Initial Advice Statement

Vecco Critical Minerals Project

PREPARED FOR
Vecco Industrial Pty Ltd

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Table of Contents

Executive Summary **1**

1 Introduction **4**

1.1 Project background **4**

1.1.1 Construction and operational requirements 4

1.1.2 Co-ordinated project declaration 5

1.2 Project justification **2**

1.2.1 Capital expenditure 3

1.2.2 Alternatives considered 3

1.3 Project timing **6**

2 Proponent **7**

3 Legislative approvals **8**

3.1 Commonwealth approvals **8**

3.2 State and local approvals **8**

4 Project description **13**

4.1 Project overview **13**

4.2 Environmentally relevant activities **14**

4.3 Notifiable activities **15**

4.4 Tenure **17**

4.4.1 Mining tenements 17

4.4.2 Land holdings 19

4.5 Geology and resource **22**

4.5.1 Geological setting 22

4.5.2 Stratigraphy of the Project 22

4.5.3 Resource 23

4.6 Mine infrastructure and facilities **23**

4.7 Mineral processing **28**

4.7.1 Vanadium, HPA and molybdenum process 28

4.7.2 Sulphuric acid plant 33

4.7.3 Residue management 33

4.8 Product transportation **33**

4.9 Site access **34**

4.9.1 Mine access road 34

4.9.2 Saxby River crossing 34

4.10 Workforce and accommodation **34**

4.10.1 On-site accommodation 35

4.10.2 Workforce and accommodation consultation 35
4.11 Power supply 36
4.12 Water supply 36
4.13 Communications 37
5 Mine rehabilitation 38
5.1 Rehabilitation objectives 38
5.2 Post-mine land use strategy 38
5.3 Decomissioning and rehabilitation 38
6 Environmental considerations 41
6.1 Land 41
6.1.1 Topography 41
6.1.2 Soils 43
6.1.3 Land suitability assessment 45
6.1.4 Land use 45
6.1.5 Areas of state interest 46
6.1.6 Visual amenity 46
6.1.7 Potential impacts to land values 46
6.1.8 Management and mitigation measures 46
6.2 Water 47
6.2.1 Surface water 47
6.2.2 Potential impacts to surface water 54
6.2.3 Management and mitigation measures 54
6.2.4 Groundwater 54
6.2.5 Potential impacts to groundwater 57
6.2.6 Management and mitigation measures 57
6.3 Ecology 57
6.3.1 Flora 57
6.3.2 Vegetation communities 58
6.3.3 Fauna 62
6.3.4 Environmentally sensitive areas 62
6.3.5 Essential habitat 62
6.3.6 Potential impacts to flora and fauna 63
6.3.7 Management and mitigation measures 63
6.4 Air 63
6.4.1 Air quality 63
6.4.2 Greenhouse gas 63
6.4.3 Potential impacts to air quality 64
6.4.4 Management and mitigation measures 64

6.5 Noise and vibration 65
6.5.1 Potential impacts to noise and vibration levels 65
6.5.2 Management and mitigation measures 65
6.6 Traffic and transport 66
6.6.1 Potential impacts to traffic and transport 66
6.6.2 Management and mitigation measures 66
6.7 Waste management 67
6.7.1 Non-mineral Waste Management Plan 67
6.7.2 Mine Waste Management Plan 67
6.8 Native title and cultural heritage 68
6.8.1 Potential impacts 68
6.8.2 Management and mitigation measures 68
6.9 Social and economic environment 68
6.9.1 Population and demographics 71
6.9.2 Potential impacts to social and economic environment 74
6.9.3 Management and mitigation measures 74
6.10 Health, safety, hazard and risk 75
6.10.1 Potential impacts to health and safety 75
6.10.2 Management and mitigation measures 76
7 Stakeholder and community consultation 77
8 References 79

List of Figures

Figure 1: Project location 1
Figure 2: Project Tenure 18
Figure 3: Land underlying and adjacent to the Project 21
Figure 4: Indicative Project material flowsheet 24
Figure 5: Indicative Project layout, water management infrastructure, and maximum pit extent 26
Figure 6: Indicative Infrastructure Layout, Transport ML 27
Figure 7: Process flow diagram 1 30
Figure 8: Process flow diagram 2 31
Figure 9: Process flow diagram 3 32
Figure 10: Local topography 42
Figure 11: Regional hydrological context 49
Figure 12: Vegetation Management Act wetlands 51
Figure 13: 0.1% AEP flood extent 53
Figure 14: Potential GDEs 56
Figure 15: Regional ecosystems within the Production ML and Infrastructure ML 60
Figure 16: Regional ecosystems within the Transport ML 61
Figure 17: Nearby regional communities 70

List of Tables

Table 1: Likely regulatory processes 9
Table 2: Applicable ERAs for the Project 14
Table 3: Notifiable activities for the Project 15
Table 4: Land ownership underlying and adjacent to the Project 19
Table 5: Site stratigraphy 22
Table 6: Indicative Project site disturbance and composition 25
Table 7: Mineral processing stages 28
Table 8: SMUs within the Production ML 44
Table 9: Land suitability class description 45
Table 10: Summary of field verified Vegetation Communities 58

Table of abbreviations

AARC	AARC Environmental Solutions Pty Ltd
BoM	Bureau of Meteorology
CH_4	methane
CO_2	carbon dioxide
CO_2-e	carbon dioxide equivalent
DAF	Department of Agriculture and Fisheries (Qld)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DESI	Department of Environment, Science, and Innovation (Qld)
DEHP	Former Department of Environment and Heritage Protection (Qld)
DEM	digital elevation model
DNRM	Former Department of Natural Resources and Mines (Qld)
DSDI	Department of State Development and Infrastructure
DoR	Department of Resources (Qld)
DSITI	Former Department of Science, Information Technology, and Innovation (Qld)
E	endangered
EA	environmental authority
EHP	former Department of Environment and Heritage Protection (Qld)
EIS	Environmental Impact Statement
EP	equivalent person
EPP	Environment Protection Policy (QLD)
EPM	exploration permit for minerals
ERA	environmentally relevant activity
GAB	Great Artesian Basin
GHG	Greenhouse gas/gasses
HCl	hydrochloric acid
HPA	high purity alumina
H_2SO_4	sulfuric acid
LGA	local government area
LNG	liquified natural gas
LOM	life-of-mine
Mi	migratory species
MIA	mine infrastructure area
ML	mining lease
MLA	mining lease application
MNES	Matter(s) of National Environmental Significance
MPP	mineral processing plant
MSES	Matter(s) of State Environmental Significance
N_2O	nitrous oxide
NGER	National Greenhouse and Energy Reporting
NT	near threatened
PMF	probable maximum flood
PRCP	Progressive Rehabilitation and Closure Plan
RE	regional ecosystem
ROM	run-of-mine
SCL	Strategic cropping land
SLC	special least concern
SMU	soil management unit
STP	sewage treatment plant
SWMP	Site Water Management Plan
SWMS	Site Water Management System
TEC	threatened ecological community
the Project	Vecco Critical Minerals Project

DTMR	Department of Transport and Main Roads (Qld)
V	vulnerable
V_2O_5	vanadium pentoxide
VC	vegetation community
Vecco	Vecco Industrial Pty Ltd
VM	vegetation management
WoNS	weed(s) of national significance

Units of measurement

%	percent
°	degree(s)
°C	degree(s) Celsius
cm	centimetre(s)
dB	decibel(s)
dBA	'A' weighted decibel
dBZ	decibel relative to 'Z'
ha	hectare(s)
K	hydraulic conductivity
kg	kilogram(s)
kL	kilolitre(s)
km	kilometre(s)
km^2	square kilometre(s)
L/s	litre(s) per second
m	metre(s)
mADH	metre(s) in Australian Height Datum
Mbcm	million bank cubic meter
mbgl	metre(s) below ground level
mg/kg	milligram(s) per kilogram
mg/L	milligram(s) per litre
mm	millimetre(s)
Mtpa	million tonne(s) per annum
pH	Potential hydrogen unit
t	tonne(s)
tpa	tonne(s) per annum
µm	micrometre(s)

Executive Summary

An Initial Advice Statement (IAS) has been prepared for the Vecco Critical Minerals Project (the Project), in accordance with Part 4, Subdivision 2, section 27AB of the *State Development and Public Works Organisation Act 1971* (SDPWO Act).

This IAS has been prepared for the key purpose of:

- providing the Coordinator General with sufficient information to support an application for declaration as a Coordinated Project requiring an Environmental Impact Statement (EIS) under the State Development and Public Works Organisation Act 1971 (SDPWO Act); and
- providing sufficient detail to enable advisory agencies and other stakeholders to have effective input into establishing a Terms of Reference where an Environmental Impact Statement is approved for the Project.

Key approvals being sought through the EIS process under the SDPWO Act include an environmental authority (EA), progressive rehabilitation and closure plan (PRCP), and mining tenure. Approvals for downstream activities, including battery electrolyte manufacturing and export, will be sought separately.

The Julia Creek region has been identified as a Critical Minerals Zone in the Queensland Critical Minerals Strategy (DSDILGP 2023). This area has substantial vanadium resources, and extracting this resource would unlock a significant critical minerals industry for Queensland.

Vecco Industrial Pty Ltd (the Proponent or Vecco) is seeking to develop a world class vanadium deposit in the Critical Minerals Zone. The Project is a greenfield site, approximately 70 km north of Julia Creek. The Project will be conducted across three Mining Lease Application (MLA) areas: MLA 100367, MLA 100368, and MLA 100369.

The Project will produce critical minerals including vanadium pentoxide (vanadium, V_2O_5), high purity alumina (HPA) and molybdenum trioxide (molybdenum). Vanadium is to be used primarily in the manufacture of industrial scale batteries for grid scale energy storage. HPA is an important component of lithium-ion batteries, high-performance electronics, and optical applications. It has additional uses in the automotive and aerospace sectors. Molybdenum is a by-product of vanadium processing and has applications across multiple sectors. These include use in electronic devices, as a strengthening alloy for steel, and usage in the synthesis of some organic compounds.

The Project will consist of an early construction and development phase occurring over approximately one year, followed by shallow, open-cut mining operations which will extract up to 6.7 Mtpa run-of-mine (ROM) ore and produce up to 8,000 tpa V_2O_5, 4,000 tpa HPA, and 600 tpa molybdenum over an operational life of approximately 17 years. This resource will be refined through an on-site processing facility. Total production quantities are estimated to be 136,000 tonnes of V_2O_5, 68,000 tonnes of HPA, and 10,000 tonnes of molybdenum.

Barriers to establishing a critical minerals industry in the Julia Creek region include the costs and time spent undertaking environmental, technical, and survey work to support approval applications, funding and developing project-specific infrastructure, approval and tenure processes, and gaining access to a secure and reliable water supply (DSDILGP 2023).

The Vecco Critical Minerals Project is in the advanced stages of environmental assessment and has undertaken a range of detailed technical assessments to support approval applications, including terrestrial and aquatic ecology, surface water and groundwater, air, greenhouse gas emissions, social and transport. These investigations have included field surveys, modelling work, and community engagement – and will be developed further as part of the EIS process.

The development and operation of the Project will require significant investment. Capital expenditure, including contingency, is calculated across two stages - where Stage 2 is anticipated to commence 12 months after Stage 1.

- Stage 1 – Capital estimate for mining and processing plant development: $605.8 million.

- Stage 2 – Capital estimate for the HPA plant upgrade: $192.3 million.

Average annual operating expenditure including royalties is projected to be approximately $226.6M. Capital expenditure will be funded via a mix of debt and equity, and operating expenditure will be funded through operating cash flows.

An assessment of water supply options for the project has been undertaken. Under the Water Plan (GABORA), part of the water saved (≥ 30%) through remediation works on open Great Artesian Basin (GAB) bores may be accessed as a water license in return for capping and preventing uncontrolled release. This approach provides a net increase in water volumes retained in the GAB with tangible environmental benefits and would provide a secure water supply for the Project. This has been identified as the preferred option for the Project.

Detailed environmental impact assessment work has been undertaken for the Project since 2022. Among other aspects, this includes terrestrial and aquatic ecology assessment of the Project. Targeted and repeated surveys for threatened species, including the Julia Creek Dunnart, have been conducted in and surrounding the Project area by expert ecologists. These surveys have found no evidence of threatened species presence on the site. The closest record of Julia Creek Dunnart occurs 47 km from the Project. An assessment of the Project's potential to cause significant impact to threatened species will be included in the EIS. The Julia Creek Dunnart is listed as a Vulnerable species under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). A referral has been submitted to the Commonwealth in March 2024.

A detailed stakeholder engagement and community consultation process for the Project has included:

- on-the-ground dissemination of information about the Project;
- planning and implementing opportunities for stakeholders to comment on the potential impacts of the Project;
- obtaining, considering, and responding to stakeholder comments and issues of concern; and
- developing relevant solutions and management strategies during the Project development phase to enhance benefits associated with the Project.

It is recognised that the Project presents significant social and economic benefits to the surrounding region and the State of Queensland. The Project is expected to:

- deliver highly sought after critical mineral products such as vanadium and high purity alumina for use in local battery manufacturing;
- become an important contributor to the State's transition to a renewable energy grid, and decarbonised economy;
- contribute significantly to the State's economy and provide ongoing employment opportunities in the resources industry;
- require significant capital investment and expenditure over the life of the Project; and
- increase industrial activity in the region and generate wealth for many sectors of the local and regional economies.

The Project strongly aligns with government policies and plans regarding critical minerals, including:

- Queensland Energy and Jobs Plan;
- Queensland New Industry Development Plan – Queensland Battery Industry Strategy 2024-2029;
- Queensland Critical Minerals Strategy 2023; and
- contributing to the mining and production of vanadium, high purity alumina, and molybdenum – identified as critical minerals in the Mineral Resources Regulation 2013 (Qld), and Australia's Critical Minerals List.

Consistent with the Queensland Government's Critical Minerals Strategy, and as a response to increased demand for vanadium, the Project will directly facilitate the renewable energy transition through the transformation of high purity V_2O_5 mined from the Project into high-grade vanadium electrolyte.

The Proponent is seeking approvals from both State and Commonwealth. Due to Project complexity and importance to the State, as well as its potential impacts on an economic, social, and environmental level, the Proponent considers the criteria for a Coordinated Project declaration - requiring an EIS under the SDPWO Act, and as outlined in Section 27(2)(b) of the SDPWO Act – have been met. This includes that the Project:

- has complex approval requirements, involving local, state and federal governments;
- has strategic significance to the locality, region and state, including for the infrastructure, economic and social benefits, capital investment and employment opportunities it may provide;
- has significant infrastructure requirements including for the provision of electricity, product transport and workforce accommodation; and
- will require detailed environmental impact assessments.

1 Introduction

1.1 Project background

The Vecco Critical Minerals Project is a proposed greenfield, open-cut vanadium mine, which will also produce HPA and molybdenum as by-products. The Project is located in Queensland's Critical Minerals Zone, approximately 70 km north of the Julia Creek township and 515 km west of Townsville (Figure 1).

Vecco has conducted resource exploration and definition activities under an exploration permit for minerals (EPM) since 2021. Concurrently, Vecco has progressed baseline technical studies as part of an environmental impact assessment for the Project. The baseline data gathered for the Project site and surrounding area includes both environmental, and social values. These have been used to assess potential impacts associated with Project development, with consideration of cumulative impacts.

The key objectives of the Project are to:

- operate profitable mining operations which maximise recovery of high-quality critical mineral products (vanadium, HPA and molybdenum) for domestic markets and export;
- support the renewable energy transition at State and Federal levels, by enabling vanadium electrolyte production locally for use in battery production and renewable energy storage;
- design, construct, and operate the Project in a manner that avoids and minimises adverse impacts on the social and natural environments; and
- comply with all relevant statutory obligations and continue to improve processes which enhance sound environmental management.

There is significant domestic and international demand for the critical mineral products that will be mined and processed as part of this Project. It is expected that all of the vanadium, HPA, and molybdenum from the early stages of the Project will be consumed domestically, with the potential for future export of vanadium to Northern America for processing.

The vanadium product will be utilised in Vecco's Vanadium Electrolyte Plant located in Townsville, for use in vanadium redox flow batteries (VRFB). Where supply of mineral product exceeds capacity of the Electrolyte Plant, export of vanadium will be through the port of Townsville.

Vecco has engaged in a conditional offtake agreement with a Queensland based entity for the HPA and expects that all downstream processing of HPA will occur domestically.

Market placement decisions for the molybdenum trioxide will be finalised as part of on-going Project development. The quantities extracted and processed as part of this Project are small in the scale of global demand and current supply – and it is considered probable that the tonnes produced will be utilised in domestic downstream processing.

1.1.1 Construction and operational requirements

The construction and operation of the Project will require access to a secure and sustainable water supply, including for use in mineral processing, dust suppression, and as potable water. The proposed water supply for the Project is discussed in Section 4.12.

The remote location of the Project makes connection to the regional electricity grid impractical. Therefore, the power supply needs for the Project during operation will be supplied by a composition of on-site sources including a solar array, steam turbine electrical power generated by the sulphuric acid plant, and supporting generators. Power supply during construction will be provided by generators, until the solar array has been developed. The Project power supply is detailed in Section 4.11.

The processing of minerals on site will require sulphuric acid. This will be produced in a sulphuric acid processing plant located in the Project's Mine Infrastructure Area (MIA), utilising external supplies of sulphur as feed. The Proponent will ensure sufficient quantities of sulphur is available over the life of the Project through commercial agreement. Mineral processing is detailed in Section 4.7.

Access to the Project site will require the development of an access road. Through agreement and discussion with the underlying landowner, the access road will be predominantly situated along an existing fence line and associated access track. This will reduce the impacts to the environmental values of the underlying property. The access road will traverse the ephemeral Saxby River. The proposed design of this crossing is as a bed level road, with culverts to sustain fish passage in larger channels. The bed level nature of this crossing, and location along existing fence line clearing, will minimise impacts to the vegetation and environmental values of this area. Site access is discussed in Section 4.9.

Where practicable, resources to develop and operate the Project site will be sourced through local supply agreements. This ensures that the Project will provide long-term support for local business and industry. In combination with the additional benefits of reducing transport requirements and corresponding emissions.

1.1.2 Co-ordinated project declaration

The Proponent considers the criteria for a Co-ordinated Project declaration - requiring an EIS under the SDPWO Act, and as outlined in Section 27(2)(b) of the SDPWO Act – have been met. This includes that the Project:

- has complex approval requirements, involving local, state and federal governments;
- has strategic significance to the locality, region and state, including for the infrastructure, economic and social benefits, capital investment and employment opportunities it may provide;
- has significant infrastructure requirements including for the provision of electricity, product transport and workforce accommodation; and
- will require detailed environmental impact assessments.

Given the scale of the Project, a myriad of approvals are required from Commonwealth, State and Local Government departments and agencies in accordance with relevant legislation. These are outlined in Section 3.

The Project will present significant social and economic benefits to the surrounding region and the State of Queensland. The Project is expected to:

- deliver highly sought after critical mineral products such as vanadium and high purity alumina for use in local battery manufacturing;
- become an important contributor to the State's transition to a renewable energy grid, and decarbonised economy;
- contribute significantly to the State's economy and provide ongoing employment opportunities in the resources industry;
- require significant capital investment and expenditure over the life of the Project; and
- increase industrial activity in the region and generate wealth for many sectors of the local and regional economies.

A number of services are required to support the Project, including:

- road network requirements;
- airport upgrades;
- water supply infrastructure;
- accommodation; and
- communications.

The Proponent has undertaken significant baseline environmental and technical assessments since 2022, alongside resource definition and Project design. Considering the scale and scope of the Project, the Proponent has determined that an EIS assessment pathway as a coordinated project would be appropriate. Therefore, the Project will further require Terms of Reference (ToR) relevant to the Project to be developed in order to define the manner in which an EIS should be prepared.

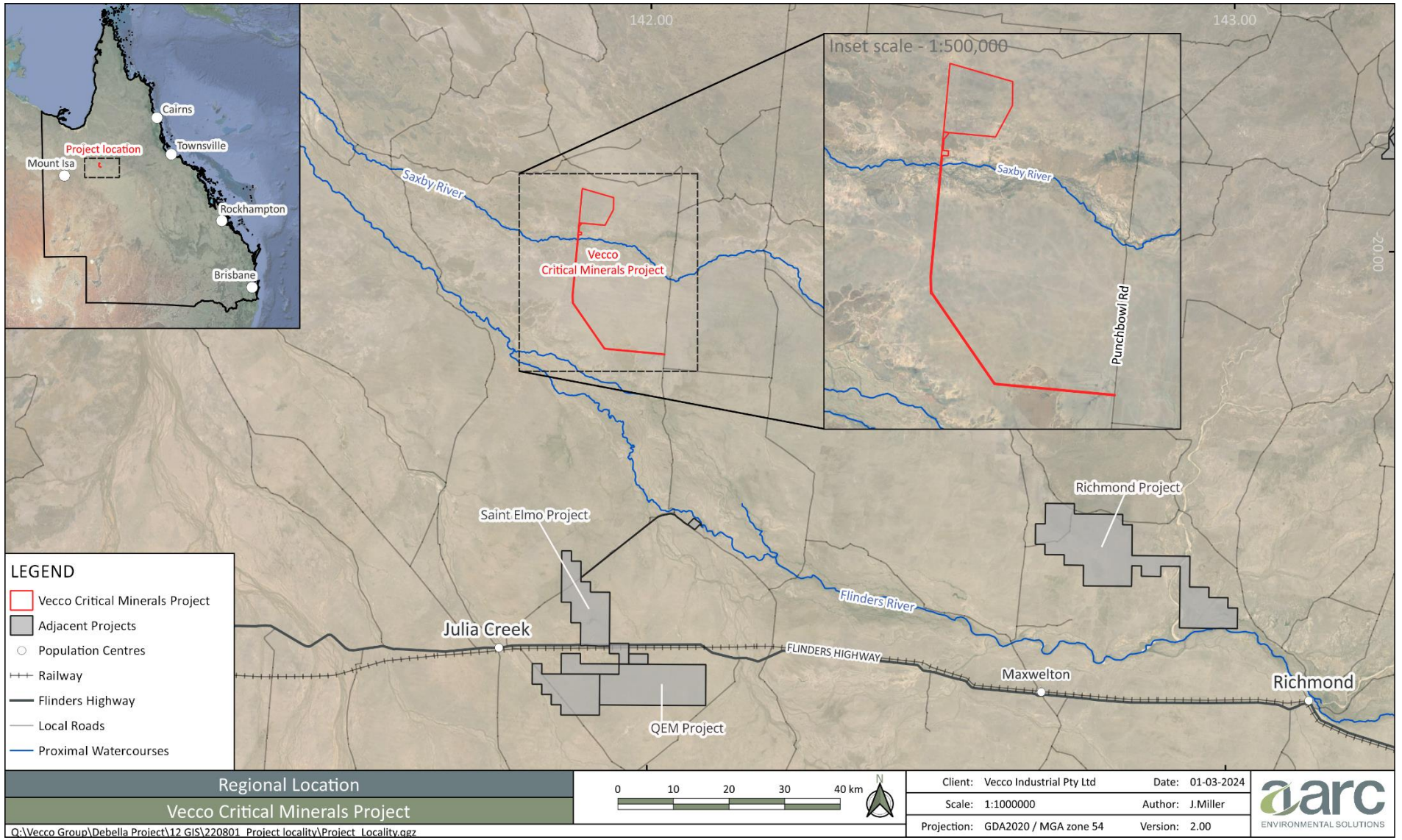

Figure 1: Project location

1.2 Project justification

Under the Queensland Government's Climate Action Plan, Queensland's current progressive emissions reduction and renewable energy targets are:

1) 30% reduction in GHG emissions on 2005 levels by 2030;

2) 75% reduction in GHG emissions on 2005 levels by 2035;

3) 50% of energy will be provided by renewable energy sources by 2030;

4) 80% of energy will be provided by renewable energy sources by 2035; and

5) A zero net emissions economy by 2050.

Vanadium, high purity alumina, and molybdenum are recognised as 'critical minerals' by both the Queensland Government through the Mineral Resources Regulation 2013 (Qld) and the Commonwealth Government's Critical Minerals List. In addition to its traditional uses in steelmaking, vanadium is used in the manufacture of vanadium redox flow batteries. Large-scale vanadium redox flow batteries will be a critical part of Australia's energy transformation, with the shift from centralised coal and gas generation to distributed and intermittent sources of energy such as wind and solar. Vanadium redox flow batteries are an ideal energy storage solution for utility and commercial uses because of their long lifespan (more than 25 years) and their application in both on-grid connection or off-grid storage. HPA is an important component of lithium-ion batteries, high-performance electronics, and optical applications. It has additional uses in the automotive and aerospace sectors. Molybdenum is a by-product of vanadium processing and has applications across multiple sectors. These include use in electronic devices, as a strengthening alloy for steel, and usage in the synthesis of some organic compounds.

The Queensland Government's Critical Minerals Strategy 2023 (DoR 2023) identifies the importance of developing a critical minerals industry in Queensland to take advantage of opportunities created by the energy transition and the new economy flowing from it. The strategy outlines the prioritisation of 'the exploration and extraction of [Queensland's] mineral resources, while fostering domestic innovation, investment, and sustainable practices'. The strategy also identifies the importance of moving quickly to seize the opportunity that has arisen in the critical minerals sector, including through 'a targeted approach and streamlining government processes'.

Recent global increases in the demand for vanadium has triggered the Queensland government to implement a goal to capitalise on the state's rich vanadium deposits, in order to become a global leader in the production and exportation of the mineral. Queensland's strategy has a renewable energy focus, with the intention to use vanadium in the manufacture of vanadium redox flow batteries associated with renewable energy generation and a shift to decarbonisation (DSDILGP 2023). In further support of achieving this goal through critical minerals and batteries, Queensland New Industry Development Plan - Queensland Battery Industry Strategy 2024-2029 identifies batteries as a "priority industry with the potential to support the state's ambitious renewable energy targets". This will be achieved through partnerships forged between industry and government and build upon the mining expertise and downstream domestic processing potential in Queensland.

Consistent with the Queensland Government's Critical Minerals Strategy, and as a response to increased demand for vanadium, the Project will directly facilitate the renewable energy transition through the transformation of high purity V_2O_5 mined from the Project into high-grade vanadium electrolyte. Vecco currently operates a pilot electrolyte processing facility in Townsville, however as mining operations commence this facility will be used for training and research purposes. A newly proposed facility with greater production capacity will be developed in Townsville to process the majority of mined product. The Townsville plant at full capacity will produce enough electrolyte annually to support 350 MWh of energy storage capacity per cycle.

The Project will play a significant role in assisting the Queensland Government in achieving its renewable energy and emissions reduction goals, and the Queensland Government's Battery Industry Strategy and Energy

and Jobs Plan (Queensland Government 2022). Under the Plan, $500 million will be invested for government backed grid-scale and community batteries The development of a circular economy using critical minerals that are not only mined and processed in Queensland through the Vecco Critical Minerals Project but are then transformed into batteries to support local Queensland communities, will secure jobs and communities, and achieve the progressive outcomes of the Energy and Jobs Plan.

The Project will also contribute to the federal Critical Minerals Strategy 2023-2030 (DISR 2023) by facilitating growth in the national production and exportation of critical minerals to meet global demands. Critical minerals are essential for the energy, transport, aerospace, defence, medical, automotive and telecommunications sectors, with additional manufacturing applications. The Australian government's vision is to become a global leader in critical mineral production by 2030, with the objectives to achieve a stable supply, expand sovereign capabilities, and grow regional economies (DISR 2023).

Key strategic benefits of the Project are summarised as follows:

- the Project will provide secure and long-lasting skilled employment opportunities in a regional location during construction and operation;
- the Project will be a key player in achieving the progressive targets of the Queensland Government's Climate Action Plan, and the Queensland Government's Critical Minerals Strategy;
- there will be significant investment at a regional and state level as a result of the Project, including through downstream processing facilities and further development of domestic value-adding industries; and
- the federal Critical Minerals Strategy will rely upon the development of projects such as this to grow the Australian critical minerals industry and achieve the vision of becoming a global leader in critical mineral production by 2030.

1.2.1 Capital expenditure

The development and operation of the Project will require significant investment. Capital expenditure is calculated across two stages - where Stage 2 is anticipated to commence 12 months after Stage 1.

- Stage 1 – Capital estimate for mining and processing plant development: $605.8 million.
- Stage 2 – Capital estimate for the HPA plant upgrade: $192.3 million.

Operational expenditure for the life of the Project including mining, processing, and rehabilitation is calculated to be approximately $2,410 million. This does not include royalties.

Capital expenditure will be funded via a mix of debt and equity, and operating expenditure will be funded through operating cash flows.

Over the life of mine, the Project will generate royalties for Queensland, and, where minerals and battery electrolyte is exported, the Project will generate revenue for Australia.

1.2.2 Alternatives considered

The Proponent has assessed the Project design, and considered numerous alternatives, to ensure that the outcome is a best practice and sustainable operation. These alternatives include for mining and production, water supply, power supply, accommodation, transport, and a scenario where the Project does not proceed. These alternatives are detailed below.

The EIS process will include further detailed analysis of the options considered, including analysis of key environmental considerations and justification of the final proposed Project description.

1.2.2.1 Mining and production

The Proponent has explored location alternatives however none are considered feasible due to the specific location of the high-quality and near surface vanadium resource at the Project location.

The Project design has considered a number of different mining and production scenarios through ongoing feasibility studies, including:

- analysis of varying mining and production scenarios which have been refined through on-going resource exploration and mine planning, environmental assessment, and stakeholder engagement;
- vanadium and HPA processing techniques were assessed and trialled in the laboratory to optimise recovery methods and minimise environmental impacts; and
- differing process residue treatment and disposal strategies were investigated and refined through laboratory testing and modelling to develop a preferred backfill strategy that protects environmental values, aligns with land use policy and reduces residual risk post-mining. Options included:
    - ex-pit tailings storage – which has been assessed to be unviable due to long term liability and potential for negative impacts on post-mining land use objectives; and
    - in-pit disposal of neutralised residue – which has been determined to be the preferred option for the Project and is an environmentally sound and practical approach to ensure the sustainability and usability of the post-mining landform, and results in no final void.

The site layout and extent of the open-cut pit has been determined by the presence of high-quality, accessible mineral resources within the MLA. Alternative locations for this pit would reduce the benefits and economic viability of this Project. The MIA is situated in close proximity to the mine pit to increase operational efficiencies. Where practicable, the MIA and Project infrastructure has been situated in open grasslands, away from areas of dense tree growth. This will ensure reduced impact on environmental values and the need for vegetation clearing during development.

1.2.2.2 Water supply

The Project will require approximately 3,200 ML of water supply per year. Options assessed for suitability as water supply include:

- a water license under the Water Plan (GABORA); and
- extraction from the Saxby River during high flow events under an allocation of water held in the Strategic Reserve.

Under the Water Plan (GABORA), part of the water saved (≥ 30%) through remediation works on open Great Artesian Basin (GAB) bores may be accessed as a water license in return for capping and preventing uncontrolled release. This approach provides a net increase in water volumes retained in the GAB with tangible environmental benefits and would provide a secure water supply for the Project. This has been identified as the preferred option for the Project. A summary of benefits of this approach are:

- tangible benefits for environmental values through water saved and retained in the GAB;
- providing a consistent and secure supply of water for the Project; and
- removing the need for streamflow harvesting as an alternate supply.

Engagement with the Department of Regional Development, Manufacturing and Water (DRDMW) has identified broad support for this strategy.

The Project has been deemed a project of regional significance, allowing for an application to be made to access water held in the Water Plan (Gulf) Strategic Reserve. This process would involve extraction from the Saxby River during high flow events. Extraction from the Saxby River has been assessed to be the least preferred option due to relative security of water supply, and potential impacts on flow and downstream users.

The final water supply solution will be subject to approval under the Water Act but will aim to minimise impacts on the environment and other users. Water supply is further discussed in Section 4.12.

1.2.2.3 Power supply

The Project has an expected power demand of approximately 16 MW. Power supply options have been assessed, including connection to the regional electricity grid, and on-site power generation. Due to the remote location, on-site power generation is the most practical approach for the Project. To reduce operational costs and greenhouse gas emissions, the Project will install a solar array with combined battery energy storage system with approximately 10 MW capacity. This will be supported by steam turbine electrical power generated by the sulphuric acid plant, and supplementary supply from diesel or gas fired generators, when renewable options aren't available. This is discussed further in Section 4.11.

1.2.2.4 Accommodation

The accommodation of the Project's workforce required careful consideration to achieve the most practical outcome. This includes an understanding of the positive and negative impacts to regional communities. Given the remote location and rural nature of the Project, the options for accommodation are:

- competing for existing and limited accommodation options, or developing new facilities, in the nearby regional communities such as Julia Creek; or
- developing an on-site accommodation facility with capacity for the entire workforce.

The accommodation capacity of the regional communities is extremely limited, with housing in short supply. Therefore, the development of new facilities would be required. Additional limitations identified through extensive consultation such as an at-capacity electricity grid, significant travel distance daily for workers, and potential for an increase in unsociable behaviour, make this option unsuitable.

The development of on-site accommodation for workers would ensure that there are minimal daily travel requirements, mitigating fatigue and health and safety risks. It will also be sustained by the infrastructure of the Project, including the off-grid power supply. This approach has been assessed as being the only feasible option for the Project. Details of the on-site accommodation are provided in Section 4.10.

On-site accommodation may reduce the direct expenditure from the workforce in the local community, however Vecco has engaged local companies in the region to establish a local procurement policy. Where practicable, resources to develop and operate the Project site will be sourced through local supply agreements. This ensures that the Project will provide long-term support for local business and industry. In combination with the additional benefits of reducing transport and housing requirements, likelihood of unsociable behaviour, and risk to the regional electricity supply, the on-site accommodation is a net-positive for the region.

Vecco has plans to operate a satellite office, with a small accommodation capacity, in Julia Creek. This would assist with transiting employees and visitors, in addition to providing a central and convenient location for the coordination of freight and logistics before going out site. This has further practical benefits; in that it will reduce the amount of traffic on Punchbowl Road as freight items can be held until a full load can be achieved. Vecco has no current tenure in or near Julia Creek and so arrangements to develop this satellite office will need to be determined as part of ongoing Project development.

1.2.2.5 Transport

The final mineral products will be packed on-site into 1 t bulk bags and transported by truck to Townsville for secondary processing into battery electrolyte. The Project is not a large mine, and therefore the rate of production and movements, and the capacity to collect and deliver directly from site to the downstream facility, make trucks a preferred transport option over the use of alternatives such as the rail network. Transport of product is discussed further in Section 4.8.

The on-site accommodation of the Project workforce will reduce the daily travel requirements. Transport to and from the Project site for roster rotation will be by bus to the nearest viable airport, or by light vehicle for workforce residing locally. It is the intention of the Proponent that FIFO workers will be flown directly to and from Julia Creek, however this will require an upgrade of the Julia Creek runway and aerodrome facilities. The Proponent has engaged the relevant Government departments to work towards this outcome. Transport of the workforce is discussed further in Section 4.10.

1.2.2.6 The 'do nothing' scenario

The Project has assessed a 'do nothing' scenario, whereby the mine and Project does not proceed. At a minimum, the following consequences of this outcome are inferred:

- there will be a loss of skilled employment opportunity including for 300 construction workers during Project development, and 274 operational workers over the life of the Project;
- approximately 136,000 tonnes of V_2O_5, 68,000 tonnes of HPA, and 10,000 tonnes of molybdenum will not be mined, resulting in loss of mining royalties;
- significantly reduced state and federal capacity to develop and support an economy which mines and processes critical minerals domestically;
- there will be a loss of federal tax revenue; and
- there will be a loss of state tax revenue royalties.

1.3 Project timing

The Project has conducted extensive technical analysis and a program of studies designed to support the feasibility study and the environmental impact assessment process. It is estimated that the ongoing feasibility assessment program will be completed in early 2024. The Environmental Impact Statement (EIS) for the Project is anticipated to be submitted late 2024, subject to procedural timing.

The coordinated project declaration and EPBC referral process includes engagement with the Office of the Coordinator General, advisory agencies, the Department of Climate Change, Energy, the Environment and Water, and public consultation. These processes will determine the final timeline of the Project development.

Pending EIS approval, additional approvals and time will be required prior to the commencement of Stage 1 of the Project: construction, development of the processing plant, and early mining. The early works construction period will likely commence in mid to late 2025 over a period of approximately one year. Stage 2, including development of the HPA processing plant capacity and further mining operations, may commence towards the end of the construction period in 2026. Mining and processing will continue over a period of approximately 17 years. Mining is expected to be maintained at a maximum of 6.7 Mtpa of ore by year 2 of production, until year 17. The Project site and mine pit will be progressively rehabilitated throughout operation, and rehabilitation works will conclude approximately 10 years after production ceases.

2 Proponent

The Proponent for the Project is:

Vecco Industrial Pty Ltd.
Level 10, 40 Creek St, Brisbane, Queensland, 4000
ABN: 66 158 805 497
ACN: 158 805 497
RSO Registration Number: 691272

Vecco Industrial Pty Ltd (Vecco, the Proponent) is a wholly a subsidiary of Vecco Group Pty Ltd and is the registered entity proposing to carry out the Project. All permits and licences are held and will be issued to that entity.

Vecco Group Pty Ltd is a private Australian based company founded in 2014. The executive team has a suite of experience in mineral project development, the renewable energy sector, as well as mining and chemical engineering expertise, spanning national and global contexts.

Since its establishment, Vecco has developed one of the largest low-cost vanadium projects in the world, integrating the mining of high purity vanadium with a downstream electrolyte facility for the manufacturing of battery electrolyte to support the national and global decarbonisation transition.

The Proponent has the financial and technical capacity to complete an EIS and has recruited an experienced and proficient team to deliver the required works. Technical expertise has been demonstrated through the commissioning of Queensland's first vanadium electrolyte plant in Townsville in 2023. As part of the application for a coordinated project, the Proponent will provide financial and technical capability statements to the Coordinator General separately to this document.

Vecco has strong support for equity funding from strategic shareholders with capacity to fund the project with equity. The proponents strategic shareholders have successfully secured funding and operated mines and energy infrastructure projects globally. The project economics provide for a compelling investment case for both debt and equity financiers. Vecco will own and operate the Project.

Vecco has never been convicted of an environmental offence under Queensland or other Australian Government legislation.

3 Legislative approvals

Given the scale of the Project, a myriad of approvals are required from Commonwealth, State and Local Government departments and agencies in accordance with relevant legislation. The Proponent has determined that an EIS assessment pathway as a co-ordinated project would be appropriate. Therefore, the Project will further require Terms of Reference (ToR) relevant to the Project to be developed in order to define the manner in which an EIS should be prepared.

3.1 Commonwealth approvals

The Project is expected to require approval under the Commonwealth EPBC Act. A referral to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) has been made addressing the potential impacts to Matters of National Environmental Significance (MNES) under the EPBC Act.

With regards to MNES, it has been assessed that there is potential for threatened species to occur on or near the proposed Project site (including within a 50 km buffer). Based on likelihood of occurrence, field surveys of the Project site, and experience of ecologists, it has been determined that the Julia Creek Dunnart (*Sminthopsis douglasi)* is the key species of concern. The Julia Creek Dunnart is a species listed as Vulnerable under the EPBC Act and is identified as potentially occurring on or near the Project site.

Repeated targeted surveys for the Julia Creek Dunnart by expert ecologists have found no evidence of Julia Creek Dunnart in the project area. With consideration of criteria described in the MNES Guidelines, an assessment of the Project's potential to cause significant residual impacts to Julia Creek Dunnart will be undertaken as part of the EIS process. The Julia Creek Dunnart is listed as a Vulnerable species, and therefore a referral will be made to the Commonwealth.

In terms of the assessment process, the Proponent considers that the Project meets the criteria for a Coordinated Project declaration, requiring an EIS under the State Development and Public Works Organisation Act 1971 (SDPWO Act). Should this Project be determined to be a controlled action under the EPBC Act, then the Commonwealth assessment and approval will be required. The Australian Government has bilateral agreements with state and territory governments to accredit environmental assessment processes that meet set standards. The Coordinated EIS process is an accredited form of assessment for the purposes of the EPBC Act.

3.2 State and local approvals

Legislative approval of the Project also requires an application for Environmental Authority (EA) and Progressive Rehabilitation and Closure Plan (PRCP), under the Queensland *Environmental Protection Act 1994* (EP Act). These applications will be made through the Queensland Department of Environment, Science, and Innovation (DESI).

The Project is also subject to several Mining Lease Applications, which have been lodged with the Department of Resources (DoR) under the Queensland *Mineral Resources Act 1989* (MR Act).

Under the Water Plan (GABORA), part of the water saved (≥ 30%) through remediation works on open Great Artesian Basin bores may be accessed as a water license in return for capping and preventing uncontrolled release. To provide water security for the Project and achieve positive environmental outcomes, the Proponent will work towards obtaining a water license by undertaking remediation works on nearby open Great Artesian Basin bores. The Department of Regional Development, Manufacturing and Water (DRDMW) has been engaged for input on this process and is supportive of the approval pathway described. Further detail on the proposed water supply for the Project is provided in Section 4.12.

A summary of likely Federal, State and Local Government legislation identified as relevant to approvals has been presented in Table 1. A summary of environmentally relevant activities (ERAs) for the Project is provided in Section 4.2. A summary of notifiable activities for the Project is provided in Section 4.3.

Table 1: Likely regulatory processes

Legislation	Administering Authority	Approval Trigger	Approval Type	Relevance to Project	Within Scope of EIS[1]
Aboriginal Cultural Heritage Act 2003 *Torres Strait Islander Cultural Heritage Act 2003*	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts (DSDSATSIP)	Activity that has the potential to harm Aboriginal or Torres Strait Islander cultural heritage. A Project requiring an EIS.	A Cultural Heritage Management Plan (CHMP) developed for the Project. The CHMP will be reviewed and updated if/as necessary, in respect of proposed Project activities.	Entire Project	No
Environmental Protection Act 1994	DESI	Conducting an Environmentally Relevant Activity (ERA) that is a resource activity or resource project. Triggers for an EIS level of assessment.	EA application (through an EIS level of assessment). Progressive Rehabilitation and Closure Plan (PRCP).	Entire Project	Yes
Environment Protection and Biodiversity Conservation Act 1999	DCCEEW	Potential impacts to Matters of National Environmental Significance (MNES) under the EPBC Act. Request for assessment under the bilateral agreement with the Queensland Government through an EIS process.	EPBC referral for MNES.	Entire Project	No
Fisheries Act 1994	DAF	Constructing or raising waterway barrier works within fish habitats; or building works in fish habitat areas. An approval is not required for waterway barrier works within waterways inside the mining tenure due to an exemption of mining activities from the *Fisheries Act 1994*.	Approval required for waterway barrier works within bed and banks of major streams and building works in fish habitat areas, outside Project mining tenure.	As Required	Yes

Legislation	Administering Authority	Approval Trigger	Approval Type	Relevance to Project	Within Scope of EIS[1]
Forestry Act 1959	DAF	Where any agreement or arrangement is entered into regarding a forest consent area that is contrary to the lawful use of the forest consent area under the *Forestry Act 1959*. This includes, but is not limited to, mining. The Proponent is required to consider whether approvals are required under the *Forestry Act 1959* to interfere with state owned quarry material, unless authorised under other legislation.	The written consent of the State.	As Required	No
Great Artesian Basin and other regional aquifers (GABORA) Water Plan 2017 *Gulf Water Plan 2007*	DRDMW	Proponent may privately fund the installation of a watertight delivery system for bores covered under the GABORA Water Plan. Under this Plan, the Proponent may apply for 30% or more of the volume of saved water for the water bore as a new water license. As a Project of Regional Significance, the Project may apply for allocation of water under the Gulf Water Plan 2007.	Application for water license under the GABORA Water Plan 2017. Application for allocation of water under the Gulf Water Plan 2007.	As Required	No
Mineral Resources Act 1989 (MR Act)	Department of Resources (DoR)	Conducting larger-scale machine-mining in an area currently subject to an exploration tenement. In accordance with Section 4A of the MR Act, development authorised under the MR Act is not subject to the provisions of the *Planning Act 2016*, except for building work which is not accepted development under the *Building Act 1975* and development on heritage land under the *Queensland Heritage Act 1992*.	Applications for new mining leases.	Entire Project	No

Legislation	Administering Authority	Approval Trigger	Approval Type	Relevance to Project	Within Scope of EIS[1]
Nature Conservation Act 1992 (NC Act) *Nature Conservation (Plants) Regulation 2020*	DESI	Clearing of protected plants, including in high and non-high-risk areas on the Flora Survey Trigger Map.	A clearing permit is required for clearing in high-risk areas unless impacts can be avoided. If a person is, or becomes aware, that a threatened or near threatened plant is present, then a clearing permit will be required unless clearing of the plant (and within 100 metres (m) of the plant) can be avoided.	Entire Project	Yes
Nature Conservation Act 1992 (NC Act) *Nature Conservation (Animals) Regulation 2020*	DESI	Tampering with an animal breeding place that is being used by a protected animal to incubate or rear the animal's offspring.	Species Management Plan or Damage Mitigation Permit.	Entire Project	Yes
Planning Act 2016 *Planning Regulation 2017*	DoR	Clearing of native vegetation is assessable development unless it is prohibited development, exempt clearing work or accepted development. This includes for activities that may occur off lease, such as roads, powerlines, pipelines, clearing of vegetation and/or activities on lease that were not assessed as part of the environmental authority approval process. Taking or interfering with water: • in a watercourse; or • underground.	Relevant purpose determination under section 22A of the *Vegetation Management Act 1999* would be required from DoR prior to applying for an approval to clear. Approval for operational work for taking or interfering with water in a watercourse or underground.	As required	No
State Development and Public Works Act 1971	Department of State Development and Infrastructure (DSDI)	Where the Project is declared a Coordinated Project by the Coordinator General and the EIS assessment process is determined.	Initial Advice Statement. Environmental Impact Statement.	Entire Project	Yes
Strong and Sustainable Resource Communities Act 2017	DSDI	As a large resource project, the SSRC Act prohibits a 100% FIFO workforce, discrimination, and requires a social impact assessment.	Social Impact Assessment as part of EIS.	Entire Project	Yes

Legislation	Administering Authority	Approval Trigger	Approval Type	Relevance to Project	Within Scope of EIS[1]
Transport Infrastructure Act 1994	Department of Transport and Main Roads (DTMR)	Upgrades to existing transport corridors.	Construction works will require approval for road works/road access works in a State controlled road under the Transport Infrastructure Act.	As required	Yes
Vegetation Management Act 1999 (VM Act)	DoR	Clearing of regulated vegetation.	Whilst final mine design plans will determine the full extent of impacts to MSES, it is likely that environmental offsets will be required to mitigate any significant residual impacts to MSES.	As required	Yes
Water Act 2000	DRDMW	Taking or interfering with surface water, overland flow water, or groundwater. Destroy vegetation, excavate or place fill in a watercourse. Removal or use of quarry materials from a watercourse.	Water licences or permits. 'Make good agreements' if/as necessary. The Project may require a Riverine Protection Permit under Chapter 2, Part 4 of the *Water Act 2000.* An exemption may apply if the Project is able to meet the 'Riverine protection permit exemption requirements'. The Project may require a Quarry Material Allocation Notice.	As required	Yes
Water Supply (Safety and Reliability) Act 2008	DRDMW	Dams requiring a Failure Impact Assessment.	The Project may require the completion of a Failure Impact Assessment for Project dams as part of EIS.	As required	Yes
McKinlay Shire Planning Scheme 2019	McKinlay Shire Council	Development assessable against the McKinlay Shire Planning Scheme.	Development application approvals.	As required	No

[1] If declared a coordinated project requiring an EIS under the SDPWO Act, the Coordinator-General may apply conditions for the entirety of the Project as part of a consolidated approvals approach.

4 Project description

4.1 Project overview

Vecco is seeking to develop a world class vanadium deposit in Queensland's Critical Minerals Zone. The Project will mine and produce critical minerals including vanadium, to be used primarily in the manufacture of industrial scale batteries, HPA and molybdenum. HPA is an important component of lithium-ion batteries, high-performance electronics, and optical applications. It has additional uses in the automotive and aerospace sectors. Molybdenum is a by-product of vanadium processing and has applications across multiple sectors. These include use in electronic devices, as a strengthening alloy for steel, and usage in the synthesis of some organic compounds.

The proposed life-of-mine (LOM) is approximately 27 years, including construction, operation, and rehabilitation.

The Project consists of a shallow, open-cut mining operation that will mine approximately 6.7 Mtpa ROM ore and produce in the order of 8,000 tpa V_2O_5, 4,000 tpa HPA, and up to 600 tpa molybdenum over an operational life of approximately 17 years. The Project is a greenfield site, located approximately 70 km north of Julia Creek.

Processing will occur following crushing and screening of the ore. Mineral processing techniques will include beneficiation, flotation, roasting, sulphuric acid leach, solvent extraction, precipitation, and calcination. These techniques are well known with a long history of use across various mineral processing operations in Queensland and throughout the world. Mineral products will be packed in containers as dry reagents, to be transported off site by truck to Townsville, for downstream processing into battery electrolyte, sale to domestic markets, or export from the Port of Townsville to international markets.

The Vecco Critical Minerals Project will include the following key components:

- open-cut mining of approximately 6.7 Mtpa ROM ore, using conventional surface mining equipment (excavators, front end loaders, rear dump trucks, dozers) or equivalent;
- development of a mine infrastructure area, including, administration buildings, bathhouse, crib rooms, storage warehouse, workshop, fuel storage, refuelling facilities, wash bay, laydown area, and a helipad;
- development of mine areas (open-cut pits) and waste rock dumps, including vegetation and soil stripping and stockpiling;
- construction and operation of a Mineral Processing Plant (MPP) and ore handling facilities adjacent to the MIA (including ROM ore stockpiles, product stockpiles and temporary residue drying facility);
- construction of on-site roads and tracks including a mine access road from the existing Punchbowl Road to the MIA, including a bed level crossing of the Saxby River;
- construction of a solar farm and associated energy storage system to maximise renewable energy usage;
- installation of waste heat recovery equipment (such as a boiler) to harness steam-based power from the acid generation process;
- use of diesel or gas fired generators during construction or as a supplementary energy supply during operations;
- installation of infrastructure for water management and transfer including but not limited to pipelines, pumps, drains, bunds and dams;
- construction of an on-site workers accommodation village and associated facilities, including an adjacent sewage treatment plant (STP);
- progressive establishment of soil stockpiles, hardstand areas and borrow pits (for road base and civil works) within the ML. Additional material will be sourced from local quarries where required;
- continued exploration and resource definition;

- progressive rehabilitation occurring at defined milestones throughout the operational life. All voids will be backfilled, ensuring all rehabilitated landforms achieve a safe and sustainable post-mining land use on closure; and
- other associated minor infrastructure, plant, and equipment necessary to support the operations.

Existing regional infrastructure, facilities and services will be utilised to support Project activities where available. These include, but are not limited to, goods and services located in the town of Julia Creek, local roads, the Flinders Highway, rail networks, Julia Creek Aerodrome and other regional airports, Vecco's battery electrolyte plant in Townsville, and the Port of Townsville.

In the event that access to preferred infrastructure, facilities and services is not available, the Project will enact contingency measures. For example, usage of the Julia Creek Aerodrome may not be viable at the point of Project commencement and therefore the Cloncurry airport, with connecting bus fleets, may be used as alternative worker transport. This is discussed further in Section 4.10.

McKinlay Shire Council currently license and operate multiple borrow pits along Punchbowl Road. Vecco has consulted with contractors who have indicated that suitable road building materials will be sourced from these locations, with relevant costs of accessing this material factored into the tender process.

4.2 Environmentally relevant activities

ERAs include resource activities or other activities as defined by the EP Act. Prescribed ERAs and resource activities are specified in Schedules 2 and 3, respectively, of the *Environmental Protection Regulation 2019* (EP Regulation).

The Project proposes mining under Environmentally Relevant Activity (ERA) 19 of Schedule 3 of the EP Regulation (mining metal ore) as well as the ancillary ERAs outlined in Table 2.

Table 2: Applicable ERAs for the Project

Environmentally Relevant Activity	Description	Activity Summary
Schedule 2 of the EP Regulation		
7(3)(6)(d) Chemical manufacturing	Manufacturing, in a year, the following quantities of inorganic chemicals, other than inorganic chemicals to which items 1 to 4 apply — more than 100,000 t	The Project will include a sulphuric acid processing plant to produce up to approximately 340,000 tpa sulphuric acid from bulk sulphur feed brought to site.
8(3)(1)(c) Chemical storage	Chemical storage (the relevant activity) consists of storing more than 500 m^3 of class C1 or C2 combustible liquids under AS1940 or dangerous goods class 3.	Chemicals will be located within the MIA area in appropriately bunded designated areas. Chemicals include: • Flotation reagent • Sulphuric acid • Flocculant • Organic solvent • Organic diluent • Ammonia • Hydrochloric acid • Ammonium sulphate • Sodium chlorate

Environmentally Relevant Activity	Description	Activity Summary
14(3)(2)(a) Electricity generation	Generating electricity by using a fuel, other than gas, at a rated capacity of 10 MW electrical to 150 MW electrical.	The Project may utilise approximately 10 x 1250 kVA diesel generators as supporting power supply, at a rated total electrical capacity of 12.5 MW.
31(2)(a) Mineral processing	Processing, in a year, the following quantities of mineral products, other than coke (a) 1,000 t to 100,000 t.	Mineral processing to produce up to 8,000 tpa vanadium pentoxide, 4,000 tpa HPA, and 600 t molybdenum.
33(1) Crushing, milling, grinding or screening	Crushing, milling, grinding or screening (the relevant activity) consists of crushing, grinding, milling or screening more than 5,000 t of material in a year.	The vanadium benefaction process involves the physical separation of target minerals from gangue material, using more than 5,000 t feed material in a year.
63(3)(1)(b)(i) Sewage Treatment	Operating a sewage treatment works at a site that has a total daily peak design capacity of more than 100 but not more than 1500 equivalent persons.	Sewage Treatment Plant will accommodate an approximate peak of 150 EPs.
Schedule 3 of the EP Regulation		
19 Mining Metal Ore	Mining metal ore, other than a metal ore mentioned in items 11, 12, 14, 15, 16, 17 or 18	The Vecco Project will mine ore containing vanadium, high purity alumina, and molybdenum.

4.3 Notifiable activities

Activities that have been identified as likely to cause land contamination are required under Schedule 3 of the EP Act to be listed as notifiable activities. Any person undertaking these notifiable activities must notify DESI, and the land is recorded on the Environmental Management Register (EMR). The notifiable activities listed under Schedule 3 of the EP Act relevant to the Project are provided in Table 3.

Table 3: Notifiable activities for the Project

Notifiable activity	Notifiable activity description
Schedule 3 of the EP Act	
7 Chemical storage	Storing more than 10 t of chemicals (other than compressed or liquefied gases) that are dangerous goods under the dangerous goods code.
24 Mine wastes	a) Storing hazardous mine or exploration wastes, including, for example, tailing dams, waste rock or waste rock dumps containing hazardous contaminants; or b) Exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.

Notifiable activity	Notifiable activity description
29 Petroleum product or oil storage	Storing petroleum products or oil: c) In above ground tanks: a. for petroleum products or oil in class 3 in packaging groups 1 and 2 of the dangerous goods code – more than 2,500 L capacity; or b. for petroleum products or oil in class 3 in packaging groups 3 of the dangerous goods code – more than 5,000 L capacity; or c. for petroleum products that are combustible liquids in class C1 or C2 in Australian Standard AS 1940, 'The storage and handling of flammable and combustible liquids' published by Standards Australia – more than 25,000 L capacity.
37 Waste storage, treatment of disposal	Storing, treating, reprocessing or disposing regulated waste including operating a sewage treatment facility with onsite disposal facilities.

4.4 Tenure

4.4.1 Mining tenements

Mining and mineral processing activities will occur within three MLAs: MLA 100367, MLA 100368, and MLA 100369 (Figure 2).

It is noted that given the overall extent of the Project, for descriptive purposes the three MLAs have been subcategorised and described hereon as follows:

- Production ML (MLA 100367) which contains the disturbance associated with the MIA, water storages and drains, a section of the water extraction pipeline, internal roads, solar farm, mining areas and stockpiles, mineral processing plant, sewage treatment plant and the workers accommodation village;
- Transport ML (MLA 100368) which contains the disturbance associated with road access from Punchbowl Road, Saxby River low level crossing, water pipeline, and gates allowing access through the stock route; and
- Infrastructure ML (MLA 100369) which contains a section of water extraction pipeline and water pumping infrastructure.

The combined area of the three MLAs is approximately 3,534 ha.

The MLAs overlie EPM 25254, EPM 25440, EPM 26846, EPM 26928, EPM 28388, and EPM 28556 held by Vecco. The resource tenements that overlap and/or are adjacent to the Project are primarily held by Vecco. The Project partially overlies EPM 27954, which is held by Red Ox Copper Pty Ltd.

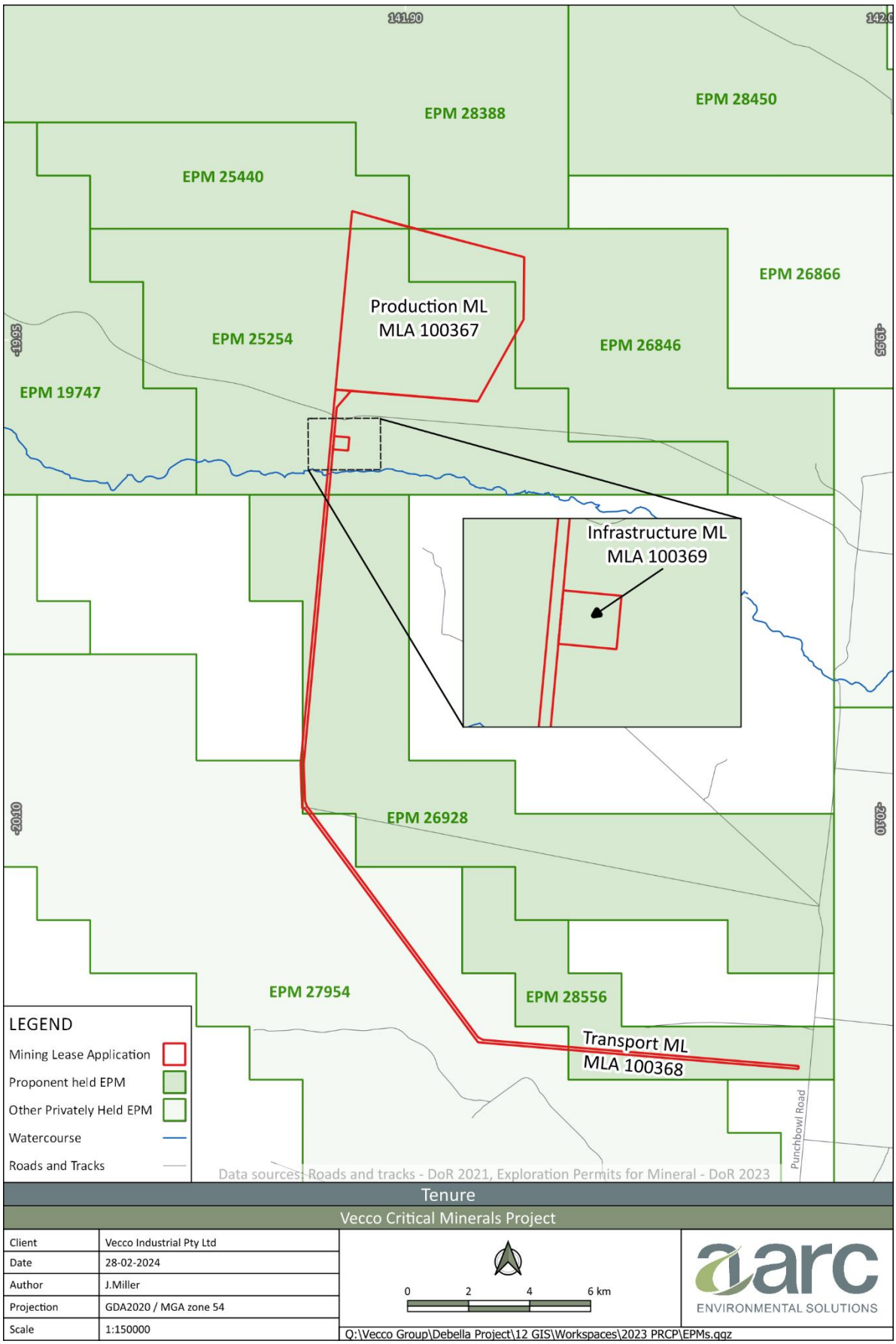

Figure 2: Project Tenure

4.4.2 Land holdings

Land ownership as it relates to the Project is described in Table 4 and depicted in Figure 3.

Table 4: Land ownership underlying and adjacent to the Project

Cadastre description	Land holder	Property name*	Tenure	Project relationship
Lot 15 on Plan TD29	Private landowner	Millungera (Farm Camp)	Rolling term lease	Located to the north and west of the production lease and transport lease.
Lot 1 on Plan SX7	Private landowner	Bow Park	Freehold – Profits à prendre**	Partially underlying the production lease.
Lot 2 on Plan SX7	Private landowner	Zonia Downs	Freehold - Profits à prendre**	Partially underlying transport lease on the western property boundary. Also underlying the infrastructure lease.
Lot 4 on Plan SX7	Private landowner	Bow Park	Freehold	Partially underlying transport lease on the western and southern property boundaries.
Lot 1 on Plan SX5	Private landowner	Woodlands	Perpetual lease	Located to the south of the transport lease.
Lot 6 on Plan SX5	Private landowner	Lindfield, Ponjola, Bezuma, Fairlea (Bezuma Downs)	Freehold	Located to the south of the transport lease.
Lot 5 on Plan SX13	Private landowner	Lindfield, Ponjola, Bezuma, Fairlea (Bezuma Downs)	Freehold	Located to the south of the transport lease.
Lot 1 on Plan SX23	Private landowner	Kilterry (Alisona)	Freehold	Located to the east of the intersection of the transport lease with Punchbowl Road.
010MLY	Managed by the McKinlay Shire Council	-	Stock route	Located to the south of the production lease. The transport lease is located along the western boundary of the widest section of the stock route.
Punchbowl Road	McKinlay Shire Council	Punchbowl Road	Road	The transport lease will connect to Punchbowl Road via a new intersection.
Road	McKinlay Shire Council	-	Road	The transport lease traverses the end of this road parcel adjacent to 15/TD29.

Cadastre description	Land holder	Property name*	Tenure	Project relationship
Saxby River	QLD Government	Saxby River	Watercourse	The transport lease traverses this watercourse to access the production lease.

Note: *Property names obtained from QLD Globe, alternative property names obtained from GeoResGlobe provided in brackets.
**Profit à prendre refers to the Forest Consent Area status for these properties, described below.

The cattle station upon which the MLAs are located is designated partly as a Forest Consent Area. These lots were converted into freehold land in 2021, and as part of this process the State retained the rights to the commercial timber through a forest consent agreement with the landholder (Profit à prendre). The landholder will inform the Department of Agriculture and Fisheries of the impacts to the timber resources covered by this agreement and obtain written consent for their removal.

One stock route (010MLY) is transected by the transport corridor, to the south of the Production ML, and north of the infrastructure lease. The transport lease will connect to the McKinlay Shire controlled Punchbowl Road via a new intersection and intersects the end of one unnamed road reserve.

No State Forests, National Parks or conservation tenure are located within or on land adjacent to the Project.

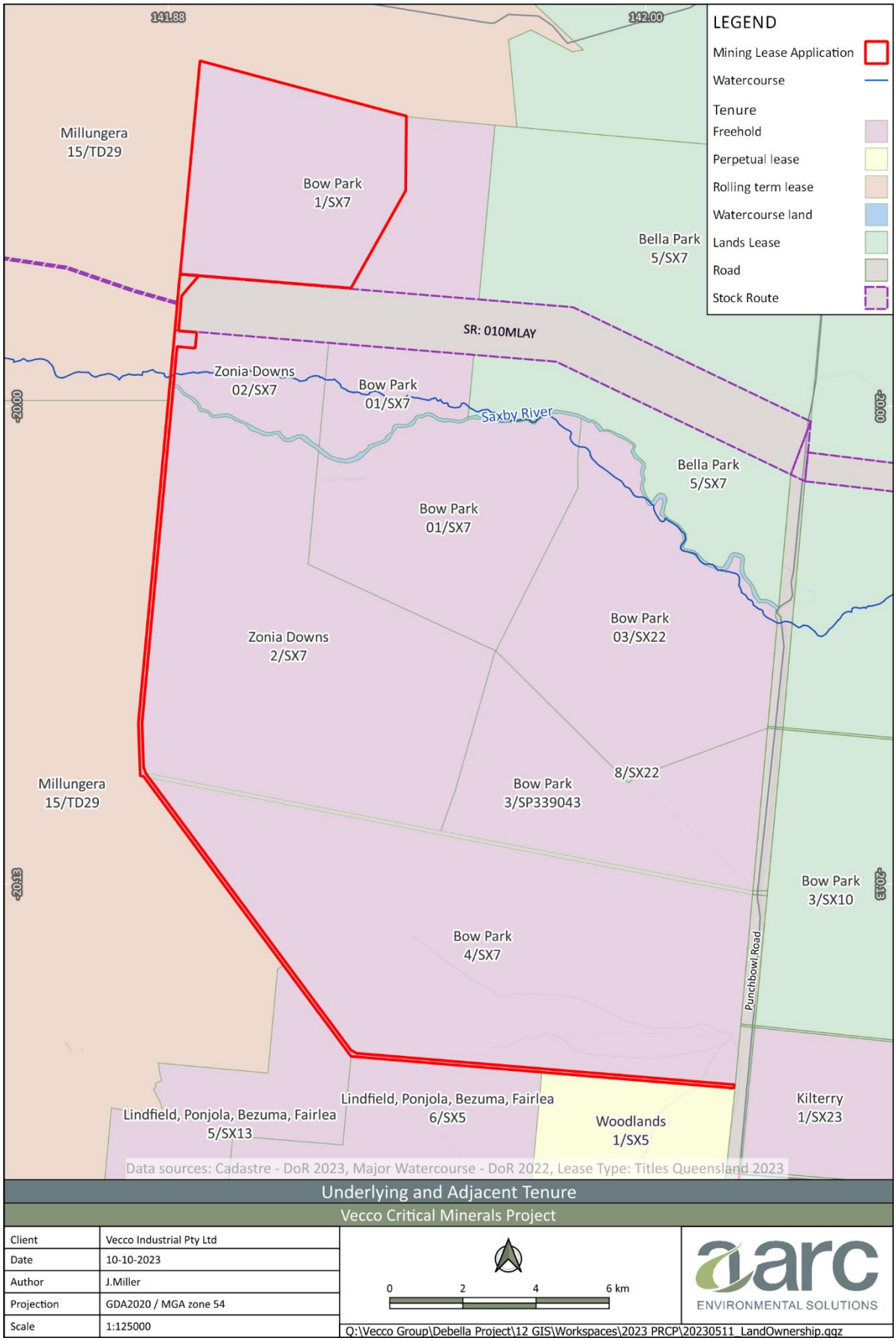

Figure 3: Land underlying and adjacent to the Project

4.5 Geology and resource

4.5.1 Geological setting

The Project is situated on the Euroka Ridge, a regional scale feature that separates the Carpentaria and Eromanga Basins.

The Euroka Ridge is a major Proterozoic basement high feature trending north-east between tectonic blocks of the Mt Isa Inlier Eastern Fold belt to the Georgetown Inlier. Basement rock comprises coarse metamorphic sediments and granites. Several perpendicular smaller scale ridges of the Mt Fort Bowen and Mt Brown-St Elmo ridges occur towards the centre of the Euroka Ridge.

The Carpentaria Basin is comprised of Early Cretaceous to Middle Jurassic age, fluvial to shallow marine dominated sediments. The Carpentaria Basin is the northern lateral equivalent of the Eromanga Basin (and Surat Basin, further to the south). The Cretaceous formations drape over the basement ridges. The Cretaceous Toolebuc Formation hosts the vanadium deposit and is an upper marker formation of the stratigraphic sequence (JBT 2023).

A thin cover of Karumba Basin unconsolidated Quaternary sediments cover much of the region. The Karumba Basin contains a thin sequence of fluvial, shallow marine and lacustrine sediments.

4.5.2 Stratigraphy of the Project

The stratigraphic sequence underlying the Project Area is summarised in Table 5.

Table 5: Site stratigraphy (JBT 2023)

Age	Formation	Unit	Code	Lithological description	Typical thickness (m)	
Quaternary	Alluvium		buqa	Soils, sands, and clays	0 – 2	
	Wondoola Beds			Unconsolidated sands, clays, and gravels	5 – 10	
Cretaceous	Allura Mudstone		ALM	Mudstone with minor interbedded siltstone and infrequent sandstone	10 – 100	
	Toolebuc Formation	St Elmo Coquina	TLBA	Banded shelly limestone, minor bituminous shale	3 – 7	8 - 15
		Willats Crossing Shale	TLBB	Laminated bituminous shale. Minor to common limestone bands. Manfred Coquina at base	1 – 4	
		Arolla Shale	TLBD	Finely laminated bituminous shale	2 – 5	
		Arolla Shale Lower Transition	TLBE	Oilshale transition to Wallumbilla Formation	0 - 2	
	Wallumbilla Formation		WLA	Blue to Grey Mudstone with minor siltstone and fine-grained carbonaceous mudstone	150 - 180	
Late Jurassic to Early Cretaceous	Gilbert River Formation			Coarse sandstone, interbedded with grey shale	50 – 70	
Proterozoic				Proterozoic Basement		

4.5.3 Resource

Exploration drilling across the Project area spans from the 1970s to 2023 and has targeted metalliferous and shale oil production from the Toolebuc formation. In 2018, Vecco assessed preserved drill cores from 2015 and assayed the Toolebuc Formation for vanadium and other minerals. Positive results were followed up by the 2018 Vecco exploration program, with 27 4C-size cores being drilled and sampled for metalliferous assays including vanadium. It was determined that the mineralisation at the Project site sits within the Toolebuc Formation. Resource definition and exploration is on-going.

Resource limits for exploration have been imposed, including:

- sampling to a maximum depth of 40 m;
- excluding known oxidized and unoxidized horizons – including areas where seams have been partly oxidized; and
- imposing a minimum V_2O_5 grade of 0.35%.

The Proponent has assessed total tonnes of vanadium and alumina ore in accordance with the JORC Code (2012) and reports the presence of an estimated 720 million tonnes (Mt) of ore containing V205 and Al2O3 (for HPA) within the Proponent held exploration tenure shown in Figure 2. The Project for which an EIS is sought will extract up to 6.7 Mtpa run-of-mine (ROM) ore and produce up to 8,000 tpa V_2O_5, 4,000 tpa HPA, and 600 tpa molybdenum over an operational life of approximately 17 years. This resource will be refined through an on-site processing facility. Total production quantities are estimated to be 136,000 tonnes of V_2O_5, 68,000 tonnes of HPA, and 10,000 tonnes of molybdenum.

Mining operations are expected to commence in 2026, following a construction and development period. Operations will occur on a continuous 24 hours per day, seven days per week roster.

The proposed open cut mine will target oxidized mineralised shale seams in the Toolebuc Formation, to an estimated depth of 30 m below ground level. Open pit mining has been identified as the optimal mining method for the type of shallow hosted ore body.

Mine operations will be conducted using conventional surface mining equipment, including hydraulic excavators, front end loaders, rear dump trucks, and dozers in free-dig mode. As only weathered material will be mined, no blasting activities are required.

Vegetation will be progressively cleared over the life of the Project ahead of the active mining, infrastructure, and waste rock emplacement areas. Topsoil will be stripped and stockpiled or directly placed for progressive rehabilitation.

Waste rock will initially be placed in an out-of-pit dump, and then backfilled behind the advancing pit face. All mined voids will be backfilled, and the land returned to a grazing land use. Rehabilitation of mined land will occur progressively over the mine life.

4.6 Mine infrastructure and facilities

The Project is expected to require the following infrastructure to facilitate mining and processing operations:

- a Mine Infrastructure Area including:
    - a processing plant;
    - a ROM stockpile pad;
    - mine affected water dams;
    - workshop facilities;
    - diesel refuelling tank(s) and oil storage area;
    - mine storage;

- equipment washdown and laydown area;
- administrative and operational office facilities;
- potable water and wastewater/sewage treatment plants; and
- internal access and haul roads;

- Worker accommodation village including:
  - facilities for up to 150 workers;
  - a sewage treatment plant;
  - a raw water dam;
- water management infrastructure including:
  - a raw water dam;
  - clean water and sediment drains;
  - sediment dams; and
  - pipelines and pumps;
- an access and infrastructure corridor connecting the Project to Punchbowl Road, including:
  - a bed level crossing of the Saxby River with culverts as necessary to maintain streamflow and fish passage during low flow events;
  - access road and road safety infrastructure; and
  - pipelines and pumps.

The Project consists of a shallow, open-cut mine. A screening plant will be located in-pit, and ensure only mineral rich material is transported out-of-pit to the processing plant. The processing plant is located in the MIA which is situated in close proximity to the pit and mining operations in order to maximise operational efficiency. The processing plant is predominantly a hydrometallurgical plant which has numerous stages, as detailed in Section 4.7. An indicative Project material flow sheet from pit to processing is shown in Figure 4.

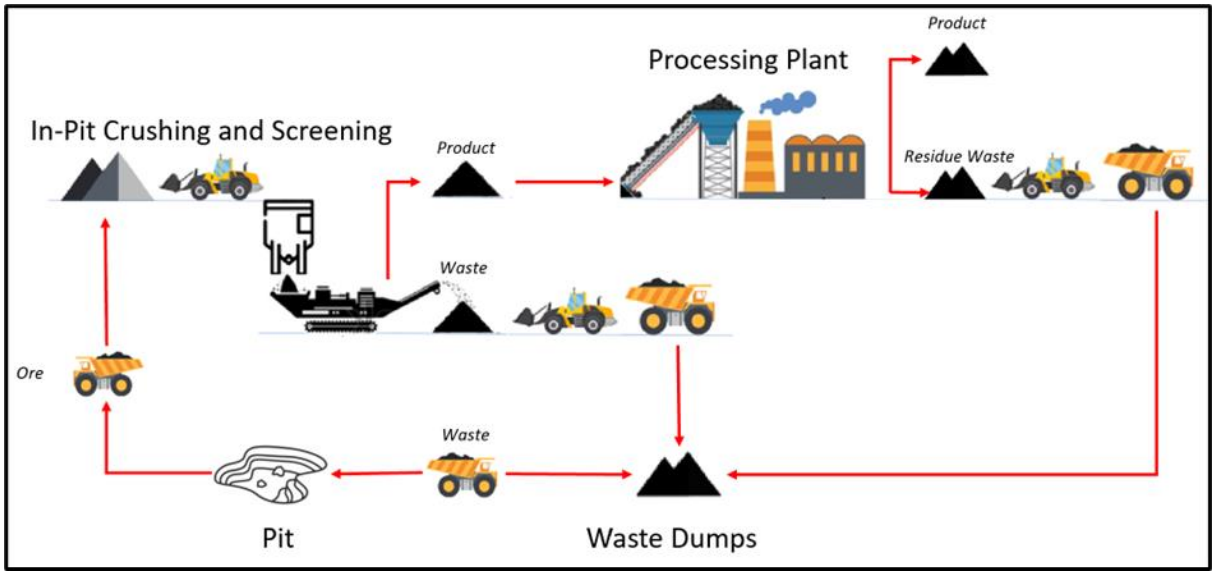

Figure 4: Indicative Project material flowsheet

Final infrastructure locations and size remain subject to ongoing technical assessment. The indicative location of infrastructure within the Production ML is presented in Figure 5, including the likely pit extent for reference.

Estimated infrastructure disturbance areas are presented in Table 6. These areas are subject to change through the EIS process. The disturbance indicated does not equate to the total disturbance footprint at any one point in time. Open-cut mining areas will be developed and rehabilitated progressively. Infrastructure will be developed on an as-needed basis.

Table 6: Indicative Project site disturbance and composition

Proposed disturbance	**Approximate area (ha)**
Infrastructure (incl. MIA, accommodation, solar array)	150
Roads	80
Dams	75
Mine pit footprint	820
Out-of-pit waste rock dump	50

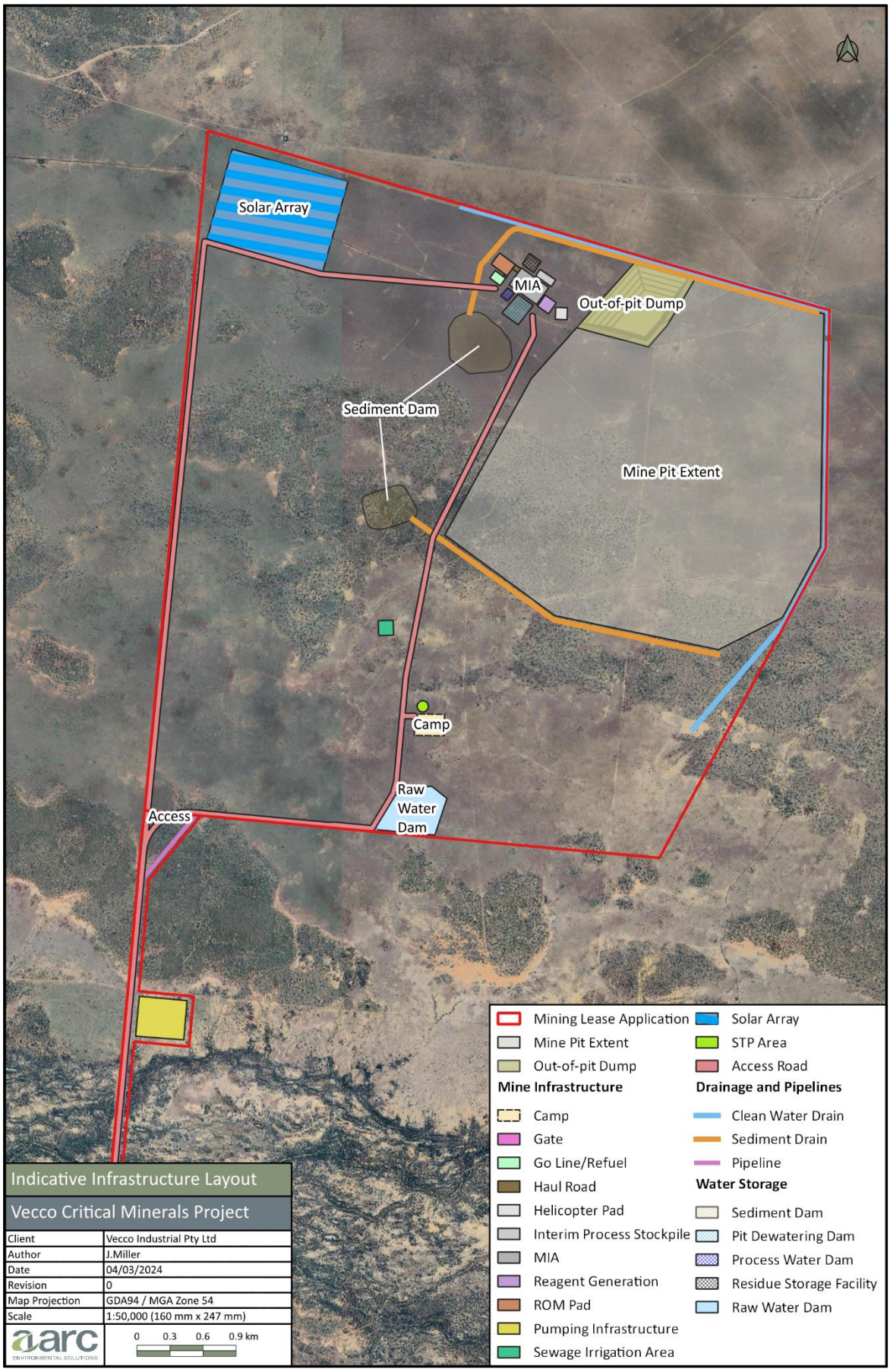

Figure 5: Indicative Project layout, water management infrastructure, and maximum pit extent

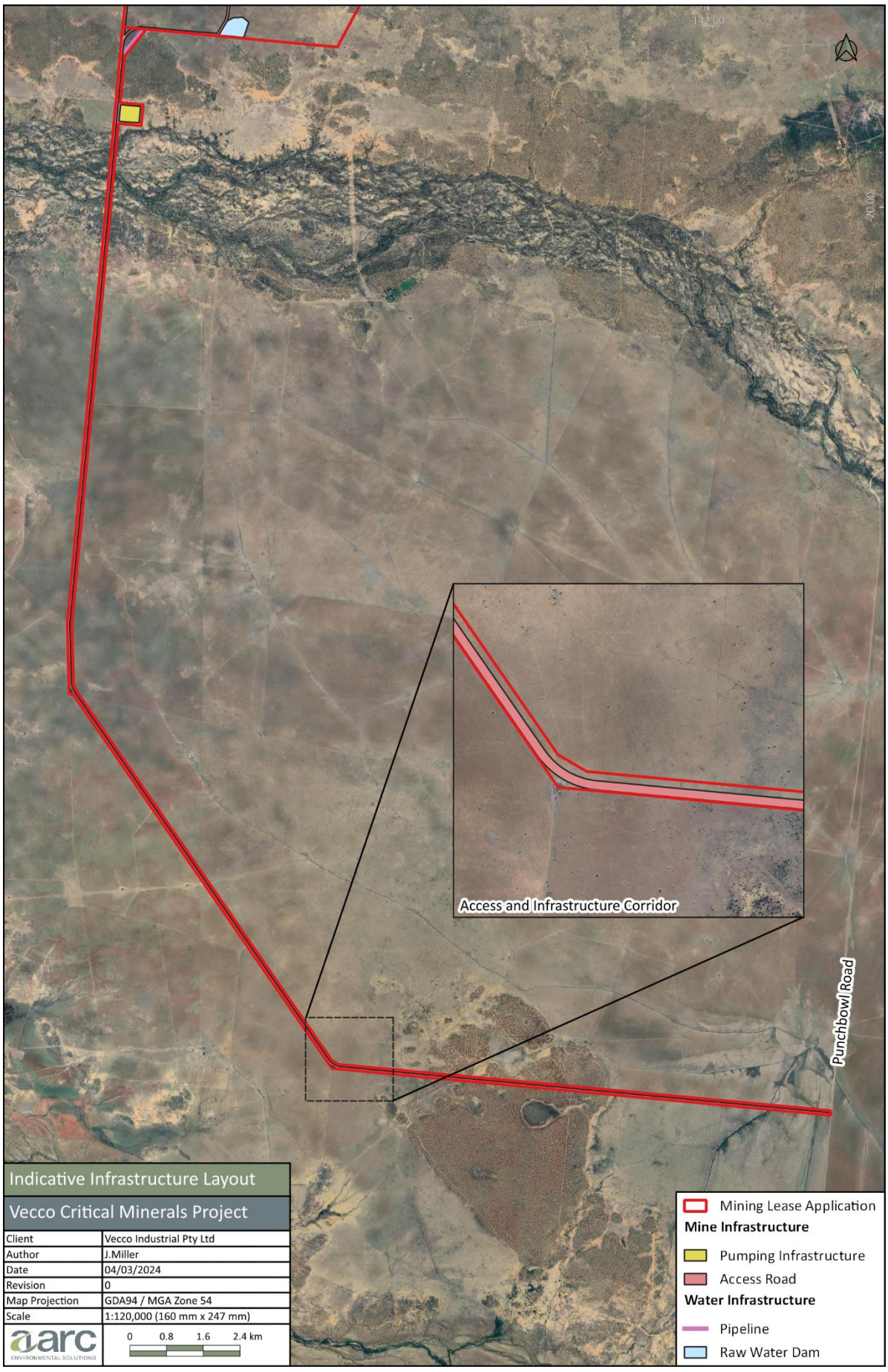

Figure 6: Indicative Infrastructure Layout, Transport ML

4.7 Mineral processing

Mineral processing will occur on-site to maximise production efficiency and extraction of refined minerals. The Vecco flowsheet is an industry standard hydrometallurgical process designed to extract and refine Vanadium and High Purity Alumina.

The vanadium extraction process is based on sulphuric acid as the lixiviant. Vanadium is contained within the clays within the orebody. Vanadium is then refined through solvent extraction. Sulphuric acid will be manufactured on site with sulphur sourced from outside of the Project, as detailed in Section 4.7.2. The HPA process uses hydrochloric acid to leach and precipitate an Alumina Chloride Hexahydrate (ACH) through multiple purification stages. The hydrometallurgical processes are established and tested practices, however there are no plants in Queensland using the exact sequence of processes. The processes have similarities to those used in alumina refining, which occurs in Queensland and other states in Australia.

4.7.1 Vanadium, HPA and molybdenum process

The processing stages are described in detail in Table 7. The processing stages are shown in Figure 7, Figure 8 and Figure 9.

Table 7: Mineral processing stages

Stage	Process
Scrubbing & classification	Mined ore is trucked to the ROM pad and then transported to the scrubbing circuit. The scrubbing circuit is designed to reduce the size of the ore for further processing. The scrubber will pre-condition the ore to disperse the clay material from the calcite and other gangue. The incoming ore is washed with water in the scrubber to liberate the fine particles containing vanadium from larger gangue material. The oversized gangue material is transported to the mine pit for disposal after being removed by the trommel and the scrubber screen.
Hydro-cyclones & dewatering	A two-stage process using hydro-cyclones is incorporated in the process to reject large quantities of fine gangue particles and to increase the vanadium concentration in the outlet stream to the flotation units.
Flotation	A multi-stage reverse flotation circuit is proposed in order to maximise vanadium recovery and reject high levels of calcite.
Filtration	Aluminium sulphate is added as a flocculant to the vanadium concentrate prior to entering the two concurrent vanadium concentrate filters (membrane filter press). The filtrate is pumped to the process water dam, whilst the filter cake solids are discharged onto a vanadium dryer feed conveyor.
Drying & roasting	The vanadium concentrate is dried in the rotary tube dryer by the use of steam heating.
Acid leaching	The roasted vanadium concentrate is conveyed into the leach conditioning tank where it is mixed with recycled acid from solvent extraction (raffinate), concentrated sulphuric acid and process water as required to leach the vanadium.
Leach filtration	The leach filtration stages remove waste solids from solution, whilst the Pregnant Leach Solution (PLS) is transferred to Solvent Extraction.

Stage	Process
Molybdenum ion exchange	The leach PLS is discharged into a Molybdenum Ion Exchange (IX) vendor package, which serves to separate the molybdenum from the vanadium.
AHM precipitation	The molybdenum PLS stream is discharged into the first AHM precipitation tank, into which sulphuric acid (pH modifier), ammonium sulphate and process water are added and agitated. The addition of the sulphuric acid and ammonium sulphate, and the lowering of the pH allows the molybdenum to precipitate out of solution as Ammonium Heptamolybdate (AHM).
Molybdenum de-ammoniation	The AHM from the underflow of the centrifuge is first fed into a AHM de-ammoniation disintegrator where it is thermally decomposed to produce an MoO_3 powder.
Solvent extraction	The solvent extraction process selectively removes the vanadium from most of the other metal ions. The selectivity of the solvent extraction process is important as it means that the downstream solution purification and production of V_2O_5 becomes less complex and more cost efficient. It is at this point that two kinds of solvent are created containing HPA and Vanadium solution.
HPA solution	The residual sulphate solution will provide a rich source of Aluminium for purification and concentration. The solution will enter a calciner to produce the final product. The final product is calcined HPA which will then be ready for packaging and transport.
AMV precipitation	Vanadium is precipitated from solution as AMV by the addition of ammonium sulphate.
AMV de-ammoniation	The AMV from the underflow of the centrifuge is first fed into a de-ammoniation disintegrator where it is thermally decomposed to produce V_2O_5 powder. The V_2O_5 powder is then dried in a flash dryer before being fed to the de-ammoniation kiln.
Vanadium washing	The V_2O_5 powder is fed to a wash centrifuge alongside demineralised water.

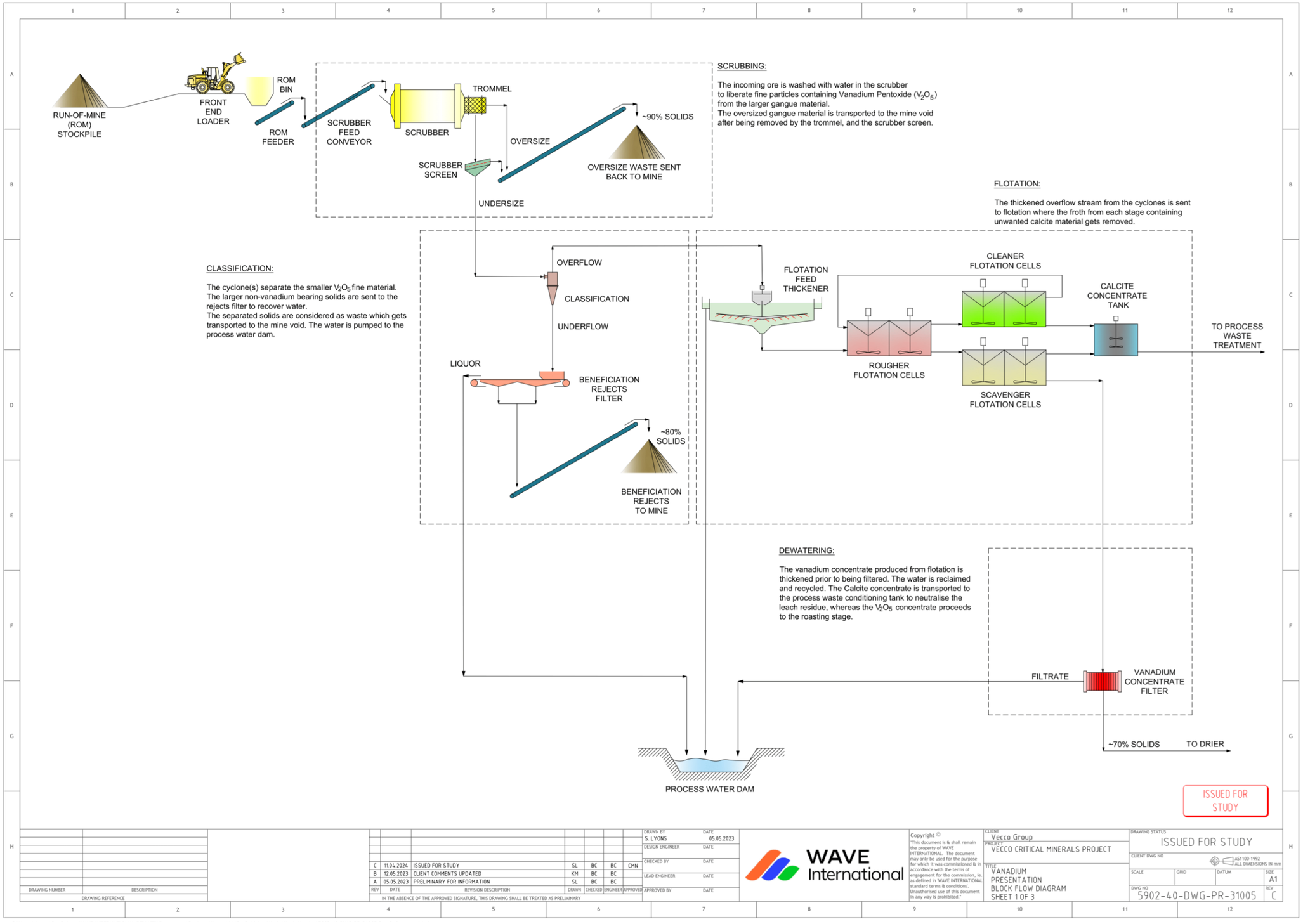

Figure 7: Process flow diagram 1

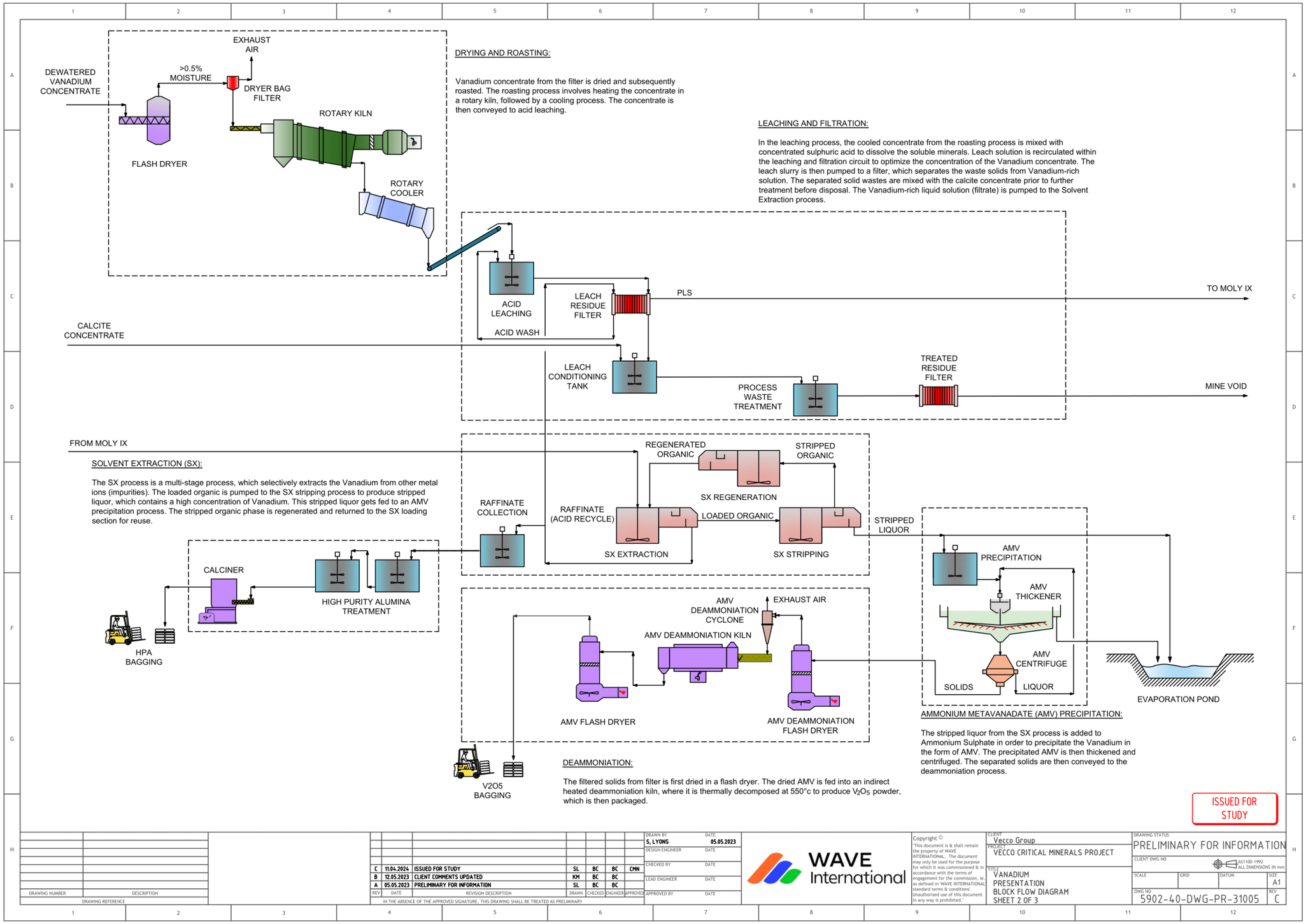

Figure 8: Process flow diagram 2

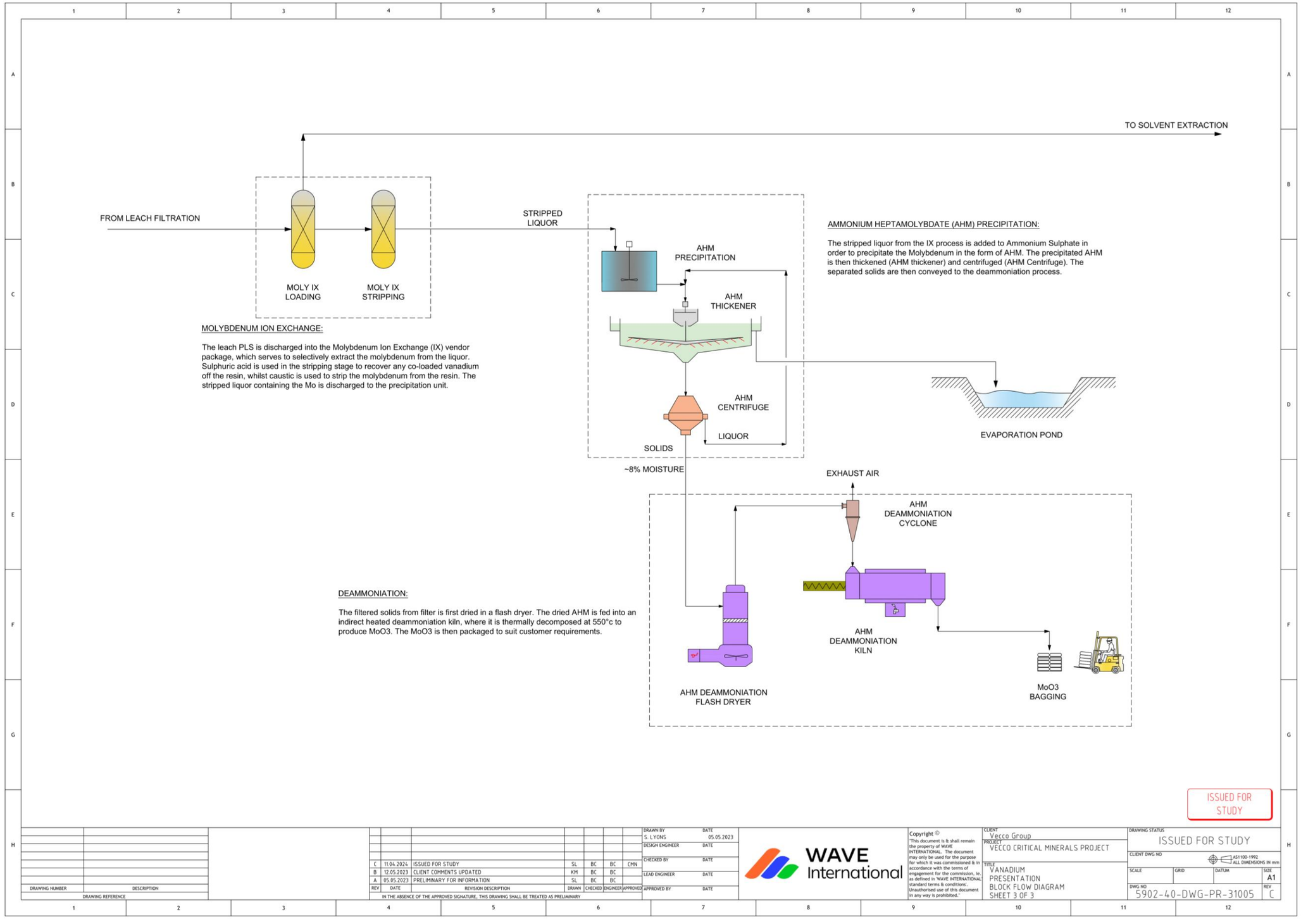

Figure 9: Process flow diagram 3

4.7.2 Sulphuric acid plant

Elemental sulphur will be transported to site for processing into sulphuric acid at the volumes required for the MPP.

Sulphur preparation

Sulphur will be received in bulk from Townsville, either by truck directly from Townsville, or by rail to Julia Creek through agreement with Aurizon, to then be trucked to site. Sulphur will be stored on-site in an enclosed shed to prevent contamination and loss of containment.

Acid generation

Sulphur will be melted in a spinning cup sulphur burner that includes atomisation of liquid sulphur prior to burning. A double adsorption, double catalysis oxidation process will produce SO_3(g), which will then be contacted with water to produce H_2SO_4(l) at 98.5 wt%.

The concentrated sulphuric acid can then be diluted. This is an exothermic reaction which provides additional heat for use in the process (such as the leach circuit). High pressure steam generation from this process will be used for Project electricity generation, reducing the requirement for diesel generator capacity.

4.7.3 Residue management

Filtration and neutralisation

Mineral extraction, processing, and treatment of vanadium and HPA will create waste process residue streams in the form of:

- thickened calcite rich rejects from flotation circuit;
- filtered waste from sulphuric acid leach and filtration; and
- filtered waste from HCl leach and filtration.

Process residue streams from these processes will first be filtered to recover additional minerals prior to process residue disposal. The filtered process residues will then be neutralised separately prior to combined in-pit disposal. This will be achieved through contact with the Calcium rich concentrate collected in the flotation process in a series of stirred tanks. Additional Calcium rich material may be sourced from the waste rock if required. Final pH adjustment will be achieved through the addition of calcined lime. The neutralised process residues will then be filtered in large plate and frame filters.

Co-disposal of process residue streams

The interim storage facility at the MIA will be used to aid in process residue drying and provide short term contingency storage.

The filtered, neutralised process residue streams are to be co-disposed in the mined pit prior to backfilling with waste rock. Treated, mixed residue streams will contain excess acid naturalising capacity, reducing potential for acid mine drainage.

4.8 Product transportation

Final product V_2O_5, HPA, and molybdenum will be palletised and transported in A-triple trucks to Townsville. The transport route for final product will be via Punchbowl Road in McKinlay Shire, on to the A6-Flinders

Highway into Townsville. Specific routes within Townsville will be developed in coordination with relevant authorities as part of Project development.

Approximately 8,000 tonnes per annum of vanadium pentoxide, 4,000 tonnes per annum of high purity alumina, and up to 600 tonnes per annum of molybdenum trioxide will be dispatched from the Project site for further processing.

Due to the climate and rainfall patterns in the region, particularly from December to March, transport systems may be intermittently disrupted and so on-site storage of approximately two weeks may be required. Therefore, contingency storage options will be incorporated into the MIA by means of sheds with packing units and storage racking.

4.9 Site access

4.9.1 Mine access road

Primary access to the site will be from the Flinders Highway via Punchbowl Road. Flinders highway is controlled by the state Department of Transport and Main Roads, and Punchbowl Road is controlled by the McKinlay Shire Council. The site will require a mine access road connecting it to Punchbowl Road. The access road will be surface level and unsealed. It will be located within the Transport ML and will primarily be constructed from locally sourced materials including naturally occurring shallow limestone. The road will have a width of approximately 10 m, providing suitable width for two-way access by A-Triple trucks, and a length of approximately 35 km. Various route options for the transport corridor have been assessed in consideration of safety, impacts on productive land use and the environment. The proposed alignment following the fence line and existing underlying access track minimises impacts to working cattle properties and the environment.

The Punchbowl Road intersection is proposed to be a three-way, priority-controlled arrangement. A turn warrant assessment was undertaken in accordance with the 'Department of Transport and Main Roads Road Planning and Design Manual Edition 2: Volume 3 – Supplement to Austroads Guide to Road Design Part 4A: Unsignalised and signalised Intersections' (TMR 2021). The assessment indicates that the Punchbowl Road intersection will require a Basic Auxiliary Right-turn (BAR) and a Basic Auxiliary Left Turn (BAL) treatment. An infrastructure agreement with the McKinlay Shire Council will be entered into regarding detailed intersection design and construction, along with ongoing use and maintenance of public road infrastructure.

4.9.2 Saxby River crossing

The development of the access road requires a low-level crossing of the Saxby River to enable access for mine personnel, contractors, mining plant maintenance, suppliers, and deliveries. The Saxby River crossing has been designed to be at bed level, and include box culverts in the main flow channels, minimising disturbance and obstruction to the Saxby River channel and floodplain. The bed level design of this crossing is further intended to be resilient against flooding events, presenting minimal risk of damage to infrastructure.

4.10 Workforce and accommodation

Employment opportunities that will be generated by the Project include:

- construction workforce of up to 300 personnel, with a peak workforce of 146 personnel on-site at any one time; and
- operations workforce of up to 274 personnel, with a peak workforce of 110 personnel on-site at any one time.

Where possible, the workforce will be drawn from local and regional communities. Roles that are not able to be filled from local communities, including where appropriate or necessary experience is not available in those communities, will be filled with workers employed on a 'fly-in/fly-out' (FIFO) basis. This approach is consistent

with the Strong and Sustainable Resource Communities Act 2017 (SSRC Act), which prohibits a workforce of 100% FIFO workers, and establishes a priority of employment in the following order:

1) workers from local and regional communities.

2) workers who will live in regional communities.

3) workers who will FIFO to the Project.

It is the intention of the Proponent that FIFO workers will be flown directly into Julia Creek however this will require an upgrade of the Julia Creek runway and aerodrome facilities. The Proponent has engaged the relevant Government departments to work towards this outcome. Travel distance from Julia Creek airport to the Project site is approximately 100 km and would take approximately 1 hour and 20 minutes. The Cloncurry airport may have sufficient capacity to support FIFO worker transport for the Project. Travel distance from Cloncurry airport to the Project site is approximately 250 km and would take approximately 3 hours.

The construction and operational workforce roster will be 12-hour day/night shifts, on an equal time rotation. The senior management and technical staff roster will be 12-hour day shifts, on variable rotations yet to be determined and dependant on operational needs.

4.10.1 On-site accommodation

During site preparation and primary construction, temporary accommodation will be available for non-resident workers within the local region or on-site. Options for on-site accommodation includes mobile accommodation facilities. During operation, the workforce will be accommodated in the on-site workers village located in the southern section of the Production ML. Access to the workers village will be via an unsealed road from the mine access road, and a connecting route to the MIA. The distance between accommodation in Julia Creek to the MIA is approximately 110 km and takes approximately 1 hour and 30 minutes. The distance between the MIA and the workers village is approximately 4 km.

The workers accommodation village will include sleeping quarters and associated facilities, including an adjacent sewage treatment plant (STP). The camp will have capacity to accommodate up to 150 persons, but under normal conditions will be occupied by approximately 110 persons. Access to the accommodation village will be from the mine access road. The majority of workers will travel to the mine via bus from the accommodation village, with some travel by light vehicle from the McKinlay Shire for contract work. The on-site accommodation is intended to ensure worker safety by reducing fatigue and daily travel time. This approach further removes the risk of lack of availability of accommodation in the wider McKinlay Shire region, which has restricted supply.

4.10.2 Workforce and accommodation consultation

In producing a workforce and accommodation strategy, Vecco has undertaken significant community consultation, including a Social Impact Assessment. This has involved repeated engagement with an array of local stakeholders, including local Government, relevant landowners, State Government agencies (Health/Education/Roads/Development, Ergon Energy etc.), local emergency services (QAS, QPS and QFS) and numerous key private sector partners. See Section 7 for further details on community consultation, and a comprehensive list of consulted parties.

Through consultation, it was determined that the relevant parties were supportive of Vecco locating its accommodation village on site. Key concerns raised by local parties around housing staff in Julia Creek town included:

- limited available energy supply capacity in the town's energy allocation;
- additional stressors on a restricted housing supply market; and
- possible anti-social behaviour from a considerable increase in the town's current population.

Vecco has assessed the need for a satellite office, with a small accommodation capacity, in Julia Creek. This would assist with transiting employees and visitors, in addition to providing a central and convenient location for the coordination of freight and logistics before going out site. This has further practical benefits; in that it will reduce the amount of traffic on Punchbowl Road as freight items can be held until a full load can be achieved. Vecco has no current tenure in or near Julia Creek and so arrangements to develop this satellite office will need to be determined as part of ongoing Project development.

On-site accommodation may reduce the direct expenditure from the workforce in the local community, however Vecco has engaged local companies in the region to establish a local procurement policy. Where practicable, resources to develop and operate the Project site will be sourced through local supply agreements. This ensures that the Project will provide long-term support for local business and industry. In combination with the additional benefits of reducing transport and housing requirements, likelihood of unsociable behaviour, and risk to the regional electricity supply, the on-site accommodation is a net-positive for the region.

4.11 Power supply

The Project has an expected power demand of approximately 16 MW, including mining, accommodation, administration, and processing demands. The supply of power for the Project will be provided by the following mix of on-site systems:

- 10 MW solar array with combined 9 MWh battery energy storage system;
- Steam turbine electrical power generated by the sulphuric acid plant; and
- Supplementary supply from diesel or gas fired generators (approximately 10 x 1250kVA generators, exceeding the trigger threshold for ERA 14).

This combination of supply will ensure electricity demand can be met during peak energy periods, and that the Project will not require connection to the regional electricity grid. To minimise disruption to operations, critical infrastructure will have emergency diesel generators installed at set locations to run in the event of an outage. During construction, diesel generators will be required for power supply until the solar array and combined battery energy storage system has been developed.

Power transmission infrastructure will be developed as required, including from the solar array to the MIA and on-site accommodation.

4.12 Water supply

The Project is expected to require approximately 3,200 ML/year of secure supply during operations. A detailed Water Balance will be developed for inclusion in the EIS.

Water demands for the Project include:

- construction of infrastructure including dust suppression, washdown, earthworks, civil works, firewater system, and commissioning;
- potable water supply to meet the needs of the workers; and
- operation of the mine, including mineral processing, dust suppression (stockpiles, transfer stations, and roads), process residue cell management, and equipment, and vehicle washdown.

Under the Water Plan (GABORA), part of the water saved (≥ 30%) through remediation works on open Great Artesian Basin (GAB) bores may be accessed as a water license in return for capping and preventing uncontrolled release. This approach provides a net increase in water volumes retained in the GAB with tangible environmental benefits and would provide a secure water supply for the Project. A summary of benefits of this approach are:

- tangible benefits for environmental values through water saved and retained in the GAB;
- providing a consistent and secure supply of water for the Project; and
- removing the need for streamflow harvesting as an alternate supply.

Engagement with the Department of Regional Development, Manufacturing and Water (DRDMW) has identified broad support for this strategy. The Proponent will work towards obtaining a water license by undertaking remediation works on nearby open Great Artesian Basin bores.

The bores are not located within the Project MLA boundaries and will require pumping and pipeline infrastructure to be developed alongside the access road, and by agreement with the relevant landowner.

To reduce waste and increase water security, processing water and water collected in the pit and sediment dams will be re-used where practicable. Alternate water supply options include water sharing agreements with surrounding stakeholders. The final water supply solution will be subject to approval under the Water Act but will aim to minimise impacts on the environment and other users.

4.13 Communications

Satellite services are available and will be considered for the Project. Radio communication between heavy machinery and light vehicles will be used for safe travel of the Project area.

5 Mine rehabilitation

Vecco will develop a PRCP for the Project in accordance with the requirements of the EP Act, which will be submitted as part of the draft EIS.

Rehabilitation will occur progressively over the life of mine to achieve an environmentally sound land use outcome. This Plan will represent the Proponent's objective to provide a rehabilitation strategy that benefits the environmental and public interests.

The following sub-sections outline a high-level proposal of the Project rehabilitation strategy. This is subject to finalisation during the detailed mine planning phase and EIS process. A complete PRCP will be submitted as per legislative and guideline requirements current at the time of submission.

5.1 Rehabilitation objectives

In Queensland, mine rehabilitation is required under the EP Act. Amendments to the EP Act in late 2018 implemented key elements of the State Government's Mined Land Rehabilitation Policy (Queensland Government 2018) which intends to ensure that, for land disturbed by mining activities:

- the land is safe and structurally stable;
- there is no environmental harm being caused by anything on or in the land; and
- the land can sustain a post-mining land use.

These three objectives comprise the foundation of rehabilitation goals for the Project.

The PRCP will cover rehabilitation of all operational activities and associated infrastructure areas for the Project on the mine site, which includes the open-cut mining areas, waste rock dumps, stockpile areas, mine infrastructure areas, and water storage areas.

5.2 Post-mine land use strategy

Through engagement with the underlying landowner, Vecco has determined that the ideal post mining land use (PMLU) for the majority of the Project site is a return to the existing land use of low intensity grazing of native vegetation. This includes ensuring that the mine pit will be progressively backfilled, and result in no final void. This approach is supported by feedback received during community engagement where the Proponent has informed the stakeholders of the Project background and design and identified that renewal of the site as grazing land at the end of the Project life is a positive outcome. Stakeholder and community consultation is discussed further in Section 7.

It is the intent of Vecco to avoid non-use management areas in the final landform, aiming to return all disturbed lands to a PMLU. Project infrastructure such as access roads and dams may be retained through agreement with the landowner, which will be a separate PMLU to that of low intensity grazing of native vegetation. This will be assessed and detailed as part of the Project PRCP.

5.3 Decomissioning and rehabilitation

Decommissioning and rehabilitation will occur according to milestones and completion criteria developed for the Project. Milestones must be achieved as soon as practicable after land becomes available for rehabilitation. Land is considered to become available for rehabilitation at the completion of mining, except where land is being used for operating infrastructure, placement of topsoil stockpiles or is identified as being retained infrastructure post-closure.

Mine infrastructure to be decommissioned will be demobilised, removed, have topsoil replaced, and the land rehabilitated to the final PMLU as soon as practicable once the service life of the infrastructure has passed.

Roads, water storages, and other Project infrastructure may be retained through agreement with the landowner.

Rehabilitation milestone timeframes will be developed with consideration of the size of the rehabilitation area, the applicable milestone activities and interim rehabilitation activities that are scheduled to occur or anticipated to be required before the area becomes available for rehabilitation. Milestones that involve revegetation activities, including monitoring of revegetation, will include provisions for unfavourable growing seasons and unforeseen extreme events such as droughts or storms that could negatively impact vegetation establishment. Including contingency for complex management requirements, and to develop a dataset supporting successful rehabilitation, it is expected that the rehabilitation of the Project site will conclude approximately 10 years after mining operations cease.

Whilst the proposed rehabilitation processes will be further defined in conjunction with the development of the PRCP, the general rehabilitation activities are likely to include:

- disconnection and removal of all infrastructure including buildings, machinery, equipment, road base, concrete slabs, water management structures, pipelines, and fences not part of the PMLU;
- topsoil is to be stripped and stockpiled to maximise the long-term viability of the growth media;
- investigation of potentially contaminated land and where necessary, remediation activities undertaken;
- landform development where backfilling, reprofiling, reshaping and/or compaction works are required;
- revegetation involving topsoil application, ripping and seeding (or planting) and the application of soil ameliorants, as required;
- the mine affected water dams will be subject to sediment removal, and re-profiling and seeding of the dam banks. Sediment removed from the dam shall be disposed of in the residual voids;
- open cut pit will be backfilled with waste rock material and process residue, and treated with appropriate surface preparation;
- Any retained waste material stockpiles will be recontoured including grading and compaction to create stable landforms that are compatible with the surrounding landform. The geotechnical stability of waste rock dumps is to be assessed;
- ongoing monitoring of the physical and chemical stability of rehabilitated areas; and
- certification of rehabilitated areas meeting and/or exceeding completion criteria (to be developed).

Rehabilitation indicators and visual observations gathered as part of an annual monitoring process will be used to identify any aspects of the rehabilitated area that are of concern or suggest rehabilitated land is at risk of not meeting the required PRCP completion criteria. These may include:

- evidence of active erosion;
- inadequate vegetation cover or growth;
- invasive weed or pest species;
- soil dispersion / instability; and
- soil infertility.

Following an annual monitoring process, areas of rehabilitation will be assessed for maintenance. An annual visual inspection of all rehabilitated areas will be undertaken to provide an overview of the status of the rehabilitation and identify any noticeable issues such as erosion or inadequate vegetation cover or growth. This information, along with monitoring results, will be used to inform the maintenance schedule.

Maintenance may include repairing areas of excessive soil erosion or undertaking supplementary plantings or seeding to increase floristic diversity and cover to assist in achieving completion criteria.

If issues re-occur, an investigation will be carried out to determine the reason and allow for remediation. Modification of rehabilitation methods and specifications may be required, and rehabilitation and maintenance planning updated accordingly.

6 Environmental considerations

6.1 Land

6.1.1 Topography

The topography of the Project region is generally flat to gently undulating, with elevations ranging between 130 m and 150 m Australian Height Datum (AHD). The topography of the Project is representative of the surrounding region, being generally flat alluvial clay plains with sandy alluvial deposits as slight near-level rises. The surface topography of the Project reduces from east to west by approximately 10 m over 11 km, a gradient of less than 0.001 (Figure 10).

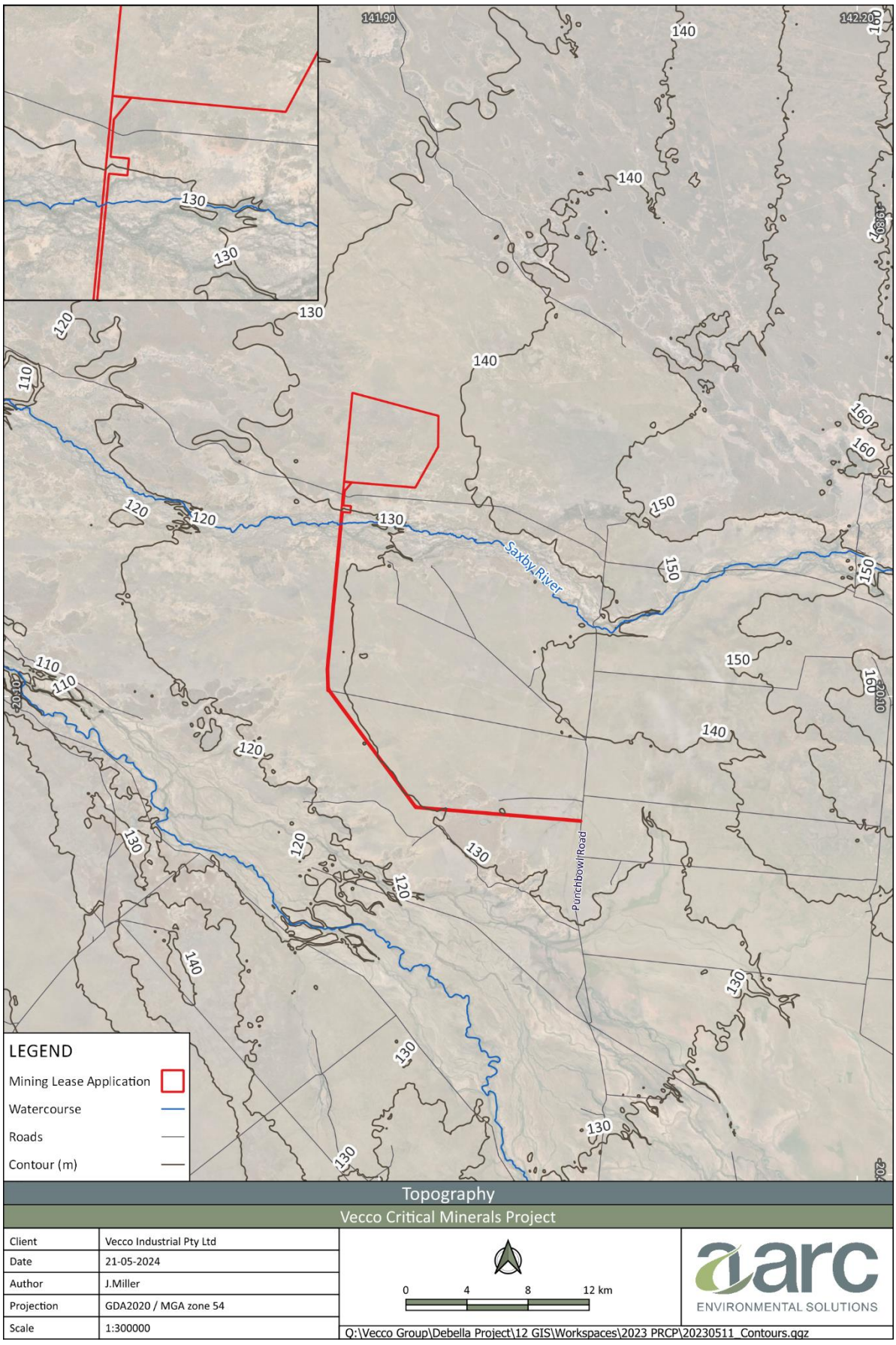

Figure 10: Local topography

6.1.2 Soils

A Soil and Land Suitability Assessment has been developed for the Project in accordance with the following:

- 'Australian Soil and Land Survey Field Handbook' (NCST 2009);
- 'Guidelines for Surveying Soil and Land Resources' (McKenzie et al. 2008);
- 'Queensland Land Resource Assessment Guidelines' (DESI and DoR 2021);
- 'Regional Land Suitability Frameworks for Queensland' (State of Queensland 2013); and
- 'Guidelines for Agricultural Land Evaluation in Queensland (2nd edition)' (DSITI and DNRM 2015).

A field survey was undertaken to map and validate soil boundaries within the Production ML area, while also characterising soil management units (SMUs). Detailed soil profile sites, representative sites for sampling, and observation-sites were selected to appropriately represent all soil types and the unit boundaries present in the Project.

Soil survey results found that generally, soil fertility decreases with depth in response to the variation in soil texture, pH and organic matter content. The most valuable soil resources are mainly confined to the surface horizons, which contain seedstock, micro-organisms and nutrients necessary for plant growth. Much of the solum to at least 0.5 m depth is usable for rehabilitation and respreading purposes.

Within the production area, a total of three SMUs were described. These are the Mitchell SMU, Soapberry SMU and Gum SMU. Table 8 provides an overview of each SMU and its extent within the Production ML.

Table 8: SMUs within the Production ML

SMU	Surface area (ha)	Proportion of area (%)	General description
Mitchell	2302	73	Predominantly deep, Grey Dermosols with Grey Vertosols occurring on gently inclined or near-level plains within an old alluvial landscape. This SMU is distributed throughout the majority of Project area as regions of paleo-drainage and flood channels. The soil consists either of a sandy surface, or self-mulching sandy clay surface, with clay content increasing with depth. Vegetation is predominantly feathertop wiregrass and Mitchell grass tussock grassland. The Mitchell SMU has a neutral pH in the upper soil profile which increases with depth within a suitable range for plant growth. EC values and chloride concentrations are considered low indicating the SMU is not affected by issues associated with salinity or toxic chloride concentrations. Cation exchange capacity (CEC levels) for this SMU is considered low to medium throughout the profile, allowing moderate to high availability of nutrients in the topsoil, with all exchangeable cations within levels ideal for plant growth. Non-sodic conditions occur in the top 0.3 m of the profile, observed as a low ESP levels. However, subsoils from 0.5 m are expected to display sodic properties, demonstrated by increased pH and concentration of free sodium in subsoil. This is further supported by Emerson class 2 at 0.5 m depth.
Soapberry	42	2	Reddish brown, deep, sandy soil occupying the southern region of the Production ML, on gently inclined or near-level plains. The profile generally exhibits little or no A horizon material and therefore often comprises a B horizon with a sandy texture throughout. Vegetation associated with this unit includes wild plum (*Terminalia platyphylla*) and beefwood (*Grevillea striata*), with western bloodwood (*Corymbia terminalis*) and whitewood (*Atalaya hemiglauca*) associated in the upper canopy, and *Melaleuca spp.* in the sub-canopy. The pH of the Soapberry SMU is slightly to moderately acidic throughout the profile, remaining within a suitable range for plant growth. The profile is non-saline and non-sodic, indicated by low ECSAT, Cl and ESP values. CEC is extremely low throughout the solum, influenced by lack of clay and organic matter in the profile. All exchangeable cations are well below the favourable range for the healthy plant nutrition. Poor aggregate stability is observed within the profile as a result of sandy soil texture. Although the profile is considered non-sodic (ESP < 6%), the solum is at risk of slaking where aggregates break down without dispersion.
Gum	801	25	Reddish brown, clay loam sandy soil occupying the central region of the Production ML, on gently inclined or near-level rises. The profile consists of only a B horizon with sandy clay loam to medium clay texture throughout. Vegetation associated with this unit includes bloodwood and *Corymbia* spp. woodlands. The pH of the Gum SMU soils is moderately to slightly acidic throughout the profile, remaining within a suitable range for plant growth. This SMU has no salinity or sodicity limitations. The CEC is generally low, influenced by the very sandy soil texture, and nutrient distribution is not ideal for sustainable plant health. The soil is possibly dispersive. Although the ESP values indicate non-sodic conditions, dispersive and slaking qualities in the upper 0.5 m of the soil are possibly contributed by poorly aggregated silt (and clay) fraction, low organic matter and acidic, non-saline conditions.

6.1.3 Land suitability assessment

Land suitability assessment considers environmental factors including climate, soils, geology, geomorphology, erosion, topography, and the effects of past land uses. The classification indicates the potential of the land to be used for specific agricultural activities. The aim of the land suitability assessment was to evaluate the suitability of the Project for dryland grazing and dryland cropping, prior to further development of the mine.

The five land suitability classes used for assessing land are defined in Table 9. Land is considered less suitable as the severity of limitations for a land use increase. The land suitability class reflects the score of the most limiting attribute for a given SMU. An increase in limitations may reflect either:

- reduced potential for production;
- increased inputs to achieve an acceptable level of production;
- increased inputs to prepare the land for successful production; and/or
- increased inputs required to prevent land degradation.

The Mitchell SMU was assessed with an overall land suitability class of 4 for both dryland grazing and cropping: unsuitable due to moderate to severe limitations, primarily soil water availability and precipitation. The land suitability class of the Soapberry and Gum SMU is Class 5 for dryland grazing and cropping; unsuitable land with extreme limitations that preclude its productive use.

Table 9: Land suitability class description (DSITI and DNRM 2015)

Class	Suitability	Limitations	Description
Class 1	Suitable	Negligible	Highly productive land requiring only simple management practices to maintain economic production.
Class 2	Suitable	Minor	Land with limitations that either constrain production or require more than the simple management practices of Class 1 land to maintain economic production.
Class 3	Suitable	Moderate	Land with limitations that either further constrain production or require more than those management practices of Class 2 land to maintain economic production.
Class 4	Unsuitable	Severe	Currently unsuitable land. The limitations are so severe that the sustainable use of the land in the proposed manner is precluded. In some circumstances, the limitations may be surmountable with changes to knowledge, economics, or technology.
Class 5	Unsuitable	Extreme	Land with extreme limitations that preclude any possibility of successful sustained use of the land in the proposed manner.

6.1.4 Land use

The Project area is a greenfield site, located within the Southern Gulf natural resource management (NRM) region. The land within and surrounding the Project is primarily used for low intensity cattle grazing of native pastures and resource exploration activities. Irrigated cotton cropping occurs sporadically throughout the region.

Land within the Production ML is used for grazing beef cattle on native vegetation with limited or no attempt at pasture modification. The land is not utilised for cropping or other higher production land uses. The land within the Transport ML contains an existing access track used by local landholders for property access.

The cattle station upon which the MLAs are located is designated partly as a Forest Consent Area. These lots were converted into freehold land in 2021, and as part of this process the State retained the rights to the commercial timber through a forest consent agreement with the landholder. The landholder will inform the Department of Agriculture and Fisheries (DAF) of the impacts to the timber resources covered by this agreement and obtain written consent for their removal.

6.1.5 Areas of state interest

The State Planning Policy defines specific matters of state interest in land use planning and development. It seeks to ensure that agricultural development opportunities are promoted and enhanced. The 'State Interest guideline – Agriculture' (DILGP 2016) nominates Important Agricultural Areas (IAAs) and the identification of Class A and Class B land, using the Agricultural Land Classification (ALC) approach, as core concepts of which local government planning schemes should be informed.

Mapping indicates a 10 km buffer on either side of the Saxby River which has classification as IAA, and which includes the proposed Project area.

Based on ALC mapping, the production ML is predominantly classified as Class B land (approximately 80%), indicating land that is suitable for sown pastures and may be suitable for a wider range of crops with changes to knowledge, economics, or technology. Approximately 20% of the production ML is mapped as Class A1 land, meaning land considered suitable for a wide range of current and potential broadacre and horticultural crops with nil to moderate limitation to production. The assessment findings of the SLSA do not support the assignation of Class A1 to the production ML, and accords with a lower, more restricted ALC class.

As identified in Section 4.4.2 (Land holdings), one stock route (010MLY) is transected by the transport corridor, to the south of the Production ML, and north of the infrastructure lease.

6.1.6 Visual amenity

The Project is situated approximately 70 km north of Julia Creek, in a regional location dominated by large scale grazing properties and some cropping. Sensitive receptors are extremely sparse, with the nearest being over 7 km from the mining area, and over 4.7 km from the mine access road. The few sensitive receptors in the area are homesteads. There are no receptors associated with large numbers of viewers or well-used tourism or recreational facilities.

6.1.7 Potential impacts to land values

Project activities, including the stripping, stockpiling, handling, and compaction of soil, will have the potential to impact land values. Among other things, the EIS will address the potential impacts associated with:

- erosion and soil loss associated with construction and operation;
- impacts to land use and suitability for agriculture;
- potential soil and land contamination through:
    - spills from mine-affected water storages or pipelines;
    - spillage of chemicals or fuel;
    - effluent irrigation from the STP;
- Important Agricultural Areas; and
- stock routes.
- visual amenity;

6.1.8 Management and mitigation measures

Management and mitigation measures to reduce potential impacts to land values will be detailed as part of the EIS developed for the Project. At a minimum, this will include:

- additional modelling of erosion risk of recreated landforms through the Watershed Erosion Prediction Project (WEPP);
- development of an Erosion and Sediment Control Plan; and
- development of containment infrastructure to required standards to minimise potential for soil and land contamination.

6.2 Water

6.2.1 Surface water

The Project is located on the northern banks of the Saxby River, around 70 km to the north of the Julia Creek township. The Saxby River is one of the major tributaries to the Flinders River. The Saxby River sub-basin total catchment area is 10,147 km2 and makes up 9.2% of the Flinders Basin catchment. The Saxby River headwaters are within the western reaches of the Einasleigh Uplands bioregion and the river flows typically in a north-west direction.

Approximately 225 km downstream of the Project, the Saxby River joins the Flinders River. Figure 11 shows watercourses in proximity to the Project and provides a regional hydrological context.

There are no major waterways defined as a watercourse under the *Water Act 2000* (Water Act) or unnamed waterways that traverse or intersect the Project's Production ML. The Transport ML crosses the Saxby River to the south of the Production ML.

6.2.1.1 Saxby River

The Saxby River is defined as a watercourse under the Water Act and is the largest watercourse in the vicinity of the Project, with a catchment of approximately 5,700 km^2 adjacent to the Project site.

The Saxby River is an ephemeral watercourse typically subject to periods of no flows during the dry season (April – October) and high flow/flooding events during the wet season (November – March). Since records began in 2014, the Saxby River has recorded mean monthly flow volumes of between 0 ML and 195 ML during the dry season, with no flow recorded for the months of May, June, September, and November. In comparison, the mean monthly flow volume in the wet season ranges from 1.7 GL (December) to 55.3 GL (February).

The Saxby River floodplain is restricted on the northern side of the river at the Production ML boundary, with the topography rising by around 5 m over 800 m to where the project site is located. The southern bank floodplain extends out around 10 km from the Saxby River channel to the border of the Flinders River sub-catchment with water during significant floods flowing from the Saxby River into the Flinders River.

The closest channel of the Saxby River lies approximately 900 m south of the Production ML. The Saxby River's proximity to the Project MLAs is shown in Figure 11, and the Saxby River floodplain is shown in Figure 13.

6.2.1.2 Flinders River

The Flinders River is defined as a watercourse under the Water Act and flows through the townships of Hughenden, Richmond, Julia Creek and Cloncurry before its outlet to the Gulf of Carpentaria. The Flinders River flows in a generally north-westerly direction with the headwaters originating on the western slopes of the Great Dividing Range around Mt Emu Plains, Strathay, and Reedy Springs. As stated above, the Flinders

joins with the Saxby River around 220 km downstream of the Project. The confluence between the Flinders and Cloncurry Rivers, is located around 30 km upstream of the Saxby/Flinders River confluence.

In comparison with other rivers in the Gulf Drainage Region, the Flinders River is fed by relatively high groundwater flows from underlying shallow alluvial aquifers as well as the Gilbert River Formation. This helps maintain streamflow and connectivity along the river well into the dry season, as reflected in recorded dry season baseflow volume of 0.5 GL at the Flinders River at Richmond stream gauge (Station Number 915008A) in comparison with a dry season baseflow volume of 0.1 GL at the Cloncurry River at Damsite stream gauge (Station Number 915204A), which is a similar distance inland in the adjacent sub catchment.

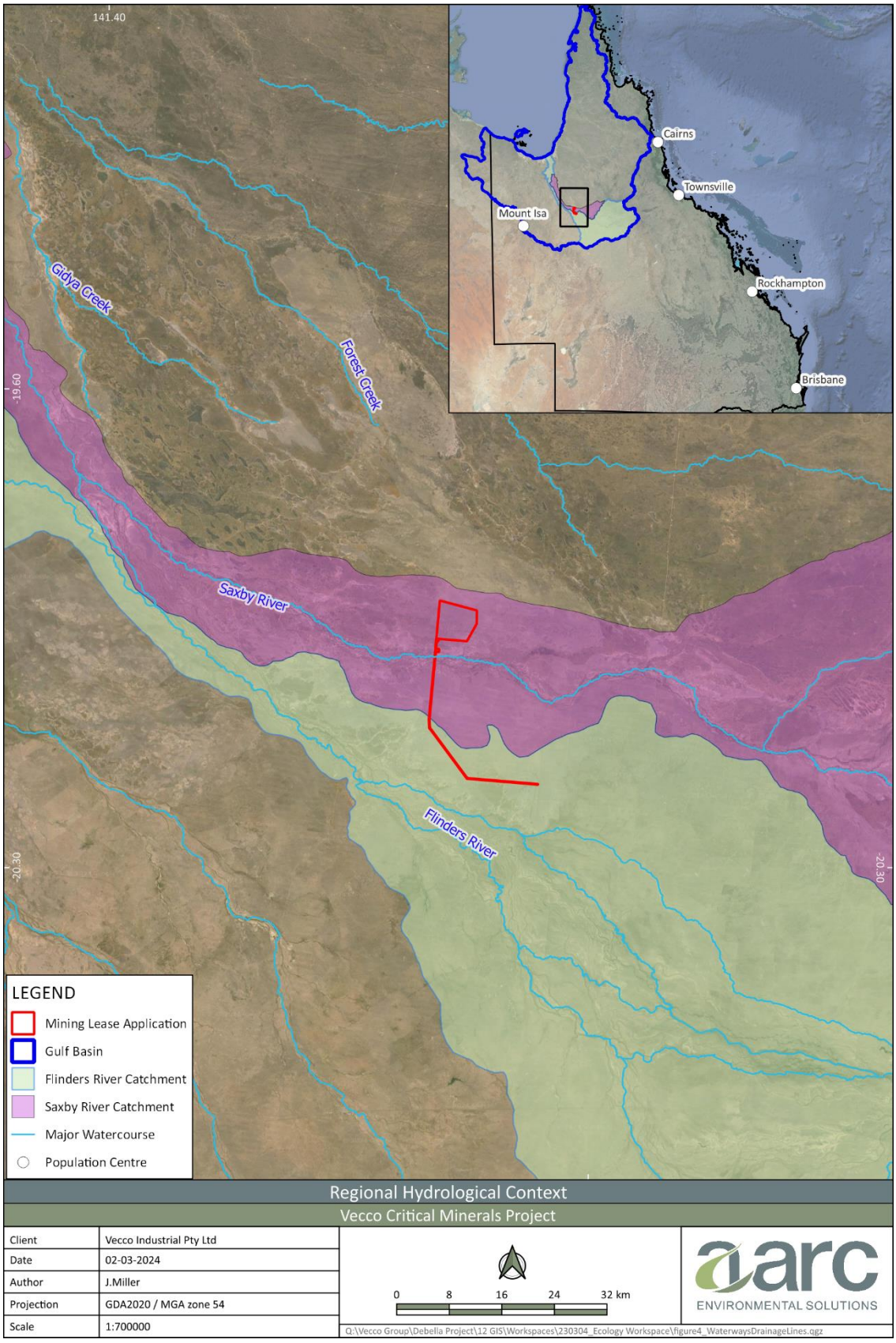

Figure 11: Regional hydrological context

6.2.1.3 Surface water quality

The availability of surface water quality data for the Saxby River is limited due to the ephemeral nature of the watercourse and the limited available access during flow events. An ongoing water quality collection program is in place for the Project. Water samples have been collected across three sample events since 2022.

Water quality in the Saxby River showed consistent elevation for some parameters including aluminium, chromium, copper, manganese, and hydrocarbons when compared to the aquatic ecosystem objectives for slightly to moderately disturbed waters. These elevated parameters are assumed to be linked to natural mineralisation in the sub-soils of the area. There are other potential contributing sources to water including grazing and agricultural land practices - and inflows from uncapped groundwater bores, accessing underlying artesian waters and overtopping to land and waters via constructed bores drains.

Baseline water quality results were considered typical of a slightly to moderately disturbed aquatic ecosystem in this region.

6.2.1.4 Wetlands

No high ecological significance wetlands or associated trigger areas are mapped within the Project area or within 100 km of the Project area.

Several ephemeral wetlands are mapped to occur near the Project, along the access road (Figure 12). This cluster of wetlands was surveyed by ecologists through a combination of field observations from a helicopter following rainfall and ground observations in the dry season (including flora species composition). The wetlands are characterised as:

- topographical depressions forming ephemeral wetlands and waterbodies that fill irregularly following local rainfall and overland flow;
- trees are typically absent or sparse, with occasional Gutta-percha (*Excoecaria parvifolia*);
- shrubs are also sparse and represented by scattered Currant Bush (*Carissa spinarum*) only; and
- the ground layer is dominated by Native Couch (*Brachyachne convergens*).

Cattle grazing was evident within the wetland areas, where the availability of standing water, when present, is thought to provide a source of drinking water, attracting cattle to the location.

Historic satellite image analysis shows the wetlands are rarely inundated in the dry season and only occasionally inundated in the wet season, following local rainfall. The ephemeral wetland features are not fed by any groundwater source or open bore drain.

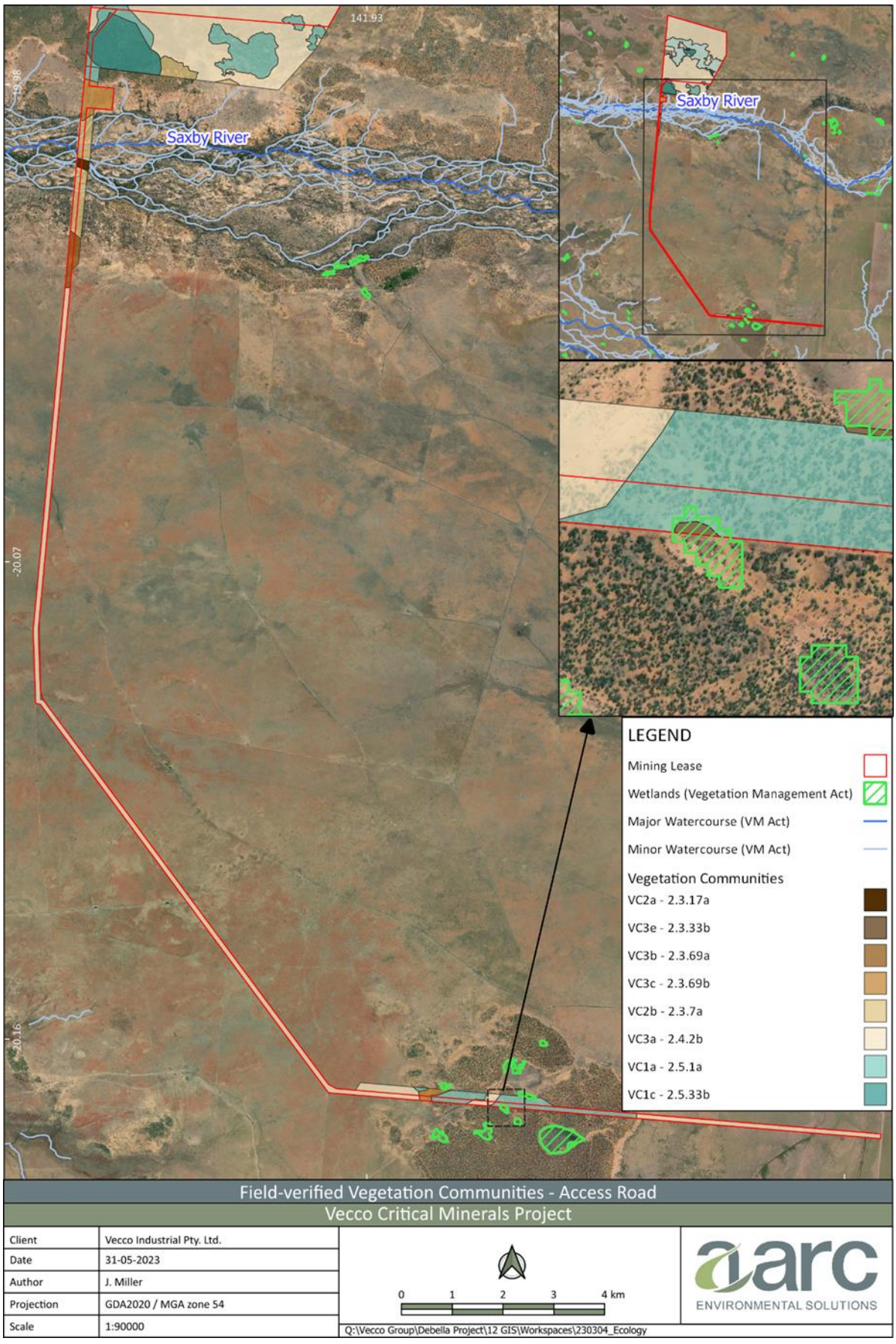

Figure 12: Vegetation Management Act wetlands

6.2.1.5 Flooding

Flood modelling was simulated for the critical 0.1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) flood events in the Saxby River and Flinders River at the Project location to identify flooding interactions and potential impacts with the project area. The flood model simulation adopted hydrology results simulated with an Aerial Reduction Factors (ARF) for the Saxby River catchment resulting in modelled flows for the Flinders River being conservatively high. Water surface contour mapping for the 0.1% AEP design flood event is provided in Figure 13. The flood model results show:

- The Production ML is not impacted by flooding in the 0.1% AEP design flood event or the Probable Maximum Flood (PMF) event.
- Peak flood levels in the Saxby River are limited by the level which water overflows the southern bank of the River towards the Flinders River.
- Peak flood velocity in the Saxby River is expected to range from 1 m/s to 2 m/s in the 0.1% AEP flood event.

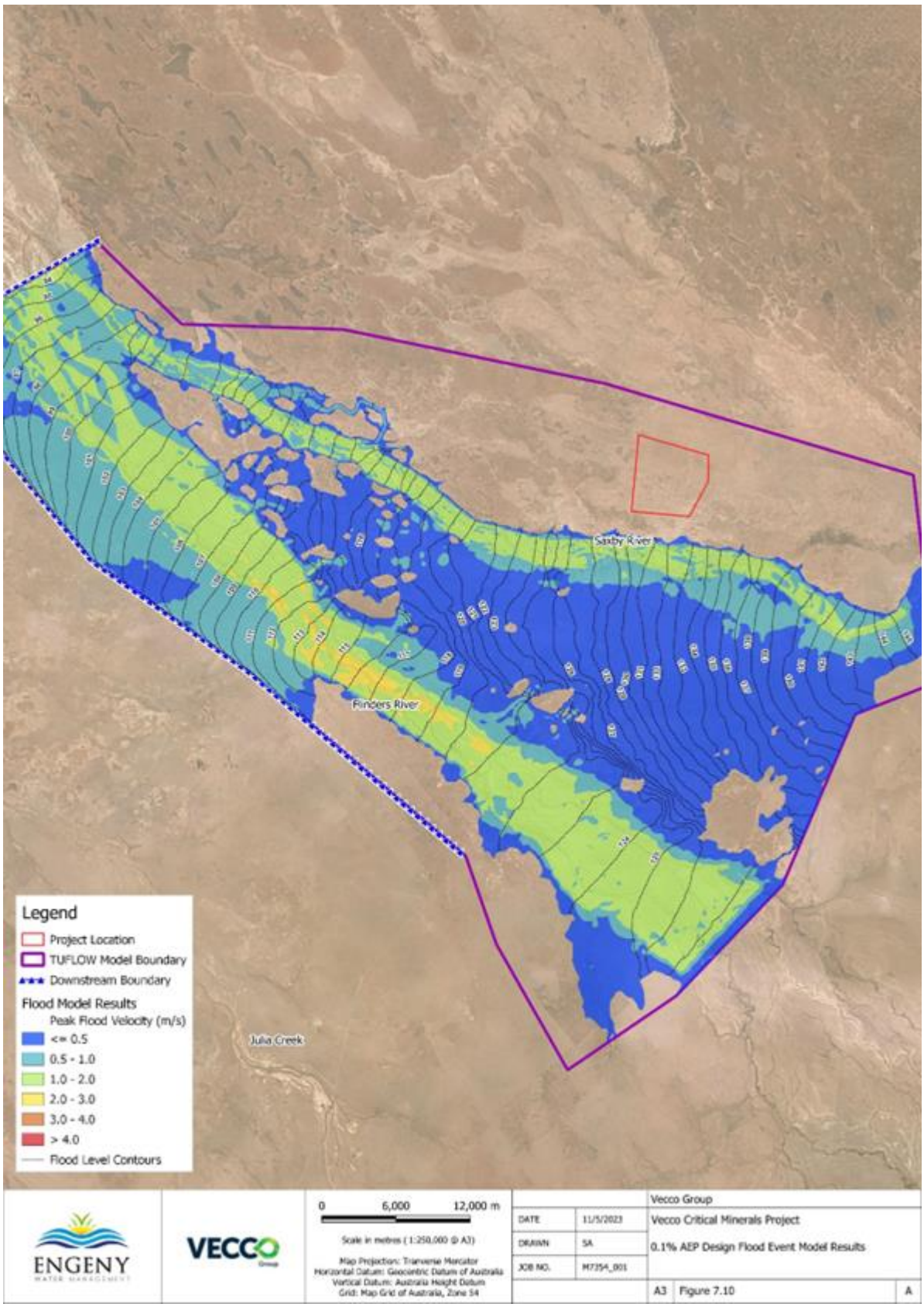

Figure 13: 0.1% AEP flood extent

6.2.2 Potential impacts to surface water

The potential impacts of the Project on surface water values include:

- changes to streamflow in minor local drainage paths downstream of the Project;
- changes to streamflow volumes and duration in the Saxby River due to the catchment area contained by the Project;
- uncontrolled releases from mine water storages or contaminant sources;
- overflows from sediment dams;
- changes to flood flows and behaviour in the Saxby River; and
- cumulative surface water impacts of Projects in the region on the environmental values of the receiving waters.

6.2.3 Management and mitigation measures

The Project will be designed to minimise impacts on surface water flows and natural catchments. Water management systems will be designed to conserve water where possible through reuse and effective containment infrastructure. Potential impacts on surface water will be assessed in detail during development of the EIS, with corresponding mitigation and management measures developed as required. Modelling will include climate change sensitivities for best practice management.

Water quality in the receiving environment will be monitored during operations including the implementation of a Receiving Environment Monitoring Program (REMP). The REMP will monitor, identify, and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity.

6.2.4 Groundwater

The Project is located within the area of the Water Plan (Gulf) 2007 and the Water Plan GABORA (Great Artesian Basin and Other Regional Aquifers) 2017.

6.2.4.1 Hydro-stratigraphy

Hydrogeological observations relevant to the Project are summarised as follows:

- The ore zone for the Project is the shale at the base of the Toolebuc Formation.
- Overlying the shale units is the St Elmo Coquina, a fossiliferous limestone unit of the Toolebuc Formation.
- The Toolebuc Formation is overlain by the Allaru Mudstone, which acts as a confining unit to the Toolebuc Formation and inhibits direct rainfall recharge to the unit. The Toolebuc Formation is the only unit at the Project site that contains groundwater, with the water level generally developed near to or just above the top of the contact between the St Elmo Coquina and the overlying Allaru Mudstone. The Toolebuc Formation in the Project area is likely to be directly recharged from an outcrop area of Toolebuc Formation that occurs approximately 10 km east of the Project site, with groundwater flowing in an east to west direction, down topographic gradient towards the Project area.
- The Toolebuc Formation is underlain by the Wallumbilla Formation, a fine-grained (mudstone, siltstone) unit that acts as a confining layer to the underlying GAB aquifers.
- The groundwater level is generally in the range of 18-22 m below ground level (mbgl), which corresponds to an elevation that is approximately at or just above the top of the St Elmo Coquina.

- The hydraulic conductivity (K) of the Toolebuc Formation (both the Willats Crossing/ Arolla Shales as well as the overlying St Elmo Coquina) is relatively low.
- The Allaru Mudstone forms a confining unit above the Toolebuc Formation and limits direct rainfall recharge to the Toolebuc Formation in the Project area.
- The St Elmo Coquina of the Toolebuc Formation is conceptualised to be recharged within two zones close to the Project area:
    - One zone occurs approximately 10 km east of the Project area, where the Toolebuc Formation crops out at surface; and,
    - The second zone occurs at the northern extent of mining, where the Allaru Mudstone is absent and the underlying St Elmo Coquina is in contact with the unconsolidated Tertiary sediments. This is supported by observations of water level response to rainfall in monitoring data.
- The Toolebuc Formation is separated by the underlying GAB aquifers (Gilbert River Formation) by low-permeability sediments of the Wallumbilla Formation. The Gilbert River Formation is artesian in the Project area, indicating that the Wallumbilla Formation is acting as an effective confining layer for this unit and also that the flow potential for the GAB aquifers is upwards (i.e. any shallow groundwater contamination resulting from the Project will not flow downwards to the GAB aquifers as the GAB aquifer pressure is higher than the groundwater level in the Toolebuc Formation). Based on data from private bores the Wallumbilla Formation has an average thickness of ~ 166 m in the Project area and the water-bearing units of the Gilbert River Sandstone occur at an average depth of 202 mbgl.
- The Saxby River, which occurs to the south of the Project, is an ephemeral water course and available data suggests that the regional groundwater level (i.e. the groundwater level that is developed within the Toolebuc Formation) occurs below the base of the river at a depth of ~20 mbgl. The Saxby River alluvium is therefore disconnected from the regional groundwater table by approximately 20 m of Allaru Mudstone and monitoring data to date indicates that the Toolebuc Formation had no water level response to the above average 2022/2023 wet season, where significant flow was observed in the Saxby River.

6.2.4.2 Existing groundwater users

Data from registered groundwater bores within approximately 20 km of the Project was obtained from the Department of Resources Groundwater Database. There are 14 registered bores located within 20 km of the Project with all bores constructed in the Gilbert River Formation, or the Eulo Queen Group – stratigraphically beneath the Gilbert River Formation. The Gilbert River Formation is a GAB aquifer which recharges approximately 100 km east of the Project. The Gilbert River Formation underlies the Project at an average depth of ~200 m and is separated from the groundwater units that may be impacted by mining by approximately 166 m (on average) of low-permeability Wallumbilla Formation sediments. The Gilbert River Formation aquifer is artesian in the Project area, meaning there is no potential for flow from the shallow units to the underlying GAB aquifer.

6.2.4.3 Groundwater dependent ecosystems

Mapping data indicates the possible presence of ‘derived terrestrial GDEs’ around the edges of vegetation communities within and near the Project (Figure 14). Databases identify these as permeable sandy plain aquifers with fresh, seasonal groundwater connectivity regime. The location of these potential GDEs broadly aligns with the outer edges of Quaternary – alluvial plain and aeolian deposits, mapped in the surface geology.

Mapping data also identifies potential presence of ‘derived terrestrial GDEs’ within the Saxby River riparian zone. Databases identify these as Quaternary alluvial aquifers with fresh, seasonal groundwater connectivity regime.

Further assessment of aquifer connectivity and Groundwater Dependent Ecosystems will be conducted during the Project EIS process.

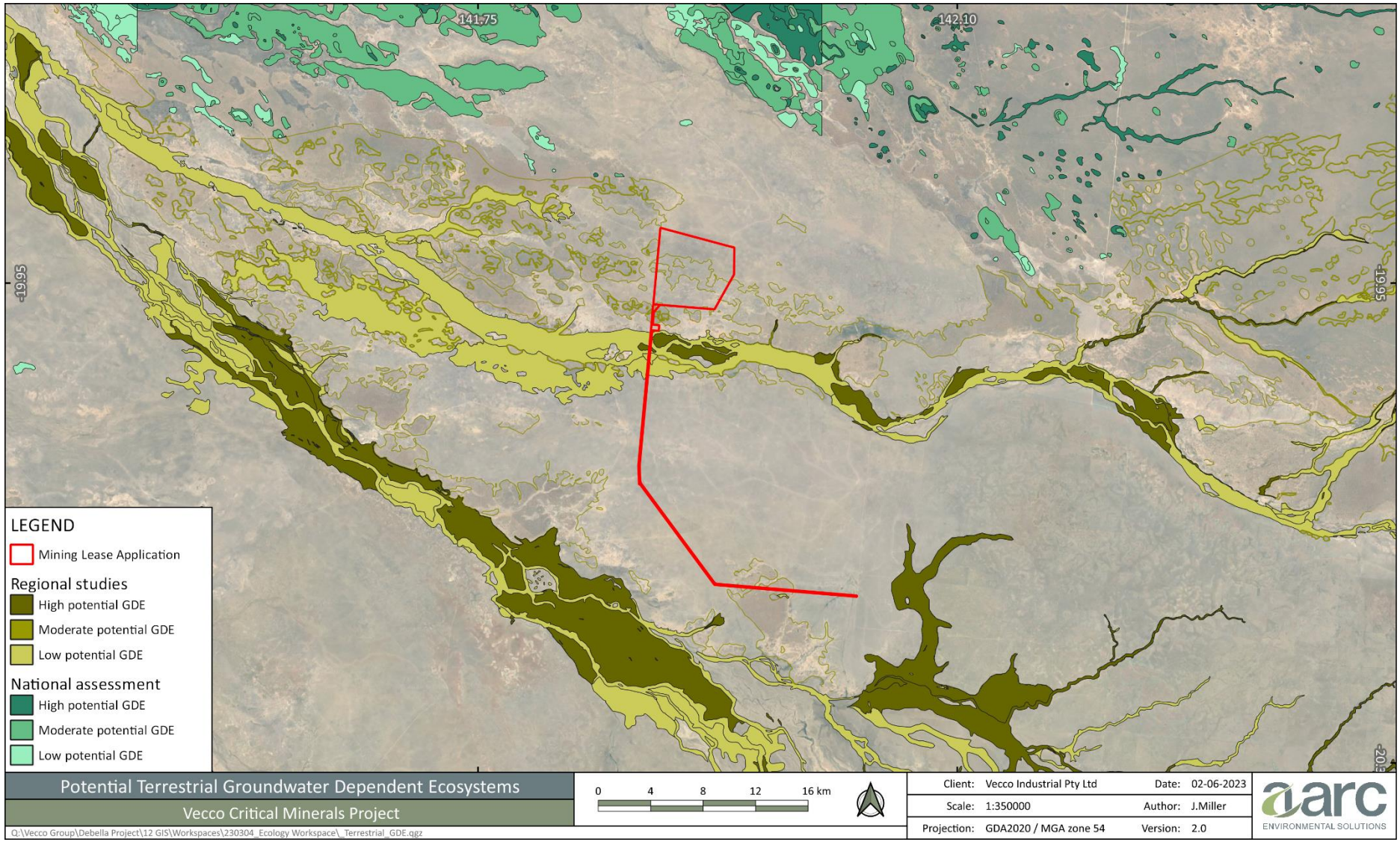

Figure 14: Potential GDEs

6.2.5 Potential impacts to groundwater

The Project has potential to cause groundwater impacts including:

- reduction of water available to existing groundwater users;
- reduction in water tables with potential to impact groundwater dependent ecosystems; or
- potential for contamination of groundwater aquifers from seepage or spills.

A detailed assessment of groundwater will be undertaken as part of the EIS process. The assessment will be inclusive of cumulative impacts on other groundwater users.

6.2.6 Management and mitigation measures

The EIS will assess potential for impacts associated with groundwater and where required will propose mitigation measures necessary for the protection of users and dependent ecosystems.

The Project has undertaken groundwater assessments, including through a combination of groundwater monitoring bores, and computer modelling. This has established an understanding of the groundwater resource as it relates to the Project. Further modelling will be undertaken as part of the EIS process to provide an accurate representation of groundwater resource prior to the Project commencing, and will include:

- Ranges of groundwater inflow to the Project area as a function of mine position and timing;
- For operational and post-mining phases for each aquifer or regulated groundwater unit:
    - The extent of the zone of aquifer depressurisation due to the impacts associated with the Project area;
    - The level and rate of drawdown at specific locations, where any sensitive receptors are identified; and
    - The post closure extent of drawdown and impact at receptors.

A Groundwater Monitoring and Management Plan will be developed to record and monitor groundwater monitoring bore levels and provide long term groundwater level data from the Project area. This program will detect any change or unexpected impact on groundwater levels occurring during and post mining, and will include monitoring in the Saxby River alluvium and throughout the Production ML. This will enable management and mitigation measures to be developed and enacted as needed.

6.3 Ecology

Terrestrial flora, fauna, and aquatic ecology assessments of the Project site have been undertaken including three terrestrial flora and fauna surveys, two aquatic surveys, and three targeted Julia Creek Dunnart surveys.

6.3.1 Flora

Desktop assessment identified ten flora species of conservation significance, of which three species were noted as potentially occurring in the study area, and seven were classed as unlikely to occur. These species were targeted in field survey methods.

A total of 89 flora species have been recorded in the Project study area, nine of which are introduced species. None of these species are listed as prohibited matters, or restricted matters under the Biosecurity Act (Qld). None of the species identified within the Project area are classed as weeds of national significance (WoNS). No threatened flora species were recorded within the Project area.

6.3.2 Vegetation communities

6.3.2.1 Threatened ecological communities

One community listed as endangered under the EPBC Act was identified through desktop assessment as potentially occurring within the Project area or surrounds. This community is "the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin'. This threatened ecological community (TEC) is associated with springs within the Great Artesian Basin discharge area that are the natural surface discharge points of aquifers in the Triassic, Jurassic and Cretaceous sedimentary sequences of the Great Artesian Basin.

Ecological surveys of the Project site determined that no springs are mapped within the Project, and no natural discharge from the GAB has been identified. Vegetation mapping confirmed that communities present within the Project area do not represent the listed TEC: 'community of native species dependent on natural discharge of groundwater from the Great Artesian Basin'.

6.3.2.2 Regional ecosystems

The Queensland Government regulated vegetation map identified all land within the Project Area as Category B remnant vegetation. All vegetation communities within the Project area showed signs of grazing pressure associated with existing land use practices.

Ten vegetation communities / Regional Ecosystems (REs) were mapped during field surveys of the Project site. Table 10 outlines the REs characteristic of each field verified vegetation community. The conservation listing of each RE is provided under the *Vegetation Management Act 1999* (VM Act) and the Queensland Biodiversity Status (BD Status), used in a range of planning and biodiversity management tools. The distribution of these field verified regional ecosystems is provided in Figure 15 and Figure 16.

Table 10: Summary of field verified Vegetation Communities

Map Unit	Vegetation Community	Associated RE	VM Act Status[1]	BD Status[2]
1: Low dry woodlands				
VC 1a	Wild Plum/Beefwood/Bloodwood woodland on gently undulating sand plains	2.5.1a	Least Concern	Least Concern
VC 1b	Western bloodwood low woodland on sandy soil	2.5.12a	Least Concern	Least Concern
VC 1c	*Melaleuca spp*. low open woodland on alluvial plains	2.5.33b	Least Concern	Least Concern
2: Woodlands on alluvial soils				
VC 2a	Coolibah woodland on alluvial plains	2.3.17a	Least Concern	Of Concern
VC 2b	Gidgee low woodland on alluvial plains	2.3.7a	Least Concern	Least Concern
3: Tussock grasslands				
VC 3a	Tussock grassland on Tertiary clay deposits.	2.4.2b	Least Concern	Least Concern
VC 3b	*Aristida spp./Sporobolus spp.* grassland on alluvial deposits	2.3.69a	Least Concern	Of Concern
VC 3c	Common Native Couch and *Sporobolus spp.* dominant grassland on silty clays	2.3.69b	Least Concern	Of Concern

Map Unit	Vegetation Community	Associated RE	VM Act Status[1]	BD Status[2]
VC 3d	*Feathertop Wiregrass and* Common Native Couch grassland on sandy loam	2.5.35	Least Concern	Least Concern
VC 3e	Seasonal swamp dominated by Common Native Couch in circular depressions in sand plains	2.3.33b	Least Concern	Of Concern

[1] Endangered; Of Concern; Least Concern
[2] Endangered; Of Concern; No Concern at Present

The condition of vegetation and the nature of disturbance present within the vegetation communities was recorded during the field surveys. Evidence of cattle grazing was noted at all vegetation communities, occurring in the form of tracks, pats, and direct observation. The condition of all vegetation communities was notably reduced by existing land management practices.

Disturbances observed included:

- previous vegetation clearing for agricultural activities;
- cattle grazing activities;
- roads/tracks;
- man-made canals for irrigation; and
- the occurrence of weeds.

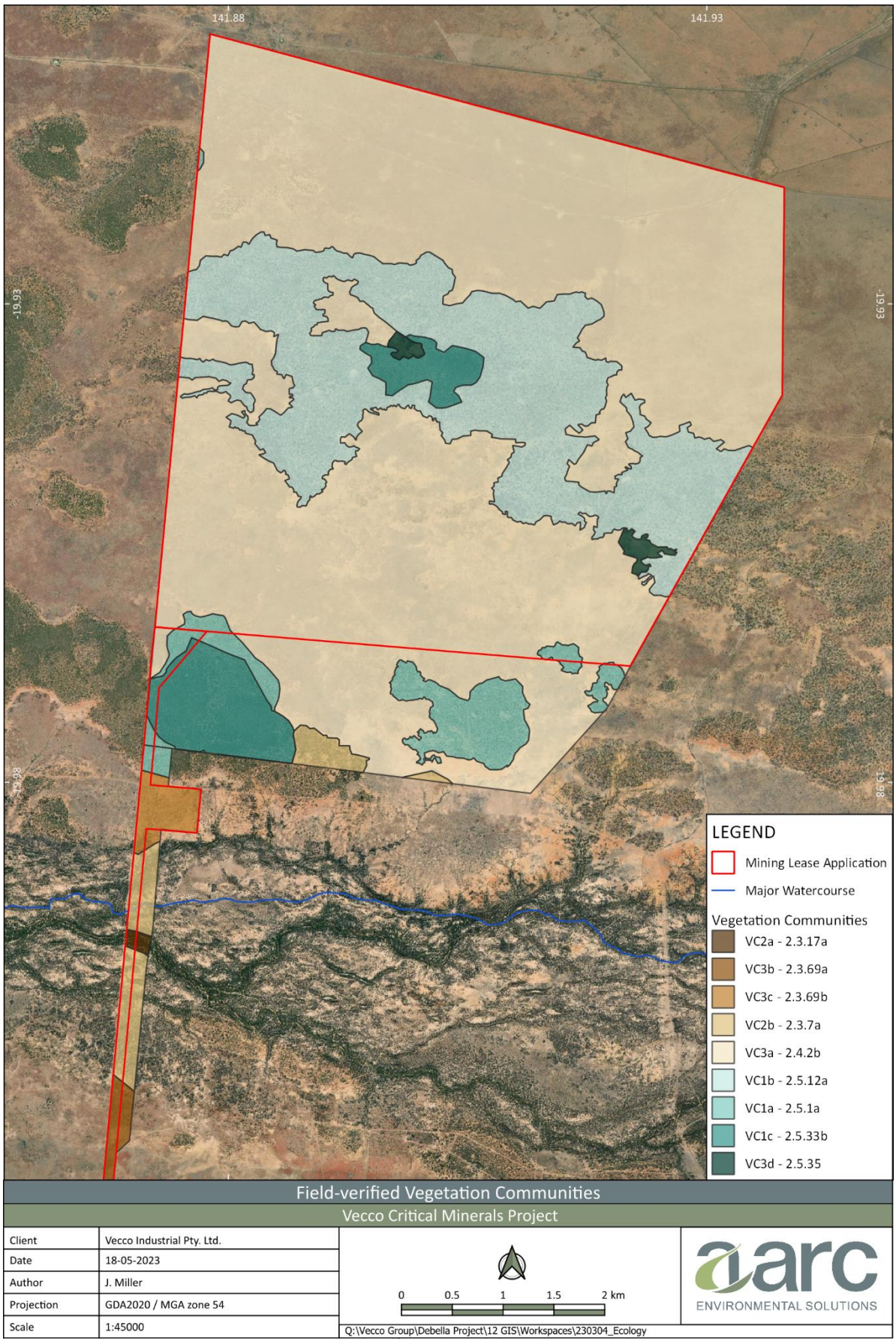

Figure 15: Regional ecosystems within the Production ML and Infrastructure ML

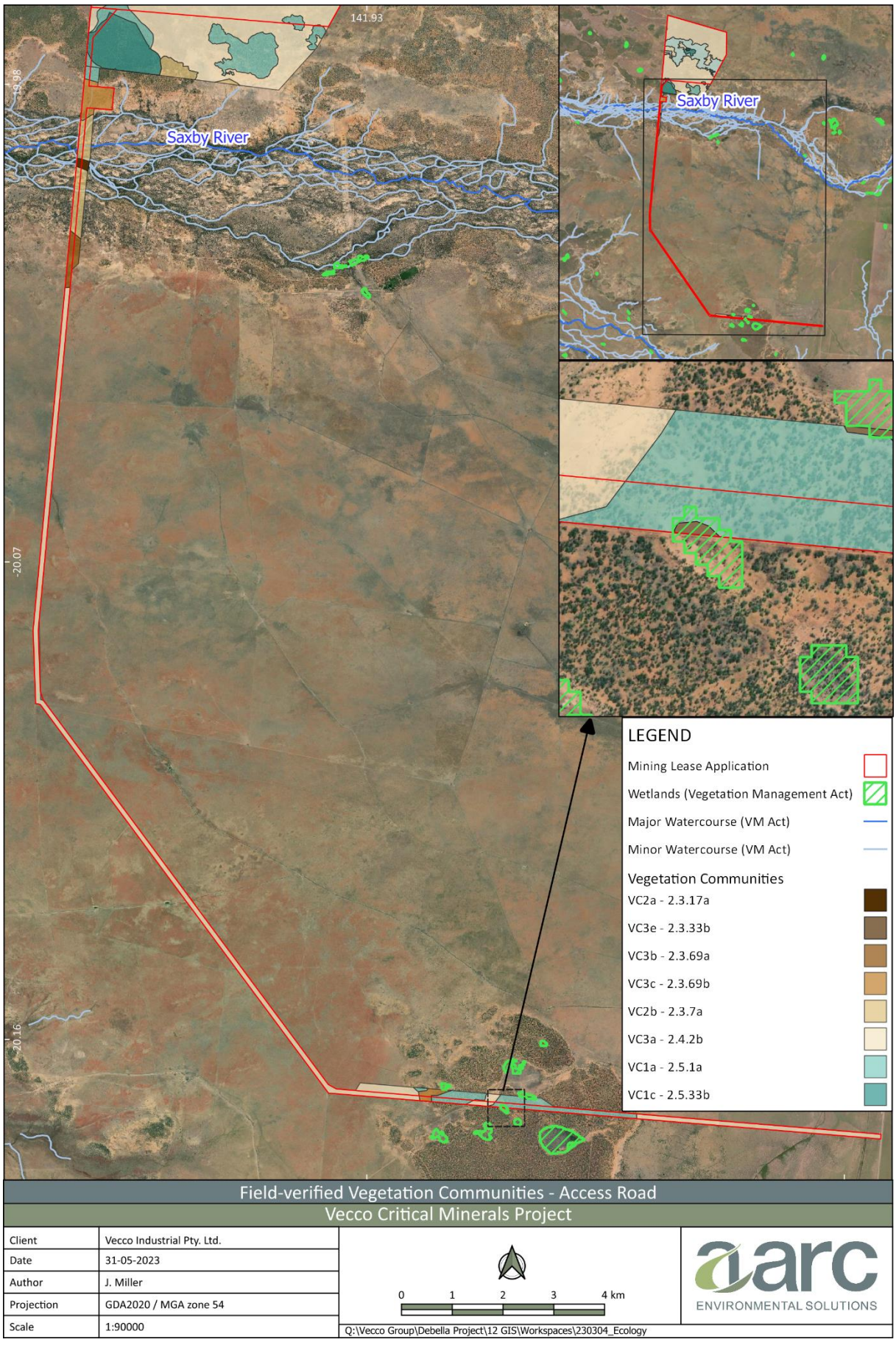

Figure 16: Regional ecosystems within the Transport ML

6.3.3 Fauna

Desktop assessment identified 27 fauna species of conservation significance, with five species noted as potentially occurring within the Project area, and 22 classed as unlikely to occur. These species were targeted in field surveys. The Julia Creek Dunnart (*Sminthopsis douglasi*), listed as vulnerable under the EPBC Act, is a small marsupial found between Julia Creek and Richmond in Queensland. Specific targeted surveys were carried out by expert ecologists to assess species presence and habitat values.

A total of 123 native vertebrate fauna species were recorded on the Project site during the terrestrial ecology surveys, comprising 1 amphibian, 22 reptiles, 15 mammals and 85 birds. Additionally, one native fish species (Spangled perch, *Leiopotherapon unicolor*) and one native crustacean (*Austrothelphusa spp.)* were recorded during the aquatic ecology surveys. No species of conservation significance were identified either within the Project areas, or adjacent to the Project areas.

The Julia Creek Dunnart habitat assessment found that Project area grasslands are typically dominated by 'grey' soils, which have limited surface cracks, are dominated by non-*Astrebla* grasses, and often have a sandy surface. These soils have lower clay content and therefore lack capacity to shrink-swell. They do not form cracks characteristic of Julia Creek Dunnart habitat. The assessment concludes, while proving an absence is always difficult, it seems unlikely that Julia Creek Dunnart will occur at the Project area due to:

- The lack of capture/evidence despite sufficient sampling effort.
- The dominance of grey soils across the site which have poor cracking potential. Areas of possible habitat, largely restricted to darker soils, is modest in extent.
- Grazing pressure affecting grass cover, especially within 5 km of fixed water points.
- Even where possible habitat occurs (i.e. dark soils lacking sandy surface and with lower grazing impacts) these have low amenity due to depleted wide soil cracks compared to high-value habitats (e.g. Julia Creek Aerodrome).
- The absence of black-soil specialist vertebrate species which are often sympatric with Julia Creek Dunnart and therefore potential indicators of presence.

As the Julia Creek Dunnart is listed as a Vulnerable species under the EPBC Act, a referral will be made to the Commonwealth.

Five introduced fauna species have been recorded within the Project area through the detection of scats, tracks, sensor camera detection and/or direct observation:

- cane toad (*Rhinella marina*);
- European cattle (*Bos taurus*);
- wild dog (*Canis familiaris*);
- feral cat (*Felis catus*); and
- feral pig (*Sus scrofa*).

The feral cat, feral pig, and wild dog are listed as a restricted matter under the *Biosecurity Act 2019* (QLD). No species are listed as a prohibited matter.

6.3.4 Environmentally sensitive areas

No environmentally sensitive areas (ESAs) were identified within the Project MLAs. There are no regional ecosystems – remnant or regrowth – listed as endangered under the DESI Biodiversity Status (Category B – ESA) within 50 km of the Project.

6.3.5 Essential habitat

Essential habitat is mapped by the Queensland Government and is defined as regulated vegetation identified as containing at least three essential habitat factors for a species that is Endangered, Vulnerable or Near Threatened or habitat in which an EVNT species is located. Vegetation Management mapping identifies that no Essential Habitat is mapped within or adjacent to the Project area.

6.3.6 Potential impacts to flora and fauna

Potential direct and indirect impacts as a result of Project operations include:

- clearing for Project development resulting in fragmentation, vegetation and habitat loss;
- fauna injury or mortality through interactions with vehicles on roads and/or heavy machinery used for land clearing;
- potential for reduced condition of surrounding vegetation communities, due to the introduction of weeds and pests;
- increased risk of bushfire, linked to equipment operation and other accidental ignition sources; and
- the release of contaminants, including sediment derived from erosion, impacting on surrounding vegetation.

6.3.7 Management and mitigation measures

The Project will develop mitigation, management, and monitoring strategies to reduce the severity and likelihood of impacts on flora and fauna. This will include at a minimum:

- vegetation clearance protocols;
- a Pest and Weed Management Plan;
- protocols for the handling of wildlife; and
- the control of cleared areas with the potential to generate sediment.

Biodiversity offsets will be proposed for significant impacts to prescribed matters that cannot otherwise be avoided.

6.4 Air

6.4.1 Air quality

The Project area is largely unaffected from processes affecting air quality, being a low-intensity cattle grazing region. Dust, and localised and seasonal vegetation burning contribute the most to air quality impacts.

A baseline air quality assessment will be completed for the Project, with assessment against the relevant criteria for air quality values as defined in *the Environmental Protection (Air) Policy 2019* (EPP (Air)), under the EP Act. The EPP (Air) provides objectives for air quality indicators (pollutants) which address health, the aesthetic environment, ecosystems and agriculture.

6.4.2 Greenhouse gas

The Project will result in Scope 1 emissions of greenhouse gasses (GHG) through:

- the clearing of vegetation;
- liquid fuel combustion in vehicles and generators; and

- leakage of LNG during storage and transfer;

These emissions will be quantified during the EIS process.

The Project will require approximately 16 MW of electricity to operate. It is currently proposed to generate this electricity on-site using a mix of solar panels and heat produced by the sulphuric acid processing plant, supplemented with diesel gensets where necessary. The Project proposes no scope 2 emissions from consumption of purchased electricity from a grid.

6.4.3 Potential impacts to air quality

The Project has the potential to increase suspended particulate matter in the immediate vicinity of the Project. The Project will also contribute to emissions of greenhouse gasses.

Sensitive receptors are extremely sparse, with the nearest being over 7 km from the mining area, and over 4.7 km from the mine access road. The few sensitive receptors in the area are homesteads. These are unlikely to be affected by air quality impacts as a result of Project operations.

6.4.4 Management and mitigation measures

6.4.4.1 Air quality

Assessment will be conducted to ensure that, with the inclusion of standard operating controls for dust suppression and gaseous emissions from stacks, the Project can be operated within the EPP Air quality objectives at all sensitive places for the life of the operation.

The Project will be designed such that it is unlikely to significantly impact:

- human health and wellbeing;
- health and biodiversity of ecosystems;
- aesthetics of the environment including odour, dust, visibility reducing particles or light; or
- agriculture activities including crop production.

6.4.4.2 Greenhouse gas

Queensland is undertaking an energy transformation that will see a reduction in the amount of fossil fuels combusted to produce electricity and an increase in the amount of electricity produced from renewable sources, i.e., solar energy and wind energy. This is expected to contribute significantly to Queensland's goals of:

1) 30% reduction in GHG emissions on 2005 levels by 2030;
2) 75% reduction in GHG emissions on 2005 levels by 2035;
3) 50% of energy will be provided by renewable energy sources by 2030;
4) 80% of energy will be provided by renewable energy sources by 2035; and
5) A zero net emissions economy by 2050.

The intermittent nature of renewable energy sources means that significant investment in energy storage systems is required to support these goals. The extraction and processing of vanadium to produce vanadium electrolyte in Vecco's electrolyte facility in Townsville will support the manufacturing of vanadium redox flow batteries. These batteries will be a critical component in the transformation of Queensland's and Australia's

electricity network – which will require the matching of supply and demand of electricity in real time – with the added benefit of minimizing costs and maintaining the stability and reliability of the grid. Furthermore, this Project will enable and accelerate the transition to renewable energy and therefore the presence of vanadium redox flow batteries will likely avoid GHG emissions that would otherwise be produced by a hybrid fossil fuel – renewable energy system which lacks storage capacity.

The Proponent's objective for the Project is to set the benchmark for the lowest emissions intensity production of vanadium pentoxide and vanadium electrolyte in Australia. To achieve this, the Proponent will conduct a greenhouse gas assessment, and corresponding decarbonisation plan, for the Project EIS. This assessment will determine the obligations of the Project to report emissions under the National Greenhouse and Energy Reporting Act 2007 (NGER Act) framework, and whether the Safeguard Mechanism applies. The decarbonisation plan will utilise findings from the air quality and greenhouse gas assessments to establish proactive, achievable, and best practice means of mitigating and managing greenhouse gas emissions. An assessment of avoided emissions will also be undertaken, to quantify the benefits and potential of this Project and vanadium redox flow batteries to support Queensland's goals of a zero net emissions economy by 2050.

6.5 Noise and vibration

The project is situated in a remote rural location. The existing acoustic environment is typically quiet with influences from natural sources such as wind, birds, and insects as well as occasional noise from agricultural activities and vehicle movements.

A baseline noise and vibration assessment will be completed for the Project, with assessment against the relevant criteria for protection of acoustic values as defined in *the Environmental Protection (Noise) Policy 2019* (EPP (Noise)), under the EP Act and associated guidelines.

6.5.1 Potential impacts to noise and vibration levels

Noise emissions will be generated over the life of the Project resulting from material extraction, handling, haulage, and mineral processing. Key noise-generating sources associated with the Project would be the mobile mining equipment (i.e. excavators, haul trucks, loaders, and dozers). Although less significant, noise emissions would also be expected from the mineral processing plant and mine infrastructure area, the camp, the access road, and other small sources such as diesel-powered pumps and lighting plant.

Due to the shallow depth of mining and material properties of the excavated ore and waste, blasting is not a requirement of the mining process. There are no significant vibration sources proposed or expected.

Sensitive receptors are extremely sparse, with the nearest being over 7 km from the mining area, and over 4.7 km from the mine access road. The few sensitive receptors in the area are homesteads. These are unlikely to be affected by noise quality impacts as a result of Project operations.

6.5.2 Management and mitigation measures

The Project will be managed such that adverse noise and vibration effects on environmental values including health and wellbeing and sensitive ecosystems are prevented or minimised.

The Project will ensure that all equipment, particularly heavy mining equipment, is properly serviced and operating in accordance with manufacturer's recommendations. Poorly maintained equipment can lead to elevated noise emissions.

Noise and vibration complaints are not expected as a result of the Project activities due to the low risk of impact. Regardless, in the event of a verified noise and/or vibration complaint, the operator will undertake monitoring at the most noise affected receptor/s and/or complainants' location. The monitoring and assessment report will be conducted in accordance with the 'Noise Measurement Manual' (DESI 2020). Results will be communicated to the complainant and reported in accordance with environmental authority conditions.

6.6 Traffic and transport

As detailed in Section 4.9, access to the site will be from the Flinders Highway via Punchbowl Road. The Project will require a private mine access road connecting it to Punchbowl Road.

Transport of materials to and from the Project site will be conducted by A-triple trucks. Sulphur for the sulphuric acid plant and other reagents will be transported by train to Julia Creek and trucked to the Project site. Mineral products will be trucked to Townsville for secondary processing into battery electrolyte or export from the Port of Townsville to international markets.

Light vehicles will be utilised by the Project where necessary, including to, from, and around the Project site. Workers will predominantly be bussed to on-site accommodation from a regional airport.

Additional materials needed for Project construction and operations, including supplies for workforce accommodation, will be trucked to site as required. The Project will procure local materials where practicable - supporting local business and industry, while reducing transport requirements and emissions.

It is the intention of the Proponent that FIFO workers will be flown directly into Julia Creek however this may require an upgrade of the Julia Creek runway and aerodrome facilities. Engagement with the McKinlay Shire Council identified that the current runway at Julia Creek does not have the capability to support a standard sized, 100-seat charter aircraft. The Proponent is not aware of commitments from State or Local authorities regarding airport upgrades and has raised this matter alongside local Council members with State Development, and the Department of Resources. The Mount Isa airport is expected to have sufficient capacity to support FIFO worker transport for the Project.

Julia Creek has a Multipurpose Health Service (MPHS) which has a doctor, four aged-care beds, and two inpatient beds. The MPHS does not cover surgery, birthing, mental health or child health – and complex cases are sent to Mt Isa or Townsville. The Royal Flying Doctor Service (RFDS) is only used in emergencies and rescue helicopters rarely land in Julia Creek. Should an emergency occur, access for emergency services would be along Punchbowl Road and the mine access road, the mine helicopter pad, or nearby runways capable of receiving the RFDS. Consultation with Julia Creek emergency services indicate that in case RFDS use or transport to the Julia Creek MPHS is not possible, and due to the remote nature of the Project, it will need to be prepared to manage major health issues on site.

6.6.1 Potential impacts to traffic and transport

Increased traffic from Project operations may require road upgrades. The local McKinlay Shire Council has been engaged on this matter to improve access and road safety along Punchbowl Road. Potential impacts to traffic may include traffic delays, traffic incidents, and impact to road surface quality. The Flinders Highway between Townsville and Mount Isa is expected to have sufficient capacity for the increase in traffic. A Traffic Impact Assessment will be undertaken as part of the EIS to identify potential impacts, and relevant management measures to ensure Project traffic is able to travel safely and to reduce impacts to transport routes.

The Project considers the availability and capacity of the Julia Creek airport, and the potential need for upgrades to facilities. Should Cloncurry airport be the key transport route for FIFO workers, there may be potential impact to scheduling and capacity of flights.

6.6.2 Management and mitigation measures

The Project will seek to minimise impacts to transport, for the benefit of the surrounding region and for Project efficiency of operations. Strategies to reduce impact to transport will include, but not be limited to:

- the use of busses to transfer workers;
- an on-site accommodation village;
- the use of rail networks for bulk sulphur transportation;

- community/road safety awareness training for all Project employees; and
- consultation with relevant regulatory authorities regarding road upgrades.

The Project will engage with relevant departments including the Department of Transport and Main Roads (DTMR) to assess disruptions as a result of operations and construction.

6.7 Waste management

Waste from the Project will be managed in accordance with the waste and resource management hierarchy from the *Waste Reduction and Recycling Act 2011,* which lists waste and resource management strategies in the order of most to least preferred option:

a) avoid unnecessary resource consumption;

a) reduce waste generation and disposal;

b) re-use waste resources without further manufacturing;

c) recycle waste resources to make the same or different products;

d) recover waste resources, including the recovery of energy;

e) treat waste before disposal, including reducing the hazardous nature of waste; and

f) dispose of waste only if there is no viable alternative.

Wastes that are not able to undergo processes of on-site reuse, recycling or treatment would be able to do so at off-site waste facilities. Where practicable, consumable suppliers will collect and recycle the waste product, and consider off-site recycling services that may be available. Before disposing waste to landfill, Vecco will consider the reuse and recycling of the waste within practicable measures.

6.7.1 Non-mineral Waste Management Plan

A Non-Mineral Waste Management Plan will be developed for all non-mining wastes prior to the construction of the Project. The Plan will identify all waste streams and volumes, baseline data, compliance protocols, set measurable waste reduction targets, describe management controls and related environmental impacts.

6.7.2 Mine Waste Management Plan

A Mine Waste Management Plan (MWMP) will be developed for the Vecco Critical Minerals Project. This plan will establish objectives and operational controls for mine waste and include ongoing assessment of management success against relevant criteria. It will outline operational contingencies for management scenarios which will assist the Project in delivering sustainable mining.

The MWMP will ensure that mine waste materials – including overburden and process residues – and their co-disposal in-pit are managed to ensure short and long-term protection of environmental values. Spoil, including overburden, will be stored in the out-of-pit dump, adjacent to the mine pit (Figure 5). Runoff from soil stockpiles will be collected in sediment drains, to reduce sediment deposition elsewhere in the Project area or surrounding environment.

Residual waste will be neutralised during the mineral processing stages to mitigate potential risks, including potential acid formation. Residue with an acidic pH will be combined with the limestone present in the overburden, and further ensure the residue is neutralised and has low potential for acid formation in the backfilled pit.

A backfilled void assessment will be undertaken to quantify the geochemical composition of the residue, in addition to assessing the groundwater and surface water modelling to ensure that there will be low risk or magnitude of impact to water quality in the receiving environment. This assessment will be included in the Project EIS.

6.8 Native title and cultural heritage

The majority of the Project area comprising ML 100367 (Production) and ML 100369 (Infrastructure) is located on free-hold land where native title has been extinguished. ML 100368 (Tranport) traverses some land where native title may exist and is being granted in accordance with section 24MD of the *Native Title Act 1993* (Cth).

There are no active Native Title Claims applying to the Project area. The closest existing native title claim application (Mitakoodi People #5 – Tribunal file no. QC2015/009), is located approximately 70 km west of the Project.

The Proponent has maintained the highest standard and respect for cultural heritage sensitivities and has been proactive in its approach to development of the Project. The steps taken by the Proponent include and will continue to include:

- ongoing review of relevant government databases to identify any new native title claimants and/or Aboriginal parties for the land underlying the Project;
- ensuring all Project activities are carried out in accordance with:
    - the duty of care guidelines gazetted by the Minister under the *Aboriginal Cultural Heritage Act 1993* (QLD) (ACH Act); and
    - the cultural heritage management plan (CHMP) (once approved) discussed in Section 6.8.2;
- providing or attempting to provide regular advice to the nearest known native title and/or Aboriginal parties of progress at the Project.

An assessment of Queensland Government databases has not identified any places or sites of Aboriginal cultural significance within the Project area.

6.8.1 Potential impacts

Items of cultural heritage which have not been recorded within or near the Project area may be impacted by Project development activities.

6.8.2 Management and mitigation measures

In accordance with Part 7 of the ACH Act, an approved CHMP will be developed for the Project. The CHMP will inform how the potential impact of the Project on Aboriginal cultural heritage will be managed. The Proponent will notify its intention to develop the CHMP in accordance with the ACH Act and will work with any endorsed Aboriginal parties to develop and seek approval of the CHMP as the approvals process continues.

Non-indigenous cultural heritage places or values have not been identified in the Project area, however if they are suspected to be present or identified during the EIS process, suitable management and mitigation measures will be developed and implemented.

6.9 Social and economic environment

Under the SSRC Act, the Proponent must prepare a social impact assessment (SIA) for the Project. An SIA has commenced and will be included in the EIS. The SIA to date has included an assessment of existing social values and stakeholder and community consultation.

Five key Study Areas were identified as relevant to the Project, and the SIA.

- Study Area 1 represents the town closest to the Project – Julia Creek – selected to provide a micro analysis of the immediate impact area.
- Study Area 2 encompasses the McKinlay LGA, of which Julia Creek is the largest town.
- Study Areas 3 and 4 represent adjacent LGAs Richmond (east), and Cloncurry (west) - the latter of which houses most major services.
- Study Area 5 encompasses the entire state of Queensland as a point of comparison.

The Project has identified nearby regional communities within a 125 km radius, and with a population of more than 200 people – shown in Figure 17. These communities will have preferential employment opportunities for suitable roles, supported by SSRC Act provisions which prohibit 100% FIFO employment, and antidiscrimination provisions.

Communities in the local Study Areas, and those identified as nearby regional communities, are essentially rural, where agriculture has been a driving force of the McKinlay and Richmond LGAs' economies, and the Cloncurry LGA having also supported major resource developments since the late 1800s.

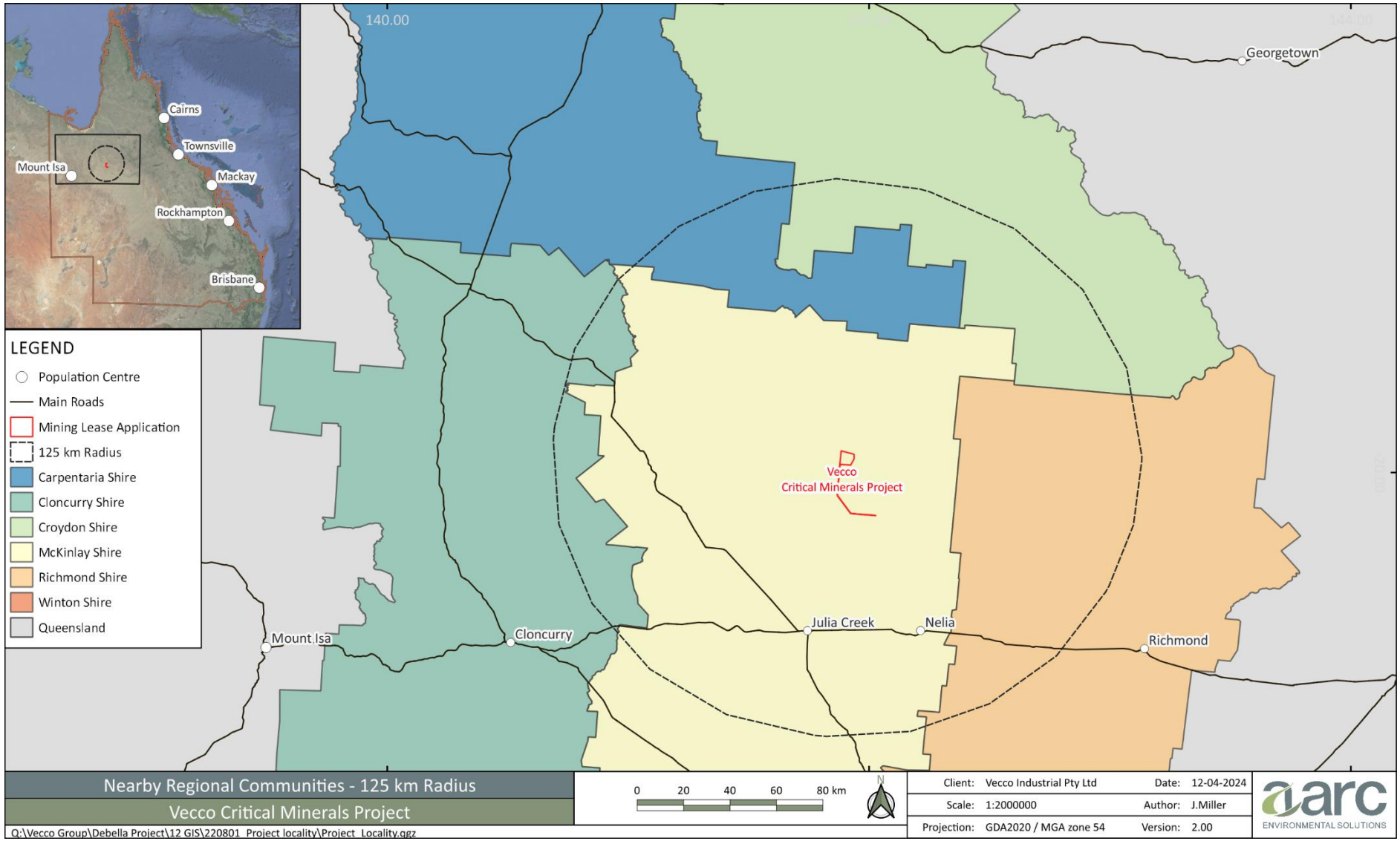

Figure 17: Nearby regional communities

6.9.1 Population and demographics

The Julia Creek population has been declining since 2016 and, in 2021, was expected to continue to decline for the next two decades. The broader McKinlay Shire population, while recently experiencing a small rebound from significant decline between 2011 and 2016, was also expected to decline at a similar rate. However, these statistics may not account for the growing northwest critical minerals industry (as well as increased cotton production), which may reverse these projections.

The Richmond LGA had a higher percentage of families comprised of couples with no children (46.9%), while McKinlay families were predominantly couple families with children. In 2021, there were 11 one-parent families in Julia Creek.

The Socio-economic Index of Disadvantage indicated that McKinlay Shire had no residents in the 'most disadvantaged' quintile and 30.5% of residents in the 'least disadvantaged' quintile. Conversely, some 42% of Cloncurry LGA residents were considered 'most disadvantaged' and there were no Cloncurry residents considered 'least disadvantaged'.

6.9.1.1 Housing and accommodation

In Julia Creek and throughout the McKinlay LGA, one-person households were the most common in 2021. This was similar for the Cloncurry LGA, whereas for Richmond and across Queensland, two-person households were the most prevalent. Most of these households lived in separate dwellings.

Almost 40% of McKinlay LGA residents owned their homes outright, with only a third of Julia Creek homes rented.

In September 2023, there was only one dwelling for sale in Julia Creek and two for sale in the Richmond LGA. During the same period, there were no homes for rent in Julia Creek or Richmond and only seven in Cloncurry – mirroring the country's deepening rental crisis.

The few McKinlay and Richmond building approvals granted in the 12 months to July 2023 were related to residential developments (including just one house in McKinlay). Conversely, Cloncurry had more non-residential approvals and across the state, the split of residential and non-residential building approvals was more even.

There are six short-term accommodation options in Julia Creek, a few of which have recently become unavailable due to being purchased or secured by companies new to the region. Julia Creek does not currently support any dedicated workforce accommodation facilities, but McKinlay Shire Council advises that it has adequate social housing. Some short-term options may provide accommodation capacity for workers during site preparation and the primary construction phase, however mobile on-site accommodation will alleviate the need for significant use of these facilities.

McKinlay Shire Council indicates that it has 12 social housing dwellings (six houses and six units). While the registered social housing demand with Julia Creek as a first preference is zero, Council considers that some community members may have withdrawn from applying for social housing until houses became available. However, Council has not estimated any need for further social housing in McKinlay.

6.9.1.2 Community and services

Julia Creek is the hub of McKinlay Shire. In addition to being the base for McKinlay Shire Council, the town has the services and infrastructure expected of a small regional community. This includes a civic centre, sports centre, swimming pool, gymnasium, parks and various retailers. There is also a wide range of community organisations, from the historical society to a theatre company. Additionally, the town hosts the annual Dirt n Dust Festival – a major music and rodeo event that attracts visitors from all over the state and beyond.

McKinlay Shire Council's strategic focus areas are retaining the population, maintaining opportunities for industry and employment, increasing childcare options, preparing for natural disasters, maintaining and improving the local road network, and ensuring residents can access allied health services – particularly around mental health.

All Study Areas have their own hospitals or MPHSs. Julia Creek's hospital was rebuilt in 2019 and now provides low-risk ambulatory care and clinical services. The small community of McKinlay also has a primary health clinic. Mt Isa Hospital is the main referral centre within the North West Hospital and Health Service, to which all Study Area hospitals belong. Julia Creek MPHS offers aged-care support services and four dedicated beds. McKinlay Shire Council maintains eight independent-living units for older residents.

All local Study Areas have dedicated police, ambulance and fire stations. Julia Creek and Cloncurry ambulance stations are part of QAS's North West District, while Richmond ambulance is part of the QAS Townsville District. Julia Creek and Cloncurry paramedics also work closely with the helicopter rescue service, based in Mount Isa, and the Royal Flying Doctor Service. Julia Creek, Richmond, and Cloncurry fire stations are all auxiliary and are part of the Queensland Fire and Emergency Services' Northern Region Western Command, headquartered in the permanent Mount Isa Fire Station.

6.9.1.3 Labour force

2021 unemployment figures for the local Study Areas were significantly lower than for Queensland. The McKinlay LGA unemployment rate was less than one percent, with Julia Creek at 2.0%. and Richmond Shire at 1.7%, while Cloncurry was higher at 3.9% – compared to Queensland at 5.4%. 2023 unemployment rates are 2.9% for McKinlay and Richmond and 5.0% for Cloncurry, compared to a current lower rate for the state of 3.8%.

McKinlay and Richmond Shires' predominant industry of employment was 'agriculture, forestry and fishing', while within the town of Julia Creek, 'public administration and safety' was the main employment industry. The Cloncurry LGA's largest employer was the mining industry in 2021.

Low regional unemployment may reduce the pool of potential employees for the Project from these communities. However, the emergence of the mining industry in historically agricultural regions may encourage re-training and new career paths and provide a wider variety of opportunities for workers. The Project will work alongside regional councils and communities to develop training programs to facilitate this.

6.9.1.4 Business and industry

Of the McKinlay LGA's 246 businesses, more than 62% were non-employing in 2022, while one-quarter employed one to four employees and no businesses supported more than 200 employees. Results were similar for the Richmond and Cloncurry LGAs.

Almost all McKinlay LGA businesses turn over less than $5 million, with just under 43% of these turning over less than $200,000. In 2022, there were eight McKinlay businesses with a turnover of between $5 million and $10 million and four turning over more than $10 million.

In 2022, some 64% of McKinlay businesses were in the agriculture industry (beef cattle and sheep). Richmond Shire was similar and in both Study Areas, construction was the next most prevalent industry. Cloncurry had a larger mining industry in 2022; however, 'agriculture, forestry and fishing' was largest employer (31.4%), followed by construction.

6.9.1.5 Critical minerals market conditions

Vanadium

The vanadium market has historically been almost exclusively developed for the steel industry. The market is generally described as ~120,000t with limited capacity to scale and absorb market shocks, however the market size is likely to be significantly larger. Chinese supply alone has been indicated as ~280,000t. Due to

the large demand of the steel industry, particularly from China, the market balance is sensitive to changes in steel production. This sensitivity has created instances of wide deviations in pricing over the last 20 years.

Recent changes in global efforts to decarbonise has led to a significant increase in vanadium usage in the energy storage sector. This sector is showing strong lead indicators in China with large increases in both vanadium flow battery projects and manufacturing precincts announced and under construction. The announced planned and in-construction battery projects in China alone will absorb 20,000 - 30,000mtpa for the next 5 years, however this is expected to increase with further project announcements.

The vanadium market is experiencing a shift in sector dynamics. The current steel base for vanadium demand is continuing to grow at an expected rate of 2-3% and the energy storage sector is expected to grow materially creating a need for new primary sources, to meet this additional demand. The large increase in use of vanadium flow batteries can be observed, with over 12.5 GWh of battery projects in China alone announced or construction. The integrated mining and manufacturing strategy employed by Vecco will enable an entrance directly to the energy storage market. Sales at the electrolyte level will allow a premium price to be paid for the high purity V2O5 and facilitate an offtake strategy delivering stable long-term pricing.

Vecco is in advanced discussions and negotiations with various battery manufacturers for domestic and global vanadium electrolyte framework agreements, with several MOUs currently in place. Vanadium electrolyte is the downstream processing product which will be manufactured by Vecco in Australia and abroad.

High purity alumina

The High Purity Alumina (HPA) market is directly tied to the expansion of its key industries: LED lighting, semiconductors, lithium ion (Li-Ion) batteries, and sapphire glass. With estimates of current market volume varying between 40,000 tonnes to 75,000 tonnes per annum, and Compound Annual Growth Rates (CAGR) ranging from 13% to over 22%, it's reasonable to expect the market's expansion to align with the growth of its key industries.

The market is segmented by purity grades, including 3N (99.9%), 4N (99.99%), 5N (99.999%), and 6N (99.9999%). Despite the broad range of applications, the demand for HPA in LEDs, semiconductors, and Li-Ion batteries will benefit the 4N and above products.

The projected growth in the HPA market is driven by the expansion of current industries like LED and semiconductor sectors and is not reliant on the emergence of new technologies. With the demand for HPA, which is projected to increase significantly, new sources of supply will need to come into production. By 2030, it's estimated that supply will need to triple, with a significant portion dedicated to the 4N market, where Vecco plans to position itself.

Molybdenum

The market for molybdenum is characterised by a notable imbalance between global production and consumption, underscoring the urgent need for new supply. With a current market size of approximately 287,000 tonnes per annum, the demand for Molybdenum, fuelled by advancements in green technologies and high-performance alloys, is on a significant upward trajectory.

Forecasts indicate a growth projection of CAGR 3% for the molybdenum market over the next 10 years. Key markets driving this demand include the manufacturing of high-performance alloys and the energy sector - particularly in green technologies such as wind turbines, solar panels, geothermal plants and battery performance enhancements, highlighting the diverse applications and risk spread of molybdenum. The majority of production comes as a by-product of copper mining. The end of life for any major copper mine could critically impact molybdenum supply, as new supply entering the market is not expected to be sufficient for demand growth. Furthermore, a significant portion (approximately 40%) of the current supply originates from regions with heightened sovereign risk – including Russia and Iran, with the remaining nearly 50% being produced in China. This dynamic introduces a critical risk factor that could impact market stability and increased pricing.

The molybdenum market presents a landscape of growing demand, driven by diverse applications across various industries. The current supply constraints and geopolitical risks further accentuate the need for high-quality, reliable sources such as the Vecco Critical Minerals Project, positioning the Proponent to leverage its strategic advantages in the evolving market landscape.

6.9.2 Potential impacts to social and economic environment

The Proponent will seek to create and maintain employment and trade opportunities within the local townships and has commenced discussions with businesses as part of community consultation. The Project will further generate royalties for Queensland, and where minerals and battery electrolyte is exported, the Project will generate revenue for Australia.

Estimated revenue for the Project totals approximately $12.6 bn, expenditure of $6.9 bn, and a pre-tax internal rate of return (IRR) of 23.2%. Over the life of mine, it is calculated that the Project will generate $216.7 m in royalties for the State of Queensland.

The Project is expected to create up to 300 jobs during construction, and 274 jobs during peak operation. The Project will increase the sustainability of Queensland's manufacturing industry, through supply of local vanadium pentoxide to the Townsville battery electrolyte manufacturing plant.

The growing demand of vanadium redox flow batteries for renewable energy storage is driving the need for vanadium extraction and processing locally. This Project will support the development of large-scale renewable energy sources, as large-scale battery production will require the critical minerals being targeted.

Through the commitment to high Environmental, Social and Governance (ESG) standards, the Project will be a fully auditable production of asset materials. The highly regulated and best practice mining methods in Queensland will ensure the Project operates within a low-risk jurisdiction for ethically derived battery minerals. Continued stability and increased employment opportunity and wealth creation in the region are key positive economic outcomes of the Project.

Potential negative social and economic impacts include:

- an increase in demand for health, emergency and educational services;
- increase in regional demand for housing; and
- amenity impacts such as an increase in dust and noise emissions (expected to be of low risk and magnitude given remote location of Project site).

6.9.3 Management and mitigation measures

Opportunities to avoid and mitigate impacts by the Project have been determined through community consultation.

On-site accommodation may reduce the direct expenditure from the workforce in the local community, however Vecco has engaged local companies in the region to establish a local procurement policy. Where practicable, resources to develop and operate the Project site will be sourced through local supply agreements. This ensures that the Project will provide long-term support for local business and industry. In combination with the additional benefits of reducing transport and housing requirements, likelihood of unsociable behaviour, and risk to the regional electricity supply, the on-site accommodation is a net-positive for the region.

The Proponent has co-ordinated with regional emergency services and schools to commence development of management measures for the Project.

An Economic Impact Assessment will form a component of the studies conducted for the Project EIS, to ensure that the benefits to the region are fully understood, and that any negative impacts can be appropriately mitigated and/or managed. This will be prepared in accordance with the Coordinator General's

Economic Impact Assessment Guideline for Coordinated Projects, and ensure impacts are clearly identified and suitable management measures are developed.

No government incentives, initiatives or programs are required for the Project to succeed, however conditions such as grants or access to funding would assist in accelerating the Project timetable and drive greater incremental investment in Queensland.

From the findings of the renewed SIA and community consultation, the Proponent will develop local and indigenous employment targets. A Social Impact Management Plan (SIMP) will be developed following completion of the SIA. This will establish appropriate mitigation and management strategies as recommended by the SIA and provide practical benefits to the community by developing action plans which relate to matters such as housing, community services, local industry, and local and indigenous employment. The SIA and corresponding SIMP will be presented in the EIS.

6.10 Health, safety, hazard and risk

The EIS application process will incorporate a Hazard and Risk Assessment to detail and manage risks associated with the construction, operation, and decommissioning stages of the project, and to develop appropriate mitigation measures and strategies. The Hazard and Risk Assessment will consider both onsite and surrounding offsite risks to people, properties, and environmental values, including flooding and bushfires.

6.10.1 Potential impacts to health and safety

Natural events such as flooding, droughts and bushfires have the potential to cause significant damage and pose safety risk, noting that the Production lease sits outside the flood extent of the Saxby River. These events have the potential to increase in severity and frequency as a result of climate change.

An operational mine site has the potential to increase risks to health and safety of the workforce and environment, including physical injuries and risk of contamination. These risks include:

- heavy vehicles interactions with light vehicles;
- an increase in dust levels and dust deposition;
- an increase in noise and vibration levels;
- geological instability;
- working at heights;
- worker fatigue;
- high temperatures; and
- interaction with wild animals.

Of particular importance to Vecco is consideration of the additional potential risks as they pertain to on-site mineral processing. Risks from these activities include:

- spillages of hazardous substances and dangerous goods;
- the handling of bulk quantities of final processed mineral product;
- the use of reagents such as sulphuric acid;
- working near machinery operating at high temperature and pressure;
- an increase in noise and vibration levels; and
- worker fatigue.

6.10.2 Management and mitigation measures

Procedures to reduce risks to health, safety and the environment will include at a minimum:

- the continued operation of a site Health and Safety Management System (HSMS);
- equipment and vehicle operators will be trained to safely operate the equipment and respond to emergency systems;
- appropriate rostering of drivers, operators, and workers will reduce potential risks associated with fatigue;
- development and implementation of a fit for work program, and code of conduct policies;
- workers will be trained in the use of fire-fighting equipment such as extinguishers, and safe operation procedures to reduce bushfire risk;
- handling procedures for flora and fauna will be developed;
- workers will have access to, and training in using, appropriate personal protective equipment (PPE), including masks against fine particulate matter such as dust;
- the transport and handling of dangerous goods and hazardous substances will be undertaken in accordance with relevant legislation and guidelines;
- chemical and hazardous substances will be stored in accordance with applicable standards;
- the Project will ensure the presence of spill kits, training of site personnel, and development and implementation of appropriate handling procedures in the event of spillages;
- suitable standard operating procedures for mineral processing operations, including:
    - using approved Safe Work Method Statement;
    - appropriate signage;
    - inspection and maintenance of machinery;
    - adequate training and competency assessments;
    - availability and training in the use of PPE; and
    - storage of hazardous substances and dangerous goods in accordance with applicable standards;
- employees and contractors will be required to manage and remove all wastes according to the Waste Management Plan and Mine Waste Management Plan, which will be developed in accordance with best practice and relevant legislation and guidelines.

Vecco will prepare an Emergency Response Plan, which will outline health and safety procedures and work in conjunction with emergency services to ensure the health and wellbeing of employees and contractors. Vecco will consider the effects of climate change, and how these may exacerbate potential risks, in the development of safety procedures.

7 Stakeholder and community consultation

The surrounding community and relevant stakeholders have been engaged on numerous occasions throughout the environmental impact assessment process. This has ensured that relevant community members are aware of the Project, its benefits, and potential impacts. Consultation has provided, and will continue to provide, the opportunity for stakeholders to comment on issues of relevance.

Key stakeholder groups that have been consulted include, but are not limited to:

- directly affected landholders;
- local, state, and Australian government agencies;
- Aboriginal and Torres Strait Islander peoples;
- potentially and directly affected communities; and
- indirectly affected key stakeholders such as interested parties.

Objectives of Project consultation have included the following principles:

- ensure community members have understood the Project details, timing, and workforce arrangements so that discussions about impacts and benefits are meaningful;
- provide community members with the opportunity to identify and assess potential social impacts;
- ensure transparent and inclusive community engagement to facilitate the ongoing management and monitoring of potential social impacts;
- ensure Project planning and delivery, including the development of the EIS, are informed by community views; and
- ensure post-mining land use is consistent with community expectations.

Comments received during consultation and stakeholder engagement have been generally supportive of the Project, including acknowledgement that the benefits of an emerging industry would provide for the region.

The Proponent has directly engaged local industry to identify where the Project can source goods, materials, services, and workers from the local region. This engagement will directly inform local supply agreements and ensure that the Project will provide long-term support for local business and industry. The McKinlay Shire Council is supportive of the Project and has been engaged to assess how the Project can further benefit the local community.

The Project has identified some concerns from relevant stakeholders, including that accommodating the full workforce in Julia Creek may result in negative outcomes such as an increase in unsociable behaviour, overburdening the local power grid, and increasing traffic. These concerns have been considered in the Project design phase and will inform future Project development.

Ongoing and additional stakeholder consultation programs will include:

- identifying affected and interested stakeholders;
- development of a schedule of activities to inform the relevant stakeholders;
- development of appropriate communication and consultation model along with the section of appropriate communication and consultation tools; and
- ongoing review and maintenance of relevant documentation to address any comments and/or issues of concern from the stakeholders and community.

Communication and consultation tools will be applied depending on the level of interests and convenience and may include the following options:

- face to face meetings;
- phone meetings;
- written notices and communications;
- local and/or regional newspaper notifications;
- newsletters; and
- media releases.

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Appendix A. Protected Matters Search Tool results (50 km radius from project boundaries)

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 28-Feb-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	16
Listed Migratory Species:	13

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	18
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin	Endangered	Community likely to occur within area	In buffer area only

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Erythrura gouldiae Gouldian Finch [413]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
Grantiella picta			
Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Neochmia ruficauda ruficauda			
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
Rostratula australis			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
Tyto novaehollandiae kimberli			
Masked Owl (northern) [26048]	Vulnerable	Species or species habitat may occur within area	In feature area
MAMMAL			
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
Macrotis lagotis			
Greater Bilby [282]	Vulnerable	Species or species habitat may occur within area	In feature area
Sminthopsis douglasi			
Julia Creek Dunnart [305]	Vulnerable	Species or species habitat known to occur within area	In feature area
REPTILE			
Acanthophis hawkei			
Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Varanus mertensi			
Mertens' Water Monitor, Mertens's Water Monitor [1568]	Endangered	Species or species habitat may occur within area	In feature area
SHARK			
Pristis pristis			
Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Marine Species			
Pristis pristis Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish [60756]	Vulnerable	Species or species habitat may occur within area	In feature area
Migratory Terrestrial Species			
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area	In feature area
Hirundo rustica Barn Swallow [662]		Species or species habitat may occur within area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Charadrius veredus Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
Glareola maldivarum Oriental Pratincole [840]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area overfly marine area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat may occur within area overfly marine area	In feature area
[Charadrius veredus](#) Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area overfly marine area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
[Glareola maldivarum](#) Oriental Pratincole [840]		Species or species habitat may occur within area overfly marine area	In feature area
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
[Hirundo rustica](#) Barn Swallow [662]		Species or species habitat may occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Reptile			
Crocodylus johnstoni			
Freshwater Crocodile, Johnston's Crocodile, Johnstone's Crocodile [1773]		Species or species habitat may occur within area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Saint Elmo Vanadium Project, 25 km east Julia Creek, QLD	2017/8007	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Referral decision				
Multicom - St Elmo Project	2017/7978	Referral Decision	Completed	In buffer area only

Bioregional Assessments			
SubRegion	BioRegion	Website	Buffer Status
Galilee	Lake Eyre Basin	BA website	In buffer area only

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix B. Flora Species of Conservation Significance – Likelihood of Occurrence

Species	Status		Description	Desktop Likelihood of Occurrence
	NC Act	EPBC Act		
Dolichocarpa spathulata	E	LC	This species is known to occur within north-west Queensland. It grows all year round, primarily in seasonally dry tropical biomes (Royal Botanic Gardens 2022)	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km
Crinum pedunculatum	SL	LC	Within Queensland, this species is primarily found along the eastern coast, however, it has been identified in western Queensland also (ALA 2021-2022). The species can grow in a range of conditions from full sun to half shade, tolerating poor drainage and clay soils, or growing underneath eucalypt trees. The flowers occur between November and March (ANPSA 2022).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km
Vallisneria caulescens	SL	LC	The species occurs in northern Australia, north of Mackay within Queensland (ALA 2021-2022). It is a hydroperennial, growing primarily in seasonally dry tropical biomes (Royal Botanic Gardens 2022).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km

Appendix C. Fauna Species of Conservation Significance – Likelihood of Occurrence

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Reptiles				
Acanthophis hawkei Plains Death Adder	V	V	**Distribution** The exact distribution of the species is unclear. Based on the presence of suitable habitat, the potential geographic range of the plains death adder extends from Western Queensland, across the north of the Northern Territory to north-east Western Australia. Fragmented populations of the plains death adder are known to occur in the Mitchell Grass Downs of western Queensland, the Barkly Tableland on the Northern Territory / Queensland border and east of Darwin in the Northern Territory (DCCEEW 2022). The distribution of this species overlaps with the EPBC Act-listed threatened ecological community 'The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin' (DoE 2011). **Habitat** Suitable habitat for the plains death adder consists of flat, treeless, cracking-soil riverine floodplains (DoE 2011).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Varanus mertensi Mertens' Water Monitor	E	E	**Distribution** Distribution across northern Australia, from Eastern Queensland, across the north of the Northern Territory, to north-east Western Australia. It's southern extent in Queensland is from Mt Isa to Cairns. **Habitat** A highly aquatic lizard that rarely ventures more than 5-10 m from the edge of water. Often found in semi-permanent pools, including springs, swamps, and creeks. Recorded sheltering in hollows between rocks and in burrows that have been dug into the banks of waterways (DCCEEW 2023). **Foraging** An active predator that forages primarily in the water and at the water-land interface (DCCEEW 2023). Varied and adaptable diet contributes to widespread distribution in the wet-dry tropics of Australia. **Breeding** Lays eggs in a burrow in the dry season and hatching in the wet season.	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Fish				
Pristis pristis	V	SL	**Distribution**	Unlikely - Potential habitat is unlikely to occur within the

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Freshwater sawfish			The Freshwater Sawfish may potentially occur in all large rivers of northern Australia from the Fitzroy River, Western Australia, to the western side of Cape York Peninsula, Queensland. It is mainly confined to the main channels of large rivers (DCCEEW 2023). **Habitat** Freshwater Sawfish occur in fresh or weakly saline water and tends to move up rivers during flood periods (DCCEEW 2023). The preferred habitat of this species is mud bottoms of river embayments and estuaries and are usually found in turbid channels of large rivers over soft mud bottoms more than 1 m deep, but they will move into shallow waters when travelling upstream or while hunting prey (DCCEEW 2023). The species is not found near riparian vegetation (DCCEEW 2023).	Project area due to the ephemeral nature of the waterways within and surrounding the Project area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Birds				
Actitis hypoleucos Common Sandpiper	Ma, Mi	SL	**Distribution** The Common Sandpiper is widespread in small numbers. It is known to occur along all coastlines in Australia, and in many areas inland (DCCEEW 2022-2023). In Queensland, this species has been recorded in South-eastern Gulf of Carpentaria and Cairns Foreshore (DCCEEW 2022-2023). It migrates to Australia during the non-breeding season, migrating to Queensland from August (DCCEEW 2022-2023). **Habitat** The Common Sandpiper can occur in a broad range of coastal and inland wetlands with varying levels of salinity (DCCEEW 2022-2023). It is mostly found around muddy margins or rocky shores, which may be narrow and or steep (DCCEEW 2022-2023). Rarely found on mudflats (DCCEEW 2022-2023). **Foraging** Generally this species forages on bare soft mud at the edges of wetlands in shallow water, often in areas where objects protrude from the substate (rocks or pneumatophores) (DCCEEW 2022-2023). Sometimes the Common Sandpiper will venture into grassy areas adjoining wetlands in search of food for extensive periods (molluscs, bivalves, crustaceans and a variety of insects) (DCCEEW 2022-2023). **Breeding/Roosting** Roost sites are typically on rocks or in roots/ branches of vegetation, especially mangroves (DCCEEW 2022- 2023). **Dispersal** The southern migration passage is said to be mostly diurnal, whereas the northern passage mainly occurs by night (DCCEEW 2022-2023).	Unlikely - Potential habitat has not been identified within the study area, and there are no confirmed records within 10 km
Apus pacificus Fork-tailed Swift	Ma, Mi	SL	**Distribution** The Fork-tailed Swift is a non-breeding visitor to all states and territories of Australia (DCCEEW 2022-2023). It is widespread throughout Queensland, with sightings common from February–March (DCCEEW 2022- 2023). **Habitat** This species does not have specific habitat requirements and is found across a range of habitats, from inland open plains to wooded and coastal areas, where it is exclusively aerial (DCCEEW 2022-2023). **Foraging** The Fork-tailed Swift forages aerially, up to hundreds of meters above the ground (DCCEEW 2022-2023). They often occur in areas of updraughts and along the edges of low-pressure systems eating small bees, wasps, termites and moths (DCCEEW 2022-2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			Breeding/Roosting It is thought that this species roosts aerially but are occasionally observed to land (DCCEEW 2022-2023). **Dispersal** It is not known to have specific dispersal habitat requirements.	
Calidris acuminata Sharp-tailed Sandpiper	V, Ma, Mi	SL	**Distribution** The Sharp-tailed Sandpiper is a non-breeding visitor to all states and territories of Australia (DCCEEW 2022- 2023). It is widespread throughout Queensland, arriving in large numbers in September (DCCEEW 2022-2023). **Habitat** This species prefers fresh or saltwater shallow wetlands with muddy edges (DCCEEW 2022-2023), with the presence of inundated or emergent sedges, grass, saltmarsh, or other low vegetation (DCCEEW 2022- 2023). This includes swamps, lakes, lagoons, and pools near the coast, and waterholes, soaks, dams, bore drains and bore swamps, saltpans, and hypersaline salt lakes inland (DCCEEW 2022- 2023). Sometimes they occur on rocky shores and rarely on exposed reefs (DCCEEW 2022- 2023). **Foraging** They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water (DCCEEW 2022-2023). This species can also forage among inundated vegetation of saltmarsh, grass, or sedge, eating seeds, worms, molluscs, crustaceans, and insects (DCCEEW 2022-2023). **Breeding/Roosting** Roosting occurs at edges of shallow wetlands, on wet open mud or sand, or in short sparse vegetation, such as grass or saltmarsh (DCCEEW 2022-2023). Mangroves and on rocks in water are some other locations this species has been seen roosting (DCCEEW 2022-2023). **Dispersal** Movements occur during the non-breeding period, moving to temporary or flooded wetlands and leaving them when they dry (DCCEEW 2022-2023).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km
Calidris ferruginea Curlew Sandpiper	CE, Mi	CR	**Distribution** Widespread in small numbers, this species is known to occur around coasts in Australia and in many areas inland during the non-breeding season (DCCEEW 2022-2023). In Queensland, this species has been recorded in the Gulf of Carpentaria, with widespread records along the coast, south of Cairns (DCCEEW 2022-2023). **Habitat** Inhabiting wetland environments, the Curlew Sandpiper mainly occurs on intertidal mudflats in sheltered	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			coastal areas, (estuaries, bays, inlets, and lagoons), as well as around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms (DoE 2015a). Small numbers have been recorded living inland around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand (DoE 2015a). **Foraging** Curlew Sandpipers forage on mudflats and nearby shallow water at the edge of shallow pools, wading through water 15-60 mm deep (DCCEEW 2022-2023). At high tide, they forage among low sparse emergent vegetation, such as saltmarsh, and sometimes forage in flooded paddocks or inundated salt flats (DCCEEW 2022-2023). **Breeding/Roosting** Roosting occurs on bare dry shingle, shell, or sand beaches, sandspits and islets in or around coastal or near-coastal lagoons and other wetlands (DCCEEW 2022-2023). Occasionally roosting occurs in dunes during very high tides and sometimes in saltmarsh (DCCEEW 2022-2023). Substantial numbers of Curlew Sandpipers remain in northern Australia throughout the nonbreeding season, arriving around September (DCCEEW 2022-2023).	
Calidris melanotos Pectoral Sandpiper	Ma, Mi	SL	**Distribution** The Pectoral Sandpiper occurs around Cairns in Queensland (DCCEEW 2022-2023). There are scattered records elsewhere, mainly from east of the Great Divide between Townsville and Yeppoon (DCCEEW 2022- 2023). A few inland records have also been recorded at Mount Isa, Longreach, and Oakley (DCCEEW 2022-2023). **Habitat** This species prefers shallow wetlands with varying levels of salinity, in coastal or near coastal habitat (DCCEEW 2022-2023). It is sometimes found further inland in the following habitat types, coastal lagoons, swamps, lakes, inundated grasslands, estuaries, bays, saltmarshes, river pools, creeks, floodplains, and artificial wetlands (DCCEEW 2022-2023). Its preferred habitat is wetlands that have open fringing mudflats and low, emergent, or fringing vegetation, such as grass or samphire (DCCEEW 2022-2023). It has also been recorded in swamp overgrown with lignum (DCCEEW 2022-2023). **Foraging** Foraging occurs in shallow water or soft mud at the edge of wetlands where they consume algae, seeds, crustaceans, arachnids, and insects (DCCEEW 2022-2023). **Breeding/Roosting** It is not known to have specific dispersal or roosting habitat requirements, and this species is found in Australia from September to June (DCCEEW 2022-2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Charadrius veredus Oriental Plover	Mi	SL	**Distribution** Within Queensland, the species is found in the north-western part of the state (the Gulf Country), both in coastal and inland areas (DCCEEW 2022-2023). **Habitat** Within Queensland, the Oriental Plover spends several weeks in coastal habitats such as estuarine mudflats, sandbanks, beaches, reefs, and near-coastal grasslands. They then move further inland, inhabiting areas such as flat, open, semi-arid grasslands where grass is sparse and interspersed with bare ground. During the wet season they may move into lightly wooded grasslands (DCCEEW 2022-2023). **Foraging** Little is known about the diet of the Oriental Plover, though it has been recorded eatin g a variety of insects, including beetles, grasshoppers and crickets. They forage among short grass or stony bare ground in a running, stopping and pecking action (DCCEEW 2022-2023). **Breeding/Roosting** This species does not breed in Australia (DCCEEW 2022-2023). **Dispersal** The species arrives in north-western Australia in early to mid-September. Within Australia, they may disperse in response to wet conditions and cold weather. They leave Australia between February and April (DCCEEW 2022-2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Chloebia gouldiae Gouldian Finch	E	E	**Distribution** The Gouldian finch is found in northern Australia, ranging from the Cape York Peninsula through north-west Queensland, and the north of the Northern Territory to the Kimberley Region of Western Australia (TSSC 2016a). **Habitat** The species tends to inhabit open woodland dominated by Eucalyptus trees and a ground cover of Sorghum and other annual or perennial grasses. They also require a waterhole or spring within 2-3 km, and unburnt hollows for breeding (TSSC 2016a). **Foraging** The species can be found individually, travelling in pairs, or traveling in groups of anywhere from three to hundreds, or even in mixed flocks comprised of other finches (TSSC 2016a). They feed almost exclusively on grass seed and rely on a small number of grass species, feeding on freshly ripened seeds in the wet season, and on older dormant seeds during the dry season (TSSC 2016a). **Breeding/Roosting** They nest in tree hollows between April and July, laying roughly five eggs per clutch though they may raise several clutches each season (TSSC 2016a).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Cuculus optatus Oriental Cuckoo	Mi	SL	**Distribution** Distributed throughout the northern parts of Western Australia, Northern Territory and Queensland, as well as along the Queensland and New South Wales coastline (DCCEEW 2022-2023). **Habitat** Nonbreeding habitat occurs within rainforest margins, monsoon forest, vine scrubs, riverine thickets, wetter, densely canopied eucalypt forests or open Casuarina, Acacia or Eucalyptus woodlands (DoE 2015a). **Foraging** Not much is known on the ecology of this species	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Erythrotriorchis radiatus Red Goshawk	V	E	**Distribution** Endemic to Australia, the Red Goshawk is sparsely dispersed across coastal and sub-coastal Australia, from western Kimberley Division to north-eastern New South Wales, and occasionally on continental islands (DCCEEW 2022-2023, TSSC 2015). Three recently confirmed sightings of dispersive individuals suggest that this species also occurs in central Australia, across South-east Queensland to the western slopes of the Great Dividing Range (DERM 2012, DCCEEW 2022-2023). **Habitat** The Red Goshawk prefers forest and woodland with a mix of vegetation types, including eucalypt woodland, tall open forest, gallery rainforest, swamp sclerophyll forest, and at the edge of rainforest (DCCEEW 2022). In partly cleared areas of eastern Queensland, it is associated with gorge and escarpment country (TSSC 2015). E. radiatus avoid very dense or very open habitats and prefer areas where large prey populations (birds) and permanent water exist (DCCEEW 2022-2023). **Foraging** Forests of intermediate density or ecotones between habitats of differing densities (e.g. between rainforest and eucalypt forest, between gallery forest and woodland) are preferred for foraging (DCCEEW 2022-2023). This species ambushes its prey when hunting, feeding on medium to large birds (DCCEEW 2022-2023). **Breeding/Roosting** Nests are located within large trees, within 1 km of permanent water (DCCEEW 2022-2023). Nest trees have been noted to be significantly taller (>20 m) than surrounding trees, with larger crown diameters and greater girth at breast height (95. 2.9 m) (DCCEEW 2022-2023, TSSC 2015, DERM 2012, DEWHA 2010a). **Dispersal** Movement patterns of the Red Goshawk are poorly known (DCCEEW 2022-2023). They have been observed individually, in pairs and in family groups (DEWHA 2010a).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Falco hypoleucos Grey Falcon	V	V	**Distribution** This species distribution is sparsely distributed throughout arid and semi-arid Australia where annual rainfall is <500 mm, except for wet years followed by drought where the Grey Falcon may become more widespread throughout its range (Birdlife International 2021, TSSC 2020). In Queensland this species appears to be absent in areas East of the Great Dividing Range (TSSC 2020). **Habitat** The Grey Falcon prefers lightly timbered and bare lowland plains in acacia shrublands crossed by tree lined watercourses (Birdlife International 2021, TSSC 2020). It is also known to occur in grassland, sand dune and	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			open woodland habitats, and has been observed hunting in treeless areas (Birdlife International 2021, TSSC 2020). **Foraging** The Grey Falcon feeds almost exclusively on birds such as doves, pigeons, small parrots and finches while breeding (TSSC 2020). It has also been seen consuming small mammals and lizards (TSSC 2020). **Breeding/Roosting** Breeding occurs from June to November in the old nests of other birds particularly raptor or corvid nests (TSSC 2020). These nests are usually located in the tallest tree along watercourses in tree species such as River Red Gum (Eucalyptus camaldulensis) and Coolabah (Eucalyptus coolabah) (TSSC 2020).	
Gallinago hardwickii Lathams Snipe	V, Ma, Mi	SL	**Distribution** The Latham's Snipe is a non-breeding visitor to south-eastern Australia, and a passage migrant through northern Australia (DCCEEW 2022-2023). In Queensland, their range extends inland over the eastern tablelands in south-eastern Queensland (and occasionally from Rockhampton in the north), and to west of the Great Dividing Range (DCCEEW 2022-2023). **Habitat** This species prefers open freshwater permeant and ephemeral wetlands, typically with low dense vegetation (DCCEEW 2022). It can be found in a variety of vegetation communities including but not limited to tussock grasslands, coastal and alpine heathlands, tea-tree scrub, and open forests (DCCEEW 2022- 2023). **Foraging** The foraging habitat of the Latham's Snipe consist of areas of mud (exposed or beneath very shallow water) with low, dense vegetation present (DCCEEW 2022-2023). **Breeding/Roosting** They roost near their foraging sites, in areas that provide some shelter (clumps of vegetation, in drainage ditches, among boulders, or in shallow water if cover is not available) (DCCEEW 2022-2023). **Dispersal** Latham's Snipe is dispersive during its stay in Australia, arriving from July to November. The snipe is thought to disperse in response to rainfall and the availability of food (DCCEEW 2022-2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Glareola maldivarum Oriental Pratincole	Mi	SL	**Distribution** Within Queensland, the species is found in the north-western part of the state (the Gulf Country), both in coastal and inland areas (DCCEEW 2022-2023). **Habitat** Within Queensland, the Oriental Pratincole inhabits open plains, floodplains, or short grasslands with large	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			patches of bare ground. They are found near wetlands, lakes, creeks, and artificial wetlands such as reservoirs, saltworks and sewage farms. In costal areas they are found on beaches, mudflats, and islands (DCCEEW 2022-2023). **Foraging** The species is insectivorous, feeding on dragonflies, cicadas, beetles, ants, flies, grasshoppers and wasps, usually foraging in flocks, searching between 0 m and 300 m off the ground (DCCEEW 2022-2023). **Breeding/Roosting** This species does not breed in Australia (DCCEEW 2022-2023). **Dispersal** The species arrives in north-western Australia in early to late October during their non-breeding season, usually coinciding with storm events that increase the number of insects. They typically leave in late March (DCCEEW 2022-2023).	
Grantiella picta Painted Honeyeater	V	V	**Distribution** The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory, with the highest concentration found in the Great Dividing Range, between Grampians, Victoria, and Roma (DoE 2015b). **Habitat** The Painted Honeyeater uses mistletoe trees as host trees, found within eucalypt forests/woodlands, riparian woodlands, acacia-dominated woodlands, paperbark forests and residential areas, preferring those areas with higher densities of mature trees. It is more commonly found in wider blocks of remnant woodland, but will use narrow strips for breeding if sufficient mistletoe trees are present (DoE 2015b) **Foraging** The most specialised of Australia's honeyeaters, the species diet primarily consists of mistletoe fruits, however is supplemented by nectar and arthropods (DoE 2015b) **Breeding/Roosting** The species occurs in singles or pairs, with breeding occuring between October and March when the mistletoe fruits are most available. The species builds a nest from plant fibres and spider webs between 3 and 20 m high in trees (DoE 2015b) **Dispersal** The species moves seasonally north-south with the fruiting of mistletoe. After breeding, many individuals move to semi-arid regions such as north-eastern South Australia. Western Queensland, and central Northern Territory (DoE 2015b). The species is considered to have a single population.	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Hirundo rustica Barn Swallow	Ma, Mi	SL	**Distribution** In Queensland, the species occurs along the north coast and down to Fraser Island. Its range continues along the top of Australia, down along the western side to the Pilbara. (DCCEEW 2022-2023). **Habitat** When in Australia, the species is found in open country in coastal lowlands, often near water, towns and cities, in addition to freshwater wetlands, paperbark woodland, mesophyll shrub thickets and tussock grassland. (DCCEEW 2022-2023) **Foraging** The species is primarily insectivorous, feeding on flying insects by skimming them from the water surface, or by simple aerial pursuit while flying love over the ground. (DCCEEW 2022-2023) **Breeding/Roosting** This species does not breed in Australia (DCCEEW 2022-2023). **Dispersal** The species breeds in the northern hemisphere in temperate regions, travelling south to Australia to spend the boreal winter, staying from November to March (DCCEEW 2022-2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km
Motacilla cinerea Grey Wagtail	Ma, Mi	SL	**Distribution** The species occurs along much of the coast, ranging west from Adelaide, all the way around to Townsville, with a patch of non-occurrence north of Cairns in Queensland (DCCEEW 2022-2023). **Habitat** Both in and out of Australia the species is highly associated with water. In Australia they are most commonly found in creeks, rivers, and waterfalls (DCCEEW 2022-2023). **Foraging** They are known to forage within rocky tidal flats during migration, but will forage in their primary habitat otherwise, feeding on a variety of insects, molluscs, crustaceans, small fish and tadpoles, depending on what is available (DCCEEW 2022-2023). **Breeding/Roosting** The species does not breed in Australia (DCCEEW 2022-2023). **Dispersal** The species regularly travels to from Russia to Australia, staying from late October to March (DCCEEW 2022-2023).	Unlikely - Potential habitat has not been identified within the study area, and there are no confirmed records within 10 km
Motacilla flava Yellow Wagtail	Ma, Mi	SL	**Distribution** This species may occur throughout Australia during the non-breeding season (DCCEEW 2022-2023).	Unlikely - Potential habitat has not been identified

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			Habitat The Yellow Wagtail prefers mostly well-watered open grasslands and the fringes of wetlands (DCCEEW 2022-2023). **Foraging** The species roosts in mangroves and other dense vegetation (DoE 2015a).	within the study area, and there are no confirmed records within 10 km
Neochmia ruficauda ruficauda Star Finch (Eastern Subspecies)	E	E	**Distribution** The eastern sub species for the Star Finch is known to occur in Central Queensland only (DCCEEW 2022- 2023). Its distribution extends north to Bowen, west to Winton and, south to Wowa (DCCEEW 2022-2023, DEWHA 2008), within the Desert Channels, Burdekin, and Fitzroy Natural Resource Management Regions (DCCEEW 2022-2023). The distribution of the Star Finch (eastern) is very poorly known (DCCEEW 2022- 2023). **Habitat** The Star Finch occurs in damp grasslands, sedgelands and grassy woodlands, near permanent water, and often in or near suburban areas (DCCEEW 2022-2023, DEWHA 2008). Common species associated with these areas include Eucalyptus coolabah, E. tereticornis, E. tessellaris, Melaleuca leucadendra, *E. camaldulensis* and *Casuarina cunninghamii* (DCCEEW 2022-2023). **Foraging** Little is known about the foraging ecology of this species (DCCEEW 2022). It has been seen eating insects in fig trees and is said to forage in the shade of Eucalyptus trees (DCCEEW 2022). This species predominantly eats seeds taken from a range of grasses including Arundinella, Brachyachne, Chloris, Chrysopogon, Digitaria, Echinochloa, Heterachne, Iseilema, Oryza, Panicum, Setaria, Sorghum, Themeda and Urochloa (DCCEEW 2022-2023). **Breeding/Roosting** Nests are bottle-shaped made from grass, often placed in trees 3-9 m above the ground, in a shrub or tree or amongst grass, sedges or reeds (DCCEEW 2022-2023). The Star Finch is sedentary or resident species that may undertake some local dispersal at the completion of the breeding season. This species is not known to have specific dispersal requirements (DCCEEW 2022- 2023).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Plegadis falcinellus Glossy Ibis	Ma, Mi	SL	**Distribution** Within Australia, the Glossy Ibis is generally located east of the Kimberley in Western Australia and Eyre Peninsula in South Australia (DCCEEW 2022-2023). This species is known to breed in select locations, which include the Channel Country in Queensland (DCCEEW 2022-2023). **Habitat** Fresh water marshes at the edges of lakes and rivers, lagoons, floodplains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation are the preferred foraging and breeding habitats for this species. They are also occasionally found in coastal locations such as estuaries, deltas, saltmarshes, and coastal lagoons (DCCEEW 2022-2023). It is known to occur in large densities in drying Top End grass/sedge swamps and Channel Country grass/forb meadows (DCCEEW 2022-2023). **Foraging** The species feeds in very shallow water, probing the water/ mud in search of its preferred food source (aquatic invertebrates/insects) (DCCEEW 2022-2023). Preferred foraging habitat mentioned above. **Breeding/Roosting** Australian breeding habitat types include wooded and shrubby swamps in the semi-arid and arid regions, including the Channel Country in Queensland (DCCEEW 2022-2023). Glossy Ibis roost in trees or shrubs usually near water bodies (DCCEEW 2022-2023). The breeding season is from mid spring to the end of summer; however reproduction may extend to September to April if persistent food resources are available at breeding sites (DCCEEW 2022-2023). **Dispersal** Within Australia, the species moves in response to good rainfalls, expanding its range (DCCEEW 2022- 2023). It often moves north in autumn, then return south to the main breeding areas in spring and summer (DCCEEW 2022-2023).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km
Rostratula australis Australian Painted Snipe	E	E	**Distribution** Known to occur within wetlands within all states of Australia (DCCEEW 2022-2023). This species is most common in eastern Australia, where it has been recorded throughout much of Queensland, New South Wales, Victoria, and south-eastern South Australia at scattered locations (DCCEEW 2022-2023). **Habitat** The Australian Painted Snipe generally inhabits shallow freshwater (sometimes brackish) wetlands, including temporary and permanent lakes, swamps and claypans (DCCEEW 2022-2023). It has also been known to occupy inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains (DCCEEW 2022-2023). These areas usually include emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps of lignum Muehlenbeckia, Canegrass or Tea-tree	Unlikely - Potential habitat has not been identified within the study area, and there are no confirmed records within 10 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			(Melaleuca sp.) (DCCEEW 2022-2023). Areas lined with trees, or that have some scattered fallen or washed-up timber are sometimes also used (DCCEEW 2022-2023). **Foraging** This species generally remains in dense cover when feeding, although may forage over nearby mudflats and other open areas such as ploughed land or grassland (DCCEEW 2022-2023). This species requires suitable wetland areas even in drought conditions (DCCEEW 2022-2023). Most nest records are from or near small islands in freshwater wetlands, which contain a combination of very shallow water, exposed mud, dense low cover and sometimes some tall dense cover (DCCEEW 2022-2023). This species is mainly crepuscular (active at dawn and dusk) and highly cryptic (DCCEEW 2022-2023). Breeding/Roosting Breeding habitat requirements are specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover (low and sometimes tall and dense) nearby (DCCEEW 2022-2023). This species may breed in response to wetland conditions rather than during a season (DCCEEW 2022-2023). **Dispersal** The Australian Painted Snipe is possibly dispersive or migratory (DCCEEW 2022-2023). Dispersive movements have been attributed to local conditions: moving to flooded areas; moving from drying to permanent wetlands; moving away from areas affected by drought (DCCEEW 2022-2023).	
Tringa glareola Wood Sandpiper	Ma, Mi	SL	**Distribution** Within Queensland, the species is sparsely scattered from Cairns and south to the state border, primarily along the coastline (DCCEEW 2022-2023). **Habitat** The Wood Sandpiper uses well-vegetated, shallow freshwater wetlands such swamps, billabongs, lakes, pools, and waterholes, typically with emergent plants or grass with taller fringing vegetation. The are also founded in flooded grasslands, short herbage, wooded floodplains, artificial wetlands such as reservoirs, dams, and irrigated crops (DCCEEW 2022-2023). **Foraging** The species is primarily carnivorous, eating insects and molluscs, though are known to eat seeds, algae, worms, fish and frogs outside of Australia. It forages on moist or dry mud at the edges of wetlands, along the shore, amongst aquatic vegetation, or in clear shallow water (DCCEEW 2022-2023). **Breeding/Roosting** This species does not breed in Australia (DCCEEW 2022-2023). **Dispersal** This species breeds throughout Eurasia, with the Australian population thought to breed in Siberia. It arrives in Australia in August, and migrate from Queensland in May (DCCEEW 2022-2023).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Tringa stagnatilis Marsh Sandpiper	Ma, Mi	SL	**Distribution** The Marsh Sandpiper is found on coastal and inland wetlands throughout Australia and is widespread in coastal Queensland (DCCEEW 2022-2023). This species is also recorded in all regions of New South Wales and is found in coastal Victoria (DCCEEW 2022-2023). Scattered records of this species have been found across Western Australia, Northern Territory and South Australia (DCCEEW 2022-2023). **Habitat** This species lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats (DCCEEW 2022-2023). The species is less often found at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes (DCCEEW 2022-2023). **Foraging** The Marsh Sandpiper usually forages in shallow water at the edge of wetlands. They probe wet mud of mudflats or feed among marshy vegetation (Higgins & Davies 1996). This species is carnivorous and has been recorded eating insects, molluscs, and crustaceans (DCCEEW 2022-2023). **Breeding/Roosting** This species is a non-breeding visitor to Australia and is known to breed from eastern Europe to eastern Siberia (DCCEEW 2022-2023). This species has been recorded potentially roosting on tidal mudflats, near low saltmarsh, and around inland swamps (DCCEEW 2022-2023). **Dispersal** This species is known to arrive in Australia from September and disperse across Australia from September to December (DCCEEW 2022-2023). The Marsh Sandpiper begins to migrate north in March and April, with temporary influxes of populations occurring at some sites along the eastern coast (DCCEEW 2022-2023).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km
Tyto novaehollandiae kimberli Masked Owl (Northern Subspecies)	V	V	**Distribution** The distribution of this species is poorly known, but estimated extent of occurrence is 1 800 00 km^2, though is assumed to be declining (DCCEEW 2022-2023). In Queensland, they have been recorded in the Normanton region, and on the Pascoe, Archer, Chester and Watson Rivers in the Cape York Peninsula, extending to the Atherton Tablelands and Einasleigh-Burdekin divide, possibly as far south as Mackay or Coomooboolaroo Station (DCCEEW 2022-2023). **Habitat** They have been found to occur in riparian forest, open forest, Melaleuca swamps and the edges of mangroves (DCCEEW 2022-2023). There have also been recordings along the margins of sugar cane field (DCCEEW 2022-2023). They appear to live in low densities so require an expansive area for hunting prey, with trees large enough to form appropriate hollows (DCCEEW 2022-2023). Their core area is	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			approximately 155 ha, while their home range during the non-breeding season can extend as far as 1178 ha (DCCEEW 2022-2023). **Foraging** The masked owl is sedentary and territorial of its core area, moving out into its home area to hunt mammals or for finding a mate (DCCEEW 2022-2023). The female will occupy the nest for up to 10 weeks prior to laying – expectedly between March and October – the female lays two to three eggs and incubates them in a large hollow (DCCEEW 2022-2023). Both before and after hatching the male will hunt for the female and the chicks, then both will hunt after 3 weeks of brooding, the young being dependent for approximately 2 months (DCCEEW 2022-2023). This being the case, the masked owl can usually be seen singly but can also be found in pairs or family groups (DCCEEW 2022-2023).	
Mammals				
Macroderma gigas Ghost Bat	V	E	**Distribution** The Ghost Bat is endemic to Australia, occurring in Queensland, northern Pilbara and Kimberley in Western Australia, and the top end of the Northern Territory (TSSC 2016b, Hourigan 2011). In Queensland, this species is currently distributed in 4-5 highly disjunct populations along the coast and inland from the McIlwraith Range in Cape York to Rockhampton, with the biggest colony occurring at Mount Etna (Hourigan 2011). Habitat modelling studies suggest that the Ghost Bat is a geographically remnant species in southern, arid landscapes, present only because caves provide suitable roost microclimates (TSSC 2016b). **Habitat** This species occupies a variety of habitats ranging from arid Pilbara to tropical savanna woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines. (TSSC 2016b). **Foraging** Foraging areas are approximately 60 ha in size (TSSC 2016b). Their diet consists of large insects, small mammals, reptiles, birds and bats, and prey availability is thought to influence foraging habitat for this species (Hourigan 2011). Ghost Bats usually require several caves to move between seasonally or as dictated by weather conditions (TSSC 2016b). It is known to forage up to 2 km from its daytime roost area and will use the same foraging area each night (TSSC 2016b, Hourigan 2011). **Breeding/Roosting** Roost sites consist of caves, rock crevices and disused mine entrances (TSSC 2016b). Permanently used roost sites are generally deep natural caves or disused mines with a relatively stable temperature of 23°−28°C, with a moderate to high relative humidity of 50−100% and the ceiling at least 2 m above the	Unlikely - Potential habitat may occur within the study area, however there are no records within 50km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
			floor (TSSC 2016b, Hourigan 2011). Individuals aggregate in these maternity roosts during spring and summer (Hourigan 2011).	
Macrotis lagotis Greater Bilby	V	E	**Distribution** The range of the Bilby has declined northwards and the decline is continuing. Wild populations are restricted predominantly to the following locations: • Northern Territory: The Tanami Desert. • Western Australia: The Gibson Desert, Little Sandy Desert, Great Sandy Desert and parts of the Pilbara and Southern Kimberley (TSSC 2016c). • Queensland: One isolated population in South-west Queensland, approximately in the area between Boulia and Birdsville (TSSC 2016c). **Habitat** The Greater Bilby is a solitary species that shelters in burrows during daylight (and intermittently during the night). The Greater Bilby is an omnivore that primarily digs for food. Diet consists of invertebrates such as lepidopteran larvae, termites, ants, grasshoppers, spiders and beetles, and other items such as seeds, bulbs (Cyperus bulbosus), and fungi (TSSC 2016c). The remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, Acacia aneura (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. Males range more widely than females from their home burrows, and home ranges can vary considerably in size in different locations. Greater bilbies can use up to 18 of these burrows concurrently over several months, as well as construct a new burrow on average every 2.5 weeks (TSSC 2016c). **Breeding/Roosting** Breeding varies depending on seasonal conditions and food availability, with litters mostly of one or two but sometimes three. Pouch life is approximately 75-80 days, with females tending their young in a burrow for another two weeks. Longevity can be up to 11 years, however in the wild, most animals are unlikely to survive that long. Females commence breeding at five months and males at eight months. Generation time is assumed to be c. 4 years (TSSC 2016c).	Unlikely - Potential habitat may occur within the study area, however there are no records within 50 km

Species	Status		Description	Desktop Likelihood of Occurrence
	EPBC Act	NC Act		
Sminthopsis douglasi Julia Creek Dunnart	V	E	**Distribution** The species is only found in the Mitchell Grasslands of north-west Queensland, ranging from downs country east of Cloncurry, south-east to Barcaldine (DCCEEW 2022-2023). **Habitat** The Julia Creek Dunnart occurs in areas with cracking clay soils dominated by grass, sheltering in soil cracks in the dry season, and amongst vegetation during the wet season when the cracks are closed (DCCEEW 2022-2023). **Foraging** The species feeds on insects such as silverfish, cockroaches and crickets, in addition to spiders, centipedes, skinks, and Long-tailed Planigales (DCCEEW 2022-2023). **Breeding/Roosting** The species breeds in spring and summer, building nests within grass tussocks. Eight young are produced per litter, with up to two litters being produced over an extended season when conditions are suitable (DCCEEW 2022-2023). **Dispersal** The species establishes home ranges up to 7.125 ha in size, though they move up to 10 km to establish new ranges, following higher availability of invertebrates and grass cover (DCCEEW 2022-2023).	Potential - Habitat may occur within the study area, and there are records of the species within 50 km of the study area, but not within 10 km