



City of Greater Geraldton Local Planning Scheme No. 1

Amendment No. 18

Lot 40 & 41 Geraldton-Mount Magnet Road, Tenindewa

Planning and Development Act 2005

RESOLUTION TO PREPARE AMENDMENT TO LOCAL PLANNING SCHEME

City of Greater Geraldton Local Planning Scheme No.1 – Amendment Number 18

Resolved that the Local Government pursuant to section 75 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by:

1. **Under Clause 4.8.1 and in Table 14 of the Scheme Text inserting the following additional development requirements for the subject site**

No.	Description of Land	Requirements
1	Lots 40 and 41 Geraldton – Mt Magnet Road, Tenindewa	<ol style="list-style-type: none"> 1. Industrial uses are to be generally restricted to the processing of vanadium and ancillary activities, including the plant operations, internal access roads, materials storage and laydown areas, evaporation ponds and any other ancillary structures. 2. The scale of development is to be consistent with that set out in the s38 Tenindewa Vanadium Processing Facility Proposal Content Document referred to the Environmental Protection Authority (published on the EPA website). 3. Additional industrial uses not listed in condition 1 may be contemplated within the development envelope of the vanadium processing plant and ancillary activities, however they will be subject to development approval and at the discretion of Council or other planning decision-maker. 4. In considering any future development proposals under condition 3, the decision-maker may refer any part of the proposal to the Environmental Protection Authority that has not been previously referred. 5. Prior to subdivision and/or development approval: <ol style="list-style-type: none"> a) Suitable arrangements for access, intersections and road upgrades are to be made;

		<p>b) Suitable arrangements are to be made to take water required for the land use; and</p> <p>c) Suitable arrangements are to be made regarding potential clearing of native vegetation.</p> <p>6. Other conditions of development may be determined by the local government or other planning decision-maker.</p>
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2. Amending the Scheme Map to rezone the site from the Rural to General Industry zone as shown in the attached plan.

The amendment is 'complex' under the provisions of the *Planning and Development (Local Planning Schemes) Regulations* 2015 for the following reasons:

1. This amendment is an amendment that is not consistent with a local planning strategy for the scheme that has been endorsed by the Commission.
2. This amendment is an amendment that is not addressed by any local planning strategy.

Dated this _____ day of _____ 2023

(Chief Executive Officer)

PLANNING REPORT

CITY OF GREATER GERALDTON – LOCAL PLANNING SCHEME NO. 1
Amendment No. 18 – In Table 14 under Clause 4.8.1 of Local Planning Scheme 1
insert additional development requirements in relation to development site on Lot's
40 & 41 Geraldton – Mt Magnet Road, Tenindewa, and rezoning a portion of the site
from *Rural* to *General Industry*.

Portion of Lot 40 & 41 Geraldton-Mount Magnet Road, Tenindewa

January 2024



1.0 INTRODUCTION

1.1. Proposal

This scheme amendment proposes to amend the City of Greater Geraldton Local Planning Scheme No.1 (LPS1) by rezoning a portion of Lots 40 and 41 Geraldton-Mount Magnet Road, Tenindewa (the site) from *Rural* to *General Industry*, and to introduce specific development provisions relating to future development on the site.

The amendment is required to facilitate the development of a vanadium processing plant with the proposed rezoning reflecting the extent of that development site. A preliminary assessment of the proposed development classifies it within the definition of *Industry* for the purposes of the Local Planning Scheme. This use is not permitted within the Rural zone, and thus a zoning amendment to *General Industry* is required.

The following report contains information about the project, to provide context and explanation as to why the scheme amendment has been initiated.

It should be noted that an application for development approval has been lodged for the proposed processing plant and is currently before the State Development Assessment Unit (SDAU) within the Western Australian Planning Commission (WAPC), and this will be considered by the SDAU/WAPC concurrently with this scheme amendment.

Australian Vanadium Limited (AVL) is the proponent of the vanadium processing plant. The plant will accept a vanadium rich concentrate from the future Australian Vanadium minesite, which is located near Meekatharra, and will produce a 99% pure vanadium product. The vanadium products of the plant will be exported for the manufacture of renewable energy batteries, aerospace parts and alloy steels used in construction. A valuable Iron-Titanium Co-product (FeTi) will also be produced and exported to overseas steel mills via the Geraldton Port.

The site has been demonstrated to be the most suitable and appropriate for the plant development, following a detailed site-selection process across the broader Mid-West region that undertaken by AVL. Once approved and constructed, the plant will introduce a downstream processing capability of locally mined concentrate type materials to value-add, diversify and stimulate the local economy.

The initial stages of development will require the construction of a worker's camp at the subject site for the construction phase. The design for the processing facility, ancillary activities and the workers camp is still being refined and the final design will form part of the SDAU application for assessment. Initial discussions with AVL indicate that the camp will accommodate up to 400 workers. The camp will be removed, and the area remediated to accord with the zoning, upon completion of construction and commissioning, and commencement of operations.

1.2. Associated Assessments and Approvals Processes

Whilst the scheme amendment will facilitate the progression of a Development Application to be assessed via the SDAU for the site, the proposal is also subject to a range of other environmental and planning assessment and approvals processes, many of which are currently in progress. These are outlined below.

Development Assessment

An application for approval to commence development has been lodged with the SDAU/WAPC for determination under Part 17 of the *Planning and Development Act 2005*. The Vanadium Processing Plant comprises the following (the proposal):

- Processing plant,
- Materials storage and laydown areas,

- Internal access roads, including two new site entrances,
- Evaporation ponds,
- Construction camp and activities; and
- Energy infrastructure.

Environmental Assessment

The processing plant was referred (April 2021) under s.38 of the *Environmental Protection Act 1986* (EP Act) to the Environmental Protection Authority (EPA). To support this referral, AVL prepared an environmental referral report (with supporting technical documents) addressing relevant EPA factors.

The proposal was advertised for public comment from May to June 2022. No submissions were received and in July 2022 the EPA determined that there would be no formal assessment required under Part IV of the EP Act. They advised that all necessary construction and operating approvals can be managed via Department of Water and Environmental Regulation (DWER) Works Approval, Clearing Permits and Licensing processes.

Table 1.1 below lists summarises related approval assessments for the project which do not involve the Scheme amendment process, but which indicate the comprehensive layered assessment of the proposal.

Table 1.1 – Related Environmental Approvals

Assessment process	Comment
Formal referral under Part IV of Environmental Protection Act 1986	The proposed vanadium plant development has been referred to the EPA pursuant to s38 of the Act. The EPA determined the proposal does not warrant formal assessment under Part IV of the EP Act. This process has now completed
Works Approval under Part V of the Environmental Protection Act 1986	Construction of processing facility, power plant and wastewater treatment plant. Management and storage of materials. This process is proceeding and will assess and set conditions to manage implementation and operation of the plant to meet environmental standards.
Licence under Part V of the Environmental Protection Act 1986	Operation of processing facility and wastewater treatment plant. This process is proceeding and will assess and set conditions to manage implementation and operation of the plant to meet environmental standards. This includes a detailed understanding of sensitive receptors in the immediate vicinity including human habitation, the use of surrounding lands for agriculture and flora and fauna.
Groundwater licence under the Rights in Water and Irrigation Act 1914	Groundwater abstraction and use. An application for a 5(c) abstraction licence has been submitted and subsequently approved by the DWER.

1.3. Importance of the Plant

Vanadium is a mineral which is sought for many uses in science and technology, including batteries and aerospace applications. Global demand for vanadium is strong and is forecast to grow. The AVL vanadium source near Meekatharra which will feed the Tenindewa plant is an extensive high-grade titanium-vanadium-magnetite deposit.

The AVL vanadium minesite and associated processing plant was awarded Major Project status by the Federal Government in 2019, recognising the project's national strategic significance due to:

- Economic growth of the vanadium demand by the global steel and battery markets
- Social and economic benefit for the Mid-West region through direct and indirect jobs including opportunities for regional and national suppliers.
- Significant \$450M initial and ongoing financial investment for the Mid-West region (Vanadium being on the critical minerals list for Australia and the US)

The Western Australian Government recognised the priority of this project by April 2020 with the WA Lead Agency Status to ensure it could be progressed. This priority support from Federal and State government indicates that assessments are to be progressed without undue delay.

The proposal aligns with Federal and Western Australian government strategies to increase development of the critical and battery minerals sector, and to include downstream processing within Australia. Successful delivery of the proposal will provide regional employment opportunities during construction and operations and provide vanadium for use in strategic industries including the storage of energy from renewable power generation.

1.4. Site Location Considerations

This site is selected based upon commercial, operating, and environmental considerations and is the result of several years of study and planning by AVL (noting that feasibility commenced in 2015).

Several site location options were considered, and these included:

- Co-location at the Meekatharra site,
- Location close to the Geraldton Port in an existing industrial area; and
- Location at a site mid-way between the mine and export facilities.

The initial base-case design considered a downstream processing plant collocated at the mine site in Meekatharra. As the project feasibility and design advanced, however, it was evident the location of a processing facility along the route to Geraldton would deliver greater plant operating and transport economies to AVL, introduce benefits to the local community and would result in lower overall environmental impacts over the operating life of the mine and plant.

The considerations/benefits of separating the processing plant from the mine include:

- Sufficient quality and quantity of water resources— a site with better access to suitable water than Meekatharra would reduce impacts on the environment.
- Availability to connect to an existing gas pipeline, thus eliminating the need for a new gas pipeline to be constructed to the mine site (including associated land disturbance and environmental impact of such a pipeline).
- Increased capability to source renewable energy sufficient for the mine site to operate and without the significant added energy required for the operation of the processing

plant.

- Reduced plant construction cost and logistics requirements compared to the more remote mine site including decreased road transport for construction, reduced road safety risks and lower greenhouse gas emissions from construction transport over a longer distance.
- Locating the plant construction and maintenance workforce closer to a major regional town, thereby leading to reduced fly-in fly-out workforce and increased regional residential employment opportunities.
- Proximity to the Dampier-Bunbury Natural Gas Pipeline or the Mid-West Pipeline enables cost-effective power generation for the plant using natural gas (and possibly hydrogen in the future).
- Efficient road access via a major road network linking the plant to the Geraldton Port.
- Reduced plant operating costs leading to increased economic sustainability of operations.
- Reduced transport costs associated with supplying the processing facility over lifetime.
- Relocation of iron-titanium (FeTi) Coproduct production point closer to the port, making it feasible to export the FeTi Coproduct rather than stockpiling it as a 'waste' at the mine site.
- With the depletion of the Meekatharra resource to provide opportunities in the longer future for the processing facility to receive alternative mineral concentrates from other vanadium mines within the region.

Under the preferred scenario of separating the mine and plant, the project relies upon the effective relationship between the activities of the mining and crushing activities located at the minesite near Meekatharra (extraction and milling), and the processing plant in Tenindewa. The plant site needs to be ready to develop with available power, water, and transport infrastructure (or readily enhanced capability of these).

The site selection process investigated options to maximise scale economies of production; to operate sustainably to limit environmental and transport impacts; minimise plant inputs (energy and water) and to achieve best use of resources for production.

1.5. Site Option Identification and Selection

AVL identified several preliminary sites of interest and undertook a detailed Multi Criteria Analysis (MCA) to compare and analyse each to determine the most suitable location for the plant, options for the plant location, taking into account the general operational requirements, availability of land, access and local planning scheme zoning. In total AVL shortlisted seven separate locations and subjected these to a detailed assessment using a comprehensive range of criteria. Two sites within the existing Narngulu Industrial Area were considered, along with possible co-location at other industrial and infrastructure sites within the Mid-West. The other sites were in rural areas east of Geraldton – including the preferred location at Tenindewa on the corner of Erangy Springs Road and the southern side of Geraldton to Mount Magnet Road.

In summary the multi-criteria site analysis compared sites based on a range of issues, such as:

- access to suitable land (suitable size, option to purchase, favourable geotechnical analysis, suitable slopes).
- utility services availability (power, water, and gas, with suitable and nearby connections available).
- environmental suitability – land that has limited conservation values.

- community considerations – proximity to townsites, employment opportunities, local economic benefits.
- transport and logistics – road access; potential future rail access.

The MCA found that there are no suitable sites for the plant already zoned and appropriately serviced for the proposed processing plant within the greater Geraldton area.

It should be noted that both the Narngulu and Oakajee Industrial areas were evaluated by the MCA and found to be unsuitable especially when compared to Tenindewa. This resulted in these two sites being ruled out as unsuitable or not commercially effective for the development and operation of a plant in the required timeframe.

Of the Narngulu Industrial Area site, the key named constraints included:

- significantly higher land values, with limited land parcel sizes available,
- the inability to secure sufficient land area across multiple ownerships,
- more complex environmental approvals process due to sensitive surrounding land uses, smaller surrounding lots sizes, and more expensive site works due to challenging site features,
- potential visual impacts associated with stack – it would be visible looking eastwards from the Geraldton urban areas,
- potential infrastructure constraints/capacity issues; and
- limited land parcel sizes restrict options for a possible stand-alone renewable energy facility.

The Oakajee Industrial Area is not implemented nor is there a capital commitment from the WA Government for this major and complex project to be advanced. It therefore cannot be considered as a serious option given the commercial timeframes for AVL to build, operate and export product to global markets by 2025.

The detailed outcomes of the MCA are confidential due to the sensitive business intellectual property associated with the design, building and operation of the plant, however an explanation of the MCA is summarised in a table at Appendix A, with overview of the matters considered in the process.

1.6. Suitability of the Tenindewa Site

The Tenindewa site is suitable and optimal for the development and operation of the plant because of the following infrastructure availability:

- The site abuts two public roads – the Geraldton - Mount Magnet Road to the north (which is a constructed freight capable route) and on the western edge the Erangy Springs Road (an unsealed rural standard road). The Geraldton-Mount Magnet Road is already recognised, constructed, and operating as a key freight route for the region.
- There is a freight rail corridor along the northern boundary of Lot 40 that connects Geraldton to Mullewa – the plant may leverage this freight rail corridor in future.
- The site is within a short distance of the Dampier to Bunbury to the west of the site. This pipeline will be used to supply gas to the plant for power generation purposes. An additional gas pipeline runs north of the site, heading eastwards to Mount Magnet.

The site comprises free draining sandy soils, and there is an available water source from a deep aquifer. DWER has issued an extraction licence for conditional use of this water source). The issue of the licence acknowledges the potential for impacts to the hydrology associated with nearby conservation areas can be managed to protect environmental water quality and quantity as part of the DWER assessment and approval process.

The Tenindewa site is surrounded by rural (extensive cropping) land use with some nearby

conservation reserves. Noting the separate environmental and development processes under way to assess the project construction works would not proceed unless it was found there was no impact to surrounding land, its values and operation of businesses.

The site also has access to adequate base utility services (at and in proximity) which can be augmented on site by the plant developer to supply the plant for all its operational activities.

2.0 SITE CONTEXT AND CONSIDERATIONS

2.1. Location

The site is located on a portion of Lots 40 and 41 Geraldton-Mount Magnet Road, Tenindewa, approximately 65km east of Geraldton and 35km south-west of Mullewa.

The site is well connected to freight transport routes and is located on the southern side of the Geraldton- Mount Magnet Road at the south-eastern corner of its intersection with Erangy Springs Road. The Northern Freight Railway between Geraldton and Mullewa (part of the existing line extending east to Mount Magnet) runs east-west along the northern border of the property.

2.2. Site Area

The entire lot area comprises an area of 1 870.2 hectares, with the plant site itself is expected to occupy around 40% of these lots (up to 760ha). The proposed amendment only applies to a portion of the lots being those areas occupied and affected by the plant (as outlined on the amendment plans).

2.3. Ownership

The property is owned by Wyalong Pastoral Co. Pty Ltd. and AVL holds the purchasing rights in agreement with the landowner to allow for the development of the plant at this site, provided approvals are possible. Tenure details are included in Table 2.1 below. A certificate of Title is Attached at Appendix B.

Table 2.1 - Title Details

Lot Number	Volume	Folio	Plan/Diagram	Registered Proprietor
40 & 41	2216	19	DP28736	Wyalong Pastoral Co Pty Ltd

A site context plan, site plan and aerial plan are provided on the following figures 1.1, 1.2 and 1.3. An indicative 'Development Concept' plan is provided at **Appendix D**.

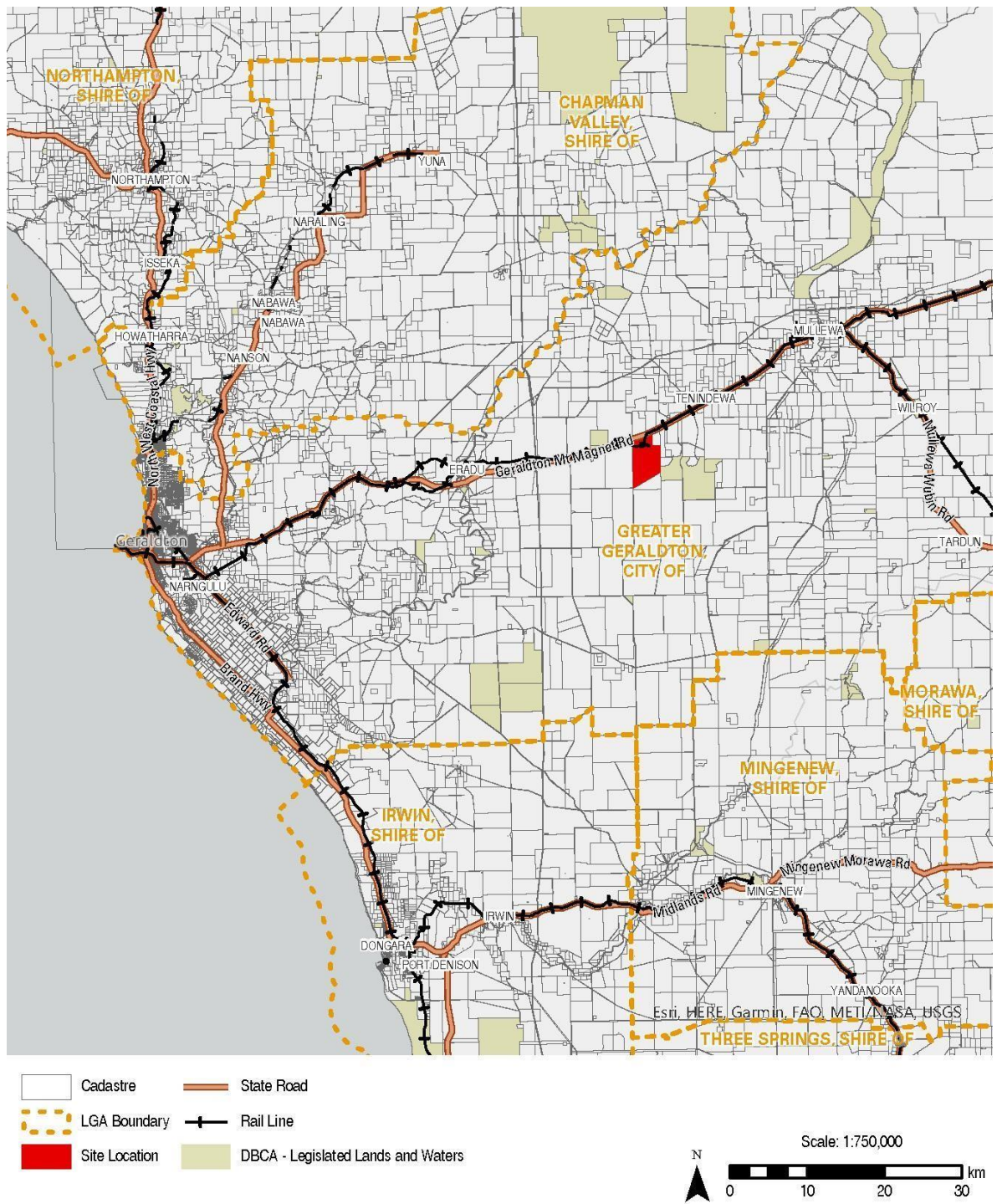


Figure 1.1 - Site Location

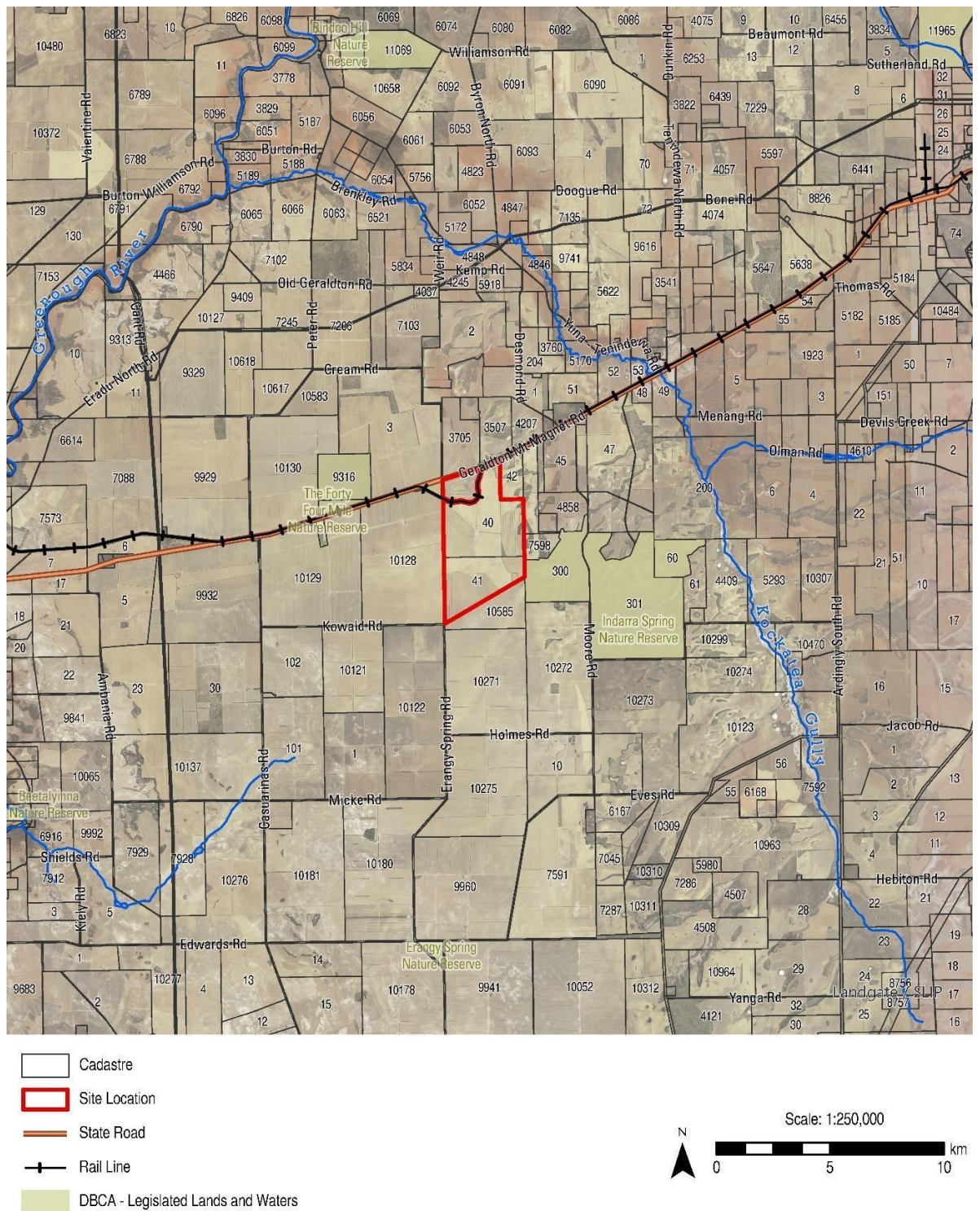
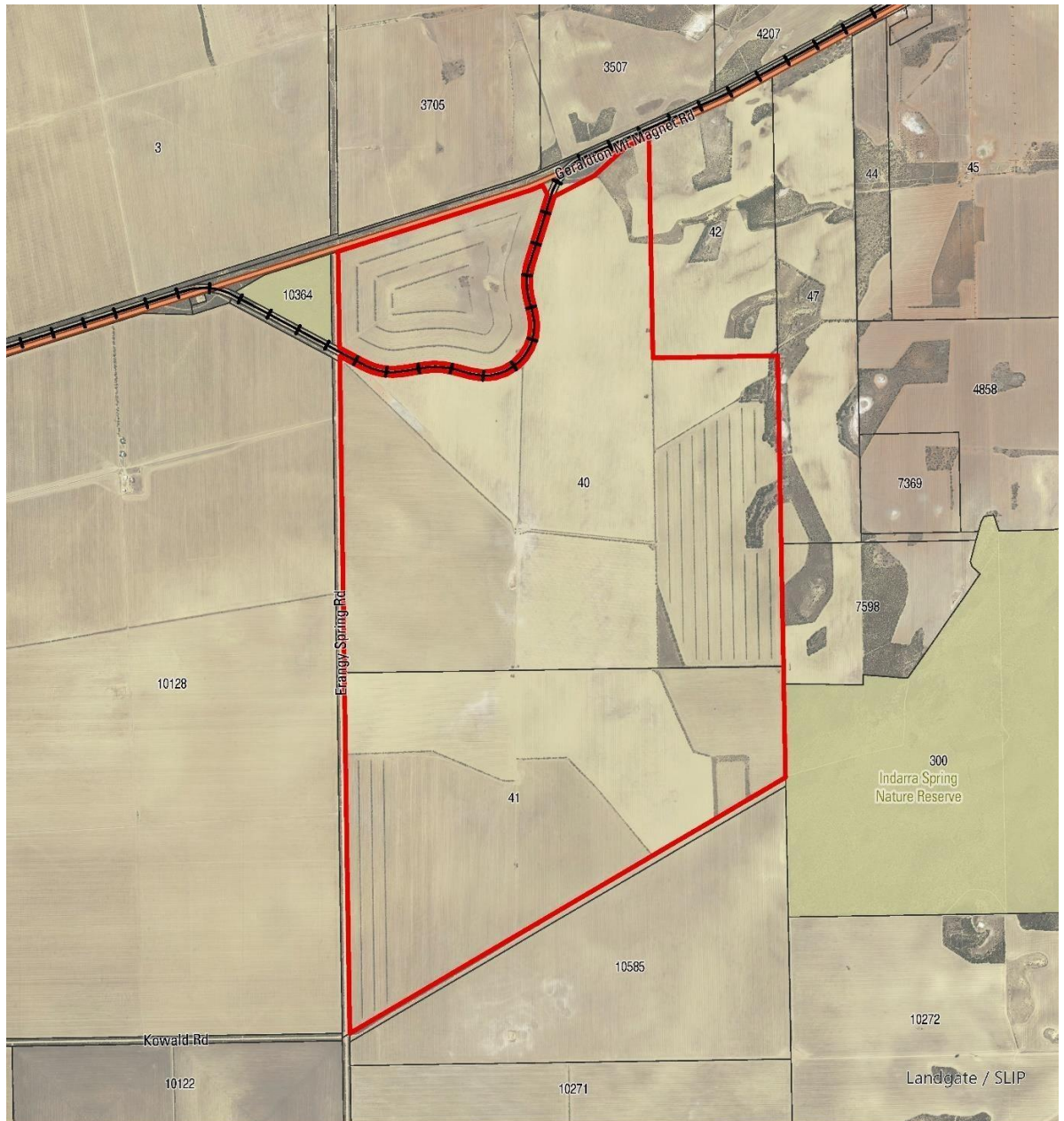


Figure 1.2 - Site Context



-  Cadastre
-  Site Location
-  State Road
-  Rail Line
-  DBCA - Legislated Lands and Waters

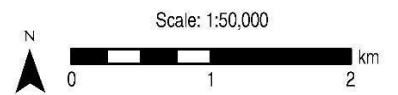


Figure 1.3 - Site Aerial

2.4. Current & Surrounding Land uses

Tenindewa is a farming locality with extensive cropping activity. Rural land holdings are substantially cleared for extensive agriculture use (namely cropping) with sparse remnant native shrubs and trees in road reserves and several planted tree windbreaks between fields.

Lots 40 & 41 are predominantly cleared of native vegetation and partially planted to cereal crops. A private air strip and apron has been cleared and is used for crop management purposes and is located across the two lots. There is a large shed and surrounding cleared area of fallow ground. The two properties are surrounded by large rural land holdings which are zoned *Rural* within LPS 1.

The Geraldton-Mount Magnet Road is located to the north of the site and is designated a primary distributor road reserve within LPS 1 with freight capability. A railway reserve is adjacent to the northern boundary of the site and has recently been upgraded to improve its freight handling capability. This freight railway line connects the Geraldton Port to Mullewa.

There are two adjacent Crown Reserves. Reserve 24185 is located to the west of the site being 29.89ha managed for the purposes of conserving flora and fauna. Abutting the site to the south-east is Reserve 41885 known as the Indarra Spring Nature Reserve a 2868.34ha Class "A" Reserve also managed for the conservation of flora and fauna.

Surrounding the site are broad-acre crop farms, and there are no houses close to the site.

2.5. Existing Site Characteristics

The landform is undulating and rises south towards an east-west ridge before sloping down to the south. There is an airstrip located on Lot 40. Although much of the property has been cleared for cropping there are small pockets of remnant vegetation (at the edges of the site).

2.6. Infrastructure requirements

Power

As there is no existing suitable power service to the site, a stand-alone power generation plant will be constructed to DWER requirements to provide a suitable power supply for the vanadium processing plant. The proposed power generation plant will be a hybrid gas and renewable (solar) power plant, with installed power capacity of 11.5MW. Initially, 35% of the power for the site will be generated from renewable sources, however provision is being made for the future installation of Vanadium Redox Flow Batteries for storage of generated power (subject to a future Development Application).

The gas-fired power station will not likely require a buffer as its generation capacity will be below 10MW, however it should be noted that the technical form and nature of the power station will be assessed by the DWER as part of an *Environmental Protection Act 1986* Pt V Works Approval at the relevant time.

Water

The vanadium processing plant will require secure supply of water for process and site management purposes. This will be obtained by abstracting groundwater from the deep aquifer in accordance with an abstraction licence recently issued by the DWER.

Access

Pre-processed ore will be trucked to the site from the Meekatharra minesite, and processed Iron Titanium co-product will be trucked from the plant to Geraldton Port. In addition, there will be some trips to and from the site for employees and contractors.

There will be two access points to the site – one for haulage Heavy Vehicles (HHVs) and one for services Heavy Vehicles (SHV = maximum Double Road Train) and Light Vehicles (LVs). Two access points are proposed for the following reasons:

- HHVs deliver material to two distinct locations at the processing plant.
- Separation of LVs and 60 m haulage HHVs for safety.

As part of the early government agency scoping for the project as part of the SDAU application, a *Development Assessment Forum* on the proposed SDAU application was held at the beginning of 2022. During the forum, MRWA did not raise specific or in-principle objections to the proposal, however it was noted that further discussions with infrastructure and service providers will continue to occur as both the scheme amendment and the SDAU application progress to be formally referred for comment. A Traffic Impact Statement (TIS) has been prepared for the project which found that access arrangements are generally suitable for the development proposed. The TIS accompanies the SDAU application. Preliminary consultation occurred with Main Roads WA (MRWA) when the TIS was prepared.

Storage of Materials and Waste Management

Waste management will be addressed as follows:

Storage of Materials and Waste Management:

Materials on site, whether they be raw, intermediate or final products, including reagents and consumables, will be stacked or stored on or in appropriately engineered facilities. These would include for example: impermeable liners, bunding and diversion drains for outdoor stockpiles and evaporation ponds; sheds for refractory and other dry consumables; tanks and sealed concrete floors and bunding for liquid reagents. A Works Approval process will be completed (DWER) in order to obtain water and environmental approval and regular reporting thereafter.

Waste Products:

Being a continuous process, the design approach is always to minimise storage of any material, reagent, or product on the site. For example, concentrate transported from the Gabanintha mining operation is typically fed directly into hoppers and then conveyed into the processing plant. Minimal storage is required only to manage surge capacity and any envisaged transportation breakdowns. The Iron-Titanium co-product will be regularly exported via the Port of Geraldton. Evaporation ponds are used to concentrate up the only waste stream (Barren Liquor) into damp solids from where it will be disposed of using a recognised waste management company and which will comply with DWER requirements.

Wastewater:

The barren liquor from the processing plant is the only liquid waste stream, where water is removed by evaporation in large Evaporation Ponds. This does not require any treatment.

There will be no wastewater treatment plant proposed on the site, with general wastewater (grey/black water) held in tanks before being pumped to trucks and removed from site.

3.0 PLANNING AND ECONOMIC FRAMEWORK

3.1. State & Regional Planning Framework

State Planning Strategy

The State Planning Strategy (SPS) identifies the importance of coordinated land planning with decisions about economic development and regional investment in infrastructure.

Section 1.1 of the SPS refers to ‘*the resources economy*,’ and establishes the following objective:

To maintain and grow Western Australia as the destination of choice for responsible exploration and development of resources.

The SPS recognises that:

- Investment in the resources sector benefits the State and Australia. As the sector expands, direct and indirect labour demand increases.
- Western Australia is already home to many multi-national resource companies and a leading centre for resource exploration, production innovation, research, and development.
- The State benefits directly from royalty revenues, which have increased from a 5% share to more than a 20% share of State revenue over the past decade.
- In addition, large numbers of asset transactions provided the State with significant stamp duty revenues. This revenue enables the Government to provide more community services and essential infrastructure to support the growth of the State.
- Much of the State's economic activity occurs in remote regional areas and provides these areas with opportunities for development.
- Despite challenges such as access to labour and services, infrastructure availability and high transport costs, the benefits that flow from the resources sector facilitate significant community and economic development throughout the State.¹

Of relevance to the AVL project, the SPS outlines the following as the strategic approach for planning the State's resource economy¹:

Project facilitation	Effective, transparent, timely and efficient administrative and regulatory systems	<ul style="list-style-type: none">• Project approval timeliness• Amount of resource investment	<ul style="list-style-type: none">• Informed and timely project approvals in which the costs and time of doing business in the State continue to be minimised• The State progressively reviews approvals systems to enhance their transparency and efficiency• Ongoing collaboration with the Australian Government to streamline project approval processes
Strategic industrial lands	Project-ready industrial land to meet the demands of the resources sector	<ul style="list-style-type: none">• Number of established project ready industrial sites• Level of investment in mining and petroleum processing	<ul style="list-style-type: none">• Appropriate strategic industrial land and infrastructure to support priority sectors is available throughout the State• Strategic Industrial Lands developed to acceptable environmental standards to ensure ongoing investment and sustainable economic growth
Downstream processing	Strong downstream processing industries, particularly in the low volume, high value, high technology Critical Minerals sector	<ul style="list-style-type: none">• Total investment in profitable downstream processing of resources and value of processed products	<ul style="list-style-type: none">• Western Australia is a world-leader in production and downstream processing of Critical Minerals (e.g. titanium metal, rare earth metals, lithium, tantalum)• Continued investment to add value to resource products• Industrial ecology is maximised in the planning and operation of all strategic industrial areas

The SPS proposes the identification of strategic industrial areas in advance of demand to ensure there is adequate supply of serviced industrial land. One of the key State Challenges (SPS, p42) is in the identification and provision of these industrial lands for their benefit to the State economy. In this regard, the SPS states:

Export-oriented heavy industries often require land in strategic industrial areas. These areas generally have multiple proponents and require efficient access to key transport infrastructure. Land suitable for strategic industrial areas is limited and cannot be easily

¹ Source: SPS, p39

replicated or replaced.

Strategic industrial areas are of significant economic and strategic importance for the State and require suitable and appropriate integration with surrounding compatible land uses and buffer areas to ensure long- term sustainability.

Within the Mid-West region, Oakajee is identified as a SIA however to date there has been no capital commitment, and therefore no further progress on feasibility or implementing this beyond being a strategic idea. As discussed earlier, the site assessment MCA assessed and concluded that Narngulu was not a suitable location for the reasons listed (refer 1.4.2).

The State Planning Strategy 2050 (SPS) provides a “credible State strategic context and basis for the integration and coordination of land-use planning and development across state, regional and local jurisdictions”.

It achieves this by identifying five key issues of strategic importance to the ongoing growth of Western Australia, namely:

- Economic Development
- Physical Infrastructure
- Social Infrastructure
- Environment
- Security.

Within this context, the Strategy in Resources Economy is seen as critically important, with the SPS objective in this regard being:

To maintain and grow Western Australia as the destination of choice for responsible exploration and development of resources.

The SPS identifies several approaches to realise the objective. Those of relevance to this current application are addressed in Table 3.1 below.

Table 3.1 - State Planning Strategy - Approach to the resource economy

SRS Approach	Relevance to project
Project Facilitation Effective, transparent, timely and efficient administrative and regulatory systems	The project has received WA Lead Agency Status with DMIRS assisting in the facilitation of all major assessment to approval pathways. This current SDAU application will assist with the facilitation of the project through the detailed assessment of layout, design, and construction.
Strategic industrial lands Project-ready industrial land to meet the demands of the resources sector	The City of Greater Geraldton Local Planning Strategy has identified a need for additional industrial land in addition to the current Narngulu Industrial Area. This is yet to be implemented. The Oakajee Industrial Area likewise is an aspiration which has not yet progressed via feasibility or formal capital commitment. This project is for a processing plant, proposed for Tenindewa. Once this project advances it may provide a catalyst for further investigation of Tenindewa as a suitable location for future industrial development. The site is well serviced and is sufficiently close to Geraldton to be serviced by City based suppliers. Whilst it is beyond the remit of AVL, the City may consider taking an investigation further on its own or with WA Government guidance.

SRS Approach	Relevance to project
Downstream processing Strong downstream processing industries, particularly in the low volume, high value, high technology Critical Minerals sector	The project proposes downstream processing to produce a high purity Vanadium (99% V ₂ O ₅) product, a high-value critical mineral product for export which can also be used to boost VRFB production in Australia. The plant also proposes minerals to be recovered as economically useful by-product
Exploration and resource development New discoveries of world-class resources continue to be made and developed in Western Australia	The Australian Vanadium Project is one of the most advanced vanadium projects currently being developed in the world because it has fundamental security of resource and capability to process it to high quality standards.

Mid-West Regional Planning & Infrastructure Framework: Guilderton to Kalbarri Sub-regional Strategy

The Mid-West Planning & Infrastructure Framework 2015 (the Framework) identifies a range of regional infrastructure projects and are considered significant to facilitate further economic growth. It is focussed on regional infrastructure and may be superseded in most respects by the recent State Infrastructure Strategy 2022, which identifies a shift in government focus as part of the planning and delivery of infrastructure across the State.

The key relevant feature of the Framework nevertheless intends for there to be a major new port developed at Oakajee and for this to be connected to the hinterland by new regional road and railway links. It also indicates the creation of a Strategic Industrial Area – presumably to accommodate major industrial development such as manufacturing, processing, and similar plants, however it does not elaborate these expected uses in detail or consider their suitability for all industry. The State Infrastructure released in 2023 does not advance or formalise a commitment to the Oakajee Port as a priority or funded project.

The Oakajee Port itself would not be achieved without expensive and necessary new major road and rail connections. None of these have been funded and there is no commitment in 2023 and as a result that site is not available or suitable in the short to medium term.

The processing plant proposed by AVL is consistent with the objectives and guidance of both State and local planning strategy by virtue of the following:

- the introduction of a significant minerals downstream processing facility within the region,
- diversification of the regional economy by introducing a new industry,
- consolidating the importance of the Geraldton Port for minerals export; and
- providing significant employment opportunities within the Greater Geraldton region, both during construction and operational phases.

Western Australia's Mineral and Petroleum Resources Development Strategy

This strategy was released in September 2021 and recognises that the resources sector dominates the State's export earnings and “*provides substantial direct and indirect employment, supports downstream and service industries, and delivers essential revenue to both the State and Commonwealth governments*”.

The strategy identifies 6 Strategic Priorities, including Strategic Priority 3: *An industry that is efficiently and effectively regulated*.

In meeting this strategic priority, a key Government action is “Amendment of Planning Legislation to cut red tape for significant development proposals”. This action specifically references the temporary Development Application pathway of the State Development

Assessment Unit, and its role in being able to consider and support minerals-based projects of State or Regional Significance; a pathway which has recently been affirmed (2023) by the WA Government.

This project is clearly of significance to WA, recognised by the Major Project Status and Lead Agency Status, and it therefore should be supported within the local planning and SDAU approvals pathway, which includes support from the Local Government regarding facilitating its development via this proposed scheme amendment for the suitable site.

State Planning Policy 2.5 – Rural Planning

The intent of SPP2.5 is to “protect and preserve Western Australia’s rural land assets due to the importance of their economic, natural resource, food production, environmental and landscape values” and applies across Western Australia. This policy was prepared in 2014 to reflect the Department of Agriculture WA soil science findings because of a pilot study which was based on the Southwest of WA and the Mid West Region.

The background to this work was the premise of a protecting agricultural land in the Mid-West Region as a contingency for the continuing loss of agriculturally productive land within the metropolitan and south-west regions of the state (due mostly to peri-urban residential expansion). The policy reversed what had been perceived to be a presumption of planning that Rural land was available for other uses without many consequences.

An additional consideration was the possible scenario of impacts on food production due to drying climate and declining soil fertility. It is a State Government policy which applies to the entire state as well as the Geraldton Region.

The objectives of SPP 2.5 are to:

- a. support existing, expanded, and future primary production through the protection of rural land, particularly priority agricultural land and land required for animal premises and/or the production of food;
- b. provide investment security for existing, expanded, and future primary production and promote economic growth and regional development on rural land for rural land uses;
- c. outside of the Perth and Peel planning regions, secure significant basic raw material resources and provide for their extraction;
- d. provide a planning framework that comprehensively considers rural land and land uses, and facilitates consistent and timely decision-making;
- e. avoid and minimise land use conflicts;
- f. promote sustainable settlement in, and adjacent to existing urban areas; and(g) protect and sustainably manage environmental, landscape and water resource assets

SPP 2.5 recognises the importance of identifying and protecting the loss of high value agricultural land in WA.

In 2013 the Department of Agriculture and Food WA completed the Identification of high-quality agricultural land in the *Mid-West region: Stage 1 – Geraldton Planning Region*. High quality agricultural land is defined as areas of land identified from a combination of soil, land capability, water resources and rainfall data as the most productive and versatile for either irrigated or broadacre agriculture. This does not account for climate variability. Lots 40 and 41 are on the boundary of two agricultural land areas being the East Eradu Sandplain ALA and the Mullewa ALA. The study characterised the East Eradu Sandplain ALA as part of the ‘Group C: Moderate Versatility’ area as it provided high crop yields with some area potential for horticulture with the Mullewa ALA being within the ‘Group E: Lower Versatility’ given the potential to insignificant water resources, variable rainfall and moderate to low yields. It should be noted that that this report has now been withdrawn by the Department of Primary Industries and Regional Development as “*New information has become available since publication that paints a significantly different picture of potential groundwater resources in the south of the planning region*”.

It is noted that Lots 40 and 41 are in an area of transitional agricultural quality for broadacre

cropping, with DPRD land capability mapping for broadacre cropping indicating (using best available data) that the site sits across categories B1 and B2. Whilst these are not of the highest agricultural quality, they are of moderate to high quality, to most of the agricultural lands the broader agricultural area.

The City referenced this study when it included the western portion of the site within the high versatility agricultural land classification in the *Local Planning Strategy* (2015). No further studies to ascertain soil productivity or climate variability have been undertaken to date. An extract from the Local Planning Strategy is provided in Figure 1.4 below. This shows the site sitting across two rural land categories of *Higher Versatility Agricultural Land* and *Other Rural Land*.

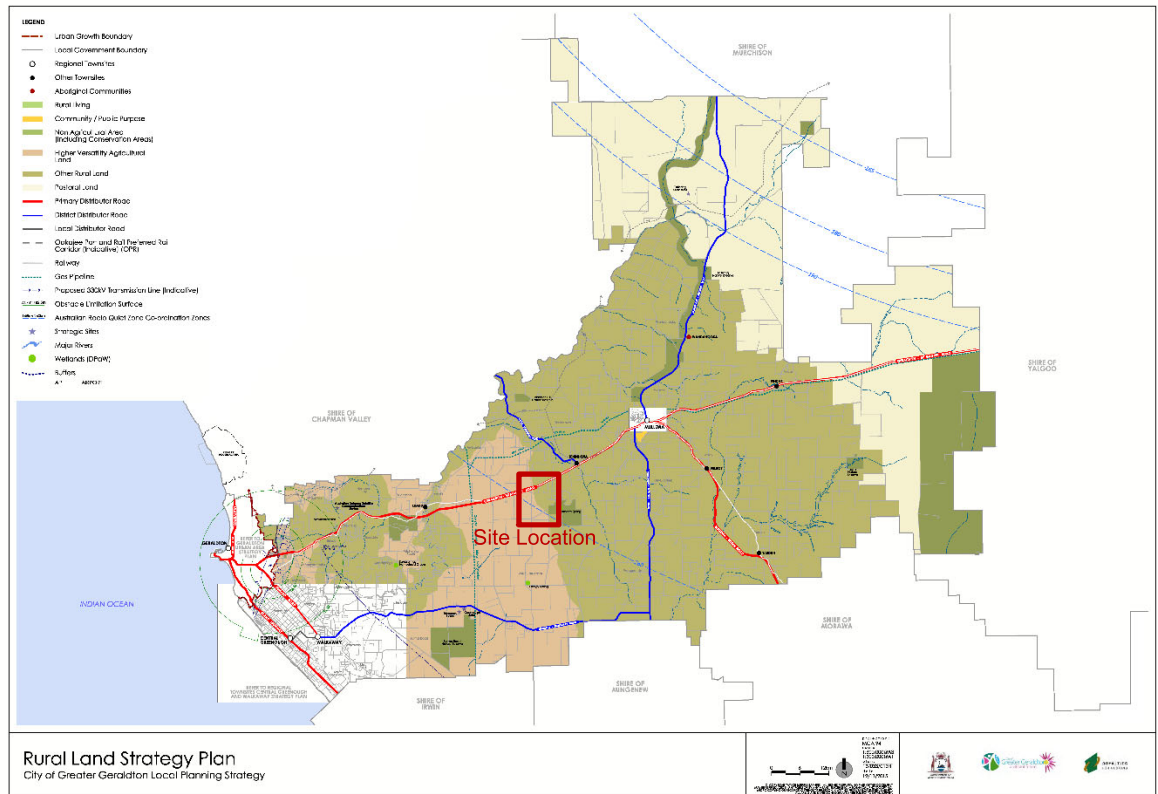


Figure 1.4 – LPS Extract

In terms of managing impact AVL acknowledges the plant once constructed will remove an area of this site from farming production. The plant footprint is however to be confined to just a portion of these two lots to minimise the extent of impact on surrounding cropping land. The balance of the site (including the entirety of Lot 41) may be managed as cropping should there be justification and interest to continue this use. Air quality monitoring for the processing plan indicates there is no likely impact on the productivity of rural cropping.

To add perspective, SPP 2.5 recognises that in a large and diverse state such as WA with regional variations of climate and economic activity, rural zones may need to accommodate for a wide range of land uses other than farming production. Decisions are to be guided by the need to provide economic opportunities for rural communities while protecting the State's primary production and natural resource assets. The policy therefore advocates for regional variations where they meet the stated objectives of the policy.

Relevant Application of SPP 2.5

SPP 2.5 contemplates that not all rural uses are associated with food production and therefore also states that due to their size, scale and potential level of impact, some rural land uses could be considered industrial, some rural land uses are located on industrial land, and

some industrial land uses are located on rural land. This is more broadly construed to apply to rural associated industries – however the amendment to the scheme is to rezone a portion of the site to *General Industry*, and thus the provisions of SPP2.5 will fall away within this context.

Lots 40 and 41 are presently partially used for cropping but are also used for an airfield and large cleared taxi way and large grain/fertiliser storage shed. It is acknowledged that the development of the vanadium processing plant will result in some further loss of land currently being cropped, however the current use of the land has not been exclusively food crop production. The SPP does contemplate whether allied but nevertheless non-productive uses such as the existing airfield or grain-silage and fertiliser storage would be appropriate in rural areas.

SPP 2.5 emphasises understanding and avoiding land use conflicts in each stage of the planning framework. Decision-makers need to consider the suitability of land uses in both a broader context and the ability to manage activities within the site prior to determining whether the use of a buffer is necessary.

Clause 5.12.1 states

- i. “where a development is proposed for a land use that may generate off-site impacts, there should be application of the separation distances used in environmental policy and health guidance, prescribed standards, accepted industry standards and/or Codes of Practice, followed by considering –
 - (i) whether the site is capable of accommodating the land use; and/or
 - (ii) whether surrounding rural land is suitable, and can be used to meet the separation distances between the nearest sensitive land use and/or zone, and would not limit future rural land uses; and
 - (iii) whether if clauses (i) and/or (ii) are met, a statutory buffer is not required.”

Clause 5.5 of the policy seeks to promote economic development opportunities, with the WAPC to balance the need for economic opportunity with the protection of the State’s primary production and natural resource assets. Regarding this proposal, the economic opportunity of the project is significant.

The western portion of Lots 40 & 41 is classified within the City’s Local Planning Strategy as “Higher Versatility Agricultural Land” along with other rural land to the west and south. The Strategy is based upon the HQAL pilot study by the then Department of Agriculture focussed on Geraldton and aimed to demonstrate how better information about agricultural land productivity can inform planning decisions. The study is careful to point out the information is just a part of an overall set of considerations for land in rural areas and has been completed to provide an overarching appreciation for rural land and its importance for food production. The focus is to protect productive rural land in peri urban areas and close to markets from being sterilised by development for non-rural use.

Although this site is not peri-urban it is nevertheless currently farmed for wheat and is therefore productive. SPP 2.5 is relevant as part of the overall consideration of the site, and the broader context of the size of the site as a proportion of the larger surrounding agricultural area.

The two lots are rated to have a High Versatility for agriculture in the Local Planning Strategy which references the HQAL methodology. This is based upon soil type, irrigation, rainfall, and land capability. This land is not irrigated, and the soils are free draining but unimproved used for extensive cropping.

The eastern portion of the site along with other rural land to the north and east is simply classified as ‘other rural land’. The land is categorised by the Department of Agriculture pilot ALA study as B1 and B2 of ‘high versatility’.

Clause 6.4 outlines relevant matters for a planning authority contemplating zoning proposals or amendments to local planning schemes. The proposal is assessed as follows:

Table 3.2 – SPP2.5 – clause 6.4 requirements

SPP requirement	Response
Suitability of site to be developed for the proposed use	The amendment is to rezone a portion of the land for the site from <i>Rural</i> to <i>General Industry</i> . The site has been identified as generally suitable for the development of a processing plant (in this case it is for vanadium). DWER and SDAU assessment processes will address site layout, and environmental management and performance of the plant to manage impacts within agreed acceptable standards.
The siting of the zone/land use in the context of surrounding zones/land uses.	The Amendment proposes rezoning a portion of the site from <i>Rural</i> to <i>General Industry</i> . The remaining land will remain <i>Rural</i> .
The capacity of the site to accommodate the proposed zoned/ land use and associated impacts, and;	Lots 40 and 41 can accommodate the proposed plant and associated infrastructure well within its boundaries. There will be sufficient land around the margins to manage screening or other issues. No off site impacts evident from modelling.
- Only support proposal consistent with endorsed planning strategies or in exceptional circumstances where the proposal meets the objectives of the WAPC policy	The proposed amendment is being considered as a complex amendment to facilitate an application made under s17 of the <i>Planning and Development Act 2005</i> .
- That the continuation of existing rural land uses are taken into account	The Rural zone will remain on the balance of the lots which does not preclude continued cropping of land adjacent to the processing plant.

An analysis has been undertaken of the extent of agricultural land that could be lost due to the development of the vanadium plant on this location. Data has been obtained from the best available land capability data published by DPIRD (noting that the publication *High Quality Agricultural Land in the Mid-West Region (2013)* has been withdrawn).

Figure 1.5 below (scaled copy provided at Appendix) analyses both grazing and cropping land within the Mid-West Region, and focuses on land capability categories of A1, through to B2.

Table 3.3 – Agricultural land in the Midwest

Land Type	Area (ha)	Area %
Tenindewa site	878	
Rural	7 547 862.43	0.012
Agricultural land	5 265 431.56	0.017
B1/B2 land	4 497 027.58	0.020

There is a significant amount of agricultural land within the Midwest Region and that the use of the proposed use of the Tenindewa site will compromise less than 0.02% of available good to medium quality agricultural land within the region.

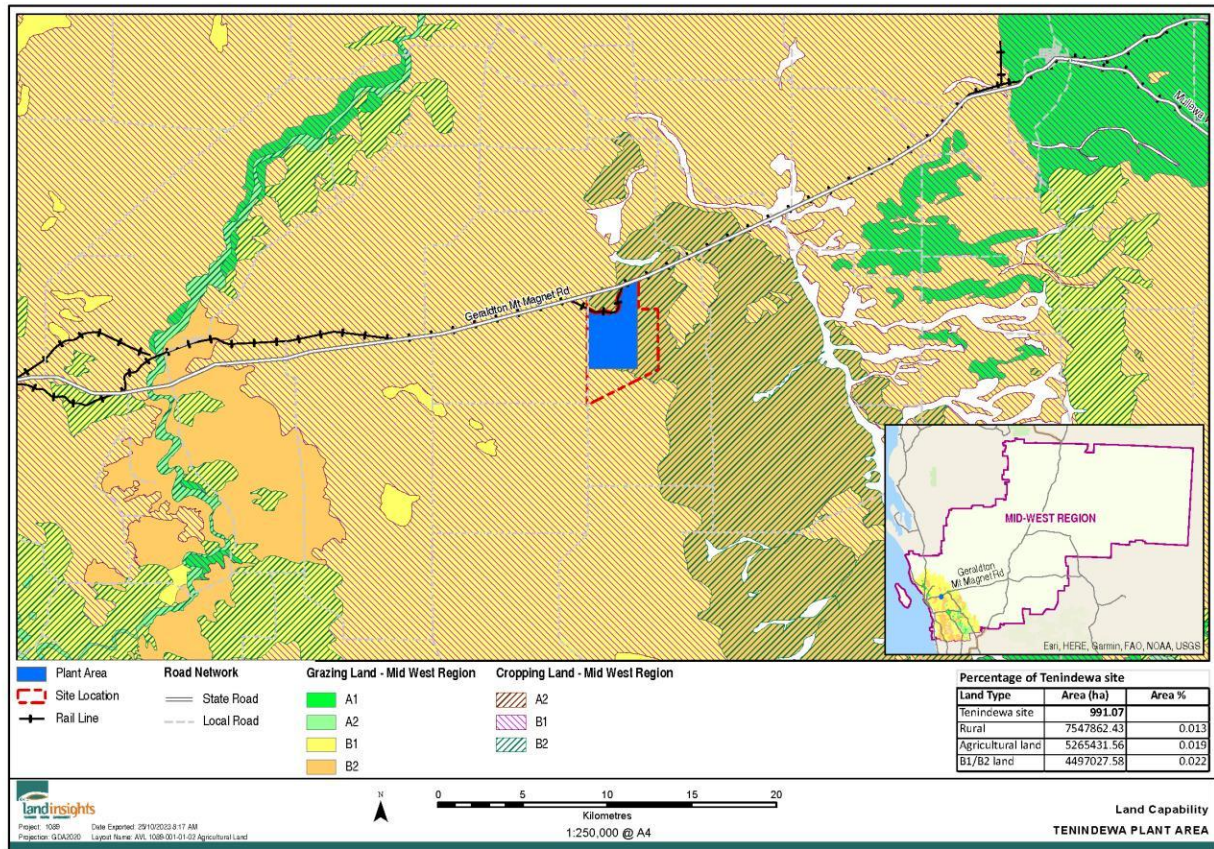


Figure 1.5 – Agricultural Land Capability

SPP 4.1 Industrial Interface

This policy of the WAPC prepared to supplement EPA Guidance on air quality and buffers. It was in draft form for several years and finalised in June 2022. The EPA Guidance is considered the reference for technical purposes whereas SPP 4.1 provides the overarching planning policy and context for that guidance to be applied.

SPP 4.1 applies to industrial land and land uses in Western Australia, in a range of cases, namely:

- a) land zoned for industrial purposes in a region or local planning scheme.
- b) industrial land uses on land zoned for industrial purposes.
- c) industrial land uses on land that is not zoned for industrial purposes.
- d) land that may be impacted by industrial land uses and strategic infrastructure.

Dot points a), b) and d) are relevant to the proposed General Industry use within the Rural zone for proposed on Lots 40 and 41.

The objectives of SPP 4.1, are to:

- a) Ensure the impacts of industrial land uses are considered at all stages of the planning process.
- b) Adequately separate industrial land uses and any resulting off-site impacts and/or safety risks from incompatible land uses to:
 - Protect industrial areas to improve long-term operational certainty.
 - Avoid, mitigate, or manage potential impacts on the health and amenity of people and the environment.
 - Promote co-location of like uses to minimise the impact area.
- c) Plan the land use transition between industrial land uses/infrastructure facilities and sensitive land uses by providing compatible zones, reserves and land uses.

These considerations are all addressed by the partial rezoning of the site with the balance remaining for rural purposes.

Consideration of the EPA's separation distance requirements is cited by SPP 2.5. There are currently two separate documents, the currently approved document published in 2005 and the Draft document published in 2015. The separation guidance for the relevant category is provided as outlined in Table 3.4 (note the site is not a Vanadium Mine and thus that category does not apply in this instance).

Table 3.3 – Environmental Assessment Guideline for Separation Distances between Industrial and Sensitive Land Uses (2015) Industry

Industry	Description	Buffer (m)
Metal smelting, refining, melting, casting, fusing, roasting or processing works (DWER Licence Category 44)	where metal, metal ores, concentrates or wastes are treated to produce metal (other than iron & aluminium):	
	up to 100 tonnes per year	100-200
	between 100 & 1000 tonnes per year	300-500
	<i>greater than 1000 tonnes per year</i>	Case by case depending on the process.

In this instance consideration of a 'case by case' separation distance is required.

AVL has completed preliminary modelling of noise, dust and particulates for the vanadium plant, based on the current layout/design of the plant itself. This work was completed by a specialist consultant for the company. It was found that there would be no exceedance of relevant environmental air quality criteria beyond the boundaries of Lots 40 and 41. Based on this information, there are no requirements for planning controls (such as Special Control Areas) beyond the site boundaries. An updated Environmental Impact Statement has been prepared for the project, and Section 4.1.8 addresses *Air Quality* considerations. A copy of this Environmental Impact Statement is attached at Attachment E.

An extract from the modelling document showing the extent of potential impacts (in red) is shown below.

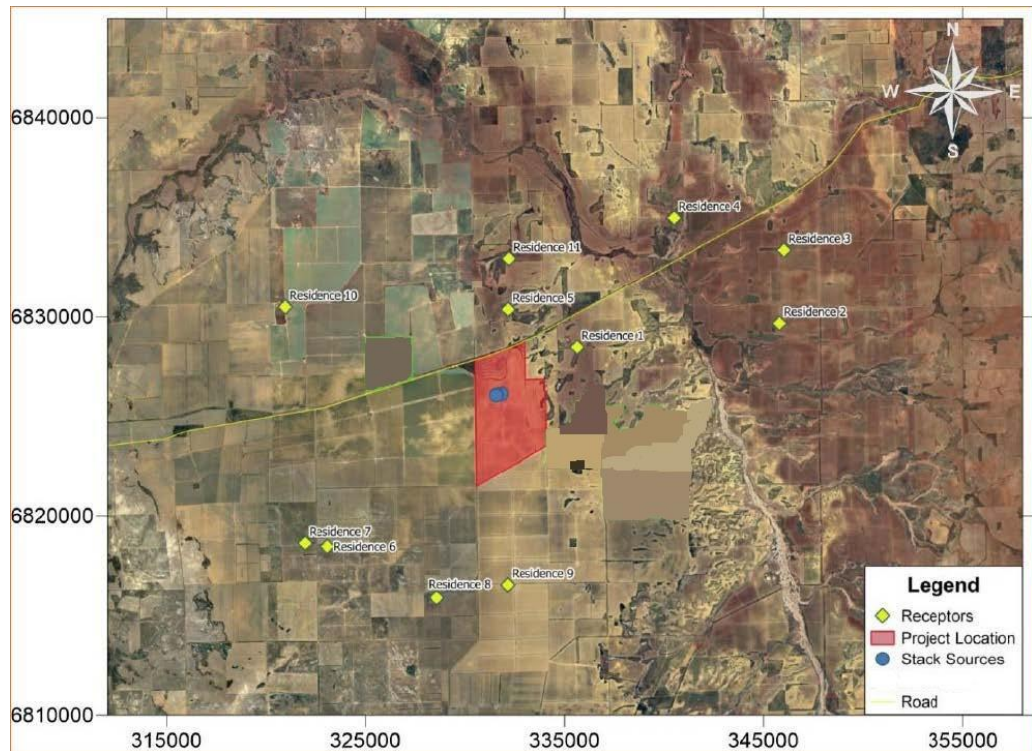


Figure 1.6 - Site-Specific Modelling of Air Quality – noting location of the plant and the boundary of the Amendment Site

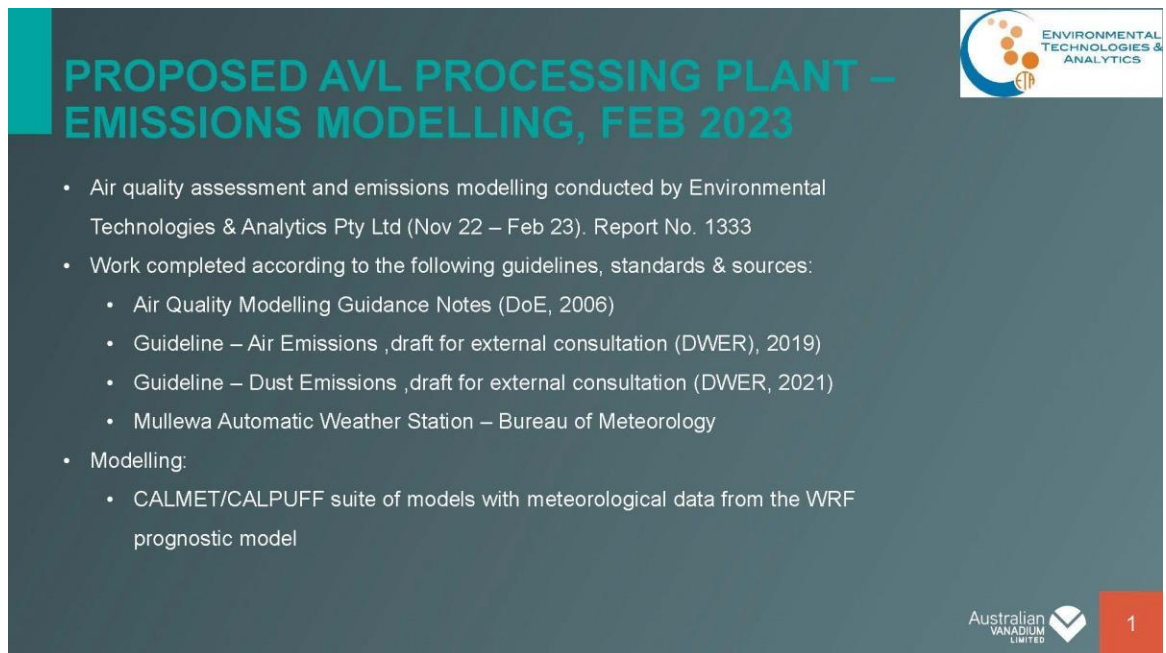


Figure 1.7 - Summary of modelling work completed

SPP 2.0 – Environment and Natural Resources Policy

State Planning Policy 2.0 was prepared by the WAPC in 2003 and aims to integrate environment and natural resource management with broader land use planning and to protect, conserve and enhance the natural environment.

Mineral production is referenced within Policy Measure 5.7 which states that “mineral resources, petroleum resources and basic raw materials are important natural resource assets and are a vital part of the economy”. This principle is recognized in the regional planning strategies referenced earlier in this chapter. The economic consideration of the project offers benefit to the State in export earnings, employment opportunity and potential to capture the value of downstream processes into products.

The project has been referred to the Environmental Protection Authority and will also be subject to the Department of Water and Environmental Regulation (DWER) assessment prior to future Works Approvals, Clearing Permits and Operating Licences. A comprehensive *EPA Referral Supporting Document* was submitted with the s.38 referral to EPA. The project's Environmental Consultant Team undertook a preliminary assessment of the project against the EPA Key Environmental Factors and Department of Agriculture, Water and the Environment Matters of National Significance (MNES) to identify likely environmental impacts from implementation of the proposal.

The Environmental Consultant team found that,

“based on the preliminary environmental impact assessment, the Proposal is not expected to have a significant impact on the environment or any MNES. It's possible that there would be an impact on significant flora listed if they cannot be avoided in locating the site entry and exit roads. The potential impact will be determined after a targeted flora survey is undertaken, and the road designs are finalised.”

Normally in these circumstances, a formal referral to EPA would not be warranted – however given the expectation from the City of Greater Geraldton and SDAU that the processing plant should be referred under s38, the formal referral has occurred.

Table 3.4 below is extracted from the Environmental Referral document and outlines the environmental risk associated with the project, relevant to EPA Environmental Factors.

Table 3.4 - Relevant EPA Environmental Factors

Theme	Factor	Section	Classification	Basis of Classification
Land	Flora and Vegetation	6.0	Other decision-making authority	There is the potential for significant flora to be present in the proposed development envelope. While the Proposal will be designed to avoid impacts to significant flora, it may not be feasible to avoid all impacts. Any residual impacts can be assessed and managed through the native vegetation clearing permit process and under the <i>Biodiversity Conservation Act 2016</i> .
	Landforms	8.1	Not significant	No significant landforms identified.
	Subterranean fauna	8.2	Not significant	No direct impacts to subterranean fauna from Proposal activities. The groundwater source is the deep aquifer (>200 m below ground

Theme	Factor	Section	Classification	Basis of Classification
				level) and is separated from the superficial aquifer.
	Terrestrial Environmental Quality	7.0	Other decision-making authority	<p>There is the potential for impacts to terrestrial environmental quality from accidental release of environmentally hazardous materials. The potential impacts will be managed through typical industrial controls such as effective design, construction, and management of run-off and storage facilities.</p> <p>The Works Approval and licensing process administered by DWER under Part V of the EP Act can effectively assess the impacts to terrestrial environmental quality and ensure EPA objectives are maintained.</p>
	Terrestrial Fauna	8.3	Not significant	No direct impacts to conservation significant fauna or habitat are expected. The proposal is primarily located within previously cleared land. The small amount of native vegetation clearing that will be required is not expected to significantly impact on terrestrial fauna values.
Water	Inland Waters – Surface Water	8.4	Other decision-making authority	<p>There is the potential for impacts to surface water from accidental release of environmentally hazardous materials. The potential impacts will be managed through typical industrial controls such as effective design, construction, and management of run-off and storage facilities.</p> <p>The Works Approval and licensing process administered by DWER under Part V of the EP Act can effectively assess the impacts to inland waters, require regular sampling and reporting and ensure EPA objectives are maintained.</p>
	Inland Waters - Groundwater	8.5	Not significant	Water for the Proposal will be sourced from the Irwin River-High Cliff Aquifer, over 200 m below ground level. No groundwater dependent ecosystems rely on this water source. An operating strategy, as required by DWERS for a 5c Extraction license has been submitted and accepted by the DWER.

Theme	Factor	Section	Classification	Basis of Classification
Air	Air Quality	8.6	Other decision-making authority	<p>The closest sensitive human receptor is Wyalong Homestead, 3.2 km from the Proposal. Potential impacts associated with particulate and other air emissions can be managed using standard practices.</p> <p>The Works Approval and licensing process administered by DWER under Part V of the EP Act can effectively assess the impacts from air emissions, require regular sampling and reporting and ensure EPA objectives are maintained. In addition, the project proposes to employ Global Best practice in terms of air emissions from all stacks for its detailed plant designs. A screening assessment has shown that no buffers are required outside the boundaries of the proposed lots. It is expected that Air emissions modelling will confirm this view, the results of which will be available by the end of January 2023. This is in line with the approach adopted by other similar recent projects in the state i.e. Tianqi Lithium (Kwinana), Albemarle Kemerton and Covalent Lithium (Kwinana).</p>
	Greenhouse Gas Emissions	8.7	Not significant	<p>Scope 1 greenhouse gas emissions will be less than 100,000 tonnes per annum. AVL is committed to minimizing direct greenhouse gas emissions where feasible.</p>
People	Social Surroundings	8.8	Not significant	<p>The proposal has been designed to minimise potential impacts to social surroundings such as visual amenity, fugitive dust emissions, loss of agricultural productivity and increase in traffic movements.</p> <p>Once the proposal location was selected AVL consulted with landowners in the locality to inform them about the project. Nearby landowners were supportive of the project following initial and ongoing consultation that has occurred over the last 12-18 months. Advertisement of the initiated amendment is expected to confirm the residual impact to social surroundings is low and offset by likely benefit to local economy.</p>

Theme	Factor	Section	Classification	Basis of Classification
	Human Health	8.9	Not significant	The closest sensitive human receptor is Wyalong homestead, 3.2 km from the Proposal. Site specific modelling of the plant design indicates there is no impact to properties from off-site emission in the future.

Source: Tenindewa Vanadium Processing Facility; S38 EPA Referral Supporting Document (Umwelt 2022)

Other State Planning Policy

Table 3.5 addresses State Planning Policies relevant to the project.

Table 3.5 - State Planning Policy Response

State Planning Policy	Response
SPP1 – State Planning Framework	<p>The State Planning Framework was prepared by the WAPC in 2017.</p> <p>It sets out the key principles relating to environment, community, economy, infrastructure, regional development and governance to guide the way in which future planning decisions are made. More specifically, the Framework identifies relevant policies and strategies used by the Commission in making decisions.</p> <p>The various planning policies and strategies identified in this section are recognised in SPP1.</p>
SPP 2.9 – Water Resources (incl draft)	<p>The objectives of this policy are to:</p> <ol style="list-style-type: none"> 1. protect, conserve, and enhance water resources that are identified as having significant economic, social, cultural and/or environmental values; 2. assist in ensuring the availability of suitable water resources to maintain essential requirements for human and all other biological life with attention to maintaining or improving the quality and quantity of water resources; and 3. promote and assist in the management and sustainable use of water resources. <p>A draft revision of SPP2.9 was released in August 2021 and contains an updated set of policy provisions. The intent of the policies is to ensure that planning/development considers water resource management at the appropriate time.</p> <p>In this instance, there are limited surface water and groundwater resources available on the site.</p> <p>It is proposed to use groundwater for the project, being drawn from the deep, brackish aquifer. The majority of the other groundwater users in the vicinity use the shallower superficial aquifer which is independent of the deep aquifer.</p> <p>There should therefore not be impact by the project on the shallow aquifer. All water used in the processing of vanadium will be managed, treated and retained on site.</p> <p>Management of water will be subject to further review as part of the environmental approvals process.</p>

State Planning Policy	Response
SPP3.7 – Planning in Bushfire Prone Areas	<p>State Planning Policy 3.7 – Planning in Bushfire Prone Areas was prepared by the WAPC in 2015. It provides the foundation for land use planning to address bushfire risk management in Western Australia and to inform and guide decision-makers, referral agencies and landowners to help achieve acceptable bushfire protection outcomes. It applies to development in designated bushfire prone areas.</p> <p>The latest DPLH mapping (2019) identifies <i>Bushfire Prone Areas</i> in some areas of the site, namely on and adjoining areas of remnant vegetation. The development application will address this.</p>
SPP 5.4 – Road and Rail Noise	<p>SPP 5.4 applies to the preparation and assessment of planning instruments, including region and local planning schemes; planning strategies, structure plans; subdivision and development proposals in Western Australia, where there is proposed:</p> <ul style="list-style-type: none"> • noise-sensitive land-use within the policy's trigger distance of a transport corridor as specified in Table 1; • new or major upgrades of roads as specified in Table 1 and maps (Schedule 1, 2 and 3); or • new railways or major upgrades of railways as specified in maps (Schedule 1, 2 and 3); or any other works that increase capacity for rail vehicle storage or movement and will result in an increased level of noise. <p>In the case of this application, the project is not considered a 'noise sensitive land use'. It also does not involve new or major road/rail upgrades and as such, the provisions of SPP5.4 do not apply.</p>

WA Regional Development Strategy

The initiation of the Scheme amendment is a potential enabler of the WA Regional Development Strategy. This strategy focusses on the development of renewable energy through solar, wind and green hydrogen. Mining companies are searching for green renewable energy (either through production or offsets) as their strategy to achieve investor and shareholder objectives for climate responsible production.

The WA Government recently announced commitment to renewable energy and associated technologies for regional WA and this proposed plant delivers this on the ground. Hydrogen hubs are being proposed at several regional locations in WA by the WA Government. These are linked to generation and storage of renewable energy to be achieved via static batteries.

Geraldton is identified as a location for hydrogen hub with focus to promote and facilitate renewable forms of energy and its storage. This aligns with the establishment of a vanadium ore enrichment plant to produce constituent materials for static battery production. Batteries are required for the storage of energy derived from hydrogen and the proximity of a vanadium plant can advance the local resourcing of these future energy plans. Vanadium Flow Batteries are an efficient and effective technology for static battery storage.

These strategy imperatives give impetus to delivering the State commitment should this project proceed at this site and according to AVL timetable. The project may catalyse other investment in Greater Geraldton to become a renewable energy and battery production hub. Although there has currently been no commitment to local production of batteries, this result may be more likely to arise in the Geraldton region provided there is definite strategic commitment, planning and follow-through by government.

3.2. Local Planning Framework

Local Planning Strategy 2015

The Local Planning Strategy (LPS) was endorsed by the WAPC in 2015. It brought together the previous strategies of Geraldton, Mullewa and Greenough. The Strategy identifies the eastern part of the greater city as potential for economic growth however the LPS does not expand the gazetted townsites, including Tenindewa, other than to ensure that appropriate services and facilities can be provided in Mullewa.

The LPS also identifies a range of Development Investigation Areas (DIAs). DIA9 (Eradu) was identified in the LPS to consider “industrial opportunities for land generally in proximity to the convergence of the Geraldton-Mount Magnet Road, the Mullewa to Geraldton narrow gauge railway and the Dampier to Bunbury Natural Gas Pipeline”. The LPS also reasoned that it was necessary for an “industrial location in the rural hinterland around Eradu to accommodate other larger industry not appropriate in other industrial areas including Narngulu”.

The initiation of the amendment on this site signifies a justification of the DIA9 intention, to introduce a major source of employment and economic activity will catalyse further investment in this locality.

Whereas DIA9 itself is not suitable for the vanadium processing plant (which was addressed in the MCA) because there is a lack of landowner support in the Eradu area for industrial land uses and a site could not be advanced to meet the vanadium plant timeframe.

The difficulties establishing industrial zoning/land uses within the Eradu area has not however negated the need by large operators, such as AVL, to seek sites outside of existing zoned industrial land areas in the Greater Geraldton area. The proposal of the additional ‘industry’ use on the proposed site is consistent with this identified need. The results of the MCA justify renewed investigation for additional land area and location within the rural hinterland close to the established infrastructure.

Given that the subject site is located east, in close proximity to the convergence of the Geraldton-Mount Magnet Road, the Mullewa to Geraldton narrow gauge railway and the Dampier to Bunbury Natural Gas Pipeline, the site at Lot 40 & 41 complies with the general intent of the LPS.

There is the potential for the City to further investigate the development of DIA near the subject site. This additional investigation will require modification to the LPS when reviewed to relocate the DIA.

The Strategy identifies a need to encourage investment into Mullewa to support housing and employment opportunities. The development of a processing plant close to this town will assist in diversifying the regional economy and bring employment opportunities to Mullewa, and the broader Greater Geraldton and Midwest Region.

The LPS reflects the intention of the Mid-West Planning Framework to better connect the proposed Oakajee Port to the eastern areas of the City with improved new regional road and rail links. Since 2015 to the present date there has been no delivery of this framework or strategy by government commitment to advance the Oakajee Port, the Strategic Industrial Area or proposed road and rail links.

The vanadium processing plant in Tenindewa heralds the type of investment which once operating, may provide a catalyst for renewed interest in establishing a port and better road and rail connections. Until these works and a strategic industrial area are advanced, it is doubtful industry or transport logistics within this Region will be realised; a situation which requires each proponent to seek its own site based on site selection suited to that specific project.

The adopted Local Planning Strategy identifies the need to focus on the economic development in the eastern districts of the City however there is an undefined role for the

eastern part of the greater city area. This section of the LPS vision is relevant to the proposal:

“Economy –

A dynamic, diverse, and sustainable economy. We value a healthy thriving economy that provides diverse employment opportunities while protecting the environment and enhancing social and cultural outcomes.”

This amendment (if initiated for this proposal) achieves this vision and principle due to the potential to introduce an important downstream industry – beneficiating and adding value to raw materials within the region to boost net product for the region. This will reduce reliance of the Mid West Region on external resources. This proposal will increase local capture of value from processing nearby mineral resources and distribute this additional value via the local community into the Greater Geraldton community.

Transport and Mullewa

“Mullewa has a regional role in transport movements and resource activity, with potential to operate as a future rail hub to Geraldton. This potential needs to be secured through protecting existing and proposed road and rail alignments.”

The proposed site can aid the delivery of this strategy objective because it is adjacent to the Geraldton-Mount Magnet Road and the railway. It is close to and already well connected by road and by rail both to Mullewa and Geraldton Port.

Renewable energy

“The City is home to renewable energy facilities including the Alinta Wind Farm, Mumbida Wind Farm and Greenough River Solar Farm, which currently produce a combined 155MW of green power. This is a significant supply, as the Alinta Wind Farm currently produces electricity supply for an equivalent of 64,000 homes per year. Expansions of renewable energy facilities are also being contemplated, which could increase the number of wind 23 turbines in the area to 195 additional turbines creating a potential 750MW of green power and increase solar energy production to 40MW. The area has also been identified for potential geothermal energy sources, wave energy (which via desalination can also produce fresh water) and biomass. As recognised in the Greater Geraldton Economic Development Strategy (2013-2023), renewable energy projects are poised to take advantage of the solar, wind, wave, and geothermal resources available within the region.”

The proposed AVL plant will include the development of a solar energy facility, which will provide 35% of the energy requirements for the site. Other opportunities for renewable energy may be incorporated into the sit in future, including a possible Vanadium Redox battery.

Local Planning Scheme

Lots 40 and 41 are zoned Rural under LPS 1. The amendment is proposing to rezone a portion of the site for *General Industry*, which will be an appropriate zone for the proposed development.

The objectives of the General Industry zone are as follows:

General Industry zone Objective	Relevance
a) provide for a broad range of industrial, service and storage activities, which by the nature of their operations, should be isolated from residential and other sensitive land uses.	The proposed vanadium plant is an industrial use that is suited to the proposed zone.
b) provide for the aggregation of industrial, storage and distribution activities based on efficient use of infrastructure and synergies between uses.	This objective is not relevant to the proposed site, as it will facilitate the development of a vanadium plant only.
c) provide for appropriate buffer distances to avoid land use conflict.	Buffers will be incorporated to the cadastral boundaries of the site.
d) avoid the establishment of non-industry related uses which may constrain industrial activity, and that can be accommodated in other appropriate zones.	There are no non-industrial uses proposed.

The proposed vanadium plant falls within the definition of 'Industry' within the Local Planning Scheme. This definition states:

Industry means premises used for the manufacturing, dismantling, processing, assembly, treating, testing, servicing, maintenance or repairing of goods, products, articles, materials or substances and includes facilities on the premises used for any of the following purposes:

- (a) the storage of goods;*
- (b) the work of administration or accounting;*
- (c) the selling of goods by wholesale or retail;*
- (d) the provision of amenities for employees;*

Currently, the land use of 'Industry' is not permitted within the Rural zone. This amendment will, however, make the use a Permitted use. The amendment will not have any effect on surrounding lots or other land zoned Rural within the City's scheme.

Table 14 under clause 4.8.1 of the Scheme will add additional site-specific development requirements for the vanadium processing plant.

Upon completion of the amendment the City or a responsible authority such as the Commission, is able to assess a development application whereby the proposal should meet those requirements of the Table 14 as well as any development design and control requirements deemed necessary.

In terms of the discretion the Schedule confines the type of industry to a vanadium plant and any ancillary or associated uses. It is a clearly defined remit for the development to be assessed noting that initially it will be the SDAU making the determination with input from the City of Greater Geraldton. Ongoing development control of subsequent or additional development is likely to be the responsibility the City.

Local Planning Policies

There are no specific local planning policies which would specifically apply to the City consideration of this Scheme amendment proposal. For matters of a design and plant layout concern the City will be consulted by the SDAU as per usual development assessment processes, and certain Local Planning Policies will be referenced during that process.

4.0 OVERVIEW AND SUMMARY

The vanadium processing plant is proposed for the site based upon a detailed proponent-driven site selection process which examined prudent and feasible alternative sites. The proposed plant will be assessed for its environmental, planning and development suitability – this amendment forms part of this process.

The Scheme amendment proposes to rezone a portion of the site to *General Industry*, and will also add additional development requirements to Table 14 under clause 4.8.1 of LPS1 that are specific to this site. Justification for the amendment has been provided in this document, including consideration the site assessment process undertaken by AVL and how the proposal relates to the planning framework.

The likely economic return from this plant its construction and operation to the Geraldton region and the State and the local community is much greater than any loss of crop area for that portion of the site.

4.1. Summary

Benefits

- While the site is being rezoned to *General Industry*, it is located within a broader rural zone context and is surrounded by cropping uses. The proposed vanadium plant can be managed to be compatible to continued rural cropping use on adjacent land.
- The amendment will accommodate the vanadium plant to allow downstream processing of a mineral concentrate and to deliver added value to the regional economy.
- Tenindewa is a site well connected to Geraldton Port and Mullewa with a direct transport route between source, plant and port using options of road or possibly future rail transport.
- Ongoing employment for the operation of the plant can enhance the Mullewa townsite and its local economy and attract further investment.
- The employment during both the construction and operation stages of the facility will offer local people more diverse opportunities for work.
- Development of the plant and associated leading technology can deliver to Australia and other countries a more sustainable energy storage and use to meet global and local climate and greenhouse gas challenges.
- This investment may provide the catalyst to trigger the WA Government and the City to advance the regional and local planning framework to transform ideas into actions in respect to favour resolving regional industry and port development.

Management

- The EPA has considered the proposed development, and this proposed Scheme Amendment. Future DWER Works Approval and Licensing conditions will manage on-site risks and institute detailed monitoring and reporting of industrial impacts on natural systems from operations.
- WAPC Development Approval will consider management of traffic flow to moderate additional vehicle impacts through the provision of access points, landscape impact and sufficient site provision for all vehicles and plant-related logistics.
- The City via WAPC and DWER decisions may address landscape impacts and screening to mitigate visibility of the plant and associated operations on the rural landscape.
- Based on current modelling, all buffers will be contained within the property boundaries.

State, Regional and Local planning framework considerations

- The proposal is a one-off facility with its own locational requirements and does not require colocation with other industries.
- AVL has undertaken MCA appraisal of the proposal and site options before identifying the site at Tenindewa as the best site for the operation of the plant.
- The lack of a suitably zoned or located site has required AVL to undertake its own site selection study tailored for the vanadium processing plant which is justification for requesting this amendment.
- The local planning scheme DIA 9 identifies land east, location requirements generally align.
- The subject site is identified in AVL's MCA and Bankable Feasibility Study as ideal and best in the region for the plant development and operation.
- Once completed and operating the plant may provide impetus to deliver other aspects of the articulated State and local planning strategies.

Planning and Development Act 2005

RESOLUTION TO AMEND LOCAL PLANNING SCHEME

City of Greater Geraldton Local Planning Scheme No.1 – Amendment No.18

Resolved that the City of Greater Geraldton pursuant to section 75 of the *Planning and Development Act 2005*, amends the above Local Planning Scheme by

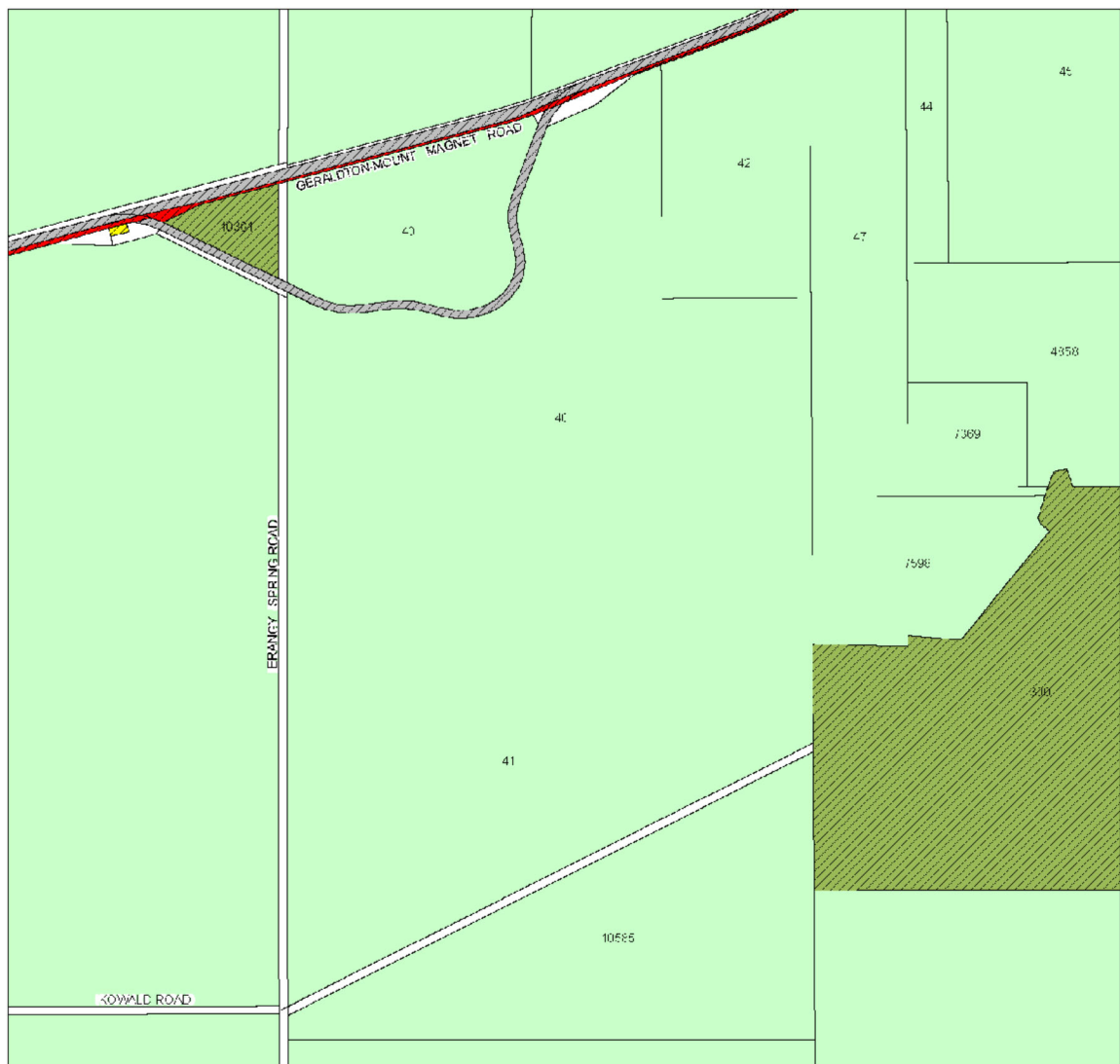
1. Under Clause 4.8.1 and in Table 14 of the Scheme Text inserting the following additional development requirements for the subject site

No.	Description of Land	Requirements
1	Portion of Lots 40 and 41 Geraldton – Mt Magnet Road, Tenindewa	<ol style="list-style-type: none"> 1. Industrial uses are to be generally restricted to the processing of vanadium and ancillary activities, including the plant operations, internal access roads, materials storage and laydown areas, evaporation ponds and any other ancillary structures. 2. The scale of development is to be consistent with that set out in the s38 Tenindewa Vanadium Processing Facility Proposal Content Document referred to the Environmental Protection Authority (published on the EPA website). 3. Additional industrial uses not listed in condition 1 may be contemplated within the development envelope of the vanadium processing plant and ancillary activities, however they will be subject to development approval and at the discretion of Council or other planning decision-maker. 4. In considering any future development proposals under condition 3, the decision-maker may refer any part of the proposal to the Environmental Protection Authority that has not been previously referred. 5. Prior to subdivision and/or development approval: <ol style="list-style-type: none"> d) Suitable arrangements for access, intersections and road upgrades are to be made; e) Suitable arrangements are to be made to take water required for the

No.	Description of Land	Requirements
		<p>land use; and</p> <p>f) Suitable arrangements are to be made regarding potential clearing of native vegetation.</p> <p>6. Other conditions may of development be determined by the local government or other planning decision-maker.</p>

2. Amending the Scheme Map to rezone the site as that portion of Lot 40 and 41 from the Rural to General Industry zone as shown in the attached plan.

AMENDMENT MAP



EXISTING SCHEME MAP

Legend

Cadastre with Lot number Railways

LPS Zones

Rural

LPS Reserves

Environmental conservation reserve

Local road

Primary distributor road

Public purposes



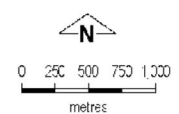
**Department of Planning,
Lands and Heritage**

City of Greater Geraldton

Local Planning Scheme No. 1

Amendment No. 18


Produced by Data Analytics
Department of Planning, Lands and Heritage, Perth WA
Base Information supplied by Western Australia
Land Information Authority by SLIP 180 2020 1





PROPOSED SCHEME AMENDMENT MAP

Legend

 Cadastre with Lot number

LPS Zones

 General industry



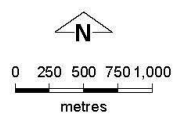
**Department of Planning,
Lands and Heritage**

Produced by Data Analytics,
Department of Planning, Lands and Heritage, Perth WA
Base Information supplied by Western Australian
Land Information Authority SLIP 1180-2020-1

City of Greater Geraldton

Local Planning Scheme No. 1

Amendment No. 18



COUNCIL ADOPTION

This Complex Amendment was adopted by resolution of the Council of the City of Greater Geraldton at the Ordinary Meeting of the Council held on the 26th day of April, 2023.

.....

MAYOR/SHIRE PRESIDENT

.....

CHIEF EXECUTIVE OFFICER

COUNCIL RESOLUTION TO ADVERTISE

City of Greater Geraldton at the Ordinary Meeting of the Council held on the 26th day of April, 2023, proceed to advertise this Amendment.

.....

MAYOR/SHIRE PRESIDENT

.....

CHIEF EXECUTIVE OFFICER

COUNCIL RECOMMENDATION

This Amendment is recommended for [approval/refusal] by resolution of the [City of Greater Geraldton] at the [NAME] Meeting of the Council held on the [number] day of [month], 20[year] and the Common Seal of the City of Greater Geraldton was hereunto affixed by the authority of a resolution of the Council in the presence of:

.....
MAYOR/SHIRE PRESIDENT

.....
CHIEF EXECUTIVE OFFICER

WAPC RECOMMENDATION FOR APPROVAL

.....
DELEGATED UNDER S.16 OF
THE P&D ACT 2005

DATE.....

APPROVAL GRANTED

.....
MINISTER FOR PLANNING

DATE.....

Appendix A

MCA Template

EXCERPT – Multi-Criteria Assessment of Tenindewa Site

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
Native flora and vegetation	Is there conservation significant flora, ecological communities or nature reserves within 500m of the site?						
Native terrestrial fauna	Is there significant habitat for native fauna within 500m of the site?						
Subterranean fauna	Will there be significant groundwater abstraction specific to the project and is there likely to be significant subterranean fauna near the groundwater abstraction location?						
Landforms	Is there an ecologically or socially significant landform that will be impacted by the project (e.g. unique, of scientific interest, important cultural values)?						
Terrestrial environmental quality	Is the proposed site, or land within 500m of the site, uniquely high value agricultural land?						

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
Inland waters - groundwater use	Will there be significant groundwater abstraction specific to the project and is there a sensitive groundwater receptor nearby to the groundwater abstraction area (e.g. significant flora, wetland, bores)?						
Inland waters - groundwater contamination	Is there a sensitive groundwater receptor within 500m of the site (e.g. drinking water source protection area, PEC for stygofauna, wetland, groundwater bore used for agricultural or domestic use)?						
Inland waters - surface water contamination	Is there a sensitive surface water receptor within 500m of the site (e.g. surface water body)?						
Inland waters - surface water flow	Is there a surface- water dependent receptor downstream of the site that is likely to be impacted by changes to surface water flow pathways (e.g. agricultural dam, wetland)?						

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
Air quality	<p>Are there sensitive human receptors within 500m to 3km of the proposed plant location?</p> <p>Sensitive receptor includes human residence but not areas with low intensity/incidental use (e.g. sheds). Employees of the mine are not considered sensitive receptors as this is managed under occupational health and safety regulations.</p>						
Social surroundings - noise and vibration	<p>Are there sensitive human receptors within 500m to 3km of the proposed plant location?</p> <p>Sensitive receptor includes human residence but not areas with low intensity/incidental use. Employees are not considered sensitive receptors as this is managed under occupational health and safety regulations.</p>						
Social surroundings - visual amenity	<p>Are there any residences with line-of-sight to the proposed plant location?</p>						

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
Social surroundings - light pollution	Are there any residences with line- of-sight to the proposed plant location?						
Heritage	Are there any non- developed areas that are likely to be culturally significant or contain Aboriginal artefacts?						
Native title	Are there any areas of non- Freehold land within the proposed site that are subject to Native Title claims?						
Native title	Are there any areas that are subject to Native Title claims that will be passed on entrance/exit to the site?						
Stakeholder acceptance	Is there resistance/opposition from local community within 1km, regardless of impacts?						
	Is there resistance/opposition from local community within 1-3km, regardless of impacts?						
	Is there resistance/opposition from local community within 3-10km, regardless of impacts?						
	State Government attitude and support for the site						

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
	Local Government attitude and support for the site						
	WAPC attitude and support for the site, including re-zoning						
	Main Roads WA attitude and support for the site						
	Will the project lead to socio-economic benefits to the local community (other than Geraldton)?						
Workforce	Will the workforce be stable through the economic cycle?						
	Does the site location support a non-FIFO workforce with a reasonable transport distance?						
Site condition	Ground conditions						
	Topography						
	Exposure to flooding						
	Exposure to fire risk						
	Existing infrastructure requiring removal or management (bores, electricity etc)						
	Ability to interface with farm						
Infrastructure	Gas available						
	Water available						
	Road Access						
	Rail line access						

Aspect	Question	Potentially Relevant Impacts (to or from the Project)	Assumptions, Basis of Assessment, Proposed Controls	Confidence	Consequence	Risk Rating	Possible Further Work or Additional Management Strategies
	Power available						

Appendix B

Certificates of Title

WESTERN



AUSTRALIA

TITLE NUMBER

Volume Folio

2216 19

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts
REGISTRAR OF TITLES



THIS IS A MULTI-LOT TITLE

LAND DESCRIPTION:

LOTS 40 & 41 ON DEPOSITED PLAN 28736

REGISTERED PROPRIETOR: (FIRST SCHEDULE)

WYALONG PASTORAL CO PTY LTD OF "STUDBROOK", TENINDEWA VIA GERALDTON
(A H872012) REGISTERED 20/11/2001

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS: (SECOND SCHEDULE)

1. K644327 MORTGAGE TO RABOBANK AUSTRALIA LTD REGISTERED 1/7/2008.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required.
Lot as described in the land description may be a lot or location.

-----END OF CERTIFICATE OF TITLE-----

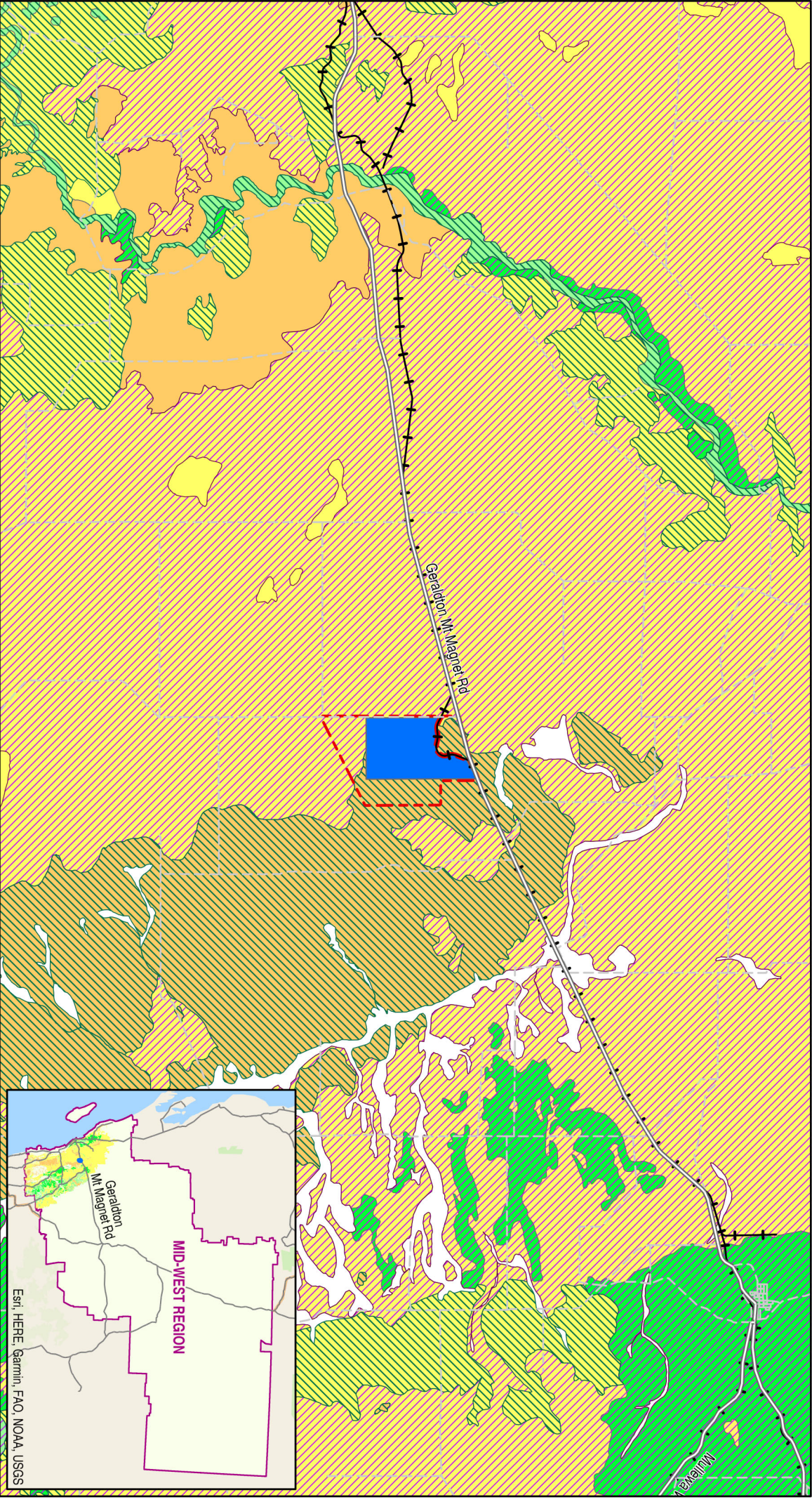
STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND: DP28736
PREVIOUS TITLE: 1352-391
PROPERTY STREET ADDRESS: NO STREET ADDRESS INFORMATION AVAILABLE.
LOCAL GOVERNMENT AUTHORITY: CITY OF GREATER GERALDTON

Appendix C

Agricultural Land Map



- Plant Area

Rail Line
- Site Location

Local Road
- State Road

- Grazing Land - Mid West Region

Cropping Land - Mid West Region
- A1

A2

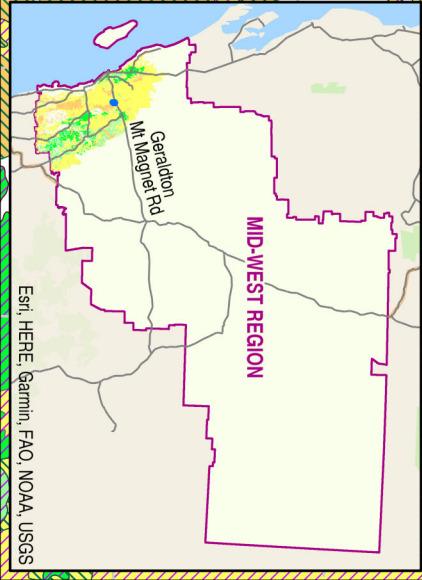
B1

B2
- A2

B1

B2

Percentage of Tenindeva site		
Land Type	Area (ha)	Area %
Tenindeva site	991.07	
Rural	7547862.43	0.013
Agricultural land	5265431.56	0.019
B1/B2 land	4497027.58	0.022



Esri, HERE, Garmin, FAO, NOAA, USGS



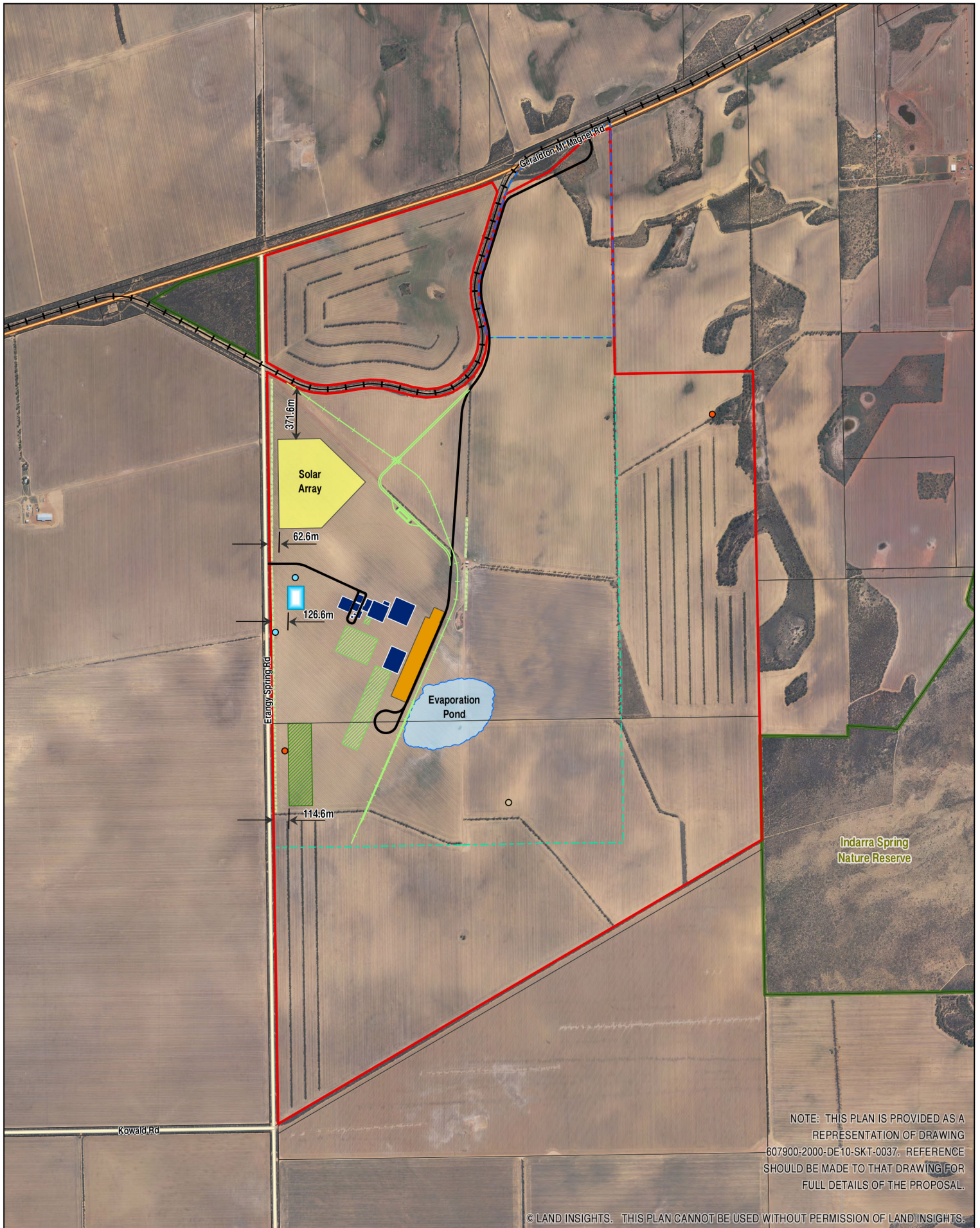
Kilometres

1:250,000 @ A4

Land Capability
TENINDEWA PLANT AREA

Appendix D

Site Layout Plan



- | | | | | | |
|---|---|--|---|---|-----------------------------|
| <ul style="list-style-type: none"> ○ Communication Tower ● Monitoring Bore ● Production Bore — State Road — Local Road | <ul style="list-style-type: none"> — Processing Plant Roads — Rail Line — Site Location — Cadastre — DBCA - Legislated Lands and Waters (DBCA-011) | <ul style="list-style-type: none"> Construction Camp Evaporation Pond Haul Road Development Envelope Leach Pad Processing Plant | <ul style="list-style-type: none"> Processing Plant Development Envelope Solar Array Stormwater Pond Treeline | Possible Future Development <ul style="list-style-type: none"> Future Road and Rail Future Processing Area | Base data provided by SLIP. |
|---|---|--|---|---|-----------------------------|

EIA Statement to support DA

TENINDEWA PROCESSING FACILITY

Environmental Impact Assessment
AP-0000-ENV-REP-00001

FINAL

December 2023



TENINDEWA PROCESSING FACILITY

Environmental Impact Assessment
AP-0000-ENV-REP-00001

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Australian Vanadium Limited

Project Director: Emma Molloy
Project Manager: Emma Molloy
Report No. 6183/R25/V3
Date: December 2023



This report was prepared using
Umwelt's ISO 9001 certified
Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

Disclaimer

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Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Emma Molloy	7 Dec 2021	Emma Molloy	7 Dec 2021
V2	Trevor Smith	10 Dec 2021	Emma Molloy	10 Dec 2021
V3	Trevor Smith	11 Dec 2023	Emma Molloy	12 Dec 2023

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1.0 Introduction

Australian Vanadium Limited (AVL) is an emerging vanadium producer focused on the Australian Vanadium Project (the Project) in Western Australia. Vanadium is mainly used to strengthen steel, with growing demand from the battery market. An Australian invention, the Vanadium Flow Battery (VFB) is set to play a vital role in the battery revolution. Vanadium's use in master alloys for defence and aerospace applications makes it a critical mineral.

AVL's strategy is underpinned by the steel market which has increasing demand for vanadium, whilst securing the long-term viability of the Project by delivering products to both the steel and battery markets. AVL's vision is to supply its high-grade product to battery makers worldwide, a market expected to grow significantly on the back of increased renewable energy generation. Through its 100% owned subsidiary, VSUN Energy, AVL is developing the VFB market in Australia.

AVL has completed a bankable feasibility study (BFS) for the Project. The BFS highlights AVL's potential to become a new, low-cost producer, with an initial mine life of 25 years. The location of the vanadium processing plant in Tenindewa would also facilitate processing of vanadium concentrate from other mines in the Mid-West region.

AVL and VSUN Energy are both members of the Future Battery Industries Cooperative Research Centre and are engaged with the WA Government Future Battery Industry Strategy and the Federal Government's Critical Minerals Facilitation Office.

The project was awarded Major Project Status by the Federal Government in September 2019 and Lead Agency Status by the State Government in April 2020. AVL intends to develop the following facilities:

- Mining Facility – mining and primary processing of the ore to produce vanadium concentrate. Mining operations will occur mainly within tenement M51/878 (granted on 28/08/2020) located within the Shire of Meekatharra. Additional tenements are currently under application to support the project.
- Processing Facility – processing of the vanadium concentrate from the mining operations to produce an iron-titanium co-product and a high purity vanadium pentoxide product. The proposed processing facility will be located on Lots 40 and 41 on Plan 28736 (7224 Geraldton - Mount Magnet Road) within the City of Greater Geraldton.
- Vanadium Electrolyte Manufacturing Facility – to undertake further downstream processing of high purity vanadium pentoxide to produce electrolyte for use in vanadium batteries. The manufacturing facility is under construction in Wangara, in the northern suburbs of Perth.

The vanadium concentrate will be transported to the Processing Facility via Local Government Roads and Main Roads.

The Mining Facility is currently under assessment by the Environmental Protection Authority (EPA) under Part IV of the *Environmental Protection Act 1986* (EP Act). Secondary environmental approvals for the Mining Facility will be sought in due course.

To allow for construction and operation of the Processing Facility, approval under the *Planning and Development Act 2005* (Planning Act) is required. Lots 40 and 41 are currently zoned as 'Rural' under the

City of Greater Geraldton Local Planning Scheme No. 1 (the scheme). Under the scheme, an area zoned as 'Rural' does not permit the use of the land for industrial purposes. Therefore, AVL has submitted a Development Application to the State Development and Assessment Unit (SDAU) concurrent with a scheme amendment application to City of Greater Geraldton (CoGG).

The Tenindewa Vanadium Processing Facility was referred to the WA EPA under section 38 of the EP Act in April 2022. The Chair of the EPA determined on 27 July 2022 not to assess the proposal, as the EPA considered that the likely environmental effects of the proposal were not so significant as to warrant formal assessment. The EPA concluded that the potential impacts of the proposed Processing Facility could be managed through the proposed management and mitigation measures and assessment by other statutory decision-making authorities under Part V of the *Environmental Protection Act 1986* and the *Rights in Water and Irrigation Act 1914*.

To support the Development Application, this environmental impact assessment has been undertaken to identify key environmental risks, mitigation strategies and expected environmental approvals pathways. The following sections have been presented in this report:

- **Section 2.0** provides an overview of the processing facility and type of infrastructure that will be constructed. Information in **Section 2.0** will assist in determining the key potential sources of pollution.
- **Section 3.0** describes the purpose and approach used to assess the risk of the project to the environment.
- **Section 4.0** presents the outcomes of the assessment and proposed controls.
- **Section 5.0** provides an overview of the environmental approvals pathway for the project.

The Processing Facility is expected to bring a positive impact to the local community via creation of job opportunities and by supporting local business in the area.

2.0 Processing Facility Overview

2.1 Location

The processing facility is near Tenindewa, a small rural locality of agricultural properties. The Tenindewa locality is approximately 80 km east of Geraldton and 27 km west of Mullewa on the Geraldton-Mount Magnet Road and lies within the City of Greater Geraldton (**Figure 1**).

The City of Greater Geraldton is also the regional service centre for the Mid-West region of Western Australia. It contains varied environments including fertile farmland, forests, rivers and coastal areas and is rich in indigenous and pioneering history. The region's economy is based on tourism, mining and agriculture as well as the Port of Geraldton, a major west coast port.

The processing location is on private land currently used for agricultural purposes. It is directly adjacent to Geraldton-Mount Magnet Road and is identified as Lot 40 and Lot 41 on Plan 28736. The Tenindewa railway siding is located at 1.5 km from the site's northern boundary and the nearest residence to the processing location is Smith's homestead (1.5 km west of Lot 40 boundary). No natural, historic, visual or recreational amenity values have been identified within the surrounding area.

AVL has an Option Agreement with the landowners which includes conditions relating to future purchase of the land for use by AVL. Access to the premises is via the Geraldton-Mount Magnet Road and Erangy Springs Road.

2.2 Proposal Description

The Processing Facility will include the following components:

- Two new access roads and internal roads.
- Materials storage and laydown areas.
- Processing plant.
- Power station, including solar component.
- Bores to source groundwater from the deep aquifer.
- Lined evaporation ponds.
- Temporary workers accommodation.
- Office and other support facilities.

The vanadium concentrate arriving at the processing site will either be directly tipped into the concentrate feed bins or into the concentrate stockpile which will be a designed facility for temporary storage until it is fed into the feed bins via a front-end loader. Handling of the concentrate will occur in the concentrate handling area and subsequent processing will involve the following activities:

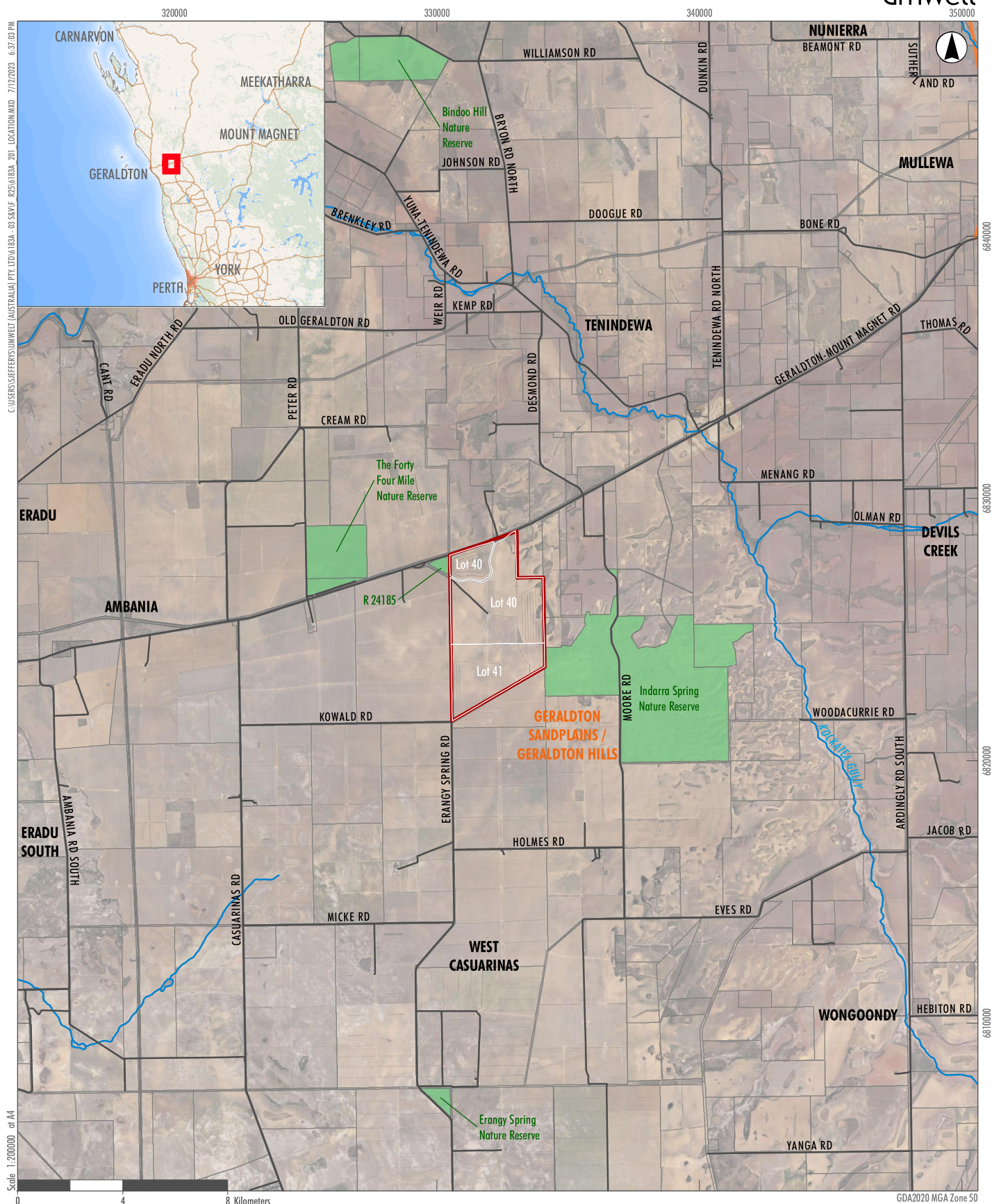
- Mixing & pelletising.

- Roasting.
- Leaching (generation of the iron-titanium co-product).
- Desilication.
- Precipitation.
- Barren solution treatment.
- Vanadium pentoxide production (generation of product – vanadium pentoxide solid flakes).

Figure 2 is a process flow diagram demonstrating the steps involved in processing of vanadium concentrate at the Processing Facility. The Processing Facility has a maximum steady state design capacity of 13,000 tonnes of V_2O_5 flake (98.5% w/w) per annum and approximately 1,050,000 tonnes of iron-titanium co-product. The vanadium pentoxide will be packaged for transport to Fremantle Port for export, and the iron-titanium co-product will be bulk transported and exported via Geraldton Port.

Raw inputs during processing are expected to include sodium carbonate, organic binder, flocculant, sulphuric acid, aluminium sulphate, ammonium sulphate, sodium metabisulphite and sodium hydroxide. All reagents will be stored in designated and suitably designed chemical storage areas. The process will also use raw water, and natural gas for direct combustion in the kiln and power generation. Renewable and hydrogen energy sources are expected to be included and increased as they become available and viable.

There will be air emissions from the processing plant, which will be mitigated via filters and scrubbers and other typical industrial processes to meet emissions limits and ensure there is no adverse impact to sensitive receptors and landowners. The only other waste from the process is barren solution, which will be treated to neutralise the pH and stored in lined ponds for evaporation. The residue will comprise salts, which may be a future product if a suitable market can be found.



- Legend**
- Project Area
 - Property Boundaries
 - IBRA Regions / Sub-regions
 - Nature Reserves
 - Roads
 - Watercourses

FIGURE 1

Processing Site Location

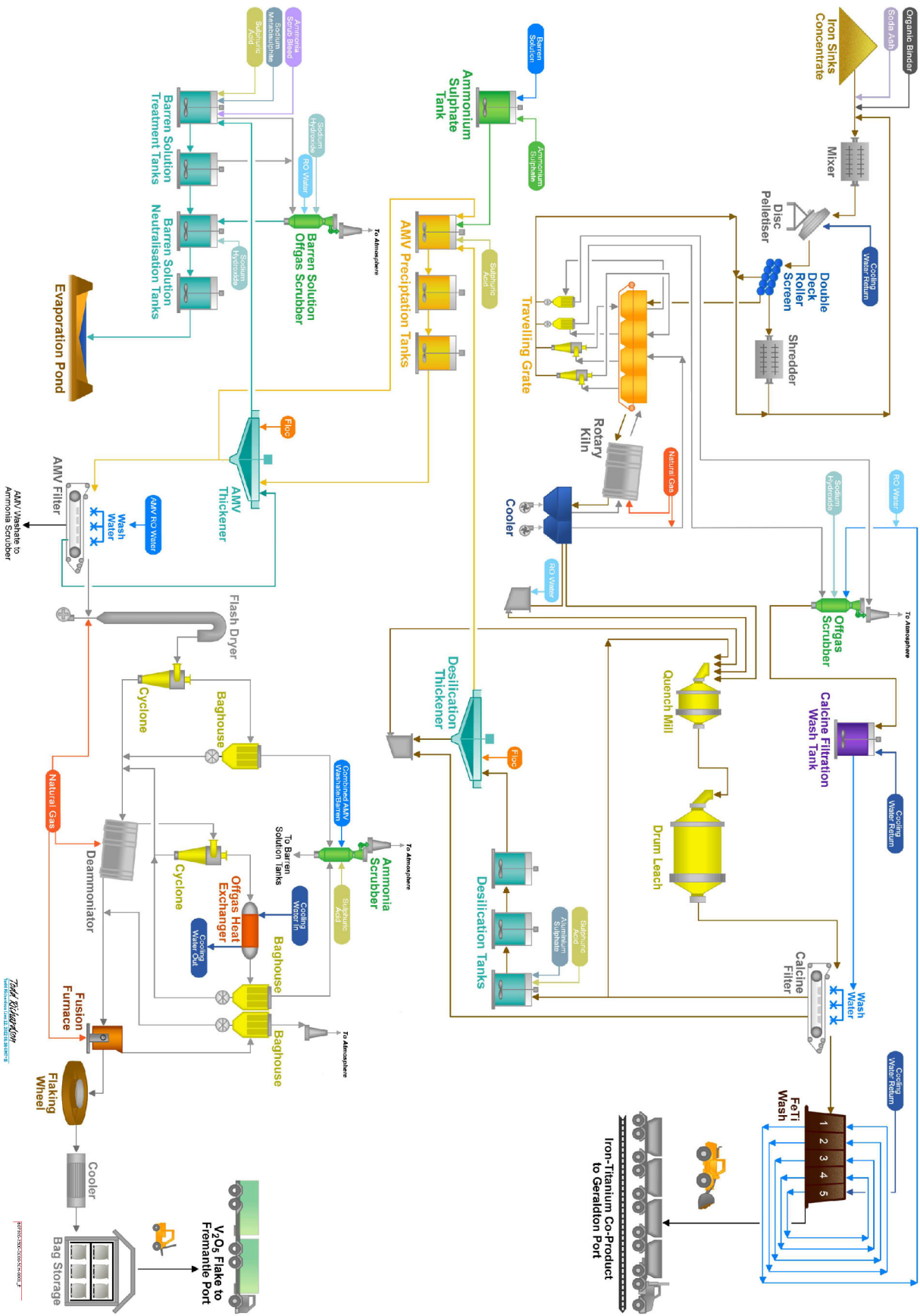


FIGURE 2
Processing Plant - Process Flow
Diagram

3.0 Preliminary EIA Approach

The preliminary environmental impact assessment (EIA) reviewed the proposed activities to determine potential environmental impacts, and identified environmental and social receptors that might be impacted. The purpose of the assessment was to understand potential environmental impacts, determine areas of focus for mitigation of the impacts and verify the environmental approvals pathway.

Sensitive receptors were determined by using the following guidance:

- EPA key environmental factors as defined under the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023).
- *Matters of National Environmental Significance - Significant impact guidelines 1.1* (DAWE, 2013).
- *DWER Guideline: Environmental Siting* (DWER, Guideline: Environmental siting, 2020).

Based on the preliminary environmental impact assessment, the Proposal is not expected to have a significant impact on the environment or any Matters of National Environmental Significance (MNES).

4.0 Environmental Impact Assessment

4.1 Flora and Vegetation

EPA Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a) has been used to address this section.

Receiving Environment

A field survey was undertaken in September 2022 to survey flora and vegetation in a Study Area encompassing native vegetation at the Processing Facility and nearby road reserves.

The results of the *Tenindewa Baseline Reconnaissance and Targeted Survey Report* (Umwelt, 2023) are summarised below and presented in **Figure 3**.

A total of 165 discrete vascular flora taxa were recorded in the Survey Area during this survey, representing 40 families and 99 genera. A total of seven introduced taxa and four planted taxa (native taxa but not indigenous to the area) were recorded within the Survey Area. No Declared Pests (as listed under the *Biosecurity and Agriculture Management Act 2007* (Department of Primary Industries and Regional Development 2022) or Weeds of National Significance (Weeds Australia 2022) were recorded.

One Threatened flora taxon (Federally and State listed) was recorded in the Survey Area, being *Caladenia wanosa* (T). This taxon was found in the central portion of Erangy Springs Road (**Sheet 2 of Figure 3**).

Eight State-listed Priority flora taxa were recorded in the Survey Area comprising *Tricoryne* sp. Geraldton (G.J. Keighery 10461) (P1), *Caladenia pluvialis* (P2), *Petrophile pilostyla* subsp. *syntoma* (P2), *Acacia leptospermoides* subsp. *psammophila* (P3), *Baeckea* sp. Walkaway (A.S. George 11249) (P3), *Thryptomene hubbardii* (P3), *Verticordia chrysostachys* var. *pallida* (P3) and *Verticordia capillaris* (P4). Most of the priority listed taxa were found within Erangy Springs Road reserve, Geraldton-Mt Magnet Road reserve, and remnant vegetation in the northeastern corner of Lot 40.

Two vegetation types were described and mapped within the Survey Area via structural vegetation classification. In addition, five highly modified areas were mapped in the Survey Area, which are vegetated to some extent but do not closely resemble intact remnant vegetation. These areas include non-indigenous and planted trees, potentially self-introduced trees from nearby plantings, some remnant native taxa and native disturbance specialists that have likely colonised the area post-disturbance. None of the vegetation described and mapped within the Survey Area is considered to be representative of any Threatened or Priority listed ecological community, nor considered to be significant for any other reason (as per the Environmental Protection Authority Technical Guidance and Factor Guideline).

The majority of the Survey Area (1,369.4 ha / 95.6 %) was cleared land consisting predominantly of paddocks with crops, pasture or agricultural weeds. A total of 63.5 ha (4.4 % of the Survey Area) was vegetated (including vegetation types and highly modified areas), with the condition ranging from Excellent to Completely Degraded. The vegetation condition of the vegetation types ranged from Excellent to Degraded, with vegetation impacted by edge effects, weeds and disturbance associated with farming, quarrying, and road or rail construction.

Potential Impacts

The Processing Facility will be sited on agricultural land that has been cleared of native vegetation, which minimises the amount of native vegetation clearing required.

Priority flora were found within Erangy Springs Road reserve, Geraldton-Mt Magnet Road reserve, and remnant vegetation in the northeastern corner of Lot 40. Establishment of site entry and exit points may require small amounts of native vegetation clearing, which might include clearing of Priority flora if they can't be avoided.

There is a risk of accidental clearing of protected flora if land disturbance occurs outside of planned areas. This risk is highest during construction activities.

There may be minor indirect impacts to native vegetation in the adjacent reserves, such as dust emissions.

Mitigation Measures

Disturbance of the one recorded location of Threatened Flora *Caladenia wanosa* will be avoided.

The final design of the site access roads will be adjusted where possible to avoid locations of Priority flora.

A native vegetation clearing permit will be obtained prior to clearing any native vegetation.

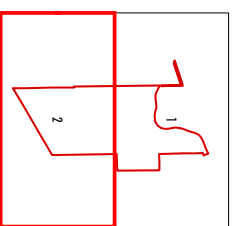
Management measures will be in place to prevent indirect impacts to the species such as dust suppression activities and clear demarcation of approved disturbance areas to prevent unauthorised clearing and disturbance. Controls to prevent indirect impacts are expected to be managed under the DWER Part V approvals and will include the following:

- an internal clearing permitting process
- an online GIS database with location of key species
- dust suppression as required during construction and operations to prevent excessive dust emission and deposition on nearby vegetation.



Scale 1:20000 at A3
0 400 800 Meters

- Legend**
- Survey Area
 - Railways
 - Roads
 - Drainage Lines
- Significant Flora**
- Umwelt**
- Alps *Acacia leptocarpoides* subsp. *assmannophila* (?)
 - BopW *Boeckera* sp. *Wakaway* (A.S. George 11249) (?)
 - Gpu *Goldfieldia plumbea* (?)
 - Cuo *Goldfieldia werneri* (?)
- DBCA Records**
- Pps *Pentaplia pilosella* subsp. *synnana* (?)
 - Thu *Thyridoptera hubbardi* (?)
 - Isag *Tricoryne* sp. *Gardiner* (G.I. Knight 10461) (?)
 - Vcop *Verticordia capitata* (?)
 - Vch *Verticordia chrysostachys* (var. *uncertain*)
 - Vhp *Verticordia chrysostachys* var. *pallida* (?)
 - Vhp *Verticordia chrysostachys* var. *pallida* (?)
- Other Flora**
- Vch *Verticordia chrysostachys* var. *chrysostachys* - Umwelt
 - Vch *Verticordia chrysostachys* var. *chrysostachys* - DBCA



Significant Flora of the Survey Area

FIGURE 3

4.2 Terrestrial Fauna

EPA Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016f) has been used to address this section. Terrestrial fauna can be defined as all vertebrates and invertebrates that live on land.

Receiving Environment

To identify presence of conservation significant fauna under the *Biodiversity Conservation Act 2016* (BC Act), a DBCA fauna search was requested. The Protected Matters Search Tool (PMST) was also used to identify presence of any Commonwealth-protected fauna species as listed under the EPBC Act. Summary of findings have been presented in **Table 4.1**.

The DBCA search identified 28 birds, 3 invertebrates and 4 reptile conservation significant fauna species that have previously been recorded within 60 km of the Processing Facility. The closest significant species recorded, Yuna broad-blazed slider (*Lerista yuna*), listed as Priority 3 under the BC Act, has been recorded 8 km east of the Processing Facility.

The PMST search tool identified 6 birds, 1 invertebrate and 1 mammal conservation-significant species that may potentially occur within the project boundary. However, none of these species have been previously recorded within the project boundary.

Table 4.1 Conservation Significant Terrestrial Fauna from Database Searches

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of presence	Nearest Record
Birds					
<i>Actitis hypoleucos</i>	Common sandpiper	MI	MI		50 km (DBCA)
<i>Apus pacificus</i>	Fork-tailed swift	MI	MI		50 km (DBCA)
<i>Arenaria interpres</i>	Ruddy turnstone	MI	MI		60 km (DBCA)
<i>Calidris acuminata</i>	Sharp-tailed sandpiper	MI	MI		55 km (DBCA)
<i>Calidris alba</i>	Sanderling	MI	MI		60 km (DBCA)
<i>Calidris ferruginea</i>	Curlew sandpiper	CR	CR	May occur	35 km (DBCA)
<i>Calidris melanotos</i>	Pectoral sandpiper	MI	MI		20 km (DBCA)
<i>Calidris ruficollis</i>	Red-necked stint	MI	MI		60 km (DBCA)
<i>Calyptorhynchus banksii</i>	Forest red-tailed black cockatoo	VU	VU		30 km (DBCA)
<i>Charadrius leschenaultii</i>	Greater sand plover	VU	MI		50 km (DBCA)
<i>Elanus scriptus</i>	Letter-winged kite	P4			30 km (DBCA)
<i>Falco hypoleucos</i>	Gray falcon	VU	VU	May occur	
<i>Falco peregrinus</i>	Peregrine falcon	OS			30 km (DBCA)
<i>Hydroprogne caspia</i>	Caspian tern	MI	MI		60 km (DBCA)
<i>Leipoa ocellata</i>	Malleefowl	VU	VU	Likely to occur	25 km (DBCA)
<i>Limosa lapponica</i>	Bar-tailed godwit	MI	MI		55 km (DBCA)

Scientific Name	Common Name	BC Act	EPBC Act	Likelihood of presence	Nearest Record
<i>Macronectes giganteus</i>	Southern giant petrel	MI	EN		60 km (DBCA)
<i>Oxyura australis</i>	Blue-billed duck	P4			25 km (DBCA)
<i>Pandion cristatus</i>	Osprey	MI	MI		30 km (DBCA)
<i>Pezoporus occidentalis</i>	Night parrot	EN	CR	May occur	
<i>Plegadis falcinellus</i>	Glossy ibis	MI	MI		20 km (DBCA)
<i>Pluvialis squatarola</i>	Grey plover	MI	MI		60 km (DBCA)
<i>Rostratula australis</i>	Australian painted-snipe	EN	EN	May occur	
<i>Sternula nereis nereis</i>	Fairy tern	VU	VU		30 km (DBCA)
<i>Thalasseus bergii</i>	Crested tern	MI	MI		30 km (DBCA)
<i>Thinornis rubricollis</i>	Hooded plover	P4			60 km (DBCA)
<i>Tringa brevipes</i>	Grey-tailed tattler	P4	MI		50 km (DBCA)
<i>Tringa glareola</i>	Wood sandpiper	MI	MI		50 km (DBCA)
<i>Tringa nebularia</i>	Common greenshank	MI	MI		50 km (DBCA)
<i>Zanda latirostris</i>	Carnaby's cockatoo	EN	EN	Likely to occur	10 km (DBCA)
<i>Zanda sp. 'white-tailed black cockatoo'</i>	White-tailed black cockatoo	EN	EN		10 km (DBCA)
Invertebrates					
<i>Idiosoma arenaceum</i>	Geraldton Sandplain shield-backed trapdoor spider	P3			35 km (DBCA)
<i>Idiosoma clypeatum</i>	Northern shield-backed trapdoor spider	P3			35 km (DBCA)
<i>Idiosoma nigrum</i>	Shield-backed trapdoor spider	EN	VU	May occur	
<i>Idiosoma sp.</i>	An Idiosoma trapdoor spider	EN			15 km (DBCA)
Reptiles					
<i>Lerista yuna</i>	Yuna broad-blazed slider	P3			8 km (DBCA)
<i>Aspidites ramsayi</i> (southwest subpop.)	Woma (southwest subpop.)	P1			20 km (DBCA)
<i>Cyclodomorphus branchialis</i>	Gilled slender blue-tongue	VU			25 km (DBCA)
<i>Egernia stokesii badia</i>	western spiny-tailed skink	VU			25 km (DBCA)
Mammals					
<i>Dasyurus geoffroii</i>	Chuditch	VU	VU	May occur	

*Conservation status P1=Priority 1; P3=Priority 3; P4=Priority 4; T=Threatened; EN=Endangered; VU=Vulnerable; CR=Critically Endangered; MI=Migratory; OS=Otherwise Specially Protected

Potential Impacts

No direct impacts to conservation significant fauna are expected. The proposed development footprint falls in a largely cleared area and limited vegetation clearing would be required to support the project. However, fauna may be subject to indirect impacts including:

- Vehicle strikes on main roads and access roads from traffic movement.
- Noise and vibration leading to fauna migration away from the project area into non suitable habitats and predation zones.
- Fauna death by drowning in hazardous waste containment ponds.
- Light emissions from operations impacting nocturnal fauna.

Mitigation Measures

Indirect impacts to fauna will be mitigated and assessed under Part V of the EP Act.

4.3 Subterranean Fauna

EPA Environmental Factor Guideline: Subterranean Fauna (EPA, 2016d) has been used to address this section. Subterranean fauna can be classified as two groups, stygofauna which is capable of living in aquatic environments and predominantly found in groundwater and troglodfauna which is an air-breathing species predominantly found in caves and voids.

Receiving Environment

There is a superficial low salinity aquifer hosted in the Wagina Sandstone occurring at approximately 20 m below ground level. This is expected to be used by local farmers. There may be potential habitat for stygofauna in this aquifer.

The superficial aquifer is isolated from the deep High Cliff aquifer by a clay aquitard. The deep aquifer occurs at a depth of over 200 m below ground level. There is a low likelihood of stygofauna being present at such a depth.

Potential Impacts

There will be no direct impacts to subterranean fauna. No major excavational works or mining activities will occur within the project area.

Although groundwater abstraction will occur, the water source for this project is the deep aquifer, at a depth of over 200 m below ground level. The proposed groundwater abstraction from the deep aquifer is not expected to impact on the superficial aquifer. Therefore, any groundwater drawdown will be below a depth that could provide suitable habitat for stygofauna.

4.4 Inland Waters – Surface Water

EPA Environmental Factor Guideline: Inland Waters (EPA, 2018b) has been used to address this section. Surface water includes wetlands, waterways, estuaries, lakes, rivers.

Receiving Environment

A desktop assessment was undertaken to understand the surface water context of the area. Findings have been summarised below:

- Ramsar sites – Ramsar site are wetlands that are internationally recognised through the Ramsar Convention and protected by the Australian government. The DBCA dataset-010 (Ramsar Sites) (DataWA, 2021) was used to determine the presence of any sites near the project area. No Ramsar Sites were identified.
- Important wetlands – Important wetlands are classified as nationally significant wetlands and are listed under the “Directory of Important Wetlands in Australia”. The DBCA-0415 (Directory of Important Wetlands in Australia – Western Australia) dataset (DataWA, 2021) was used to determine the presence of any important wetlands and no important wetlands were identified.
- As per the DWER Hydrography Linear (Hierarchy) DWER-031 dataset, the following water bodies are located near the project area (DataWA, 2021):
 - Kockatoa Gully which is a minor river is located at 7.8 km directly east of the project boundary.
 - Greenough river which is a mainstream is located at 16.7 km north-west of project boundary.
 - There is an unnamed minor tributary located at 8.9 km south-west of the project boundary.
- The project area is located within the Greenough River basin catchment area (DWER-027 dataset) and Greenough River, Tributaries and Catchment sub catchment area (DWER-030 dataset) within the Indian ocean division (DWER-029 dataset) (DataWA, 2021).

The main receiving environment comprise the rivers/tributaries and nature reserves surrounding the project area. **Figure 1** provides the location of the nearby water bodies.

Potential Impacts

Impacts to the Greenough River and Tributaries Catchment Area can possibly occur if waste containment infrastructure fails or bunds are over-topped. This could occur during large rainfall and flooding events or due to poorly designed, constructed or maintained infrastructure. This potential impact is assessed in **Section 4.6 Terrestrial Environmental Quality**.

Mitigation Measures

AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant and hazardous material storage facilities. The design, construction, commissioning and operations of the processing plant and associated facilities that may discharge or emit materials to the environment will be regulated by DWER under Part V of the EP Act.

Further mitigation measures are described in **Section 4.6 Terrestrial Environmental Quality**.

4.5 Inland Waters – Groundwater

EPA Environmental Factor Guideline: Inland Waters (EPA, 2018b) has been used to address this section. Groundwater which includes confined and unconfined aquifers.

Receiving Environment

A desktop assessment was undertaken to understand the groundwater context of the area. Findings are summarised below:

- As per the DWER-083 WRIMS Groundwater Subareas dataset (DataWA, 2021), the project area is located within the Gascoyne groundwater area and Casuarina and Yuna/Eradu subareas.
- As per the DWER-033 Public Drinking Water Source Areas dataset (DataWA, 2021), the project is not located within any public drinking water source areas.
- Private bores are present within and surrounding the project area. Limited information is available as no sampling has been undertaken thus far but DWER's Water Reporting Portal shows private bores have been installed to a maximum depth of 21.3 m below ground level (mbgl) (DWER, 2021a).
- A hydrogeological investigation was undertaken by Rockwater in 2021, which informed preparation of the *Bore Completion Report and H2 Level Hydrogeological Assessment* (Rockwater, 2022). Based on investigations carried out by Rockwater, there is a shallow low salinity aquifer hosted in the Wagina Sandstone occurring at approximately 20 m below ground level. There is also a deep aquifer hosted in the High Cliff Formation occurring at a depth of over 200 m below ground level. The groundwater quality of the deep aquifer was sampled in September 2021, and was brackish (6,850 mg/L total dissolved solids). The shallow aquifer is isolated from the deep aquifer by a clay aquitard that is over 30 m thick.
- The shallow aquifer is expected to be used by local farmers. The deep aquifer is the proposed water source for AVL.

Potential Impacts

Potential impacts to groundwater include:

- Change in groundwater quality could occur if waste containment infrastructure fails or bunds are overtopped. This could occur during large rainfall and flooding events or due to poorly designed, constructed or maintained infrastructure. This potential impact is assessed in **Section 4.6 Terrestrial Environmental Quality**.
- Decrease/drawdown of groundwater levels could occur from groundwater abstraction. The proposed groundwater abstraction could draw down groundwater levels in the deep aquifer.

Mitigation Measures

AVL was issued a Licence to Take Groundwater (GWL 208955(1)) in July 2023, for abstraction of up to 1.2 GL of groundwater from the deep aquifer. Abstraction of groundwater will be managed in accordance with the approved *Water Resource Operating Strategy GWL208955(1)* (Australian Vanadium Limited, 2023), which includes monitoring and reporting of groundwater use, water levels and water quality.

AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant and hazardous material storage facilities. The design, construction, commissioning and operations of the processing plant and associated facilities that may discharge or emit materials to the environment will be regulated by DWER under Part V of the EP Act.

Further mitigation measures are described in **Section 4.6 Terrestrial Environmental Quality**.

4.6 Terrestrial Environmental Quality

EPA Environmental Factor Guideline: Terrestrial Environmental Quality (EPA, 2016e) has been used to address this section. Terrestrial environmental quality can be defined as the chemical, physical, biological and aesthetic characteristics of soils.

Receiving Environment

The proposed site has a long history of agricultural use (crops such as wheat and canola) and the soil in the area is suitable for agriculture. No soil sampling has been undertaken to date to investigate soil characteristics in the area. To further understand the soil characteristics in the area, the following searches were undertaken:

- DWER-059 (Contaminated Sites Database) dataset was checked for the presence of any contaminated sites within 3 km of the proposal area (DataWA, 2021). No contaminated sites were identified.
- DWER-048 (Acid Sulphate Soil Risk Map 100K) dataset was assessed to determine the presence of any Acid Sulphate soil risks in the area (DataWA, 2021). No risk for Acid Sulphate Soils was identified.
- The Natural Resource Information (WA) online database provided the following context (DPIRD, 2021):
 - The area comprises the Binnu East Subsystem 4 (soil landscape map unit 227Be_4) and the Eradu 1 subsystem (soil landscape map unit 220Er_1).
 - The soil landscape mapping shows that the area is characterised by:
 - level to gently sandplains and relict hardpan wash plains on Permian and Carboniferous sedimentary rocks of the Perth Basin
 - yellow deep sands, red-brown hardpan shallow loams, yellow sandy earths, red sandy earths, deep, yellow siliceous clayey sands and pale sands over ferruginous gravel.
 - Both soil units have a high to extreme hazard potential for wind erosion.
 - Both soil units show no potential for water erosion hazards.
 - The soils show low salinity and alkalinity at surface. Soil unit 227Be_4 shows potential for acidity at surface but no potential for acidity at subsurface. Both soil units show no potential for alkalinity at subsurface.

Potential Impacts

Construction and operational activities may potentially impact the soil quality within the proposal area. At the end of the operations, the use of the soil within the proposal area for agricultural purposes may not be viable without mitigation measures. Social and economic impacts from changes of the current land use and impacts to agricultural productivity are discussed in the Social Surroundings environmental factor.

The feasible impacts to terrestrial environmental quality are grouped into impacts to topsoil revegetation quality, and potential discharge of contaminants.

Potential impacts to topsoil quality and revegetation include:

- Poor topsoil stripping and handling practices during construction phase leading to insufficient material for rehabilitating the area.
- Poor weed management hygiene on the site leading to introduction of invasive species.
- Loss of soil during windy days due to soil characteristics demonstrating high to extreme potential for wind erosion.

Potential impacts from discharge of contaminants:

Proposal activities will use, handle and store materials which, if discharged into the environment, have the potential to adversely impact terrestrial environmental quality, as well as other environmental values.

Table 4.2 lists the potential contamination sources, and the pathways by which these contaminants might impact soils. **Table 4.2** also lists the soil receptor locations and the other environmental values that might be reasonably impacted.

Table 4.2 Potential Contaminants, Contamination Pathways and Soil-Related Receptors

Contamination Source	Potential Contamination Pathway	Potential Receptor
Hydrocarbons stored in appropriately designed facilities and used in plant and vehicles	Leak, spill or failure leading to hydrocarbon discharge from storage facility, vehicle, plant or workshop	<ul style="list-style-type: none"> • Plant area or other cleared disturbed area – no topsoil • If not cleaned up, may impact on shallow groundwater or surface water
Reagents stored in appropriately designed facilities and used in the processing plant	Leak, spill, overtopping or failure leading to reagent discharge from storage facility, pipeline or plant facility	<ul style="list-style-type: none"> • Plant area or other cleared disturbed area – no topsoil • If not cleaned up, may impact on shallow groundwater or surface water
Concentrate stored in stockpiles	Leaching from stockpile Water erosion/runoff from stockpile Wind erosion from stockpile	<ul style="list-style-type: none"> • Leaching into shallow groundwater • Transport by surface water to undisturbed areas including topsoil • Transport by wind to undisturbed areas including topsoil and adjacent land
Intermediate liquids formed as part of processing stored in appropriately designed facilities and used in the plant	Leak, spill, overtopping or failure leading to intermediate liquid discharge from storage facility, pipeline or plant facility	<ul style="list-style-type: none"> • Plant area or other cleared disturbed area – no topsoil • If not cleaned up, may impact on shallow groundwater or surface water

Contamination Source	Potential Contamination Pathway	Potential Receptor
Calcine solids stored in appropriately designed facility, washed to leach out further vanadium-rich solution	Leak, spill, overtopping or failure leading to discharge of wash water or leachate from storage facility Water erosion/runoff from stockpile Wind erosion from stockpile	<ul style="list-style-type: none"> Leaching into shallow groundwater Transport by surface water to undisturbed areas including topsoil Transport by wind to undisturbed areas including topsoil and adjacent land
Emissions to air from processing plant	Particulate emissions from flash dryer, de-ammoniator or fusion furnace (gaseous emissions are considered in Air Emissions section)	<ul style="list-style-type: none"> Transport by wind to undisturbed areas including topsoil and adjacent land
Vanadium pentoxide product	No pathways identified, solid metallic material packaged for transport.	<ul style="list-style-type: none"> Not applicable
Iron-titanium product	Leak, spill or failure leading to discharge from storage facility Water erosion/runoff from stockpile Wind erosion from stockpile	<ul style="list-style-type: none"> Leaching into shallow groundwater Transport by surface water to undisturbed areas including topsoil Transport by wind to undisturbed areas including topsoil and adjacent land
Final waste liquids treated to reduce toxicity (neutralised barren solution), evaporated in appropriately designed facilities	Leak, spill or failure leading to discharge from plant facility, pipeline or storage facility	<ul style="list-style-type: none"> Plant area or other cleared disturbed area – no topsoil In the event of a large discharge or failure, may impact on adjacent land If not cleaned up, may impact on shallow groundwater or surface water
Residual salts remaining from evaporation of neutralised barren solution, stored in appropriately designed facilities	Residual salts may be permanently retained in a lined encapsulated storage facility on site after closure of the processing plant.	<p>Future land uses would be restricted in the area immediately above and surrounding the storage facility to prevent damage to the encapsulation. This may reduce economic value of the land and ability to use it for agriculture.</p> <p>Alternatively, the residual salts may be removed and the entire processing area remediated.</p>

The environmental values that may feasibly be impacted by discharge of contaminants are topsoil quality, groundwater quality and surface water quality, and associated water-dependent environmental values.

Mitigation Measures

Risks to terrestrial environmental quality and associated management controls will be assessed and managed as part of the Works Approval and Operating Licence application through DWER Industry Regulation, under Part V of the EP Act (see **Section 5.0**).

The following measures will be implemented during detailed design, construction and operations to minimise potential impacts to terrestrial environmental quality:

Mitigation of impacts to topsoil quality and revegetation:

- Topsoil from areas proposed for disturbance will be stripped and stored for use in rehabilitation.
- Appropriate measures will be taken to maintain the viability and quantity of topsoil, these may include:
 - Stripping topsoil as soon as possible following vegetation clearing.
 - Avoiding stripping and handling of soil during windy or wet conditions.
 - Covering soil stockpiles with stripped vegetation.
 - Limiting the height of stockpiles to 2 m.
 - Using only water of acceptable salinity for dust suppression on topsoil stockpiles.
 - Considering the use of dust suppression surfactants for long-term soil stockpiles.
 - Locating stockpiles in flood-free areas which are also sheltered from wind exposure and have sufficient separation distance from unsealed roads to minimise the risk of saline water spray accumulating on stored topsoil.
- Processes for management of weeds will be determined in consultation with adjacent landowners, and may include:
 - Weed and seed checks of vehicles prior to entering site during topsoil stripping.
 - Regular weed surveys and control measures as required.

Mitigation of impacts from discharge of contaminants:

- Storage, handling, reporting, monitoring and clean-up of reagents, hydrocarbons and other pollutants will be undertaken in accordance with standard safety management practices and regulatory requirements including the *Work Health and Safety Act 2020*, *Dangerous Goods Safety Act 2004* and EP Act Part V (Industry Regulation).
- Spills will be recorded and cleaned up as soon as practicable to mitigate ongoing pollution.
- Concentrate, intermediate products and final products will be further characterised including assessment of physical properties and risk of metalliferous drainage.
- All environmentally hazardous materials will be stored and transported through the process site in facilities designed in accordance with relevant guidelines such as *Water quality protection note no. 61 – tanks for ground level chemical storage* (Department of Water, 2008), *Water quality protection note no.*

26 - Liners for containing pollutants, using synthetic membranes (Department of Water, 2013), *Water quality protection note no. 65 – Toxic and hazardous substances storage and use* (Department of Water, 2006) or other appropriate guideline. These requirements include use of chemically-resistance containers, suitable bunding and secondary containment, and separation of clean stormwater.

- Waste containment infrastructure will be designed, constructed and operated to manage the risk of flooding or overtopping. Regular visual inspections of waste containment infrastructure will be undertaken to ensure freeboard level and structural integrity are maintained.
- Groundwater monitoring bores will be installed and regular monitoring undertaken of ambient groundwater quality in the shallow aquifer, to detect any adverse impacts on groundwater quality from unknown leaks or other sources.
- Options for final disposal of residual salts will be explored prior to closure of the Processing Facility, and include:
 - AVL will seek opportunities for recovery and sale of salts that may become technically or financially viable over time.
 - Excavation and removal of salts from the lined facilities and disposal to an approved off-site location.
 - Encapsulation of residual salts in an enclosed permanent storage facility on site, which would restrict possible future land uses over the area where the salts are stored to prevent damage to the encapsulation.
- The method of final disposal of residual salts will be agreed with relevant stakeholders (including local landowners, local government authority and relevant regulators) prior to closure of the processing plant.
- At the time of closure, the processing plant will be decommissioning, deconstructed and removed from site for appropriate disposal or resale if possible. Any residual contamination will be remediated for a final land use agreed with relevant stakeholders prior to closure.
- Concentrate storage and processing area to be equipped with engineering controls to prevent dust emissions.
- Concentrate transport to be undertaken in tarped trucks to prevent emission of concentrate to the environment and prevent soil contamination due to deposition of the concentrate on the soil.

AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant and hazardous material storage facilities. The design, construction, commissioning and operations of the processing plant and associated facilities that may discharge or emit materials to the environment will be regulated by DWER under Part V of the EP Act.

4.7 Air Quality

The *EPA Environmental Factor Guideline: Air Quality* (EPA, 2020) defines air quality as the chemical, biological and aesthetic characteristics of air. Human health impacts are generally associated with emissions of particulates and pollutants.

Receiving Environment

The homesteads closest to the boundary of Lot 40, which will host the Processing Facility, are located:

- 1.5 km west of Lot 40
- 1.7 km north of Lot 40
- 2.0 km northeast of Lot 40.

Climate records for Mullewa indicate the regional prevailing wind direction in the morning is from the east-southeast with afternoon winds coming from the southwest (Bureau of Meteorology, 2020).

All the nearest neighbouring homesteads might be in the direction of the prevailing winds at times.

Potential Impacts

An air quality assessment was undertaken to model the predicted air emissions and dispersion from the Processing Facility. The *Tenindewa Project Air Quality Assessment Report* (Environmental Technologies & Analytics, 2023) used predicted emission rates and operating parameters to model emissions from the Processing Facility including material handling. The air pollutants relevant to the Processing Facility are particulate matter (dust), nitrogen dioxide, ammonia, sulphuric acid, and vanadium.

The modelling and analysis were undertaken in accordance with:

- *Air Quality Monitoring Guidance Notes* (DoE, 2006)
- *Guideline – Air Emissions, draft* (DWER, 2019)
- *Guideline – Dust Emissions, draft* (DWER, 2021)
- National Environmental Protection (Ambient Air Quality) Measure.

The predicted ground-level concentrations of pollutants and background air quality were compared to the ambient air quality assessment criteria, in accordance with the above guidelines.

The air quality assessment determined that the predicted air emissions associated with the Processing Facility would remain below the relevant ambient air quality assessment criteria at all homesteads, and at the boundary of Lots 40 and 41 (**Table 4.3**).

Predicted annual average PM_{2.5} (fine particulate matter) is above the air quality assessment criteria as the background concentration exceeds the assessment criteria. The Processing Facility contributes a very small component of PM_{2.5} emissions.

Table 4.3 Predicted Air Emissions at the Processing Facility

Pollutant	Ambient Air Quality Assessment Criteria			Maximum Off-site Emissions at Lots 40 & 41 Boundary	
	µg/m ³	Averaging period	Reference	Processing Facility only	Including Background
Nitrogen dioxide (NO ₂)	151	1-hour	(DWER, 2019)	1.8	15.0
	28	Annual	(DWER, 2019)	<0.1	13.3
Dust (PM ₁₀)	46	24-hour	(DWER, 2019)	6.2	30.5
	23	Annual	(DWER, 2019)	0.3	21.2
Dust (PM _{2.5})	23	24-hour	(DWER, 2019)	1.07	10.3
	7	Annual	(DWER, 2019)	0.04	8.0
Dust (TSP, total suspended particulates)	82	24-hour	(DWER, 2019)	9.3	57.9
Dust deposition	4 g/m ² /month	Maximum	(DWER, 2021)	0.03	Not available
	2 g/m ² /month	Above background	(DWER, 2021)	0.03	Not available
Sulfuric acid (H ₂ SO ₄)	18	1-hour	(DWER, 2019)	7.1	Not available
Ammonia (NH ₃)	330	1-hour	(DWER, 2019)	6.4	Not available
Vanadium (V)	0.92	24-hour	(DWER, 2019)	0.03	Not available

Mitigation Measures

The stack heights and gas and dust scrubbing and filtration systems at the processing plant facility have been designed to meet relevant air quality guidelines. Continuous Emission Monitoring Systems (CEMS) will be installed on relevant stacks for real time sampling and measurement of gas and particulate emissions.

AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant. The design, construction, commissioning and operations of air emissions from the processing plant will be regulated by DWER under Part V of the EP Act.

4.8 Greenhouse Gas Emissions

Receiving Environment

The emission of greenhouse gases in one location contributes to the cumulative quantity of greenhouse gases in the global atmosphere. The receiving environment of greenhouse gas emissions is therefore the global atmosphere, although the scope of the EPA's obligations is the State of Western Australia.

The receiving environmental context is the emissions and policies relating to greenhouse gas management at the federal and state level.

The Western Australian *Greenhouse Gas Emissions Policy for Major Projects* (Government of Western Australia, 2019) adopted an aspirational target of net zero greenhouse gas emissions by 2050 and committed to working with the Commonwealth to achieve the targeted reductions under the Paris Agreement. The *Western Australia Climate Policy* (Government of Western Australia, 2020) commits to actions to achieve the target of net zero emissions by 2050. The policy also recognises that reduction of greenhouse gas emissions must occur to mitigate potential impacts from climate change including extreme weather events, rising sea levels, changes to climate and loss of habitats.

The State *Greenhouse Gas Emissions Policy for Major Projects* is intended to apply to new significant proposals that meet the criteria of a designated large facility under the Australian Government's Safeguard Mechanism. As the mine site and process site are different industry sectors and are located more than 400 km apart, they are two separate facilities for the purpose of GHG reporting under the Safeguard Mechanism.

The EPA *Environmental Factor Guideline for Greenhouse Gas Emissions* states that proposals which expect to emit more than 100,000 tpa CO₂-e of Scope 1 emissions as a direct result of activities at a facility level would be assessed for this environmental factor.

Potential investors are focused on the longevity of the project which comprises financial sustainability (minimising operating costs) as well as maintaining social and environmental licenses to operate. There are global expectations of the need to reduce greenhouse gas emissions. Social licence to operate requires the project to demonstrate practices that recognise and mitigate climate change risks.

Potential Impacts

Peak average annual GHG emissions for the processing facility were calculated as 95,575 t CO₂-e pa, which is below the threshold that would require EPA assessment.

The Processing Facility includes innovations to enhance energy efficiency during processing. Vanadium production from this facility would have 50% lower carbon emissions intensity than three quarters of the vanadium that is produced globally.

Scope 3 GHG emissions associated with mining and beneficiation of vanadium concentrate and transport of large inputs and products were calculated as 114,584 t CO₂-e pa. The calculated transport emissions could be reduced by mitigation throughout operations, as technologies become available. GHG emissions associated with the mining and beneficiation operations at the Australian Vanadium Project will be assessed by EPA.

Vanadium is primarily used for strengthening steel, which reduces the volume of steel that is required to be used for applications such as rebar. If the entire volume of vanadium pentoxide planned to be produced by the Processing Facility each year was used in high strength low alloy steel, the **net reduction** in carbon emissions from downstream use is estimated as 14,500,000 t CO₂-e pa.

A growing use of vanadium is in vanadium flow batteries, which support the transition to a lower-carbon economy. This application is expected to drive increasing demand for vanadium and demonstrates the value of vanadium as a critical mineral and a battery metal.

Mitigation Measures

The calculated GHG emissions for the processing facility incorporate:

- design improvements developed during Proposal feasibility studies to reduce GHG emissions by over 20,000 t CO₂-e pa
- mitigation of GHG emissions feasible to incorporate straightaway upon proposal commencement, which will further reduce emissions by 11,000 t CO₂-e pa.

The mitigation opportunities that are expected to be feasible upon commencement of the proposal include:

- incorporation of 35% renewable power generation and battery storage into the power plant
- use of 100% electric or hydrogen powered light vehicles at the processing facility
- incorporation of 2% of green hydrogen into the natural gas feed.

These mitigations are estimated to reduce the peak Scope 1 GHG emissions to 95,575 t CO₂-e pa at Proposal commencement.

Additional mitigation strategies (such as inclusion of green hydrogen as an increasing proportion of the natural gas feed) are expected to be implemented during operations as technologies become available. It is also believed that further opportunities to improve efficiencies and reduce emissions will be achieved during detailed design and planned early vendor involvement, including site visits to similar operations both locally and abroad.

The Processing Facility was referred to EPA in April 2022, who determined not to assess the proposal (CMS Number 18189, EPA Notice of Decision dated 27 July 2022).

Greenhouse gas emissions at the Processing Facility will be managed and mitigated in accordance with the *Greenhouse Gas Management Plan – Tenindewa Vanadium Processing Facility* (Umwelt, 2022), which includes annual reporting of GHG emissions in a publicly available report.

4.9 Social Surroundings

The *EPA Environmental Factor Guideline: Social Surroundings* (EPA, 2016f) states that social surroundings may include Aboriginal heritage, historical heritage, amenity (impacts associated with visual amenity, noise and fugitive dust emissions) and economic surroundings that may be impacted by the physical activities of the proposal.

Table 4.4 lists the social values identified near the proposal, the possible impacts, mitigation measures, and assessment of residual impacts. These are shown in **Figure 4**.

Table 4.4 Impact Assessment for Social Surroundings

Type	Social Values	Potential Impacts	Mitigation	Assessment of Residual Impacts
Road Use	Mullewa Town is approximately 25 km northeast of the proposal area.	<p>Increase in road traffic within Mullewa townsite, forecast to comprise an additional:</p> <ul style="list-style-type: none"> 20 full and 20 empty heavy vehicle movements per day through Mullewa. 27 light vehicle movements per day associated with employees based in Mullewa. 	<p>A Traffic Impact Statement has been prepared and submitted with the Development Application to the State Development Assessment Unit.</p> <p>The road network through Mullewa is a major highway and proposed haul trucks are compliant with the existing highway classification.</p> <p>Main Roads WA will review the traffic impact statement and agree road use conditions with AVL.</p>	<p>Traffic data for Geraldton-Mount Magnet Rd east of Mullewa Wubin Rd indicates annual average daily traffic volume for 2022-23 was 432 movements per day (223 heavy vehicles and 209 light vehicles).</p> <p>The forecast traffic movements associated with the proposal would be an 18% increase in heavy vehicle movements per day through Mullewa townsite, compared to 2022-23 data.</p>
	Public road users	<p>Increase in traffic volume along proposed transport routes, forecast to comprise an additional:</p> <ul style="list-style-type: none"> 20 full and 20 empty heavy vehicle movements per day between Tenindewa and Gabanintha 27 full and 27 empty heavy vehicle movements per day between Tenindewa and Geraldton 2 small buses transporting workers from Geraldton each day. 		<p>Traffic data for Geraldton Mount Magnet Rd east of Glengarry Road near Geraldton indicates annual average daily traffic volume for 2022-23 was 1,086 movements per day (402 heavy vehicles and 684 light vehicles).</p> <p>The forecast traffic movements associated with the proposal would be a 7% increase in heavy vehicle movements and 0.6% increase in light vehicle movements per day towards Geraldton, compared to 2022-23 data.</p>

Type	Social Values	Potential Impacts	Mitigation	Assessment of Residual Impacts
Homesteads	Nearest homesteads are located: <ul style="list-style-type: none"> 1.5 km west of Lot 40 1.7 km north of Lot 40 2.0 km northeast of Lot 40 	Fugitive dust emissions from: <ul style="list-style-type: none"> Wind erosion of cleared areas and stockpiles Material handling including loading and tipping Driving on unsealed roads Land clearing for establishment of infrastructure 	Fugitive dust emissions will be managed through typical controls such as water trucks on any unsealed road and sprays as needed for stockpiles and material handling. <p>The concentrate and Fe-Ti Co-product will be transported with moisture levels suitable to facilitate handling and minimize dust emissions (typically 7-8%).</p> <p>AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant.</p>	Dust deposition associated with the Processing Facility is predicted to be a maximum of 0.03 g/m ² /month at the boundary of Lots 40 & 41, which is well below the relevant assessment criteria of 2 g/m ² /month above background (see Section 4.7 Air Quality). <p>The potential noise impacts associated with construction and operations of the processing plant will be assessed and regulated by DWER under Part V of the EP Act.</p>
		Noise emissions from construction and operation of processing facility.	A screening assessment will be undertaken as part of the DWER Works Approval application using the DWER Guideline: Assessment of environmental noise emissions. <p>The processing facility will be designed to meet noise limits.</p> <p>AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant.</p>	The potential noise impacts associated with construction and operations of the processing plant will be assessed and regulated by DWER under Part V of the EP Act.
Other nearby land uses	Railway line immediately north of the proposal boundary	Haul vehicle and light vehicle interactions with two level crossings on Geraldton-Mt Magnet Road and one level crossing on Erangy Springs Road.	A Traffic Impact Statement has been prepared and submitted with the Development Application to the State Development Assessment Unit. <p>The road network along Geraldton-Mt Magnet Road is a major highway and proposed haul trucks are compliant with the existing highway classification. Main Roads WA will review the traffic impact statement and agree road use conditions with AVL.</p>	Road usage is not expected to impact on the railway line.

Type	Social Values	Potential Impacts	Mitigation	Assessment of Residual Impacts
	Public road users	Visual amenity impacts.	<p>An analysis of the views of the Processing Facility from Geraldton-Mt Magnet Road was undertaken using a 3D model and submitted as part of the Development Application to the State Development Assessment Unit.</p> <p>The processing plant will have at least 1 km setback from the Geraldton-Mt Magnet Road. There is existing vegetation along the road and the railway. Vegetation along the road corridor will be retained where possible (with the exception of the haul road) to preserve the visual screen.</p>	<p>The 3D model demonstrated that the Processing Facility would not have a meaningful impact on visual amenity from the Geraldton-Mt Magnet Road.</p>
Agricultural use of land	Agricultural production within Lots 40 and 41	Loss of productive agricultural land within Lots 40 and 41 when AVL take ownership and develop the processing plant.	<p>The proposal lies in the Mullewa Agricultural Land Area. Agricultural importance is limited by availability of fresh groundwater and low rainfall, which leads to lower yields than experienced on similar soils to the south and west (Department of Agriculture and Food, 2013).</p> <p>AVL has signed an options agreement with the landowner for the purchase of Lots 40 and 41, which will provide financial compensation for loss of the land.</p> <p>Parts of the options agreement makes provision for the landowner to optionally use that portion of Lots 40 and 41 that are outside of the Processing Facility development envelope for agricultural purposes.</p>	<p>The residual impact from loss of productive agricultural land is expected to be low.</p>
	Agricultural production within adjoining and nearby land	<p>The proposal could impact on agricultural productivity of adjacent and nearby land if: Dust emissions result in accumulation of environmentally deleterious materials on</p>	<p>Mitigation of impacts from discharge of contaminants is described in Section 4.6 Terrestrial Environmental Quality.</p> <p>AVL will apply for a Works Approval and Operating Licence under the EP Act Part V prior to commencement of construction of the processing plant.</p>	<p>Dust deposition associated with the Processing Facility is predicted to be 0.03 g/m²/month at the boundary of Lots 40 & 41, which is well below the relevant assessment criteria of 2 g/m²/month above background (see Section 4.7 Air Quality).</p>

Type	Social Values	Potential Impacts	Mitigation	Assessment of Residual Impacts
		<p>nearby agricultural land outside of Lots 40 and 41.</p> <p>Discharges of environmentally hazardous materials result in contamination of surface or groundwater.</p>		<p>The potential dust emissions and discharges of hazardous materials associated with construction and operations of the processing plant will be assessed and regulated by DWER under Part V of the EP Act.</p>
Aboriginal heritage	<p>Tenindewa Creek (Site ID 18905) located 8 km east of the proposal location</p>	<p>Due to the distance from the proposal, no impacts to Tenindewa Creek are expected.</p> <p>It is possible that excavation associated with construction could unearth Aboriginal artefacts or remains.</p>	<p>The design, construction, commissioning and operations of the processing plant and associated facilities that may discharge or emit materials to the environment will be regulated by DWER under Part V of the EP Act.</p> <p>The proposed area is largely cleared, and no evidence of Aboriginal sites has been found during a desktop search of the Aboriginal Heritage Inquiry System.</p> <p>Should any Aboriginal artefacts or human remains be encountered during construction or other excavations, all nearby excavation work will cease and appropriate authorities will be notified.</p>	<p>No residual impacts to Aboriginal heritage sites are expected.</p>

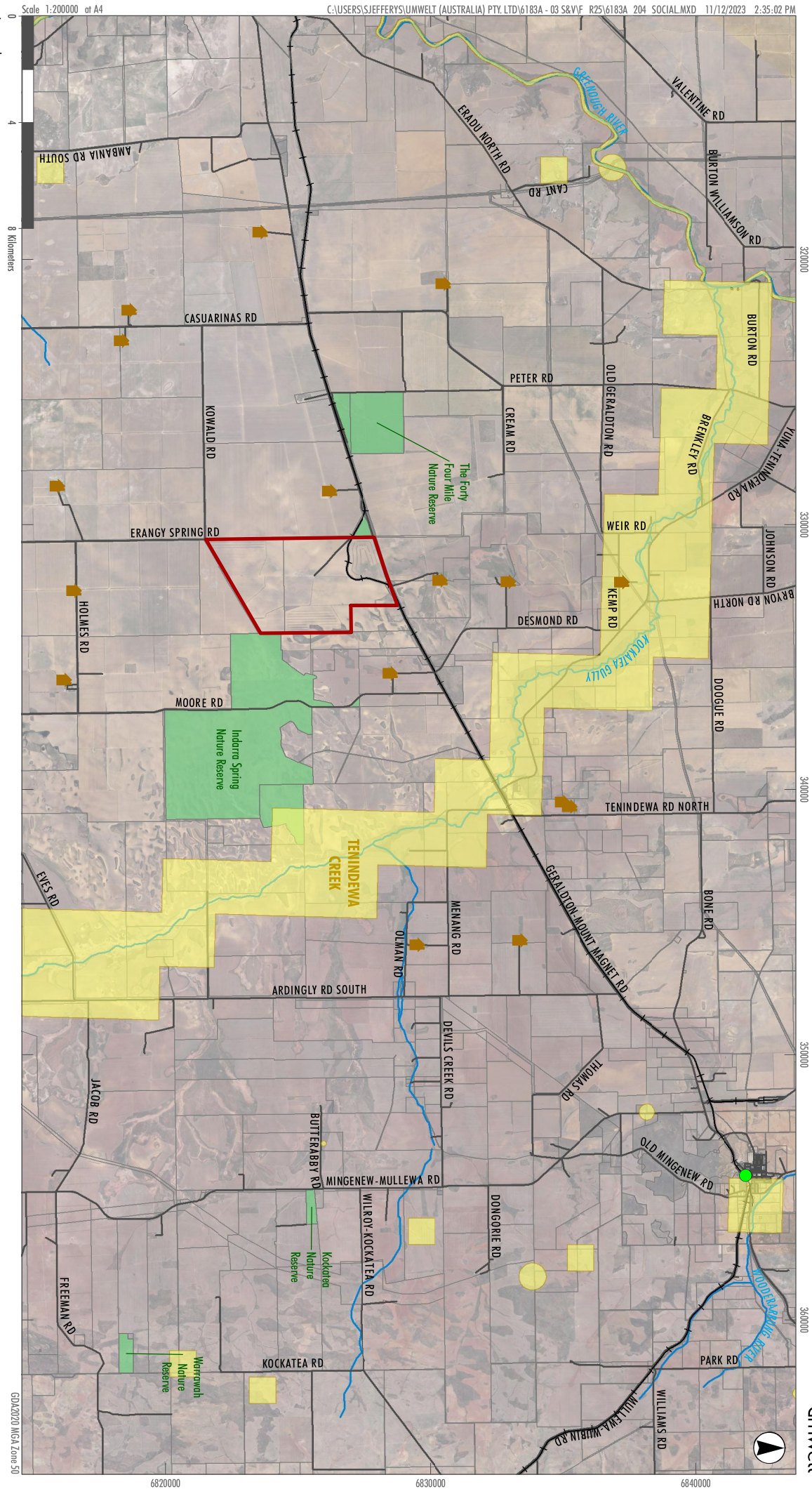


FIGURE 4
Social Surroundings

4.10 Human Health

The *EPA Environmental Factor Guideline: Human Health* (EPA, 2016b) considers impacts to human health from emission of radiation.

Receiving Environment

Material and waste characterisation undertaken to support the project approvals have confirmed there is no risk from radioactive metals in the mine orebody and hence in the vanadium concentrate arriving at the Processing Facility.

Potential Impacts

The processing plant will not use any installed radiation emitting equipment or devices. Therefore, no impacts to human health are anticipated.

4.11 Landforms

EPA Environmental Factor Guideline: Landforms (EPA, 2018a) has been used to address this section. Landform refers to the geology and morphology of an area and is characterised by the distinctive and recognisable physical features of the earth's surface.

Receiving Environment

The landforms at the processing site are not considered significant as the landform is typical in the region and unremarkable.

Potential Impacts

No major excavational works or mining activities will occur and therefore no permanent change to the physical landform is anticipated. No impacts to landforms are expected.

4.12 Matters of National Environmental Significance

Receiving Environment

The Commonwealth Protected Matters Search Tool (PMST) was used to identify any MNES that could trigger a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A summary of the search is presented in **Table 4.5**.

Table 4.5 Commonwealth Factors Impact Summary

Factor	Present	Description	Comments
World Heritage Properties	No	Not applicable	
National Heritage Places	No	Not applicable	
Wetlands of International Importance	No	Not applicable	
Great Barrier Reef Marine Park	Not applicable	Not applicable	
Commonwealth Marine Area	Not applicable	Not applicable	
Listed Threatened Ecological Communities	No	Not applicable	No Listed Threatened Ecological Communities present.

Factor	Present	Description	Comments
Listed Threatened Species (flora)	Yes	Potential presence of 5 listed flora species.	Database searches identified five Commonwealth-listed flora species as having some potential to occur (ranging from 'may' to 'likely'). <i>Styphelia marginata</i> was also identified as being recorded in a nearby road reserve in 1986. A targeted flora survey undertaken in September 2022 recorded the presence of one Commonwealth-listed flora species, <i>Caladenia wanosa</i> (Threatened). Refer to Section 4.1 for more information.
Listed Threatened Species (fauna)	Yes	Potential presence of 8 listed fauna species.	Database searches identified eight Commonwealth-listed fauna species as having some potential to occur (ranging from 'may' to 'likely'). However, it is not expected that fauna will be directly impacted by the Proposal due to the low density of fauna habitat in the area. Any indirect impacts will be managed through DWER approvals and licences. Refer to Section 4.2 for further detail.
Listed Migratory Species	Yes	Potential presence of 7 species comprising avifauna.	The Protected Matters Search Tool identified one migratory marine bird, five migratory wetland birds, and one migratory terrestrial species that may occur. Due to the migratory nature of these species and the likely low habitat value of the Proposal area, there is not expected to be any significant impacts to migratory species.

Potential Impacts

No direct impacts to any MNES will occur as part of this proposal and therefore referral under the EPBC Act is not required.

4.13 Reserves

Receiving Environment

A search for any surrounding reserves within 3 km of the project area was undertaken using the DBCA-011 (DBCA – Legislated Lands and Waters) dataset (DataWA, 2021). Three natural reserves were identified as shown in **Figure 1** namely:

- Indarra Spring Nature Reserve (R 41885) is located immediately east of Lot 41. The reserve has been classified as a Class A reserve under Section 5(1)(d) of *Calm Act 1984*. The nature reserve is protected for the purpose of conservation of flora and fauna.
- Reserve R 24185 is located immediately west of Lot 40. R 24185 is a Class A reserve under Section 5(1)(d) of *Calm Act 1984* and is protected for the purpose of conservation of flora and fauna.

- The Forty-Four Mile nature reserve (R 1017) is located 3.2 km west of the project. The reserve is ranked as a Class A reserve under Section 5(1)(d) of *Calm Act 1984* and is protected for the purpose of conservation of flora and fauna.

Potential Impacts

The nature reserves are protected for the purpose of conservation of flora and fauna. No direct impacts are anticipated. However, given their proximity to the project area, indirect impacts may potentially affect the reserve including:

- Excessive dust emissions generated from traffic movement, poor dust suppression practices and wind erosion of mineral concentrate stockpiles impacting vegetation.
- Excessive noise emissions from processing facility and traffic movement disturbing fauna.
- Light emissions leading to impacts on nocturnal fauna.
- Fire risks leading to bushfire.

Mitigation Measures

The following controls will be implemented to mitigate impacts to nearby reserves:

- Dust mitigation as described in **Section 4.7**.
- Engineering controls will be used to mitigate noise emissions from the processing facility.
- Light emissions will be directed away from the nature reserve to minimise impacts to nocturnal fauna.
- Bushfire Management Plan is included as part of the Development Application.

Controls to mitigate impacts arising from dust, noise, water abstraction, bushfire and air emissions will be managed as part of the DWER Part V approvals (see **Section 5.0**).

5.0 Environmental Approvals Context

5.1 Environmental Approvals Completed

The Tenindewa Vanadium Processing Facility was referred to the WA EPA under section 38 of the EP Act in April 2022.

The Chair of the EPA determined on 27 July 2022 not to assess the proposal, with the following explanation of decision provided (CMS Number 18189, EPA Notice of Decision dated 27 July 2022):

“The EPA considers that the likely environmental effects of the proposal are not so significant as to warrant formal assessment. The EPA is of the view that the potential impacts of the proposal can be adequately managed through the implementation of the proposal in accordance with the referral documentation, and the proponent's management and mitigation measures. The EPA considers the potential impacts of the proposal can be dealt with under other statutory decision-making processes:

- Department of Water and Environmental Regulation – Part V Division 3 of the Environmental Protection Act 1986 (Works Approval and licence).
- Department of Water and Environmental Regulation – Part V Division 2 of the Environmental Protection Act 1986 (Clearing of Native Vegetation).
- Department of Water and Environmental Regulation – Rights in Water and Irrigation Act 1914 (5C groundwater Licence to take water)”.

AVL has subsequently obtained a 5C Licence to Take Water ((GWL 208955(1)) issued in July 2023. The licence is for abstraction of up to 1.2 GL of groundwater from the deep aquifer for industrial processing on Lots 40 and 41. Abstraction of groundwater will be managed in accordance with the approved *Water Resource Operating Strategy GWL208955(1)* (Australian Vanadium Limited, 2023), which includes monitoring and reporting of groundwater use, water levels and water quality.

The further environmental approvals expected to be required are described in the next section.

5.2 Environmental Approvals Required

Based on the preliminary environmental impact assessment presented above, the proposal is not expected to have a significant impact on the environment or any MNES. It is possible that there would be an impact on significant flora listed if they cannot be avoided in locating the site entry and exit roads.

It is expected that risks for each of the abovementioned environmental aspects can be managed under DWER and Planning approvals.

The identified environmental decision-making authorities and approvals processes, and their ability to mitigate environmental impacts, are described in **Table 5.1** below.

Table 5.1 Environmental Approvals Pathway

Decision-making authority	Legislation and guidelines regulating the activity	Approval required	Environmental Factor and Proposal Activity	Can the statutory decision-making process mitigate impacts on the environment? If yes, summary of reasons.
DWER - Environment	Environmental Protection Act 1986 Part V Environmental Protection Regulations 1987 Industry Regulation Guide to Licensing (DWER, 2019a) Guidance Statement – Environmental Siting (DWER, 2016) Guideline – Risk Assessments (DWER, 2017) Guidance Statement – Regulatory Principles (DWER, 2015)	Works Approval	Terrestrial environmental quality, air quality Construction of processing facility, evaporation ponds, power plant and wastewater treatment plant.	Yes, this process upholds EPA's objective to maintain the quality and land and soils to protect their environmental values. Works Approval application and DWER assessment will consider risks from emissions and discharges to the environment and management of wastes. This will include risk assessment and controls relating to point and non-point sources of emissions and handling and storage of environmentally hazardous materials. The risk assessment will consider DWER listed Environmental Sensitive receptors including nearby human receptors, the groundwater management area, surface water catchment area, noise impacts, dust impacts and nearby reserves. Applications for Works Approvals are publicly advertised, and DWER seeks direct comment from relevant public authorities and direct landowners. Granted Works Approvals are also published and open to public appeal.
		Critical Containment Infrastructure Report assessment	Terrestrial environmental quality Commissioning of waste storage facilities (evaporation ponds)	Yes, this process upholds EPA's objective to maintain the quality and land and soils to protect their environmental values. DWER will assess the Critical Containment Infrastructure Report to ensure that waste containment infrastructure is properly constructed with no material defects and all requirements have been met before being approved for use.
DWER – Environment	Environmental Protection Act 1986 Part V Environmental Protection Regulations 1987 Industry Regulation Guide to Licensing (DWER, 2019a) Guidance Statement – Environmental Siting (DWER, 2016)	Environmental Commissioning Report and Licence Application	Terrestrial environmental quality, air quality Operation of processing facility and wastewater treatment plant.	Yes, this process upholds EPA's objective to maintain the quality and land and soils to protect their environmental values. The Environmental Commissioning Report is required to demonstrate that environmental commissioning activities have been completed, the premises can operate to the specification detailed in the Works Approval application, and emissions and discharges from the premises meet the required standard. The operational licence will include conditions for monitoring and annual reporting of environmental emissions and discharges and quality of the surrounding environment during operations, to verify compliance with required standards. Environmental factors that are expected to be subject

Decision-making authority	Legislation and guidelines regulating the activity	Approval required	Environmental Factor and Proposal Activity	Can the statutory decision-making process mitigate impacts on the environment? If yes, summary of reasons.
	Guideline – Risk Assessments (DWER, 2017) Guidance Statement – Regulatory Principles (DWER, 2015)			to monitoring and reporting include air emissions and surrounding groundwater quality. The annual reporting process also includes an audit for compliance with licence conditions. Applications for licences are publicly advertised, and DWER seeks direct comment from relevant public authorities and direct landowners. Granted licences are also published and open to public appeal.
DWER – Environment	Environmental Protection Act 1986 Part V Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Native vegetation clearing permit	Flora and vegetation Clearing of native vegetation	Yes, this process upholds EPA's objective to protect flora and vegetation to maintain biological diversity and ecological integrity. The DWER assessment considers the likely environmental impacts of an application in accordance with the requirements of the EP Act and bilateral agreement (where relevant). The DWER guidelines and information sources are used by assessors in gathering the information required for objective assessment under each clearing principle. Applications and determinations for clearing permits are published on the DWER website. Decisions can be appealed in writing within 21 days of the applicant being notified of the decision. A vegetation clearing permit will include conditions to manage and monitor any potential impacts to flora.
SDAU	Planning and Development Act 2005	Development Application	Social surroundings Construction of processing facility including supporting infrastructure	Yes. Traffic and bushfire impact and mitigation measures are expected to be assessed as part of the Development Application.

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