KASA Consulting

Environmental Review Document

Lynas Rare Earths Processing Facility and By-product Storage Facility – Kalgoorlie

Report

May 2021

Version 1

EPA Ref. CMS17898

Lynas Rare Earths Ltd

KASA CONSULTING
Environment I Safety I Quality

Version	Description	Author	Reviewed By	Date
0	Environmental Review Document	KASA / Ramboll	EPA	08/04/2021
1	Environmental Review Document	KASA	Lynas	14/05/2021

REPORT DISCLAIMER

This report has been prepared for the exclusive use of the client in accordance with the Agreement between KASA Consulting and the client. KASA Consulting accepts no liability or responsibility whatsoever for it in respect of any use of or reliance upon this report by any person who is not party to the Agreement.

This report has been prepared based upon the scope of services defined by the client, observations made during site visits, discussions with site personnel and interpretation of the documentation made available by the client. KASA Consulting has not attempted to verify the accuracy or completeness of information supplied by the client.

EPA Ref.: CMS17898

Invitation to Make a Submission

The Environmental Protection Authority (EPA) invites people to make a submission on the environmental review for this proposal.

Lynas Kalgoorlie Pty Ltd, a wholly owned subsidiary of Lynas Rare Earths Limited, proposes to develop a new Rare Earths Processing Facility at 70 Johns Road, Yilkari, near the town of Kalgoorlie, and an associated permanent off site By product Storage Facility on Common Reserve 8767, Yarri Road, Parkeston, in the City of Kalgoorlie-Boulder. The Environmental Review Document (ERD) has been prepared in accordance with the EPA's Procedures Manual (Part IV Divisions 1 and 2). The ERD is the report by the proponent on their environmental review which describes this proposal and its likely effects on the environment.

The ERD is available for a public review period of 4 weeks from 9 June 2021, closing on 7 July 2021.

Information on the proposal from the public may assist the EPA to prepare an assessment report in which it will make recommendations on the proposal to the Minister for Environment.

Why write a submission?

The EPA seeks information that will inform the EPA's consideration of the likely effect of the proposal, if implemented, on the environment. This may include relevant new information that is not in the ERD, such as alternative courses of action or approaches.

In preparing its assessment report for the Minister for Environment, the EPA will consider the information in submissions, the proponent's responses and other relevant information.

Submissions will be treated as public documents unless provided and received in confidence, subject to the requirements of the Freedom of Information Act 1992.

Why not join a group?

It may be worthwhile joining a group or other groups interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

Developing a submission:

You may agree or disagree with, or comment on information in the ERD.

When making comments on specific elements in the ERD:

- Clearly state your point of view and give reasons for your conclusions.
- Reference the source of your information, where applicable.
- Suggest alternatives to improve the outcomes on the environment.

What to include in your submission:

Include the following in your submission to make it easier for the EPA to consider your submission:

- Your contact details – name and address.
- Date of your submission.
- Whether you want your contact details to be confidential.
- Summary of your submission, if your submission is long.
- List points so that issues raised are clear, preferably by environmental factor.
- Refer each point to the page, section and if possible, paragraph of the ERD.
- Attach any reference material, if applicable. Make sure your information is accurate.

The closing date for public submissions is: 7 July 2021

The EPA prefers submissions to be made electronically via the EPA's Consultation Hub at https://consultation.epa.wa.gov.au.

Alternatively submissions can be:

- Posted to: Chairman, Environmental Protection Authority, Locked Bag 10, Joondalup DC WA 6919; or
- Delivered to: Environmental Protection Authority, Prime House, 8 Davidson Terrace, Joondalup 6027.

If you have any questions on how to make a submission, please contact the EPA Services at the Department of Water and Environmental Regulation on 6364 7000.

ADDITIONAL INFORMATION REQUEST

This Proposal was referred to the EPA under Section 38 of the EP Act on 13 September 2020, and the EPA determined that the REPF would be assessed at "Assessment on Referral Information – with Additional Information Requested". The EPA issued a Notice Requiring Information for Assessment, under Section 40(2)(a) of the EP Act, dated 24 November 2020. In accordance with this notice, this document has been revised to address the requirements summarised in Table 0-1.

Table 0-1: Additional Information for Assessment

Factor	Required Information	Addressed in Section
Flora and Vegetation	Information on Flora and Vegetation surveys for the Yarri Road site.	Section 5.3.2, Appendix D.
	Clear definition and description of the area(s) to be cleared as part of the proposal. This should include a shape file(s) of the proposed clearing footprint.	Section 2.4, Figure 2-, Figure 2-2, Figure 5-6, attached shapefiles.
	Mapping of the indicative footprint, or provide this information quantified in tables with respect to vegetation communities, significant flora records and an assessment of regional impacts.	Section 5.4, Figure 5-1, Figure 5-2, Figure 5-3, Figure 5-5.
	Separate figures/maps to clearly illustrate threatened flora and vegetation and priority species.	Figure 5-4.
	The referral information should be updated to state that the biodiversity survey reports have been submitted to IBSA. Any survey reports or data that is revised after initial acceptance into IBSA should be updated in IBSA.	IBSA File Link: Section 5.7
	Prepare a Flora and Vegetation Management Plan for both the REPF and Yarri Road detailing the management and mitigation of impacts on flora and vegetation for assessment.	Appendix R, Appendix S.
Terrestrial Environmental Quality	An assessment on the potential for erosion of the proposed waste facility at the Yarri Road facility. This should include landform evolution modelling and solute fate and transport modelling.	Section 6.4.7, Section 8.5.3, Appendix K, Appendix L.
	Prepare a Closure and Rehabilitation plan for both the REPF and Yarri Road detailing the management and mitigation of impacts on terrestrial environmental quality for assessment	Appendix Y
Terrestrial Fauna	Undertake Fauna surveys at the Yarri Road site.	Section 7.3.2
	Mapping of the indicative footprint, or provide this information quantified in tables with respect to fauna habitat, significant fauna habitats or significant fauna records.	Section 7.5
	Separate figures/maps to clearly illustrate threatened fauna, priority fauna and migratory fauna.	Nil Section 7, Appendix E, Appendix F.
	The referral information should be updated to state that the biodiversity survey reports have been submitted to IBSA. Any survey reports or data that is revised after initial acceptance into IBSA should be updated in IBSA.	IBSA File Link Section 5.7
	Provide a Terrestrial Fauna Management Plan detailing the management and mitigation of impacts on terrestrial fauna for assessment.	Appendix R, Appendix S.

Factor	Required Information	Addressed in Section
Inland Waters	Impact assessment for the Yarri Road facility on inland waters.	Section 8.5, Appendix J.
	Prepare a Groundwater and Surface Water Management Plan for both the REPF and Yarri Road detailing the management and mitigation of impacts on inland waters for assessment.	Appendix R, Appendix S.
Air Quality	Provide Air Quality Modelling for the Yarri Road site.	Section 9, Appendix M, Appendix O.
	Provide an assessment of the cumulative impacts of the proposal (both the REPF and Yarri Road) on air quality in the area.	Section 9, Appendix M.
	Prepare an Air Quality Management Plan for both the REPF and Yarri Road detailing the management and mitigation of impacts on air quality for assessment.	Appendix R, Appendix S.
Social Surroundings	Undertake a Heritage Survey of the Yarri Road Site.	Section 10.3.2.2.
	Evidence and results of recent consultation with Traditional Owners on the implementation of the proposal (both the REPF and Yarri Road).	Table 3-1.
	Prepare a Noise Management Plan for both the REPF and Yarri Road detailing the management and mitigation of impacts on noise for assessment.	Section 10.5, Appendix R, Appendix S.
	Additional information on the justification for site selection and potential alternatives.	Section 2.2.1, Section 2.2.2.
Human Health	Undertake and report on a Transport Risk Assessment for product and waste transfer to, from and between the sites.	Section 11.5.1.
	Provide a radiation health risk assessment to assess the risk of impact on the public from radiation from all sources at both locations.	Section 11.5, Section 11.5.1.2.

EXECUTIVE SUMMARY

Lynas Rare Earths Limited is one of the key suppliers of rare earths (RE) to the international marketplace and is the only significant supplier of RE outside of China. From its mine site at Mt Weld in the northern Goldfields of Western Australia and its Lynas Advanced Materials Plant (LAMP) in Malaysia, Lynas supplies REs to approximately 20% of the global market.

REs are used in a variety of global industries and, because of their specific properties, are instrumental in the electronics, automotive, defence, medical technology and industrial sectors. To capitalise on a growing market, Lynas Kalgoorlie Pty Ltd (Lynas), a wholly owned subsidiary of Lynas Rare Earths Limited, proposes to develop a new Rare Earths Processing Facility (REPF) at 70 Johns Road, Yilkari, near the town of Kalgoorlie (formerly Lot 500, Great Eastern Highway and referred to within this document as Lot 500), and an associated permanent off-site By-product Storage Facility (BSF) on Common Reserve 8767, Yarri Road, Parkeston, in the City of Kalgoorlie-Boulder. The REPF will process RE concentrate from the Mt Weld mine to produce an RE carbonate, before transporting the RE carbonate product to Fremantle port for export to Lynas' downstream production facilities, including the Lynas Advanced Materials Plant (LAMP) in Kuantan, Malaysia, and a proposed facility in the USA. By-products generated from the process include gypsum, iron phosphate (IP), and sodium and magnesium sulphate salts from the raffinate (brine) discharged into the lined evaporation pond.

This Proposal was referred to the EPA under Section 38 of the *Environmental Protection Act, 1986* (EP Act) on 13 September 2020. The EPA determined that the REPF would be assessed at "Assessment on Referral Information – with Additional Information Requested" on 30 November 2020.

This report has been prepared in accordance with the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* and the EPA Notice Requiring Information for Assessment, under Section 40(2)(a) of the EP Act.

The Proposal was referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) in July 2020 given the presence of Naturally Occurring Radioactive Materials (NORM) in the RE concentrate and in the IP by-product produced by the REPF. The referral was initiated for DAWE's assessment of whether it triggered the definition of "Nuclear Action" under the *Environmental Protection and Biodiversity Conservation Act, 1999* (EPBC Act).

In assessing the information in support of the EPBC referral, DAWE determined that the Proposal is not a Controlled Action and approval under the EPBC Act is not required.

Lynas acknowledges the DAWE decision and considers that all potential impacts can be fully managed and regulated through state-based legislation administered by the WA EPA, Department of Water and Environmental Regulation (DWER), Radiological Council of WA (RCWA) and the Department of Mines, Industry Regulation and Safety (DMIRS).

The Lynas REPF at Kalgoorlie will ultimately contribute to a value chain that offers significant net environmental benefit as a result of the application of RE in many individual items such as electric cars, drone technology, wind turbines, computers and robotics, thereby reducing the reliance on carbon-based products.

At the local and regional level, the Proposal has the benefit of providing an economic stimulus to an area that has a demonstrated need for employment opportunities for its residents and an increase in business activity for its industries.

Lynas has completed a range of technical studies and investigations on all key environmental factors, to inform the REPF design and operating regime and to identify appropriate controls and management measures that may be adopted. Detailed technical studies of the BSF site have also been conducted and demonstrate that proposed by-product storage at this location can be appropriately managed with risks mitigated as far as practicable.

The presentation of all completed studies within this document is intended to support the referral, as well as to document the significance of key potential environmental impacts and how these can be managed.

By-Products

Given the anticipated life of the Proposal, Lynas recognises that there is finite space available on Lot 500 for the long-term storage of gypsum and IP by-products. Lynas has taken a multi-pronged approach to by-product management and has assessed a number of options for by-product re-use and/or long-term storage. As part of the by-product treatment process, both the IP and gypsum by-products will require drying and conditioning within purpose-designed engineered facilities at the REPF before handling for re-use, transport or long-term storage can occur.

Lynas recognises that the pathway to re-use will take both significant time and resources and may only consume a portion of the by-product. Realisation of any approved re-use opportunities may only realistically arise well after the start of operations.

There is also capacity to back-load a portion of the material to Mt Weld, however the feasibility of this option is subject to ongoing economic and logistical assessments, and the return of material to Mt Weld is likely to preclude the reprocessing or re-use of the material.

Whilst Lynas believes that there may be a future opportunity to demonstrate the feasibility and environmental acceptability both the re-use and backload to Mt Weld scenarios, with research and development and more detailed feasibility assessments to occur at a future date, in consultation with key stakeholders. Assessment of re-use and backload opportunities are therefore excluded from the current Proposal.

The Yarri Road site is the preferred location for off-site permanent by-product storage. Environmental assessments indicate that it is suitable for the safe, long-term storage of large quantities of materials, with all risks to community and the surrounding environment able to be readily managed and mitigated. The BSF site is zoned as rural, and surrounding land is also similarly zoned except for two notable reserves (the city landfill and the Mullingar speedway), with sufficient separation distance away from sensitive human receptors.

The facilities for drying and storage of gypsum and IP at Lot 500, as well as those for long-tern storage at Yarri Road, will be engineered to ensure that seepage beyond the limits of the facilities will be prevented, as demonstrated through seepage modelling and groundwater monitoring. A closure plan for both the REPF and BSF sites will be developed to ensure that permanent storage of IP and gypsum by-products at either site will not present a long-term environmental or public health risk, through the implementation of robust capping and closure strategies.

Flora and Vegetation

A direct impact to flora and vegetation will occur from 120 ha of ground disturbance over the 135 ha site at Lot 500, and from 97.3 ha of ground disturbance at the 535 ha BSF site. These areas also represent potential fauna habitat.

Lynas commissioned three surveys with the third being a targeted flora survey in March 2021, taking advantage of recent rainfall in February 2021.

One flora species recorded from the Yarri Road flora study area was listed as a Priority flora taxon by the Department of Biodiversity Conservation and Attractions (DBCA) – Eremophila praecox (Priority 2). A total of seven (7) plants from six (6) point locations were recorded, three of which fell within the preliminary BSF footprint. Eremophila praecox is represented outside of the study area. The layout of the BSF facilities has been revised to avoid impact on these Priority flora at the BSF site. As of March 2021, following a third (targeted survey), *Eremophila praecox* was recorded as a total of seven (7) plants from six (6) spot locations within the Proposal area.

Therefore, the impact of the By-product Storage on the recorded population of *Eremophila praecox* is considered to be low. None of the plants within the Proposal area will be directly impacted as they occur outside the infrastructure disturbance footprint.

Surveys at both Proposal sites have shown that all flora and fauna species, vegetation types and habitat are well represented outside of the development envelope. No Threatened Flora (T) gazetted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act) were recorded from within the REPF or BSF Proposal area.

Proposed activities at Lot 500 and Yarri Road will not result in a significant impact on biological diversity and ecological integrity of the sites and their surrounds.

Fauna

Fauna surveys conducted over both the REPF and BSF sites confirmed that there is no evidence of conservation significant fauna species was recorded in the study area.

Three significant species have the potential to occur within the study area: the Malleefowl, Rainbow Bee-eater and Carnaby's Cockatoo. While suitable habitat exists for the Rainbow Bee-eater and Carnaby's Cockatoo, the study area is not considered suitable breeding habitat for these species. The area was extensively ground truthed for evidence of Malleefowl and no nesting mounds or evidence of this species was recorded.

A further species of interest, the Arid Bronze Azure Butterfly (Ogyris subterrestris petrina) is a Threatened species that is listed as Critically Endangered under the EPBC Act and the BC Act. The Arid Bronze Azure Butterfly has an obligate association with a sugar ant Camponotus sp. nr. terebrans. The larvae are cryptic and extremely difficult to detect. The most critical factor for habitat occupancy by the butterfly is the presence of large colonies of the host ant; only large colonies can support the Arid Bronze Azure Butterfly because, being a parasitic species, it requires large numbers of hosts. A five day/night survey carried out in March 2021, found no evidence of suitable colonies for the host sugar ant *(Camponotus* sp. nr. *terebrans)* at any of the 235 trees sampled across the two sites. It is therefore concluded that the likelihood of direct or indirect impact on the Arid Bronze Azure Butterfly is low to negligible.

Surface and Groundwater

With respect to inland waters, both Lot 500 and Yarri Road are situated in benign environmental contexts. There are no significant surface water features near either Proposal site and groundwater has shown to be at a depth of 38 mbgl at the REPF. The REPF by-product and wastewater storage / evaporation facilities will be lined to minimise seepage of contaminants. Modelling of seepage at the BSF has confirmed that a liner will not be required given the lack of potential for contamination of groundwater identified at approximately 28 mbgl.

Through the implementation of a Zero Process Water discharge philosophy at the Proposal sites, as well as conventional drainage design and sound water management at both Proposal sites, the downstream (off-site) natural hydrological regimes, quality of groundwater and surface water will not be adversely impacted by this Proposal.

Noise

The social surroundings to Lot 500 will receive minor noise impacts, but these are mitigated with the implementation of sound environmental management practices. The two closest neighbouring residences and businesses to the north of Lot 500 that have been identified as sensitive receptors. These properties will experience increased noise, but the impacts remain in compliance with the relevant Noise Regulations, once mitigation actions (optimised equipment specifications, relocation of equipment, sound enclosures and noise attenuating bunds) are in place. Noise impacts on other receptors located further away from the REPF have also been assessed, and it is concluded that compliance will be achieved based on the surrounding land use and operational assumptions applied. Minor modifications as part of the detailed design phase of the REPF are not anticipated to alter the noise impacts with full conformance to assigned levels at nearest receptors. This will be demonstrated through the Works Approval assessment in consultation with DWER, and verified post construction.

The Yarri Road BSF site is more remote than Lot 500. Consequently, the nearby residences are located farther from the site. The Ningamia indigenous residential community is the closest residential land use to the BSF and this is some 4 km to the south east. Given the significant separation distance of the proposed Yarri Road site from sensitive receptors, the BSF is predicted to be compliant with all applicable noise regulations, and noise impacts on nearby residents are expected to be negligible.

Air Quality

From an air quality perspective, the modelling undertaken by specialist air quality consultants taking into account the cumulative contribution of both the REPF, BSF and background particulate ambient concentrations indicates that particulates as well as other emissions from both the REPF and BSF will fall below all applicable assessment criteria. Dust generation during both the construction and operational phases can be managed using conventional design techniques and responsive environmental management.

Transport

The Proposal will result in an improved environmental outcome for the transport of RE product from the Goldfields. At present the RE concentrate is transported from the mine at Mt Weld via road to Leonora and then via rail network from Leonora to Fremantle port for export. The product receives some processing at the mine site but contains low levels of NORM.

The RE carbonate product will be transported from the REPF to Fremantle port having been processed in Kalgoorlie and most of the radioactivity removed. The proposed rail task will utilise the existing rail timetable and no additional train movements are proposed. A key beneficial change to the existing approved transport and export of Lynas RE concentrate product from Mt Weld to Malaysia is that the RE carbonate produced by the REPF will have a lower radioactivity than RE concentrate currently shipped from Mt Weld, and is not classified as radioactive for transport purposes.

During construction there will be a modest increase in heavy vehicle traffic servicing Lot 500 and Yarri Road. At its busiest in mid-2021, Proposal construction will result in an 8% increase of vehicle movements on Great Eastern Highway. This is a major heavy vehicle route within the State freight network, designed specifically for this type of freight movement.

During operation of the REPF, cartage of by-products to the Yarri Road site will result in a modest increase of approximately 3% and 1%, on Anzac Drive and Eastern Bypass heavy haulage routes respectively.

Socio-economic and Aesthetics

In land use terms, Lot 500 is situated in a strategically identified industrial area where the City of Kalgoorlie Boulder (CKB) has been attempting to encourage the location of compatible, employment-generating industries such as the REPF. A Local Development Plan (LDP) prepared by the CKB for Lot 500 identifies a landscape vegetation buffer around the site. This will assist in providing a visual screening to these sensitive receptors and a softening of the view of the REPF from Great Eastern Highway.

The BSF site is zoned as rural in the CKB Town Planning Scheme (TPS). Surrounding land is also similarly zoned except for two notable reserves – the city landfill / mine waste site and the Mullingar speedway. At Yarri Road, the visual impact of the BSF will be minimal, due to the large proportion of vegetation retained on the site and the facility's setback from Yarri Road.

All Proposal buildings and infrastructure will be coloured to blend in with natural and background shades.

Indigenous Heritage

With respect to Lot 500, surveys have been undertaken of the site and concluded that no indigenous heritage sites will be affected by the Proposal. Consultation has also been undertaken with relevant indigenous groups. The construction and operation of the REPF on Lot 500 will not impact on indigenous heritage values.

At the BSF site, Native Title objections are currently being assessed through the tenure process. Consultation between Lynas and the two respective Native Title claimants at the BSF site have commenced and are ongoing. Once the outcomes of the consultation process have been determined, archaeological and ethnographic surveys will be conducted, ensuring that all requirements for tenure are addressed. Currently, relevant Aboriginal Heritage registers indicate no recorded sites exist at the BSF site.

In light of the current pending status of Native Title determinations at Yarri Road, as part of its commitment to ensuring heritage matters are appropriately addressed and managed, Lynas will develop and implement a Cultural Heritage Management Plan in consultation with the EPA and Traditional Owners that reflects the outcomes and any recommendations of the Native Title determination process, including the scope of proposed archaeological and ethnographic surveys at the BSF site.

Human Health – Radiation Exposure

Assessments carried out for the Proposal show that the public radiation exposure from transport of IP is extremely low and would be indistinguishable from natural background radiation. The public is not expected to receive a radiation dose exceeding the public limit of 1 mSv/year during the transport of IP from the REPF to Yarri Road site.

Through the collection and analysis of data about existing background radioactive materials at the REPF and BSF sites, it is evident that likely levels will be below those prescribed in applicable guidelines. Lynas has extensive experience in managing the modest amounts of radioactive materials likely to be present in the processes and operations of the Proposal at Kalgoorlie. As a result of this experience, a Radiation Management Plan (RMP) has been developed in consultation with DMIRS and the Radiological Council to manage any residual impacts.

The predicted outcomes of the Proposal are that the low level of residual radioactive material will be continually monitored and regulated by the Radiological Council and DMIRS. Through the implementation of a thorough, and long-standing management program, residual impacts will be negligible.

Track Record

Lynas has an exemplary record of environmental management. In WA, Lynas has been operating the Mt Weld mine and RE Concentrator since 2011. In Malaysia, Lynas has been operating the LAMP since 2013. Both operations are regularly audited and Lynas has received several awards for the environmental management of the sites.

Management Systems

Lynas currently holds triple ISO certification of its Integrated Management System (Health and Safety, Environment, Quality) in Western Australia and in Malaysia, and proposes to extend these systems to the Kalgoorlie REPF.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF INSERTS

LIST OF TABLES

LIST OF APPENDICES

GLOSSARY

Term	Definition
AELB	Atomic Energy Licencing Board
AEP	Annual Exceedance Probability
ANZECC	Australian and New Zealand Environment and Conservation Council
APA	Australian Pipeline Association
ARI	Assessment on Referral Information
BAM Act	*Biosecurity and Agriculture Management Act 2007*
BC Act	*Biodiversity Conservation Act 2016*
BEV	Battery Electric Vehicles
bgl	Below Ground Level
BoM	Bureau of Meteorology
BSF	By-product Storage Facility
BVE	Battery Electric Vehicles
C&L	Cracking and Leaching
CEC	Cation Exchange Capacity
CEMP	Construction Environmental Management Plan
CEMS	Continuous Emissions Monitoring System
CKB	City of Kalgoorlie-Boulder
CME	Chamber of Minerals and Energy
CS	Contaminated Sites
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DISER	Department of Industry, Science, Energy and Resources
DMIRS	Department of Mines, Industry, Regulation and Safety
DoE	Department of Environment (Malaysia)
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
E&I	Electrical and Instrumentation
EC	Electrical Conductivity
EP Act	*Environmental Protection Act 1986*
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERMP	Emergency Response Management Plan
ESP	Exchangeable Sodium Percentage (Sodicity)
EU	European Union
FRP	Fibre Reinforced Plastic
GCL	Geosynthetic Clay Liner

Term	Definition
GEDC	Goldfields-Esperance Development Commission
GHG	Greenhouse Gas
GLC	Ground Level Concentration
GPL	General-Purpose Lease
HDPE	High-density Polyethylene
HV	Heavy Vehicle
ICE	Internal Combustion Engine
IF	Influencing Factor
IP	Iron Phosphate
JORC	Australasian Joint Ore Reserves Committee
JTSI	Department of Jobs, Tourism, Science and Innovation
LaCe	Lanthanum Cerium
LAMP	Lynas Advanced Materials Plant
LDP	Local Development Plan
LoA	Level of Assessment
Lot 500	70 Johns Road, Yilkari (formerly Lot 500 Great Eastern Highway)
Lynas	Lynas Kalgoorlie Pty Ltd
mbgl	Metres Below Ground Level
Mining Act	*Mining Act 1978*
MNES	Matters of National Environmental Significance
MOU	Memorandum of Understanding
MRI	Magnetic Resonance Imaging
NATA	National Association of Testing Authorities
NdPr	Neodymium Praseodymium
NEPM	National Environment Protection Measure
NiMH	Nickel–metal Hydride
NORM	Naturally Occurring Radioactive Materials
NUF	Neutralisation Underflow
OEMP	Operations Environmental Management Plan
OUR	Off-site, Utilities and Residues
PCB	Polychlorinated Biphenyls
PEC	Priority Ecological Community
PET	Positron Emission Tomography
PF	Product Finishing
PMP	Project Management Plan
PSI	Preliminary Site Investigation
RCWA	Radiological Council of WA
RE	Rare Earths
REMPLAN	REMPLAN Regional Economic and Planning Tool

Term	Definition
REPF	Rare Earths Processing Facility
RIA	Radiation Impact Assessment
RMP	Radiation Management Plan
RO	Reverse Osmosis
RSA	*Radiation Safety Act 1975*
RSO	Radiation Safety Officer
SCA	Special Control Area
SEG	Samarium, Europium and Gadolinium
SIRIM	Standards and Industrial Research Institute of Malaysia
SVO	Surface Ventilation Officer
SVOC	Semi-volatile Organic Compounds
SWC	Soilwater Consultants
SWG	Soilwater Group
SWIS	South West Interconnected System
SWL	Sound Power Level
SX	Solvent Extraction
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
the Proposal	Includes both the REPF and BSF, including any ancillary activities between the two sites
TML	Transportable Moisture Limit
TMP	Transport Management Plan
TN	Total Nitrogen
TPS	Town Planning Scheme
US	United States
UV	Ultraviolet
UWA	University of Western Australia
VOC	Volatile Organic Compounds
WA	Western Australia
WASM	Western Australia School of Mines
WEPP	Watershed Erosion Prediction Project
WESP	Wet Electrostatic Precipitator
WIR	Water Information Reporting
WQPN	Water Quality Protection Notice
Yarri Road	Common Reserve 8767, Yarri Road, Parkeston

1 INTRODUCTION

1.1 Purpose of Report

The Mt Weld Rare Earths Project is an existing rare earth (RE) mine and concentration plant situated 35 km south east of Laverton in the north eastern Goldfields region of Western Australia. The RE ore is mined by Mt Weld Mining Pty Limited (Mt Weld Mining), a wholly owned subsidiary of Lynas Rare Earths Ltd, and then processed in the existing concentration plant at the Mt Weld mine site to produce an RE concentrate.

Lynas Kalgoorlie Pty Ltd (Lynas), also a wholly owned subsidiary of Lynas Rare Earths Ltd, proposes to construct and operate a Rare Earths Processing Facility (REPF) at 70 Johns Road, Yilkari, near the town of Kalgoorlie (formerly Lot 500, Great Eastern Highway, Yilkari, and referred to within this document as Lot 500), and an associated permanent off-site By-product Storage Facility (BSF) on Common Reserve 8767, Yarri Road, Parkeston (Yarri Road) in the City of Kalgoorlie-Boulder (Figure 1-1). The REPF will further separate and concentrate the Mt Weld RE concentrate to produce an RE carbonate, which will be exported to the Lynas downstream production facilities, including the Lynas Advanced Materials Plant (LAMP) located in Kuantan, Malaysia, and a proposed facility in Texas, USA, via Fremantle port in Western Australia (Insert 1-1).

The LAMP is the world's largest single RE plant and comprises four production areas, including cracking and leaching (C&L). On 15th August 2019, the Malaysian government announced that, as a condition of Lynas Malaysia's operating licence renewal, Lynas must have a replacement C&L facility (i.e., the proposed REPF) in place abroad within 4 years (by July 2023). To meet this condition, the proposed schedule requires commissioning of the proposed REPF by mid-2022 and full operation by mid-2023. The construction, commissioning and ramp-up of the proposed REPF within this time frame is essential to the continuing supply of RE to Japanese, North American and European industry.

The REPF was referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act) on 13 September 2020. The EPA subsequently determined that the REPF would be assessed at "Assessment on Referral Information – with Additional Information Requested". This report addresses the information requested in the EPA's Notice Requiring Information for Assessment, under Section 40(2)(a), dated 24 November 2020.

This report describes the Proposal, potential environmental impacts, proposed mitigation measures and environmental outcomes associated with the construction and operation of the REPF.

For the purposes of this document, references to "the Proposal" includes both the REPF at Lot 500 and the BSF at Yarri Road, including any ancillary activities (e.g., transport) between the two sites.

This report has been prepared in accordance with the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* and the EPA Notice Requiring Information for Assessment, under Section 40(2)(a) of the EP Act, dated 24 November 2020 (refer Table 0-1).

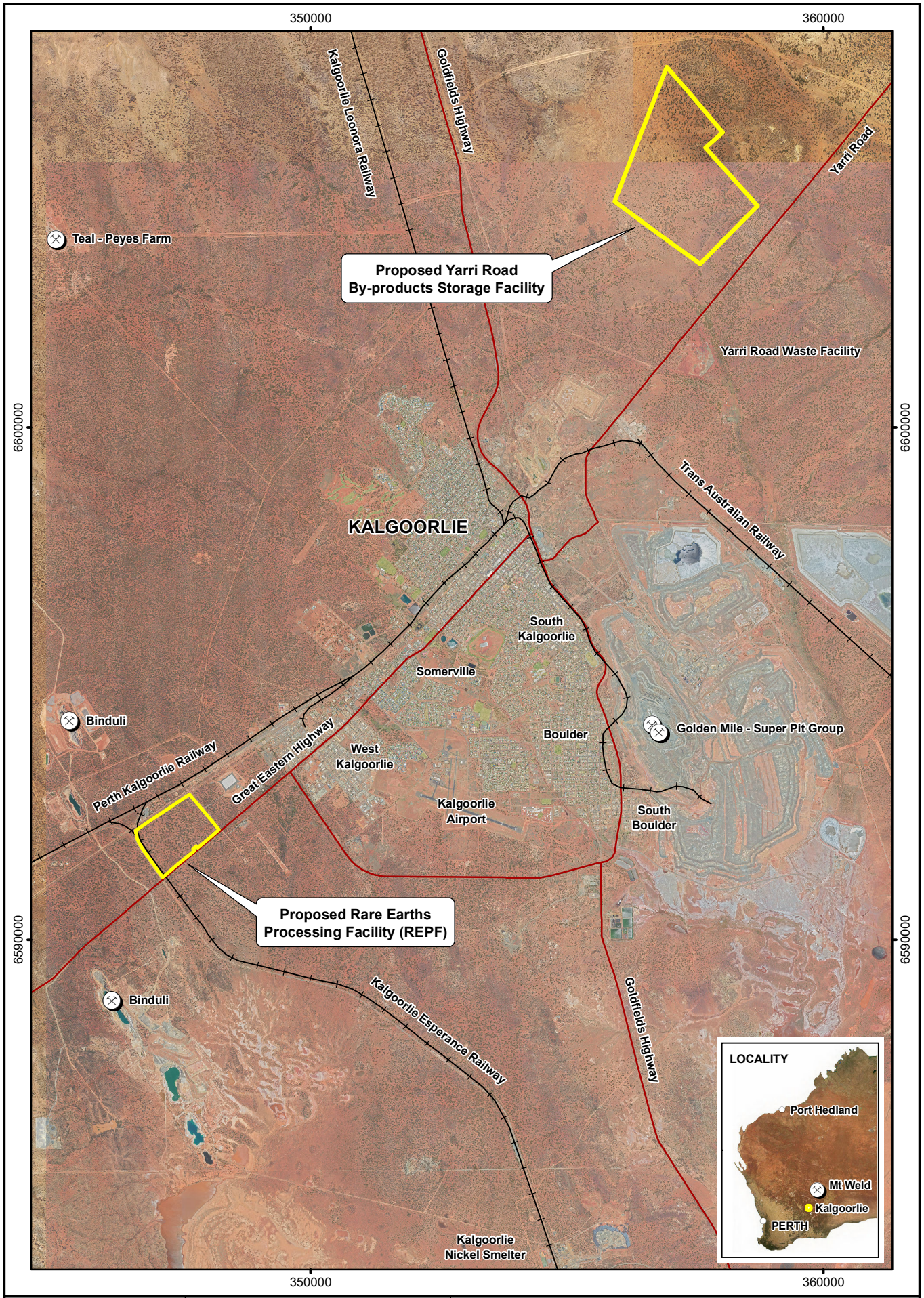
1.2 Proposal Summary

Table 1-1: Proposal Summary

Proposal title:	Lynas Rare Earths Processing Facility and By-product Storage Facility – Kalgoorlie
Proponent name:	Lynas Kalgoorlie Pty Limited
Short description:	Construction and Operation of a Rare Earths Processing Facility and By-product Storage Facility.
Location	• REPF: 70 Johns Road, Yilkari General Purpose Lease No. G 26/169 • BSF: 90% on Common Reserve 8767, and 10% on Unallocated Crown Land (UCL), Parkeston[1]
Primary feed:	162,000 tpa Mt Weld RE Concentrate
Production capacity:	86,000 tpa RE Carbonate Product
Proposal footprint:	Lot 500 REPF disturbance envelope of 120 ha over 135 ha site. Yarri Road BSF disturbance envelope of 97.3 ha over a 535 ha site.

Notes:

1. Refer to Section 1.4.4 for General Purpose Lease and Miscellaneous Licence application status.



Imagery: © Landgate (December 2018)

0 1 2 km

Scale: 1:100,000
MGA94 (Zone 51)

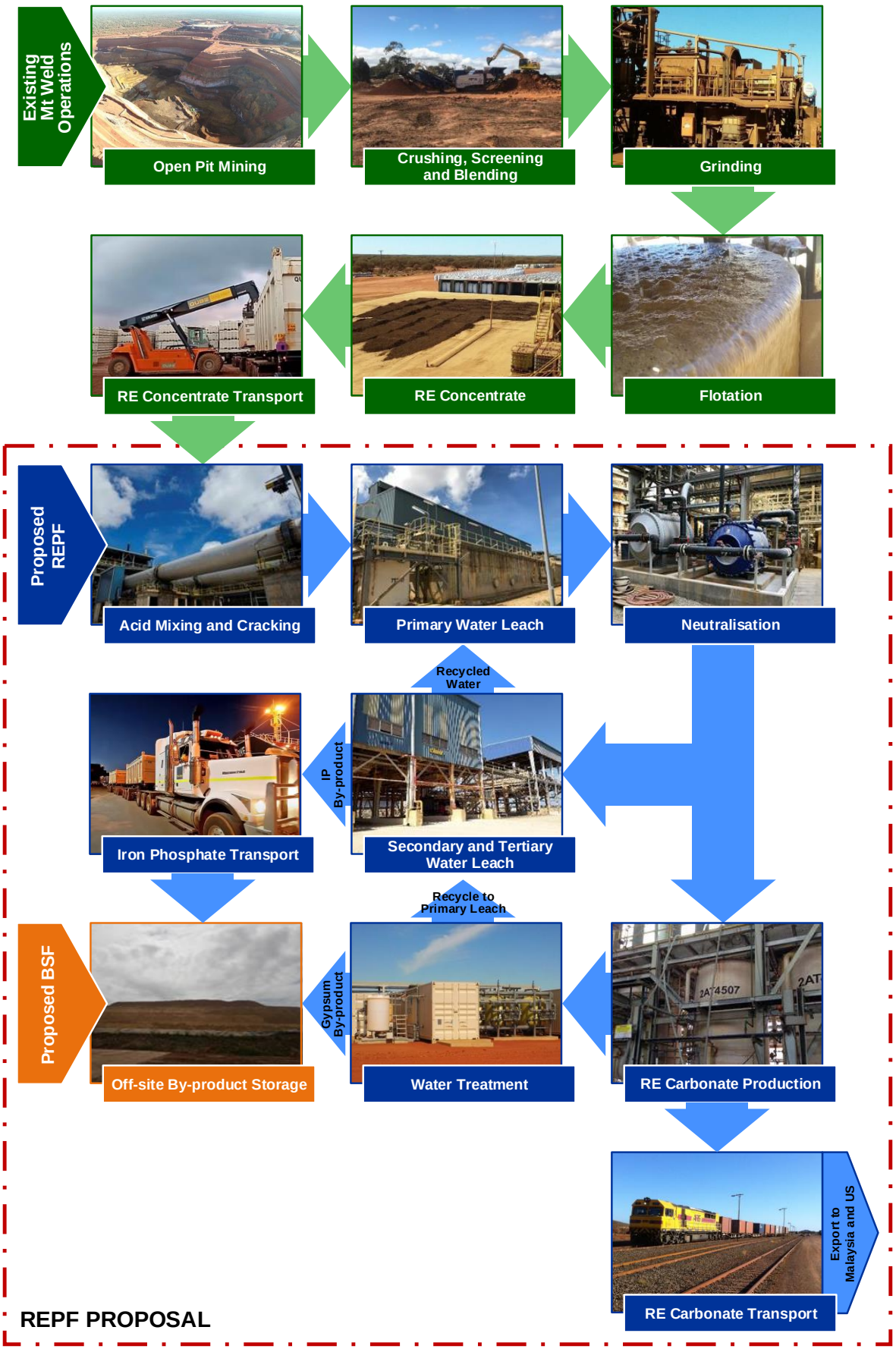
Lynas
KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_01		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 1-1

Proposal Site Locations

Insert 1-1: Simplified Process Overview



1.3 The Proponent

The formal details of the proponent are: Lynas Kalgoorlie Pty Ltd (ABN 73 053 160 302).

Lynas Kalgoorlie Pty Ltd is a wholly owned subsidiary of Lynas Rare Earths Ltd.

Table 1-2: Proponent Details

Contact Details	Lead Approvals Consultant
Kam Leung (VP Upstream)	Peter Jansen
Suite 1, 1st Floor, 45 Royal Street, East Perth, WA 6004	PO Box 239, Innaloo WA 6918
KLeung@lynascorp.com	peterj@kasaconsulting.com.au
+61 8 6241 3800	+61 459 222 151

1.4 Legislative Framework

The following sections describe the range of applicable legislation that the Proposal will be regulated under. Lynas considers that all environmental aspects relevant to the Proposal can be regulated at State level to ensure environmental risks are adequately mitigated at each stage of Proposal development.

1.4.1 Environmental Protection Act, 1986 – Part IV

The Proposal was referred to the EPA under Section 38 of the EP Act on 13 September 2020. The EPA subsequently determined that the Proposal would be assessed at "Assessment on Referral Information – with Additional Information Requested" on 30 November 2020.

This document supports the referral of the Proposal to the Western Australian EPA under Part IV of the EP Act and addresses the information requested in the EPA's Notice Requiring Information for Assessment, under Section 40(2)(a), dated 24 November 2020 (refer Table 0-1).

The following environmental factors will be assessed:

- Flora and vegetation (Section 5);
- Terrestrial environmental quality (Section 6);
- Terrestrial fauna (Section 7);
- Inland waters (Section 8);
- Air quality (Section 9);
- Social surroundings (Section 10); and
- Human health (Section 11).

1.4.2 Environmental Protection Act, 1986 – Part V

A works approval and operating licence for the Proposal is required under the EP Act – Part V. Preliminary discussions have been conducted with the Department of Water and Environmental Regulation (DWER) regarding these approvals. It is expected that the REPF will be considered as a Category 44 premises, in accordance with the following definition:

> *Category 44 – "Metal smelting or refining: premises on which metal ore, metal ore concentrate, or metal waste is smelted, fused, roasted, refined or processed. The volume threshold is – 1 000 tonnes or more per year.'*

The following items will be assessed, and management provisions assigned:

- Noise emissions;
- Air emissions;
- Wastewater disposal; and
- Solid waste disposal.

1.4.3 Environmental Protection and Biodiversity Conservation Act 1999

A Proposal may be deemed a 'Controlled Action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) if it impacts on Matters of National Environmental Significance (MNES).

Lynas referred this Proposal to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the EPBC Act, as radioactive materials in the by-products stored on site may be considered within the definition of nuclear actions.

The Delegate determined, on the basis of information provided in support of the referral, that the Proposal did not constitute a Controlled Action and therefore approvals under the EPBC Act are not required.

Refer to Section 12 for further details.

1.4.4 Mining Act 1978 – General Purpose Lease Application

A General-Purpose Lease (GPL) over Lot 500 was granted by DMIRS on 9 October 2020 (G 26/169), which allows for the works to be applied for and assessed via a Mining Proposal under the *Mining Act 1978* (Mining Act).

For the Yarri Road site, Lynas has submitted an application for a GPL over the 535 ha BSF site (G 26/173, lodged 16 October 2020) as well as a Miscellaneous Licence application for a further 7.9 ha for the BSF access corridor (L 26/294, lodged 10 November 2020). Both applications are currently pending and are anticipated to be approved in 2021.

The lease applications have addressed the following requirements of Section 90(2) of the Mining Act:

- When operations are likely to commence;
- The mining operations associated with the infrastructure and the nature and purpose of proposed infrastructure and associated environmental monitoring requirements; and
- The location, and the area, of land that is likely to be required for the operation of plant, machinery and equipment and for other activities associated with operation of the proposed facility.

1.4.5 Mining Act 1978 – Mining Proposal

Separate Mining Proposals will be submitted to DMIRS under the Mining Act for both Lot 500 and the Yarri Road BSF.

The key environmental issues to be presented in the Mining Proposals are:

- Materials characterisation;
- Hydrology;
- Biodiversity, flora, fauna and ecosystems;
- Environmental threats;
- Mine closure; and
- By-products management.

Separate to the above, Lynas has submitted a Project Management Plan (PMP) to DMIRS, which addresses construction works. The PMP will be progressively augmented to address operational risks. DMIRS has approved the PMP for proposed minor and preliminary works (KASA Consulting, 2021).

1.4.6 Radiation Safety Act 1975 – Radiological Council

The Radiological Council is an independent statutory authority appointed under Section 13 of the *Radiation Safety Act 1975* (RSA) to administer the RSA and to advise and assist the Minister for Health to protect public health and to maintain safe practices in the use of radiation. The subsidiary regulations to the RSA are the Radiation Safety (General) Regulations 1983, the Radiation Safety (Transport of Radioactive Substances) Regulations 2002 and the Radiation Safety (Qualifications) Regulations 1980.

The Radiological Council is responsible for regulating the operation, use, manufacture, storage, transport, sale, possession, installation, service, maintenance, repair, or other dealing with any prescribed radioactive substance, irradiating apparatus or electronic product. This encompasses both ionising and non-ionising radiation.

The registration of premises, prescribed radioactive substances, irradiating apparatus and electronic products, and the licensing of individuals (including the licensing of the Radiation Safety Officer (RSO)), are the principal means by which the use of radiation is regulated.

The Radiological Council, in collaboration with DMIRS, will also assess and approve a Radiation Management Plan (RMP) which incorporates a radioactive waste management strategy prepared for this Proposal by Lynas (Appendix U).

1.4.7 Chemical Storage

The Proposal will involve chemical storage at Lot 500 (Table 1-3) and at the BSF (Table 1-4). Consequently, a Dangerous Goods Licence is required and will be applied for under the Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007. Lynas will ensure that the DG permit application will reflect the final chemical storage composition and tank specifications adopted prior to commencement of construction

Table 1-3: Lot 500 Chemicals Stored on Site - Provisional

Raw Material Inputs and Chemicals	Quantity	Vessel Type	Dangerous Good Descriptions	Comments
50% Sodium Hydroxide (Caustic Soda)	50 m^3	Carbon Steel Tank	Class 8	1 x 50 m^3 reagent storage for water treatment.
10% Sodium Hydroxide (Caustic Soda)	100 m^3	Carbon Steel Tank	Class 8	1 x 100 m^3 emergency scrubber vessel.
98% Sulphuric Acid	450 m^3	Carbon Steel Tank	Class 8	2 x 225 m^3 day tanks.
65% Sulphuric Acid	220 m^3	FRP Tank	Class 8	Produced on site. 1 x 60 m^3 acid sludge vessel. 1 x 160 m^3 acid storage vessel.
Diesel	40,000 L in aggregate	Dual-skinned tank	Class 1	2 x Emergency generator diesel tanks – nominally 5kL capacity each. Diesel storage tank on site for site vehicles – nominally 30kL capacity.
Calcium Hydroxide (Lime)	700 m^3	Carbon Steel Silo	N/A	1 x 700 m^3 powdered lime silo.
Magnesium Oxide (Magnesia)	250 m^3 1600t	Carbon Steel Silo Container	N/A	2 x 100 m^3 silos. 1 x 50 m^3 silo. 80 Containers @ 20t each.
Sodium Carbonate (Soda Ash)	579 m^3	Carbon Steel Silo	N/A	1 x 579 m^3 silo.

Table 1-4: Yarri Road BSF Chemicals Stored on Site

Raw Material Inputs and Chemicals	Quantity	Vessel Type	Dangerous Good Descriptions	Comments
Diesel	10,000 L	Dual-skinned tank	Class 1	Emergency generator diesel tank. Diesel storage tank on site for site vehicles.

2 PROPOSAL DESCRIPTION

2.1 Background

REs are included on the critical mineral lists of several countries worldwide, including the Australian Government's "Australia's Critical Mineral Strategy 2019", the United States "Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals" and the European Union's "2020 List of Critical Raw Materials".

REs are used in a variety of global industries and are highly valued because of their specific optical, magnetic and catalytic properties, which are instrumental in the following applications:

- Industrial processes: Petroleum catalytic cracking, chemical catalysis;
- Glass manufacturing: Polishing, UV absorption, refractive index improvement;
- Automotive emission control: Catalytic convertors;
- Energy storage: Nickel–metal hydride (NiMH) batteries;
- Energy efficient electrical motors: RE permanent magnets which enable lighter, more efficient motors;
- Special steel alloys: Lighter and less brittle alloys;
- Electronics: Semi-conductor manufacturing, micro-motors for computers and server hard disks, acoustic devices including earphones and high-quality speakers, and micro-capacitors used in many electronic devices;
- Lighting: Energy efficient fluorescent lamps; and
- Medical: Positron emission tomography (PET) scanners, magnetic resonance imaging (MRI).

China has historically dominated the global supply of RE materials, however, in recent years Lynas has become the second largest supplier of separated RE materials globally. Lynas represents approximately 20% of global supply and is the only significant producer of separates RE products outside of China.

Lynas produces a range of high quality RE products including Neodymium Praseodymium (NdPr) oxide, Neodymium oxide, Praseodymium oxide, Lanthanum oxide, Samarium, Europium and Gadolinium (SEG) oxide, Cerium carbonate and oxide, and Lanthanum Cerium (LaCe) carbonate and oxide.

Neodymium, Praseodymium and NdPr are used in the manufacture of RE magnets used in wind turbines, electric motors in internal combustion engines (ICE), hybrid and battery electric vehicles (BEVs). Lanthanum is used to manufacture catalysts for catalytic cracking in oil refineries. Cerium is used in the exhaust system of ICE cars to remove harmful nitrogen oxides and carbon monoxide. Cerium and LaCe oxides are used in polishing powders for high quality screens.

Neodymium and Praseodymium products are a major revenue source for Lynas, and Japan is the second largest user of these products globally, after China. Lynas, through its partner Sojitz, is the major supplier to Japanese industry. Lynas also supplies REs to industries in North America and the European Union.

Lynas, with the assistance of the Australian government, has been working with the United States government to establish RE processing in the United States. In July 2020, Lynas signed a contract with the U.S. Department of Defense to complete a detailed market and strategy study plus detailed planning and design work for the construction of a Heavy Rare Earth separation facility. In January 2021, Lynas signed a further contract with the US Department of Defense to build a commercial Light Rare Earth separation facility, with the Department of Defense contributing funding up to approximately US$30 million. The U.S. Light Rare Earth separation facility will be designed to receive material directly from the proposed Kalgoorlie REPF.

2.1.1 Existing Mt Weld Mine and Rare Earths Concentration Plant

The Mt Weld orebody is recognised as a Tier 1 long life, high grade RE deposit. In 2002, Lynas acquired 100% of Mt Weld Pty Limited, which held the title to the deposit, and has since proved Australasian Joint Ore Reserves Committee (JORC) compliant RE resources and reserves.

The concentration plant at Mt Weld was commissioned in 2011 and is now licenced for production capacity of 242 ktpa of RE ore. The processing method at the concentration plant has been progressively optimised and utilises existing, well-tested and state-of-the-art technology to produce RE concentrate.

Blended ore is fed to a concentration circuit that comprises a ball mill, froth flotation, dewatering and filtration. The RE concentrate, which comprises mainly phosphate minerals, is then solar dried and bagged for transport. The bagged RE concentrate is packed in sealed containers, trucked to Leonora, railed to Fremantle, and then shipped to the purpose-built Lynas Advanced Materials Plant (LAMP) in Kuantan, Malaysia.

In order to accommodate the potential for return of by-products to Mt Weld, should this be deemed necessary, separate applications for amendments to the Mt Weld environmental approvals are being pursued under both Part IV and V of the EP Act, Mining Act (Mining Proposal) and other approvals as applicable (RMP update for approval by Radiological Council of WA (RCWA) and DMIRS).

2.1.2 Existing Lynas Advanced Materials Plant – Malaysia

The LAMP in Kuantan, Malaysia is the largest single RE processing plant in the world and comprises four production areas: Cracking and Leaching (C&L), Solvent Extraction (SX), Product Finishing (PF) and Off-site, Utilities and Residues (OUR). Commissioning commenced in late 2012, and full capacity of the facility was achieved in 2016 The long ramp-up period reflects the complexity of the technology and the need to build significant in-house intellectual property.

In C&L, the RE concentrate is reacted with concentrated sulphuric acid and then baked in high temperature gas-fired kilns, which convert the RE phosphate minerals to a soluble RE sulphate which can be leached in water. The RE concentrate contains low levels of naturally occurring radioactive material (NORM), i.e., thorium, and to a much lesser extent, uranium, and this process locks up the thorium as insoluble thorium pyrophosphate. The solution is neutralised using magnesium oxide (magnesia) to precipitate impurities such as iron, aluminium and phosphorous. The iron phosphate (IP) by-product, which contains the locked-up thorium, is filtered and dry stacked in purpose-built storage facilities. The RE solution is filtered and sent to SX.

In the SX process (which will continue to be implemented in Malaysia), the REs in solution are separated using solvent extraction, a liquid/liquid separation technology. The RE separation process is highly complex and is the Intellectual Property of Lynas as well as several Chinese RE producers. RE separation requires many stages for each circuit, and there is a total of 900 SX stages in the LAMP.

Once separated, the REs are then sent to PF where they are purified, precipitated, washed and dewatered. Approximately half of the production is calcined at high temperature (1100 degrees C) in eight 88 m long high temperature tunnel furnaces.

The LAMP is dependent on several key suppliers for its raw materials. A dedicated plant producing sulphuric acid and steam was built adjacent to the facility, with acid and steam supplied via dedicated pipelines. A chlor-alkali plant nearby was expanded specifically to supply the plant with hydrochloric acid and caustic soda.

2.2 Proposal Justification

On 15 August 2019, the Malaysian government announced that, as a condition of the LAMP operating licence renewal, Lynas must have a replacement for the C&L facility in place abroad within 4 years (i.e., by July 2023). To meet this condition, the proposed schedule requires commissioning of the proposed REPF by mid-2022 and full operation by mid-2023. The construction, commissioning and ramp up of the proposed REPF within this time frame is essential to the continuing supply of RE to Japanese, North American and European industry. A key consideration in relation to meeting this schedule is the timely (if not expedited) receipt of all environmental approvals for the proposed REPF in Kalgoorlie, by mid-2021 (refer to Section 2.3).

The C&L process at the proposed REPF is based on the proven sulphuric acid bake and leach process used at the existing LAMP in Malaysia, with additional processing required at the REPF to produce a solid RE carbonate product for shipping. Optimisation of REPF plant design has been based on lessons learned during commissioning and operation of the LAMP, and the REPF will replace the current capacity of the LAMP with one large C&L train where the LAMP currently uses four trains.

In addition to providing feed for the LAMP in Malaysia, the proposed new Lynas Light Rare Earth Processing Facility in the U.S. will be designed to process RE carbonate from the proposed Kalgoorlie REPF.

2.2.1 Lot 500 Site Selection

Location studies have been conducted to assess suitable sites for the REPF in Western Australia, and the shortlisted locations for the REPF were:

- On-site at Mt Weld; or
- At a site in the Kalgoorlie region.

In May 2019, Lynas was approached by the City of Kalgoorlie-Boulder (CKB) offering three potential sites for the REPF in Kalgoorlie, as well as the opportunity to enter into a memorandum of understanding which offered access to land, water and infrastructure. The three potential sites were designated:

- Strategic Industrial Area 1 (SIA1) located near BHP Nickel West;
- Lot 350 Great Eastern Highway (Lot 350); and
- Lot 500 Great Eastern Highway (Lot 500).

Lot 500, together with Lot 350, is part of the CKB plan to develop an industrial estate in the western region of Kalgoorlie. This will allow other industries who are potential suppliers to Lynas to establish in Kalgoorlie, including:

- Renewable power generation;
- Sulphuric acid and power supply;
- Lime supply; and
- Hydrochloric acid supply for future expansions of the Lynas processing facility and other projects requiring hydrochloric acid and/or caustic soda.

There are opportunities for Lynas to share costs in the establishment of utilities and infrastructure for the industrial estate, including:

- Gas supply;
- Power supply;
- Road infrastructure;
- Future intermodal rail terminal; and
- Sulphuric acid pipeline/supply from local supplier.

The favoured location for the REPF is Lot 500. This site was chosen after reviewing selection criteria which included environmental, social and heritage considerations. The key benefits of constructing the REPF at Lot 500 include:

- The land has a relatively flat topography which minimises earthworks.
- Adjacent to Great Eastern Highway with good road access via Great Eastern Highway and Anzac Drive.
- Good access to Kalgoorlie rail terminal via road, with minimal disruption to local traffic.
- Good access to existing major infrastructure, including:
  - Goldfields Gas Pipeline (GGP) gas main, approximately 1 km away (toward Kalgoorlie).
  - Commercial quantities of recycled water available from the CKB under agreement.
  - Potable water connection from Water Corporation.
  - Reliable grid power supply from Western Power via the West Kalgoorlie substation.
  - Communications from Telstra.
- Not listed as an Ecological Sensitive Area or conservation reserve, with no major environmental constraints.
- Vacant land with no known, former or current potentially contaminating land uses occurring.
- Close to a skilled workforce and town site amenities.
- Native title has been determined not to exist over the area.
- CKB holds a lease over the land, which they have sub-leased to Lynas.

Additionally, an earlier Proposal for the Neometals Lithium Hydroxide Plant, with a similar process to that of the REPF, had progressed to a Works Approval submission at the Lot 500 site, which highlights that an industrial plant is considered generally acceptable at this location.

The sites at SIA1 and Lot 350, as well as a site at Mungari were assessed and not considered suitable, based on the following considerations:

- SIA1 is Crown Land comprising four pieces of land including portions of Reserve 8168 (Parklands), Reserve 33948 (Government requirements) and Woolibar Station Pastoral Lease N050022. Native title constraints over SIA1 exist, and the site is significantly constrained by its current land tenure and planning status.
- Lot 350 falls wholly within Crown Reserve 8787. CKB sought consent of the Minister for Mines under s.16(3) of the Mining Act for freehold title of the land to allow issue of a general lease for industrial purposes; however, CKB was not granted a lease due to objections raised by the Eastern Goldfields Mining Company Pty Ltd regarding existing prospecting licences which cover more than half of the site.
- The Mungari site does not have existing access to infrastructure (water, power, rail, gas, roads) and was not considered suitable.

2.2.2 By-product Storage Facility Site Selection

Government engagements to date have identified that the EPA requires Lynas to include a site, which is suitable for the long-term storage of process by-products, within this referral.

DMIRS identified three sites with no mining tenement encumbrances in the Kalgoorlie region. All three sites were to the north of Kalgoorlie, with only two being suitable for use as a long-term BSF.

A site at Common Reserve 8767, Yarri Road, Parkeston was one of the three locations identified and was assessed to be the most suitable of the three proposed sites. The Yarri Road site was identified after considerable engineering design and environmental studies had been carried out on Lot 500.

The key benefits of constructing the BSF at Yarri Road include:

- The site is large enough for the required 25 years of operations, with an additional 25 years of storage available for all by-products, if required;
- It can be readily accessed via a Heavy Vehicle bypass route, and there is better access to road infrastructure than the other proposed sites;
- It is on land free from any mining tenure;
- It is well away from any residential development; and
- The site is closer to Lot 500 than the other proposed sites.

Lynas commissioned a desktop environmental review of the BSF site (Ramboll, August 2020) which is included as Appendix W. The preliminary environmental review concluded that the BSF site is relatively benign in environmental-impact terms and is well located for the storage of by-products. On this basis, Lynas offers the Yarri Road site as the preferred long-term BSF option, and it therefore forms part of this referral to the EPA for assessment.

By-product management is discussed further in Section 2.6.

2.2.3 Sustainability and Process Optimisation

The REPF process has been designed to recover and recycle process water, weak acid and energy (heat) during normal operation of the REPF.

- Water recovered from both the water treatment plant and the secondary / tertiary leach circuit will be recycled to primary leach for re-use in the primary leach process.
- Flue gas from the kiln, which contains sulphuric acid vapour, will be condensed to form a weak acid which is recycled to the secondary leach circuit where it is used to recover unreacted REs.
- Energy from the cracking and leaching process is recovered using heat exchangers and stored in a hot water tank. The hot water is then used in the carbonation process which requires additional heat for the process reactions to occur.

These measures are illustrated in Insert 2-1 and discussed further in Section 2.5.

2.3 Proposal Timing

An indicative timetable for implementation of the Proposal is set out in Table 2-1 below. The key milestones reflect an ambitious timeframe based on the following temporal drivers:

- The need to have the Kalgoorlie REPF operational before the 2023 deadline specified by the Malaysian government to cease C&L operations in Kuantan; and
- The complex process, involving many interdependent processing stages, which will require considerable time to commission and de-bottleneck to meet the REPF nameplate capacity to have C&L operational outside Malaysia.

Consequently, the key milestones include the following assumptions:

- An Assessment on Referral Information (ARI) with Additional Information Required Level of Assessment determined by the EPA upon referral under Section 38 of the EP Act;
- The completion of the EP Act Part IV process, including issue of the Ministerial Statement within 10 months of referral under Section 38 of the EP Act;
- The commencement of preliminary earthworks and other preparatory work from Quarter 2, 2021, following the recent receipt of the approvals under Section 41A of the EP Act and the *Mining Act, 1978*;
- Referral under the EPBC Act on 3 July 2020 and determination by the Delegate on whether the Proposal is a Controlled Action. As stated previously, the Delegate has determined that the Proposal does not constitute a Controlled Action (Appendix A); and
- Other approvals to progress concurrently with the EP Act Part IV process and issued following grant of the Ministerial Statement in 2021.

Table 2-1: Indicative Timetable

Milestone	Date
Lot 500 Environmental Studies Complete	June 2020 (Complete)
Submit EPBC Referral	July 2020 (Complete)
EPBC Decision	September 2020 (Complete)
Submit Section 38 Referral	September 2020 (Complete)
EPA Determines Level of Assessment	November 2020 (Complete)
Section 41A Preliminary Works Approved	March 2021 (Complete)
Preliminary Works	April 2021 to August 2021
Additional Information Submitted	April - May 2021 (this document)
Public Review Period (4 weeks) and Lynas Response	May 2021
EPA Assessment Completed	June 2021
Ministerial Approval	July 2021
REPF Construction	August 2021 to May 2022
REPF Commissioning	February 2022 to July 2022
REPF Ramp-up and Optimisation	July 2022 to February 2023
REPF Commencement of Operations	July 2023
BSF Construction	February 2023 to July 2023
BSF Commencement of Operations	July 2023

2.4 Proposal Components

2.4.1 Lot 500

Lot 500 has a total area of 135 hectares (ha). The development footprint will be 120 ha of the entire area of Lot 500. The footprint is required for the process plants, by-product storage facilities, evaporation ponds and ancillary infrastructure as shown in Table 2-2 and Figure 2-1 below.

Table 2-2: Lot 500 Proposal Components

Components	Area (Ha)	Comments
Plant Site	9.4 ha	Located centrally within the overall site.
IP Storage Facility	10.2 ha	Dry stack and stored as a solid.
Gypsum Storage Facility Stage 1	26.3 ha	Stored as a solid.
Gypsum Storage Facility Stage 2	16.3 ha	Stored as a solid.
Evaporation Ponds	38 ha	To evaporate raffinate (brine) from water treatment.
Stormwater Retention Pond	4 ha	See 2.5.10 below.
Buildings, Civils, Utilities and Internal Buffers	10.3 ha	See 2.7 below.
Roads and Access Corridor	5.2 ha	
Total Disturbance Envelope	**120 ha**	
External Green Buffers	15 ha	
TOTAL LOT AREA	**135 ha**	

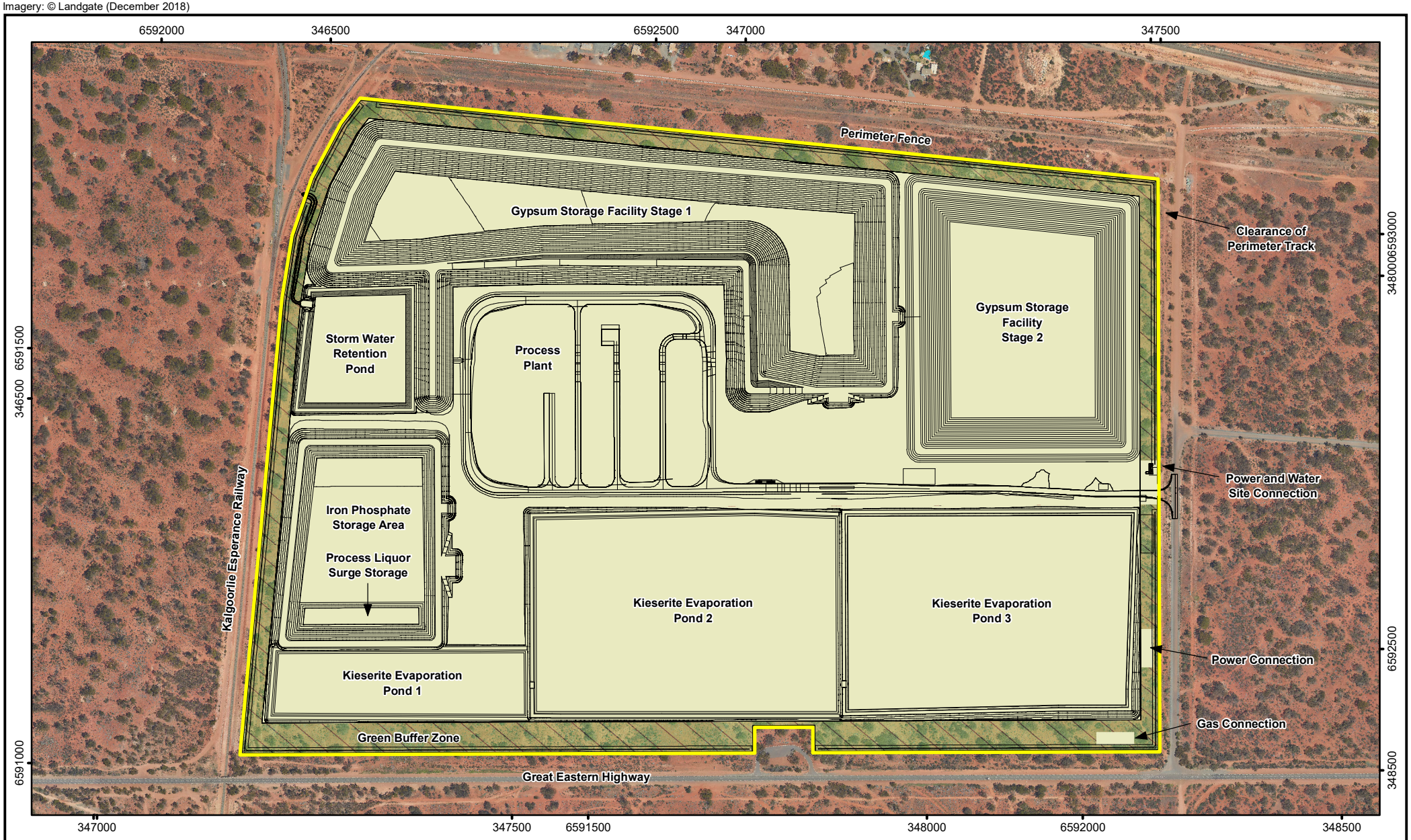
2.4.2 Yarri Road BSF

The BSF site has an area of 535 hectares (ha). Detailed design of the facility will commence upon grant of the GPL and Miscellaneous Licence for the site – areas and locations shown in this document for the BSF are therefore indicative only, but recognise any environmental constraints, e.g., the need to protect conservation significant flora species. The disturbance envelope will be 97.3 ha of the entire area of the site. The footprint is required for the by-product storage facilities (IP and gypsum) and ancillary infrastructure as shown in Table 2-3 and Figure 2-2 below.

Table 2-3: BSF Proposal Components

Components	Area (Ha)	Comments
IP Landform	21.3 ha	Dry stack and stored as a solid.
Gypsum Landform	36.8.5 ha	Stored as a solid.
Diversion Bunds	0.6 ha	
Drainage Channel	1.6 ha	
Stormwater Containment Pond	1.1 ha	
Total By-product Stockpile Area	**64 ha**	
Roads and Access Corridor	3.5 ha	
Hardstand and Wheel Wash Area	0.3 ha	
Topsoil Stockpile	10.1 ha	
Internal Cleared Buffers	19.5 ha	
Total Disturbance Envelope	**97.3 ha**	
TOTAL LOT AREA	**535 ha**	

Imagery: © Landgate (December 2018)



Legend

- Lot 500 Great Eastern Hwy, Yilkari
- Green Buffer Zone
- Proposed Layout
- Proposed Clearing

0 100 200m

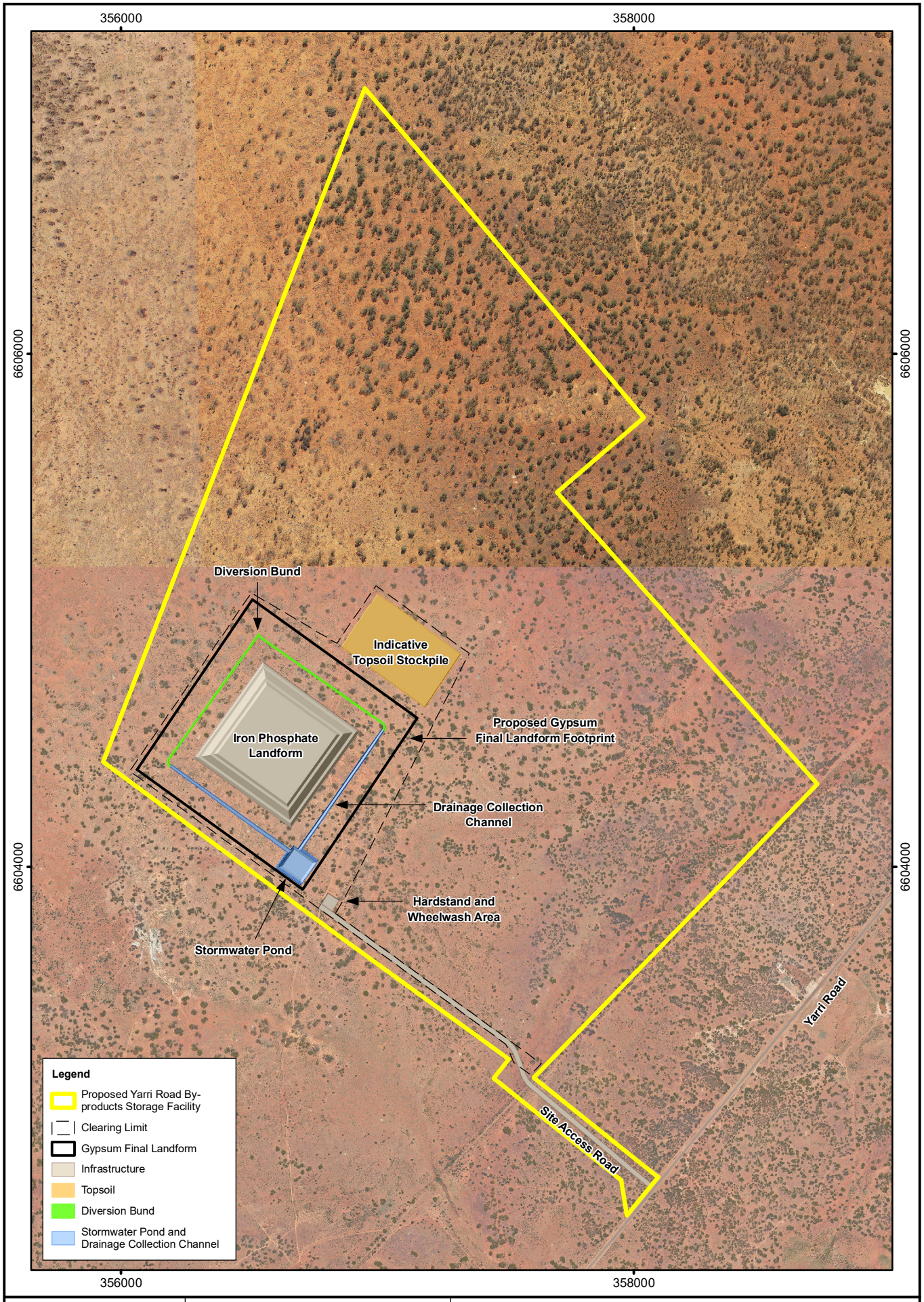
Scale: 1:8,000
MGA94 (Zone 51)

CAD Ref: a2769_ERD04_02		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au	

Lynas KALGOORLIE PTY LTD

Figure 2-1

Lot 500 - Site Layout



Imagery: © Landgate (December 2018)

0 200 400m

Scale: 1:20,000
MGA94 (Zone 51)

Lynas
KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_03		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: May 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 2-2
Yarri Road BSF
Indicative Site Layout

2.5 Cracking and Leaching Plant

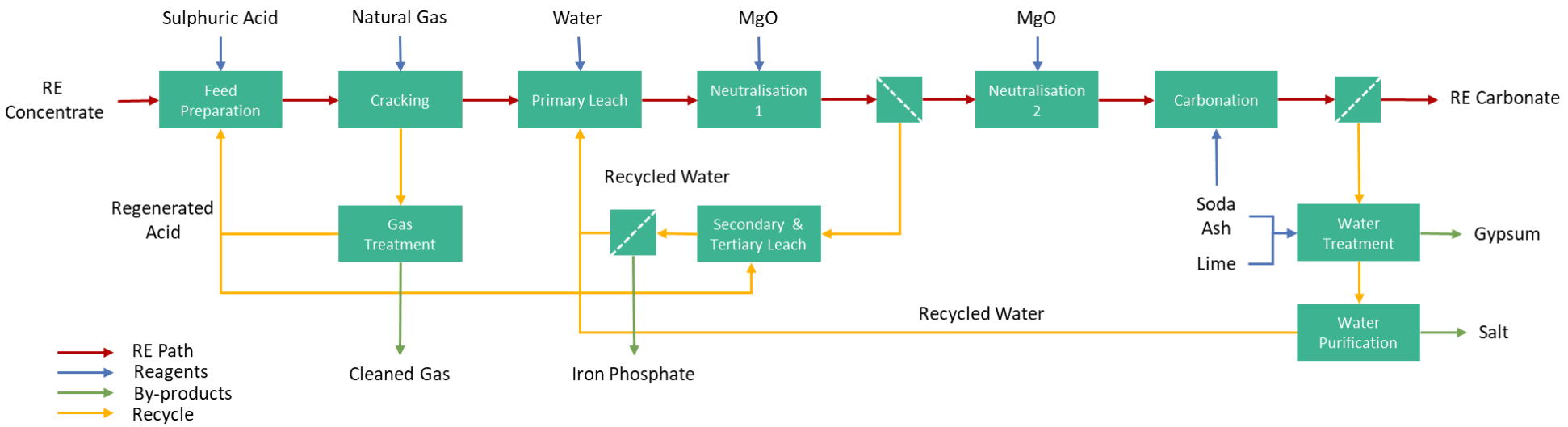
2.5.1 Core Processes

Key infrastructure at Lot 500 will include:

- Cracking and Leaching Plant:
  - Feed Preparation;
  - Cracking;
  - Primary Leach;
  - Two stages of Neutralisation;
  - Filtration, Secondary and Tertiary Leach;
  - RE Carbonate Production (Carbonation);
  - Carbonate Filtration;
  - Product Handling and Storage Facility;
  - Water Treatment and Purification;
  - Gas Treatment (pollution controls, stack, fans); and
  - Reagents and consumables (sulphuric acid, magnesium oxide, sodium carbonate calcium hydroxide, flocculant).
- Utilities (power, water, gas);
- Ancillary plant (compressed air, communications, control system);
- Infrastructure buildings (processing, raw and finished materials storage, offices, laboratory, warehouse, workshop, control rooms, substations);
- Lined Evaporation Pond;
- Lined IP Drying and Storage Facility; and
- Lined Gypsum Storage Facility.

The RE solution is precipitated as an RE carbonate which is sent to Malaysia for processing into final products. The process overview is illustrated in Insert 2-1.

Insert 2-1: Rare Earths Processing Facility Process Flow Diagram



2.5.2 Raw Materials and Product Handling

Concentrate will be transported from the Mt Weld concentration plant to the REPF in closed containers, with handling at the REPF undertaken by a tippler unit attached to a reach stacker which tips into a hooded hopper, which is drafted through a bag filter to eliminate dust. Refer to Figure 2-3 for road transport routes.

Concentrate will remain in sealed containers and be stored on an engineered hardstand in a container yard adjacent to the feed hopper and feed conveyor at the REPF site in order to minimise handling and dust generation. Other chemicals, reagents and supplies will be transported in closed containers or sealed vessels by a combination of road and rail. The RE carbonate product from the REPF will be packaged in closed containers and transported by rail to the port of Fremantle for export. The IP by-product will be transported in covered triple side tippers from Lot 500 to the BSF site for long-term storage.

In considering potential options for by-product management, several scenarios have been assessed, each of which have undergone feasibility reviews. Key options include each of, or a combination of, the following:

- Off-site permanent storage of IP at a designated and dedicated facility on the Yarri Road site – refer to Section 2.6.3 and Appendix W;
- Transfer of a portion of the IP back to Mt Weld for disposal utilising a back-loading arrangement. Over 60% of the IP could potentially be backloaded. This option is dependent on the back-loading costs;
- Initial on-site storage of IP in an engineered and lined storage facility on Lot 500; and/or
- Re-use of IP and/or gypsum as described in Section 2.6.5.

Acid is proposed to be transported to the REPF site via road in acid tankers. Loading and unloading of acid tankers is highly regulated and carried out by suitably trained operators in accordance with approved procedures.

Lynas will implement a Transport Management Plan (TMP) that will define management measures to minimise the risk of materials transport to and from Lot 500 and Yarri Road. The TMP will include a framework for implementing contingency measures in the event of unplanned events and the management of accident and emergency scenarios. For the purpose of this referral, key transport management provisions are included in the Operations Environmental Management Plan (OEMP) and the Construction Environmental Management Plan (CEMP), to address environmental risks (Appendix R and Appendix S). Further details on traffic and transport routes are provided in Section 2.11.

A key beneficial change to the transport and export of Lynas products to Malaysia from the REPF to the Port of Fremantle is that the RE carbonate produced by the REPF will contain radioactive material of lower radioactivity compared to the RE concentrate currently exported from the Mt Weld Rare Earths Project which contains low levels of radionuclides. RE carbonate is not classified as radioactive (for any purpose).

2.5.3 Feed Preparation

The stored concentrate will be gravity fed into the feed hopper directly from the container by the tippler unit. The concentrate is then conveyed into the acid mixing tank located above the kiln, where concentrated sulphuric acid is mixed with the RE concentrate.

2.5.4 Cracking

The mixture of concentrated sulphuric acid and RE concentrate will be gravity fed into a rotary kiln. The mixture will be heated to 600 degrees C as part of the cracking process, forming a soluble RE sulphate. This process will also lock up thorium as insoluble thorium pyrophosphate.

2.5.5 Flue Gas Treatment

Flue gas from the kiln, which contains sulphuric acid vapour, will be cleaned using a flue gas treatment system, including a combination of two venturi scrubbers, spray tower and Wet Electrostatic Precipitator (WESP). The liquor collected from the flue gas treatment is a weak acid which is recycled to secondary leach where it is used to recover unreacted RE minerals.

The Flue Gas Treatment system is implemented to ensure that emissions meet the environmental standards prescribed by DWER in the site environmental licence, and ensure that ambient air quality standards are complied with. An emergency gas scrubbing system utilising a packed tower and caustic scrubbing will be installed as a backup in the event of any failure of the primary gas treatment system.

2.5.6 Primary Leach

Cracked material will be discharged from the kiln into the primary leach circuit where the RE sulphate will be dissolved in water, leaving insoluble material, including thorium pyrophosphate, in suspension.

2.5.7 Neutralisation

The slurry from Primary Leach will be neutralised with magnesium oxide which will raise the pH of the slurry to precipitate iron, phosphate and aluminium, leaving the Res in solution.

2.5.8 Filtration, Secondary and Tertiary Leach

The neutralised slurry will be filtered to produce a filter cake which will be re-leached in secondary and tertiary leaching to recover unleached REs. The slurry from secondary and tertiary leaching will be filtered, producing an IP filter cake which will be stored and solar dried in an engineered and lined IP storage facility at Lot 500. After solar drying it will either be stored in-situ and/or transported to the dedicated BSF at Yarri Road. The filtrate will be recycled to the primary water leach circuit to recover REs.

2.5.9 Carbonate Production (Carbonation)

An RE carbonate precipitate will be produced from the neutralised RE sulphate solution. The precipitate will be filtered and bagged for shipping to the LAMP in Malaysia for separation and product finishing.

Energy is recovered during the cracking and leaching process, using heat exchangers which produces excess heat, using heat exchangers and is stored in a hot water tank. The hot water is then used in the carbonation process, which requires additional heat for the process reactions to occur.

2.5.10 Water Treatment and Purification

The design of the REPF will maximise the recovery and re-use of water in the process as far as practicable. Wastewater from gas treatment and RE carbonate production will be neutralised with calcium oxide (quicklime) to precipitate gypsum. This resulting slurry will be pumped into a lined Gypsum Storage Facility where gypsum settles out and the water can be recovered for treatment. The water will then be softened with sodium carbonate (soda ash) and sent to a Reverse Osmosis (RO) plant which will recover water to recycle back into the process. The raffinate (brine) discharge from the water recovery process will contain sodium and magnesium sulphate salts and will be directed to the lined evaporation pond on-site.

2.6 By-Product Management

2.6.1 Rationale

The IP solid by-product contains iron, aluminium, phosphorous and residual RE from the concentrate. It will also contain low levels of NORM (thorium and uranium). The radiation level of the IP by-product will be similar to that of the Mt Weld concentrate, ore and tailings, which are all safely managed in accordance with approved RMPs.

Given the anticipated life of the Proposal, Lynas recognises that there is finite space available on Lot 500 for the long-term storage of gypsum and IP by-products. Lynas has taken a multi-pronged approach to by-product management and has assessed numerous options for by-product re-use and/or long-term storage. As part of the by-product treatment process, both the IP and gypsum by-products will require solar drying and conditioning within purpose-designed engineered facilities at the REPF before handling for re-use, transport or long-term storage can occur.

Whilst Lynas believes that there may be a future opportunity to demonstrate the feasibility and environmental acceptability of re-use of IP and/or gypsum, e.g., as a soil conditioner, land rehabilitation, precursor for cement and civil raw materials, these options are excluded from this Proposal, with research and development and more detailed feasibility assessments to occur at a future date, in consultation with key stakeholders.

By-product storage at the Yarri Road site is the preferred long-term management option and is therefore included in this Proposal.

Table 2- below summarises the anticipated volumes of by-products that will be generated.

Table 2-4: Anticipated By-product Volumes (at 90% Plant Utilisation)

Stream	Solid	Water	Moisture (%)	Total		
	Dry (t/h)	(t/h)		Wet (t/h)	Dry (tpa)	Wet (tpa)
Concentrate Feed	18.0	2.5	12%	20.5	142,000	162,000
Iron Phosphate	14.8	14.8	50%	29.6	117,000	233,000
Gypsum	36.1	33.4	48%	69.6	285,000	548,000
Product	7.5	3.4	31%	10.9	59,000	86,000

2.6.2 Lot 500

IP will initially be stored on Lot 500 in a double lined conditioning and storage area prior to being directed to the BSF. IP will be produced as a wet solid cake discharge from a pressure filter. The first stage will be conditioning (solar drying and handling to below the transportable moisture limit (TML)) on Lot 500 before any transport and storage. This will increase the compaction and strength when stored, making it safe to transport, reduce the volume to be stored and reduce the associated transport costs.

Any IP that is permanently stored on-site will be compacted, profiled, capped and remediated in accordance with the appropriate authorisation and the site-specific Closure Plan.

2.6.3 Yarri Road Site

The Yarri Road site is the preferred option for a long-term BSF (refer to Section 2.2.2) and it therefore forms part of this referral to the EPA for assessment.

The site is 535 ha and approximately 26 km by road from Lot 500 using the Anzac Drive and the Heavy Vehicle bypass route – refer to Figure 2-4.

Lynas' investigations for a permanent storage of by-products has considered the following key objectives / criteria:

- Demonstrating that the long-term and permanent disposal of by-products will be safe and secure with negligible risk to community and the surrounding environment;
- Economic feasibility;
- Consideration of future uses of the land (if applicable); and
- Sustainability principles including working proactively to reduce our greenhouse gas emissions, conserve resources and energy, prevent contamination of the air, water, soil and limit waste generation.

Lynas has applied for a GPL for the BSF site (G 26/173) and a Miscellaneous Licence for the proposed access road (L 26/294).

2.6.4 Back-Load to Mt Weld

Lynas completed a study assessing the feasibility of returning IP to Mt Weld. The study assumed the use of existing transport movements to minimise the total cost by taking advantage of back-load capacity to Mt Weld and to construct the base and capping with waste rock movement. Unfortunately, the study concluded that at this stage, there is insufficient back-load capacity for all of the IP to be returned to Mt Weld. The distance by road is approximately 400 km making this option heavily dependent on competitive back-load rates. It would be undesirable both in terms of sustainability (greenhouse emissions) and economic viability to undertake additional vehicle movements.

Whilst excluded from this proposal, the back-load option will continue to be assessed by Lynas for its feasibility and, if circumstances change to deem it necessary, this option will require separate updates and regulatory approvals for the Mt Weld operations and respective management plans.

2.6.5 By-Product Re-use

The main by-products generated at the REPF, namely IP and gypsum, will be similar in characteristics to that generated at the LAMP in Malaysia.

Whilst outside the scope of this proposal, Lynas has commissioned significant research and development (R&D) on the re-use of IP and gypsum by-products. This was done with the support of previous governments, a number of universities, government agencies and landowners / farmers. A number of formulations of IP and gypsum plus filler material under the Condisoil® branding were extensively tested (from small scale to upscaled tests) as a soil conditioner for a range of crops (kenaf, corn, rice paddy, napier grass, teak, coconut, oil palm) in poor quality soils, and also tested for the rehabilitation of bauxite mining voids. The programs successfully proved the application of Condisoil® to increase crop yield. The use of Condisoil® which contains both IP and gypsum was independently tested and declared safe by:

- Standards and Industrial Research Institute of Malaysia (SIRIM);
- Atomic Energy Licencing Board (AELB, Malaysia);
- Department of Environment (DoE, Malaysia); and
- University of Western Australia (UWA).

CondiSoil®, a product currently developed by Lynas in Malaysia for successful use as a soil conditioner, and comprises IP, gypsum and a filler material. This product has also showed strong potential for safe use as engineered backfill material in voids created by bauxite mining and possibly other mining activities.

Condisoil® reached the final stages of regulatory approval before the new Malaysian government directed Lynas to stop research and development activities. While the research and development may be specific to Malaysian soils and crops, a key learning is that both IP and synthetic gypsum are not harmful to either people or the environment.

The re-use of synthetic gypsum has been tested in Malaysia independent of Condisoil® formulations. This includes the use as a substitute for imported material in the manufacture of cement. This work is still in progress.

IP has been shown to have properties similar to rock phosphate, which is used in fertilisers, and the fertilisers derived from rock phosphate. This makes it valuable in ameliorating problematic soil for agriculture.

Gypsum material produced in the C&L process, referred to as NUF at the LAMP facility, has been shown by Golder Associates (2014) and Standards and Industrial Research Institute of Malaysia (SIRIM) (2018) to be a non-toxic and non-hazardous material with negligible human health risk. In addition, its chemical composition showed potential for use in agriculture (ameliorating oil palm plantation) and the manufacturing of cements.

Lynas recognises that there is some potential for the re-use of the by-products from the Kalgoorlie REPF, but due to a number of factors, including proximity to potential end users, re-use at best will only consume a portion of the amount produced on a yearly basis.

Lynas is cognisant of perceived risks and potentially extensive approvals process required to justify this option and has therefore excluded the re-use of by-products from this Proposal. Lynas will however continue to undertake research into the re-use of by-products from the REPF and maintain open dialogue with key regulatory agencies on its progress on this matter.

2.7 Non-process Infrastructure and Ancillary Plant

2.7.1 Lot 500

Non-process infrastructure at Lot 500 will include raw and finished materials storage, offices, laboratory, warehouse, workshop, control rooms and substations, as well as an access road and carparking. Additionally, the ancillary plant area will include compressed air, communications and control system.

A buffer of between 30 to 50 m along the plant boundary, which will not be cleared, will be left around the perimeter of the site to act as a visual screen (refer Section 10.6).

2.7.2 Yarri Road BSF

Non-process infrastructure at the BSF will include an access road, wheel wash area, office, ablutions, communications, HV maintenance workshop for minor repairs and servicing and carparking.

Mobile equipment operating at and travelling to/from the BSF includes:

- 1 x Water Cart
- 2 x Front End Loaders
- 2 x Light Vehicles
- 2 x Dozers
- 2 x Moxys
- 2 x Road Trains

2.8 Utilities

2.8.1 Lot 500

Natural gas will be supplied through a spur from the GGP, operated by Australian Pipeline Association (APA).

Approximately 1.8 GL per annum of water supply will be required for the industrial processes associated with the REPF. CKB (who hold the head lease for Lot 500) has agreed to supply reclaimed water (treated domestic wastewater) to the REPF site to meet this requirement. CKB is responsible for the construction of pipeline infrastructure from its reclaimed water service to the REPF site boundary and is responsible for obtaining all relevant easements and approvals for the delivery of reclaimed water to the REPF site.

Potable water for office reticulation, ablutions and safety showers will be supplied from the Goldfields Water Supply Scheme by Water Corporation, who are responsible for obtaining all relevant easements and approvals for the delivery of water to the REPF site.

Given the above, and the high salinity, no groundwater will be abstracted from beneath or in proximity to the proposed site, and therefore no applications for groundwater licensing under the WA *Rights in Water and Irrigation Act, 1914* are required.

Power will be supplied from the grid and/or a local source. Lynas is currently applying for a connection to the South West Interconnected System (SWIS) with Western Power and third-party power retailers. Lynas is also assessing opportunities to supplement power requirements for the REPF from renewable power sources. Additionally, potential opportunities to establish a solar farm for power generation purposes (either during operations and/or post closure) are being assessed by Lynas.

2.8.2 Yarri Road BSF

Power will be supplied from the grid and/or generated on-site using genset. Potential opportunities to establish a solar farm for power generation purposes (either during operations and/or post closure) are being assessed by Lynas.

Diesel fuel for on-site vehicles will be tankered to the BSF and stored in a 10,000 L on-site diesel tank. Fuel storage will meet the requirements of *AS1940:2017 – The storage and handling of flammable and combustible liquids* and will be appropriately bunded or comprised of double skinned tanks, with appropriate measures to contain spills being employed as standard practice.

Potable and process water supply will be tankered to the BSF and stored in on-site water tanks.

No major mobile equipment servicing will be undertaken on site, however it is anticipated that a workshop may be located at the BSF site for minor repairs and maintenance.

2.9 Process Water

2.9.1 Lot 500

The REPF plant site at Lot 500 will be managed as a zero process water discharge site. Where possible, water will be recovered and recycled back into the process. Treatment and recycling of water is included in the plant design. Raffinate (brine) from water treatment will be evaporated in ponds (refer to Section 2.5.10).

CKB has agreed via Memorandum of Understanding (MOU) to provide between 1 GLpa and 2.5 GLpa of treated recycled water to the REPF site to meet Proposal process water requirements, refer to Section 2.8. Lynas will ensure that the water is treated on site to meet Department of Health requirements for use of recycled water. Negotiations are currently in progress with CKB for the water supply agreement.

Site drainage will be designed to segregate potentially contaminated areas from clean stormwater. Specific details on site drainage management will be presented in applications to DWER for a Works Approval for the premises.

2.9.2 Yarri Road BSF

The BSF site at Yarri Road will be managed as a zero water discharge site, with runoff water from potentially contaminated areas diverted to the stormwater pond and evaporated.

The dust suppression water supply at the BSF will be stored in a water tank on-site. Potable water will be tankered to the site as required for domestic use.

2.10 Road Access

2.10.1 Lot 500

Transportation to the REPF will utilise existing established roads and highways (Section 2.5.2).

CKB is responsible for road access to the site boundary at Lot 500, including the access road from Johns Road and associated easements and approvals.

2.10.2 Yarri Road

Transportation to the BSF will utilise existing established roads and highways (Figure 2-4).

An easement will be required for the access road and grid power supply from Yarri Road to the edge of the site. Lynas has applied for a Miscellaneous Licence for the access road and power line. The access road location has been chosen to be the shortest route from Yarri Road to the site and not be on a granted mining lease.

2.11 Traffic

Lot 500 is strategically located on the main transport route into Kalgoorlie from the west which can accommodate significant traffic demand. There are also alternative routes from the east and the north of the site to accommodate road transport from Mt Weld (Figure 2-3).

The BSF site is located north east of the Kalgoorlie townsite, approximately 26 km by road from Lot 500 using the Anzac Drive and the Heavy Vehicle bypass route (Figure 2-4), both of which can accommodate significant heavy vehicle traffic. It is located on the fringe of the Kalgoorlie area, with the nearest residential areas in the Ningamia indigenous residential community approximately 4 km to the south east and the suburb of Hannans which is approximately 5 km to the west of the BSF site.

Emergency response plans are being established which incorporate measures to ensure potential environmental impacts, in the event of a transport accident, is mitigated (refer Section 11.6.3). The potential impacts in the event of a motor vehicle or rail accident include:

- Physical damage to members of the public and surrounding environment (land, waterways, flora and fauna); and
- Exposure of the public or the surrounding environment to low levels of naturally occurring radiation. The Radiation Impact Assessment (RIA) at Appendix T indicates that any exposure will be significantly below legislative limits and, in many cases, this exposure would be below or just above the minimum detection limits of the currently available radiation monitoring equipment (refer to Sections 11 and 12).

2.11.1 Construction Traffic

The likely construction timetable for the REPF is 12 to 15 months and during this time there will be periods of increased traffic generation relative to current baseline traffic movements for the area.

Heavy Vehicle (HV) construction traffic will originate from four main locations:

- Perth by both road;
- Perth by rail, then road from the rail yards to the sites;
- Esperance by road; and
- Kalgoorlie by road (e.g., local supply of aggregate, sand and cement for concrete).

A peak traffic increase is anticipated in Q4 2021 to end Q3 2022 during the delivery of demountable buildings and steel from Perth by road to Lot 500 (approximately 600 km). This traffic is estimated to increase HV traffic on Great Eastern Highway, west of Lot 500, by approximately 8% in Q2 (an average of approximately 13 return truck movements per week) and 4% in Q3 (an average of approximately 6 return truck movements per week). Outside of this period, HV traffic from Perth via Great Eastern Highway is estimated to increase HV traffic to the west of Lot 500 by less than 1% (an average of approximately 2 return truck movements per week).

Return rail movements will utilise the existing operational rail line, using the existing rail configuration and timetable. The frequency of rail movements will not change as a result of construction activities. HV traffic between the Kalgoorlie railyard and Lot 500 via West Kalgoorlie Road and Great Eastern Highway (approximately 5 km) will increase in HV traffic by an average of approximately 4 return truck movements per week over a 12-month period. The route between the Kalgoorlie railyard and Lot 500 will utilise existing roads that are appropriate for industrial traffic. Baseline traffic data for this route is not available to estimate the proportional increase in HV traffic; however, the proportional increase in truck movements is not anticipated to be significant.

HV traffic from Esperance (approximately 400 km) will approach Lot 500 via Goldfields Highway and Anzac Drive and represents an approximate average increase in HV traffic of 3% (an average of approximately 3 return truck movements per week) over a 12-month period.

A concrete batching plant will be established on-site during construction, local supply of aggregate and sand is assumed to approach Lot 500 via Anzac Drive and Great Eastern Highway, and represents an approximate increase in HV traffic of 8% (an average of approximately 13 return truck movements per week) across the 18-month construction timetable.

Transport routes for delivery of large equipment (e.g., kiln components and tanks) to Lot 500 are currently being evaluated, and it is expected that oversize deliveries will originate from either Henderson in the Perth metropolitan area or from Esperance. There is a designated oversize route from Henderson to Kalgoorlie via Roe Highway and Great Eastern Highway. The proposed route from Esperance. via the Esperance-Coolgardie Highway and Goldfields Highway is also sized to support oversized traffic.

Given the temporary nature of the construction traffic movements, the impacts are readily manageable with conventional techniques, including:

- Scheduling of high volume or heavy vehicle traffic deliveries at off peak times;
- Regular checking and maintenance of contractor vehicles; and
- Sound planning and design of vehicle parking areas used during the construction period.

2.11.2 Operations Traffic

Operational traffic has been assessed on the basis of 90% plant utilisation for a non-shutdown year, which is considered the worst case for traffic movements.

Currently, RE concentrate is transported in closed containers from the Mt Weld mine to the Perth metropolitan area for export using either rail (i.e., road transport to Leonora where containers are loaded onto rail for transport to Fremantle port) or by road for the full route when the rail system is not available.

The proposed transport options for REPF feed material (Mt Weld RE concentrate) and REPF product (RE carbonate) will utilise the routes that are either currently being used (rail) or have previously been used (transport solely by road) by Mt Weld Mining to transport concentrate (i.e., Mt Weld to Kalgoorlie and Kalgoorlie to Fremantle).

The proposed rail option will utilise the existing operational rail line between Leonora and Kalgoorlie, using the existing rail configuration and timetable. The frequency of rail movements will not change as a result of delivering RE concentrate to the REPF in Kalgoorlie or as a result of delivering RE carbonate to Fremantle.

The rail option from Kalgoorlie to Fremantle is the current preferred option for transport of RE carbonate to Fremantle, and is estimated to increase HV traffic by an average of approximately 31 return truck movements, using double road trains, per week between Lot 500 and the Kalgoorlie rail yard (approximately 5 km). Triple road trains are also being considered, which will decrease the number of truck movements. The route between the Kalgoorlie railyard and Lot 500 will utilise existing roads that are appropriate for industrial traffic. Baseline traffic data for this route is not available to estimate the proportional increase in HV traffic.

Both the road and rail options are being assessed for transport of RE concentrate from Mt Weld to Lot 500. The proposed road option will deliver RE concentrate directly to the REPF site by road from Mt Weld in triple road trains, via Laverton, Leonora and Menzies. Quadruple road trains are also being considered for this haulage route which will decrease the number of truck movements. It should be noted that truck movements between Mt Weld and Leonora will represent no increase in traffic volumes from the current transport arrangements for RE concentrate. Concentrate will approach Lot 500 via Goldfields Highway (Kalgoorlie Bypass) and then via Anzac Drive and Great Eastern Highway from the east (Figure 2-3) and represents an approximate average increase in HV traffic of 19% (an average of approximately 38 return truck movements per week). The rail option requires that the concentrate is collected from the Kalgoorlie rail yard by double road trains and transported approximately 5 km to Lot 500 (an average of approximately 58 truck movements per week).

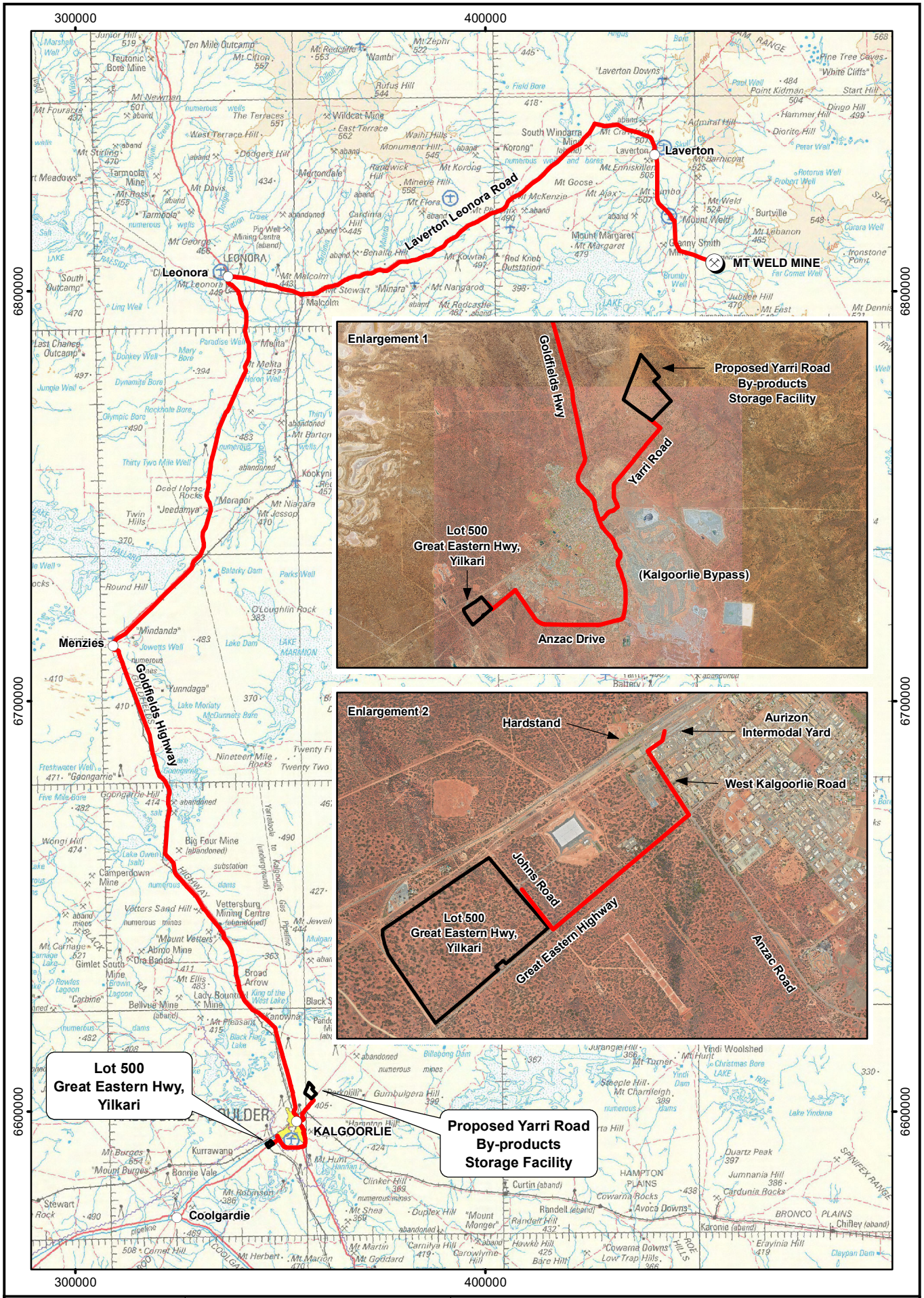
By-product can be managed under several scenarios (refer to Section 2.5.2) but the preferred option is to transport the by-product to the Yarri Road site. This would impose 43 truck movements per week on to the highway network, utilising Anzac Drive and the Eastern Bypass; this is an increase of approximately 3% and 1% respectively. These are established routes in the heavy vehicle network around Kalgoorlie and can efficiently accommodate such a modest increase.

Sulphuric acid is proposed to be transported to the REPF site via road from a local source in acid tankers and represents an approximate average increase in HV traffic of 12% (approximately 50 return truck movements, using double road tankers, over the 15 km route). Magnesium oxide (magnesia), sodium carbonate (soda ash) and ferric sulphate will be transported to Lot 500 from Perth by rail and are estimated to increase HV traffic by an average of approximately 34 return truck movements per week between Lot 500 and the Kalgoorlie rail yard. Calcium hydroxide (lime) will be transported to Lot 500 from Esperance by road and represents an approximate average increase in HV traffic of 25% (an average of approximately 28 truck movements per week). Other potential options for sourcing of lime includes supply from Perth and/or local producers in Kalgoorlie.

Overall, Lynas considers that both the temporary (construction phase) and operational transport movements as a result of the Proposal are unlikely to present a significant increase to existing baseline traffic movements in and around Kalgoorlie.

As stated previously, a key beneficial change to the transport and export of Lynas products to Malaysia from the REPF to the Port of Fremantle is that the RE carbonate produced by the REPF will contain lower levels of radioactivity that the RE concentrate currently exported from the Mt Weld Rare Earths Project. Radioactivity levels of RE concentrate remain below placarding trigger levels for transport.

Additionally, an Emergency Response Management Plan (ERMP) is being developed to identify and manage unplanned events such as traffic accidents associated with Lynas vehicle movements.



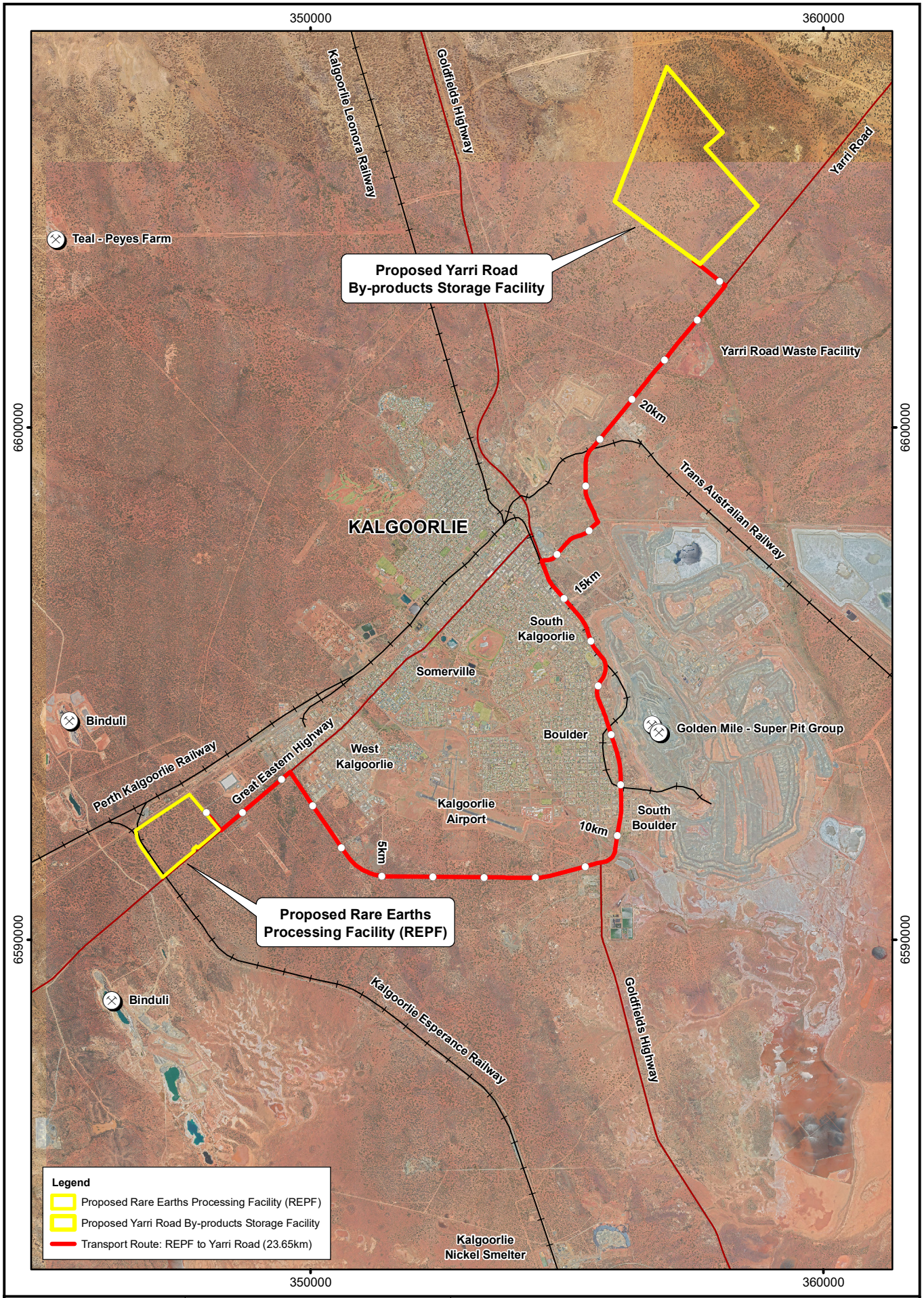
0 10 20 km

Scale: 1:1,250,000
MGA94 (Zone 51)

Lynas KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_04		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 2-3
Mt Weld to Lot 500
Road Transport Routes



Imagery: © Landgate (December 2018)

0 1 2 km
Scale: 1:100,000
MGA94 (Zone 51)

Lynas KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_05	Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021 | Rev: A | A4	Drawn: CAD Resources ~ www.cadresources.com.au	

Figure 2-4
Lot 500 to Yarri Road BSF
Road Transport Routes

3 STAKEHOLDER ENGAGEMENT

3.1 Overview

The Kalgoorlie community and the broader Goldfields region is underpinned by the resource sector. With this comes a degree of acknowledgement and acceptance of the sector and the benefits development can bring to the community in terms of prospective employment and economic lift.

As a new development on the periphery of Kalgoorlie, Lynas acknowledges the need to communicate and engage with the community about the impacts of the proposed REPF.

Lynas is committed to an open, transparent and comprehensive engagement program for the REPF at all stages of the project. A stakeholder engagement strategy was developed which identified key stakeholders that Lynas needed to engage with from Federal, State and Local Government, key agencies and regulatory authorities, and the community and interest groups.

3.2 Consultation Undertaken to Date

Lynas initially commenced stakeholder engagement on the REPF with the following Federal, Local and State Government agencies:

- Commonwealth Department of Agriculture, Water and the Environment;
- Commonwealth Department of Industry, Science, Energy and Resources;
- Department of Jobs, Tourism, Science and Innovation;
- Department of Mines, Industry Regulation and Safety;
- Western Australia Environmental Protection Authority;
- Department of Water, Environmental Regulation (EPA Services, Science and Planning (Air Quality Branch and Noise Branch) and Regulatory Services / Licensing Division);
- Department of Health;
- City of Kalgoorlie-Boulder;
- Shire of Laverton;
- Goldfields Esperance Development Commission (GEDC); and
- Commonwealth Department of Industry, Industry and Science.

On 3 September 2020, Lynas hosted a Joint Agency site visit of Lot 500 and Yarri Road and a subsequent briefing on the Proposal to key representatives from DWER, DMIRS, JTSI, CKB, GEDC. Lynas is appreciative of the positive feedback and advice received from these regulators which will be taken into account in any ongoing assessments and implementation of the Proposal.

Additionally, Lynas has undertaken several broader local community engagement activities since 2019 and these remain ongoing. These include:

- Direct engagement with neighbouring property owners to Lot 500.
- Direct engagement with indigenous stakeholders and representatives.
- Presented at the Kalgoorlie What's Down the Track Forum in November 2019 to over 300 attendees. The primary objective of the Kalgoorlie-Boulder Chamber of Commerce and Industry What's Down the Track Forum is to provide a 12-month forecast into the drivers that support the growth and opportunities that exist within our region's economy. Lynas also presented to the November 2020 forum.
- Co-hosted a Business After Hours with the Kalgoorlie-Boulder Chamber of Commerce and Industry, engaging with 180 local community members.
- Established a Lynas Western Australia Facebook page (standalone from corporate) as a mechanism to further engage the community in Laverton and Kalgoorlie-Boulder.
- Held a Community Information Session in June 2020 (see below for details).
- Hosted an information stall at the annual Lorna Mitchell Spring Festival (October 2020) in Kalgoorlie which was attended by over 7,000 people.
- Hosted a booth and presented at the annual Diggers and Dealers Forum in Kalgoorlie (October 2020).

In June 2020, Lynas hosted an online video information forum which allowed broad engagement with the community. Members of the community were invited to submit their questions via email in advance or during the session. The online presentation can be accessed online **here**, with questions and responses presented **here**.

Over a three-week period in September 2020, Lynas established the Lynas Kalgoorlie Information Pop-up shop within a public venue in Kalgoorlie for members of the community to attend and receive relevant information and have an opportunity to provide their direct feedback on the Proposal. Feedback to date has been positive with no objections or significant concerns raised by attendees on the Proposal or its predicted impacts. Lynas will report relevant outcomes of this stakeholder engagement to the EPA once this initiative is complete.

The Town Planning Scheme (TPS) Amendment 95, which includes additional planning provisions to the TPS for Lot 500, went through a mandatory public advertising process. There was minimal community response to the prospect of an industrial development on the site. Refer to Section 10.4.3 for further information on planning aspects.

In February 2021, Lynas distributed a project update via email to inform key stakeholders, including nearby residents and heritage groups, of the Proposal's status. Due to COVID-19 restrictions on regional travel, key Lynas representatives were not able to conduct in-person briefings of these residents. As a temporary alternative and to fulfil Lynas' commitment to open and transparent stakeholder engagement, Lynas circulated a project update which included notification of the proposed preliminary works.

3.3 Public Review Period

The Proposal will be subject to a 4-week public review period where Lynas' proposal will be accessible to the public for review and comment, with Lynas' response to public submissions being provided to the EPA for consideration as part of its assessment process.

To offer the local community further opportunity to enquire and comment on the proposal, Lynas will re-establish the 'Pop-up Shop" in Kalgoorlie town in order to facilitate community engagement throughout the public review period.

Table 3-1: Stakeholder Engagement

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Western Australia School of Mines	21/04/2021	Danielle Thompson - Industry Liaison Coordinator - Western Australia School of Mines WASM undergraduate and post graduate students	Introduction of our team, our links to WASM and how and why we joined Lynas A bit about i) Lynas, ii) Rare Earths and iii) the unlikely and difficult journey from a junior gold company to a successful Rare Earths company. Some insights into the complexity of mining, beneficiation and refining of Rare Earths. Some insights into building the Lynas Kalgoorlie Rare Earths Facility. Why did we decide to build a plant in Kalgoorlie and how does it relate to the legal/political/ethical landscape both here in Australia and overseas. The importance of community engagement in achieving social license to operate in Kalgoorlie. Where are we applying state-of-the-art techniques and processes to improve environmental management of the operation. The major social and community issues that your operation is faced with (particularly those associated with Indigenous communities) and what management strategies have been adopted. What other sustainability challenges is our operation facing?	Organise site tour for WASM students during construction
Kalgoorlie-Boulder CCI	21/04/2021	Simone De Been (CEO Kalgoorlie Boulder Chamber of Commerce and Industry KBCCI Members (around 170 registrants Kam Leung - VP Upstream Chris Torrisi - GM WA George Nicholls - Construction Manager Kallan McElroy - Process Engineer Larry Hodges - Deputy Construction Manager Ross Arnold - HSE Superintendent Kate Mills – Lynas Consultant	New Lynas Rare Earth Processing Facility business opportunities - construction and operations radiation safety demonstration.	
State Government	14/04/2021	Kyle McGinn MLC Mining & Pastoral (Labour Party) Kam Leung - VP Upstream Mhairi Dunbar - People & Culture Manager	Lot 350 Lynas Project Update. Very good feedback on Lynas presence at Spring Festival, community aware of Lynas project, waiting for the development Can Lynas give heads up on use of non-local contractors and the reason(s) so KMcG can Lynas advise when kiln is to be transported	Lynas to advise use of non-local contractors. Lynas to advise when kiln is transported

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Goldfields Aboriginal Business Chamber	14/04/2021	Chairman - Rowena Leslie Kam Leung - VP Upstream Mhairi Dunbar - People & Culture Manager	Rowena provided briefing on GABC Corporate Partnership - will include assistance on RAP, cultural awareness for workforce, etc Lynas provided project update, commitment to engage with Aboriginal Business Questions for Lynas - how to register, previous problems with engaging with companies, initial contact and then hear nothing until after contract is let. (Patricia Lewis - Bundarra) Suggestions - Lynas visit to GABC businesses and GABC visit Lynas	Maintain contact, investigate business opportunities starting with Mt Weld
Resident	26/02/2021	Jacob Altes, neighbour John Ganser, Lynas George Nicholls, Lynas	Discussed timing of preliminary works that Lynas is preparing to carry out on the REPF site, including selective logging, earthworks and concrete. Jacob raised no issues related to these works.	Continue contact on a regular basis.
Industry	26/02/2021	Mike Tamlin, Neometals COO Matt Read, Neometals GM Lithium Projects John Ganser, Lynas George Nicholls, Lynas	Discussed potential mutual opportunities, particularly with regard to establishment of a chlor-alkali plant, should Neometals reinitiate a project in Kalgoorlie.	Continue contact for updates.
Native Title Services Goldfields	10/02/2021	Anthony Sherlock – Kalgoorlie Chief Operations Officer Andrew Burke – Future Acts and Heritage Co-ordinator	Project update emailed for information and feedback requested.	Address any feedback received.
Indigenous Stakeholder	10/02/2021	Simon Blackshield – Lawyer for Marlinyu-Ghoorlie NT Group	Project update emailed for information and feedback requested.	Address any feedback received.
Indigenous Stakeholder	10/02/2021	Marj Strickland – Maduwongga Applicant	Project update emailed for information and feedback requested.	Address any feedback received.
Local Busines	10/02/2021	Patricia Lewis – Bundarra Contracting	Project update emailed for information and feedback requested.	Address any feedback received.
Local Government Representatives	10/02/2021	Shire of Laverton: Pat Hill – Shire President Peter Naylor CEO	Project update emailed for information and feedback requested.	Address any feedback received.
WA School of Mines	9/02/2021	WA School of Mines: Sabina Shugg – Director	Project update emailed for information and feedback requested.	Address any feedback received.
Aboriginal Chamber of Commerce	9/02/2021	Aboriginal Chamber of Commerce	Project update emailed for information and feedback requested.	Lynas invited to speak at a monthly forum.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
State Government Officers	9/02/2021	Regional Development Australia, Goldfields Esperance: Jo Swan – Director Lee Jacobsen – Chair Travis Tucker – Committee Member	Project update emailed for information and feedback requested.	Address any feedback received.
State Government Officers	9/02/2021	Goldfield Esperance Development Commission: Kris Starcevich – CEO	Project update emailed for information and feedback requested.	Address any feedback received.
Chamber of Minerals and Energy	9/02/2021	CME WA: Paul Everingham – CEO Ryan O'Hanlon – Manager Goldfields	Project update emailed for information and feedback requested.	Address any feedback received.
Kalgoorlie Boulder Chamber of Commerce and Industry	9/02/2021	Simone De Been – Kalgoorlie-Boulder CCI	Project update emailed for information and feedback requested.	Address any feedback received.
Federal Government Representative	9/02/2021	Rick Wilson MHR – Federal Member for O'Connor	Project update emailed for information and feedback requested.	Address any feedback received.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
State Government Representatives	9/02/2021	Robin Chapple – State Member for Mining and Pastoral Region Robin Scott – State Member for Mining and Pastoral Region Kyle McGinn – State Member for Mining and Pastoral Region Ken Baston – State Member for Mining and Pastoral Region Jacqui Boydell – State Member for Mining and Pastoral Region Hon. Stephen Dawson MLC – State Member for Mining and Pastoral Region Kryan O'Donnell – State Member for Kalgoorlie	Project update emailed for information and feedback requested.	Address any feedback received.
State Government Officers	9/02/2021	DMIRS: David Alexander – Senior Policy Advisor Neil Roberts – Chief of Staff	Project update emailed for information and feedback requested.	Address any feedback received.
State Government Officers	9/02/2021	JTSI: Gerad Treacy – GM Strategic Projects Anthea Petersen	Project update emailed for information and feedback requested.	Address any feedback received.
Local Government Officers	9/02/2021	John Bowler – Major CKB John Walker – CEO of CKB Alex Wiese – Executive Manager of Economy and Growth CKB	Project update emailed for information and feedback requested.	Address any feedback received.
Resident	9/02/2021	Jacob Altes – Neighbour	Project update emailed for information and feedback requested.	Address any feedback received.
Resident	9/02/2021	Kevin Mclerie – Neighbour	Project update emailed for information and feedback requested.	Address any feedback received.
Resident	9/02/2021	Shirley and Greg Elston – Neighbours	Project update emailed for information and feedback requested.	Address any feedback received.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Indigenous Stakeholder	13/01/2021	Marlinyu-Ghoorlie NT Group	Lynas has attempted to organise contact between Lynas and the Marlinyu-Ghoorlie Group from November 20 through January 21. 4/11/20: Voice message with Simon Blackshield. Reply received same day confirming Simon as the best contact and passing on email address. Email sent on the same day providing information on the project and requesting how they would like to proceed. 11/11/20: Follow up email to Simon Blackshield 30/11/20: Follow up phone messages sent to Simon Blackshield 27/12/20: Reply from Simon Blackshield asking for additional information to take to Future Act team meeting. 13/1/21: Additional information provided about the project by Lynas.	Continue trying to make contact.
Indigenous Stakeholder	22/12/2020	Marj Strickland – Maduwongga Applicant	Concerned about the radiation risks. Queried the process for grant of the sub-lease by CKB to Lynas for Lot 500. Questioned the determination that native title was extinguished on this land. Marj believed that CKB and Lynas are trying to bypass them and have not consulted the Traditional Owners. Lynas has consulted widely with the community and have not singled out any particular group.	Lynas advised the representative that all radiation assessments conducted to date demonstrated that radiation impacts were within acceptable limits. Lynas advised that CKB has acquired the lease through Landcorp and have followed due process. Lynas advised that native title had been extinguished following due process. Remain in contact. Organise higher level contact from Lynas.
State Government Officers	10/12/2020	Andrew Ducas – Manager Customers & Stakeholders – Goldfields & Esperance for Water Corporation	EPA comment regarding concern dust deposition on Water Corp dam roof. Andrew will organise contacts in Kalgoorlie regional office and Perth water quality branch.	Organise to meet with WC regional office and water quality branch.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Indigenous Stakeholder	1/12/2020	Marj Strickland, Graham Nudding – Maduwongga Applicants	Initial contact with Maduwongga group. Main concerns raised with Yarri Road: • Radiation, need to know it is safe • Need to look after the land, preserve as much land as possible • Recognition of traditional owners • Focussed on native title • Economic opportunities, funding to support their native title claim, business opportunities • Cultural awareness for Lynas employees Native title claims is in dispute with 2 other groups. Going to trial next week with overlapping claim by Wongatha group. Overlapping claim with Marlinyu Ghoorlie group in Kalgoorlie region.	Maintain contact. Future heritage survey participation. NT process for Yarri Road lease.
Indigenous Stakeholder	30/11/2020	Maduwongga NT Group	Koa Jaensch (archaeological consultant working for Lynas) was requested to organise contact between the Maduwongga NT claimants and Lynas: 3/11/20: Koa made contact with the Corser and Corser office who gave Koa the contact details for Pet Berryman. 4/11/20: Koa made contact via email on the 4 November, providing information on the project and requesting how they would like to proceed. 6/11/20: Pet Berryman emailed requesting further information about project. 13/11/20: Additional information received from Lynas and sent to Pet Berryman. 25/11/20: Having had no response Koa followed up with Pet Berryman on information sent through on the 13 November. Reply received on the same day confirming that the information had been passed onto the clients for their attention. 27/11/20: Koa received email from Marjorie Strickland, Maduwongga applicant, with contact details for a meeting. 30/11/20: Koa passed contact information onto John Ganser at Lynas, with suggestion to meet with the Maduwongga group. Koa and John had a phone conversation and John then organised to meet Marjorie Strickland in Kalgoorlie on the 1st of December.	

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Native Title Services Goldfields	19/11/2020	Anthony Sherlock – NTSG Lynas – Kam Leung	Establishment of new Native Title Services provider. Working towards providing some clarity for dealing with Native title claimant groups	Suggested Lynas make contact with Perth staff
Aboriginal business community	19/11/2020	Rowena Leslie – Goldfields Aboriginal Chamber of Commerce Lynas – Kam Leung	Opportunities for Aboriginal businesses	Opportunities for local aboriginal businesses included in Lynas Policy Will maintain contact
Resident	17/11/2020	Jacob Altes, nearest residential receptor	Jacob has rejected an offer of $2 million for his property as there are no similar lifestyle options available to him in Kalgoorlie. He is happy to stay on Hall Road. Jacob has started collecting timber from the site.	Continue contact with Jacob, regular updates on Project status.
State Government Representatives	17/11/2020	Trevor Donaldson, Daniel Chambers	Opportunity for Forest Products Commission to "harvest" timber from the site before we clear the site for earthworks.	Develop plan for harvesting timber.
DWER & DMIRS	16/11/2020	Caron Goodbourn, Manager Process Industries Tania Liaghati, Team Leader James Best, Senior Environmental Officer	Officers briefed on proposed s41a application. DMIRS advised that Mining Proposal required and would need to detail clearing schedule and rehabilitation measures. DWER advised that a Works Approval if required, would offer the proponent a defence in the event of unexpected environmental impacts occurring. Neither agency is able to issue approvals prior to an EPA determination on the consent.	Lynas to include required information on staging in the submissions.
Lorna Mitchell Spring Festival	11/10/2020	Kalgoorlie community members Lynas – Kam Leung, Brendan Poepjes	Hosted a stall at annual community spring festival – over 7,000 attendees. Update and information on project. adiation safety demonstrations. Local employment and business opportunities.	Conducted radiation safety demonstrations.
Kalgoorlie Community	31/8/2020 – 20/9/2020	Various	Issues raised primarily related to interest in the project, development schedule and job opportunities.	Maintain up to date project information on website.
Local industry	9/09/2020	Adrian Lally, Environmental Supt, Norton Gold	Further discussions with Norton Gold and City of Kalgoorlie Boulder on developments in West Kalgoorlie	Joint meeting with CKB, Lynas and Norton.
Various	3/9/2020	Various representatives from DWER, DMIRS, JTSI, CKB, GEDC	Lynas provided a site tour of Lot 500 and Yarri Road, as well as an overall project briefing addressing the project description, approvals process and environmental management.	Lynas to refer project under Section 38 to EPA following a pre-referral meeting with the Chairman and DWER (completed 9/9/2020).

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Local Government – CKB	2/9/2020	Alex Wiese – CKB Simon Tomizzi – Arup Other CKB and Arup representatives	Input on Lynas infrastructure requirements into the Kalgoorlie Industrial Land Study.	Information supplied. Lynas will continue assisting CKB and Arup with the study input and review of outcomes.
DWER	9/07/2020	EPA Services – Helen Butterworth, Stuart Simmonds; DWER Noise Branch – Jingnan Guo; DWER Licensing – Daniel Hartnup;	Pre-referral noise assessment briefing addressing: • Proposal summary and background; • Noise assessment methodology, results and conclusions. DWER feedback included: • Assessment appears acceptable; • confirm identified sensitive receptors as some appear to be industrial premises; • verify noise specifications for certain equipment proposed as some appear lower than is likely to be achieved.	Lynas confirmed that minimum noise specifications will be prescribed in tender/contract specifications. Initial responses confirm that these specifications will be met. Use of shielding/sound barriers will also be adopted as required to meet assigned noise levels at sensitive receptors. Talis confirmed status of sensitive receptors which were also ground truthed in collaboration with the City of Kalgoorlie-Boulder.
DWER	7/07/2020	Services – Helen Butterworth, Stuart Simmonds, Leanna Zheng; DWER Air Quality Branch – Anthony Stuart, Sean Lam; DWER Licensing – Daniel Hartnup;	Pre-referral air quality assessment briefing addressing: • Proposal summary and background; • Air quality assessment methodology, results and conclusions. DWER feedback included: • Assessment appears acceptable; • Include information that identifies and assesses upset / shut-down conditions.	Air quality assessment has been revised to assess upset conditions and confirms that assessment criteria will continue to be met with these events.
Resident	10/7/2020	Nearest resident	Reviewed proposed site layout including green barrier around the site, gypsum ponds and bund directly south of the residence. The bund will be revegetated. Dust from road, metal recycling 2 doors down – would like sealing. Firewood from land clearing – Lynas suggested a special gate. Rebuilding residence, B&B? Has tenant on site – not supportive of project. Noise from plant – is there going to be PA, alarms (emergency sirens are okay)? – no PA or alarms. Will there be dusty uncleared areas like Water Corp?	Keep updated.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Local industry	2/07/2020	Adrian Lally, Environmental Supt, Norton Gold	Norton Gold have a $550m heap leach project directly west of Lot 500. Using same noise modelling consultant as Lynas Will impact some of the same receptors as Lynas Is there interest in some collaboration (engaging with receptors, common services).	Joint meeting with CKB, Lynas and Norton.
State Government Representatives	2/07/2020	Hon Kyran O'Donnell MLA, Shadow Minister for Seniors and Aging, Volunteering (Liberal)	Proposal Update Radiation safety briefing and demonstration very supportive of project, how can he assist?	Provide dates for a Mt Weld visit.
State Government Representatives	2/07/2020	Hon Kyle McGinn MLC, Member for Mining & Pastoral Region	Proposal update Yarri Road site Radiation safety briefing and demonstration Support for local employment and business. Kyle has discussed project with Minister Johnson. He was disappointed about COVID and cancelled trip to Kuantan, He still wants to visit Mt Weld. He suggested that Lynas participates in Spring Festival, Mining Expo and Diggers.	Kyle will advise when he is in Laverton and can visit Mt Weld.
Resident	2/07/2020	Kevin McLerie, neighbour to Lot 500 (187 Halls Road) John Walker, CEO CKB	Proposal overview. Radiation safety briefing and demonstration. Kevin lives on site with wife and has downsized his business. Understands and supports resources industry. Would like to see Halls Rd sealed.	Keep updated.
Local business	2/07/2020	Rino Borremi, Access Hire Luke Bowler, Access Hire John Bowler, Mayor of Kalgoorlie Boulder	Proposal Update. Opportunities for Local content and local business.	Evening session (2 Jul) with CKB Councillors
Local Industry	2/07/2020	Alex Wiese, CKB Adrian Lally, Norton Gold	CKB plan for “Industrial precinct” in West Kalgoorlie including Lynas and Norton Gold projects. CKB plan to align zoning and land use for outer West Kalgoorlie. Agreement to work together, CKB to take a lead role, Lynas and Norton to support.	CKB to gather information on the stakeholders in the area, Lynas and Norton to have regular meetings.
Local business	2/07/2020	Cathie, Jill, Julian, Mairia, Office National	ON had missed on-line community forum. Provided Proposal Briefing including Radiation Safety demo. Discussed Lynas buy local strategy, require local business to be competitive.	
Local Government	2/07/2020	John Bowler, Major John Walker, CEO CKB Councillors	Proposal Briefing. Reason for choosing Kalgoorlie. Radiation safety briefing and demonstration. By-product strategy including re-use, Yarri Road site, Mt Weld and West Kalgoorlie. Residential operation and buy local policy.	

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Kalgoorlie On-line Community Forum	16/06/2020	Lynas – Kam Leung, Kallan McElroy	Lynas presentation included: • Why REs are important • Our operations in the Goldfields • Our Plans for Kalgoorlie • Lynas is safe including a radiation safety demonstration • Community and business involvement • Followed by an on-line Q&A session.	The presentation and Q&A are posted on the Lynas website. https://www.lynascorp.com/projects/
DWER/DAWE	02/06/2020	DAWE – Angela Gilman, David Loch DWER/EPA/s – Robert Hughes JTSI – Adam Lynas –Kam Leung, John Ganser KASA – Peter Jansen	Lynas presented proposed preliminary works and sought DAWE/EPA advice on process to initiate this application while the main approvals process was ongoing. EPA's advice was for Lynas to pursue EPBC referral and delegate decision first, prior to referring the Proposal under Section 38 of EP Act. DAWE advised (and confirmed in follow up email) that: It would be reasonable for Lynas' referral under the EPBC Act to specifically exclude the preliminary works, so long as it appropriately justifies that those preliminary works do not need to be referred. There is a risk that our delegate will decide that the entire Proposal needs to be referred if the information provided in the referral does not present a convincing case that the preliminary works do not need to be referred. This is likely to cause a delay in the process while further referral information is provided. If the preliminary works are undertaken and it turns out that they *do* have a significant impact on a matter of national environmental significance, then an offence will have been committed under the EPBC Act. It would be helpful if Lynas can acknowledge this risk in the referral, so that the delegate could be clear that Lynas understands the potential consequences of the Department accepting a referral that does not include the preliminary works.	DAWE and EPA advice was noted. Lynas to submit EPBC referral in late June 2020) and s38 referral in July.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Commonwealth Government Officers	21/05/2020	DISER – Jessica Robinson DAWE – Angela Gilman, David Loch DWER/EPA/s – Robert Hughes Lynas – Amanda Lacaze, Kam Leung, John Ganser, Kallan McElroy, Fatahiah Mohd Saad KASA – Peter Jansen	Briefing to key Federal and State Environmental Regulators on the Proposal including an overview of radiation impacts and management. Lynas tabled proposed schedule which is reliant on commencing preliminary works while approvals are ongoing. WA EPA can accommodate this via S41A application.	A follow up, more focused discussion on the process for the preliminary works approval was proposed with DAWE and EPA/s.
Nearest residential receptor	21/11/2019, 08/04/2020, 16/4/2020	Jacob Altes, nearest residential receptor	Sent draft site layout and noted perimeter green zone (Jacob suggestion)- replacement of process water ponds with process water tanks to stop evaporation losses (Jacob suggestion) entrance off Johns Road – will look at direction of lighting during detailed design and installation – offered call to walk through design.	Send draft plans to Jacob and followed up with an email and phone call.
Commonwealth Government Officers	12/03/2020	Jeffrey Paul, Carri Elliot (DAWE)	Present C&L Proposal; Seek clarification on whether the Proposal requires referral under EPBC Act.	Commence preparation of EPBC referral.
State Government Officers	28/02/2020	Dept of Health – Duncan Surin EPA Service – Leanne Zheng JTSI – Gerard Treacy, Anthea Petersen DMIRS – Tania Liaghati, Martin Ralph, Paul Foley	Presentation by Lynas on LAMP radiation monitoring program and update on radiation management for Kalgoorlie REPF. DMIRS introduced new factors for calculation of radon exposure.	Evaluate impact of new factors for Mt Weld and C&L.
Kalgoorlie Boulder Chamber of Commerce and Industry	19/02/2020	KBCCI Members (180 registered, approximately 130 attended) Lynas team – Kam Leung, Grant Mcauliffe, Tony Malloch, Alex Logan, John Ganser, Jeff Wishart	Lynas co-hosted KBCCI Business After Hours members networking events.	Short Talk – Long history in Goldfields (discovery 1966, mining 2007, processing 2011, Cracking & Leaching 2022). REs are part of our lives and future (digital technology, cleaner vehicles, renewable energy). Lynas Kuantan largest RE plant and what we are relocating (C&L) to Kalgoorlie. Meet our team tonight, register your interest. Lynas is Safe – Radiation demonstration by Alex Logan

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
State Government Representatives	05/02/2020	Member for Mining & Pastoral Region (Greens)	Provided briefing on Lynas and REPF Proposal in Kalgoorlie. Had a long history with the Proposal back to Ashton days, was involved in protests at Kuantan in early days. Had an understanding about the low level of radiation due to relationship. Was a former member of the Radiation Health Committee (ARPANSA) representing the interests of the general public. Spoke of potential pathway if ingested.	Continue briefings, invitation to visit Lynas sites.
State Government Officers	19/12/2019	Dept of Health – Duncan Surin EPA Service Unit – Robert Hughes JTSI – Gerard Treacy, Anthea Petersen DMIRS – Tania Liaghati, Martin Ralph, Paul Foley	Radiation Aspects of Lynas REPF Proposal in Kalgoorlie. Presentation on Kuantan radiation Management.	Presentation by Lynas Kuantan Radiation Executive.
State Government Representatives	13/12/2019	Hon Ken Baston MLC, Member for Mining & Pastoral (Liberal) Hon Robin Scott MLC, Member for Mining & Pastoral (Pauline Hanson's One Nation) David Modolo, Electorate Officer for Hon Robin Scott	Presentation on Lynas REPF Proposal in Kalgoorlie. Overview of Mt Weld operations. Both very supportive of Kalgoorlie Proposal. Raised concerns re radiation. Satisfied low risk after presentation and demonstration using Mt Weld concentrate.	Follow up communication.
State Government Representatives	12/12/2019	Hon Kyle McGinn MLC, Member for Mining & Pastoral Region	Briefing on Lynas RE Processing in Kalgoorlie Proposal. Very supportive of the Proposal in Kalgoorlie, if residential. Concern about radiation and safety, and feed from non-Goldfields region if waste were to remain.	Follow up with invitation to Mt Weld, more information on radiation.
State Government Representatives	12/12/2019	Hon Kyran O'Donnell MLA, Shadow Minister for Seniors and Aging, Volunteering (Liberal) Krystie Tham, Research Officer	Briefing on Lynas RE Processing in Kalgoorlie Proposal. Very enthusiastic about proposal in Kalgoorlie. Some concerns about radiation.	Invitation to Mt Weld.
Local Education Stakeholders	12/12/2019	Chelsie Grace, Director Central Regional TAFE	Overview of Central Regional TAFE and Tour of Facilities including Workshops.	Investigate opportunities for collaboration.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
Local Education Stakeholders	12/12/2019	Sabina Shugg, Director Kalgoorlie Campus WASM Bryan Maybee, Discipline Lead, Minerals and Energy Economics, WASM Laurence Dyer, Discipline Lead, Metallurgical Engineering, WASM	Overview of WASM and tour of teaching facilities.	Investigate opportunities for collaboration.
Kalgoorlie Boulder Chamber of Commerce and Industry	21/11/2019	KBCCI hosted event, supported by local and state government agencies.	KBCCI annual What's Down the Track Forum attended by government agencies, local business, local community and stakeholders with Goldfield interests	Update on Lynas REPF progress.
State Government Representatives	11/12/2019	Hon Stephen Dawson MLC, Minister for Environment; Disability Services, Electoral Affairs; Member for Mining and Pastoral Region (Labour) Darren Foster – Principal Policy Adviser Robert Hughes – EPA Services	Briefing on Lynas RE Processing in Kalgoorlie Proposal.	Further dialogue.
State Government Representatives	11/12/2019	Hon Jacqui Boydell MLC, Member for Mining and Pastoral Region (The Nationals) Josh Nyman, Office of Mia Davies, Leader of the Nationals	Briefing on Lynas REPF in Kalgoorlie Proposal. Very supportive of Proposal, concern about potential issues with radiation.	Josh Nyman provided copies of presentations.

Stakeholder Group	Date	Stakeholder Contact	Issues Raised	Lynas Response
State Government Officers	31/10/2019	JTSI – Chris Cottam, Gerard Treacy, Anthea Petersen Dept of Health – Duncan Surin DMIRS – Rick Rogerson, Tony Bullen, Isabell McCagh (Tenure), Warren Ormsby (land Use Planning), Dan Endacott, Karen Caple (Environmental Compliance) Christina Folley, Paul Foley (Mines Safety) DWER – Rebecca Kelly (Regulatory Services), Robert Hughes (Assessments)	Interagency meeting hosted by JTSI. Briefing on Lynas Processing Proposal in WA.	Further dialogue.
State Government Officers	3/10/2019	Tom Hatton – Chairman EPA Robert Hughes – Manager EPA	Update on Lynas C&L in WA Proposal.	Further dialogue.
Local Government Officers	08/07/2019	Alex Wiese – Executive Manager of Economy and Growth KBCC Stuart Devenish – General Manager Infrastructure and Environment KBCC John Walker – CEO KBCC	Followed on from previous meeting with Council to aid support operational setup in Kalgoorlie. Review of Potential Sites for C&L Plant. Water Supply – reviewed volumes of available water and water makeup. Power Supply.	Further dialogue.
Local Government Officers	14/06/2019	Alex Wiese – Executive Manager of Economy and Growth CKB Stuart Devenish – General Manager Infrastructure and Environment CKB John Walker – CEO CKB	Council willingness to aid support operational setup in Kalgoorlie. Review of Potential Sites for C&L Plant inclusive of drive out to sites to review sites. Water Supply. Power Supply.	Further dialogue.

4 ENVIRONMENTAL PRINCIPLES AND FACTORS

4.1 Environmental Principles

Table 4-1 summarises how the project conforms to the key environmental principles advocated by the EPA.

Table 4-1: Environmental Principles

Principle	Response
Precautionary principle: Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decision should be guided by: a) Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and b) An assessment of the risk-weighted consequences of various options.	From the technical work undertaken to assess the impacts of the REPF in Kalgoorlie, Lynas has concluded that serious or irreversible damage to the environment will not result and that environmental risks are ALARP.
Inter-generational equity: The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	From the technical work undertaken to assess the impacts of the REPF in Kalgoorlie, Lynas has concluded that the environmental values will be protected and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations. Moreover, the use of RE has a significant global environmental benefit by reducing reliance on carbon-based products and energy sources.
Conservation of biological diversity and ecological integrity: Conservation of biological diversity and ecological integrity should be a fundamental consideration.	From the ecological work undertaken to assess the impacts of the REPF in Kalgoorlie, Lynas has concluded that the Proposal would not compromise the biological diversity and ecological integrity of the affected areas.
Principles relating to the improved valuation, pricing and incentive mechanisms: a) Environmental factors should be included in the valuation of assets and services. b) The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. c) The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. d) Environmental goals, having been established, should be pursued in the most cost – effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.	REs are an essential component of contemporary societal operations. Many countries include REs on their critical mineral lists. REs are used in a variety of applications including wind turbines, ICE vehicles and electric vehicles, oil refineries, military technologies, and electronic devices. REs are included in the Australian Government's "Australia's Critical Mineral Strategy 2019". REs are included in United States "Federal Strategy to Ensure Secure and Reliable Supplies of Critical Minerals". The extraction and processing of REs, including the management of any resulting environmental impacts, incorporates the full lifecycle costs in product pricing.
Waste minimisation: All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	The REPF by its very nature produces industrial waste. Some of this waste will be stored and treated on-site. Any radiation from this waste will only be permitted at safe levels, managed and monitored through an approved RMP. Significant research has been conducted in order to identify the risks and opportunities for IP and gypsum re-use (Section 2.6.5)

4.2 Identification of Key Environmental Factors

Table 4-2 summarises the key environmental objectives and factors relevant to this Proposal.

Table 4-2: Environmental Factors

Factor	Objective	Relevance to Proposal	Significant Factor
Sea			
Benthic Communities and Habitat	To protect benthic communities and habitat so that biological diversity and ecological integrity are maintained.	No impacts to benthic habitats.	No
Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	No impacts to coastal processes.	No
Marine environmental quality	To maintain the quality of water, sediment and biota so that environmental values are protected.	No impacts to marine environmental quality.	No
Marine fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	No impacts to marine fauna.	No
Land			
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Plant construction will require disturbance of approximately 120 ha at the REPF and 97.3 ha at the BSF.	No Threatened Flora (T) gazetted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act) were recorded at the REPF or BSF sites. **Lot 500 – No** Lot 500 flora and vegetation studies have been completed but these conclude that clearing will not produce a significant impact. **Yarri Road – Yes** A two-season detailed flora and vegetation survey has been completed. The second season survey was completed under poor seasonal conditions. A targeted survey under fair seasonal conditions was conducted in March 2021. Final report provided as Appendix D. One species listed as Priority flora – Eremophila praecox (Priority 2) – was recorded within the study area. No other significant constraints identified to date.

Factor	Objective	Relevance to Proposal	Significant Factor
Landforms	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.	The impact on the landform of the Proposal site and its surrounds is not significant.	No
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	The Proposal will not impact subterranean fauna. Water table is deep at about 28 mbgl at both Lot 500 and at Yarri Road. No groundwater abstraction is proposed for production water. All ponds and dams will be engineered to prevent seepage and will be monitored.	No
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Both sites are vegetated, largely rural in nature. Acid sulphate soils are not present. Erosion and containment of sediment during construction will need to be managed.	**No.** Both sites will be designed to meet 'zero discharge' of contaminated runoff. Drainage design to be assessed as part of works approval.
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Construction will impact natural habitat.	**Lot 500 – No** Lot 500 fauna study has been undertaken which shows that impacts will be insignificant at the bio-regional level. **Yarri Road – No** Yarri Road fauna study has been undertaken which shows that impacts will be insignificant at the bio-regional level.
Water			
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	Inland waters occur near Proposal sites, including deep groundwater resources and drainage into ephemeral surface water features.	**Lot 500 – Yes.** Site is designed to meet 'zero discharge' of contaminated runoff. Drainage design detail will be assessed as part of Works Approval application. Dangerous goods will be bunded and stored to meet AS1940 or applicable standards. All Lot 500 by-products storage will be lined to meet 10^{-9} m/s permeability. **Yarri Road – Yes** Site is designed to meet 'zero discharge' of contaminated runoff. Drainage design detail will be assessed as part of Works Approval application..

Factor	Objective	Relevance to Proposal	Significant Factor
Air			
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	The Proposal will create new air emissions.	**Lot 500 – Yes** Dispersion modelling completed concluding that air quality will comply with ambient air quality criteria and can be managed via proposed pollution controls. Annualised greenhouse emissions are approximately 60% of EPA GHG Guidance triggers **Yarri Road – No** Given the isolated location, and proposed monitoring and controls, impacts from fugitive dust will be demonstrated to be insignificant.
People			
Social Surroundings	To protect social surroundings from significant harm.	Lot 500 is within a low-density rural area, but with two sensitive receptors nearby. Potential noise and visual amenity issues may be created. Also, traffic impacts during construction. Yarri Road is within a low-density rural area with the neared residential sensitive receptors 4 km away.	**Lot 500 and Yarri Road – No** Visual impact, construction impact and social impacts will be negligible. Traffic impacts during construction and operation will present a negligible change to current baseline traffic volumes. **Lot 500 – Yes** A number of sensitive receptors lie in proximity to the REPF. Lot 500 Noise assessment has been completed demonstrating compliance with Noise Regulations. **Yarri Road – No** Heritage Native Title objections are currently being assessed through the tenure process. Once the outcomes of the consultation process have been determined, archaeological and ethnographic surveys will be conducted, ensuring that all requirements for tenure are addressed. Currently, relevant Aboriginal Heritage registers indicate no recorded sites exist at the BSF site
Human Health	To protect human health from significant harm	No adverse human health impacts expected but radiation impacts need to be assessed.	**Both Lot 500 and Yarri Road – Yes** RIA for the Proposal has been completed demonstrating that all human and environmental exposure criteria will be met.

Factor	Objective	Relevance to Proposal	Significant Factor
			RMP, including a radioactive waste management strategy has been developed in consultation with Radiological Council and DMIRS. DMIRS approval was granted pursuant to regulation 16.7(7)(a) of the Mines Safety and Inspection Regulations 1995 (8 April 2021) Appendix U).

5 ENVIRONMENTAL FACTOR – FLORA AND VEGETATION

5.1 EPA Objective

To protect flora and vegetation so that biological diversity and ecological integrity are maintained.

In the context of this objective: ecological integrity is the composition, structure, function and processes of ecosystems, and the natural range of variation of these elements.

5.2 Policy and Guidance

- *Environmental Protection Act 1986* (EP Act).
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (Clearing Regulations).
- *Biodiversity Conservation Act 2016* (BC Act).
- Environmental Protection Authority 2016, Environmental Factor Guideline: Flora and Vegetation, EPA, Western Australia. (EPA 2016b).
- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).
- Technical Guidance Flora and Vegetation Surveys for Environmental Impact Assessment (EPA 2016a).
- Protection of Naturally Vegetated Areas Through Planning and Development, Environmental Protection Bulletin No. 20 (EPA 2013).

5.3 Receiving Environment

5.3.1 Lot 500

Desktop assessments of the Lot 500 Proposal area, Targeted Surveys and a Detailed Survey, as defined in Sections 4.2 and 4.3 of the Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016), have been undertaken to gain an understanding of the flora and vegetation composition of Lot 500.

In addition to the survey completed specifically to support this Proposal, the flora and vegetation composition for the Proposal area and surrounds are well understood as a result of surveys that have been conducted for a previous proposal for Lot 500. Flora and vegetation studies relevant to Lot 500 are provided in Table 5-1.

Table 5-1: Flora and Vegetation Studies of Lot 500

Flora Study	Details
Native Vegetation Solutions, (2018). Reconnaissance Flora and Vegetation Survey of Lot 500 Great Eastern Highway Kalgoorlie	Commissioned by the CKB for the Neometals Lithium Hydroxide Plant.
Onshore Environmental (April 2020) Detailed Flora and Vegetation Survey, Lot 500, Great Eastern Highway, Yilkari	Commissioned by Lynas for the Lynas REPF. Refer to Appendix C.

5.3.1.1 Broad Vegetation Groups on Lot 500

The vegetation type within Lot 500 can be generally defined as an 'open eucalypt woodland with a mixed understory of scattered shrubs and chenopods' (Native Vegetation Solutions, 2018). More specifically, Native Vegetation Solutions (2018), grouped vegetation on Lot 500 into six distinct vegetation groups, a summary of these can be seen in Table 5-2 and Figure 5-1.

Table 5-2: Flora and Vegetation Groups on Lot 500

Vegetation Group	Hectares (ha)	Percentage of Survey Area (%)
Eucalyptus griffithsii over sclerophyll shrubland	5.66	3.86%
Eucalyptus oleosa and *Eucalyptus lesouefii* over *Maireana sedifolia* and mixed shrubland	43.15	29.43%
Eucalyptus salmonophloia and *Eucalyptus transcontinentalis* open woodland	84.79	57.83%
Eucalyptus yilgarnensis over sclerophyll shrubland	6.21	4.24%
Sclerophyll shrubland	2.11	1.44%
Acacia acuminate thicket	4.70	3.20%

The most recent flora and vegetation survey (Onshore Environmental, April 2020) was completed in November 2019. The key outcomes of this survey are summarised below.

5.3.1.2 Taxa

A total number of 118 plant taxa from 27 families and 58 genera was recorded from the study area. Species representation was greatest among the Chenopodiaceae, Poaceae, Scrophulariaceae, Fabaceae, Myrtaceae and Asteraceae families. The most speciose genus was *Eremophila* (13 taxa), followed by *Eucalyptus* (10 taxa), *Maireana* (10 taxa), *Acacia* (7 taxa), *Atriplex* (4 taxa) and *Sclerolaena* (4 taxa).

None of the plant taxa recorded from the Lot 500 study area were gazetted as Threatened Flora pursuant to the BC Act or listed under the EPBC Act.

5.3.1.3 Introduced Species

Ten introduced species were recorded by Onshore Environmental Consultants (Onshore Environmental) in November 2019. An additional two weed species were recorded during the previous reconnaissance flora and vegetation survey of Lot 500 in June 2018 (Native Vegetation Solutions, 2018). None of the 12 introduced species recorded from the study area are listed as Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act 2007).

5.3.1.4 Vegetation Associations

A total of ten vegetation associations classified as seven broad floristic formations and occurring on five broad landforms were described and mapped from the study area.

None of the vegetation associations were aligned with any federal or state listed Threatened Ecological Communities (TECs) or state listed Priority Ecological Communities (PECs) documented from the Coolgardie bioregion.

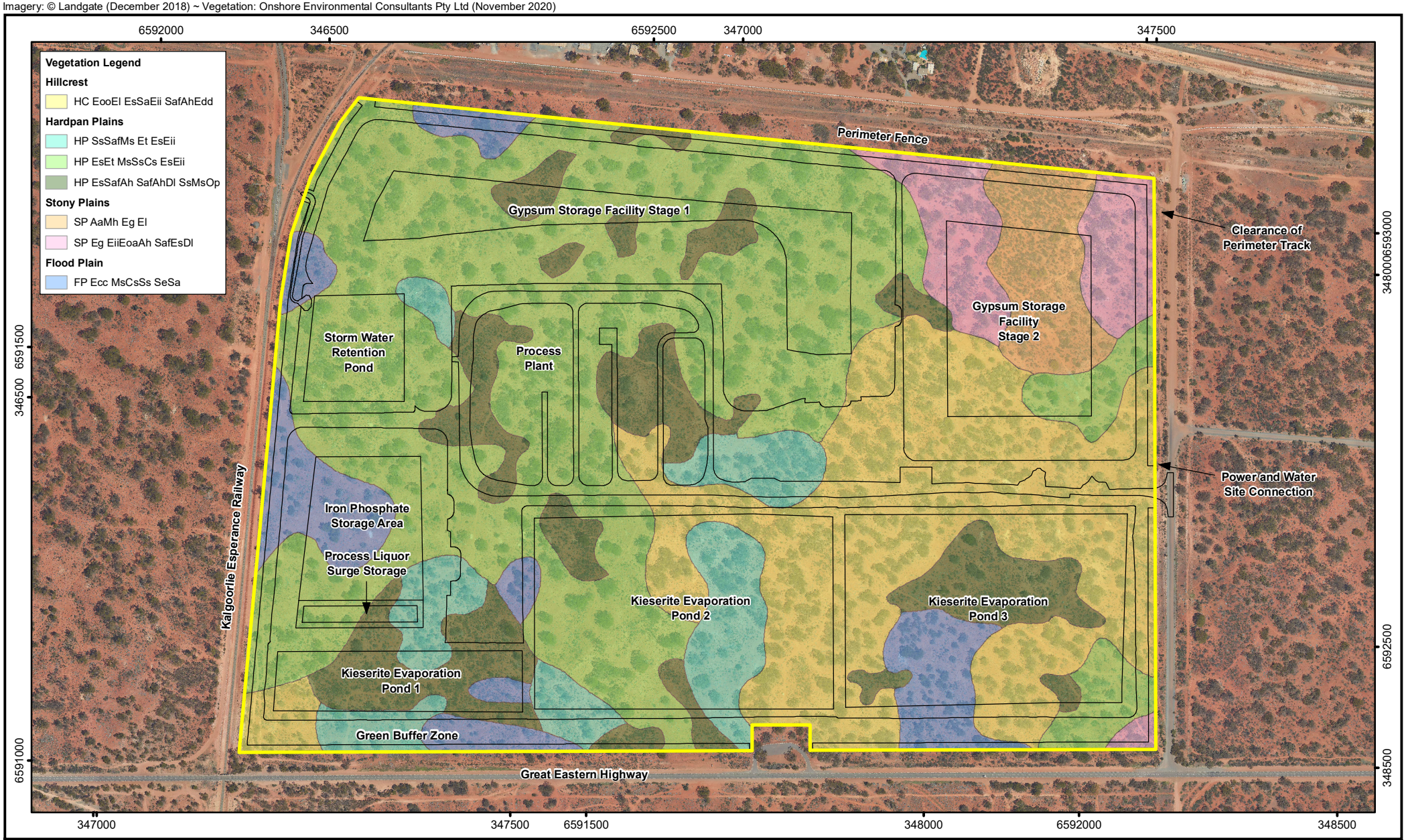
5.3.1.5 Vegetation Representation

Vegetation within the study area was determined to be well represented at all levels (state-wide, bioregional [IBRA region and IBRA sub-region] and local), with greater than 96.2% of the pre-European extent remaining for the one Beard (1978) vegetation association represented. The proportion of the same vegetation association occurring within secure (Class I-IV) reserves ranged from 8.1% to 11.3% at the state level, bioregional and local levels, which is under the 15% minimum standard. However, given that the proposed development will not significantly reduce the pre-European extent of the Beard (1978) vegetation association represented (i.e., it will remain well above the 30% threshold within the bioregion), the reservation status is determined to be of least concern for biodiversity conservation.

5.3.1.6 Vegetation Condition

Vegetation condition in the study area (Lot 350 and Lot 500) ranged from *very good* to *degraded* with disturbances including roads and access tracks, historic ground disturbance activities, rubbish dumping, mine exploration, sandalwood cutting, timber cutting, historical revegetation, grazing by rabbits, motorbike tracks and unauthorised camping activities. Vegetation condition across the largest proportion of the study area was rated as *very good* (317 ha or 91% of the study area), with minor pockets rated as *good* (15 ha or 4%), *poor* (3 ha or <1%) and *degraded* (13 ha or 4%) typically occurring adjacent to roads and access tracks on Lot 350, refer Figure 5-2.

Imagery: © Landgate (December 2018) ~ Vegetation: Onshore Environmental Consultants Pty Ltd (November 2020)



Legend

- Lot 500 Great Eastern Hwy, Yilkari
- Proposed Layout

0 100 200m

Scale: 1:8,000
MGA94 (Zone 51)

CAD Ref: a2769_ERD04_06		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Lynas KALGOORLIE PTY LTD

Figure 5-1
Lot 500 - Detailed Flora and Vegetation Survey

Vegetation: Onshore Environmental Consultants Pty Ltd (November 2020)

Vegetation Legend

Hillcrest

HC EooEl EsSaEii SafAhEdd	Open Tree Mallee of Eucalyptus oleosa subsp. oleosa and Eucalyptus lesouefii (sometimes with Eucalyptus griffithsii and/or Eucalyptus ravida) over Open Scrub of Eremophila scoparia, Santalum acuminatum and Eremophila interstans subsp. interstans over Open Low Scrub A of Senna artemisioides subsp. filifolia, Acacia hemiteles and Eremophila decipiens subsp. decipiens over Open Dwarf Scrub C of Scaevola spinescens, Halgania andromedifolia and Maireana sedifolia over Open Dwarf Scrub D of Olearia muelleri, Eremophila parvifolia subsp. auricampa and Westringia rigida (Ptilotus obovatus, Atriplex vesicaria) on brown loamy sands on undulating low hills

Hardpan Plains

HP SsSafMs Et EsEii	Dwarf Scrub C of Scaevola spinescens, Senna artemisioides subsp. filifolia and Maireana sedifolia with Open Woodland of Eucalyptus transcontinentalis (Eucalyptus salmonophloia) over Open Scrub of Eremophila scoparia and Eremophila interstans subsp. interstans over Open Low Scrub A of Senna artemisioides subsp. filifolia, Acacia hemiteles and Eremophila scoparia over Open Dwarf Scrub D of Olearia muelleri, Atriplex vesicaria and Scaevola spinescens on orange sandy loam on hardpan plains
HP EsEt MsSsCs EsEii	Woodland of Eucalyptus salmonophloia (Eucalyptus transcontinentalis) over Dwarf Scrub C of Maireana sedifolia, Scaevola spinescens and Cratystylis subspinescens (Cratystylis conocephala) with Open Scrub of Eremophila scoparia and Eremophila interstans subsp. interstans over Open Low Scrub A of Senna artemisioides subsp. filifolia and Eremophila scoparia over Open Dwarf Scrub D of Atriplex vesicaria, Maireana triptera, Sclerolaena diacantha and Olearia muelleri on orange sandy clay loam on hardpan plains
HP EsSafAh SafAhDl SsMsOp	Scrub of Eremophila scoparia, Senna artemisioides subsp. filifolia and Acacia hemiteles over Low Scrub A of Senna artemisioides subsp. filifolia, Acacia hemiteles and Dodonaea lobulata over Dwarf Scrub C of Scaevola spinescens, Maireana sedifolia and Olearia pimelioides over Open Dwarf Scrub D of Ptilotus obovatus, Scaevola spinescens and Eremophila decipiens subsp. decipiens on brown sandy loam on hardpan plains

Stony Plains

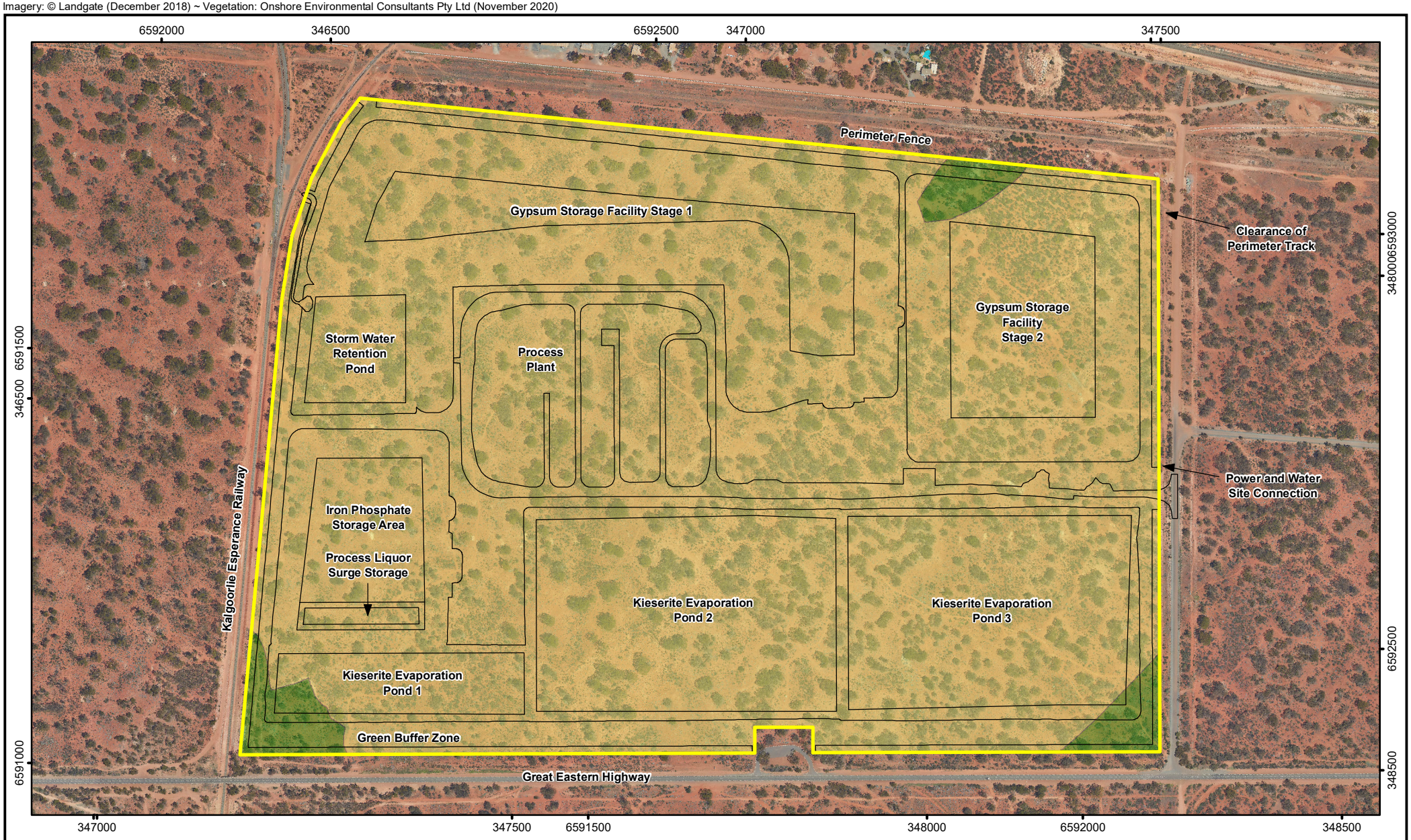
SP AaMh Eg El	Thicket of Acacia acuminata and Melaleuca hamata over Low Scrub A of Eremophila granitica with Scattered Shrub Mallee of Eucalyptus longissima and Scattered Herbs of Cheilanthes sieberi on orange brown silty loam on stony
SP Eg EiiEoaAh SafEsDl	Open Tree Mallee of Eucalyptus griffithsii over Scrub of Eremophila interstans subsp. interstans, Eremophila oldfieldii subsp. angustifolia and Acacia hemiteles over Low Scrub A of Senna artemisioides subsp. filifolia, Eremophila scoparia and Dodonaea lobulata over Open Dwarf Scrub C of Scaevola spinescens and Maireana sedifolia over Open Dwarf Scrub D of Olearia muelleri, Ptilotus obovatus and Westringia rigida on orange loamy sands on sandy / stony plains

Flood Plain

FP Ecc MsCsSs SeSa	Open Shrub Mallee of Eucalyptus celastroides subsp. celastroides (with Scattered Trees of Eucalyptus salmonophloia, Eucalyptus transcontinentalis and Eucalyptus ravida) over Dwarf Scrub C of Maireana sedifolia, Cratystylis subspinescens and Scaevola spinescens (Halgania andromedifolia) with Open Scrub of Eremophila scoparia and Santalum acuminatum over Open Low Scrub A of Eremophila scoparia and Senna artemisioides subsp. filifolia over Open Dwarf Scrub D of Ptilotus obovatus, Olearia muelleri and Atriplex vesicaria on red sandy clay loams on drainage areas and floodplains

		Lynas KALGOORLIE PTY LTD	**Figure 5-1** **Lot 500 - Detailed Flora and Vegetation Survey Legend**
	Ref: a2769_ERD04_06_Legend	Author: P. Jansen	Kasa Consulting Pty Ltd
	Date: March 2021 | Rev: A | A4	Drawn: CAD Resources ~ www.cadresources.com.au	

Imagery: © Landgate (December 2018) ~ Vegetation: Onshore Environmental Consultants Pty Ltd (November 2020)



Legend

- Lot 500 Great Eastern Hwy, Yilkari
- Proposed Layout
- Very Good Condition
- Good Condition

0 100 200m

Scale: 1:8,000
MGA94 (Zone 51)

CAD Ref: a2769_ERD04_07		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Lynas KALGOORLIE PTY LTD

Figure 5-2
Lot 500
Vegetation Condition Mapping

5.3.2 Yarri Road BSF

Lynas commissioned Onshore Environmental (April 2021) to undertake a detailed flora and vegetation survey of the 535 ha Yarri Road Site and the 8 ha Miscellaneous Licence area required for the site access corridor. A two-season detailed flora and vegetation survey was completed by Onshore Environmental personnel. The first season survey was completed under fair seasonal conditions between 12 and 18 June 2020. A second season survey was completed under poor seasonal conditions between 27 October and 2 November 2020. An additional phase of survey work was undertaken in March 2021 following significant summer rainfall during February 2021. The additional phase of survey work included reassessment of the 48 permanent quadrats and targeted searches for annual and ephemeral plant taxa.

Table 5-3: Flora and Vegetation Studies of BSF Site

Flora Study	Details
Onshore Environmental (April 2021), Detailed Flora and Vegetation Survey for By-product Storage Site	Commissioned by Lynas for the Lynas REPF. Refer to Appendix D.

5.3.2.1 Broad Vegetation Groups at BSF Site

Onshore Environmental grouped vegetation at the BSF site into 12 distinct vegetation types, classified as nine broad floristic formations and occurring on two landform features were described and mapped from the study area.

A summary of these can be seen in Table 8 of Appendix D and Figure 5-3.

5.3.2.2 Taxa

A total of 160 plant taxa from 37 families and 91 genera were recorded from the study area. Species representation was greatest among the Chenopodiaceae, Fabaceae, Poaceae, Scrophulariaceae and Asteraceae families. The most speciose genera were Eremophila (15 taxa), Maireana (ten taxa), Acacia (nine taxa), Eucalyptus and Senna (both with six taxa), refer Figure 5-3.

None of the plant taxa currently identified from the study area were gazetted as Threatened Flora pursuant to the BC Act or listed under the EPBC Act. Based on the database searches completed as part of the desktop assessment, no Threatened flora species are likely to occur within the study area.

One species recorded from the study area was listed as a Priority flora taxon by the Department of Biodiversity Conservation and Attractions (DBCA); Eremophila praecox (Priority 2). Eremophila praecox was recorded as a total of seven plants from six point locations within the study area, refer Figure 5-4 below. The identified Eremophila praecox reached a maximum height of one metre and was recorded on hardpan plains (refer Insert 5-1 below).

Insert 5-1: Eremophila Praecox

The DBCA definition of Priority 2: Poorly-known species is as follows:

> *Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g., national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.*

5.3.2.3 Introduced Species

13 introduced species were recorded from the study area:

- *Carrichtera annua;
- *Carthamus lanatus;
- *Cenchrus ciliaris;
- *Citrullus amarus;
- *Cucumis myriocarpus;
- *Cuscuta cf.epithymum;
- *Erigeron bonariensis
- *Lysmachia arvensis;
- *Medicago laciniata
- *Oligocarpus calendulaceus;
- *Salvia verbenaca;
- *Stapelia sp. Indet; and
- *Sonchus oleracea.

None of these species are Declared Plants listed under the BAM Act 2007.

5.3.2.4 Vegetation Associations

A total of twelve vegetation types were described and mapped from the study area.

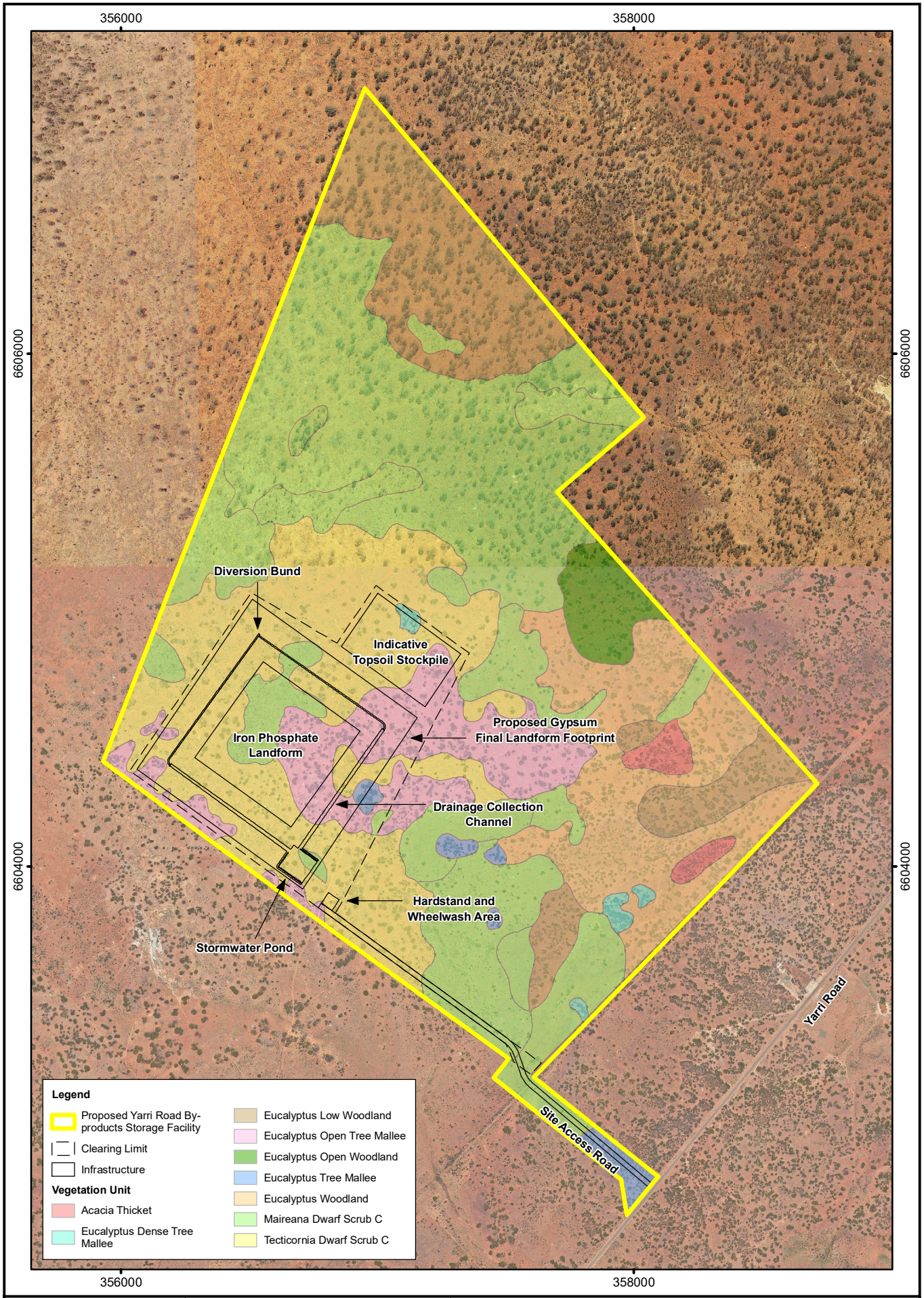
None of the vegetation types were aligned with any federal or state listed TECs or state listed PECs known to occur within the Goldfields region.

5.3.2.5 Vegetation Representation

Vegetation within the study area was determined to be well represented at all levels (state-wide, bioregional (IBRA region and IBRA sub-region) and local), with approximately 99% of the pre-European extent remaining for the two Beard (1978) vegetation associations occurring within the study area. The proportion of these vegetation associations occurring within secure (Class I-IV) reserves ranged between 3% and 14% at the state level.

5.3.2.6 Vegetation Condition

Vegetation condition was rated as being very good with disturbances including roads and access tracks, timber cutting, rubbish dumping, and mine exploration.



Imagery: © Landgate (December 2018) ~ Vegetation: Onshore Environmental Consultants Pty Ltd (June 2020)

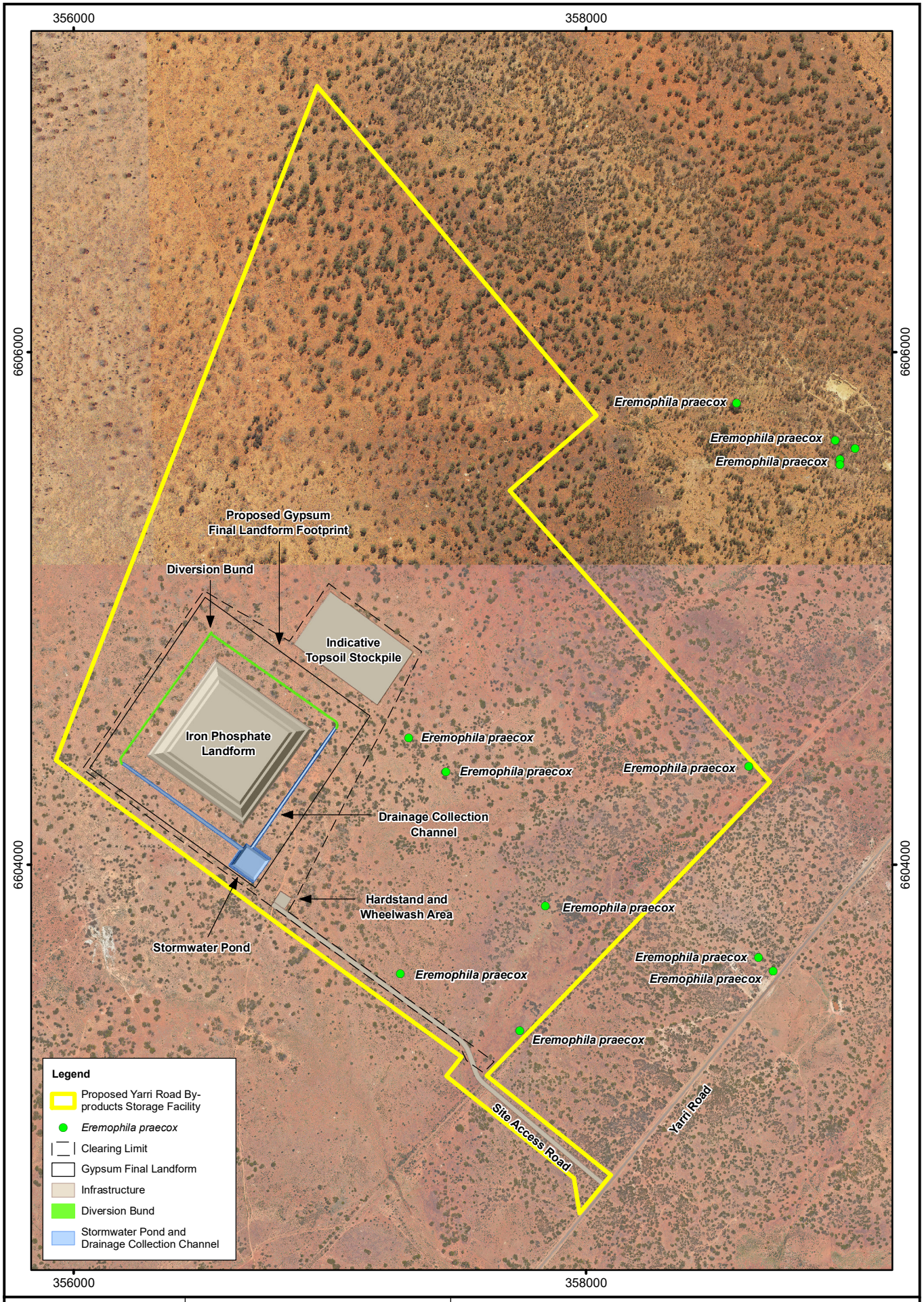
0 200 400m

Scale: 1:20,000
MGA94 (Zone 51)

Lynas KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_08		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: May 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 5-3
Yarri Road BSF
Detailed Flora and Vegetation Survey



Imagery: © Landgate (December 2018) ~ Vegetation: Onshore Environmental Consultants Pty Ltd (June 2020)

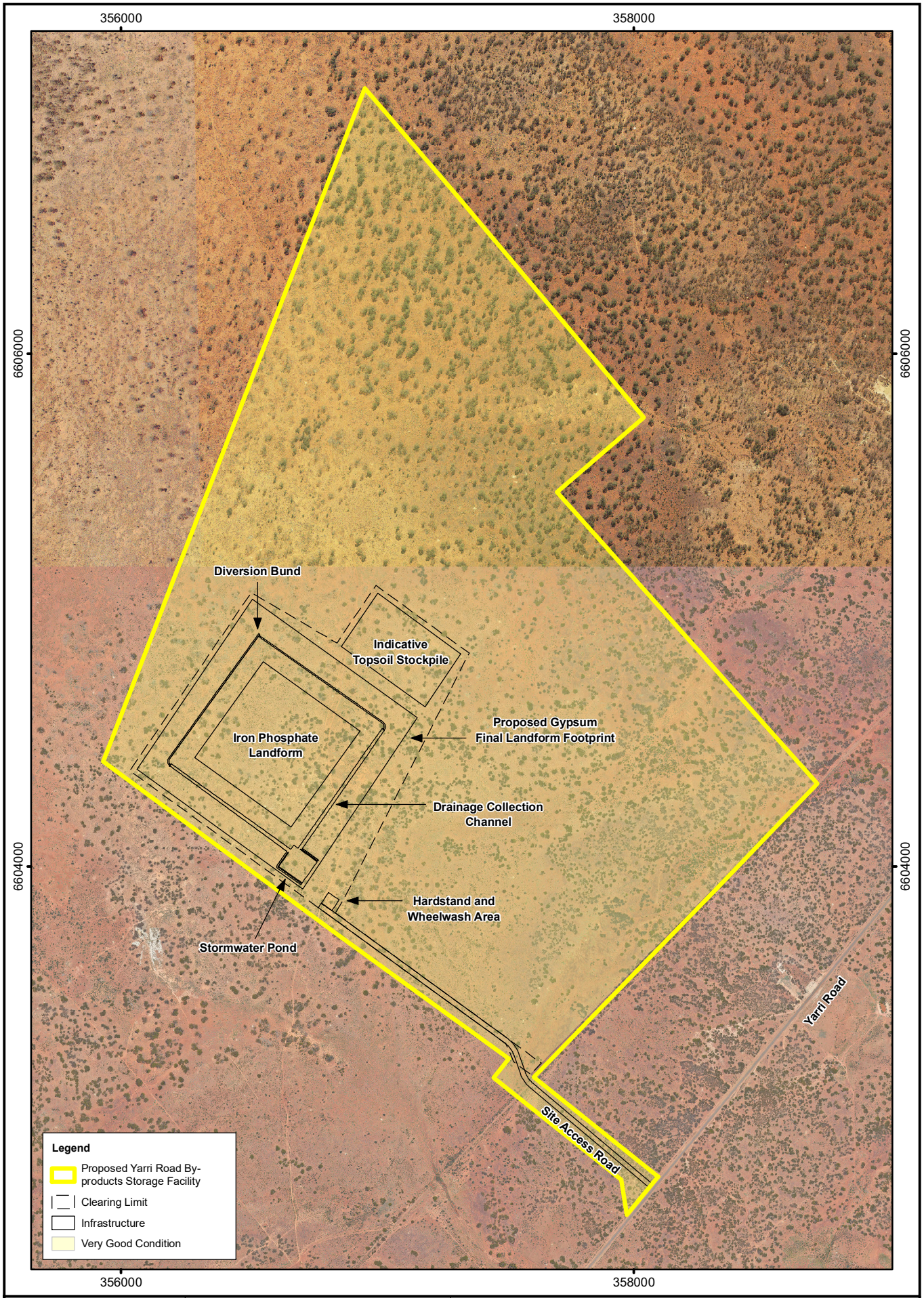
0 200 400m

Scale: 1:20,000
MGA94 (Zone 51)

Lynas KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_09		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: May 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 5-4
Yarri Road BSF - Distribution of Species of Conservation Significance



Imagery: © Landgate (December 2018) ~ Vegetation: Onshore Environmental Consultants Pty Ltd (June 2020)

0 200 400m

Scale: 1:20,000
MGA94 (Zone 51)

Lynas KALGOORLIE PTY LTD

CAD Ref: a2769_ERD04_10		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: May 2021	Rev: A	A4	Drawn: CAD Resources ~ www.cadresources.com.au

Figure 5-5
Yarri Road BSF
Vegetation Condition Mapping

5.4 Potential Impacts

The obvious direct impact on the flora and vegetation on the site is the REPF ultimate disturbance footprint which is 120 ha of the 135 ha site at Lot 500 and 97.3 ha of the 535. While this represents a large proportion of Lot 500, the discussion in Section 5.3.1.5 above shows that the vegetation to be removed is well represented outside of the Lot 500 area.

At the BSF site, a large proportion of the vegetation present on the 535 ha site will be retained, and vegetation to be removed is well represented outside of the BSF development envelope. Eremophila praecox (Priority 2) which is recorded at the site is represented outside of the BSF development envelope, and the facility design has been revised in order to not disturb the plants that have been identified on the BSF site.

These impacts are not significant when viewed against the various Commonwealth and State guidelines. In addition to direct impacts to vegetation and flora arising from the Proposal, indirect impacts to vegetation and flora may arise including the introduction of non-indigenous species (weed / pathogens), and accidental clearing of areas outside of the proposal development envelope. These impacts are manageable at both sites through good site construction practices.

The potential risk on vegetation down hydraulic gradient of the site from changes to on-site natural drainage is discussed in Section 8.4.1.

Impacts on vegetation from fugitive or point source emissions including particulates are not anticipated to present a significant risk at either site. Air dispersion modelling of particulates and other pollutants is presented in Section 9.5 and demonstrate that ground level concentrations of all key parameters are well below the relevant air quality assessment criteria.

5.5 Assessment of Impacts

5.5.1 Lot 500

A direct impact to flora and vegetation will occur from ground disturbance of approximately 120 ha. Surveys have shown that all flora and fauna species, vegetation types and habitat are well represented outside of the development envelope.

It is worth noting that this clearing of vegetation within Lot 500 has been approved under the *EP Act 1986* (WA) – Part V Clearing Permit CPS 8322/1 with a clearing quota of 134.9 ha. This approval was issued to CKB to allow clearing proposed for pending industrial land uses on Lot 500 such as the former Neometals Lithium Hydroxide proposal which has since been revoked. CKB was the applicant for the permit. Through the processing and assessment of this clearing permit the impacts have been considered against the clearing principles and found to be acceptable.

5.5.2 Yarri Road BSF

The maximum disturbance area at the BSF site will be 97.3 ha of the 535 ha site, which includes clearing for by-products storage facilities, evaporation ponds, dams and infrastructure required for the first 25 years of operation.

Surveys have shown that all flora and fauna species, vegetation types and habitat are well represented outside of the development envelope, and design consideration of the BSF footprint has been made, in order to avoid impact to Priority 2 species identified at the site.

5.5.2.1 Yarri Road BSF – Conservation Significant Flora

No Threatened Flora (T) gazetted under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Biodiversity Conservation Act 2016* (BC Act) were recorded from within the Project area.

As previously detailed, one Priority flora species, as listed by the Department of Biodiversity Conservation and Attractions (DBCA), was recorded from the Project area; *Eremophila praecox* (Figure 5-4). *Eremophila praecox* (Priority 2) is a broom shaped shrub reaching up to 3 metres high and flowering purple in October or December.

As of March 2021, over three separate surveys, *Eremophila praecox* was recorded as a total of seven plants from six spot locations within the Project area (Figure 5-4). Plants reached a maximum height of 1 metre and occurred on hardpan plains.

Eremophila praecox does not occur within the infrastructure disturbance footprint and will not be disturbed as part of project development. The nearest plants are located 60 metres to the north of the access road and 100 metres to the east of the additional clearing areas (Figure 5-4).

Eremophila praecox has a bimodal geographic distribution, occurring in the Goldfields region of Western Australia (Coolgardie bioregion) and the western part of the Eyre Peninsula in South Australia (Nullarbor, Eyre, Yorke Block bioregions). In the Goldfields, it has been documented growing on red brown sandy loam soils on undulating plains around the Coolgardie-Widgiemooltha-Kalgoorlie area (Western Australian Herbarium , 2020), (Brown, 2011), (Chinnock, 2007).

The database searches identified 14 *Eremophila praecox* locations occurring within 20 kilometres of the Project area. Total plant numbers were generally low at each location. Habitat was described as red sand or clay with *Eucalyptus* woodland.

Eremophila praecox was recorded at an additional seven locations outside the Project area by Onshore Environmental during a targeted flora survey conducted in March 2021. These locations occur between 500 metres and one kilometre northeast of the Project area. The plants occurred on stony hillslopes dominated by *Eucalyptus lesouefii* and in a drainage zone with *Eucalyptus ravida* and *Eucalyptus salubris.* Plant numbers were low with between one and three plants recorded at each location, and nine plants recorded in total. The species is considered likely to occur more widely in the general area.

The impact of the BSF on the recorded population of *Eremophila praecox* is considered to be low. Lynas has redesigned the layout of the BSF such that no plants will be directly impacted as they occur outside the infrastructure disturbance footprint and minimum 50 m buffer zone for each colony.

5.5.2.2 Yarri Road BSF – Vegetation Types

A total of 12 vegetation types, classified as nine broad floristic formations and occurring on two landform features were described and mapped from the Project area (Figure 5-3). The two broad landforms were hardpan plain and gilgai plain. The vegetation of the Project area consisted predominantly of hardpan plains supporting *Eucalyptus salmonophloia* Woodland*, Eucalyptus salubris* Mallee, and *Maireana sedifolia* Shrubland*.*

None of the vegetation types described and mapped from the Project area were found to be aligned with any known Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) documented from the Coolgardie or Murchison bioregions.

The total area of vegetation within the proposed disturbance footprint is 97.24 hectares (Figure 5-3).

The following six vegetation types occur within the proposed disturbance footprint:

- HP MsSafCs EscSaf AvMsLa (9.91 ha);
- HP TdMs TdMsAv Es (58.18 ha);
- HP Esa TdMsAv MsTd (25.13 ha);
- HP Esa EscEapEoa MsSsOm (1.71 ha);
- HP Er EiEscEoa MsPoSs (0.68 ha); and
- HP MpMs AvMpMs EpEcSc (1.65 ha).

All six vegetation types impacted under the proposal supported vegetation rated to be in *very good* condition. The area of each vegetation type occurring within the proposed disturbance footprint is presented in Table 1.

Table 5-4: Vegetation Associations Impacted by Proposed Clearing for Infrastructure

Infrastructure Area	Vegetation Association	Area Impacted (ha)
Diversion Bund	HP MsSafCs EscSaf AvMsLa	0.04
	HP TdMs TdMsAv Es	0.50
	HP Esa TdMsAv MsTd	0.08
Drainage Collection Channel	HP Esa TdMsAv MsTd	0.02
	HP MsSafCs EscSaf AvMsLa	0.04
	HP TdMs TdMsAv Es	1.15
	HP Esa TdMsAv MsTd	0.40
Gypsum Final Limit	HP Esa TdMsAv MsTd	1.97
	HP MsSafCs EscSaf AvMsLa	1.59
	HP Esa TdMsAv MsTd	0.08
	HP MsSafCs EscSaf AvMsLa	0.18
	HP TdMs TdMsAv Es	28.01
	HP Esa EscEapEoa MsSsOm	0.45
	HP Esa TdMsAv MsTd	6.91
Hardstand and Wheel Wash Lines	HP Esa TdMsAv MsTd	0.01
	HP TdMs TdMsAv Es	0.25
Iron Phosphate Landform	HP MsSafCs EscSaf AvMsLa	6.41
	HP TdMs TdMsAv Es	7.98
	HP Esa TdMsAv MsTd	6.95
Other Clearing Area (within Clearing Limit)	HP Esa TdMsAv MsTd	0.81
	HP Er EiEscEoa MsPoSs	0.23
	HP MsSafCs EscSaf AvMsLa	0.01
	HP MpMs AvMpMs EpEcSc	0.45
	HP Esa TdMsAv MsTd	0.28
	HP MsSafCs EscSaf AvMsLa	0.26
	HP TdMs TdMsAv Es	11.31
	HP MsSafCs EscSaf AvMsLa	0.12
	HP Esa EscEapEoa MsSsOm	0.61
	HP MpMs AvMpMs EpEcSc	0.38
	HP Esa TdMsAv MsTd	5.08
Road	HP MpMs AvMpMs EpEcSc	0.82
	HP Esa TdMsAv MsTd	0.05
	HP TdMs TdMsAv Es	0.99
	HP MsSafCs EscSaf AvMsLa	0.97
	HP Esa EscEapEoa MsSsOm	0.66
Stormwater Containment Runoff Pond	HP Esa TdMsAv MsTd	0.01
	HP MsSafCs EscSaf AvMsLa	0.28
	HP TdMs TdMsAv Es	0.85
Topsoil	HP Er EiEscEoa MsPoSs	0.45
	HP TdMs TdMsAv Es	7.14
	HP Esa TdMsAv MsTd	2.47

5.5.2.3 Yarri Road BSF – Representation and Reservation of Vegetation Types

Regional vegetation mapping completed by Beard (1978) was utilised to assess representation of vegetation within the Project area. Two Beard vegetation associations were represented within the Project area (Table 5-5). In terms of representation, the Western Australian Government is committed to the National Objectives Targets for Biodiversity Conservation which includes a target that prevents clearance of ecological communities with an extent below 30% of that present at pre-European settlement (Department of Natural Resources and Environment 2002, EPA 2000).

When considering representation at the State level, the Beard vegetation associations represented within the Project area currently have >98.6% of the pre-European extent remaining (Table 5-5). The Project area is located on the boundary of the Coolgardie and Murchison bioregions, specifically within the Eastern Murchison subregion and the Eastern Goldfields subregion. When considering the representation of vegetation at the IBRA regional level and IBRA system level, over 93.6% of the pre-European extent remains for the vegetation associations represented. The Project area falls entirely within the City of Kalgoorlie-Boulder. At this local level >97.8% of the pre-European extent remains for the two vegetation associations represented.

Vegetation within the Project area is therefore determined to be well represented at all levels (state-wide, bioregional [IBRA region and IBRA sub-region] and local).

In terms of reservation, there is a benchmark for a minimum of 15% of each Beard vegetation association to be protected in Class I-IV reserves (Beard, 1978). The proportion of the vegetation associations occurring within Class I-IV reserves at a state level ranges between 4% and 13%, noting that 20% of the current extent occurs within DBCA managed lands (Table 5-5).

Hence the reservation status is determined to be of least concern for biodiversity conservation.

Table 5-5: Pre-European Extent of Vegetation Represented on the Basis of Identified Datasets

Vegetation System / Association	Pre-European Extent (ha)	Current Extent (ha)	% Pre-European Extent Remaining	Current Extent in Class I-IV Reserves (ha)	% Current Extent in Class I-IV Reserves	Current Extent DBCA Managed Lands (ha)	% Current Extent DBCA Managed Lands
State-wide							
20 Low woodland; mulga mixed with *Allocasuarina cristata* & *Eucalyptus* sp.	1,295,103.39	1,292,474.58	99.80	172,489.47	13.35	250,985.57	19.42
468 Medium woodland; salmon gum & goldfields blackbutt	592,022.32	583,902.76	98.63	24,330.49	4.17	135,197.44	23.15
Beard Vegetation System							
20 (Barlee)	1,172,537.62	1,169,909.26	99.78	104,409.37	8.92	181,845.19	15.54
468 (Coolgardie)	65,948.55	61,726.56	93.60	0.94	0.00	1,314.84	2.13
IBRA Region							
20 – Murchison (MUR)	1,174,259.17	1,171,630.81	99.78	104,409.37	8.91	181,845.19	15.52
468 – Coolgardie (COO)	583,357.71	575,360.61	98.63	24,003.77	4.17	130,719.16	22.72
IBRA Sub-Region							
20 – Eastern Murchison (MUR01)	1,174,259.17	1,171,630.81	99.78	104,409.37	8.91	181,845.19	15.52
468 – Eastern Goldfields (COO3)	482,361.84	474,364.74	98.34	610.08	0.13	106,338.62	22.42
Local Government – City of Kalgoorlie-Boulder							
20	728,313.00	726,233.00	99.71	49,000.90	6.75	62,069.80	8.55
468	303,529.42	296,698.80	97.75	607.75	0.20	13,864.94	4.67

Dataset source (Government of Western Australia 2018)

5.6 Mitigation

5.6.1 General

Impacts to flora and vegetation can be readily managed through the implementation of good construction practices at each Proposal site. Key mitigation measures that will be implemented at the Proposal sites include:

- Construction workforce will be trained in conforming to key mitigation measures defined in a comprehensive CEMP.
- Additional discrete pockets of vegetation may be retained around the site including retention of large trees where practicable.
- A robust air quality management and monitoring program will be implemented to ensure that atmospheric emissions do not impact on the health, welfare and amenity of sensitive receptors (human and biological) in proximity to the Proposal sites (Figure 9-1 and Figure 9-2).

5.6.2 Lot 500

Specific mitigation measures will be carried out at the Lot 500 site, including:

- Provision of a 30 m buffer around the REPF footprint on the site, which will retain approximately 15 ha of the natural vegetation.
- Progressive clearing as particular plant components are scheduled for construction (Figure 5-6).
- Point source emission controls from the stack and other emission points include a combination of bag houses, venturi scrubbers, spray tower, packed tower and a Wet Electrostatic Precipitator (WESP).
- Particulates from by-product stockpiles will be managed through the inherent moisture content of the materials, coupled with use of water sprays and other dust mitigation measures, as required.

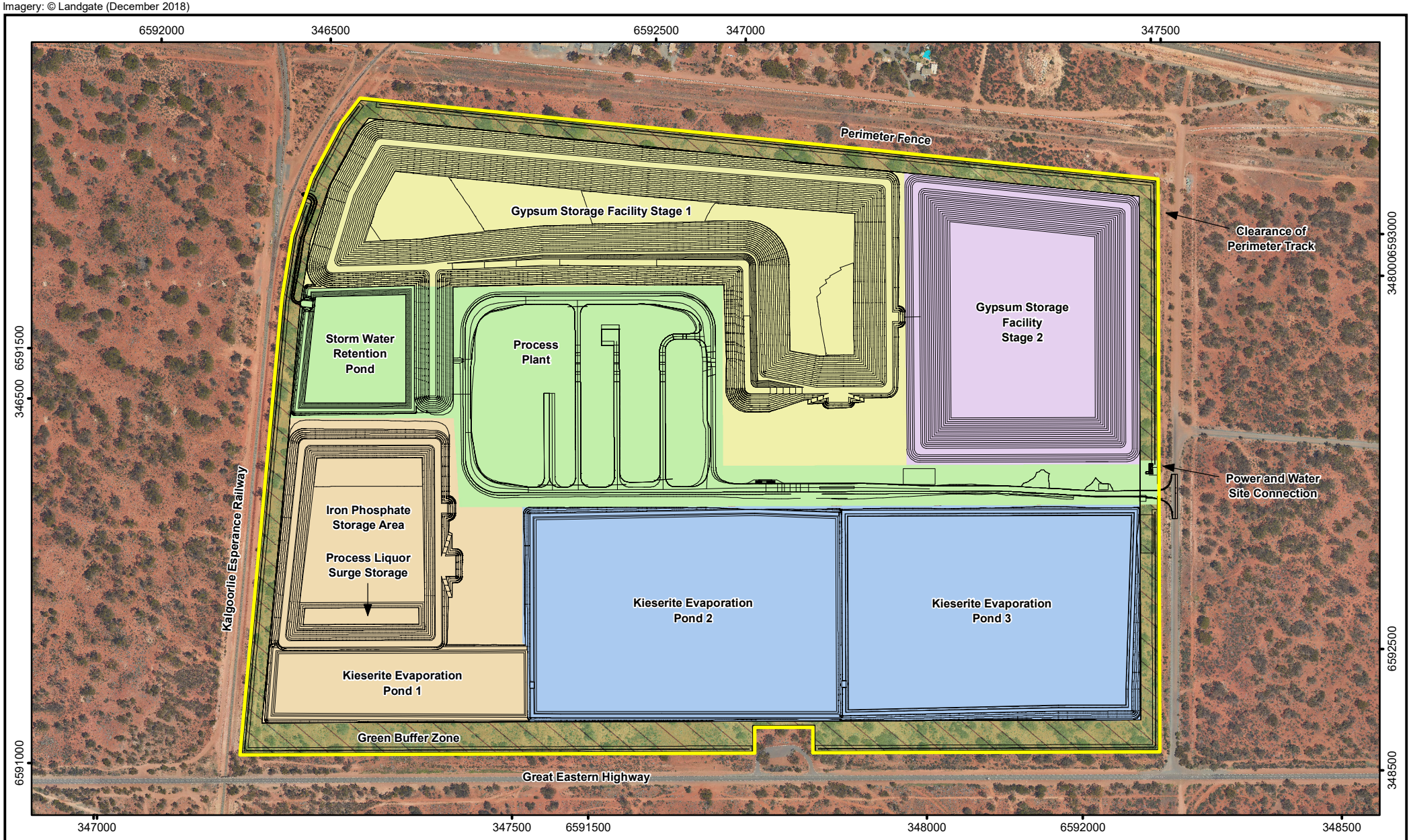
5.6.3 Yarri Road BSF

Specific mitigation measures will be carried out at the BSF site, including:

- Retention of approximately 437 ha of natural vegetation on the 535 ha site, that falls outside of the disturbance envelope.
- Progressive clearing of the by-product landform area to accommodate staged development of the landform **(**Figure 5-7**).**
- Particulates from by-product stockpiles will be managed through the use of water sprays and other dust mitigation measures, as required.

It should also be noted that Lynas has made every effort to update the BSF footprint based on recent survey information. The BSF site layout has been iteratively revised in order to avoid impact on Priority 2 species (Eremophila Praecox) that have been identified within the survey area (Figure 5-4).

Imagery: © Landgate (December 2018)



Legend

- Lot 500 Great Eastern Hwy, Yilkari
- Proposed Layout
- Green Buffer Zone
- Stage 1
- Stage 2
- Stage 3
- Stage 4
- Stage 5

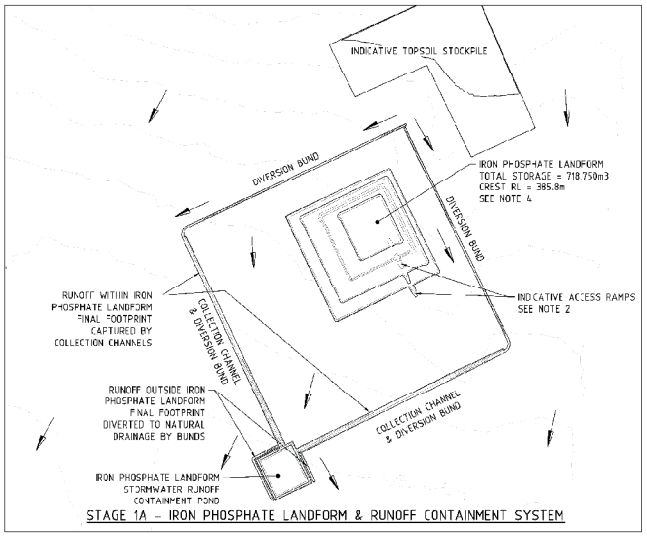
0 100 200m

Scale: 1:8,000
MGA94 (Zone 51)

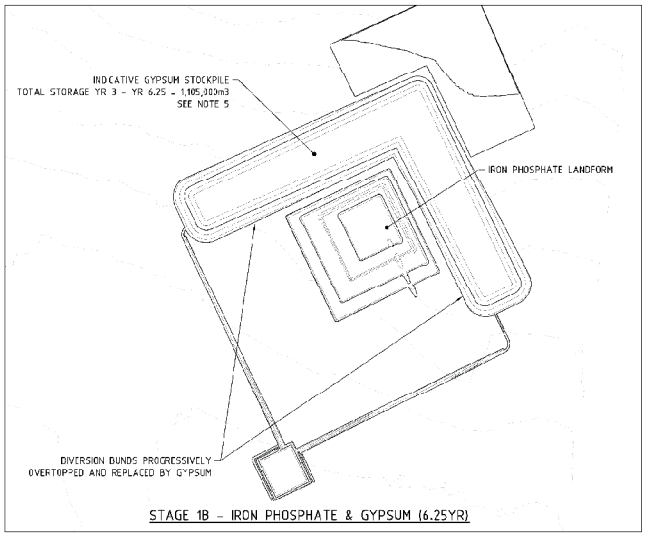
CAD Ref: a2769_OEMP02_02		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au	

Lynas KALGOORLIE PTY LTD

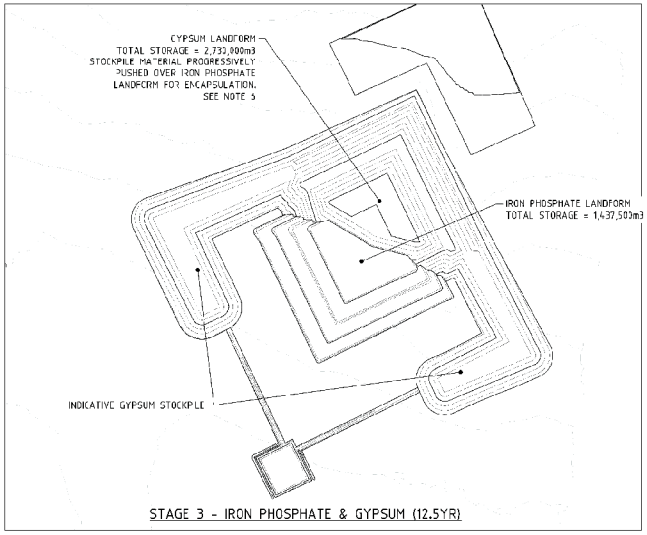
Figure 5-6
Lot 500 - Indicative Staged Clearing Sequence



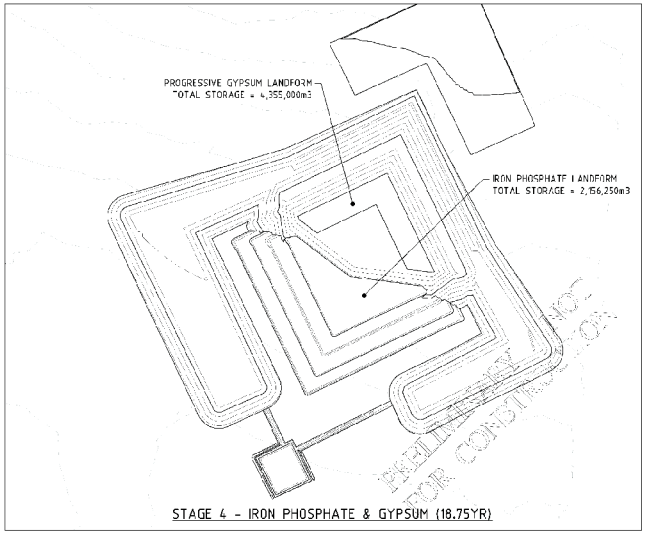
STAGE 1A – IRON PHOSPHATE LANDFORM & RUNOFF CONTAINMENT SYSTEM



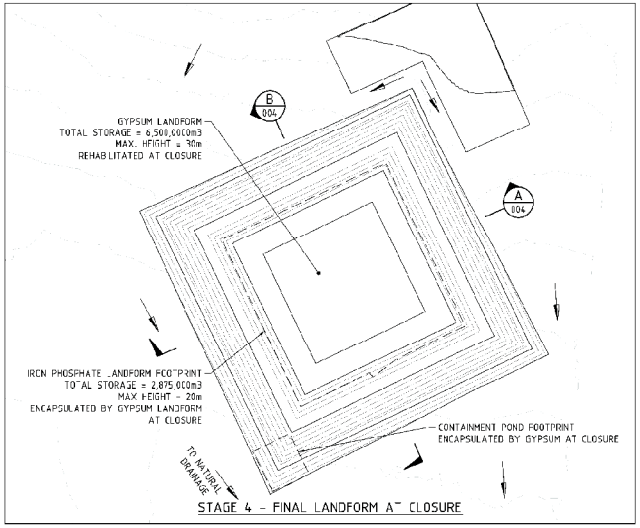
STAGE 1B – IRON PHOSPHATE & GYPSUM (6.25YR)



STAGE 3 – IRON PHOSPHATE & GYPSUM (12.5YR)



STAGE 4 – IRON PHOSPHATE & GYPSUM (18.75YR)



STAGE 4 – FINAL LANDFORM AT CLOSURE

Legend

CAD Ref: a2769_ERD04_30		Author: P. Jansen	Kasa Consulting Pty Ltd
Date: March 2021	Rev: A A4	Drawn: CAD Resources ~ www.cadresources.com.au	

Lynas KALGOORLIE PTY LTD

Figure 5-7
Yarri Road BSF -
Staged Development Sequence

5.7 Predicted Outcomes

The outcomes of the Proposal at Lot 500 are predicted to be:

- No impact on Threatened Flora pursuant to the BC Act or listed under the EPBC Act.
- No impact to conservation significant species or communities.
- Clearing of native vegetation in good condition, for which a Native Vegetation Clearing permit has previously been issued.

The outcomes of the Proposal at the Yarri Road BSF are predicted to be:

- No impact on Threatened Flora pursuant to the BC Act or listed under the EPBC Act.
- No significant impact to conservation significant species or communities.
- Clearing of native vegetation in very good condition.

Based upon the nature and scale of the vegetation and flora impacts associated with Proposal activities, and through implementation of proposed mitigations, Lynas considers that the Proposal will not result in a significant impact to flora and vegetation on or in proximity to the REPF and BSF sites, and that and the EPA Objective for this factor can be met.

Lynas, through its specialist consultants (Onshore Environmental Consultancy) have submitted all biodiversity survey reports to IBSA. Any survey reports or data that have been updated since initial acceptance into IBSA have been updated accordingly. IBSA files can be accessed via **this link.**

6 ENVIRONMENTAL FACTOR – TERRESTRIAL ENVIRONMENTAL QUALITY

6.1 EPA Objective

To maintain the quality of land and soils so that environmental values are protected.

6.2 Policy and Guidance

- Environmental Factor Guideline Terrestrial Environmental Quality (EPA 2016e).
- Dangerous Goods Safety Act 2004 and associated Regulations 2007.
- Contaminated Sites (CS) Act 2003 and Contaminated Sites Regulations 2006.
- Environmental Protection (Controlled Waste) Regulations 2004.
- Soil and Land Conservation Act 1945.
- Environmental Protection (Unauthorised Discharges) Regulations 2004.
- Identification and Investigation of Acid Sulphate Soils and Acidic Landscapes (DER 2015a).
- Treatment and Management of Soil and Water in the Acid Sulphate Soil Landscapes (DER 2015b).

6.3 Receiving Environment

6.3.1 Lot 500

6.3.1.1 Soil Description

The area is regionally mapped as “red loamy earths” which was confirmed through sampling and analysis carried out as part of the baseline soil investigation (Ramboll, May 2020). The baseline soil investigation identified the soils typically comprise a 30 to 50 cm layer of sandy clay near the surface, underlain by clay with weathered metamorphosed felsic volcanics (weathered bedrock) encountered at 1.2 to 2 m depth. The weathered bedrock was observed during the installation of the groundwater monitoring wells at the site to a maximum depth of 40 mbgl.

6.3.1.2 Soil Contamination

A Preliminary Site Investigation (PSI) has been carried out for Lot 500 by Talis Consultants (2018). The Talis (2018) report was peer reviewed by Ramboll (2019) and found to be a robust assessment carried out in accordance with DWER guidelines (DWER, 2014) and an adequate assessment of the potential for soil contamination to be present at the site.

Although the risk of contamination at the site is low, Ramboll recommended that baseline soil and groundwater sampling be carried out at the site prior to development to confirm baseline conditions do not present an unacceptable risk to the proposed commercial / industrial use.

As part of the baseline soil investigation (Ramboll, May 2020), refer to Appendix I, Ramboll undertook the following tasks between 20 and 21 April 2020:

- Supervision, logging and sampling of soils from 20 test-pits completed across the site; and
- Submission of select samples for laboratory analysis at a National Association of Testing Authorities (NATA) accredited laboratory for analysis as presented in this section.

Ramboll collected and analysed soils from the ground surface and subsoils to a maximum depth of 2.8 mbgl to enable an accurate estimation of the physical and chemical properties of surficial and deeper soils. Select soil samples were submitted for analysis of general chemistry and soil physical attributes along with a range of potential organic compounds associated with the proposed land uses including: pH, total organic carbon, sodicity (ESP), electrical conductivity (EC), moisture content, exchangeable cations, cation exchange capacity (CEC), clay content, nutrients, cyanide, metals, polychlorinated biphenyls (PCB), hydrocarbons and semi-volatile organic compounds and volatile organic compounds (SVOC/VOC).

The baseline soil investigation identified that all chemical concentrations in soil were reported below adopted screening criteria. While the baseline assessment was not intended to fully characterise the site for suitability from a contaminated sites perspective, the results of the soil investigations do not preclude the site for its intended use.

6.3.1.3 Acid Sulphate Soils

Acid Sulphate Soils are naturally occurring soils that contain iron sulphide (iron pyrite) minerals that, if disturbed by soil excavation, dewatering or drainage, can then oxidise and result in the release of acidity and potentially cause adverse environmental impacts.

The Commonwealth Scientific and Industrial Research Organisation (CSIRO) has gathered data from numerous governmental agencies across the country to produce a country wide database. This database contains Acid Sulphate Soils risk mapping geospatial data generated by the DWER and the DBCA. Talis Consultants (2018) undertook a review of this data for Lot 500 and concluded that the site is in an area of '*extremely low probability / very low confidence'* of Acid Sulphate Soils occurring. Further to this, based on the geomorphology, these soils are deemed unlikely to be present at the site.

6.3.1.4 Soils and Drainage

As part of the background technical documentation that supports the Local Development Plan (LDP) for Lot 500, a drainage investigation was undertaken for the development of the Lot 500 site by Jim Davies and Associates (2019).

Surface soils across Lot 500 are relatively impermeable due to high composition of clay derived from weathered laterite. The impermeable nature of these soils restricts infiltration and leads to high rainfall runoff across the site as shallow overland flow.

Survey contours provided by CKB (2018) derived from LiDAR indicates the site generally falls to the south west, ranging from 378 m AHD in the north east to 366 m AHD in the south west (refer to Figure 8-1).

The baseline soil investigation (Ramboll, May 2020) indicated that soils across the site are marginally sodic to sodic and exhibit naturally high variability in sodicity and associated clay dispersion risk. Due to the presence of sodic soils at the site, there is likely to be inhibited soil structure and vertical infiltration. Site drainage infrastructure should seek to maintain overland flows during periods of high rainfall to prevent waterlogging. Achieving this will in-turn prevent an increase in saline subsoils, dispersion and subsequent acceleration of erosion and soil aggregation and resulting in reduced potential as a growth medium.

Any revegetation at the site will take soil sodicity into account, local species will be adapted to these conditions and will be used wherever possible.

Soil analytical data indicated that water and wind erodibility risk to soils are low to moderate but also vary across the site. Erodibility does not indicate that erosion will occur, as erosion is also dependent on topography and the magnitude of rainfall events. Regardless, the erodibility of this site will be similar to neighbouring areas, which may exhibit off-site sediment transport during high intensity rainfall events. Surface water management at the site will take this into account to ensure off site transport of sediment is minimised.

The baseline soil investigation is reported as part of Ramboll (May 2020) and included as Appendix I.

6.3.2 Yarri Road BSF

6.3.2.1 Soil Description

The area's soils are regionally mapped as "red loamy earths". A search of the DWER databases reveals that there are two existing bores that contain soils data relevant to the BSF site. The bore data records soils at these locations as follows:

- Red brown clayey sand and yellow orange silty clay.
- Red brown ironstone leading to red brown clay between 2 m and 5 m depth.

6.3.2.2 Soil Contamination

A search of the DWER Contaminated Sites database indicates that the BSF site is not recorded as a contaminated site. Moreover, there are no recorded contaminated sites adjoining or nearby. Of interest is that the Yarri Road refuse disposal site is not recorded as a contaminated site in the database.

The closest recorded contaminated site to the BSF is 134 Goldfields Highway Mullingar, WA, 6430 (Lot 134 On Plan 214965).

Lot 134 was classified on 13 September 2011 as remediated for restricted use, with the following description:

> *"Tailings, drums of process residue, earth moving plant and equipment are contained in cells in the western portion of the site. The site should not be developed for a more sensitive use without further contamination assessment. Excavation or disturbance of soils in the area of the containment cells (sign posted) is restricted, unless an appropriate management plan is developed and implemented."*

6.3.2.3 Soils and Drainage

Based on the Yarri Road Preliminary Desktop Review of the Yarri Road site (Ramboll, August 2020), no registered contaminated sites were identified at or in proximity to that site. Accordingly, it is not anticipated that Yarri Road investigations will include further detailed assessments of historical contamination. Publicly available information in relation to soils and geological data are provided in the Yarri Road Preliminary Desktop Review. Further details on local soil geology and hydrogeology will be derived from pending site investigations including groundwater bore logs once installed at the Yarri Road site (commencing March 2021).

6.4 Potential Impacts

6.4.1 Soil Erosion (Construction Phase)

The direct impacts at Lot 500 and Yarri Road to terrestrial environmental quality associated with this Proposal will mainly be experienced during the construction phase of the Proposal. During the construction phase, there will be the requirement for civil works to be completed to enable the construction of suitably engineered hardstands for key components of the REPF. The potential construction impacts that may occur from this include:

- Erosion or scouring from reduction in soil stability during civil works.
- Impairment of soil drainage due to construction of engineered hardstands.
- Dispersion of saline, sodic and alkaline soils, which will reduce the soil quality and local native species seedbanks.

6.4.2 Soil Contamination

Potential contamination of in-situ soils and land can occur if unmanaged as a result of:

- Depositional dust from the IP and Gypsum Storage Facilities, general materials handling (including processing reagents and chemicals).
- Limited seepage of by-product leachate from the by-product storage facilities beyond the proposed synthetic liner.
- Operational leaks and spills.
- Failure of By-product Storage Facility integrity.
- Limited seepage from the evaporation pond and water and process liquor dams (Lot 500 only).
- Drainage and associated erosion of by-product facility surfaces.

6.4.3 By-product Treatment and Storage

The REPF will generate three by-products. These are IP, gypsum and sodium and magnesium sulphate salts.

IP and gypsum by-product will be produced and stored at Lot 500, prior to transport to the BSF for long-term storage. Sodium and magnesium sulphate salts will remain in ponds at Lot 500 until the end of the REPF facility life, when the ponds will be backfilled and remediated (refer Appendix Y for closure initiatives).

Details of each are presented in Table 6-1 below.

Table 6-1: By-product Treatment and Storage

Aspect	Iron Phosphate	Gypsum	Salt (REPF Only)
Method of deposition	BSF & REPF: Manual deposition of filter cake, via dry stacking (approx.. 40% moisture).	REPF: Pumped slurry which will be dewatered to reclaim water for recycling. BSF: Dry stacked.	Pumped bittens.
Chemical characteristics – solids	Mix of IP, iron hydroxide, aluminium hydroxide, minor RE sulphate and RE phosphate, 6 Bq/g thorium as insoluble pyrophosphate, phosphate, ppb level radium sulphate, others.	Mix of gypsum, magnesium hydroxide and manganese hydroxide.	A solid will be present at the base of the pond as a salt crystal for limited periods following evaporation.
Chemical characteristics – liquids (REPF Only)	70 grams per litre sulphate, 5-10 g/L RE, <10 gL-1, minor Al, minor phosphate. pH 3 to 3.5.	Saturated gypsum solution pH 10-10.5	6-8% bittens, major cations sodium and magnesium (minor calcium), major anions sulphate (minor carbonate and bicarbonate).
Liner system(s)	REPF: GCL/HDPE (double seam welded). BSF: No liner.	REPF: HDPE (double seam welded). BSF: No liner.	REPF: HDPE (double seam welded). BSF: N/A

Notwithstanding the above, reference should be made to Section 2.6.5 for a summary of by-product re-use opportunities that will be pursued by Lynas. These initiatives will reduce the volume of on-site storage of by-products at either site.

The degree of potential impacts from by-product storage facilities on soil quality may be influenced by the following factors:

- The siting of by-product storage structures;
- The nature of the by-product materials stored;
- The design, monitoring, and management of by-product storage facilities to avoid loss of containment; and
- Closure and capping design.

Potential impacts on soil quality from the storage of by-products both Proposal sites are detailed in Table 6-2 below.

Table 6-2: By-product Storage Potential Impacts

By-product	Potential Impact
Iron Phosphate	Seepage of leachate from IP resulting in localised soil contamination. IP contains iron, aluminium, phosphorous and low levels of NORM (thorium, and to a much lesser extent, uranium). Thorium in the IP (present as thorium phosphate and thorium pyrophosphate) are both highly insoluble species.
Gypsum	Seepage of leachate containing calcium sulphate, manganese hydroxide and magnesium hydroxide resulting in localised soil contamination.
Salt (Lot 500 only)	Seepage containing sodium sulphate, magnesium sulphate and manganese resulting in localised soil contamination.

Discussion of the long-term erosion and stockpile stability risks is presented in Section 6.4.4 below.

6.4.4 BSF Landform Evolution Modelling

Landform Evolution Modelling (LEM) was conducted on the BSF design files to determine the long-term behaviour of the landform design with respect to surface stability. The LEM was undertaken by subject matter experts, Soilwater Consultants (SWC) (2021), and the full report is attached at Appendix K.

The BSF cover material is proposed to be formed from the gypsum by-product. The gypsum will be placed around and on top of the IP by-product in a 'donut' cover system configuration, used in numerous mining closure scenarios to permanently isolate problematic waste material types.

The measured physical properties of the gypsum by-product are summarised as silty clay with >80% silt and clay fraction, of which 50% of particles are between 6-8 µm in diameter. It has a dry bulk density of 0.74 t/m^3 and corresponding wet density of 1.55 t/m^3, indicating that it is highly porous with a total porosity of around 68%.

SWC concluded that these properties make the gypsum material unlikely to be capable of remaining stable on a sloped closure landform surface over the long-term, and it therefore requires the application of a more stable cover material to increase the long-term stability of the closure design. Assessment of Impacts

6.4.5 Soil Erosion (Construction Phase)

The potential impacts of proposed civil and structural works including erosion, scouring and dispersion of soils, modification in soil drainage may occur as a result of construction works and presence of hardstand surfaces, By-Product Storage facilities and process water and liquor dams. Erosion impact magnitudes are anticipated to be low due to the presence of marginally sodic soils of low to moderate erodibility under low topographic gradients. Erosion is anticipated to be further limited via the occurrence of only shallow overland flow events in response to high rainfall events, with no locally or regionally significant drainage channels at the site.

6.4.6 Soil Contamination

Low permeability surficial soils are anticipated to limit the vertical migration of contamination from the potential sources of contamination at both sites. The potential exists for unmanaged accidental chemical release or spills (with potential to mainly occur in an incident at the REPF) to migrate with shallow overland flow during high intensity rainfall events and be redistributed in shallow soils across the site and potentially transport off-site.

Any seepage from the respective by-product storage facilities is likely to be limited to the immediate vicinity, with vertical migration through the sub-surface restricted by near surface clay and bedrock. A 1-D seepage assessment has been conducted to quantify and assess the extent of seepage from storage facilities. Results from this assessment are detailed in Section 8 and Appendix L.

Impacts from particulate fallout were assessed as part of the air dispersion modelling (refer Section 9) and RIA (refer Section 11). Both assessments concluded that these impacts were negligible.

6.4.7 BSF Landform Evolution Modelling

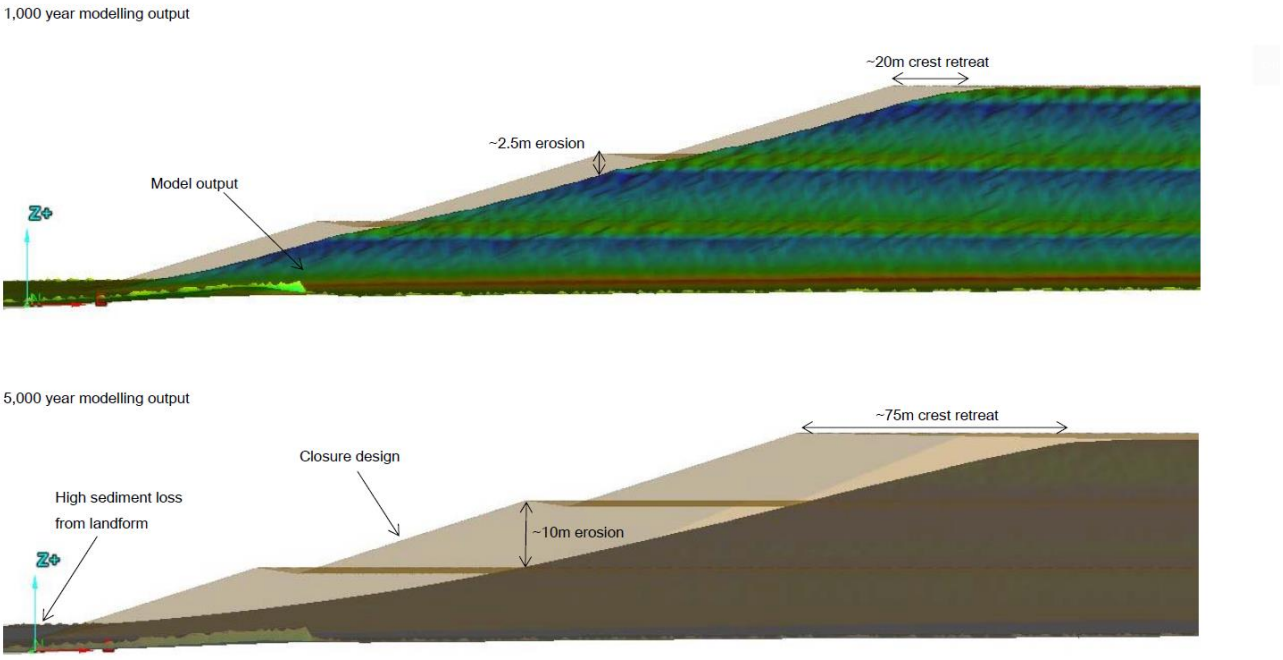
The LEM allowed for design characteristics, such as slope configuration or cover material usage, which may exacerbate erosion rates to be identified and the design potentially modified prior to closure. The LEM has been undertaken using a combination of watershed erosion prediction project (WEPP) and the SIBERIA landscape evolution model, both of which have been used across many different sites to model erosion patterns and landform developments over large timescales.

SWC has concluded (Appendix K) that the gypsum material is unlikely to be capable of remaining stable on a sloped closure landform surface over the long-term, so a second cover scenario utilising waste rock material as a stabilising agent in a 50:50 ratio with the gypsum, was modelled. The waste rock material was assumed to be a competent, fresh waste rock sourced from nearby mining operations (e.g., Super pit) and either mafic or felsic in composition.

The summary of erosion statistics show a distinct difference between the two cover scenarios both in terms of overall erosion rates and the dominant erosion process. The gypsum-only cover system displays much higher overall erosion rates, approximately three times higher than the mixed cover system scenario. In contrast to this, the average gully depths calculated from the gypsum cover scenario outputs are generally shallower than the mixed scenarios, particularly as the model run time extends beyond 500 years.

Comparing the two scenarios across the modelling timeframe has displayed significant differences in how the landform erodes. At 250 years, both modelling scenarios show development of surface erosion features on the batter slopes and sediment deposition on the batter berms. The depth of sediment loss on the batter berms for the gypsum cover scenario which averages approximately 0.7 m are substantially higher than the mixed cover system at approximately 0.2 m. At 500 years, the erosion depths increases but overall sediment movement follows the same trend of erosion on the batter slopes and deposition within the batter berm areas. At 1,000 years, the situation starts to diverge as the berm areas have been 'lost' as a landform feature due to the mass movement of sediment within the gypsum cover scenario. This results in increasing the mass transport of sediment from the landform surface to the surrounding plains. This process can be clearly seen in Insert 6-1 below, where the profile view of the 1,000- and 5,000-year outputs of the gypsum cover scenario are compared to the scenario with no mitigations implemented. These images illustrate the loss of the batter / berm design which has been replaced by a long gently curving sinusoidal type slope.

Insert 6-1: Gypsum Cover Scenario Compared with Initial Closure Design



6.5 Mitigation

6.5.1 Soil Erosion

During construction activities, potential impacts associated with disturbances to the natural surface water regime will be minimised by employing the following measures at both sites:

- Civil infrastructure will be designed to make use of natural flow regimes.
- The use of non-erosive materials on surface slopes of respective storage facility landforms.
- Ensuring geotechnical assessments of bunds and batters on storage facilities are conducted to ensure these structures are safe and stable.
- Drainage systems will be designed, constructed and maintained to ensure no adverse alteration to off-site downstream natural flow regimes.
- Stormwater from operational areas will be diverted to the stormwater dam. The drainage system will be designed to prevent erosion and sedimentation Sediment basins to prevent export of sediment laden stormwater will be installed at key locations as required.

6.5.2 Soil Contamination

During the construction and operation phases, potential impacts to soils associated with the Proposal's potentially contaminating activities will be minimised by employing the following measures at both sites:

- Minimise dust generation during operations using water sprays and "crusting" sprays over stockpiles, where required.
- Store concentrate in enclosed containers to minimise handling prior to use in the processing plant.
- Minimise potential for spills through personnel training and awareness.
- Contractor management, including:
  - Environmental compliance requirements in contracts.
  - Environmental Specification for Contractors (to be developed) will include:
    - Requirement for site-specific and activity specific EMP;
    - Roles and responsibilities;
    - Provision of Lynas relevant management plans, procedures and license conditions;
    - Provision of Lynas environmental policy;
    - Ensuring each contractor has adequate resourcing for environmental management of their activities relative to the level of risk;
    - Requirement for activity based and task specific environmental risk assessment; and
    - Environmental performance reporting requirements.
  - Coordination of waste segregation, recycling and management.
  - Training and awareness.
  - Audits and inspections.

- Environmental Management Plans include the following considerations:
  - Containment bunding, silt and oil traps will be established where necessary to remove sediments or pollutants from runoff.
  - All fuels, chemicals and waste materials will be appropriately stored in bunded areas (where required).
  - All controlled wastes (e.g., spent chemicals, empty chemical / hydrocarbon containers) will be stored in bunded areas prior to disposal by licenced controlled waste contractors.
  - Spill clean-up procedures.
  - Visual monitoring will be undertaken of diversion channels and downstream drainage lines, and the condition of vegetation in the diversion channels.
  - Continuous Emissions Monitoring System (CEMS) on gas treatment to include sulphur dioxide and criteria pollutants.
  - Ambient particulate monitoring around the perimeter of the site and/or at key sensitive receptor locations.
  - Visual monitoring of dust emissions during scheduled daily inspections.
  - Contingency measures for excessive dust generation.
- IP by-product management to include the following:
  - Development and implementation of a radioactive waste management strategy in consultation with the WA Radiological Council and DMIRS Radiation Safety Division;
  - Use of a geosynthetic clay liner (GCL) and a high-density polyethylene (HDPE) lining of Lot 500 storage facility base;
  - Ensuring storage facility design incorporates an adequate freeboard (nominally 300 mm) to prevent overtopping under significant rainfall events; and
  - Use of appropriate batter angles to minimise potential for erosion, and to ensure structure is safe and geotechnically stable.

6.5.3 BSF Landform Evolution Modelling

The results of LEM modelling of the two cover scenarios show that surface stability in both scenarios is not high, with large sediment movement and loss occurring over the modelled timeframe in both scenarios. The mixed cover system displayed higher resistance to erosion as would be expected, and also largely retained the over batter berm design configuration over the length of the model. However, neither cover scenario outcome can be considered stable over the long term for closure purposes.

Based on these outcomes SWC made the following recommendations:

1. Carry out direct measurements of material erodibility and surface runoff / permeability characteristics in a laboratory setting for the different components of all proposed cover system(s); and
2. Consider different cover system materials and/or proportions to increase long term surface stability of the closure design.

Lynas will be taking the recommendations above into account as the design process for the by-product landforms progresses. In response to point 2 above, Lynas has determined that surface stability can be achieved by bringing in blocky material to cover the by-product landform (rock armouring), plus subsoil and topsoil, as part of the facility closure plan.

6.6 Predicted Outcomes

6.6.1 Soil Erosion

At Lot 500, with mitigation measures in place, soil erosion impacts will be kept to a minimum. Regardless, the erodibility of this site will be similar to neighbouring areas, which can exhibit off-site sediment transport during high intensity rainfall events. Surface water management at the site will take this into account to ensure off site transport of native sediment or any dust or waste from the proposed REPF is minimised.

Residual impacts to soils in at Lot 500 are anticipated to be of low magnitude and significance to dependant ecology and minor soil rehabilitation works and natural processes post operations are likely to return Site soils to baseline conditions.

Pending site investigations at the Yarri Road site will extend existing knowledge on potential risks to local soils and inform required management at that site. Monitoring bore installation and baseline soil assessment of the BSF site commenced in March 2021.

6.6.2 Soil Contamination

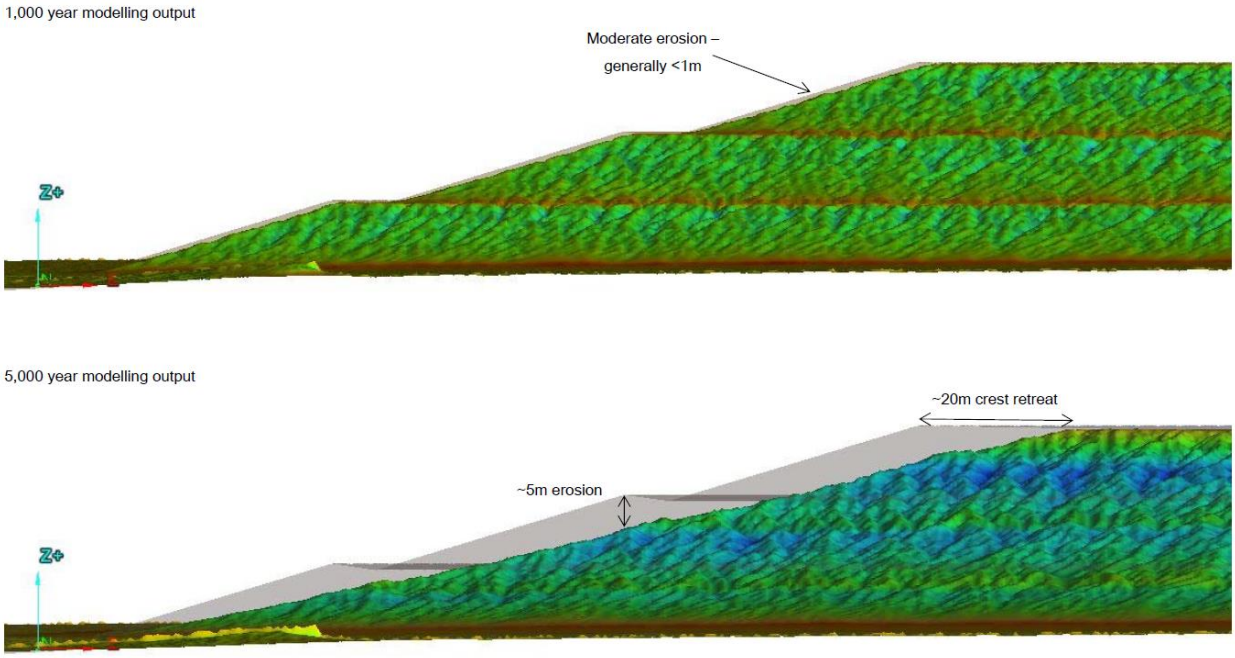
Residual soil contamination impact significance is low at both sites with best practice in construction of by-product storage facilities and supporting infrastructure and appropriate environmental management measures in place during operations.

6.6.3 BSF Landform Evolution Modelling

Considering the 1,000 and 5,000 year outputs for the mixed cover system modelling scenario, it can be seen in Insert 6-2 below, that the batter / berm configuration has been largely retained (strongly so at 1,000 years). This retention of the batter berm configuration results in lower erosion rates and much lower overall sediment loss to the surrounding land area.

With the implementation of the additional rock armouring mitigation measures outlined in Section 6.5.3, sediment loss from the BSF by-product landform can be readily managed.

Insert 6-2: Gypsum and Rock Cover Scenario compared with Initial Closure Design



7 ENVIRONMENTAL FACTOR – TERRESTRIAL FAUNA

7.1 EPA Objective

To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.

7.2 Policy and Guidance

- Biodiversity Conservation Act 2016.
- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).
- Environmental Factor Guideline Terrestrial Fauna (EPA 2016c).
- Technical Guidance Sampling methods for Terrestrial Vertebrate Fauna (EPA 2016d).
- Technical Guidance Terrestrial Fauna Surveys (EPA 2016e).

7.3 Receiving Environment

7.3.1 Lot 500

A Level 1 Vertebrate Fauna Risk Assessment by Terrestrial Ecosystems was undertaken at Lot 500 (Terrestrial Ecosystems, 2018) to determine the degree of risk that development and clearing may have on existing wildlife. A desktop analysis of several databases was carried out to prepare a list of potential vertebrate fauna that may occur, and a one-day field survey conducted to verify the findings of the desktop.

Terrestrial Ecosystems (2018) report that the fauna habitat in the Lot 500 area is an open eucalypt woodland with a mixed understory of scattered shrubs and chenopods. There are variations in the densities of trees, shrubs and ground cover, but these differences are not enough to support a significantly different vertebrate fauna assemblage. Much of the Lot 500 area is in reasonable condition, however, there is evidence of well used tracks through the area, prior ground disturbance and rubbish has been dumped in some areas.

A peer review of the Level 1 Vertebrate Fauna Risk Assessment for Lot 500 Kalgoorlie West (Terrestrial Ecosystems, 2018) was conducted by Onshore Environmental (Appendix F). The review concluded the following (Onshore Environmental, 2020):

- The previous vertebrate fauna report by Terrestrial Ecosystems (2018) assessed all the relevant conservation significant fauna species for the Lot 500 area located at Lot 500 Great Eastern Highway, Yilkari.
- A review of the current assessment guideline for EPBC Act referrals, as well as taxonomic and conservation status changes to potentially occurring fauna showed no alterations that would alter the findings of the initial report.