



FI Joint Venture Pty. Ltd.
Yogi Magnetite Mine - Public Environmental Review
Environmental Review Document
Assessment No. 2154

April 2020

Limitations

This report: has been prepared by GHD for FI Joint Venture Pty. Ltd. and may only be used and relied on by FI Joint Venture Pty. Ltd. for the purpose agreed between GHD and the FI Joint Venture Pty. Ltd. as set out in section 1.1 of this report.

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Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

Invitation to Make a Submission

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

FI Joint Venture Pty Ltd (FIJV) proposes to establish and operate the Yogi Magnetite iron ore mine in the Mid-West of Western Australia.

The Environmental Review Document (ERD) has been prepared in accordance with the EPA's ***Procedures Manual (Part IV Divisions 1 and 2)***. The ERD is the report by the proponent on their environmental review which describes this proposal and its likely effects on the environment.

The ERD is available for a public review period of 6 weeks starting in **15 April 2020** and closing on **28 May 2020**.

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

Why write a submission?

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

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

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

Why not join a group?

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

Developing a submission?

You may agree or disagree with, or comment on information in the ERD. When making comments on specific elements in the ERD:

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

What to include in your submission

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

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

The closing date for public submissions is: **28 May 2020**.

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

Alternatively submissions can be:

- Posted to: Chairman, Environmental Protection Authority, Locked Bag 10, JOONDALUP WA 6027 or
- Delivered to: the Environmental Protection Authority, Prime House, 8 Davidson Terrace, JOONDALUP WA 6027.

If you have any questions on how to make a submission, please contact the Office of the Environmental Protection Authority on 6145 0800.

Executive summary

This report is subject to, and must be read in conjunction with, the limitations set out on Page i, and the assumptions and qualifications contained throughout the Report.

Introduction

FI Joint Venture Pty Ltd (FIJV, the Proponent) proposes to establish and operate a magnetite iron ore mine approximately 250 km east-northeast of Geraldton and 15 km northeast of Yalgoo in the Mid-West region of Western Australia (WA) (Figure ES 1). The Yogi Magnetite Mine project (the Proposal) also includes a slurry pipeline from the mine site to Geraldton port, a return water pipeline, and a gas supply pipeline from the Dampier to Bunbury Natural Gas Pipeline.

This Environmental Review Document (ERD) has been prepared to support the assessment of the proposal by the Western Australian Environmental Protection Authority (EPA). This document has been prepared as required under section 40(2)(b) of the *Environmental Protection Act 1986* (EP Act). It is presented in the format specified in the EPA (2018a) *Instructions on how to prepare an Environmental Review Document*, and in accordance with the EPA approved *Environmental Scoping Document* (ESD) (GHD 2019a, Appendix A) for the Yogi project.

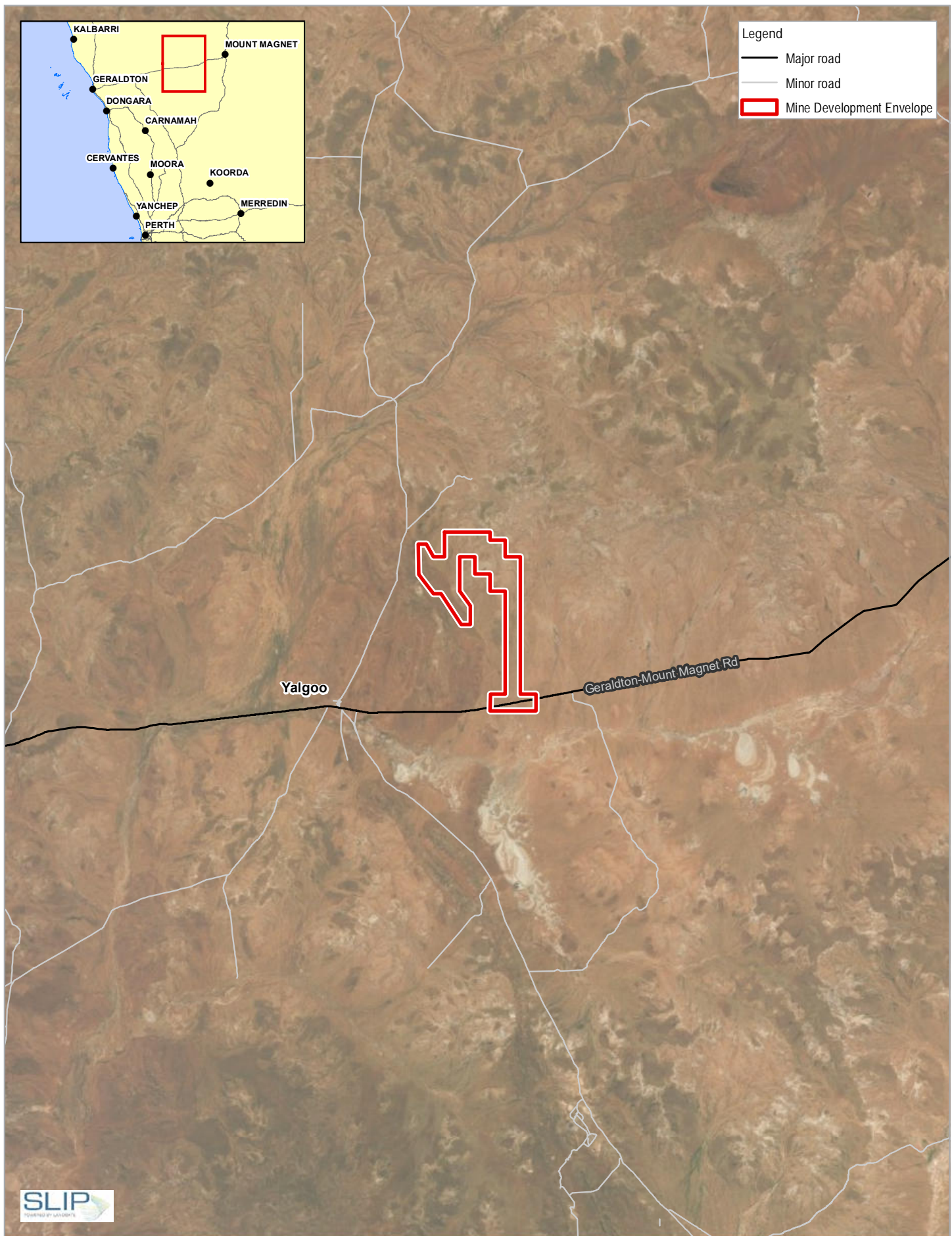
The purpose of the ERD is to provide sufficient information on the preliminary key environmental factors identified in the ESD (2019a) to enable the WA Environmental Protection Authority (EPA) to assess the project and for the public and decision making authorities (DMA's) to review and comment on the project. This document presents information on key stakeholders, the details of the technical studies undertaken as part of the environmental assessment, and the proposed mitigation measures associated with the construction and operation of the Yogi Magnetite Mine.

Background and context

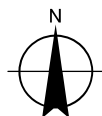
The Yogi Ore deposit (formerly known as the 'Sam Deposit') was explored substantially initially when the mining leases were first granted, however expenditure was minimal until the acquisition of the Yogi ore deposit and associated mining leases by FIJV. Following the approval of the development from the Foreign Investment Review Board, FIJV referred the proposal to the EPA under s 38 of the EP Act (1986) on 19 December 2017.

On 21 February 2018, the EPA determined the proposal was to be assessed at the level of 'Public Environmental Review' (PER) with a six week public review period, due to the potential of significant environmental impacts. An ESD was submitted to the EPA and was approved on 29 April 2019.

The preliminary key environmental factors which were identified by the EPA to be investigated were: *Flora and Vegetation, Subterranean Fauna, Landforms, Terrestrial Environmental Quality, Terrestrial Fauna, Inland Waters, Air Quality and Social Surroundings*.



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



FI Joint Venture Pty Ltd
Environmental Review Document

Proposal Location

Project No. 61-37117
Revision No. 0
Date 12 Jul 2019

FIGURE ES-1

Overview of the proposal

A summary of the proposal is provided in Table ES 1 and the key proposal characteristics for the proposal are outlined in Table ES 2.

Table ES 1 Summary of the Proposal

| | |
|----------------------|--|
| Proposal title | Yogi Mine Project |
| Proponent Name | FI Joint-Venture Pty Ltd |
| Proponent Activities | Mine construction and operation |
| Short Description | <p>Yogi Mine</p> <p>The Proposal is to construct and operate an open-cut mine referred to as the Yogi Mine Project and will include construction of all relevant mining infrastructure (such as haul roads, processing plant, dry processing waste facility (DPWF), run mine pad, crusher, electricity generation, fuel storage site, treated ore stockpile pad, crusher, explosive warehouse and general onsite buildings).</p> <p>Mining of magnetite will occur below groundwater and will include open cut mine operation. The operation will involve clearing and topsoil stockpiling, overburden drilling and blasting, followed by removal of material by truck.</p> <p>Pipeline Corridor</p> <p>The Proposal also includes construction of a pipeline corridor for a slurry pipeline, water pipeline and gas pipeline. The gas pipeline will supply gas from the Dampier to Bunbury Gas Pipeline Network to the Yogi Mine.</p> <p>The slurry and water pipeline will extend from the Mid-West Ports to the Yogi Mine. The water pipeline will supply water from the Port Dewatering Plant to the Yogi mine for re-use in the processing plant.</p> |

Table ES 2 Key proposal characteristics for the Yogi Mine Project

| Physical Elements | Location | Proposed extent |
|---|---|--|
| Mine Development Envelope Including Mine Pit, Mining overburden and Waste Facilities, Dry Processing Waste Facility, Mine and Processing Support Infrastructure and Corridors | Figure 2-1 | Clearing of no more than 1,530 ha within a 8,230 ha Development Envelope |
| Pipeline Development Envelope Including Magnetite Slurry Pipeline, Water Pipeline, and gas pipeline | Figure 2-2 | Clearing of no more than 200 ha within the 76,800 ha |
| Operational Elements | Details | |
| Groundwater Abstraction (Water demand) | Up to 5 gigalitres per annum (GLpa) from water supply borefield | |
| Mine site dewatering | Up to 5 GLpa (to be used for processing) | |
| Power | 70 MW to be supplied by onsite Gas Power Station | |
| Gas Supply | Gas to be supplied to the power station via a buried steel pipeline at a rate of 23 TJ/day | |
| Overburden/ Waste Rock | Disposal of up to 800 million tonnes (over the life of the project) | |
| Ore Processing Waste | Disposal of up to 80 million m ³ of dry processing waste (over the project life) | |
| Ore transport | Ore will be transported as a slurry in the new slurry pipeline proposed to be constructed between Yogi Mine and Geraldton Port. | |

Summary of potential impacts, proposed mitigation and outcomes

A summary of potential environmental impacts, impact assessment, proposed management strategies and predicted environmental outcomes for each of the preliminary key environmental factors addressed in this Environmental Review Document is provided in Table ES3.

Table ES3 Summary of environmental impact assessment of preliminary key environmental factors

| Flora and vegetation | |
|----------------------|--|
| EPA objective | <i>To protect flora and vegetation so that biological diversity and ecological integrity are maintained.</i> |
| Policy and guidance | <p>EPA Policy and Guidance</p> <ul style="list-style-type: none"> • <i>Instructions on how to prepare an Environmental Review Document</i> (EPA 2018a) • <i>Statement of Environmental Principles, Factors and Objectives</i> (EPA 2018b) • <i>Environmental Factor Guideline: Flora and Vegetation</i> (EPA 2016b) • <i>Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment</i> (EPA 2016c) |
| Potential impacts | <ul style="list-style-type: none"> • Loss of vegetation and flora through clearing, including conservation significant vegetation and flora • Dust generation during construction and operations • Introduction and spread of environmental weeds • Increased edge effect • Habitat loss and fragmentation from vegetation clearing • Alteration of fire regimes • Decline of species abundance and diversity • Alteration to surface and groundwater flows and quality |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Disturbance footprint designed to reduce disturbance to Priority flora. • Pre-clearance surveys for significant flora, with the aim to avoid, all significant flora for the pipeline route. Vehicles will be restricted to designated routes, where dust control measures are undertaken. • Dust associated with the operations will be managed in accordance with the <i>Environmental Management Plan</i> (EMP) (GHD 2020d, Appendix C). • Review the proposed project design against the vegetation survey data to avoid/minimise clearing of significant flora and vegetation. • Ensure staff and contractors are aware of the location of significant flora and vegetation on site and their responsibility to ensure they are protected. • Local drainage will be considered when constructing new haul roads and access tracks and maintaining existing road infrastructure. This activity can be managed under the <i>Mining Act 1978</i>. <p>Minimise</p> <ul style="list-style-type: none"> • Land disturbance kept to minimum necessary for development of the Proposal within the design footprint. |

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| | <ul style="list-style-type: none"> • Vehicles and mining equipment access limited to designated roads/access tracks and cleared areas. • Dust suppression, including use of water carts on access roads, to be used during construction, operation and closure activities. • Dust associated with the operations will be managed in accordance with the EMP (GHD 2020d, Appendix C). • Implement biannual weed monitoring and targeted spraying program at the Proposal following completion of land clearing activities and during operations and closure activities. • Continued biannual weed monitoring and targeted spraying program along the pipeline route to minimise existing weed populations and reduce potential spread into adjacent land. • Minimise clearing and vegetation disturbance to conservation significant flora and communities. • Conduct clearing in accordance with the permit and clearing procedure • Proposal site induction to include information on prevention and management of fires. • All machinery and vehicles undertaking clearing activities will be fitted with firefighting equipment. • A Hot Work Permit system will be implemented. • Firefighting equipment will be located on site and emergency personnel will be trained in fire response. • Conduct vegetation clearing in accordance with a permit issued. • Disturbance to watercourses will be minimised to that required to achieve safe mine design and asset protection. • Clearing and topsoil stockpiling will be undertaken in accordance with EMP (GHD 2020d, Appendix C). <p>Rehabilitate</p> <ul style="list-style-type: none"> • FIJV will undertake progressive rehabilitation in areas where mining operations have been completed. • FIJV will undertake progressive rehabilitation in areas where mining operations have been completed. For land based operations this will involve rehabilitation of disturbed areas. |
| Outcomes | <p>Residual impact</p> <p>The following residual impacts are considered to be of minor significance at both local and regional scale:</p> <ul style="list-style-type: none"> • 1530 ha of native vegetation will be cleared within the Mine Development Envelope (MDE) and 200 ha within the Pipeline Development Envelope (PDE). • The impact of weeds on flora and vegetation is assessed to be low following implementation of the weed control measures outlined above and in the EMP (GHD 2020d, Appendix C). • Edge effect will be minimised in the MDE by keeping infrastructure together, and avoiding clearing in new, discrete areas. There is anticipated to be increased edge effects, however their significant is estimated to be low as the vegetation and flora present onsite are well represented in the local area and region. |

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| | <ul style="list-style-type: none"> • There will be some fragmentation of flora and vegetation, however it is not assessed as significant as the vegetation and flora present onsite are well represented in the local area and region. Rehabilitation will create new ecological linkages between remnant and newly established flora and vegetation communities post-disturbance. • Weed management, construction of firebreaks and hot work permits will reduce the risk of fires caused by the proposal such that their impact is assessed as low. • Dust impacts to flora and vegetation are anticipated to be minimal given the management measures proposed. • The vegetation and flora present onsite are well represented in the local area and region and their removal is not assessed to impact species abundance and diversity. • Due to the absence of GDE and riparian vegetation within the MDE and PDE, and the depth of groundwater below ground level, impacts to flora and vegetation due to changes in groundwater quality and flow changes are considered low. <p>Assessment against the EPA objective As the implementation of the Proposal is not assessed to have any significant residual impacts to Flora and Vegetation, it is considered that the Proposal meets the EPA objective for this factor such that the biological diversity and ecological integrity of flora and vegetation are maintained.</p> <p>Offsets Based on the assessment that the clearing will not have significant residual impacts, no offsets are proposed.</p> |
| Landforms | |
| EPA objective | <p><i>To maintain the variety and integrity of significant physical landforms so that environmental values are protected.</i></p> <p>For the purpose of EIA, the EPA defines landforms as distinctive, recognisable physical features of the earth's surface having a characteristic shape produced by natural processes. A landform is defined by the combination of its geology (composition) and morphology (form).</p> |
| Policy and guidance | <p>EPA Policy and Guidance</p> <ul style="list-style-type: none"> • <i>Statement of Environmental Principles, Factors and Objectives</i> (EPA 2018b) • <i>Instructions on how to prepare an Environmental Review Document</i> (EPA 2018a) • <i>Environmental Factor Guideline: Landforms</i> (EPA 2016d) |
| Potential impacts | <ul style="list-style-type: none"> • Alteration to landform structure (either temporary or permanent) • Alteration to ecological function of the landform (either temporary or permanent) • Impacts on environmental values of the landform (either temporary or permanent) |

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| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> Disturbance footprint designed to reduce clearing of and disturbance to Yalgoo BIF PEC (Priority 1), conservation significant flora and fauna, as well as the BIF landform structure. <p>Minimise</p> <ul style="list-style-type: none"> An internal ground disturbance procedures and permitting system will be implemented so that disturbance footprint is adhered to. Conduct clearing in accordance with permit and clearing procedure. Undertake a variety of management measures during all phases of the project to prevent negative impacts to flora, fauna and landform structure. <p>Rehabilitate</p> <ul style="list-style-type: none"> Progressive rehabilitation of disturbed areas will be undertaken in accordance with the <i>Mine Closure Plan</i> (MCP) so that native vegetation is re-established and the site landscape reflects regional topography. |
| Outcomes | <p>Residual impacts</p> <p>The following residual impacts are considered to be of minor significance at both local and regional scale:</p> <ul style="list-style-type: none"> Some permanent impacts to the BIF landform structure would occur from mine construction and operations given that the BIF is located on the western portion of the MDE where the ore body located and the mine pit is proposed. However, ground disturbance will be rehabilitated and landforms established in the location of the BIF (i.e. overburden facility) will be rehabilitated to reflect regional BIF topography. Temporary alteration to the ecological function may occur due to the removal of Yalgoo BIF itself, including conservation flora and fauna habitat. Permanent impacts to the environmental values of the BIF landform may occur due to alteration of the landform structure and the removal of the Yalgoo BIF PEC, including conservation flora and fauna habitat. <p>Assessment against the EPA objective</p> <p>As the implementation of the Proposal is not assessed to have any significant residual impacts to Landforms, it is considered that the Proposal meets the EPA objective for this factor such that the variety and integrity of significant physical landforms are protected.</p> <p>Offsets</p> <p>Based on the expectation that the clearing and removal of the BIF landform within the MDE will not have significant residual impacts, no offsets are proposed.</p> |
| Subterranean Fauna | |
| EPA objective | <i>To protect subterranean fauna so that biological diversity and ecological integrity are maintained.</i> |

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| Policy and guidance | <p>EPA Policy and Guidance</p> <ul style="list-style-type: none"> • <i>Instructions on how to prepare an Environmental Review Document</i> (EPA 2018a) • <i>Statement of Environmental Principles, Factors and Objectives</i> (EPA 2018b) • <i>Environmental Factor Guideline Subterranean Fauna</i> (EPA 2016e) • <i>Technical Guidance Terrestrial Subterranean Fauna Surveys</i> (EPA 2016f) |
| Potential impacts | <ul style="list-style-type: none"> • Loss or degradation of habitat or species population from construction and operations • Loss of potential habitat and species populations due to: <ul style="list-style-type: none"> – Abstraction of groundwater – Changes to hydrological regimes and water quality – Groundwater contamination – Loss of food/nutrient sources |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Disturbance footprint designed to reduce disturbance to BIF landform structure. • Abstraction of water will be avoided through the reuse of water in the slurry pipeline, which will be returned to the mine. <p>Mitigate</p> <ul style="list-style-type: none"> • An internal ground disturbance procedures and permitting system will be implemented so that disturbance footprint is adhered to. • Conduct clearing in accordance with permit and clearing procedure. • Abstraction of water will be minimised through the design of water efficient infrastructure, such as dry-stack tailings. • Disturbance to watercourses will be minimised to that required to achieve safe mine design and asset protection • Local drainage will be considered when constructing new haul roads and access tracks and maintaining existing road infrastructure. This activity can be managed under the Mining Act. • Minimise clearing of vegetation and construction of hard-stand surfaces |
| Outcomes | <p>Residual impacts</p> <ul style="list-style-type: none"> • Some permanent loss of potential subterranean fauna habitat will occur from mine construction and operations. However, subterranean fauna species are not restricted to the mine area and only a minor portion of the geological unit will be removed (96.5% remaining). • Abstraction of Groundwater will be localised to the immediate vicinity of the mine pit area and the paleochannel area. • Changes to the hydrological regimes and water quality are expected to be minimal and only in the immediate vicinity of the proposal. • With implementation of appropriate environmental management subterranean fauna values are unlikely to be affected by groundwater contamination • The development of the proposal is unlikely to affect the overall supply of food/nutrients to subterranean fauna communities. |

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| | <p>Assessment against the EPA objective</p> <p>As the implementation of the Proposal is not assessed to have any significant residual impacts to Subterranean Fauna, it is considered that the Proposal meets the EPA objective for this factor such that the biological diversity and ecological integrity are maintained.</p> <p>Offsets</p> <p>Based on the assessment that the proposal will not have significant residual impacts, no offsets are proposed.</p> |
| Terrestrial Environmental Quality | |
| EPA objective | <i>To maintain the quality of land and soils so that environmental values are protected.</i> |
| Policy and guidance | <ul style="list-style-type: none"> • Instructions on how to prepare an Environmental Review Document (EPA 2018a) • Statement of Environmental Principles, Factors and Objectives (EPA 2018b) • Environmental Factor Guideline Terrestrial Environmental Quality (EPA 2016g) • Guidance Statement 6 – Rehabilitation of Terrestrial Ecosystems (EPA 2006) |
| Potential impacts | <ul style="list-style-type: none"> • Soil acidification as a result of disturbance of soil • Contamination of soils as a result of Acid and Metalliferous Drainage • Contamination of soils through spillage of reagents, chemicals, hydrocarbons |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Waste rock dumps to be designed to include drainage management in order to capture and monitor runoff from the waste rock dumps to avoid runoff discharging into watercourses • Maintenance work to be undertaken on appropriate hardstand areas to prevent spills infiltrating into soils • Chemicals used on-site to be stored in an appropriate manner <p>Minimise</p> <ul style="list-style-type: none"> • Sample collection (mineralogical/assay) and laboratory analysis of the hanging wall and footwall materials and other underrepresented rock types to further understand the leaching potential of the waste rock and ore prior to the beginning of mining. • Sample collection (mineralogical/assay) and laboratory analysis of processed material throughout mining operations to further understand its leaching potential. • Ongoing monitoring throughout life of mine to be undertaken to evaluate potential for waste rock and ore to generate acid mine drainage. This will include surface water monitoring and groundwater bore monitoring • Minimise disturbance of PASS • Follow appropriate procedures for use of buffer material (i.e. lime) in trench construction • Minimise waste rock handling |

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| | <ul style="list-style-type: none"> • Undertaking refuelling of mobile fleet in accordance with appropriate procedures |
| Outcomes | <p>Residual impacts</p> <ul style="list-style-type: none"> • Soil acidification is unlikely from the construction of the trenches through ephemeral watercourses with the application of standard management techniques and mitigation measures applied based on the outcomes of further materials testing prior to the beginning of mining and monitoring throughout the life of mine. • AMD is considered unlikely based on the low sulfur content of the ore and waste material. . However, proactive management measures will be applied based on further materials testing and monitoring to ensure that Terrestrial Environmental Quality values are not significantly affected. • Soil contamination from spills is unlikely to result in significant environmental impacts. <p>Assessment against the EPA objective</p> <p>As the implementation of the Proposal is not assessed to have any significant residual impacts on Terrestrial Environmental Quality, it is considered that the Proposal meets the EPA objective for this factor such that the environmental values associated with the quality of land and soils are maintained.</p> <p>Offsets</p> <p>Based on the assessment that there will be no significant impact to Terrestrial Environmental Quality values, no offsets are proposed.</p> |
| Terrestrial Fauna | |
| EPA objective | <i>To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.</i> |
| Policy and guidance | <ul style="list-style-type: none"> • Instructions on how to prepare an Environmental Review Document (EPA 2018a) • Statement of Environmental Principles, Factors and Objectives (EPA 2018b) • Environmental Factor Guideline: Terrestrial Fauna (EPA 2016h) • Technical Guidance Terrestrial Fauna Surveys (EPA 2016i) • Technical Guidance Sampling methods for terrestrial vertebrate fauna (EPA 2016j) • Technical Guidance: Sampling of short range endemic invertebrate fauna (EPA 2016k) |
| Potential impacts | <ul style="list-style-type: none"> • Loss of up fauna habitat as a result of clearing vegetation • Displacement and death of fauna • Habitat fragmentation • Habitat degradation from introduction and spread of environmental weeds • Alteration of fire regimes • Introduction and spread of feral animals |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Disturbance footprint designed to reduce disturbance to conservation significant fauna. |

- Sections of the haul road traversing granitic formations and the BIF ridgeline will be deviated and narrowed to avoid and reduce impact to Priority flora habitats.
- Prior to clearing, areas of the granitic formation and BIF ridgeline (all suitable habitat) will be targeted searched for Western Spiny-tailed Skink colonies. These areas will be demarcated and logged on the project's GIS database. The proposed site layout will be revised to avoid these areas and where colonies of Western Spiny-tailed Skinks are present, and avoidance is not appropriate, these animals will be relocated to new sites (GHD 2020d, Appendix C).
- Pre-clearance surveys for Malleefowl mounds, with the aim to avoid all active mounds, within areas of potential Malleefowl habitat for pipeline development envelope.
- Disturbance footprint designed to reduce disturbance to fauna habitats.
- Vegetation clearing to be limited to 1,530 ha, with no clearing or mining activities to occur on the BIF ridgeline in excess of the required minimum area.
- Minimise clearing and vegetation disturbance to ensure conservation significant fauna and associated habitat is minimally affected.
- Excavation and trenches will be kept open only as long as needed for the works. Trenches will be checked daily for trapped animals. Vehicles and mining equipment access limited to designated roads/access tracks and cleared areas.
- During initial clearing, machinery will be sat idle for at least half an hour to allow fauna to migrate away from the disturbance area. A fauna spotter will also be employed to watch for fauna to ensure that they can be moved to a safe location.
- Lighting designed to illuminate designated operations areas rather than the surrounding landscape.
- No feeding of native or feral animals.
- Vehicles and mining equipment access limited to designated roads/access tracks and cleared areas, and prohibition of off-road driving.

Minimise

- Staff and contractors to be provided with appropriate training to ensure conservation significant fauna and associated habitat are protected.
- Prior to conducting ground disturbance activities, ensure known locations of environmentally sensitive areas are retained and protected from disturbance by installing appropriate signage, fencing or flagging.
- Record conservation significant fauna and habitat identified during a targeted fauna survey in a centralised database to ensure that these areas can be easily identified during mine planning and proposed works.
- Internal ground disturbance procedures and permitting system will be implemented.
- Develop and establish an internal clearing permit procedure for any required clearing works, which is discussed in the EMP. Conduct clearing in accordance with the permit and clearing procedure (to be developed).

| | |
|-----------------|--|
| | <ul style="list-style-type: none"> • Daily inspections of the waste storage facility to determine if fauna are entrapped within. • Removal of dead fauna away from edges of roads. • Implement appropriate mitigation measures such as speed limit restrictions, right of way for fauna and the prohibition of off-road driving. • Where possible, clearing should be undertaken on one front only, to provide an opportunity for the fauna to move out of the proposal area. • Dust suppression, including use of water carts on access roads, to be implemented during all Proposal phases • Proposal site induction to include information on prevention and management of fires. • All machinery and vehicles undertaking clearing activities will be fitted with firefighting equipment. • A Hot Work Permit system will be implemented. • Firefighting equipment will be located on site and emergency personnel will be trained in fire response. • Putrescible wastes associated with site offices to be stored in bins with lids and transferred to a licenced waste facility for disposal. • Develop and implement a Feral Animal Program to effectively manage and control feral animals within FIJV controlled sites to minimise impacts on conservation significant fauna. • Implement biannual weed monitoring and targeted spraying program at the Proposal following completion of land clearing activities and during operations and closure activities. • Continued biannual weed monitoring and targeted spraying program along the pipeline route to minimise existing weed populations and reduce potential spread into adjacent land. |
| <p>Outcomes</p> | <p>Residual impacts</p> <ul style="list-style-type: none"> • Clearing of 1,530 ha of fauna habitat and 18.49% fauna habitat within the MDE. Removed fauna habitats will be re-established as part of rehabilitation during operations and closure in disturbed areas and new permanent landforms. There may be some permanent loss of habitat such as the loss of 311.98 ha of BIF Ridgeline and up to 198.93 ha of granitic formations. • Fauna habitat will be rehabilitated following completion of works within that area, indicating that the habitat loss period will vary according to completion of works, and success rehabilitation. • Adjacent vegetation within the buffer of the Mine and PDE should remain intact with little or no disturbance allowing ecosystem processes to continue both at local and regional scale. • While the vegetation of the MDE plays a role in providing fauna habitat, none of the vegetation types that are affected in development of the Proposal are known to provide habitat critical to the maintenance of fauna species. The proposed development has been designed to minimise impacts to the granitic formations and BIF ridgeline, which are considered to be the most significant of habitats from a SRE fauna utilisation and refuge perspective. The impact on the riparian vegetation is restricted to creek crossings, with remaining riparian vegetation |

undisturbed. The residual impact to riparian vegetation is considered to be minor.

- The mine footprint is proposed to intersect areas of large uniform habitat, and through discrete sections of different habitats that coincide with landforms rehabilitation will establish habitat for fauna species post-disturbance to restore ecological linkage for some species.
- Whilst the vegetation communities on rehabilitated surfaces are unlikely to be similar to those removed, the resulting habitats will be generally used by fauna species present. Some permanent landforms may provide new habitat for some fauna species post-closure.
- Implementation of the proposed management measures will reduce direct impacts to fauna to as low as possible.
- Impacts to fauna due to light, dust and noise are anticipated to be limited to the short term, and not expected to impact on the ability of terrestrial fauna to persist long term. As such, the residual impacts are considered negligible.
- Weed management, construction of firebreaks and hot work permits will reduce the risk of fires caused by the proposal.
- Given there is currently no management of feral animals in the local area, the management of feral animals during operations may actually reduce the number of feral animals in the local area. This is likely to counterbalance the proposal's potential to provide improved access by feral predators into the area.
- Impacts to fauna due to introduction of weeds are not assessed to be significant as the management measures are anticipated to adequately manage this issue, and not expected to impact on the ability of terrestrial fauna to persist long term. As such, the residual impacts are considered negligible.

Assessment against the EPA objective

As the implementation of the Proposal is not assessed to have any significant residual impacts to terrestrial fauna, it is considered that the Proposal meets the EPA objective for this factor such that the biological diversity and ecological integrity of terrestrial fauna are maintained.

Offsets

Based on the results of the targeted survey for Western Spiny-tailed Skink, significant residual impact to the species will be determined and, if required, appropriate offsets, in accordance with the EPBC Act Environmental Offset Policy, will be considered and discussed with the DAWE.

Inland waters

| | |
|---------------|--|
| EPA Objective | <i>To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.</i> |
|---------------|--|

| | |
|---------------------|---|
| Policy and guidance | <p>EPA Policy and Guidance</p> <ul style="list-style-type: none"> • <i>Statement of Environmental Principles, Factors and Objectives</i> (EPA 2018b) • <i>Instructions on how to prepare an Environmental Review Document</i> (EPA 2016b) • <i>Environmental Factor Guideline Inland Waters</i> (EPA 2018c) |
|---------------------|---|

| | |
|-------------------|---|
| Potential impacts | <ul style="list-style-type: none"> • Alteration to surface water flows as a result of mining and infrastructure construction and operations, including potentially altering natural erosion and deposition patterns which could increase the surface water turbidity (Section 10.6.1) • Alteration of the hydrology of the area from groundwater abstraction (Section 10.6.2) • Impacts to inland wetland communities or groundwater dependent ecosystems as a result of groundwater drawdown (Section 10.6.3) • Contamination of surface water associated with Acid and Metalliferous Drainage (Section 10.6.4) • Groundwater contamination from Acid and Metalliferous Drainage (Section 10.6.5) • Impacts to inland wetland communities or groundwater dependent ecosystems as a result of groundwater drawdown and changes to groundwater quality (Section 10.6.6) |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Where possible, proposed infrastructure identified to be affected by flooding will be moved to areas which are less prone to flooding (most applicable to Waste Rock Formation (WRF), drainage water pond, and explosives warehouse as their locations are intercepted by the Western Primary Watercourse (WPW)) • Where possible, mining infrastructure will be placed to avoid interaction with major surface water features such as the WPW, and minor surface water features. • Pipelines in the PDE will be buried under water crossings to prevent the alteration of surface water flows. • Hazardous materials and waste will be subject to appropriate handling, storage and disposal procedures to avoid any impact on the environment. • Hazardous materials and waste will be subject to appropriate handling, storage and disposal procedures to avoid any impact to inland wetland communities or groundwater dependent ecosystems <p>Minimise</p> <ul style="list-style-type: none"> • Undertake design and construction of linear infrastructure corridors (access corridor, water pipeline) with the aim of minimising changes to the hydrology and geomorphology of the rivers and creek lines, and minimise the risk of exposure of dispersive soils. • Install appropriate cross-drainage along linear infrastructure corridors (including access routes, haul roads and pipelines) to reduce the impact of the proposed infrastructure on the existing flow paths and sediment deposition during flood events. • Install rock armour protection from scour and erosion along the edges of causeways. • The WPW may also need to be diverted in the south-western portion of the WRF to minimise flood risk, and allow the WRF area that is traversed by the WPW to be used for waste rock storage purposes (assuming the entire area proposed is required for such purposes). A bund, or other |

| | |
|---------------------|--|
| | <p>armouring would be required along the perimeter of the WRF to avoid erosive / structural impacts to the waste rock.</p> <ul style="list-style-type: none"> • The explosives warehouse, drainage water pond, ore stockpile, processing plant, workshop, and administration at the mine site may need to be raised and/or armoured to avoid erosive or structural impacts to the waste rock. • If Potential Acid Forming (PAF) material exists within the waste rock, it should be appropriately disposed in a dedicated facility which is constructed in a way which will prevent acid generation. • To minimise the impacts from saline drainage various water storages should be operated to ensure that they are well mixed and that any outflow to the environment considered the salinity it discharges. • All critical infrastructure will need to have the necessary flood protection measures and stormwater will be separated into clean and dirty water diversion channels. This will reduce the likelihood of contamination of downstream waters. • Any water discharged from the mine should be tested to confirm the suitability of discharge and/or treated to render the water suitable for discharge. • Monitoring of the surface water and groundwater will be undertaken throughout mine construction, operations and closure to assess for potential contamination. |
| Outcomes | <p>Residual impacts</p> <p>There is potential for significant surface water – groundwater interactions within the vicinity of the proposed mine site due to its location within an alluvial floodplain and the presence of ephemeral surface water drainage systems with flood-out zones, and paleo-drainage channels.</p> <p>Assessment against the EPA objective</p> <p>As the implementation of the Proposal is not assessed to have any significant residual impacts to inland waters, it is considered that the Proposal meets the EPA objective for this factor such that the hydrological regimes and quality of groundwater and surface water are maintained.</p> <p>Offsets</p> <p>This Proposal meets the EPA’s objective for the inland waters environmental quality factor. Residual impacts are not considered significant, and thus no offsets are proposed for this environmental factor.</p> |
| Air Quality | |
| EPA Objective | <i>To maintain air quality and minimise emissions so that environmental values are protected.</i> |
| Policy and guidance | <ul style="list-style-type: none"> • <i>Instructions on how to prepare an Environmental Review Document (EPA 2018a)</i> • <i>Statement of Environmental Principles, Factors and Objectives (EPA 2018b)</i> • <i>Environmental Factor Guideline Air Quality (EPA 2016m)</i> |
| Potential impacts | <ul style="list-style-type: none"> • Dust generation • Pollutant emissions from mining and power generation activities |

| | |
|------------|---|
| | <ul style="list-style-type: none"> • Ore processing • Post –closure rehabilitation • Greenhouse gas emissions |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Wet down areas ahead of blasting. • Vehicle speeds would be limited to 25 km/h on areas on unconsolidated or unsealed soil associated with the project. • Sprinklers on the fine ore stockpiles. • Review of daily weather updates from BoM, or a private meteorology service provider, to give warning of likely strong winds to assist with daily management of windblown dust from unconsolidated soil surfaces and material stockpiles. • All haulage vehicles are to have their loads covered while transporting material to or from the work area through off-site routes that may have sensitive receptors. • Operate water carts during dry, windy conditions and spring (i.e. driest) months • All construction and maintenance equipment/vehicles to be operated and maintained to manufacturers' specifications in order to minimise exhaust emissions. • Servicing should be undertaken by competent personnel who can interpret diesel emission monitoring results to minimise emissions following maintenance and repairs. • Use of hooding with baghouse (or fabric filter) with a dust extraction system. Regular maintenance inspections and repairs on dust extraction ducting and baghouses • Enclosure on conveyors. • Post-closure landforms are not to be left as bare earth and should be appropriately re-vegetated to reduce dust emissions. • The MCP (Appendix D) will be updated prior to closure to ensure that appropriate land formation characteristics are included and revised according to the new landforms. • Operating the power plant at a suitable efficiency to meet demand and not produce excess electricity. • Install energy efficient fittings, fixtures and equipment where appropriate. <p>Mitigate</p> <ul style="list-style-type: none"> • Defined haul routes to be used wherever it is necessary for vehicles to traverse unsealed surfaces or unformed roads. • Prompt mitigation of excessive visible dust emissions, which may involve a combination of: <ul style="list-style-type: none"> • Stabilisation of surface silt content through application of localised water sprays, or the use of appropriate chemical dust suppressants (suitable for access roads which are traversed less frequently). • Control of mechanically induced dust emissions (from clearing, excavation, loading, dumping, filling and levelling activities) by application of water sprays. |

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| | <ul style="list-style-type: none"> • Awareness of operational areas more frequently exposed to higher winds and the predominant wind directions in these areas at various times of the year. Temporary wind barriers may be employed where necessary. • An air quality monitoring programme for TSP, PM₁₀ and dust deposition will be implemented to determine ambient dust concentrations. A monitoring station for TSP and PM₁₀ will be located at the Yalgoo township and dust deposition gauges will be located at the boundary of the Site. Monitoring equipment and sampling methods will conform to Australian standards and will be selected prior to commencement of the dust monitoring programme. • Good maintenance practices will be implemented in an effort to reduce raw exhaust emission levels. • Implement diesel reduction plans that focus on emissions, these will be integral to the overall plan for reductions in workplace exposures. • Operators should report any equipment issues. |
| <p>Outcomes</p> | <p>Residual impacts</p> <p>Any changes in dust deposition is expected to be limited to the immediate vicinity of the mine and roads. The MDE is currently an active pastoral station, with dust generated as a result of cattle and vehicle movement. The mining operation are not expected to result in a measurable change to vegetation health in the wider region.</p> <p>Dust management measures implemented will reduce the amount received in nearby areas of vegetation and fauna habitat such that it is assessed to have no significant impact.</p> <p>It is unlikely that the Yogi Mine Project will have an adverse impact on local ambient air quality.</p> <p>Nearest sensitive receptor is located in the town of Yalgoo which is approximately 16 km east of the MDE.</p> <p>The majority of airborne particulates likely to originate from the proposed operations are greater than PM₁₀ and are more associated with nuisance rather than public health impacts. The larger particles tend to settle back to the ground within a short range (less than 300 m) from the source.</p> <p>Ore processing is assessed to have no significant impact on air quality given consideration of the control measures.</p> <p>Post-closure rehabilitation will be adequately planned to ensure that there are no significant impacts to air quality.</p> <p>Greenhouse gas emissions from the Proposal are anticipated to contribute to the overall global warming of the earth, with GHG emissions presently mainly attributed to power generation (70%).</p> <p>It is recommended that opportunities for reducing greenhouse gas emissions during the life of the Proposal should be investigated.</p> <p>Assessment against the EPA objective</p> <p>As the implementation of the Proposal is not assessed to have any significant residual impacts to air quality, it is considered that the Proposal</p> |

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| | <p>meets the EPA objective for this factor such that the emissions are minimised and air quality is maintained.</p> <p>Offsets</p> <p>Based on the assessment that implementation of the Proposal will not have significant residual impacts to air quality, no offsets are proposed.</p> |
| Social Surroundings | |
| EPA Objective | <i>To protect social surroundings from significant harm.</i> |
| Policy and guidance | <ul style="list-style-type: none"> • Statement of Environmental Principles, Factors and Objectives (EPA 2018b) • Instructions on how to prepare an Environmental Review Document (EPA 2016b) • Environmental Factor Guideline Social Surroundings (EPA 2016m) • Guidance for the Assessment of Environmental Factors, Assessment of Aboriginal Heritage No. 41 (EPA 2004a) • Guidance Statement 41 – Assessment of Aboriginal Heritage (EPA 2004b) |
| Potential impacts | <ul style="list-style-type: none"> • Loss/disturbance to Aboriginal or European heritage sites • Activities may occur in areas of Native Title • Negative impacts to pastoral lease operations and any tourism activities in the Development Envelope • Impacts to amenity values (including visual landscape, visual aesthetics values and recreational tourism) associated with the Pipeline corridor |
| Mitigation | <p>Avoid</p> <ul style="list-style-type: none"> • Mine design has considered the Aboriginal heritage within the Development Envelope and has been through a substantial number of versions balancing economic and cultural concerns <p>Minimise</p> <ul style="list-style-type: none"> • The Disturbance Footprint has been minimised by generating engineering solutions which have permitted the Proposal to remain feasible while reducing impacts on environmental and cultural values. <p>Rehabilitation</p> <ul style="list-style-type: none"> • Proposal disturbance areas to be rehabilitated in accordance with the Proposal MCP. |
| Outcomes | <p>Residual impacts</p> <p>This Proposal is expected to result in permanent changes to local landforms, specifically the BIF range. This could potentially affect the visual amenity at potentially sensitive receptors. However, visual impacts associated with additional permanent changes to local landforms as a result of this Proposal are not expected to be particularly prominent as the nearest sensitive receptor is approximately 16 km away. From the Mine Development Envelope there is limited accessibility and distance of the Proposal from potentially sensitive viewpoints. Much of the Pipeline development envelope lies within an already altered landscape given the pipeline is proposed to follow closely the existing Dampier-Bunbury Natural Gas Pipeline and the proximity of the Proposal to the existing Mount Magnet Road and other surrounding land uses (pastoral). Views of the</p> |

Proposal from potentially sensitive viewpoints are also expected to be obscured by local topography and existing vegetation. As such, visual impacts are expected to be limited.

Assessment against the EPA objective

As the implementation of the Proposal is not assessed to have any significant residual impacts to Social Surroundings, it is considered that the Proposal meets the EPA objective for this factor such that the cultural, heritage and amenity values will be maintained.

Offsets

Based on the assessment that the clearing will not have significant residual impacts, no offsets are proposed.

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Appendices

Appendix A – Environmental Scoping Document

Appendix B – Supporting Documents

Appendix C – Management Plans

Appendix D – Mine Closure Plan

Acronyms

| Abbreviation | Description |
|--------------|--|
| ACMC | Aboriginal Cultural Material Committee |
| AH Act | <i>Aboriginal Heritage Act 1972</i> |
| BoM | Bureau of Meteorology |
| DAA | Department of Aboriginal Affairs |
| DAFWA | Department of Agriculture and Food Western Australia |
| DBCA | Department of Biodiversity, Conservation and Attractions |
| DEC | Department of Environment and Conservation |
| DAWE | Department of Agriculture, Water and the Environment |
| DJTSI | Department of jobs, Tourism, Science and Innovation |
| DMA | Decision Making authorities |
| DMIRS | Department of Mines, Industry Regulation and Safety |
| DoH | Department of Health |
| DPLH | Department of Planning Lands and Heritage |
| DPIRD | Department of Primary Industries and Regional Development |
| DPWF | Dry Processing Waste Facility |
| DWER | Department of Water and Environmental Regulation |
| EIA | Environmental Impact Assessment |
| EP Act | <i>Environmental Protection Act 1986</i> |
| EPA | Environmental Protection Authority |
| EPBC Act | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| ESA | Environmentally Sensitive Area |
| ERD | Environmental Review Document |
| ESD | Environmental Scoping Document |
| FIJV | FI Joint Venture Pty Ltd |
| GDE | Groundwater dependent ecosystem |
| GHG | Greenhouse gas |
| GLpa | Gig litres per annum |
| ha | Hectare |
| km | Kilometre |
| kL | Kilolitre |
| LGA | Local government area |
| m | Metre |
| MDE | Mine development envelope |
| MNES | Matters of National Environmental Significance |
| MS | Ministerial Statement |
| Mtpa | Million tonnes per annum |
| PDE | Pipeline development envelope |
| s | section |
| TJ | Terra joule |
| TWS | Town water supply |
| WRD | Waste Rock Dump |

1. Introduction

1.1 Purpose of this document

FI Joint Venture Pty Ltd (FIJV, the Proponent) proposes to establish and operate a magnetite iron ore mine approximately 250 km east-northeast of Geraldton and 15 km northeast of Yalgoo in the Mid-West region of Western Australia (WA) (Figure 1-1). The Yogi Magnetite Mine project (the proposal) also includes a slurry pipeline from the mine site to Geraldton port, a return water pipeline, and a gas supply pipeline from the Dampier to Bunbury Natural Gas Pipeline.

This Environmental Review Document (ERD) has been prepared to support the assessment of the proposal by the WA Environmental Protection Authority (EPA). This document has been prepared as required under section 40(2)(b) of the *Environmental Protection Act 1986* (EP Act). It is presented in the format specified in the EPA (2018a) *Instructions on how to prepare an Environmental Review Document*, and in accordance with the EPA endorsed *Environmental Scoping Document* (ESD) (GHD 2019a) for the Yogi project.

The purpose of this ERD is to provide sufficient information on the preliminary key environmental factors identified in the ESD to enable the WA Environmental Protection Authority (EPA) to assess the project and to allow public and decision making authorities (DMAs) to review and comment on the proposal. This document presents information on key stakeholders, the details of the technical studies undertaken as part of the environmental assessment, and the proposed mitigation measures associated with the construction and operation of the Yogi Magnetite Mine.

1.2 Proponent

The Proponent is FIJV, a private mining investment company with a sole shareholder, FSTA Australia Pty Ltd, owned by Fakoor Sanat Company. The contact details for the Proponent are:

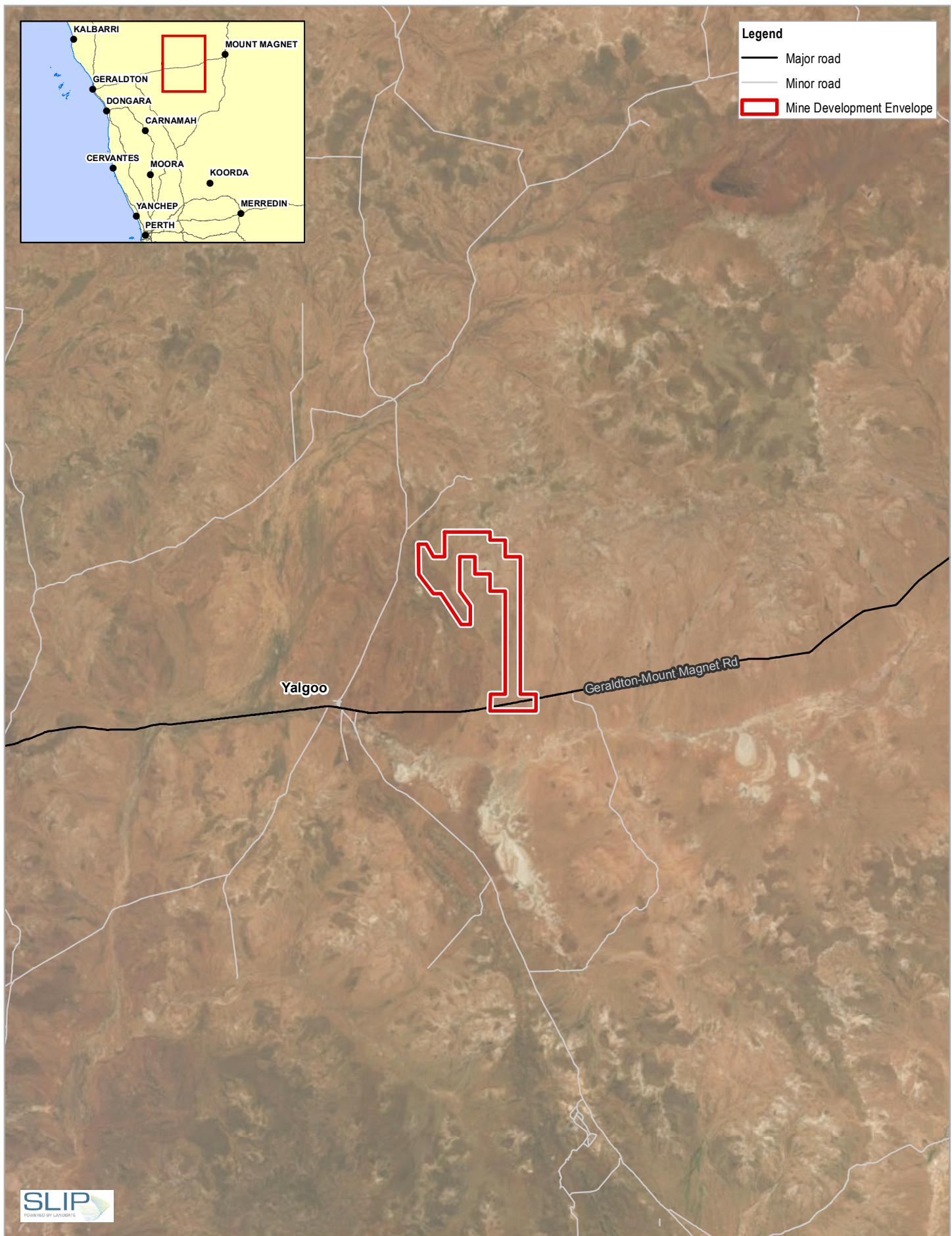
Shadi Sadegh
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Level 14, Forrest Centre
221 St George's Terrace
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Telephone: T: +61 8 9485 0579
Email: s.sadegh@fstco.com.au; s.sadegh@fstco.com

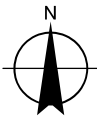
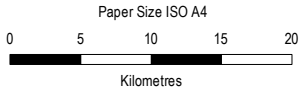
ABN: 51 611 846 023

ACN: 611 846 023



Legend

- Major road
- Minor road
- Mine Development Envelope



**FI Joint Venture Pty Ltd
Environmental Review Document**

Project No. **61-37117**
Revision No. **0**
Date **12 Jul 2019**

Proposal Location

FIGURE 1-1

G:\6137117\GIS\Maps\Working\Environmental Review Document\6137117_001-1_ProposalLocation_rev0.mxd
Print date: 12 Jul 2019 - 12:05
Data source: GHD: Survey Area - 20180622; Landgate: Roads - 20181023; Imagery - Taken September 2012 - Accessed 20181210 Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: cgyerzosa

1.3 Environmental impact assessment process

1.3.1 *Environmental Protection Act 1986*, Part IV Environmental Impact Assessment

The EP Act is the primary legislation governing environmental impact assessment in WA and Part IV of the EP Act relates to Environmental Impact Assessment, which is carried out in accordance with the EPA Administrative Procedures (2016a). This proposal was referred to the EPA under s 38 of the EP Act. The Referral Form outlining the proposal was submitted to the EPA on 19 December 2017. Further information on the proposal was submitted on 5 and 29 January 2018. Following assessment of the referral, the EPA determined that this proposal requires assessment at the level of 'Public Environmental Review' with a six week public review period (EPA 2018c).

An ESD (GHD 2019a) was prepared for the proposal and approved by the EPA on 29 April 2019. The ESD defined the proposal specific requirements and the form and content of this ERD, including the preliminary key environmental factors that need to be addressed, and the technical work required. The ESD (GHD 2019a) is provided in Appendix A.

The ERD will be released by the proponent for a public review period of six weeks. The EPA will then provide a summary of the submissions on the ERD for the Proponent to then respond. The EPA will then review the response to the submissions and may publish the proponent's response to the submissions on the EPA website if appropriate. The EPA prepares a draft assessment report, and after two weeks consultation on the draft conditions, completes the assessment and gives the report to the Minister.

The Minister will review the assessment report, and draft conditions, and upon their approval cause the report to be published and copies of the report to be given to concerned Ministers, decision-making authorities, the Proponent and the Referrer. The Assessment Report will also be published on the EPA website.

1.3.2 *Environment Protection and Biodiversity Conservation Act 1999*

The Australian Government *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) covers the assessment of proposals which may have a significant impact on Matters of National Environmental Significance (MNES).

The proposal was referred to the Australian Government Department of Agriculture, Water and the Environment (DAWE) on 1 February 2018 under the EPBC Act. On 20 April 2018, DAWE deemed the proposal to be a 'Controlled Action' under the EPBC Act due to its potential direct or indirect impacts on one of the nine MNES. This included:

- Listed threatened species or any threatened ecological community, or their habitat

As part of this decision, the DAWE also prescribed that the proposal will be assessed under s 87 of the EP Act as an accredited assessment.

To satisfy the requirements for completing an accredited assessment, a separate section of this ERD discusses the relevant MNES (Section 13). The section summarises the potential impacts on the MNES and describes, to the extent practicable, any feasible alternatives to the proposed action and possible mitigation measures. Proposed offsets to address significant residual impacts on MNES will also be discussed, if appropriate.

1.4 Other approvals and regulation

This proposal is also subject to compliance with other relevant state legislation and regulations and is guided by relevant key over-arching state policies and strategies. The relevant approvals considered for the Proposal are provided in Table 1-1.

Table 1-1 Summary of regulatory approval requirements for the Yogi mine proposal

| Proposal activities | Land tenure/ access | Type of approval | Legislative regulating the activity |
|---|------------------------------|---|--|
| Construct groundwater bores | Crown land – LA Act, Min Act | Licence to Construct Wells | Section 26D of the <i>Rights in Water and Irrigation Act 1914</i> (Department of Water and Environmental Regulation) |
| Groundwater extraction | Crown land – LA Act, Min Act | Licence to Take Groundwater | Section 5C of the <i>Rights in Water and Irrigation Act 1914</i> (Department of Water and Environmental Regulation) |
| Installation of buildings and any other infrastructure | Crown land – LA Act, Min Act | Planning and building approvals | <i>Building Act 2011</i> <i>Planning and Development Act 2005</i> (Shire of Yalgoo) |
| Sewage treatment or septic tanks | Crown land – LA Act, Min Act | Licence for sewage treatment or septic tanks | <i>Building Act 2011</i> <i>Planning and Development Act 2005</i> (Shire of Yalgoo) |
| Disturbance of an Aboriginal heritage site | Crown land – LA Act, Min Act | Consent to use the Land for a given Purpose is required under section 18 | <i>Aboriginal Heritage Act 1972</i> (Department of Planning, Lands and Heritage) |
| Proposal development | All | Aboriginal land interest (where applicable) for native title processes for the granting of tenure | <i>Cth Native Title Act 1993</i> (Native Title Tribunal) |
| Impacts to MNES | All | Approval to develop proposal | <i>Cth Environment Protection and Biodiversity Conservation Act 1999</i> (Department of Agriculture, Water and the Environment) |
| Mining project on Mining Act Tenure | Crown land – LA Act, Min Act | Mining Proposal | <i>Mining Act 1978</i> DMIRS |
| Works Approval (for construction) and Licence (to commence and continue operations) | Crown land – LA Act, Min Act | Environmental Protection Works Approval and Licence | Part V of the EP Act (Department of Water and Environmental Regulation) |

1.4.1 Land Tenure

The Yogi Project is located on Mining Lease (M) 59/740 and M 59/637, which was granted in 2011 and 2007 respectively under the *Mining Act 1978* (WA) (Mining Act). Approval under the Mining Act will be required for the development of the proposal.

The majority of the mine pit, waste rock/overburden and processing infrastructure is located in M 59/740. A small portion of the southern end of the mine pit is located within M59/637. Additional infrastructure at the proposed Yogi Project that will be located on Miscellaneous Licence L 59/156.

1.4.2 Native title

Native title recognises the traditional rights and interests to land and waters of Aboriginal and Torres Strait Islander people. An Aboriginal Heritage Assessment was completed by Brad Goode & Associates (2019) on behalf of FIJV as part of the planning for the Yogi mine. The MDE and PDE lie within the Widi Mod Native Title Claim (NNTT No. 2661). The PDE also covers the Mullewa Wadjari Community, the Wajarri Yamatji and the Southern Yamatji.

Native Title and impacts to Native Title are discussed in Section 12.

1.4.3 Aboriginal heritage

An Aboriginal Heritage assessment was completed by Brad Goode & Associates (2019) as part of the planning for Yogi Mine. The assessment included a desktop assessment of the Department of Planning, Lands and Heritage (DPLH) *Aboriginal Heritage Inquiry System* (Brad Goode & Associates 2019).

A search of the DPLH Aboriginal Sites and Places register revealed eight Registered Aboriginal heritage sites within the PDE (Brad Goode & Associates 2019). There are 24 'Other heritage Places' on the Aboriginal Sites and Places register within the PDE (Brad Goode & Associates 2019).

Within the MDE there are two 'Other Heritage Places', one of which is also partially within the PDE. The two 'Other Heritage Places' are not within the current footprint for mining or its associated infrastructure.

Aboriginal sites and places present within or in close proximity to the Proposal area are further discussed in Section 12.

1.4.4 Decision making authorities

The proponent identified the authorities listed in Table 1-2 as decision making authorities (DMA's) for the proposal.

Table 1-2 Nominated Decision-making authorities

| Decision making authorities | Relevant legislation and Agency |
|--|--|
| Department of Agriculture, Water and the Environment (Commonwealth) | <i>Environment Protection and Biodiversity Conservation Act 1999</i> |
| Minister for Aboriginal Affairs (Western Australia) | <i>Aboriginal Heritage Act 1972</i> |
| Minister for Environment (Western Australia) | <i>Environmental Protection Act 1986</i> <i>Biodiversity Conservation Act 2016</i> |
| Minister for Lands (Western Australia) | <i>Land Administration Act 1997</i> |
| Minister for Mines and Petroleum (Western Australia) | <i>Mining Act 1978</i> |
| Director General, Department of Water and Environmental Regulation (Western Australia) | <i>Environmental Protection Act 1986</i> <i>Rights in Water and Irrigation Act 1914</i> |
| Executive Director: Department of Mines, Industry, Regulation and Safety (Western Australia) | <i>Mining Act 1978</i> |
| Shire of Yalgoo | <i>Local Government Act 1995</i> |

2. The Proposal

2.1 Background

The Proposal was referred to the EPA on 19 December 2017, with additional information submitted on 5 and 29 January 2018. Following assessment of the referral, the EPA set the level of assessment at 'Public Environmental Review' and designated the requirement for a six week public review period.

An ESD (GHD 2019a) was prepared for the proposal and approved by the EPA on 29 April 2019. The ESD defined the proposal specific requirements and the form and content of this ERD, including the preliminary key environmental factors that need to be addressed, and the technical work required.

The preliminary key environmental factors included: Flora and Vegetation, Subterranean Fauna, Landforms, Terrestrial Environmental Quality, Terrestrial Fauna, Inland Waters, Air Quality and Social Surroundings.

The ESD (GHD 2019a) is provided in Appendix A.

2.1.1 Modification to the Proposal since referral

Since the initial referral of this proposal to the EPA, the proponent has requested a modification to the pipeline alignment, which reduced the amount of clearing required from 1500 ha to 600 ha, and the size of the PDE from 383,850 ha to 76,800 ha. This modification was approved by the EPA following assessment under s 43A of the EP Act.

Since the approval of the ESD, a number of amendments were requested by the proponent. The size of the MDE has been reduced from 9,410 ha to 8,230 ha. This is a reflection of the total area available within the mining tenements. The area of the PDE has changed, from 800 ha to 200 ha, due to a change in the pipeline route to the east of Geraldton, which was diverted to the south of Geraldton Airport. The estimated amount of clearing required within the MDE decreased from 3,100 ha to approximately 1,530 ha. The estimated amount of clearing required within the PDE decreased from 600 ha to 200 ha.

The location of the Borefield, as denoted in Figure 2-1, may require repositioning due to geological characteristics of the MDE. The groundwater assessment targeted the area of alluvial geology and paleochannel present on the southern end of the MDE within the Miscellaneous Licence area.

2.2 Proposal Description

2.2.1 Key project characteristics

A summary of the Proposal is provided in Table 2-1 and the key proposal characteristics for the proposal are outlined in Table 2-2.

The construction of the iron magnetite mine and associated mining infrastructure will have a total footprint of 1,530 ha within an 8,230 ha mine development envelope (MDE). The pipeline will have a maximum footprint of 200 ha within a 75,800 ha pipeline development envelope (PDE).

For the purposes of this report, the PDE has been divided into two portions: the western and the eastern portions. The eastern portion covers approximately 80 km of the pipeline corridor, extending from the MDE to east of Mullewa and is the area covered by the pipeline flora and

fauna technical study (GHD 2020c). The eastern portion of the PDE is approximately 500 meters (m) wide and covers 4,654.86 ha. The remainder of the PDE is referred to as the western portion, which was not covered by biological assessments and comprises mostly agricultural and pastoral land uses.

A limit of 200 ha of clearing in the PDE is included as a Key Characteristic in Table 2-2. It is anticipated that the majority of this clearing (approximately 178 ha) will be within the eastern portion of the PDE. Clearing will be avoided, and if not minimised, within the western portion of the PDE. However, an area of up to 22 ha may be required to be cleared within the western portion of the PDE.

Given the location of the pipeline in the western portion of the PDE is still being determined in consultation with landholders and the limited extent of remnant vegetation in this area, surveys have not been undertaken at this point. However, a desktop assessment of the western portion of the PDE has been undertaken to identify clearing ‘avoidance areas’ based on the location of previously recorded Threatened and Priority flora and fauna species. Should the pipeline route identify the requirement to clear native vegetation within the western portion of the PDE appropriate surveys will be undertaken prior to clearing.

The commitment to undertake pre-disturbance surveys within the PDE are described further in the Environmental and Rehabilitation Management Plan (GHD 2020e).

Accommodation arrangements for construction and operation personnel has yet to be decided.

The location of the individual elements of the Proposal (e.g. pit, dumps, processing plant, internal haul roads and other infrastructure) remains subject to ongoing mine planning, engineering and related studies through the Feasibility Study that is currently not complete.

Physical elements of the Proposal outlined in Table 2-2 within the MDE are presented in Figure 2-1 and those within the PDE are presented in Figure 2-2.

The individual elements of the MDE have been incorporated into the total proposed clearing area for the MDE. The proposed clearing areas for the MDE and the PDE are provided as conservative values, and the actual anticipated clearing areas are less than these areas. Clearing is discussed further in impacts relating to clearing of vegetation (Section 5.6.1) and loss of fauna habitat (Section 6.6.1).

2.2.2 Proposal location

The Yogi Magnetite Mine site is located approximately 250 km north-east of Geraldton and 15 km north-east of Yalgoo, within the Shire of Yalgoo, in the Mid- West Region of Western Australia (Figure 1-1).

The pipeline broadly follows the Mt Magnet road from the Yogi Mine Project area, west for approximately 80 km from the town site of Yalgoo.

Table 2-1 Summary of the Proposal

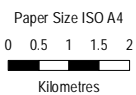
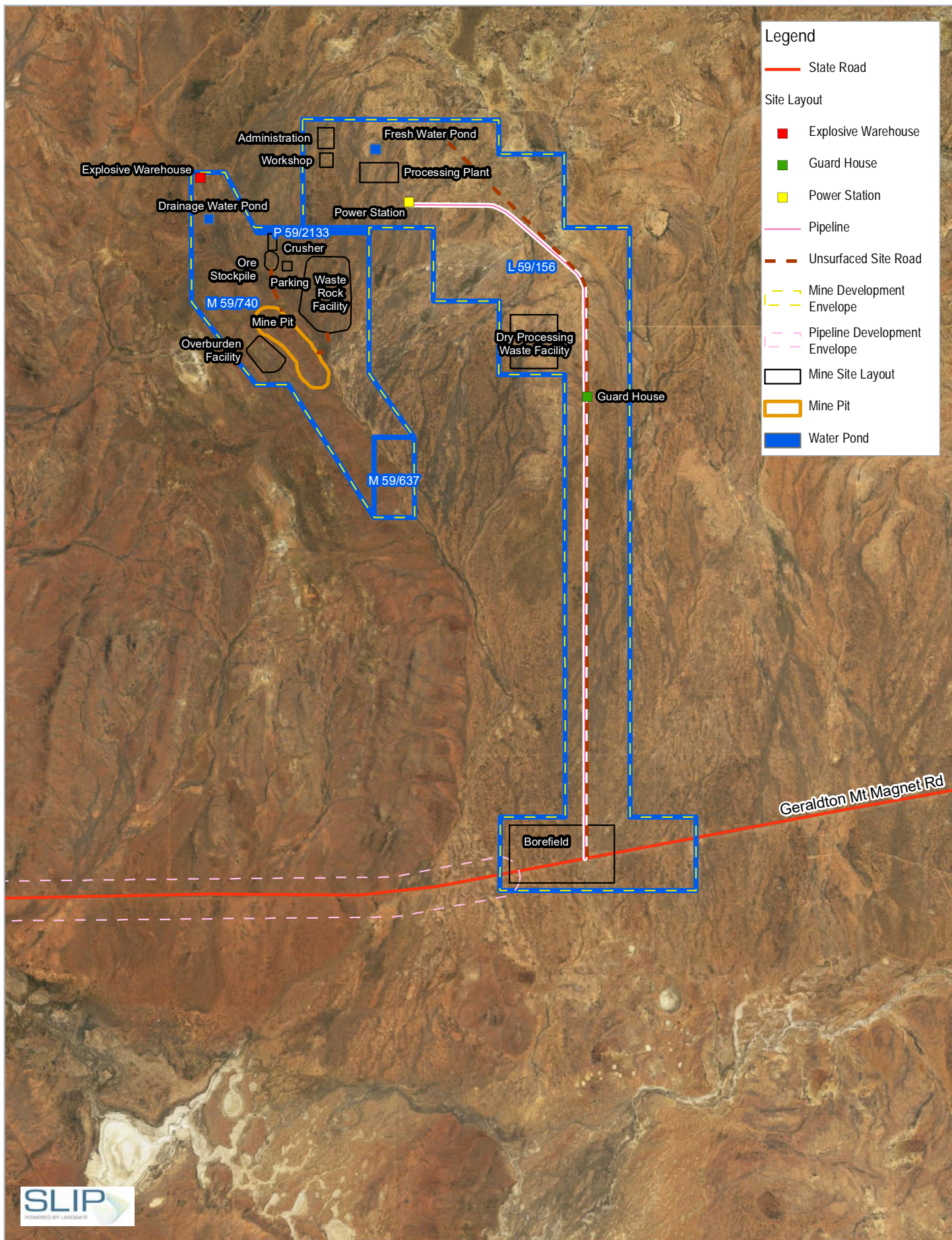
| | |
|----------------------|---------------------------------|
| Proposal title | Yogi Mine Project |
| Proponent Name | FI Joint-Venture Pty Ltd |
| Proponent Activities | Mine construction and operation |

| Proposal title | Yogi Mine Project |
|-------------------|--|
| Short Description | <p>Yogi Mine</p> <p>The Proposal is to construct and operate an open-cut mine referred to as the Yogi Mine Project and will include construction of all relevant mining infrastructure (such as haul roads, processing plant, dry processing waste facility (DPWF), run mine pad, crusher, electricity generation, fuel storage site, treated ore stockpile pad, crusher, explosive warehouse and general onsite buildings).</p> <p>Mining of magnetite will occur below groundwater and will include open cut mine operation. The operation will involve clearing and topsoil stockpiling, overburden drilling and blasting, followed by removal of material by truck.</p> <p>Pipeline Corridor</p> <p>The Proposal also includes construction of a pipeline corridor for a slurry pipeline, water pipeline and gas pipeline. The gas pipeline will supply gas from the Dampier to Bunbury Gas Pipeline Network to the Yogi Mine.</p> <p>The slurry and water pipeline will extend from the Mid West Ports to the Yogi Mine. The water pipeline will supply water from the Port Dewatering Plant to the Yogi mine for re-use in the processing plant.</p> |

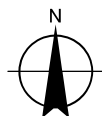
Table 2-2 Key proposal characteristics for the Yogi Mine Project

| Physical Elements | Location | Proposed extent |
|--|---|--|
| <p>Mine Development Envelope</p> <p>Including Mine Pit, Mining overburden and Waste Facilities, Dry Processing Waste Facility, Mine and Processing Support Infrastructure and Corridors</p> | Figure 2-1 | Clearing of no more than 1,530 ha within a 8,230 ha Development Envelope |
| <p>Pipeline Development Envelope</p> <p>Including Magnetite Slurry Pipeline, Water Pipeline, and gas pipeline</p> | Figure 2-2 | Clearing of no more than 200 ha within the 76,800 ha |
| Operational Elements | Details | |
| Groundwater Abstraction (Water demand) | Up to 5 gigalitres per annum (GLpa) from water supply borefield | |
| Mine site dewatering | Up to 5 GLpa (to be used for processing) | |
| Power | 70 MW to be supplied by onsite Gas Power Station | |

| | |
|------------------------|---|
| Gas Supply | Gas to be supplied to the power station via a buried steel pipeline at a rate of 23 TJ/day |
| Overburden/ Waste Rock | Disposal of up to 800 million tonnes (over the life of the project) |
| Ore Processing Waste | Disposal of up to 80 million m ³ of dry processing waste (over the project life) |
| Ore transport | Ore will be transported as a slurry in the new slurry pipeline proposed to be constructed between Yogi Mine and Geraldton Port. |



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50



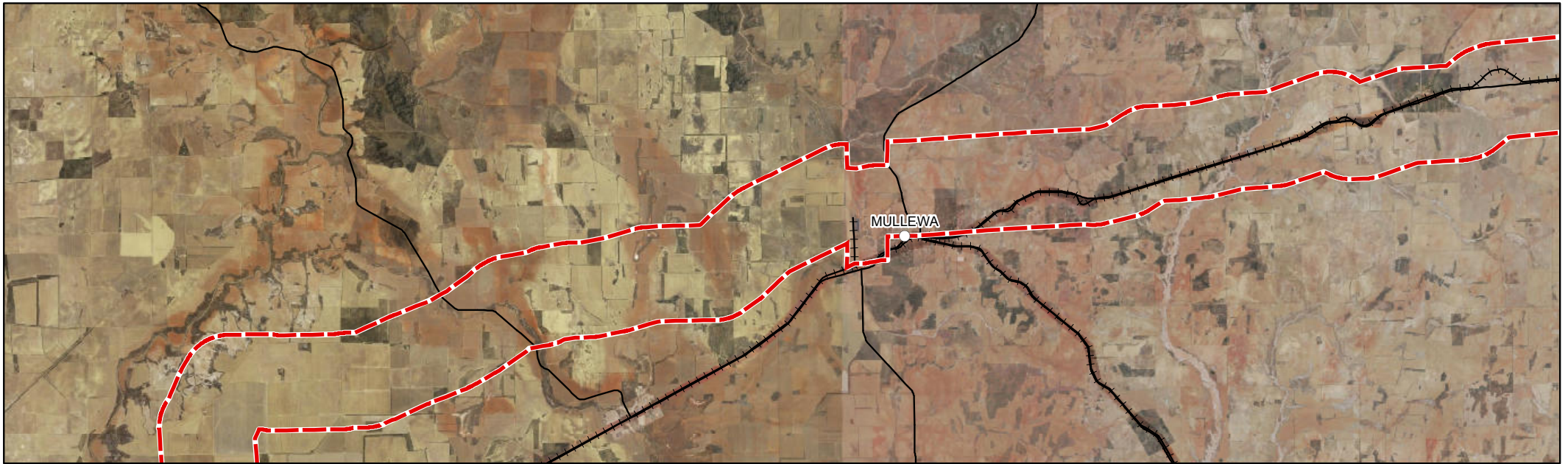
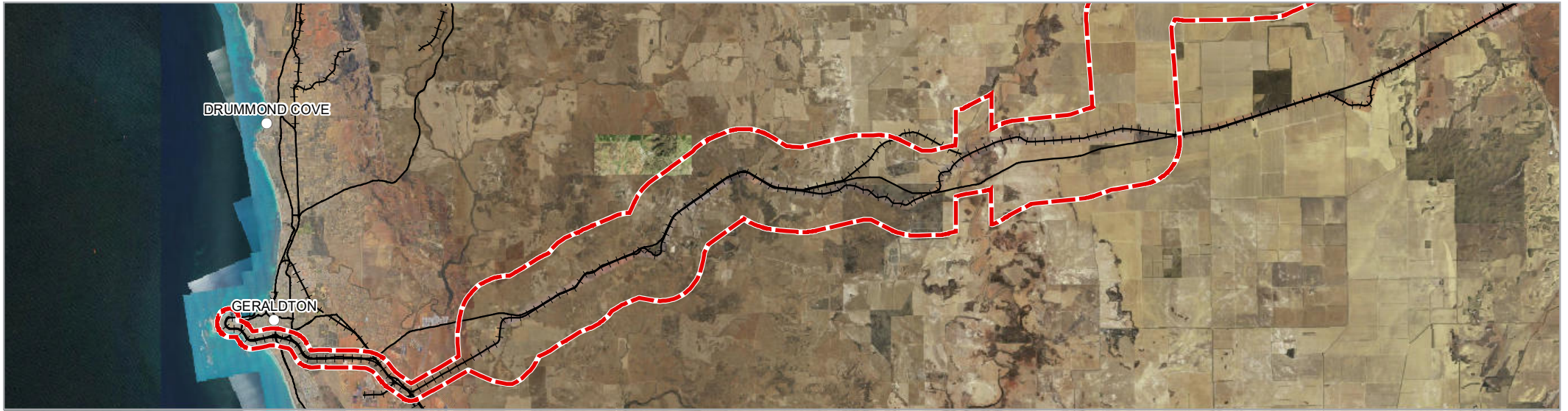
FI Joint Venture Pty Ltd
 Environmental Review Document

Mine Development Envelope

Project No. 61-37117
 Revision No. 0
 Date 26 Feb 2020

FIGURE 2-1

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Legend

- City
- Main Roads
- Railways
- Pipeline Development Envelope

Paper Size ISO A4



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



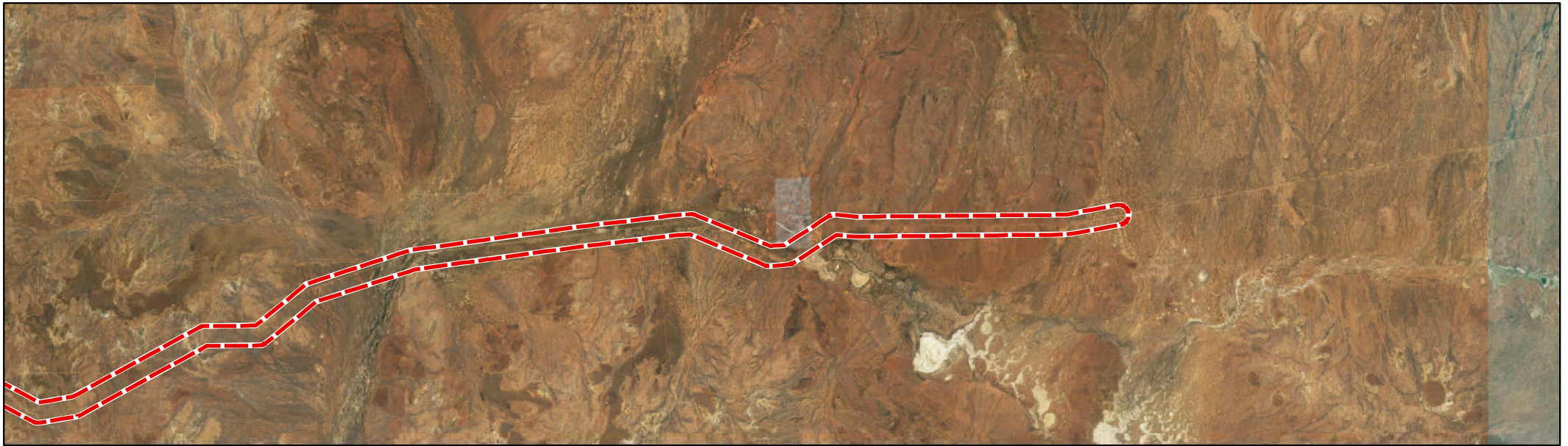
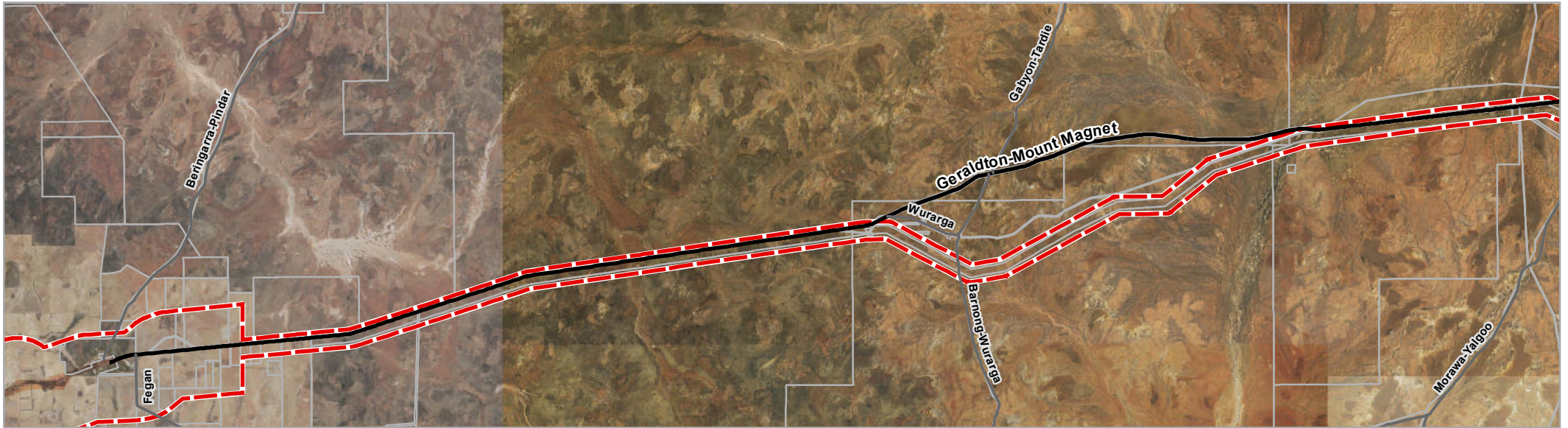
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Pipeline Development Envelope

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Date 13 Mar 2020

FIGURE 2-2

Page 1 of 2



Legend

-  Major roads
-  Pipeline Development Envelope
-  Minor roads
-  Cadastral boundary

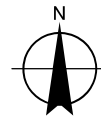
Paper Size ISO A4

0 1 2 3 4



Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



FI Joint Venture Pty Ltd
Environmental Review Document

Pipeline Development Envelope

Project No. 61-37117
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FIGURE 2-2

Page 2 of 2

2.2.1 Construction

Construction is anticipated to commence in Q1 2021, once all FIJV and regulatory approvals are secured. Some early works (e.g. construction camps) will be undertaken prior to the main development construction; however these are considered to be excluded from the Proposal (Section 4.3). These schedules may change, depending on external approvals, internal funding approvals, business priorities and market conditions.

2.2.2 Operation

Operation of the mine is anticipated to commence in 2025, with an estimated mine life of around 21 years.

Mining

Mining will employ conventional open pit methods of drill and blast followed by load and haul, similar to the methods employed at other open cut mines in the Mid-west and Pilbara. Mine sequencing will be dependent on a number of variables including grade, mining costs and product demand from customers and will change over the life of the Proposal. A mine pit within the single ore body will be actively mined at any given time.

Mine dewatering will be required where the mine pit intersects groundwater. Mine dewatering uses a series of abstraction bores situated either within, or in close proximity, to the pit to gradually lower the groundwater table in the local area.

Waste rock handling

Geological waste rock will be used on site for earthworks purposes, where possible. Excess waste rock will be stored in waste dumps, which may be either permanent or temporary, adjacent to the mining operation.

The waste dumps will be designed to be suitably stable, in consideration of industry accepted geotechnical design scenarios and stakeholder agreed acceptable erosion rates, and where possible, reflect the natural topography.

Where waste rock with the potential to generate Acid and Metalliferous Drainage (AMD) is identified, the deleterious waste rock will be encapsulated within 10 m or more of benign waste rock, to minimise oxidation and to ensure the material is not exposed to the surface post-closure. Details on the geochemical nature of the waste rock is provide in Section 8.

As part of the normal mine planning process, FIJV will construct each waste rock dump to ensure the appropriate placement of waste materials to ensure the ability to achieve the closure landform design objective is not compromised.

Low grade ore handling

Low grade stockpiles will be used to temporarily or permanently store material that does not meet current product strategy specifications. This material may be used if product strategies change over time or as a source of lower grade material for blending with high grade ore. These stockpiles will be designed in accordance with waste rock landform designs.

Ore handling and processing

The ore will be processed on site by a 5 million tonne per annum (Mtpa) Iron Ore Concentrate Plant. The magnetite ore would be transported by truck to the Run of Mine stock pile and then processed through the following means:

- Primary Crushing
- Secondary Crushing
- Stockpile and Reclaim
- High Pressure Grinding Roll Grinding and Air Classification.
- Low Intensity Magnetic Separation
- Tertiary grinding
- Concentrate Filtration
- Dry processing waste thickening and dewatering

Process waste management

The wet processing waste will be slurried, thickened, and dewatered within the processing plant. Waste dewatering will be carried out using a press filtration system to produce clean water for recycling to the processing plant for reuse. The dewatered processing waste will be transferred to a dedicated and suitably designed disposal facility (the DPWF) within the Development Envelope. Any dry processing waste will be placed within an appropriately designed waste disposal facility within the Development Envelope.

Transport

The magnetite ore will be transported as a slurry within a pipeline to Geraldton Port. A return water pipeline will be used to transport water from the Port Dewatering Plant to the mine site for re-use in the processing plant.

Water efficiency and re-use

A number of measures will be used to optimise water efficiency and re-use measures, including:

- Mine dewatering water will be used as feed water for the processing plant.
- The ore concentrate will be dewatered at Geraldton Port and recycled water will be returned to the Yogi site processing plant via the pipeline for re-use.
- The wet waste stream within the processing plant will be dewatered and the water recovered recycled in the processing plant.

Pipeline

The pipeline will be installed within the PDE and will comprise three pipes: a slurry pipeline to transport slurry from the ore processing plant to Geraldton Port; return water pipeline from Geraldton Port; and gas supply connection from the Dampier Bunbury Natural Gas Pipeline.

Workforce and accommodation

The source of the workforce and accommodation for the workforce is not yet known. This will be revised at later stages in the mine planning process.

Wastewater treatment

A small wastewater treatment plant will be constructed to manage wastewater generated onsite by the construction and operation workforce.

Treated wastewater will be irrigated in an area designated as suitable, however a specific site has yet to be selected. Site suitability will be determined through soil characteristics, final site layout, and landform characteristics.

Power supply

Electrical power supply will be provided off the power station proposed to be constructed within the MDE. This proposed power station is estimated to provide 70 MW of power.

Diesel powered generators will be used during construction, some of which will be retained on-site during operations for emergency back-up power supply.

2.3 Justification and alternatives considered

This section outlines the justification for this Proposal and summarises the alternative options considered. The intent of this section is to provide an overview of the options that have been considered by the Proponent to minimise the potential environmental impacts resulting from this Proposal.

2.3.1 Benefits of the Proposal

The projected long-term demand for iron ore is considered unlikely to decline. While the iron content of magnetite ore in the ground is generally around 20% to 30%, once the ore has undergone processing to produce a concentrate, iron content is often higher than that found in hematite ores. The Yogi deposit is estimated to obtain approximately 65% iron ore once processed.

Magnetite concentrate is also lower in impurities. The higher grade and lower impurities of magnetite concentrate increases the efficiency of steel making furnaces, thereby reducing the energy and cost required to produce steel. This has resulted in magnetite concentrate being a preferred source of iron for many steel makers, making up about 30% of global furnace feed.

Implementation of the proposal provides the opportunity to contribute to the creation of employment and training opportunities for local and indigenous community members, royalties and taxation payments from the sale of iron ore, and supports the development of ancillary industries in Western Australia, and is anticipated to result in the following benefits:

- Promote economic activity in the Mid-West, particularly the growth of the Geraldton Port.
- Increase employment and training opportunities for the local and indigenous community during both the construction and operational phases of the Yogi Mine Project.
- Royalties and taxation payments from the sale of iron ore.
- Create a supply chain between Western Australia and other countries to better meet global demand.
- Once the magnetite has undergone processing to produce a concentrate, the iron content is often higher than found in hematite ores, and the level of impurities less. This makes the magnetite ore a more efficient option for use in steel furnaces.

2.3.2 Alternative options considered

Alternative location of mine pit and associated mine infrastructure

The location of the Banded Ironstone Formations (BIF) within the Proposal area limits the possible alternative locations of the mine footprint. Although the footprint of the open cut pit is

limited to existing geological formations, alternative locations of mining infrastructure and support services were considered in order to minimise impacts to significant environmental and heritage features. However, placement of the mining infrastructure and support services was limited due to the topography of the area, with hills on multiple sides, and the shape of the tenements. Following the results of environmental surveys and in consideration of the aforementioned constraints, infrastructure was relocated in order to avoid communities of Priority Flora, and threatened fauna and/or areas of heritage significance and to utilise existing disturbed areas where possible. The final locations of infrastructure in relation to the environmental and heritage features are discussed further in Section 2.2.

Pipeline development location

A number of possible pipeline routes were considered during the development of this proposal to ensure the most appropriate and least environmentally impact option was chosen. The final PDE was the preferred option as it was designed to avoid any Nature Reserves.

The proposed PDE is also constrained by land tenure on the north and south sides along the entire route, which leaves little opportunity to revise the route.

2.4 Local and regional context

2.4.1 Climate

Climate characteristics

The climate of the region is Mediterranean, with warm semi-arid to arid conditions. The region experiences a hot and dry summer (December to February) and a mild wet winter (June to August) (Payne et al. 1998; Markey and Dillon 2006). The closest current Bureau of Meteorology (BoM) weather station to the site is in Mount Magnet (Station 1D: 007600) located approximately 115 km east north-east of the Yalgoo town site.

The mean annual rainfall recorded in Mt Magnet is 217.1 mm, with an average of 56 days of rain per year (BoM 2019). Rainfall may occur throughout the year, however predominately occurs in winter in association with a low pressure system and westerly winds. Summer rainfall occurs as a result of thunderstorms associated with remnant tropical low pressure systems. The mean maximum temperature ranges from 18.8 °C in July to 37.9 °C in January. The mean minimum temperature ranges from 7.0 °C in July to 23.5 °C in February.

The nearest BoM climatic station to the PDE with reliable data is the Mullewa station (Station ID: 008095). According to this station, the average annual rainfall at Mullewa is 333.7 mm with an average of 43.9 days of rainfall each year (BoM 2018).

Summary climate data recorded at Mt Magnet Station from years 1995 to 2019 and at Mullewa Station from year 1896 to 2019 are presented in Figure 2-3 and Figure 2-4, respectively.

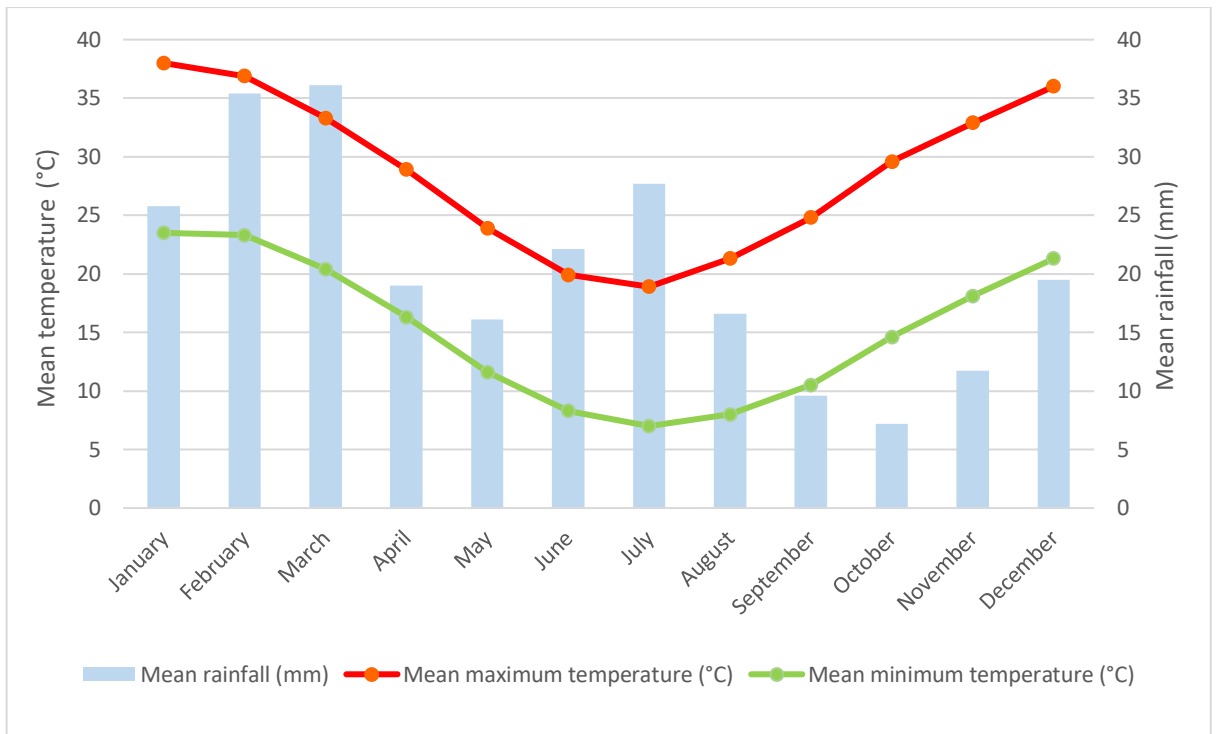


Figure 2-3 Mt Magnet (Station ID: 007600) Climate Statistics from 1995 to 2019

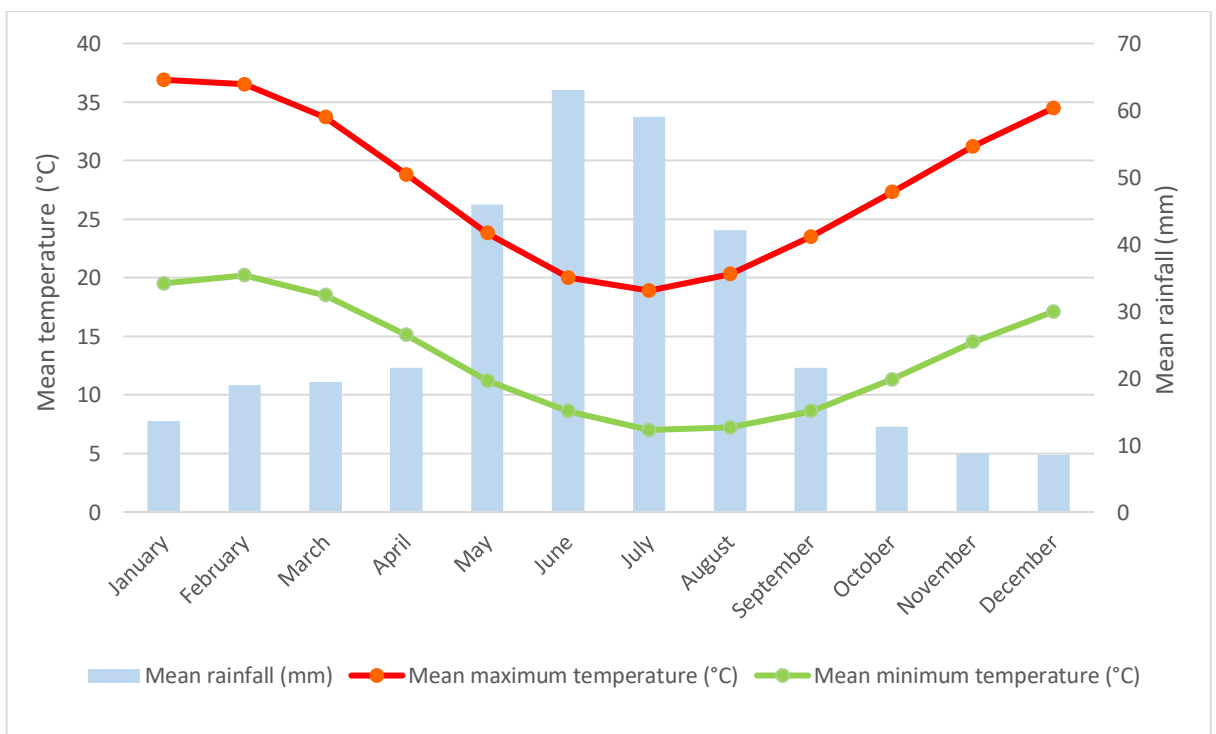


Figure 2-4 Mullewa (Station ID: 008095) Climate Statistics from 1896 to 2019

2.4.2 Geology

The Yogi Mine Site is located within the Murchison Province of the Yilgarn Craton. The Yilgarn Craton is comprised of a geological formation from the Archaean age (2.5 billion years ago) to Cainozoic age (66 million years ago to present). It is bounded by the Murgoo Gneiss Complex of the Western Gneiss Terrane in the west and the Southern Cross Province in the east. The Archaean rocks of the Murchison and Southern Cross Provinces consists of linear to arcuate greenstone belts. The greenstones comprises volcanic rocks, felsic volcanic rocks and metasedimentary rocks including cherts and BIF. The granitoid rocks contain granite, gneiss and migamite (Payne *et al.* 1998).

A map showing the regional geology is shown in Figure 2-5.

2.4.3 Regional biogeography

The proposed mine site is situated in the Eremanean Botanical province, within the Yalgoo bioregion and Talling sub region as described by the Interim Biogeographic Regionalisation of Australia (IBRA) (GHD 2019b). The PDE also traverses the Merredin subregion of the Avon Wheatbelt bioregion (GHD 2020b).

The Yalgoo bioregion is characterised by low woodlands to open woodlands of *Eucalyptus*, *Acacia*, and *Callitris* on red sandy plains of the Western Yilgarn Craton and Southern Carnarvon Basin. The Western Yilgarn Craton comprises mulga, *Callitris-E. salubris*, and Bowgada open woodlands and scrubs on earth to sandy-earthy plains. The Southern Carnarvon Basin has a basement of Phanerozoic sediments. The subregion is particularly rich in ephemerals (Desmond *et al* 2001).

The Merredin subregion within the Avon Wheatbelt is characterised by drainage dissecting a tertiary plateau in the Yilgarn Craton within a gently undulating landscape of low relief. Proteaceous heath scrub is rich with endemics, on residual lateritic uplands and derived sandplains; mixed eucalypt, *Allocasuarina huegeliana* and Jam – York Gum woodlands on Quaternary alluvial flats. Within this subregion is the ancient peneplain with low relief, gently undulating landscape. There is no connected drainage; salt lake chains occur as remnants of ancient drainage systems that now only function in very wet years. Lateritic uplands are dominated by yellow sandplain. Climate is semi-arid warm Mediterranean (Beechman 2001).

A map showing the regional biogeography is shown in Figure 2-6.

Legend

Pipeline Development Envelope

Mine Development Envelope

1: 500 000 Interpreted Bedrock Geology of Western Australia, 2008 update

A-bs-YMU - Komatiitic basalt, often with pyroxene-spinifex texture (generally pseudomorphed by amphibole); metamorphosed. Includes mafic schist derived from komatiitic basalt, may contain some metamorphosed tholeiitic basalt and minor mafic and ultramafic int

A-b-YMU - Mafic volcanic rocks with minor mafic and ultramafic intrusive rocks; minor felsic rocks

A-fnv-YMU - Felsic volcanogenic sedimentary rocks; local felsic lava and tuff

A-f-YMU - Felsic volcanic rock, undivided; metamorphosed

A-g-Y - Granitic rocks, undivided; metamorphosed

A-g-YSW - Granitic rock; monzogranite dominant

A-mn-YMU - Gneiss, undivided

A-mwa-YMU - Amphibolite; may include meta-banded iron-formation

A-mwa-YSW -

A-ogy-YMU - Gabbro, anorthositic gabbro, anorthosite; may include vanadiferous magnetite

A-o-YMU - Gabbro and dolerite, may include layered sills

A-sc-YMU - Metamorphosed conglomerate

A-s-YMU - Sedimentary rocks, undivided; metamorphosed

A-u-YMU - Ultramafic rocks, undivided; metamorphosed

A-xmgn-g-YNA - Granitic gneiss and granitic rocks; minor granodiorite, muscovite granite, amphibolite, ultramafics

A-xmgn-mb-YMU - Granitic gneiss with greenstone enclaves

CP_na-sepg - diamictite, shale (in places varvoid), conglomerate, sandstone

J_cd-sf - grey shale, siltstone and sandstone; scattered carbonate lenses

J_cm-sh - carbonaceous siltstone, shale, claystone, coal, sandstone

J_ya-st - fine- to coarse-grained sandstone, thin shale interbeds

O_tu-st - fine- to coarse-grained red-bed sandstone; minor siltstone and conglomerate

P_cg-sf - micaceous siltstone and quartz sandstone, minor granule to pebble conglomerate, limestone

P_g-NO - granitic rock

P_hi-st - fine-grained quartz sandstone, subordinate interbeds of coarse-grained sandstone, conglomerate and shale

P_ho-sh - grey shale, well-bedded clayey siltstone, interbedded limestone

P_ir-ssh - interbedded very coarse- to fine-grained sandstone, claystone, siltstone, shale (commonly carbonaceous), and coal

P_mdng-NO - Paragneiss

P_mnqf-NO - Quartzofeldspathic gneiss

P_mog-NO - Metamorphosed gabbroic rock

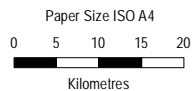
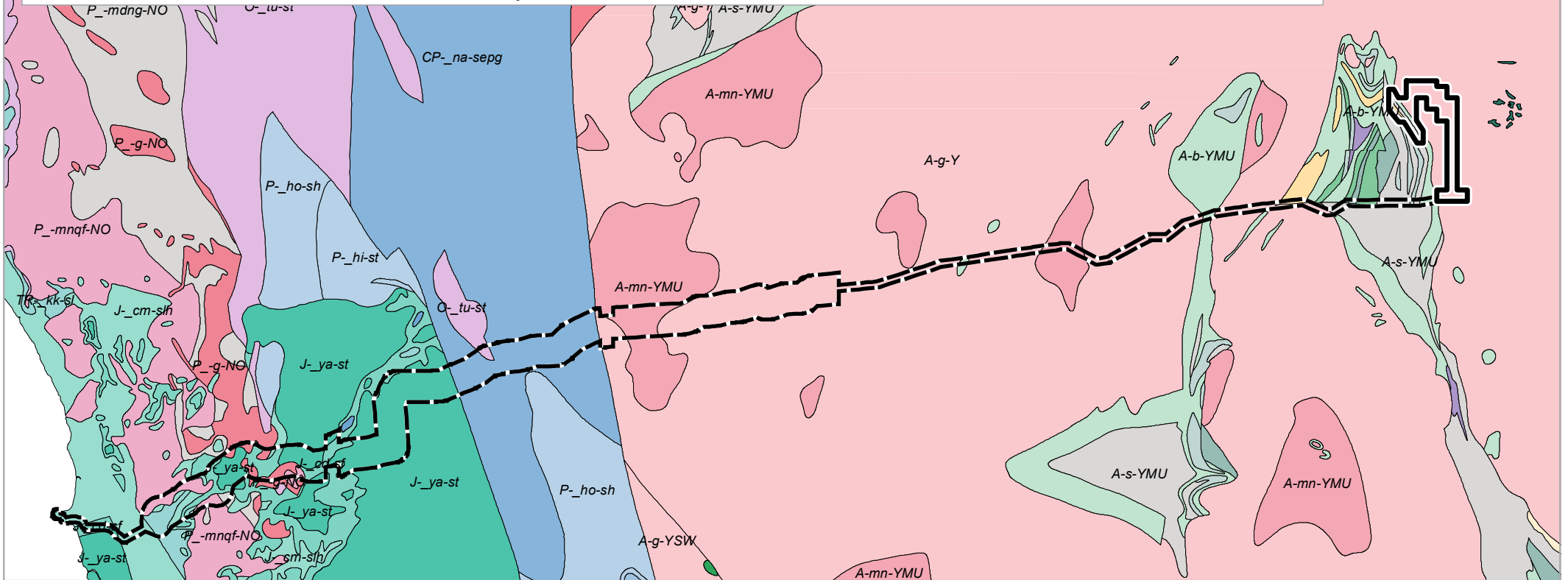
P_mq-NO - Quartzite and micaceous quartzite; significant quartz-feldspar gneiss

P_od - Dolerite dyke, sill or plug; fine- to medium-grained dolerite and gabbro

P_wg-st - fine- to medium-grained clayey quartz sandstone; minor conglomerate, shale, siltstone and coal

P_xmb-BD - Metamorphosed siliclastic rocks and minor mafic volcanic rocks; may correlate with Badgeradda Group and Nilling Formation

TR_kk-sl - shale; minor siltstone and sandstone; in places calcareous; sandstone members at base



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

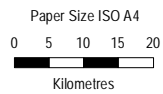
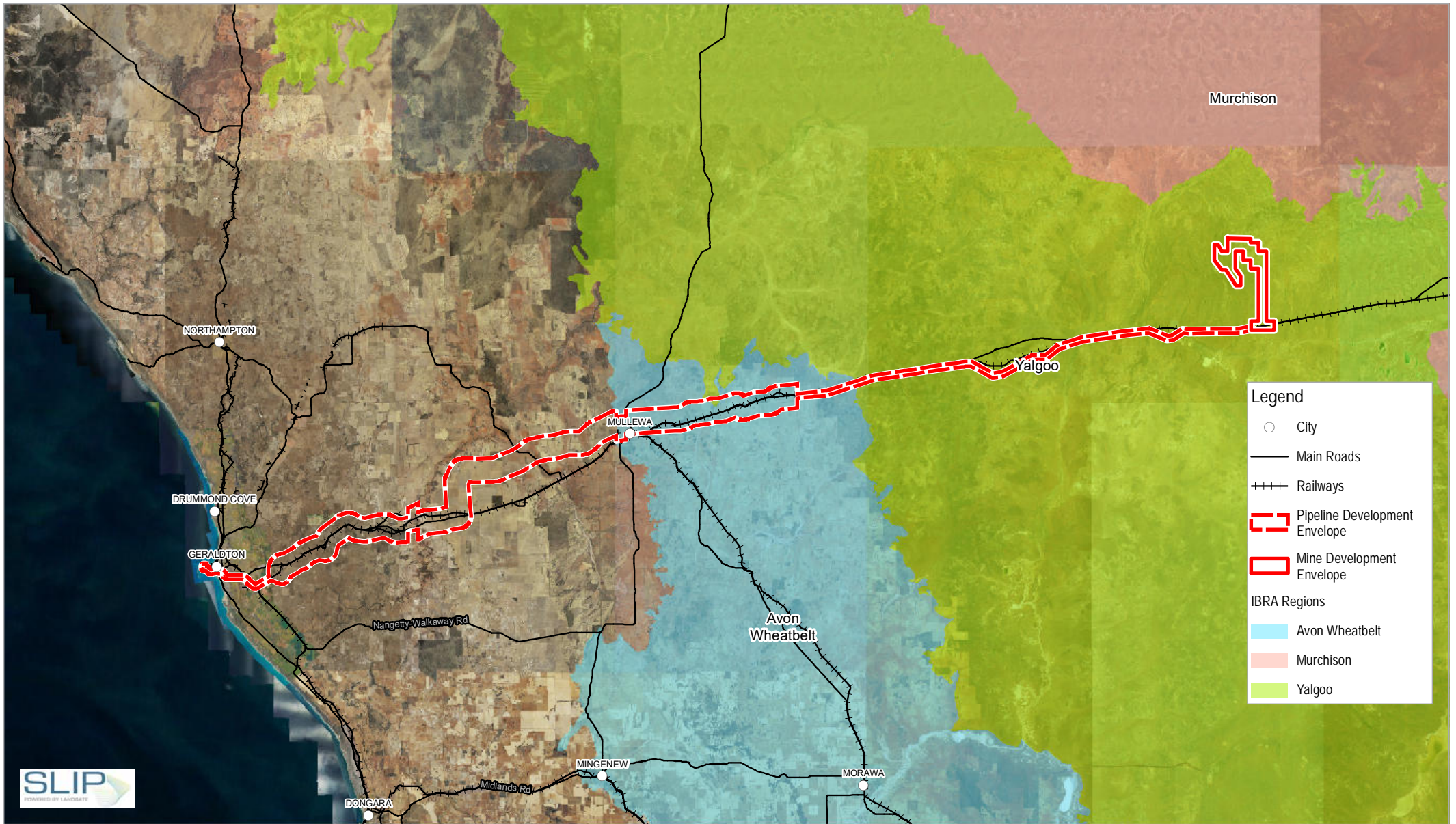


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Geology of the Region

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FIGURE 2-5



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

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 Date 12 Jul 2019

Biogeography of the Region

FIGURE 2-6

2.4.4 Landforms and soil

The proposal area intersects three soil landscape zones of the Murchison province, including:

- Irwin River Zone: characterised by “Dissected Plateau (with shallow valleys, stony ridges and sandplain remnant) on deeply weathered mantle, colluvium and alluvium over granite and gneiss of the Yalgoo Craton. Yellow and Red deep sands with Red shallow sands with Red loamy earths and Red deep and some Red shallow loams. Bowgada-Jam shrublands and York gum woodland (with some acacia-casuarina thickets and halophytic shrublands” (Tille 2006).
- The Karrara Hills Plains and Lake Zone: characterised by “Hills and ranges, sandy plains, hardpan wash plains, stony plains and salt lakes (with some mesas and plains) on greenstone and granitic rocks of the Yilgarn Craton. Red shallow loams, Red loam earths, Red deep sands and Salt lake soils with some Red shallow sands, Stony soil and Red shallow sandy duplexes” (Tille 2006)
- The Yalgoo Plain Zone is described as “Hardpan wash plains (with some sandplains, stony plains, mesas and granite outcrops) on granitic rocks (with some greenstone) of the Yilgarn Craton (Murchison Domain). Red loamy earths and Red shallow loams (often with hardpans) with Red deep sands and Red shallow sands and some shallow sandy complexes” (Tille 2006)

A map showing the three soil landscapes is included as Figure 2-7.

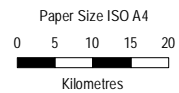
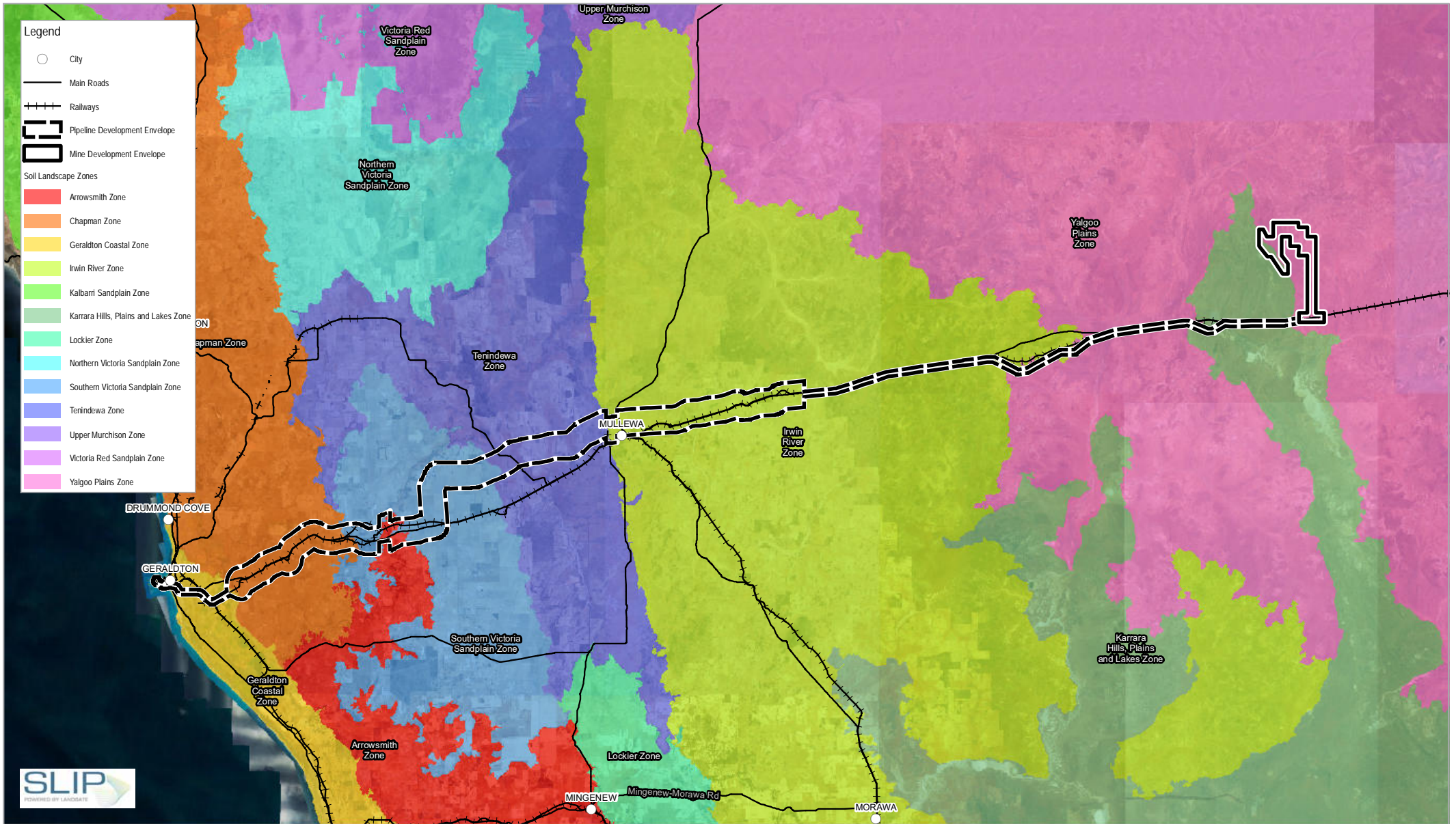
2.4.5 Environmental values

Nature reserves

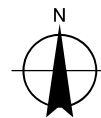
There are no nature reserves within the development envelope of the MDE or the PDE.

The nearest nature reserve is Urawa Nature Reserve, which is located approximately 120 km west of the MDE and the southern section of the reserve borders the PDE. Several former pastoral leases now registered as lands of interest with the Department of Biodiversity, Conservation and Attractions including ex Noongal (located 18 km northeast of the mine site), ex Barnong (located 40 km southeast of the mine site), and Karara Rangeland Park (located 74 km southeast of the mine site), which is comprised of six former pastoral lease areas, however none have an official conservation status.

These features are shown in Figure 2-8.



Map Projection: Transverse Mercator
 Horizontal Datum: GDA 1994
 Grid: GDA 1994 MGA Zone 50

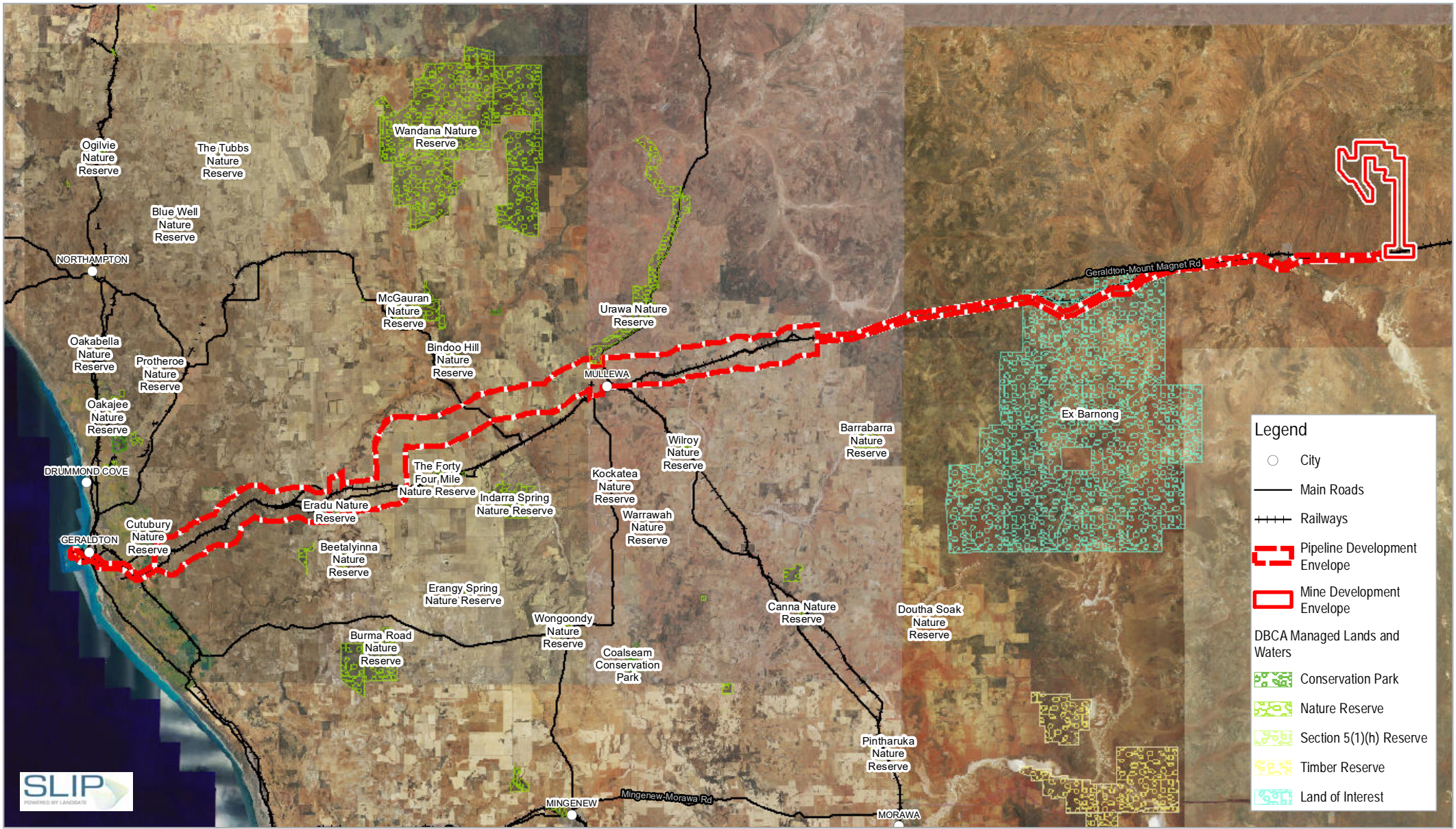


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Soil Landscapes of the Region

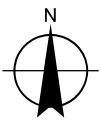
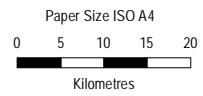
Project No. 61-37117
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 Date 12 Jul 2019

FIGURE 2-7



Legend

- City
- Main Roads
- ++++ Railways
- ▬ Pipeline Development Envelope
- ▬ Mine Development Envelope
- DBCA Managed Lands and Waters
- ▨ Conservation Park
- ▨ Nature Reserve
- ▨ Section 5(1)(h) Reserve
- ▨ Timber Reserve
- ▨ Land of Interest



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Environmental Values of the Region

FIGURE 2-8

G:\6137117\GIS\Maps\Working\Environmental Review Document\6137117_002-8_EnvValuesRegion_rev0.mxd
Print date: 02 Oct 2019 - 09:40

Data source: GHD: Pipeline Corridor and Pipeline Development Envelope - 20190124; Dow: Rivers; DBCA: Legislated lands and waters - 20180226; Landgate: Roads - 20190128, Railway - 20190304, Imagery, Created by: cgyerzosa

2.4.6 Social values

The town of Yalgoo has a population of approximately 120 people, while around 400 people live regionally throughout the Shire. The main industries within the region are gold, tantalite and bauxite mining (worth \$122 million per annum), and pastoralism (worth around \$5.5 million). The Yogi mining tenements overlap sheep-farming pastoral leases Carlaminda Station and Wagga Wagga station. The PDE includes several Local Government Areas: Shire of Yalgoo, City of Greater Geraldton, Shire of Murchison, and Shire of Chapman Valley.

The key host communities for the proposal are the townships of Yalgoo, Mullewa, and Geraldton (Australian ABS, as cited in GHD 2018a). According to the 2016 ABS census, the proposal exists within the following socio-economic setting:

- Yalgoo: The township has a population of 279, with approximately 17% of the population younger than 20 years, 72% of the population aged between 20 to 60 years, and approximately 11% of the population aged over 60 years. The unemployment rate is currently 1.9%, with over 70% of those employed working full time, and a further approximately 16% working part time. The major industries of employment including mining, mineral exploration and Local Government administration.
- Mullewa: The town has a population of 447, with approximately 28% of the population younger than 20 years, 48% of the population aged between 20 to 60 years, and approximately 24% of the population aged over 60 years. The unemployment rate is currently 9.3%, with approximately 50% of those employed working full time, and a further 33% working part time. The major industries of employment include grain growing, Local Government administration, education, and hospitals.
- Geraldton: Geraldton is a coastal city with a population of over 38, with approximately 28% of the population younger than 20 years, 52% of the population aged between 20 to 60 years, and 20% of the population aged over 60 years. The unemployment rate is currently at 8.8%, with approximately 56% of those employed working full time, and a further 30% working part time. The major industries of employment include hospitals, food services, education and retail.

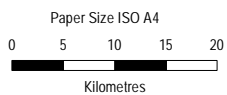
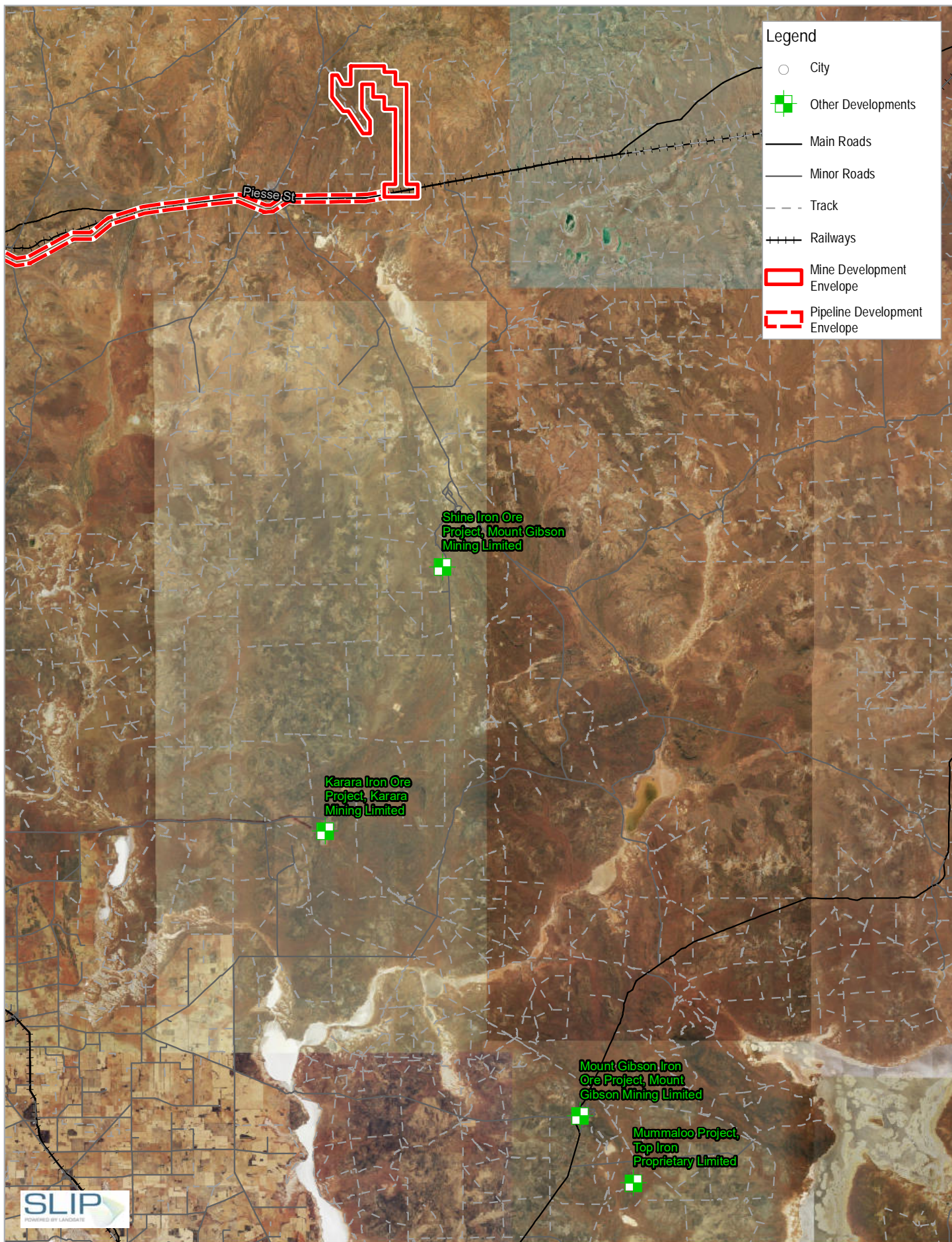
2.4.7 Other developments

Other developments in proximity to this proposal include:

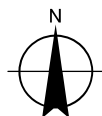
- Shine Iron Ore Project, Mount Gibson Mining Limited - located approximately 60 km south of the proposed Yogi mine.
- Karara Iron Ore Project, Karara Mining Limited – located approximately 115 km southwest of the proposed Yogi mine.
- Mount Gibson Iron Ore Project, Mount Gibson Mining Limited– located approximately 165 km southeast of the proposed Yogi mine.
- Mummaloo Project, Top Iron Proprietary Limited - – located approximately 20 km southwest of the proposed Yogi mine.

The location of other developments within the region are included as Figure 2-9.

These projects have been used to inform the cumulative impacts of the proposal with other developments within the region.



Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50



FI Joint Venture Pty Ltd
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Other Developments in
Proximity to the Yogi Mine

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FIGURE 2-9

3. Stakeholder Engagement

3.1 Key Stakeholders

FIJV have engaged with key stakeholders since early 2016, including:

- Government departments and decision making agencies including the EPA, Commonwealth Department of Agriculture, Water and the Environment, Department of Water and Environmental Regulation (DWER), Department of Mines, Industry Regulation and Safety (DMIRS) and the Department of Biodiversity, Conservation and Attractions: to provide information on the project and to initiate approvals processes, through meetings, telephone discussions, emails and letters.
- The City of Greater Geraldton and Shire of Yalgoo: to provide information, and provide the land access required for botanical surveys as part of the Environmental Assessment.
- The Mid West Ports Authority, with a Memorandum of Understanding established regarding access at Geraldton Port for shipment.
- The pastoral leases of Wagga Wagga Station and Carlaminda Station: to provide information on the project and seek access to land for botanical surveys as part of the environmental assessment (GHD 2018c).

3.2 Stakeholder engagement process

In order to undertake effective consultation, a Yogi Magnetite Mine Project *Stakeholder Engagement Strategy* (SES) was developed by GHD (2018a) specifically for this proposal. This SES was designed to create a methodology for engagement throughout the project planning stages, through to operation. A strategic and holistic approach ensures effective and transparent engagement with stakeholders for the project. This will directly contribute to the success of the project.

The stakeholder engagement process will involve:

- Building stakeholder understanding of the project to contribute to stakeholder acceptance.
- Building trusted relationships with stakeholders to foster tolerance and compromise for the project.
- Strengthening the reputation of FIJV as a positive contributor in their host communities.

To achieve these goals, the objectives of engagement throughout all stages of the project are to:

- Provide clear, objective, and timely information to stakeholders.
- Seek input and feedback from the key stakeholders to inform the project planning and development.

The SES includes processes to manage stakeholders who are critical to the project approval and development process, those potentially affected directly or indirectly by the proposal, and those not affected by the proposal but potentially interested in being kept informed of the project activities.

3.2.1 Ongoing consultation

FIJV will continue to engage with relevant stakeholders throughout the environmental approval process to ensure that all concerns are addressed. This includes decision making authorities, other relevant government authorities, the local community, and environmental non-government organisations. FIJV is committed to building effective relationships and working transparently with all stakeholders.

3.3 Stakeholder consultation

A summary of the consultation undertaken to date in relation to this proposal is provided in Table 3-1. This table provides an overview of the comments and issues raised and FIJV's response to these issues.

Table 3-1 Stakeholder consultation

| Stakeholder | Date | Issues/topics raised | Proponent response/outcome |
|--|-----------|---|--|
| Department of Water and Environmental Regulation (DWER) | 2017 | Met with DWER EPA Services to discuss referral of project to EPA | DWER EPA Services advised that referral to the EPA was warranted |
| Department of Mines, Industry Regulation and Safety (DMIRS) | 2016 | Applications for tenements, changes to tenements | Tenements issued as required |
| Shire of Yalgoo | 2016 | Meetings to provide an overview of the project | Shire confirmed the project was compatible with land uses in the Shire |
| Department of Biodiversity Conservation and Attractions (DBCA) | Pre 2015 | Lodgement of priority flora records for historical flora surveys (by Ferrowest) | Priority flora records are now reflected in DBCA databases |
| Carlaminda Station | 2016-2017 | Ongoing discussions regarding site access | Site access granted for exploration activities |
| Wagga Wagga Station | 2016-2016 | Ongoing discussions regarding site access | Site access granted for exploration activities |

4. Environmental principles and factors

4.1 Environmental Principles

Each of the five principles of the EP Act have been applied to the Proposal, in accordance with the EPA's *Statement of Environmental Principles, Factors and Objectives* (EPA 2018b). The EP Act principles considered for this proposal are specified in Table 4-1.

Table 4-1 *Environmental Protection Act 1986 Principles*

| Principle | Consideration of Principle in the Proposal |
|--|---|
| <p>The precautionary principle Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.</p> <p>In the application of the precautionary principle, decision should be guided by:</p> <ol style="list-style-type: none"> Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment and an assessment of the risk-weighted consequences of various options. | <p>Technical investigations and studies have been undertaken for the entire area potentially affected by the proposal to ensure impact assessment and/or modelling can be carried out with scientific certainty.</p> <p>All environmental impacts have been carefully evaluated in this ERD.</p> <p>Where the potential for serious or permanent damage was identified, mitigation measures, including avoiding impacts where practical, have been applied. Efforts have been made to reduce the disturbance footprint of the proposal, including revising the location of the pipeline development to limit clearing. A precautionary approach has been taken where residual risk to the surrounding environment is uncertain.</p> |
| <p>The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p> | <p>The environmental management of the construction, operation and closure of the Proposal will be conducted in a manner which ensures the health and diversity of the surrounding environment is maintained and enhanced for the benefit of future generations. and includes the following commitments:</p> <ul style="list-style-type: none"> • Prioritising research and implementation programs through technology to reduce impacts to land, enhancing our contribution to biodiversity and improving our efficiency in water and energy use. • Identifying climate change improvement solutions through dedicated optimisation work programs. • Contributing to the health and well-being of local communities <p>A <i>Mine Closure Plan</i> (MCP) has also been developed to ensure that Yogi is closed in a manner to ensure that the environment is maintained for the benefit of future generations.</p> <p>Where, significant residual impacts were identified, offsets are proposed.</p> |

| Principle | Consideration of Principle in the Proposal |
|---|---|
| <p>The principle of the conservation of biological diversity and ecological integrity</p> <p>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</p> | <p>Comprehensive baseline studies have been undertaken to understand existing biological diversity in the area and to assess potential threats to the diversity and ecological integrity. Clearing of vegetation has been avoided or minimised where possible. Environmental management strategies will be implemented to minimise impacts to biological diversity and ecological integrity. Examples of management strategies proposed to conserve biological and ecological integrity include:</p> <ul style="list-style-type: none"> • Avoidance of critical fauna habitat for the Western Spiny Tailed Skink and Gilled Slender Bluetongue. • Modification of site layout to minimise impacts to high value fauna habitat including the banded iron formation ridgeline, granitic formations and chenopod plains. |
| <p>Principles relating to the improves valuation, pricing and incentive mechanisms</p> <p>a. Environmental factors should be included in the valuation of assets and services.</p> <p>b. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement.</p> <p>c. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes.</p> <p>d. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.</p> | <p>The Proponent has, and will continue to, evaluate (and implement wherever possible) opportunities to reduce impact to land, reduce waste and improve efficiencies in water and energy use during the implementation, operation and closure of Yogi mine.</p> <p>The Proponent will operate under an Operating Licence, issued under Part V of the EP Act, which will ensure that pollution (when or if generated) is paid for in line with legislation.</p> <p>The cost of mine rehabilitation and closure have been taken into consideration during the planning of the project.</p> <p>A MCP has been included in the proposal planning.</p> |
| <p>The principle of waste minimisation</p> <p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</p> | <p>FIJV will implement waste management measures to minimise the generation of waste and its discharge to the environment. FIJV will, where practicable, implement a 'reduce, reuse, recycle' approach to waste management.</p> |

4.2 Environmental Factors

The Proponent has assessed the environmental factors relevant to this Proposal, in accordance with the approach in the EPA's Statement of Environmental Principles, Factors and Objectives (2016d) and the EPA's Environmental Factor Guidelines and Environmental Factor Technical Guidance.

The preliminary key environmental factors identified in the ESD were: *Flora and Vegetation, Subterranean Fauna, Landforms, Terrestrial Environmental Quality, Terrestrial Fauna, Inland Waters, Air Quality and Social Surroundings.*

The Proponent used extensive regional data sets to undertake environmental impact assessment for each of the key environmental factors relating to this Proposal, resulting in a high degree of confidence in the identification of potential impacts. Where residual impacts have been assessed as potentially significant the application of the mitigation hierarchy has resulted in a reduction of potential impacts.

Closure is considered relevant to this Proposal. A Mine Closure Plan (MCP) is contained in Appendix D.

4.3 Impacts assessed

In accordance with the approved ESD (GHD 2019a), the impacts to the preliminary key environmental factors that were assessed are outlined in Table 4-2.

Table 4-2 Impacts assessed for each preliminary key environmental factor

| Factor | Impacts Assessed | Section |
|----------------------|--|---------|
| Flora and Vegetation | • Loss of flora and vegetation through clearing, including conservation significant vegetation and flora | 5.6.1 |
| | • Dust generation during construction and operations | 5.6.2 |
| | • Introduction and spread of environmental weeds | 5.6.3 |
| | • Increased edge effect | 5.6.4 |
| | • Habitat loss and fragmentation from vegetation clearing | 5.6.5 |
| | • Alteration of fire regimes | 5.6.6 |
| | • Decline of species abundance and diversity | 5.6.7 |
| | • Alteration to surface and groundwater flows and quality | 5.6.8 |
| Landforms | • Alteration to landform structure (either temporary or permanent) | 6.6.1 |
| | • Alteration to ecological function of the landform (either temporary or permanent) | 6.6.2 |
| | • Impacts on environmental values of the landform (either temporary or permanent) | 6.6.3 |
| Subterranean Fauna | • Loss or degradation of habitat or species population from construction and operations | 7.6.1 |
| | • Abstraction of groundwater | 7.6.3 |
| | • Changes to hydrological regimes and water quality | 7.6.3 |
| | • Groundwater contamination | 7.6.4 |

| Factor | Impacts Assessed | Section |
|-----------------------------------|---|---------|
| | <ul style="list-style-type: none"> • Loss of food/nutrient sources | 7.6.5 |
| Terrestrial Environmental Quality | <ul style="list-style-type: none"> • Soil acidification as a result of disturbance of soil | 8.6.1 |
| | <ul style="list-style-type: none"> • Contamination of soils as a result of Acid and Metalliferous Drainage | 8.6.2 |
| | <ul style="list-style-type: none"> • Contamination of soils through spillage of reagents, chemicals, hydrocarbons | 8.6.3 |
| Terrestrial Fauna | <ul style="list-style-type: none"> • Loss of up fauna habitat as a result of clearing vegetation | 9.6.1 |
| | <ul style="list-style-type: none"> • Displacement and death of fauna | 9.6.2 |
| | <ul style="list-style-type: none"> • Habitat fragmentation | 9.6.3 |
| | <ul style="list-style-type: none"> • Habitat degradation from introduction and spread of environmental weeds | 9.6.4 |
| | <ul style="list-style-type: none"> • Alteration of fire regimes | 9.6.5 |
| | <ul style="list-style-type: none"> • Introduction and spread of feral animals | 9.6.6 |
| Inland Waters | <ul style="list-style-type: none"> • Alteration to surface water flows as a result of mining and infrastructure construction and operations, including potentially altering natural erosion and deposition patterns which could increase the surface water turbidity | 10.6.1 |
| | <ul style="list-style-type: none"> • Alteration of the hydrology of the area from groundwater abstraction | 10.6.2 |
| | <ul style="list-style-type: none"> • Impacts to inland wetland communities or groundwater dependent ecosystems as a result of groundwater drawdown | 10.6.3 |
| | <ul style="list-style-type: none"> • Contamination of surface water associated with Acid and Metalliferous Drainage | 10.6.4 |
| | <ul style="list-style-type: none"> • Groundwater contamination from Acid and Metalliferous Drainage | 10.6.5 |
| | <ul style="list-style-type: none"> • Impacts to inland wetland communities or groundwater dependent ecosystems as a result of groundwater drawdown and changes to groundwater quality | 10.6.6 |
| Air Quality | <ul style="list-style-type: none"> • Dust generation | 11.6.1 |
| | <ul style="list-style-type: none"> • Pollutant emissions from mining and power generation activities | 11.6.2 |
| | <ul style="list-style-type: none"> • Ore processing | 11.6.3 |
| | <ul style="list-style-type: none"> • Post –closure rehabilitation | 11.6.4 |
| | <ul style="list-style-type: none"> • Greenhouse gas emissions | 11.6.5 |
| Social Surroundings | <ul style="list-style-type: none"> • Loss/disturbance to Aboriginal or European heritage sites | 12.6.1 |
| | <ul style="list-style-type: none"> • Activities may occur in areas of Native Title | 12.6.2 |
| | <ul style="list-style-type: none"> • Negative impacts to pastoral lease operations and any tourism activities in the Development Envelope | 12.6.3 |

| Factor | Impacts Assessed | Section |
|--------|---|---------|
| | <ul style="list-style-type: none"> Impacts to amenity values (including visual landscape, visual aesthetics values and recreational tourism) associated with the Pipeline corridor | 12.6.4 |

4.4 Supporting technical assessment and management plans

The following technical reports and management plans were completed to support the preparation of this report and implementation of the Proposal:

- *Yogi Magnetite Project, Pipeline Corridor Flora and Fauna Assessment* (GHD 2020c)
- *Yogi Magnetite Project, Western Pipeline Flora and Fauna Desktop Assessment.* (GHD 2020a)
- *Yogi Magnetite Project, Flora and Vegetation Assessment* (GHD 2019b)
- *Dual Phase Survey for Subterranean Fauna for the Yogi Magnetite Project, Yalgoo, Western Australia* (Invertebrate Solutions Pty Ltd 2020)
- *Survey for Short Range Endemic Fauna for the Yogi Magnetite Project, Yalgoo, Western Australia* (Invertebrate Solutions Pty Ltd 2019b)
- *Yogi Magnetite Project, Environmental Management Plan* (GHD 2020d)
- *Yogi Magnetite Project, Mine Closure Plan* (GHD 2019c)
- *Yogi Magnetite Project, Fauna Assessment* (GHD 2020b)
- *Yogi Magnetite Project, Materials characterisation assessment* (GHD 2019d)
- *Yogi Magnetite Project, Surface water assessment* (GHD 2019e)
- *Yogi Magnetite Project, Groundwater assessment* (GHD 2019f)
- *Yogi Magnetite Project, Air Quality assessment* (GHD 2019g)
- *Due diligence risk assessment advice for a mine proposal at Yalgoo and an infrastructure corridor between Yalgoo and Geraldton Western Australia* (Brad Goode & Associates Pty Ltd 2019a)
- *Report of an Aboriginal Heritage survey for the Yogi Magnetite Project in the Shire of Yalgoo, Western Australia* (Brad Goode & Associates Pty Ltd 2019b)