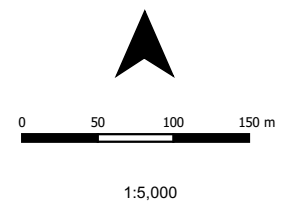
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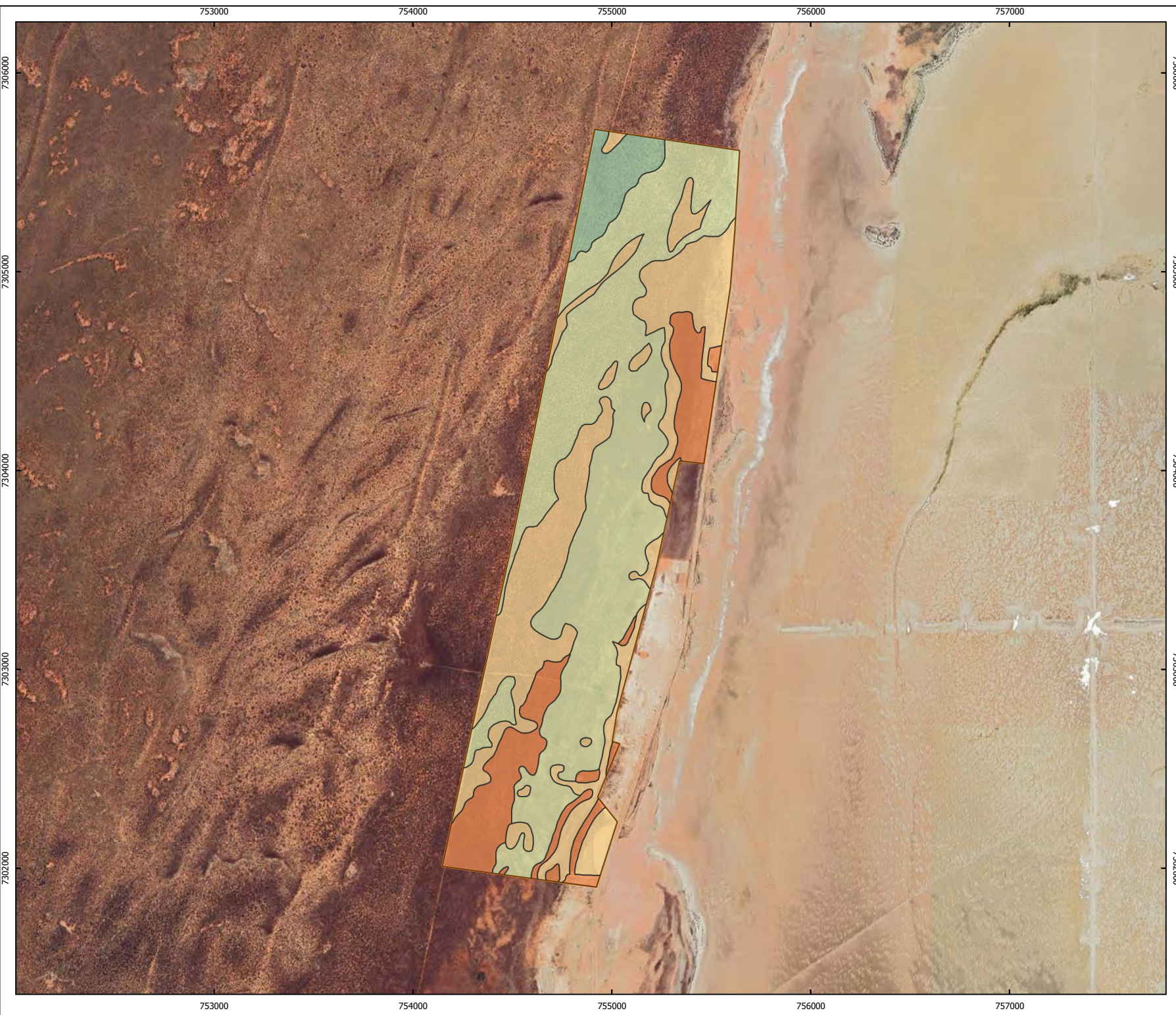
Vegetation Condition

The condition of the vegetation within the DE ranged from Very Good to Degraded, with the majority of the area considered Good to Poor according to the Keighery (1994) scale. The vegetation condition of the DE is shown in Figure 17 and Figure 18, and summarised in Table 10.

Table 10: Vegetation condition

Condition	Extent within Survey Area (ha)	Extent within DE (ha)	Extent within DF (ha)
Completely Degraded	13.2	-	-
Degraded	55.5	45.3	9.1
Poor	124.0	106.0	27.1
Good	159.7	148.6	6.9
Very Good	44.5	14.2	0



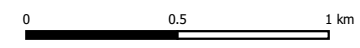


**LEICHHARDT
LAKE MACLEOD
OPERATIONS**

**Figure 17: Vegetation
condition northern borrow pit**

Legend

- Study Area
- Vegetation Condition**
- Degraded
- Poor
- Good
- Very Good



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Status:	Final
Figure:	9
Sheet Size:	A4
File Reference:	LM_Figure7_veg_cond

Datum: GDA 2020
Projection: MGA Zone 50

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**LEICHHARDT
LAKE MACLEOD
OPERATIONS**

**Figure 18: Vegetation
condition southern borrow pit**

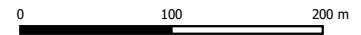
Legend

Study Area

Vegetation Condition

Degraded

Poor



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Document Control

Date:	10th June 2025
Status:	Final
Figure:	9
Sheet Size:	A4
File Reference:	LM_Figure7_veg_cond

Datum: GDA 2020
Projection: MGA Zone 50

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Locally Significant Vegetation

Vegetation may be of significance for reasons other than a listing as a TEC or PEC. Factors include, but are not limited to, having a restricted distribution, historical impact from threatening processes; a role as a refuge for protected flora and fauna; and providing an important function required to maintain ecological integrity of a significant ecosystem (EPA, 2016b).

Local significance can be determined where a vegetation type is confined to a specialised habitat and/or landform that is not common in the local area, or the vegetation types are supporting conservation significant species or groundwater dependent species.

None of the vegetation recorded within the DE was considered to be locally significant.

Key Flora and Vegetation Values

Based on the information provided above, there are no specific significant flora or vegetation values that require assessment in this ERD.

3.4 PROPOSED MITIGATION

LMPL has mitigated the potential impacts to this factor according to the mitigation hierarchy; Avoid, Minimise, Rehabilitate and Offset. Offsets are not expected to be required for this factor.

3.4.1 AVOID

LMPL engaged Onshore Environmental (2025) to conduct a reconnaissance flora and vegetation survey of the areas within and surrounding the DE and have utilised this information to conduct multiple operational planning and access road design revisions. GHD (2025) were also engaged to complete a high-level options assessment, resulting in the crystalliser field design avoiding native vegetation. These avoidance processes resulted in the final boundaries of the DE and indicative DF presented in this ERD.

3.4.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to flora and vegetation are minimised:

1. **Implement industry best-practice management measures for flora and vegetation, including:**
 - a. Vegetation clearing will be managed through internal ground disturbance procedures;
 - b. Boundaries of areas to be cleared or disturbed will be identified by GPS coordinates and clearly demarcated prior to clearing activities commencing;
 - c. Progressive clearing will be undertaken;
 - d. The disturbance footprint will be developed to the minimum required to ensure safe and adequate construction and operation, and compliance with approved limits;
 - e. Emergency response capabilities will be maintained to control fire outbreaks;



- f. Weed hygiene and management measures/procedures will be implemented to prevent spread of weeds and the introduction of new weed species as a result of construction and operation;
2. **Implement the following measures to minimise the risk and impact of hydrocarbon spills:**
 - a. Hydrocarbons will be stored either within a bunded area or within self-bunded tanks;
 - b. All spills will be controlled, contained, and cleaned up as soon as practicable;
 - c. Service vehicles will be fitted with spill kits;
 - d. Spill kits will be located at all workshop and fuel storage areas; and
 - e. Environmental incident recording, investigation and reporting system will be implemented.
 3. **Comply with Water Quality Protection Guidelines and guidance notes**, particularly in relation to the storage and use of hydrocarbons and other harmful chemicals, the design and operation of vehicle maintenance areas and facilities, and the handling and storage of other waste materials, including contaminated soils.
 4. **Design and construct the flood levee and crystallisers to be safe and stable according to DMPE requirements.**

3.4.3 REHABILITATE

At the completion of the Proposal the site will be rehabilitated to allow and encourage the natural establishment of vegetation. A Mine Closure Plan (MCP) has been submitted for the broader Project and will be revised and resubmitted to incorporate the expansion (Appendix 5.5). The key rehabilitation measures from the MCP that relate to flora and vegetation are summarised below: Ground preparation including replacement of subsoil, topsoil and soil improvements;

- Seed sourcing and management;
- Application of seeds for revegetation;
- Non-native or naturalised flora will be removed from rehabilitation activity areas;
- Maintenance (including irrigation if/as required); and
- Crystallisers will be rehabilitated to an acceptable landform.

3.5 POTENTIAL ENVIRONMENTAL IMPACT

The following sections assess the potential impacts on each environmental value identified in Section 4.3.

3.5.1 IDENTIFIED ENVIRONMENTAL IMPACTS

The Proposal will require clearing of up to 42.9 ha of native vegetation. The crystalliser field and flood levee will be constructed within the lakebed which is void of vegetation. However, to construct the cells of the crystallisers and the flood levee, borrow material from borrow pits located within native vegetation outside of the lakebed will be required.



Impacts to flora and vegetation due to changes in surface water hydrology on the lake are unlikely, due to the minimal influence of the Proposal on the inundation regime (refer to Section 5). The flood levee will result in less freshwater reaching the fringing vegetation to the south of the levee. There is an existing levee 2.5 km south of the proposed levee associated with the existing operations. Therefore, only the vegetation between the two levees may be indirectly impacted as a result of altered hydrology from the Proposal. It is clear from the aerial imagery that there is very little vegetation within this area with salt scarring apparent through the area. There are only small pockets of what is presumed to be *Tecticornia* that may be affected by the reduced freshwater flows.

The following potential impacts to flora and vegetation were considered to be appropriately managed using industry-standard controls and are not discussed further in this ERD:

- Localised dust emissions, reducing the health of surrounding flora and vegetation;
- Introduction of weeds or feral fauna, resulting in the competition and a reduction in health of surrounding flora and vegetation;
- Altered fire regimes – as on-site fire control equipment is likely to be sufficient to ensure fires are controlled on-site; and
- Hydrocarbon spills - as only low volumes of hydrocarbons will be kept on site, and containment and clean up equipment will be available.

3.5.2 PREDICTED ENVIRONMENTAL IMPACTS

Table 11 summarises the extent of the predicted direct and indirect impacts on flora and vegetation. Additional assessment information is provided in the following sections.



Table 11: Impacts on flora and vegetation

Flora / Vegetation / Feature	Regional extent	Extent in Survey Area	Extent in DE	Extent in Indicative DF	Extent of indirect impacts	Level of certainty	Direct and indirect impacts	Cumulative impacts (incl. other Proposals)
Regional Native Vegetation								
Native Vegetation	141,484.6 (within 20 km of the DE)	N/A	540.1	43.0	N/A	High – direct impacts are known, and indirect impacts are likely to be restricted to fringes of direct disturbance (included in direct impact calculations)	43.0	8,795 ha (8,752 ha or 99% is associated with the Lake MacLeod Project), although this includes unvegetated lake surface
Vegetation associations								
Coastal Dunes 95	389,947.9 ha (within Carnarvon IBRA region)	N/A	95.0	N/A	N/A	High – direct impacts are known, and indirect impacts are likely to be restricted to fringes of direct disturbance (included in direct impact calculations)	N/A	246.1 ha associated with the Lake MacLeod Project.
Coastal Dunes 328	9,954.7 ha (within Carnarvon IBRA region)	N/A	219.0	43.0			43.0	770.0 ha (727.0 ha or 94% is associated with the Lake MacLeod Project).
Lake MacLeod 125	196,734.7 ha (within Carnarvon IBRA region)	N/A	339.0	339.0			339.0	7,733 ha (7,690 ha or 99% is associated with the Lake MacLeod Project), although this includes unvegetated lake surface
Vegetation communities								
CA AbFp Cc	N/A	45.6	35.9	18.4	N/A	High – direct impacts are known, and indirect impacts are likely to be restricted to fringes of direct disturbance (included in direct impact calculations).	18.4	N/A
CA AsyRll PoElSr		37.5	37.5	3.4			3.4	
CA FpPoAs Cc		17.8	4.9	4.9			4.9	
SA RpoRllPm PoSlFp		110.9	32.2	2.4			2.4	

Flora / Vegetation / Feature	Regional extent	Extent in Survey Area	Extent in DE	Extent in Indicative DF	Extent of indirect impacts	Level of certainty	Direct and indirect impacts	Cumulative impacts (incl. other Proposals)
SM Th Sv		4.7	109.6	1.4			1.4	
SM TpTibTh		4.1	2.7	0.7			0.7	
SP AooAsyAt EaPmRll PoMp		2.7	2.9	0.8			0.8	
SP AsyAi Mp Cc		57.1	0.7	9.2			9.2	
SP TpTibFp Cc		1.7	1.7	1.7			1.7	

3.6 ASSESSMENT OF SIGNIFICANCE OF RESIDUAL IMPACT

3.6.1 REGIONAL VEGETATION AND VEGETATION ASSOCIATIONS

Proposal

As detailed in Table 11, the Proposal will result in very small reductions in both regional vegetation extent and vegetation associations. Impacts at a regional scale is therefore only relevant when assessed on a cumulative basis, as detailed in the following section.

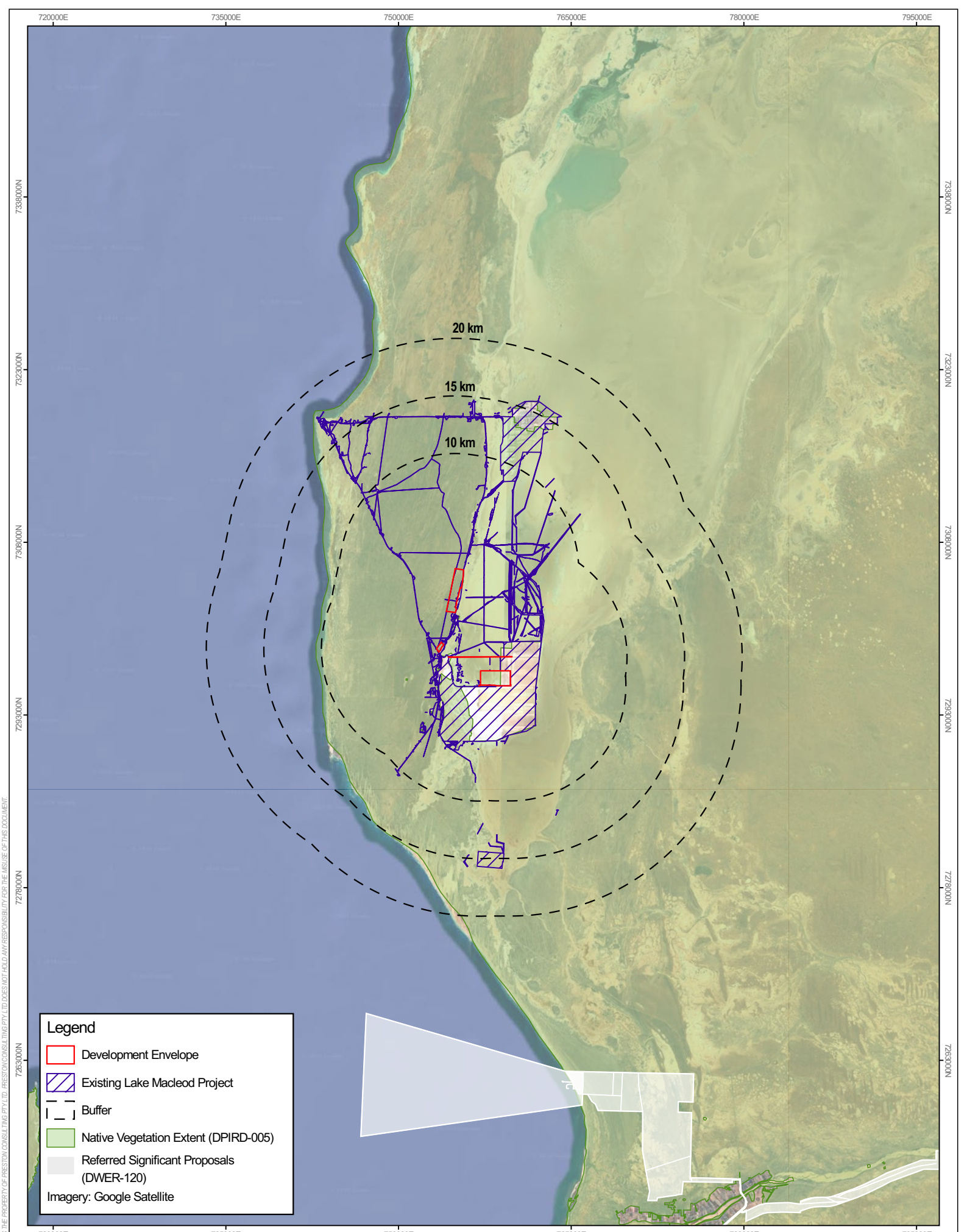
Cumulative Impacts

Up to 8,752 ha of disturbance has been undertaken as part of the existing Lake MacLeod Project, 7,467.5 ha of which occurred within the Lake MacLeod salt lake. There are no EPA referred significant Proposals within 30 km of the Proposal. The nearest Project is the HyEnergy Green Hydrogen and Ammonia Project located 35 km south of the Proposal. Cumulative impacts from Proposals in the surrounding area is shown in Figure 19.

- 8,795.0 ha of the remaining pre-European vegetation/ salt lake extent within 10 km of the Proposal (14%);
- 8,795.0 ha of the remaining pre-European vegetation extent/ salt lake within 15 km of the Proposal (7%); and
- 8,795.0 ha of the remaining pre-European vegetation extent/ salt lake within 20 km of the Proposal (5%).

The Proposal will result in direct disturbance of approximately 43.0 ha of native vegetation, which is considered to be in Very Good to Completely Degraded condition (no disturbance to Pristine vegetation). All of the vegetation associations that will be impacted will have more than 90% of their pre-European extent remaining after all current and planned projects are developed.





Legend

- Development Envelope
- Existing Lake Macleod Project
- Buffer
- Native Vegetation Extent (DPIRD-005)
- Referred Significant Proposals (DWER-120)

Imagery: Google Satellite

0 6 12 km

GDA2020 / MGA zone 49

1:400,000



Project: 0659_LMS_008
 Date: 25/02/2026
 Size: A4
 Author: ASmithers



Figure 19: EPA referred significant proposals and remaining native vegetation

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738000N 739000N 740000N 741000N 742000N 743000N 744000N 745000N 746000N 747000N 748000N 749000N 750000N 751000N 752000N 753000N 754000N 755000N 756000N 757000N 758000N 759000N 760000N 761000N 762000N 763000N 764000N 765000N 766000N 767000N 768000N 769000N 770000N 771000N 772000N 773000N 774000N 775000N 776000N 777000N 778000N 779000N 780000N 781000N 782000N 783000N 784000N 785000N 786000N 787000N 788000N 789000N 790000N 791000N 792000N 793000N 794000N 795000N

When assessing the disturbance associated with the Proposal at a regional scale, the Proposal’s disturbance will occur within two vegetation associations; Coastal Dunes 328 and Lake MacLeod 125. It should be noted that vegetation association mapping is broadscale and will not always represent the actual vegetation on the ground.

The current extent of vegetation association Coastal Dunes 328 at a State-wide, IBRA region and IBRA subregion level is outlined in Table 12. Up to 43 ha of this vegetation association intersects the DF. The only project in the vicinity of the Proposal which impacts this vegetation association is the existing Lake MacLeod Project (Figure 20). The clearing associated with this Proposal has been accounted for in the remaining native vegetation extent already as this clearing was completed prior to the collection of this data.

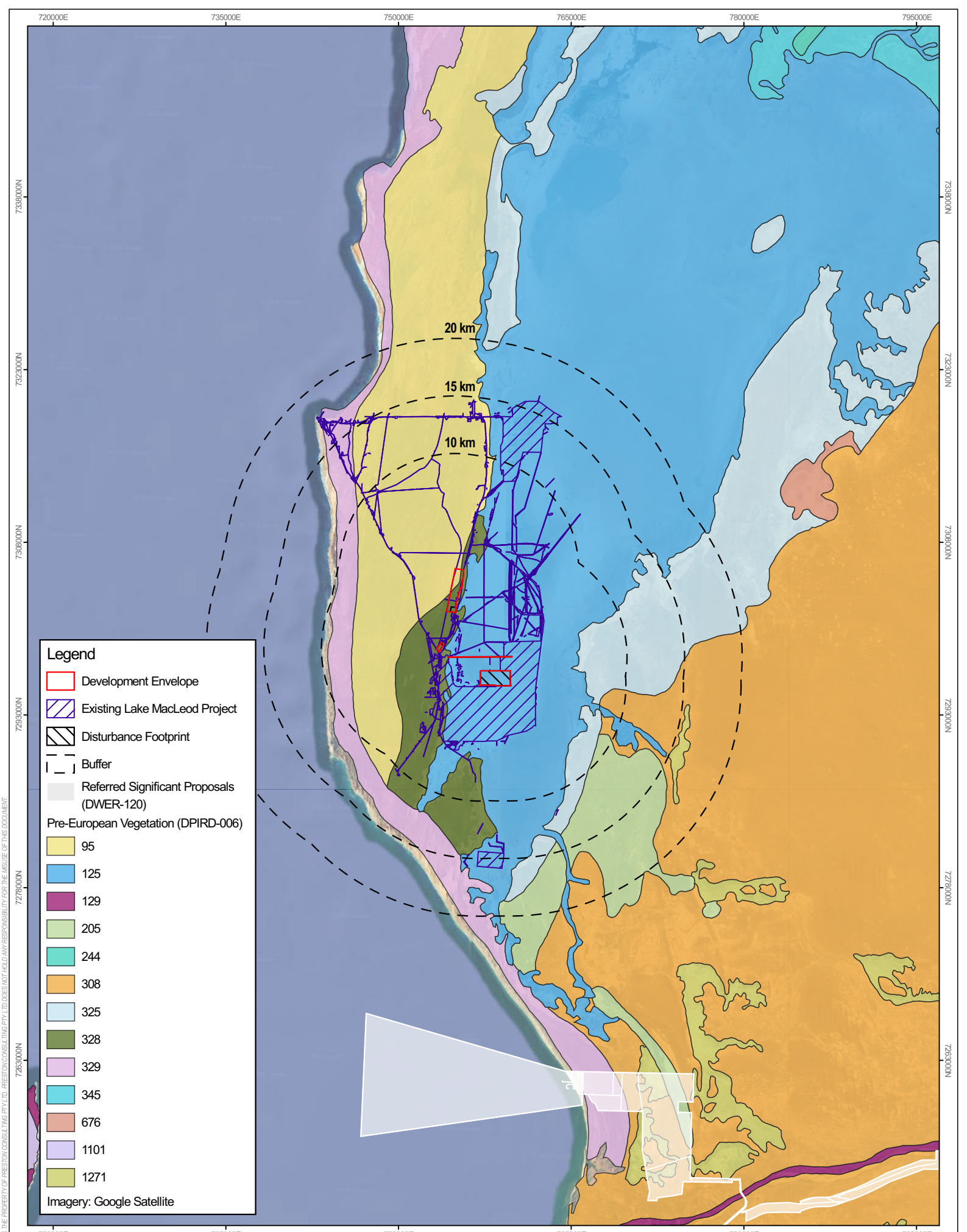
The current extent of vegetation association Lake MacLeod 125 at a State-wide, IBRA region and IBRA subregion level is outlined in Table 12. Up to 338.7 ha of this association intersects the DF. The only project in the vicinity of the Proposal which impacts this vegetation association is the existing Lake MacLeod Project (Figure 20). The clearing associated with this Proposal has been accounted for in the remaining native vegetation extent already as this clearing was completed prior to the collection of this data. All disturbance within this association will occur within the salt lake and therefore no clearing of vegetation is required.

Table 12: Extent of vegetation associations

Vegetation Association	Pre-European (ha)	Current extent (ha) (% of Pre-European)	Current extent after Proposal (ha) (% of Pre-European)	Current extent after Proposal and other Projects (ha) (% of Pre-European)
Statewide				
Coastal Dunes 328	10,236.9	9,954.7	9,911.7 (96.8%)	9,911.7 (96.8%)
Lake MacLeod 125	3,485,785.5	3,146,487.2	3,146,444.2 (90.3%)	3,146,444.2 (90.3%)
IBRA Region – Carnarvon				
Coastal Dunes 328	10,236.9	9,954.7	9,911.7 (96.8%)	9,911.7 (96.8%)
Lake MacLeod 125	201,172.4	196,734.7	196,691.7 (97.8%)	196,691.7 (97.8%)
IBRA Subregion – Wooramel				
Coastal Dunes 328	10,236.9	9,954.7	9,911.7 (96.8%)	9,911.7 (96.8%)
Lake MacLeod 125	201,172.4	196,734.7	196,691.7 (97.8%)	196,691.7 (97.8%)

The Proposal will result in direct disturbance of approximately 43 ha of native vegetation, of which is considered to be in Very Good to Degraded condition (no disturbance to Pristine vegetation). As described above, the vegetation associations intersected by the Proposal will all have more than 96% of their original extent remaining and therefore clearing of these vegetation associations is not considered significant due cumulative impact.





Summary

There are no planned projects within the vicinity of the Proposal that would be considered as a cumulative impact. The existing Lake MacLeod Project has already been accounted for in the regional remaining vegetation mapping. The Proposal will result in direct disturbance of approximately 43.0 ha of native vegetation, which is considered to be in Very Good to Degraded condition (no disturbance to Pristine vegetation). All of the vegetation associations that will be impacted will have more than 96% of their pre-European extent remaining following implementation of the Proposal, with no cumulative impacts to be considered.

3.7 ENVIRONMENTAL OUTCOMES

The EPA's environmental objective for this factor is "*to protect flora and vegetation so that biological diversity and ecological integrity are maintained*". In the context of this objective: "*ecological integrity*" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016a).

LMPL has conducted flora and vegetation surveys of the areas within and surrounding the DE, and no significant flora or vegetation were recorded within the DE.

LMPL has incorporated avoidance and minimisation measures into the Proposal design and operational processes, however direct impacts to flora and vegetation are unavoidable. The Proposal will result in the clearing of up to 43.0 ha of native vegetation.

The clearing of native vegetation will occur adjacent to the existing Lake MacLeod Project. Clearing will occur within vegetation associations with more than 90% of their pre-European extent remaining.

No significant flora or vegetation communities were recorded.

The predicted outcome for Flora and Vegetation is therefore:

- Disturbance of no more than 43.0 ha of native vegetation.



4 TERRESTRIAL FAUNA

4.1 EPA ENVIRONMENTAL FACTOR AND OBJECTIVE

The EPA Objective for this Key Environmental Factor is to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

4.2 RELEVANT POLICY AND GUIDANCE

Relevant EPA and Commonwealth Government guidance documents for terrestrial fauna are summarised in Table 13.

Table 13: Policy and guidance relevant to the Terrestrial Fauna Key Environmental Factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023b)	This document was considered in the preparation of this ERD and to inform EIA.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document was considered in the preparation of this ERD and to inform EIA.
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document was considered in the preparation of this ERD and to inform EIA.
Instructions on how to prepare an Environmental Review Document (EPA, 2025a)	This document was considered in the preparation of this ERD and to inform EIA.
EIA Practice Guide (EPA, 2025b)	This document was considered in the preparation of this ERD and to inform EIA.
Relevant EPA Factor Guidelines	
Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016b)	This document was considered in the preparation of this section of the ERD.
Relevant EPA Technical Guidance	
Technical Guidance – Sampling methods for terrestrial vertebrate fauna (EPA, 2016d)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced throughout the terrestrial vertebrate fauna reports for the Proposal.
Technical Guidance – Terrestrial fauna surveys (EPA, 2020)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced throughout the terrestrial fauna reports for the Proposal.
Technical Guidance – Sampling of SRE invertebrate fauna (EPA, 2016e)	This document was used to inform the survey effort required to undertake EIA for the Proposal and is referenced throughout the SRE invertebrate fauna reports for the Proposal.
Other Policy and Guidance	
Guideline for preparing Mining Development and Closure Proposals (DMPE, 2025a)	This document has been considered in the design and planning of closure strategies for the Proposal, it has also been considered in the preparation of closure mitigation measures.



4.3 RECEIVING ENVIRONMENT

Information within this section has been sourced from the 'Reconnaissance Flora & Vegetation/ Survey Basic Vertebrate Fauna Survey (Onshore Environmental, 2025; Appendix 5.1), undertaken for the Proposal.

4.3.1 SURVEYS AND STUDIES

A basic vertebrate fauna survey was conducted by Onshore Environmental (Onshore Environmental, 2025; Appendix 5.1). The flora and vegetation 'Survey Area' detailed in Section 4 is analogous with the Survey Area for the fauna survey and is shown in Figure 8.

Bennelongia Environmental Consultants (Bennelongia, 2025; Appendix 5.2) was commissioned by LMPL to complete a desktop review of short-range endemics (SRE) within a defined Study Area for the Proposal.

Outback Ecology Services (Outback Ecology, 2011; Appendix 5.3) were commissioned by Dampier Salt Limited (DSL) in 2011, following the 2010 flood for an aquatic assessment of Lake MacLeod. This assessment contains the most recent aquatic fauna studies conducted at Lake MacLeod. The aquatic fauna Survey Area is shown in Figure 21.

Desktop Assessment

Terrestrial Vertebrate Fauna

Database searches were undertaken to identify significant vertebrate fauna previously recorded within, or in the vicinity of the Survey Area.

Database information and literature used to develop the species list include:

- DBCA's Threatened and Priority Fauna;
- DBCA's Threatened and Priority Ecological Communities;
- EPBC Act Protected Matters Search Tool;
- Atlas of Living Australia (ALA);
- IUCN database; and
- Previous studies and scientific literature.

Short-range Endemic Fauna

A database and literature review was undertaken to identify species from SRE Groups known from the region. The SRE desktop assessment combined four sources of information using GIS mapping:

- Records of occurrence of species from SRE Groups provided by the Western Australia Museum (WAM);
- Records of occurrence of species from SRE Groups stored in Bennelongia's database;
- Publicly available information such as published papers or scientific reports accessible via online portals (ALA and the Dandjoo Biodiversity Data Repository); and
- A previous terrestrial fauna desktop study and a field survey conducted within and around the Project (Outback Ecology, 2009; 2011).



Field Surveys

Terrestrial Vertebrate Fauna

The field survey was conducted between 13 - 18 May 2025 in the Survey Area shown in Figure 8. The field survey involved opportunistic sampling using relevé sites. The Survey Area was ground truthed at approximately 250 m intervals to describe and map fauna habitats and identify opportunistic records for significant flora and fauna species.

Key activities that occurred during the basic terrestrial fauna surveys were:

- Ground truthing;
- Ultrasonic detectors;
- Acoustic detectors;
- High-resolution aerial photography; and
- Opportunistic records.

The fauna habitat mapping was based on vegetation type mapping completed during the survey and also utilised high-resolution aerial photography. Ground-truthing of the Survey Area further aided in definition of fauna habitat boundaries.

Ground-truthing conducted across the Survey Area provided an opportunity to record opportunistic locations for significant species and undertake closer examination of specific landforms where significant species would be expected to occur. Targeted searches for significant species were completed in areas where it was anticipated that significant fauna might occur based on habitat preferences (according to the database searches) and from previous knowledge of the local habitats. Habitats likely to support significant species were intensively targeted during the field survey.

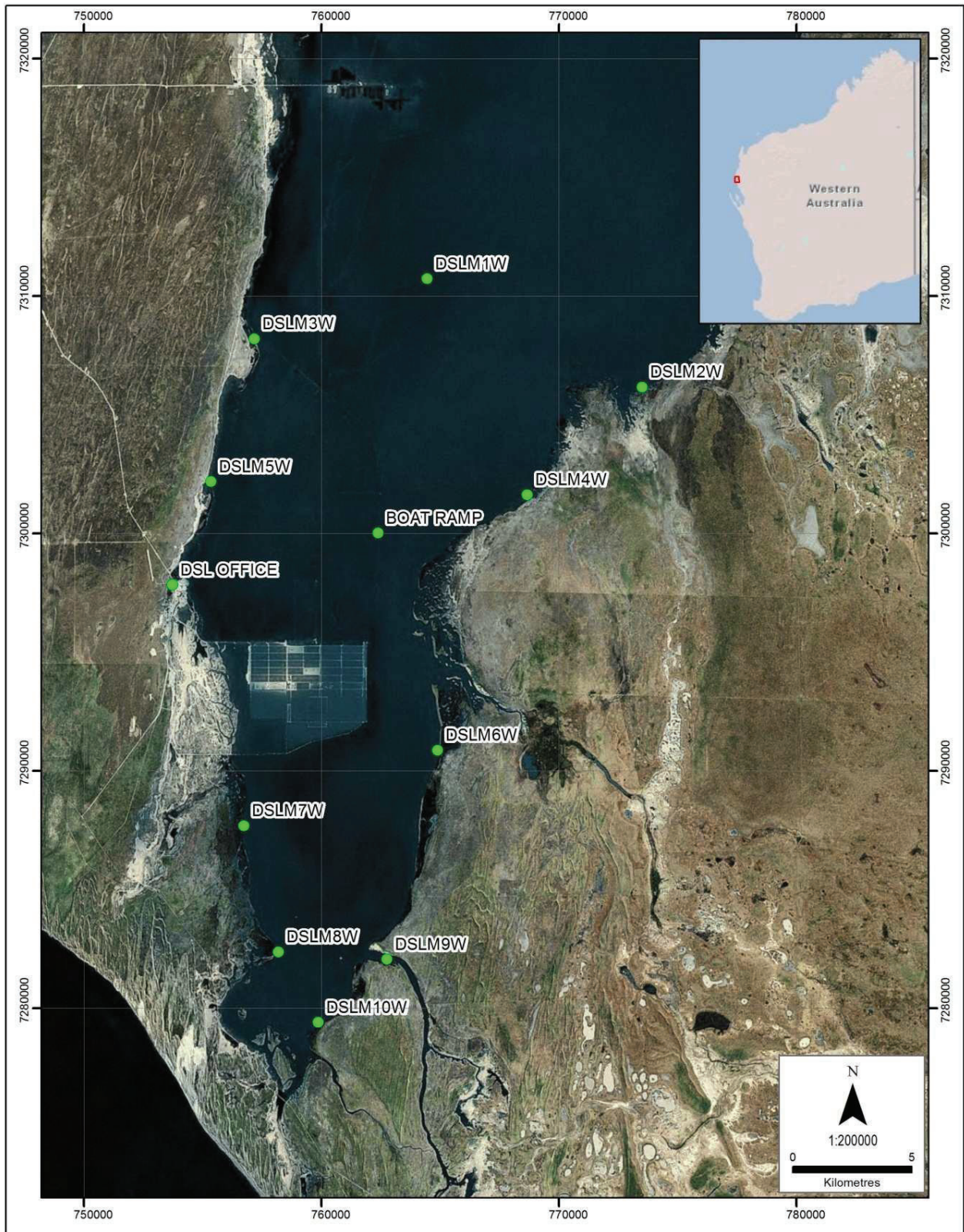
Aquatic Fauna

The aquatic assessment was conducted in May 2011 in the southern area of Lake MacLeod (Figure 21). Ten sample sites were established across a range of habitats including playa, embayments, islands and inlets, typically inundated to a depth of between 40 - 60 cm.

The following abiotic and biotic components were collected during the aquatic assessment:

- Water and sediments (for analyses);
- Phytoplankton (free-floating algae);
- Periphyton (diatoms); and
- Aquatic invertebrates (including zooplankton and macroinvertebrates).





Path: U:\Clients\Lake Mcleod\3. Projects\LakeMcleod_SM_SampleSites.mxd



Source: Satellite imagery from ESRI Site data from Outback Ecology		Coordinate System: GDA 1994 MGA Zone 49	Rio Tinto Dampier Salt		Salt Lake Sites, May 2011
		File Name: LakeMcleod_SM_SampleSites	Lake Mcleod		
		Date Created: 8/09/2011			

Figure 21: Aquatic Fauna Survey Area and sample sites

Alignment with Technical Guidance

Terrestrial Fauna

In accordance with EPA (2020) technical guidance, an assessment of the limitations of the terrestrial fauna survey is presented in Table 14.

Table 14: Limitations of the terrestrial fauna survey (Onshore Environmental, 2025)

Aspect	Discussion
Scope and intensity	Not a limitation: All allocated tasks were achieved during the survey, with camera surveys, targeted searches and ground truthing undertaken.
Availability of contextual information at a regional and local scale	Not a limitation: Extensive database results and information were available to complete a desktop study for the survey. Several fauna surveys have been completed in close proximity to the Survey Area. No significant issues with the reliability or accuracy of the desktop searches or previous surveys were identified. However, it is acknowledged that there may be errors in the data presented from these sources. Where required species lists from previous surveys and database searches were reviewed and nomenclature and conservation significance were updated.
Competency/experience of the team carrying out the survey, including experience in bioregion surveyed	Not a limitation: All members of the survey team have experience in conducting fauna surveys in arid WA. Ms. Jessica Waters (Principal Ecologist >ten years' experience) was project lead and has undertaken numerous surveys within the Bioregion and WA.
Proportion of fauna recorded and/or collected, any identification issues	Not a limitation: The targeted survey represented a snapshot of the fauna present over the survey period supplemented by camera trapping/acoustic recordings and did not include a formal trapping program. There are likely to be additional fauna species present following rainfall events. There were no problems encountered with the collection or analysis of survey data.
Was the appropriate area fully surveyed (effort and extent)	Not a limitation: Tasks completed from the scope of works included ground truthing to record opportunistic observations of birds, reptiles and mammals, map habitat types and identify habitats likely to support fauna of conservation significance. Infra-red motion sensor camera traps and acoustic recorders provided the ability to further increase total fauna, particularly for nocturnal species.
Access restrictions within the Survey Area	Not a limitation: There were no access restrictions experienced during the survey. The Survey Area was accessible on foot.
Survey timing, rainfall, season of survey	Minor limitation: The basic fauna survey was undertaken during May 2025. Seasonal conditions were dry and additional surveys undertaken after significant rainfall would likely result in higher numbers of fauna species being recorded. The fauna observed within the study are representative of a basic survey with no trapping or detailed systematic survey undertaken.
Disturbances that may have affected the results of the survey (e.g., fire, flooding, clearing)	Not a limitation: No disturbances have affected the results of the survey.



4.3.2 EXISTING ENVIRONMENT

Fauna Habitat

General Fauna Habitat

Three fauna habitat types were mapped within the DE. These habitats were classified and identified based on topography, landforms, broad vegetation, soil type, and surface substrate. These habitat classifications are also supported by data collected from a detailed flora and vegetation survey that occurred across the same survey area and survey dates. The fauna habitats were representative of the region, based on biogeography and regional vegetation descriptions. Based on topographical mapping and aerial photography, the habitats appeared to extend outside of the DE. The fauna habitats include:

- *Acacia* shrublands on sandplains and sand dunes;
- Limestone plains; and
- *Tecticornia* saltmarshes.

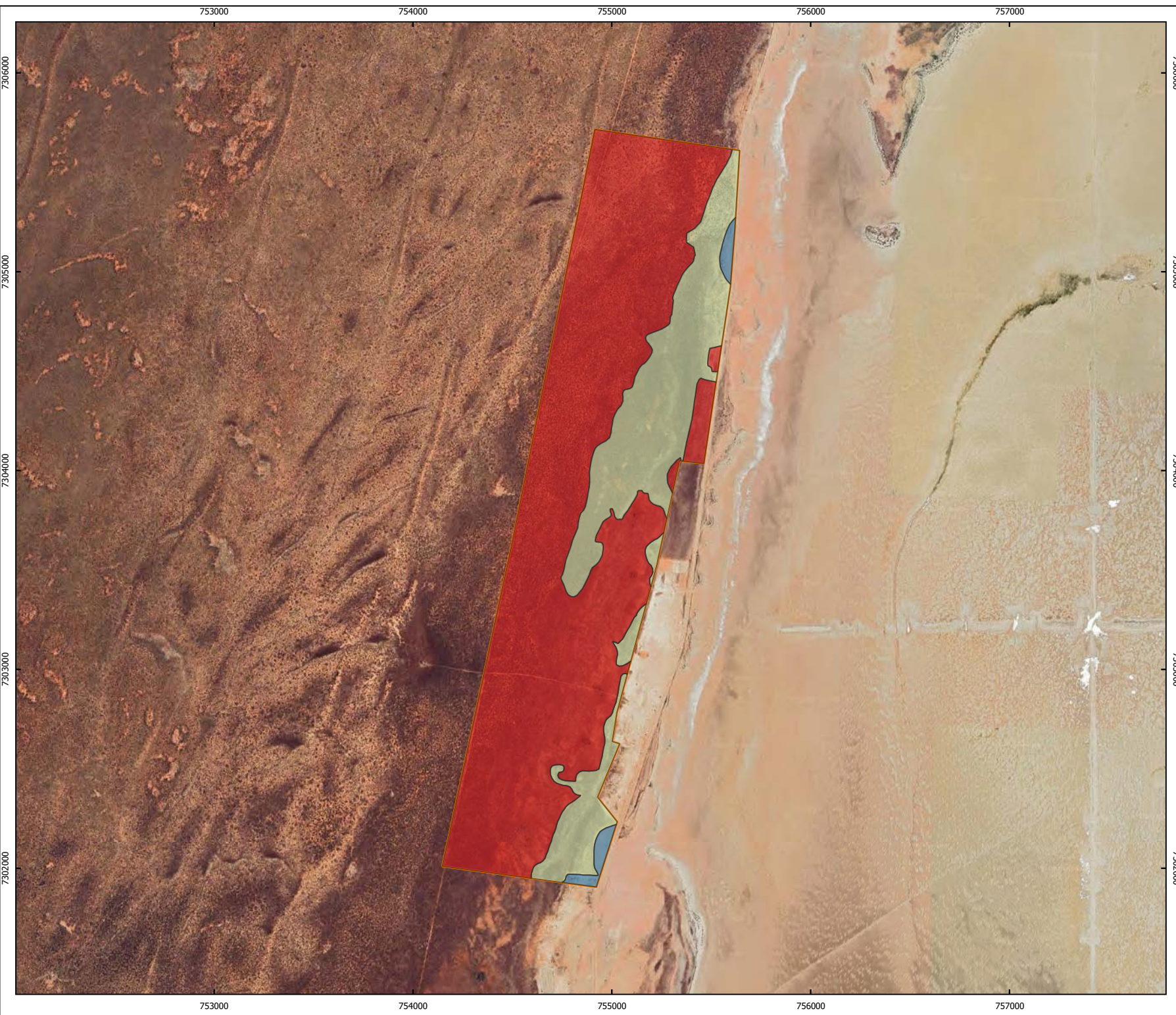
The flood levee and the crystallisers were not included in the fauna survey as these are located within the unvegetated portion of the salt lake. The salt lake habitat is still considered habitat for fauna (albeit of low value when dry) and has been included as a separate habitat type.

The most dominant fauna habitat within the DE is the salt lake (338.7 ha) followed by *Acacia* shrublands on sandplains and sand dunes (255.7 ha). The fauna habitats are detailed in Table 15 and shown in Figure 22, Figure 23 and Figure 24.

Table 15: Fauna habitats

Fauna Habitat	Key Habitat Elements	Extent in Survey Area (ha)	Extent in DE (ha)
<i>Acacia</i> shrublands on sandplains and sand dunes	<ul style="list-style-type: none"> • Supported a variety of small birds. • Sandy soils suitable for burrowing. 	255.7	230.0
Limestone plains	<ul style="list-style-type: none"> • Occurred on the fringes of Lake MacLeod. • Supported predominately low chenopod shrublands with some <i>Acacia</i> spp. • Scattered stony mantle of limestone pebbles. 	367.8	78.3
<i>Tecticornia</i> saltmarshes	<ul style="list-style-type: none"> • Edges of Lake MacLeod lakebed and low points of survey area. • Likely subject to occasional inundation during flooding events. • Most likely used by migratory shorebirds and waterbirds. 	10.7	5.4
Salt Lake	<ul style="list-style-type: none"> • Hypersaline lakebed with occasional fluctuating freshwater inflows. • Most likely used by migratory shorebirds and waterbirds when inundated (i.e., every ten years) 	N/A	338.7



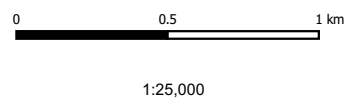


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LAKE MACLEOD
OPERATIONS**

**Figure 22: Fauna habitat
borrow pit north**

Legend

- Study Area
- Fauna Habitats**
- Acacia Shrublands on sand plains and dunes
- Limestone plains
- Tecticornia Salt Marsh



Document Control

Date:	10th June 2025
Status:	Final
Figure:	11
Sheet Size:	A4
File Reference:	LM_Figure10_habitats
Datum: GDA 2020 Projection: MGA Zone 50	

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LAKE MACLEOD
OPERATIONS**

**Figure 23: Fauna habitat
borrow pit south**

Legend

- Study Area
- Fauna Habitats**
- Acacia Shrublands on sand plains and dunes
- Limestone plains
- Tecticornia Salt Marsh



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Document Control

Date:	10th June 2025
Status:	Final
Figure:	11
Sheet Size:	A4
File Reference:	LM_Figure10_habitats

Datum: GDA 2020
Projection: MGA Zone 50



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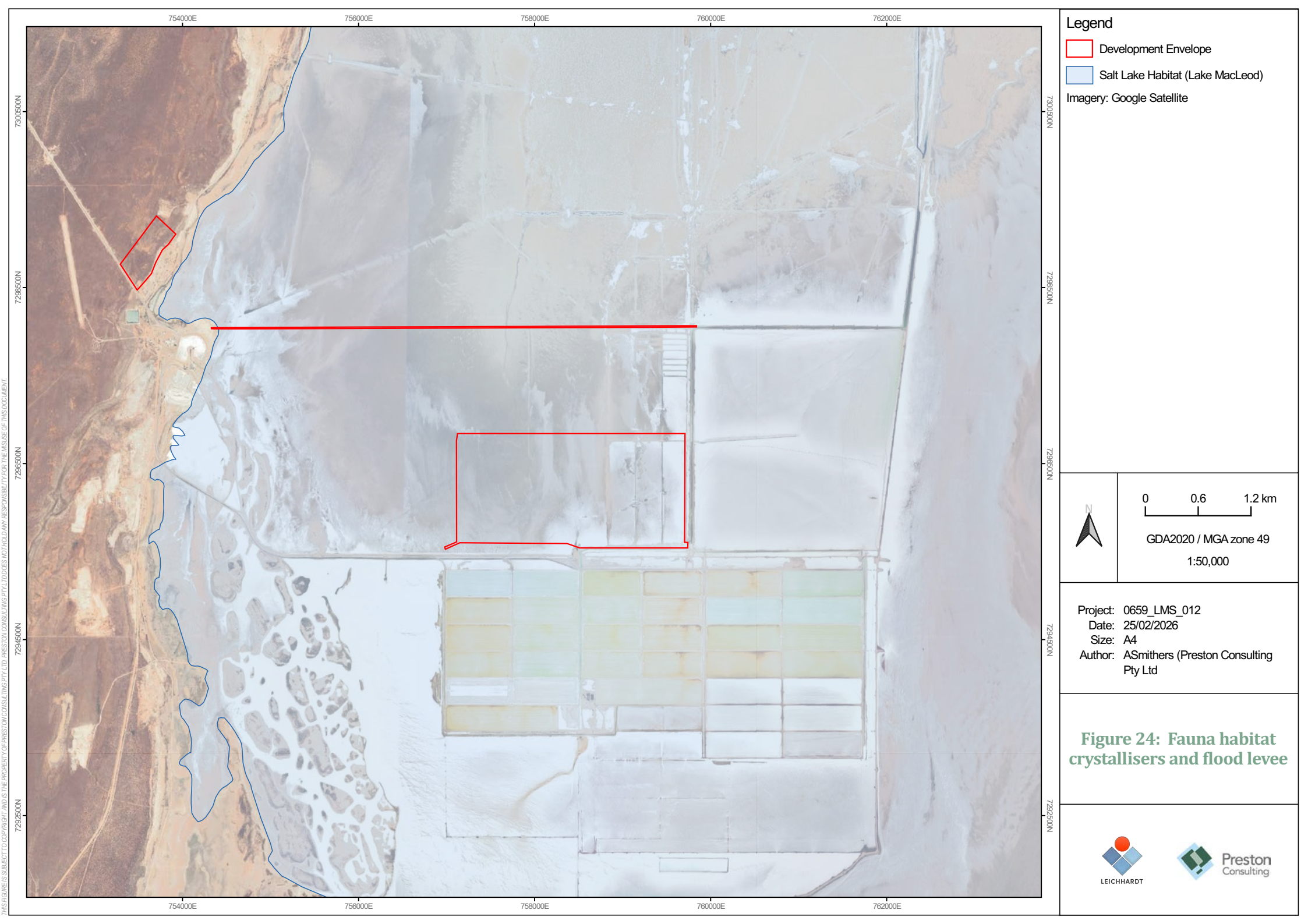
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Legend

- Development Envelope
- Salt Lake Habitat (Lake MacLeod)

Imagery: Google Satellite



0 0.6 1.2 km

GDA2020 / MGA zone 49

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Project: 0659_LMS_012
 Date: 25/02/2026
 Size: A4
 Author: ASmithers (Preston Consulting Pty Ltd)

Figure 24: Fauna habitat crystallisers and flood levee



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Short-Range Endemic Invertebrate Habitat

Vegetation, landscape and geology mapping indicate all units found within the Proposal extend well beyond its boundaries, suggesting that habitats that might be deemed prospective for SREs are likely to be locally widespread. Nevertheless, surficial calcrete deposits in and around the northern end of the Proposal are more likely to harbour suitable habitat for SREs due to a local patchy distribution.

Bennelongia's desktop assessment (2025) identified 11 broad fauna habitats surrounding the Proposal, four of these were considered moderately isolated, including:

- Salt lake;
- Salt land scrub;
- Low coastal shrubland/heath; and
- Calcrete ledge.

Of these, only calcrete ledge was categorised as a moderately sheltered habitat with moderate potential to support SRE species.

Significant Fauna

For the purposes of this assessment the term 'significant fauna' refers to:

- Fauna species listed under the EPBC Act or BC Act that were recorded or considered likely to occur within the Survey Areas;
- Species with restricted distribution;
- Species with a degree of historical impact from threatening processes; and/or
- Species that provide an important function required to maintain the ecological integrity of a significant ecosystem.

No significant fauna were recorded from within the DE. The desktop review found records of 66 significant fauna species listed under EPBC Act and/or BC Act (or listed by DBCA) whose range and distribution overlap with the Survey Area. The records were identified from the combined desktop and literature searches as potentially occurring within the Survey Area, comprising six mammals, 58 birds, and two reptiles. Marine birds, marine mammals and sharks were removed from the database search.

Based on the known distribution and habitat preference, 16 species were determined likely to occur and ten species as possibly occurring within the Survey Area. These species are listed in Table 16 with additional information about their extent provided in Table 17.

The majority of the species are migratory shorebirds and while suitable habitat may occur within the DE, the availability of habitat is likely to be limited. Habitats within the DE are most likely to be utilised occasionally after infrequent significant rainfall events and inundation. The majority of records are associated with the permanent saline wetlands of the Northern Ponds and the adjacent lakebed and mudflats of Lake MacLeod.



Table 16: Significant fauna potentially occurring within the Survey Area

Species	Conservation listing		Likelihood of occurrence
	EPBC Act	BC Act/DBCA	
Birds			
Curlew Sandpiper (<i>Calidris ferruginea</i>)	CR & MI	CR	Possible
Greater Sand Plover (<i>Charadrius leschenaultia</i>)	VU & MI	VU	Likely
Southern Whiteface (<i>Aphelocephala leucopsis</i>)	VU	P4	Possible
Letter-winged Kite (<i>Elanus scriptus</i>)	-	P4	Possible
Peregrine Falcon (<i>Falco peregrinus</i>)	-	OS	Possible
Common Sandpiper (<i>Actitis hypoleucos</i>)	MI	MI	Likely
Fork-tailed Swift (<i>Apus pacificus</i>)	MI	MI	Likely
Ruddy Turnstone (<i>Arenaria interpres</i>)	MI	MI	Likely
Long-toed Stint (<i>Calidris subminuta</i>)	MI	MI	Likely
Common Redshank (<i>Tringa tetanus</i>)	MI	MI	Likely
Gull-billed Tern (<i>Gelochelidon nilotica</i>)	MI	MI	Likely
Oriental Pratincole (<i>Glareola maldivarum</i>)	MI	MI	Likely
Caspian Tern (<i>Hydroprogne caspia</i>)	MI	MI	Likely
Osprey (<i>Pandion haliaetus</i>)	MI	MI	Likely
Glossy Ibis (<i>Plegadis falcinellus</i>)	MI	MI	Likely
Pacific Golden Plover (<i>Pluvialis fulva</i>)	MI	MI	Likely
Grey Plover (<i>Pluvialis squatarola</i>)	MI	MI	Likely
Wood Sandpiper (<i>Tringa glareola</i>)	MI	MI	Likely
Common Greenshank (<i>Tringa nebularia</i>)	MI	MI	Likely
Sharp-tailed Sandpiper (<i>Calidris acuminata</i>)	MI	MI	Possible
Broad-billed Sandpiper (<i>Calidris falcinellus</i>)	MI	MI	Possible
Red-necked Stint (<i>Calidris ruficollis</i>)	MI	MI	Possible
White-winged Black Tern (<i>Chlidonias leucopterus</i>)	MI	MI	Possible
Black-tailed Godwit (<i>Limosa limosa</i>)	MI	MI	Possible
Little Tern (<i>Sternula albifrons</i>)	MI	MI	Possible
Reptiles			
Gnaraloo Mulch Slider (<i>Lerista haroldi</i>)		P1	Previously recorded in Survey Area – outside of DE

MI = Migratory; VU = Vulnerable; CR = Critically Endangered; OS = other specially protected; and P = Priority



Table 17: Significant fauna potentially occurring within the Survey Area

Species	Conservation listing		Likelihood of occurrence	Nearest record	Notes
	BC Act	EPBC Act			
Gnaraloo Mulch Slider (<i>Lerista haroldi</i>)	P1	-	Likely	14 km	Previously recorded within the Borrow Pit 13 Survey Area, 14 km north of the DE. The species is found in coastal dunes. The habitat within the Survey Area comprised of <i>Acacia</i> shrublands on sandplains and sand dunes would be suitable for this species.
Southern Whiteface (<i>Aphelocephala leucopsis</i>)	P4	VU	Possible	33 km	Nearest record 33 km south-east (ALA, 2025). The species inhabits open woodlands and shrublands dominated by acacias or eucalypts. The species may potentially occur in <i>Acacia</i> shrublands on sandplains and sand dunes within the Survey Area.
Peregrine Falcon (<i>Falco peregrinus</i>)	OS	-	Possible	10 km	A single record from the 1970s occurs within 10 km. The species inhabits areas with cliffs, gorges, timbered watercourses, drainage lines, and rivers, wetlands, plains and open woodlands. The species may potentially occur in any habitat types within the Survey Area on occasion.
Letter-winged Kite (<i>Elanus scriptus</i>)	P4	-	Possible	10 km	Two records within 10 km from 1994. The species occurs in regions of open country and grasslands in arid and semi-arid zones where there are tree-lined streams or water courses. The species may potentially occur in any habitat type within the Survey Area.
Migratory Birds	-	-	Possible or Likely	N/A	Several species listed as Migratory under BC and/or EPBC Act are considered Likely or Possible to occur.

VU = Vulnerable; OS = other specially protected; and P = Priority.

Significant Fauna Habitat

There is a lack of unique or distinct habitats within the DE, with the salt lake only providing waterbird habitat during extreme inundation events. During these flood events, inland salt lakes can provide an abundance of food resources for waterbirds including aquatic invertebrates and macrophytes. The extent of available habitat within Lake MacLeod during these flood events is significant given the lake's size.

Short Range Endemic Invertebrates

The SRE desktop assessment identified at least 77 species (described and undescribed) belonging to SRE groups previously collected from within the search area, with 16 occurring within the Study Area. Groups represented include trapdoor spiders, snails, scorpions, pseudoscorpions, centipedes, millipedes and terrestrial slaters (Figure 25). Of the 37 described species, no Confirmed SRE species were recovered, ten were considered Potential SRE species and 27 as Widespread species.



The Potential SRE species include eight Unlikely Potential SRE species and two Likely Potential SRE species (Table 18). Unlikely Potential SRE species status can be applied in one of two cases:

- The species belongs to an SRE Group that has been collected from many sites; and/or multiple habitats; or
- The species belongs to a smaller taxonomic group within the SRE Group that tends not to contain SREs.

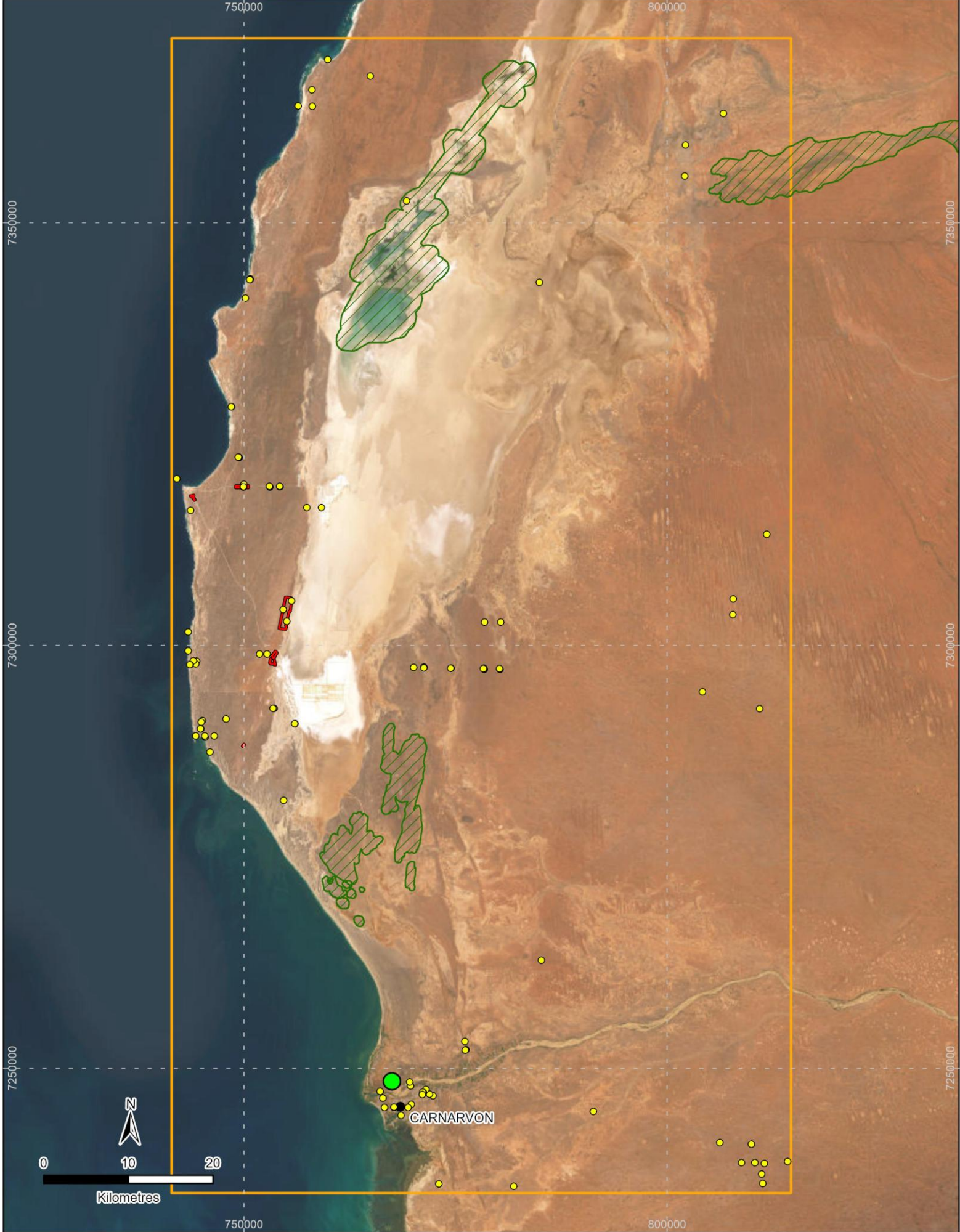
Likely Potential SRE species are from taxonomic groups in which SREs are likely, and when specimens have been collected from one or very few sites.

The spider species *Idiosoma incomptum*, also known as the Carnarvon shield-backed trapdoor spider, is part of the *nigrum*-group which includes three threatened species that are listed as endangered under the BC Act, listed as Priority 3 by DBCA.

Table 18: Potential SRE species found within the desktop search area

Highest Level ID	Lowest Identification	Closest record to Proposal	SRE Status
Land Snails			
Camaenidae	<i>Plectorhagada scolythra</i>	8.7 km	Unlikely Potential SRE
	<i>Quistrachia warroorana</i>	20.1 km	Unlikely Potential SRE
	<i>Rhagada torulus</i>	Within DE	Unlikely Potential SRE
	<i>Strepsitaurus cardabius</i>	45.3 km	Unlikely Potential SRE
Spiders			
Actinopodidae	<i>Missulena mainae</i>	3.4 km	Unlikely Potential SRE
	<i>Missulena terra</i>	3.7 km	Unlikely Potential SRE
Anamidae	<i>Hesperonatalius langlandsi</i>	6.5 km	Likely Potential SRE
	<i>Hesperonatalius maxwelli</i>	6.4 km	Likely Potential SRE
Idiopidae	<i>Bungulla quobba</i>	Within DE	Unlikely Potential SRE
	<i>Idiosoma incomptum</i>	15.8 km	Unlikely Potential SRE





Aquatic Fauna

Aquatic Invertebrates

Fifteen aquatic invertebrate taxa were recorded during the survey in May 2011. Crustaceans were the most dominant group (11 taxa), and in particular copepods, represented by the orders Calanoida, Cyclopoida and Harpacticoida, which were well distributed across the lake. Other fauna included calanoid and cyclopoid copepods, ostracods, a rotifer, mysid shrimp and chironomid representatives. There were no clear differences between assemblages across the lake, with similarities observed from sites north and south of the Lake MacLeod Project.

There were no rare or restricted species identified from Lake MacLeod during the May 2011 aquatic assessment. All of the taxa recorded are widespread occurring in WA waters and in many cases distributed in salt-affected and coastal environments overseas. A number of immature fish larvae were also collected in the invertebrate samples, likely to be common estuarine or marine species.

4.4 PROPOSED MITIGATION

LMPL has mitigated the potential impacts to this factor according to the mitigation hierarchy; Avoid, Minimise, Rehabilitate and Offset. Offsets are not expected to be required for this factor.

4.4.1 AVOID

LMPL utilised information from environmental surveys to conduct multiple operational planning and bund design revisions. These avoidance processes resulted in the final boundaries of the DE and indicative DF presented in this ERD.

4.4.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to terrestrial fauna are minimised:

- 1. Implement industry best practice management measures for terrestrial fauna:**
 - a. Vegetation clearing will be managed through internal ground disturbance procedures;
 - b. Boundaries of areas to be cleared or disturbed will be identified by GPS coordinates and clearly demarcated prior to clearing commencing;
 - c. Maps of boundaries will be provided to dozer operator to minimise clearing;
 - d. Progressive clearing will be undertaken;
 - e. The DF will be developed to the minimum required to ensure safe and adequate construction and operation;
 - f. Emergency response capabilities will be maintained to prevent fire outbreaks where possible;
 - g. Weed hygiene and management measures / procedures will be implemented to prevent spread of weeds and the introduction of new weed species as a result of construction and operation;
 - h. Any trenches will be dug with shallow interior slope angles or exit points to allow fauna escape;



- i. Any trenches will be progressively opened and closed;
 - j. Fauna egress mechanisms will be installed at all trenches and water ponds / crystallisers;
 - k. Any open trenches (if required) will be inspected less than two hours after sunrise for the presence of trapped fauna;
 - l. Barbed wire fences will not be installed at the Proposal;
 - m. Training will be provided to ensure that site personnel do not feed fauna;
 - n. Food wastes will be stored in bins that are not easily accessible to fauna;
 - o. Implement additional feral animal controls if required;
 - p. Low noise equipment will be used where practicable;
 - q. All incidents resulting in fauna injury or death will be reported internally;
 - r. Vehicle speed limits will be set and enforced;
- 2. Obtain and comply with the following approvals:**
- a. Ministerial Statement to be issued under Part IV of the EP Act (if assessed) or NVCP;
 - b. Works Approval(s) and Licence to be issued under Part V of the EP Act;
 - c. MCP to be approved under the Mining Act;
 - d. DG Licence issued under the *Dangerous Goods Safety Act 2004* if required;
- 3. Implement the following measures to minimise the risk and impact of hydrocarbon spills:**
- a. Hydrocarbons will be stored either within a bunded area or within self-bunded tanks;
 - b. All spills will be controlled, contained, and cleaned up as soon as practicable;
 - c. Service vehicles will be fitted with spill kits;
 - d. Spill kits will be located at all workshop and fuel storage areas;
 - e. Environmental incident recording, investigation and reporting system;
- 4. Comply with Water Quality Protection Guidelines and guidance notes**, particularly in relation to the storage and use of hydrocarbons and other harmful chemicals, the design and operation of vehicle maintenance areas and facilities, and the handling and storage of other waste materials, including contaminated soils; and
- 5. Design and construct crystallisers to be safe and stable according to DMPE requirements.**

4.4.3 REHABILITATE

At the completion of the Proposal the site will be rehabilitated to allow and encourage the natural establishment of vegetation. A MCP has been submitted for the broader Project and will be revised and resubmitted to incorporate the expansion (Appendix 5.5). The key rehabilitation measures from the MCP that relate to flora and vegetation are summarised below:

- Ground preparation including replacement of subsoil, topsoil and soil improvements;
- Seed sourcing and management;
- Application of seeds for revegetation;
- Non-native or naturalised flora will be removed from rehabilitation activity areas;
- Maintenance (including irrigation if/as required); and
- Crystallisers will be rehabilitated to an acceptable landform.



4.5 POTENTIAL ENVIRONMENTAL IMPACT

4.5.1 IDENTIFIED ENVIRONMENTAL IMPACTS

The following aspects have the potential to result in environmental impacts to all environmental values identified in Section 4.3.

Clearing of fauna habitat

Impacts to terrestrial fauna and their habitats due to changes in surface water hydrology on the lake are unlikely, due to the minimal influence of the Proposal on the inundation regime (refer to Section 5). The flood levee will result in less freshwater reaching the fringing vegetation to the south of the levee. There is an existing levee 2.5 km south of the proposed levee associated with the existing operations. Therefore, only the habitat between the two levees may be indirectly impacted as a result of altered hydrology from the Proposal. It is clear from the aerial imagery that there is very little vegetated habitat within this area with salt scarring apparent through the area. The capture of rainfall on the southern side of the levee would also likely lead to inundation, mirroring the inundation on the northern side of the levee.

The following potential impacts to terrestrial fauna were considered to be appropriately managed using industry-standard controls and are not discussed further in this ERD:

- Earthmoving or vehicle movements resulting in fauna death or injury;
- Introduction of weeds or feral fauna, resulting in competition with native fauna and a reduction in health of surrounding habitat;
- Alteration of fauna behaviour due to light or noise emissions;
- Concentration ponds and crystallisers attracting fauna and potential fauna entrapment;
- Altered fire regimes – as on-site fire control equipment is likely to be sufficient to ensure fires are controlled on-site; and
- Hydrocarbon spills - as only low volumes of hydrocarbons will be kept on site, and containment and clean up equipment will be available.

Up to 20 of the significant fauna recorded during the desktop assessment were considered unlikely to occur based on a lack of suitable habitat in the Survey Area and/or a lack of nearby contemporary records, and are unlikely to be significantly impacted by the implementation of the Proposal.

Based on the aquatic fauna results, there appears to be no apparent risk to aquatic biota from the proposed expansion. As long as some parts of the southern basin remain undisturbed, and surface flow is maintained, this will allow for the completion of reproductive cycles by organisms during future wet events.

4.5.2 PREDICTED ENVIRONMENTAL IMPACTS

Table 19 summarises the extent of the predicted direct and indirect impacts on terrestrial fauna. Additional assessment information that quantifies the extent of impacts is provided in the following sections.



Table 19: Impacts on fauna

Feature	Regional extent	Extent in Survey Area	Extent in DE	Extent in Indicative DF	Extent of indirect impacts	Level of certainty	Direct and indirect impacts	Cumulative impacts (incl. other Proposals)
Fauna Habitat								
<i>Acacia</i> shrublands on sandplains and sand dunes	N/A	255.7 ha	230.1 ha	12.4 ha	Negligible, indirect impacts to habitat likely to be restricted to areas on the fringes of cleared areas.	Some changes to the disturbance footprint in the borrow pit may occur if the borrow material in the proposed location is not suitable.	12.4 ha	9,134.1 ha (8,752 ha associated with the existing Lake MacLeod Project)
Limestone plains		367.8 ha	78.6 ha	26.7 ha			26.7 ha	
<i>Tecticornia</i> saltmarshes		10.7 ha	5.4 ha	3.9 ha			3.9 ha	
Salt lake	Lake MacLeod is 188,145 ha	N/A	339.1 ha	339.1 ha			339.1 ha	
Significant Fauna Habitat								
Gnaraloo Mulch Slider (<i>Lerista haroldi</i>)	N/A	623.5 ha	308.7 ha	39.1 ha	Negligible, indirect impacts to habitat likely to be restricted to areas on the fringes of cleared areas.	Some changes to the disturbance footprint in the borrow pit may occur if the borrow material in the indicative DF location is not suitable.	39.1 ha	9,134.1 ha (8,752 ha associated with the existing Lake MacLeod Project)
Southern Whiteface (<i>Aphelocephala leucopsis</i>)		255.7 ha	230.1 ha	12.4 ha			12.4 ha	
Peregrine Falcon (<i>Falco peregrinus</i>)		634.2 ha (excl. Salt lake)	653.2 ha	381.7 ha			381.7 ha	
Letter-winged Kite (<i>Elanus scriptus</i>)		634.2 ha (excl. Salt lake)	653.2 ha	381.7 ha			381.7 ha	
Migratory Birds		634.2 ha (excl. Salt lake)	653.2 ha	381.7 ha			381.7 ha	

Significant Fauna Habitat

Section 4.3.2 identified 26 significant fauna species that have the potential to occur within the Survey Areas. All 26 species were identified as having widespread habitat that may be impacted by the Proposal and therefore were considered to be key environmental values requiring assessment. No fauna habitats were identified as being restricted to the DE. Direct impacts to fauna habitat are shown in Figure 26.

Gnaraloo Mulch Slider (*Lerista haroldi*)

The Gnaraloo Mulch Slider is considered likely to occur within the DE and is listed as P1 under the BC Act. *Acacia* shrublands on sandplains and sand dunes and limestone plains are considered potential habitat for the species. Due to the recorded individual in the Survey Area 15 km north of the DE on a previous survey, the species was considered likely to occur. The Proposal will require disturbance of up to 39.1 ha of potential habitat out of the 623.5 ha mapped within the Survey Area (6.3%).

Southern Whiteface (*Aphelocephala leucopsis*)

The Southern Whiteface is considered possible to occur within the DE and is listed as P4 under the BC Act. *Acacia* shrublands on sandplains and sand dunes is considered potential habitat for the Southern Whiteface. The Proposal will require disturbance of up to 12.4 ha of potential habitat out of the 255.7 ha mapped within the Survey Area (4.8%).

Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is considered possible to occur within the DE and is listed as Specially Protected (OS) under the BC Act. Given the wide-ranging habitat usage of this species, all of the habitat types mapped within the DE could provide potential habitat for the Peregrine Falcon on occasion. The Proposal will require disturbance of up to 381.7 ha of this potential habitat.

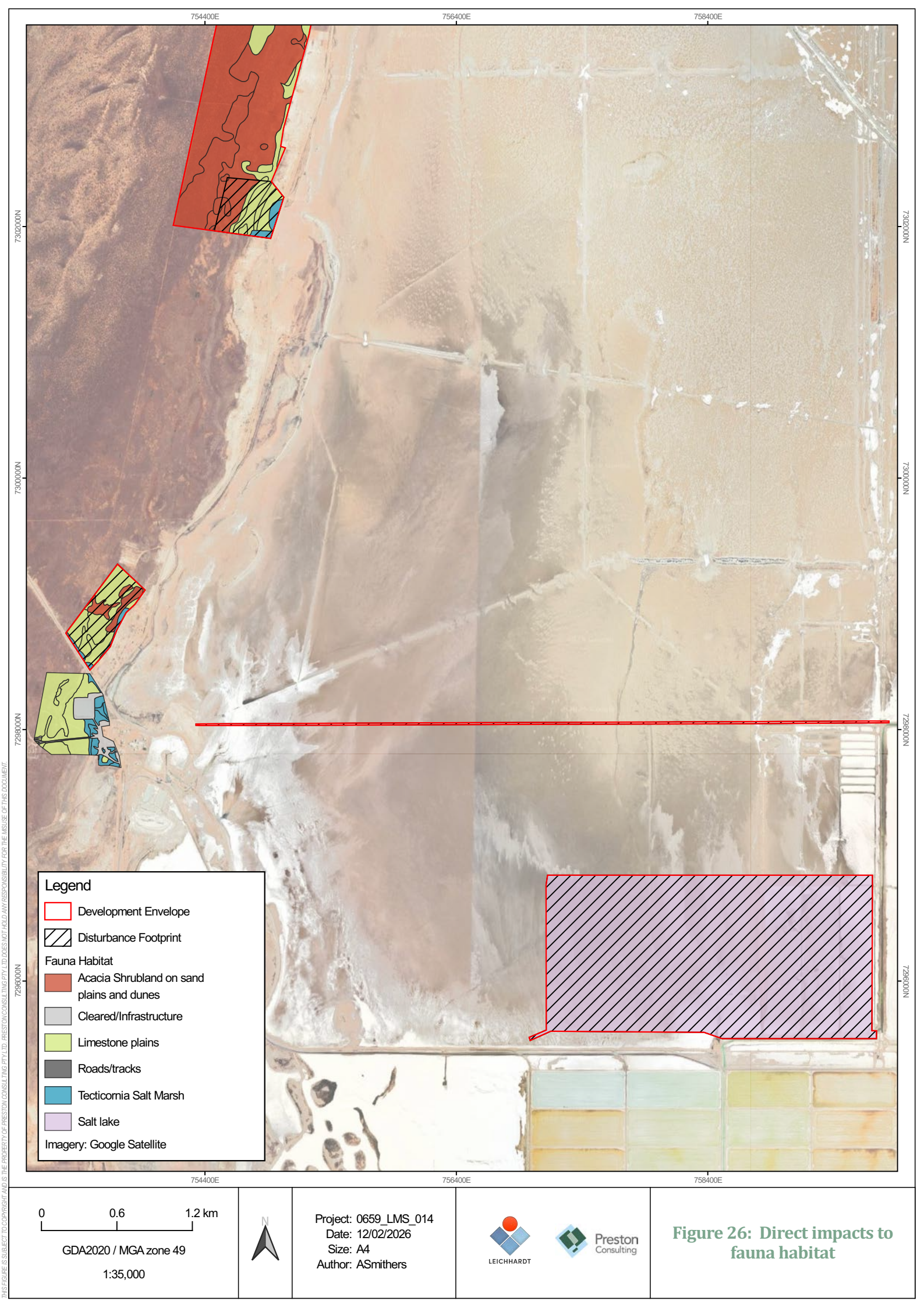
Letter-winged Kite (*Elanus scriptus*)

The Letter-winged Kite is considered possible to occur within the DE and is listed as P4 under the BC Act. Given the wide-ranging habitat usage of this species, all of the habitat types mapped within the DE could provide potential habitat for the Letter-winged Kite on occasion. The Proposal will require disturbance of up to 381.7 ha of this potential habitat.

Migratory Birds

Migratory Birds have been considered as both likely to occur and possible to occur within the DE, listed as Migratory under the BC Act or EPBC Act. Migratory Birds are likely to occur when the lake is in full flood. During that time, they will most likely utilise *Tecticornia* saltmarshes and salt lake as habitat, followed by *Acacia* shrublands on sandplains and sand dunes and limestone plains. The Proposal will require disturbance of up to 381.7 ha of this potential habitat.





Legend

- Development Envelope
- Disturbance Footprint
- Fauna Habitat**
- Acacia Shrubland on sand plains and dunes
- Cleared/Infrastructure
- Limestone plains
- Roads/tracks
- Tecticornia Salt Marsh
- Salt lake

Imagery: Google Satellite

0 0.6 1.2 km

GDA2020 / MGA zone 49

1:35,000



Project: 0659_LMS_014
 Date: 12/02/2026
 Size: A4
 Author: ASmithers

Figure 26: Direct impacts to fauna habitat

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4.6 ASSESSMENT OF SIGNIFICANCE OF RESIDUAL IMPACT

4.6.1 GENERAL FAUNA AND ASSOCIATED HABITAT

Proposal

The Proposal will result in the loss of 381.7 ha of fauna habitat (Table 19). An assessment of the impacts of the direct disturbance of fauna habitat has been provided below. Where more detail is warranted (i.e., for specific species), it has been provided in subsequent sections:

- *Acacia* shrublands on sandplains and sand dunes – an estimated 12.4 ha of this habitat is proposed to be disturbed. This equates to 2% of the extent within the Survey Area, and this habitat is widespread and not restricted to the DE. This habitat type holds value as potential widespread habitat for the Migratory birds, Southern Whiteface, Letter-winged Kite, Peregrine Falcon and Gnarlou Mulch Slider;
- Limestone plains – an estimated 26.7 ha of this habitat is proposed to be disturbed. This equates to 4.2% of the extent within the Survey Area and this habitat is also widespread and not restricted to the DE. This habitat type holds value as potential widespread habitat for the Letter-winged Kite, Peregrine Falcon and Gnarlou Mulch Slider;
- *Tecticornia* saltmarshes – an estimated 3.9 ha of this habitat is proposed to be disturbed. This equates to 0.6% of the extent within the Survey Area and this habitat is not restricted to the DE (extends around the majority of Lake MacLeod). This habitat type holds value as potential foraging habitat for Migratory birds when water is present; and
- Salt lake – an estimated 330.4 ha of this habitat is proposed to be disturbed. This equates to 0.2% of the extent of Lake MacLeod, or 0.2% when the entire Lake MacLeod Project is considered. This habitat type holds value as foraging habitat for Migratory birds when water is present.

None of these habitats are restricted to the DE and will remain well represented within the Survey Area and the surrounding region. *Tecticornia* saltmarshes and Salt lake habitats become potential habitat when water is present, providing negligible habitat value for the remainder of the time.

The loss of widespread habitat within the DE is unlikely to result in significant impacts to fauna populations, with no restricted habitats and extensive alternative habitat in the surrounding area.

Cumulative Impacts

Cumulative impacts to general fauna habitat in the region are best assessed in the context of remaining extent. This assessment was conducted in terms of total remaining native vegetation in Section 3.6.1. The findings of that assessment identified that there are no planned projects within the vicinity of the Proposal that would be considered as a cumulative impact. The existing Lake MacLeod Project has already been accounted for in the regional remaining vegetation mapping. All of the vegetation associations that will be impacted will have more than 90% of their pre-European extent remaining following implementation of the Proposal, with no cumulative impacts to be considered.



Summary

The Proposal will result in direct disturbance of approximately 381.7 ha of fauna habitat, 43 ha of which is considered to be in Very Good to Completely Degraded condition (remaining disturbance is within the salt lake). While habitats were all noted to be widespread and common in the region, several provide suitable habitat for significant fauna species, discussed separately in the sections below.

4.6.2 SIGNIFICANT FAUNA

Proposal

Gnaraloo Mulch Slider (Lerista haroldi)

The Gnaraloo Mulch Slider was previously confirmed to occur within the Survey Area, 15 km north of the DE however, no sightings or evidence of its presence was observed during exploration activities, Aboriginal Heritage surveys, fauna surveys or flora and vegetation surveys (including foot traverses and targeted surveys). This species may occur across the habitats within the DE, however only on occasion.

The Gnaraloo Mulch Slider is a poorly-known species with limited studies and information available. The species is known from one locality on the upper west coast of WA (Storr, 1983), found within the Shire of Carnarvon and the Shire of Exmouth with a habitat preference of grasslands.

As discussed above, the Proposal will result in the clearing of an estimated 39.1 ha of potential Gnaraloo Mulch Slider habitat (12.4 ha of *Acacia* shrublands on sandplains and sand dunes and 26.7 ha of limestone plains). At least 98% of *Acacia* shrublands on sandplains and sand dunes habitat and 95.8% of limestone plains habitat will remain uncleared within the Survey Area, with both habitats known to be well represented in the surrounding area.

The mitigation measures proposed to minimise indirect impacts are predicted to result in minimal impacts on habitat and behaviour of this species.

Given the small habitat disturbance, the maximum loss of up to 39.1 ha of habitat is considered unlikely to significantly impact the viability of this species.

Southern Whiteface (Aphelocephala leucopsis)

The Southern Whiteface was identified as potentially occurring within the DE; however, no sightings or evidence of its presence was observed during LMPL exploration activities, Aboriginal Heritage surveys, fauna surveys or flora and vegetation surveys. This species may occur within the DE however only on occasion.

Southern Whiteface occurs across most of mainland Australia south of the tropics, from the north-eastern edge of the WA wheatbelt, east to the Great Dividing Range (Onshore Environmental, 2025; Appendix 5.1).



Due to the proximity of recent records and the Survey Area containing potential foraging habitat, Southern Whiteface were classified as possibly occurring in the Survey Area. Based on the fauna habitats presented in the Survey Area, a portion of the area likely provides supportive foraging habitat within the *Acacia* shrublands on sandplains and sand dunes.

The Proposal will result in the clearing of approximately 12.4 ha of potential Southern Whiteface foraging habitat (2% of the mapped extent within the Survey Area). While the disturbance footprint location within the borrow pit area may change slightly to access suitable material, it is likely that at least 98% of foraging habitat will remain within the Survey Area, with all impacted habitats known to be well represented in the surrounding area.

The mitigation measures proposed to minimise indirect impacts are predicted to result in minimal impacts on habitat and behaviour of this species.

Given the wide foraging range of this species, the estimated loss of 12.4 ha of foraging habitat is considered unlikely to significantly impact the viability of this species.

Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon was identified as potentially occurring within the DE; however, no sightings or evidence of its presence was observed during LMPL exploration activities, Aboriginal Heritage surveys, fauna surveys or flora and vegetation surveys. This species may occur within the DE however only on occasion.

In the Gascoyne region, Peregrine Falcons are considered rare, whilst they are moderately common in the Stirling Range, and uncommon in the Kimberley, Hamersley and Darling Ranges. The Peregrine Falcon is often recorded along cliffs above rivers, ranges and wooded watercourses where it hunts birds (Onshore Environmental, 2025; Appendix 5.1). It typically nests on rocky ledges occurring on tall, vertical cliff faces between 25–50 m high. It also appears to prefer nesting on ledges a reasonable distance from the top of the cliff, possibly to avoid predators. Nesting also occasionally occurs in tall trees along drainage lines, including use of abandoned nests of other large bird species. The species mate for life, with a home range of approximately 20 - 30 km².

Due to the Survey Area containing potential foraging habitat, the Peregrine Falcon was classified as possibly occurring in the Survey Area. Based on the fauna habitats presented in the Survey Area, a portion of the area likely provides supportive foraging habitat within the *Acacia* shrublands on sandplains and sand dunes, limestone plains and *Tecticornia* saltmarshes.

The Proposal will result in the clearing of approximately 381.7 ha of potential Peregrine Falcon foraging habitat (0.03% of native vegetation within 20 km). While the disturbance footprint location within the borrow pit area may change slightly to access suitable material, it is likely that at least 99% of vegetated habitat within 20 km of the Proposal will remain in the local region, with all impacted habitats known to be well represented in the surrounding area. The mitigation measures proposed to minimise indirect impacts are predicted to result in minimal impacts on habitat and behaviour of this species.

Given the wide foraging range of this species, the estimated loss of 381.7 ha of foraging habitat is considered unlikely to significantly impact the viability of this species.



Letter-winged Kite (*Elanus scriptus*)

The Letter-winged Kite was identified as potentially occurring within the DE; however, no sightings or evidence of its presence was observed during LMPL exploration activities, Aboriginal Heritage surveys, fauna surveys or flora and vegetation surveys. This species may occur within the DE however only on occasion.

Letter-winged Kites are endemic to Australia, primarily occurring in the Eastern Australian arid zone, but occasionally irrupt to other areas of the arid and semi-arid zones, and dispersing individuals have been encountered at the coastal margins of all mainland states (Onshore Environmental, 2025; Appendix 5.1). The core range is poorly known with most records from the Cooper Creek drainage system and the Strzelecki and eastern Simpson Deserts. During wetter periods, Letter-winged Kites disperse widely across all regions of the continent. Habitat suitability can fluctuate greatly, models suggest at least 60,000 km² has remained suitable in even the driest years since 1998. While the locations of records vary greatly in extent and location between years, there is no evidence of any decline in range.

Due to the proximity of previous records and the Survey Area containing potential foraging habitat, the Letter-winged Kite was classified as possibly occurring in the Survey Area. Based on the fauna habitats presented in the Survey Area, a portion of the area likely provides supportive foraging habitat within the *Acacia* shrublands on sandplains and sand dunes, limestone plains, *Tecticornia* saltmarshes and salt lake.

The Proposal will result in the clearing of approximately 381.7 ha of potential Letter-winged Kite foraging habitat (0.03% of native vegetation within 20 km). While the disturbance footprint location within the borrow pit area may change slightly to access suitable material, it is likely that at least 99% of vegetated habitat will remain in the local region, with all impacted habitats known to be well represented in the surrounding area.

The mitigation measures proposed to minimise indirect impacts are predicted to result in minimal impacts on habitat and behaviour of this species.

Given the wide foraging range of this species, the estimated loss of 381.7 ha of foraging habitat is considered unlikely to significantly impact the viability of this species.

Migratory Birds

One Migratory bird species; the Glossy Ibis (*Plegadis falcinellus*), was identified during the fauna survey, outside of the Survey Area and DE. The remaining previously listed potential migratory bird species had no sightings or evidence of presence observed during LMPL exploration activities, Aboriginal Heritage surveys, fauna surveys or flora and vegetation surveys. Migratory birds may occur within the DE, however this is likely to be only following substantial rainfall or lake flooding.

Following substantial rainfall or lake flooding, Migratory birds may utilise *Tecticornia* saltmarshes as foraging habitat, followed by *Acacia* shrublands on sandplains and sand dunes, limestone plains and salt lake. During these events, the majority of the 188,145 ha Lake MacLeod would be under similar conditions, which would result in a large increase in potential habitat for these species. During normal conditions, the higher value habitat is limited to the Northern Ponds area of Lake MacLeod, well away from the Proposal.



The Proposal will require disturbance of up to 381.7 ha of this potential occasional habitat for Migratory birds. Given the availability of foraging habitat for these species during the rainfall / flooding events, the estimated loss of 381.7 ha of foraging habitat is considered unlikely to significantly impact the viability of any Migratory bird species.

Cumulative Impacts

The significant fauna listed above are listed species due to a number of threats, however a common threat is habitat degradation or loss. All habitats within the DE are widespread and remain well represented in the surrounding area. As stated in Section 3.3.2, all of the vegetation associations that will be impacted will have more than 90% of their pre-European extent remaining (Table 8) after all current and planned projects are developed.

Based on the above, the Proposal is unlikely to result in significant impacts to significant fauna.

Summary

The Proposal will result in direct disturbance of approximately 381.7 ha of fauna habitat, all of which is considered to be in Very Good to Degraded condition and may be utilised on rare occasions by significant fauna species. All habitats were noted to be widespread, therefore due to the small habitat disturbance; the loss of suitable fauna habitat was not considered significant.

4.7 ENVIRONMENTAL OUTCOMES

The EPA's environmental objective for this factor is to "protect terrestrial fauna so that biological diversity and ecological integrity are maintained". In the context of this objective: "ecological integrity" is listed as the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements (EPA, 2016b).

LMPL has incorporated extensive avoidance, minimisation and rehabilitation measures into the Proposal design and operational processes, however some direct and indirect impacts to terrestrial fauna are unavoidable. The Proposal will result in disturbance to 381.7 ha of terrestrial fauna habitat. All vegetation is considered to be in Very Good to Completely Degraded condition (no disturbance to pristine vegetation). All of these habitats are however well distributed throughout the region and species that potentially use the DE generally have relatively wide-ranging distributions and/or will persist in adjoining unaffected areas given the presence of extensive areas of similar habitat nearby.

The predicted outcomes for Terrestrial Fauna are therefore:

- Disturbance of no more than 381.7 ha of fauna habitat;
- No reduction in the abundance and diversity of migratory birds utilising the salt lake habitats; and
- No losses of fauna habitat that would significantly affect the viability of any significant fauna species.

The above outcomes can all be assured by the conditions of a Native Vegetation Clearing Permit if the Proposal is not assessed under Part IV of the EP Act.

Based on the above, LMPL considers that the Proposal can be implemented such that there are no significant residual impacts to this factor, and the EPA objective can be met.



5 INLAND WATERS

5.1 EPA ENVIRONMENTAL FACTOR AND OBJECTIVES

The EPA Objective for this key environmental factor is to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

5.2 RELEVANT POLICY AND GUIDANCE

Relevant EPA and Commonwealth Government guidance documents for Inland Waters are summarised in Table 20.

Table 20: Policy and guidance relevant to the Inland Waters key environmental factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023b)	This document was considered in the preparation of this ERD and to inform EIA.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document was considered in the preparation of this ERD and to inform EIA
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document was considered in the preparation of this ERD and to inform EIA
Instructions on how to prepare an Environmental Review Document (EPA, 2025a)	This document was considered in the preparation of this ERD and to inform EIA
EIA Practice Guide (EPA, 2025b)	This document was considered in the preparation of this ERD and to inform EIA
Relevant EPA Factor Guidelines	
Environmental Factor Guideline – Inland Waters (EPA, 2018).	This document was considered in the preparation of this section (Section 5) of the ERD.
Other Policy and Guidance	
Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018).	This document was considered in the preparation of this section (Section 5) of the ERD.
WA Environmental Offsets Policy (EPA, 2011).	This document was considered when determining whether offsets were expected to be required for this factor.
WA Environmental Offsets Guidelines (EPA, 2014a).	This document was considered when determining whether offsets were expected to be required for this factor.
WA Environmental Offsets Template (EPA, 2014b).	This document was considered when determining whether offsets were expected to be required for this factor.



5.3 RECEIVING ENVIRONMENT

Information within this section has been sourced from the Aquatic Assessment of Lake MacLeod (Outback Ecology, 2011; Appendix 5.3) and Lake MacLeod Operations Hydrogeological Expansion Pre-Feasibility Study (Groundwater Resource Management (GRM), 2014; Appendix 5.4), undertaken for the Lake MacLeod Project and surrounding areas.

5.3.1 SURVEYS AND STUDIES

A series of field surveys were undertaken to collect additional and higher quality data of the conditions on Lake MacLeod (GRM, 2014; Appendix 5.4). Key activities that occurred during these surveys included:

- Drilling and construction of monitor bores at nine locations within the salt field to measure groundwater conditions within the near surface hydrological units, and equipping bores with transducers/dataloggers to monitor groundwater levels; and
- Collection of groundwater and surface water monitoring data.

Groundwater monitoring locations are shown in Figure 27.



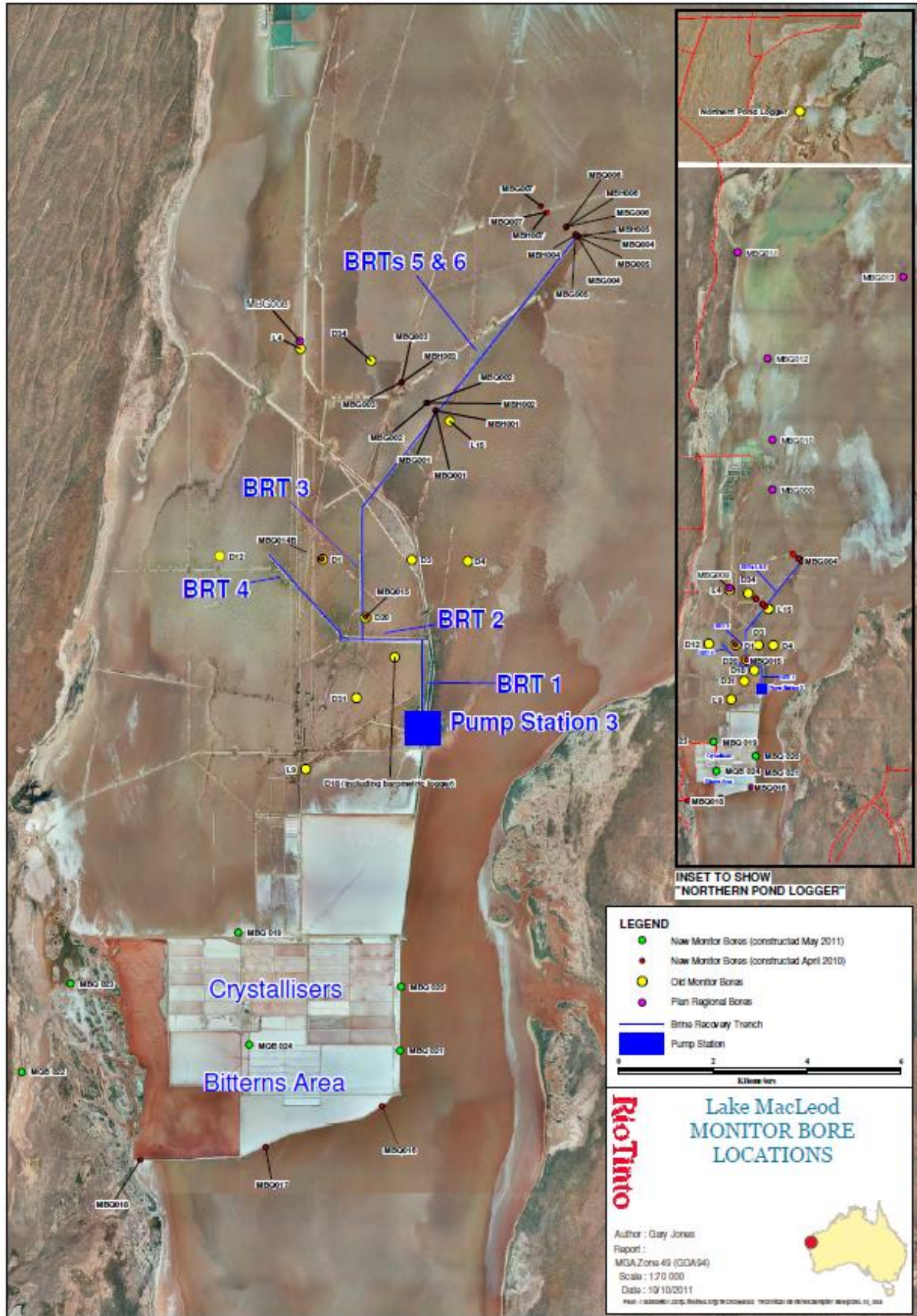


Figure 27: Existing operation and groundwater monitoring locations



5.3.2 EXISTING ENVIRONMENT

Climate

The climate of the Carnarvon area is arid to semi-arid with annual rainfall approximating 200 mm across the region. Summer temperatures are hot with the maximum summer temperature for Carnarvon averaging 32.6°C during February. Winter temperatures are mild with the minimum winter average dropping to 10.9°C during July (Bureau of Meteorology (BoM), 2025). The average annual rainfall at the Carnarvon Airport (ID: 6011) is 219.8 mm with the highest totals generally occurring in winter (averaging >40 mm in June and July).

Monthly rainfall totals at Carnarvon Airport prior to the May 2025 field survey period were below average with 3.9 mm recorded in January and 10 mm recorded in May (BoM, 2025) (Figure 28). Seasonal conditions at the time of survey were very dry.

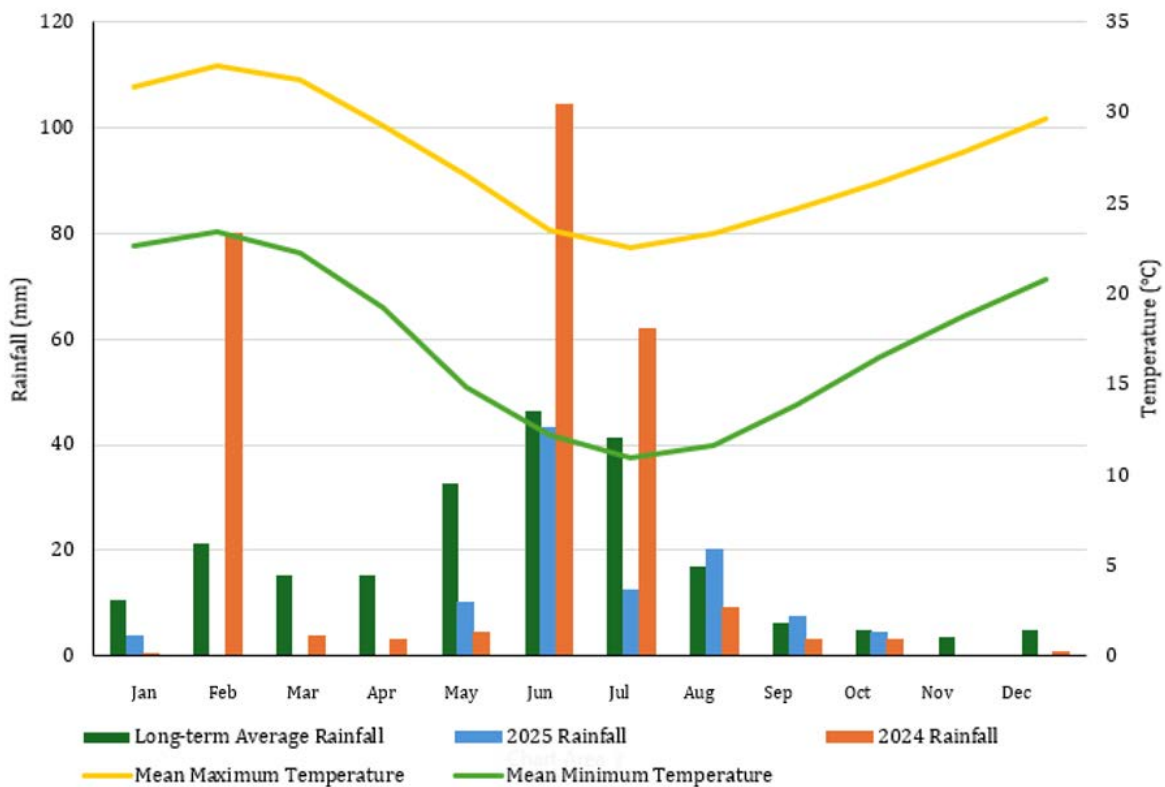


Figure 28: Rainfall and temperature data (Carnarvon Aero Weather Station 006011)

Flooding

Water in the Northern Ponds of Lake MacLeod is supplied by subterranean links to the ocean. A number of ephemeral rivers and creeks discharge into Lake MacLeod, including Lyndon River, Minilya River, Cardabia Creek and Boolathanna Creek.



These rivers and creeks deliver water to Lake MacLeod intermittently as a result of summer cyclonic activity or winter rainfall. After significant rain events, the entire surface of Lake MacLeod becomes inundated with a flood sheet up to 2 m deep. A flood sheet may develop approximately one year in six, on average (Logan, 2003).

Major flooding from the Gascoyne River occurs infrequently, with significant historical flows to the lake occurring in 1960, 1961, 1980, 1995, 2000 and 2010. The 2010 flood was the largest recorded flood over this period with water contributed by all rivers and local rainfall. Most floods occur during the cyclone season (February-March) and in mid-winter (May-June). Flooding was analysed from historical Google Earth imagery ranging between 1984 - 2020. Flooding typically expands from the Northern Ponds, extending southwards. Another flooding area occurs between the Lake MacLeod Salt and Gypsum Operations, accumulating and expanding outwards.

Climate Change

Climate projections for the Central-west region, in which Lake MacLeod is located, show a drying trend out to 2100, forecasting reduction of annual rainfall between 1% and 26% and a temperature rise between 1.9°C and 3.3°C, depending on the model scenario (Department of Water, 2015).

The latest Intergovernmental Panel on Climate Change (IPCC) report (IPCC, 2021) confirms climate change poses a serious risk to WA under all emissions scenarios. By 2050 the following changes are projected:

- Tropical cyclones appear to reduce, but inter-decadal variability overshadows the slight changes in the frequency of the total numbers of tropical cyclones for the region. A potential increase in the proportion of high intensity tropical cyclones is anticipated;
- Quasi-biennial and 3–4-year oscillations in the future climate temperature and rainfall records. This effect is likely to be passed on to the air temperatures through associated changes in the strength of the Leeuwin and Ningaloo Currents;
- Significant multi-decadal scale oscillations were observed in the rainfall climates, both historical and future, for many months of the year;
- A warming trend was predicted for the region around Lake MacLeod, although it was predicted to be significantly less than for the inland locations near Tom Price and slightly below that for the Dampier region; and
- A sustained drying of the climate was predicted for the Lake MacLeod region for the months from January to August inclusive.

Possible warming and drying of the climate would be conducive to increased salt production, due to more favourable conditions for evaporation. However, higher intensity tropical cyclones would not only be adverse for salt production but would be more likely to cause damage to the Lake MacLeod Project.

Groundwater

The groundwater monitoring information below was previously conducted by GRM for a Pre-Feasibility Study in 2014, commissioned by DSL for the investigation of expansion options of the Lake MacLeod Project.



There is both a shallow and deep groundwater system at Lake MacLeod. The shallow system comprises the Ibis Gypsite and Texada Halite aquifers. These are underlain by a layer of low permeability Cygnet Carbonate, which restricts flows to the deeper groundwater system comprising the Quobba Aquifer and Trealla Limestone (GRM, 2014; Appendix 5.4).

Laterally the very high permeability Texada Halite pinches out against the overlying Ibis Gypsite and Cygnet Carbonate. However, the gypsite does on-lap onto the Quobba Aquifer to the north, east and west; and is contiguous with the Boolathanna Formation to the south, thereby facilitating lateral flows between the shallow and deep systems along these margins.

The deeper groundwater system extends beyond the footprint of the lake and overlies the Krojon and Toolonga Calcarenites, which are considered to be aquitards and provide a base to the deeper system. The Trealla Limestone outcrops along the coast and include karst structures that hydraulically link Cygnet Pond to the Indian Ocean (Figure 29).

Horizontal groundwater flows in the shallow groundwater system are generally to the south and east from the recharge zones near to and south of Cygnet and Ibis Ponds, towards the regional depressions in the lake surface at the Ralph and Texada Sinks. The vertical flow regime is poorly understood.

Groundwater recharge to the near surface lake deposits will be from infiltration from brine sheets flowing south from Ibis Pond and from periodic infiltration of brackish to saline water from flood sheets.



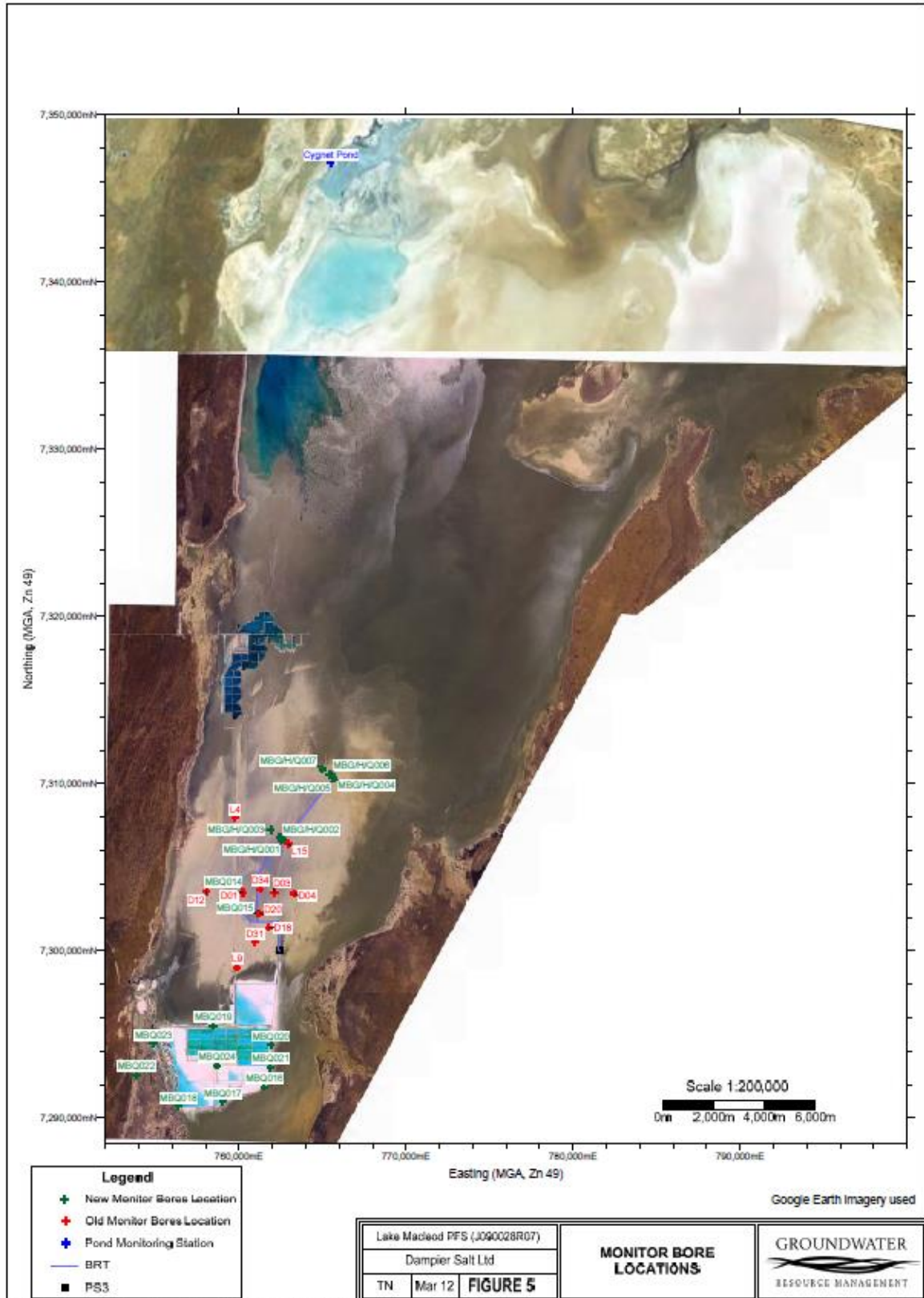


Figure 29: Existing layout and the Ibis and Cygnet Ponds



Geology and Geomorphology

The Proposal lies within the Carnarvon Basin, which stretches between Geraldton and Karratha. The basin contains up to 15,000 m of sediments overlying Pre-Cambrian crystalline basement. The sediments range in age from Silurian to Tertiary and comprise marine to fluvial deposits reflecting tectonic activity and various marine transgressions and regressions that have affected the basin.

Lake MacLeod covers an area of about 2,000 km² with a length of around 140 km. The narrow northern third of the lake is partially isolated from the southern part of the lake by the Sandy Bluff Sill. South of the sill the lake is at its widest (approximately 40 km) with Minilya Bay forming its eastern margin. The lake narrows again to the south.

Sandy calcareous soils, which are low in organic matter, dominate the coastal area in which Lake MacLeod is located. The soils within and adjacent to Lake MacLeod are mostly classified as Salt Lake Soil. Salt Lake Soil is typically wet to within 80 cm of the surface level for a major part of the year, has variable textures, is often gypseous and/or calcareous and highly saline, with primary areas of salinity occurring on salt lake beds and adjacent flat saline areas. The latter areas are often vegetated with salt-tolerant flora species (halophytes). Lake MacLeod Project areas are located on hydrosols, chromosols and rudosols.

Hydrogeology

The underlying geology of Lake MacLeod is referred to as MacLeod Evaporite, which is comprised of Ibis Gypsite, Texada Halite and Cygnet Carbonate. The MacLeod Evaporite covers the majority of Lake MacLeod.

Ibis Gypsite is the uppermost layer of the MacLeod Evaporite and forms the surface of Lake MacLeod. The gypsite layer has low permeability and varies in thickness from 2 – 6 m across the lake. The low permeability Ibis Gypsite acts as an aquiclude above the Texada Halite aquifer, limiting movement of brine from the aquifer to the lake surface. Pressure in the Texada Halite aquifer can drive brine levels up to 1 m above the aquifer surface when the Ibis Gypsite layer is ruptured.

The Texada Halite aquifer is a rock salt aquifer which underlies the Ibis Gypsite. The aquifer is 5 - 6 m and is contained under pressure between the overlying low permeability Ibis Gypsite and the underlying impermeable Cygnet Carbonate. The brine used in production of salt at the Lake MacLeod Project is drawn from the Texada Halite aquifer.

The bottom layer of the MacLeod Evaporite is a low permeability carbonate layer approximately 1 m thick, known as Cygnet Carbonate. The Cygnet Carbonate provides the bottom hydroseal layer of the MacLeod Evaporite and prevents exchange of groundwater with underlying strata. Located in the southern extent of the MacLeod Evaporite is the Texada Sill.

At the Texada Sink, the underlying geological layers are Boolathanna Formation Pilot Member, calcrete horizon, and Quobba Sands. The Boolathanna Formation Pilot Member is the surface layer, approximately 1 – 2 m thick and is comprised of calcareous quartz sand interlayered with clay, gypsite and skeletal sand. The calcrete horizon is a 0.05 - 0.2 m thick layer of laminar calcrete that acts as a low permeability hydroseal.



The hydroseal is maintained in the north by overlap with the Cygnet Carbonate. The hydroseal is essentially continuous, although there are some solution holes that provide limited hydraulic connection across the hydroseal (Logan, 1987b).

The primary inflow to Lake MacLeod is seawater seepage, through four currently active seepage faces: Gnaraloo, Cygnet Marsh, Quobba and Bejaling (Logan, 1987b).

A long section of the hydrogeology at Lake MacLeod is illustrated in Figure 30.

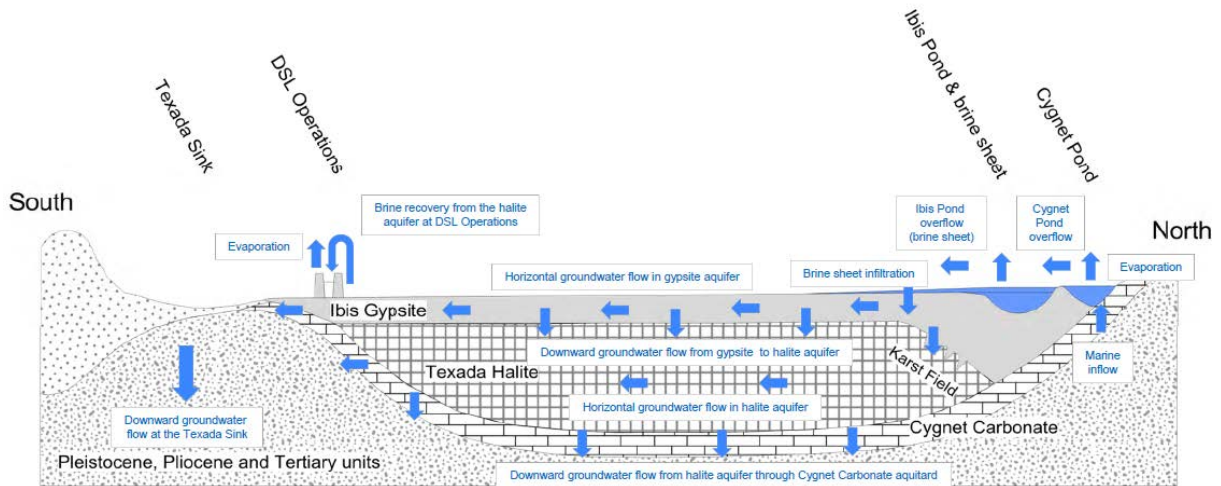


Figure 30: Schematic hydrogeology long-section

Groundwater Quality

Groundwater samples were collected from targeted locations and were analysed for key potential chemical substances of concern (GRM, 2014).

Hydrogeochemical studies found the ratio of magnesium to both bromide and potassium are significantly higher in the samples of the Texada Halite salt (i.e., solids samples of the halite unit) compared to the groundwater collected from halite monitoring bores, although the absolute concentration of magnesium in the halite is much lower than in the surrounding groundwater. This variance suggests the high salinity of the halite groundwater is not primarily a result of halite dissolution, which supports the conclusion that the current operation is harvesting rather than mining salt; and is therefore sustainable.

Groundwater samples were also taken once during the 2023 review period as per the DWER licence. Samples were tested for basic parameters (pH, EC, dissolved oxygen), salts, nutrients and metals. During 2023, all parameters were within normal historical ranges.

Groundwater Levels, Flow Direction and Salinity

General trends show gradually declining levels in all three aquifers with generally upward heads (i.e., water levels in the Quobba Sand Aquifer are higher than those in the adjacent Texada Halite bore), indicating groundwater flows are upward through the Cygnet Carbonate.



Salt Field Bores

The Ibis Gypsite was dry in all bores at the time of construction in 2010, indicating the water table was below the gypsite and within the Texada Halite. Groundwater levels indicated generally upward heads (i.e., water levels in the Quobba Sand Aquifer are higher than those in the adjacent Texada Halite bore), suggesting groundwater flows are upward through the Cygnet Carbonate.

Groundwater flow rates of 5 L/s or greater (based upon field measurements during drilling) were observed in the Texada Halite, which is consistent with the high hydraulic conductivities estimated for this unit by CyMod.

Groundwater quality in the Gypsite, Texada Halite and Quobba Sand was hypersaline as would be expected in close proximity to the halite body, with near neutral pH.

Crystalliser/Bitterns Storage Area

Groundwater levels in the bores located around the southern end of the Bitterns Storage Area (Figure 27), which were installed in 2010 when the lake was dry, showed artesian pressures (vertical upward flows). The groundwater salinity at the time of bore installation was lower compared to the groundwater in the salt field bores (Specific Gravity 1.0 and Electrical Conductivity 1,330 mS/m, equivalent to about 8,000 mg/L TDS). This indicates a brackish recharge source at a higher elevation to the lake surface, most likely the Quobba Sand along the Barrier west of the lake.

Groundwater levels in the bores installed in 2011 (MBQ019 to 024; Figure 27), located on the northern and eastern side of the crystallisers/Bitterns Storage Area (MBQ019 to 021 and 024; Figure 27) showed water levels similar to the surrounding lake flood water levels. The quality of the groundwater was also hypersaline with a Specific Gravity of about 1.2 which is consistent with the feed brine. This suggests movement of brine downward either from the lake water or from brines in the crystallisers and Bitterns Storage Area, i.e., a reverse of the condition observed when the lake was dry.

Groundwater levels in bores MBQ022 and 023, when they were installed, were close to surface and the quality of the groundwater was higher than in MBQ019 to 021 and 024, with Specific Gravities (SG) of 1.032 in MBQ022 the western most bore and 1.129 in MBQ023. This indicates a reduced influence from downward seepage of flood water brines moving westward onto the Barrier, most likely due to continued effects of lower salinity recharge from the Quobba Sands west of the lake.

Historic water quality data from Quobba Sand drill-holes located across Lake MacLeod showed SGs ranging from 1.078 (equivalent to 164,000 mg/L TDS) at the western margin of the lake south of Lake MacLeod Project to 1.219 (equivalent to 460,000 mg/L TDS) in the salt field. It is possible the presence of lower salinity groundwater west of the lake is due to rainfall recharge over the Barrier and westward groundwater flows to the lake. Similar conditions are expected on the eastern lake margin.



Inland Surface Waters

Information outlined below has been sourced from an aquatic assessment of Lake MacLeod in 2011 conducted by Outback Ecology (2011; Appendix 5.3) for an expansion of the Lake MacLeod Project, following a substantial flooding event. This study is the most recent for surface water quality. Information has also been sourced from the Lake MacLeod Closure Plan (Leichhardt, 2025; Appendix 5.5).

Catchment characteristics

The Proposal lies within the Gascoyne River Catchment and the Lyndon-Minilya Rivers Catchment. The Gascoyne River Catchment is an ephemeral unique river system of west-central WA, flowing intermittently for one-third of the year. The Gascoyne River is the largest of the three major rivers in WA, stretching approximately 865 km.

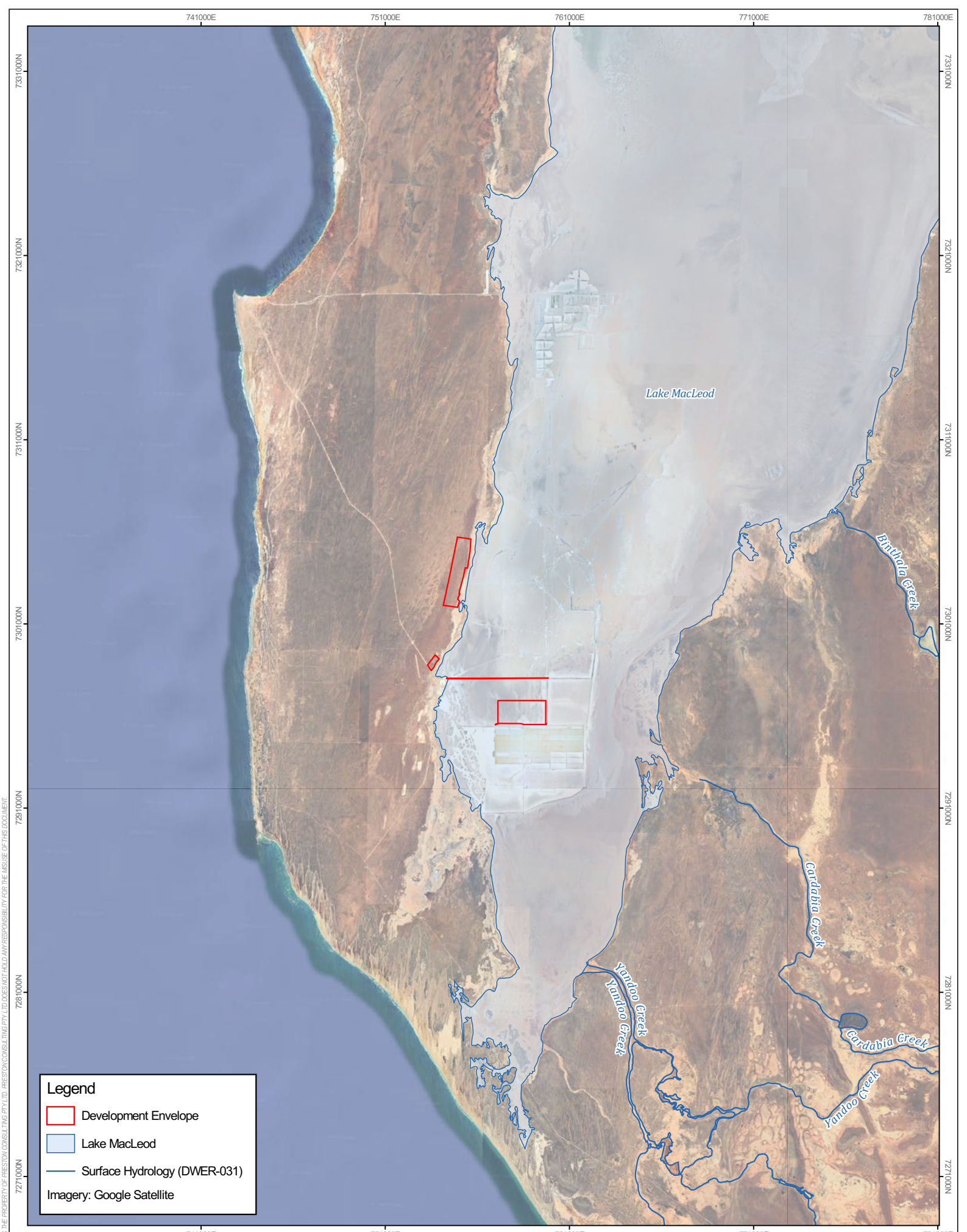
The Lyndon-Minilya Rivers Catchment spans across 48,300 km² and is comprised of both the Lyndon River and the Minilya River (Water and Rivers Commission, 1996a). The Lyndon-Minilya Rivers flow intermittently between January and August as a response to seasonal rainfall which supports the surrounding pastoral activities, groundwater recharge and unique semi-arid ecosystems in the Carnarvon Basin (Water and Rivers Commission, 1996b; Halse et al., 2000).

The Minilya, Lyndon and Gascoyne Rivers are all ephemeral, with only occasional permanent water holes. The greater part of Lake MacLeod periodically receives freshwater from the Lyndon and Minilya Rivers and Cardabia and Boolathana Creeks; the latter being a distributary of the Gascoyne River which originates 620 km to the east south-east and has a surface catchment of 73,000 km². Surface inflow from the smaller rivers is intermittent and may affect only the vicinity of the river mouths.

Key Surface Water Features

Lake MacLeod, covering 188,145 ha and with a surface level up to 5 m below sea level, represents a major point of internal regional drainage (Gascoyne Development Commission, 1997). The lake is normally dry, except when the Gascoyne, Minilya or Lyndon Rivers are in flood. Two permanent water bodies are present in the north-western area of the lake – the Ibis and Cygnet Ponds. Some of the key surface water bodies and features at Lake MacLeod are shown on Figure 31 and include Cygnet Pond, Ibis Pond, the Ralph Sink and the Texada Sink.





Legend

- Development Envelope
- Lake MacLeod
- Surface Hydrology (DWER-031)

Imagery: Google Satellite

0 4 8 km

GDA2020 / MGA zone 49

1:250,000



Project: 0659_LMS_011
 Date: 11/02/2026
 Size: A4
 Author: ASmithers

LEICHHARDT Preston Consulting

Figure 31: Key surface water bodies

Surface Water Quality

The pH of surface water ranged from 7.95 - 8.31, close to the typical pH of sea water (8.2) (ANZECC, 2000). The southern area of Lake MacLeod was classified as mesosaline (30,000 - 70,000 $\mu\text{S}/\text{cm}$) to hypersaline ($>70,000 \mu\text{S}/\text{cm}$), with a mean salinity of 64,910 $\mu\text{S}/\text{cm}$. Salinity concentrations were variable, and testing indicated sites north of the Lake MacLeod operations had significantly higher values than those sites located in the south. These results are attributed to differences in surface and groundwater hydrology, as well as potential marine water influence (Department of Environment and Conservation, 2009).

The major constituents of the ionic balance were Na and Cl in May 2011, however compared to sea water there was a proportionally greater contribution of Ca and SO_4 (Outback Ecology, 2011; Appendix 5.3). This is likely due to the dissolution of gypsum (CaSO_4) during flooding, a dominant mineral present in the Lake MacLeod basin. The concentrations of these ions were also higher in sites north of Lake MacLeod operations, reflecting the increased salinity levels in this area.

The concentrations of metals and trace elements were mostly below detection in the Lake MacLeod surface waters. Only Ba, Cu, Mn and Ni were detected, and of these only Ba and Cu were detected in all sites. The concentrations of Cu were the only metal to slightly exceed the ANZECC guideline value, at all ten sites. At DSLM1W, DSLM2W and DSLM4W Cu levels were 2.5 times greater (0.02 mg/L) than the ANZECC guideline value (0.008 mg/L) (Figure 21). This trend has also been observed in previous studies of Lake MacLeod (GHD, 2008) and may be a reflection of natural mineralisation within the catchment.

5.4 PROPOSED MITIGATION

LMPL has mitigated the potential impacts to this factor according to the mitigation hierarchy; Avoid, Minimise, Rehabilitate and Offset. Offsets are not expected to be required for this factor.

5.4.1 AVOID

The key avoidance mechanism implemented by LMPL was the iterative design of the DE to avoid key environmental features, predominantly by locating the new ponds away from the lake edge.

5.4.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to inland water resources are minimised:

1. **Ensure erosion and sediment control is included in contractor management plans** for the construction phase, to ensure that erosion and sediment control strategies and measures are implemented consistent with industry best practice guidelines;
2. **Crystallisers will be designed and constructed to be safe and stable**, according to DMPE requirements and in accordance with an approved MDCP issued under the Mining Act;
3. **Inspect for erosion after each significant rainfall or flood event.** If significant erosion is noted, then install additional erosion controls to minimise further occurrences;
4. **Comply with Water Quality Protection Guidelines and guidance notes**, particularly in relation to the storage and use of hydrocarbons and other harmful chemicals, the design



and operation of vehicle maintenance areas and facilities, the siting and operation of wastewater treatment systems, and the handling and storage of other waste materials, including contaminated soils; and

5. **Ensure fuel is stored within self-bunded tanks or within a bunded area.**

5.4.3 REHABILITATE

At the completion of the Proposal the site will be rehabilitated to allow and encourage the natural establishment of vegetation. A MCP has been submitted for the broader Project and will be revised and resubmitted to incorporate the expansion (Appendix 5.5). The key rehabilitation measures from the MCP that relate to flora and vegetation are summarised below:

- Ground preparation including replacement of subsoil, topsoil and soil improvements;
- Seed sourcing and management;
- Application of seeds for revegetation;
- Non-native or naturalised flora will be removed from rehabilitation activity areas;
- Maintenance (including irrigation if/as required); and
- Crystallisers will be rehabilitated to an acceptable landform.

5.5 POTENTIAL ENVIRONMENTAL IMPACT

5.5.1 IDENTIFIED ENVIRONMENTAL IMPACTS

The following aspects have the potential to result in environmental impacts to the following environmental values identified in Section 5.3.2:

- Groundwater beneath and surrounding the crystalliser ponds, as a result of:
 - Seepage and mounding from crystallisers that may lead to changes in groundwater levels and localised flow paths;
 - Seepage from ponds resulting in elevated salinity in underlying groundwater; and
 - Changes in groundwater salinity regimes due to mounding; and
- Inland surface waters, as a result of:
 - 338.7 ha reduction in the surface extent of Lake MacLeod;
 - Reduction in surface water flooding regimes due to the capture of rainfall within the ponds and flood levee; and
 - Surface water quality impacts associated with:
 - Groundwater mounding;
 - Potential leaks or overflow of brine from the crystalliser ponds or pipelines;
 - Sediment loss; and
 - Hydrocarbon spills.

The following potential impacts to inland waters were considered to be appropriately managed using industry-standard controls and are not discussed further in the assessment section of this ERD:

- Potential leaks or overflow of brine from the crystallisers or pipelines;
- Sediment loss during construction or erosion, as this would only occur during high rainfall or flooding events and would be limited to the area immediately surrounding the pond walls and levee; and



- Hydrocarbon spills - as hydrocarbons will be kept in existing facilities on site, and containment and clean up equipment will be available.

5.5.2 PREDICTED ENVIRONMENTAL IMPACTS

Table 21 summarises the extent of the predicted direct and indirect impacts on inland waters. Additional assessment information that quantifies the extent of impacts is provided in the following sections.



Table 21: Potential impacts on Inland Waters

Environmental value in regional and local extent	Extent of direct impacts	Extent of indirect impacts	Level of certainty	Direct and indirect impacts of other Proposals	Cumulative impacts (incl. other Proposals)
Groundwater	No direct impacts – no additional groundwater abstraction is required.	<ul style="list-style-type: none"> • Seepage and mounding from crystallisers may lead to changes in groundwater levels and localised flow paths; • Seepage from ponds resulting in elevated salinity in underlying groundwater; and • Changes in groundwater salinity regimes due to mounding. 	Medium – specific groundwater modelling has not been completed for the Proposal however the small footprint in an area where there is already and existing salt operation, is likely to cause similar changes to the quality of the underlying groundwater.	<p>Abstraction of up to 3.35 GL/yr from the Carnarvon-Birdrong aquifer as part of the existing Lake MacLeod operation.</p> <p>Indirect groundwater impacts associated with the existing Lake MacLeod Project.</p>	<ul style="list-style-type: none"> • Abstraction of up to 3.35 GL/yr from the Carnarvon-Birdrong aquifer. • Changes in groundwater levels and localised flow paths due to seepage and mounding from the crystallisers; and • Changes in groundwater salinity due to seepage and mounding from the crystallisers.
<p>Inland Surface Waters</p> <p>Two freshwater catchments intersect with Lake MacLeod. Lake MacLeod covers an area of 188,145 ha.</p>	338.7 ha reduction in the surface extent of Lake MacLeod.	<ul style="list-style-type: none"> • Reduction in surface water flooding regimes due to the capture of rainfall within the ponds and flood levee; and • Surface water quality impacts associated with: <ul style="list-style-type: none"> ○ Groundwater mounding; ○ Potential leaks or overflow of brine from the crystalliser ponds or pipelines; ○ Increased salinity; ○ Sediment loss; and ○ Hydrocarbon spills. 	Medium – specific surface water modelling has not been completed for the Proposal however the reduction in in the surface extent of Lake MacLeod can be easily calculated and is a relatively small footprint in the context of the size of Lake MacLeod and the existing Lake MacLeod Project.	Loss of 7,467 ha of the surface extent of Lake MacLeod associated with the existing Lake MacLeod Project.	<ul style="list-style-type: none"> • Loss of 7,805.7 ha of the surface extent of Lake MacLeod (4.5% increase and 4.1% in total) • Indirect surface water quality impacts; and • Changes to flooding regimes.

5.6 ASSESSMENT OF SIGNIFICANCE OF RESIDUAL IMPACT

5.6.1 GROUNDWATER

Proposal

Groundwater Quality and Increased Salinity

The crystalliser ponds are designed to accumulate salt via evaporation. Minimal seepage or loss of salt through the base of the evaporation pond to underlying lake bed sediments will occur due to the natural clay-lined base, and high evaporation. Regardless, any potential seepage will be dominated by Na and Cl and is not expected to significantly alter the salinity or ionic composition of groundwater within the lake bed sediments. Any changes in salinity are likely to occur around the perimeter of the ponds (within the flood levee) and not extend out into the remainder of the lake.

Ongoing groundwater quality monitoring will be undertaken which will continue to build knowledge on natural spatial and temporal variability in groundwater quality and monitor Proposal-related changes from baseline condition.

Groundwater samples were also collected around the existing ponds during the 2023 review period as per the DWER licence. Samples were tested for basic parameters (pH, EC, dissolved oxygen), salts, nutrients and metals. During 2023, all parameters were within normal historical ranges, which confirms the limited groundwater quality impacts predicted for the Proposal.

Groundwater Mounding

The crystalliser ponds will hold water, and while seepage or loss of salt through the base of the evaporation pond to underlying lake bed sediments will be low, over time there is the potential for groundwater mounding to occur around the pond. This is due to the hydrostatic pressure being applied, raising the levels of the surrounding groundwater.

On the lake surface the groundwater levels are close to the surface, therefore mounding may result in groundwater 'daylighting' on the lake surface around the pond. This effect primarily affects surface water, and is discussed in Section 5.6.2.

Cumulative Impacts

The Proposal includes the development of crystallisers that will be added to an existing series of crystallisers directly south of the Proposal at the existing Lake MacLeod Project.

The potential groundwater quality impacts associated with the Proposal (described above) align with the recognised impacts associated with the existing Project crystalliser ponds. The impacts to groundwater have been noted to be limited. As stated previously, groundwater monitoring has identified that groundwater quality parameters were within normal historical ranges, indicating that groundwater quality impacts are minimal.



Summary

Given the low permeability of the proposed crystalliser ponds, and the hypersaline nature of the lake and underlying sediment, the Proposal is unlikely to result in significant impacts to groundwater quality within the lake sediments, with impacts likely to be limited to an area immediately surrounding the pond boundaries. Impacts associated with groundwater mounding are more relevant to surface water and are discussed below.

5.6.2 SURFACE WATER

Proposal

Direct disturbance of lake surface and changes to flooding regimes

The Proposal will result in the direct disturbance of 338.7 ha of the lake surface. The disturbance is required to install infrastructure consisting primarily of flood levees and crystalliser cells. The flood levee will also isolate an estimated 900 ha portion of the lake surface from the surrounding lake.

The affected area is rarely inundated (approximately every six years) and is located within an area of Lake MacLeod that is a significant distance from the high surface water values associated with the Northern Ponds (Figure 33). Even when flooded, the reduction in lake surface and isolation of lake surface within the flood levee represents an extremely small proportion of Lake MacLeod and the broader catchment, such that it would be unlikely to influence surface water levels or volumes within the lake.

Potential impacts on the Northern Ponds have been raised as concerns by members of the public. The disturbance footprint is located 35 km to the south of the Northern Ponds (down gradient) and will have no direct impacts on the significant ecological values of that area. The previous operator of Lake MacLeod, DSL, had conducted significant analysis and multiple studies on the potential impacts of increased brine abstraction on the northern ponds over the many years of the operation. The culmination of this work was summarised in a pre-feasibility study completed by Groundwater Resource Management (GRM) in 2014. The modelling and reporting by GRM included production scenarios that were far in excess of the current planned expansion. These numerical models investigated very high abstraction scenarios, more than double the proposed 20.6 GL saturated brine abstraction, and concluded that the risk to the Northern Ponds from a brine abstraction rate of 47 GL/annum was low.

As this Proposal is seeking to install infrastructure that will support production levels the site has previously operated at and that are below the current approved throughput level on the Prescribed Premises Licence, LMPL assessed that the risk of any indirect impacts of brine abstraction on the Northern Ponds is very low. As part of the operation's ongoing environmental risk management and mitigation strategy, LMPL is already in the process of reinstating the monitoring program of ground water levels and completing an update to the hydrogeological model conducted in 2014.



Pond Seepage and Groundwater Mounding

The crystalliser ponds will hold water, and while seepage or loss of salt through the pond walls or through the base of the evaporation pond to underlying lake bed sediments will be low, over time there is the potential for seepage or groundwater mounding to occur around the ponds. Groundwater mounding is due to the hydrostatic pressure being applied, raising the levels of the surrounding groundwater.

On the lake surface the groundwater levels are close to the surface, therefore seepage and mounding may result in seepage water or groundwater 'daylighting' on the lake surface around the pond. This may lead to elevated salinity in the upper lake sediments in these areas, particularly during and after rainfall (i.e., when other sediments are fresher). This water will evaporate quickly, leaving some salt crust remaining. This is evident around the current operations, with remaining salt visible within an area extending up to 100 m around the ponds (Figure 32). Some of the visible salt is also due to the bitterns holding pond outlined in Figure 2.

It is likely that similar mounding will occur around the proposed crystallisers, potentially extending up to 100 m from the pond walls. This salt crust however will occur within the flood levee which is disconnected from the remainder of the lake. Regardless of this, Lake MacLeod is a saline lake, with high salinity naturally occurring within its lake sediments.



Figure 32: Salt crust surrounding ponds



Cumulative Impacts

The Proposal will result in up to 338.7 ha of disturbance within Lake MacLeod. The existing Lake MacLeod Project has previously resulted in up to 8,752 ha of disturbance of which 7,467 ha is within Lake MacLeod. The cumulative disturbance to the lake is therefore 7,805.7 ha, however this represents only 4% of the total lake area. The area surrounding the ponds also have (and will have) some indirect impacts to the lake surface associated with salt crusts from seepage and mounding.

The Proposal will result in a small increase in the cumulative impacts of the Proposal, however will not present any new impact pathways from what is already present, resulting in minimal quantity and quality impacts to surface water and groundwater outside the immediate disturbed areas.

Summary

The Proposal is unlikely to have a significant impact on surface water based on:

- The minimal increase in disturbance associated with the Lake MacLeod Project;
- The area within the flood levee will still receive localised freshwater input from precipitation;
- 96% of the lake will remain intact; and
- Lake MacLeod is ephemeral with the southern area, where disturbance is proposed, rarely flooded.



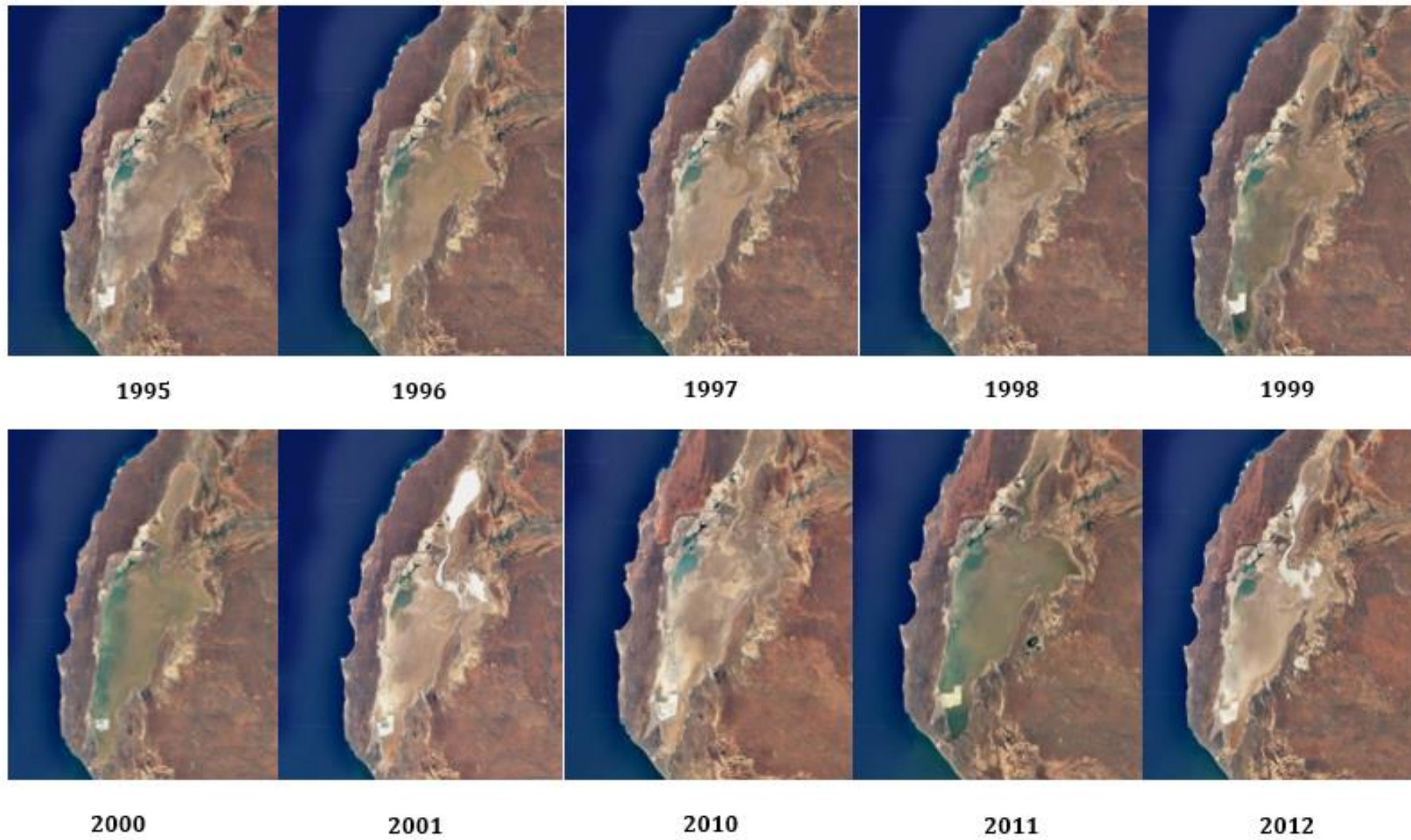


Figure 33: Inundation at Lake MacLeod time series



5.7 ENVIRONMENTAL OUTCOMES

The EPA's environmental objective for this factor is *"to maintain hydrological regimes and quality of groundwater and surface water so that environmental values are protected"* (EPA, 2018).

The assessment in Section 5.6 identified that the Proposal may result in seepage and mounding around the new crystalliser ponds however this is unlikely to be significant in the context of Lake MacLeod surface water values. The predicted outcomes for inland waters are:

- No adverse impact to groundwater quality outside the Proposal flood levee, beyond natural variation, as a result of the Proposal;
- No adverse impacts to surface water quality or quantity within Lake MacLeod, outside the flood levee.

These outcomes may contribute to impacts to other factors however they are not considered to be significant residual impacts for this factor and therefore offsets are not proposed.



6 SOCIAL SURROUNDINGS

6.1 EPA ENVIRONMENTAL FACTOR AND OBJECTIVES

The EPA Objective for this Key Environmental Factor is to protect social surroundings from significant harm.

6.2 RELEVANT POLICY AND GUIDANCE

Relevant EPA and Commonwealth Government guidance documents for social surroundings are summarised in Table 22.

Table 22: Policy and guidance relevant to the Social Surroundings Key Environmental Factor

Policy and Guidance	How guidance has been considered
WA Government	
Key EPA documents	
Statement of Environmental Principles, Factors, Objectives and Aims of EIA (EPA, 2023b)	This document was considered in the preparation of this ERD and to inform EIA.
EIA (Part IV Divisions 1 and 2) Procedures Manual (EPA, 2024a)	This document was considered in the preparation of this ERD and to inform EIA
EIA (Part IV Divisions 1 and 2) Administrative Procedures (EPA, 2024b)	This document was considered in the preparation of this ERD and to inform EIA
Instructions on how to prepare an Environmental Review Document (EPA, 2025a)	This document was considered in the preparation of this ERD and to inform EIA
EIA Practice Guide (EPA, 2025b)	This document was considered in the preparation of this ERD and to inform EIA
Relevant EPA Factor Guidelines	
Environmental Factor Guideline – Social Surroundings (EPA, 2023a)	This document was considered in the preparation of this section (Section 6) of the ERD.
Relevant EPA Technical Guidance	
INTERIM Technical Guidance Environmental impact assessment of Social Surroundings Aboriginal cultural heritage (EPA, 2023c)	This document has been considered in the design and planning of the Proposal; it has also been considered in the preparation of mitigation measures for the Proposal.
Relevant Technical Guidance	
Engage Early – Guidance for proponents on best practice Indigenous engagement for environmental assessments under the EPBC Act (DotE, 2016)	This document was used as guidance for assessment and management of physical and social impacts on Aboriginal Heritage.



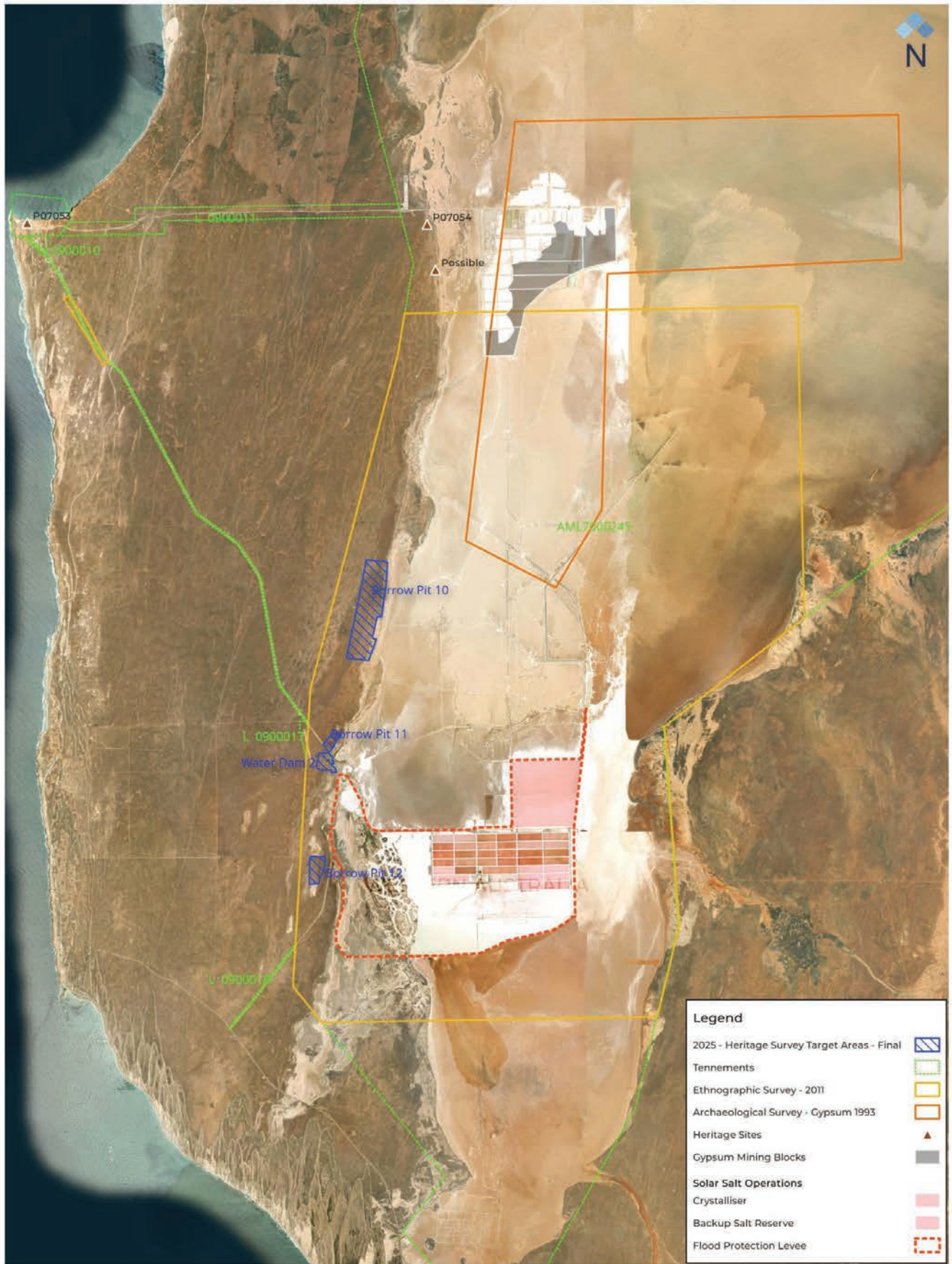
6.3 RECEIVING ENVIRONMENT

Information within this section has been sourced from Archaeological Work Area Clearance Assessment (Big Island Research (BIR), 2025; Appendix 5.6), prepared for the Proposal.

6.3.1 SURVEYS AND STUDIES

A systematic archaeological survey of the nominated survey areas was undertaken by BIR archaeologists and NTGAC Traditional Owner participants in 2025 (Figure 34; Appendix 5.6). The survey area encompassed both borrow pits in the DE. Prior to survey, the team established the most suitable survey method and process for the nominated area. This included conversations around logistics, topography, accessibility, safety, areas of high archaeological potential, any NTGAC Traditional Owner participant concerns, and previous knowledge of the local landscape and surrounds. The team agreed to walk transects spaced approximately 20 – 30 m apart. Locations of high archaeological potential, such as areas in proximity to stone outcrops and water sources, were targeted as part of this approach. Access to the survey areas was facilitated by 4WD.





Final

Scale 1:195000
 0 25 5 km
 Horizontal datum: GDA 2020
 Coordinate System: GDA2020/MGA Zone 50
 Paper Size ISO A3



Lake MacLeod Solar Salt Project
 2025 Heritage Surveys

Lake MacLeod Solar Salt Project

Doc Control No: 250422
 Revision No: 0.1
 Approved by: Thomas Mitchell
 Date: 01/05/2025

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Figure 34: Heritage Survey Area (BIR, 2025)

6.3.2 EXISTING ENVIRONMENT

Current Land Use

The Proposal is located in the Gascoyne region of WA. The Gascoyne region is known for its ancient landscapes, agriculture and UNESCO World Heritage-listed Areas including Ningaloo Reef. With a geographic area of over 135,000 km², the Gascoyne consists of four Local Government Areas and has a key regional centre in Carnarvon, alongside Exmouth and Shark Bay.

The resident population of the Gascoyne in 2021 was estimated at 9,537, with Aboriginal people comprising about 11.9%. The region has more than nine Aboriginal language groups comprising people who have a strong spiritual, physical, and cultural connection to Country.

The Gascoyne is comprised of major industries including tourism, fishing, mining (salt production), horticulture and pastoralism. Around 80% of the Gascoyne is pastoral land and is primarily focused on sheep and cattle grazing (DBCA, 2025). The gross regional product of the Gascoyne in 2019-2020 was \$1.9 billion (Infrastructure WA, 2025).

Lake MacLeod is surrounded by pastoral leases, with the southern area of the lakebed containing the salt mining operations, serviced by a number of access roads and connected to the ship loading area at Cape Cuvier (Figure 35).

Local Residents and Community

Sensitive receptors within 50 km of the Proposal include residential areas and naturally occurring tourist attractions (Table 23; Figure 35).

The area surrounding the Proposal is sparsely populated, with the closest town of substantial population being Carnarvon, approximately 30 km south of the Proposal.

Table 23: Potential sensitive receptors within 50 km of the Proposal

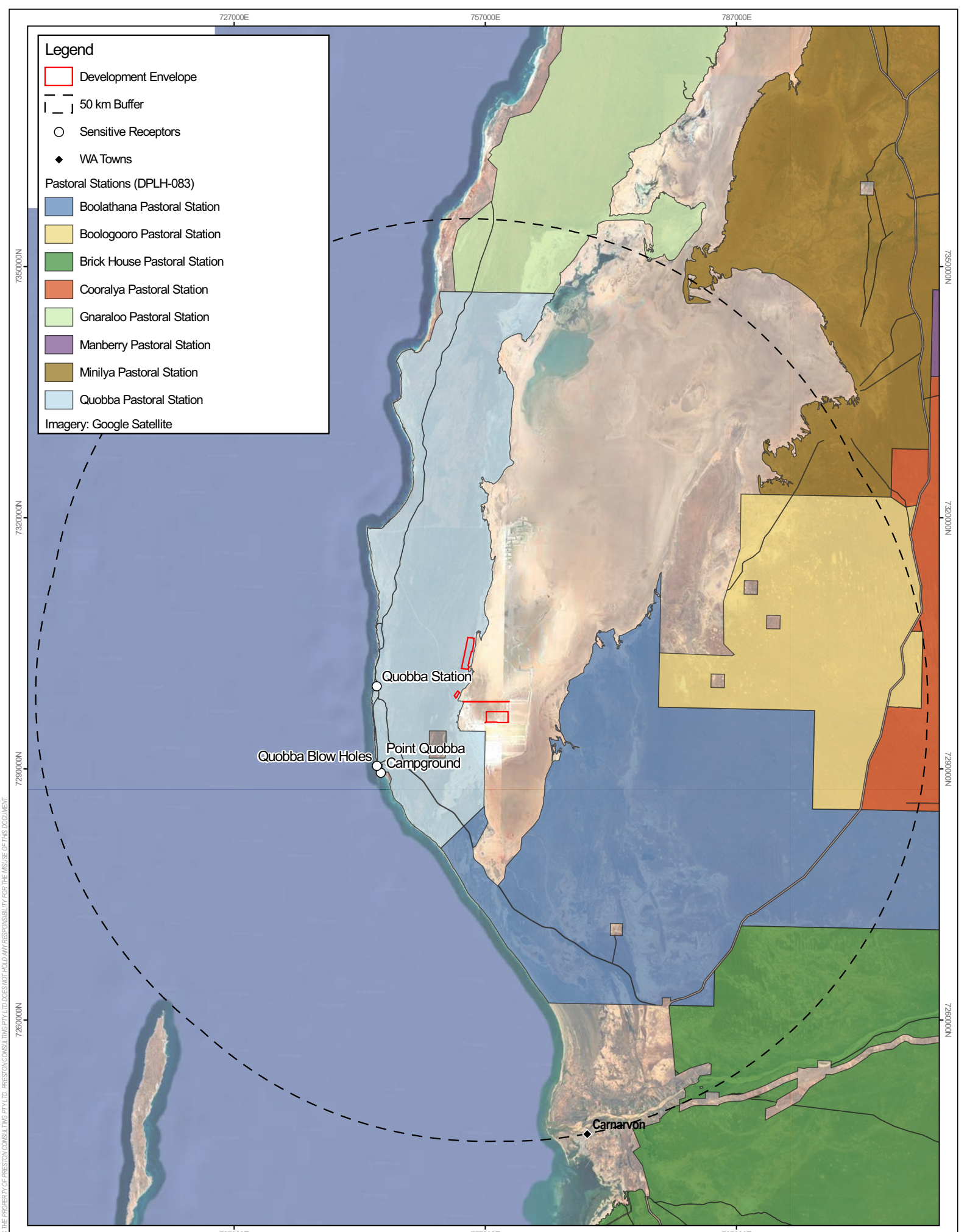
Name	Significance	Distance to DE
Quobba Homestead	Residential / Station	15 km
Quobba Blowholes and Point Quobba Campground	Tourist Attraction / Campground	10 km
Carnarvon	Residential	30 km

The Shire of Carnarvon identified the following Local Planning Scheme zones within a 20 km buffer of the Proposal (Department of Planning, Lands and Heritage (DPLH), 2025):

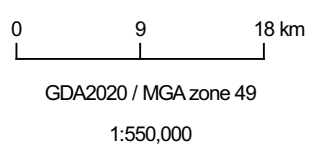
- Rural; and
- Tourism.

No Regional Schemes, State Planning Policies, Structure Plans, or other underlying land descriptions were identified.





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Figure 35: Pastoral stations and sensitive receptors surrounding Proposal

Aboriginal Heritage and Cultural Values

Native Title / Traditional Owners

Native Title rights and interests comprise either the exclusive right to possession, occupation, use and enjoyment of the relevant land or a set of non-exclusive rights which include, among others, the right to maintain and protect places of significance.

Lake MacLeod is situated on the traditional lands of the Baiyungu People (Figure 36). Native Title is recognised under the Gnulli, Gnulli #2 and Gnulli #3 Native Title determination for the Yinggarda, Baiyungu and Thalanyji People (WCD2019/016), which is overseen by NTGAC and includes Lake MacLeod and Carnarvon (YMAC, 2019).

Baiyungu Country extends from Point Cloates through to Point Quobba, then stretches east to Manberry Station and north to Winning Pool Station. In 1998 ownership of Cardabia Station was handed back to the Baiyungu people. This station is now run as a pastoral property with Baiyungu people working as managers. Cardabia has become the main place where people of Baiyungu heritage gather. Murlandia, or Maud's Landing, was one of the main traditional meeting places where people from all neighbouring language groups came together (WMPALC, 2026).

Yinggarda Country extends from the coast at the northern end of Shark Bay between the Gascoyne and Wooramel rivers, along the rivers inland to Red Hill and Gascoyne Junction.

Thalanyji Country spreads out across the Ashburton River coastal plain south to Tubridji Point, then across to Yannarie River and upstream to Emu Creek, across the range hills of southwest Pilbara to Henry River and Cane River in the north (BTAC, 2026).

It was a 22-year long journey for the Yinggarda, Baiyungu and Thalanyji People to achieve native title recognition, with the initial claim (WC 1997/028) lodged with the National Native Title Tribunal on 14 April 1997. The Federal Court, representatives of the State and Federal governments, other parties and importantly, the Traditional Owners came together to witness this historic occasion (YMAC, 2019).

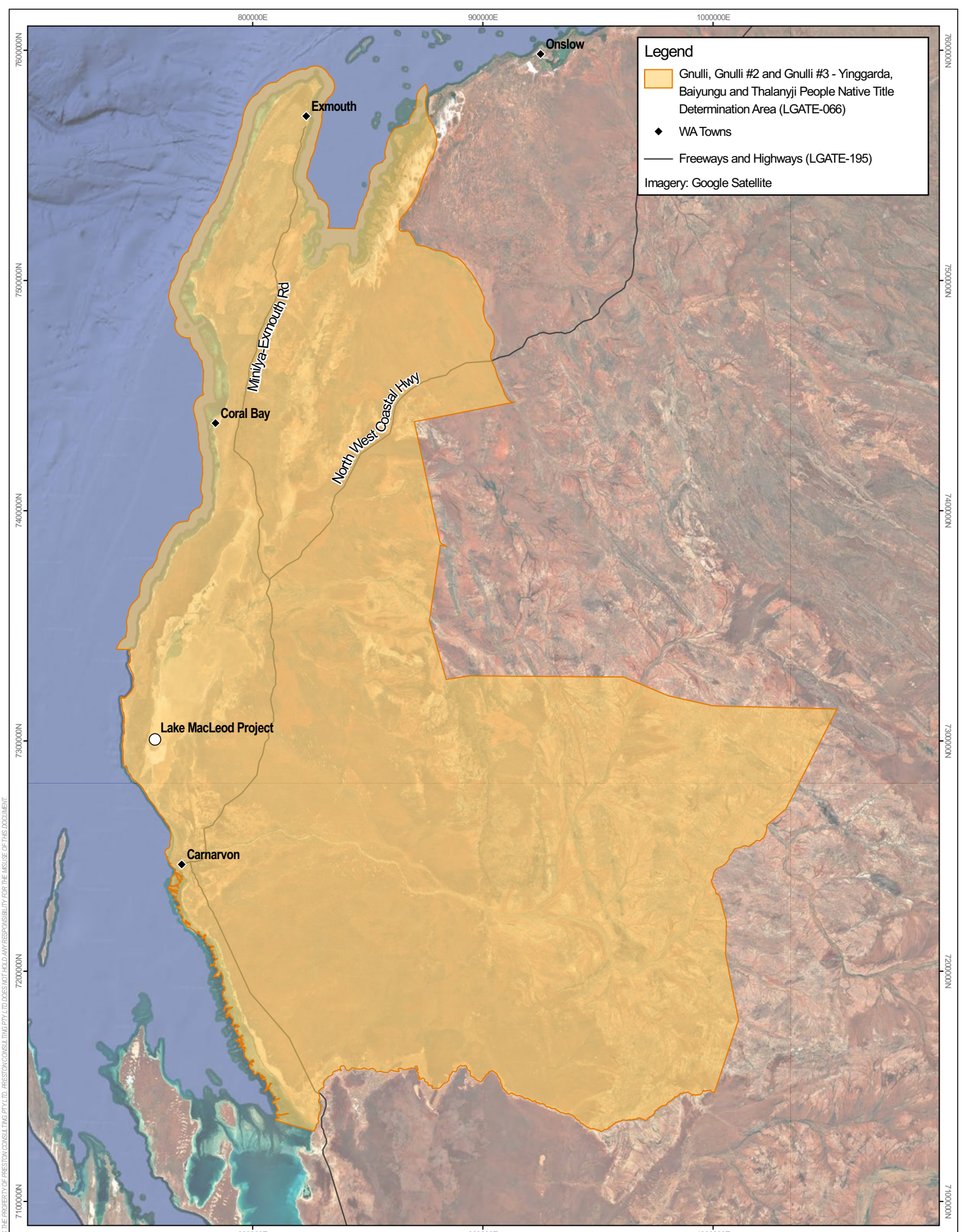
The Determination Area covers approximately 71,354 km² of Yinggarda, Baiyungu and Thalanyji traditional country in the West Pilbara, encompassing the town of Carnarvon, several pastoral leases, mining tenements, roads and reserves as well as portions of the Kennedy Range and Cape Range National Parks, the Ningaloo Marine Park, Lake MacLeod, and waters in the Exmouth Gulf and the Ningaloo Marine Park.

Aboriginal Heritage

A desktop search of the Aboriginal Cultural Heritage Inquiry System did not identify any registered or lodged places within the survey area (BIR, 2025).

The field survey was completed 6-11 November 2025 and did not identify any ACH places or isolated artefacts within the survey area. These areas were deemed as clear for proposed works.





Legend

- Gnulli, Gnulli #2 and Gnulli #3 - Yinggarda, Baiyungu and Thalanyji People Native Title Determination Area (LGATE-066)
- WA Towns
- Freeways and Highways (LGATE-195)

Imagery: Google Satellite

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 Date: 13/02/2026
 Size: A4
 Author: ASmithers



Figure 36: Yinggarda, Baiyungu and Thalanyji People Native Title Determination Area

6.4 PROPOSED MITIGATION

LMPL has mitigated the potential impacts to this factor according to the mitigation hierarchy; Avoid, Minimise, Rehabilitate and Offset. Offsets are generally not applied to this factor.

6.4.1 AVOID

The avoidance of Aboriginal heritage sites was not required in this case, as no sites were identified.

6.4.2 MINIMISE

The following mitigation measures are proposed to ensure that direct and indirect impacts to social surroundings are minimised:

1. **Obtain and comply with Works Approval and Licence issued under Part V of the EP Act.** A Works Approval and Licence will be required for the Proposal. The Works Approval and Licence is the primary mechanism for ensuring the design and operation of the Proposal is conducted in a manner that minimises impacts to social surroundings, primarily by minimising dust and noise emissions;
2. **Heritage Agreement NTGAC-0072.** Aboriginal Heritage will be managed in accordance with this agreement, which has been approved by the NTGAC Board.
3. **Implement industry best-practice management measures for Aboriginal Heritage and Culture:**
 - a. Undertake Aboriginal Heritage surveys across any areas proposed to be cleared (complete);
 - b. Ensure access to Country is not restricted for Traditional Owners unless necessary for safety reasons;
 - c. Vegetation clearing will be managed through internal ground disturbance procedures;
 - d. Boundaries of areas to be cleared or disturbed will be identified by GPS coordinates and maps of boundaries will be provided to dozer operators;
 - e. Progressive clearing will be undertaken; and
 - f. The DF will be developed to the minimum required to ensure safe and adequate construction and operation.
4. **Obtain approvals under AH Act if required.** If required (i.e., if new sites are identified), obtain and comply with approvals under the AH Act for any Aboriginal Heritage sites that are to be disturbed.

6.4.3 REHABILITATE

LMPL acknowledges the important role that the Traditional Owners have to play in rehabilitation, from designing final landforms that reflect cultural values and participating in the physical rehabilitation of the land generating economic opportunities through contracting.



At the completion of the Proposal the site will be rehabilitated to allow and encourage the natural reinstatement of lake hydrology and the establishment of vegetation in areas of disturbance off the lake. A MCP has been submitted for the broader Project and will be revised and resubmitted to incorporate the expansion (Appendix 5.5). The key rehabilitation measures from the MCP that relate to social surroundings are summarised below:

- Ground preparation including replacement of subsoil, topsoil and soil improvements;
- Seed sourcing and management;
- Application of seeds for revegetation;
- Non-native or naturalised flora will be removed from rehabilitation activity areas;
- Maintenance (including irrigation if/as required); and
- Crystallisers will be rehabilitated to an acceptable landform.

6.5 POTENTIAL ENVIRONMENTAL IMPACT

6.5.1 IDENTIFIED ENVIRONMENTAL IMPACTS

The implementation of the Proposal is not predicted to result in direct or indirect impacts to Aboriginal heritage sites as none were identified during the surveys. The Proposal however may impact traditional cultural uses of the land by removing access to Country through clearing or safety restrictions.

There are no other potential impacts to recreational, tourism or other sensitive receptors that would require further assessment.

6.5.2 PREDICTED ENVIRONMENTAL IMPACTS

Table 24 defines the predicted impacts (direct, indirect, and cumulative) for the identified impacts on social values for this factor in a local and regional context.



Table 24: Predicted impacts on social surroundings

Environmental value in regional and local extent	Extent of direct impacts	Extent of indirect impacts	Level of certainty	Direct and indirect impacts of other Proposals	Cumulative impacts (incl. other Proposals)
Aboriginal traditional cultural uses of the land. No recorded Aboriginal Heritage Sites occur within the DE.	No direct impact to registered Aboriginal heritage sites. No direct impact to lodged Aboriginal heritage sites. Impacts to cultural and traditional uses of the land through clearing and access restrictions.	Amenity impacts associated with noise and dust emissions.	High level of certainty. No known Aboriginal Heritage sites occur within the DE. Limited potential for Heritage Sites to be found during land clearing disturbance.	Up to 8,752 ha of disturbance associated with the existing Lake MacLeod operations	The Lake MacLeod Project has been developed and no other clearing is proposed outside the areas in this Proposal. The potential disturbance of sites is therefore limited to this Proposal only. Disturbance of native vegetation and lake ecosystems that could otherwise be used by the Baiyungu People.



6.6 ASSESSMENT OF SIGNIFICANCE OF RESIDUAL IMPACT

6.6.1 PROPOSAL

The Proposal has been designed to minimise impacts on Aboriginal Cultural Heritage, resulting in a Proposal layout that is accepted by the Baiyungu People. The Proposal will result in the following unavoidable impacts to Social Surroundings:

- Temporary and permanent (post-closure) disturbance of Country; and
- Restriction of access for traditional cultural uses of the land during the life of the Proposal.

LMPL continue to consult with the Baiyungu People and LMPL will continue to uphold the Heritage Agreement NTGAC-0072. This Agreement will serve as the main management document for the implementation of the Proposal and ensure that impacts to Aboriginal Cultural Heritage and traditional uses of Country will be minimised.

6.6.2 CUMULATIVE IMPACTS

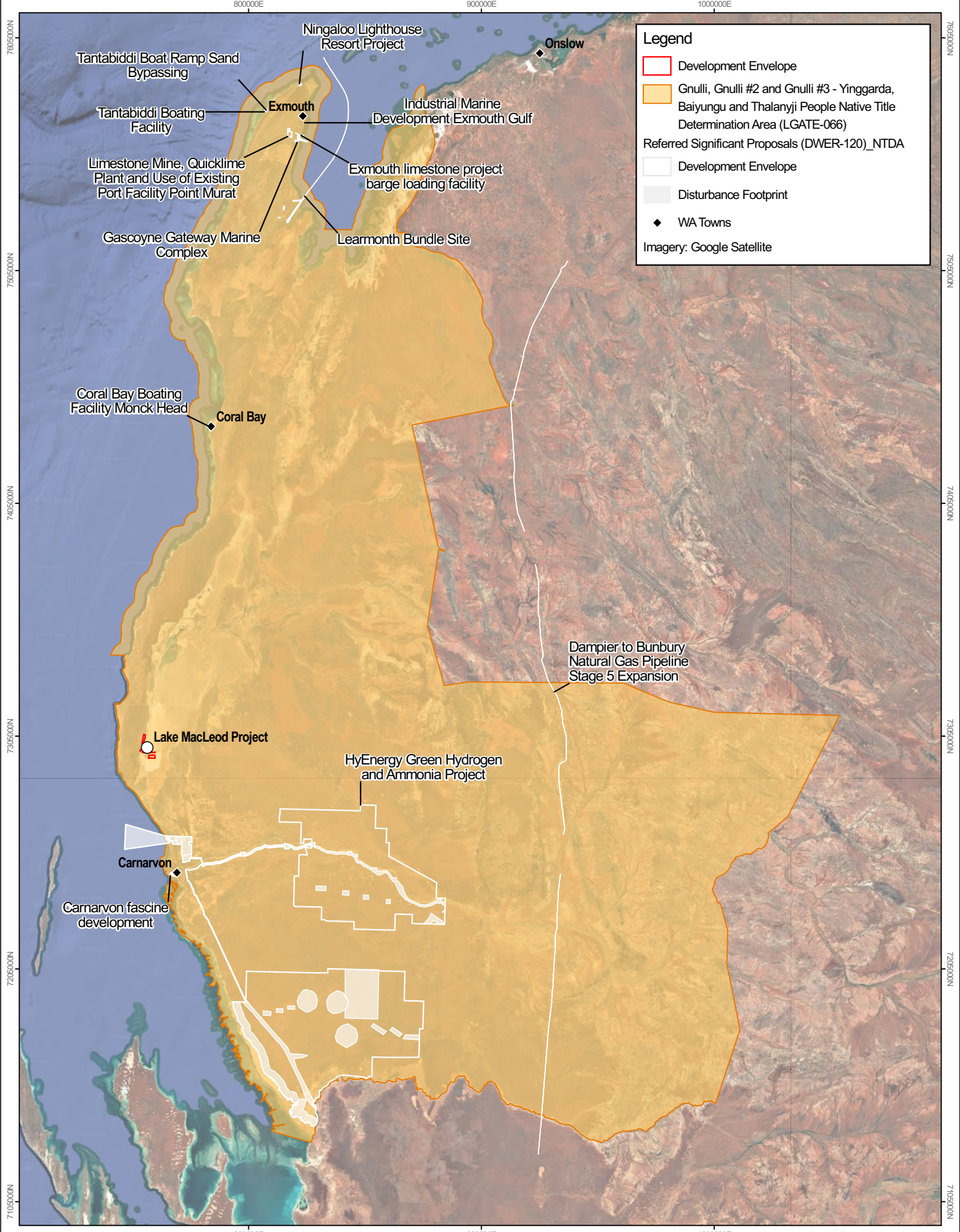
The Proposal is proposed to be developed on Baiyungu Country, which contains a few existing and planned mining projects including the existing Lake MacLeod Project. A total of 14 EPA significant Projects have been proposed or are currently operating on Baiyungu Country under Part IV of the EP Act, however the majority are small in scale, with the exception of the Lake MacLeod Project and the HyEnergy Green Hydrogen and Ammonia Project.

Figure 37 shows the DE's of EPA Significant Proposals located within the Yinggarda, Baiyungu and Thalanyji People Native Title Determination Area (WCD2019/016). There is limited public information on disturbance to heritage values associated with these other Proposals, however, it is acknowledged that the implementation of some of these projects will result or has resulted in the loss of heritage and cultural values in addition the values proposed to be disturbed for the Proposal.

6.6.3 SUMMARY

The Proposal presents a minor increase (in percentage terms) in the extent of land lost or subject to access restrictions within Baiyungu Country. The Heritage Agreement NTGAC-0072 will provide a management document designed to minimise impacts to Aboriginal Cultural Heritage and traditional uses of Country.



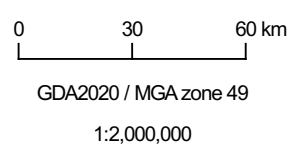


Legend

- Development Envelope
- Gnulli, Gnulli #2 and Gnulli #3 - Ynggarda, Baiyungu and Thalanyji People Native Title Determination Area (LGATE-066)
- Referred Significant Proposals (DWER-120)_NTDA
- Development Envelope
- Disturbance Footprint
- ◆ WA Towns

Imagery: Google Satellite

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Project: 0659_LMS_015
 Date: 17/02/2026
 Size: A4
 Author: ASmithers



Figure 37: EPA Significant Proposals within the Native Title Determination Area

6.7 ENVIRONMENTAL OUTCOMES

The EPA's environmental objective for this factor is to "*protect social surroundings from significant harm*" (EPA, 2023a).

The Proposal is expected to result in negligible impacts to local residents and community.

LMPL has conducted extensive Aboriginal Heritage, archaeological, ethnographic investigations across the DE, with no sites identified. LMPL will endeavour to avoid any sites if they are identified during the development of the Proposal and will seek approval under the AH Act if they cannot be avoided, which is unlikely.

Based on the above, the Proposal is not expected to result in significant harm to Registered Aboriginal Heritage sites.

The predicted outcomes for Social Surroundings are therefore:

- No disturbance to recorded Aboriginal Heritage Sites; and
- No restrictions on Traditional Owner's access to Country, unless for safety reasons.

Based on the above, LMPL considers that the Proposal can be implemented such that there are no significant residual impacts to this factor, and the EPA objective can be met.



7 OFFSETS

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal. The EPA may apply environmental offsets where it determines that the residual impacts of a proposal are significant, after avoidance, minimisation and rehabilitation have been pursued. Consistent with the WA Environmental Offsets Guidelines (EPA, 2014a), the EPA will consider whether offsets can counterbalance, and are appropriate for, the Proposal's residual impacts.

Offsets are the last of the four steps in the mitigation hierarchy (Avoid, Minimise, Rehabilitate and Offset). They are only applied to counterbalance residual significant impacts when the other steps have already been applied to a Proposal.

7.1 SUMMARY OF SIGNIFICANT RESIDUAL IMPACTS

The WA Environmental Offsets Guidelines (EPA, 2014a) states:

"In general, significant residual impacts include those that affect rare and endangered plants and animals (such as declared rare flora and threatened species that are protected by statute), areas within the formal conservation reserve system, important environmental systems and species that are protected under international agreements (such as Ramsar listed wetlands) and areas that are already defined as being critically impacted in a cumulative context. Impacts may also be significant if, for example, they could cause plants or animals to become rare or endangered, or they affect vegetation which provides important ecological functions".

The assessments conducted in Sections 4 – 6 have utilised the findings of the numerous surveys and studies completed for the Proposal. LMPL has assessed the residual impacts of the Proposal against the residual impact significance model provided in the WA Environmental Offsets Guidelines (EPA, 2014a).

The significant residual impacts are based on the current indicative DF and will continue to be refined as necessary during the planning phase of the Proposal.

As described in the preceding sections of this ERD, with the implementation of mitigation measures the Proposal is unlikely to result in any significant residual impacts on the environmental values described in the previous sections.

LMPL has assessed the residual impacts of the Proposal against the residual impact significance model provided in the WA Environmental Offsets Guidelines (EPA, 2014a). The findings of this assessment are provided in Table 25.



Table 25: Assessment against residual impact significance model

Part IV Environmental Factors	Vegetation and Flora						
				Terrestrial Fauna			
				Inland Waters			
Part V Clearing Principles	C: Rare flora	D: TECs	E: Remnant vegetation	F: Wetlands and waterways	H: Conservation areas	A: High biological diversity	B: Habitat for fauna
Residual impact that is environmentally unacceptable and cannot be offset	No residual impacts are considered to meet this criterion						
Significant residual impacts that will require an offset – all significant residual impacts to species and ecosystems are protected by statute or where the cumulative impact is already at a critical level	No residual impacts are considered to meet this criterion as no rare flora occur within the DE.	No residual impacts are considered to meet this criterion as no TECs or PECs recorded within the DE.	No residual impacts are considered to meet this criterion as the Proposal will reduce the current extent of vegetation association 328 by only 0.4%. This vegetation association is well-represented and has not been extensively cleared.	No residual impacts are considered to meet this criterion as impacts to Lake MacLeod are minor and localised around existing operations, and are unlikely to affect the quality or flooding regimes of the broader lake system. No impacts to the Northern Ponds	No residual impacts are considered to meet this criterion as no conservation areas that are protected by statute occur within the DE.	No residual impacts are considered to meet this criterion as no areas of high biological diversity were identified within the DE.	Some residual impacts associated with terrestrial fauna habitat including: <ul style="list-style-type: none"> • 39.1 ha of disturbance to habitat for the Gnaraloo Mulch Slider; • 12.4 ha of disturbance to habitat for the Southern Whiteface; and • 381.7 ha of disturbance to foraging habitat for the Peregrine Falcon, Letter-winged Kite and Migratory Birds. <p>Given the species and their habitats are widespread and a large proportion of habitat will remain intact, impacts to fauna habitat are not</p>



							expected to meet this criteria.
Significant residual impacts that may require an offset – any significant residual impacts to potentially threatened species and ecosystems, areas of high environmental value or where the cumulative impact may reach critical levels if not managed	No residual impacts are considered to meet this criterion – refer above.	No residual impacts are considered to meet this criterion – refer above.	No other residual impacts are considered to meet this criterion – refer above.	No residual impacts are considered to meet this criterion – refer above.	No residual impacts are considered to meet this criterion: refer above.	No residual impacts are considered to meet this criterion: refer above.	No residual impacts are considered to meet this criterion: refer above.
Residual impacts that are not significant	No residual impacts are considered to meet this criterion – refer above.	No residual impacts are considered to meet this criterion – refer above.	Clearing of vegetation will occur as a result of the Proposal however this is not considered to be a significant residual impact.	Some minor impacts to Lake MacLeod are predicted, however these will be minor and localised around existing operations, and are unlikely to affect the quality or flooding regimes of the broader lake system. These impacts were therefore considered to not be a significant residual impact.	No residual impacts are considered to meet this criterion – refer above.	No residual impacts are considered to meet this criterion – refer above.	Clearing of fauna habitat will occur as a result of the Proposal however this is not considered to be a significant residual impact.



8 GLOSSARY

Term	Definition
ACH	Aboriginal Cultural Heritage
AH Act	<i>Aboriginal Heritage Act 1972</i>
ALA	Atlas of Living Australia
ANZECC	Australian and New Zealand Environment and Conservation Council
BAM Act	<i>Biosecurity and Agriculture Management Act 2007</i>
Bioregion	Biogeographic region
BoM	Bureau of Meteorology
°C	Degrees Celsius
cm	Centimetres
CR	Critically Endangered species
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DE	Development Envelope
DEED	Department of Energy and Economic Diversification
DF	Disturbance Footprint
DG	<i>Dangerous Goods Safety Act 2004</i>
DMPE	Department of Mines, Petroleum and Exploration
DotE	Department of the Environment
DPIRD	Department of Primary Industries and Regional Development
DSL	Dampier Salt Limited
DWER	Department of Water and Environmental Regulation
EC	Electrical Conductivity
EIA	Environmental Impact Assessment
EP Act	<i>Environmental Protection Act 1986</i>
EPA	Environmental Protection Authority
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)</i>
ERD	Environmental Review Document
GL/yr	Gigalitres per year
GPS	Global Positioning System
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature
km	Kilometres
km ²	Kilometres squared
L/s	Litres per Second
Lake MacLeod Project	Lake MacLeod Solar Salt Operation
LMPL	Lake MacLeod Pty Ltd



Term	Definition
m	Metres
m ³	Cubic Metres
MCP	Mine Closure Plan
MDCP	Mine Development and Closure Plan
mg/L TDS	Milligrams per Litre of Total Dissolved Solids
MI	Migratory species
mm	Millimetres
ms/m	MilliSiemens per Metre
Mtpa	Million Tonnes per Annum
NTGAC	Nganhurra Thanardi Garrbu Aboriginal Corporation
NVCP	Native Vegetation Clearing Permit
Off-LDE	Off-Lake Development Envelope
Onshore Environmental	Onshore Environmental Consultants Pty Ltd
OS	Species otherwise in need of species protection
P	Priority species
PEC	Priority Ecological Communities
Proposal	Lake MacLeod Crystalliser Expansion Project
RMA	Relationship Management Agreement
SG	Specific Gravities
SRE	Short Range Endemic
Stage Agreement	<i>Evaporites (Lake MacLeod) Agreement Act 1967</i>
Survey Area	Flora and Fauna Survey Area
TEC	Threatened Ecological Communities
VU	Vulnerable species
WA	Western Australia
WAM	West Australian Museum
YMAC	Yamatji Maarlpa Aboriginal Corporation
µS/cm	Microsiemens per centimetre



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10 APPENDICES

Appendix 1: Legislative Context

Appendix 2: Proposal Content Document

Appendix 3: Other Environmental Factors or Matters

Appendix 4: Stakeholder Engagement Register

Appendix 5: Relevant Technical Surveys

Appendix 5.1: Reconnaissance Flora & Vegetation Survey/Basic Vertebrate Fauna Survey
(Onshore Environmental, 2025)

Appendix 5.2: Short-Range Endemic (SRE) Invertebrate Desktop Assessment (Bennelongia,
2025)

Appendix 5.3: Aquatic Assessment of Lake MacLeod 2011 (Outback Ecology, 2011)

Appendix 5.4: Extract of Hydrological Expansion Pre-Feasibility Study (GRM, 2014)

Appendix 5.5: Lake MacLeod Closure Plan (Leichhardt, 2025)

CONFIDENTIAL Appendix 5.6: Archaeological Work Area Clearance Assessment (Big Island
Research, 2025)





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