Finniss Lithium Project
BP33 Underground Mine

Supplementary Environmental Report

Prepared for assessment under the Environment Protection Act 2019

NT EPA Assessment Number: P2020/001

November 2021

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BP33 Underground Mine Supplementary Environment Report

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ACRONYMS

AAPA	Aboriginal Areas Protection Authority (body responsible for Aboriginal sacred sites protection)
ANC	Acid Neutralising Capacity (a term used in mine waste rock characterisation)
ANZECC	Australian and New Zealand Environment and Conservation Council
ARD	Acid rock drainage (drainage produced from oxidation of mine materials)
BCF	Burrell creek formation (a groundwater aquifer)
BGL	Below ground level
EC	Electrical conductivity (a measure of the total amount of dissolved salts in water)
ECNT	Environmental Centre NT
EIA	Environmental impact assessment
EIS	Environmental Impact Statement
EP Act	Environmental Protection Act (2019) (NT)
EPBC Act	Environment Protection and Biodiversity Conservation Act (1999) (Commonwealth)
ESCP	Erosion and Sediment Control Plan
GARD Guide	Global Acid Rock Drainage Guide – best-practice guide to ARD prevention and management
GDE	Groundwater dependent ecosystems
GHG	Greenhouse gas
IAP2	International Association for Public Participation
IVMS	In-vehicle management system
LOR	Laboratory limit of reporting (the lowest measurable concentration)
MCP	Mine Closure Plan
ML	Mineral Lease (granted)
MMP	Mining Management Plan (regulatory requirement under Mining Management Act)
MNES	Matters of National Environmental Significance
MSD	Mine settling dam
NAF	Non-acid forming (a term used in mine waste rock characterisation)
NAG	Net Acid Generation (a term used in mine waste rock characterisation)
NGER Act	National Greenhouse and Energy Reporting Act
NMD	Neutral Mine Drainage (contaminated drainage produced under neutral conditions)
NT EPA	Northern Territory Environment Protection Authority
NTG	Northern Territory Government
OHD	Observation Hill Dam – man-made dam used as water source for mining activities
PAF	Potentially acid forming (waste rock)
PAF-LC	Potentially acid forming – Low capacity (waste rock)
ROM pad	Run of mine pad where mined materials are stockpiled for processing
RWD	Raw water dam (a raw water storage to be constructed on mine site)
SER	Supplementary Environmental Report
SIA	Social Impact Assessment
SILO	Scientific information for landowners – a climate database maintained by Qld Government
SIMP	Social Impact Management Plan
SLOS	Sub level open stope (mining method)
SOCS	Sites of Conservation Significance
SSGV	Site specific guideline value
TDS	Total Dissolved Solids
TIS	Traffic Impact Statement
TPWC Act	Territory Parks and Wildlife Conservation Act (Northern Territory)
WDL	Waste discharge licence

WRD	Waste rock dump

1 INTRODUCTION

On 14 September 2020 the Northern Territory Environmental Protection Authority (NT EPA) decided that the proposed BP33 Underground (lithium) Mine proposal requires assessment under the *Environmental Protection Act* (*EP Act*). This Supplementary Environmental Report (SER) responds to the *Direction to Provide Additional Information* received from the NT EPA on 16 October 2020. The document is intended to be read in conjunction with the original referral documents available on the NT EPA web site [Available here]. The NT EPA in making their decision on whether to approve the proposal or not and will take into consideration the information provided in the Referral, SER and submissions received from the public and other stakeholders.

The purpose of this SER is to:

- Ensure that the NT EPA has sufficient information to complete the environmental impact assessment process and a make a decision on whether or not to approve the proposal, and associated conditions.
- Address the submissions received from the public and other stakeholders in relation to the Referral [1] made to the NT EPA in July 2020.

The document structure and content also address the requirements of the *Environmental Impact Assessment Guidance for Proponents: Preparing a Supplementary Environment Report* (NT EPA 2021)

The SER will be available for public comment on the NT EPA website for a period of 25 business days. On completion of the public comment period, the NT EPA will consider submissions, and will make a decision as to whether or not to approve the proposal and under what conditions.

Table 1-2 summarises the additional information requested by the NT EPA and identifies the section/s in this document where the information is provided. Where detailed technical study or review was required, stand-alone reports prepared by suitably qualified technical experts are provided as Appendices.

[1] The NT EPA placed the Referral on public comment from 10 July to 10 August 2020. Submissions received were passed on to Core for addressing in the SER.

Table 1-1. Additional information required to address potential significant environmental impacts to environmental objectives

Environmental Factor	Referral ref.	Additional information required	SER section
Terrestrial ecosystems	Section 7	Threatened species – *Stylidium ensatum* Provide the Field Survey Report for the *Stylidium ensatum* survey and assessment. The survey must be adequate to reliably detect the presence or absence of *Stylidium ensatum*. Where the absence of the species cannot be ruled out, provide an evaluation of the potential direct, indirect, off site and cumulative impacts prepared in accordance with the Significant Impact Guidelines 1.1 under the *Environment Protection and Biodiversity Conservation Act 1999*. The evaluation of the potential impacts must be supported by a risk assessment and appropriate measures that would be implemented to avoid, mitigate and/or offset potential impacts, including referral to the Australian Government Department of Agriculture, Water and the Environment. The Department of Environment, Parks and Water Security (DEPWS) Flora and Fauna Division should be consulted on the proposed approach to manage potential impacts, and the results.	Section 7
Terrestrial environmental quality	Section 8	Waste Rock Characterisation Provide the results of additional geochemical testing undertaken to demonstrate appropriate representation of samples with higher sulfur content and to quantify the amount of Potential Acid Forming (PAF) material present and the potential for water leaching of aluminium, arsenic and zinc. In line with recommendations from the Geochemical Characterisation Report (Referral Appendix A) additional tests are to include: • Completion of Acid Neutralising Capacity and Net Acid Generation testing on selected samples from drill holes FRC166 – FRC171, focusing on, but not exclusively, samples with sulphur content >0.2 %S. All fresh and transitional waste rock from the 2018 drill holes should be included in the test program. • Kinetic testing (leach columns) of oxidised and fresh rock samples to confirm initial results of aluminium, arsenic and zinc leachability and to define the kinetics of this process. Kinetic leach column (KLC) testing should be conducted under oxic conditions to simulate conditions during storage in Waste Rock Dump (WRD) and in the unsaturated zones within the backfilled underground mine and box cut. Following a period of leaching under oxidising conditions, KLC tests should be conducted under saturated conditions to simulate the leaching properties of backfilled waste that would be placed below the water table upon groundwater rebound.	Section 8
Hydrological processes	Section 10	To reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal, the following information must be provided:	
		Site water balance	
		• A predictive water balance model, developed to aid site water management planning, minimise water use and assist in comparisons of the actual site water balance against the predicted site water balance. The modelling report should include details on how the model was calibrated and validated; and the key assumptions used.	Appendix A & Section 2.2
		• Provide a detailed description of the site water management system and the water balance model including: o Potential sources of water, and their quantity, quality and security o Water volume and quality needs of the proposed operation, including water proposed to be taken for consumptive (e.g. Dust control sprays, dust suppression, wash down) and non-consumptive purposes (e.g. Dewatering)	Section 2.2.1 Section 2.2.2
		o Assessment and management of dewatering volumes and use of surplus (either on-site or off-site) including quantification of the anticipated peak dewatering requirements for the proposal	Section 2.2.3

Environmental Factor	Referral ref.	Additional information required	SER section
		o Water take rate and volume and alignment with the *Northern Territory (NT) Water Allocation Planning Framework*	Section 2.2.2 Section 9.5.1
		o Measures to minimise water use and discharge, consistent with the environmental decision-making hierarchy and the waste management hierarchy	Section 2.2.2
		o How the impacts of climate change were considered in the development of the water balance.	Section 2.2.4
		• Confirm the anticipated volume of water that would be lost to evaporation from surface infrastructure, noting the referral states that 2,478.2KL/day would be lost.	
		Surface hydrology	
		• Provide details of any significant diversion or interception of overland flow, including an assessment of impacts, the location and design of controls and structures that would be used to divert or contain flows.	Section 9.5.1
		• Provide details of any proposed storage, extraction (i.e. volume and rate), discharge, use or loss of surface water. Include details of the proposed dewatering, taking into account the ephemeral and variable flow nature of the receiving waterways and the need for flow rates to be enough to provide adequate dilution of contaminants during periods of discharge.	Section 2.2.3 Section 10.5.4
		• Provide details of the management strategies for mine-affected water for the life of the proposal to demonstrate minimisation of any impacts to land and waters, in particular off-site impacts.	Section 2.2.5 Section 2.2.6 Section 10.6
		• Provide details of a monitoring program, including trigger thresholds and response (corrective) actions.	Section 9.6.2
		Groundwater hydrology	
		• Describe the quantity and significance of groundwater in the proposal area that would potentially be affected by the proposal activities through the collection of an appropriate baseline dataset (note: groundwater quality is addressed below)	Section 9.4.2
		• Provide details of any proposed storage, extraction (i.e. volume and rate), discharge, use or loss of groundwater. Identify any approval or allocation required under the *Water Act 1992*. State how any proposed groundwater extraction would be carried out on site for the life of the proposal and describe the aquifers that would potentially or likely be affected.	Groundwater extraction not proposed – only dewatering. Section 9.4.2 provides reasoning groundwater extraction is not feasible.
		• Confirm proposed bore locations and extraction requirements, supported by results of groundwater investigations conducted at the proposal site, within the Charlotte River sub-catchment of the Burrell Creek Formation groundwater resource that underlies the proposal area.	As above

Environmental Factor	Referral ref.	Additional information required	SER section
		• Provide modelling of aquifer drawdown and an assessment of the impacts on the receiving environment. Develop hydrological models as necessary to describe the predicted impacts on groundwater resources that may be affected by the proposal. The models should address the range of climatic conditions that may be experienced at the site, and adequately assess the potential impacts of the project on water resources including in the post-mining phase. Modelling should enable a description of the project's impacts at the local scale and in a regional context. The modelling report should include details on how the model was calibrated and validated; and the key assumptions use.	Appendix B Section 9.5.2
		• Provide details of a monitoring program, including trigger thresholds and response (corrective) actions.	Section 9.6.2
Inland water environmental quality	Section 11	**Water quality**	
		• Detail the chemical and physical characteristics (quality) of surface waters and groundwater within the area that may be affected by the proposal, through the collection of an appropriate baseline dataset. Identify any water quality standards and guidelines that would be used to describe the ecological values and health of surface water environments.	Appendix C Section 10.4
		• Identify the quantity, quality and location of all potential discharges of water and wastewater by the proposal, to groundwater and surface water, whether as point sources (such as controlled discharges from regulated dams) or diffuse sources (such as seepage from waste rock dumps or irrigation to land of wastewater). Demonstrate how water would be managed and treated to achieve a quality that provides for protection of at least 95% of aquatic ecosystem species prior to discharge.	Section 10.5 Section 10.6
		• Assess the potential impacts of any discharges on the quality and quantity of receiving waters taking into consideration the assimilative capacity of the receiving environment, the loads of key contaminants, the carrying capacity of the receiving system, cumulative impacts from other proposals and the practices and procedures that would be used to avoid or minimise impacts.	Section 10.5
		• Demonstrate how the implementation of mitigation strategies would mitigate significant impacts of water discharges on the receiving environment. Information should be supported with references to relevant legislation, policies, guidelines and modelling. Describe how the achievement of water quality objectives would be monitored and audited.	Section 10.6
		• Provide details of a monitoring program, including trigger thresholds and response (corrective) actions.	Section 10.6.2
		• Provide detail about the proposed onsite sewage system and how sewage would be managed, treated and disposed in a manner which ensures drainage to groundwater is minimised and subsurface flows of contaminants to surface waters are prevented.	Section 10.5.1
Communities and economy	Section 12	**Social Impact Assessment (SIA)**	
		Conduct a Social Impact Assessment (SIA) in line with the *New South Wales (NSW) Social Impact Assessment Guideline*. The SIA scoping should be undertaken in consultation with DEPWS Environmental Assessments and should reflect the predicted nature and scale of the potential social (positive and negative) impacts of the proposal on potentially affected communities, including potentially affected Aboriginal communities	Section 11

Table 1-2. Additional information required to demonstrate compliance with the *Environment Protection Act* 2019 (*EP Act*) and subordinate regulations

Act Reference	Description	Summary additional information required	SER section
Section 26	Environmental decision- making hierarchy	Describe how the environmental decision-making hierarchy has been applied to the proposal. Provide detail about how impacts would be avoided and mitigated and how the potential to offset significant residual impacts has been considered, including for vegetation clearing, emissions and water take.	Section 12.1
Section 27	Waste management hierarchy	Describe how the waste management hierarchy has been considered in the design, implementation and management of the proposal. Provide detail about how each of the waste streams generated by the proposal would be handled, managed and disposed.	Section 12.2
Section 42(b)(iv)	Ecosystem-based management	Describe how the proposal would be managed using ecosystem-based management i.e. management that recognises all interactions in an ecosystem, including ecological and human interactions.	Section 12.3
Section 42(b)(v)	Impacts of a changing climate	• Provide an estimate of scope 1 and 2 greenhouse gas emissions and describe measures that would be implemented to reduce emissions to as low as reasonably practicable • Provide additional detail about the proposed energy sources and use, including consideration of non-renewable and renewable energy for the proposal • Describe how the impacts of a changing climate have been considered in relation to the proposal.	Section 12.4
Section 42(c)	Purpose of environmental impact assessment process	Describe how the potential for less environmentally damaging alternative approaches, methodologies or technologies has been considered, including for energy use.	Section 12.5
Section 42(e)	Purpose of environmental impact assessment process	Provide detailed information about the methods, outcomes and timing of mine closure and rehabilitation to ensure that the environmental quality of land disturbed by mining activities is restored, rehabilitated and able to sustain an approved post-mining land use.	Section 12.6
Section 43(a)	General duty of proponents	Provide information to: • Demonstrate that communities that may be affected by the proposal have been provided with information and opportunities for consultation to assist in their understanding of the proposal and its potential impacts and benefits. • Demonstrate that stakeholder engagement and consultation undertaken in relation to the proposal is consistent with the *NT EPA's Guidance for Proponents - Stakeholder Engagement*. • Provide a Community and Stakeholder Engagement Plan that details how the community and stakeholders will be consulted, engaged and informed through the life of the project.	Section 12.7
Section 43(b)	General duty of proponents	Provide information to demonstrate that affected communities, including Aboriginal communities, have been consulted with in a culturally appropriate manner.	
Section 43(c)	General duty of proponents	Provide information to demonstrate that the Proponent has sought and documented 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 proposal.	
Section 43(d)	General duty of proponents	Provide information to demonstrate that the Proponent has addressed Aboriginal values and the rights and interests of Aboriginal communities in relation to areas that may be impacted by the proposal.	

Table 1-3. Additional information required to address submissions received

Submitter	Description	Summary additional information required	SER section
Aboriginal Areas Protection Authority (AAPA)	Authority certificate	Provide a copy of the relevant Authority Certificate for the proposal (C2019/077) and how potential impacts to the sacred site in the proposal vicinity would be avoided and/or mitigated.	Section 5
Department of Infrastructure, Planning and Logistics (DIPL)	Traffic Management Plan & Traffic Impact Assessment	Provide detail about the extent of potential traffic impacts of the proposal and how those impacts would be managed.	
Department of Primary Industry and Resources (DPIR) (now DITT)	Groundwater bore locations	Provide details of the locations of groundwater monitoring bores in the vicinity of the proposed ROM and WRD areas.	
Department of Health (Medical Entomology)	Biting insects	Provide advice with regards to existing biting insect populations at the site, and measures to reduce the potential to create new mosquito breeding sites during all phases of the proposal.	
Private individual	Visual impacts / Cultural values	Confirm that there has been consultation with communities that may be affected by the proposal, including Aboriginal communities, and that Aboriginal values and the rights and interests of Aboriginal communities have been considered in relation to the areas that would be impacted by the proposal, including the proposed height of the waste rock dumps.	
Private individual	Vegetation debris	Provide detail about how vegetation debris would be used, noting that burning of vegetation is not supported. The NT EPA's preference is that vegetation be mulched during/after clearing and used for erosion and sediment control during construction and operations; or retained and reused onsite for rehabilitation.	

2 PROPOSAL DESCRIPTION

Core Lithium propose to construct and operate an underground lithium mine (referred to as BP33) on Mineral Leases (ML) ML32346 and MLN16 located on the Cox Peninsula approximately 27 km south of Darwin. The mine is part of the broader Finniss Lithium Project, which comprises the approved Grants open pit lithium mine and processing facility, and several other areas prospective for lithium (in addition to the BP33 resource).

2.1 Summary of proposal

Core is seeking approval to develop the underground mine and truck the mined ore approximately 7.5 km to the Grants processing plant via a purpose-built haul road[2]. Potable water requirements for the BP33 underground mine operations will be sourced from Observation Hill Dam (OHD), an existing dam located on ML32074 which was established by past mining operators. The water source for other operational water requirements is the groundwater inflows into the underground mine, which will require dewatering for mining operations to occur. The BP33 life of mine is approximately four years, after which all surface landforms and infrastructure will be removed and the site will be rehabilitated with plant species native to the area. Core's objective is for there to be no restrictions to future use of the land once mine closure is complete.

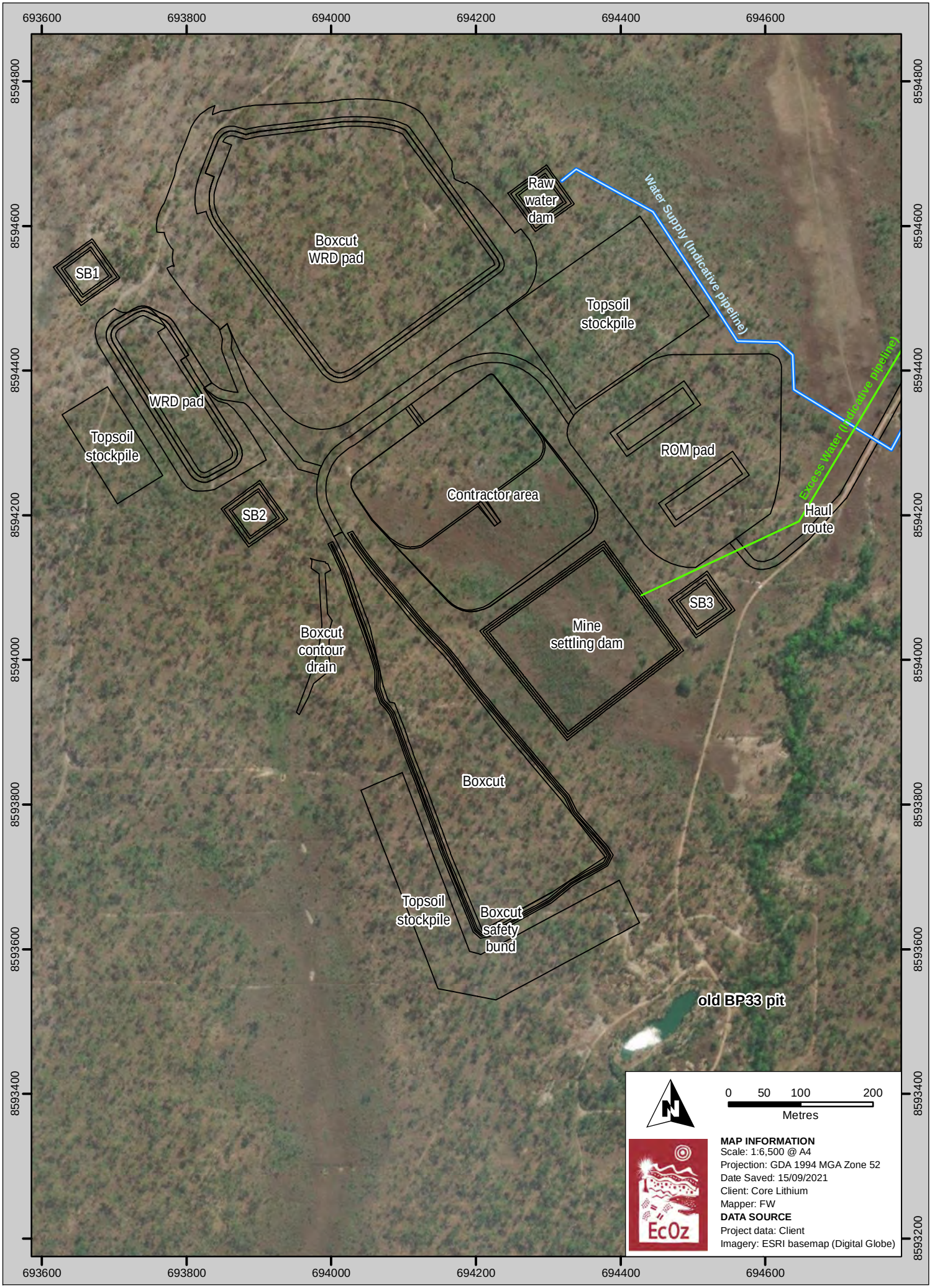
The proposed mine site location and layout are shown on Figure 2-1 and Figure 2-2 and key aspects of the proposal are summarised in Table 2-1. There have been no significant changes made to the proposal since the Referral was submitted to the NT EPA in July 2020[3]. However, there has been advancements made in relation to design of the site water management system and mine closure planning, details of which are provided in section 2.2 below.

[2] *The processing requirements of the BP33 ore resource have previously been assessed by the NT EPA as part of the Grants Lithium Project EIS and therefore are not part of the current proposal.*

[3] Full details of the proposal are provided in the Referral available on the NT EPA web site [Available here]

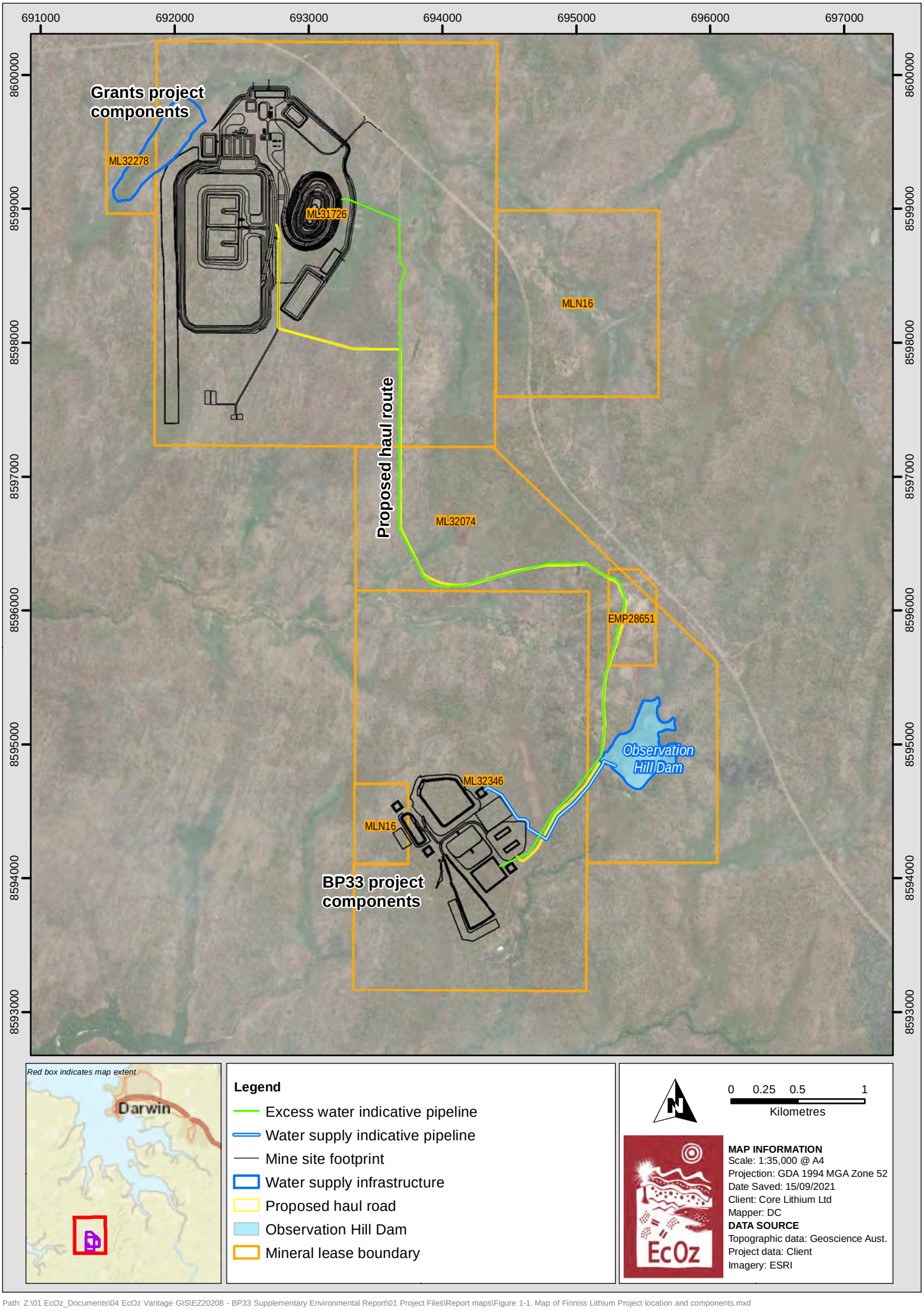
Table 2-1. Summary of key proposal components

Aspect	Component	Details
Footprint	Development envelope	88ha
	Haul road	7.3km from BP33 to Grants processing facility 13m wide corridor - total 12.5ha
	Water pipeline	0.4ha clearing for pipeline corridor from OHD to mine
	Total	~100.9ha
Schedule	Construction phase	6 months
	Operations phase	44 months
	Closure phase	5 months of reinstatement works plus ongoing monitoring until requirements for relinquishment of lease are met.
	Total life of mine	55 months
	Operating hours	24hrs/day, 7 days/week
Mining	Methods	Underground; sublevel open stope with pillar support; drill and blast
	Production	1 Mt/ore processed per annum; 2.09Mt over life of mine at 1.42% LiO_2
Waste Rock Management	Geochemical characteristics	Low risk of Acid Rock Drainage (ARD); potential risk of metals/metalloids leaching under neutral conditions (Neutral Mine Drainage) to be managed
	Waste rock dump 1 (WRD1)	WRD1 will temporarily store weathered waste rock material from box cut, prior to being used as backfill
	Waste rock dump 2 (WRD2)	WRD2 will temporarily store transitional and fresh waste rock material from the underground mine, which will be returned underground
Processing	Not applicable	Ore will be transported to the Grants processing facility. Environmental impacts associated with ore processing were addressed in the Grants Lithium Project EIS and are not further considered.
Water Management	Demand	~2.62ML/day for haul route and underground dust suppression and ablutions/facility operations.
	Sources	Observation Hill Dam (OHD); underground mine dewatering
	Internal water storage capacity	Raw water dam (RWD) 6.25ML Mine settling dam (MSD) 156ML
	Controlled release (discharges)	Controlled release of excess water from MSD to ephemeral drainage line to the south of the mine site during the wet season. Subject to granting of a Waste Discharge Licence under the *Water Act*.
	Land irrigation area (option)	A land irrigation area may be required to manage excess water during BP33 construction phase. Initial assessment indicates an area of 20ha but actual requirement, size and location will be determine through detailed design.
	Transfer to Grants open pit	Excess water pumped to Grants open pit for storage and reuse. Forecast up to 60-180 ML/month based on current water balance.
Power Supply	Power supply to mining operations	Onsite diesel power generation is base case. Potential for connection to mains power under consideration.
Roads and Traffic	Internal haulage	Mined ore hauled from BP33 to Grants processing facility - 18 trucks/day (90t capacity)
	Product transport	Quad road trains will transport product from site to Darwin Port via Cox Peninsula Road and Stuart Highway; 10 return trips/day. Road safety risks were assessed through the Grants Lithium Project EIS. A Journey Management Plan is in place to provide safety controls along the haul route.
Workforce	Construction	~60 personnel
	Operations	~125 to 150 personnel
Mine Closure	Infrastructure	Removed from site on completion of mining
	Backfilling	WRD's and other landforms backfilled to box cut and underground
	Plugging	Box cut portal and shaft vents plugged with concrete
	Rehabilitation	Site revegetated with native species



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20208 - BP33 Supplementary Environmental Report\01 Project Files\Report maps\Figure 1 2. Map of BP33 mine site layout.mxd

Figure 2-1. Map of BP33 mine site footprint and layout



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20208 - BP33 Supplementary Environmental Report\01 Project Files\Report maps\Figure 1-1. Map of Finniss Lithium Project location and components.mxd

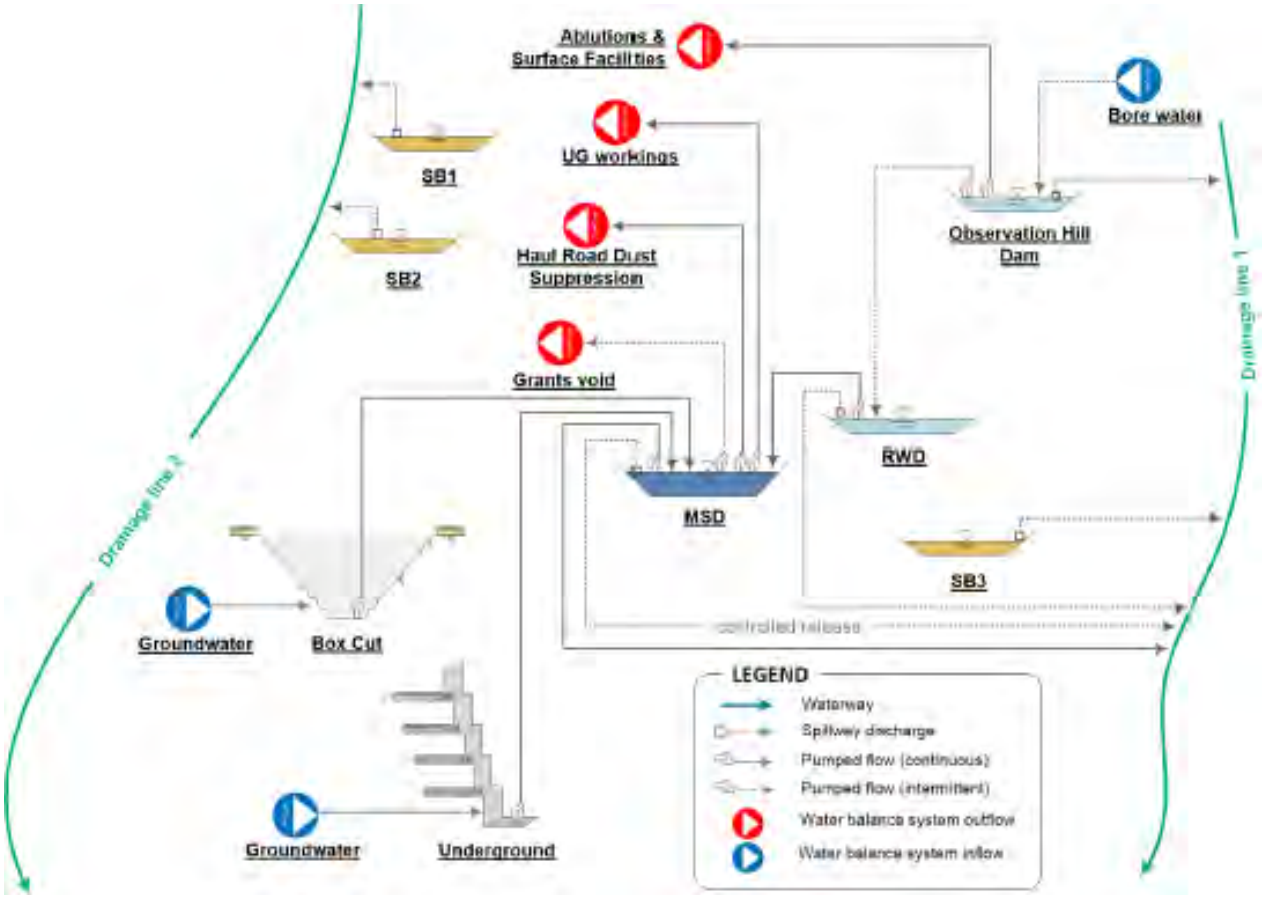
Figure 2-2. Map of haul route from BP33 to Grants

2.2 Water management system

Further studies have been undertaken to advance the design of the BP33 site water management system. This section provides details of the system, which replace the preliminary information provided in the referral.

A schematic of the BP33 site water management system is shown in Figure 2-3. The water management objectives for the site are listed below:

- Where possible, divert clean runoff from undisturbed areas around areas disturbed by mining activities and allow to drain from the site.
- Capture suspended sediment in site runoff in accordance with an Erosion and Sediment Control Plan. This will include controlling sediment-laden runoff and passing it through sediment basins prior to releasing it.
- Contain mine water in on-site water storages for reuse as a water supply.
- Mine runoff and groundwater inflows will drain to collection sumps and be pumped to dedicated on-site storage dams or, if required, to the completed Grants pit.



SB = sediment basin; RWD = raw water dam (storage); MSD = Mine Settling Dam (storage)

Figure 2-3. Schematic of BP33 mine water circuit. Source: WRM (2021)

2.2.1 Operational water demand

Operational water demand comprises of water for haul road dust suppression, underground dust suppression and potable water use (i.e. ablution and surface facility uses). Table 2-2 summarises the forecast demand volumes adopted for the site water balance and the water quality required for each use.

Table 2-2. Estimated operational water demand and guideline quality

Operational component	Demand (kL/d)	Guideline water quality
Haul road dust suppression	up to 2,000[4]	*ANZECC (2000a) Guidelines for Irrigation and general use*
Underground water use	500	
Ablution and surface facility use, including ablutions and wash down	120	*Australian Drinking Water Quality Guidelines (NHMRC 2011)*
Total	**2,620**	

2.2.2 Water sources

The water sources for the mine site will comprise groundwater inflows dewatered from the underground mine, surface water runoff, and supplementary external water from OHD. The water balance model predicts that on average most of the operational demand (approximately 88%) may be met by reuse of groundwater inflows; however, this will need to be verified once mining commences and the actual rate of inflows are known. Surface water inflows and pumped inflows from OHD will make up the remaining inputs. No groundwater bore water is required to supplement water supplies for any of the climatic conditions assessed by the water balance model. Table 2-3 provides details of each of the water sources and the forecast volumes extracted from each source over the life of mine under average climatic conditions.

Table 2-3. Summary of water sources

Water source	Onsite storage location	Quality	Volume ML over mine life (median)	% demand met by source
Surface inflows	Mine Settling Dam (MSD)	Rainfall treated to remove sediments and hydrocarbons	401	5.6%
Groundwater inflows	Mine Settling Dam (MSD)	High arsenic (naturally occurring) does not exceed ANZECC irrigation guideline values. Treated to remove sediments and hydrocarbons.	6,359	88.8%
OHD	Raw Water Dam (RWD)	Rainwater, with some groundwater inflows. Disinfection required to meet drinking water guidelines.	403	5.6%

Water use from external sources (i.e. OHD) will be minimised by capturing, storing and treating water dewatered from the underground mine for use in dust suppression. Reuse of this water will decrease the volumes of makeup water that need to be extracted from OHD. The site water balance model indicates that extraction from external sources will be required to make up a small component of the operational demand (approximately 6%). Extraction from OHD will need to be licenced under the *Water Act*[5]*;* however, a licence is not required for capture and reuse of surface water or groundwater inflows.

[4] *It has been assumed that haul road dust suppression would not be required when the rainfall on a given day is greater than the daily evaporation rate.*

[5] Core's licence application was under assessment at the time of writing.

Figure 2-4 shows the monthly external water requirement from OHD, which would be pumped to the RWD for storage and used to supply ablution and surface facility. The graph shows that the highest monthly volumes required from OHD will be around 90 ML, in the first month of operations when there are minimal groundwater inflows due to the shallow depth of excavation. After month seven in the mining schedule, up to 4 ML/month would be extracted from OHD during median climatic conditions.

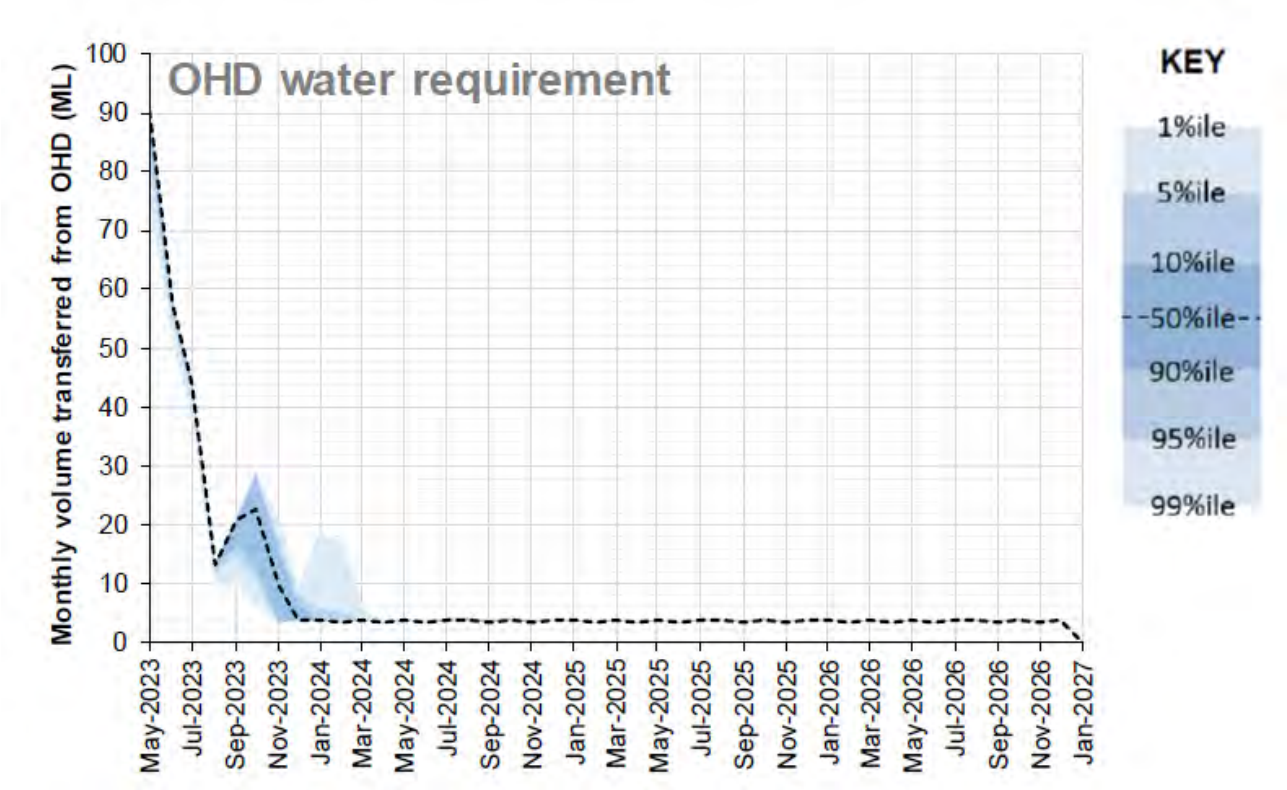


Figure 2-4. Monthly water requirements from Observation Hill Dam. Source: WRM, 2021.

2.2.3 Dewatering

Both the box cut and the underground mine will require dewatering to prevent the mine from flooding. Inflows will be pumped to the mine settling dam (MSD), where the water will be treated to remove sediments and any other contaminants so that it can be reused supply the mine non-potable water demand. Predicted groundwater inflow rates shown in Figure 2-5 as the 'base case', are estimates from the BP33 groundwater model report at Appendix B (CloudGMS, 2021). Inflows and dewatering requirements are forecast to increase rapidly over the first 17 months of mining to approximately 4.5 ML/day, then will continue an upward trend through to the end of mining, when dewatering is forecast to peak at approximately 7 ML/day.

The variation in inflows and dewatering requirements that could occur due to groundwater model uncertainty is illustrated in Figure 2-5 by the 'lower bound' and upper bound' lines. These data represent the lowest and highest groundwater inflow rates provided in an uncertainty assessment for the BP33 groundwater model (Cloud GMS, 2021a). The data indicate that daily groundwater inflows could be up to 2.5 ML greater than the modelled base case. Contingency strategies for managing this surplus water, should it eventuate during the BP33 start-up phase, are discussed in section 2.2.6 below.

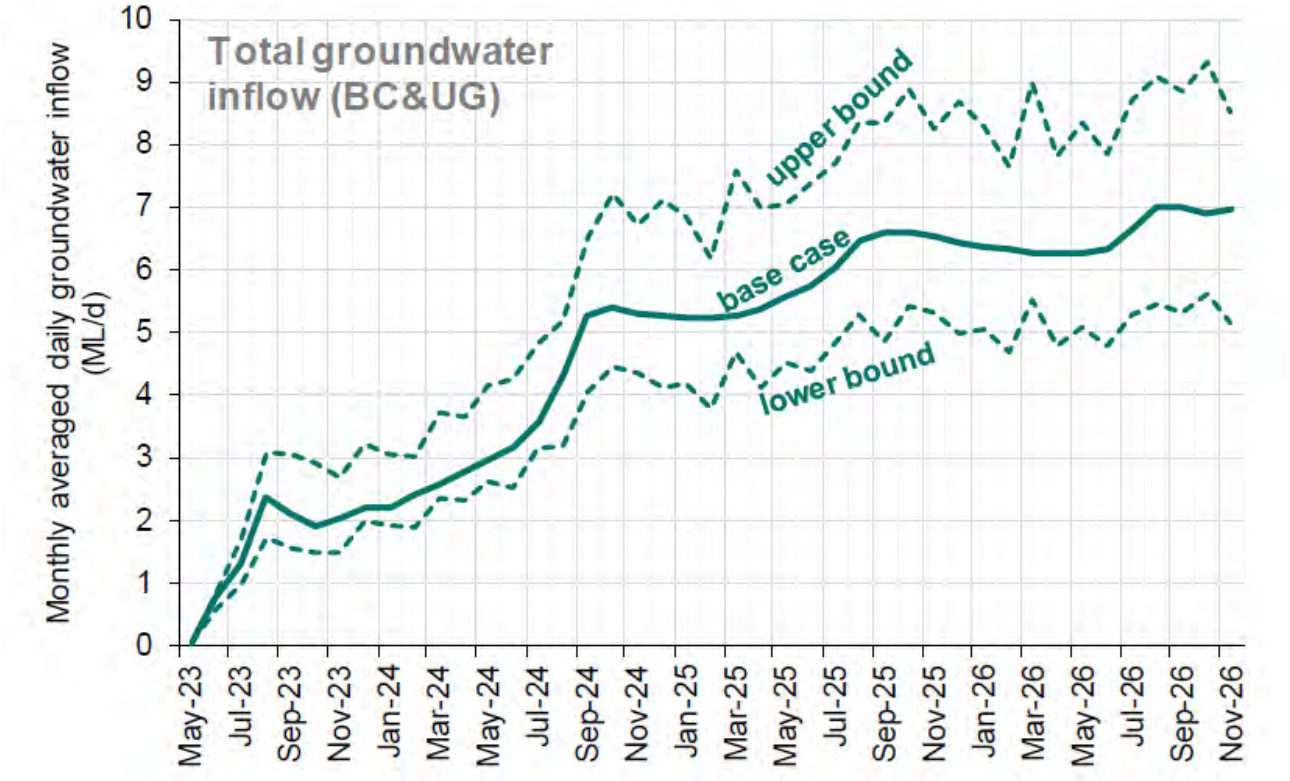


Figure 2-5. Predicted monthly groundwater inflows over the BP33 life of mine. Source: WRM, 2021.

2.2.4 Water balance model

Specialist water consultants WRM have prepared a site water balance model for the period covering the construction and operation phases of the BP33 mine, with an assumed start date of May 2023 and ending November 2026. The modelling report is at Appendix A. Details of the model configuration and calibration are provided in section 3 and Appendix B of the report and key assumptions used are summarised below (from section 3.12 of the report):

- Excess water in the BP33 box cut and underground will be dewatered to the Grants open cut void after once mining in the Grants pit ceases, which is assumed September 2024 based on 1 January 2022 start date.
- The modelled controlled release rate to the drainage line south-east of the mine site (Drainage line 1) would not be capped by a minimum or maximum pump/release rate. Controlled release volumes are only constrained by the dilution requirements in Drainage Line 1 and only occur during the wet season.
- The BP33 box cut sump is assumed to have a volume of five ML. Potential box cut sump overflows would enter the BP33 underground.

Table 2-4 shows a summary of the BP33 water balance results for average climatic conditions. The following points summarise the system performance:

- The mine water balance will be net positive. That is, water inflows will be greater than water losses and usage. This is mainly due to the large volumes of groundwater inflow (6,359 ML), which are close to double the modelled losses and usage (3,327 ML) over the life of mine.
- Additional water disposal methods will be required to manage surplus groundwater. Most of the groundwater inflows received by the BP33 water management system would be transferred to the

Grants site and stored in the finished open cut void. However, other options are required to manage surplus water during the period between the BP33 mine starting and the Grants mine finishing.

- There would be no spills from the BP33 mine water storages (MSD and RWD) for any of the climatic conditions assessed.

The water balance modelling has used scientific information for landowners (SILO) data, which provided a continuous daily data set for 132 years (1889 – 2021). The SILO data provided a base for modelling successive dry and wet years. By accounting for the extremes in the local climatic conditions, the proposal will be resilient to the changes in climate that could occur over the short mine life of approximately 4 years.

Table 2-4. BP33 mine water balance for the period May 2023 to November 2026. Source: WRM (2021)

Description		Average (ML/period)
Water Source (Inputs)	Surface water inflows	401
	Groundwater inflow	6,359
	Inflows from OHD	403
	Bore water inflows	0
	Total Input	7,164
Water Losses and Usage (Outputs)	Evaporation (from water storage)	288
	BP33 demands*	3,039
	Offsite overflows	0
	Total Output	3,327
Site water balance excluding water disposal measures	Total Input-Total Output	3,837
Water disposal measures	Transfers to Grants area	3,197
	Irrigation loss	176
	Controlled releases offsite	342
	Total Disposal	3,715
Site water balance including water disposal measures	Total Input-Total Output-Total Disposal	122

* Includes haul road dust suppression, underground demand and ablutions/surface facility demands

2.2.5 Surplus water management strategies

The water balance model indicates that inflows to the BP33 water management system are significantly greater than the mine site water demand. It is critical that the predicted groundwater inflows are managed to prevent flooding of the mine. Primarily surplus water will be managed by pumping to the Grants open pit void for storage and discharging to the drainage line to the south-east of the mine site (when flows are sufficient to dilute the naturally elevated arsenic concentrations in the to acceptable levels). Land irrigation areas and water treatment (to lower phosphate and arsenic concentrations) may also be required for a short period of time, approximately 16 months, when the water balance model predicts surplus water volumes at BP33 before mining is completed at the Grants open pit. The combination of management options required will depend on the surplus volumes that eventuate and the timing of these in relation to when mining is complete at Grants. The management strategies summarised below will be subject to further consideration through the detailed mine design phase.

Pump to Grants open cut pit void

Most of the surplus water will be transfered to the Grants open cut void. Figure 2-6 shows the monthly volumes that would need to be transferred to keep the BP33 underground dry, which range between approximately 60 ML/month to 180 ML/month over the life of mine. It is assumed that water cannot be transferred until month 18 in the BP33 mining schedule, which is when mining has ceased at Grants (schedule for September 2024). Once transfer of water commences, the Grants open cut void is predicted to accumulate up to approximately 4.7 GL of water by January 2027 (during median climatic conditions), which is approximately half of the total Grants void capacity and so does not pose any risk of causing the pit to overtop.

Details of the modelling conducted to assess the feasibility of transferring water to Grants open cut void is provided in section 4.3.6.1 of the technical report at Appendix A.

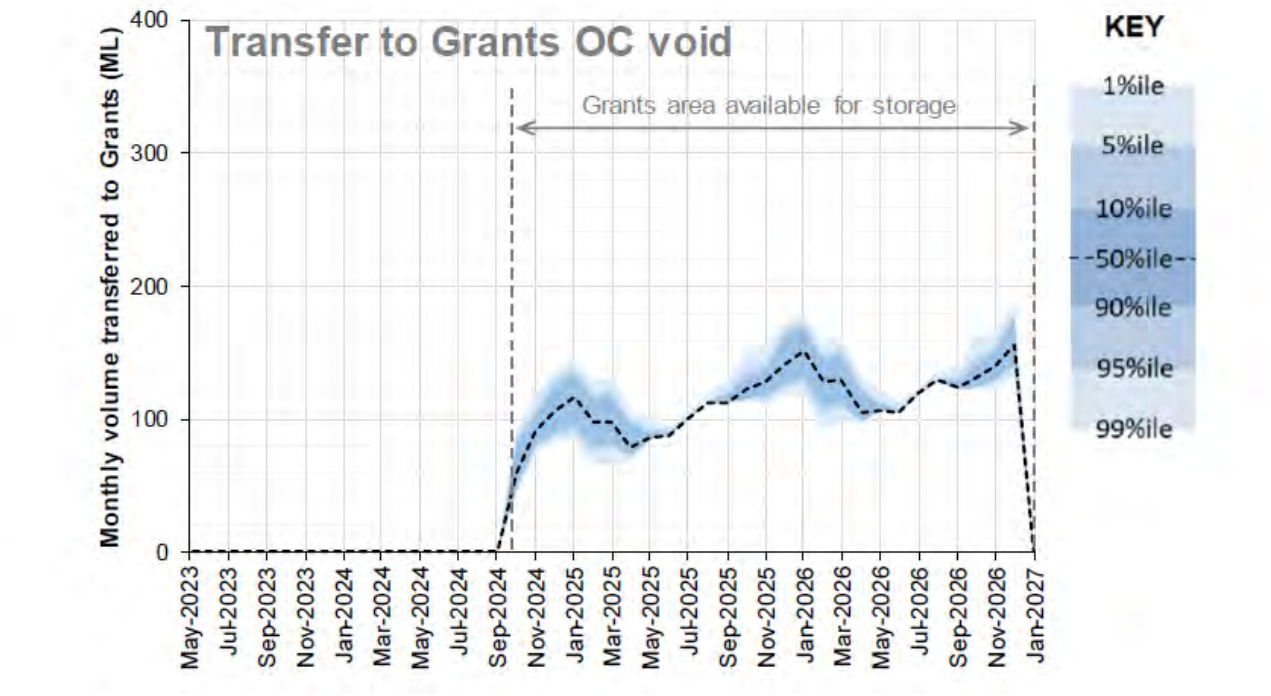


Figure 2-6. Monthly volume of water transferred to Grants open cut void. Source: WRM (2021)

Controlled release (discharges)

Controlled release will occur from the MSD into the drainage line east of the mine. The volumes that can be released by this method are limited by the naturally high arsenic concentrations of groundwater dewatered from the underground, as well as the restricted timing of discharges to periods when the ephemeral drainage line would naturally flow i.e. discharge is not permitted during the dry season. The maximum allowable controlled release rate has been determined based on the dilution factors required to meet the arsenic site-specific guideline value (SSGV) for surface water (0.013 mg/L)[6], and is predicted to fluctuate generally between 1:17 and 1:12 parts[7] MSD water to parts receiving water, depending on the amount of dilution from rainfall runoff.

[6] Source: ANZG (2018) 95% species protection, freshwater

[7] The dilution requirements were based on the modelled arsenic concentration in MSD. The flow volumes in Drainage Line 1 at the ML boundary were estimated using a 210 ha catchment area and the 'natural' Australian Water Balance Model parameters. The arsenic concentration in the receiving water was assumed to be 1 µg/L based on available surface water monitoring data from BP33.

Figure 2-7 shows the modelled controlled release volumes from MSD to the receiving environment under different climatic conditions. This graph shows that in very wet (1%ile) climatic conditions, the site could release up to 150 ML/month in the peak of the wet season. In median (50%ile) climatic conditions, the site could release up to 25 ML/month. Controlled release of water can only be undertaken in accordance with a Waste Discharge Licence under the *Water Act,* which Core will need to apply for prior to commencement of mining.

Details of the modelling conducted to determine the controlled release is provided in section 4.3.6.2 of the technical report at Appendix A.

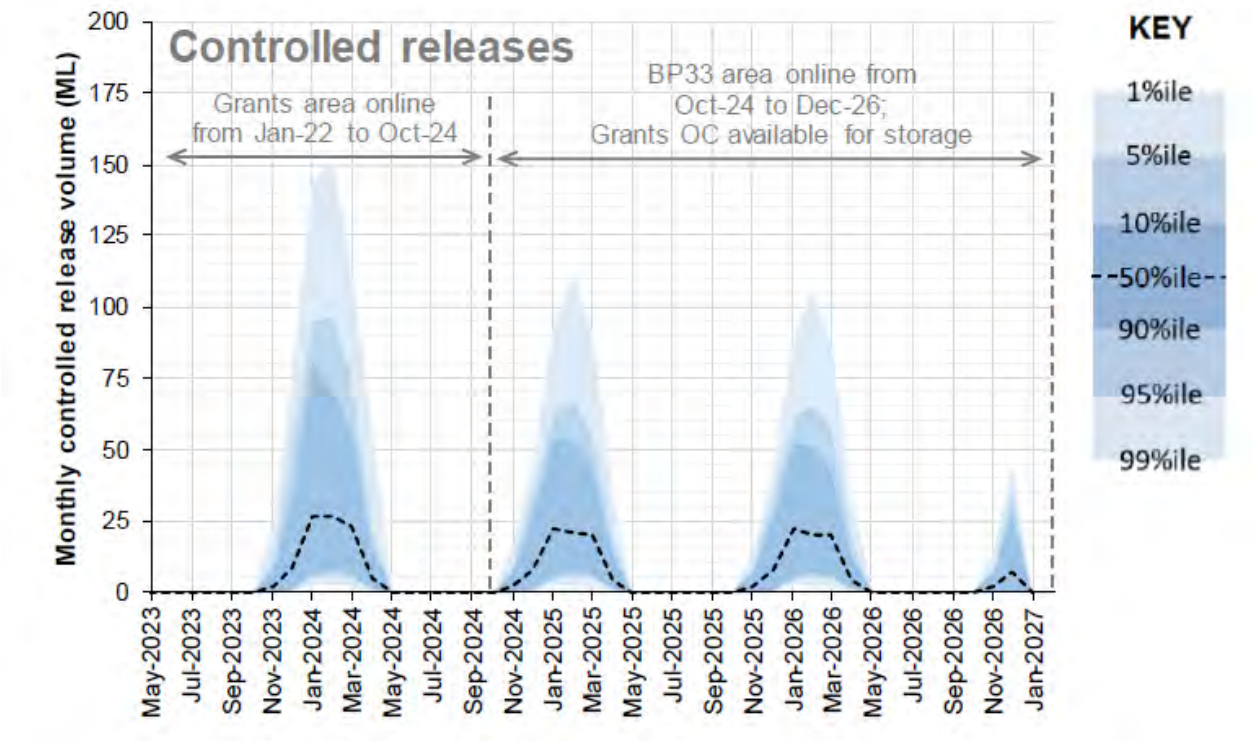


Figure 2-7. Modelled controlled release volumes to drainage line. Source: WRM (2021)

Irrigation

Irrigation of surplus water to a designated land irrigation area may be required during the BP33 start-up phase, prior to the Grants open cut void being available for the transfer of water. The total volume of water requiring disposal during the 16 months start-up phase is estimated to be between 120 ML to 210 ML, depending on the climatic conditions experienced at the time (Figure 2-8). Modelling outcomes indicate that an irrigation area of 20 ha should be sufficient to accept these volumes of water during most climatic conditions. Achievable irrigation rates at BP33, as well as assessment of the area available to irrigate, will be undertaken through the detailed mine design phase to confirm the suitability of this as a water disposal method for the project.

Details of the modelling conducted to determine land irrigation volumes are provided in section 4.3.6.3 of the technical report at Appendix A.

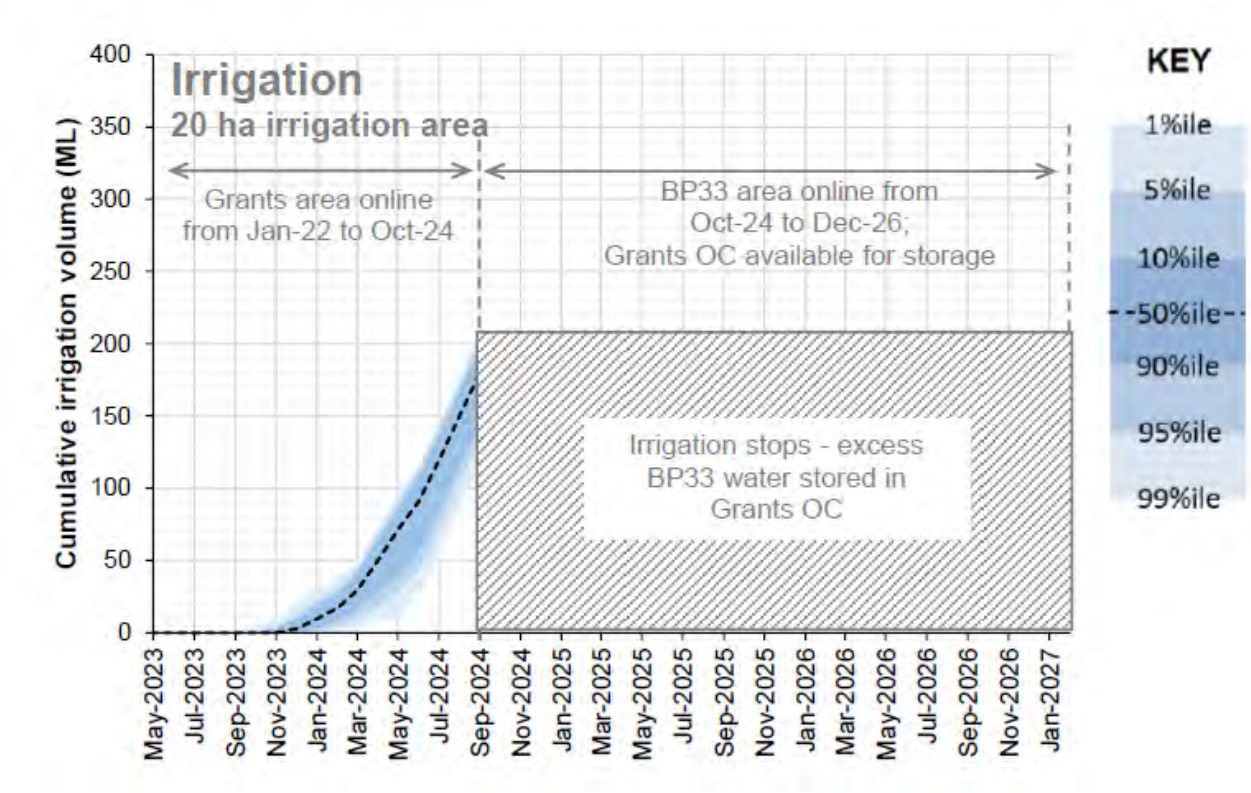


Figure 2-8. Cumulative irrigation volumes during BP33 start-up phase

2.2.6 Contingencies

The water balance model identified the following contingencies that may be used in the event that surplus water volumes greater than predicted:

- Additional mine water storage: This may include constructing an additional 320 ML storage.
- Evaporator fans at Grants Pit: This would increase water disposal opportunities.
- Water treatment for arsenic removal: This could increase controlled release opportunities and water transfer options to clean water storages such as OHD.

Contingencies will be further evaluated through the detailed mine design phase. As the production phase at Grants mine is planned to commence in January 2022, groundwater inflows and dewatering monitoring data recorded at the Grants mine site will be used to refine the groundwater and water balance models for the BP33 projects to aid mine water management planning prior to commencement of mining.

2.3 Mine closure and rehabilitation

Core's closure vision for the BP33 mine site is to return the site to similar to pre-mining conditions so that there is no limitation to future land uses as a result of the mining activities. Closure planning for the BP33 Project will adopt the principles and approaches provided by the *Integrated Mine Closure: Good Practice Guide* (ICMM, 2019). The closure vision will be further developed in consultation with stakeholders, in particular NT Government, as the mine site is located on Crown Land where there is currently no formal land use. The closure vision will guide the development of a detailed Mine Closure Plan (MCP) for submission with the Mining Management Plan (MMP) under *Mining Management Act*.

The mine closure strategy for the BP33 mine involves removing all mining landforms, returning all fresh and transitional waste rock material underground, plugging the portal and vent shaft and backfilling the box cut,

and rehabilitating the site with native vegetation species. There will be no WRD or other mining landforms remaining on site post closure. The underground void once plugged will be left to fill with groundwater and the modelling results provided in Section 9.5.2 predict that natural groundwater levels will return within three years post closure.

Key closure activities and timing are summarised in Table 2-5.

Table 2-5. Key closure activities and timing

Closure activities	Timing (indicative)
Mine planning and approvals phase	
Establish knowledge base to inform closure planning	In-progress.
Engage with stakeholders to develop closure vision and objectives	March 2022
Prepare MCP and submit with MMP	March 2022
Pre-start phase	
Calculation and payment of security bond	Prior to commencement ~April 2023
Operations phase	
Annual review of Closure Execution Plan	Annually
Strip and store topsoil and sub-soil	Month 1 of mining schedule
Segregate waste rock from box cut in WRD 1 for use as box cut backfill	Months 1-6 of mining schedule
Segregate waste rock from underground in WRD 2 for return underground	Month 7-50 of mining schedule
Temporary or sudden closure	
Prepare Care and Maintenance plan for approval by NT Government	If required
Closure and rehabilitation phase	
Return all material in WRD 2 back underground	Month 51-65 of mining schedule
Reclaim material from the box cut WRD to completely backfill the box cut	
Remove all other mining infrastructure and landforms	
Spread the safety bund over the top of the finalised surface of the box cut	
Re-profiling of the final surface	
Subsoil and topsoil re-spreading and contour ripping	
Revegetation and weed control	
Post-closure phase	
Monitoring, maintenance and management	Month 66 onwards
Relinquishment and return of security bond	When closure criteria met

3 ALTERNATIVES CONSIDERED

The *EP* Act requires consideration of alternative, less environmentally damaging approaches, methodologies and technologies. Alternatives considered by Core in mine planning and design are summarised in Table 3-1.

Table 3-1. Summary of alternatives considered by Core in mine planning and design

Aspect	Alternatives and justification
Mining method	Open cut and underground mining methods were considered in optimisations run for the BP33 deposit. The mining method selected is underground sublevel open stope (SLOS) mining. The narrow (5 m to 15 m) ore body width, vertical orientation, and competent host rock ground conditions allows SLOS mining to be a viable low-cost mining method. This option also has the benefit of reducing the proposal footprint and waste rock volumes.
Mine site layout	The mine site layout has been subject to several iterations to utilise the local topography where possible to minimise water flows into the mining area. The box cut and WRD locations have been sited outside of areas subject to inundation or flooding.
Haul route	The option of utilising Cox Peninsula Road for hauling material between the BP33 mine and Grants processing facility was discounted early in mine planning due to the potential impacts on other road users. An internal haul route was identified, and two options were considered. Option 1 involved establishing a new access route over the shortest distance between the two sites. Option 2, the preferred option, involves upgrading the existing track. Whilst the length of the haul route is 1.7 km longer, this route was chosen as it follows higher ground (with less impact to drainage lines) and requires less land clearing.
Water sources	The base case water supply for mining at BP33 comes from OHD. Groundwater bores were considered, but discounted due to the absence of a reliable supply. The groundwater model and site water balance model prepared for BP33, predict that a significant portion of the mine water demand can be met by reusing water dewatered from the box cut and underground mine. This water will be used preferentially, and options for treating the water are being investigated (to remove naturally occurring arsenic), so that it can be used to top up OHD allowing it to spill earlier in the wet season.
Discharges	To minimise discharges, water dewatered from the box cut and underground mine will be treated in the onsite storage dam (MSD) to remove contaminants so that it can be used as a water source for dust suppression. Alternatives/options under consideration for management of surplus water are provided in 2.2.5 above.
Energy supply	The base case power supply for the BP33 mine is on site diesel power generation, and this has been assumed in the GHG emissions calculations. Core is planning to install a power line to connect the Grants Lithium Project site to mains power, which is supplied by the gas-fired power station at Channel Island. The capacity of the grid to supply the mine energy demand has been confirmed with Power Water. The option to connect the BP33 mine site into the grid, will be considered once Grants is operational. Establishment of solar power infrastructure is not considered feasible at BP33 due to the short mine life.
Mine closure and rehabilitation	The preferred closure option for BP33 to comply with NT EPA recommendations involves backfilling. Core has undertaken analysis and determined that backfilling with surface waste material is feasible. Two separate waste rock dumps (WRD) will be established to segregate oxide waste rock (from the box cut) from transitional and fresh waste rock (from the underground), which will allow for progressive backfilling of material to occur as the underground mine stopes are complete. 65% of the underground will be backfilled for stope stability, which will remove all waste rock material from the surface prior to mine closure.

4 STAKEHOLDER ENGAGEMENT

Core began engaging with key stakeholders about the BP33 Project in August 2020, following submission of the Referral to the NT EPA. Further engagement in May 2021 focussed on speaking with the most affected stakeholders (i.e. communities on the Cox Peninsula), having a presence in the local communities and broadly communicating updates to a wide range of stakeholders as practicable. Engagement and communications specialists' company True North Strategic Communications assisted Core in planning and undertaking these activities and prepared the consultation reports provided at Appendix D. The sections below provide details and outcomes of the engagement undertaken, and Core's plans for continuing engagement.

4.1 Stakeholder engagement strategy

The stakeholder engagement strategy for the BP33 Project aligns with the NT EPA's *Guidance for Proponents – Stakeholder Engagement* (2021) and adopts the *International Association for Public Participation (IAP2)* core values as principles that guide good community engagement. Using the IAP2 principles, engagement was conducted at the levels of inform, consult and involve[8]. Key stakeholders were provided with information about Core's proposed activities in electronic and printed format, and were given the opportunity to ask questions, seek more information and provide feedback on the project.

4.1.1 Objectives

The stakeholder engagement strategy defines engagement as an authentic process of involving people in solutions and decisions, listening to understand their perspectives, providing an honest account of people's input and taking seriously the live experience of communities (Munday 2020).

The communication objectives of the strategy were to:

- Inform stakeholders of the BP33 Project details and potential impacts
- Update stakeholders on changes to the Grants Project since previous consultation
- Notify stakeholders of the commitments made by Core as part of the Grants EIS process
- Encourage stakeholders to provide feedback on interest or concerns about the project
- Continue to build on existing stakeholder relationships and trust
- Provide clarity and understanding about the various Core activities in the region, under the Finniss Lithium Project banner.

The engagement objectives of the strategy were to:

- Listen to and understand the priorities and perspectives of all stakeholder groups
- Manage stakeholder expectations
- Provide clarity and information on any issues of concern raised by stakeholders
- Support delivery of projects that are environmentally, economically, culturally and socially acceptable to the community and key stakeholders (i.e., earn social licence to operate)
- Provide regulators with confidence that all positive and negative impacts are well understood and can be managed through all phases of the project
- Provide guidance to the company's long-term social performance.

[8] The IAP2 Public Participation Spectrum incorporates five levels of participation that define the public role in a stakeholder engagement program - *Inform, Consult, Involve, Collaborate, and Empower*. The Spectrum shows that differing levels of participation are legitimate depending on the goals, time frames, resources and levels of concern in the decision to be made.

4.1.2 Key stakeholders

Key stakeholder groups were identified based on them being within the project's area of influence, likely to have an interest in the project, or the potential to be positively or negatively impacted by the project. The key stakeholder groups consulted are listed below:

- Local government including Belyuen Community Government Council, Wagait Shire Council, Litchfield Shire Council
- Aboriginal groups including Larrakia Nation, Kenbi Rangers, Ironbark Aboriginal Corporation, Larrakia Development Corporation and others
- Representatives and people in affected communities, including Belyuen, Berry Springs, Wagait Beach, Cox Peninsula
- Local elected representatives
- Local industry associations including Chamber of Commerce, NT Farmers Association, NT Cattlemen's Association, Tourism Top End and NT Guided Fishing Industry Association
- Non-government organisations, including environmental groups, and Environment Centre NT
- Stakeholders who have requested to be kept informed of project updates
- Stakeholders who have previously provided feedback on the Finniss Lithium projects
- NT Government departments, ministers and/or their key advisors.

A full list of stakeholders is in the stakeholder engagement report (Appendix D, pg.10).

4.2 Approach and methods

Two rounds of engagement activities have been undertaken since submission of the Referral in May 2021.

4.2.1 Stage 1 – July/August 2020

The methods used to engage with stakeholders in July/August 2020 are summarised in Figure 4-1.

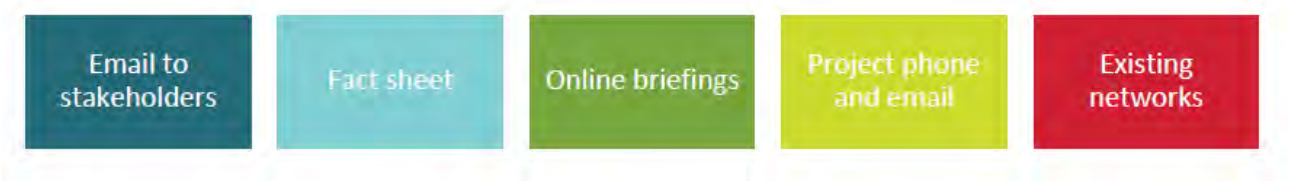


Figure 4-1. Stage 1 tools and tactics

Emails and factsheets were sent to 41 key stakeholder groups, to provide background information about BP33 Project, the broader Finniss Lithium Project and the engagement process. Stakeholders were encouraged to distribute the factsheets to the wider community, to ensure other people were informed of the project and had the opportunity to provide feedback or seek more information. Priority stakeholders were invited to attend an online briefing by Core, while others were offered a briefing or invited to contact Core or True North if they had feedback or questions.

Online briefings were used as a tool to engage with stakeholders due to the social distancing guidelines and domestic travel restrictions associated with COVID-19. Core's Chief Operating Officer, Blair Duncan, conducted 10 online briefings with key stakeholders. The briefings outlined the BP33 Project, provided a status update of Grant project and information about Core's broader Finniss Lithium Project. The briefings allowed stakeholders to engage with Core to ask questions about the project and provide any comments or feedback.

4.2.2 Stage 2 – May 2021

Stage 2 engagement in May 2021 was used as an opportunity to engage more broadly with stakeholders and community members. The methods used are summarised in Figure 4-2. The content of the engagement materials focused on providing key stakeholders and the community with updates and information on:

- Management policies and plans or actions that Core has committed to since the Grants EIS process
- Changes to the Grants project, as a result of the BP33 Project providing a longer-term supply of ore
- Information on the BP33 Project
- Timeframes for start of construction and operations.

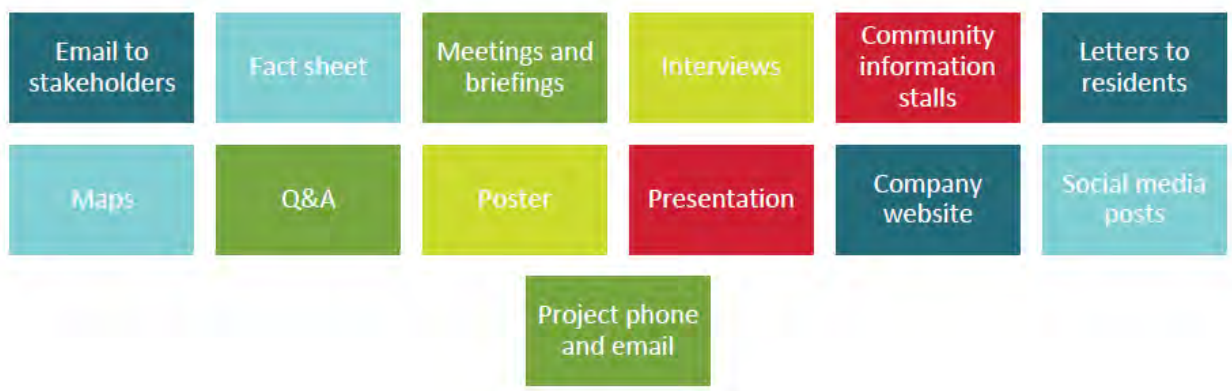


Figure 4-2. Stage 2 tools and tactics

The engagement and consultation effort are summarised in Figure 4-3.

Figure 4-3. Stage 2 engagement and consultation effort

Email and fact sheet

An email and fact sheet were sent to all stakeholders and the fact sheet was made available on Core's website. The fact sheet provided an update on the proposed BP33 Project and updates to the Grants Project. The fact sheet listed the dates, times and locations of the three community engagement stalls as well as an email and phone number for queries and feedback.

Meetings and briefings

Priority stakeholders were invited to attend a briefing by Core while others were offered to contact Core or True North if they had any feedback or questions through the project phone and email.

A total of five briefings were conducted with the following stakeholders:

- Berry Springs Primary School
- Kenbi Rangers and Traditional Owners
- Litchfield Council, including Council members
- Wagait Council
- Larrakia Development Corporation.

Several stakeholders either declined attending the briefing, were not available or did not respond to the offer.

Briefings provided an overview of both projects, including the mine design, water use and sources, environmental management, rehabilitation and closure, traffic and road safety, employment and contracts, and timeframes. A number of maps were used to show the location of the project, the mine site layout and the proposed haul route between Grants and BP33. An internal Q&A document was produced to ensure consistent messaging from all project team members during engagement activities.

Community information stalls

Three community information stalls provided an opportunity for Core and the local communities to discuss the project and provide feedback. Information about the project and community information stalls was posted to various Facebook groups and pages as well as being sent to local contacts for promotion on social media. Figure 4-4 summarises details of the community engagement stalls and the number of people that attended.

Figure 4-4. Community engagement stalls information

Interviews

Targeted interviews were conducted with a select group of five stakeholders to help inform the social impact assessment (SIA):

- Kamfari – Darwin Motorcycle Club President
- Belyuen Council, Chief Executive Officer
- Wagait Shire Council, Chief Executive Officer and President
- Litchfield Shire Council, Mayor
- Wagait beach Supermarket, Owner

Poster

A poster was displayed at a several locations to advertise the community stalls and included a QR code to access the fact sheet for more information. The poster was displayed at the Berry Springs Shopping Village, Wagait Beach Supermarket, Berry Springs Tavern, the Mandorah Ferry and ferry and was also sent to local member Ian Sloane's office, Wagait Shire Council, Litchfield Shire Council, Cox Country Club, Dundee Social and Recreational Club, Sandpalms Resort and the Lodge of Dundee (Figure 4-5).

Figure 4-5. Photos of the poster displayed on community notice boards

Letter to residents

A letter to residents with the fact sheet was pegged on approximately 45 fences along the haul route on Cox Peninsula Road to advise the planned start of construction for Grants later this year (2021) and to outline the haul operations, road safety measures and provide details about the information stalls. The letter included the phone and email to contact for more information. Five incoming phone calls were received in response to the letter and no emails.

4.2.3 Engagement with Aboriginal people

The stakeholder engagement strategy sought to identify and engage Aboriginal people with ties to the BP33 Project area and/or an interest in the project. The following stakeholders were emailed factsheets and those marked with an asterix were briefed by Core in May 2021:

- Aboriginal Areas Protection Authority (custodians)
- Larrakia Development Corporation*
- Larrakia Nation
- Northern Land Council
- Ironbark Aboriginal Corporation
- Belyuen Community Council (represents a number of Larrakia and non-Larrakia Aboriginal residents of Belyuen, the closest community to the site)
- Kenbi Rangers*.

Core sought advice from Belyuen Council members on how they would like Core to engage with the Belyuen community members. The Core project team visited the region in May 2021 and held a number of information stalls and briefings. Core did not visit Belyuen community at this time due to advice from the Belyuen Community Government Council that Core should brief the elected members on the project first, and seek elected members' advice on engaging with the community. Council representatives advised that a community meeting should be held in late June 2021. Due to COVID-19 restrictions, Core representatives were unable to return to Darwin in June; however, Core has advised Belyuen Council that it will engage with community residents in line with Council's suggested approach at a time that suits the community.

The Kenbi Rangers and Tommy Lyons Group (recognised as Traditional Owners for much of the Cox Peninsula under the Kenbi Land Rights Claim) were briefed on the project, as was the Larrakia Development Corporation. Many Belyuen residents attended the information stall at the Wagait Beach Supermarket and

discussed the project, opportunities and impacts with the project team. Core and True North had previously held a meeting at Belyuen community with Ironbark, an Aboriginal employment agency, community and council members as part of the Grants Project engagement, in December 2018.

4.3 Findings

Generally, the feedback received from the community was positive, with support for the potential employment opportunities and economic benefits. Some people are not supportive of the project, mainly citing environmental concerns. The stakeholder engagement reports Appendix D document the comments, queries, feedback received from each individual stakeholder group. Table 4-1 summarises the key feedback themes.

Table 4-1. Stakeholder engagement key feedback themes received

Key theme	Feedback received
Local jobs and benefits	Stakeholders expressed a lot of interest in the employment and contracting opportunities for locals. Many stakeholders and community members are eager to see the project commence, and the benefits received by the community. They were pleased that Core was committed to hiring a local workforce and a longer mine life at Grants had the potential to encourage specialised workers to relocate to the region. The potential benefits identified by stakeholders included purchasing of goods and services from local businesses, providing sponsorship for community events and groups and engagement with the Berry Springs Primary School for educational purposes.
Opportunities for Aboriginal employment and contracts	Local Aboriginal organisation expressed their interest in engaging with Core to identify work and contract opportunities, that would benefit Aboriginal people over the long term. Many local people from Belyuen were interested in what employment opportunities would be available as there are few job opportunities in Belyuen.
Road safety and degradation	Concerns from community members and stakeholders regarding the existing unsafe, narrow and poor condition of Cox Peninsula Road. Community members are wanting to see road conditions improve. A number of queries were received regarding how Core would contribute to safety problem and decreasing quality of the road.
Ongoing communication with the community	Stakeholders raised questions about Core providing information to the wider community about the projects local employment opportunities. Core advised that no information could be certain until a final investment decision announced, which is scheduled for September 2021.
Rehabilitation and closure	Backfilling of the BP33 mine was positively received. Questions were raised about timeframes of rehabilitation, ongoing monitoring and what will happen to the mining infrastructure decommissioned from site. All infrastructure will be removed from site.
Water use and discharge	Water use is a sensitive topic in the community surrounding the project. Concerns were raised about how the project's use of water might impact groundwater water, water availability in the Cox Peninsula area and discharge of mine affected water. Core advised that no water from the Berry Springs Dolostone Aquifer will be used and that Core's water use would not impact water availability of residents. There was some misconception that the project will contaminate water in the area, and there was mention of OHD being used for recreational purposes and how this would be affected by the mine.
Dust	Dust from haulage of ore and BP33 operations affecting nearby community and residents and what monitoring and dust suppression measures will be implemented was raised. Core advised about their dust suppression and air monitoring measures and outlined they will share the air quality results with the community.
Contribution to local economy	Positive comments and feedback was raised about the positive impact of providing employment to local people and the ability for Core to give back to the community.

4.4 Future opportunities for engagement

A Stakeholder Communication and Engagement Plan has been prepared as a key component of the Social Impact Management Plan (SIMP) for the BP33 Project (Appendix E). Following submission of this SER, Core will reconnect with stakeholders and encourage them to engage with the public comment process run by the NT EPA. Key stakeholders will be engaged throughout the life of the project using the following communication tools:

- Complaints, concerns, feedback and grievance hotline platform
- Social media and local job portals to communicate employment opportunities
- Regular meetings with relevant Aboriginal stakeholder groups, Department of Infrastructure Planning and Logistics (DIPL) and necessary local Governments, to discuss the highest priority stakeholder concerns:
    - Road safety and traffic
    - Local content for jobs and contracts
    - Environmental monitoring results (i.e., air quality, water quality etc).

5 RESPONSE TO SUBMISSIONS

Table 5-1 addresses submissions received by the NT EPA from stakeholders during the BP33 Project Referral public exhibition phase. The Referral was available for public comment for a period of 20 business days from 10 July 2020 to 10 August 2020. Ten submissions were received: one from the Aboriginal Areas Protection Authority (AAPA), seven from NT Government agencies, one from Environment Centre NT and one from a private individual

Table 5-1. Summary table of submissions and responses

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
Aboriginal Areas Protection Authority (AAPA)	**Aboriginal Sacred Sites protection** • AAPA issued an Authority Certificate to Core Lithium on 10 September 2019. • The information provided in the Referral incorrectly states there are no sacred sites in the area. There is one sacred site within the proposed project area. • It would be useful to understand the extent of road use in proximity to known sacred sites to understand possible pressures on these sites.	The NT EPA Direction required Core to provide: • A copy of the relevant Authority Certificate for the proposal (C2019/077). • Details about how potential impacts to the sacred site in the proposal vicinity would be avoided and/or mitigated.	Core have provided the AAPA Authority Certificate (C2019/077) at Appendix F (redacted). A further variation to the certificate will be sought by Core as the extent of the current certificate covers only part of the BP33 mine site. The current certificate identifies one sacred site (no. 5072-178 - a White Ochre Collection site) and associated restricted work area (RWA1) within the Subject Land. Another site is also shown on the map but is outside of the subject land covered by the Authority Certificate The identified sacred sites are both located on the northern side of Cox Peninsula Road, whereas the mining activities are located to the south of the road. As the sites are not located near to the mining footprint, they will not be impacted. Core will utilise the Cox Peninsula Road to haul product from the mine to Port. The sacred site will not be impacted by use of the public road. It is noted that the sites are located on Crown Land. Core has an Exploration Permit over the area, but there are no mining activities authorised to occur there. As a result, Core does not currently have any control over public use and access along the tracks in the area.
Department of Infrastructure Planning and Logistics (DIPL)	**Traffic Management Plan (TMP) and Traffic Impact Assessment (TIA)** • Core states that the previous TIA and TMP for the Grants Lithium Project will be used for this project. • The information provided in the Referral does not reflect changes to the socio-economic environment and transport conditions over the extended time period of operations. • The proponent will also be required to confirm requirements in relation to the proposed 2nd access from the Cox Peninsula Road.	The NT EPA Direction required Core to provide: • Detail about the extent of potential traffic impacts of the proposal and how those impacts would be managed.	Core engaged GHD to prepare a Traffic Impact Statement (TIS) to assess the extent of potential traffic impacts on public roads associated with the BP33 mine. The TIS was prepared with reference to the AustRoads Guide and is provided at Appendix G to the SER. Conclusions and mitigation measures are summarised below from GHD (March 2021): • Up to 10 heavy vehicle traffic movements will be associated with the haulage of material from BP33 Underground Mine to Darwin Port, with approximately one heavy vehicle movement during the peak hour. The largest size vehicle is proposed to be a quad road train. This is consistent with the haulage movements with the Grants Open Pit Mine, which is already approved.

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			• BP33 mine site staff and general operation traffic will generate approximately 10 light vehicle movements and 10 heavy vehicle movements a day, with staff travelling to and from site. There will also be staff retained at the Grants Mine for processing operations resulting in up to 20 light vehicle movements and 5 heavy vehicle movements a day. There is likely to be a total of 15 light vehicle movements and 6 heavy vehicle movements associated with staff and general operation traffic during the peak hour. • An assessment of the increase in overall traffic on haul roads as a result of traffic generated by the site shows mostly insignificant traffic increases on the majority of roads. There may be some roads which may require further analysis due to percentage increases greater than 5%. • The operation of the BP33 Underground Mine will occur at the end of the operation of the Grants Open Pit Mine and utilise the same haul roads. 36% of trips (20 vehicle movements per day) are new trips associated with BP33. • Site access for heavy vehicles will continue to be via the access into Grants Mine approximately 17 km northwest of the Fog Bay Road. Construction of the intersection commenced in October 2021. A second access from Cox Peninsula Road is not currently part of the mine plan. Core are committed to actively managing the potential traffic impacts on Cox Peninsula Road and other roads that will be utilised for the Finniss Lithium Project. These impacts were assessed through the Grants Lithium Project EIS process and a Journey Management Plan has been prepared and approved for the haulage operations, which includes the following key management strategies: • Trucks will be speed limited to 80 km/hr through intersections and the Berry Springs township, and further limited to 40km/hr through the Berry Springs school precinct (20km/hr below the signed speed limit). • Truck speeds will be monitored through the use of IVMS that monitor speed, fatigue and driver behaviour in real time. The school will be 'geofenced' in the IVMS to a restricted speed, which will result in automatic notification to QUBE headquarters if speed limits are exceeded. • Core are committed that truck movements will be restricted past the school during drop-off and pick-up times (7:45 to 8:45am and 2:30 to 3:30pm) (after direct engagement with the Principal of Berry Springs Primary School).

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Department of Chief Minister	**Social Impact Assessment (SIA) and Social Management Plan (SMP)** • The referral states that 'the Social Impact Assessment and Management Plan prepared for the Grants Lithium Project adequately capture the risks associated with an extension to the life of the mine' • The information provided in the Referral does not provide information specifically regarding potential pressures of social and economic impacts and proposed mitigation for the Finniss Lithium Project. **Greenhouse Gas Assessment** • The information provided in the Referral does not provide an assessment of project's greenhouse gas emissions, and the impact on the Territory's total greenhouse gas emissions.	The NT EPA Direction required Core to: • Conduct a Social Impact Assessment (SIA) in line with the New South Wales (NSW) Social Impact Assessment Guideline. • Provide an estimate of scope 1 and 2 greenhouse gas emissions and describe measures that would be implemented to reduce emissions to as low as reasonably practicable.	A SIA and SIMP have been prepared for the BP33 mine and are appended to the SER - see Appendix E and Appendix J. The approach and findings are summarised in Section 4 of the SER. Core engaged Environmental Resources Management (ERM) to prepare a Greenhouse Gas Assessment of the Finniss Lithium Project, including Grants and BP33 mines. Details of the study and results are reported in Section 12.4 of the SER. The study predicts average annual emissions over the seven and half year mine life are approximately 63,000 tonnes $CO_{2\text{-}e}$[21], which equates to an increase of approximately 0.29% of the NT's total reported annual emissions.
DPIR (now Department of Industry, Tourism and Trade (DITT))	**Geochemical studies, water balance, groundwater quality and dam design** • DPIR acknowledges that geochemical investigations and groundwater studies are ongoing. Should these studies and relevant mitigation measures confirm the low environmental risk of the proposed development, DPIR anticipates that the proposal can be managed under the *Mining Management Act 200*1.	The NT EPA Direction required Core to provide: • The results of additional geochemical testing. • Further information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal. • Provide details of the locations of groundwater monitoring bores in the vicinity of the proposed ROM and WRD areas.	Core has undertaken a range of additional studies and investigations since the Referral was submitted. These are summarised in Section 6.1 of the SER and technical reports have been appended. The results of the studies were used to inform the EIA undertaken for each of the environmental factors presented in the SER. The groundwater bore network installed in September 2020 includes 13 groundwater monitoring bores located upgradient and downgradient of the mine footprint (including both WRDs and the ROM pad) installed at both shallow and deep depths (refer to section 5 Appendix C draft WMP). These bores were sampled monthly for 6 months over the 2020/21 wet season until March 2021 and are now continuing to be sampled every 3 months throughout the period before and during mining. Any potential seepage into groundwater from the WRD or ROM during surface storage of waste rock will be detected through the monitoring program. Baseline groundwater quality results in all 13 bores are presented in section 5 at Appendix C draft WMP.

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Department of Environment and Natural Resources (DENR) – now Department of Environment, Parks and Water Security (DEPWS)	**Terrestrial ecosystems** • DENR considers that the Referral provides sufficient information to make an assessment decision on the proposal's risks to terrestrial flora and fauna. • The Flora and Fauna Division considers that there is uncertainty around the presence of *S. ensatum* within the project footprint and potential risks to the species.	The NT EPA Direction required Core to: • A *Stylidium ensatum* survey report.	A targeted survey for *Stylidium ensatum* was undertaken at the appropriate time of year (June 2020) using accepted survey methods. The survey report is appended to the SER – see Appendix I. The species was not detected and there is a high level of confidence that it does not occur in the area.
Department of Health (Medical Entomology)	**Biting insects** • The creation of water dams, roads across drainage lines, and sediment ponds, has the potential to increase mosquito populations at the mine site and nearby vicinity, potentially increasing the mosquito borne disease risk to workers. • No biting insect studies are considered necessary for this project, due to short life of mine. • Recommended that biting insect management incorporated into relevant site management plans and workforce inductions.	The NT EPA Direction required Core to provide: • Advice with regards to existing biting insect populations at the site, and measures to reduce the potential to create new mosquito breeding sites during all phases of the proposal.	The proposed BP33 mine site is located close to salt and freshwater mosquito breeding habitats, and it is expected that mosquitos and biting midges will be present throughout the year. The northern salt marsh mosquito (*Aedes vigilax*) the most important pest mosquito in the Top End[9], and other saltwater breeding species, may disperse to the site from any breeding areas associated with West Arm, Bynoe Harbour and the broader coastline of Cox Peninsula. The common banded mosquito (*Culex annulirostris*), the most important disease-carrying mosquito in the NT[10], and other species that breed in natural freshwater environments, could potentially breed in the OHD (a permanent man-made dam adjacent to the mine site) throughout the year and in the ephemeral drainage lines and seasonally flooded areas during the wet season. The mine site has potential to create mosquito breeding habitat associated with onsite water storages, sediment dams, storm water drains, onsite wastewater management systems and irrigation areas. Because there will be no onsite accommodation camp, the risk to mine workers from exposure to biting insects will be limited. Night shift workers will be at greater risk of exposure; however, exposure will be limited by all workers wearing long sleeved shirts and pants as part of their standard Personal Protective Equipment. The risk posed to the community by any biting insert populations around the mine site is limited due to the site being located more than 33 km from any population centre and at least 10 km from any rural residence. Core will adopt the relevant mitigation and monitoring actions provided in the *Guidelines for Preventing Mosquito Breeding Sites Associated with Mining Sites* (DoH, 2005).

[9] *https://nt.gov.au/wellbeing/emergencies-injuries-and-accidents/bites-and-stings/insects-of-medical-importance*

[10] *As above*

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Department of Tourism, Sport and Culture	**National Parks and Tourism** • The Department does not foresee impact upon the environmental, social or cultural values associated with the Blackmore Conservation Reserve or Litchfield National Park. • Extending life of mine will have ongoing benefits for driving demand for aviation, tourism and hospitality services.	Not applicable	Submission noted. No action required.
Department of Attorney General and Justices	**NT WorkSafe** • The information provided in the Referral does not recognise the requirements under the NT WorkSafe Administered legislation.	Not applicable	Core is aware of our obligations under workplace health and safety legislation, including the requirement to provide to NT Work Safe a certified Risk Management Plan prior to commencement of any mining or related activity.
Environment Centre NT (ECNT)	**Stakeholder engagement** • ECNT acknowledge the ongoing consultation that was undertaken by the proponent in respect to our organisation.	The NT EPA Direction required Core to provide: Additional information to demonstrate that affected communities, including Aboriginal communities, have been consulted.	Thank you for your acknowledgement of our efforts. Core has continued to engage with the community in relation to our plans for the Finniss Lithium Project. Section 4 of the SER provides details of further activities undertaken over the past 12 months since the Referral was submitted for the BP33 underground mine.
Environment Centre NT (ECNT)	**Cumulative impacts** • Concerns that development is being undertaken in a piecemeal manner. This makes it difficult to assess cumulative impacts particularly regarding drawdown of groundwater from the Burrell Creek Formation, wastewater discharge and impacts on the community from increased industrial vehicle movements. • We believe that if Core Lithium presented the full extent of the plans for Lithium extraction on the Cox Peninsular…. there would be increased community interest and engagement in the various projects.	The NT EPA Direction required Core to provide: • Additional information to address potential significant impacts, including cumulative impacts, to Terrestrial Ecosystems, Hydrological Process, Inland Water Quality and Community and Economy factors.	Development of the Finniss Lithium Project is deliberately being undertaken in a staged manner to minimise risk. Through our stakeholder engagement activities, Core has been open and honest about the potential for future expansion and/or extension of our mining activities across our leases held in the Finniss River region. The SER prepared for the BP33 underground mine proposal assesses cumulative impacts from the concurrent operation of the Grants and BP33 mines where relevant. The specific issues raised by ECNT in relation to cumulative impacts from drawdown of groundwater from the Burrell Creek Formation, wastewater discharge and impacts on the community from increased industrial vehicle movements, are responded to below. Any further expansion of mining activities at the Finniss Lithium Project is subject to the outcomes of exploration activities and findings of feasibility studies. All future proposals will be subject to environmental assessment and approvals under both the *Environment Protection Act 2019* and the *Mining Management* Act, through which Core is required to address cumulative impacts associated with our own activities and other activities on the Cox Peninsula. We believe there has been a good amount of interest and engagement from the community. Section 4 of the SER provides details of engagement activities undertaken since the Referral was submitted.

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			Core have engaged widely, and we note there has been a high level of community interest, especially in relation to employment and training opportunities, as works have commenced on constructing the Grants mine in October 2021.
Environment Centre NT (ECNT)	**Level of Assessment** • We strongly urge this project to be assessed at the level and under the methodology of an 'Environmental Impact Statement' (EIS). • It is concerning that under the Supplementary Environmental Report (SER) methodology, the proponent merely needs to respond to the limited comments we can provide here in the referral.	The NT EPA directed Core to prepare a SER.	The NT EPA, following review of stakeholder submissions and information provided in the Referral, decided on assessment at the level of a Supplementary Environment Report (SER). The Notice of Decision, Statement of Reasons and Direction to include additional information in the SER are available on the NT EPA website. Core has responded to the direction provided by the NT EPA and we believe that the SER provides a comprehensive assessment of the environmental impacts associated with the proposal. It is important to clarify that the SER will be made available for public comment and all stakeholders will have a further opportunity to comment through that process. The NT EPA is required to take all comments into consideration when making a decision on the proposal and is able to request additional information from Core if required to adequately respond to issues raised.
Environment Centre NT (ECNT)	**Traffic Impacts** • Need to assess cumulative impacts on the community from increased industrial vehicle movements.	The NT EPA Direction required Core to provide: • Detail about the extent of potential traffic impacts of the proposal and how those impacts would be managed.	In relation to increased industrial traffic, we acknowledge the concerns raised by the community in relation to traffic and road safety on Cox Peninsula Road. BP33 mine will not increase the number of haul trucks on the Cox Peninsula Road because the mine schedule is designed so that the ore from BP33 comes online once Grants open pit is finished. There will be an extended period of haulage activities along Cox Peninsula Road, approximately 7 years including the Grants and BP33 mines, which could be further extended if further ore resources are identified in the area. Core will implement all commitments made through the Grants and BP33 mine approvals processes in relation to road safety and will continue to engage with the community and other stakeholders in relation to this issue once the mine operations commence.
Environment Centre NT (ECNT)	**Groundwater** • We believe that there is a risk this project will have significant impacts on groundwater. • This referral offers no figures on groundwater requirements, and we are unable to assess the cumulative impacts of the groundwater requirements of BP33 and the Grants Lithium Project.	NT EPA Direction required Core to provide: • Additional information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater	We acknowledge that the sustainable use of groundwater and surface water resources is a community priority. Core has engaged various surface water and groundwater modelling studies to inform identification of a sustainable water supply for the mining operations and these studies provide confidence that our water use will not limit water availability for other users or cause significant long-term environmental impacts.

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	• This referral does not address the NT water allocation framework and certainly does not offer scientific research to support any use beyond the 'allocated' 20% water extraction limit. • Despite the Burrell Creek Groundwater aquifer having no connection to the Berry Springs Dolostone aquifer, the use of precious groundwater resources and the role of water allocation standards is very much in the forefront of community concerns.	resources that may be affected by the proposal.	Details of the operational water demands and water sources that will be used to supply water required for dust suppression, underground mining and ablutions at BP33 are provided in section 2.2.1 and 2.2.2 of the SER. Core is not proposing to seek any groundwater extraction licences, as the water balance model, summarised in Section 2.2.2 of the SER, indicates that the mine water demand can be supplied from capture and reuse of surface water and groundwater inflows, and extraction from the existing Observation Hill Dam under a Surface Water Extraction Licence. In relation to the cumulative impacts to groundwater, Section 9.5.2 of the SER presents the findings of the groundwater modelling work done to assess the combined impacts of Grants and BP33 mines. The modelling indicates there is no interaction between the groundwater drawdown cones associated with each of the mines and therefore there is no potential for cumulative impacts to occur. Section 9 of the SER provides a detailed assessment of potential impacts to surface water and groundwater hydrological processes based on the results of further studies undertaken since the Referral was submitted.
Environment Centre NT (ECNT)	**Surface Water** • It is unsatisfactory that it is stated in the table on page 40 of supporting referral document that there will be no impact on surface water and yet there will be a "decrease flows in the downstream ephemeral creek by 20-30%" which flows in Charlotte River". • This creek is clearly being impacted and potentially sacrificed for the project. This referral highlights that there is a potential for cumulative impacts with altered surface water flows. • We question whether simply monitoring and measuring the flows and habitat condition of the West Arm and Charlotte River catchments once the various Core Lithium projects are underway, with a condition to report and manage, is an adequate way to address this risk. • We are not satisfied with the assumptions applied to surface water in this referral, to conclude that there is no impact on surface water.	NT EPA Direction required Core to provide: • Additional information in relation to water take rate and volume to demonstrate alignment with the NT Water Allocation Planning Framework.	Section 9.5.1 of the SER provides a detailed assessment of potential impacts to surface water flows in the watercourses downstream of the BP33 mine and Section 7.5 assesses the potential impacts of reduced flows to riparian vegetation. The surface water and groundwater modelling indicate that riparian vegetation that occurs along the minor ephemeral watercourse downstream of the Observation Hill Dam (OHD) and mine site could be stressed by the combined effects of groundwater drawdown and reduced overflows from the OHD spillway while the dam is being used as a water supply. The zone of potential impact encompasses a 4.5 km section of stream order one ephemeral watercourse. Once mining ceases, the water levels beneath the riparian vegetation are predicted to recover to pre-mining levels within three years. The resilience of the riparian vegetation to this short period of reduced water availability is difficult to predict with certainty and will need to be monitored to inform mine closure and rehabilitation requirements – a monitoring program is provided in the Water Management Plan submitted with the SER. Surface water modelling indicates the percentage reduction in flows at the Charlotte River outlet to Bynoe Harbour across the wet season months does not exceed the threshold established in the Territory Water Allocation Planning Framework, which requires that extraction for consumptive uses will not exceed the threshold level equivalent to 20 per cent of flow at any time in any part of a river.

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Environment Centre NT (ECNT)	**Wastewater discharges** • Need to assess cumulative impacts from wastewater discharges occurring at Grants and BP33.	NT EPA Direction required Core to provide: • Additional information in relation to discharges, treatment that provides for protection of at least 95% of aquatic ecosystem species prior to discharge and to demonstrate how the implementation of mitigation strategies would mitigate significant impacts of water discharges on the receiving environment.	In relation to wastewater discharge, cumulative impacts are not predicted to occur because the Grants and BP33 mines are located in different catchments – Grants mine is in the West Arm catchment of Bynoe Harbour, whereas BP33 mine is in the Charlotte River catchment of Bynoe Harbour. Section 2.2.5 of the SER presents details of the discharges predicted to be required to manage surplus water at BP33 during each wet season. Controlled release will occur into the drainage line east of the mine, which is in the Charlotte River catchment. As most of the inflows to the mine will be managed by reusing the water for dust suppression and pumping water to the Grants open pit, the requirement for discharges has been minimised and is not predicted to impact water quality in Charlotte River.
Environment Centre NT (ECNT)	**Waste Rock - Potentially Acid Forming (PAF), Zinc, Arsenic** • This referral clearly identifies that there is "evidence that fresh phyllite may include PAF material" (page 21) with further testing 'to quantify the likely volume of PAF material". "Fresh rock may also contain water leachable arsenic and zinc", with naturally occurring radioactive material (NORM) detected in samples. • It is imperative that the characteristics of the waste rock is fully researched and presented for comment and scrutiny in an EIS. It is also imperative that the impact of NORM on the surrounding environment, not only on human health, be researched and presented.	The NT EPA Direction required Core to provide: • The results of additional geochemical testing undertaken to demonstrate appropriate representation of samples with higher sulfur content and to quantify the amount of Potential Acid Forming (PAF) material present and the potential for water leaching of aluminium, arsenic and zinc.	Further geochemical test work has been undertaken on waste rock and ore samples from the BP33 mine. The test methods and results are provided in the technical report appended to the SER. Section 8 of the SER summarises the test results and provides an assessment of the risks of Acid Rock Drainage occurring. The geochemical studies indicate that the waste rock and ore pose a low risk of acid drainage as there are very limited volumes of PAF material present. Longer-term kinetic test work is being undertaken to further assess the potential for metalliferous drainage from short-term storage of waste rock in the temporary WRD's to determine requirements for management of seepage and drainage from these areas. The mine closure concept involves placing transitional and fresh waste rock materials back underground and backfilling the box cut with oxide waste rock, which further reduces the likelihood of legacy issues associated with the mine. In relation to Naturally Occurring Radioactive Materials (NORM's), test work undertaken at Grants and BP33 has not detected the presence of NORM's associated with the rock types being mined.
Environment Centre NT (ECNT)	**Threatened Species** • We need to see the results and methodology of field survey June/July 2020 for threatened plant *Stylidium ensatum* to make comment and identify the risk to this species. • A fauna survey threatened species must be undertaken in the project areas. This was not undertaken for the Grants project under the assumption that "there are many areas of	NT EPA Direction required Core to provide: • A *Stylidium ensatum* survey report.	A targeted survey for *Stylidium ensatum* was undertaken at the appropriate time of year (June 2020) using accepted survey methods. The survey report is appended to the SER (Appendix I). The species was not detected and there is a high level of confidence that it does not occur in the area. Surveys were also previously undertaken for the threatened plant species *Typhonium praetermissum.* The species was not detected and there is a high level of confidence that it does not occur in the area.

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
	suitable habitat for these species throughout the Cox Peninsula, and the quality of that habitat within the project area is similar to that elsewhere in the region". The Cox Peninsular attracts many local and tourist visitors all year round, with much of the land regularly accessed, thus there are potentially few undisturbed areas for threatened fauna. There needs to be detailed surveys of threatened fauna in the Project area for us to comment on potential impacts.		In relation to threatened fauna surveys, for both Grants and BP33 mine sites, there have been habitat assessments and surveys undertaken to determine the likelihood of threatened species occurring. These assessments have been undertaken by qualified ecologists from EcOz Environmental Consultants and the survey reports were appended to the BP33 Referral and the Grants Lithium Project EIS. The surveys concluded that area does not contain habitats that are likely to support significant populations of any of the listed threatened fauna species that occur in the region and on this basis targeted surveys have not been undertaken.
Environment Centre NT (ECNT)	**Renewable Energy** • We note that Core Lithium has become a member of the European Battery Alliance (EBA250), an organisation committed to driving a sustainable battery industry. Given the EU's commitment to the Paris Agreement and the attention they are giving to the full life cycle carbon emissions of their products and the extra length of Core's projects, renewable energy must be considered for this project.	The NT EPA Direction required Core to provide: • Additional information in relation to an estimate of Scope 1 and 2 emissions, proposed energy sources and how the impacts of a changing climate have been considered in relation to the proposal.	Joining EBA250 is a significant signal of Core's intent with regard to renewables. Core is looking at renewables projects that will complement & contribute to the Finniss Lithium Projects longer mine life. When these projects are further advanced, we will be able to discuss them and their favourable impact. However, as an ASX listed company we cannot divulge such information until we have further certainty. Core engaged Environmental Resources Management (ERM) to prepare a Greenhouse Gas Assessment of the Finniss Lithium Project, including Grants and BP33 mines. Details of the study and results are reported in Section 12.4 of the SER. The study predicts average annual emissions over the seven and half year mine life are approximately 63,000 tonnes $CO_{2\text{-}e}$[21], which equates to an increase of approximately 0.29% of the NT's total reported annual emissions.
Environment Centre NT (ECNT)	**Consultation with Belyuen** We note that in the Grants Lithium Project that the Belyuen Community was not consulted, due to 'stakeholders being unavailable". Thus the impact on current traditional activities has not been determined. This referral does not indicate consultation with the Belyuen community has occurred. This could be a significant stakeholder that has not been consulted and given the expanded time frame of mining and processing in their vicinity the communities ability to comment on this project is another reason for BP33 to be assessed at the highest level of an EIS.	The NT EPA Direction required Core to provide: • Additional information to demonstrate that affected communities, including Aboriginal communities, have been consulted.	Core commenced engaging with the community in late 2017, during the prefeasibility stage of Grants Project and has re-engaged stakeholders over 2020 and 2021 in relation to the BP33 underground mine and updates to the Finnis Lithium Project activities more broadly. Section 4 provides details of consultation, and specific details of engagement with Aboriginal stakeholders is detailed in section 4.2.3. Key queries and feedback received from Aboriginal people and/or representative groups to date are listed below: Jobs and contract opportunities for local Aboriginal people and groups was also raised across both stages of the engagement.

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
			<u>Kenbi Rangers</u> • Queries and concerns about impacts to roads and increased traffic. • Queries about how workers will transport to the site and whether workers will stay on site. • Queries about opportunities for Kenbi Rangers. Keen for rehabilitation opportunities. • Asked whether the project needs to meet a certain percentage of Aboriginal workers/capacity. • Noted previous Aboriginal engagement with major contractors has not always been good and processes didn't work. Asked if works can be broken down purposefully for Aboriginal opportunities. <u>Larrakia Development Corporation</u> • Discussed Aboriginal employment opportunities. • Discussed need for Core and LDC to continue to engage on workforce opportunities for local Aboriginal people. • Core reiterated that opportunities for workers will be better known once management contracts are awarded. • LDC raised heritage management and the desire for someone to walk the site for cultural heritage items so they are not destroyed before construction. <u>Belyuen Council, CEO</u> • Belyuen is a small community of about 190 people. It used to be larger but there were some family problems a long time ago. Only two Larrakia people in the community, others are a mix. People are passionate about culture and the cemetery holds strong significance. • People don't tend to travel much or to Observational Hill Dam and will instead go fishing along the coastline • Road safety will be an issue and people travel regularly to the Tumbling Waters pub. • Concerns about additional trucks on the road as there is no space to pull over. • Trucks should be well lit so people can see them from a long way away. • Suggested additional signage about the road trains and a community meeting and safety campaign about how to be safe on the roads.

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Environment Centre NT (ECNT)	**Economics of the projects** This referral highlights the severe impact on land and soils in the event of early closure of BP33, particularly the "increased risk of erosion as landforms (i.e. box cut, remaining WRD) will not be stabilised or rehabilitated". We also note Core Lithium has received a conditional loan from the NT Government. The proponent should provide details of the economic viability of mining lithium over the next 10 years, addressing worldwide supply trends and the risk of new material being used in future batteries, reducing the demand for lithium.	The NT EPA Direction required Core to: • Conduct a Social Impact Assessment (SIA) in line with the New South Wales (NSW) Social Impact Assessment Guideline.	With respect to the lithium market and viability of the Finniss Lithium Project Core directs interested parties to the company's Final Investment Decision (FID) announcement [Available here] where the company discusses the market factors that have contributed to the FID. Prior to commencement of mining at BP33, Core will be required to pay a bond to the NT Government. In the event of early or unforeseen closure of any mine, a Care and Maintenance Plan is required to be prepared and submitted under the *Mining Management Act* to provide for protection of the environment.
Private individual	**Waste Rock Dumps** • Please define the length of time these surface WRDs are expected to be on surface.	Not applicable	WRD's are planned to be removed in months 51-65 of the mine schedule. They will be on the surface for approximately 5.5 years. Refer SER Section 2.3.
Private individual	**WRD visual impacts/cultural values** • Has predicted WRD height been discussed with Traditional Owners?	The NT EPA Direction required Core to: • Confirm that there has been consultation with communities that may be affected by the proposal, including Aboriginal communities, and that Aboriginal values and the rights and interests of Aboriginal communities have been considered in relation to the areas that would be impacted by the proposal, including the proposed height of the WRDs.	Core can confirm that communities affected by the proposal have been consulted, including Aboriginal people with interests in the area. Details of consultation and issues raised are provided in Section 4 of the SER and are summarised above in response to a similar comment provided by ECNT. No stakeholders engaged to date have raised concern about visual amenity impacts associated with the mine site. The two WRD's at BP33 are approximately 25m and 10m high, and will be in place for 4-5 years, after which they will be used to backfill the underground mine and box cut. As the WRD's are located at least 1.7km from the nearest public access (Cox Peninsula Road), they will not be highly visible to anyone outside of the BP33 area. Once the mine site is rehabilitated and public access is resumed, there will be no WRD's (or other mining landforms) remaining on the site. An AAPA certificate has been provided over part of the BP33 Project area which incorporated the Aboriginal values of the area. This certificate is provided at Appendix F (redacted).

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
Private individual	**Water quality and treatment** • Will water management system treat sediment, hydrocarbons, PAF/NAF and metals? • Will water treatment be required to minimise the risk of legionella exposure where RWD is to be used in dust suppression in restricted air environments such as underground? What are these treatment methods? • Hydrocarbon spills and use in underground drilling are notorious. Will the treatment system also capture and separate hydrocarbons? • Please explain the treatment system in place for sediment basins? • How will Core lithium ensure metals and other contaminants from the WRDs do not enter the clean stormwater system? • What is the water quality of the Observation Hill Dam water? Is it within appropriate human contact standards in addition to environmental standards? • If additional water is needed U/G it appears water is pumped from OHD. How will this closed water pumped to OHD going to change the chemical nature of OHD? How will Core ensure water quality in OHD will not be impacted and still discharge in accordance with appropriate guidelines or Waste Discharge Licence? • Will water be treated prior to or post OHD storage? Are there any other inputs to OHD.	NT EPA Direction required Core to provide: • Additional information in relation to discharges, treatment that provides for protection of at least 95% of aquatic ecosystem species prior to discharge and to demonstrate how the implementation of mitigation strategies would mitigate significant impacts of water discharges on the receiving environment.	Details of the site water management system are summarised in Section 2.2 of the SER from the appended draft WMP – see Appendix C. The water management objectives for the site are listed below: • Where possible, divert clean runoff from undisturbed areas around areas disturbed by mining activities and allow to drain from the site. • Capture suspended sediment in site runoff in accordance with an Erosion and Sediment Control Plan. This will include controlling sediment-laden runoff and passing it through sediment basins prior to releasing it. • Contain mine water in on-site water storages for reuse as a water supply. • Mine runoff and groundwater inflows will drain to collection sumps and be pumped to dedicated on-site storage dams or, if required, to the completed Grants pit. The water management system will treat water to meet Site Specific Guideline Values (SSGV's) for discharge. The system will treat sediment and hydrocarbons. There may also be a requirement to treat arsenic and phosphorous, which are naturally elevated in the groundwater. There is no identified requirement to treat for legionella; however, this will be further considered as part of the risk management plan that is required to be submitted to NT WorkSafe to meet workplace health and safety requirements. OHD is being used as both a potable and non-potable water supply. Water will be treated to ensure is safe for human consumption and exposure. There are no inputs to OHD aside from rainfall and runoff. A Waste Discharge Licence will be required under the *Water Act* for wet season discharges to the creek downstream of OHD, as part of the surplus water management strategy.
Private individual	**Water storage capacity** • The referral stated the preliminary design capacity of MSD is 156ML – provide measurement method to provide confidence in this estimate. • Please undertake groundwater modelling and provide confirmation of estimates & assumptions in design structures. • Please ensure storage is suitable for wet season conditions and prevents clean rainwater filling bunding capacity	NT EPA Direction required Core to provide: • Additional information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal.	A groundwater modelling report is appended to the SER – see Appendix B. The predicted groundwater inflows over the life of mine have been used in the site water balance model, which is also appended to the SER – see Appendix A. Section 4 of the water balance model report provides a 'Water Management System Performance Assessment'. The modelling indicates that "There would be no spills from the BP33 mine water storages (MSD and RWD) for any of the climatic conditions assessed."

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
Private individual	**Water pipeline** • How will Core lithium detect leaks or pressure lost in this pipe?	Not applicable	Core will have flow meters installed to record volumes extracted from all storages. Visual inspections will also be undertaken.
Private individual	**OHD wet season discharge** • Is there a designed discharge point in the wall able to cope with flows and not erode? What is the OHD design construction able to cope with (max volume). How will Core ensure that water quality from OHD will meet guidelines or Waste Discharge Licence parameters without active control over volumes discharged? • Consider the volume of water able to be discharged into the receiving environment given existing natural loads of contaminants. • Consider beneficial use and groundwater dependent ecosystems downstream of discharge point. • Consider the volume of water to be discharged resulting from the project into OHD and into the surrounding surface water • environments. Can Core be certain about this?	NT EPA Direction required Core to provide: • Additional information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal.	OHD has an existing spillway that will be upgraded as part of the dam wall raise works. Engineered designs have been submitted to the Mines Department under the Mining Authorisation in place for Grants Lithium Mine. OHD will not be used for storage of mine affected water. Water that flows over the spillway will be clean water from rainfall and runoff. Controlled discharges will occur to the watercourse downstream of the OHD as a strategy to manage surplus water during the wet season. Details are provided in Section 2.2.5 of the SER.
Private individual	**Vegetation debris** • Consider use of vegetation debris for rehabilitation or erosion and sedimentation controls.	The NT EPA Direction required Core to: • Provide detail about how vegetation debris would be used, noting that burning of vegetation is not supported.	Vegetation cleared for the purpose of mining, will be reused by Core for erosion and sediment control measures and in rehabilitation, either as is or will be mulched and stockpiled for future use. A Vegetation Clearing Procedure will be incorporated into Core's Environmental Management System and MMP. The procedure will clearly detail areas to be cleared and the reuse procedure.
Private individual	**Fauna protection** • How will Core ensure protection of fauna from vegetation clearing process? • Subject to effective implementation of these measures, the proposal is considered unlikely to have significant impacts on flora and fauna. This is a difficult conclusion given detailed controls are not provided in this document, and are to be included in MMP documents.	Not applicable	Core will implement pre-clearing inspections to identify and relocate any non-mobile species. The Grants mine site clearing commenced in October 2021 following pre-clearing inspections. Core staff and contractors have followed Standard Operating Procedures for managing the clearing and there have been no incidences involving fauna.

Stakeholder	Summary of issues raised in submission	Additional information required by NT EPA	Core's response and actions taken
Private individual	**Aquatic Ecosystems** • Ensure certainty is obtained through investigations and modelling to determine if the proposal has the potential to impact the environment.	NT EPA Direction required Core to provide: • Additional information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal.	Impacts to water quality are assessed in Section 10 of the SER. Baseline studies of surface water and groundwater have been undertaken, and Site-Specific Guideline Values (SSGV's) have been derived for the protection of aquatic ecosystem. Details of the SSGV's are provided in the draft WMP appended to the SER (Appendix C). The water balance model has utilised the SSGV's to determine the volume of water that can be discharged without impacting downstream water quality. Ensuring discharges meet the SSGV"s will protect aquatic ecosystems.
Private individual	**Hydrological processes - Groundwater** • Is there expected to be a positive or negative net groundwater cycle based on expected inflow from underground against usage requirements? • Will there be further requirements for water to be used in underground drilling/mining activities in addition to natural inflows? • Ensure certainty is obtained through investigations and modelling to determine if the proposal has the potential to impact groundwater levels.	NT EPA Direction required Core to provide: • Additional information to reduce uncertainty about the inputs, movements, outputs, quantities and quality of surface water and groundwater resources that may be affected by the proposal.	The site water balance model referenced above indicates there will be a surplus of water to the mine demands. Predicted volumes and management strategies are provided in Section 2.2.5 of the SER. The groundwater modelling report appended to the SER provides an assessment of groundwater drawdown due to mine dewatering. The results are summarised in Section 9.5.2 of the SER.
Private individual	**Hazardous substance storage and handling** • No information provided on suitability of storage containers and bunding during wet season conditions, transportation or methodology of waste hydrocarbons and hazardous substances. • How does Core plan to transport and dispose of waste hydrocarbons and hazardous substances?	Not applicable	All hydrocarbons and hazardous substances will be stored and handled in accordance with Australian Standards and legislative requirements. Core will engage a licenced waste contractor to transport and dispose of wastes.
Private individual	**Human health** • Consider impact to worker health particularly air quality in working environment. • Consider diesel particulate matter in ventilation restricted working environments. • Consider silica in blasted and ventilation air. • Consider respirable and inhalable dust concentrations from mining activities.	Not applicable	The matters raised are workplace health and safety considerations. Core is committed to providing a safe workplace. We will meet all obligations under workplace health and safety legislation, including the requirement to provide to NT Work Safe a certified Risk Management Plan prior to commencement of any mining or related activity.

6 ENVIRONMENTAL IMPACT ASSESSMENT

The NT EPA has identified that the BP33 Project has potential to significantly impact five environmental factors and associated values (refer Table 6-1). The approach taken to assessing the significance of environmental impacts to each factor is summarised in the sections below and each factor is addressed individually in Sections 7- 11.

Table 6-1. Extract from NT EPA Notice of Decision and Statement of Reasons

Statement of Reasons	
Potential significant environmental impacts: The NT EPA identified that the proposed action has the potential to significantly impact the following environmental factors and associated environmental values:	
Land	• **Terrestrial environmental quality** – soil quality may be significantly impacted by vegetation clearing; loss of containment of hydrocarbons or other chemicals; generation of acid metalliferous or saline drainage; and seepage from waste rock storage. • **Terrestrial ecosystems** – threatened flora may be significantly impacted by vegetation clearing; and the viability of sensitive and significant vegetation may be significantly impacted through alteration of surface water flows.
Water	• **Hydrological processes** – the surface hydrology of downstream ephemeral waterways may be significantly impacted by altered surface water flows, and altered groundwater hydrology of the Charlotte River sub-catchment. • **Inland water environmental quality** – the proposal has the potential to act as a contaminant source and significantly impact downstream surface water quality; and the water quality of the underlying aquifer.
People	• **Communities and economy** – the proposal has the potential to significantly impact the regional community, including the Aboriginal community. Potential benefits include contribution to the economy, and training and employment for 125 – 150 people.
Other factors: The NT EPA considered the importance of other environmental factors during its consideration of the referral; however, the impact on those factors was not identified as potentially significant.	

6.1 Additional studies

Additional baseline studies and stakeholder engagement have been undertaken over the past 12 months since the Referral was submitted to refine our understanding of the receiving environment and sensitivity to impacts associated with the proposed BP33 underground mine. The work undertaken is summarised in Table 6-2.

Table 6-2. Additional studies undertaken over 12 months since Referral submitted in July 2020

Factor	Description of additional work
Terrestrial ecosystems	Targeted field surveys for *Stylidium ensatum* were undertaken in June 2020 during the optimal detection period. The survey report is provided at Appendix I and findings are summarised in section 7.
Terrestrial Environmental Quality	Additional geochemical testing was undertaken by Environmental Geochemistry International (EGI), to refine the waste rock characterisation (refer Appendix H). Kinetic leach column tests have been established and will be run for 12 months to assess leaching potential of the waste rock in the short-term in the surface WRD's and in the longer-term when used to backfill the underground mine. Findings of this work are summarised in section 8.
Hydrological Processes	A network of monitoring bores was installed around the proposed mine site in late 2020. Baseline groundwater levels and water quality have been monitored monthly. The data was used to develop a groundwater model that was used to predict groundwater inflows (to the box cut and underground), associated dewatering volumes, and the extent of the groundwater drawdown around the mine site. The groundwater model report is provided at Appendix B. A site water balance was prepared to inform the water management system requirements for the site. The water balance report is provided at Appendix A. Findings of this work are summarised in section 9.
Inland Water Environment Quality	Baseline surface water and groundwater quality sampling has been undertaken monthly to establish a baseline dataset. Details of the monitoring program and summary of the water quality baseline findings are provided in the draft Water Management Plan (WMP) (Appendix C).
Communities and economy	A Social Impact Assessment (SIA) was undertaken, and a Social Impact Management Plan (SIMP) prepared to provide a framework for maximising opportunities and minimising impacts from the proposal. There documents are provided at Appendix J and Appendix E. Refer section 4 for details of the stakeholder and community engagement undertaken.

6.2 Assessing the significance of impacts

Potential direct, indirect and cumulative impacts to each key environmental factor were identified,[11] and the significance of impacts was assessed using the following criteria:

- **Likelihood** of the impact occurring (refer Table 6-3).
- **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[12] (refer Table 6-4).

The approach and methods used to assess social impacts and opportunities are bespoke, incorporating community/stakeholder perceptions and assessment of opportunities. The criteria are detailed in the SIA Report (Appendix J).

6.3 Impact avoidance, mitigation and monitoring

Core has worked with its technical specialists, to consider how environmental impacts can be avoided or mitigated. Where the EIA process indicates there is still uncertainty about the likelihood or scale of potential impacts, adaptive management approaches have been developed, incorporating further baseline data collection and monitoring. Alternatives were considered where relevant, with the selected measures chosen being practical to implement and accepted as best practice with the mining industry. Monitoring programs have been developed to verify the impact predictions and to provide early indication of impacts that require further

[11] Note that the SER focusses on assessing impacts that were not adequately assessed in the Referral (as per the direction given by the NT EPA). The NT EPA will refer to information presented in both the Referral and SER when making its decision on whether or not to approve the proposal.
[12] 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

mitigation. The SER provides details of impact avoidance, mitigation and monitoring measures for each key environmental factor.

6.4 Predicted outcome (residual impact)

Environmental outcomes were predicted, in terms of the residual impact to each environmental factor after mitigation measures are implemented. The EIA process for the BP33 mine did not identify any significant residual impacts that require offsets.

Table 6-3. Likelihood criteria used in the impact assessment process

Likelihood category	Criteria
Unlikely	The impact is not expected to occur. The impact occurs rarely on similar projects and/or in similar environments.
Possible	The impact could occur in some circumstances. The impact has occurred infrequently on similar projects and/or similar environments.
Likely	The impact will probably occur in most circumstances, but there is some uncertainty about the likelihood. The impact has occurred on a number of occasions on similar projects and/or similar environments.

Table 6-4. 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 occurs across a catchment.	**Localised** Impact extends outside of the Mineral Lease but is confined.	**Limited** Impact occurs across the direct disturbance footprint.	**Isolated** Impact occurs within a small portion of the direct disturbance footprint.
Magnitude: The degree or amount of change from natural conditions.			
Major Impact causes a significant change in existing environmental conditions.	**Moderate** Impact is measurable, exceeds the natural variability of existing environmental conditions.	**Minor** Impact is measurable but within the natural variability of existing environmental conditions.	**Negligible** No discernible impact on existing environmental conditions.
Duration: The longevity of the impact, including whether it is reversible.			
Permanent Impact that is permanent; values will never recover.	**Long-term** Impact that lasts for an extended period post mine closure.	**Medium-term** Impact that is felt for the duration of the mining activities and up to 2-years post-closure.	**Short-term** Impact that is felt over a period of weeks or months.
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 Value is significant at a regional or national scale and/or has highly valuable or widespread beneficial use.	**Medium** Value is important at a local scale and/or has significant beneficial use.	**Low** Value impacted is common or already reduced, and/or has limited beneficial use.	**Very Low** Value impacted is already significantly reduced and/or has no beneficial use.

7 TERRESTRIAL ECOSYSTEMS

This section provides additional information in relation to potential impacts to Terrestrial Ecosystems (i.e. habitats, flora and fauna).

7.1 Environmental objective

The NT EPA's objective for Terrestrial Ecosystems is to:

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

7.2 Policy and guidance

The following policy and guidance documents have been referenced in assessing impacts to terrestrial ecosystems:

- Department of the Environment and Natural Resources (2020). *Land Clearing Guidelines*. Available at: https://nt.gov.au/__data/assets/pdf_file/0007/236815/land-clearing-guidelines.pdf
- Northern Territory Environment Protection Authority (NT EPA) (2013). *Guidelines for Assessment of Impacts on Terrestrial Biodiversity*. Available at: https://ntepa.nt.gov.au/__data/assets/pdf_file/0004/287428/guideline_assessment_terrestrial_biodiversity.pdf

7.3 Additional information required

The NT EPA requested additional information to assess whether threatened flora, specifically *Stylidium ensatum*, may be significantly impacted by vegetation clearing. Field surveys have now been undertaken and have confirmed the absence of *S. ensatum* in the BP33 disturbance footprint. The additional information provided in this section has been summarised from the survey report prepared by EcOz Environmental Consultants (Appendix I).

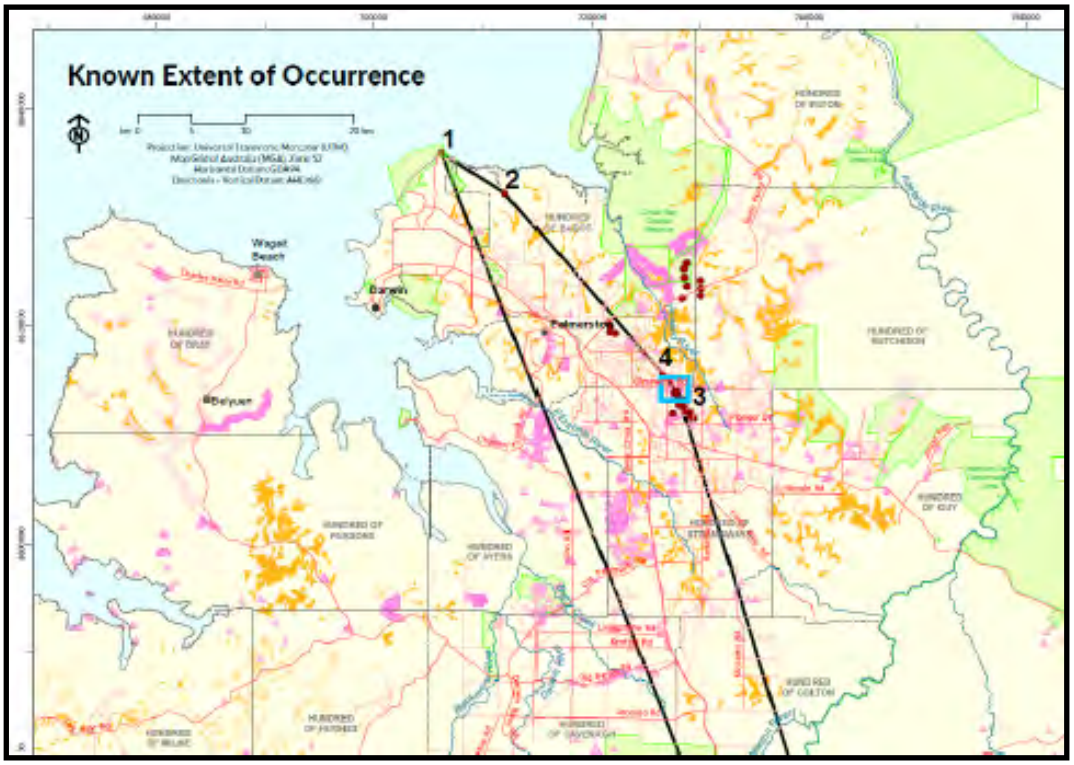
7.4 Environmental values

The flora and fauna, and significant habitats, present in the BP33 disturbance footprint are described in section 7 of the Referral information [Available here]. Ecological desktop and field surveys identified the potential presence of two listed threatened plant species and nine fauna species. In consultation with staff from the NT Government (DEPWS) Flora and Fauna division, it was decided that targeted surveys would be required to confirm the presence/absence of the threatened plant species, *Typhonium praetermissum* and *Stylidium ensatum*. For the threatened fauna species, the findings of desktop studies and field-based habitat assessments indicated that project disturbance footprint is unlikely to contain important habitat critical to survival of any of the species because the habitat types are common and not restricted in extent across the wider region.

The Referral information provided details of surveys undertaken for *Typhonium praetermissum*, which was not detected in the project disturbance footprint; however, as the Referral was submitted in April, prior to the time when *Stylidium ensatum* can be detected by field surveys, Core made a commitment to have the field surveys undertaken in June-July 2020.

7.4.1 Presence/absence of the threatened plant *Stylidium ensatum*

The project disturbance area contains areas mapped by the NT Herbarium as high likelihood habitat for the listed endangered plant species *S. ensatum* (Figure 7-1). This species inhabits margins of drainage areas in damp heavy clay or peaty soil, (Cowie & Westaway, 2012), that remain wet well into the dry season. Plants grow in the early dry season and are best able to be detected by surveys between June-July when flowering and fruiting occurs (Donna Lewis, NT Herbarium, pers. Comm. 2020).



Blue star - approximate location of Grants Lithium Project in relation to NT Herbarium mapping of potential habitat for S. ensatum. Orange – mapped potential habitat of S. ensatum (NT Herbarium), Pink triangle – locations of previous surveys with no S. ensatum records, Red circles – S. ensatum records, Black lines – Extent of Occurrence of S. ensatum

Figure 7-1. Map of known extent of occurrence and modelled habitat of *S. ensatum* (Source: DLRM 2016)

A targeted survey was undertaken on 07 July 2020. The survey approach and method, comprising meander searches in suitable habitat, was developed by qualified ecologists from EcOz, in consultation with the NT Herbarium. Details of the survey area selection and methods are provided below. The surveys did not detect the presence of the species and it is concluded that it is unlikely to be present in the project disturbance footprint.

Prior to undertaking the survey, EcOz identified approximately 16 ha of the mining infrastructure footprint and 2 ha of the road corridor were within the high likelihood habitat modelled areas for *S. ensatum* (see Figure 7-1). Suitable locations for the targeted survey were selected using existing land unit and vegetation mapping and satellite imagery. The relevant features used to select suitable locations were:

- Areas that are poorly drained with seasonal inundation or waterlogging and have hydrosols soils i.e. they are saturated with water for extended periods, are generally a greyish colour and have a high organic content.
- Shallow inundation or saturated soils in the mid dry season.
- Overstorey consisting of *Melaleuca spp.* and/or *Lophostemon lactifluus*, *Pandanus spiralis*.
- Ground layer incorporating grasses and herbs that occur in poorly-drained habitats.
- Relatively open overstorey.

Figure 7-2 depicts the targeted high likelihood *S. ensatum* habitat areas that intersect with the mining infrastructure and the access track corridor. The survey effort (GPS tracks) in these areas are also shown on the figure.

Survey effort focused along the creek margin south of the survey area. It was deemed the most suitable habitat for the species because it had maintained soil moisture into the mid dry season. The remaining areas of modelled habitat that were targeted based on being mapped as seasonally saturated, were found to be dry at the surface at the time of the survey and therefore were unlikely to provide habitat for *S. ensatum*. The survey identified that some areas – although modelled as suitable habitat – actually had vegetation comprising *Eucalyptus miniata* and *Erythrophleum chlorostachys* on higher ground with skeletal rudosol soils, which is not indicative of suitable for *S. ensatum* and so these areas were not surveyed.

Despite searching in potentially suitable sites at an appropriate time of year, *S. ensatum* was not found and is not expected to occur. *S. ensatum* plants were not detected in the survey area. Previous floristic surveys undertaken in areas nearby at an appropriate time of year also have not recorded the species (see Figure 7-1 for locations of previous surveys with no records). High fire frequencies in the area are possibly a factor detrimental to the survival of this species and decrease the likelihood of its occurrence. The level of confidence associated with the surveys is considered high as the timing and target habitats were identified based on current knowledge of the species ecology, and a known population of the species was visited by the field ecologists on the day of the survey to confirm that the species would likely be detectable if it was present.

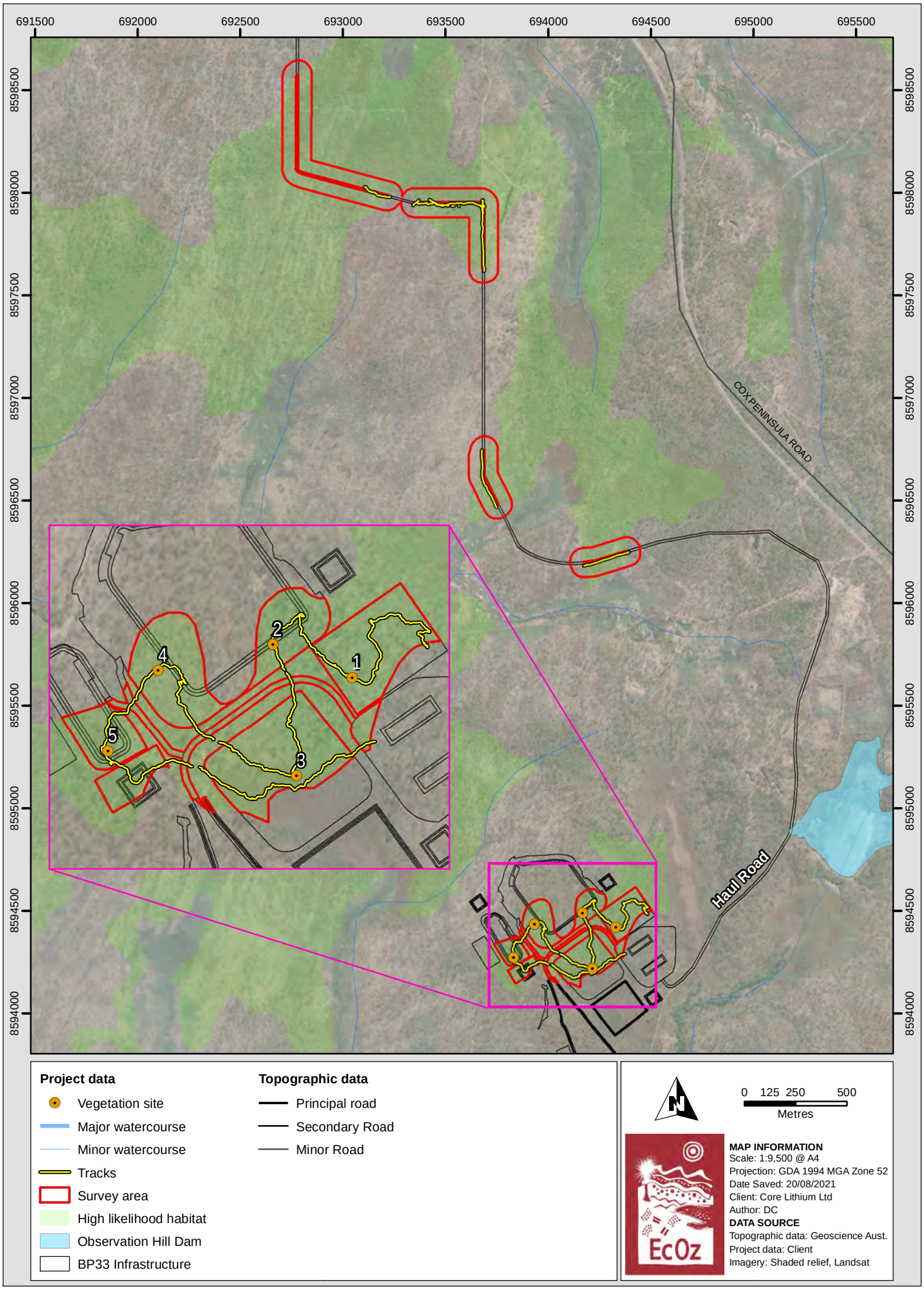


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Figure 7-2. Map of survey effort (tracks and details of search locations)

7.5 Assessment of potential significant environmental impacts

The NT EPA identified that the BP33 Project proposal has the potential to significantly impact:

- Threatened flora through vegetation clearing.
- Sensitive and significant vegetation through alteration of surface water flows.

In addition, the EIA undertaken by Core/EcOz, has also identified the potential to significantly impact:

- Riparian vegetation (a significant vegetation type) associated with groundwater drawdown.

The significance of these impacts is assessed below.

Impacts to threatened flora through vegetation clearing

As described above, targeted surveys for *T. praetermissum* and *S. ensatum*, undertaken according to accepted survey guidelines, did not detect the presence of these species and they are considered unlikely to occur in the project disturbance footprint. The work undertaken indicates with a high level of confidence that the proposal is unlikely to impact threatened flora and therefore no further assessment or mitigation measures are proposed.

Impacts to riparian vegetation through alteration of flows and groundwater drawdown

The riparian vegetation that occurs along the minor ephemeral watercourse downstream of the Observation Hill Dam (OHD) and mine site could be stressed by the combined effects of groundwater drawdown and reduced overflows from the OHD spillway while the dam is being used as a water supply. The watercourse is a minor stream order one drainage line, but the closed structure of the riparian vegetation and observed persistence of surface pools of water in the dry season (EcOz, 2019), indicates the community is likely to be a facultative GDE, with an infrequent or partial dependence on groundwater (CloudGMS, 2021 p.59). Monitoring data collected from monitoring bore BPG5i[13], close to the riparian area, indicate that depth to groundwater ranges from around one meter in the wet season, to six metres in the late dry season[14] and on this basis it is assumed that the riparian vegetation accesses the groundwater for some or part of the dry season when there are no surface flows.

Modelling of groundwater drawdown around the mine (detailed in section 9.5.2) indicates that groundwater levels are likely to be below the depth accessible by riparian vegetation out to approximately 1.5 km from the underground mine for approximately five years over the latter stages of the mining operations and following closure. The zone of impact to riparian vegetation has been defined by the one metre drawdown contour shown in Figure 7-3, because it is assumed that drawdown of less than that would only affect water availability for a short period of time in the mid-late dry season when groundwater levels are naturally lowered. The zone of impact encompasses a 4.5 km section of stream order one ephemeral watercourse. Once mining ceases, the water levels beneath the riparian vegetation are predicted to recover to pre-mining levels within three years (refer section 9.5.2). The resilience of the riparian vegetation to this short period of reduced water availability is difficult to predict with certainty and will need to be monitored to inform mine closure and rehabilitation requirements.

[13] Hydrographs are based on monitoring data collected over the period October 2020 to April 2021
[14] Refer to the draft WMP (Appendix C) – section 3.4.2 for graphs

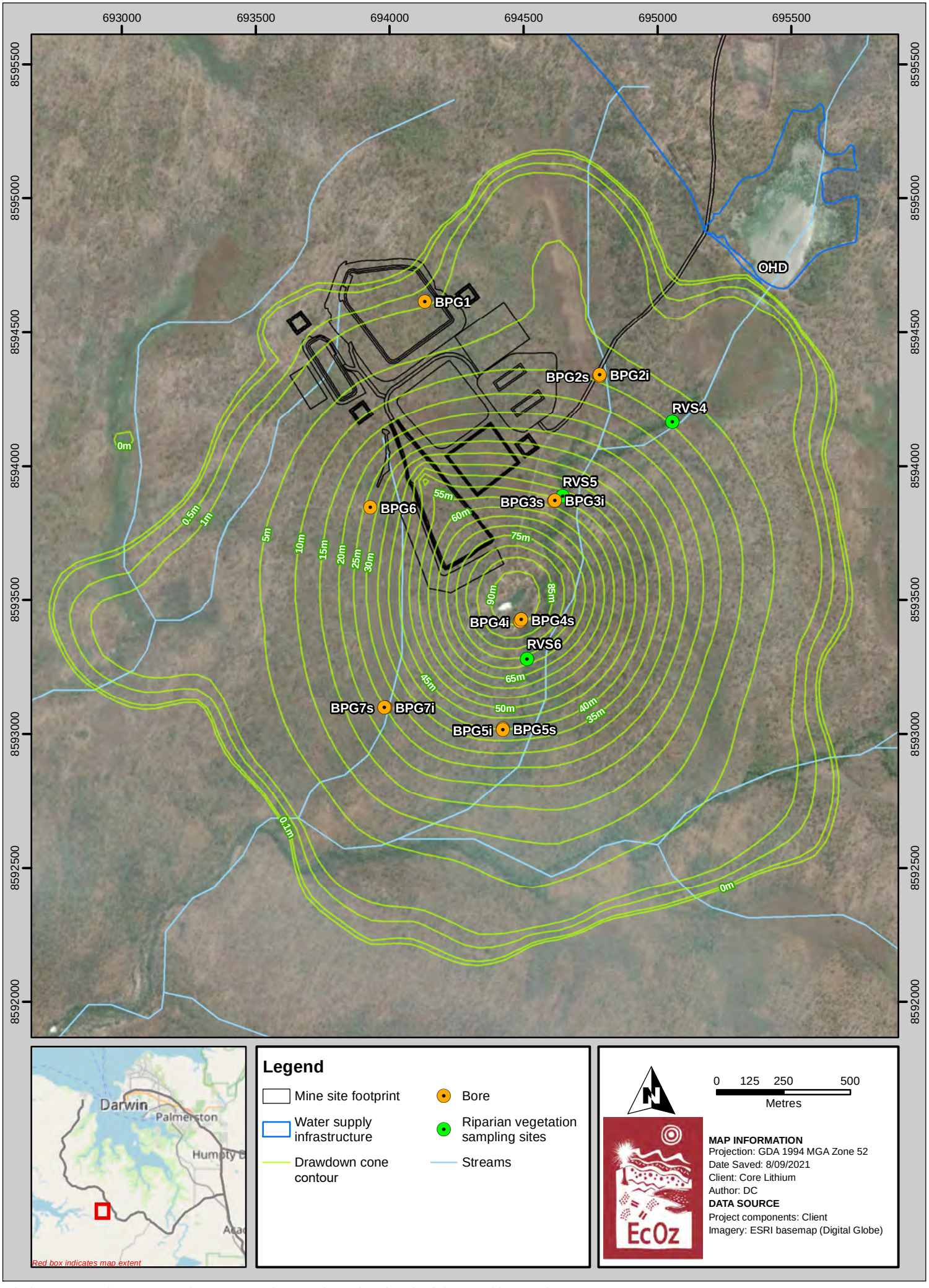

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Figure 7-3. Map of riparian vegetation zone of influence from project activities

7.6 Avoidance and mitigation

The measures that will be implemented to avoid or minimise the potential impact of the proposal on riparian vegetation are summarised in Table 7-1.

Table 7-1. Terrestrial ecosystems avoidance, mitigation and monitoring measures

Potential impact	Avoidance	Mitigation	Monitoring
Riparian vegetation degradation through changes to hydrological regimes	Mine site footprint avoids direct disturbance of riparian vegetation.	• Long-term impacts to riparian vegetation will be avoided by partial backfilling the mine allowing groundwater levels to recover to pre-mining conditions. • Water dewatered from the underground mine will be treated and used as a water source to offset extraction from OHD. • Water dewatered from the underground mine will be discharged to the surface watercourse in accordance with a Waste Discharge Licence will be obtained under the *Water Act*.	• Groundwater levels will be sampled quarterly in monitoring bores – refer section 8.3 of the draft WMP (Appendix C) to verify extent of reduced water availability for riparian vegetation. • A flow gauge will be installed to record surface flows on the drainage line downstream of the OHD and mine site. • Annual riparian vegetation monitoring will occur to record changes to vegetation extent, structure and composition compared to baseline conditions – refer section 8.4 of the draft WMP (Appendix C). • If monitoring identifies an unexpected impact to riparian vegetation, then the MCP will include post-mining reinstatement of habitat values in the affected areas.

7.7 Predicted outcome

The BP33 Project proposal will result in loss of approximately 100 ha of vegetation in an area with low habitat value where no threatened species have been detected or are expected to occur. Rehabilitation will return habitat value to the site; however, as rehabilitation success on mine sites is variable there could be some long-term reduction in habitat value. These changes will affect a localised area and are not predicted to have any long-term impact on ecological integrity or ecosystem function.

There is some uncertainty with respect to the residual impact to riparian vegetation because it is difficult to predict how the habitat will respond to a five-year period of lowered groundwater levels caused by the mining activities (refer Section 9.5.2). Any impact that does occur is predicted to be limited to the 4.5 km section of stream order one watercourse that lies within the modelled extent of groundwater drawdown. Because the watercourse is ephemeral, with limited instream and terrestrial habitat values, impacts are considered unlikely to affect ecological integrity or function of downstream watercourses that flow into the Charlotte River. The riparian vegetation monitoring program described in the draft WMP (Appendix C) will detect changes in the riparian vegetation, so that rehabilitation and/or recovery of habitat values can be addressed through mine closure and rehabilitation.

8 TERRESTRIAL ENVIRONMENTAL QUALITY

This section provides additional information in relation to potential impacts to Terrestrial Environmental Quality (land and soils).

8.1 Environmental objective

The NT EPA's objective for Terrestrial Environmental Quality is to:

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

8.2 Additional information required

The NT EPA requested additional information to improve their level of confidence in the prediction of potential significant impacts of the proposal and the effectiveness of mitigation measures, in relation to:

- Certainty that that waste rock characterisation studies are adequate to assess the suitability of proposed waste rock management systems and associated potential impacts.
- The potential for acid, metalliferous and saline drainage from the waste rock landforms, ore stockpiling areas and other mine infrastructure.

Core engaged Environmental Geochemistry International (EGi) to undertake additional static geochemical testing of rock samples covering the range of oxidation, lithologies and types of materials (waste and ore) that will be encountered during mining of the BP33 resource. Kinetic leach column tests have been established and will be run for 12 months to assess leaching potential of the waste rock over the short period (approximately 4 years) of surface storage in WRD's and in the longer-term when used to backfill the underground mine. The additional information provided in this section is summarised from the geochemical technical report prepared by EGi provided at Appendix H.

8.3 Policy and guidance

The following policy and guidance documents have been referenced for assessing and managing risks associated with Acid Rock Drainage (ARD) from mining activities:

- International Network for Acid Prevention *Global Acid Rock Drainage (GARD) Guide*. Available at: https://www.inap.com.au/gard-guide/#:~:text=The%20GARD%20Guide%20deals%20with,caused%20by%20sulphide%20mineral%20oxidation.
- Commonwealth of Australia (2016) *Preventing Acid and Metalliferous Drainage, Leading Practice Sustainable Development Program for the Mining Industry*. Available at: https://www.industry.gov.au/data-and-publications/leading-practice-handbook-preventing-acid-and-metalliferous-drainage
- ANZG (2018). Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

8.4 Existing environment and values

The geochemical characteristics of the rock types that will be mined as part of the BP33 Project, need to be well understood to assess the potential for the mining activities to impact surface water and groundwater quality and the ecosystems and land uses that depend on these resources. This is because when certain rock types are exposed to air and water (rainfall), as they are in a mine WRD or on a Run of Mine (ROM) pad, chemical

reactions can take place that result in the production of drainage that is acidic and/or contains high concentrations of metals. The mine waste characterisation program at the BP33 Project commenced during exploration and has continued through the project development phase where the peak characterisation effort occurs (refer Figure 8-1 extract from the GARD Guide). The sections below document current knowledge of the waste rock characteristics from the initial geochemical test work submitted with the Referral (EGi, 2020) and additional geochemical test work undertaken as detailed in the report at Appendix H.

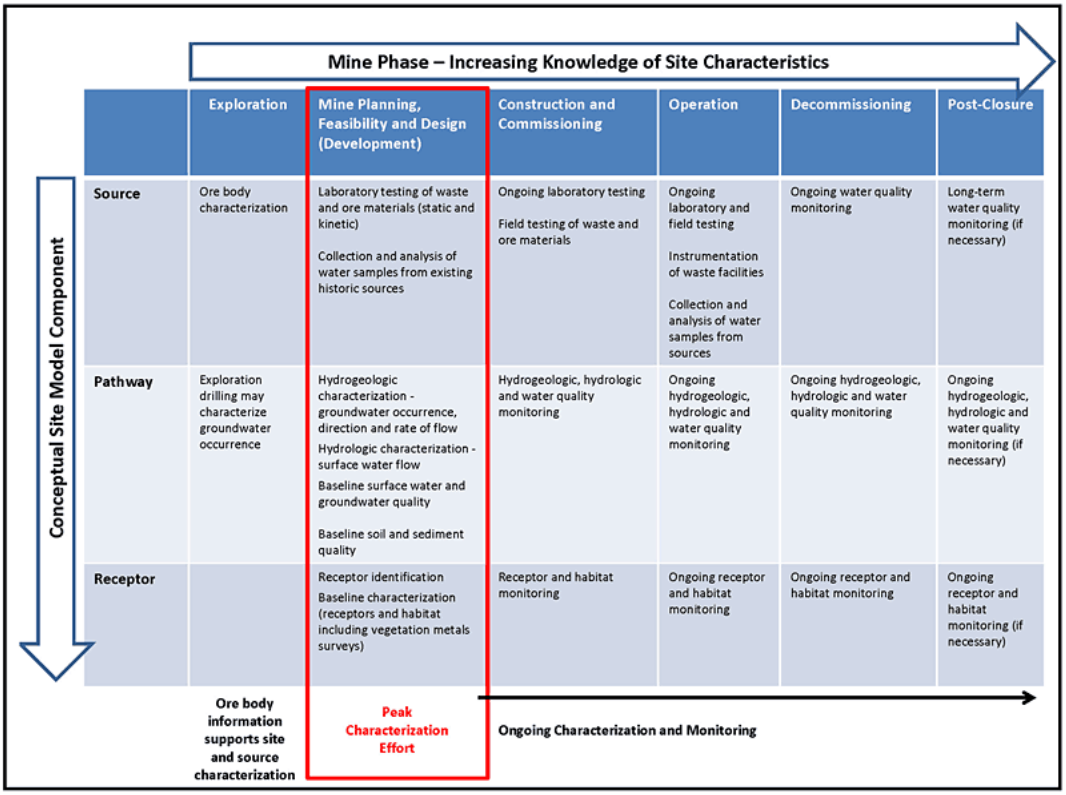


Figure 8-1. Mine waste characterisation activities by mine phase (Source: GARD Guide, 2014)

8.4.1 Geochemical testing

The initial geochemical test work results indicated that most of the rock (>90%) that will be mined poses a low risk of producing Acid Rock Drainage (ARD). However, the fresh waste rock (which comprises <10% of the total waste rock volume) may include small volumes of Potentially Acid Forming (PAF) material and water leachable arsenic and zinc, and oxide waste rock could contain low concentrations of aluminium and zinc. Additional static testing and short-term kinetic (batch leaching) tests have been undertaken to assess the waste rock characteristics and behaviour with a greater level of confidence, and long-term kinetic (column leach) tests have commenced to assess the drainage characteristics under longer-term field-like conditions. Details of the approach taken to sample selection, static geochemical testing methodologies and results are provided in section 2 of the technical report at Appendix H.

Static geochemical testing

A total of 144 samples from the BP33 Project have been subject to static geochemical testing, of which 91 samples had sufficient results to provide an ARD classification i.e. Potentially Acid Forming (PAF), PAF-Low Capacity (PAF-LC) or Non-Acid Forming (NAF). Results from initial testing of 97 samples were provided in the Referral information and detailed static geochemical testing was undertaken on an additional 47 rock samples in early 2021. Samples were selected from both waste and ore and covered a range of lithologies, including

phyllite, pegmatite and sandstone, focusing on fresh rock with a sulphur content above 0.1%, which were under-represented in the initial geochemical tests. Testing included Total S (Sulfur), carbon speciation (Total C, Organic C, Inorganic C), Acid Neutralising Capacity (ANC) and Net Acid Generation (NAG) tests. The ARD classification of the tested waste rock samples and an estimate of likely volumes PAF material that will be mined is provided in section 8.4.2 below.

Short-term kinetic testing

Additional batch-leaching tests have been undertaken to provide an indication of the potential for leaching of metals from the ore and waste rock when stored temporarily in surface WRD's. Ten samples were subject to water extraction tests and peroxide extraction tests (NAG test). The results of water extraction provide an indication of chemical mobility for a material that is freshly mined and exposed to atmospheric conditions, whereas the results of the peroxide extractions (NAG test) provide information on metal mobility for sulphidic materials (only present in the fresh waste rock) that undergo oxidation. As waste rock at the BP33 Project will be stored on the surface for a short period of time (up to 4 years), and residual ore remaining in stopes will be exposed for a relatively short time prior to inundation, it is expected any sulphidic material will only undergo partial oxidation. Therefore, the results of the two tests represent the extremes of the leaching process and have been used to provide an indication of the metal/metalloid concentrations that might be expected from the longer-term kinetic leach tests that are currently underway.

Water extraction tests

The approach, methods and results of the water extraction tests are detailed in Appendix H section 3.2. The additional water extraction test results were added to the results from earlier testing, providing results covering ore (9 samples) and waste rock (45 samples). Samples tested were representative of oxide, transition, and fresh rock types, with most samples classified as NAF (Table 8-1). The selected samples are reasonably representative of the waste rock which will be mined during the BP33 Project; however, the number of PAF samples is likely to over-represent the volumes present in the WRD's at the mine. The results of these tests and an assessment of the likelihood of metalliferous drainage occurring from the WRD's is provided in section 8.4.3 below.

Table 8-1. Properties of waste rock samples used for water extraction tests (Source: EGi, 2021)

Category	No. Samples	Percentage of Total Samples
Oxide	9	20%
Transition	13	29%
Fresh	23	51%
Total	45	
NAF	38	84%
PAF-LC	4	9%
PAF	3	7%
Total	45	

Peroxide extraction (Net Acid Generation tests)

The approach and methods used to conduct the NAG tests are detailed in Appendix H section 3.3. Ten samples of fresh waste rock were tested to provide indicative data on metals and metalloids that are likely to occur in runoff from waste rock that is subject to oxidation processes following surface storage. Normally only the pH and acidity of the NAG solution are measured following the oxidation stage, but additional elemental analysis of the NAG liquor was also carried out to provide data on the release of metals/metalloids. Experience

of EGi has suggested NAG test concentrations typically need to be multiplied by between 3 to 10 times to provide a reasonable guide to what might be expected from long-term kinetic (column leach) tests, so multiplication by a factor of five of metal concentrations in peroxide leachate was undertaken to give indicative metal/metalloid concentrations from column tests. The results of these tests and an assessment of the likelihood of metalliferous drainage occurring from the WRD's is provided in section 8.4.3 below.

Long-term kinetic tests

Column leach tests are currently being conducted and are expected to be completed over the next 12 months. Testing is being undertaken on a composite of crushed rock samples that are representative of the mixture of rock types (oxide, transition and fresh) that will be stored in the WRD's. The procedure used to select the materials used in the testing and ensure these are representative of waste rock types to be stored in the WRD at the BP33 Project, is described in Appendix H section 4. These tests will provide an understanding of the rates of reactivity and likely mobility of various metals and metalloids under field conditions that replicate conditions in the WRD's and will be used to assess the likelihood of metalliferous drainage being produced during short-term surface storage in WRD's and leachability of solutes from the waste following backfill and inundation by recovering groundwater.

8.4.2 Estimates of Potentially Acid Forming waste volumes

The static geochemical test results suggest that all the mine materials (oxide waste in WRD1, transition and fresh waste in WRD2, ore on the ROM pad) will present a low risk of producing ARD. The testing showed that oxidation and sulphur content could be used to determine the ARD classification of materials which will be disturbed during mining at the BP33 Project. The approach taken to developing the criteria is described in Appendix H section 2.3 and the criteria are provided in Table 8-2. While there is likely to be some overlap between the classifications, it is expected that the criteria may be used to provide a reasonable segregation of waste rock and ore according to their likelihood to produce acid during surface storage in WRD's.

Table 8-2. Criteria for ARD classification of waste rock and ore (Source: EGi, 2021)

ARD Classification	Criteria
NAF	Ore *OR* Oxide waste rock *OR* Transition and fresh waste rock with Total S <0.2%
PAF-LC	Transition and fresh waste rock with Total S ≥0.2% and <0.4%
PAF	Transition and fresh waste rock with Total S ≥0.4%

Exploration assay data provided by Core for around 2,500 samples from 48 drill holes was used to classify waste rock and ore using the above criteria and the volumes of each class were estimated. The results are provided in Table 8-3 below. The results show:

- **Oxide rock** excavated from the box cut, which will be placed in WRD1, is expected to be NAF. All but one of the oxide samples contained Total S below the reporting limit of 0.01.
- **Transition waste rock**, which will be placed in WRD2, is expected to be mostly NAF. Around 95% of samples contained below 0.2% Total S; however, a small portion containing Total S above 0.2% are likely to be classified as PAF-LC (low capacity) with limited acid producing potential.
- **Fresh waste rock**, which will be placed in WRD2, is expected to encompass a range of materials from NAF through to PAF. While most of the fresh waste rock contained below 0.2% Total S, there is a significant proportion of the fresh rock samples with higher Total S content.

- **Ore** that will be stored on the ROM pad while awaiting transport to the processing plant is expected to be NAF. Of the ore samples examined, a clear majority have a Total S content below 0.2%. These samples classified as NAF materials with a couple of exceptions, which while having a NAGpH below 4.5, produced very little acidity when treated with peroxide (NAG(pH4.5) <2 kg H_2SO_4/t).

The estimates indicate that in total around 15,000 tonnes of PAF-LC and PAF waste will be moved to WRD2 through the life of the mine, which constitutes 6% the total 229,000 tonnes which will be mined. Most of the 15,000 tonnes is classified as PAF-LC with limited acid producing potential, with the portion of material classified as PAF comprising less than 1% of the total waste rock volume moved to WRD2.

Table 8-3. Estimated volumes of transition and fresh waste rock placed in WRD2 (Source: EGi, 2021)

Rock Type	ARD Class	BCM	LCM	Tonnage (t)
Transition/fresh waste (from underground)		85000	127500	229000
Transition rock in WRD2		8036	12053	21649
Fresh Rock in WRD2		76964	115447	207351
Transition Rock in WRD2	NAF	7239	10859	19503
	PAF-LC	796	1194	2145
	PAF	0	0	0
Fresh Rock in WRD2	NAF	72223	108334	194576
	PAF-LC	4199	6298	11312
	PAF	543	814	1463
Waste Rock in WRD2	NAF	79462	119193	214080
	PAF-LC	4995	7493	13457
	PAF	543	814	1463

Table 8-4. Estimate volumes and tonnages of transition and fresh waste rock and ARD classification

Rock Type	ARD Class	BCM	LCM	Tonnage (t)
Transition/fresh waste (from underground)		85000	127500	229000
Transition rock in WRD2		8036	12053	21649
Fresh Rock in WRD2		76964	115447	207351
Transition Rock in WRD2	NAF	7239	10859	19503
	PAF-LC	796	1194	2145
	PAF	0	0	0
Fresh Rock in WRD2	NAF	72223	108334	194576
	PAF-LC	4199	6298	11312
	PAF	543	814	1463
Waste Rock in WRD2	NAF	79462	119193	214080
	PAF-LC	4995	7493	13457
	PAF	543	814	1463

8.4.3 Acid and metalliferous drainage potential

The results of the short-term leach tests indicate the while ARD is unlikely to occur, some metals could mobilise from the ore and transition/fresh waste rock at neutral to slightly alkaline pH. Results of the water extraction tests undertaken to date indicate:

- Ore stockpiles could produce run-off with elevated concentrations of Aluminium (Al)
- The mobility of aluminium concentration in all waste rock, and arsenic in fresh waste rock, when incorporated in water, has the potential to result in elevated concentrations of Al in seepage from WRD1, and Al and As from WRD2.
- Concentration of arsenic in the water extraction of transition and fresh waste rock were similar to groundwater quality sampling in the deep aquifer of the Burrell Creek Formation (BCF). It is expected that backfilling the underground with fresh mine rock (with no extensive weathering) will not significantly impact groundwater in relation to mobilisation of arsenic.

The results of peroxide extraction tests indicate:

- Should extensive oxidation of waste rock occur in WRD2, the concentrations of several metals/metalloids including Al, As, Co, Cr, Cu, U and Zn may by elevated in comparison to background water quality.

The likelihood that significant oxidation and metal/metalloid release will occur during short-term surface storage is being investigated using kinetic leach column testing currently underway. These tests will also investigate metal mobility under saturated conditions (simulating mine backfill after groundwater rebound) following a period of exposure to oxidative conditions.

8.5 Assessment of potential significant environmental impacts

The NT EPA identified that the BP33 Project has the potential to significantly impact soil quality through:

1. Vegetation clearing causing erosion
2. Loss of containment of hydrocarbons and other chemicals
3. Generation of Acid Rock Drainage (ARD)
4. Seepage from waste rock storage.

The potential significance of impacts associated with ARD (acid, metalliferous or saline drainage and seepage) from waste rock storage is further assessed below based on the additional information provided by the geochemical testing described above. The potential significance of impacts associated with erosion and hydrocarbon/chemical spills was adequately assessed in the Referral information and is not further assessed. The EIA undertaken by Core/EcOz did not identify any additional impacts that require assessment.

8.5.1 Impact to soil quality through generation of acid or metalliferous drainage

Geochemical testing undertaken on samples representative of ore and waste rock from the BP33 Project indicates potential for metalliferous drainage to occur from ore stockpiles and WRD's. Acid drainage is unlikely due to the very limited volumes of PAF material and there is a high level of confidence in the prediction of acid drainage risk. The test results available to date, combined with the plan to backfill all WRD material to the underground mine and box cut, suggest a low risk of widespread and/or long-term impacts associate with metalliferous drainage. The long-term kinetic testing currently underway will provide additional information about whether metalliferous is likely to be produced from the WRD's during the life of mine or in the event of unforeseen closure resulting in WRD remaining on the surface for a longer period than anticipated, and/or post-closure once the WRD materials are backfilled.

If metalliferous drainage occurs and is not effectively controlled, elevated concentrations of metals/metalloids, primarily Al and As, but also Co, Cr, Cu, U and Zn, could be released to groundwater through seepage beneath

the WRD's and surface waters surrounding the mine site. The potential impacts on water quality and associated environmental values are assessed in section 9 Inland Water Environmental Quality.

8.6 Avoidance and mitigation

Once the results of the long-term kinetic tests are available, further assessment will be undertaken to determine if there is a requirement for specific management controls to be incorporated into the WRD designs and to inform the development of an Acid and Metalliferous Drainage (AMD) Management Plan. The objective of these measures will be to avoid generation of metalliferous drainage and minimise off-site release, with the target of maintaining water quality within the site-specific guideline values for 95% ecosystem protection. Table 8-5 summaries the measures that have or will be implemented to avoid or minimise the generation and release of metalliferous drainage from the mine site.

Table 8-5. Summary of measures to avoid and minimise NMD generation and release

Potential impact	Avoidance	Mitigation	Monitoring
Metalliferous mine drainage	The mine closure concept involves backfilling the underground with all waste rock available on the surface, which when completed will eliminate the WRD's as a source of contamination.	• The results of long-term kinetic tests will be used to assess the environmental risk posed by metals and metalloids leaching from the WRD's, ROM pad during mining and underground mine post-closure. • A risk-based approach will be adopted, consistent with the GARD Guide, to identify prevention and mitigation measures to be incorporated into mine design, construction, operation and closure. • An AMD Management Plan will be prepared and submitted for approval. • If metals concentrations in any mine affected waters exceed the SSGVs specified in the draft WMP (refer Appendix C), the water will be contained and treated prior to reuse or discharge. • A Waste Discharge Licence will be obtained under the *Water Act* and discharges will be managed to comply with the licence conditions.	• ARD classification of waste rock will be verified by ongoing field and laboratory testing during operations. • If testing indicates PAF volumes greater than predicted, the AMD Management Plan will be updated to include prevention and mitigation measures for ARD. • Surface water and groundwater monitoring will be undertaken as per section 8 of the draft WMP (refer Appendix C).

8.7 Predicted outcome

The BP33 Project is predicted to have a localised and short-term impact on land and soils within the ML area. The extent of erosion is predicted to be limited by diverting surface flows around the site implementation of an Erosion and Sediment Control Plan (ESCP) prepared by a Certified Practitioner. Soil contamination by hydrocarbons or chemicals is predicted to be limited because there are no large storages at the site. The waste rock and ore pose a low risk of ARD (as confirmed through geochemical testing) and test work to date indicates that any metalliferous drainage risk identified by long-term kinetic tests, can be prevented and/or mitigated by implementing design and operational controls that are well-established within the mining industry. The mine closure concept involves placing transitional and fresh waste rock materials back underground and backfilling the box cut with oxide waste rock so that there is no long-term surface storage of waste rock. Once all sources of contamination are removed and the site is rehabilitated, it is predicted there will be no long-term impacts to land and soils.

9 HYDROLOGICAL PROCESSES

This section provides additional information in relation to potential impacts to Hydrological Processes (i.e. the flow regimes of surface water and groundwater).

9.1 Environmental objective

The NT EPA's objective for Hydrological Processes 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.

9.2 Additional information required

The NT EPA requested additional information to improve the level of confidence in the prediction of potential significant impacts of the proposal and the effectiveness of mitigation measures, in relation to:

- Assurance that an adequate water balance has been developed, including quantification of the amount of water required to be taken from, and returned to, the hydrological system.
- Effectiveness of mitigation measures, with respect to the duration, magnitude and extent of aquifer drawdown from mine dewatering and groundwater extraction

Since the Referral was submitted, a network of thirteen groundwater monitoring bores has been installed and a groundwater model developed by specialist consultants CloudGSM (2021). This work has provided a significant amount of additional information to inform mine planning and design, as well as the assessment of environmental impacts (Appendix B). A water balance has been developed to model operation of the mine water management system across a range of climatic scenarios as described earlier in section 2.2.4 from the technical report at (Appendix A). A draft WMP has been prepared to provide a risk-based framework for avoiding and minimising impacts to hydrological processes and water quality (Appendix C). The plan documents the current state of knowledge with respect to the surface water and groundwater receiving environments, potential impacts and mitigation measures, and provides for addressing knowledge gaps and uncertainties prior to commencement of mining.

Core is no longer proposing installation of groundwater production bores because the water balance model (summarised earlier in section 2.2.4) indicates that operational water demand can be met by reuse of surface water and groundwater inflows dewatered from the box cut and underground mine, under all modelled climatic conditions (including very dry years).

9.3 Policy and guidance

The following policy and guidance documents have been referenced for assessing and managing risks to surface water and groundwater hydrological processes:

- *NT Water Allocation Planning Framework* (2020). Available at: https://denr.nt.gov.au/__data/assets/pdf_file/0011/476669/NT-Water-Allocation-Planning-Framework.pdf
- ANZECC (2000) *Water quality guideline for 95% freshwater ecosystem protection*. Available at: https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol1.pdf
- Barnett B, Townley L.R., Post V., Evans R.E., Hunt R.J., Peeters L., Richardson S., Werner A.D., Knapton A. and Boronkay A. (2012) *Australian groundwater modelling guidelines*. Available at: http://www.groundwater.com.au/media/W1siZiIsIjIwMTIvMTAvMTcvMjFfNDFfMzZfOTYwX0F1c3RyY

WxpYW5fZ3JvdW5kd2F0ZXJfbW9kZWxsaW5nX2d1aWRlbGluZXMucGRmIl1d/Australian-groundwater-modelling-guidelines.pdf

- Department of Environment and Science (DES) SILO Data Dill Service. Available at: https://www.data.qld.gov.au/dataset/silo-climate-database
- NT Government Gazette No. G25 – Darwin Rural Water Control District. Available at: https://nt.gov.au/__data/assets/pdf_file/0004/197284/g25.pdf
- ANCOLD (2012). *Guidelines on the Consequence Categories for Dams*. Available at: https://www.ancold.org.au/?product=guidelines-on-the-consequence-categories-for-dams-october-2012

9.4 Existing environment and values

9.4.1 Surface water

The project is in the Charlotte River catchment of Bynoe Harbour. A minor ephemeral watercourse (stream order 1) flows along the eastern boundary of the mine site and discharges off the southern boundary of the ML and into the Charlotte River, approximately 2.5km downstream. The manmade OHD is a permanent waterbody that will be used as a water source for mining and there are also a number of pit lakes that have formed from past mining activities. The watercourses in the ML are ephemeral and generally cease to flow by April-May each year; however, some small pools remain into the dry season and indicate there is likely some groundwater interaction. The area of the BP33 Project disturbance footprint covers 3.3% of the sub-catchments in project area, and less than 1% of the Charlotte River catchment area. Surface water features are shown in Figure 9-1.

The surface watercourses have ecological value as refuge habitat for fauna, especially when small pools remain in the dry season and surface water is limited in the surrounding areas. There are no land uses identified that utilise the ephemeral watercourses downstream of the project disturbance footprint.

9.4.2 Groundwater

The hydrogeology of the area has been characterised using data collected from thirteen monitoring bores constructed in 2020, desktop studies and groundwater modelling. The information below is summarised from the groundwater investigation report Appendix L and groundwater modelling report at Appendix B.

Monitoring bores

Thirteen monitoring bores were constructed at seven locations around BP33 in 2020 (Figure 9-3). Six bores are in the fractured slightly weathered to fresh BCF, five bores are in heavily weathered to fresh BCF with negligible fracturing and two bores are in alluvial sediments. Nested bores were constructed at five sites to investigate the occurrence of shallow groundwater within alluvial deposits and the weathered top of the BCF, and its connection to the deeper, fractured rock aquifer in the BCF. Hydraulic testing (slug testing) was undertaken on all constructed bores and monitoring of groundwater levels commenced in October 2020 with pressure loggers installed in all monitoring bores and also the BP33 pit-lake. Further details of the bore locations and monitoring program are documented in the draft WMP (Appendix C).

Aquifers

The Burrell Creek Formation (BCF) forms the main aquifer beneath the BP33 Project. It is a marginal fractured rock aquifer with typical bore yields of less than 0.5 L/s; largely due to the low primary porosity and lack of open fracturing within the formation. Higher yields (up to 3.5 L/s) have been recorded where drilling intersects fracture zones or bands of quartz veining. These fracture zones are discrete and commonly less than 1 m in thickness. Groundwater is typically intersected at the base of the weathering zone/transition into fresh BCF. Maximum pumping rates for groundwater supply was estimated through analysing pump test results of four monitoring bores at BP33 (BPG4d, BPG1, BPG5i and BPG6). The results of the pump testing rate ranged between 1.8 and 2Ls/s per bore. Due to the variable nature of the fractured rock aquifer, confidence in the

rate predictions will decrease over longer pumping durations. With sustained pumping it is expected that bore rates will decline due to a combination of bore interference, the intersection of aquifer boundaries and decreased bore efficiency, which indicates the feasibility of targeted groundwater bores as a supply for mining activities is limited and not reliable. This is representative of the BCF which underlies most Finniss Lithium Project MLs (Groundwater Enterprises 2020).

Groundwater drilling around the BP33 site indicates the main groundwater intersections occur at depths of 25 – 70 m with most bores intersecting the groundwater at depths around 45 m. The BCF is largely fine grained and characteristically weathers to clay. Where heavily weathered the formation is likely to be less permeable relative to fresh rock due to the higher likelihood of fractures staying open in the more competent, unweathered rock.

There is limited information available on the groundwater characteristics of the pegmatite. Anecdotal information from mineral drilling and diamond coring at BP33 suggests the pegmatite is very competent and has limited potential to form an aquifer. The pegmatite is an igneous rock with negligible primary porosity and aquifer development is dependent on fracturing. Geotechnical logging at BP33 suggests the fracture density within the pegmatite is of a similar order to the surrounding BCF.

There is potential for minor aquifers in the Cenozoic deposits (sand, clay, gravel and laterite) in areas with thicker alluvial cover (i.e. along drainage lines) or where the laterite profile is more extensive. Investigation drilling undertaken at BP33 in late 2020 found that the alluvial sediments have limited spatial extent and thickness (< 4.5 m). In the late dry season the alluvial sediments were unsaturated at the drilling sites between the BP33 pit/proposed mine workings and the drainage line to the east. These results and subsequent groundwater monitoring suggest groundwater within the alluvial deposits is largely ephemeral or is restricted to small areas in very close proximity to the drainage lines.

Aquifer hydraulic properties

Slug tests completed on the installed monitoring bores, hydraulic conductivity results from Groundwater Enterprises (2020) reveal that the permeability of the BCF is dependent on secondary porosity (i.e., fracture and joint development). Fresh and weathered BCF with negligible fracturing displayed a hydraulic conductivity range of 0.003 – 0.08 m/day. Bores that intersected fractured BCF (fresh or weathered) showed a hydraulic conductivity two orders of magnitude higher with a range from 0.27 – 2.6 m/day. The alluvial sediments (silty sand) tested with a hydraulic conductivity in the order of 0.4 m/day.

Groundwater levels

Groundwater level monitoring has been undertaken on the BP33 bores since their installation in the dry season of 2020. Groundwater levels in the deeper fractured BCF bores ranged from 4.5 to 9.8 mBGL in the late dry season. The bores responded uniformly to wet season recharge and groundwater levels approached land surface by late January 2021. The seasonal change in water levels in the deep BCF bores ranges from 3.7 – 9.6 m. The seasonal range is greatest in BPG1 and BPG6, which are located on a ridge of outcropping BCF approximately 15 m higher in the landscape than the other bore sites. The larger water level range in these bores suggests that recharge rates may be higher in the elevated areas relative to the lower lying sites along the drainage lines. The water level range observed in 2020 is consistent with the longer monitoring record available from bores at Grants Lithium Project where since 2018 the annual change in groundwater levels in the deep BCF bore has ranged from 5.4 – 9.3 m.

Groundwater levels in the shallow bores constructed in the heavily weathered top of the BCF or alluvial sediments ranged from 4.4 – 6.6 mBGL in the late dry season. They rose steadily in response to wet season rainfall from December 2020 and plateaued by mid-February at levels around the natural surface. The seasonal water level fluctuation in the shallow bores ranged from 3.1 – 5.5 m.

Groundwater flow direction

The local flow direction of groundwater is south-east across the BP33 site with groundwater moving from the more elevated areas in the north-west of the site to the lower lying areas along the drainage line in the south-east. The flow direction does not change between the dry and wet season surfaces, however the groundwater

gradients become much steeper in the north-east of the site in the wet season. This is attributed preferential recharge occurring on the higher elevations. Water levels in the BP33 pit-lake are slightly elevated relative to the surrounding watertable surface suggesting that the pit-lake is operating as a local recharge feature.

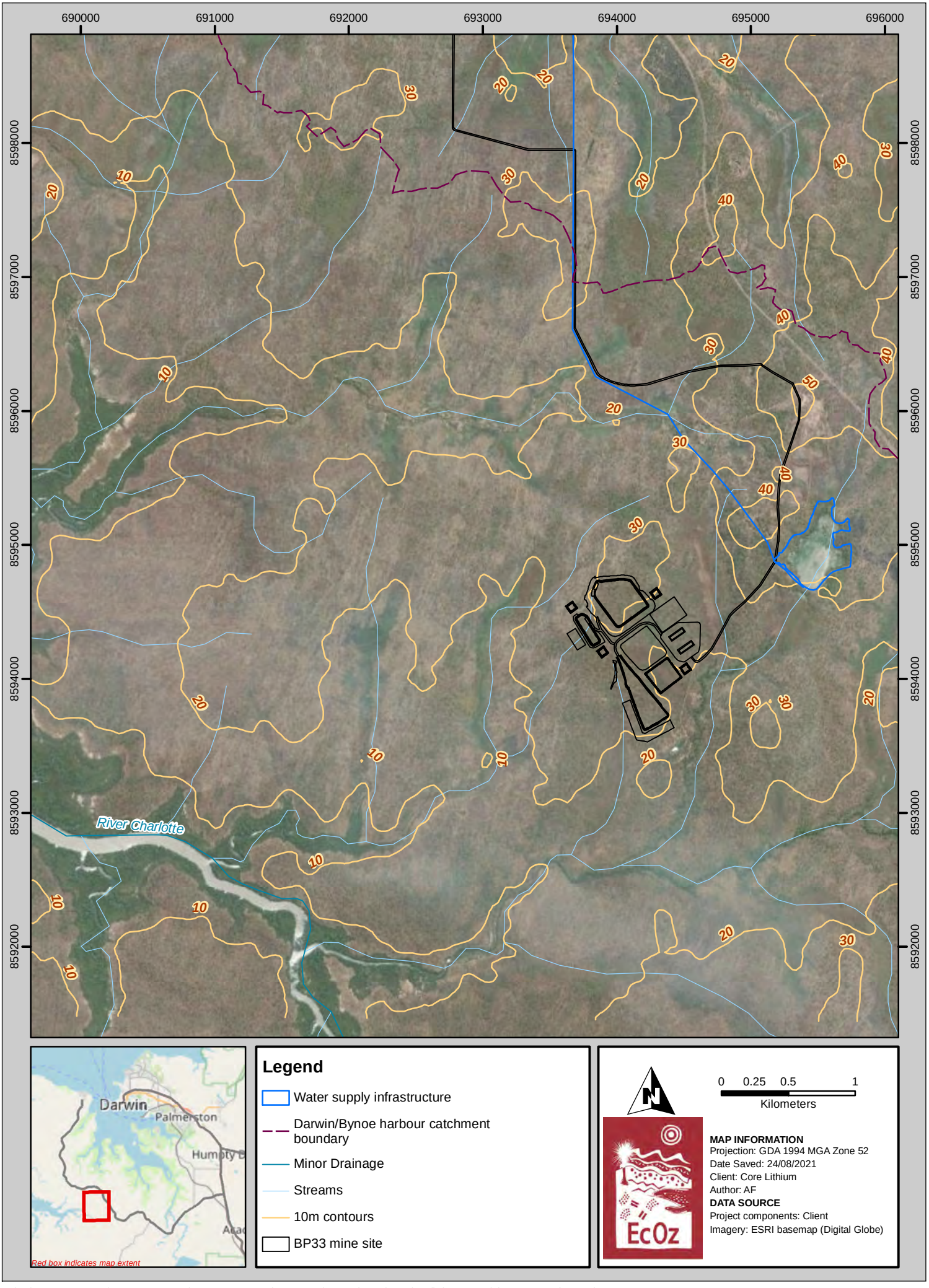
Existing groundwater users

Excluding monitoring bores drilled for the Grants and BP33 project's there are six registered groundwater bores within 10 km of the BP33 site. The closest groundwater bore is RN023177, located 2.5 km north of BP33. RN023177 was drilled in 1984 and was constructed in the BCF as a potential water supply bore for Greenex mining operations at OHD; the bore is not currently in use. The next closest groundwater bore RN041993 is located 4.6 km south of BP33 on the Fog Bay Road and is a domestic water supply bore drilled in 2020. The location of these bores is shown in Figure 9-3.

Groundwater dependent ecosystems

The groundwater dependent ecosystems (GDE) Atlas[15] maps an area of medium GDE potential along the drainage lines to the immediate east and south of BP33. Small pools have been observed to persist in the watercourse into the late dry season (EcOz, 2019) and a narrow zone of riparian rainforest occurs, which suggests a level of groundwater dependence. These ecosystems are likely facultative GDEs, with an infrequent or partial dependence on groundwater (CloudGMS, 2021).

[15] Bureau of Meteorology http://www.bom.gov.au/water/groundwater/gde/map.shtml



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20208 - BP33 Supplementary Environmental Report\01 Project Files\Report maps\Figure 3 2. Map of topo.mxd

Figure 9-1. Map of surface water features in the BP33 Project area

9.5 Assessment of potential significant environmental impacts

The NT EPA identified that the BP33 Project proposal has potential to significantly impact the surface hydrology of downstream ephemeral waterways by altered surface water flows and altered groundwater hydrology of the Charlotte River sub-catchment. The EIA undertaken by Core/EcOz, with reference to the additional information gathered from the site water balance and groundwater model, has identified the following potential significant impacts to hydrological processes:

- Alteration of surface water flows into receiving environment from surface water diversion with mining infrastructure and uncontrolled release of MSD water
- Drawdown of groundwater in the underlying aquifers from dewatering of the underground workings.

The potential significance of these impacts and implications for ecological health, land uses, and the welfare and amenity of people is assessed in the sections below.

9.5.1 Alteration of surface water flows

Hydrologic and hydraulic modelling submitted with the Referral information (SWES, 2020), indicated that there will be localised alteration of surface flow paths within the mine site footprint. Core has designed the box cut to incorporate a contour drain on the western side, to divert surface water run-off from adjacent elevated areas towards a natural topographic low to the south-west, which will reduce the volumes of water requiring dewatering from the box cut. A drainage network system and sediment dams have been designed to manage internal stormwater flows. The contour drain and drainage system are shown on the site layout Figure 2-1. The modelling indicates the infrastructure will have a limited impact on natural surface water flow regimes in comparison to pre-mining conditions, which is expected given the small portion of the catchment affected by the mine site infrastructure.

Surface water flows will be reduced in the drainage line downstream of the OHD when the dam is in use as a water source for the mining activities. Table 9-1 shows the modelled reduction in flows in the Charlotte River at a take rate of 2.02 ML/day from OHD, which is based on meeting the water demand for Grants Project as the modelling was prepared for the Grants Lithium Project EIS. The modelling is suitable for assessing potential impacts from changes to flows associated with the BP33 production phase because the modelled take rate from OHD is now predicted to be significantly less[16] due to the groundwater model indicating the availability of significant inflow volumes that will be dewatered and reused on site. There are no other licenced consumptive uses on the Charlotte River catchment, and so it is assumed that extraction from the OHD is the only significant source of consumptive use in the catchment. On this basis, the percentage reduction across the wet season months does not exceed the threshold established in the *Territory Water Allocation Planning Framework,* which requires that extraction for consumptive uses will not exceed the threshold level equivalent to 20 per cent of flow at any time in any part of a river.

Table 9-1. Modelled percent reduction in flows at Charlotte River outlet to Bynoe Harbour. (Source: EnviroConsult 2019, pg.26)

November	December	January	February	March	April
12.6	9.4	3.7	2.9	1.4	3.9

[16] The take-rate from OHD during the BP33 production phase is forecast as follows: BP33 supplementary demand (0.013 ML/day from the BP33 water balance); Grants processing demand 0.96 ML/day (from the Grants Lithium Project EIS); Total take-rate approximately 1 ML/day.

9.5.2 Groundwater drawdown

The modelled extent of groundwater drawdown around the BP33 mine (and Grants mine) due to dewatering is shown in Figure 9-2. At the end of the BP33 life of mine, there will be two separate drawdown cones in the surrounding BCF groundwater system. The BP33 drawdown cone extends approximately 2 km from the underground mine and the Grants drawdown cone approximately 1 km from the open pit. The Grants and BP33 drawdown cones do not interact, indicating that groundwater impacts are localised around each of the mine sites and because there are no other extractive uses in this area do not contribute to cumulative impacts to the aquifer.

Modelling of groundwater drawdown was undertaken as a component of a broader modelling study with the objective of identifying potential impacts to the groundwater system and associated receptors from the Finniss Lithium Project (including Grants open cut mine and BP33 underground mine). The modelling addresses a range of climatic conditions using long term climate data sourced from the SILO[17] data set and includes a predictive uncertainty assessment that adjusts the permeability and storage parameters of the aquifer to examine the potential upper and lower groundwater inflow volumes that could eventuate. The groundwater modelling technical report is provided at Appendix B, including details of conceptual model development and calibration.

The modelling 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 around the mine site. Once mining ceases, the water table surface 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 (refer section 7.5 for discussion of potential impacts to riparian vegetation). No impacts are predicted to existing groundwater users - the nearest of which is 4.6 km from the site.

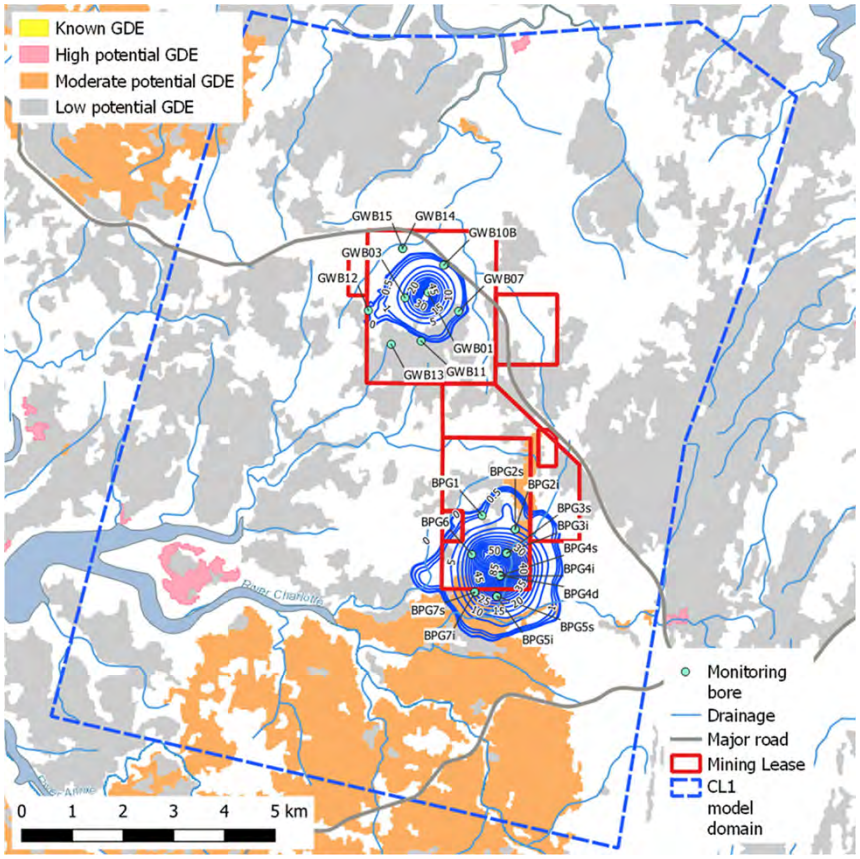


Figure 9-2. BP33 life of mine groundwater drawdown contours. (Source: CloudGMS 2021, pg.60)

[17] SILO data drill (https://www. https://www.longpaddock.qld.gov.au/silo), a national scale database of climate records for Australia.

9.6 Avoidance and mitigation

The measures that have or will be implemented to avoid or minimise the potential impact of the proposal on hydrological processes are provided below.

Table 9-2. Hydrological processes avoidance, mitigation and monitoring measures

Potential impact	Avoidance	Mitigation	Monitoring
Alteration of surface water flows due to extraction and discharges	• Mine water management system designed to ensure all surplus water can be contained so that no releases occur to watercourses in the dry season. • A contour drain will be installed to divert overland flows away from the box cut, which will reduce dewatering and discharge requirements and maintain overland flows.	• Extraction from OHD will be minimised by reusing inflows dewatered from the mine as the primary water source. • Stormwater drainage and sediment dams will be designed to capture, treat and release clean water off site as overland flows. • Controlled discharge to the watercourse east of the mine site will be limited to periods of high flow due to the dilution factors required to meet site specific guideline values for water quality.	• Extraction from OHD will be metered and reported in accordance with the conditions of a Water Extraction Licence. • Water use on site will be metered and monitoring undertaken to assess water use efficiency. • A flow gauge will be installed to record surface flows on the drainage line downstream of OHD and mine site. • Discharges will be subject to a Waste Discharge Licence and volumes will be monitored and reported in accordance with the licence conditions.
Groundwater drawdown due to mine dewatering	• Not applicable	• Long-term impacts to groundwater will be limited by partial backfilling the mine allowing groundwater levels to recover to pre-mining conditions.	• Groundwater levels will be continuously monitored in all bores using Troll loggers – refer section 6.1.2 of the draft WMP (Appendix C) to verify extent of drawdown cone.

9.6.1 Measures to minimise water use and discharge

Water use and discharges will be minimised by re-use of water dewatered from the underground mine for dust suppression (underground and above ground) and as a water supply for the mining operations. Once mining ceases at the Grants open pit, any surplus water from BP33 can be pumped to Grants for storage and reuse. Excess water that cannot feasibly be contained on site will be treated to remove sediments and other contaminants (if required), prior to discharge to a land irrigation area and/or watercourse (management options for excess water are discussed in subsequent sections below). Discharges will be authorised under the Mining Authorisation and a Waste Discharge Licence will be required for discharge to water during the wet season.

9.6.2 Monitoring program

A detailed monitoring plan is provided in section 8 of the draft WMP (Appendix C). The plan includes continuous logging of water levels in groundwater monitoring bores and stream flow monitoring at an automatic gauging station downstream of the OHD and mine site. The locations of all monitoring bores and sites are shown on Figure 9-3.

Table 9-3 summarises the assessment criteria and corrective actions that will be implemented to minimise impacts to surface water flows and groundwater levels as far as is practicable. Assessment criteria and SSGV's that will protect the downstream ecosystems were derived from pre-mining baseline results from surface and groundwater quality monitoring. The criteria and details of how they were derived are provided in the draft WMP (Appendix C).

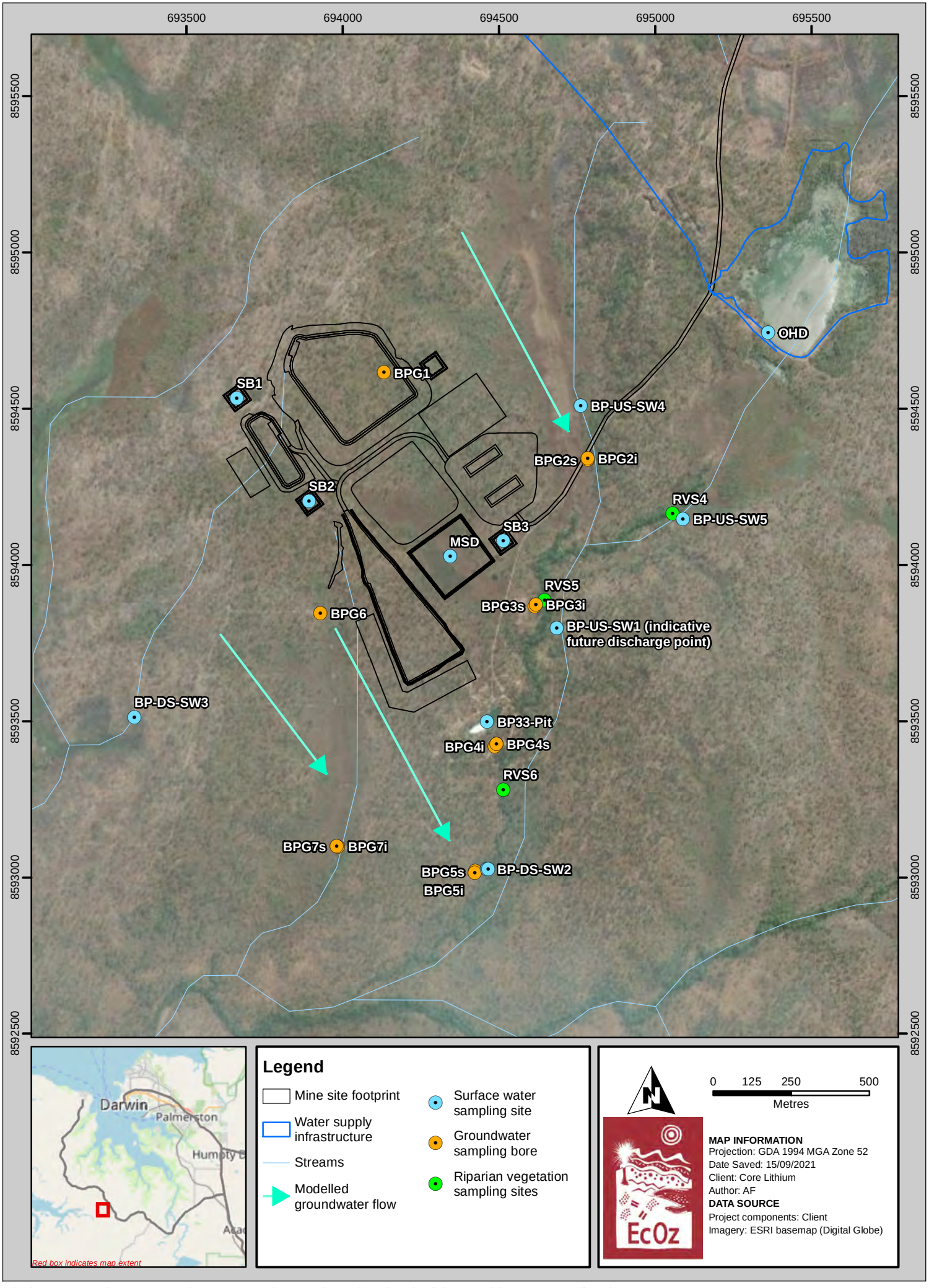
Table 9-3. Summary of assessment criteria and corrective actions for surface water flows and groundwater levels

Monitoring	Assessment criteria	Response
Monitoring of water extraction volumes from OHD	Volumes greater than predicted in water balance model (i.e. 4ML/month during the BP33 production phase)	• Review site water use efficiency. • Check that water reuse is being maximised.
Monitoring of downstream surface flows by automatic gauging station	Not applicable. Data to inform causation assessment if impacts to riparian vegetation are detected.	• Review site water use efficiency. • Check that water reuse is being maximised.
Monitoring of water use across the mine site (refer draft WMP Appendix C section 8.25)	Water use greater than forecast in the site water balance model (i.e. 2.6ML/day for BP33)	• Investigate and fix system leaks. • Implement measures to minimise water use to as low as reasonably practicable.
Continuous water level logging and quarterly sampling of water levels in 13 groundwater monitoring bores	Drawdown in bores closest to the riparian zone (i.e. BPG3, BPG5) greater than predicted by groundwater model.	• The risks to the environment and other water users will be re-assessed and mitigation measures identified as part of the annual Mine Management Plan reporting and review process. • Annual riparian vegetation condition monitoring to assess ecosystem response to reduced groundwater availability. • If monitoring identifies an impact to riparian vegetation, then the MCP will include post-mining reinstatement of habitat values in the affected areas and monitoring of ecosystem recovery.

9.7 Predicted outcome

The BP33 Project proposal is predicted to reduce wet season surface water flows in the ephemeral watercourse downstream of the OHD and groundwater levels within an approximately 2 km zone of influence around the mine site that corresponds to the 1 m groundwater drawdown contour. The modelled reduction in wet season flows in the ephemeral watercourse is not predicted to impact ecological health or amenity of the Charlotte River, as the reduced discharged volumes average approximately 6% over the wet season months and do not exceed the 20% threshold established in the *Territory Water Allocation Planning Framework*. Lower groundwater levels around the mine site will be experienced in the medium-term, for the life of mine (four years) and three years' post-closure. which will not impact any other groundwater users because there are none in zone of influence.

The predicted outcome for riparian ecosystems from the combined effects on surface water flows and groundwater levels, was discussed earlier in section 7.7. It was concluded that riparian vegetation, within the groundwater drawdown cone could be degraded. The area of impact is predicted to be limited to a 4.5 km section of stream order one watercourse where instream and terrestrial habitat values are low, due to the ephemeral nature of the flows. The magnitude of impact is difficult to predict with certainty as it depends on the level of groundwater dependence and how the vegetation will respond and recover. The riparian vegetation monitoring program described in the draft WMP (Appendix C), will detect any impact that does occur, so that rehabilitation and/or recovery of habitat values can be addressed as during mine closure and rehabilitation.



Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20208 - BP33 Supplementary Environmental Report\01 Project Files\Report maps\Figure XX. Future sampling.mxd

Figure 9-3. Map of ongoing groundwater, surface water and riparian vegetation monitoring sites

10 INLAND WATER ENVIRONMENTAL QUALITY

This section provides additional information in relation to potential impacts to Inland Water Environmental Quality (i.e. the quality of surface water within and downstream of the proposal and the groundwater aquifers beneath).

10.1 Environmental objective

The NT EPA's objective for this environmental 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.

10.2 Additional information required

The NT EPA requested additional information to improve the level of confidence in the prediction of potential significant impacts of the proposal and the effectiveness of mitigation measures, in relation to:

- Certainty that the quality of groundwater and surface water resources would be protected from mine related impacts.
- Confidence that the waste management hierarchy has been considered in the dewatering strategy, and wastewater discharge would only occur when specific flow and water quality criteria are satisfied through monitoring and testing.
- Effectiveness of mitigation measures, with respect to mine site water management and downstream water quality impacts.

Since the Referral was submitted, collection of baseline groundwater and surface water data has continued and has provided Core an understanding of the pre-mining water quality characteristics for the BP33 Project and surrounding watercourses and groundwater aquifers. A draft WMP (Appendix C) has been prepared to provide a risk-based framework for avoiding and minimising impacts to water quality. The plan includes baseline surface and groundwater water quality data compiled by EcOz, a site groundwater inflow model prepared by specialist consultants CloudGMS (2021) and a site water balance model prepared by specialist water consultants WRM (2021). The plan documents the current state of knowledge with respect to the surface water and groundwater receiving environments, potential impacts and mitigation measures, and provides a plan for addressing knowledge gaps and uncertainties prior to commencement of mining. The additional information provided in the sections below have been summarised from the draft WMP (Appendix C).

10.3 Policy and guidance

The following water quality standards and guidelines have been adopted to describe the ecological values and health of surface water environments and identify avoidance and mitigation measures:

- ANZG (2018). *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Governments and Australian state and territory governments*, Canberra ACT, Australia. Available at: http://www.waterquality.gov.au/anz-guidelines
- ANECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality, National Water Quality Management Strategy Paper No 4, Volume 3, Primary Industries — Rationale and Background Information,* Australian and New Zealand Environment and Conservation Council (ANZECC) and Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), Canberra. Available at: https://www.waterquality.gov.au/sites/default/files/documents/anzecc-armcanz-2000-guidelines-vol3.pdf

10.4 Existing environment and values

The water quality of surface waters and groundwaters surrounding the BP33 Project, need to be well understood to inform monitoring programme and water management system to be implemented during construction and mining operations. The baseline data provides a characterisation of pre-mining surface water and groundwater quality. The data is used to develop initial site-specific guideline values (SSGV's) for early detection and implementation of adaptive management measures, in response to change in surface waterways, groundwater aquifers and the ecosystems that depend on them. Establishing the levels of metals, nutrients and other constituents in the groundwater is also important for determining how to manage groundwater dewatered from the from the box cut, decline and underground workings whilst mining is underway. The sections below document current knowledge of baseline surface water and groundwater quality.

10.4.1 Surface water

Baseline surface water quality monitoring at four sites has been undertaken in the BP33 area since February 2017. The monitoring locations are shown in Figure 9-3 and encompass two existing surface storages (i.e. OHD and the old BP33 mine pit) and an upstream and downstream site (BPUS SW 1 and BPDS SW2) located on the ephemeral watercourse to the east of the mine site. The figure also provides the future ongoing surface water monitoring sites to be sampled during operations.

Baseline data has indicated that the existing surface water storages (OHD and BP33 Pit) are characteristic of rainwater mixed with groundwater seepage and close to neutral (pH 6.0 and 8.2). Electroconductivity (EC) was low and very similar to the upstream and downstream sampling sites. Arsenic (which is naturally high in the groundwater, as discussed in section 10.4.2 below) is below the ANZG (2018) default value in the OHD, but BP33 had occasional detections above the guideline value, probably because it receives groundwater inflows. Concentrations of dissolved metals (i.e. aluminium, boron, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, uranium, vanadium and zinc) and hydrocarbons were below the level of laboratory limit of reporting (LOR) or guideline value (if applicable), apart from iron and lithium, which are not considered toxic but were detected and do not have specific guideline values against which to assess toxicity. *E. coli* and *enterococci* were also sampled and detected at varying levels indicating that the water will require treatment when used as a potable water supply.

The upstream and downstream sampling sites are characteristic of fresh rainwater and surface runoff, with a small component of groundwater seepage (indicated by low EC similar to the surface water storages). The sites range from slightly acidic to neutral (pH generally between 5.2 and 7.3). Table 10-1 provides a summary of toxicant data for the site, which indicates most dissolved metals (i.e. arsenic, beryllium, boron, caesium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, silver, thorium, tin, titanium, uranium, vanadium and zinc) and hydrocarbons were below the level of LOR or guideline value (if applicable). Barium, iron, lithium and strontium concentrations were detected above the LOR, but do not have specific guideline values against which to compare concentrations as they are not key toxicants. Aluminium was the only dissolved metal that recorded concentrations above the guideline value for most sampling rounds, indicating it is naturally elevated in the surface waters. *E. coli* and *enterococci* were also sampled and detected as expected. The water quality results collected from the upstream and downstream locations are similar and indicate the surface waters are not impacted by previous or current land use.

Details of the approach taken for selection of sampling sites, monitoring, laboratory parameters assessed, and results of the monitoring are provided in section 4 of the draft WMP (Appendix C). The data sets have been used to establish site specific guidelines values (SSGV's) to use as thresholds for detecting impacts to surface water from the mining activities.

Table 10-1. Toxicant summary for BPUS SW1 and BPDS SW2 sites.

Parameter	ANZG (2018) guideline[18] (mg/L)	Discussion	No data points	Median (mg/L)	80th percentile (mg/L)
Dissolved metals					
Aluminium	0.055 when pH >6.5 0.0008 when pH <6.5	Mostly above the ANZG (2018) guideline value. The pH at these sites is <6.5 most of the time.	26	0.05	0.10
Arsenic	0.013	Almost always below 0.002 mg/L and always below the guideline value	26	<0.001	0.002
Barium	NA	Always 0.003 mg/L	2	0.003	0.003
Beryllium	NA	Always below the LOR of <0.001 mg/L	2	<0.001	<0.001
Boron	0.37	Always below the LOR of <0.05 mg/L and as such always below the guideline value	2	<0.05	<0.05
Cadmium	0.0002	Always below the LOR of <0.0001 mg/L and as such always below the guideline value	26	<0.0001	<0.0001
Caesium	NA	Always below the LOR of <0.001 mg/L	2	<0.001	<0.001
Chromium	0.004	Always below the LOR of <0.001 mg/L and as such always below the guideline value	26	<0.001	<0.001
Cobalt	0.0014	Always below the LOR of <0.001 mg/L and as such always below the guideline value	2	<0.001	<0.001
Copper	0.0014	Always below the LOR of <0.001 mg/L and as such always below the guideline value	26	<0.001	<0.001
Iron	NA	Most concentrations less than 0.33 mg/L, with occasional concentrations above this	26	0.17	0.33
Lead	0.0034	Always below the LOR of <0.001 mg/L and as such always below the guideline value	26	<0.001	<0.001
Lithium	NA	Most concentrations less than 0.007 mg/L, with occasional concentrations above this	22	0.004	0.007
Mercury	0.0006	Always below the LOR of <0.0001 mg/L and as such always below the guideline value	26	<0.0001	<0.0001
Nickel	0.011	Always below the LOR of <0.001 mg/L and as such always below the guideline value	26	<0.001	<0.001
Selenium	0.011	Always below the LOR of <0.01 mg/L and as such always below the guideline value	20	<0.01	<0.01
Silver	0.00005	Always below the LOR of <0.001 mg/L. Unknown if this is below the guideline value.	2	<0.001	<0.001
Strontium	NA	Always below 0.002 mg/L	2	<0.001	0.002
Thorium	NA	Always below the LOR of <0.001 mg/L	2	<0.001	<0.001
Tin	NA	Always below the LOR of <0.001 mg/L	15	<0.001	<0.001
Titanium	NA	Always below the LOR of <0.01 mg/L	2	<0.01	<0.01
Uranium	0.0005	Always below the LOR of <0.001 mg/L. Unknown if this is below the guideline value.	2	<0.001	<0.001
Vanadium	0.006	Always below the LOR of <0.01 mg/L. Unknown if this is below the guideline value.	2	<0.01	<0.01
Zinc	0.008	Always below the LOR of <0.005 mg/L and as such always below the guideline value	26	<0.005	<0.005

[18] Default guideline values for 95% species protection in freshwater. NA – no ANZG (2018) default guideline value available.

Parameter	ANZG (2018) guideline[18] (mg/L)	Discussion	No data points	Median (µg/L)	80th percentile (µg/L)
Hydrocarbons					
TRH C6-C10	NA	Always below the LOR of <20 µg/L	14	<20	<20
>C10-C16	NA	Always below the LOR of <100 µg/L	14	<100	<100
>C16-C34	NA	Always below the LOR of <100 µg/L	14	<100	<100
>C34-C40	NA	Always below the LOR of <100 µg/L	14	<100	<100
Benzene	950	Always below the LOR of <1 µg/L and as such always below the guideline value	14	<1	<1
Toluene	180	Always below the LOR of <2 µg/L and as such always below the guideline value	14	<2	<2
Ethylbenzene	80	Always below the LOR of <2 µg/L and as such always below the guideline value	14	<2	<2
Meta & para-xylene	75	Always below the LOR of <2 µg/L and as such always below the guideline value	14	<2	<2
Ortho-xylene	350	Always below the LOR of <2 µg/L and as such always below the guideline value	14	<2	<2
Naphthalene	16	Always below the LOR of <5 µg/L and as such always below the guideline value	14	<5	<5

10.4.2 Groundwater

Baseline groundwater quality monitoring has been undertaken at 13 groundwater monitoring bores in seven locations since their installation in September 2020. A combination of shallow and deep bores were installed to provide data representative of the range of groundwater quality conditions encountered as the mine progresses deeper underground. Shallow bores are drilled to maximum depth of 36m below ground level (BGL) and the deepest bore to 109 mBGL. Locations of the groundwater bores are provided in Figure 9-3. The bore locations were selected to be up and downgradient of the mining infrastructure so that they can be used as part of an ongoing monitoring program to detect contaminated seepage.

Analysis of baseline data collected from the bores indicates that the shallow and deep aquifers have distinct water quality characteristics. Table 10-2 summarises the water quality characteristics of each. The characteristics that are notable from a mine planning perspective are marked with a * in the table. The data show that the deep groundwater aquifer is naturally high in arsenic, which is potentially toxic to aquatic organisms, and phosphorous, which can cause algal blooms in surface water courses. This indicates that groundwater inflows dewatered from the underground mine may include water quality characteristics that mean the water cannot be directly released to surface waters, even if free from any contaminants associated with mining.

Details of the approach taken for selection of groundwater bore locations, aquifer formation information, monitoring undertaken, laboratory parameters assessed, and results of the monitoring are provided in section 5 of the draft WMP (Appendix C).

Table 10-2. Summary of bore groupings based on groundwater quality characteristics

Bore Grouping	Screened aquifer	Screened depth	Water quality characteristics
1	Alluvial sediments and weathered BCF at shallow depth	Maximum 8 mBGL	slightly acidic pH relatively low EC positive ORP relatively low alkalinity low arsenic relatively high zinc relatively low iron relatively low phosphorus Faecal contamination indicators E. coli and enterococci are mostly always below the LOR
	Weathered BCF in elevated areas/recharge zones at intermediate depths	Maximum 36 mBGL	
2	Deeper weathered and fresh BCF	Depths greater than 36 mBGL	close to neutral pH relatively higher EC negative ORP relatively higher alkalinity *high arsenic* relatively low zinc relatively high iron *relatively high phosphorus*

10.4.3 Site Specific Guideline Values (SSGVs)

The draft WMP (Appendix C) provides complete details of the baseline surface water and groundwater monitoring programs, including site selection criteria, sampling frequencies, parameters assessed and analysis of results. The baseline data sets have been used in the mine water balance modelling to assess available options for managing surplus water because while the waters are not contaminated by past or current land uses, the water quality characteristics of the surface water and groundwater are different. SSGV's have been developed from the baseline data to use as thresholds for detecting impacts to surface water from the mining activities. Further details are provided in section 10.6.1 and 10.6.2 below.

10.5 Assessment of potential significant environmental impacts

The NT EPA identified that the BP33 Project proposal has the potential to act as a contaminant source and significantly impact downstream surface water quality and the water quality of the underlying aquifer. The potential significance of these impacts and implications for ecological health, land uses, and the welfare and amenity of people is assessed in the sections below.

10.5.1 Contaminant sources

Table 10-3 summarises point and diffuse sources of discharges from the BP33 mine site that could have a significant impact to surface water and groundwater if not appropriately managed.

Table 10-3. Sources of point and diffuse discharges from the BP33 mine site

Discharge source/location	Quality	Quantity
Sediments present in run-off and discharges to watercourse	Water in sediment basins will be treated with flocculants to remove sediments prior to discharge off site as overland flow. The discharge standard adopted is the standard recommended for sediment basins in IECA (2008): 90th percentile NTU reading not exceeding 100, and 50th percentile NTU reading not exceeding 60.	Variable depending on wet season rainfall. Three sediment basins are located around the mine site as shown in Figure 2-1.
Seepage from WRD's and ROM pad	Geochemical characterisation of waste rock and ore indicates potential for seepage to contain elevated metals and metalloids, primarily Al and As, but also Co, Cr, Cu, U and Zn.	Predicted to be low due to the WRD and ROM pad designs incorporating a low permeability base, and because the facilities will be in place for a short period of time (4 years). Kinetic testing underway to improve certainty and inform detailed mine design and closure requirements is described in section 8.6 of this document.
Seepage from BP33 underground mine post-closure	As above	As above
Controlled discharge of surplus water to watercourse discharge point – refer Figure 9-3 for indicative location.	Groundwater inflows dewatered from the underground mine to the MSD are likely to contain hydrocarbons and suspended sediments. The water will be treated to remove these contaminants. The water is also naturally high in arsenic and phosphorous compared to local surface water characteristics. The water will be treated to reduce phosphorous concentrations (if required) and controlled release rate managed to address arsenic concentrations.	Maximum allowable controlled release rate has been determined based on the dilution factors required to meet the arsenic site-specific guideline value (SSGV) for surface water (0.013 mg/L). In very wet (1%ile) climatic conditions, the site could release up to 150 ML/month in the peak of the wet season. In median (50%ile) climatic conditions, the site could release up to 25 ML/month. Controlled release of water can only be undertaken in accordance with a Waste Discharge Licence under the *Water Act*, which Core will need to apply for prior to commencement of mining. Refer section 2.2.5 for details.
Controlled discharge of surplus water to a 20ha land irrigation area	As above Baseline water quality meets irrigation water quality trigger values as outlined in *Chapter 4 Primary Industries* of the ANZECC (2000b) guidelines.	The total volume of water requiring disposal during the 16 months start-up phase is estimated to be between 120 ML to 210 ML, depending on the climatic conditions experienced at the time. Refer section 2.2.5 for details.
Storage of surplus water in Grants open pit void	As above	Monthly volumes that would need to be transferred to keep the BP33 underground dry, range between approximately 60 ML/month to 180 ML/month over the life of mine. Refer section 2.2.5 for details.

Other sources of potential impacts to water quality, hydrocarbon and chemical storages and the onsite sewage system were considered in the EIA; however, these aspects were not considered potentially significant. Fuel and chemical storages being designed and operated in accordance with Australian Standards, they are unlikely to be a source of significant impact to water quality. The onsite sewage system will be designed and installed in accordance with the *Code of Practice for Wastewater Management* (Department of Health, 2020). These aspects will be managed through the adoption of design criteria and operational processes that are well-documented in the above-mentioned standards and guidelines, and therefore are unlikely to be a significant source of contaminants that could impact water quality.

10.5.2 Turbidity in surface watercourses from mine run-off and discharges

Mine affected water, including inflows dewatered from the box cut and underground and stormwater, will contain high levels of suspended sediments. This water will be captured and treated to remove sediments prior to being re-used or discharged off site. Dewatering will be directed to the MSD where sediments will be removed, and stormwater within the mine site will be captured in the internal drainage network and directed to one of three sediment basins for retention and/or treatment, prior to being released off site as overland flows. These systems will be designed and operated in accordance with the *Best Practice Erosion and Sediment Control Guidelines* to provide sufficient retention time for the majority of sediments to fall out. Flocculants may be added to further reduce sediment loads. These forms of sediment removal align with best-practice guidance and are well-established in the mining industry, and so it is assumed they will be effective at reducing the sediment loads in discharges from the mine site.

10.5.3 Metals in mine seepage and run-off from WRD and ROM pad

The geochemical testing undertaken on materials that will be mined at the BP33 Project, described in section 8 of this document, indicates that elevated concentrations of metals/metalloids, primarily Al and As, but also Co, Cr, Cu, U and Zn, could occur beneath the WRD's and from the backfilled materials after the mine is closed. Run-off from the ROM pad could contain elevated concentrations of Al. The test results available to date, combined with the plan to backfill all WRD material to the underground mine and box cut, suggest a low risk of widespread and/or long-term impacts associate with metalliferous drainage. Further testing is underway to improve the certainty of this assessment and the results will inform detailed mine design and closure requirements.

If leaching from the WRD was to occur, it is expected to be low in volume as the WRD designs incorporate a low permeability base that will minimise seepage. The particle tracking work undertaken as part of the groundwater modelling study (see Appendix B, pg.68) indicates the extent of contaminant movement is likely to be limited to within the mine site footprint. The modelling results presented in Figure 10-1 indicate that the groundwater flows from the WRD's move to the east and terminate at the underground mine.

Post-closure when the mine is backfilled, or if the mine were to close unexpectedly and the WRD's remain on the surface, then the particle tracking results shown in Figure 10-1 indicate that as the mine is no longer being dewatered and groundwater levels recover, contaminants could move towards the drainage lines to the east and west. The modelling predicts that any groundwater contamination that occurs will be localised and will not impact any groundwater users because the nearest licenced extraction bore is located 4 km away.

Run-off from the ROM pad will be captured and directed to the MSD where it can be managed with other mine-affected water. The surplus water management strategies provided in section 2.2.5 of this document include options for managing water with elevated metals concentrations, which include transfer to the Grants open pit void and irrigation to land. If the kinetic testing results predict Al concentrations greater than can be managed by these strategies, then alternative strategies would need to be investigated.

The ephemeral surface water courses to the east and west of the mine, which flow into the Charlotte River, would be the receiving environment in the event that uncontrolled discharge of water occurs from the mine site, including contaminated seepage or run-off from the WRD's and ROM pad. The extent to which aquatic ecosystems and other users of the ephemeral watercourses and Charlotte River could be affected by metalliferous drainage, depends on the metals/metalloids of concern, their toxicity and concentrations. The range of measures in place to minimise seepage and capture runoff are expected to effectively limit the release of large volumes of contaminated water.

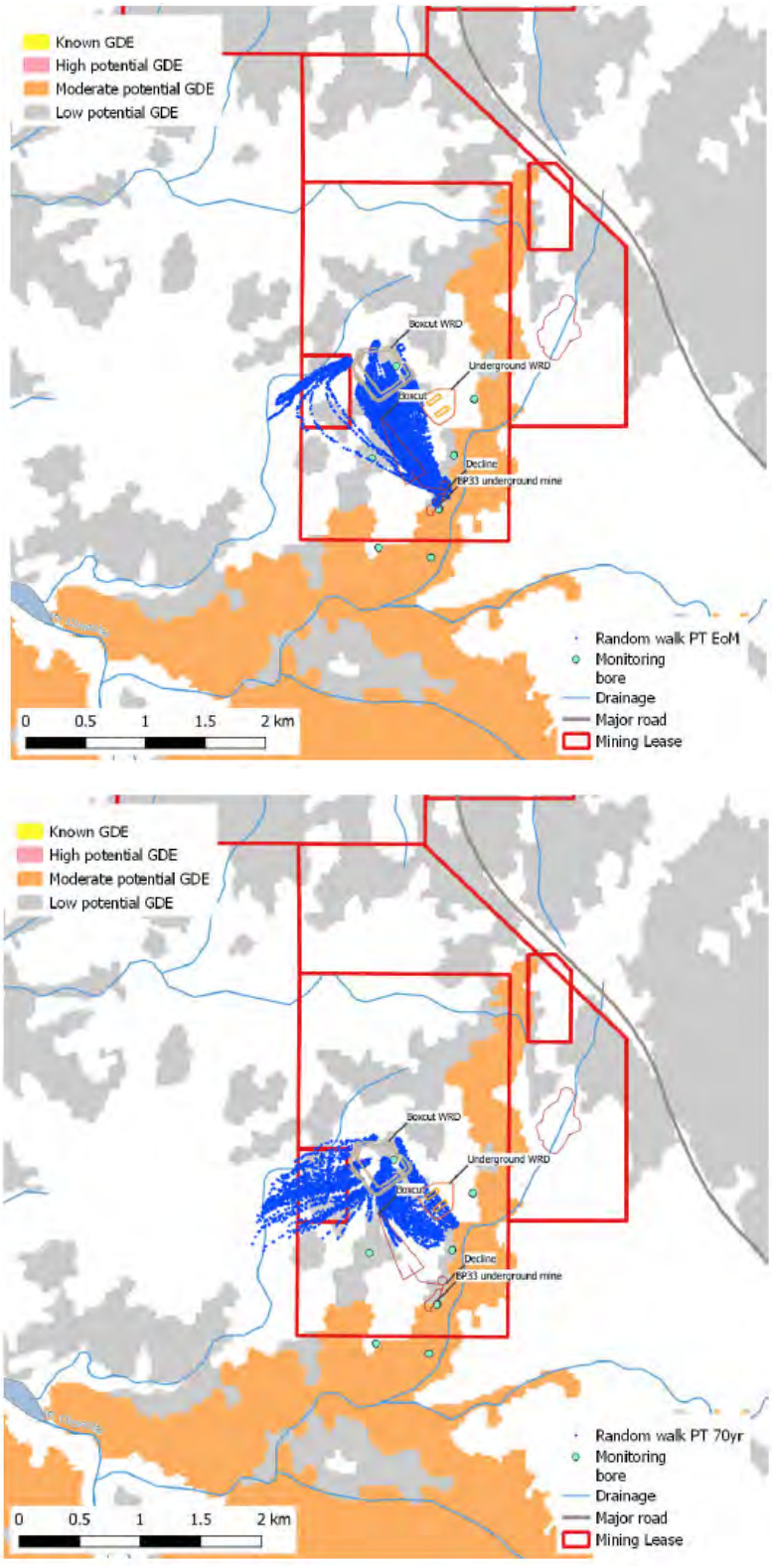


Figure 10-1. Random walk particle tracking results end of mine and 70 years post-closure. (Source: CloudGSM 2021)

10.5.4 Metals in groundwater dewatered from the mine

Groundwater inflows dewatered from the box cut and underground mine are predicted to contain naturally elevated concentrations of arsenic and phosphorus, which exceed the surface water quality guideline values. To maintain the site water balance, most of this water will either be used for dust suppression or transferred Grants open pit void, and a small portion (approximately 12%) will be discharged to the watercourse east of the mine site or to a land irrigation area (refer section 2.2.5). If large volumes of water containing elevated concentrations of arsenic and/or phosphorous are discharged without adequate dilution or treatment, this could affect aquatic ecosystems either directly through arsenic exposure, or indirectly by phosphorous causing algal blooms.

Transfer of water to the Grants open pit void is the primary water management measure that will minimise potential for significant off-site impacts to surface water quality associated with surplus water management. The Grants Project groundwater model (submitted with the Grants Lithium Project EIS) indicates that the pit acts as a groundwater sink and so water stored in the pit is not predicted to pose a contamination risk to the surrounding aquifer. Further to this, the contaminants of concern are naturally occurring in the groundwater and so the concern relates only to their potential release to surface watercourses.

The use of the water for dust suppression and irrigation to land is not predicted to affect surface water or groundwater quality. The water quality results from baseline studies, summarised in section 10.4 above from the draft WMP, indicates the water will meet the irrigation water quality trigger values outlined in *Chapter 4 Primary Industries* of the ANZECC (2000b) guidelines. To avoid run-off from land application areas, the water balance model assumes that dust suppression water will only be applied on days when rainfall is less than evaporation and the irrigation area requirements and rates were calculated using Food and Agricultural Organisation guidelines[19].

Controlled release of water to the watercourse will only occur during the wet season and at times when there is sufficient rainfall and surface water flows in the watercourse to achieve the dilution factors required to meet the surface water SSGVs for arsenic and total phosphorous defined in the draft WMP (Appendix C). Dewatering will be directed to the MSD where water quality will be tested and mine contaminants (hydrocarbons and sediments) removed so that the majority of water can be reused for dust suppression, irrigated to land or transferred to the Grants open pit void, without posing a risk to off-site surface water or groundwater quality. This strategy minimises discharge volumes and is expected to effectively limit release contaminants to the watercourse.

10.6 Avoidance and mitigation

The measures that have or will be implemented to avoid or minimise the potential impact of the proposal on water quality are summarised in Table 10-4 below.

Table 10-4. Inland water environmental quality avoidance, mitigation and monitoring measures

Potential impact	Avoidance	Mitigation	Monitoring
Elevated turbidity in surface water courses downstream due to releases and discharges.	• Mine design includes internal drainage network, storage dams and sediment dams that capture all mine-affected water and avoid uncontrolled release off-site.	• Sediment basins designed and operated according to *Best Practice Erosion and Sediment Control Guidelines*. • Mine-affected water reports to the MSD for removal of sediments and other contaminants prior to re-use or discharge.	• Monitoring as per draft WMP (Appendix C section 8). • Internal storage dams and sediment dams monitored for turbidity, prior to any controlled release and weekly during the wet season.

[19] Crop evapotranspiration - Guidelines for computing crop water requirements - FAO Irrigation and drainage paper 56.

Potential impact	Avoidance	Mitigation	Monitoring
Elevated metals concentrations in groundwater caused by seepage from WRD, ROM pad and/or underground mine post-closure	• WRD and ROM pads constructed of low permeability material. • Drains installed to capture run-off and divert to MSD if contaminants present. • The mine closure concept involves backfilling all available surface waste rock from BP33, which when completed will eliminate the WRD's as a source of contamination.	• A risk-based approach consistent with the *GARD Guide*, will use the results of long-term kinetic testing to inform development of prevention and mitigation measures required in the detailed mine design to prevent metalliferous mine drainage.	• Monitoring as per draft WMP (refer Appendix C section 8). • Weekly sampling of internal water storages. • Weekly sampling of downstream surface water in the wet season • Quarterly sampling of groundwater bores.
Elevated metals and phosphorous in surface water from controlled discharge of surplus water	• Surplus water volumes will be minimised by re-use of inflows dewatered from the mine for dust suppression. • Majority of surplus transferred to the Grants open pit void once mining ceases there. • Irrigation area used to dispose of excess water during periods when watercourses are under no or low flow conditions.	• All mine-affected water will report to onsite storages for water quality testing to confirm suitability for reuse or off-site discharge. • If SSGV's specified in the draft WMP (refer Appendix C) not met, the water will be contained and treated[20] prior to reuse or discharge. • Dust suppression and irrigation will only occur when daily rainfall is less than evaporation. • Irrigation area/s will be delineated by land suitability assessment in accordance with the *NT Land Clearing Guidelines* and an irrigation management plan will be developed and implemented to ensure site soils and water balance are maintained. • Discharge to the watercourse east of the mine site will only occur when flows are sufficient to achieve dilution factors for arsenic. • A Waste Discharge Licence will be obtained under the *Water Act* and discharges will be managed to comply with the licence conditions.	• Monitoring as per draft WMP (refer Appendix C section 8). • MSD sampled prior to any controlled release and weekly during the wet season. • Weekly sampling of downstream surface water in the wet season.

[20] Treatment is expected to involve sediment and hydrocarbon removal at minimum. Phosphorous removal by flocculants may be required as indicated by the baseline water quality. Arsenic treatment is not required as part of the current water balance model, but may be investigated to increase water management options.

10.6.1 Management and treatment of mine site discharges

All mine-affected water will be contained in onsite storages, tested and treated (if required) to meet the SSGV's documented in the draft WMP (Appendix C section 8) prior to re-use or disposal using the surplus water management strategies detailed in section 2.2.5. Mine-affected water transferred to the MSD will require treatment to remove sediment and hydrocarbons introduced by the mining activities, and potentially to reduce the naturally elevated Total Phosphorous concentrations present in the groundwater compared to surface water. Treatment to reduce naturally elevated arsenic concentrations is not required based on the current water balance model, because the majority of water can be managed using strategies that do not require release to surface water, but arsenic treatment may be investigated to provide a wider range of water management options. The adopted guideline values for key contaminants of concern that will be adopted for water released to surface water, and water used for dust suppression/irrigation are provide in Table 10-7 below.

10.6.2 Monitoring program

A detailed monitoring plan is provided in section 8 of the draft WMP (Appendix C). The monitoring plan includes monitoring of internal storages, surface water, groundwater and riparian vegetation during mining and post closure. Monitoring aims to provide early warning and trigger management actions for mitigating impacts to surface waterways, groundwater aquifers and the ecosystems that depend on them. The monitoring plan will be updated regularly throughout operations to reflect on-ground activities as mining progresses. It will also support the project's Waste Discharge Licence (WDL) application to allow discharge from the MSD. Once the WDL is issued, this plan will be updated to reflect all WDL monitoring and reporting requirements.

Surface water

Eleven sites comprise the surface water monitoring program including the OHD water source, two internal storages, three sediment basins, one at the indicative controlled discharge point of water from the MSD, two upstream control sites and two downstream impact sites. Monitoring site locations are shown in Figure 9-3 and program details are summarised in Table 10-5.

Groundwater

The 13 groundwater monitoring bores used for baseline monitoring will continue to be sampled. The bore network includes coverage of the shallow and deep aquifers and there are bores located up and down gradient of the mining infrastructure, including along the surface watercourse to the east, which is a GDE. Monitoring bore locations are shown in Figure 9-3 and program details are summarised in Table 10-5. Sampling will be undertaken quarterly throughout operations and post-closure until all rehabilitation criteria specified in the MCP is achieved.

Table 10-5. Surface water quality monitoring program details

Catchment	Site ID	Site Name	New/ Existing Site	Location	Purpose	Sampling Frequency
Eastern drainage	OHD	Observation Hill Dam	Existing	Surface water storage upstream of BPUS SW1	Monitor water quality of water supply for mine site.	Monthly
	BPUS SW1	BP33 Upstream Surface Water 1 (indicative future discharge monitoring point)	Existing	Downstream of OHD but upstream of BP33 mine site. Indicative future discharge point proposed for this location.	Previously was the reference site for upstream of any BP33 mine site impacts. Monitor impacts from controlled release from BP33 into drainage line.	Monthly: during wet season (Nov – Apr)
	BPDS SW2	BP33 Downstream Surface Water 2	Existing	Downstream of OHD, BPUS SW1 and BP33 mine site (eastern side).	Monitor impacts from OHD water extraction on downstream waterways. Is also located downstream of BP33 mine site operations and used to monitor potential impacts from MSD, ROM pad, box cut, WRD's and contractor's area.	
	BPUS SW4	BP33 Upstream Surface Water 4	New	Upstream of BP33 mine site (not downstream of OHD).	New reference site for upstream of any BP33 mine site impacts.	
	BPUS SW5	BP33 Upstream Surface Water 5	New	Downstream of OHD but upstream of BP33 mine site	Monitor impacts from OHD water extraction on downstream waterways.	
Western drainage	BPDS SW3	BP33 Downstream Surface Water 3	New	Downstream of BP33 mine site (western side).	Located downstream of BP33 mine site operations and used to monitor potential impacts from WRDs.	
Mine footprint	MSD	Mine Settlement Dam	New	Eastern side of mine site. Receives water dewatered from box cut and underground.	Monitor water quality in sediment basins/MSD to ensure they meet assessment criteria prior to release. For guiding any water quality treatment measures required prior to release or management actions to improve input water quality.	Prior to any controlled release field parameters are to be measured to confirm water quality meets discharge criteria Weekly field parameters during wet season (Nov – Apr) regardless of discharge Weekly lab parameters when discharging from either MWD1 and/or sediment basins. Monthly lab parameters during wet season (Nov – Apr) regardless of discharge
	SB1, SB2, SB3	Sediment Basins 1, 2 and 3	New	At end of stormwater drains across the site prior to discharge offsite		

Table 10-6. Groundwater monitoring bore details

Bore ID	Site type	RN	Depth (mBGL)	Screened interval (mBGL)	Screened formation	Purpose
BPG1	single bore	041833	36	29-35	Fractured/weathered BCF with pegmatite	Assess groundwater conditions up-gradient of mine site
BPG2s	nested	041792	3.5	2.5-3.5	Alluvial sediments (silty sand with laterite band)	Assess groundwater conditions up-gradient between box cut and OHD in the area of mapped GDE potential
BPG2i		041791	28.3	22.3-28.3	Fractured/weathered BCF with quartz veins	
BPG3s	nested	041794	4.5	3.5-4.5	Alluvial sediments	Assess groundwater conditions and establish a groundwater monitoring point at field-verified GDE and vegetation monitoring site RVS5
BPG3i		041793	48.75	41.75-47.75	Fresh BCF	
BPG4s	nested	041832	8.	5-8	Weathered BCF	Establish a nested monitoring site to investigate the degree of vertical connection between BCF aquifer, the weathered zone in the BCF and the alluvial aquifer in the immediate vicinity of the underground mine workings
BPG4i		041831	35.4	28.4-34.4	Weathered BCF	
BPG4d		041830	109	Open hole from 47	Fractured fresh BCF	
BPG5s	nested	041795	8	5-8	Weathered BCF	Assess groundwater conditions and establish monitoring at field-verified GDE and surface water monitoring site BPUS SW2
BPG5i		041796	57.3	49.3-55.3	Fractured fresh BCF	
BPG6	single bore	041799	73	66-72	Fractured fresh BCF	Assess conditions down-gradient of box cut
BPG7s	nested	041797	7	4-7	Weathered BCF	Assess groundwater conditions down-gradient of mine site in area of mapped GDE potential
BPG7i		041798	53.2	46.2-52.2	Fractured fresh BCF	

10.6.3 Assessment criteria and corrective actions

Table 10-7 summarises the assessment criteria and corrective actions that will be implemented to protect water quality in the downstream watercourses and the groundwater aquifers. Assessment criteria and SSGV's that will protect the downstream ecosystems were derived from pre-mining baseline results from surface and groundwater quality monitoring. The criteria and details of how they were derived are provided in the draft WMP (Appendix C).

Table 10-7. Summary of assessment criteria and corrective actions for surface water and groundwater quality

Monitoring	Assessment criteria/SSTV's	Response
Observation Hill Dam (OHD)	Australian Drinking Water Guidelines	• Treatment through Reverse Osmosis plant
Raw Water Dam (RWD)	Australian Drinking Water Guidelines	• Investigate issues with treatment system. • Import potable water until treatment issues resolved.
Sediment basins	IECA (2008) discharge standard - 90th percentile NTU reading not exceeding 100, and 50th percentile NTU reading not exceeding 60	• Increase retention time, addition of flocculants or physical filtering • Identify sources of sediment loads and rectify. Install sediment controls in internal drainage network. • Clean out sediment basins • Transfer water to alternative storages – i.e. MSD or Grants open pit void.
Mine Settling Dam (MSD)	As per surface water below. Irrigation water quality trigger values Chapter 4 Primary Industries of the ANZECC (2000b) Compliance with WDL conditions	• Treatment to remove sediments, hydrocarbons and phosphorous. • Review release criteria to ensure dilution factors achieved in watercourse. • Send to irrigation area or Grants open pit void if surface water criteria not met.
Surface water	Toxicants = ANZG (2018) 95% species protection guideline values Physical, bacteriological and metals with no GV = 80th percentile of baseline data Lithium = 0.43 mg/L based on ecotoxological testing Hydrocarbons = below detection limits Sediments = as per above	• Decrease discharge volumes • Check flow gauge station is providing accurate reading of flow volumes in watercourse • Review release criteria and procedures • Visually inspect mine site to identify diffuse contamination sources. • Sample sites further downstream to record extent of contamination. • Report to regulators in accordance with approval and licence conditions. • Increase sampling frequency to weekly until issue resolved.
Groundwater bores	Derived from the 80th percentile of background data. Separate SSTV's derived for shallow and deep bores.	• Investigate source of contamination based on contaminants of concern and bore location. • Implement mitigation measures at source if possible. • Assessment of plume extent and fate by qualified hydrogeologist. • Implement controls at receptors if modelling indicates potential impact. • Report to regulators in accordance with approval and licence conditions.

10.7 Predicted outcome

The BP33 Project proposal is predicted to have short-term and localised impacts to surface water and groundwater quality. Discharges of mine-affected water to the watercourse east of the mine site will occur only during the wet season, and only when flows are sufficient to dilute the water to achieve SSGV's. The site water balance demonstrates it is feasible to manage the majority of surplus water by transfer to Grants open pit void and land irrigation, which pose a much lower risk of impacts than direct discharge to watercourses. While there is some uncertainty about the potential for metalliferous drainage to occur during mining or post-

closure, volumes of seepage entering the groundwater system are expected to be low because the WRD's and ROM pad designs incorporate low permeability base layers. Impacts to water quality are expected to be confined to within the ML boundary.

Short-term exceedances of water quality SSGV's can be expected, especially of turbidity criteria. Adopting the *Best Practice Erosion and Sediment Control Guidelines* is expected to ensure these events are isolated. The surface water monitoring program provides for early detection of contaminants in water storages or sediment basins prior to discharge, and the Grants open pit and irrigation areas can be used for disposal of excess water that does not meet SSGV's for direct release. A Waste Discharge Licence (WDL) will be required, which will allow the adequacy of the site water management system to be independently verified by regulators, and conditions of the licence are expected to provide for protection of downstream surface water quality.

There is some uncertainty with respect to whether the WRD and ROM pad will be a source of metalliferous drainage during operations, and whether the underground mine could leach metals once backfilled post-closure. Further kinetic testing currently underway will provide the information needed to inform a risk-based approach to preventing metalliferous mine drainage consistent with the best-practice *GARD Guide*. Any leaching of metals that does occur during operations is modelled to move to the east and terminate at the underground mine and so will be contained with the ML and will not affect surface water courses. Post-closure, any contamination plume could extend further to the west; however, modelling indicates widespread contamination is unlikely. No groundwater users will be impacted as the closest is 4.6kms away and outside the predicted area of influence on groundwater quality.

11 COMMUNITIES AND ECONOMY

This section provides additional information in relation to potential impacts to Communities and Economy.

11.1 Environmental objective

The NT EPA's objective for Communities and Economy is to:

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

11.2 Additional information required

The NT EPA requested additional information to improve their level of confidence in the prediction of potential significant impacts of the proposal and the effectiveness of mitigation measures, in relation to:

- Information about social impacts that may arise through engagement and consultation with communities that may be affected by the proposal, including Aboriginal communities.

A Social Impact Assessment (SIA) was undertaken by qualified SIA practitioners from True North Strategic Communications. A Social Impact Management Plan (SIMP) has been prepared to provide a framework for avoiding and/or reducing impacts to social and economic values, and maximising the benefits of the project to the community. The content of this section has been summarised in the main from the SIA report (Appendix J) and SIMP (Appendix E).

11.3 Policy and guidance

A complete list of all the policy and guidance material that has been used in the development of the SIA and to assess the potential impacts are provided in section 5.3 of the SIA (Appendix J). The guidance material includes:

- Munday J (2020) *Guide to Social Impact Assessment*. Available at: https://static1.squarespace.com/static/5fd84a533ea9e15de736ac0b/t/60541d0d7db8ef1e23ce6d4c/1616125212404/Guide+to+Social+Impact+Assessment.pdf
- NT EPA (2021) *Guidelines of Proponents – Stakeholder Engagement and Consultation*. Available at: https://ntepa.nt.gov.au/__data/assets/pdf_file/0005/884696/guidance-proponents-stakeholder-engagement-and-consultation.pdf
- NSW (2021) *Social Impact Assessment Guideline*. Available at: https://shared-drupal-s3fs.s3.ap-southeast-2.amazonaws.com/master-test/fapub_pdf/SIA+Guideline+20210622v6_FINAL.pdf

11.4 Existing environment and values

The sections below summarise the social and economic characteristics of communities in the Cox Peninsula region and other areas where the proposed action will take place.

11.4.1 People and communities

The area immediately surrounding the BP33 Project is sparsely populated, surrounded by undeveloped vacant Crown Land for 6-7 km in all directions. The nearest community is Belyuen 15 km to the north-west. The small rural settlement of Berry Springs is located 33 km east of the project. Darwin and Palmerston are the nearest densely populated areas, with estimated populations in excess of 82,030 and 33,000 respectively

(ABS 2020 and ABS 2016). Mining exploration is the main land-use in the area, and rural living, recreation and tourism occur across the peninsula more broadly.

The project area is not located within the boundaries of any local government area; however, the majority of the haul route is within the Litchfield Local Government Area (Litchfield LGA), with small sections also passing through the City of Palmerston LGA (Palmerston LGA) and the Darwin City LGA. Statistics from the Litchfield LGA have been used to provide a demographic background to the project.

The Litchfield LGA covers approximately 3,100 km^2 around the outskirts of Darwin, bounded by the Adelaide River to the east, van Diemen Gulf to the north, Coomalie Shire to the south and the cities of Darwin and Palmerston to the north-west. It had an estimated population of approximately 24,000 people in 2016 (ABS, 2016). The Palmerston LGA, covering 56 km^2, is bounded by the Litchfield LGA to the north, east and south, and East Arm in the west. Regional demographic statistics are set out in Table 11-1. LGA boundaries are shown in Figure 11-1.

Table 11-1. Population details from 2016 census

Area	Population	Median Age	% Aboriginal
Litchfield LGA	23,855	37	9.7
Belyuen	164	30	90.4
Berry Springs	818	35	9.2
Greater Darwin region	136,828	33	8.7
Northern Territory	228,333	32	25.5

Key stakeholder groups and communities

The key stakeholder groups and outcomes of engagement with stakeholdres and the community are detailed in section 4. These groups included local government offices, relevant Aborginal groups and representatinve and people in the surrounding potentially affected communities (i.e. Belyuen, Berry Springs, Cox Peninsula, Wagait Beach.

Table 11-2 summarises the potential interactions key communities have with the proposed action. The location of key sensitive receptors within the project's area of influence is shown in Figure 11-1. A summary of the stakeholder engagement Core has undertaken with these stakeholders is provided in section 4. The subsequent sections below summarise profiles of the two communities closest to the BP33 Project, Berry Springs and Belyuen.

Table 11-2. Key communities in area of influence

Community	Interaction with Project
Berry Springs	Nearby community and on haul route (traffic interactions)
Belyuen	Closest community and traffic interactions on Cox Peninsula haul route
Wagait Beach	Traffic interactions on Cox Peninsula (only access to community)
Tumbling Waters / Blackmore / Southport	Rural communities on haul route (traffic interactions)
Mandorah	
Dundee/ Dundee Beach	
Bynoe	
Crab Claw Island	
Darwin and Palmerston	Supply of services (i.e. electricity) and materials

Berry Springs

The Berry Springs community is a small rural settlement, located along the BP33 haul route with a population of 818 and a median age of 35. At the time of the Census 2016 there were 348 houses and approximately 205 families living in the settlement. Of those employed in Berry Springs, 7% worked in State Government administration, 4.9% in nature reserves and conservation parks operation, 3.3% in other fruit and tree nut growing, 3.3% in primary education and 2.7% worked in vegetable growing. The median weekly income for people aged 15 years and over in Berry Springs is $1,068.

Infrastructure and services in Berry Springs include the Berry Springs Primary School, medical centres, a tavern, cafes, a fuel station and a small shopping centre. There are similar services and infrastructure in each of the surrounding rural centres located along the haul route.

The Berry Springs area is a popular tourist destination, situated on-route to Litchfield National Park and popular fishing locations on the peninsula. The town experiences peaks in traffic along the Cox Peninsula Road during the tourist season, on weekends and school holidays.

Belyuen

Belyuen is the closest community to the BP33 project. It is an Aboriginal community with a population of 164, a median age 29 and an average of 4.4 people per household. Most residents (132 people) said they speak another language at home and only 22 people said they speak English at home. There were 40 houses in the community. Of those, 13 households reported having no vehicle. The median weekly household income was $850.

Local infrastructure for haul route

Cox Peninsula Road is a two-way undivided road maintained by the DIPL, the entry turnoff to BP33 will be on this road. It is used by a mix of traffic including trucks moving cattle from nearby pastoral properties, tourists travelling to and from Litchfield National Park, Territory Wildlife Park and other locations, local fishermen travelling to and from popular fishing spots, school buses and school traffic going to and from Berry Springs Primary School, and locals commuting to and from work. The BP33 Project will not be connected to mains water, sewage or telecommunication services associated with Cox Peninsula Road.

The Stuart Highway is a two-way divided road maintained by the DIPL. The highway is the only southern highway that can be used to access the City of Palmerston and Darwin. The Coolalinga intersection, of the Stuart Highway and Girraween Road is a known area for traffic accidents. Road trains frequently travel through this intersection, and will be travelled as part of the haulage route. The Northern Territory Government is aware of the existing road risk at this intersection, and announced $28.6 million of Commonwealth funding to upgrade the intersection. To address the safety, efficiency and access concerns. This work is expected to start late 2021, with completion scheduled late 2022 (True North 2021a).

Path: Z:\01 EcOz_Documents\04 EcOz Vantage GIS\EZ20208 - BP33 Supplementary Environmental Report\01 Project Files\Report maps\Figure 11-1.mxd

Figure 11-1. Map of communities locations within BP33 Project's area of influence

11.4.2 Economy

In the Litchfield Council LGA, defence is the highest industry of employment, followed by public administration, manufacturing and mining, with technicians and trades workers being the most common occupation. In combination, these industries accounted for a total of $2.03 billion to residents in the Litchfield Council LGA. This has been an upward trend in the last few years. There are more Aboriginal and Torres Strait Islander people employees as technicians and trade workers in the Litchfield Council LGA than any other occupation (19.3%) (.id demographic resources, 2016).

The main employment industries in the Greater Darwin region more broadly are government administration, defence, hospitals, primary education and other heavy and civil engineering and construction. The region has low unemployment; however, these figures are expected to rise with the completion or closure of some key major projects in the region in the next year or so.

Two organisations function specifically as indigenous employment providers in the area, Ironbark Aboriginal Corporation and Larrakia Development Corporation. Ironbark Aboriginal Corporation works out of Belyuen Shire office two days per week, seeking employment opportunities and placements for residents. The Larrakia Development Corporation, based in Darwin, provides employment and business opportunities for the local Larrakia people via contractual or joint venture arrangements with local organisations. During the 2016 census, 59% of people in Belyuen were unemployed.

Education profile

Information relating to education and employment can be useful indicators of a populations ability to support a construction workforce. Of people aged 15 and over in the greater Darwin region, 20.4 % were educated to a Batchelor degree level or above; this figure drops to 9.4 % in the Litchfield LGA and none in Belyuen. Proportions of people holding a Certificate III or IV are higher in the Litchfield LGA (25 %) compared to the greater Darwin region (19 %), and similar for those reporting Year 12 as the highest level of education (14 % in Darwin and 11 % in the Litchfield LGA). The educational attainment figures for Belyuen are significantly lower.

11.5 Assessment of potential significant environmental impacts

The NT EPA identified that the BP33 proposal has the potential to significantly impact the regional community, including the Aboriginal community. Potential benefits include contribution to the economy, and training and employment for 125 – 150 people. The scoping study undertaken by True North Strategic Communications (2021b) identified several specific opportunities and impacts for further assessment as part of the SIA. Details of the approach taking to scoping social impacts and opportunities are provided in the Scoping Study Report appended to the SIA report (Appendix J).

11.5.1 Assessment of opportunities

The SIA identified potential opportunities and impacts associated with the construction/operations phase of the Project. The key opportunities considered in the assessment focus on economic opportunities and these are:

- Boost to the regional economy through employment
- Enhanced opportunities for local Aboriginal people for jobs and training
- Boost to the regional economy through local procurement
- Local communities benefit through sponsorship and local support.

Employment opportunities

Total workforce numbers are expected to peak at 50 to 80 during operations, with up to 60 people for the construction phase. The majority of positions will be contractors, tradesman, operators (for mining and

processing) and haulage drivers, with limited senior management and supervisory positions. The BP33 Project will extend the life of the Grants processing facility and will extend the employment timeframe.

Whilst some specialist skills may be required during construction, the mining workforce is expected to be comprised mainly of local residents of Darwin, Palmerston and surrounding areas given there will be no on-site accommodation. Given the travel time from Darwin to site is less than one hour; workers will be expected to travel to/from site for each shift.

During consultation concerns were raised about the potential negative impacts on remote mine sites, which employ local residents. However, this effect is likely to be negligible considering this project is relatively small scale. Core will have to manage expectations of the number of jobs available, as the Project is small with limited number of jobs.

Core is committed to maximising employment opportunities for local workers and ensuring ongoing communication with the local community and businesses regarding job numbers and opportunities. This impact has been assessed as beneficial for the community and economy of the region.

Indigenous employment opportunities

The NT Government has an expectation that projects in the NT provide opportunities for indigenous employment. In order to maximise these opportunities over the duration of the overall Finniss Lithium Project, Core will work with indigenous employment and training providers such as Ironbark and the Larrakia Development Corporation to identify opportunities for employment and participation for Aboriginal people. The extension of the Grants Project processing facility as a result of the BP33 Project enhances the opportunities for longer term jobs and training for indigenous people. This impact has been assessed as beneficial for the community and economy of the region.

Similarly to the employment opportunities for local workers, Core will have to manage the expectation of the number of jobs available for the Project, but longer term jobs will be available in processing and transportation of ore.

Local business opportunities

Benefits to the local and regional (NT) economies are expected to accrue through the generation of jobs and the sourcing of goods and services required for construction and operation of the BP33 Project and extension of Grants processing facility. The capital cost to develop the project is estimated to be $A33.79million, with the expected capital expenditure for the project estimated at $A45million into the local economy.

There is an expectation from the community that this will provide service and supply opportunities to local businesses in the rural area, Palmerston and Darwin. Given construction is the largest industry in the Litchfield LGA and the Greater Darwin region more broadly, businesses in Darwin, Palmerston and the rural area are likely to have the experience and capacity available to service aspects of the BP33 Project.

To enhance the opportunity for local business, Core will ensure that recruitment and procurement processes prioritise the local contractors. Local service and supply requirements will be specified in agreements with contractors. Tenders will be packaged to suit local and indigenous organisation capacity where possible. Core is also committed to proactively identifying local businesses with the capability to work on the BP33 Project and ongoing Grants processing facility.

The local procurement is expected to stimulate and strengthen the local business economy for a longer period than originally assessed for the Grants Project. The impact has been assessed as beneficial.

Sponsorship opportunities

Core has expressed a willingness to work with local stakeholders to minimise negative impacts as much as possible, through various management strategies and by providing sponsorship funds to enhance benefits to the community. Core has indicated their willingness to engage with local councils to seek their input into prioritisation of suitable sponsorship opportunities. The impact has been assessed as beneficial.

11.5.2 Assessment of impacts

Key potential impacts raised by community/stakeholders and assessed as part of the SIA are listed below:

- Higher level of road trauma as a result of mine traffic
- Reduced sense of safety and wellbeing due to mine traffic sharing roads with local traffic
- Amenity impacts due to road train movements for seven years
- Increased anxiety due to perceptions about the project's water use
- Concerns about legacy mines and the impact on the environment
- Cumulative impacts of multiple projects in the region (particularly increased traffic).

Increased road trauma

The road identified as having the potential for increased road trauma and impact of people, from the proposed action are Cox Peninsula road, around Berry Springs Primary School and the Berry Springs Township, and the Coolalinga intersection on the Stuart Highway. A Traffic Impact Statement (TIS) (GHD 2021) has been prepared to assess the impact of project traffic on the existing road network in terms of increases in traffic, congestion, incidents and damage to the road surface. A summary of this TIS is provided in Table 5-1 to address a submission received as part of the SER Direction, refer to Appendix G for the technical report. The change in heavy vehicles movements on the commencement of mining at BP33 is negligible, as there will be no cumulative increase the level heavy vehicle movements with the Grants Project. The BP33 will extend the timeframe from three to seven years, extending the duration of any impact not increasing it.

The operational traffic for BP33 is estimated as a 36% increase (20 additional vehicle movements per day) on Cox Peninsula, this will consist of mostly light vehicle traffic from staff and general operations. The small increase in traffic volumes is also not expected to impact other industry sectors that utilise the Cox Peninsula Road (GHD 2021).

Core will implement a Journey Management Plan as part of the Grants Project to manage traffic delays and impacts to traffic movements. This management plan will continue to be implemented for the duration of the BP33 Project. The project will utilise the Grants Project mine site access intersection on Cox Peninsula. The concept design of this access incorporates a slip land and signage to minimise traffic impacts at the turnoff. No additional access intersections will be required for BP33. Speed restrictions will be implemented through Berry Springs, and a process for public feedback/complaints will be established. Liaison will continue with the DIPL regarding road usage, and truck movements will be planned to minimise impacts to people and communities. Ongoing communication and engagement with stakeholders will be undertaken by Core to inform motorists of expected delays and traffic movements.

Reduced sense of safety and wellbeing due to mining traffic

At commencement of the BP33 Project, residents along the haul road would have four years' experience sharing the road with the haulage and light vehicles associated with the Grants Project. This provides Core the opportunity to monitor and adapt to actual impacts or feedback from the community in their Journey Management Plan. It is not expected that the BP33 Project will further reduce the sense of safety and wellbeing associated with haulage traffic, however any impacts would be prolonged with the commencement of BP33 mining operations.

Engagement with stakeholders indicated that most people were satisfied with the road safety measure that Core has previous committed as part of the Grants Project, refer to section 8.4.2 at Appendix J for a summary of the road safety measure commitments. However, people still had concerns with the safety of Cox Peninsula road, prior to any commencement of haulage operations associated with the overall Finniss Lithium Project, particularly at night, in heavy rain or around vehicles towing loads. As mentioned above Core will implement a Journey Management Plan to mitigate and minimise impacts to road users and the haul route.

Amenity impacts due to increased traffic timeframe

During the Grants consultation process some stakeholders raised concerns about noise, dust and lights from the project, particularly around the Berry Springs community. Noise and dust from the site and haul route is unlikely to impact the amenity of residents along the route, given the remoteness of the residents from the site (the closest residence is 10+ km away) and absence of surrounding land users.

The Grants EIS approval addressed these concerns by incorporating heavy vehicle mitigation measures in the Journey Management Plan (such as speed restrictions and the requirement of covering of loads) and prescribing a dust suppression and visual monitoring of dust along Cox Peninsula Road into the Environmental Management Plan (EMP) component of the Mining Management Plan (MMP). The BP33 Project will not create additional amenity impact but will extend the Grants Project impacts (True North 2021a).

Increased anxiety of water use and impacts

Stakeholders expressed their increase anxiety of the BP33 Projects impacts on groundwater availability in the Berry Springs Dolostone aquifer. Details of the Project water demand and sources are provided in section 2.2. Water sources for the project will be comprised of groundwater/rainfall in-flows to the underground and box cut, which will be dewatered to an on-site storage dam, and water pumped from Observation Hill Dam (OHD). There will be no extraction from any groundwater bores and the groundwater modelling indicates there is no groundwater connection between the mine site and the Berry Springs Dolostone aquifer. The studies undertaken to inform the water balance model, provide a high level of confidence that the project will not affect any other groundwater users.

To demonstrate to the community that the BP33 Project will not impact groundwater in the region, ongoing and upfront communication with stakeholders will occur, as part of the Stakeholder Impact Management Plan (refer Appendix E) The draft WMP (refer Appendix C), documents the proposed approaches and measure that will be implemented if impacts are detected. Core will be required to report any exceedance of water quality criteria (both groundwater and surface water) to DITT and submit an annual report.

Legacy mines

Concerns regarding early mine closure and the result of a legacy mine were expressed by stakeholders. Core commissioned economic feasibility studies that explored numerous scenarios for the BP33 Project and provided the study as part of their definitive feasibility study announcement. A combination of the positive results of the feasibility study (i.e. low initial capital expenditure, high average operating profit margin and high grade lithium deposit) and the short mine life (3-4 years) suggests that early mine closure at BP33 is unlikely. The operation of BP33 Project will extend the operations at the Grants Project, increasing the economic viability of the overall Finniss Lithium Project. The mine closure strategy described in section 12.6 of this document involves backfilling of the underground mine, plugging the portal and vent shaft and backfilling the box cut and rehabilitation of the mine site to per-mining conditions, which will limit future environmental liabilities and allow public access to return to the area.

Cumulative impacts of multiple projects in the region

The cumulative impacts in region, assessed related to increased industry traffic on local roads. Core will not have a cumulative impact on local roads for the Grants and BP33 Project as they will no operation concurrently, and transport between the sites will be via an internal track. However cumulative impacts with potential future development projects in the area is a possibility. Currently there are two projects proposals in the planning phase in the region, Department of Defence's Kangaroo Flats Project and Seafarms Group's Project Sea Dragon. No formal development or environmental approvals have been received for the proposals. If these proposals receive development approval, a significant increase in traffic in the region is a possibility, particularly in relation to the Defence Project, with estimated traffic movements being up to 100 to 120 vehicles daily. The known details of the proposals are provided in sections 12.1.1 and 12.1.2 of the SIA (Appendix J). Strategies to minimise the potential cumulative impacts to increased traffic on local roads are provided in the SIMP (Appendix E).

11.6 Avoidance and mitigation

The SIMP provided at Appendix E outlines Core's commitments to manage, mitigate or enhance the seven key negative impacts and four key positive impacts identified as part of the SIA (Appendix J). It outlines the targets, monitoring methods and reporting for each of the key eleven identified social impacts. Table 11-3 summarises the measures that will be implemented to minimise impacts and Table 11-4 provides measures to maximise opportunities. Commitments made to stakeholders and the community are provided in Table 11-5.

Table 11-3. Community and economy - negative impacts avoidance, mitigation and monitoring measures

Potential impact	Avoidance	Mitigation	Monitoring and Response
Higher level of road trauma along haul route Reduced sense of safety from local traffic interactions with mine traffic	• No increase of haulage traffic from processing facility when BP33 is mined. • No haulage will occur during Berry Springs School pick up and drop off times (7:45 to 8:45am and 2:30 to 3:30pm).	• Journey Management Plan which includes speed restrictions and specific safety instructions for drivers. • Industry collaboration on road safety campaigns for the region. • Road safety communication before the start of truck movements (e.g. Berry Springs school students, Belyuen residents) and signage along the route (e.g. for tourists, fishermen). • Establish grievance contact details and register. Publicise email and phone number to lodge complaints. • Ongoing repairs to damage to the road pavement that is attributed to the project. • Continue traffic mitigation and management measures in place from the Grants Lithium Project.	• Monitoring of haul trucks through geo-fencing in the IVMS system. • Maintain a record of any traffic incidents involving project traffic or identified road safety risks. • Review geo-fencing data where required. • Record and action all complaints and follow up to determine satisfaction with resolution of complaints • In conjunction with NT Police and other stakeholders, ensure proactive identification of any road safety risks and appropriate responses. • Conduct comprehensive reviews in response to any incident.
Amenity impacts from increase traffic interaction	• None	• Loads will be covered to prevent dust emissions. • Journey Management Plan in place, which includes speed restrictions through Berry Springs. • Community liaison and stakeholder engagement. • Night-time noise levels from road train hauling activities will be managed in accordance with the NT EPA Noise Management Framework Guideline. • Establish grievance contact details and register. • Publicise email and phone number to lodge complaints. • Ongoing repairs to damage to the road pavement that is attributed to the project. • Continue traffic mitigation and management measures in place from the Grants Project.	• Record and action all complaints and follow up to determine satisfaction with resolution of complaints. • Investigate cause of impacts to amenity, respond to the complaints, and amend procedures if necessary.
Increased anxiety of water use and water quality impacts	• Core will not source water directly from the groundwater aquifer.	• Ongoing communication with the community and stakeholders about water use, management, permits and licencing. This will minimise rumours and misinformation that leads to fear and anxiety. • Reporting of relevant information from water monitoring. • Mine Closure and Rehabilitation Plan. • Establish, promote and monitor grievance hotline/email.	• Monitoring of feedback received through grievance hotline and general community feedback. • Communication to give the community confidence that the project is causing no harm to the water quantity and quality in the region. • Investigate any complaints or issues, respond to the complaint, amend procedures if necessary and provide feedback on how any incident was resolved.

Potential impact	Avoidance	Mitigation	Monitoring and Response
Concern about legacy mine from early closure	• The mine closure concept involves progressive backfilling the underground stopes during mining, which avoids the potential for legacy mine. • The likelihood of early closure for the mine is low (based on short mine life).	• Stakeholders engagement to inform development of the MCP. • Ongoing community and stakeholder communication about the project, including environmental management, water use and management and rehabilitation plans. This will minimise rumours and misinformation that leads to fear and anxiety. • Establish, promote and monitor grievance hotline/email. • Payment of bond to ensure costs not borne by the community if agreed closure objectives are not met.	• Monitoring of feedback received through grievance hotline and general community feedback. • Communication to give the community confidence that the project is operating in line with legislated environmental standards. • Investigate any complaints or issues, respond to the complaint, amend procedures if necessary and provide feedback on how any incident was resolved.
Reduced ties to land and ability to maintain culture	• Sacred sites have been avoided by mine disturbance footprint.	• Aboriginal people maintain access to the area around the mine site for cultural activities. • Appropriate sacred site clearances. • Ensure Aboriginal people know who to contact should there be any access issues. • Ongoing engagement with potentially impacted people and local communities.	• Ongoing liaison with Belyuen Council and Aboriginal organisations to ensure any access needs can be accommodated and to minimise potential for disruption by project activities. • Proactively check with organisations that there have been no issues. • Record and appropriately respond to any complaints.

Table 11-4. Community and economy - measures to maximise opportunities

Opportunity	Objective	Mitigation	Monitoring and Response
Boost to regional economy through local employment	• Maximise the recruitment and retention of local workers, both directly and with contractors	• Recruitment and procurement processes prioritising the local market. • Produce a local procurement plan, including communication of opportunities. • Work with local job providers. • Package and promote tenders to suit local capacity. • Good communication about jobs available on the project. • Encourage contractors to use local services and suppliers where possible.	• Monitoring of feedback from business and industry on level of local employment and local contracts awarded. • Communicate progress against objectives and the reason for any failure to achieve targets.
Enhanced opportunities for local Aboriginal people for jobs and training	• Maximise local Aboriginal employment on the project - direct and with contractors.	• Work with Aboriginal organisations and employment providers to maximise opportunities. • Identify opportunities for contracts that are suited to local Aboriginal organisations. • Provide support to contractors to employ and train local Aboriginal people. • Produce an Aboriginal Participation Plan.	• Feedback from Aboriginal stakeholders, government and the community on the level of Aboriginal employment on the project. • Ongoing collaboration with Aboriginal organisations and employment providers.

Opportunity	Objective	Mitigation	Monitoring and Response
Boost to regional economy through local procurement	• Maximise local content where possible. • Build the capacity of local small businesses. • Provide opportunities to businesses in the immediate local communities where possible.	• Procurement processes that prioritise the local market where possible. • Package and promote tenders to suit local capacity and prepare businesses for competitiveness and standards required by Core. • Proactive identification of local business with the capability to work on the project. • Produce a local procurement plan, including communication of opportunities. • Encourage contractors to use local services and suppliers where possible.	• Monitoring of feedback from business and industry on level of local content. • Communicate progress against objectives and the reason for any failure to achieve targets.
Local communities benefit through sponsorship and support	• Maximise benefits to the local community	• Establish a sponsorship budget. • Prepare a sponsorship plan, prioritising projects that benefit community groups in the project's local area. • Identify sponsorship objectives in conjunction with the community.	• Produce annual reports outlining sponsorship expenditure, with a short summary of what was achieved. • Liaise with local councils and community groups to ensure sponsorship and support is in line with community priorities.

Table 11-5. Commitments to stakeholders and the community

Commitment	Responsibility	Accountability
Stakeholder and community engagement	Core will continue to engage with stakeholders and the community in line with established procedures, including progress updates/fact sheets, meetings with representative groups, and via established feedback mechanisms. Core will develop a community and stakeholder engagement plan to guide ongoing engagement throughout the life of the project.	Regular reporting to key stakeholders and/or regular community newsletters with updates.
Agree on indicators to be monitored	Stakeholders and Core to discuss risks and opportunities identified in this SIMP and agree on indicators to be measured, how often and reporting.	Regular reporting to stakeholders includes measurement of agreed indicators against baseline data in SIA.
Grievance register	Core is establishing a grievance hotline, email and register for the Grants Lithium project. This grievance system will be used for the BP33 Lithium project as it will begin as the Grants project finishes. This includes establishing a register to be maintained by site management, with agreed protocols and response times for complaints and escalation flow chart. Core commits to appropriate responses in the event of complaints, from communication to redress and remedy or compensate.	Number and type of complaints will be reported to stakeholders through updates, together with an outline of how complaints were resolved.

Commitment	Responsibility	Accountability
Management plans	All issues raised in the SIMP will be addressed in other appropriate management plans where relevant, including: • Journey Management Plan • Environmental Management Plan • Engagement Plan • Sponsorship Plan • Emergency Management and Response Plan • Mine Closure Plan (MCP) • Rehabilitation Plan (as part of MCP) • Human Resource Management Plan • Occupational Health and Safety • Site Safety Management Plan • Worker Code of Conduct.	Any reportable social issues covered by other management plans will be covered in regular reporting to stakeholders.
Aboriginal employment	Core will work with Aboriginal organisations to maximise Aboriginal employment opportunities.	Report to relevant stakeholders on progress.
Local recruitment and procurement	Recruitment and procurement processes prioritise the local market where possible. Core will work with business groups to identify local capacity and capabilities before packaging tenders. Good communication on opportunities and expected standards. Encourage contractors to use local services and suppliers.	Reporting on total value and number of local contracts.
Road safety	As part of the Grants Project, Core will work with key stakeholder groups to ensure road safety communication about sharing the roads with road trains.	Communication about road safety.
Sponsorship and community events	Core will identify opportunities to invest in the local communities, in line with community priorities.	Reporting on sponsorships to stakeholders and through community updates and newsletters.
Monitoring results	Core will share monitoring results of interest to the community, such as water quality monitoring.	Report to stakeholders through meetings and community updates.

11.7 Predicted outcome

The social impact of the BP33 Project is predicted to be localised to the communities of Belyuen, Wagait Beach and Berry Springs, and users of Cox Peninsula Road. The majority of impacts identified in the SIA can be effectively mitigated by ensuring good ongoing engagement. Road safety concerns are the key impact that is predicted to require ongoing engagement and adaptive management.

The presence of quad road trains on the Cox Peninsula Road is likely to cause frustration to some road users and road safety is a real concern. Impacts to the Berry Springs Primary School community will be limited by avoiding road train journeys during the drop-off and pick up times and restricting truck speeds. The Journey Management Plan approved for Grants Lithium Project will be extended to the BP33 Project and is expected to reduce the likelihood of road trauma but will not entirely eliminate this risk.

Opportunities associated with the BP33 Project will extend to the regional economy through employment and procurement. Core has made a commitment to maximising local employment, in particular for Aboriginal people. It is expected that be prioritising local recruitment and training, a significant part of the workforce will be sourced from the region. A commitment to package tenders to suit local capacity and proactively identify local business capacity is expected to result in numerous local businesses benefiting from the Project. The NT economy will benefit from the direct payment of royalties and the project expenditure in the NT. Community acceptance of the Project (and Core's Social Licence to Operate) is expected to be closely linked to how successful Core is at maximising the benefits to local communities from the Project.

12 COMPLIANCE WITH EP ACT

The NT EPA requested Core provided additional information to demonstrate compliance with the following specific parts of the *EP Act*.

12.1 Section 26 Environmental decision-making hierarchy

The environmental decision-making hierarchy refers to a proponent consciously making decisions to avoid, mitigate and offset environmental impacts. As part of EIA process described above, measures to avoid or mitigate impacts have been considered for each environmental factor and are detailed in the relevant environmental factor sections below. Offsets have not been considered because the EIA process did not identify any impacts that cannot be mitigated to an acceptable level. Table 12-1 provides a summary of the key impact avoidance and mitigation measures for each environmental factor.

Table 12-1. Application of environmental decision-making hierarchy to the proposal

NT EPA Environmental Factor	Avoid	Mitigate
Terrestrial environmental quality	• Waste rock will be stored on the surface for approximately 4 years and then progressively be backfilled into the underground on completion of mining. • Waste rock will be subject to an ongoing testing regime to identify any unexpected occurrence of problematic materials that require specific management or containment. • No waste rock to remain on the surface post mining, which avoids longer-term erosion and water quality impacts that can occur from mine WRD's.	• WRD design will incorporate controls to minimise and capture any seepage that could contain high metals concentrations. • Erosion and sediment controls are incorporated into the mine design. • All hydrocarbons and chemicals will be stored and handled in accordance with Australian Standards to minimise the likelihood of leaks and spills. • Emergency response plans will be in place to provide for containment of leaks and spills on site. • Surface water and groundwater monitoring program implemented to provide early-warning of any contaminant release to the surrounding environment.
Terrestrial ecosystems	• The proposal disturbance footprint avoids direct impacts to sensitive vegetation types. • Targeted surveys for threatened plants *Stylidium ensatum* and *Typhonium praetermissum* indicate that they do not occur in the proposal footprint. • Clearing footprint minimised by transporting ore to existing Grants processing facility and using existing access track as haul route.	• A Vegetation Clearing Procedure will be developed as part of the MMP to delineate clearing areas and establish procedures for managing cleared vegetation. • Weed control will be implemented in accordance with a Weed Management Plan that complies with the requirements of the *Weed Management Act*. • Mine closure concept involves removal of all mine landforms, progressively backfilling underground to remove all waste material from the surface, plugging the portal and vent shaft, backfilling the box cut and rehabilitation of site with native vegetation.
Hydrological processes	• The proposal disturbance footprint does not directly impact any watercourses. • No groundwater extraction will occur. • Surface water extraction from Observation Hill Dam will occur in accordance with a Surface Water Extraction Licence under the *Water Act*.	• Inflows dewatered from the underground mine to be used as a water supply to offset extraction from OHD. • Groundwater levels, surface flows and riparian vegetation health will be monitored in accordance with the draft WMP (Appendix C) to verify predictions made through the EIA process.

NT EPA Environmental Factor	Avoid	Mitigate
Inland water quality	• Refer row 1 above for measures to avoid long-term impacts associated with seepage and runoff from WRD's. • Mine affected water will be contained in a purpose-built storage dam (MSD) where it will be treated to remove hydrocarbons, sediments and any other contaminants, prior to being reused for dust suppression.	• Discharges will be minimised by transferring excess water to the Grants open pit once mining is finished there. • Controlled discharges of excess water during the wet season will occur in accordance with a Waste Discharge Licence under the *Water Act.* • Seepage and runoff from the WRD's and ROM pad will be captured and contained/treated on site if contaminant concentrations exceed water quality guidelines. • Erosion and sediment controls, including sediment dams, have been incorporated into the mine design. • Surface water and groundwater monitoring will be undertaken as per the draft WMP (Appendix C) to detect water quality issues. Adaptive management measure will be incorporated into the WMP.
Communities and economy	• BP33 underground mine is scheduled to commence supplying ore once the Grants open pit mine is complete. This will provide a constant rate of production and will avoid increased heavy vehicle movements on the haul route from the mine to Darwin Port. • BP33 site access will be through the Grants mine access gate. Avoiding the requirement of additional slip lanes to Cox Peninsula Road.	• The Social Impact Management Plan (SIMP) provided at Appendix E details measures that will be implemented to maximise social and economic opportunities from the proposal and minimise impacts to the community.

12.2 Section 27 Waste management hierarchy

The waste management hierarchy refers to the proponent consciously making decisions to avoid, minimise, re-use, recycle, recover, treat and dispose of waste produced by the proposal in an environmentally sound manner. Table 12-2 provides a summary of the waste management measures that will be applied for each of the waste streams generated by the BP33 mine.

Table 12-2. Key waste streams and application of waste management hierarchy

Key waste streams	Hierarchy of measures applied	Description of measure
Cleared vegetation	Minimise Re-use	• The amount of clearing will be minimised by utilising the Grants Projects access and upgrading existing tracks for the haul route from BP33 to Grants. • Cleared vegetation will be reused for erosion and sediment control and in rehabilitation, either as is or mulched.
Waste rock from box cut and underground (i.e., transitional and fresh waste rock)	Re-use	• Waste rock will be used to backfill the underground and box cut progressively during and following completion mining operations. The waste rock will be temporarily stored in surface WRD's on purpose-built pads that will minimise the likelihood of drainage or seepage from the dumps to groundwater or surface water. • Waste forecasts predict that the underground and box cut will have capacity to be backfilled by all the BP33 waste rock and a quantity of Grants pit waste. There will be no requirement for long-term surface disposal of waste rock from the Proposal.
Tailings – from processing ore	Avoid	• No processing will occur at BP33, which avoids the need for an additional Tailing Storage Facility (TSF). • Ore will be transported for processing at the Grants mine site where tailings produced will be disposed of in a purpose built TSF managed under Mining Authorisation 1021-01 (Grants Project) issued under the *Mining Management Act*.

Key waste streams	Hierarchy of measures applied	Description of measure
Mine water discharges	Minimise Re-use Treat Dispose	• The volume of mine water discharges will be minimised by re-use of water dewatered from the underground mine for dust suppression and as a water supply for the mining operations. • Once mining ceases at the Grants open pit, any excess water from BP33 can be pumped to Grants for storage and reuse. • Excess water that cannot feasibly be contained on site will be treated to remove sediments and other contaminants (if required), prior to discharge to a land irrigation area and/or watercourse. • Discharges will be authorised under the Mining Authorisation and a Waste Discharge Licence will be required for discharge to water during the wet season.
Sewage	Treat Dispose	• Wastewater from staff amenities will be directed to a septic system designed and constructed in accordance with the *Code of Practice for Onsite Wastewater Management* (July 2014).
Industrial and domestic wastes	Recycle Dispose	• Recyclable construction and demolition (i.e., packaging, metals, wood, tyres etc.) will be collected by a licenced waste contractor and recycled at a waste facility in Darwin region. • General domestic putrescible waste such as crib room/office/ maintenance waste that cannot be recycled (i.e., food waste scraps, oils and greases) will be collected by a licenced waste contractor and disposed of at a waste facility in Darwin regional area accordingly. • Waste oils will be stored in bulk containers. Other workshop wastes such as used chemical containers and batteries, will be segregated and stored undercover to prevent ingress of rainfall and subsequent release of contaminated water from storage areas.

12.3 Section 42 Ecosystem-based management

Section 42(b)(iv) of the *EP Act* requires that the EIA process ensures that all actions that may have a significant impact on the environment are assessed, planned and carried out taking into account the principles of ecosystem-based management. The NT EPA requested additional information be provided to demonstrate the application of this principle to the BP33 Project. Ecosystem-based management means management that recognises all interactions in an ecosystem, including ecological and human interactions.

The BP33 Project EIA process incorporates prediction of indirect and cumulative impacts that could occur because of interactions in an ecosystem. The approach adopted has used the findings of stakeholder engagement, 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. The monitoring programs described in this SER provide multiple layers of ecosystem protection by providing a scientific basis for decision-making. The following are key components of the adaptive management framework:

1. Waste rock sampling will be undertaken during mining to identify potentially problematic waste rock materials, so that they can be selectively managed to minimise the likelihood of metalliferous drainage occurring during the short period of surface storage.

2. 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.
3. 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 and human impacts to occur, which then triggers action to manage the source of the impact and protect sensitive receptors.
4. 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 as described in the draft WMP. 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.

12.4 Section 42 Impacts of a changing climate

Section 42(b)(v) of the *EP Act* requires that the EIA process ensures that all actions that may have a significant impact on the environment are assessed, planned and carried out taking into account the impacts of a changing climate. To demonstrate consideration of climate change impacts, the NT EPA requested Core provide a greenhouse gas emissions assessment, additional detail about proposed energy sources and use, and details of how the impacts of a changing climate have been considered.

12.4.1 Greenhouse Gas Emissions Assessment

Core engaged Environmental Resources Management (ERM) to prepare a Greenhouse Gas Assessment of the Finniss Lithium Project (ERM 2021). The assessment focused on the cumulative emissions associated with mining, power, haulage and downstream processing operations of lithium concentrate for the seven and half year mine life of the Finniss Lithium Project. The emissions estimates include the Grants and BP33 Projects. The GHG assessment report is provided at Appendix K and key findings are summarised below.

Emissions sources were estimate in accordance with the *National Greenhouse and Energy Reporting (NGER) Determination (2008)* and *NGER Technical Guidelines (2017)* for Scope 1 and Scope 2 emissions. In addition to the Scope 1 and 2 emissions required for mandatory reporting under the NGER Framework, Scope 3 emissions were estimated using the World Resource Institute *Greenhouse Gas Protocol - Technical Guidance for Calculating Scope 3 Emissions* (2013). Table 12-3 and Table 12-4 provide a summary of the emission sources that were assessed.

A summary of the estimated annual emissions during the life of the project for Scope 1 (associated with land clearing, using petrol and diesel engines for transport, generation of energy and heavy mining equipment and underground blasting activities) and Scope 2 emissions (associated with purchased energy consumption) is shown in Table 12-5. The total annual emissions over the life of mine are shown in Figure 12-1. Emissions are predicted to peak in year one (associated with land clearing and construction activities) and year seven (associated with mine closure and demobilisation). Average annual emissions over the seven and half year mine life are approximately 63,000 tonnes $CO_{2\text{-}e}$[21], which equates to approximately 0.29% of the NT's total reported annual emissions[22]. The estimates indicate that Core will not exceed the annual emissions thresholds

[21] *Average annual emissions were calculated by dividing total emissions 473,538 by 7.5 years.*
[22] *Based on the 2019 State and Territory Greenhouse Gas inventory report (DISER, 2021)*

in the *NT Large Emitters Policy*[23] and will not trigger the requirement to develop a greenhouse gas abatement plan; however, Core will be required to submit an annual NGER report as the project emissions exceed the NGER emission reporting threshold of 25,000 t $CO_{2\text{-}e}$ / year.

Table 12-3. Summary of Scope 1 and 2 emission sources (Source: ERM, 2020)

Emission Source	Scope / GHG
Transport combustion – diesel in light vehicles	Scope 1 - CO_2, CH_4 and N_2O
Stationary combustion - diesel combustion	Scope 1 - CO_2, CH_4 and N_2O
Blasting – diesel combustion in explosives	Scope 1 - CO_2, CH_4 and N_2O
Vegetation clearing (life of Project emission source)	Scope 1 - CO_2-e
Purchased electricity consumption	Scope 2 - CO_2-e

Table 12-4. Summary of Scope 3 emission sources (Source: ERM, 2020)

Emission Source	Scope / Greenhouse Gases
Emissions from light vehicles operating on site who are not under Lithium Developments' control	Scope 3 - CO_2, CH_4 and N_2O
Emissions associated with transporting the SC6 to Darwin	Scope 3 CO_2-e
Emissions associated with transporting the SC6 from Darwin to China	Scope 3 CO_2-e
Emissions associated with refining the SC6 into refined lithium carbonate	Scope 3 CO_2-e
Emissions associated with transporting consumables and equipment to site	Scope 3 CO_2-e
Emissions associated with transporting waste from the site	Scope 3 CO_2-e
Emissions associated with employee air travel	Scope 3 CO_2-e
Emissions associated with employee commute	Scope 3 CO_2-e
Landfill Emissions	Scope 3 - CH_4

[23] *NT Large Emitters Policy*: *Industrial project threshold: 100 000 tonnes of carbon dioxide equivalent in any financial year over the life cycle of a project. Land use project threshold: 500 000 tonnes of carbon dioxide equivalent generated from a single land clearing action, or cumulatively from multiple land clearing actions over time.*

Table 12-5. Scope 1 and 2 GHG emission estimates (Source: ERM, 2021).

Project scenario	Description	Emissions (t CO_2-e)			
		CO_2	CH_4	N_2O	Total
Annual Emissions: Start-up / Construction Phase	Transport combustion - diesel in light vehicles (Scope 1)	189	0	1	190
	Stationary combustion - diesel - mining equipment (Scope 1)	35,049	50	100	35,199
	Stationary combustion - diesel - concentrate processing (Scope 1)	567	1	2	569
	Stationary combustion - diesel - electricity generation (Scope 1)	3,400	5	10	3,414
	Blasting - explosive combustion (Scope 1)	688	1	2	671
	Petroleum oil combustion (Scope 1)	22	0	0	22
	Purchased electricity consumption (Scope 2)	14,056	0	0	14,056
	Total Scope 1 Emissions	**39,894**	**57**	**115**	**40,066**
	Total Scope 2 Emissions	**14,056**	**0**	**0**	**14,056**
	Total Scope 1 and Scope 2 Emissions	**53,950**	**57**	**115**	**54,122**
Annual Emissions: Commercial Production Phase	Transport combustion - diesel in light vehicles (Scope 1)	189	0	1	190
	Stationary combustion - diesel - mining equipment (Scope 1)	16,000	23	46	16,069
	Stationary combustion - diesel - concentrate processing (Scope 1)	567	1	2	569
	Stationary combustion - diesel - electricity generation (Scope 1)	0	0	0	0
	Blasting - explosive combustion (Scope 1)	668	1	2	671
	Petroleum oil combustion (Scope 1)	22	0	0	22
	Purchased electricity consumption (Scope 2)	26,146	0	0	26,146
	Total Scope 1 Emissions	**17,445**	**25**	**51**	**17,521**
	Total Scope 2 Emissions	**26,146**	**0**	**0**	**26,146**
	Total Scope 1 and Scope 2 Emissions	**43,591**	**25**	**51**	**43,667**
Total Emissions: Life of the Project	Transport combustion - diesel in light vehicles (Scope 1)	1,417	0	10	1,427
	Stationary combustion - diesel - mining equipment (Scope 1)	143,811	206	411	144,428
	Stationary combustion - diesel - concentrate processing (Scope 1)	4,250	6	12	4,268
	Stationary combustion - diesel - electricity generation (Scope 1)	4,250	0	0	4,250
	Blasting - explosive combustion (Scope 1)	5,011	7	14	5,032
	Petroleum oil combustion (Scope 1)	163	0	0	163
	Purchased electricity consumption (Scope 2)	180,983	0	0	180,983
	Vegetation clearing (Scope 1)	132,987	0	0	132,987
	Total Scope 1 Emissions	**291,888**	**219**	**448**	**292,555**
	Total Scope 2 Emissions	**180,983**	**0**	**0**	**180,983**
	Total Scope 1 and Scope 2 Emissions	**472,871**	**219**	**448**	**473,538**

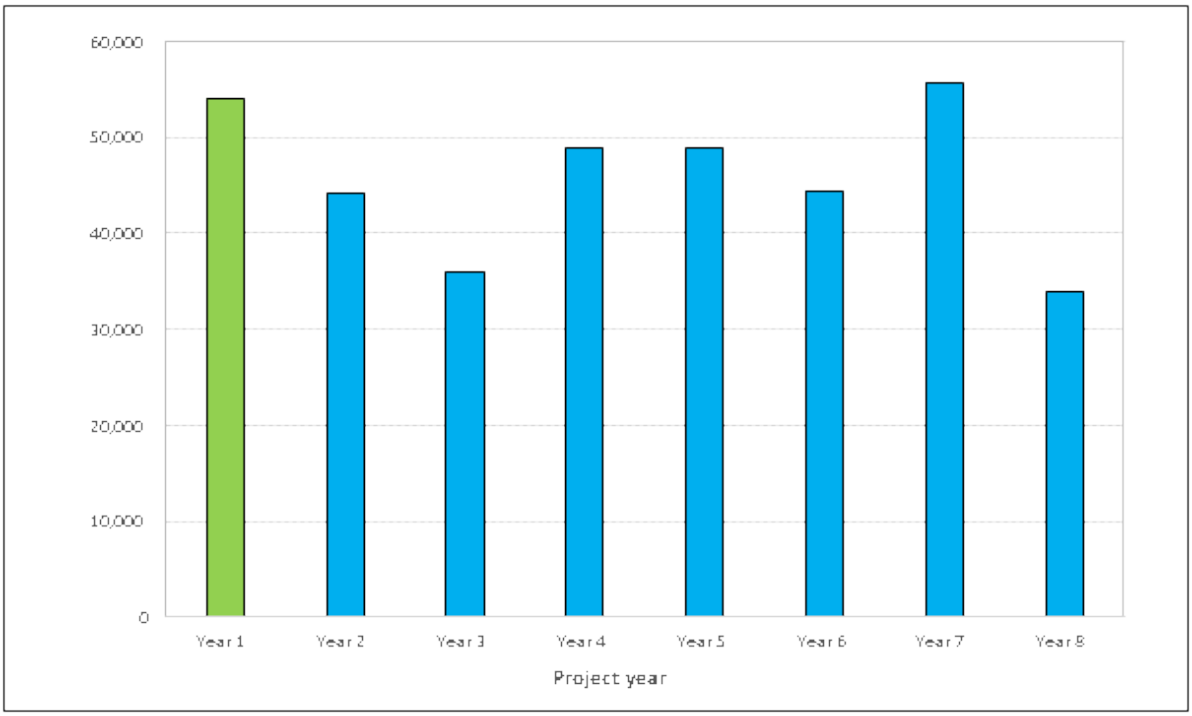


Figure 12-1. Projected Scope 1 and Scope 2 emissions estimates over life of mine (tonnes $CO_{2\text{-}e}$/year)[24] (Source: ERM, 2020)

12.4.2 Energy sources

The start-up construction phase will require the use of large diesel operated mobile mining equipment, in the processing facilities and in generators. During mining operations, it is planned that there will be a switch from the diesel generators to grid electricity, which is supplied by the gas-fired power station at Channel Island. As the life of mine is relatively short it is not feasible to construct infrastructure to provide solar powered energy to operate the Finniss Lithium Project.

12.4.3 Consideration of changing climate

The impacts of a changing climate are not expected to affect the BP33 Project due to the short mine life of four years proposed from commencement of construction to mine closure, after which all mining landforms will be removed and the land rehabilitated. The mine design has taken into consideration the variable nature of the local climatic conditions in relation to rainfall, temperature (evaporation) and extreme weather events. Flood modelling has been used to inform siting of infrastructure and the need for inundation bunds to prevent flooding of mine infrastructure. The water balance modelling has used SILO data, which provided a continuous daily data set for 132 years (1889 – 2021). The SILO data provided a base for modelling successive dry and wet years. By accounting for the extremes in the local climatic conditions, the proposal will be resilient to the changes in climate that could occur over the mine life.

12.5 Section 42 Alternative approaches, methodologies or technologies

Section 42(c) of the *EP Act* requires that the EIA process considers the potential for less environmentally damaging alternative approaches, methodologies or technologies. The alternatives considered by Core are provided in Section 3 of this document.

[24] *Construction phase emissions are in Green. Land clearing emissions are not shown on the graph but have been accounted for in calculating average annual emissions for comparison with NT annual emissions.*

12.6 Section 42 Mine closure and rehabilitation

Section 42(e) of the *EP Act* requires that the EIA process considers the potential for actions to enhance of restore environmental quality through restoration or rehabilitation is identified and provide for to the extent practicable. The NT EPA requested Core provide detailed information about the BP33 mine closure strategy. This information is provided in Section 2.3 of this document.

12.7 Section 43 General duty of proponents

Section 43 of the EP Act details seven duties of proponents undertaking an EIA process. Additional information requested by the NT EPA to demonstrate compliance with specific sub-clauses is provided below.

Section 43(a) Stakeholder engagement and consultation

The general duty of proponents relating the stakeholder engagement and consultation have been addressed in the Stakeholder Engagement section of this report (section 4). A Social Impact Management Plan (SIMP) prepared by True North, provides a Core a framework to consult, engage and inform key stakeholders for the life of the project (Appendix E).

Section 43(b) Cultural stakeholder engagement

The strategy prepared by True North developed the communication tools and tactics were to meet the needs of the audience - key stakeholders and the surrounding communities. The engagement content of the information provided was written in plain English, with maps and imagery used to explain locations accurately. All information materials was electronic and hard copy formats, and were delivered via email, phone and face to face interaction. Indigenous corporations, such as the Larrakia Development Corporation were engaged to assist in briefing the Kenbi Rangers and Tommy Lyons Group.

Section 43(c) Community knowledge

True North consulted with Traditional Owners, custodians and Belyuen residents and conducted a literature review of all anthropological work available for the Cox Peninsula area, including areas within the Kenbi Land Claims declaration. The BP33 project is not within the Kenbi Land Claim footprint. The Kenbi Land Claim lodged over most of the area within the Cox Peninsula, in 1979 under the *Aboriginal Land Rights Act 1976*, recognised the Larrakia people as Traditional Owners of most of the Cox Peninsula.

The Cox Peninsula area is used for a range of customary activities, such as camping, hunting and fishing, by many Belyuen residents (many of whom are not Larrakia) (True North 2021). 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).

No areas of specific natural or cultural values were identified in the BP33 Project footprint; however, wet season swimming holes were identified downstream. Hydrological modelling indicates that alteration in surface water flows from the project activities, will be localised to the project footprint and is not expected to impact downstream recreational uses (refer section 9). Similarly, impacts to water quality are not predicted to extend outside of the Mineral Lease (refer section 10).

Section 43(d) Aboriginal values, rights and interests

Core has engaged with Aboriginal people through project planning and will continue to engage as the project transitions into operations. Section 4 summarises the stakeholder engagement and consultation that has been attempted and conducted with Traditional Owners and the Belyuen Community. The BP33 project site is not subject to either the *Native Title Act* or *Aboriginal Land Rights Act*.

An AAPA certificate has been issued to Core for part of the BP33 project footprint and identifies one sacred site and associated restricted work area (RWA1), which is located to the north of the Cox Peninsula Road

outside of the BP33 ML (refer Appendix F). Core are requesting a variation to cover the remaining BP33 footprint in the certificates subject land.

13 WHOLE OF ENVIRONMENT ASSESSMENT

Through the EIA process undertaken for the BP33 Underground Mine proposal Core has provided information and consulted with affected communities (refer Section 4) and has considered and applied the principles of environmental protection and management provided in Part 2 of the *EP Act* (refer Section 12). Environmental impacts have been predicted and assessed based on the best available evidence provided by technical studies undertaken by suitably qualified professionals. Where there is uncertainty in relation to the likelihood or severity of impacts, which is mainly in relation to groundwater drawdown impacts and the potential for metalliferous drainage from the WRD's waste material, these have been acknowledged and monitoring and adaptive management measures provided to ensure that serious or irreversible damage does not occur. The outcomes of the EIA process indicate that the proposal can be implemented without unacceptable environmental or social impacts and the NT EPA's environmental objectives for each environmental factor assessed in this SER are likely to be met.

Terrestrial Ecosystems impacts were addressed in Section 7 of this SER. The outcomes of the EIA process indicate that localised impacts to habitats, flora and fauna will occur over 100 ha of land, and it is possible that the health of riparian vegetation along a 4.5 km section of watercourse downstream could be affected by the cumulative impacts of the mine operations on the Hydrological processes (water availability) and Inland Water Quality (water quality) factors. The direct loss of primarily Eucalyptus woodland habitat is not predicted to affect local biodiversity because surveys have confirmed the area does not provide important habitat for any threatened species and similar habitats are available in surrounding areas that are undisturbed that fauna can move into. Riparian habitats may tolerate the period of reduced water availability that is predicted to be caused by mining operations; however, the system response is uncertain and therefore Core has committed to monitoring to measure the level of impact and to rehabilitating or offsetting impacts if they do occur. Subject to effective implementation of these commitments, it is likely that the NT EPA's objective for Terrestrial Ecosystems will be met by the proposal.

Terrestrial Environmental Quality impacts were addressed in Section 8 of this SER. The findings of the EIA process indicate that land and soils impacts associated with isolated occurrences of erosion, contamination from fuel spills/leaks and short-term surface storage of waste rock are unlikely to affect surrounding land uses or values. Implementation of routine mine management measures, which will include ESCP's and a Spill Response Plan, will provide for early detection and response to hazards and as a result serious or irreversible damage is unlikely to occur. The waste rock and ore pose a low risk of ARD (as confirmed through geochemical testing) and any metalliferous drainage risk identified by longer-term testing currently underway, will be mitigated by implementing design and operational controls around waste rock placement and storage. Subject to effective implementation of these controls, it is likely that the NT EPA's objective for Terrestrial Environmental Quality will be met and impacts to the Inland Water Quality factor will be avoided.

Hydrological processes impacts were addressed in Section 9 of this SER. The findings of the EIA process indicate the modelled reduction in surface water discharges and groundwater drawdown are unlikely to affect other water users, land uses or amenity, but could affect riparian vegetation health considered under the Terrestrial Ecosystems factor. Stakeholder engagement has indicated that water resources are highly valued by the local community and so ensuring the protection of water resources will be important to Core achieving their Social Licence to Operate and meeting the objectives for the Community and Economy factor. Implementation of the Water Management Plan, which includes measures to minimise and monitor water use, is expected to ensure that the NT EPA's objective for Hydrological Processes is met, and the potential for impacts the Terrestrial Ecosystems and Community and Economy factors is minimised.

Inland Water Quality impacts were addressed in Section 10 of this SER. Impacts to water quality from mine site runoff and discharges are predicted to be localised and as a result are unlikely to affect ecological health, other water users, land uses or amenity. Short-term exceedances of water quality guideline values in the ephemeral watercourse downstream of the mine are likely to occur during the wet season but are unlikely to affect riparian vegetation or aquatic health. There is no licenced surface water or groundwater extraction near the mine site, and water quality impacts are not predicted in the Charlotte River where recreational land uses

occur. Implementation of the Water Management Plan, which includes an extensive monitoring program and adaptive management processes, will minimise impacts to water quality and is expected to ensure that the NT EPA's objective for Inland Water Quality is met, and there is limited potential for water quality to affect values associated with the Terrestrial Ecosystems and Community and Economy factors.

Community and economy impacts were addressed in Section 11 of this SER. The findings of the SIA process indicate that social and economic impacts and benefits associated with the proposal will occur across the Greater Darwin region, with communities on the Cox Peninsula most directly affected and also having the greatest opportunity to benefit from increased local employment, economic activity and community sponsorship. Local communities will notice increased heavy vehicle traffic on the Cox Peninsula Road for an extended period, which could lead to accidents and inconvenience to road users. People are also likely to notice increased activity at local shops and hospitality venues associated with the presence of mine workers, which will provide economic benefits but could also lead to inconvenience and tensions. Local people have generally expressed support for the proposal and a strong interest in training, employment, supply and contracting opportunities; however, some community members also raised concerns about the social and environmental impacts that could occur. The level of community acceptance of the mine is likely to be strongly influenced by Core's achievement of environmental protection outcomes and realisation of the opportunities that the community is seeking. Effective implementation of the SIMP, environmental protection commitments made in this SER and ongoing stakeholder engagement, is likely to ensure that the NT EPA's objective for the Community and Economy factor are met.

Post-closure the mining activities are not expected to cause any long-term (legacy) issues. Such issues are most commonly caused by Acid Rock Drainage (ARD), which is unlikely to occur at BP33 based on the results of geochemical testing of the ore and waste rock. The likelihood of legacy issues is further reduced by Cores commitment to placing mined materials back underground post-closure and backfilling the box cut excavation. Groundwater modelling predicts that once this is done, groundwater levels will recover back to pre-mining levels within three years (see Section 9). The areas that were disturbed during mining will then be stabilised and planted with native vegetation species, with the objective of restoring some environmental value to the site. Core plans to return the site to pre-mining conditions so that there is no limitation to future land uses as a result of the mining activities.

14 REFERENCES

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APPENDIX A WATER BALANCE MODELLING REPORT (WRM, 2021)

APPENDIX B GROUNDWATER MODELLING MEMORANDUM AND MODELLING REPORT (CLOUDGMS, 2021 AND 2021C)

APPENDIX C DRAFT WATER MANAGEMENT PLAN (ECOZ 2021)

APPENDIX D STAKEHOLDER ENGAGEMENT REPORTS (TRUE NORTH, 2020)

APPENDIX E SOCIAL IMPACT MANAGEMENT PLAN (TRUE NORTH, 2021C)

APPENDIX F AAPA CERTIFICATE (C2019/077) (REDACTED)

APPENDIX G TRAFFIC IMPACT STATEMENT (GHD 2021)

APPENDIX H STATIC GEOCHEMICAL TESTING OF MINE WASTES AND ORE REPORT (EGI 2021)

APPENDIX I *STYLIDIUM ENSATUM* SURVEY REPORT (ECOZ 2020B)

APPENDIX J SOCIAL IMPACT ASSESSMENT (TRUE NORTH, 2021A)

APPENDIX K FINNISS LITHIUM PROJECT GREENHOUSE GAS ASSESSMENT (ERM 2021)

APPENDIX L GROUNDWATER INVESTIGATION REPORT (GROUNDWATER ENTERPRISES, 2020)