REFERRAL UNDER THE ENVIRONMENTAL PROTECTION ACT 2019 (NT)

Lei Lithium Project

19 November 2024

PUBLICATION STATEMENT

This Referral has been prepared by EcOz Environmental Consultants (EcOz) on behalf of Lithium Plus Minerals Ltd. A listing of the key consultants, their qualifications and experience in the environmental field are provided below.

Key consultant	Role	Qualifications	Experience
Claire Jones	Principal Consultant & Water and Soils Team Leader, EcOz	Batchelor of Science (Hons); Master of Science, Ecotoxicology and Pollution Monitoring	20+ years
Suzanne Barber	Lead Consultant - Impact Assessment and Approvals, EcOz	Bachelor of Environmental Science	15+ years
Glen Ewers	Principal Consultant – Ecology, EcOz	Bachelor of Science and Bachelor of Law (Environment)	15+ years

A listing of the key technical consultants is provided below:

- EcOz - Ecology assessments.
- Environmental Geochemistry International (EGi) - Geochemical characterisation of waste and ore.
- Groundwater Enterprises - Preliminary groundwater assessment.
- CDM Smith Australia - Groundwater bore drilling supervision.
- GHD - Haulage route assessment.
- Lithium Plus Minerals - Stakeholder Engagement Plan (Prepared in conjunction with Bina Sustainable Solutions and True North Strategic Communication).
- WRM Water + Environment - Preliminary surface water assessment.

EXECUTIVE SUMMARY

Project overview

Lithium Plus Minerals Ltd (Lithium Plus) proposes to develop an underground mine at the Lei Lithium Project, located in the Northern Territory, 30 km (direct line) south of Darwin within mineral lease application ML(A) 33874, The Project is located on vacant crown land and is accessed via Fog Bay Road. The nearest town, Berry Springs, is located approximately 25 km (direct line) east of the Project.

3.10 Mt of high grade spodumene ore is proposed to be recovered from the Lei deposit via underground mining methods. Preliminary mine plans include a surface box-cut with a portal providing access to a spiralling underground decline located east of the pegmatite orebody. Crushing and screening will be undertaken to produce Direct Shipping Ore (DSO) at an estimated peak production rate of 600 kt pa.

The DSO will be trucked to the Darwin Port for export overseas. No processing or tailings facilities are required on site. Waste rock is chemically benign and will be temporarily stored on the surface prior to being used for backfilling of the box-cut and underground on closure.

The life of mine is approximately 7 years, from construction to closure. The total proposed disturbance footprint is <100 ha.

Assessment of potential impacts

Pre-referral screening (Appendix A) of the Lei Lithium Project determined that the Project has potential to impact 7 of the 14 NT EPA environmental factors. An assessment of these 7 factors within this referral identified that 4 factors have a moderate residual impact, and the remaining 3 factors have a minor residual impact. A summary of factors relevant to the Project, potential impacts, and residual impact ratings and provided in the table below.

For each of the relevant factors, surveys and assessments were undertaken to identify environmental values and avoidance and mitigation measures to minimise potential impacts. Information gaps and uncertainties were identified that will be addressed through further assessments under the NT EPA environmental approvals process.

Summary of factors relevant to the Project, potential impacts, and residual impact ratings

Factor	Residual impact	Description
LAND		
Terrestrial environmental quality Section 5.1	**Minor**	The disturbance is small-scale (<100 ha). The potential for erosion is minimised through the implementation of best practice mitigation measures, including a CPESC endorsed ESCP. The Project does not involve activities with the potential to create significant soil contamination. Effective implementation of standard and proven measures should ensure that any hydrocarbon contamination does not result in any measurable impacts to soil, surface or groundwater quality. Geochemical characterisation the waste rock and ore material indicate that the majority of the material represents very low to low risk of environmental impact. Mitigation measures include the development and implementation of a: • Vegetation Clearing Procedure. • Erosion Sediment Control Plan. • Emergency Response Plan. • Hazardous Materials Management Plan. • Mine Closure and Rehabilitation Plan. Adoption of the mitigation measures onsite will minimise the likelihood of significant land and soil erosion and contamination occurring.

Factor	Residual impact	Description
Terrestrial ecosystems Section 5.2	**Moderate**	Threatened fauna Black-footed Tree-rat and the Northern Brushtail Possum are known to occur within the Project area. The assessment resulted in a moderate residual impact due to the high sensitivity value of the threatened species. However, the potential significant impact is inherently unlikely due to avoidance through design. Avoidance through design: • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the Project area adjacent to Fog Bay Road. • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. • Retention of 76 ha of habitat (additional to the wildlife corridor) with Black-footed Tree-rat records in the east of Project area that will not only be uncleared but will be managed for weeds and fire, to ensure current habitat values are retained, if not improved. Mitigation measures include: • Assessment of proposed disturbance footprint to confirm presence/absence of large hollow-bearing trees in densities qualifying for as sensitive vegetation. • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs (groundwater discharge potential) and riparian vegetation value to apply an appropriate buffer in accordance with the land clearing guidelines. • The development and implementation of the following management plans and procedures: o Vegetation Clearing Procedure - including pre-clearance survey and use of a fauna spotter-catcher. o Weed Management Plan. o Waste Management Plan. o Dust Management Plan. o Blasting Management Plan. o Bushfire Management Plan. o Erosion Sediment Control Plan o Mine Closure and Rehabilitation Plan.
WATER		
Hydrological processes Section 5.3	**Moderate**	The groundwater level will be reduced during dewatering activities, resulting in uncertainties to the extent of the zone of influence and duration – groundwater level recovery time. Uncertainties will be resolved through the development of: • A site-specific groundwater model, and • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs including any evidence of water permanence and groundwater dependence on the existing riparian vegetation. Mitigation measures include the development and implementation of: • A Water Management Plan. • A Significant Vegetation Monitoring Plan (GDEs / riparian vegetation and mangrove communities). • Erosion Sediment Control Plan. • An *Application for a permit to construct or alter works*, Pursuant to section 41 of the *Water Act* will be undertaken and appropriate assessment conducted, including an analysis of the alteration of surface water flow as a result of the RWD construction. • A Waste Discharge Licence will be obtained under the *Water Act.* • A water extraction licence will be obtained under the *Water Act,* if required. • Final surface water assessment will be developed for the detailed mine design, including finalised flood modelling with LiDAR data and revision of water balance.
Inland water environmental quality Section 5.4	**Moderate**	As a result of dewatering activities, uncertainties relate to potential for release of contaminants from exposure of ASS within the Charlotte River, and the potential for saline intrusion into the underground. Further assessment will include the development of: • A site-specific groundwater model, and a

Factor	Residual impact	Description
		• Solute transport model (or similar) to model potential saline intrusion (pending outcomes of groundwater model). • ASS assessment. Mitigation measures include the development and implementation of: • Vegetation Clearing Procedure. • Erosion and Sediment Control Plan. • Water Management Plan. • Hazardous Materials Management plan. • Emergency Response Plan. • Mine Closure and Rehabilitation Plan.
Aquatic ecosystems Section 5.5	**Moderate**	Groundwater drawdown associated with dewatering activities during operations may result in impacts to aquatic ecosystems. Uncertainties will be resolved through the development of: • A site-specific groundwater model, and • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs including any evidence of water permanence and groundwater dependence on the existing riparian vegetation. Avoidance through design of site layout: • To reduce the disturbance footprint as much as reasonably practicable, reducing the potential impacts of erosion and sedimentation downstream. • Design includes drainages and sediment basins to capture and manage sediments on-site. • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. Mitigation measures include the development and implementation of: • Vegetation Clearing Procedure. • Erosion and Sediment Control Plan. • Water Management Plan (aquatic surveys). • A Significant Vegetation Monitoring Plan (GDEs / riparian vegetation and mangrove communities).
PEOPLE		
Community and economy Section 5.6	**Minor**	The Project is likely to result in benefits to the community and economy. The identification of impacts, and assessment of their significance requires consultation with stakeholders and the broader community. Lithium Plus will implement impact avoidance and mitigation measures as required to minimise impacts to the community and economy and will aim to maximise benefits to the local community and NT economy. Mitigation measures include the development and implementation of a: • Traffic Management Plan. • Emergency Response Plan. • Social Impact Assessment, Social Impact Management Plan and Territory Benefit Plan.
Culture and heritage Section 5.7	**Minor**	Uncertainties will be resolved through the undertaking an archaeological survey and obtaining an AAPA Authority Certificate. Sacred sites will be avoided in accordance with the requirements of an Authority Certificate obtained under the *Northern Territory Sacred Sites Act 1989.* Surveys and consultation are required to identify and assess the significance of archaeological sites and objects. Impact avoidance and mitigation measures will be implemented to minimise impacts to cultural values. Mitigation measures include the development and implementation of a Cultural Heritage Management Plan.

Section 4.3 of this Referral details how the Project has accounted for key principles of environment protection and management (Part 2 of the EP Act), including:

- Engaging suitably qualified professionals to undertake technical studies specifically for the Project to allow for evidence-based decision-making.
- Applying the precautionary principle whenever information is unknown or at insufficient detail to make an assessment.
- Undertaking early engagement with the community.
- Committing to working with the local community and training providers to prioritise local employment and develop an industry that provides social and economic benefits to the Berry Springs township.
- Applying the environmental decision-making hierarchy through siting and design of project infrastructure to avoid impacts, and development of mitigation measures for potential impacts.
- An energy options analysis will be undertaken to determine appropriate power supply options in consideration for the impacts of a changing climate.

Conclusions

The Lei Lithium Project referral has identified that further studies are required to address knowledge gaps and uncertainties in relation to hydrological processes, inland environmental quality and aquatic ecosystems to assess the potential for significant impact on the environment. Outcomes will further inform the mine design and planning to minimise the potential impacts through adopting effective and proven avoidance and mitigation measures.

Lithium Plus has commenced consultation with stakeholders and the community and will continue to inform, engage and consult with all relevant stakeholders throughout the environmental assessment process, during construction, operations and closure.

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ACRONYMS

AAPA	Aboriginal Areas Protection Authority (Northern Territory)
ABS	Australian Bureau of Statistics
AEP	Annual Exceedance Probability
AMD	Acid mine drainage
ANZG	Australian New Zealand guidelines for fresh and marine water quality
ARD	Acid rock drainage
ASS	Acid sulfate soil
ASX	Australian Securities Exchange
BCF	Burrell creek formation
bgl	Below ground level
BOM	Bureau of Meteorology
CHMP	Cultural Heritage Management Plan
CPESC	Certified Professional in Erosion and Sediment Control
CPF	Cemented paste fill
Cth	Commonwealth
dbh	diameter at breast height
DCCEEW	Department of Climate Change, Energy, and Environment and Water (Cth)
DEPWS	Department of Environment, Parks and Water Security (NT) – (now DLPE)
DHWQO	Darwin Harbour Water Quality Objectives
DIPL	Department of Infrastructure, Planning and Logistics (now DLI)
DITT	Department of Industry, Tourism and Trade (now DME)
DLI	Department of Logistics and Infrastructure (formerly DIPL)
DLPE	Department of Lands, Planning and Environment (formerly DEPWS)
DME	Department of Mining and Energy (formerly DITT)
DRWCD	Darwin Rural Water Control District
EC	Electrical conductivity (a measure of the total amount of dissolved salts in water)
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EL	Exploration Licence
EMP	Environmental Management Plan
EP Act	Environment Protection Act 2019 (Northern Territory)
EPBC Act	Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth)
ERP	Emergency response plan
ERT	Emergency response team
ESCP	Erosion and Sediment Control Plan
ESO's	Emergency service officers
EV's	Electric vehicles
GARD Guide	Global Acid Rock Drainage Guide – best-practice guide to ARD prevention and management
GDE	Groundwater dependant ecosystems
GGAP	Greenhouse Gas Abatement Plan
GHG	greenhouse gas
ha	hectare
HV	Heavy vehicle
ICMM	International Council on Mining and Metals

IECA	International Erosion Control Association
INAP	International Network for Acid Prevention
LHOS	Long Hole Open Stoping
LPM	Lithium Plus Minerals Ltd
LV	Light vehicle
LWD1	Lei waste dump 1 (box cut oxide waste rock material)
LWD2	Lei waste dump 2 (fresh waste rock material from the underground)
MA	Mining Authorisation
MCP	Mine Closure Plan
ML	Mineral Lease
ML(A)	Mineral Lease Application
MNES	Matters of National Environmental Significance
MRE	Mineral resource estimate
MSDS	Material safety data sheet
MTA	Mineral Titles Act
MWD	Mine water dam
NAF	Non-acid forming
NAFI	Northern Australia and Rangelands Fire Information
NGER	National Greenhouse and Energy Reporting
NLC	Northern Land Council
NMD	Neutral mine drainage
NT	Northern Territory
NTG	Northern Territory Government
NT EPA	Northern Territory Environment Protection Authority
NVIS	National Vegetation Information System
PAF	Potentially acid forming
PWC	Power and Water Corporation
RAR	Return air raise
RF	Rock fill
ROM	Run of mine
RWD	Raw water dam
SD	Saline drainage
SIA	Significant impact assessment
SoCS	Sites of Conservation Significance
SWL	Standing water level
TARP	Trigger action response plan
TDS	Total Dissolved Solids
TIS	Traffic Impact Statement
TO	Traditional Owner
TPWC Act	Territory Parks and Wildlife Conservation Act (Northern Territory)
WDL	Waste Discharge Licence
WMP	Water management plan
WONS	Weed of National Significance
WRD	Waste rock dump
UG	Underground
VCL	Vacant Crown land
ZOI	Zone of influence

1 INTRODUCTION

This Referral report has been prepared to inform the Northern Territory Environment Protection Authority (NT EPA) of the proposal by Lithium Plus Minerals Ltd (Lithium Plus) to develop an underground lithium mine, approximately 30 km south of Darwin within mineral lease application ML(A) 33874 on Fog Bay Road ('the Project area'). The proposal is known as the Lei Lithium Project (referred to herein as 'the Project').

The Project is being referred to the NT EPA to determine whether formal assessment is required pursuant to section 48 of the NT *Environmental Protection Act 2019* (EP Act). This document provides supplementary information to the Referral Form and has been prepared with reference to the guidelines document '*Referring a Proposed Action to the NT EPA: Environmental impact assessment guidance for proponents*' (NT EPA, 2022).

This Referral also gives consideration as to whether the Project should be referred for assessment under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This assessment has determined that a significant impact to Matters of National Environmental Significance (MNES) is unlikely, therefore Lithium Plus are not proposing to submit a referral to the Commonwealth Department of Climate Change, Energy, and Environment and Water (DCCEEW) under the EPBC Act.

1.1 Proponent overview

Lithium Plus Minerals Ltd (ASX: LPM) is a pure-play lithium company, with a tenement portfolio located in the northern end of the Litchfield Pegmatite Belt. This region has seen significant lithium mineralisation discoveries since 2017. The total area of Lithium Plus tenure exceeds 1690 km^2. Lithium Plus has multiple drill targets at the Lei, Cai, Cai SW, Perseverance and Jewellers deposits offering excellent exploration potential to generate new targets and new lithium hosted discoveries (Figure 1-1).

Lithium-rich spodumene concentrate is a feedstock material used in the production of lithium chemicals that go into batteries for EVs and other renewable energy requirements. The supply of spodumene concentrate remains structurally constrained – so that meaningful lithium supply response is highly dependent on uptake of low grade, carbon dioxide intensive Chinese lepidolite production. Lithium Plus is ideally placed to take advantage of strong, long term market fundamentals for spodumene concentrate extraction in Australia.

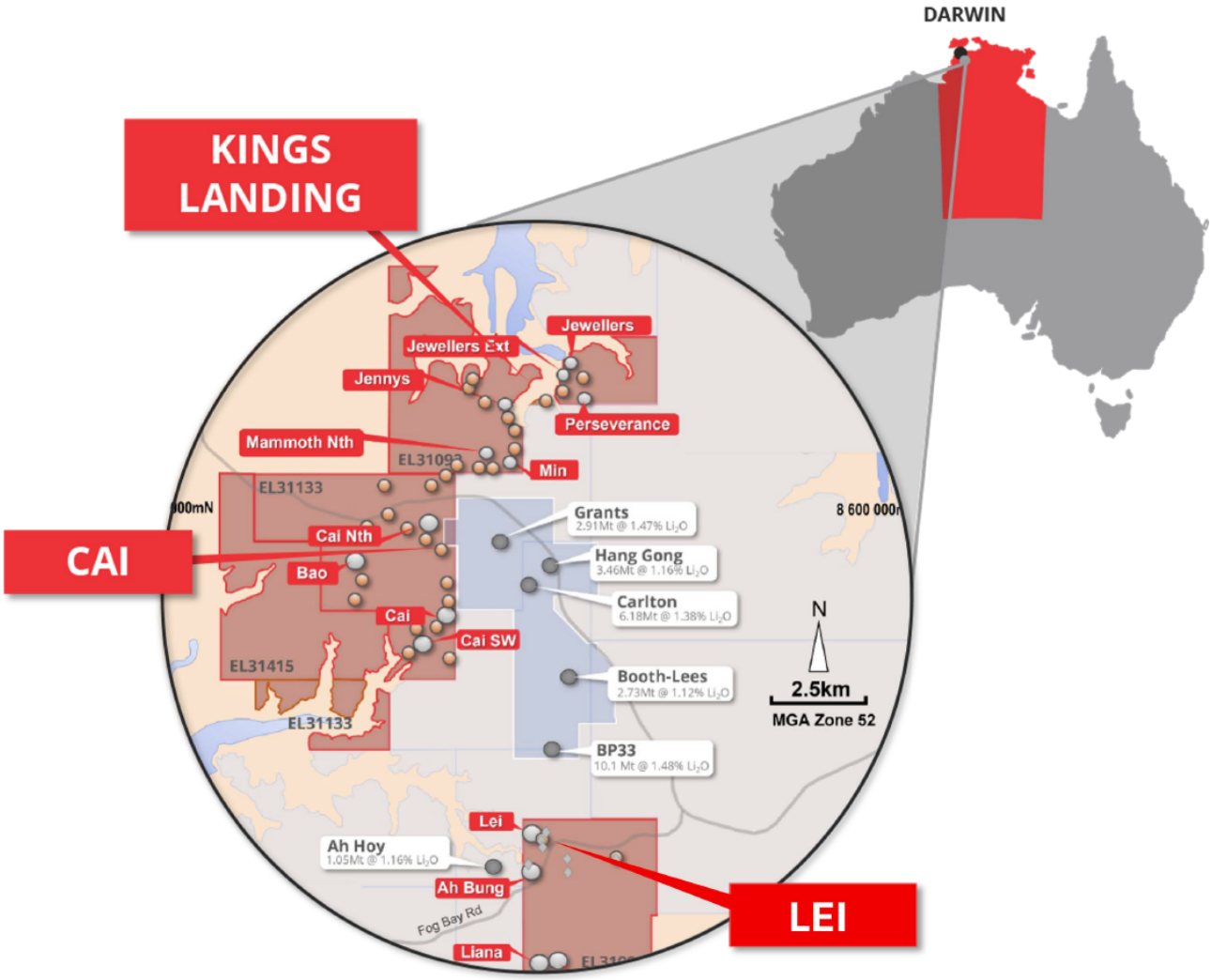

Figure 1-1. Lithium Plus Minerals Ltd tenements (red) in the Bynoe Pegmatite Field

1.2 Project overview

Lithium Plus propose to develop an underground mine at the Project, located in the Northern Territory, 30 km south of Darwin, within ML(A) 33874 on Fog Bay Road. The tenement forms part of the Bynoe Pegmatite Field located on the Cox Peninsula in the Northern Territory, approximately 2 km south of the Lithium Developments (Grants NT) Pty Ltd (Lithium Developments), Finniss Lithium Project BP33 underground mine.

The Lei deposit, located within the Project area, is one of a series of discrete, lithium yielding pegmatite deposits located in the West Arm–Mt Finniss pegmatite belt. The Lei deposit is estimated to contain 4.09 million tonnes (Mt) at 1.43% Li2O from which 3.10 Mt (at equivalent grade) is proposed to be recovered from underground mining methods. Fresh pegmatite at the Project is composed of spodumene, quartz, albite, microcline and muscovite (in decreasing order of abundance). Spodumene, a lithium-bearing pyroxene ($LiAl(SiO_3)_2$), is the predominant lithium-bearing phase. The Lei lithium deposit is hosted in one discrete pegmatite in the order of 15-20 m wide, 240 m long and dipping steeply to the east. Preliminary mine plans include a surface box-cut with a portal providing access to a spiralling decline located east of the pegmatite body.

The key components of the Project are summarised below:

- Mining of the pegmatite deposit containing spodumene ore using box cut and portal entry with underground decline.
- Total depth of the underground workings is approximately 700 m.

- Life of mine (LOM) is approximately 7 years (inclusive of 12 months of construction, 68 months of operation and 6 months of rehabilitation and closure).
- Transfer of mined material to a Run of Mine (ROM) Pad located adjacent to the box cut/underground portal.
- Crushing and screening to produce Direct Shipping Ore (DSO) at an estimated peak production rate of 600 kilotonnes per annum (ktpa). Feasibility Studies are currently being undertaken to optimise operation for a 750 ktpa production capacity at peak production. The ore production is proposed as a DSO therefore no processing and tailings production will occur on site.
- Establishment of surface Waste Rock Dumps (WRDs) for temporary disposal of chemically benign waste rock prior to being used for backfill underground, and backfill of the box-cut on closure.
- Transport spodumene as DSO and/or beneficiated product to Darwin Port by road for export overseas.
- Site infrastructure components: Site access road, administration offices, employee facilities, laydown and storage areas, workshop, fuel storage and refuelling areas, internal haul roads, water storages, pumps and pipelines; drainage and sediment basins, run of mine pad, stockpiling areas, waste rock dumps, box cut and safety bund, portal and decline, ventilation, return air raise (RAR), and explosives storage.

The total “proposed disturbance footprint” is the area of direct impact within the Project area and is <100 ha.

1.3 Studies undertaken to inform this Referral

The following studies have been undertaken to inform this Referral:

- Pre-referral screening tool (EcOz, 2024a) Appendix A.
- Ecological Assessment of EL31091 (EcOz, 2024b) Appendix B.
- Supplementary Ecological Assessment (EcOz, 2024c) Appendix C.
- Haulage Route Assessment (GHD 2024) Appendix D.
- Stakeholder Engagement Plan (Lithium Plus et al 2024) Appendix E.
- Geochemical Characterisation of Proposed Waste and Ore Materials, Lei Lithium Project (EGi, 2024) Appendix F.
- Preliminary Groundwater Assessment (Groundwater Enterprises, 2023) Appendix G.
- Drilling Report – Lei Lithium Deposit – Groundwater Bore Drilling (CDM Smith, 2024) Appendix H.
- Lei Lithium Project – Preliminary Surface Water Assessment (WRM Water & Environment, 2024) Appendix I.

2 PROJECT DESCRIPTION

2.1 Location

A summary of the Project location details is provided in Table 2-1 and shown in Figure 2-1.

Table 2-1. Summary of Project location details

Tenements details	ML(A) 33874
Latitude	-12.737751°
Longitude	130.784129°
Mineral Lease area	295 ha
Street address Lot/Section number Town/Hundred	Street Number: 2873 Road: Cox Peninsula Locality/Suburb: Charlotte Town/Hundred: Hundred of Hughes (372) Parcel: 2746
Zoning	Rural (R)
Tenure / ownership of land	Vacant Crown Land (VCL) – NT Government
Nearest residential community/town	Berry Springs is the nearest residential community / township, located approximately 25 km (direct line) east of the Project.
Site access	From Darwin, head South for approximately 45 km on the Stuart Highway to the Cox Peninsula intersection, head west for approximately 36 km on Cox Peninsula Road, then head west for ~3.5 km on Fog Bay Road. The Project is accessed ~500 m along an existing access track north of Fog Bay Road.
Land use history	ML(A) 33874 is within exploration lease (EL) 31091 (expiry date 24/08/2024, renewal submitted 23/08/2024). Prior to this, the Project had been under mineral titles but shows no signs of previous disturbance apart from exploration by Lithium Plus. *The project area is not previously or currently regulated as a contaminated site* under the *Waste Management and Pollution Control Act (WMPC Act)1998.*
Surrounding land uses	The area immediately surrounding ML(A) 33874 is titled exploration lease, held by Lithium Plus to the South and East (EL 31091), Lithium Developments to the North and East (EL29698) and Synergy Prospecting Pty Ltd (EL 31774) to the Northeast. Fog Bay Road intersects ML(A) 33874, with the mine infrastructure proposed to be located North of the road. The Lithium Developments, Finniss Lithium Projects - Grants open-cut mine and BP33 underground mine are located approximately 8 km and 2.5 km north (respectively) of the Project. The closest sensitive land uses are: • The Charlotte River (mapped as estuary/coastal waters - mangrove communities and salt flats) directly downstream of the Project area, approximately 300 m south-west of the Lei deposit. • Rural residential zones (parcel 2512 and 2511, with and without agriculture respectively), located approximately 3.3 km (direct line) south of the Project area.

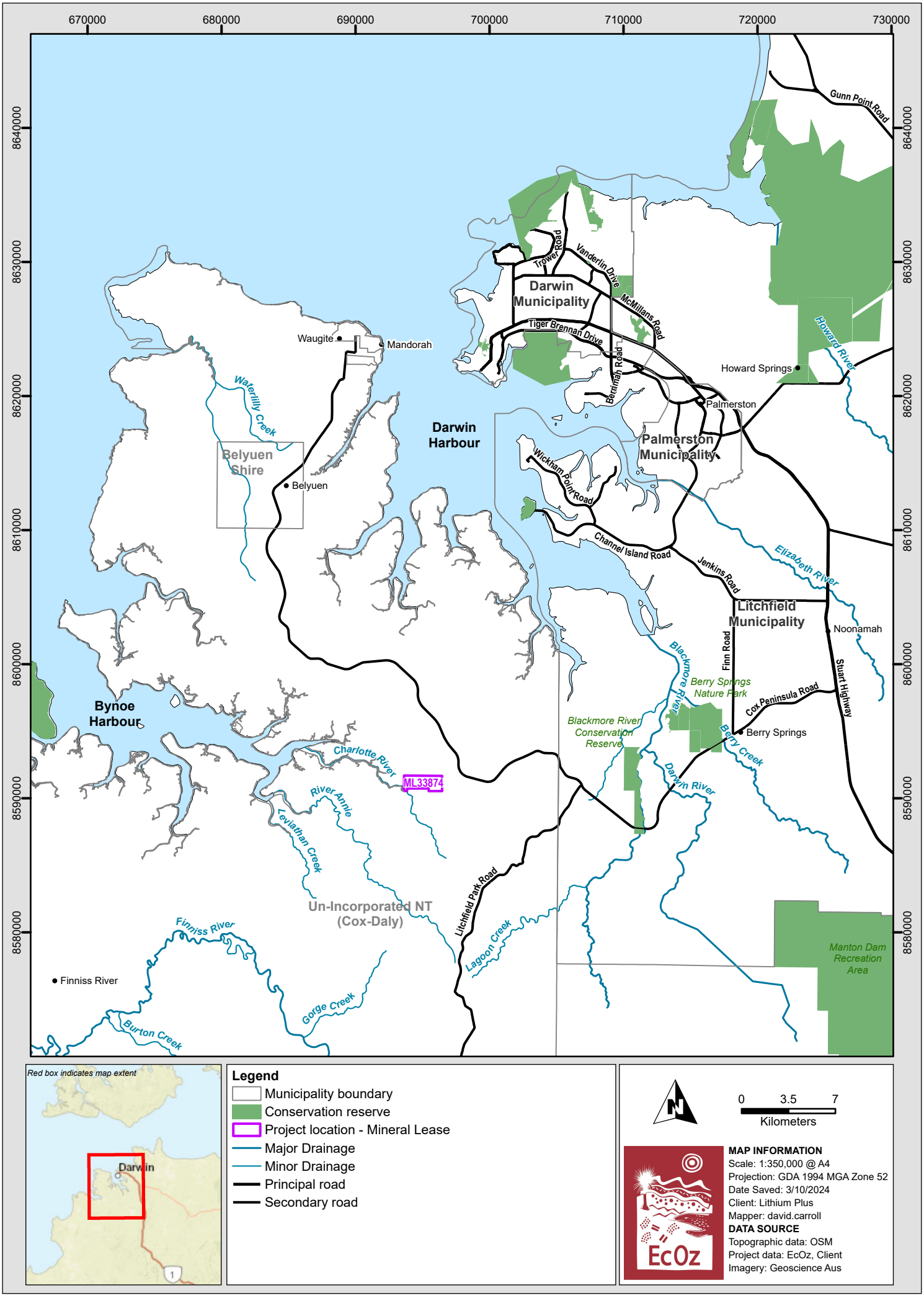

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Figure 2-1. Map of Lei Lithium Project location

2.2 Regional environmental context

The following provides a brief overview of the key characteristics of the regional environment, which provides context for the identification of site-specific environmental values described in section 5.

Table 2-2. Key characteristics of the regional environment

Climate	The region of the project area experiences a tropical climate with a distinct Dry season (May to October) and Wet season (November to April). Typically, for this region, humidity, maximum and minimum temperatures are highest in the Wet season, and annual evaporation far exceeds annual rainfall. Climate statistics for the Darwin Airport (Site number: 014015) from 1941 to current (July 2024) show an average annual rainfall of 1729.5 mm, of which 93% of it falls during the wet season. The mean annual maximum temperature is 32.1 °C and minimum temperature is 23.2 °C (BOM 2024). Wind direction is predominately from the north through west most of the year (August to March) and particularly during the wet season (September to March). During the dry months (April to July) winds come predominately from the east. Climatic factors are a key consideration for planning and design of the mine water management system and water demand.
Bioregion	The Project is located within the Darwin Coastal Bioregion.
Land systems	Land systems have been mapped in the region by the NT Government at a scale of 1:250,000. This mapping shows that the Project ML(A) 33874 is entirely within the sandstone plains and rises of the Bustard land system. Land units within the Project area are mapped at a scale of 1:25,000 and described in Land Resources of the Elizabeth, Darwin and Blackmore Rivers - Greater Darwin Area (DEPWS 2000 and Fogarty et al. 1984). Land unit mapping within the Project disturbance footprint was verified by EcOz Environmental Consultants (Appendix B) and detailed in section 5.
Vegetation	Bustard land system vegetation comprises of Low shrubland of *Eucalyptus* species, *Xanthostemon paradoxus* and *Buchanania* species. Vegetation described in the land unit mapping at a scale of 1:25,000 is detailed in section 5.
Soils	Bustard land system - comprise of lithosols with minor shallow yellow massive earths and earthy sands. Soils described in the land unit mapping at a scale of 1:25,000 is detailed in section 5.
Fire regime	The Project is located within the NT Vernon Arafura Management Zone and the Northern Fire Protection Zone. Regional fire history and fire scar mapping was obtained through the Northern Australia and Rangelands Fire Information website. In the past decade (2014 - 2023), most of the Project area has been burnt as many as 8 - 10 times and was last burnt in either 2023 or 2022. Overall, the Project area has recorded high fire frequency. Bushfire management and preparedness will be important to protection of the mine infrastructure, habitat and threatened fauna species, and in the long-term, achieving rehabilitation outcomes.
Regional hydrology and topography	The Project is regionally within the Finniss River drainage basin and falls within the Charlotte River sub-catchment of Bynoe Harbour. The sub-catchment is approximately 170 $km^{2,}$ with surface water flows following the topography gradient of the drainage lines, trending towards the north-west via the Charlotte River, flowing into the tidal inlet of the Bynoe Harbour, approximately 8 km Northwest of the Project area (direct line from the mapped coastline (NRMaps) to the western boundary of ML(A) 33874).
Beneficial water use declaration	The Project lies within two Beneficial Use Declaration areas: • Fog Bay Area - beneficial use of aquatic ecosystem protection (Northern Territory Government gazette: no. G9) and • Darwin Rural Water Control District (DRWCD), beneficial use of agriculture, aquaculture, public water supply, environment, cultural, industry, rural stock and domestic, mining activity and petroleum activity (Northern Territory Government gazette: no. G25).
Regional geology	The Project is located in the north-west of the Pine Creek Geosyncline, a thick sequence of Proterozoic metasediments that overlie Archean basement rocks. The Pine Creek Geosyncline underwent extensive folding and uplift 1800 million years ago. After a long hiatus, during which

	significant weathering and erosion occurred, a thin drape of Cretaceous and Cainozoic sediments was deposited over the Proterozoic rocks. The lithium prospect at Lei is hosted in a pegmatite, one of a swarm of complex zoned rare element pegmatites forming the 55 km long by 10 km wide West Arm–Mt Finniss pegmatite belt (Groundwater Enterprises 2023). The pegmatites are predominantly hosted within the early Proterozoic metasedimentary lithologies of the Burrell Creek Formation (BCF) and are usually conformable to the regional schistosity. The principal rock type of the BCF is phyllite, a low-grade metamorphic equivalent of an immature sandy siltstone. In fresh form, the phyllite is grey, finely bedded or cleaved, and is composed of quartz, feldspar, lithic fragments, micas and clay. Fresh pegmatite hosting the ore is overlain by approximately 50 m of weathered rock and transitional rock (EGi 2024).
Regional hydrogeology	The project area is underlain by the Burrell Creek Groundwater System. The aquifer is described as fractured and weathered rocks, the rock is mostly weakly fractured so is a comparatively poor aquifer. There is limited use of this aquifer for domestic, stock or agricultural water supply. Groundwater around the Lei deposit is hosted in the BCF, which underlies the area surrounding the deposit with the exception of shallow alluvial deposits around the Charlotte River. The BCF forms a marginal fractured rock aquifer with typical bore yields of less than 0.5 L/s. The limited groundwater potential is largely due to the lack of primary porosity and limited open fracturing within the formation. Higher yields are recorded where drilling intersects fracture zones or bands of quartz veining. Groundwater is typically intersected at the base of the weathering zone/transition into fresh BCF. The BCF is largely fine grained and characteristically weathers to clay. Where heavily weathered, the formation is often less permeable relative to fresh rock due to the lower likelihood of fractures staying open in the clayey, weathered phyllite (Groundwater Enterprises 2023). The Berry Springs Dolostone aquifer and Water Allocation Plan area is located approximately 16 km east of the Project area. Water allocation for this aquifer is subject to the Berry Springs Water Allocation Plan 2016 - 2026 (DLRM 2016). There are current concerns regarding over-extraction from this aquifer. There is no connection of the Burrell Creek Groundwater aquifer beneath the project area to the Berry Springs Dolostone aquifer. The Project will not impact the Berry Springs Dolostone aquifer and therefore is not further considered in this report.
Parks and reserves	The Project does not occur within any national parks or reserves. The nearest is the Blackmore River Conservation reserve, located approximately 15 km to the east of the Project area. The Litchfield National Park boundary is located approximately 33 km south of the Project area. The Project will not impact on these areas and therefore they are not further considered in this report.
Significant sites or features or sensitive receptors	The Project does not occur within any Sites of Conservation Significance (SOCS) or nationally important wetlands, nor does water from the Project area flow into any of these areas. The Darwin Harbour SOCS is the closest, located approximately 4 km from the Lei deposit to the SOCS boundary to the Northwest. The Project will not impact on these areas and therefore they are not further considered in this report. <u>Charlotte River:</u> The Charlotte River, located 300 m south-east of the Lei deposit, is mapped by the BOM GDE Atlas, as having a moderate potential for aquatic GDEs. The Charlotte River supports significant riparian vegetation and mangrove woodlands directly downstream of the Project area. <u>Bynoe Harbour:</u> Bynoe Harbour is utilised for both recreational and commercial purposes, with the mangrove communities within the harbour constituting 6% of the total mangrove area in the Northern Territory (Lee, G.P. 2003). The harbour's mangrove communities are supported by small tidal creeks. The Bynoe Harbour is located approximately 8 km Northwest of the Project area (direct line from the mapped coastline - NRMaps to the western boundary of ML(A) 33874). The NT Government produced mapping of mangrove communities in Bynoe Harbour in 2003 at the scale of 1:10,000 (DEPWS, 2024a). Aerial imagery shows that mangrove woodlands and riparian vegetation occur directly downstream of the Project area.

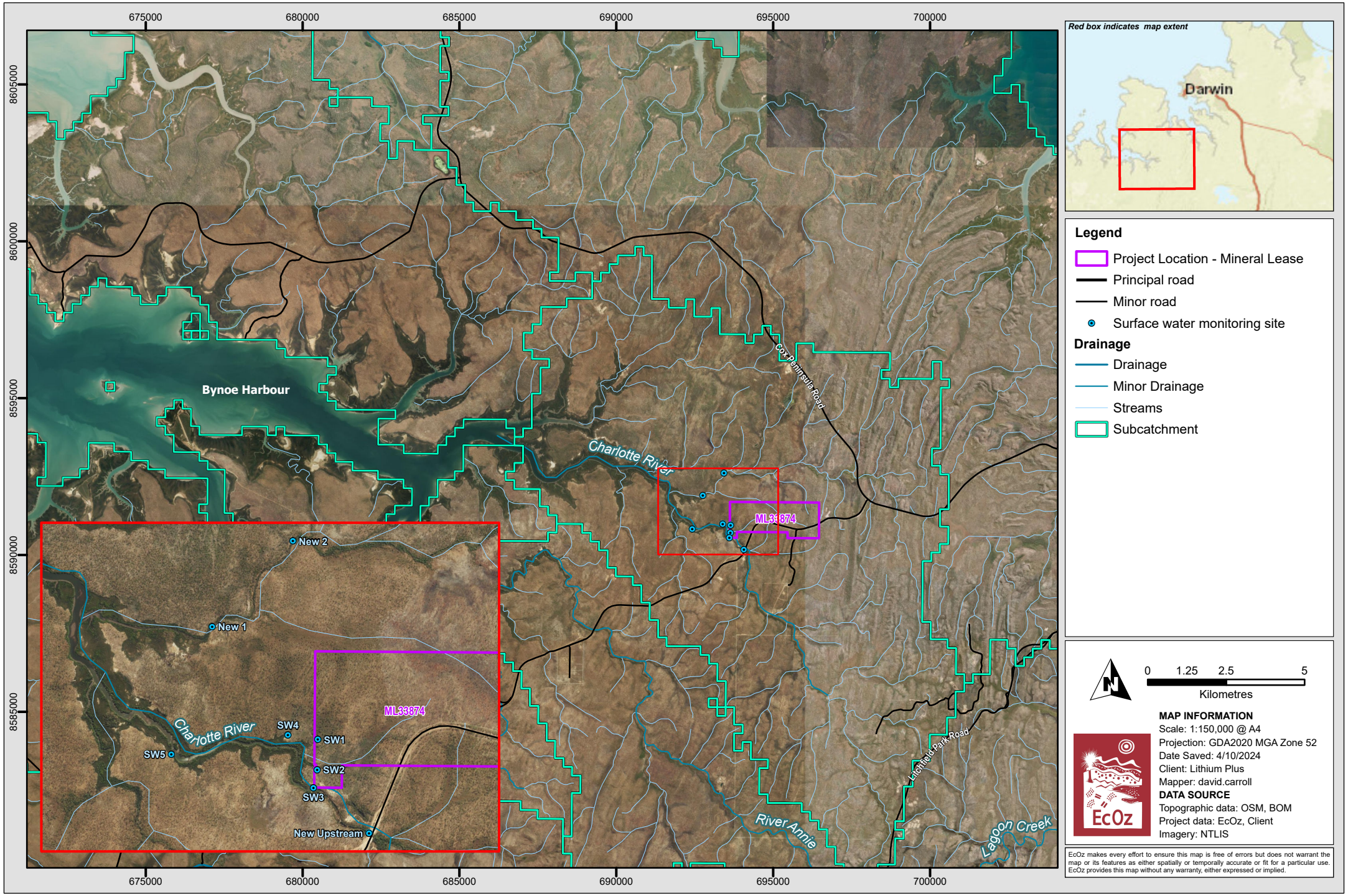

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Figure 2-2. Map of regional hydrology

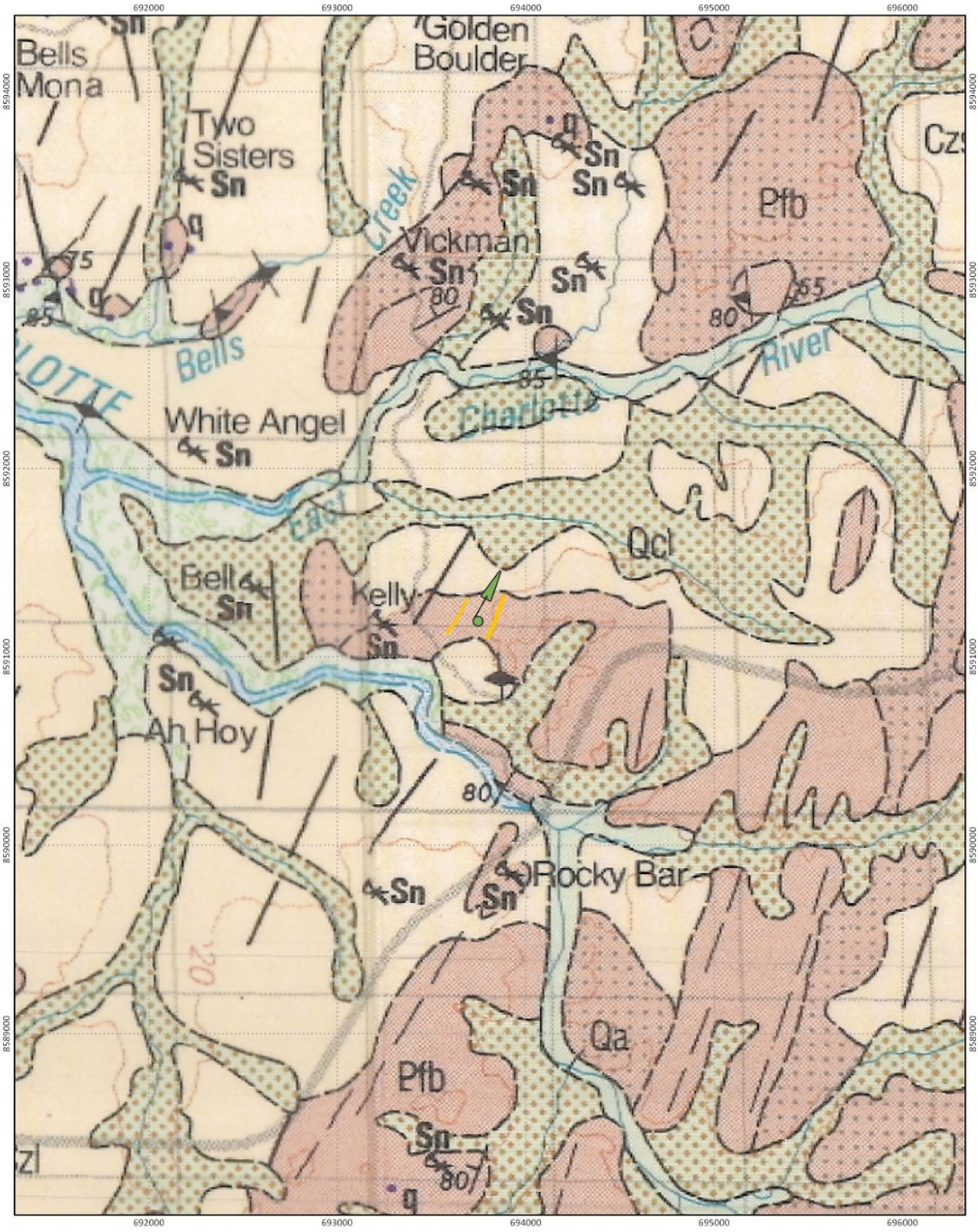

Figure 2-3. Map of surface geology

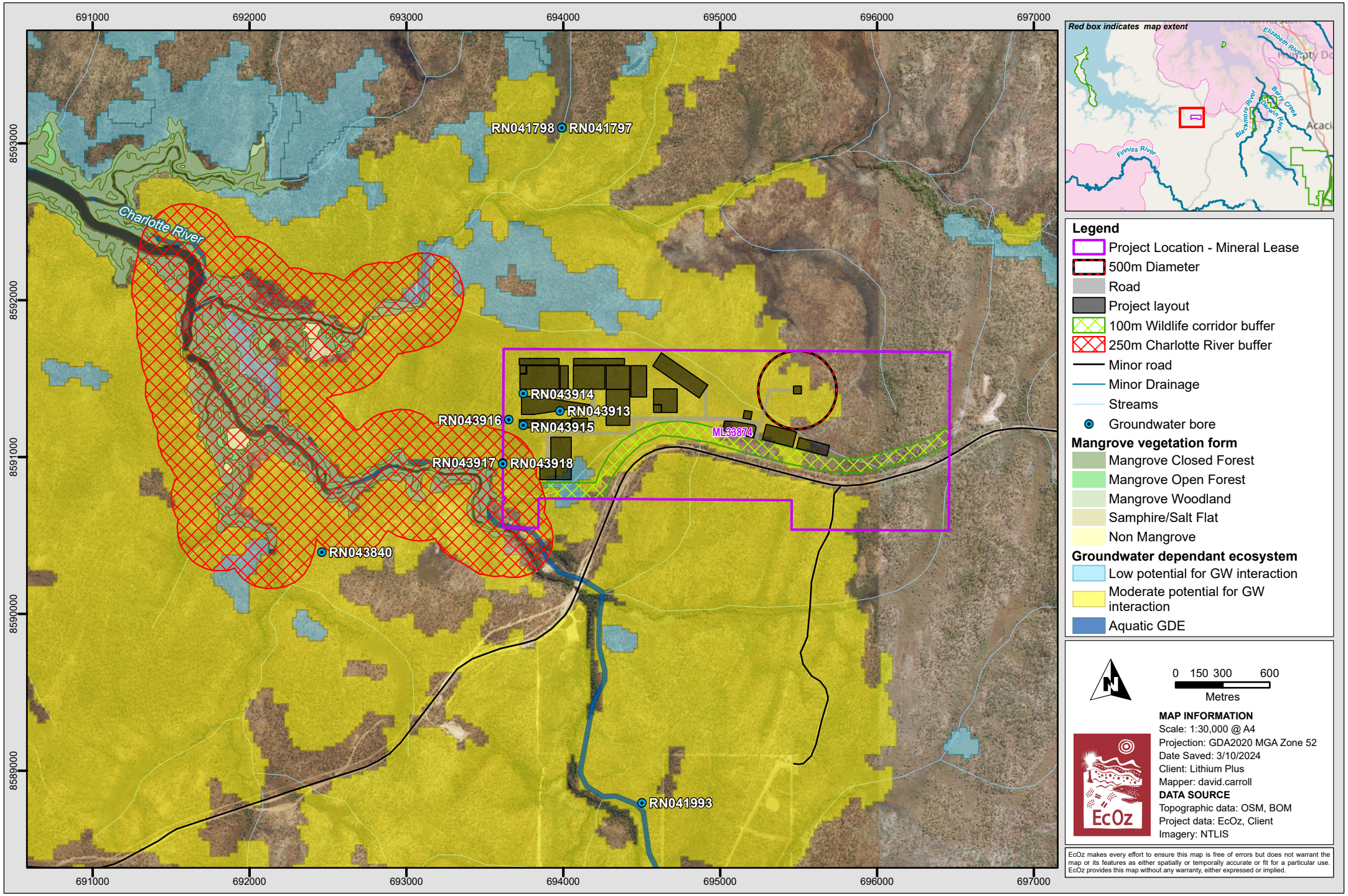

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Figure 2-4. Map of surrounding significant sites or features

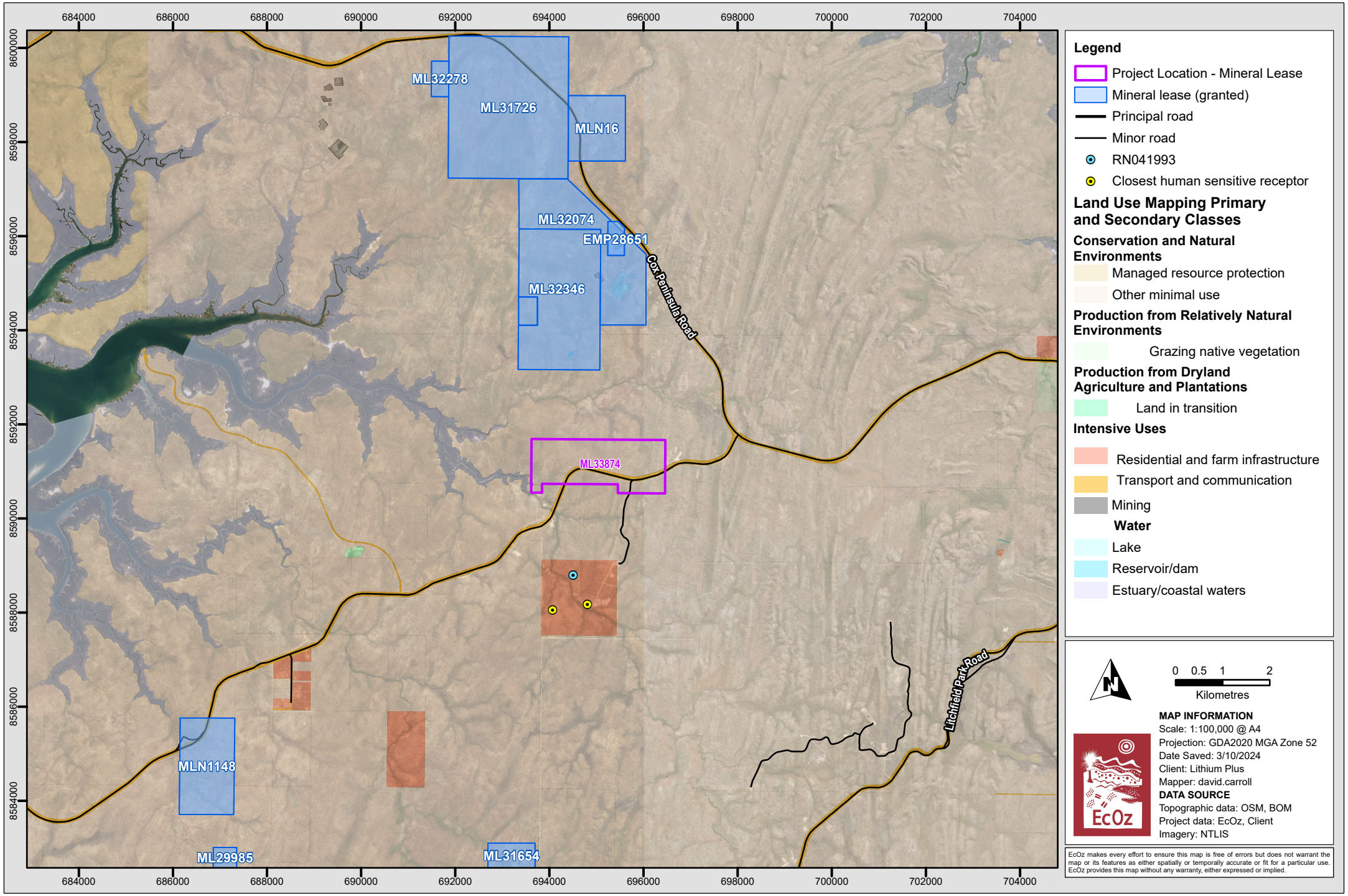

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Figure 2-5. Map of surrounding land use

2.3 Key components

This section describes the Projects key physical components and their purpose/function, including infrastructure and major equipment. The key Project features are presented in Table 2-3 and infrastructure identified in Table 2-4 and Figure 2-6.

Table 2-3. Key Project features

Aspect	Component	Details
Project area	Proposed disturbance footprint	Preliminary site design allows for disturbance footprint of less than 100 ha.
Schedule	Construction Phase	12 months.
	Operations Phase	68 months.
	Closure Phase	6 months of reinstatement works plus ongoing monitoring until requirements for relinquishment of lease are met.
	Total Life of Mine (LOM)	86 months (~ 7 years).
	Operating hours	24 hrs/day, 7 days/week.
Resource	Target commodity	Spodumene.
	Total Resource Recovery	3.10 million tonnes (Mt).
Mining	Mining Depth	Approximately 700 m below surface.
	Mining Methods	Underground; sublevel open stope with pillar or paste fill (CRF); drill and blast.
	Ore production	Up to 600 kt/ore processed per annum. 3.10 Mt over LOM at 1.43% LiO_2.
	Waste rock production	1.53 Mt over LOM
Waste Rock Management	Geochemical characteristics	Low risk of Acid Metalliferous Drainage (AMD) and Neutral Metalliferous Drainage (NMD) from waste rock and ore.
	LWD1 (Lei waste dump)	LWD1 will temporarily store weathered waste rock material from box cut, prior to being used as backfill.
	LWD2 (Lei waste dump)	LWD2 will temporarily store transitional and fresh waste rock material from the underground mine, which will be backfilled on closure.
Processing	Primary Ore	DSO product: crushed/screened and loaded straight road trains for shipping to the Port facilities. No processing and tailings will occur on site.
Water Management	Demand	Construction: ~300 ML across one dry season (currently targeted 2026). Operations: ~150 ML per annum for surface operations (crushing, dust suppression). Underground operations ~132 ML per annum.
	Sources	Potable water will be trucked from nearby town water supply for human consumption. Clean surface water runoff and incidental rainfall will be captured in a Raw Water Dam (RWD) for operational use. Stormwater runoff and mine affected water will be captured and treated (as required) in two Mine Water Dams (MWD) and one Sediment Dam.
	Internal water storage capacity	Four water dams will be located across the site with the following preliminary capacity (WRM, 2024): • A RWD (180 ML) to collect clean, localised stormwater runoff from the eastern portion of the Project area.

Aspect	Component	Details
		• MWD1 (100 ML) which collects mine affected runoff from the ROM pad, ore handling areas and the workshop area, and underground workings. • MWD2 (10 ML) which collects mine affected runoff from the waste dump areas. • SD1 (10 ML) which collects mine affected runoff from disturbed areas in the southwestern portion of the lease area.
	Controlled release (discharges)	Water balance modelling undertaken for median climatic conditions (WRM, 2024 - Appendix I) indicates that controlled release of excess water from Mine Water Dam 1 (MWD1) to the Charlotte River during the wet season, at 10 ML/d when the MWD1 volume exceeds its Maximum Operating Volume is 117 ML (based on no groundwater inflow scenario) and 142 ML (groundwater inflow scenario of 0.25 ML/d). Passive overflows of clean water from the RWD to the Charlotte River during the wet season, is 240 ML, and based on modelling undertaken for median climatic conditions (WRM, 2024 - Appendix I). Subject to granting of a Waste Discharge Licence under the *NT Water Act 1992*.
	Options to supplement water demands in the dry season	Outcomes of the preliminary water balance (WRM, 2024 - Appendix I) indicate that the proposed water management infrastructure can supply the estimated site demands under median climatic conditions, based on collection of stormwater runoff from within the Project area. A small shortfall in meeting demands (27 ML) occurs under dry conditions (10 %ile) based on no groundwater inflow scenario. A 2 ML shortfall is modelled for dry conditions (10 %ile) based on 3 L/s (0.25 ML/d or 91 ML/yr) groundwater inflow scenario. Options to supplement water demands in the dry season will be considered in the final surface water assessment (if required), and may include: • Surface water extraction from existing nearby water storages and/or waterways (subject to granting of a Surface Water Extraction Licence under the Water Act). • Groundwater extraction and bores (subject to granting of a Groundwater Extraction Licence under the Water Act); and/or • Yield additional water from catchment runoff from within the mine lease.
Power Supply	Power supply to mining operations	Options to connect to the external power grid, on-site generation, and renewable energy are being investigated. The Power and Water Corporation (PWC) is currently assessing external network capacity to provide power to the site. Alternatively, on-site generation via diesel-powered units as either a primary source or emergency backup is being considered. An on-site solar / battery plant will provide low-voltage power requirements to administration, lighting, and water plants. It is anticipated that the fuel requirement for the diesel-powered generators will be 605 kL per year. In addition, the mining fleet is forecast to require approximately 16,800 kL over the life of the mine; the bulk of this (over 75%) will be required during the first 12 months. An energy options analysis will be undertaken during 2025 to inform further environmental assessment.
Emissions	Dust emissions	Air quality impacts from dust particles largely produced from land clearing, construction, mining, crushing and screening and haulage/traffic activities. Dust will be managed using water for dust suppression activities
	GHG emissions	Exhaust emissions will be produced from plant and equipment and diesel generators and pumps. Given the Project is relatively small-

Aspect	Component	Details
		scale and limited duration, the emission levels are not anticipated to be a magnitude that would cause any measurable changes in air quality beyond the mine site The energy options analysis will include an GHG emissions assessment and development of mitigation measures as required.
Waste	Non-mineral	There will be no landfill onsite. Lithium Plus is committed to avoid, reduce, reuse and recycle material where possible. All waste will be segregated into skip bins and removed from the Project area by a licenced waste management contractor to be recycled where possible (i.e., packaging, metals, wood, tyres, batteries etc.). Hazardous wastes that cannot be recycled will be segregated, appropriately stored and collected by a licenced waste contractor to be disposed of at a waste facility in Darwin regional area accordingly.
Hazardous substances	Hydrocarbons	Maximum quantity fuel stored on site will be 220,000 L (2x 110,000 L above ground, self-bunded fuel storage tanks) and ~10,000 L (maximum) bunded storage facilities for greases, oils and lubricants.
	Oxygen and Acetylene	~ 63 m^3 oxygen and ~ 63 m^3 Acetylene stored in accordance with manufacturers specifications.
	Chemicals	Provision of ~500 L for miscellaneous chemicals for cleaning and maintenance that will be stored in accordance with manufacturers specifications.
	Ammonium Nitrate	Magazine located on site for storage of explosives (Ammonium Nitrate Fuel Oil - ANFO) for blasting. Estimated storage onsite based on a weekly delivery: • 35 - 40 t explosive • 4000 - 5000 detonators.
Roads and Traffic	Product Transport	Quad road trains will transport product from site to Darwin Port via Fog Bay Road, Cox Peninsula Road and Stuart Highway; 13-18 return trips/day during peak production.
Workforce	Construction	~60 personnel.
	Operations	~80 to 100 personnel.
Mine Closure	Infrastructure	Removed from site on completion of mining.
	Backfilling	Waste rock material will be backfilled to box cut and underground voids.
	Plugging	Box cut portal and shaft vents plugged with concrete.
	Rehabilitation	Site stabilised and revegetated with native species.

Table 2-4. Key Project infrastructure

Component	Details	Approximate area / capacity
Topsoil stockpiles	Topsoil will be stockpiled upon clearing. The top 100-200 mm will be scraped and stockpiled during clearing activities from the disturbance area. Topsoil stockpiles are proposed to be located adjacent to the waste dump, ROM pad and south of the box cut. Stockpiles are not proposed to be more than 2 m in height.	3.5 ha

Component	Details	Approximate area / capacity
Box cut	A surface box cut will be constructed to 50 m depth to gain access to geotechnical stable fresh material for construction of the portal and underground decline. A safety bund will be constructed around the perimeter of the box cut to prevent surface water from ingress into the box cut and restrict access. The bund will be constructed in accordance with relevant guidelines. Sump, pump and pipeline network will be constructed in the base of the box cut for dewatering of rainfall and groundwater inflows. The water intercepted will be retained on-site within the MWD1 for dust suppression use.	3.1 ha
Portal and decline	A portal (underground entrance) will be constructed within the box cut and a spiralling decline developed between the two pegmatite bodies with long hole open stoping methods to access the ore. The total depth of the underground workings is 700 m. Preliminary designs include production levels, with each level having stope access, sump/drainage, ventilation network and a turning/stockpile bay. Water from the underground sumps will be pumped into the box cut sump to be dewatered to MWD1 for reuse.	N/A
Underground services	Ventilation and return air raise (RAR) will be developed to provide fresh air circulation throughout the underground. Mine air water, power station and backup generator will be located adjacent to the box cut.	1.3 ha
Run of mine pad (ROM)	A ROM pad will be constructed north of the box cut for the temporary stockpiling of ore prior to be crushed and screened. The ROM pad will have the capacity to stockpile 110,000 t of ore. The pad will be raised with oxide material from the construction of the box cut, requiring 220,000 t of material. Drainage will be directed to MWD1.	3 ha
Crushing, screening and road train loading area	Ore placed on the ROM pad will be crushed and screened in the area located adjacent to the ROM pad, prior to the crushed and screened ore being loaded into the haul trucks for transport to the Darwin Port. Drainage will be directed to MWD1.	5.7 ha
Road train assembly area	Area for assembly of road trains prior to loading of ore.	1.5 ha
Waste dumps (WDs)	There will be two temporary waste dumps, one for the oxide waste rock from the surface box cut (LWD1) and the other for the fresh waste rock from the underground decline development (LWD2). The mine will be waste negative, and the material will be backfilled underground (fresh waste) and the box cut with the oxide waste on closure. • The volume of waste rock for LWD1 is ~400 kt. • The volume of waste rock for LWD2 is ~1,130 kt. The oxide waste from the box cut may also be used construction of surface works such as the box cut safety bund, raising of the ROM pad, RWD wall (the latter pending suitability from geotechnical assessment). The waste dumps are located north of the box cut.	4.3 ha
Access roads and internal haul roads	There will be access roads for light vehicles (LV) and wider haul roads for heavy vehicles (HV). These roads will vary in width based on type of machinery that will primarily utilise the roadway. The haul road will be directly from the ROM pad to the internal Fog Bay access road. LV access roads will be 20 m wide and a network of approximately 1.61 km. HV access roads will be 30 m wide and approximately 1.70 km.	7 ha
Administration offices and employee facilities	Employee facilities will include office buildings, crib rooms, ablution/change rooms, gatehouse, located near the entrance of the mine adjacent to Fog Bay Road. Wastewater from ablutions will be directed to a septic system designed and constructed in accordance with the Code of Practice for Wastewater Management (Department of Health, 2020).	2 ha
Solar plant	Located next to the administration facility to provide low-voltage power requirements to administration, lighting, and water plants.	1.4 ha

Component	Details	Approximate area / capacity
Laydown and storage areas	Storage for portable mine infrastructure and plant to go underground. A laydown and storage area will be located south of the box cut.	2 ha
Workshop and fuel bay	A workshop will be centrally located between the mining area and the administration area. Two fuel storage/refuelling areas are proposed, one for light vehicles and the other for heavy vehicles. Fuel storage and maintenance areas will be bunded with drainage directed to a sump for storage, and maintenance areas will be bunded with drainage directed to a sump for the removal of hydrocarbons.	2.3 ha
Water management systems	The preliminary surface water assessment (WRM, 2024 - Appendix I) undertaken to inform the preliminary mine design provides the following water management system requirements: • A RWD (3.6 ha) will be used as a mine water supply (with backup supply from MWD1). • MWD1 (2 ha) will contain the mine water dewatered from the underground and box cut. The water, once settled, will be reused for surface water demands, including dust suppression activities. • MWD2 (0.2 ha) and SD1 (2 ha) will be dewatered to MWD1 if MWD1 is below its maximum operating volume. • A pump transfer rate of 4 ML/d for all pumped transfers, except transferring from MWD2 to MWD1 which is 10 ML/d was used in the preliminary water balance. • A water storage tank for use in office region within a 0.25 ha area. Pending mine water quality, water treatment may be required to ensure water reuse or discharge to environment is in accordance with required Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018) water quality guidelines. Drainage lines and sediment basins will be installed across the site to manage sedimentation and surface water runoff in disturbed areas. Final location, sizing and type of sediment basin will be determined through the preparation of an erosion and sediment control plan (ESCP), certified by a certified practitioner in erosion and sediment control (CPESC). The water balance and water management system will be refined following detailed mine design.	8 ha Total 300 ML
Magazine (explosives storage)	The explosive magazine has been positioned to maintain a minimum separation distance of 500 m from the mine administration area and Fog Bay Road. The compound design will comply with Australian Standard AS2187 Explosives – Storage, transport and use.	0.3 ha
Preliminary site layout disturbance area		**45.3 ha**
Total proposed disturbance footprint		**<100 ha**

The total proposed disturbance footprint is <100 ha for the purpose of the referral assessment. The current site layout is a preliminary design and requires further details such a box cut safety bund, site drainages, haul road turn-out onto Fog Bay Road, and refined water storage sizing based on final groundwater and surface water assessment. Future detailed designs will retain as small a footprint as possible to minimise disturbances within this proposed disturbance footprint of less than 100 ha.

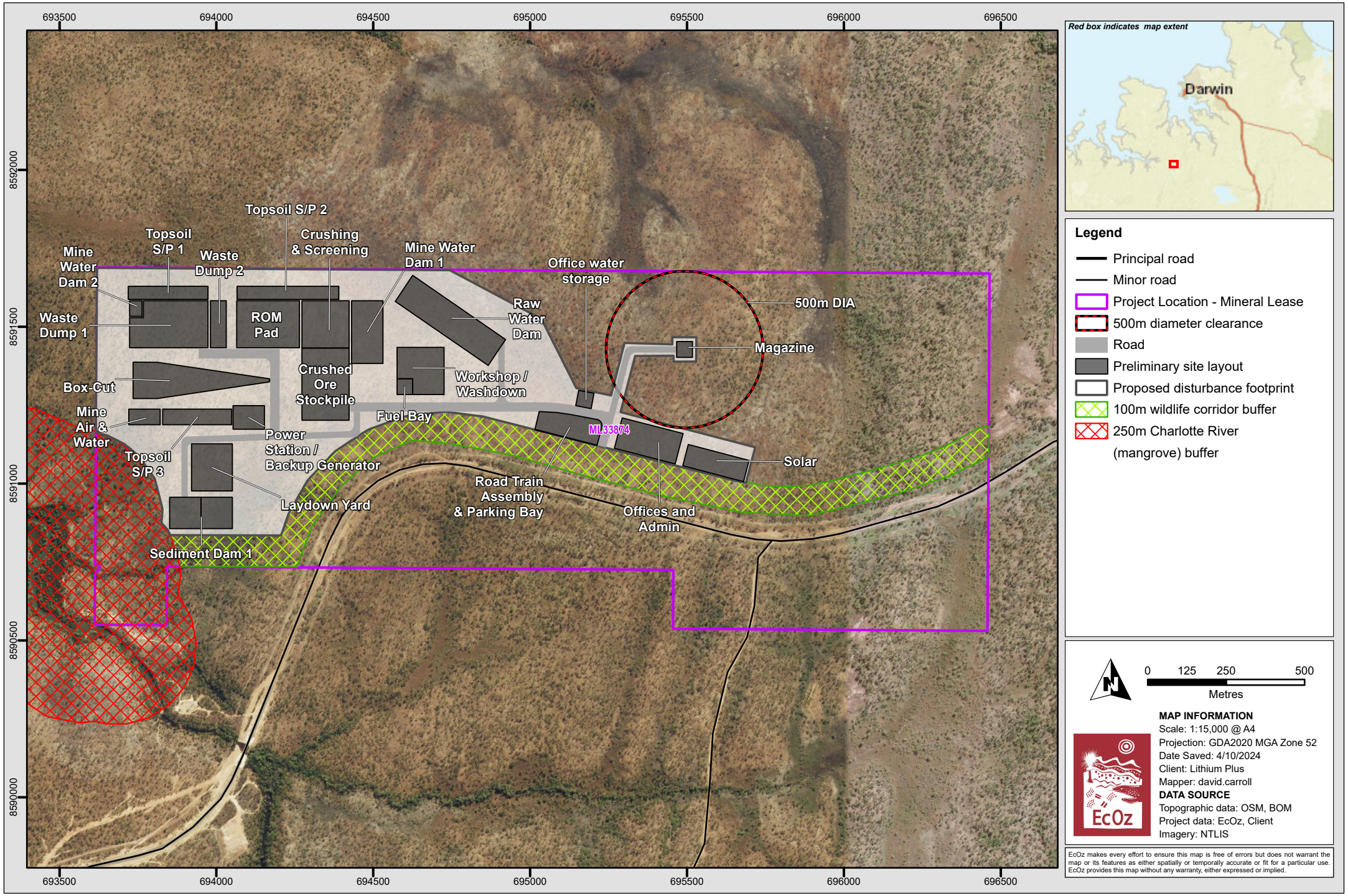

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Figure 2-6. Map of preliminary mine design and proposed disturbance footprint

2.4 Workforce

During construction, the Project is estimated to employ a workforce of 60 people (maximum) and between 80 and 100 personnel during the operational phase. The workforce composition will be as follows:

- Management/Supervision/Professionals - 20 %.
- Contractors (Mining, Processing and Haulage) - 60 %.
- Trades - 20 %.

The workforce is expected to comprise mainly of residents of Darwin, Palmerston or surrounding areas. There will be no on-site accommodation camp as part of the Project; workers will be expected to travel to/from site for each shift. The travel time from Darwin/Palmerston to the site is less than one hour.

2.5 Schedule

The proposed LOM is 7 years. The months required to undertake construction, operation and rehabilitation is outlined in Table 2-5 below.

Table 2-5. Indicative project schedule

Schedule	Months 1-4	Months 5-12	Months 13-80	Months 81-86	Months 87 onward
Phase	Construction	Construction	Production	Closure and rehabilitation	Post-closure
Duration	4 months	8 months	68 months	6 months	Ongoing
Activities	Construction of infrastructure and box-cut	Construction of underground portal and decline	Underground construction, mining, and ore transport to Port	Backfilling, removal of infrastructure and revegetation	Monitoring of the mine site until rehabilitation completion criteria are achieved and the site is relinquished

2.6 Key Project activities

2.6.1 Construction

Construction activities are estimated to take 12 months and will include land clearing, and construction of the site infrastructure.

Vegetation clearing and topsoil stripping and storage

Progressive clearing will occur as construction evolves, reducing the area of exposed bare ground to minimise the impacts of wind-blown dust and loss of topsoil. Pre-clearance habitat checks, and use of a fauna spotter-catcher will be undertaken during clearing. Any large established and hollow-bearing trees will be retained where construction design allows. Vegetation will be dozed and pushed into piles and topsoil pushed into the designated topsoil stockpile areas.

Infrastructure (building, workshop, fuel bays)

Surface infrastructure has been grouped in clusters, minimising the disturbance footprint and enabling the management of emissions such as dust, noise, and stormwater. Buildings will be temporary and relocatable in structure.

Administration buildings will accommodate mine management, engineering services, first aid, and security resources. They will also provide ablution logistics and capture and remove waste from the site.

Workshop facilities will include servicing logistics for heavy, light, and road haulage mine vehicles. The workshop precinct will provide bulk storage facilities for fuels and lubricants, all in temporary, relocatable formats, i.e., transportable tanks and shipping containers.

Primary and secondary crushing plants in a combination of fixed and mobile plant formats will be arranged adjacent to the ROM stockpile to process ore. This plant will be supported by overhead lighting for 24-hour operation and dust suppression systems.

Bitumen or asphalt sealing of mine roads will be investigated to manage all weather access and safety requirements for mine operations.

Water storages, drainage lines and sediment basins

The RWD and MWD1 will be constructed early in construction phase to ensure water supply is available (from RWD) and MWD1 availability to store water dewatered from construction of the box cut.

A construction ESCP will be developed prior to construction commencing to ensure suitable erosion and sediment controls are in place. Stormwater drains will be constructed at the base of areas of disturbance directing water to either sediment dams or mine water dams. Mechanical sumps and pumps will be installed in water storage dams to enable water to be pumped back to the MWD1 for reuse and/or for treatment (if required) for management of authorised discharge as required.

Potable water will be sourced from Darwin or Palmerston (town water supply) to fill potable water tanks located at the administration area.

Box-cut construction and waste rock management

A box cut will be constructed to provide access for development of a portal and decline. The box cut will be designed at a grade of ~1:7 and side batters of ~ 1:10 and ~1:20, depending on the integrity of the ground conditions. Excavation of the box cut will be via free digging of the oxide material with truck and shovel methods. No drill and blast activities are anticipated to be required until the transitional rock is exposed.

Waste rock from the box cut comprising primarily oxide and to a lesser extent transitional materials, will be used to backfill the box cut on closure, requiring temporary storage of waste rock (~400 kt) on the surface (LWD1).

2.6.2 Operation

Material volumes

Total material volumes and tonnages of waste (oxide, transitional and fresh) and ore to be mined over the life of mine is shown in Table 2-6.

Table 2-6. Material volumes and tonnages

Material	Volume (bcm)	Tonnage (kt)
Oxide waste (box cut)	200,000	400
Transitional/fresh waste (from underground)	420,000	1,130
Ore (production tonnes)	1,150,000	3,100

Portal and decline development

Approximately 1.13 Mt of fresh waste rock from decline development will form a temporary surface waste dump. All waste rock will ultimately be backfilled underground on closure.

A series of underground sumps will be constructed and mechanically pumped to MWD1 and managed accordingly.

Underground mining method

A Long Hole Open Stoping (LHOS) underground mine utilising rib pillars to support the rock mass in the stoping area is proposed. The mine will be accessed via a single decline from the planned portal location on surface, continuing along the extent of the ore body. A uniform decline (Figure 2-7) has been designed to provide better level access and more uniform wear on underground equipment.

Ventilation will be provided by a single exhaust fan utilising a single exhaust path designed on the northern side of the mine. This primary system will be located in the first stage of the decline, allowing rapid decline development. Each level will be force ventilated using secondary fans.

Secondary means of egress is provided by escapeways on every level, leading to the surface. Given the single decline, these will be essential for the safety of working personal.

The underground mine is designed to be mined top down, allowing quicker access to Ore Reserves. Each stope will be drilled using upholes with no fill to be placed into the voids. Each level will have a rib pillar every 50 m with a 10 m width to support the surrounding stoping region. These pillars will be offset on each level so as not to have continuous pillars and provide the most support for the rock mass.

Underground development waste rock management

Underground development will require drill and blast of the fresh material, and ~ 1,130 kt of waste rock trucked to the temporary fresh rock waste dump on the surface (LWD2). All waste rock will ultimately be backfilled underground on closure.

Crushing and screening

The mining operation proposes a DSO product, only requiring on site crushing and screening prior to loading into haul trucks for transport to Darwin Port (East Arm).

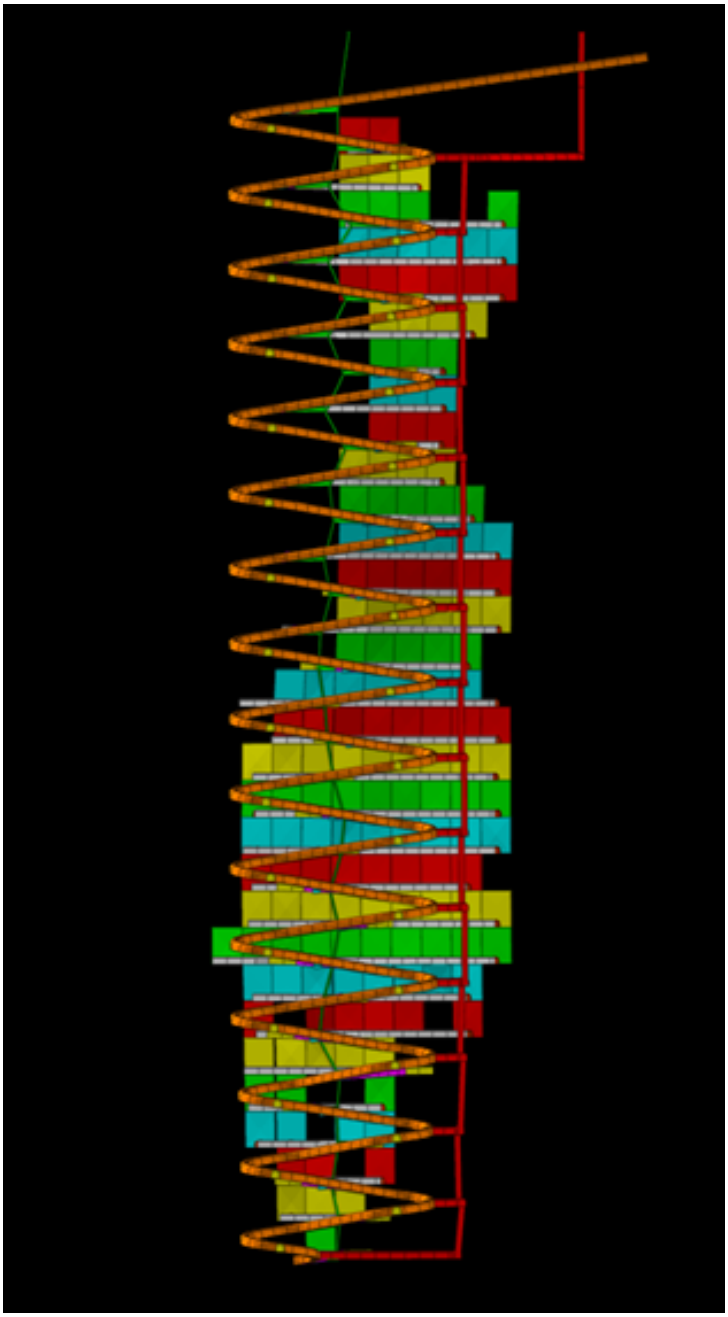


Figure 2-7. Concept Underground Mine Layout

Water management

The proposed site water management systems, including purpose, volumes and areas are outlined in Table 2-3 and Table 2-4.

Water balance

A preliminary site water assessment was undertaken by WRM, 2024 (Appendix I), based on the estimated construction water demand of 300 ML (during the first year – for 6 months of the dry season), and operational water requirements of 150 ML surface and 132 ML underground (282 ML total operational use).

Two scenarios were modelled for groundwater inflow:

A groundwater flow of 0 ML/d and a sensitivity case - adopting a net groundwater inflow of approximately 3 L/s (0.25 ML/d) (see Table 2-7 and Table 2-8 respectively).

Results for the median of the modelled climate sequences (50 %ile) and the 10 %ile which represents dry conditions (90% of years will be wetter than the 10 %ile) are shown for each scenario below.

Table 2-7. Preliminary site water balance annual summary – zero groundwater inflow (WRM 2024)

	Parameter	10%ile Dry	50%ile Median
Inflows (ML/yr)	GW inflow	0	0
	Rainfall runoff	287	680
	Direct rainfall on dams	40	72
Outflows (ML/yr)	Total evaporation	84	99
	MWD overflows (MWD1+MWD2)	0	0
	SD overflows (SD1)	0	12
	RWD overflows	0	242
	Total controlled release	0	117
	Total UG demand supplied	118	132
	Total surface demand supplied	136	149
Shortfall (ML/yr)	Shortfall in total demand	27	0

Table 2-7 indicates that the proposed water management infrastructure is capable of supplying site demands under median conditions based on collection of stormwater runoff from within the mining lease area. A shortfall of 27 ML occurs during the 10 %ile dry conditions; however, groundwater inflow will meet this shortfall.

Under this modelled scenario, active water management is required for a controlled release of 117 ML of mine water (from MWD1) under median conditions.

Table 2-8. Preliminary site water balance annual summary – 0.25 ML/d groundwater inflow (WRM 2024)

	Parameter	10%ile Dry	50%ile Median
Inflows (ML/yr)	GW inflow	91	91
	Rainfall runoff	281	673
	Direct rainfall on dams	49	74
Outflows (ML/yr)	Total evaporation	95	102
	MWD overflows (MWD1+MWD2)	0	0
	SD overflows (SD1)	0	13
	RWD overflows	0	241
	Total controlled release	18	142
	Total UG demand supplied	131	132
	Total surface demand supplied	149	149
Shortfall (ML/yr)	Shortfall in total demand	2	0

Table 2-8 indicates that a net groundwater inflow of approximately 3 L/s (0.25 ML/d or 91 ML/yr) improves the reliability of site water supply during dry conditions with minimal demand shortfall (2 ML/yr) in 10%ile dry conditions. Groundwater inflows slightly increase controlled release volumes (by 25 ML/yr in median conditions) due to higher average dam inventories (WRM 2024).

Transport

Lithium Plus proposes to ship spodumene as a DSO product, from Darwin Port to customers in China. The transfer of the DSO to East Arm is planned to commence in quarter one 2027, peaking at a haulage rate of 600,000 t in 2029 and concluding in the 2032 third quarter: hauling in total an estimated 3.10 Mt of high grade spodumene. During peak haulage, it is estimated that 18 return trips with quad road trains will occur per day. A summary of peak haulage activity is provided in Table 2-9 below.

GHD (2024) on behalf of Lithium Plus, have prepared a Haulage Route Assessment (Appendix D). Of the four haulage route options identified, a preferred route was selected based on a multi-criteria analysis, of road suitability, stakeholder benefits and impacts, value for money, technical risk and opportunity, and other criteria. Outcomes of the assessment identified the preferred haul route via Fog Bay Road, Cox Peninsula Road, Stuart Highway, Tiger Brennan Drive, Berrimah Road and East Arm Wharf (Figure 2-8). A total distance of ~79.2 km.

Further details of the proposed DSO haulage schedule, truck movements and haulage route options are provided in Appendix D.

Table 2-9. Haulage Summary

Parameter	Peak Annual Value
Amount of Product to be Shipped (tonnes)	600,000
Maximum load for quad road train (tonnes)	95
Assumed Trip Duration (hours – 1 way)	1.5
Assumed Trip Duration (hours – return)	3.0
Assumed Number of Working Days Per Month (Days)	30
Assumed Length of Working Days (Hours)	12
Number of Trips per Month (Road Trains)	526
Number of Trips per Day (Road Trains)	18
Number of Trips per Hour (Road Trains)	1.5
Minimum Size of Road Train Fleet (Road Trains)	5

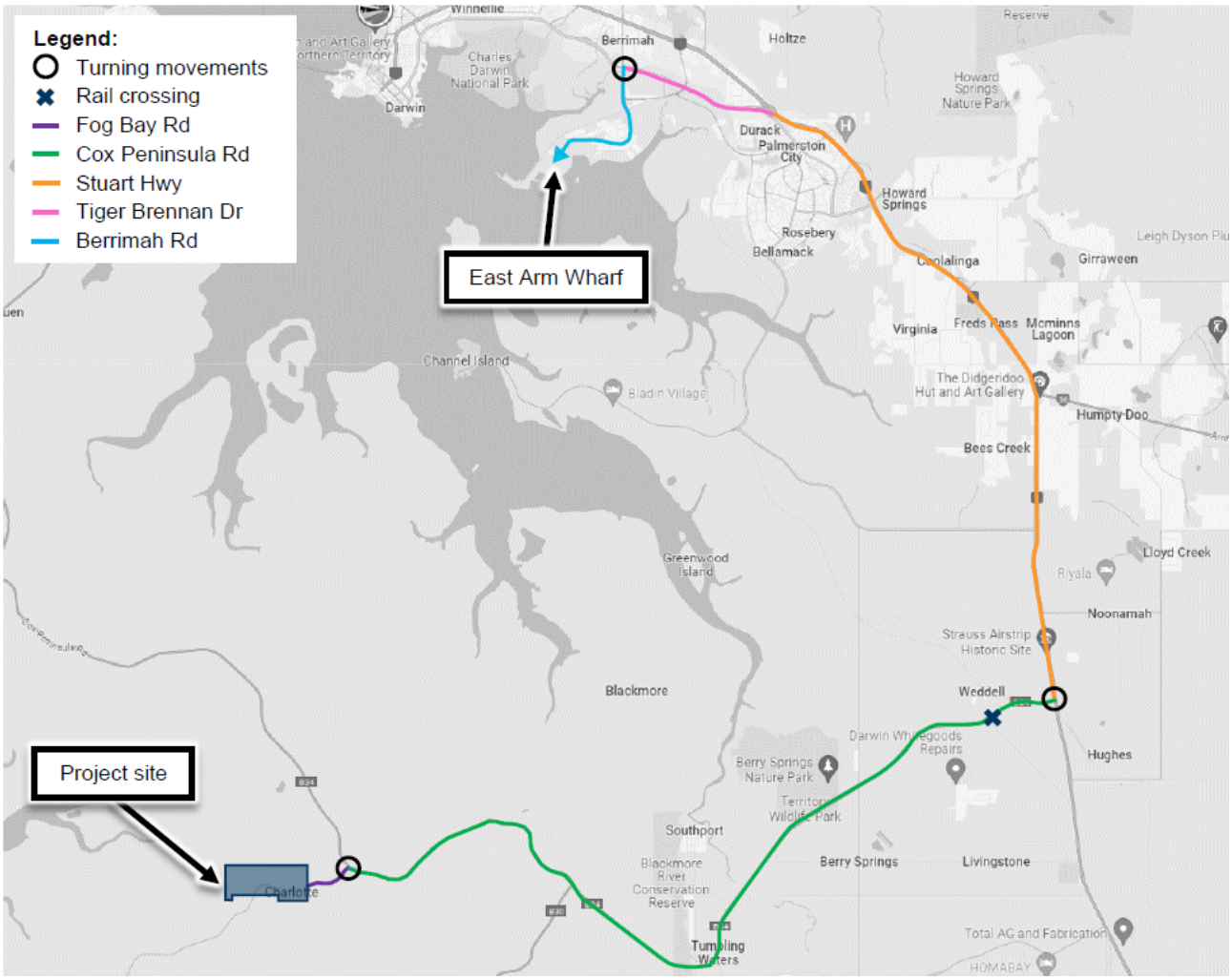


Figure 2-8. Map of preferred haul route from Lei Lithium Project to East Arm Wharf (GHD 2024).

2.6.3 Decommissioning and site rehabilitation

A Mine Rehabilitation and Closure Plan will be developed consistent with the relevant mine rehabilitation and closure guidelines outlined in section 4.2.2. Post mining land use, objectives and closure criteria will be developed in consultation with relevant stakeholders. It is anticipated the land will be returned to its pre-mining land use.

Decommissioning will include closing off the decline/portal, removing all mine infrastructure and dewatering pumps, allowing the underground workings to flood. A groundwater model will be developed during 2025 which will predict the timeframe for recovery of groundwater to reach pre-mining levels post closure.

Two closure options are currently under consideration for the box cut pending final underground mine design:

(a) Backfilling the box cut during construction following installation of the Armco style tunnel; or

(b) Backfilling the waste rock underground and in the box cut void on closure.

2.7 Past, present and reasonably foreseeable future developments in the region

Other projects in the area include the Lithium Developments Grants Lithium Project (Grants), owned by Core Lithium Ltd that was subject to assessment under the *Environmental Assessment Act 1981* at the level of an Environmental Impact Statement (EIS). Environmental approval was granted in June 2019 and a mining Authorisation granted under the *Mining Management Act (MMA) 2001* (now redacted) on 1 April 2020. Clearing

and construction works commencing in quarter four 2021 and operations in 2022. During January 2024, Core Lithium Ltd made the decision to cease mining operations.

The Lithium Developments Finniss Lithium Project BP33 Underground Mine was subject to assessment under the *Environmental Protection Act (EP Act) 2019* at the level of Supplementary Environmental Report (SER). Environmental approval was granted in April 2022 and a mining Authorisation granted under the MMA on 20 April 2023.

The Lithium Developments projects are currently in care and maintenance, with plans to restart operations, should market conditions become more favourable.

Table 2-10 below shows the currently approved Lithium exploration projects surrounding the Project.

Table 2-10. Lithium exploration projects surrounding the Project

Site name	Current Operator	First authorised
Bynoe Lithium Project	Charger Metals NL	17/06/2022
Bynoe Project	Lithium Plus Minerals Ltd	31/05/2022
Bynoe Project	Evergreen Lithium Limited	5/12/2022
Finniss Project	Core Lithium Ltd	25/07/2016

2.8 Alternatives

The section examines the various alternatives that were considered by Lithium Plus, prior to deciding upon the Project presented in this referral. The alterations account for the principles of environment protection and management (Part 2 of the EP Act) as detailed in section 4.3.

Site Layout

The initial conceptual site layout (Figure 2-9) proposed infrastructure such as mine affected water dams, workshops and fuel bays positioned in the southwest corner of the mineral lease boundary, within proximity to the Charlotte River. Based on initial environmental considerations, sensitivities, presence of threatened fauna species, and preliminary flood modelling, the precautionary principle and principle of conservation of biological diversity and ecological integrity was considered and the following changes to the site layout were undertaken to inform the preliminary site layout (Figure 2-6):

- The Charlotte River is near the southwest tenement boundary and contains significant riparian and mangrove habitat. A 250 m guideline buffer, derived from the Land Clearing Guidelines (DEPWS, 2024e), was placed on the mapped mangrove communities. This buffer accounts for the precautionary principle as the value of the mangrove communities is not verified.
- The proposed location of the mine affected water storage dams, and potential polluting sources such as the workshop and fuel bay were moved further away from the Charlotte River and avoiding drainage lines. Preliminary flood modelling also provided guidance for the positioning of site infrastructure, avoiding shallow inundation areas.
- Threatened fauna species (Northern Brushtail Possum and Black-footed Tree-rat) have been observed within the Project area (see section 5.2). A 100 m wide retained habitat wildlife corridor north of Fog Bay Road, was applied to provide connectivity between the Charlotte River, immediately to the west of the Project area to the east side of the Project area where habitat will be retained and managed from wildfire risks.
- The preliminary site layout has been kept to a minimum within the proposed disturbance footprint to reduce the need for land disturbance where possible. The proposed disturbance footprint allows for revisions to the site layout following further assessments as required. The preliminary site layout

includes catchment runoff dams to ensure appropriate management of sediment and mine affected water.

Mine design – box cut

Currently the mine design is in concept stage until geotechnical assessments are undertaken to determine best approach.

The current mine design includes construction of a box cut void and a portal to access the underground. The box cut void is retained during operations and requires management of water inventory within the box cut catchment until the box cut is backfilled on closure.

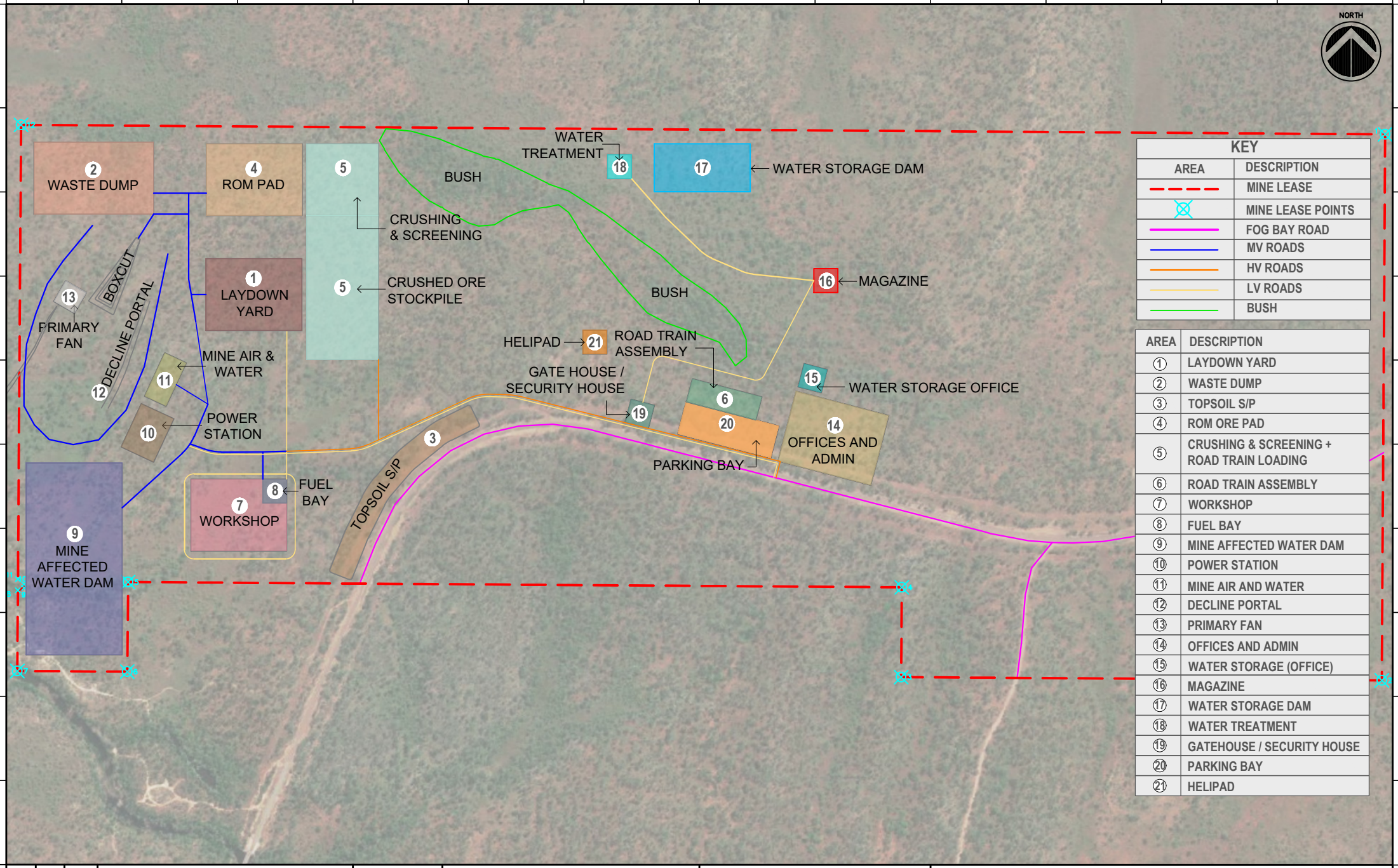
An alternative is the cut and cover (Armco tunnel), which involves backfill of the box-cut during construction of the Armco tunnel that will reduce the site water surface catchment, by immediately backfilling the box cut.

Mine design - underground

The proposed underground reduces the disturbance footprint in comparison to the alternative open-cut mining method. LHOS underground mine utilising rib pillars is proposed. However, an option for a paste-fill (CRF) plant and ore sorting systems is under consideration.

A paste-fill plant may be utilised to backfill and stabilise underground mining operations and provide a solution to end of mine site remediation of surface waste rock. Waste rock (brought to the surface) would be processed through the crushing and screening plant and into a paste plant. The slurry produced from the paste plant would be pumped underground. The paste will provide structural support to underground workings as well as returning surface waste material underground. The paste plant would be located within the crushing and screening area.

The principle of intergenerational equity has been considered in mine closure planning by Lithium Plus committing to backfilling all waste rock and undertaking rehabilitation activities.



KEY	
AREA	DESCRIPTION
	MINE LEASE
	MINE LEASE POINTS
	FOG BAY ROAD
	MV ROADS
	HV ROADS
	LV ROADS
	BUSH

AREA	DESCRIPTION
①	LAYDOWN YARD
②	WASTE DUMP
③	TOPSOIL S/P
④	ROM ORE PAD
⑤	CRUSHING & SCREENING + ROAD TRAIN LOADING
⑥	ROAD TRAIN ASSEMBLY
⑦	WORKSHOP
⑧	FUEL BAY
⑨	MINE AFFECTED WATER DAM
⑩	POWER STATION
⑪	MINE AIR AND WATER
⑫	DECLINE PORTAL
⑬	PRIMARY FAN
⑭	OFFICES AND ADMIN
⑮	WATER STORAGE (OFFICE)
⑯	MAGAZINE
⑰	WATER STORAGE DAM
⑱	WATER TREATMENT
⑲	GATEHOUSE / SECURITY HOUSE
⑳	PARKING BAY
㉑	HELIPAD

REVISION:	BY:	DATE:	DESCRIPTION:	APPROVED BY:
1	MMC	16/07/2024	INITIAL CONCEPT	RMC
2	MMC	12/11/2024	SCALE AND FONT SIZE CHANGES	PJH

projectick creativity | rigour | confidence

Lithium PLUS MINERALS

PROJECT NAME:

LEI LITHIUM PROJECT

DRAWING TITLE: Figure 2-9. Map of initial conceptual site layout prior to environmental considerations

SCALE BAR 1:10000 (0, 5, 10, 15, 20)

SHEET: A4 | DRAWING NO.: J041.200.00.SKE.001.02 | REVISION NO.: 2

Processing

DSO has been identified as the preferred method; therefore, no processing facility or tailings dam is required on site. This also reduces the disturbance footprint required.

Ore sorting trials are currently being undertaken through Nagrom/Stark which may allow minor beneficiation and product upgrade prior to transport. The economic viability of this test work will be assessed, once suitability of the methods to concentrates has been proven. Ore sorting module would generate a semi-concentrated DSO with byproduct waste of 500 kt to 1000 kt. Waste material is proposed to be temporarily placed on LWD2 for the progressive backfill waste material underground. Benefits include reduced ore for haulage, reducing numbers / frequency of haul trucks to/from site to the Port.

Power supply

An energy options analysis study will be undertaken to determine appropriate power supply options in consideration for the impacts of a changing climate. On site generation via diesel-powered units was originally chosen as the primary source, however, in consideration for impacts on climate change, alternate options to connect to the external power grid, and renewable energy are being investigated. An on-site solar farm has been included in the site layout and is proposed to provide low-voltage power requirements to administration, lighting, and water plants. The use of EV's for mining fleet vehicles will also be assessed. The energy options analysis will include an assessment of GHG emissions.

Water supply

An existing water supply was considered - Observation Hill Dam, located ~3.5 km north of the Project area. This water supply currently has a surface water extraction licence in place (number 8151018), for use by Core Lithium. The option was not considered further due to potential access permissions; limited water supply as a result of existing users; and a pipeline would need to be constructed, which would result in additional clearing of habitat.

3 CONSULTATION

The *EP Act 2019* requires proponents to engage with stakeholders who may be affected by their proposal and to support these communities and the public to understand the potential impacts and benefits of a proposed action. The *NT EPA's Stakeholder Engagement and Consultation Guidance for Proponents (2021*) recognises that stakeholder consultation is an important component of social, cultural and health impact assessments, over and above formal opportunities for feedback on documents placed on public exhibition. Lithium Plus objectives and approach to stakeholder engagement are guided by the NT EPA's Stakeholder Engagement and Consultation Guidance for Proponents (2021). These objectives are captured in the Lithium Plus Stakeholder Engagement Plan (Appendix E), prepared by True North Strategic Communication in conjunction with Bina Sustainable Solutions on behalf of, and in conjunction with, Lithium Plus which formed the basis for engagement and consultation activities.

3.1 Stakeholder engagement

Lithium Plus has engaged Bina Sustainable Solutions (Bina) to assist in meeting their objectives and obligations related to community and key stakeholder engagement, supporting the NT EPA Environmental Assessment process. Stakeholder engagement and consultation process has, and will continue to be undertaken in accordance with;

- Section 43 *EP Act* general duty of proponents (refer to section 4.3).
- International association for public participation (IAP2) (2015) Quality Assurance Standard for Community and Stakeholder Engagement – Principles that guide good community engagement.
- The NT EPA's Stakeholder Engagement and Consultation Guidance for Proponents (2021).

A summary of the key stakeholders identified, and early stakeholder engagement undertaken to date are discussed below.

Key stakeholder groups identified include:

- NT Government departments, ministers and/or their key advisors.
- Local government including Belyuen Community Government Council, Wagait Shire Council, Litchfield Shire Council.
- Relevant Indigenous groups including Larrakia Nation, Kenbi Rangers, Larrakia Development Corporation, Indigenous Women in Mining Resources Association (IWMRA).
- Local community, services and businesses.
- Local elected representatives.
- Local industry associations including Chamber of Commerce, Industry Capability Network NT.
- Non-government organisations, including environmental groups, in particular the Environment Centre NT and Amateur Fisherman's Association NT.

The first phase of engagement commenced June to August 2024, and included (Bina 2024):

- Development of engagement materials such as banners, leaflets, interactive email and fact sheet for distribution to identified stakeholders.
- Mailbox drop of invitations to planned information stalls at Berry Springs and the Wagait Beach supermarket complex.
- Delivered 2 x public information stalls on the 27th and 28th of July 2024. As a result, the team engaged directly with 25 community members and 2 local businesses providing visibility and an introduction to Lithium Plus.

- Development and delivery of online perception surveys.
- Face-to-face, phone and/or online meetings with key stakeholders.
- Further refined the stakeholder analysis and distributed a fact sheet to maximise awareness of the intent to progress the project.

Based on the early engagement undertaken to date, key matters raised and proposed action and considerations are discussed in Table 3-1.

Table 3-1. Key matters raised in the stakeholder engagement to date

Key matter raised	Action / consideration
Local employment General community interest in job opportunities	Lithium Plus is committed to prioritising local employment opportunities from Darwin and Palmerston, with a focus on Aboriginal employment. The project location allows for a convenient commute eliminating the need for on-site accommodation facilities.
Road safety, traffic and road condition and maintenance: Within the communities consulted to date, there appears a relatively high level of awareness of lithium mining, transport and logistics, issues pertaining to road design / capacity, safety and maintenance within Cox Peninsula communities (Bina 2024)	Lithium Plus is committed to minimising the road safety impacts by considering on-site ore sorting which will reduce traffic of haul trucks. Safety is prioritised in collaboration with the Department of Logistics and Infrastructure (DLI) – formerly the Department of Infrastructure, Planning and Logistics (DIPL) to address and ongoing concerns and explore solutions. A haulage route assessment (GHD 2024 – Appendix D) has been prepared to assess the most suitable haulage route, factoring in road safety into the assessment criteria. A traffic management plan will be developed that will provide mitigation measures to minimise impacts of road safety.
Water use	The Project's operational model involves underground operations and DSO, reducing water demand. Water will be recycled and reused where possible.
Dust and noise	The Project's underground operation will be largely concealed which minimises visual impact and surface disruption. Surface activities of clearing during construction will result in some dust impacts, however, will be managed through progressive clearing as construction activities are required, and the use of surplus water for dust suppression. Operational dust on the surface will largely be from carting of ore and waste, dumping waste rock on the surface waste dump, and crushing and screening of ore. Standard mitigation methods will reduce the impacts of dust, such as covered loads and dust suppression activities.

3.2 Future engagement

Lithium Plus is committed to undertaking ongoing consultation throughout all stages of the Project. Lithium Plus will provide copies of this referral report directly to key stakeholders and will be available for meetings to discuss any concerns or feedback that will be incorporated into the environmental approvals process. Lithium Plus is also committed to working with the local community and training providers to prioritise local employment and develop an industry that provides social and economic benefits to the Berry Springs township.

Future engagement will be undertaken in accordance with Lithium Plus stakeholder engagement plan that will guide ongoing consultation activities.

4 REGULATORY CONTEXT

The following sections discuss the policy context of the proposal at both the NT and Commonwealth level, required primary approvals, licences and authorisations, and describe how the Project has applied the principles of environment protection and management (Part 2 of the EP Act), and general duty on proponents (section 43 of the EP Act).

4.1 Strategic and planning context

Both NT and Commonwealth Governments have been focused on the pathway to net zero emissions, including the role renewable energy generation will play in the transition away from fossil fuel energy resources for both domestic supply and international export. Table 4-1 describes how the proposal aligns with key policies and strategies prepared by both NT and Commonwealth Government.

Table 4-1. Strategic policy and plans relevant to the Project

Policy/plan	Relevance to the Project
Northern Territory Government's Climate Change Response: Towards 2050 (NT Government, 2020b)	The NT Government recognises the challenge climate change presents for the global community and the importance of a well-managed transition to a low-carbon economy. The NT Government is committed to taking action on climate change to maximise the economic, social and environmental wellbeing of Territorians. In response, the NT Government has set a goal of achieving net zero emissions by 2050 by progressively reducing net greenhouse gas emissions in the NT. The NT Government supports industries taking advantage of the abundant natural resources in the NT. The Project would contribute to achieving the goal of net zero emissions by 2050, by supplying Lithium-rich spodumene concentrate that is a feedstock material used in the production of lithium chemicals that go into batteries for EVs and other renewable energy requirements. The supply of spodumene concentrate remains structurally constrained – so that meaningful lithium supply response is highly dependent on uptake of low grade, CO_2 intensive Chinese lepidolite production. Lithium Plus is ideally placed to take advantage of strong, long term market fundamentals for spodumene concentrate extraction in Australia.

4.2 Approvals, licenses and authorisations

The Project will adhere to all relevant NT and Commonwealth legislation and will be required to obtain all associated permits and approvals. The NT EPA will assess the information in this referral to determine if the Project requires assessment under the EP Act. Relevant primary legislation is described in Table 4-2.

4.2.1 Statutory obligations

Table 4-2. Legislation applicable to the Project

Legislation	Purpose of the Act	Relevance to the Project	Status
Commonwealth			
Environmental Protection Biodiversity Conservation (EPBC) Act (Cth) 1999	The *EPBC Act* is the Australian Government's key environmental legislation. Approval under the *EPBC Act* may be required for any proposed action likely to have a significant impact on a matter protected by that *Act*. The environment assessment and approvals process of the *EPBC Act* aims to protect Matters of National Environmental Significance (MNES), as well as the environment in general where actions proposed are on, or will affect Commonwealth land, and/or where Commonwealth agencies are proposing to take an action. The EPBC Act is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW).	The potential impacts on MNES protected by the *EPBC Act* is unlikely to be significant (see Section 7). *T*hreatened fauna species have been identified within the Project area, however, potential for significant impact is expected to be avoided. A self-assessment of the proposal has been undertaken on the potential impacts on MNES protected by the EPBC Act and has determined that an EPBC Act Referral is not required.	N/A
Native Title Act 1993	The *Native Title Act 1993* sets out processes for native title groups to negotiate agreements with other parties in relation to the use of land and waters.	The project area is not located on land subject to native title claim. If a native title claim is lodged and registered in response to the native title notification of MLA33874 then, in the first instance, the intention is to engage directly with registered native title parties to develop protocols as necessary for sacred sites. It is anticipated that the Northern Land Council (NLC) and AAPA will be involved in this process to ensure the relevant traditional owners and/or traditional custodians can make informed decisions about sacred sites. In the event that there are no native title parties following native title notification of MLA33874, an application for authority certificate will be progressed for the proposed development through the AAPA and in consultation with the NLC.	If required
National Greenhouse and Energy Reporting Act 2007	Corporations must register and report if they emit greenhouse gases (GHG), produce energy, or consume energy at or above specified quantities in a given financial year.	The land clearing and energy use associated with the Project is unlikely to exceed the thresholds for reporting under the *National Greenhouse and Energy Reporting Act 2007*.	If required

Northern Territory			
Building Act 1993	Provide for the establishing of technical standards for buildings, the registration of building practitioners and certifiers, the regulation of building matters, the granting of building permits and occupancy certification and the establishing of a building appeal process, and for related purpose.	The mine site is located within the Darwin Building Control Area. Building and occupancy permits will be required. A registered certified plumber will conduct any upgrades required to the wastewater management system (septic).	Prior to construction
Bushfires Management Act 2016	Provides the framework for managing bushfire in areas outside the Emergency Response Area of cities and towns in the NT.	The Project area is located outside of an Emergency Response Area (ERA) and will therefore be subject to the *Bushfires Management Act*. The Project is within the Vernon Arafura Fire Management Zone and the Northern Fire Protection Zone. Relevant management and mitigation actions within the Vernon Arafura Regional Bushfire Management Plan will be included in the Project's Environmental Management Plans (EMPs).	Prior to construction
Crown Lands Act 1992	Northern Territory owned and managed land. Provision for the tenure, management, and alienation of crown lands.	The proposed Mineral Lease (ML) is located on Vacant Crown Land (VCL).	N/A
Dangerous Goods Act (NT) 1998 and Regulations (1985)	Provides for the safe storage, handling and transport of certain dangerous goods (including chemicals). Dangerous goods include explosives, flammable, toxic and corrosive materials.	Dangerous goods will be handled and transported during construction and operation of the Project in compliance with the requirements of the Act. A permit will be acquired from NT WorkSafe for storage, handling and transport of explosives. An explosives business licence will be obtained by the contractor handling and storing the explosives, which will licence the storage facility and handling of explosives on the mine site.	Prior to operations
Environment Protection (EP) Act (2019) and Regulations (NT) 2020	The process for environmental impact assessment is legislated under the *Environment Protection Act (EP Act) 2019 and Environment Protection Regulations 2020.* The Mining Management Act (NT) 2001 has been repealed. Effective from 1 July 2024, mining in the NT is regulated under the EP Act 2019.	Lithium Plus is required to hold an Environmental Approval, pursuant to Section 65 of the Act. This referral report will be reviewed by the NT EPA to determine whether formal assessment is required pursuant to the EP Act. Under the EP Act, an environmental (mining) licence is required in order to undertake mining activities.	This referral report

Greenhouse Gas Emissions Management for New and Expanding Large Emitters (the Large Emitters Policy)	The Large Emitters Policy identifies the Government's minimum requirements for how greenhouse gas emissions are to be managed from new, or expanding, industrial and land use development projects. If thresholds are exceeded, a Greenhouse Gas Abatement Plan (GGAP) will be developed to demonstrate how scope 1 and scope 2 emissions will be managed and reduced.	The Project will not trigger the large emitters threshold and will not require development of a GGAP.	N/A
Heritage Act (NT) 2011	Provides for the identification, declaration, conservation and protection of archaeological places and objects. All sites on the NT Heritage Register and Aboriginal and Macassan archaeological objects and places are protected under this Act.	Heritage assessments will be undertaken to identify any Aboriginal and/or non-Aboriginal archaeological features within the Project area. Approval under the *Heritage Act 2011* will be required if there are any impacts to heritage. Impacts to any identified features will be managed in accordance with a Cultural Heritage Management Plan (CHMP) prepared in consultation with the Heritage Branch and relevant Traditional Owners.	Heritage assessments will be undertaken prior to construction / land disturbance activities.
Mineral Titles Act (NT) 2010 and *Regulations 2011*	The *Mineral Tiles Act (MTA)* establishes the framework within which activities to explore for and mine mineral resources can occur. It sets out the administrative processes for authorising activities through the granting of a title.	Lithium Plus is required to hold a mineral title granted under the Act, prior to undertaking exploration and/or mining activities. Lithium Plus hold Exploration Licence (EL) 31091 over the Lei project area. ML(A) 33874 has been applied for over the area and is currently pending approval.	Ongoing
Northern Territory Aboriginal Sacred Sites Act and *Regulations 2004*	The Act protects sites that are 'sacred and otherwise of significance in the Aboriginal Tradition'.	An Aboriginal Areas Protection Authority (AAPA) Certificate will be obtained. A search of the AAPA records in relation to MLA33874 as of 9 August 2024 shows that: • there are no registered sacred sites located on ML(A)33874; • there are no recorded sacred sites located on ML(A)33874; • there is a restricted work area within MLA33874 which was provided for in a previously issued Authority Certificate to an unrelated entity and unrelated activity.	Commenced and ongoing
Public and Environmental Health Act (NT) 2011 and *Regulations 2014*	The Act provides for the protection and promotion of the health of individuals and communities in the Territory. Under the Act it is an offence to cause a public health nuisance, which is anything that has or is likely to put at risk or damage public health e.g. dust, smoke, odour, waste, creation of biting insect breeding habitat.	Approvals will be required for onsite wastewater management systems that accept black and greywater from ablutions. These approvals are obtained from Department of Health.	Prior to construction
Soil Conservation and Land Utilisation Act (NT) 1969	This Act provides for the prevention of soil erosion, and for the conservation and reclamation of soil.	As the proposed action include earthworks in proximity to watercourses, an Erosion and Sediment Control Plan (ESCP) will be required to facilitate compliance with the general provisions of this Act during construction and operation.	Prior to construction

Territory Parks and Wildlife Conservation Act (NT) 2014	Amongst other things, applies statutory obligations in relation to the protection of flora and fauna. Under the Act, the taking or interfering with wildlife that is listed as threatened requires approval at the Ministerial level.	Threatened species are known or likely to occur within, or adjacent to, the Project footprint (refer section 5.2). Seeking a permit to interfere with these would only be sought as a last resort if impacts could not be avoided.	If required
Traffic Act 1987	Under the Traffic Act, permit approval is required where construction activities are within a NT road reserve.	A Development Approval (DA) and Traffic Impact Statement (TIS) / Traffic Management Plan will be required to enable the use of public roads to haul direct shipping ore (DSO) from the Project area to the Darwin Port.	Prior to operations
Transport of Dangerous Goods by Road and Rail (National Uniform Legislation) Act 2010 and Regulations (2011)	Provides for the transport of dangerous goods by road or rail, and for related purposes.	Dangerous goods will be handled and transported during construction and operation of the Project in compliance with the requirements of the Act. A permit will be acquired from NT WorkSafe for storage, handling and transport of explosives.	Prior to operations
Water Act and Regulations (NT) 1992	Provides for the investigation, allocation, use, control, protection, management and administration of water resources, and for related purpose. Provides the regulatory framework governing the installation and use of groundwater bores.	The project will require water for operational dust suppression. The project area is located in the DRWCD and is required under the *Water Act* to submit a surface water extraction licence application and/or a groundwater extraction licence to extract water from bores (>5 ML/yr). A Waste Discharge Licence (WDL) may be required in the event that any wastewater will be disposed of off-site.	If required / prior to operations (water extraction / water discharge)
Waste Management and Pollution Control Act and Regulations (NT) 1998	The Act provides for the protection of the environment through encouragement of effective waste management and pollution prevention and control practices. The WMPC Act establishes which activities require environmental protection approvals or licences, and also establishes environmental nuisances as an offence.	For wastes that are removed for off-site disposal, waste management contractors engaged by the project and facilities accepting listed wastes must be licensed under this Act.	Prior to construction
Weeds Management Act (NT) 2001	Declares certain plants to be weeds, classifies weeds according to management requirements, and places obligations on landowners and occupiers to manage weeds (including mine sites).	Lithium Plus will be obligated to manage declared weeds under this Act to ensure listed weeds are not introduced or spread. Weeds will be managed in accordance with the relevant Statutory weed management plans and the Darwin Regional weeds strategy 2021-2026.	Ongoing
Work Health Safety (National Uniform Legislation) Act and Regulations (NT) 2011	The Act establishes a duty to identify and manage risks to health and safety of workers, including providing safe facilities, first aid, emergency plans, personal protective equipment, managing risks from airborne contaminants, hazardous atmospheres, storage of flammable or combustible substances, hazardous work. The Act contains specific requirements for remote or isolated work, which will apply. Notification to WorkSafe NT is required if hazardous chemical volumes stored on site exceed manifest quantities.	Mine sites in the NT must not permit any mining activity or a related mining activity to be carried out unless the mine operator has given to the regulator an RMP for the mine site that has been certified in accordance with regulation 614.	Prior to operations

4.2.2 Non-Statutory obligations

Air Quality

- Greenhouse Gas Emissions - Management for New and Expanding Large Emitters (DEPWS, 2021).
- Northern Territory's Offsets Framework including Principles, Policies and Guidelines (https://depws.nt.gov.au/environment-information/northern-territory-offsets-framework/northern-territory-offsets-framework
- NT EPA Environmental Factor: Atmospheric Processes Greenhouse Gas Emissions (NT EPA, 2024).
- National Environment Protection (Ambient Air Quality) Measure (NEPC, 1998).

Biodiversity

- NT Land Clearing Guidelines (DEPWS, 2024e).
- Biodiversity management - Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia, 2016).
- Northern Territory Environment Protection Authority (NT EPA) (2013). Guidelines for Assessment of Impacts on Terrestrial Biodiversity
- Threatened Species Action Plan 2022-2032 – Towards Zero Extinctions (Commonwealth of Australia, DCCEEW 2022). Available at: https://www.dcceew.gov.au/sites/default/files/documents/threatened-species-action-plan-2022-2032.pdf.
- Threat abatement plan for predation by feral cats (Commonwealth of Australia, 2015). Available at: http://www.environment.gov.au/biodiversity/threatened/publications/tap/threat-abatement-planferal-cats. In effect under the EPBC Act from 23-Jul-2015.

Community and economy

- Social Impact Assessment Guideline (NSW Government, 2023).
- Guidelines for the preparation of an Economic and Social Impact Assessment (NT EPA, 2013).
- Quality Assurance Standard for Community and Stakeholder Engagement (IAP2, 2015).
- Stakeholder Engagement and Consultation Guidance for Proponents (NT EPA, 2021).
- Noise Guidelines for Development Sites in the Northern Territory (NT EPA ,2014)
- Northern Territory Noise Management Framework Guidelines (NT EPA 2018).

Land management

- International Erosion Control Association Australasia - Best Practice Erosion & Sediment Control (IECA, 2008).
- Land clearing guidelines, Northern Territory Planning Scheme (DEPWS, 2024e).
- National Environment Protection (Assessment of Site Contamination) Measure (NEPC, 1999).
- Northern Territory Contaminated Land Guideline (NT EPA, 2017).
- NT Weed Management Handbook (DEPWS, 2021b).
- *Darwin Regional Weeds Strategy 2021-2026* (DEPWS, 2021c).
- *Northern Territory Government Weed Management Plan - Gamba Grass 2020 – 2023 (2024 Revision)* (DEPWS 2024d).

Mine Closure

- International Council for Mining and Metals (ICMM) Integrated Mine Closure, Good Practice guide (2nd Edition, 2019).
- International Council for Mining and Metals (ICMM, 2020), Key Performance Indicators – Tool for Closure.
- Mine Closure and Mine Rehabilitation - Leading Practice Sustainable Development Program for the Mining Industry (Commonwealth of Australia, 2016).
- Mine Closure Plan Guidance - How to prepare in accordance with the Statutory Guidelines (DMIRS, 2020).

Sustainable Mining

The Australian Government, Department of Industry, Innovation and Science (now the Department of Industry, Science and Resources), in co-operation with private industry and state/territory partners has developed a series of *Leading Practice Handbooks* for sustainable mining. These will be referenced in mine planning and design, with details provided in the EIS where relevant.

In 2021, the Australian minerals industry adopted Towards Sustainable Mining (TSM), a globally recognised accountability framework which supports minerals companies evaluate, manage and communicate their site level sustainability performance. TSM in Australia is administered by the Minerals Council of Australia (MCA). Implementation of TSM is being rolled out in a phased process, with external verification of self-assessments and publication of company ratings anticipated to occur in 2026.

Waste Characterisation

- International Network for Acid Prevention - Global Acid Rock Drainage (GARD) Guide (INAP, 2014).
- Environmental Assessment Guidelines - Acid and metalliferous drainage (NT EPA, 2013).
- Preventing Acid and Metalliferous Drainage, Leading Practice Sustainable Development Program for the Mining Industry, Commonwealth of Australia, 2016.

Water Management

- ANCOLD Guidelines on the Consequence Categories for Dams (ANCOLD, 2012).
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZG, 2018).
- Australian Drinking Water Guidelines (National Health and Medical Research Council, 2011).
- Australian River Assessment Scheme Sampling and Processing Manual Northern Territory (AUSRIVAS, 2001)
- Water Quality Objectives for the Darwin Harbour Region (NRETAS, 2010).
- The Darwin-Daly Regional AUSRIVAS Models – Northern Territory: User Manual. (Lamche, 2007).
- Northern Territory Land Sustainability Guidelines (DIPL, 2020).
- Code of Practice for Wastewater Management and Guidance notes (Northern Territory Department of Health, 2020).
- Guidelines for preventing mosquito breeding sites associated with mining sites (Department of Health and Families, 2005).
- Water Accounting Framework for the Australian Minerals Industry (Minerals Council of Australia, 2014).

Codes and Standards

- AS/NZS 4360:2004 Risk management.
- AS 3671-1989 (1989) *Acoustics – Road traffic noise intrusion – Building siting and construction.*

- AS 3833:2007 Storage and handling of mixed classes of dangerous goods.
- AS 1940:2017 Storage and handling of flammable and combustible liquids.
- AS 2187:2006 Explosives - Storage and use.
- National Code of Practice for the Storage and Handling of Workplace Dangerous Goods
- [NOHSC:2017(2001)].
- SAA/SNZ HB76:2010 Dangerous Goods – Initial Emergency Response Guide.
- Storage and Handling of Dangerous Goods: National Standard for Storage and Handling of Workplace Dangerous Goods [NOHSC:1015(2001)].

4.2.3 Environmental protection

Lithium Plus is committed to responsible and effective environmental protection and management.

The environmental impact assessment in this referral (section 5) assumes that standard environmental protection measures will be implemented and will be effective. This includes at a minimum preparation and implementation of the below management plans and mitigation measures to support the environmental (mining) licence (under the *EP Act*). The management plans will be developed in accordance with the relevant legislation in section 4.2.1 guidance listed above in section 4.2.2.

Bushfire Management Plan

The Project area has a high fire frequency. Bushfire management and preparedness will be important to protection of the mine infrastructure, biodiversity and in the long-term to achieving rehabilitation outcomes. The Bushfire management plan will include preventative measures, preparedness and hazard reduction burns to minimise the risk of late season wildfires. It will be developed in accordance with the requirements of the *Bushfires Management Act 2016* and to the satisfaction of Bushfires NT. The plan will also focus on fire management for the protection of threatened fauna species i.e. the Black-footed Tree-rat.

Cultural heritage management plan (CHMP)

CHMP developed in accordance with the requirements of the *Heritage Act 2011* and to the satisfaction of Heritage Branch and traditional owners and relevant Indigenous groups. The plan will include:

- Identification of sites to be avoided, determined in consultation with heritage branch and Traditional Owners.
- Avoidance and mitigation commitments to protect archaeological features.
- An unexpected finds procedure to manage impacts to any archaeology that remains unknown after the above assessments are complete.

Appropriate permits will be obtained under the *Heritage Act 2011* to carry out work on a heritage place or object ('works approval') if there are some archaeological objects that cannot be avoided. Where required, permits will be obtained to move features to a location for protection, determined in consultation with Traditional Owners and site custodians, and Heritage Branch.

Dust management plan

Will be developed to include dust control measures to ensure the Project meets the NEPM Ambient Air Quality guidelines for the protection of surrounding flora and fauna, water quality, visual amenity and human health.

Erosion and sediment control plan (ESCP)

A site-specific ESCP will be developed for construction and operations, which will include installation and maintenance recommendations for drainage, erosion and sediment controls. The ESCP will be developed in accordance with the International Erosion Control Association *Best Practice Erosion Control Guidelines* (IECA 2008) and endorsed by a Certified Professional in Erosion and Sediment Control (CPESC).

Emergency response plan (ERP)

The ERP will include environmental emergencies such as spill response, wildfire, severe weather and uncontrolled releases of water.

Hazardous materials management plan

The hazardous material management plan will include provisions for storage and handling (as prescribed under the AS1940); inductions and training; spill containment and response procedures and waste management practices, including disposal requirements and regular inspections of hazardous material storage and use area.

Mine rehabilitation and closure plan

The mine rehabilitation and closure plan will identify the measures that will be taken to decommission infrastructure and rehabilitate the site to meet the agreed end land use objectives. The plan will and address any residual contamination and rehabilitation and closure monitoring to ensure a safe, stable and non-polluting site.

Vegetation clearing plan and procedure

Vegetation clearing plan and procedure will be developed in accordance with best practice guidelines, including relevant aspects of the NT Land Clearing Guidelines. The procedure will include provisions for:

- Surveying and pegging the proposed clearing area prior to clearing activities commencing, to ensure clearing remains within the approved disturbance footprint only.
- A pre-clearance survey, conducted by a qualified ecologist (fauna spotter-catcher), prior to the clearing to identify any potential habitat for wildlife, relocate wildlife found, and provide advice as required.
- Use of a qualified ecologist - fauna spotter-catcher during clearing activities to relocate wildlife found, and provide advice as required.
- Undertaking progressive clearing as required for construction activities to minimise exposed soils.
- Using existing access tracks to minimise disturbances; retaining vegetation where possible between infrastructure.
- Retaining 100 m vegetation buffer wildlife corridors providing connectivity from the Charlotte River to the eastern side of the Project area.
- Clearing practices to reduce risk of erosion of soil and sedimentation during the wet season.

Water management plan (WMP)

The WMP will outline the required monitoring programs (groundwater, surface water and aquatic), including where relevant, the monitoring of upstream (control) sites, potential impact sources within the Project area, and the downstream receiving sites (impact). Sufficient baseline data will be obtained to develop site-specific guideline values in accordance with the relevant ANZG (2018) guidelines and Darwin Harbour Water Quality Objectives (DHWQO).

A trigger action response plan (TARP) will also be developed. The plan will include the continuous logging of water levels in groundwater monitoring bores and stream flow and quality monitoring within the Charlotte River with an automatic gauging station upstream and downstream of the mine site. The WMP will also outline on-site water management strategies for clean water and mine impacted water and any water treatment that may be required.

Waste management plan

A waste management plan will be developed in accordance with the waste hierarchy to avoid and reduce; reuse; recycle; recover energy; treat; dispose of waste (in order of most preferred to least preferred).

Weed management plan

Lithium Plus will develop a Weed Management Plan in accordance with the requirements of the *Weeds Management Act 2001*, the *Darwin Regional Weeds Strategy 2021-2026* (DEPWS, 2021a), and relevant Statutory Weed Management Plans (e.g. for Gamba grass). The Weed Management Plan will be applicable for land clearing, construction and operational activities. This plan will include hygiene and quarantine measures to prevent the introduction of new species to the Project area, prevent the spread of weeds, and will detail control measures for existing weed infestations.

Weed control will be undertaken as prescribed in the *Northern Territory Weed Management Handbook* (DEPWS, 2021b) and will be consistent with the Strategy, Objectives and Actions outlined in the *Darwin Regional Weeds Strategy 2021-2026* (DEPWS, 2021a). Weed management for rehabilitation and closure will be addressed in the Mine Rehabilitation and Closure Plan.

4.3 Principles of environmental protection and management

The Project has applied the principles of environment protection and management (Part 2 of the EP Act), and section 43 general duty on proponents. Details of how and where these principles have been applied are provided in Table 4-3.

Table 4-3. Checklist of requirements under Section 42 and 43 of the EP Act

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
42 (a)	Actions do not have an unacceptable impact on the environment, now or in the future	The referral identifies all potential environmental impacts associated with the Project during construction, operations and closure, and assesses the significance if the impact. Mitigation measures are proposed to ensure the level of impact is acceptable.	Section 5
42 (b) (i)	all actions that may have a significant impact on the environment are assessed, planned, and carried out taking into account: the **principles of ecologically sustainable development;** and		
	Decision-making principle: *(1) Decision-making processes should effectively integrate both long-term and short-term environmental and equitable considerations.* *(2) Decision-making processes should provide for community involvement in relation to decisions and actions that affect the community.*	The Project has considered both short and long-term impacts and benefits, including impacts during construction, operation, and closure. Lithium Plus held initial community forums in July 2024 to present details of the Project to the community and discuss any concerns or feedback that was raised. Lithium Plus is committed to undertaking ongoing consultation and working closely with relevant stakeholder throughout all Project stages.	Section 3 Section 5.6
	Precautionary principle: *(1) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *(2) Decision-making should be guided by:* *a careful evaluation to avoid serious or irreversible damage to the environment wherever practicable; and* *an assessment of the risk-weighted consequences of various options.*	This assessment is based on both existing information and studies undertaken specifically for the Project by suitably qualified professionals. Where there is insufficient information to determine whether an impact will occur (for example groundwater modelling) the referral has assumed impacts until such time as evidence can be provided to the contrary. Where a significant vegetation type can also be considered under an alternative value classification (e.g. Stream order for the Charlotte River), a precautionary approach has been adopted by default and the most conservative mitigation recommendation applied. For example: where an assessment identifies a high value riparian rainforest (250 m buffer) along a third order stream (100 m riparian buffer), the wider buffer associated with the most significant biodiversity values is retained.	Section 2.8 and Section 5
	Principle of evidence-based decision-making: *Decisions should be based on the best available evidence in the circumstances that is relevant and reliable.*	This assessment is based on both existing information and studies undertaken specifically for the Project by suitably qualified professionals. Where information is unknown or sufficient detail to make an assessment is not yet available, additional studies will be undertaken, by suitably qualified professionals to address information gaps and the referral has assumed impacts until such time as evidence can be provided to the contrary.	Section 5

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
	Principle of intergenerational and intergenerational equity: *The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of present and future generations.*	The Project aims to improve the community and environment, by providing benefits to local communities. The Project is committed to working with the local community and training providers to prioritise local employment and develop an industry that provides social and economic benefits to the region, and NT more broadly. The principle of intergenerational equity has been considered in mine closure planning. The Project mine closure concept involves removing of the waste rock by backfilling the material underground and within the box cut and establish a safe, stable and non-polluting site. The land will be returned to pre-mining land use or land use criteria as determined in consultation with stakeholders. The geochemical characterisation of waste and ore undertaken to date indicate that the Project is not expected to result in legacy contamination issues that would prevent achievement of the closure objectives. Once the closure objectives are achieved, it is not expected that there will be any limitations on land use by future generations.	Section 2.6.3, 2.8 and 5.1
	Principle of sustainable use: *Natural resources should be used in a manner that is sustainable, prudent, rational, wise and appropriate.*	Lithium Plus is currently undertaking an energy options analysis and have proposed an on-site solar farm to provide low-voltage power requirements for administration, lighting, and water plants. Water will be reused in operations for dust suppression activities. Car-pooling and the use of a minibus will be available for the workforce for transport to and from site.	Section 2.8
	Principle of conservation of biological diversity and ecological integrity: *Biological diversity and ecological integrity should be conserved and maintained.*	Ecological assessments have been undertaken for the Project to inform the development. Threatened fauna species are known to occur within the Project area and within the surrounding area. Lithium Plus are committed to adhere to appropriate measures where possible to avoid and minimise significant impacts to these species.	Section 2.8 and 5.2
	Principle of improved valuation, pricing and incentive mechanisms: *(1) Environmental factors should be included in the valuation of assets and services.* *(2) Persons who generate pollution and waste should bear the cost of containment, avoidance and abatement.* *(3) Users of goods and services should pay prices based on the full life cycle costs of providing the goods and services, including costs relating to the use of natural resources and the ultimate disposal of wastes.* *(4) Established environmental goals should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, which enable persons best placed to maximise*	This referral documents the lifecycle of the Project, including management of waste through the Project. The principle of improved valuation, pricing and incentive mechanisms has been addressed by adopting a mine closure strategy that provides for backfilling of the mine to avoid any future impacts to land use. A security will be paid that will provide for remediation of the site so that these costs are not borne by the community if Lithium Plus is unable to achieve the agreed closure objectives.	Section 2.3, 2.6.3 and 4.2.3

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
	benefits or minimise costs to develop solutions and responses to environmental problems.		
42 (b) (ii)	**Environmental decision-making hierarchy:** *(1) In making decisions in relation to actions that affect the environment, decision-makers, proponents and approval holders must apply the following hierarchy of approaches in order of priority:* *ensure that actions are designed to avoid adverse impacts on the environment;* *identify management options to mitigate adverse impacts on the environment to the greatest extent practicable;* *if appropriate, provide for environmental offsets in accordance with this Act for residual adverse impacts on the environment that cannot be avoided or mitigated.* *(2) In making decisions in relation to actions that affect the environment, decision-makers, proponents and approval holders must ensure that the potential for actions to enhance or restore environmental quality is identified and provided for to the extent practicable.*	As part of referral, measures to avoid or mitigate impacts have been considered for each environmental factor and are detailed in the relevant environmental factor sections. Project site layout and design has been, and will continue to be, informed by results of due diligence assessments and further studies to avoid potential impacts. Lithium Plus is committed to ensure impacts are within an acceptable level.	Section 2.8 and 5
42 (b) (iii)	**Waste management hierarchy:** *(1) In designing, implementing and managing an action, all reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.* *(2) For subsection (1), waste should be managed in accordance with the following hierarchy of approaches in order of priority:* *avoidance of the production of waste;* *minimisation of the production of waste;* *re-use of waste;* *recycling of waste;* *recovery of energy and other resources from waste;* *treatment of waste to reduce potentially adverse impacts;* *disposal of waste in an environmentally sound manner.*	Lithium Plus is committed to implementing recycling processes and disposing of any unavoidable waste in a sustainable manner. <u>Avoid:</u> • No processing will occur on-site, which avoids the need for an additional processing plant and tailing storage facility. <u>Minimise:</u> • The objective of the proposed site layout was to ensure that all required infrastructure is installed within the smallest disturbance footprint possible to minimise environmental impact. Effort has been made to ensure that planned regions for the mine site infrastructure does not encroach on bush land to further minimise impact on the environment. An underground mine to access the ore rather than an open cut, substantially reduces the disturbance footprint. <u>Reuse</u>: • The underground mine will be waste negative. Mine waste will be reused to backfill the box-cut and underground on closure. There will be no requirement for long-term surface disposal of waste rock from the Project. • Water dewatered from the underground and box cut will be settled in a mine water dam and reused on-site as a water supply for the mining operations and dust suppression activities where possible. <u>Treat and dispose:</u> • Excess water that cannot feasibly be contained on site will be treated to remove sediments and other contaminants (if required), prior to disposal	Section 2.3 and 4.2.3

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
		(discharge to a land irrigation area and/or watercourse under an approved waste discharge licence). • Wastewater from staff amenities will be directed to a septic system designed and constructed in accordance with the Code of Practice for Wastewater Management (Department of Health, 2020). <u>Recycle / dispose:</u> • Recyclable construction and demolition (i.e., packaging, metals, wood, tyres, batteries etc.) will be collected by a licenced waste contractor and recycled at a waste facility in Darwin region. • Hazardous wastes that cannot be recycled i.e. waste from workshop such waste oils and grease will be stored in bulk containers; chemical containers, will be segregated and stored undercover to prevent ingress of rainfall and subsequent release of contaminated water from storage areas and collected by a licenced waste contractor and disposed of at a waste facility in Darwin regional area accordingly.	
42 (b) (iv)	**Ecosystem-based management:** Ecosystem-based management means management that recognises all interactions in an ecosystem, including ecological and human interactions.	The referral process incorporates prediction of indirect and cumulative impacts that could occur because of interactions in an ecosystem. Outcomes are based on technical studies, and professional judgement to consider how different ecosystem components will respond to the changes that are predicted to occur as a result of the mining activities. These predictions will be validated by operational environmental monitoring programs and stakeholder engagement activities as part of an adaptive management framework with the objective of balancing the needs of the environment and people. Adaptive management is a key principle of ecosystem-based management that will be used to protect ecological integrity and functioning and ensure that the impacts of mining remain at levels acceptable to the community and regulators. Monitoring programs proposed provide a scientific basis for decision-making. Trigger action response plan (TARP) will be developed as part of the water management plan, and include the following key components of the adaptive management framework: 1. Monitoring of water quality in internal mine water storages will detect point source water quality issues before water is released to the environment, which then triggers containment and treatment of water onsite, and review of internal management practices. 2. Monitoring of water quality in the receiving watercourses and groundwater aquifer will detect diffuse and/or cumulative water quality issues. A change to water quality is an early warning of potential for ecological impacts, which then triggers action to manage the source of the impact and protect sensitive receptors.	Section 5 and Section 6

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
		3. Monitoring the response of downstream riparian ecosystems to groundwater drawdown and water extraction. Reduced water availability will occur, which may or may not cause measurable change in the riparian ecosystem. As the response to these stresses is difficult to predict with certainty an ecological monitoring program will be implemented to assess any changes required in the water management plan. If there is an unexpected impact, this will trigger further consideration of rehabilitation and offsets. The monitoring programs will provide scientific evidence that will increase confidence in impact predictions, inform adaptive management of mine site activities and will also be used by the community and regulators to inform their decision-making as to whether the level of impact is acceptable.	
42 (b) (v)	**Impacts of a changing climate:**	The impacts of climate change will be considered through an energy options analysis which will include a GHG emissions assessment. This study will assess potential energy sources (both renewable and non-renewable) and measures to reduce emissions to as low as reasonably practicable. As the project is relatively small scale, has a short mine life of 7 years (construction to closure), will undergo rehabilitation on closure, and does not include a processing facility, the Project is unlikely to exceed the annual emissions thresholds in the NT Large Emitters Policy and will not trigger the requirement to develop a greenhouse gas abatement plan.	Section 2.8
42 (c)	**The potential for less environmentally damaging alternative approaches, methodologies or technologies for actions is considered:**	Alternatives considered include: Underground operation instead of open cut, reducing the disturbance footprint; DSO instead of processing on-site, reducing the disturbance footprint and retaining a benign operation.	Section 2.8
42 (d)	**The community is provided with an opportunity to participate, and have its views considered, in decisions on proposed actions:**	Lithium Plus have commenced early engagement with local community as detailed in Section 3 and will continue the engagement process throughout the LOM.	Section 3 and Appendix E
42 (e)	**The potential for actions to enhance or restore environmental quality through restoration or rehabilitation is identified and provided for to the extent practicable:**	The Project mine closure concept involves removing all waste rock from the surface and backfilling the material underground and within the box cut. The land will be returned to pre-mining land use. The preliminary closure objective for the site is to establish a safe, stable and non-polluting site with a self-sustaining native vegetation community.	Section 2.6.3
43 (a)	To provide communities that may be affected by a proposed action with information and opportunities for consultation to assist each community's understanding of the proposed action and its potential impacts and benefits;	Lithium Plus has committed to conducting consultation with stakeholders throughout the life of the Project and addressing questions and concerns that may raise. A stakeholder engagement plan has been prepared. Lithium Plus is committed to working with the local community and training providers to prioritise local employment and develop an industry that provides social and economic benefits to the Berry Springs township.	Section 3 and Appendix E

Section	Requirement of the principles of environment protection and management	How addressed	Cross-reference
43 (b)	To consult with affected communities, including Aboriginal communities, in a culturally appropriate manner;	A stakeholder engagement plan has been prepared and includes the strategy to consult with affected communities in a culturally appropriate manner; including Belyuen Community and relevant Indigenous groups including Larrakia Nation, Kenbi Rangers, Larrakia Development Corporation, Indigenous Women in Mining Resources Association (IWMRA).	Section 3 and Appendix E
43 (c)	To seek and document community knowledge and understanding (including scientific and traditional knowledge and understanding) of the natural and cultural values of areas that may be impacted by the proposed action;	The stakeholder engagement plan details the strategy to consult and engage with the community, and outcomes will be prepared in stakeholder engagement reports. Knowledge of the communities has been summarised in the community and economy section 5.6 and cultural values in section 5.7	Section 5.6, 5.7 and Appendix E
43 (d)	To address Aboriginal values and the rights and interests of Aboriginal communities in relation to areas that may be impacted by the proposed action;	The stakeholder engagement plan details the strategy to consult and engage with Aboriginal communities and will continue to engage as the project transitions into operations. The project area is not subject to claim or determination under the *Native Title Act* or *Aboriginal Land Rights Act*. If a native title claim is lodged and registered in response to the native title notification of ML(A) 33874 then, in the first instance, the intention is to engage directly with registered native title parties to develop protocols as necessary for sacred sites. It is anticipated that the Northern Land Council (NLC) and AAPA will be involved in this process to ensure the relevant traditional owners and/or traditional custodians can make informed decisions about sacred sites and other native title interests. In the event that there are no native title parties following native title notification of ML(A) 33874, an application for authority certificate will be progressed for the proposed development through the AAPA and in consultation with the NLC.	Section 5.7 and Appendix E
43 (e)	To consider the principles of ecologically sustainable development in the design of the proposed action;	Refer to 42(b)(i) above	Refer to 42(b)(i) above
43 (f)	To apply the environmental decision-making hierarchy in the design of the proposed action;	Refer to 42(b)(ii) above	Refer to 42(b)(ii) above
43 (g)	To consider the waste management hierarchy in the design of the proposed action.	Refer to 42(b)(iii) above	Refer to 42(b)(iii) above

5 ENVIRONMENTAL IMPACT ASSESSMENT

The NT EPA has developed a framework for the assessment of environmental impact. The framework uses 14 environmental factors to provide a systematic approach to organising environmental information and to establish environmental objectives against which proposals will be assessed.

This section provides an assessment of the potential environmental impact of the Project in regard to the NT EPA's environmental factors and corresponding factor objectives. Pre-referral screening (see Appendix A) undertaken by EcOz (2024a) determined that the Project has potential to impact 7 of the 14 environmental factors - see Table 5-1. These 7 factors were selected for further assessment either because the environmental values associated with the factor may be significantly impacted, or because there was insufficient information available to make a conclusive assessment. Factors excluded from further assessment are presented in Table 5-2. Refer to Appendix A for detail.

Table 5-1. NT EPA factors assessed and reasons for further assessment

Factor	Justification for assessment
Factors assessed in this referral	
LAND	
Terrestrial environmental quality	The Project is considered to trigger referral because of potential impact to land and soil: • Integrity due to soil erosion • Quality due to hydrocarbon contamination, and oxidation of stockpiled waste rock and ore materials.
Terrestrial ecosystems	The Project is considered to trigger referral because of potential impact due to: • Direct loss of vegetation and habitat • Loss of significant or sensitive vegetation types • Fauna disturbance and reduced habitat quality • Direct mortality of fauna • Loss threatened fauna species habitat and disturbance and/or loss of individuals.
WATER	
Hydrological Processes	The Project is considered to trigger referral because of potential impact to the hydrological processes due to uncertainty related to: • Groundwater drawdown from dewatering activities, reducing groundwater availability and alteration of flows for o other consumptive uses o mangrove communities, riparian vegetation and GDEs within the Charlotte River and its tributaries. • Alteration of surface water flows from construction of the mine with potential to cause o mine site inundation o reduced surface water availability to the Charlotte River and its tributaries.
Inland Water Environmental Quality	The Project is considered to trigger referral because of potential significant impact to the inland water environmental quality due to: • Sediment laden runoff and increased turbidity contaminating surface water • Hydrocarbon contamination (leaks and spills) contaminating surface and groundwater • Elevated nutrients and metals/metalloids from groundwater impacting surface water quality

Factor	Justification for assessment
	• Elevated metals/metalloids from mined waste and ore stockpiles contaminating surface and groundwater (acid and metalliferous drainage contamination is considered low) • Saline intrusion through dewatering activities and uncertainty related to the connectivity between the Charlotte River and the proposed infrastructure • Release of contaminants from exposure of acid sulfate soil (ASS) within Charlotte River due to the lowering of the groundwater from dewatering activities (uncertain).
Aquatic Ecosystems	The Project is considered to trigger referral because of potential significant impact to aquatic ecosystems due to: • Altered surface water and groundwater hydrology reducing habitat quality and biodiversity • Degraded and/or altered water quality and temporal variation of water quality available, impacting habitat quality (including mangroves) and biodiversity • Decrease in habitat quality from the accumulation of sediments in mangroves from sediment laden runoff. As there is some uncertainty about impacts to groundwater hydrology, the potential for impacts to aquatic ecosystems is uncertain.
PEOPLE	
Communities & Economy	The Project is considered to trigger referral because of potential significant impact to community and economy due to: • Reduced sense of safety with increased traffic on local roads • Potential pressures on emergency and social services • Boost local economy through employment opportunities and support to local businesses • Change in community composition, cohesion or character • Potential impacts to recreational activities such as fishing.
Culture & Heritage	The Project is considered to trigger referral due to uncertainty of existing archaeological, heritage and/or sacred sites within the Project area. Disturbance undertaken within an area where previous survey effort is unknown can result in potential significant impact to culture and heritage through: • Direct loss or damage to archaeological sites • Loss or damage to sacred sites.

Table 5-2. NT EPA Factors which were excluded from further assessment

Factor	Justification for exclusion
Factors excluded from further assessment	
LAND	
Landforms	There are no distinct natural landforms present within the Project footprint, which will be impacted by the Project.
SEA	
Coastal Processes	The Project area does not contain any values associated with the Sea factors and Project activities are not expected to impact the marine environment based on the distance of activities from nearest coastline (approximately 8 km Bynoe Harbour Inlet / coastline).
Marine environmental quality	
Marine ecosystems	
AIR	
Air Quality	The Project does not involve any activities which will emit significant volumes of airborne pollutants such that air quality criteria would be exceeded, and sensitive receptors would be impacted. Dust and particulate matter emissions and emissions from the combustion of diesel in machinery and vehicles are likely to occur during construction and operations, however, the proposed disturbance footprint is small-scale (<100 ha), the disturbance is short-term, and it is not expected to impact sensitive receptors.

Factor	Justification for exclusion
	The closest sensitive receptors are two rural residential properties located 3.3 km (direct line) south of Lei Project. The nearest town is Berry Springs, approximately 25 km (direct line) east of the Project. Project activities have an inherently low risk to air quality as dust will be managed using standard, best practice and proven mitigation measures.
Atmospheric Processes	Land clearing, the use of diesel-powered machinery for the project power supply, and the operation of vehicles, plant and equipment during both construction and operation will contribute to increased atmospheric GHG concentrations. However, the Project is expected to be a minor contributor to GHG emissions as the land clearing is small-scale (<100 ha), the disturbance is short-term, and revegetation will occur as part of closure. The Project is unlikely to trigger the NT Government (DEPWS) Large Emitters Policy or the reporting threshold requirements for greenhouse gas emission. The National Environment Protection (Ambient Air Quality) Measure will be used to evaluate performance. The impacts of climate change will be considered through a GHG Emissions Assessment, which will assess potential energy sources (both renewable and non-renewable) and measures to reduce emissions to as low as reasonably practicable.
PEOPLE	
Human Health	Project activities are unlikely to impact human health as: • The mined material/product is benign and does not contain any components that could pose a health risk to workers or the community and there is no processing of ore on site. • There are no sensitive land uses present in or immediately surrounding the Project. The nearest residence or other land use is located 3.3 km (direct line) from the Project area. • No known consumptive uses of surface water or groundwater downstream. Some limited recreational use/fishing in Charlotte River, more so in the Bynoe Harbour. • The closest registered bore (RN041993) for rural stock and domestic purposes is located 2.6 km south of the Lei deposit. All other registered water supply bores are located over 7 km from the Lei deposit. • Groundwater contamination is not expected to occur due to low risk of ARD and small volumes of hydrocarbons to be used. If some level of contamination did occur there would be no risk to community health as the contamination would be localised and there are no consumptive users nearby. • Dust emissions will be managed on site with suitable controls.

Assessing the significance of impacts

For each of the 7 factors selected for further assessment, the approach outlined in Figure 5-1 was taken to identify and assess environmental impacts from the Project.

Potential direct, indirect and cumulative impacts to each key environmental factor were identified, and the significance of impacts was assessed using the following criteria:

- **Likelihood** of the impact occurring (refer Table 5-3).
- **Severity** (consequence) of the impact having regard to the context and intensity of the impact; and the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact[1] (refer Table 5-4).

Definitions for residual impact ratings are provided in Table 5-5.

[1] Potentially significant impacts are defined under section 11 of the *EP Act* an impact of major consequence having regard to the context and intensity of the impact; and the sensitivity, value and quality of the environment impacted on and the duration, magnitude and geographic extent of the impact

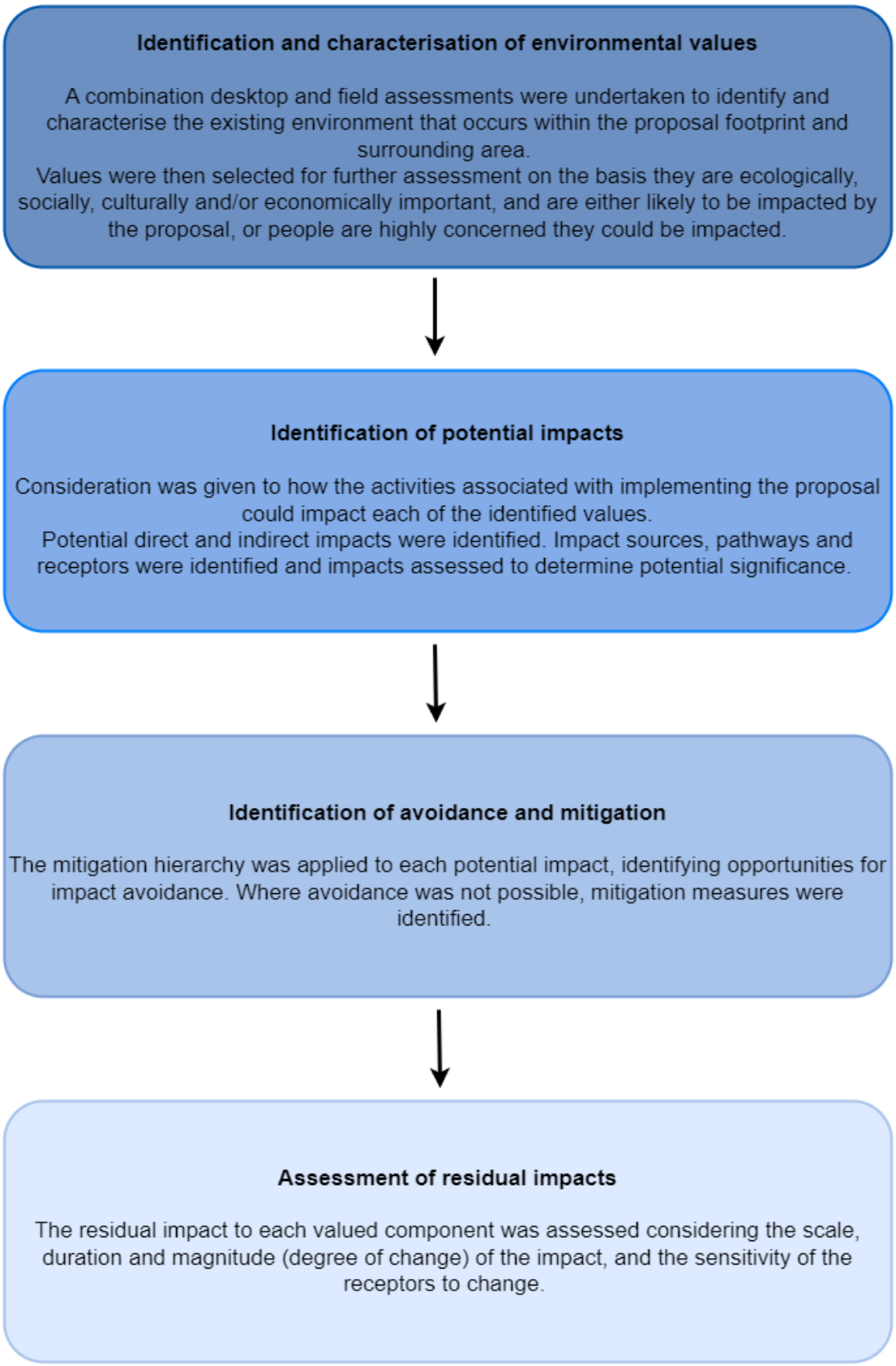


Figure 5-1. Impact assessment process

Table 5-3. Likelihood criteria used in the impact assessment process

Likelihood category	Criteria
Unlikely	The impact is not expected to occur because there are no sources of impact associated within the project area, and/or no pathways or receptors present. The impact has not been reported in association with similar development activities. The impact has been considered in the impact assessment because stakeholders have raised it as an issues/concern.
Possible	The impact would not occur as part of normal operations but could occur in association with incidents and emergencies and/or there is some uncertainty as to whether the impact is likely to occur. The impact has been reported to occur infrequently in association with similar projects and/or similar environments.
Likely	The impact will likely occur if the project is developed as planned. The impact has occurred on more than one occasion in association with similar projects and/or similar environments or it is reasonably likely to occur in association with certain industry types.
Certain	The impact is certain to occur.

Table 5-4. Severity (consequence) criteria used in the impact assessment process

More Severe			Less Severe
Scale: The spatial extent of the impact, considering both the impact footprint (direct disturbance) and/or area of influence (indirect disturbance).			
Widespread Impact affects >10,000ha or areas >10km from activities Impact affects multiple regions, Territory-wide, National or International implications and/or population level concern	**Regional** Impact affects 5,000-10,000ha or areas >5km but <10km from activities Impact experienced widely across the Region (i.e. Tiwi Islands, Darwin Region) Regional implications and/or broad community concern	**Localised** Impact affects 100-5,000ha or areas >1km but <5km from activities. Local implications and/or pockets of community concern Impact affects limited areas, near neighbours or local residences/land users	**Limited** Impact affects a small area (less than 100ha) or is confined to within 1km of activities Limited implications and/or only a handful of people concerned
Magnitude: The degree or amount of change from natural conditions.			
Very high Major changes from natural conditions such that values are severely impacted or no longer supported. Return to normal conditions unlikely to be possible.	**High** Changes exceed natural variation, impacts to supported values are likely. Recovery to normal conditions may be possible with active remediation.	**Moderate** Changes exceed natural variation but impacts to supported values are unlikely.	**Low** Changes are detectable but within normal range or natural variation.
Duration: The longevity of the impact, including whether it is reversible.			
Permanent Impact is permanent endures beyond 50 years. Recovery is unlikely.	**Long-term** Impact is regular and/or enduring over an extended period (5-50 years). Conditions may return to normal with active remediation and/or restoration activities.	**Medium-term** Impact that recurs intermittently and/or persists for <1-5 years. Conditions return to normal within 1-5 years.	**Short-term** One-off or occasional impact that persists for days to months. Conditions quickly return to normal.
Sensitivity, value and quality of receiving environment: Including consideration of significance to stakeholders and beneficial uses, and the degree to which they are already impacted.			
High Very sensitive receptors are present that have limited resilience to change.	**Medium** Sensitive receptors are present but have some resilience to change. AND/OR	**Low** Environment is intact (has inherent value as an undisturbed landscape). AND	**Very Low** Environment is degraded. AND There are no sensitive receptors present.

More Severe			Less Severe
AND/OR Environment contains values that are important at a regional or national scale.	Environment contains values that are important at a local scale and/or have beneficial use.	There are no sensitive receptors present. AND The environment does not contain any aspects that are valuable or otherwise important or unique.	AND The environment does not contain any aspects that are valuable or otherwise important, or unique.

Table 5-5. Residual impact ratings

Low / Minor	Moderate	High	Major
A minor residual impact is unlikely to be significant and generally has two or more of the following characteristics: SEVERITY: **Scale**: limited **Magnitude**: low **Duration**: short-term / reversible. OR SENSITVITY: Environment is degraded. AND There are no sensitive receptors present. AND The environment does not contain any aspects that are valuable or otherwise important, or unique. There is a high degree of certainty about the likelihood and intensity of the impact, and the effectiveness of proposed mitigation measures.	A moderate residual impact has potential to be significant. The significance depends on the acceptability of the impacts and the effectiveness of mitigation measures. A moderate impact generally has two or more of the following characteristics: **Scale**: localised **Magnitude**: moderate **Duration**: medium-term / reversible. AND/OR Environment is intact (has inherent value as an undisturbed landscape). AND There are no sensitive receptors present. AND The environment does not contain any aspects that are valuable or otherwise important or unique. There is moderate degree of certainty about the likelihood and intensity of the impact, and the effectiveness of proposed mitigation measures.	A high residual impact is likely to be significant. The level of acceptability will depend on offsets or benefits compensating for the impact. A high impact generally has two or more of the following characteristics: **Scale**: regional **Magnitude**: moderate / high **Duration**: long-term / reversible with active remediation AND Sensitive receptors are present but have some resilience to change. AND/OR Environment contains values that are important at a local scale and/or have beneficial use. There is a low degree of certainty about the impact, and the effectiveness of proposed mitigation measures.	A major residual impact is significant. The level of acceptability will depend on offsets or benefits compensating for the impact. A major impact generally has two or more of the following characteristics: **Scale**: widespread **Magnitude**: very high **Duration**: permanent / recovery is unlikely AND Very sensitive receptors are present that have limited resilience to change. AND/OR Environment contains values that are important at a regional or national scale

5.1 Terrestrial environmental quality

The NT EPA's objective for the terrestrial environmental quality factor is to:

Protect the quality and integrity of land and soils so that environmental values are supported and maintained.

The sections below identify the land and soils values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.1.1 Environmental values

The environmental values identified for assessment under the terrestrial environmental quality factor are:

- **Land and soil integrity** – intact land and soils are valued due to their role in supporting future land uses, revegetation and preventing offsite impacts to water quality associated with erosion and turbidity and sedimentation.
- **Land and soil quality** – clean (uncontaminated) land and soils are valued as they support land uses, revegetation, biodiversity and prevent offsite contamination and water quality impacts.

This environmental values and assessment of impacts on terrestrial environmental quality was informed by the following information sources:

- NR Maps: Natural Resource Maps NT (DEPWS, 2024a)
- Northern Territory Land Clearing Guidelines (DEPWS, 2024e)
- Land Resources of the Elizabeth, Darwin and Blackmore Rivers – Greater Darwin Area, Northern Territory (DEPWS, 2000)
- The Land Resources of the Elizabeth, Darwin and Blackmore Rivers (Fogarty et al. 1984)
- Land Resources of the Lower Finniss (Hill et al., 2002).
- Ecological Assessment of EL31091 (EcOz, 2024b) Appendix B
- Geochemical Characterisation of Proposed Waste and Ore Materials, Lei Lithium Project (EGi, 2024) Appendix F.

Land and soil integrity

Intact soils are valued because they minimise off site impacts from mining activities (associated with erosion and sedimentation) and support successful rehabilitation and post-mining land uses. Land clearing makes soils susceptible to erosion, resulting in potential sedimentation of receiving waterways. Intact soils support rehabilitation success and protect the long-term integrity of post-mining landforms.

The Project will disturb <100 ha of soil by land clearing and development. The proposed disturbance footprint is situated on the western side of a gentle ridge with the land gradient falling to the south-west toward the Charlotte River. The area to the north of the deposit and proposed box-cut and decline is flatter lying and falls gently to the north-west toward a small, ephemeral drainage line that joins a tributary of the Charlotte River. Locally, the highest elevations (32 mAHD) occur along a ridge line coincident with the Fog Bay Road that is situated to the south-east of the deposit. The lowest elevations (4 mAHD) occur along the Charlotte River to the south-west of the Lei deposit (Groundwater Enterprises 2023).

Lithium Plus commissioned EcOz to undertake an ecological assessment (Appendix B) during 2023. The Ecological Assessment (EcOz, 2024b) refers to the "proposed drilling area" and the "study area" within EL31091, prior to defining the proposed disturbance footprint and the mineral lease application. "The Project area" encompasses the ML(A) 33874 (~295 ha), the "Study area" (~563 ha), which was chosen to delineate 2023 ecology survey, encompasses the project area but also extends further south. The "proposed drilling area" (location of the proposed box cut and underground) is the western portion of ML(A) 33874.

The existing land units within the study area are mapped at a scale of 1:25,000 and described in *Land Resources of the Elizabeth, Darwin and Blackmore Rivers - Greater Darwin Area* (Fogarty et al., 1984) and to a lesser extent, the Lower Finnis region (Hill et al., 2002). Satellite imagery, available land resource datasets and field survey undertaken by EcOz were collectively used to verify land units relevant to the study area and refined to a scale of 1:10,000.

Eight land units are mapped as occurring within the ML(A) 33874 supporting mostly low hills and rises across, and to a lesser extent, drainage systems and plains. These are summarised in Table 5-6, and their extents mapped in Figure 5-2.

The dominant land unit within ML(A) 33874 is 2a1, 134.7 ha or 45.9% of the ML(A), comprising of well-drained rises to 4% slope, intersected by seasonally waterlogged plains, alluvial plains and drainage systems. Soils in land unit 2a1 are leptic rudosols, very shallow soils, typically gravelly brown or yellow-brown sandy clay loams with minimal development. The proposed disturbance footprint occurs predominately on land unit 2a1. Proposed disturbance areas within the 2-4% slope, presents an erosion risk following removal of vegetation.

Table 5-6. Desktop land units relevant to the Project area at a scale of 1:25,000

Land unit	Landform class	Landform Description	Drainage	Soils	Soil description	Area (ha)
10e1	Drainage systems	River systems (steep banks); Rock outcrop on banks	Very poorly drained	Hydrosols	Hydrosols	1
1b	Low hills	Steep ridges 10 - 40%	Nil to low level of seasonal soil waterlogging	Rudosols	Leptic rudosols	43.3
2a1	Rises	Rises to 4%	Nil to low level of seasonal soil waterlogging	Rudosols	Leptic rudosols	134.7
2b2	Rises	Sideslopes 2 - 5%	Nil to low level of seasonal soil waterlogging	Kandosols	Brown kandosols	20.1
3e	Plains	Flat to gently undulating upland surface, slope 0.5 – 2%	Moderate to high level of seasonal soil waterlogging	Hydrosols	Kandosolic redoxic hydrosols	29.7
4c	Plains	Gentle lower slopes, slope 0.5 - 1.5%	Moderate to high level of seasonal soil waterlogging	Hydrosols	Kandosolic redoxic hydrosols	11.9
5a	Alluvial plains	Narrow upland alluvial plains, slope <1.0%	Severe level of seasonal soil waterlogging or inundation for extended periods	Hydrosols	Chromosolic redoxic hydrosols	9.6
5b1	Drainage systems	Drainage floors within upland terrain, slope <1.0%	Severe level of seasonal soil waterlogging or inundation for extended periods	Hydrosols	Kandosolic redoxic hydrosols	43.1

Land and soil quality

Clean (uncontaminated) soils are valued because they minimise offsite impacts to water quality and support successful rehabilitation and post-mining land uses. Soil contamination can result in runoff or seepage of contaminants to surface water and groundwater and can limit rehabilitation success and future land use options.

The Project area ML(A) 33874 had been under EL31091 mineral titles but shows no signs of previous disturbance except from exploration activities by Lithium Plus. None of the Project area or properties surrounding the Project area are registered contaminated sites under the *Waste Management and Pollution Control Act 1998.*

Hydrocarbons:

The Project will involve the storage and handling of hazardous materials including bulk diesel fuel storage (2x 110,000L self-bunded above ground tanks and 1x 10,000L oil tank, total volume <230,000 L) and explosives (ammonium nitrate). Hazardous material will be managed in accordance with the *Waste Management Pollution Control Act 1998* and managed in accordance with a Hazardous Materials Management Plan. There is no processing of ore on-site, thus the operation does not use hazardous materials or chemicals that could contaminate the land and soils. Fuel storage will be in accordance with AS 1940-2004.

Acid sulfate soil (ASS):

There is no mapped occurrence of Acid sulfate soil (ASS) within the Project area. The proposed disturbance activities are predominantly occurring within Land Unit 2a1. ASS mapping indicates a high probability of occurrence of ASS to the west (approximately 300 m) of the proposed box cut and underground mine infrastructure, within the tidal reaches of the Charlotte River (NRMaps – DEPWS, 2024a). Groundwater Dependent Ecosystems (GDEs) that may be affected by acid sulfate soils include groundwater discharge areas of estuarine or coastal systems, aquatic ecosystems occupying estuaries associated with base flow dependent rivers and streams and coastal wetlands dependent on groundwater supply (Sinclair Knight Merz, 2001). This is further discussed in inland water quality (section 5.4)

As the mapped ASS area is not within the proposed disturbance footprint, there are no impacts due to land clearing activities, thus is not assessed further in this section.

Geochemical characterisation of the waste rock and ore:

Geochemical characterisation of the waste rock and ore material undertaken by EGi (2024) indicates that the majority of the material is categorised barren (NAF) with a low propensity to leach metal(loid)s on contact with water, therefore represents very low to low risk of environmental impact.

Geochemical testing included a selection of 122 rock core samples representing all oxide zones and key lithologies associated with the box cut, decline and production stopes, for preliminary analysis of:

- Total sulphur (S), Total carbon (C), and Organic C to support selection of 100 samples for further analysis including:
    - pH and electrical conductivity (EC) of water extracts
    - Multi-element (ME) analyses of solids
    - ANC (Acid Neutralisation Capacity)
    - NAG (Net Acid Generation) testing.

Samples were most usefully grouped by oxidation state and lithology (EGi, 2024):

- 38 samples were from the overlying weathered zone (totally oxidised, partially oxidised, and soil)
- 84 samples were fresh rock (fresh and fresh/altered) comprising:
    - Main hosting lithologies, psammite and phyllite
    - Pegmatite ore body, both barren and ore-containing; and
    - Quartz vein material.

Results of the preliminary testing indicated that the pegmatite lithologies, both barren and ore-bearing, contained very low levels of Total S and acid neutralising capacity (ANC) and present very low potential of acid formation. Of the hosting lithologies, all contained low levels of Total S and were classified as non-acid forming (NAF) materials except for 3 phyllite samples. These phyllite samples (classified as PAF-LC or PAF) were either proximal or internal to the ore body, indicating the required attention to hosting lithologies, particularly phyllite, associated with the pegmatite body (EGi, 2024). The ME analyses of the indicated some enrichment

in potentially problematic elements such as Arsenic (As). However, the potential release of these elements is dependent on the occurrence of reactions such as oxidation and acidification (EGi, 2024).

Further testing, including ME analyses of water extracts, ME analyses of peroxide extracts, ABCC tests and Kinetic NAG tests of selected samples was undertaken by EGi (2024) to determine:

- the potential of the materials to release dissolved species to water,
- the potential to release dissolved species under oxidising conditions,
- the amount and type of carbonate buffering comprising the ANC of these materials, and
- the estimated lag period of PAF(-LC) samples.

Overall outcomes of the further testing are summarised below (EGi, 2024):

- Pegmatite lithologies, both barren and ore-bearing:
  - Low potential to release dissolved species. As and Manganese (Mn) < 0.1 mg/L in water extracts.
  - Contained very low levels of Total S and ANC and present very low potential of acid formation.
- Hosting lithologies:
  - All weathered samples contained low levels of Total S and Total C and were classified as NAF materials.
  - Most fresh samples contained low levels of Total S and were classified as NAF materials with the exception of 3 phyllite samples with higher S and classified as PAF(-LC).
  - Effective ANC was <20 kg $H2SO_4$/t and mostly close to zero, indicating only low levels of carbonate minerals available for acid consuming reactions.
  - Water extracts of some samples contained As and Mn at concentrations >0.1 mg/L, but not correlated with Total S.
  - Higher S materials, particularly the 3 PAF(-LC) phyllite samples, oxidized to release 100 to 1000 mg/L sulphate on addition of peroxide. Highest associated metal(loid) releases were >10 mg/L for Aluminium (Al) and Mn and >1 mg/L for Copper (Cu) and Zinc (Zn).
  - Estimates from Kinetic NAG testing of the PAF(-LC) samples indicated lag periods of longer than 6 years. When mixed with typical low S NAF material containing some effective ANC, the mixture was estimated to remain circumneutral indefinitely.
  - The 3 phyllite samples classified as PAF-LC or PAF were internal or proximal to ore body indicating the required attention to the hosting lithologies associated with the ore body. Co-disposal with non-phyllite metasedimentary materials should prevent any future acidification.

Implications of the findings for handling/management of waste during mine operations and closure include (EGi, 2024):

- Oxide and transitional waste excavated to construct the box cut will be essentially barren (NAF) with a low propensity to leach metal(loid)s on contact with water, therefore surface storage of this material until backfilling of the box cut can be undertaken represents very low risk of environmental impact.
- Results show that fresh waste rock to be mined during development of the decline is predominantly NAF, with a low propensity to leach significant metal(loid)s on contact with water. Surface storage of this material before it can be used to backfill stopes will represent a very low risk of environmental impact.
- There is potential for some fresh phyllite rock near to contact zones with the pegmatite to contain elevated S and on exposure to air oxidise to produce ARD. However, the lag period to acid

generation is estimated to be significant (> 5 years) and co-disposal with NAF waste is likely to extend this lag period significantly. Excavation of fresh material is expected commence after 6 months, following construction of the box-cut and portal. In the current LOM, the fresh material may temporarily be stored on the surface for 5.5 to 6 years before it is backfilled on closure. This short to medium term surface storage of fresh waste rock represents a low risk of environmental impact.

- Ore samples are barren (NAF) with respect to acid generation and neutralisation, with a low propensity to leach significant metal(loid)s on contact with water. Surface stockpiling of ore prior to shipping off site therefore represents a low risk of environmental impact.
- Should paste backfilling of stopes involve addition of binder including cement to waste rock to generate the paste fill, then leach testing of the paste backfill should be undertaken, as the alkaline conditions of the cemented paste backfill can increase dissolution rates in comparison with those at neutral pH and result in mobilisation of some metal(loid)s.

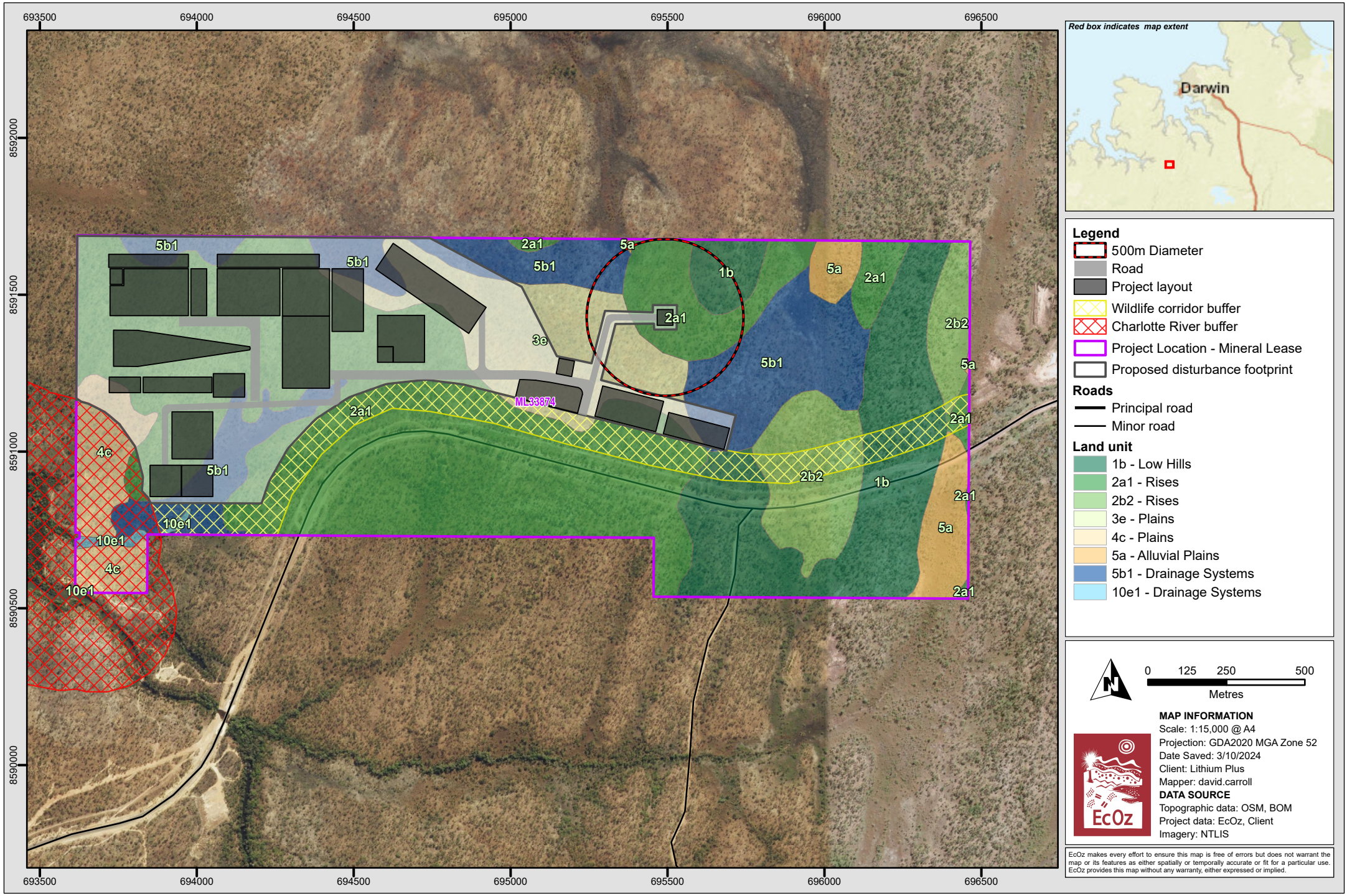


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Figure 5-2. Map of the land units relevant to the Project area

5.1.2 Impact assessment

The impact assessment process identified the following potential impacts to land and soils from the Project activities:

- Soil erosion; and
- Contamination of land and soils due to:
  - hydrocarbon contamination
  - oxidation of stockpiled waste rock and ore materials.

Accounting for implementation of avoidance and mitigation described below, the Project has the potential to have a minor residual impact on the terrestrial environmental quality through soil erosion and contamination of soils due to hydrocarbons and oxidation of stockpiled waste rock and ore materials.

There is a high degree of confidence that the avoidance and mitigation measures will be effective in avoiding significant environmental impacts.

Table 5-7. Impact assessment – terrestrial environmental quality

Impact	Avoidance and mitigation	Residual Impact
Soil erosion <100 ha subject to land clearing, earthworks and construction activities, exposing soils to erosion by wind and rainfall. Erosion could result in soil loss and sedimentation of downgradient areas, and resultant impacts to water quality (through turbidity and suspended sediment) and air quality (through dust). Experience on other mine sites within seasonal monsoonal climate conditions of the Northern Territory, indicates that erosion is likely to occur within the disturbance area. Exposed surfaces after land clearing will be most susceptible to erosion by rainfall during the first wet season of construction. Soil erosion is likely to occur during construction, operations, and post closure. The key pathways for soil erosion to occur are due to vegetation removal/ground disturbance, construction of landforms, placement of dispersive waste rock in mining landforms, and instability of the landforms that remain post closure.	• An Erosion Sediment Control Plan (ESCP) that complies with the Best Practice Erosion and Sediment Control Guidelines (IECA, 2008) will be developed by a certified professional in erosion and sediment control (CPESC) or suitably qualified person prior to clearing and implemented during clearing and construction for construction and operation activities. • Land clearing will be conducted in accordance with the Land Clearing Guidelines (DEPWS, 2024e). • Controls will be implemented to minimise the amount of vegetation clearing that takes place. A Vegetation Clearing Procedure will be developed that includes setting out limitations on clearing areas, staging clearing to limit the areas of exposed soils at any given time, using existing access tracks and disturbances, and not clearing during the wet season. • Topsoil will be stockpiled in accordance with relevant guidelines and best practices to minimise soil loss i.e. height of stockpile no greater than 2 m. • Dust suppression will be implemented as required to minimise wind erosion. • Stormwater management infrastructure will be implemented to minimise erosion and sedimentation from stormwater runoff. • The potential for erosion will be minimised by adopting appropriate design criteria for infrastructure components (i.e. construction of water storages, site drainage and diversion bunds will be suited to high rainfall conditions experienced within the project area) and stabilising cleared areas as soon as practicable following clearing and construction. • Underground mining reduces the amount of surface disturbance required, in comparison to open-cut mining. • The surface waste rock dumps and ore stockpiles are temporary. Ore is taken to Darwin Port and all waste rock will be backfilled on closure, therefore minimising long-term / post closure erosion risks. • Progressive rehabilitated will be undertaken where possible to minimise exposed soils.	**Minor**
Contamination of soils – hydrocarbons Soil contamination could occur by the accidental release of	**Design and engineering:** • Fuel tanks are above-ground, self-bunded and located in designated refuelling and waste storage areas away from any sensitive receptors such as drainage lines. Design and location	**Minor**

Impact	Avoidance and mitigation	Residual Impact
hazardous materials or wastes to the environment. Potential sources of contamination include areas where hazardous materials are stored for example the fuel bays (light and heavy vehicle) and where they are used for example in plant and equipment underground and on the surface. The project design comprises self-bunded above-ground fuel tanks and designated refuelling and waste storage areas. Hydrocarbon contamination of land and soils could be caused by leaks and spills from diesel fuel storages. Fuel storages have the potential to locally contaminate the land and soil if the appropriate mitigation measures are not implemented and managed accordingly. Operational controls will limit the risk of spills/leaks resulting in large-scale soil contamination.	combined with the short life of mine, minimises risks associated with diffuse pollution over time, and also the risks associated with failure of the fuel storage tanks and containment bunds. • Refuelling areas will comprise of an impervious surface and stormwater drainage pits. • Fuel storages will be removed during mine closure and minor areas of soil contamination remediated. The Project is not expected to result in any residual soil contamination. **Acts and Regulations:** • Storage and handling of hydrocarbons will be controlled in accordance with Work Health and Safety Regulations and, under normal conditions of use, are unlikely to be released to the environment. **Plans:** The following plans and procedures will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details of the relevant plans as outlined in section 4.2.3. • An Emergency Response Plan will be in place and employees inducted in its application. • The Hazardous Materials Management Plan will document monitoring procedures for fuel storages for leaks/spills, and spill response procedures, which all personnel on site will be trained in. • The Mine Rehabilitation and Closure Plan will identify the measures that will be taken to decommission infrastructure and address any residual soil contamination and minimise erosion to ensure the long-term stability of the post-mining landforms. • Waste management practices include consideration of the waste hierarchy. **Procedures:** • Storage and handling procedures that minimise risks to people and the environment are prescribed under the Australian Standard AS1940 Storage and handling of flammable and combustible liquids and the Dangerous Goods Act. • Spill containment and response procedures. **Personnel, training and equipment:** • A qualified person will be appointed as Site Safety Adviser and will have on-site a set of all relevant MSDS for hazardous materials. • Absorbent and containment material (e.g., absorbent matting) and neutralising material will be available where hazardous materials are used and stored, and personnel trained in correct use. • Inspection of storage areas, including bunding and maintenance. • Inductions and training for the storage, handling and disposal of hazardous materials. Adoption of these measures on site will minimise the likelihood of major contamination incidents occurring. Effective implementation of these measures should ensure that any soil contamination is limited to within the immediate areas around fuel storage and refuelling areas and does not result in any measurable impacts to surface or groundwater quality.	
Contamination of soils - oxidation of stockpiled waste rock and ore materials (ARD) Mining activities such as the excavation of ore and waste	• Mine rehabilitation and closure plan will be developed. It will identify the measures that will be taken to ensure all surface waste rock is backfill underground and, in the box cut on closure. This will reduce the amount of time the material will be exposed	**Minor**

Impact	Avoidance and mitigation	Residual Impact
material, can result in potential acid metalliferous drainage (AMD), neutral metalliferous drainage (NMD) or saline drainage (SD) produced from sulphide mineral oxidation, collectively termed Acid Rock Drainage (ARD). ARD can produce significant contamination issues to land and soils. Geochemical characterisation of the waste rock and ore material undertaken by EGi (2024) indicates that the majority of the material is categorised barren (NAF) with a low propensity to leach metal(loid)s on contact with water, therefore represents very low to low risk of environmental impact.	to oxidising conditions, and therefore inherently lowers the risk of ARD. • There is potential for some fresh phyllite rock near to contact zones with the pegmatite to contain elevated S and on exposure to air oxidise to produce ARD. Co-disposal of fresh phyllite rock with NAF waste in the temporary waste rock dump is likely to extend this lag period (estimated to be > 5 years). • Should paste backfilling of stopes involve addition of binder including cement to waste rock to generate the paste fill, then leach testing of the paste backfill will be undertaken, to assess any potential mobilisation of metal(loid)s and any specific management requirements.	

5.1.3 Offsets

No offsets are currently proposed for terrestrial environmental quality.

5.1.4 Conclusion

Subject to effective implementation of the avoidance and mitigation measures, it is concluded that the Project is unlikely to have a significant impact on land and soils and the NT EPA's objective will be met.

Erosion was assessed as unlikely to be significant (minor residual risk) due to the small scale of land clearing (<100 ha), and implementation of standard environmental management practices. While best practice mitigation measures will be implemented, it is likely that there will still be localised erosion in the short to medium term during land clearing and construction, due to climatic conditions (e.g. high intensity rainfall during the wet season). If erosion occurs, rectification measures will be implemented to avoid significant erosion which could impact on surrounding land uses and supported values.

The Project does not include the use or production of any hazardous materials that cannot be managed through standard best practice measures. Hydrocarbons will be stored onsite during construction and operations, but standard controls will avoid these storages being a source of significant soil contamination. Any minor contamination which occurs due to a spill (e.g. from a fuel storage) can be managed through standard, proven effective measures.

Based on the waste and ore geochemical characterisation, the risk of ARD occurring and resulting in impacts to surrounding land and soils is inherently low due to the lack of PAF material. The plan to backfill the waste material on closure will negate any long-term risk.

There is a high degree of confidence that these measures will be effective in avoiding significant environmental impacts.

5.2 Terrestrial ecosystems

The NT EPA's objective for the terrestrial ecosystems factor is to:

Protect terrestrial habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.

The sections below identify the terrestrial ecosystem values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective. Key terms are:

- **Biodiversity** which refers to the variety of animal and plant life within a region. Areas with a range of habitats that organisms can occupy support higher biodiversity.
- **Ecological integrity** which refers to the quality of ecosystems (such as extent, condition and connectivity of habitats), and their capacity to adapt to change.
- **Ecological functioning** which is defined here as the role that ecology has in maintaining other environmental values in the region. For instance, the presence of intact vegetation stabilises the soil and thereby reduces erosion, which could otherwise cause reduced soil and surface water quality. Some ecological functions can be replaced with technological ones.

5.2.1 Environmental values

The environmental values and assessment of impacts on terrestrial ecosystems was informed by the following information sources:

- NR Maps: Natural Resource Maps NT (DEPWS, 2024a).
- GDE Atlas (BOM, 2024).
- Ecological Assessment of EL31091 (EcOz, 2024b) – see Appendix B.
- Supplementary Ecology Survey EL31091 (EcOz, 2024c) – see Appendix C.
- Terrestrial Flora and Fauna Study Report – Core Lithium Ltd Mineral Lease 1148 Baseline Studies (EcOz, 2023).

The environmental values associated with biodiversity, ecological integrity and ecological functioning identified for assessment under the terrestrial ecosystems factor are summarised below. These values are discussed in detail in the two ecology reports that are included in Appendix B and Appendix C of this referral. The 2023 ecology survey study area (~563ha) encompasses the project area but also extends further south (Appendix B). The 2024 supplementary ecology survey areas are the three areas, northern, central and south (1,585ha combined) surrounding the Project area (see Appendix C).

Vegetation and habitats

Most of the proposed Project area contains relatively-intact remnant vegetation that provides habitat for threatened and non-threatened fauna and flora – see Figure 5-2. The dominant vegetation is Eucalypt savanna woodland. The landform within the dominant land unit – 2a1 – consists of rises of 4% with well-drained soils. In the west, these habitats are interspersed with drainage woodland communities which experience seasonal water-logging or inundation. In the south-western corner of the project area is a small section of riparian vegetation along the Charlotte River.

Groundwater Dependent Ecosystems (GDEs) are ecosystems which require access to groundwater on a permanent or intermittent basis to meet all or some of their water requirements so as to maintain their communities of plants or animals, ecological processes and ecosystem services (Richardson et al., 2011). A large portion of the proposed disturbance footprint is mapped as having moderate potential to be a terrestrial GDE. In this regard, however, the proposed disturbance footprint is similar to a vast area to the south and west

that is also mapped as moderate potential. This is not an unusual situation in the Top End and is presumably due to the high wet season water table and low-lying altitude.

Significant vegetation types

These are vegetation types that are valuable due to their unique and/or inherently high biodiversity values and are defined under the Land Clearing Guidelines (DEPWS, 2024e). There are three significant vegetation types of relevance to the Project area:

- According to the Land Clearing Guidelines (DEPWS, 2024e), **riparian vegetation** is any native vegetation within, and immediately surrounding, a waterway, and is not restricted to a distinct vegetation community immediately adjacent to waterways. This broad definition identifies that all riparian vegetation provides a critical role in maintaining ecological processes. Riparian vegetation that is distinct from the surrounding vegetation often has additional values – including supporting unique biodiversity and providing refuge habitat and habitat corridors. Riparian vegetation edges the river and creek lines that cross the Project area – specifically the Charlotte River and its tributaries (Figure 2-4).
- **Mangroves** occur in the NT along sheltered coastlines, growing in tidal areas frequently inundated by salt water. This vegetation type contains many unique and highly specialised animals and plants, including many species restricted to these environments (DENR, 2018a). A mangrove community occurs adjacent to the proposed disturbance footprint within the landward zone, where tidal inundation is irregular and infrequent (Figure 2-4).
- **Old-growth forest.** The size of a tree is linked to its age and the potential for that tree to support hollows critical for hollow-dependant fauna species. Hollow-bearing trees occur in a wide range of vegetation; however, they are more likely to occur within older Eucalyptus forests and woodlands, with a lower fire frequency. Since the development of tree hollows is associated with the age of vegetation, a forest with many tree hollows is referred to as old-growth forest. Some large hollow-bearing trees were noted between the Charlotte River and the western side of the Study area (see Appendix B). However, the densities observed did not qualify for as old-growth forest. Further assessment of the Project area may be required once the disturbance footprint is finalised.

Threatened flora

Threatened species are those which are vulnerable to extinction in the near future. They are important due to the role they play in a healthy and functioning ecosystem, as well as having high social value. A desktop assessment detailed in Appendix C identified two threatened flora species – *Typhonium praetermissum* and *Cycas armstrongii* – as having a reasonable likelihood of being present within the Project area. Subsequent targeted field surveys did not detect either of these species within the Study area. From these results, it has been concluded that threatened flora is not present within the Project area.

Threatened fauna

A desktop assessment detailed in Appendix B identified six threatened fauna species as having a reasonable likelihood of being present within the Project area. Three of these were the subject of a targeted survey – Northern Brushtail Possum (*Trichosurus vulpecula arnhemensis*), Black-footed Tree-rat (*Mesembriomys gouldii gouldii*) and Partridge Pigeon (*Geophaps smithii smithii*).

The 2023 camera survey detected Northern Brushtail Possum and Black-footed Tree-rat within the Project area (Appendix B). The Partridge Pigeon was not found within the project area during 2023 fauna surveys; however, it is reasonable to assume that this mobile sub-species does frequent the area because three individuals were observed incidentally in adjacent habitat during supplementary field surveys in 2024 (Appendix C), and there are recent records of this sub-species in habitat near the project area.

For reasons detailed in Appendix B, the remaining three species were not surveyed but should still be considered as having a reasonable chance of being present – perhaps only occasionally – within the Study area. These are the Bare-rumped Sheath-tail Bat (*Saccolaimus saccolaimus*), based on the presence of

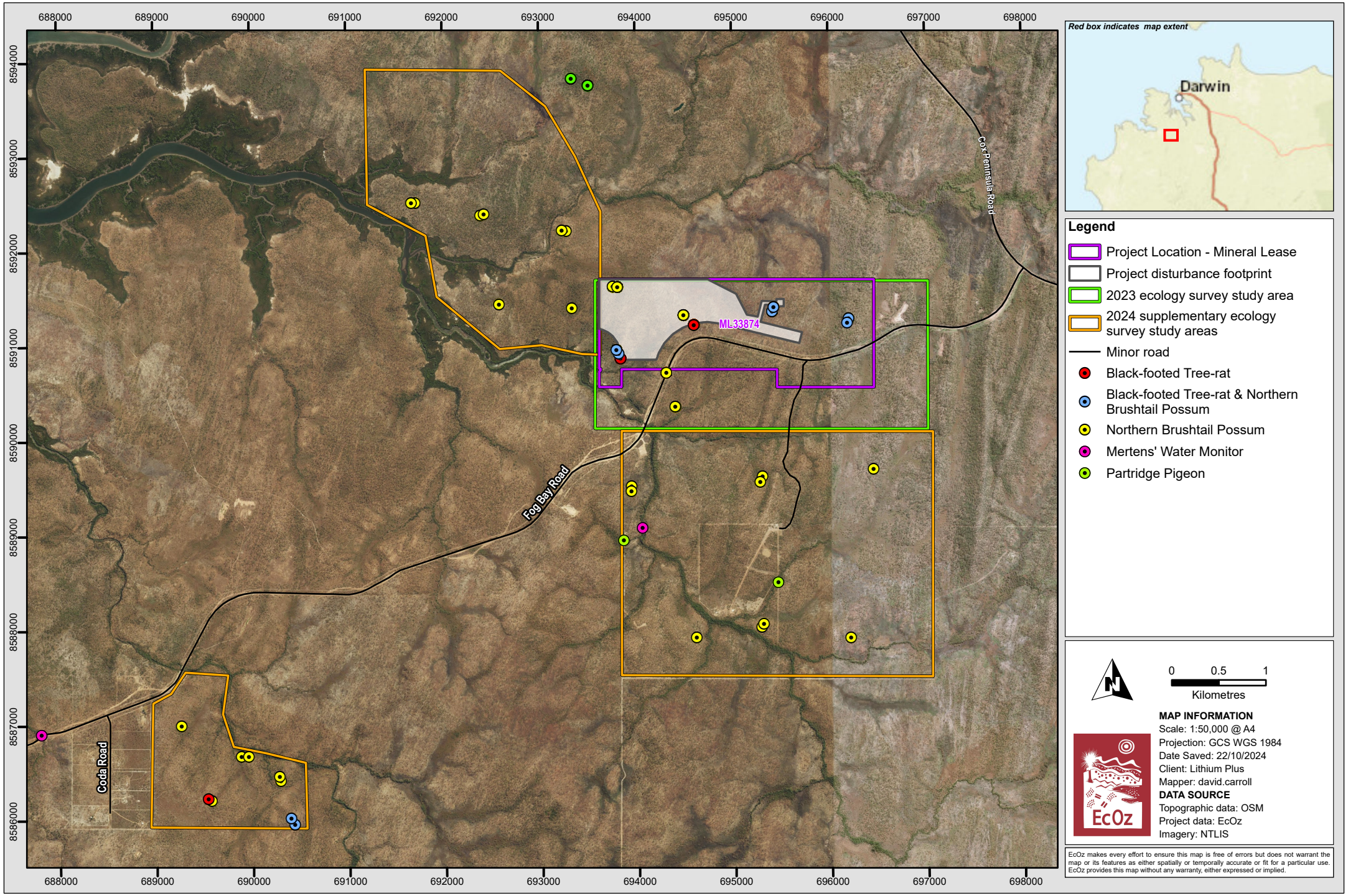
suitable foraging habitat (namely savanna woodland) and a few large, potentially hollow-bearing trees for roosting; Mitchell's Water Monitor (*Varanus mitchelli*) in the mangroves downstream of the Charlotte River and in the riparian habitat and Mertens' Water Monitor (*Varanus mertensi*) in freshwater and riparian habitat.

Figure 5-3 below shows the project area, the proposed disturbance footprint, the ecology survey's study areas and the threatened species occurrence within these areas identified during the 2023 and 2024 camera trapping surveys. These six species, their occurrence and likelihood of significant impact is discussed in more detail as part of the threatened species significant impact assessments undertaken in Section 5.2.3.

Threatening processes

The ecology and biodiversity within Project area has also been affected by threatening processes. It has recorded a high fire frequency, with much of the area burnt as much as 8 to 10 times in the past decade. There are at least three weed species listed as being potentially present – Gamba Grass[2] (*Andropogon gayanus*), Tully Grass (*Urochloa humidicola*) and Stylo (*Stylosanthes* species). Apart from Stylo, weed occurrence throughout the Study area when surveyed was low (EcOz 2023). Feral pigs, feral cats and cattle were recorded during field surveys.

[2] Gamba Grass is a Weed of National Significance



Path: Z:\01 EcOz_Documents\05 EcOz M-Files GIS\2024\EZ24072 - Supplementary Ecology Survey\1. Project Files\2. Report Maps\EZ24072 - Supplementary Ecology Survey\EZ24072 - Supplementary Ecology Survey - threatened species in region.aprx Layout: Figure 5-7. Map of location of threatened fauna records within the study area and recent records within the region

Figure 5-3. Map of Project location, proposed disturbance footprint and threatened species occurrence within the ecology survey study areas

5.2.2 Impact assessment

The potential impacts to terrestrial ecosystems from the Project activities are:

- Direct loss of vegetation and habitat
- Loss of significant vegetation types
- Fauna disturbance and reduced habitat quality
- Direct mortality of fauna
- Loss threatened fauna species habitat and disturbance and/or loss of individuals.

Potential impacts to threatened species are assessed under specific criteria developed by the Commonwealth Government, and so are assessed in Section 5.2.3, and a summary provided in Table 5-8 below.

Table 5-8 identifies potential impacts, avoidance and mitigation measures relevant to each impact. The Project is likely to have a low level of residual impact to terrestrial habitats and fauna and a moderate level of residual impact for threatened fauna species, the latter due to the high sensitivity value of the threatened species. Localised habitat loss will occur, and fauna may avoid using the degraded habitats around the edge of the mine site. These impacts will be greatest during construction and operations but should reduce over time post-mining as the site is rehabilitated.

The impact is not expected to alter the local or regional biodiversity because the areas to be cleared are relatively small, and if appropriately implemented, the avoidance and mitigation measures will be effective in avoiding potential significant impacts.

Table 5-8. Impact assessment – terrestrial ecosystems

Impact	Avoidance and mitigation	Residual Impact
Direct loss of vegetation and habitat There will be a direct loss of approximately <100 ha of vegetation and habitat from land clearing. The existing vegetation and habitats are relatively intact and regionally common. Loss of these Eucalyptus woodland habitats is expected to have a limited impact to biodiversity because the area is relatively small and the affected habitat types are well represented in the surrounding areas. Habitat values within the disturbed area may return to some extent in the years' post-closure as the disturbed areas will be backfilled, rehabilitated and returned to pre-disturbance landform. However, rehabilitation success on mine sites is highly variable and it is expected that some reduction of habitat value. Other mines in the surrounding area include the Lithium Developments (BP33 and Grants projects). There is no other industrial development in proximity that would deter use of these habitats. The land clearing associated with the Project is not expected to have a significant impact on flora and fauna.	• Vegetation clearing procedure will be developed in accordance with the Land Clearing Guidelines (DEPWS, 2024e) and include: - clearing undertaken by experienced operators - pre-clearance survey conducted prior to the clearing by a qualified ecologist (fauna spotter-catcher), to identify any potential habitat and presence of wildlife, relocate wildlife, and or provide advice as required. - steps to be followed in the event a threatened species is identified during clearing activities - checking any trenches/pits/excavations prior to works each morning and relocating any trapped wildlife - avoidance of large hollow-bearing trees where possible - progressive clearing of land as required for construction activities - only clear to required proposed disturbance footprint. - minimise clearing during the wet season - use existing access tracks and disturbances. • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the ML adjacent to Fog Bay Road • Retention of 250 m habitat buffer surrounding the Charlotte River. • Mine rehabilitation and closure plan to provide provisions for rehabilitation with native species endemic to the area.	**Minor**
Loss of significant vegetation types During land clearing, there is potential for the removal of large hollow-bearing trees were noted during an EcOz field surveys; however, the densities observed did not qualify for sensitive vegetation. Riparian vegetation edges the creek lines that cross the Project area (tributaries of the Charlotte River) Riparian vegetation surrounding the Charlotte River (field verified) - also mapped as moderate potential aquatic GDE (BOM GDE Atlas). Outside of the proposed disturbance footprint. Mangrove woodlands directly downstream (field verified). Outside of the proposed disturbance footprint.	• Further assessment of proposed disturbance footprint will be undertaken to confirm presence/absence of large hollow-bearing trees in densities qualifying for as sensitive vegetation. • Individual large hollow bearing trees identified during pre-clearance surveys will be avoided if possible. If not possible to avoid, hollows will be checked for fauna presence by ecologist prior to clearing, and any fauna present will be relocated. • Only clear to required proposed disturbance footprint. • Apply to the Land Clearing guidelines vegetation buffers for sensitive and significant vegetation types (inclusive of GDE, riparian and mangrove woodlands) where possible: The segment of the Charlotte River that is within closest proximity to the Project area is stream order 3 - a minimum buffer width guideline of 100 m. This section of the Charlotte River mapped (and field verified) as containing riparian vegetation and mangrove woodlands, requiring a buffer of 250 m (buffer applied for high value based on the precautionary principle). • Further assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs (groundwater discharge potential).	**Minor**

Impact	Avoidance and mitigation	Residual Impact
Fauna disturbance and reduced habitat quality Land clearing, construction activities and the use of mobile plant and equipment has the potential to reduce habitat quality in the surrounding area by removal of native vegetation, soil disturbance and exposure, increasing the risk of weed proliferation. The project area currently has low levels of existing weed infestation; however, experience on mine sites in the region shows that weeds are easily introduced and once present are likely to proliferate in disturbed areas without management. If not managed, the increased bushfire risk associated with grassy weeds could further degrade habitat quality and biodiversity values in the project area, which is already affected by frequent bushfires. However, weeds are not expected to cause a significant impact to flora and fauna values; with effective management. Project activities, particularly those that generate noise, vibration, light and dust, may disturb fauna and reduce habitat quality within and adjacent to the project area. However, impacts will occur in the short-term and can be managed through standard environmental management measures. It is anticipated that habitat quality will gradually return post-mining as the Project area is rehabilitated.	• Vegetation clearing plan and procedure - only clear to required proposed disturbance footprint • Restrict access to existing access tracks and disturbances only (no unauthorised driving through the bushland) • Weed management plan, weed mapping and control measures. Plan to include plant and equipment weed hygiene inspections prior to coming to site and before removal from site to reduce risk of weed introduction and spread. • Ensure noise controls via machinery specifications • Blasting management plan to address noise and vibration for fauna safety • A Bushfire Management Plan will be developed to establish an effective mosaic burning regime at suitable times of the year to minimise the risk of late season wildfire. • Dust management plan - dust suppression will be undertaken using water carts and application of polymer products as required. • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the ML adjacent to Fog Bay Road • Retention of 250 m habitat buffer surrounding the Charlotte River. • Mine rehabilitation and closure plan to provide provisions for rehabilitation with native species endemic to the area.	**Minor**
Direct mortality of fauna Land clearing, construction and increased volumes of road traffic, will increase the potential for animal mortalities due to collision with vehicles/plant and interaction. The highest risk to fauna is during site clearing, when non-mobile or slow-moving species could be killed or injured. During operations it is likely that there will be occasional fauna deaths occur due to collision with vehicles/haul trucks, which will mostly affect larger mobile species such as wallabies but could also affect the Northern Brushtail Possum and Black-footed Tree-rat. Birds are unlikely to interact with the onsite water storages due to the high level of noise and disturbance occurring around the mine site. Species are mobile and can avoid collisions, and standard mitigations including pre-clearance surveys and vehicle speed limits will be employed which are effective management measures.	• Implement speed limits • Pre-clearance survey undertaken with qualified ecologist, fauna spotter-catcher • Vegetation clearing plan and procedure • Fauna spotter/catcher used during clearing activities • Fauna entrapment - inspections of trenches/pits and water storages, designs to factor in fauna escape ways where possible. **Avoidance through design of site layout:** • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the ML adjacent to Fog Bay Road • Retention of 250 m habitat buffer surrounding the Charlotte River.	**Minor**

Impact	Avoidance and mitigation	Residual Impact
Loss threatened fauna species habitat and disturbance and/or loss of individuals Potential impacts to threatened fauna species identifies in the significant impact assessment section 5.2.3.	Summary of avoidance and mitigation measures identified in section 5.2.3: • Inclusion of a vegetation clearance procedure (which includes pre-clearance habitat checks and use of a fauna spotter-catcher during clearing) will minimise the risk of direct mortality. • During the pre-clearance survey if the ecologist identifies that there are trees that are considered likely to contain breeding tree-rats, the clearing of that section of the project footprint should be postponed until the tree is no longer being used for breeding. • A Weed Management Plan will be developed to minimise introduction and proliferation of weeds within the project area of influence for the life of the project. • A Bushfire Management Plan will be developed to establish an effective mosaic burning regime at suitable times of the year to minimise the risk of late season wildfire, reducing habitat loss and risk to threatened fauna. • Appropriate waste management to manage pests and vermin – no landfill proposed for the site, all waste will be removed from site by a licenced waste management contractor to a licenced waste management facility. • ESCP developed and implemented to reduce potential impacts to water quality (and therefore habitat quality). **Avoidance through design of site layout:** • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the ML adjacent to Fog Bay Road • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. • Retention of 76 ha of habitat (additional to the wildlife corridor) with Black-footed Tree-rat records in the east of ML that will not only be uncleared but will be managed for weeds and fire to ensure current habitat values are retained, if not improved.	**Moderate**

5.2.3 Threatened species significant impact assessment

The following section assesses the potential impact to all of the threatened species known, or likely, to occur within the Project area, that were identified in Section 5.2.1.

Black-footed Tree-rat

The Kimberley and mainland Northern Territory sub-species of the Black-footed Tree-rat (*Mesembriomys gouldii gouldii*) is listed as Endangered under the *EPBC Act* and the *TPWC Act*. It is a medium-sized nocturnal rodent that dens mostly in tree hollows but may also use clumps of *Pandanus spiralis*. The sub-species is largely arboreal but also forages on the ground. The Black-footed Tree-rat foraging habitat generally includes fruit and seed resources – including *Pandanus* fruits, fruiting trees and shrubs (Rankmore, 2006). The sub-species predominantly occurs in woodlands and lowland open forests dominated by large *Eucalyptus miniata* and *Eucalyptus tetrodonta* trees with a moderately dense and diverse mid-storey of smaller trees and shrubs (DEPWS, 2021c). The Black-footed Tree-rat have a large home range (~67 ha) and can travel over two kilometres in a single night (Rankmore & Friend, 2008).

This sub-species is thought to be more prevalent in woodlands with infrequent and low intensity fires (Price & Baker, 2007) that have a greater fruiting species diversity to support a greater abundance of individuals (Rankmore, 2006). Tree hollows are an important resource for the species and frequently burnt landscapes may contain fewer larger trees that support these; however, natural events such as cyclones may also reduce the number of trees and hence hollow availability (Woinarski & Westaway, 2008). This species does not use highly modified habitat and requires forested corridors connecting remnant patches of intact woodland larger than 1 ha in size (Rankmore & Price, 2004).

The main drivers of decline for this species are inappropriate fire regimes, habitat clearing and fragmentation, and predation by feral cats (Hill 2020). Based on EcOz survey experience, Black-footed Tree-rats have remained relatively abundant in some parts of the Darwin area where they have access to suitable nesting habitat and food resources. Elsewhere – such as at Gunn Point, Litchfield, Kakadu, and in the Kimberley – recent surveys have yielded far fewer records of the species than previously, indicating severe species decline in these areas (TSSC 2015). The continuing decline of this sub-species means that all known populations and habitat supporting them is considered important and should be protected wherever possible (Stokeld et al., 2020).

The Black-footed Tree-rat was recorded within the project area during a 2023 fauna survey (Figure 5-3). The sub-species was also recorded in a fauna survey was that undertaken by EcOz in 2022 within mining lease ML1148, approximately 8.5 km to the south-west of the project area (Appendix B – see Figure 5.7). Noting a paucity of survey effort within the region, in 2024 EcOz undertook a supplementary survey of the environment surrounding the project area, targeting the Black-footed Tree-rat and Northern Brushtail Possum, to give more context to the camera survey results within the project area – Appendix C. Despite surveying what was assumed to be optimum habitat in the near region for these two species – namely savanna woodland adjacent to vegetation that is less regularly burnt (e.g. riparian, blocks on which fire is managed etc.) – the survey resulted in a large number of Northern Brushtail Possum detections throughout all study areas, but only a few Black-footed Tree-rat restricted to the southern study area (see Figure 5-3 above and Appendix C Figure 3-8 to 3-10). It is not known why this is the case, especially given in other nearby locations the Black-footed Tree-rat has been detected in such habitat. Habitat immediately to the north of the project area – and in the project area but south of Fog Bay Road – appears to be suitable for the species, but those areas have not been surveyed. Because of the uniformly high fire frequency in areas to the east of the project, it seems unlikely that area would support Black-footed Tree-rats.

If present within an area, the Black-footed Tree-rat is considered to have a high rate of being detected using the survey methods applied. Consequently, the fact that the species was only recorded in the vicinity of the project footprint and immediately to the east – despite surveying high-likelihood habitat in the immediate surrounds – indicates that the area within which it was recorded is important to the local population of the species. Nevertheless, the presence of other records and suitable habitat in the region means it is reasonable

to assume that the Black-footed Tree-rat occurs at a low density throughout the Bynoe Harbour hinterlands, particularly in areas savanna woodland adjacent to vegetation that is less regularly burnt.

Based on records from the past 30 years, there are five geographically-distinct regional populations of the Black-footed Tree-rat in NT – Kakadu and Nitmiluk National Parks, Cobourg Peninsula, Nhulunbuy region, Bradshaw, and greater Darwin to Daly River. The records within the project area are part of the latter.

The project has the potential of impacting the Black-footed Tree-rat through direct mortality and the loss of habitat due to land-clearing. Table 5-9 assesses whether project activities are likely to have a significant impact upon this sub-species (as defined in EPBC Significant Impact Guidelines 1.1). Records show that the Black-footed Tree-rat is present elsewhere in the region, albeit at low densities. The loss of this small amount of habitat (<100ha) is unlikely to lead to a decline in this species. Sufficient habitat within the east of the Project area will remain intact and undisturbed, as well as in the surrounds. Moreover, inclusion of a wildlife corridor in the project design will ensure landscape connectivity for the species. Consequently, the small area to be cleared is unlikely to result in a significant impact to the Black-footed Tree-rat. Additionally, Lithium Plus will develop and implement a vegetation clearance procedure (which includes pre-clearance habitat checks and use of a fauna spotter-catcher during clearing), which will minimise the risk of direct mortality.

Table 5-9. Significant impact assessment table for Black-footed Tree-rat

Criterion[3]	Assessment
Lead to a long-term decrease in population size	**UNLIKELY.** The Black-footed Tree-rat is a mobile species, which lowers the likelihood of direct mortality during land-clearing activities for the Proposed Action. Moreover, land-clearing will be preceded by a pre-clearance survey for fauna nesting and roosting sites, and undertaken under the direction of a fauna spotter-catcher. There are other ways in which this development could potentially lead to a long-term decrease in the size of the Black-footed Tree-rat population – which are discussed below. None of these are likely to result in a long-term decrease in population size.
Reduce the area of occupancy of the species	**UNLIKELY.** There will be no reduction in the area of occupancy (AOO) for the Black-footed Tree-rat. The AOO of a species is a scaled metric that represents the area of suitable habitat occupied by a species (IUCN 2024)[4]. The AOO is determined using a 2 x 2 km grid that is applied on all the known, inferred or projected sites of present occurrences (IUCN 2012). The simplest way to estimate the AOO is using records of the species – considering each record to represent a known site. The two drawbacks of this approach are that, in general: 1. The older a record is, the less likely the threatened species is still present at that site. 2. Areas of suitable habitat that have not been surveyed are not included. On the other hand, for many species (particularly those that are not restricted in range – such as the Black-footed Tree-rat) it is very difficult to identify inferred or projected sites across the entire extent of occurrence of the species. That is because such an undertaking requires there to be uniform, detailed habitat mapping that includes evidence that all the mapped habitat is not just suitable but is likely to support a population of the species. A compromise approach is used in this assessment. First, an AOO is generated using 'known' records (irrespective of their age). The focus is then turned to the resultant AOO grid cells relevant to the project footprint whereby – using local knowledge of the species – the extent of habitat adjacent to the known records that is both suitable and likely to support the species is inferred. If the extent of inferred suitable habitat for the species within the relevant cell(s) is limited to the project

[3] It is important to note that these criteria were derived from those used by the International Union for Conservation of Nature's (IUCN) to compile the *Red List of Threatened Species*. Because the ecologies and populations of, and threats to, all the Earth's species are incredibly varied, the criteria have been designed to collectively ensure that the threatened status of all the species is adequately considered. Consequently, the relevance of each criterion varies between different species, and so for each species some consideration of the applicability and relative weighting of a particular criterion is warranted.

[4] According to IUCN (2024), the area of occupancy (AOO) is a scaled metric that represents the area of suitable habitat currently occupied by the taxon. It is particularly relevant to species with small populations and/or that occur within a few small patches, and hence are exposed to elevated extinction risks because there is a greater chance that a threat/s will affect all or most of the distribution within a given time frame.

Criterion[3]	Assessment
	footprint, then the loss of that habitat is considered to equate to a loss of the grid cell, and therefore a reduction in the AOO for the species. This is not the case for the Black-footed Tree-rat in this location. Instead, known suitable habitat will still exist within the grid cell after the project footprint is cleared, and hence there will be no reduction in the AOO.
Fragment an existing population into two or more populations	**UNLIKELY.** The Proposed Action is unlikely to fragment the existing population into two or more populations because the species is very mobile, has large home ranges, and there are large areas of suitable habitat adjacent to the Proposed disturbance footprint. The project disturbance footprint is located within habitat known to support the Black-footed Tree-rat, with additional records within the Project area immediately to the east and to the west. Development of the mine and supporting infrastructure will likely present a hinderance to the westward movement of Black-footed Tree-rats that are present to the east of the project area. However, the species is very mobile, has large home ranges, and there are large areas of suitable habitat adjacent to the Proposed disturbance footprint. Additionally, a 100 m wide wildlife corridor running east-west between project infrastructure and Fog Bay Rd will allow fauna movement through the project area.
Adversely affect habitat critical to the survival of the species	**UNLIKELY.** The Proposed Action will not lead to the loss of habitat critical to the survival of the Black-footed Tree-rat as the species has large home ranges, there are large areas of suitable habitat in the surrounding area, and the species is very mobile. Habitat critical is not defined for the Black-footed Tree-rat. For the Brush-tailed Rabbit-rat – which has similar ecological requirements – it is noted that: *No habitat can be clearly circumscribed as being critical to the survival of this species, because it occurs (or occurred) extensively across a habitat that is extremely wide-ranging (tropical Eucalypt open forests), because it occupies (or occupied) a range of habitats, and because in most cases, its survival is dependent upon the management of threats within a habitat, rather than retention of a defined habitat per se. A case could be made that relatively long-unburnt forest provides habitat critical to the survival of this species; however, the location of such areas will change across the landscape between years.* The situation is the same for the Black-footed Tree-rat and so it is concluded that the Proposed Action will not lead to the loss of habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	**UNLIKELY.** Given that Black-footed Tree-rats are known to occur in the project footprint, there is a risk that land-clearing activities could coincide with – and therefore disrupt – the breeding cycle of animals using breeding habitat in the cleared areas. Breeding may occur throughout the year (TSSC 2015), and so this impact cannot be avoided through scheduling. The best mitigation available is the use of pre-clearance surveys to identify and check potential habitat trees. If there are trees that are considered likely to contain breeding tree-rats, the clearing of that section of the project footprint should be postponed until the tree is no longer being used for breeding. If a breeding Black-footed Tree-rat is inadvertently disrupted, then the ecology of the species is such that the individual may attempt to breed again in the same cycle.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**UNLIKELY.** Records show that the Black-footed Tree-rat is present elsewhere in the region, albeit at low densities. The loss of this small amount of habitat is unlikely to lead to a decline in this species. The project has been designed to minimise clearing of Black-footed Tree-rat to <100 ha, to avoid clearing habitat near riparian areas, and to include an east-west wildlife corridor to ensure habitat connection. This leaves approximately 76 ha of habitat (additional to the wildlife corridor) with records in the east of ML that will not only be uncleared but will be managed for weeds and fire to ensure current habitat values are retained, if not increased. The sub-species is associated with Eucalypt open forests and woodlands. Based on Government vegetation mapping (NVIS Level 2) there are approximately 58,000 ha of this habitat within a 15 km buffer[5] of the project footprint, and recent survey

[5] This distance was chosen as representative of the situation at a 'landscape' level.

Criterion[3]	Assessment
	records that demonstrate that the Black-footed Tree-rat are present within the buffer. The <100 ha of habitat within the project footprint represents 0.17% of this total.
Result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Critically Endangered or Endangered species' habitat	**UNLIKELY.** Feral Cats (as predators), Cane Toads (as potential prey that is toxic) and invasive grasses such as Gamba Grass (with large biomasses that increase fire intensity) are considered not demonstrated, but plausible threat factors to Black-footed Tree-rats in the Conservation Advice (TSSC 2015). Those predator species are already common in the region, and the Proposed Action is unlikely to lead to any substantial change in their occurrence. There is Gamba Grass in the area. A Weed Management Plan will be developed to minimise introduction and proliferation of weeds within the project area of influence for the life of the project.
Introduce disease that may cause the species to decline	**UNLIKELY.** Disease is not considered in the Conservation Advice (TSSC 2015) to be a potential threat factor to the Black-footed Tree-rat.
Interfere with the recovery of the species	**UNLIKELY.** The small area to be cleared is unlikely to interfere with the recovery of the species. There is no recovery plan for the Black-footed Tree-rat. Instead, the Conservation Advice for the species is considered to provide sufficient direction to implement priority actions, mitigate against key threats and enable recovery of the species (TSSC 2015). The primary conservation action is to 'stabilise or increase populations across range through amelioration of existing threats.' Threats rated as severe are inappropriate fire regimes, predation by feral animals, and habitat loss/fragmentation. As noted above, whilst the project will result in loss of some habitat known to be occupied by the Black-footed Tree-rat, it is only a very small proportion of that available in the region. Moreover, the impact of that habitat loss will be mitigated through the avoidance and management measures mentioned elsewhere in this table.

Northern Brush-tailed Possum (Trichosurus vulpecula arnhemensis)

The north-western sub-species of the Brushtail Possum (*Trichosurus vulpecula arnhemensis*) is listed as Vulnerable under the *EPBC Act*. This nocturnal semi-arboreal marsupial mainly inhabits tall Eucalypt open forests and woodlands with large hollow-bearing trees, particularly where the understorey contains shrubs that bear fleshy fruits, but also occurs in mangrove communities (especially where these contain hollow-bearing trees), rainforests and semi-urban areas (notably around Darwin) (TSSC, 2021). Northern Brushtail Possum abundance is associated with high shrub density (Stobo-Wilson et al. 2019).

The sub-species' range extends across the whole of the NT; however, the distribution of most records in the past 30 years indicate there may be up to seven main populations in the NT, as well as numerous scattered records. These populations are found on the Tiwi Islands, Coburg Peninsula, Groote Eylandt, Kakadu/Nitmilik, Daly River and around Katherine. The records surrounding and from the project footprint are part of the Greater Darwin population of this sub-species, which is considered a stronghold for the Northern Brushtail Possum. The majority of recent records of this species in the NT are from the Darwin rural area where, it is posited, the sub-species is protected from the higher rates of burning that are occurring across much of its range.

In the region of the project footprint, the sub-species has been recorded extensively within Middle Arm (~15 km north-east of the project footprint) and 7 km to the south-west. Northern Brushtail Possums were recorded in EcOz camera trap surveys within the project footprint in 2023 and in adjacent land in the supplementary 2024 survey, to the north-west and south (Figure 5-3).

Table 5-10 assesses whether Project activities are likely to have a significant impact upon an important population of this species (as defined in EPBC Significant Impact Guidelines 1.1). The conclusion is that the impacts to this sub-species associated with the Project are unlikely to be significant because they are not considered an important population and because the area of habitat to be removed is small in comparison with that available in the wider region, which is supported by numerous observations of this sub-species in recent camera trap surveys.

Table 5-10. Significant impact assessment for the Northern Brushtail Possum

Criterion	Assessment
Lead to a long-term decrease in the size of an important population Reduce the AOO of an important population Disrupt the breeding cycle of an important population Fragment an existing important population into two or more populations	**UNLIKELY.** With reference to the definition of an important population[6] in the Significant Impact Guidelines, it is noted that the Greater Darwin population of this sub-species contains many recent records, and so could be considered a key source population. However, given that Northern Brushtail Possums are locally common within the large area that supports the Greater Darwin population – and that the local occurrence of the sub-species within the project footprint constitutes such a small proportion of that population (and total area of suitable habitat) – it is contrary to the intention of defining 'important populations' to deem the Northern Brushtail Possums occurring in the project footprint an 'important population'. Moreover, the local occurrence of Northern Brushtail Possums is not near the limit of the sub-species range. Therefore, these four criteria are not relevant.
Adversely affect habitat critical to the survival of a species	**UNLIKELY.** The Proposed Action will not lead to the loss of habitat critical to the survival of the Northern Brushtail Possum as the broader area contains suitable and common habitats to support the species. Habitat critical is not defined for the Northern Brushtail Possum. For the Brush-tailed Rabbit-rat – which has similar ecological requirements – it is noted that: *No habitat can be clearly circumscribed as being critical to the survival of this species, because it occurs (or occurred) extensively across a habitat that is extremely wide-ranging (tropical Eucalypt open forests), because it occupies (or occupied) a range of habitats, and because in most cases, its survival is dependent upon the management of threats within a habitat, rather than retention of a defined habitat per se. A case could be made that relatively long-unburnt forest provides habitat critical to the survival of this species; however, the location of such areas will change across the landscape between years.* The situation is the same for the Northern Brushtail Possum and so it is concluded that this development will not lead to the loss of habitat critical to the survival of the species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**UNLIKELY.** The habitat loss within the proposed disturbance footprint is small in comparison the available suitable habitat in the surrounding area. The Proposed Actions will likely lead to a decline of the Northern Brushtail Possum. The sub-species is associated with Eucalypt open forests and woodlands. Based on Government vegetation mapping (NVIS Level 2) there are approximately 58,000 ha of this habitat within a 15 km buffer of the project footprint, and recent survey records that demonstrate that Northern Brushtail Possums are present within the buffer. The <100 ha of habitat within the project footprint represents 0.17% of this total. The loss of this small amount of habitat is unlikely to lead to a decline in this local-common species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**UNLIKELY.** The Proposed Action will unlikely lead to increased occurrence of invasive species that could directly or indirectly impact the Northern Brushtail Possum. Feral Cats (as predators) and invasive grasses with large biomasses that increase fire frequency and intensity, such as Gamba Grass are considered current threats to Northern Brushtail Possum (TSSC 2021). Feral Cats are already common in the region, and development of the Project is unlikely to lead to any substantial change in their occurrence. A Weed Management Plan has been developed to minimise introduction and proliferation of weeds within the area of influence for the life of the Project.
Introduce disease that may cause the species to decline	**UNLIKELY.** The Conservation Advice considers disease carried by Black Rats as a potential threat to the Northern Brushtail Possum due to documented population decline from epizootic disease (TSSC 2021). Black Rats are an existing invasive species within the possum's range. It is unlikely that the Proposed Actions will lead to an increase in abundance of this species as there will be no landfill on-site and any occurrence will be adequately managed through site-wide pest control as required.
Interfere substantially with the recovery of the species	**UNLIKELY.** The habitat loss associated with the Proposed Action is minimal and not within areas identified as important habitat. The small area to be cleared is unlikely to interfere with the recovery of the species.

[6] The Significant Impact Guidelines 1.1 define an 'important population' of a Vulnerable species as one that is a key source population either for breeding or dispersal; necessary for maintaining genetic diversity; or populations that are near the limit of the species range.

Criterion	Assessment
	There is no Recovery Plan for the Northern Brushtail Possum. Instead, the Conservation Advice for the species lists four primary conservation actions: • Identify and protect important habitat for the Northern Brushtail Possum from habitat loss, degradation, and fragmentation. • Minimise levels of feral cat predation by managing habitat to reduce cat impacts (through fire management, the removal of feral introduced herbivores, and not killing dingoes). • Manage fire to promote resources important to the species, as well as reduce risk from predation. Undertake long-term monitoring to assess changes in population status, evaluate the success of management actions, and inform adaptive management.

Partridge Pigeon (eastern) (Geophaps smithii smithii)

The Partridge Pigeon is listed as Vulnerable under both the *TPWC* and *EPBC Acts*. It is a medium-sized, ground-dwelling bird which forages entirely on the ground and rarely flies, except when flushed. The sub-species is largely sedentary and typically occurs singly or in small family groups. Larger aggregations may occur around waterholes (DEPWS, 2021d). The Partridge Pigeon nests on the ground, preferentially in lowland Eucalypt open forests and woodlands at sites with relatively dense grass cover in the early dry season. This is in contrast to the relatively open (often burnt) areas the sub-species prefers for feeding, which suggests that fire regimes may significantly affect the sub-species (DEPWS, 2021d).

The Partridge Pigeon has suffered a severe range contraction. Apart from isolated populations on the Tiwi Islands and the Coburg Peninsula (TSSC 2015), occurrences in the past 30 years are almost all from the central Top End – including the outskirts of Darwin, Kakadu and Nitmiluk National Parks, Pine Creek, and Litchfield National Park. The Partridge Pigeon is also sparsely distributed in eastern and central Arnhem Land (DEPWS, 2021d).

The Partridge Pigeon was not found within the project footprint during 2023 fauna surveys; however, it is reasonable to assume that this mobile sub-species does frequent the area because three individuals were observed incidentally in adjacent habitat during supplementary field surveys in 2024, and there are recent records of this sub-species in habitat near the project footprint (Figure 5-3).

Table 5-11 assesses whether project activities are likely to have a significant impact upon an important population of this sub-species (as defined in EPBC Significant Impact Guidelines 1.1). The conclusion is that the impacts to this sub-species associated with the Project are unlikely to be significant because they are not considered an important population and because the area of habitat to be removed is small in comparison with that available in the wider region.

Table 5-11. Significant impact assessment for the Partridge Pidgeon

Criterion	Assessment
Lead to a long-term decrease in the size of an important population	**UNLIKELY.** With reference to the definition of an 'important population' in the Significant Impact Guidelines, it is noted that the Top End population of this sub-species contains many recent records, and so could be considered a key source population. However, given that Partridge Pigeons are locally common within the very large area that supports the Top End population – and that any local occurrence of the sub-species within the project footprint would constitute such a small proportion of that population (and total area of suitable habitat) – it is contrary to the intention of defining 'important populations' to deem Partridge Pigeons occurring in the project footprint an 'important population'. Moreover, the local occurrence of Partridge Pigeons is not near the limit of the sub-species range. Therefore, these four criteria are not relevant.
Reduce the AOO of an important population	
Fragment an existing important population into two or more populations	
Disrupt the breeding cycle of an important population	
Adversely affect habitat critical to the survival of a species	**UNLIKELY.** Partridge Pigeons are known to move locations in response to changing resources, and the loss of a small portion of habitat within the project footprint represents

Criterion	Assessment
	a negligible proportion of suitable habitat for the species, and so will not have an adverse effect or lead to the decline of the species. Critical habitat for the Partridge Pigeon has not been formally defined. In lieu of such, the most limiting of the sub-species' habitat requirements could be considered 'critical'. For the Partridge Pigeon, this would be seed food resources and diversity of habitat within their home range – namely dense, unburnt grasses for nesting and open (typically burnt) areas for feeding. The majority of the project footprint does not meet this preferred 'mosaic' of burnt and unburnt grasses because of frequent fires (Appendix B). A small portion of more suitable habitat occurs within the south-western portion of the project footprint, but also more broadly in the savanna woodland that dominates the region and where recent records of the sub-species have been found.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**UNLIKELY.** The loss of this small amount of habitat is unlikely to lead to a decline in this species. The sub-species is associated with Eucalypt open forests and woodlands. Based on Government vegetation mapping (NVIS Level 2) there are approximately 58,000 ha of this habitat within a 15 km buffer of the project footprint, and recent survey records that demonstrate that Partridge Pigeons are present within the buffer, albeit at a possibly a low density. The <100 ha of habitat within the project footprint represents 0.17% of this total.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**UNLIKELY.** Feral Cats and invasive grass species such as African Gamba Grass (*Andropogon gayanus*), Grader Grass (*Themeda quadrivalvis*) and Mission Grass (*Cenchrus spp.*) are threats to this sub-species. Feral Cats and Gamba Grass have been recorded within the project footprint during recent surveys (Appendix B). The Proposed Action is unlikely to lead to any increase in Feral Cat numbers. A Weed Management Plan will be developed to minimise introduction and proliferation of weeds within the project area of influence for the life of the project.
Introduce disease that may cause the species to decline	**UNLIKELY.** Disease is not listed as a threatening process for Partridge Pigeons. The author is not aware of any literature on diseases that could be introduced by the project and that would detrimentally affect this species.
Interfere substantially with the recovery of the species	**UNLIKELY.** There is no Recovery Plan for this sub-species. Instead, the Conservation Advice (TSSC 2015) describes conservation actions to address threats to the species – appropriate fire management, Feral Cat control and weed management strategies. The Project's actions will not interfere with any of these conservation actions or the recovery of the Partridge Pigeon.

Bare-rumped Sheathtail Bat

Listed as Vulnerable under the EPBC Act[7] (but not listed under the TPWC Act), the Bare-rumped Sheathtail Bat (*Saccolaimus saccolaimus nudicluniatus*) is a high-flying insectivorous bat species that occurs as two geographically isolated populations in northern Australia:

- A north-eastern Queensland population within a relatively narrow range on the eastern side of Cape York in Queensland between Lockhart River to just south of Townsville.
- A western population and extending throughout the Kimberley region of Western Australia, areas of the Victoria Bonaparte bioregion, the north-western part of the Top End of the Northern Territory and reaching into the coastal areas of the western part of the Gulf of Carpentaria to Roper River (Armstrong et al. 2021; McKenzie et al. 2018).

The two geographic isolates are the same species (Milne et al., 2009) but are also assumed to be separate genetic populations given the lack of contact. There have been relatively few records of Bare-rumped Sheathtail Bats across this broad distribution. The species is difficult to capture because of its tendency to fly

[7] It is worth noting that the species was listed as Critically Endangered under the EPBC Act until December 2016, when it was re-assessed as Vulnerable. At that time, the assessment presented in the Conservation Advice for the species (TSSC 2016) suggested that the species may no longer be eligible to be listed under the EPBC Act, as it may not satisfy the listing criteria in any category. TSSC (2016) cited new information showing that the Bare-rumped Sheathtail Bat's range was larger than previously thought, and there was no evidence of a substantial, severe or very severe reduction in population size. However, the assessment also indicated a deficiency in data for this species and concluded that there was insufficient evidence to demonstrate that the Bare-rumped Sheathtail Bat should not be included on the threatened species list under the EPBC Act – hence its re-listing as Vulnerable.

high (Armstrong et al. 2021). Only recently have ecologists been able to develop the means to unambiguously identify it from echolocation calls, and in the Queensland part of its range it can still be difficult to distinguish from closely related species (Armstrong et al. 2021; McKenzie and Bullen 2018; Woinarski et al., 2014). Based on collected voucher specimens and verified calls, Bare-rumped Sheathtail Bats have been recorded at 10 locations within the NT – the most recent and relevant record being from Middle Arm Peninsula.

Bare-rumped Sheathtail Bats forage above the tree canopy (McKenzie and Bullen, 2018). In Queensland, the Bare-rumped Sheathtail Bat is known to forage in coastal lowland rainforests, as well as more open Eucalyptus or Corymbia forests interspersed with such rainforest. Based on the types of habitats within which specimens have been recorded in the NT, suitable habitat for the western population is much broader – as suggested from the collection of specimens up to approximately 145 km from the coast in the NT (Milne et al., 2009), and even further inland in the Kimberley (McKenzie et al., 2018). In the NT, Bare-rumped Sheathtail Bat specimens have been collected from Pandanus woodland fringing sedgelands and Eucalyptus tall open forests (Churchill 2008; Friend and Braithwaite, 1986).

All confirmed roosting sites for the Bare-rumped Sheathtail Bat have been in *Eucalyptus miniata, Eucalyptus tetrodonta* and *Eucalyptus platyphylla* (Schulz and Thomson, 2007), as well as large Melaleuca species (Armstrong et al., 2021). The species roosts in groups of 10 to 100 individuals in large trees generally characterised by broken tree trunks, large branches (Murphy, 2001; Armstrong et al., 2021) and deep hollow pipes more than 18 cm in diameter with hollow entrances more than 6 m from the ground (Churchill, 2008). Armstrong et al. (2021) notes that '*given the widespread nature of these Eucalypt woodlands and forests across parts of northern Australia, potential for roosting appears to be high...*'.

The most severe threat to Bare-rumped Sheathtail Bats is habitat loss and fragmentation – in particular the loss of roost trees (Woinarski et al., 2014).

There are no records of the Bare-rumped Sheathtail Bat within or near to the project area (although they were not included in the 2023 fauna surveys); however, there are recent records within Middle Arm (22 km north-east) and near Batchelor (32 km south-east). While the Bare-rumped Sheathtail Bat has not been recorded in the project footprint, it is reasonable to assume that it may be present, based on suitable habitat and records in the wider region. All remnant vegetation – and possibly even cleared areas – in the project area constitute foraging habitat for the Bare-rumped Sheathtail Bat. Roosting habitat is likely limited to old-growth forest with trees supporting hollows.

The Bare-rumped Sheathtail Bat was assessed using the Significant Impact Guidelines 1.1. The results are detailed in Table 5-12. The assessment concluded that because any occurrence of the sub-species within the project area is not considered an important population, no critical habitat exists within the project footprint, and any other potential impacts to the sub-species can be mitigated or avoided, the impacts to this species associated with the Project area unlikely to be significant.

Table 5-12. Significant impact assessment for the Bare-rumped Sheathtail Bat

Criterion	Assessment
Lead to a long-term decrease in the size of an important population	**UNLIKELY.** The occurrence of this species within the project area is not considered an 'important' population, and so these criteria are not relevant. With reference to the definition of an 'important population' in the Significant Impact Guidelines, it is noted that the occurrence of the Bare-rumped Sheathtail Bat in the NT is as part of the western population of the species, whose range extends from the Gulf of Carpentaria to the Kimberley. It is considered a single population across that broad range, indicating connectivity between all occurrences, and hence it is unlikely that – if Bare-rumped Sheathtail Bats occur in the project area – the local population would contain unique genetic diversity. Therefore, any local occurrence would not constitute a key source population, or one that is necessary for maintaining genetic diversity. Moreover, the project area is located well within the known distribution of this species, not at its limits.
Reduce the AOO of an important population	
Fragment an existing important population into two or more populations	
Disrupt the breeding cycle of an important population	

Criterion	Assessment
Adversely affect habitat critical to the survival of a species	**UNLIKELY.** The loss of this small amount of habitat is unlikely to lead to a decline in this species. Critical habitat is only loosely defined in *The National Recovery Plan for the Bare-rumped Sheathtail Bat* (Schulz et al., 2007) as being foraging and roosting habitat. The foraging and breeding habitat requirements for the population of Bare-rumped Sheathtail Bats relevant to the NT are both broad – Eucalypt woodlands and forests in the Top End. Such habitat occurs within the project footprint. However, it is also the dominant vegetation type across the northern Australia – i.e. the population's entire range. This renders redundant the concept of critical habitat for the northern Australian population of this species. Based on Government vegetation mapping (NVIS Level 2) there are approximately 58,000 ha of this habitat within a 15 km buffer of the project footprint. The <100 ha of habitat within the project footprint represents 0.17% of this total.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**UNLIKELY.** The only invasive species identified as possibly being harmful to the Bare-rumped Sheathtail Bat is the Asian Honey Bee (*Apis cerana*) in Queensland, which may outcompete the bat for hollows (TSSC, 2016). The activities associated with the Project are highly unlikely to result in the establishment of the Asian Honey Bee into the region. Introduced fauna species that may prey upon the Bare-rumped Sheathtail Bat - such as feral cats – are already well-established in the region. The Proposed Action is unlikely to lead to any substantial change in their occurrence.
Introduce disease that may cause the species to decline	**UNLIKELY.** The Lyssavirus pathogen may be a threat factor for this species, with transmission coming from congeners; however, this link has not been demonstrated due to lack of collected specimens. In any case, the activities associated with the Project are highly unlikely to lead to the introduction of diseased bats into the region.
Interfere substantially with the recovery of the species	**UNLIKELY.** The Proposed Action will not interfere with the recovery of the species. *The National Recovery Plan for the Bare-rumped Sheathtail Bat* (Schulz et al., 2007) was adopted in 2008. It contains five objectives – all research-centred – none of which are relevant to the Project.

Mertens' Water Monitor

The Mertens' Water Monitor (*Varanus mertensi*) is listed as Vulnerable under the TPWC Act and Endangered under the EPBC Act. A moderately large, semi-aquatic and arboreal monitor, this species forages extensively in freshwater. A flexible diet enables the species to adapt to seasonal and spatial differences in prey availability throughout its broad distribution, occurring in coastal and inland waters across northern Australia, from the Kimberley, in Western Australia, to the western side of Cape York Peninsula in Queensland (Christian, 2004; DEPWS, 2024b). Within the NT, records span across most of the Top End and Gulf Region (DEPWS, 2024b).

A strong swimmer seldom seen far from waterbodies, Mertens' Water Monitor occupies a range of natural and unnatural freshwater bodies (Mayes et al., 2005; Wilson & Swan, 2017).

Cane Toads, the greatest threat to this species, are now present across its entire NT distribution. Mertens' Water Monitor is highly susceptible to Cane Toad toxin (DEPWS, 2024b). Given the inability to prevent localised declines once Cane Toads are established, conservation effort is best directed to maintaining Mertens' Water Monitor numbers in toad-invaded areas (TSSC, 2023a).

There are only a few records of Mertens' Water Monitor for the region, but notably one of those is an incidental record upstream of the Charlotte River during the ecology survey undertaken in 2024 (Figure 5-3) to contextualise the findings of this report by EcOz. The distribution of Mertens' Water Monitor records in the Top End indicates that this species should be considered likely to occur anywhere in the vicinity of the Charlotte River, as well as in other watercourses in the region that retain permanent freshwater pools.

Based on records from the past 30 years, there is a single population of Mertens' Water Monitor stretching across the Top End of the NT, and into WA and the Gulf country of Qld. A separate population occurs on the eastern side of Cape York.

There is no suitable habitat for the Mertens' Water Monitor within the proposed disturbance footprint. The stretch of the Charlotte River adjacent to, and downstream of, the project area is tidal, and therefore unsuitable for this freshwater species. However, there is potential for indirect impact to the species' habitat if the Proposed

Action will result in reduced water quality and groundwater availability that affected upstream reaches of the Charlotte River or the watercourse to the north. At this point, it is unknown whether – and to what extent – groundwater drawdown associated with this Proposed Action will affect adjacent watercourses. If drawdown is likely to lead to a loss of riparian habitat, then that could impact Mertens' Water Monitor. However, the potential for significant impact is unlikely as the species is mobile and there is alternate suitable habitat in the surrounding area. This species is unlikely to occur in the Charlotte River section closest to the Project area, as this section is tidal. This species was incidentally sighted ~1.5 km upstream of the Project area in the freshwater section of the Charlotte River.

Table 5-13 assesses whether project activities are likely to have a significant impact upon this species (as defined in EPBC Significant Impact Guidelines 1.1). The conclusion is that because no habitat for this species will be directly disturbed, and potential impacts to water quality (and therefore habitat quality) have been minimised through project design and erosion and sediment control plans (ESCPs) – the impacts to this species associated with the project are unlikely to be significant. The greatest threat to this species relates to interactions with Cane Toads; this project will not exacerbate that threat.

Table 5-13. Significant impact assessment table for Mertens' Water Monitor

Criterion	Comment
Lead to a long-term decrease in population size	**UNLIKELY.** Due to the habitat for this species being outside the disturbance footprint, the Proposed Action will not directly impact upon habitat for the Mertens' Water Monitor. Consequently, there is a very low likelihood of direct mortality of individuals due to the Proposed Action. The only other way in which this development could potentially lead to a long-term decrease in the size of the Mertens' Water Monitor population is through reduction in water quality and reduced groundwater availability (and therefore habitat quality) in nearby watercourses – which is discussed and discounted below.
Reduce the area of occupancy of the species	**UNLIKELY.** Using the same process as was applied for assessing this criterion for the Black-footed Tree-rat, even if there are some impacts to water quality and groundwater availability near the project area, there will still be habitat upstream that is known to be occupied by the species and which will still exist within the relevant AOO grid cell after the project footprint is cleared, and hence there will be no reduction in the AOO. The water quality upstream will not be impacted by the Proposed Action. The groundwater modelling is yet to be undertaken to predict the extend of groundwater drawdown. However, the potential for indirect impact of reduced groundwater availability on habitat quality, if any, is expected to occur in the immediate vicinity of the underground mine. The upstream freshwater riparian habitat is unlikely to be significantly impacted by groundwater drawdown due to the distance from the underground, thus any potential indirect impacts of the Mertens' Water Monitor is unlikely to be significant.
Adversely affect habitat critical to the survival of the species Fragment an existing population into two or more populations Disrupt the breeding cycle of a population Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**UNLIKELY.** According to the Conservation Advice for this species (TSSC, 2023a) Habitat critical to survival of Mertens' Water Monitor includes all areas where this species persists – which includes the freshwater reaches of the Charlotte River. Habitat avoidance, project design and water quality management measures will ensure that riparian habitat quality is not adversely affected. In the unlikely event that there is reduced water quality associated with the project, that impact is only likely in the tidal section of the river, which is not suitable habitat for Merten's Water Monitor. As discussed above, the extent of groundwater drawdown from the dewatering activities are yet to be modelled. However, the area of the riparian habitat closest to the Project area is tidal influenced and not suitable habitat for Merten's Water Monitor. The Merten's Water Monitor has been recorded ~1.5km upstream of the Project area. This freshwater habitat is suitable for the Merten's Water Monitor and the habitat is unlikely to be significantly impacted by reduced groundwater availability from the Proposed Action due to the distance. Consequently, the Proposed Action will not affect critical habitat, fragment the existing population, disrupt the breeding cycle, or otherwise negatively impact upon habitat availability or quality to the extent that the species is likely to decline.

Criterion	Comment
Result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Critically Endangered or Endangered species' habitat	**UNLIKELY.** The Proposed Action will unlikely lead to increased occurrence of invasive species that could directly or indirectly impact the Mertens' Water Monitor. The primary threat to the Mertens' Water Monitors comes from mortality due to ingestion of toxic Cane Toads (TSSC, 2023a). Predation of eggs by Feral Pigs is considered a suspected threat factor, as is damage to wetlands and watercourses by Feral Pigs, Cattle and Water Buffalo which results in reducing water, and therefore habitat, quality (TSSC, 2023a). These species are already common in the region, and development of the project is unlikely to lead to any substantial change in their occurrence.
Introduce disease that may cause the species to decline	**UNLIKELY.** Disease is not considered to be a potential threat factor to the Mertens' Water Monitor (TSSC, 2023a).
Interfere with the recovery of the species	**UNLIKELY.** There is no recovery plan for the Mertens' Water Monitor. Instead, the Conservation Advice (2023a) provides two primary conservation actions for these species: • Detecting subpopulations that are resilient to Cane Toads in impacted areas and supporting them to recover. • Maintaining habitat integrity and connectivity among remnant subpopulations to support population expansion into areas that have become temporarily unoccupied due to Cane Toad impacts. Neither of these will be interfered with by the Proposal Actions.

Mitchell's Water Monitor

Mitchell's Water Monitor (*Varanus mitchelli*) is a diurnal, semi-aquatic and arboreal medium-sized monitor listed as Vulnerable under the TPWC Act and as Critically Endangered under the EPBC Act. In the NT, the distribution of the species includes the catchments of all rivers flowing to the Timor Sea, Arafura Sea and the Gulf of Carpentaria, with isolated occurrence in north-western Queensland (DEPWS, 2024c).

Mitchell's Water Monitor shelters in tree hollows or under bark and inhabits margins of Pandanus-lined watercourses, swamps and lagoons in Northern Australia (TSSC, 2023b). Found close to watercourses, this species basks on overhanging vegetation and submerges into water when approached (Swanson, 2007).

Mitchell's Water Monitor numbers have severely declined because of the spread of Cane Toads and the high susceptibility of monitors to their toxin; however, there does not appear to be a range contraction for this species since there are still many recent records across its historic distribution (TSSC, 2023b).

Although there are no nearby records of this species, de Laive et al. (2021) argue that the ecological niche occupied by Mitchell's Water Monitor is broader than currently recognized, and that the species should be considered as potentially occurring in most mangrove habitats across their known range. There are records of Mitchell's Water Monitor living in mangroves around the Darwin Harbour region, including from 2020 on Middle Arm Peninsula. As such, this species should be considered likely to occur in the vicinity of the Charlotte River, adjacent watercourses and adjoining mangroves.

Based on records from the past 30 years, there is likely a single population of Mitchell's Water Monitor stretching across the Top End from central Arnhem Land into the Kimberley.

There is no suitable habitat for the Mitchell's Water Monitor within the proposed disturbance footprint. However, there is potential to impact the species' habitat if the Proposed Action results in reduced water quality and groundwater availability that affected nearby mangroves, the Charlotte River or the watercourse to the north. At this point, it is unknown whether – and to what extent – groundwater drawdown associated with this project will affect adjacent watercourses. However, the potential for significant impact is unlikely as the species is mobile and there is extensive suitable habitat in the surrounding area.

Table 5-14 assesses whether project activities are likely to have a significant impact upon this species (as defined in EPBC Significant Impact Guidelines 1.1). The conclusion is that because no habitat for this species will be directly disturbed, and potential impacts to water quality (and therefore habitat quality) have been minimised through project design and erosion and sediment control plans (ESC) – the impacts to this species

associated with the project are unlikely to be significant. The greatest threat to this species relates to interactions with Cane Toads; this project will not exacerbate that threat.

Table 5-14. Significant impact assessment table for Mitchell's Water Monitor

Criterion	Comment
Lead to a long-term decrease in population size	**UNLIKELY.** Due to the habitat for this species being outside the disturbance footprint, the Proposed Action will not directly impact upon habitat for the Mitchell's Water Monitor. Consequently, there is a very low likelihood of direct mortality of individuals due to the Proposed Action. The only other way in which this development could potentially lead to a long-term decrease in the size of the Mitchell's Water population is through reduction in water quality and reduced groundwater availability (and therefore habitat quality) in nearby watercourses and mangroves – which is discussed and discounted below.
Reduce the area of occupancy of the species	**UNLIKELY.** Using the same process as was applied for assessing this criterion for the Black-footed Tree-rat, even if there are some impacts to water quality and groundwater availability near the project footprint, there will still be inferred habitat upstream Charlotte River and in downstream mangrove community of the Charlotte River which will still exist within the relevant AOO grid cell after the project footprint is cleared, and hence there will be no reduction in the AOO.
Adversely affect habitat critical to the survival of the species Fragment an existing population into two or more populations Disrupt the breeding cycle of a population Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**UNLIKELY.** The Proposed Action is unlikely to significant impact the Mitchell's Water Monitor by affecting critical habitat, fragmenting the existing population (if present), disrupting the breeding cycle or otherwise negatively impacting upon habitat availability or quality to the extent that the species is likely to decline. According to the Conservation Advice for this species (TSSC, 2023b) Habitat critical to survival of Mitchell's Water Monitor includes all areas where this species persists and where habitat occurs within the species' recorded distribution. This includes the Charlotte River, watercourse to the north of the project footprint, and nearby mangroves – noting that the species has not been recorded in proximity to the project footprint. Habitat avoidance, project design and water quality management measures will ensure that riparian habitat quality is not adversely affected. In the unlikely event that there is reduced water quality associated with the Proposed Action, the proportion of Mitchell's Water Monitor habitat that would be temporarily affected compared with that available in the region is so small as to negligible, and therefore could not be reasonably considered likely to have a significant impact by affecting critical habitat, fragmenting the existing population (if present), disrupting the breeding cycle or otherwise negatively impacting upon habitat availability or quality to the extent that the species is likely to decline. The extent of groundwater drawdown from the dewatering activities are yet to be modelled. However, the potential impacts, if any, of reduced groundwater availability to habitat quality would be the localised habitat in the vicinity of the underground mine. The proportion of Mitchell's Water Monitor habitat that would be temporarily affected for the duration of the Proposed Action, compared with that available in the region is so small as to negligible, and therefore could not be reasonably considered likely to have a significant impact by affecting critical habitat, fragmenting the existing population (if present), disrupting the breeding cycle or otherwise negatively impacting upon habitat availability or quality to the extent that the species is likely to decline.
Result in invasive species that are harmful to a Critically Endangered or Endangered species becoming established in the Critically Endangered or Endangered species' habitat	**UNLIKELY.** The Proposed Action will unlikely lead to increased occurrence of invasive species that could directly or indirectly impact the Mitchell's Water Monitor. The primary threat to the Mitchell's Water Monitors comes from mortality due to ingestion of toxic Cane Toads (TSSC, 2023b). Predation of eggs by Feral Pigs is considered a suspected threat factor, as is damage to wetlands and watercourses by Feral Pigs, Cattle and Water Buffalo which results in reducing water, and therefore habitat, quality (TSSC, 2023b). These species are already common in the region, and development of the project is unlikely to lead to any substantial change in their occurrence.
Introduce disease that may cause the species to decline	**UNLIKELY.** Disease is not considered to be a potential threat factor to the Mitchell's Water Monitor (TSSC, 2023b).

Criterion	Comment
Interfere with the recovery of the species	**UNLIKELY.** There is no recovery plan for the Mitchell's Water Monitor. Instead, the Conservation Advice (TSSC, 2023b) provides two primary conservation actions for these species: • Detecting sub-populations that are resilient to Cane Toads in impacted areas and supporting them to recover. • Maintaining habitat integrity and connectivity among remnant sub-populations to support population expansion into areas that have become temporarily unoccupied due to Cane Toad impacts. Neither of these will be interfered with by the development of the project.

5.2.4 Offsets

Offsets have not been identified as a requirement because the Proposed Action will not have a significant residual impact.

5.2.5 Conclusion

Significant impacts to Terrestrial Ecosystem values from the activities of this project are unlikely because the habitat loss is not considered a significant impact to the identified threatened species. This is because the area of habitat to be removed is small (<100ha) in comparison with that available similar habitat in the wider region, and either because the species is not considered an important population, or no critical habitat exists within the project footprint, or because no habitat for other species (Mitchell's and Mertens' Water Monitor) will be directly disturbed and the potential for indirect impacts will be localised, temporary and minimal. The severity of potential impacts has also been avoided through design and will be mitigated using proven, routine measures commonly adopted during mining activities.

5.3 Hydrological processes

The NT EPA's objective for the hydrological processes factor is to:

Protect the hydrological regimes of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.

The sections below identify the hydrological values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.3.1 Environmental values

The environmental values identified for assessment under the hydrological processes factor are:

- **Surface water flows** – supply and quantity of water in surface water features including the Charlotte River, its tributaries and surrounding mangrove communities. Surface water flows regime, including the direction, volume, duration and seasonal pattern of flows, is an important factor in maintaining local ecosystems which have adapted to the conditions, including habitat formation and species migration. Flow regimes are also key in regulating the geomorphic processes that shape the flow paths and channels.
- **Groundwater conditions (levels and discharges)** – supply and quantity of water in groundwater features including aquifers and the GDEs and riparian vegetation they support. Groundwater is an important resource which supports ecosystems, cultural values, public water supply and agriculture. The groundwater underlying the Project area is recharged via diffuse rainfall recharge

during the wet season, which is an important process for maintaining groundwater levels and surface water flows.

The environmental values and assessment of impacts on hydrological processes was informed by the following information sources:

- NR Maps: Natural Resource Maps NT, including registered bore reports within and surrounding the project area, water control districts and groundwater systems (DEPWS, 2024).
- Preliminary Groundwater Assessment (Groundwater Enterprises, 2023) Appendix G.
- Drilling Report – Lei Lithium Deposit – Groundwater Bore Drilling (CDM Smith, 2024) Appendix H.
- Groundwater Dependent Ecosystems Atlas (GDE Atlas; BoM 2024).
- Preliminary Surface Water Assessment (WRM, 2024) Appendix I.

Desktop assessments in this referral provide a high-level overview of surface and groundwater processes relevant to the Project, however further detailed assessment is required. Hydraulic and hydrologic modelling will be undertaken to predict groundwater drawdown, extent and recovery time; model surface water flows, refine mine design and surface water storage requirements, and assess the potential impacts of reduced surface flows to downstream watercourses and identified environmental values.

Surface water flow regimes

The Project area is located within the Charlotte River sub-catchment of Bynoe Harbour. The Charlotte River is a small, ephemeral water course that drains a sub-catchment of approximately 170 km^2. The Charlotte River (stream order 3) is located approximately 300 m south-west of the Lei deposit at its closest point. All minor drainage lines on or within the proximity of the project area drain into the Charlotte River. The Charlotte River rises in land to the south-east and drains towards the north-west to the lower reaches of the Charlotte River before flowing into the tidal inlet of the Bynoe Harbour, approximately 8 km (direct line from the mapped coastline to the western boundary of ML(A) 33874) downstream of the Lei deposit (Figure 2-4).

Estuarine conditions are mapped as extending up the Charlotte River until a point around 300 m south-west of the Lei deposit. Estuaries are transitioning environments between the land and the ocean, where fresh water coming from the river mixes with saline oceanic water (Groundwater Enterprises, 2023).

The Lei deposit is situated on the western side of a gentle ridge with the land gradient falling to the south-west toward the Charlotte River. The area to the north of the deposit and proposed box-cut and decline is flatter lying and falls gently to the north-west toward a small, ephemeral drainage line that joins a tributary of the Charlotte River.

There are no permanent surface water features or watercourses within the Project area. However, multiple minor ephemeral drainage lines flow from the project area into the Charlotte River. The drainage lines downstream of the proposed project developments, have evidence of mangroves and dense riparian vegetation outlining the watercourse.

There are no known consumptive uses of surface water downstream of mine site.

Flood assessment

A preliminary flood inundation assessment of the proposed mine site infrastructure has been undertaken by WRM (2024) (Appendix I). The modelled flood extent and depth for the 1% Annual Exceedance Probability (AEP) event, has minimal impact on the infrastructure within the Project area (Figure 5-4). Shallow inundation occurs within low-lying areas of the Project area (WRM, 2024). The preliminary site layout has been designed to avoid placement of infrastructure in drainage areas (apart from the RWD, with placement intended to capture surface water runoff). No flood diversion infrastructure is required in the current design. However, the preliminary assessment was undertaken on the available 1 m contours. Lithium Plus are in the process of obtaining LiDAR data. This data will be used to inform the final surface water assessment and final detailed mine design.

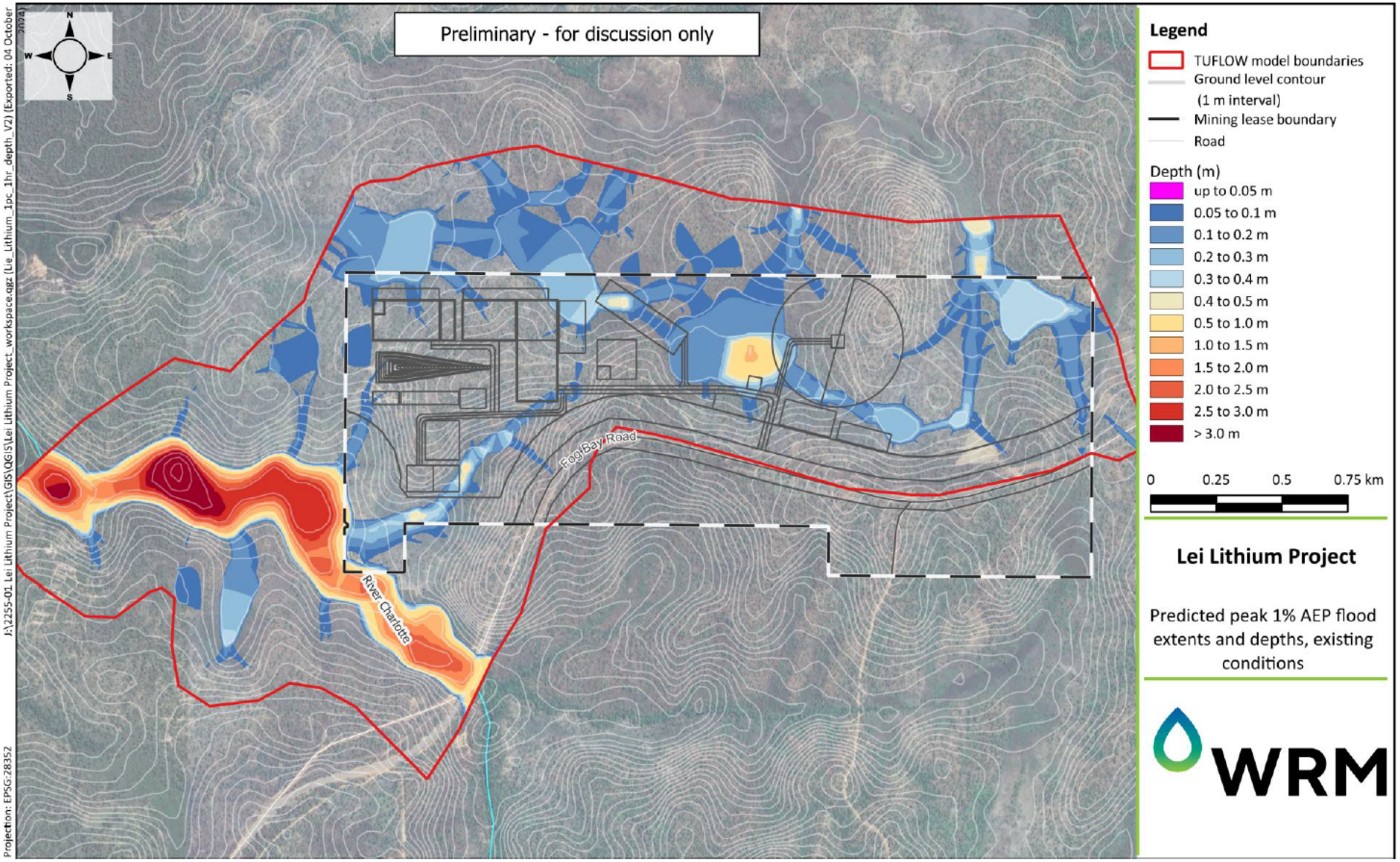


Figure 5-4. Preliminary flood model extent and depths, 1% AEP - existing conditions (WRM 2024)

Groundwater conditions (levels and discharges)

The Project is underlain by the Burrell Creek Formation (BCF). The BCF is extensively weathered at surface where it often forms a laterite horizon. The underlying shale and phyllite is typically heavily weathered and decomposed into mottled clay. Where the BCF is not exposed it subcrops beneath a thin veneer of Tertiary and Quaternary aged sediments, including alluvial deposits along the drainage lines, and colluvium and laterite, the latter formed by in-situ weathering of the BCF (Groundwater Enterprises, 2023). The aquifer is in fractured shale, the rock is mostly weakly fractured so a comparatively poor aquifer, with a typical yield of 0.5 to 1.5 L/s (NRMaps – DEPWS, 2024a). It is mainly used for stock and domestic purposes (DEPWS, 2024a).

Six monitoring bores were drilled and constructed at five locations within the Project area during November to December 2023 to inform the groundwater model. The bore locations are shown on Figure 2-4. The drilling of the bores confirmed the following groundwater conditions (CDM Smith, 2024 – see Appendix H):

- No alluvial aquifers were intersected during the 2023 drilling program, and the geology comprised the BCF confirming that where intersected, the water table sits within this unit.
- Water was generally intercepted at depths of less than 15 mbgl, and the depths to water decreased (i.e. water levels were higher) closer to the Charlotte River.
- The drilled boreholes typically yielded an airlift flow rate of around 1 L/s or lower. However, at LG4 a fracture zone was intersected which increased the airlift to 2-3 L/s. This indicates that groundwater flow could be assumed to occur in fractures located in the unweathered zone, where the fractures have not been filled with clay.
- The slug tests conducted in the unweathered deeper bores revealed a range of hydraulic conductivities between 0.13 and 6.8 m/day. The highest hydraulic conductivity was recorded at LG1-D.
- LG1-S had the lowest hydraulic conductivity of 0.05 m/day and is located in the weathered zone of pegmatites. This confirms that weathering in pegmatites can cause a decrease in hydraulic conductivity, which could be interpreted as a potential confining bed to the lower, more permeable profiles.
- Groundwater elevation results from the nested bore (LG1-S, -D) suggests there is an upward vertical groundwater gradient within the BCF, driven by the shallow weathered portion of the unit acting to confine the deeper, fresher aquifer.
- Water quality measurements indicate the presence of fresh water in the aquifer. The EC ranges from 85 to 210 µS/cm, with the lowest observed in LG3 and the highest in the deep bore of LG1 (LG1-D). The EC results indicate very little to no mixing of the aquifer with relatively highly saline surface water of the Charlotte River.
- Available DEM data and measured groundwater depths suggest that the groundwater flows southwest toward the Charlotte River.

In summary, the key water bearing zones are likely at the base of the weathering zone and transition into fresh rock. However, the results indicate the overlying weathered BCF is saturated, but of low permeability. The weathered zone potentially acts as an aquitard confining the main aquifer zone deeper in the BCF, but this can only be inferred at this stage (Groundwater Enterprises, 2024).

Other groundwater users

The Project is located within the Darwin Rural Water Control District (DRWCD). Groundwater is a key water source for rural residents in the Darwin Rural Area, supporting land uses such as agriculture, horticulture and extractives. The estimated groundwater use within the BCF of the Charlotte River sub-catchment is low (DEPWS, 2024a).

The closest registered bore (RN041993) for rural stock and domestic purposes was drilled in 2020 to 42 m depth and is located 2.6 km south (upstream) of the Lei deposit (Figure 2-5). All other registered water supply bores are located over 7 km from the Lei deposit.

The only other existing registered bores in proximity to the ML(A) 33874 are monitoring/investigation bores installed by Core Lithium Ltd and previous mining operators, for mining purposes. The closest registered bores for mining purposes are located approximately 1.4 km South-west (RN043840) and ~1.5 km North (RN041797/RN041798) (Figure 2-4).

There is one surface water extraction licence ~3.5 km north of the project area. The licence (number 8151018) relates to surface water extraction from Observation Hill Dam, used as a water source for the Lithium Developments Mining Projects (Grants and BP33) during operations. There are no other water extraction licences within 10 km of the Project area.

Groundwater dependent ecosystems (GDEs)

Regional scale GDE mapping identified using the GDE Atlas, a national data set of Australian GDEs developed by the Bureau of Meteorology (BOM, 2019), suggests a low and moderate potential terrestrial GDE within the Project area, and a moderate potential for aquatic GDEs along the Charlotte River to the south/south-west of the Project area (Figure 2-4). Given the observed saturation of the upper weathered BCF, native vegetation may access and use groundwater.

Satellite imagery suggests there may be permanent water in the Charlotte River to the south-west of the Lei deposit. The possible presence of permanent water in Charlotte River in the vicinity of the Lei Deposit suggests the river may be partially sustained by groundwater discharge or alternatively is influenced by the movement of water from Bynoe Harbour due to tidal activity. Field verification is recommended to confirm the permanence and water quality attributes of surface water and groundwater along the Charlotte River adjacent to the Lei deposit (Groundwater Enterprises, 2023).

Monthly baseline surface water quality sampling undertaken by EcOz (see section 5.4.1) shows that the water quality in the Charlotte River and immediate upstream tributaries are intermittently fresh and saline, indicating tidal connectivity in the upper reaches of the Charlotte River.

If drawdown from dewatering the underground mine is significant and was to occur over an extended period of time, there could be indirect impacts on the GDEs (if present), riparian vegetation and mangrove woodlands downstream of the mine, which potentially have a level of groundwater dependence.

5.3.2 Impact assessment

Mining operations typically occur at localised spatial scales, and hence, they tend to represent point, rather than diffuse, sources of threats to ecosystems. For threats to surface waters, the potential impacts are typically confined to immediate or near-field downstream features and can often be controlled to a large degree (Finlayson et al, 1999). Such localised practices can affect the ecological values of areas through water contamination, water extraction, and the construction of infrastructure. The extraction of groundwater for mining operations, typically for dewatering of mine pits or underground workings, may threaten water availability and GDEs. Dewatering may have localised impacts on wetlands, terrestrial ecosystems and stygofauna communities that rely on groundwater supply (i.e. GDEs) (Bartolo et al, 2008). The construction of the RWD, may alter surface water flow regimes.

The impact assessment process identified the following potential impacts to surface water flow regimes and groundwater levels and discharges:

- Groundwater drawdown from dewatering activities, reducing groundwater availability and flows for:
  - other consumptive uses
  - mangrove communities, riparian vegetation and GDEs within the Charlotte River and its tributaries.

- Alteration of surface water flow regime from construction of the mine site infrastructure with potential to cause:
  - Mine site inundation
  - Reduced surface water availability to the Charlotte River and its tributaries.

Accounting for implementation of avoidance and mitigation described in Table 5-15 below, the Project has the potential to have a moderate residual impact on hydrological processes due to uncertainties regarding dewatering of the aquifer resulting in reduced groundwater levels.

Table 5-15. Impact assessment – hydrological processes

Impact	Avoidance and mitigation	Residual impact
Groundwater drawdown - reduced groundwater availability for other consumptive users associated with dewatering activities Dewatering activities will result in a lowering of groundwater levels in the aquifer surrounding the mine and may lead to a reduction in groundwater availability for surrounding groundwater users, specifically a groundwater supply bore located 2.6 km south of the Lei deposit (upstream of the Project area). Uncertainties exist regarding the extent of the groundwater drawdown and the time it will take for groundwater levels to recover post-mining. Groundwater modelling of the nearby BP33 indicates that for the BP33 life of mine to around three years post-closure, there will be some impact to groundwater levels and availability within a 2 km zone of influence (ZOI) around the mine site. Once mining ceases, the water table is predicted to recover to pre-mining levels within three years (Core Lithium Ltd, 2021). Based on the BP33 and the Lei Project similarities (LOM, underground operation, geology, catchment and location), assuming the ZOI is 2 km, with the greatest groundwater drawdown levels within 1.5 km of the underground it is likely that the upstream bore will remain outside of the predicted ZOI and unlikely to be significant. However, the precautionary principle has been adopted and potential impacts have been assigned a higher level of significance until site-specific groundwater modelling is undertaken.	A site-specific groundwater model will be developed in 2025 following collection of sufficient groundwater baseline data sourced from the investigation bores. The model will assess pre-mining (baseline) conditions and predict the zone of influence (ZOI) from dewatering of the underground during mining and post mining groundwater level recovery time. Groundwater levels in all bores will be continuously monitored using Troll loggers to collect baseline date and verify extent of any drawdown cone during mining and recovery post mining.	**Moderate**
Groundwater drawdown – reduced groundwater availability and alteration of flows for GDEs, riparian vegetation and mangrove communities Groundwater drawdown has the potential to significantly impact GDEs as a result of direct modification of the hydrological regime these ecosystems experience (i.e. reduced water availability) or indirectly as a result of changes to prevailing ecological processes that may influence the quality or extent of these ecosystems (e.g. reduced water availability may result in increasing fire susceptibility for fire sensitive species) (DEPWS, 2021).	A site-specific groundwater model will be developed to reduce the uncertainties of the potential impacts to hydrological processes. The site-specific groundwater model is critical not only to assessing potential environmental impacts, but also to the next phase of mine design, as it will inform dewatering requirements and associated sizing of onsite water storages. It is proposed that the groundwater model will be developed in 2025 following collection of sufficient groundwater baseline data sourced from the recently installed investigation bores. Groundwater levels in all bores will be continuously monitored using Troll loggers to	**Moderate**

Impact	Avoidance and mitigation	Residual impact
Dewatering activities will result in a lowering of groundwater levels in the aquifer surrounding the mine and may lead to a reduction in groundwater availability to GDEs (if present), riparian vegetation and mangroves. Riparian vegetation is likely to be largely dependent on groundwater, particularly during the Dry season (O'Grady et al, 2006). As the tidal inundation of the adjacent Charlotte River is likely to be irregular and infrequent, the mangrove communities are likely not only dependent of saline water, but also wet season surface freshwater flows (see section 5.4.1) and potentially groundwater discharges in the dry season. While the BCF has typically low permeability, there is potential for the mine and the Charlotte River to be connected by fracture networks due to its proximity and location along strike, which increases the likelihood that the Charlotte River is connected to the groundwater system at Lei through open fracture networks. If this occurs the Charlotte River may act as a constant source of water to the underground mine and increase dewatering requirements (Groundwater Enterprises, 2023). Uncertainties include: • The connectivity between the Charlotte River and the underground mine. • Groundwater drawdown extent (ZOI) and groundwater level recovery time post-mining due to dewatering activities. • Presence of GDEs within the Charlotte River. A 1.5 km ZOI was modelled at BP33 (Core Lithium Ltd, 2021). If the same is applied, the ZOI may include approximately a 2.5 to 3 km section of the Charlotte River (stream order 3). Given this section of the Charlotte River contains sensitive vegetation (riparian vegetation and mangrove woodlands), the impact has potential to be significant. The precautionary principle has been adopted and potential impacts have been assigned a higher level of significance until site-specific groundwater modelling is undertaken. The potential impacts of reduced flows on the riparian vegetation and aquatic communities are discussed in section 5.5.	collect baseline date and verify extent of drawdown cone. GDEs will be field verified at the end of the 2024 dry season, for evidence of any water permanence and groundwater dependence on the existing terrestrial vegetation and aquatic GDEs within an immediately downstream of the Project area (Charlotte River and its tributaries). A Significant Vegetation Monitoring Plan will be developed to monitor ecosystem health of the aquatic GDEs / riparian vegetation and mangrove communities within adjacent Charlotte River. The plan will include a groundwater monitoring program to detect changes in groundwater levels pre, during and post mining and monitor potential impacts to aquatic GDEs / riparian vegetation and mangrove communities. The monitoring plan will allow for adaptive management and/or rehabilitation of damage. The plan will include seasonal baseline surveys prior to the commencement of mining activities of the riparian vegetation species composition and structure and mangrove communities. Repeat monitoring will subsequently be undertaken to the required frequency to compare ecosystem health and impacts during mining and post-closure, to these baseline conditions. A Water Management Plan (WMP) will be developed and implemented that will propose water quality and level gauging station to be established in the upstream and downstream of the Charlotte River for continuous surface water quality and level measurements. The plan will also include groundwater level monitoring program and an aquatic ecology monitoring program.	
Construction of the mine site infrastructure with potential to cause mine site inundation Potential for flooding of mine site infrastructure due to proximity to the Charlotte River. As detailed in the preliminary surface water assessment (Appendix I), the preliminary flood inundation assessment, based on the 1% AEP event, indicates that flooding in the Charolotte River has minimal impact within the mine site infrastructure, and the entirety of the mineral lease.	• The preliminary site layout has been designed to avoid placement of infrastructure in drainage areas (apart from the RWD, with placement intended to capture surface water runoff). • Undertake LiDAR to obtain a precise DEM to finalise the flood modelling and surface water assessment to inform the detailed mine design.	**Low**

Impact	Avoidance and mitigation	Residual impact
Alteration of surface water flow regime from construction of the mine site infrastructure with potential to reduce surface water availability to the Charlotte River and its tributaries A Raw Water Dam (RWD) is proposed for construction within a drainage line and catchment of the Charlotte River. This may alter surface water flow regimes, reducing downstream water availability. Water balance modelling undertaken for median climatic conditions (WRM, 2024 - Appendix I) indicates that: • Controlled release of excess water from MWD1 to the Charlotte River during the wet season, at 10 ML/d when the MWD1 volume exceeds its Maximum Operating Volume is 117 ML (based on no groundwater inflow scenario) and 142 ML (groundwater inflow scenario of 0.25 ML/d). • Passive overflows of clean water from the RWD to the Charlotte River during the wet season, is 240 ML. This may result in altered natural flow regimes. However, the impacts are not expected to be significant for the following reasons: • The size of the RWD (180 ML and ~3.6 ha), is very small in relation to the size of the Charlotte River catchment (170 km^2). • The location of the RWD is in the upper reaches of a stream order 1 drainage line, flowing into stream order 3 drainage line approximately 1.7 km downstream. Both are minor ephemeral drainage lines that are subject to periods of no flow each year. • RWD will be designed to passively overflow during the wet season when supply exceeds the mine site demand, resulting in flows downstream. • Controlled discharges modelled to be minimal, and likely to be very small volumes in relation to the flows available in the receiving Charlotte River.	• Mine water management system designed to capture and manage surplus water to ensure no releases occur to watercourses in the dry season. • An *Application for a permit to construct or alter works*, Pursuant to section 41 of the Water Act will be undertaken and appropriate assessment conducted. • Controlled discharge to the Charlotte River will be limited to periods of high flow due to the dilution factors required to meet site specific guideline values for water quality. Discharges will be subject to a Waste Discharge Licence and volumes will be monitored and reported in accordance with the licence conditions. • Monitoring undertaken in accordance with the WMP and includes monitoring of all water usage on site with flow meters to assess water use efficiency. • Undertake LiDAR to obtain a precise DEM to finalise the flood modelling and surface water assessment. • ESCP will be developed and implemented, inclusive of stormwater drainage and sediment dams designed to capture, treat and release clean water off site as overland flows.	**Low**

5.3.3 Offsets

No offsets are currently proposed for hydrological processes.

5.3.4 Conclusion

Dewatering of the underground mine will drawdown the groundwater levels in the main aquifer. There is uncertainty with respect to the extent of groundwater drawdown during mining, the time it will take for groundwater levels to recover post-mining and potential impacts to surrounding GDEs, riparian vegetation and mangrove communities, therefore has the potential to be significant.

Reduced groundwater availability for other consumptive users is unlikely to be significant based on the limited groundwater users, and the distance to the nearest groundwater user to the Project. However, the impacts of the groundwater drawdown are yet to be modelled. Therefore, in applying the precautionary principle, a

moderate residual impact remains until further work is undertaken to determine the significance of potential impacts, and the most appropriate mitigation measures.

5.4 Inland water environmental quality

The NT EPA's objective for the inland water environmental quality factor is to:

Protect the quality of groundwater and surface water so that environmental values including ecological health, land uses and the welfare and amenity of people are maintained.

The sections below identify the surface water and groundwater values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.4.1 Environmental values

The environmental values identified for assessment under the inland water environmental quality factor are:

- **Surface water quality –** surface water quality is important in maintaining ecosystem health and supporting biodiversity. The Charlotte River and downstream Bynoe Harbour support freshwater and marine ecosystems that depending on good water quality, and these areas also have recreational value for local people. Estuary conditions are mapped as extending up the Charlotte River until a point around 300 m south-west of the Lei deposit (Groundwater Enterprises 2024) and is influenced by the movement of water from Bynoe Harbour due to tidal activity (see water quality data in section 5.4.1).
- **Groundwater quality –** groundwater quality is important for maintaining the health of watercourses and GDE's which are supported by groundwater. Groundwater is also extracted for mining, stock and domestic purposes in the surrounding Project area, and impacts to groundwater quality could therefore impact other users.

The assessment of impacts on inland water environmental quality was informed by the following information sources:

- NR Maps: Natural Resource Maps NT (DEPWS, 2024a).
- Baseline water quality data (EcOz, 2024) Appendix D of Appendix H.
- Drilling Report – Lei Lithium Deposit – Groundwater Bore Drilling (CDM Smith, 2024) Appendix H.
- Geochemical Characterisation of Proposed Waste and Ore Materials, Lei Lithium Project (EGi, 2024) Appendix F.

Surface water quality

There is one minor stream (stream order one) that intersects the Project area, flowing from the southeast to northwest into a tributary of the Charlotte River, north of the Project area. The preliminary site layout proposes the construction of a raw water dam within this drainage line (Figure 2-4Figure 2-6). Water also sheds to the southwest of the Project area, via minor drainages into the Charlotte River. Drainage lines within the Project area are freshwater, ephemeral and flow is responsive to rainfall. All surface water runoff from the Project area reports to the Charlotte River, either to the west or to the northwest via an unnamed tributary of the Charlotte River.

Baseline surface water quality monitoring (see Figure 2-2) at the Project commenced in 2023, undertaken by EcOz. In general, water quality within the Charlotte River upstream of the mine is freshwater, adjacent to the mine is fresh and brackish/saline, and further downstream is saline as described below.

The upstream Charlotte River surface water monitoring location, (new upstream), located at Fog Bay Road (~1.2 km SSE of the Lei deposit – direct line) is not tidal influenced. Baseline surface water quality data to date indicates freshwater, with the electrical conductivity (EC) remaining <250 µS/cm on most monthly sampling occasions (January to July 2024) and low TDS. The EC concentration was elevated at the start of the 2023 wet season (November and to a lesser extent December), likely due to evapo-concentration and first flush events.

Surface water monitoring location (SW3) within the Charlotte River, closest to the mine (~700 m south of the Lei deposit) is fresh during the wet season months of January to April. EC remained below <250 µS/cm in the peak wet season months when there are substantial and regular freshwater flows (January, February and March), and TDS remained low through to April (<360 mg/L TDS). Water quality was brackish in December 2023, and saline during November and May to July 2024. SW3 is located on the extent of the mangrove mapping (DEPWS, 2024a).

The downstream Charlotte River surface water monitoring location (SW5) is located ~1.5 km downstream of SW3 (in stream) and ~1.3 km from Lei deposit (direct line). It is located within the mapped mangrove zone (DEPWS, 2024a) and is tidal influenced. TDS indicated brackish water on three monitoring occasions, and saline water on all seven other monthly sampling occasions during wet and dry season, until the most recent sampling event in July 2024.

The pH of all the surface water sites was typical of rainfall, slightly acidic (>5.5 pH) to neutral (<7.5 pH). See Appendix D of Appendix F for baseline water quality data (EcOz 2024).

Except at SW1, Total Nitrogen concentrations were elevated at all sites on at least one sampling occasion. Concentrations ranged from 0.1 to 0.6 mg/L and nitrogen comprised almost entirely of TKN. TKN is the sum of total organic nitrogen plus ammonia. The corresponding low ammonia concentrations, indicate the source of nitrogen as organic nitrogen (biological matter). Chlorophyll-a was not elevated.

Total Phosphorus concentrations were also elevated at both upstream and downstream monitoring locations, with concentrations ranging from 0.02 to 0.12 mg/L.

Of the metals, Total Aluminium (Al) and Total and Filtered Boron (B) concentrations most commonly exceeded respective ANZG guideline values. At SW5, both total and filtered B exceeded the ANZG guideline value of guideline value of 0.94 mg/L on all sampling occasions, noting the guideline refers to freshwater and not marine, for which there is not a default guideline value. The potential source(s) are to be investigated.

Groundwater quality

Baseline water quality monitoring undertaken over three sampling rounds during December 2023, March and June 2024 by EcOz, indicate that the groundwater is fresh, with EC ranging from 85 to 210 µS/cm.

Phosphorus and Nitrogen concentrations were above the DHWQO (upper estuary[8]) on 100% and 12.5% (respectively) of all monitoring occasions. The high phosphorus concentrations appear associated with the mineralogy of the BCF (specifically in the host pegmatite); with higher concentrations in the more weathered zones, reducing in concentration with depth.

Filtered Aluminium (Al), Arsenic (assuming AsV) and Zinc (Zn) were elevated on 18.75%, 60% and 69% of all monitoring occasions (respectively) against the ANZG (2018) freshwater and marine water aquatic guidelines. The BCF aquifer is a known 'high' risk aquifer for arsenic (see Karp, 2008).

Shallow groundwater quality

At the LG1-shallow bore (screened at 8-11 mbgl): Total P and N, and Nitrite + Nitrate concentrations exceeded respective DHWQO guideline value (upper estuary) on both occasions it was sampled. Total Arsenic, Cobalt, Copper, Lead, Nickel, Selenium and Zinc was above the freshwater default guideline value on one of two occasions. Exceedances of total and dissolved Al and Zn were noted.

[8] The DHWQO guidance does not provide values for nutrients.

Based on these initial groundwater data, it is anticipated that groundwater inflows dewatered from the box cut and underground mine may contain naturally elevated concentrations of nutrients - phosphorus and nitrogen, and metals (Al, As and Zn), which exceed respective surface water quality guideline values.

Beneficial uses

The Project lies within two Beneficial Use Declaration areas,

- Fog Bay Area - beneficial use of aquatic ecosystem protection; and
- DRWCD - beneficial use of agriculture, aquaculture, public water supply, environment, cultural, industry, rural stock and domestic, mining activity and petroleum activity.

5.4.2 Impact assessment

The impact assessment process identified the following potential impacts to surface water and groundwater quality from the Project activities:

- Sediment laden runoff and increased turbidity contaminating surface water.
- Hydrocarbon contamination (leaks and spills) contaminating surface and groundwater.
- Elevated nutrients and metals/metalloids from extraction of groundwater impacting surface water quality.
- Elevated metals/metalloids from mined waste and ore stockpiles contaminating surface and groundwater.
- Saline intrusion through dewatering activities and uncertainty related to the connectivity between the Charlotte River and the aquifer.
- Release of contaminants associated with acid sulfate soils (ASS) within Charlotte River due to oxidation via the lowering of the groundwater from dewatering activities.

Accounting for implementation of avoidance and mitigation described below, the Project has the potential to have a moderate residual impact on inland water environmental quality, due to uncertainties related to alteration of water quality from dewatering activities.

Table 5-16. Impact assessment – inland water environmental quality

Impact	Avoidance and mitigation	Residual Impact
Sediment laden runoff and increased turbidity contaminating surface water Clearing of <100 ha in an area with inherently high rainfall erosivity during the wet season months (when significant rainfall events can occur) increases the risk of sediment laden runoff and high levels of suspended sediments and turbidity in the receiving waterways. This can also have potential indirect impacts to the sensitive vegetation downstream in the Charlotte River (riparian and mangroves communities). Increased levels of silt and soil in mangroves can lead to decreases in water quality and lowered dissolved oxygen levels (DENR, 2018). The potential for erosion and sediment runoff is greatest during construction activities (land clearing and earthworks), and operational activities (stockpiling and handling of large volumes of waste rock and ore).	The mine has been designed to reduce the disturbance footprint as much as reasonably practicable. The design includes drainages and sediment basins to capture and management sediments on site. This allows water to settle in the sediment basins prior to passive flows off site. Administrative controls will include the development and implementation of the following site-specific environmental management plans and procedures to minimise soil loss via erosion and sedimentation receiving of waterways: • Erosion and Sediment Control Plans (ESCPs) for construction and operational activities. • Vegetation clearing procedure; and • Water Management Plan (WMP). The plans will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details of the relevant plans as outlined in section 4.2.3. Adoption of these measures will	**Minor**

Impact	Avoidance and mitigation	Residual Impact
The accumulation of sediments in mangroves can be greatly increased by upstream disturbances, including clearing of vegetation and construction. Increased levels of silt and soil in mangroves can lead to decreases in water quality and lowered dissolved oxygen levels. (NTG Sensitive Vegetation in the Northern Territory – Mangrove Forests. (DENR 2018). Experience on other mine sites shows that erosion and sediment control targets are regularly not achieved.	minimise the likelihood of major exceedances of turbidity occurring.	
Hydrocarbon contamination (leaks and spills) contaminating surface and groundwater Storage and handling of hazardous materials including 2 x 110,000 L (maximum tank size) fuel storage tanks (maximum total diesel fuel storage 220,000 L) and ~10,000 L oil storage. Major spills have the potential to impact surface and groundwater quality. Minor spills are likely to occur and will need to be contained. However, it is very unlikely that the project will result in any major or sustained exceedances of water quality criteria for hydrocarbons and other chemical contaminants at downstream surface water monitoring sites or monitoring bores with the adoption of the avoidance and mitigation measures.	• Above-ground, self-bunded diesel fuel storage tanks will be used during construction and operations, over short life of mine. Storage and use of hazardous materials is within designated areas, located away from and sensitive receptors such as drainage lines. Volumes stored on site and not considered significant quantities and is standard practice for mine sites. The storage tanks are designed to capture spills and leaks. The inherent risk is low due to design, which is standard practice. • Data indicate that the upper weathered BCF (<15 m) is saturated, but transmissivity is low, lowering the risk associated with diffuse pollution over time. Further, the weathered zone has the potential to act as an aquitard, reducing vertical migration. • There is no processing of ore on-site, thus the operation does not use hazardous materials or chemicals that could contaminate the land and soils. • Hazardous material will be managed in accordance with the relevant Acts outlined in section 4.2.1. • Administrative controls will include the development and implementation of a site-specific Emergency Response Plan, Water Management Plan and Hazardous materials management plan with details as outlined in section 4.2.3. Adoption of these measures will minimise the likelihood of major contamination incidents occurring.	**Minor**
Elevated nutrients and metals/metalloids from extraction of groundwater impacting surface water quality Groundwater inflows dewatered from the box cut and underground mine are predicted to contain naturally elevated concentrations of nutrients (phosphorus and nitrogen) and metal(oid)s (Al, As, and Zn), which exceed the ANZG (2018) aquatic surface water quality guideline values, so the concern relates to their potential release to surface watercourses.	A Water Management Plan will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details outlined in section 4.2.3. Water management strategies to be assessed in the WMP include: • Re-use of water for dust suppression in accordance with the ANZG (2018) irrigation water quality trigger values. • A waste discharge licence (WDL) will be obtained under the *Water Act 1992* and discharges to the Charlotte River will be managed to comply with the approved licence conditions. Discharge will only occur when flows are sufficient to achieve dilution factors for contaminants ensuring the water quality to be released meets the ANZG (2018) aquatic quality trigger values.	**Minor**

Impact	Avoidance and mitigation	Residual Impact
Elevated metals/metalloids from mined waste and ore stockpiles contaminating surface and groundwater Mining activities such as the excavation of ore and waste material, can result in ARD, and potentially produce significant surface and groundwater contamination issues. However, ggeochemical characterisation of the waste rock and ore material undertaken by EGi (2024) indicates that the majority of the material is categorised barren (NAF) with a low propensity to leach metal(loid)s on contact with water, therefore represents very low to low risk of environmental impact.	Mine construction and design will include: • Waste rock dumps and ROM pads constructed of low permeability material. • Drains installed to enable the separation of clean and mine affected water. • Co-disposal of fresh phyllite rock (from near to contact zones with the pegmatite) with NAF in the temporary waste dump (LWD1). <u>Plans</u>: • A Mine Rehabilitation and Closure Plan will be developed. It will identify the measures that will be taken to ensure all surface waste rock is backfill underground and, in the box cut on closure. This will reduce the amount of time the material will be exposed to oxidising conditions, and therefore inherently lowers the risk of ARD. <u>Monitoring / testing:</u> • Should paste backfilling of stopes involve addition of binder including cement to waste rock to generate the paste fill, then leach testing of the paste backfill will be undertaken, to assess any potential mobilisation of metal(loid)s and any specific management requirements. • Monitoring of water quality in accordance with the WMP.	**Minor**
Saline intrusion through dewatering activities and uncertainty related to the connectivity between the Charlotte River and the aquifer Groundwater extraction can cause saltwater to be drawn toward the freshwater zones of the aquifer. Saltwater intrusion decreases freshwater storage in the aquifers (DEPWS, 2021). Groundwater is potentially more saline near the Charlotte River due to the influence of estuarine conditions. There is potential for poorer quality groundwater to migrate towards the underground mine due to changes in groundwater gradients caused by dewatering. This process could impact on the health of terrestrial GDEs (if present) and the beneficial use of the groundwater resource (Groundwater Enterprises, 2023). There is currently no groundwater data near the Charlotte River to support this.	• The preliminary groundwater assessment (Appendix G) identified 8 groundwater monitoring bores be installed. All bores were installed at the end of 2023, except for the 2 nested bores located nearby the Charlotte River as this bore was off the mineral lease, and access permissions not yet received. The proposed location is also within the 100 m riparian buffer zone as per the land clearing guidelines for stream order 3, so further approval is required to install the bore. Lithium Plus is committed to installing all the bores required to inform the groundwater model and reduce uncertainties. • A site-specific groundwater model will be developed to reduce the uncertainties of the potential impacts to hydrological processes and as a result, inland water quality. The model will assess potential for connectivity between the Charlotte River and the underground mine, assessing potential flows and potential water quality impacts. If saline intrusion is possible, predictions of water quality change will be undertaken via a reactive transport model (or alike) to define the potential saline plume. The precautionary principle has been adopted and potential impacts have been assigned a higher level of significance until uncertainties are addressed and site-specific groundwater modelling is undertaken.	**Moderate**
Release of contaminants associated with ASS within Charlotte River due to the lowering of the groundwater from dewatering activities ASS is mapped within the Charlotte River, ~300 m adjacent from the Proposed mine.	An ASS assessment will be undertaken to characterise the soils and determine the presence/absence of ASS/PASS to identify the potential risks and impacts. The assessment will include the development of an ASS sampling plan, that will:	**Moderate**

Impact	Avoidance and mitigation	Residual Impact
If ASS are drained via dewatering activities, reducing groundwater discharge, there is potential that drained soils can release ASS contaminants of concern to the receiving environment impacting water, habitat and sediment quality and aquatic ecosystems. The impact of lowering water tables over the short and long term during dewatering activities is not well understood (Shand, et al., 2018). The impacts of contaminant mobilisation may not be seen during the pumping phase as the cone of depressions remains unsaturated. The oxidation products, including a range of contaminants such as metals, metalloids and nutrients, within the cone of depression can subsequently dissolve in water as the water table rises, leading to contamination of groundwater (particularly by iron and sulfate). This can cause ongoing problems at sites where poor-quality water is discharged to rivers via surface flow, interflow and groundwater flow (Shand, et al., 2018). It is assumed that if ASS are present, the surface is likely to will remain waterlogged throughout the year, due the freshwater wet season flows and saline dry season flows from tidal influence. However, the subsurface soils may become unsaturated within the predicted cone of depression, thus the risk of the release of PASS contaminants may occur on rebound of the water table.	• Identify sampling method and sampling locations. Samples are proposed to be collected within the soil profile to identify the depth of sulfidic horizons (if present). Samples are proposed to be collected during the construction of the nested bore (shallow and deep), located near the Charlotte River and additionally, with a hand auger from select locations within the mapped ASS area, within the likely predicted cone of depression, particularly close to the deposit where the cone of depression will be at a maximum. • Outline testing requirements to characterise the soils: acidification hazard (actual and potential acidity - mainly in the form of sulfides), and acid neutralizing capacity (ANC), potential for mobilisation of metals, metalloids and nutrients, texture, structure and profile using existing relevant guidelines. • Analysis of soils and potential risks. If ASS is identified, the groundwater model will include predictions ZOI and water quality change using a reactive transport model (or alike) to predict ASS contamination plume. The precautionary principle has been applied and potential impacts assigned a higher level of significance until uncertainties are addressed by undertaking ASS characterisation and development of the site-specific groundwater model.	

5.4.3 Offsets

No offsets are currently proposed for inland water environmental quality.

5.4.4 Conclusion

Dewatering of the underground mine will drawdown the groundwater levels in the main aquifer. There is uncertainty with respect to the extent of groundwater drawdown during mining, the time it will take for groundwater levels to recover post-mining and potential indirect impacts on water quality from dewatering activities, including uncertainties relating to:

- the potential for release of contaminants associated with ASS within the Charlotte River, and
- the potential for saline intrusion into the underground.

In applying the precautionary principle, these uncertainties have resulted in a moderate residual impact as further studies are required to inform the potential for a significant impact.

5.5 Aquatic ecosystems

The NT EPA's objective for the aquatic ecosystems factor is to:

Protect aquatic habitats to maintain environmental values including biodiversity, ecological integrity and ecological functioning.

The sections below identify the aquatic ecosystem values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.5.1 Environmental values

The environmental values identified for assessment under the aquatic ecosystems factor are:

- **Aquatic ecosystems –** include permanent and temporary surface water features which provide habitat for aquatic flora and fauna, including supporting threatened species, significant vegetation and GDEs. Taking or diverting water from natural waterways or groundwater should not have a significant impact on the health (and water requirements) of GDEs; and the *Water Act 1992* requires that water is allocated to the environment to maintain the health of aquatic ecosystems, including GDEs (DEPWS, 2024e). The Charlotte River, a small, ephemeral watercourse located ~300 m south-west of the Project area provides aquatic habitats during periods of flow.
- **Significant vegetation** – the Charlotte River and its tributaries supports significant vegetation, including riparian vegetation and mangrove woodlands.
- **Groundwater Dependent Ecosystems (GDEs)** - Regional scale GDEs mapped from a National assessment (BOM GDE Atlas) suggests a moderate potential for aquatic GDEs along the Charlotte River to the south/south-west of the Project area.

The assessment of impacts on aquatic ecosystems was informed by the following information sources:

- NR Maps: Natural Resource Maps NT (DEPWS, 2024a).
- Groundwater Dependent Ecosystems Atlas (GDE Atlas; BoM, 2024).
- Ecological Assessment of EL31091 (EcOz, 2024b) – see Appendix B.

Aquatic ecosystems

No aquatic surveys have been undertaken by Lithium Plus in the surrounding waterways to date. The Charlotte River has a narrow zone of dense riparian vegetation and because it is ephemeral, supports a low diversity aquatic community only during the wet season and early dry season. Under a worst-case scenario, these communities could be impacted. Impacts are considered possible to extend to the Charlotte River given the proximity (~300 m) of the Charlotte River to the Lei deposit (Groundwater Enterprises, 2023).

Typically, mining impacts on aquatic ecosystems result from the discharge of (often acidic) mine waters containing elevated concentrations of metals and non-metallic inorganics (Lloyd et al, 2002; DRCRG, 2004). Based on the geochemical characterisation of waste and ore to date, the potential for ARD contamination of surface or groundwater is considered low (see section 5.4.2), and subsequently ARD is not discussed in this section. Impact on water quality and aquatic ecosystems from ASS are discussed in section 5.4.2.

Significant vegetation

The ecology surveys undertaken by EcOz (2024b) identifies the presence of significant riparian vegetation and mangrove woodlands within the Charlotte River, adjacent to the Project area. The quality and extent of the significant vegetation types is yet to be verified and mapped. This assessment will be undertaken once further design information is available to determine buffers required around aquatic habitats and significant vegetation.

The Charlotte River is a third order stream, requiring a 100 m riparian buffer in accordance with the NT Land clearing guidelines (DEPWS, 2024e). However, as the value of the riparian vegetation has not been assessed, a precautionary approach has been adopted by default, and the most conservative mitigation recommendation applied - a high value riparian rainforest buffer of 250 m from the proposed disturbance footprint.

Additionally, as discussed in section 5.3.2, surface water and groundwater modelling will be undertaken, which will inform engineering design required to maintain surface water flows which are important for maintaining aquatic ecosystems and assess the potential impacts of groundwater drawdown.

GDEs

Regional scale GDE mapping suggests a moderate potential for aquatic GDEs along the Charlotte River to the south/south-west. Verification of the aquatic GDE will be undertaken at the end of the 2024/25 dry season, to assess potential groundwater dependent vegetation types, groundwater discharge and presence of pools of water. Remaining pools provides an important water source for fauna and a refuge for many species during the dry season.

5.5.2 Impact assessment

The impact assessment process identified the following potential impacts to aquatic ecosystems from the Project activities proposed:

- Altered surface water and groundwater hydrology reducing habitat quality and biodiversity
- Degraded and/or altered water quality and temporal variation of water quality available, impacting habitat quality (including mangroves) and biodiversity.
- Decrease in habitat quality from the accumulation of sediments in mangroves from sediment laden runoff.

A description of potential impacts to each of the identified environmental values present is provided below. Accounting for implementation of avoidance and mitigation described below, the Project has the potential to have a moderate residual impact on aquatic ecosystems due to uncertainties related to groundwater drawdown.

Table 5-17. Impact assessment - aquatic ecosystems

Potential impact	Avoidance and mitigation	Residual impact
Altered surface water and groundwater hydrology reducing habitat quality and biodiversity Alteration of surface water and groundwater flows and levels has the potential to result in degradation of downstream aquatic ecosystems, including watercourses and pools. The potential impact to aquatic ecosystems will depend on the duration and extent of groundwater drawdown associated with dewatering and groundwater extraction, and the extent to which that affects surface flows in the watercourse. As there is some uncertainty about impacts to groundwater hydrology, the potential for impacts to aquatic ecosystems is uncertain.	Design: • The Project will be designed and engineered to manage stormwater runoff and maintain flows to downstream aquatic ecosystems. Assessments: • A site-specific groundwater model will be developed to reduce the uncertainties of the potential impacts to hydrological processes and, as a result, potential impacts to aquatic ecosystems. • The adjacent Charlotte River will be assessed at the end of the 2024/25 dry season, for evidence of any water permanence and groundwater dependence (GDEs). Monitoring: • Lithium Plus will undertake aquatic surveys within the surrounding waterways. The surveys will be undertaken pre-mining (baseline), during mining and post mining. The aquatic monitoring program will be detailed in the water management plan. The aquatic monitoring, along with surface and groundwater quality monitoring and sediment monitoring will	**Moderate**

Potential impact	Avoidance and mitigation	Residual impact
	form a multiple line of evidence approach to assessing the overall health of the aquatic ecosystem and potential impacts. • Surface water flows will be maintained such that significant impacts to downstream ecosystems are avoided.	
Degraded and/or altered water quality and temporal variation of water quality available, impacting habitat quality (including mangroves) and biodiversity. The mangroves in the Charlotte River adjacent to the Project have adapted to half the year in fresh water during the wet season and half in saltwater during the dry season, based on surface water quality data to date. This may also be the case for groundwater – fresh in the wet season when the water table is high and saline during the dry season as the water table recedes. Groundwater drawdown can potentially reduce freshwater availability, whilst saltwater may become more readily available for longer periods of the year. This can affect habitat quality and distribution of the mangroves. As there is some uncertainty about impacts to groundwater hydrology, the potential for impacts to habitat quality (including mangroves) and biodiversity is uncertain.	Assessments: • A site-specific groundwater model will be developed to reduce the uncertainties of the potential impacts to hydrological processes and, as a result, potential impacts to habitat quality (including mangroves) and biodiversity. Predictions of water quality change and availability will be made using a reactive transport model (or alike). Monitoring: • A Water Management Plan (WMP) will be developed and implemented that will propose water quality and level gauging station to be established in the upstream and downstream of the Charlotte River for continuous surface water quality and level measurements. The plan will also include groundwater level monitoring program and aquatic ecology monitoring programs. • A significant vegetation monitoring plan will be developed to monitor ecosystem health of the aquatic GDEs / riparian vegetation and mangrove communities within adjacent Charlotte River. The plan will include a groundwater monitoring program to detect changes in groundwater levels pre, during and post mining and monitor potential impacts to aquatic GDEs / riparian vegetation and mangrove communities. • The monitoring plan will allow for adaptive management and/or rehabilitation of damage. The plan will include seasonal baseline surveys prior to the commencement of mining activities of the riparian vegetation species composition and structure and mangrove communities. Repeat monitoring will subsequently be undertaken to the required frequency to compare ecosystem health and impacts during mining and post-closure, to baseline conditions. The precautionary principle has been adopted and potential impacts have been assigned a higher level of significance until site-specific groundwater modelling is undertaken.	**Moderate**
Decrease in habitat quality from the accumulation of sediments in mangroves from sediment laden runoff. The accumulation of sediments in mangroves can be greatly increased by upstream disturbances including clearing of vegetation and construction. Increased levels of silt and soil in mangroves can lead to decreases in water quality and lowered dissolved oxygen levels. These impacts can destroy plant and animal life and subsequently impact on food webs (Lee, 2003; Mastaller, 1997).	Avoidance through design of site layout: • The mine has been designed to reduce the disturbance footprint as much as reasonably practicable <100 ha), reducing the potential impacts of erosion and sedimentation downstream. • The design includes drainages and sediment basins to capture and management sediments on-site. • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. Administrative controls will include the development and implementation of the following site-specific environmental management plans and procedures to minimise soil loss via erosion and sedimentation receiving of waterways: • ESCPs for construction and operational activities. • Vegetation clearing procedure and staged clearing of land. • WMP. The plans will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details of the relevant plans as outlined in section 4.2.3. Adoption of these measures will minimise the likelihood of sedimentation in runoff and accumulation of silt and sediments the downstream mangrove communities.	**Minor**

5.5.3 Offsets

No offsets are currently proposed for aquatic ecosystems.

5.5.4 Conclusion

As a result of dewatering activities, uncertainties relating to altered surface water and groundwater flows and water quality, may result in potential impact to aquatic ecosystem habitat quality and biodiversity. In applying the precautionary principle, these uncertainties have resulted in a moderate residual impact as further studies are required to inform the potential for a significant impact.

5.6 Community and economy

The NT EPA's objective for the community and economy factor is to:

Enhance communities and the economy for the welfare, amenity and benefit of current and future generations of Territorians.

The sections below identify the community and economy values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.6.1 Environmental values

The environmental values identified for assessment under the community and economy factor are:

- **Way of life** – how people live, how they get around, how they work, how they play, and how they interact on a daily basis;
- **Community** – composition, character, cohesion, function, and sense of place;
- **Access** – how people access and use infrastructure, services and facilities, whether provided by local, state, or federal governments, or by for-profit or not-for-profit organisations or groups;
- **Culture** – both Aboriginal and non-Aboriginal culture, including shared beliefs, customs, values, and stories, and connections to country, land, waterways, places, and buildings;
- **Health and wellbeing** – physical and mental health, especially for those who are highly vulnerable to social exclusion or substantial change, plus wellbeing of individuals and communities;
- **Surroundings** – access to, and use of, services that ecosystems provide, public safety and security, access to and use of the natural and built environment, and its aesthetic value and amenity;
- **Livelihoods** – people's capacity to sustain themselves, whether they experience personal breach or disadvantage, and the distributive equity of impacts and benefits; and
- **Decision-making systems** – whether people experience procedural fairness; can make informed decisions; have power to influence decisions; and can access complaint, remedy and grievance mechanisms.

The Project is located on vacant crown land within the Charlotte locality, which has relatively few residents (19 people based on the 2021 ABS Census). The nearest town, Berry Springs, is located approximately 25 km (direct line) east of the Project. The Berry Springs locality has 870 people (ABS, 2021). The closest residents are two private rural residence in Parcel 2511 and 2512, located approximately 3.3 km (direct line) south of the Project area.

The Darwin Regional Land Use Plan (DLPE, 2015) identifies the portion North of Fog Bay Road (location the Project area disturbance) and including the Cox Peninsula to be the Cox Peninsula subregion, with grazing / agriculture identified as the land use. The Cox Peninsula Subregion is largely undeveloped apart from residential areas at Wagait Beach and Belyuen. The long running Kenbi Land Claim under the Aboriginal Land Rights (Northern Territory) Act 1976 (Cth) has been significant in delaying development (DLPE 2016). Belyuen local Government area has a population is 149 (ABS, 2021), and Wagait local Government area has a population is 423 (ABS, 2021). The Cox Peninsula subregion is visited for recreational purposes by Darwin and rural residents.

The Cox Peninsula area is used for a range of customary activities, such as camping, hunting and fishing, by many Belyuen residents. Many of these residents identify as members of Daly River language groups such as Wadjigiyn, Kiyuk, Emi, Mentha, Marriamu and Marritjaben' or as the 'Belyuen mob'. Majority of the language groups have lived and used the Cox Peninsula for 140 years; however, the Larrakia are recognised as the Traditional Owners (Povinelli, 1993; True North, 2021).

Fog Bay Road intersects ML(A) 33874, with the mine infrastructure proposed to be located North of the road. The road will be used to access the Project area and used by heavy vehicles (road trains) for haulage of DSO to the Darwin Port, increasing traffic along the public roads (~3.5 km of Fog Bay Road and ~36 km of the Cox Peninsula Rd). No on-site accommodation facilities are proposed for the Project, it will be a drive in/out operation with a portion of the workforce to be sourced from Darwin and surrounds. There will be no public access to the operational area of the Project.

The Project has potential to improve livelihood for local people with increased jobs and business opportunities. If is estimated that workforce during construction will be 60 people and employ between 80 and 100 personnel during operations. There is a high unemployment rate in the area as identified in the ABS Census (2021), Berry Springs 23.5% not in the labour force (3.4% unemployed that reported to be in the labour force), and Wagait local Government area 37% was not in the labour force (with 5.1% unemployed that reported to be within the labour force).

The communities on Cox Peninsula have previously been exposed to exploration and mining operations in the area, namely, the Core Lithium Ltd Finniss Lithium Project (BP33 underground and Grants open-cut mine).

5.6.2 Impact assessment

Potential impacts and concerns likely to be held by the community include:

- Reduced sense of safety with increased traffic on local roads.
- Potential pressures on emergency and social services.
- Change in community composition, cohesion or character.
- Potential impacts to recreational activities such as fishing.

Potential benefits to the community include a boost for the local economy through employment opportunities and support to local businesses.

The unemployment rate is high in the Cox Peninsula area. The opening of the surrounding lithium mines, owned by Core Lithium Ltd provided local employment opportunities and local business support. However, this is currently reduced due to unforeseen closure of the mines (care and maintenance). Lithium Plus is committed to providing local employment and local business support.

Accounting for implementation of avoidance and mitigation described below, the Project has the potential to have a minor residual impact on community and economy. However, if other mining operations were to operate in the area concurrently, there is a risk for cumulative impacts as discussed in section 6. Table 5-17 outlines potential impacts and available management measures relevant to each impact.

Table 5-18. Impact assessment - community and economy

Potential impact	Avoidance and mitigation	Residual impact
Reduced sense of safety with increased traffic on local roads Increased traffic through employees and contractors commuting daily to/from the mine and ore haulage to the Darwin Port with road trains on the local roads has the potential to increase the risk of accidents that may cause fatalities and injuries.	• Consideration of on-site ore sorting which will reduce traffic of haul trucks. • A haulage route assessment (GHD 2024 – Appendix D) has been prepared to assess the most suitable haulage route, factoring in road safety into the assessment criteria. • A Traffic Management Plan (TMP) will be developed for the haulage route from the project area to the Darwin Port. The plan will include mitigation measures to reduce risk of road/traffic incidents, such as speed restriction requirements at specific areas i.e., Berry Springs community and school zones; covered loads, road signage requirements, management of road closures for blasting as required, construction of slip lanes where required, in coordination with the Department of Logistics and Infrastructure (DLI - formerly DIPL). • Mine vehicles will be used to pool employees where possible to/from site and a minibus used to reduce traffic congestion and limit the number of vehicles on the local roads. • Lithium Plus has established a community hotline for community engagement, concerns and complaints. • Ongoing community liaison and stakeholder engagement.	**Minor**
Potential pressures on emergency and social services The mining activities have the potential for workplace accidents/incidents and environmental emergencies such as fire. These accidents and emergencies may require the assistance on local emergency services, putting pressure on emergency services which are already limited to the communities.	• The mine will employ safety advisors to ensure site work is undertaken to safe workplace standards and practices. Site emergency service officers (ESO's) with appropriated training and qualifications will be employed to manage on-site incidents. The ESOs will also be available to respond to local incidents in the surrounding area. An emergency response team (ERT) comprising of mine site employees will also be will also be established. This will take pressure off the local emergency services and may assist the local emergency services in emergency response in the local area as required. • An emergency response plan will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details of the ERP as outlined in section 4.2.3. Adoption of these measures will minimise the pressures on emergency and social services.	**Minor**
Change in community composition, cohesion or character Potential change to local demographic and community structure by inflow/outflow of temporary residents during construction and/or operations. Potential social impacts trust and cooperation, participation in community activities and institutions, and the potential for harmony or conflict. Lack of cohesion may result in division and tensions in the community.	• A Social Impact Assessment will be undertaken and a Social Impact Management Plan (SIMP) to address potential impacts to change in community composition, cohesion or character. • Established a community hotline for community engagement, concerns and complaints. • Early and appropriate consultation, to ensure community concerns are addressed as much as possible in early design phases of the Project. • Ongoing community liaison and stakeholder engagement. • 100 m wide vegetated buffers adjacent to Fog Bay Road, minimising impacts to visual amenity. • Standard controls for dust, noise and other amenity impacts during construction and operations. • Undertaking a Traffic Impact Assessment to identity potential traffic impacts and inform appropriate traffic routes and controls. • Development and implementation of a Territory Benefit Plan, consistent with the Territory Benefit Policy.	**Minor**
Potential impacts to recreational activities such as fishing The waterways, estuaries, harbours in the	• Standard mitigation measures to protect the waterways and the aquatic and recreational values will be implemented, including; erosion and sediment controls, water management	**Minor**

Potential impact	Avoidance and mitigation	Residual impact
surrounding Cox Peninsula area are popular for locals in recreational activities such as fishing. The mine may impact the recreational use of the area by road congestion, impacts to water and habitat quality and aquatic ecosystems.	and monitoring, weed management and monitoring, hazardous materials management (and associated management plans as outlined in section 4.2.3) and mine design considerations. • Lithium Plus has established a community hotline for community engagement, concerns and complaints.	

5.6.3 Offsets

No offsets are currently proposed for community and economy.

5.6.4 Conclusion

The environment protection and management measures outlined in this referral indicate with appropriate management, the Project is unlikely to result in material significant impacts to community and economy and will meet the NT EPA's objective.

Lithium Plus will continue to implement the Stakeholder Engagement Plan (Appendix E), undertaking early and proactive consultation with stakeholders and the community. Consultation will also inform the Social Impact Assessment and inform project planning. Lithium Plus will implement impact avoidance and mitigation measures as required to minimise impacts to the community and economy. Lithium Plus also aim to maximise benefits to the local community and NT economy.

5.7 Culture and heritage

The NT EPA's objective for the culture and heritage factor is to:

Protect sacred sites, culture and heritage.

The sections below identify the culture and heritage values that occur within and surrounding the Project area and assess the potential impacts of the Project on these values and the NT EPA's objective.

5.7.1 Environmental values

The environmental values identified for assessment under the culture and heritage factor are:

- **Sacred sites** – Sacred sites are protected under the *Northern Territory Aboriginal Sacred Sites Act 1989* due to their cultural significance.
- **Archaeological features** – Archaeological features can be of Aboriginal or non-Aboriginal origin. There are likely to be unknown archaeological features across the project footprint due to the lack of previous survey effort. All Aboriginal and Macassan archaeological places and objects are automatically protected under the *Heritage Act 2011*. Historic and archaeological places and objects which are listed on the Heritage Register are protected under the *Heritage Act 2011.*

The presence and distribution of archaeological features within the Project is currently unknown due to an absence of a formal archaeological survey for this project to date. There have been several Authority Certificates issued over a large portion of the Project area from the early 1990s to as late as 2022 for various

proposed activities although unrelated to mining. The assessment of impacts on culture and heritage for this project is based on desktop assessment informed by the following information sources:

- Aboriginal Areas Protection Authority (AAPA) Abstract of Records
- A review of previously issued Authority Certificates
- Consultation with the NT Heritage Branch.

Sacred sites

There is no current AAPA Authority Certificate for the ML(A) 33874. A search of the AAPA Abstract of Records in relation to ML(A) 33874 as of 9 August 2024 and a review of previously issued authority certificates issued over the project area shows that:

- There are no registered sacred sites located on ML(A) 33874.
- There are no recorded sacred sites located on ML(A) 33874.
- There is a restricted work area within ML(A) 33874 which was provided for in a previously issued Authority Certificate to an unrelated entity for activities and purpose unrelated to the currently proposed project.

Lithium Plus intends for the project to be subject to sacred site survey prior to commencement. The timing of survey is to be resolved following notification of ML(A)33874.

If a native title claim is lodged and registered in response to the native title notification of ML(A) 33874 then, in the first instance, the intention is to engage directly with registered native title parties to develop protocols as necessary for sacred sites. It is anticipated that the Northern Land Council (NLC) and AAPA will be involved in this process to ensure the relevant traditional owners and/or traditional custodians can make informed decisions about sacred sites and other native title interests.

In the event that there are no native title parties following native title notification of ML(A) 33874, an application for authority certificate will be progressed for the proposed development through the AAPA and in consultation with the NLC.

While existing information indicates there are no significant sites or features present, further consultation with Traditional Owners, site custodians and the Aboriginal community, and surveys are required to identify previously unrecorded sites and/or other cultural values and uses of the land that could be impacted by the Project.

Archaeological features

A search of the NT Heritage Register returned no records of nominated, provisionally declared or declared heritage places or objects within ML(A) 33874 as of 26 June 2024. Information sought from the Heritage Branch confirmed this finding. The Heritage Branch also confirmed that there are no known Aboriginal or Macassan archeological heritage places or objects within ML(A) 33874.

The Heritage Branch did indicate that in a preliminary assessment, the likelihood of unrecorded Aboriginal or Macassan archaeological heritage places existing is considered probable, and that future works or activities may be required to identify and mitigate impact on potential Aboriginal or Macassan archaeological sites.

Further investigation of the potential for unrecorded archaeological heritage places and objects is planned to occur simultaneously with sacred site investigations. In the alternative, an archaeologist will be engaged independently to undertake this investigation.

5.7.2 Impact assessment

As the presence of cultural heritage sites within the Project is uncertain, the Project currently has the potential to impact on culture and heritage through direct loss or damage to archaeological features and sacred sites.

However, proposed survey and consultation will identify any archaeological and heritage sites and any potential significant impact will be avoided through effective and proven mitigation measures (Table 5-19).

Table 5-19. Impact assessment - culture and heritage

Potential impact	Avoidance and mitigation	Residual impact
Direct loss or damage to archaeological sites	**Archaeological assessment** An archaeological assessment of the Project area will be undertaken prior to disturbance activities to identify Aboriginal and historic archaeological sites and objects and meet the requirements of the *Northern Territory Heritage Act 2011*. The assessment will: • Assess the significance of identified places. • Identify constraints and assess potential impacts of the Project. • Develop management strategies to mitigate impacts based on the significance of identified places and values and consultation with Aboriginal traditional owners and custodians. • Recommend appropriate mitigation and management strategies to ensure compliance with the provisions of the *NT Heritage Act* including identifying requirements for permits and/or further works where appropriate. **Cultural Heritage Management Plan** If the archaeological assessment identifies Aboriginal and historic archaeological sites and objects, a Cultural Heritage Management Plan (CHMP) will be prepared and implemented to manage potential impacts to archaeological features. The CHMP will be developed in accordance the relevant Acts and regulations outlined in section 4.2.1, guidelines outlined in section 4.2.2 and include details of the CHMP as outlined in section 4.2.3. Adoption of these measures will minimise the likelihood of potential impacts to archaeological features.	**Minor**
Loss or damage to sacred sites	**AAPA Authority Certificate** The Authority Certificate process will identify sacred sites and stipulate conditions, including restricted works areas, to protect sacred sites. All works will be undertaken in accordance with the Authority Certificate. **CHMP** The abovementioned CHMP will align with the conditions of the Authority Certificate and will include provisions for the protection of sacred sites.	**Minor**

5.7.3 Offsets

No offsets are currently proposed for culture and heritage.

5.7.4 Conclusion

The identification of cultural and heritage values within the Project area requires consultation and on-ground survey work. The findings of archaeological survey and consultation will be used to inform a CHMP which will detail impact avoidance and mitigation measures developed in consultation with Traditional Owners and site custodians, and to the satisfaction of NT Heritage Branch.

Lithium Plus will undertake consultation with AAPA and will apply for an Authority Certificate and adhere to all conditions of the certificate (including avoiding direct impacts to sacred sites and mitigating indirect impacts).

Assuming effective implementation of the CHMP, and adherence to the AAPA certificate, no significant impacts to culture and heritage is expected.

Lithium Plus will undertake consultation with NLC, AAPA and Traditional Owners and site custodians to ensure that all values are identified, and impact avoidance and mitigation measures are implemented to the satisfaction of relevant people and representative bodies and the NT Heritage Branch. Assuming effective implementation of the proposed measures, the NT EPA's objective is likely to be met.

6 CUMULATIVE IMPACTS

The EP Regulations (regulation 79) defines matters that may be included in an environmental impact assessment, including a cumulative impact assessment that takes into account the combined impact of the action or Project and other actions. Cumulative impacts are impacts that can accumulate as a result of additive or interactive processes and actions, interactions among multiple management measures (past, present and future), a combination of multiple minor impacts over time, and activities conducted over a wider area than the proposed action, such as the activities of multiple proposals operating in a region.

Table 6-1 identifies key proposals in the Cox Peninsula / Bynoe Harbour region where the Project is located that:

- Are approved, planned or reasonably likely to occur in the next 20 years.
- Are likely to affect the same environmental values as the current Project within the Greater Darwin Region to an extent these impacts could be considered cumulative.

It should be noted these projects have been identified based on a review of online sources and publications, including projects being referred to or being assessed under the NT EP Act and/or EPBC Act, are identified in an existing regional land use plan, or are identified as major projects on the NT major projects list. It is not exhaustive but is considered representative of the key projects that may contribute to cumulative impacts. Climate change is also considered a potential to exacerbate residual impacts and contribute to cumulative impacts.

Table 6-1. Projects in the region which may contribute to cumulative impacts

Project	Timeframe	Description
Finniss Lithium project BP33 Underground mine – Core Lithium Ltd	Currently approved. Recommencement may be driven by price of lithium.	Environmental approval granted in 2022 (Supplementary Environmental Report). BP33 underground lithium mine is located 2.5 km north of the Lei deposit., upstream of the Charlotte River. There are potential cumulative impacts to water quality from surface water runoff into the Charlotte River and groundwater drawdown. Projects occurring simultaneously will increase traffic on the Cox Peninsula Road and have potential cumulative impacts to community and economy. Not currently in operation.
Grants Lithium Project – Core Lithium Ltd	Currently approved. Recommencement may be driven by price of lithium.	Environmental approval granted in 2019. Grants Lithium Project is an open-cut mine and processing facility located 8 km north of the Lei deposit on Cox Peninsula Road. Not currently in operation. Projects occurring simultaneously will increase traffic and road train frequency on the Cox Peninsula Road and potential cumulative impacts to community and economy.
Project Sea Dragon - Seafarms Group Ltd	~5-10 years	Environmental approval granted in 2017 and currently has major project status in the Northern Territory. The Seafarms Group proposed a Core Breeding Centre and Broodstock Maturation Centre in the Bynoe Harbour. Not currently in operation.
Exploration projects	Current	A number of exploration leases occur within and surrounding the Project area, which involve a small degree of land clearing and ground disturbance.

Cumulative impacts associated with land clearing; habitat loss is considered negligible. To accurately measure the impact of habitat loss on a species in a region, the total loss of habitat in the region should be considered. There is approximately 67,100 ha of intact native vegetation in a 15 km buffer surrounding the Project. Of this area, approximately 1,373 ha (2.04%) has been cleared for mining, residential or other reasons. Clearing of up to an additional 100 ha will represent a negligible (0.14 %) increase in the total land cleared.

The project footprint will be a small island of development surrounded by a large area of contiguous remnant vegetation, and with no developments that Lithium Plus is aware of proposed for the adjacent land. The lithium mines that have been developed by Core Lithium Ltd are located approximately 2.5 km to the north-east, with remnant vegetation in between. Lithium Plus, Core Lithium Ltd and possibly other mining companies have exploration licences granted or under consideration in the area. There is insufficient information available on the viability and developability of any prospects discovered in the future – and therefore the location and size of any future new mines – to assess possible cumulative impacts.

The following factors have been identified with the potential for cumulative impacts:

Hydrological processes

Groundwater modelling for the nearby Lithium Developments BP33 Underground Mine indicated that for the BP33 life of mine to around three years post-closure, there will be some impact to groundwater levels and availability within a 2 km ZOI around the deposit. Once mining ceases, the groundwater level is predicted to recover to pre-mining levels within three years. The maximum extent of the drawdown cone extends outside of the ML and below ephemeral drainage lines to the east and south (Core Lithium Ltd, 2021). BP33 is a similar Project to the Lei Project, with regard to BP33 LOM (55 months), mining type / method (underground operation), is within the similar geology, located 2.5 km north of the Lei deposit, and within the Charlotte River sub-catchment. If the Projects were to occur concurrently, it is possible the drawdown cones will interact and may contribute to cumulative direct impacts to the aquifer and indirect impacts to potential GDEs.

Inland water quality

The BP33 mine, is located 2.5 km north of the project. There is potential for cumulative impacts to surface water quality in the receiving waterways if the operations occur concurrently. However, the cumulative impacts are not expected to be significant based on the benign nature of the Lithium Plus operation (i.e., waste rock - low ARD risk, no processing facility), assuming the avoidance and mitigation measures are implemented effectively.

Community and economy

There are potential social impacts associated with the Project that may also be associated with the projects listed in Table 6-1 including:

- Transport/traffic pressures.
- Workforce pressures and/or competition for skilled workers.
- Consultation fatigue due to ongoing consultation across a variety of projects.
- Perceived stress at the loss of other values (i.e. ongoing habitat loss/vegetation clearing).

Pending the market price of lithium, it is possible that all approved lithium operations in the area could be in operation concurrently. The area is heavily covered in exploration leases, and it is anticipated that exploration throughout the area will occur concurrently with the Project.

7 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

There are nine Matters of National Environmental Significance protected under the EPBC Act as listed in Table 7-1. A Protected Matters Search Tool (PMST) search was undertaken within a 50 km buffer of the Project area on 7 August 2024 – see summary in Table 7-1.

Table 7-1. Summary of PMST results

EPBC Act section	Controlling provision	Quantity
S12	World Heritage properties	None
S15B	National Heritage places	None
S16	Wetlands of international importance (listed under the Ramsar Convention)	None
S18	**Listed Threatened Species and Ecological Communities**	**58 (threatened species)**
S20	**Migratory Species protected under international agreements**	**71**
S21	Nuclear actions (including uranium mines)	None
S23	Commonwealth Marine Area	None
S24B	Great Barrier Reef Marine Park	None
S24D	A water resource, in relation to coal seam gas development and large coal mining development.	None

The EPBC PMST report (see Appendix B of Appendix B) identified the possibility of migratory species protected under international agreements occurring within the region. However, most of these migratory species have a low likelihood of occurring within the Project area. Many of the birds listed within the report are wetland species and/or occur almost exclusively in coastal and estuarine environments. For these species, and marine species, this Project area does not contain suitable habitat.

The remaining migratory species could occur within the terrestrial or freshwater ecosystems within the Project area. However, even if individual members of some migratory species were to seasonally utilise habitat within the Project area, this occurrence is expected to be for a short period and in low abundances. Additionally, any migratory species utilising habitat within the Project area could reasonably be expected to utilise the areas of similar habitat in the region. As such, the habitat within the Project area is not considered to be important habitat for any migratory species.

As discussed in section 5.2, six threatened fauna species were identified as having a reasonable likelihood of being present within the Project area. Two species, the Northern Brushtail Possum, and Black-footed Tree-rat listed as Vulnerable and Endangered (respectively) under the EPBC Act have found to be present within the Project area. A threatened species significant impact assessment (section 5.2.3) assessed the impacts as unlikely to be significant on these threatened species. Therefore, a referral is not proposed to be submitted to the Commonwealth DCCEEW under the EPBC Act for the proposal.

8 CONCLUSION

Lithium Plus proposes to develop an underground lithium mine, located in the Northern Territory, 30 km south of Darwin within mineral lease (application) 33874 on Fog Bay Road. Pre-referral screening identified that 7 of the NT EPA's 14 environmental factors have the potential to be significantly impacted by the Project due to uncertainties. The project is being referred to the NT EPA to determine whether formal assessment is required pursuant to the NT *Environmental Protection Act 2019*.

The impact assessment undertaken to inform this referral identified the potential for minor and moderate residual impacts to the 7 factors assessed and a summary of avoidance, mitigation and further assessments required to inform uncertainties (Table 8-1).

Table 8-1. Summary of potential impacts to NT EPA environmental factors

Factor	Residual impact	Description
LAND		
Terrestrial environmental quality Section 5.1	**Minor**	The disturbance is small-scale (<100 ha). The potential for erosion is minimised through the implementation of best practice mitigation measures, including a CPESC endorsed ESCP. The Project does not involve activities with the potential to create significant soil contamination. Effective implementation of standard and proven measures should ensure that any hydrocarbon contamination does not result in any measurable impacts to soil, surface or groundwater quality. Geochemical characterisation the waste rock and ore material indicate that the majority of the material represents very low to low risk of environmental impact. Mitigation measures include the development and implementation of a: • Vegetation Clearing Procedure. • Erosion Sediment Control Plan. • Emergency Response Plan. • Hazardous Materials Management Plan. • Mine Closure and Rehabilitation Plan. Adoption of the mitigation measures onsite will minimise the likelihood of significant land and soil erosion and contamination occurring.
Terrestrial ecosystems Section 5.2	**Moderate**	Threatened fauna Black-footed Tree-rat and the Northern Brushtail Possum are known to occur within the Project area. The assessment resulted in a moderate residual impact due to the high sensitivity value of the threatened species. However, the potential impact is expected to the avoided through design and additionally, routine mitigation measures commonly adopted during mining activities. Avoidance through design: • Retention of 100 m vegetation wildlife corridor connecting the Charlotte River to the eastern portion of the Project area adjacent to Fog Bay Road. • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. • Retention of 76 ha of habitat (additional to the wildlife corridor) with Black-footed Tree-rat records in the east of Project area that will not only be uncleared but will be managed for weeds and fire, to ensure current habitat values are retained, if not improved. Mitigation measures include the following field assessments: • Assessment of proposed disturbance footprint to confirm presence/absence of large hollow-bearing trees in densities qualifying for as sensitive vegetation. • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs (groundwater discharge potential) and riparian vegetation value to apply an appropriate buffer in accordance with the land clearing guidelines. • The development and implementation of the following management plans and procedures:

Factor	Residual impact	Description
		○ Vegetation Clearing Procedure - including pre-clearance survey and use of a fauna spotter-catcher. ○ Weed Management Plan. ○ Waste Management Plan. ○ Dust Management Plan. ○ Blasting Management Plan. ○ Bushfire Management Plan. ○ Erosion Sediment Control Plan ○ Mine Closure and Rehabilitation Plan.
WATER		
Hydrological processes Section 5.3	**Moderate**	The groundwater level will be reduced during dewatering activities, resulting in uncertainties to the extent of the zone of influence and duration – groundwater level recovery time. Uncertainties will be resolved through the development of: • A site-specific groundwater model, and • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs including any evidence of water permanence and groundwater dependence on the existing riparian vegetation. Mitigation measures include the development and implementation of: • A Water Management Plan. • A Significant Vegetation Monitoring Plan (GDEs / riparian vegetation and mangrove communities). • Erosion Sediment Control Plan. • An *Application for a permit to construct or alter works*, Pursuant to section 41 of the *Water Act* will be undertaken and appropriate assessment conducted, including an analysis of the alteration of surface water flow as a result of the RWD construction. • A Waste Discharge Licence will be obtained under the *Water Act.* • A water extraction licence will be obtained under the *Water Act,* if required. • Final surface water assessment will be developed for the detailed mine design, including finalised flood modelling with LiDAR data and revision of water balance.
Inland water environmental quality Section 5.4	**Moderate**	As a result of dewatering activities, uncertainties relate to potential for release of contaminants from exposure of ASS within the Charlotte River, and the potential for saline intrusion into the underground. Further assessment will include the development of: • A site-specific groundwater model, and a • Solute transport model (or similar) to model potential saline intrusion (pending outcomes of groundwater model). • ASS assessment. Mitigation measures include the development and implementation of: • Vegetation Clearing Procedure. • Erosion and Sediment Control Plan. • Water Management Plan. • Hazardous Materials Management plan. • Emergency Response Plan. • Mine Closure and Rehabilitation Plan.
Aquatic ecosystems Section 5.5	**Moderate**	Groundwater drawdown associated with dewatering activities during operations may result in impacts to aquatic ecosystems. Uncertainties will be resolved through the development of: • A site-specific groundwater model, and • Assessment of the adjacent Charlotte River to determine presence of potential aquatic GDEs including any evidence of water permanence and groundwater dependence on the existing riparian vegetation. Avoidance through design of site layout:

Factor	Residual impact	Description
		• To reduce the disturbance footprint as much as reasonably practicable, reducing the potential impacts of erosion and sedimentation downstream. • Design includes drainages and sediment basins to capture and manage sediments on-site. • Retention of 250 m habitat buffer surrounding the Charlotte River to avoid clearing habitat near riparian areas. Mitigation measures include the development and implementation of: • Vegetation Clearing Procedure. • Erosion and Sediment Control Plan. • Water Management Plan (aquatic surveys). • A Significant Vegetation Monitoring Plan (GDEs / riparian vegetation and mangrove communities).
PEOPLE		
Community and economy Section 5.6	**Minor**	The Project is likely to result in benefits to the community and economy. The identification of impacts, and assessment of their significance requires consultation with stakeholders and the broader community. Lithium Plus will implement impact avoidance and mitigation measures as required to minimise impacts to the community and economy and will aim to maximise benefits to the local community and NT economy. Mitigation measures include the development and implementation of a: • Traffic Management Plan. • Emergency Response Plan. • Social Impact Assessment, Social Impact Management Plan and Territory Benefit Plan.
Culture and heritage Section 5.7	**Minor**	Uncertainties will be resolved through the undertaking an archaeological survey and obtaining an AAPA Authority Certificate. Sacred sites will be avoided in accordance with the requirements of an Authority Certificate obtained under the *Northern Territory Sacred Sites Act 1989.* Surveys and consultation are required to identify and assess the significance of archaeological sites and objects. Impact avoidance and mitigation measures will be implemented to minimise impacts to cultural values. Mitigation measures include the development and implementation of a Cultural Heritage Management Plan.

Lithium Plus will undertake additional surveys and studies as identified in Table 8-1 to further understand the values present within the Project area and identify appropriate impact avoidance and mitigation measures.

Lithium Plus will implement industry standard, best practice and proven effective measures to avoid and mitigate potential impacts to the greatest extent possible and implement the mitigation hierarchy (avoid in the first instance, mitigate, and then offset if required).

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APPENDIX A PRE-REFERRAL SCREENING REPORT

APPENDIX B ECOLOGICAL ASSESSMENT OF EL31091

APPENDIX C SUPPLEMENTARY ECOLOGICAL ASSESSMENT

APPENDIX D HAULAGE ROUTE ASSESSMENT

APPENDIX E STAKEHOLDER ENGAGEMENT PLAN

APPENDIX F GEOCHEMICAL CHARACTERISATION OF WASTE AND ORE MATERIALS

APPENDIX G PRELIMINARY GROUNDWATER ASSESSMENT

APPENDIX H DRILLING REPORT – LEI LITHIUM DEPOSIT – GROUNDWATER BORE DRILLING

APPENDIX I PRELIMINARY SURFACE WATER ASSESSMENT