



Report and recommendations of the Environmental Protection Authority



Eliwana Iron Ore Mine Project

Fortescue Metals Group Limited

Report 1641

June 2019

Environmental impact assessment process timelines

| Date | Progress stages | Time (weeks) |
|------------------|---|-----------------|
| 31 July 2017 | EPA decides to assess – level of assessment set | |
| 21 December 2017 | EPA approved Environmental Scoping Document | 20 |
| 7 September 2018 | EPA accepted Environmental Review Document | 37 |
| 01 October 2018 | Environmental Review Document released for public review | 3 |
| 29 October 2018 | Public review period for Environmental Review Document closed | 4 |
| 26 April 2019 | EPA accepted Proponent Response to Submissions | 25 |
| 30 April 2019 | EPA received final information for assessment | 1 |
| 16 May 2019 | EPA completed its assessment | 2 |
| 19 June 2019 | EPA provided report to the Minister for Environment | 6 |
| 24 June 2019 | EPA report published | 3 days |
| 8 July 2019 | Close of appeals period | 2 |

Timelines for an assessment may vary according to the complexity of the proposal and are usually agreed with the proponent soon after the EPA decides to assess the proposal and records the level of assessment.

In this case, the Environmental Protection Authority met its timeline objective to complete its assessment and provide a report to the Minister.



Dr Tom Hatton
Chairman

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Executive Summary

The Eliwana Iron Ore Mine Project (the proposal) was referred to the Environmental Protection Authority (EPA) by the proponent, Fortescue Metals Group Limited (Fortescue), on 7 July 2017.

The proposal is for the development and operation of the Eliwana Iron Ore Mine and associated infrastructure, located 90 kilometres (km) west-north-west of Tom Price in the Pilbara region of Western Australia. Infrastructure would include processing facilities, water management infrastructure, temporary and permanent waste landforms, and tailings storage facilities. The proposal would include clearing of up to 7,900 hectares (ha) of native vegetation within a 43,804 ha development envelope.

The EPA conducted an Environmental Impact Assessment on the proposal, which included a four-week public review period, with additional review time granted to key stakeholders following a request by Native Title holders.

The EPA has concluded that the proposal is environmentally acceptable and can be implemented, subject to certain conditions.

The EPA examined potential impacts on six key environmental factors: Inland Waters, Flora and Vegetation, Terrestrial Fauna, Subterranean Fauna, Social Surroundings, and Air Quality. The EPA has assessed the impacts of the Eliwana Iron Ore Mine Project in the context of the environmental and social values of the project area, with particular regard to Aboriginal heritage sites identified in the proposed development envelope.

The EPA has recommended conditions (listed in Appendix 4) which include requirements to

- investigate risks associated with Acid and Metalliferous Drainage (AMD)
- monitor and manage hydrological regimes and water quality
- avoid places of recognised Aboriginal cultural heritage
- monitor and manage impacts to flora and vegetation, terrestrial fauna, and subterranean fauna
- monitor and manage impacts to Aboriginal heritage, and
- minimise greenhouse gas emissions.

To mitigate the residual loss associated with clearing of up to 7,900 ha of native vegetation, the EPA has recommended a condition that requires the proponent to provide an offset through contributions to an approved fund.

1. Introduction

This report provides the advice and recommendations of the Environmental Protection Authority (EPA) to the Minister for Environment on the outcomes of the EPA's environmental impact assessment of the proposal by Fortescue Metals Group Limited (Fortescue). The proposal is to develop and operate the Eliwana Iron Ore Mine Project.

The EPA has prepared this report in accordance with section 44 of the *Environmental Protection Act 1986* (EP Act). This section of the EP Act requires the EPA to prepare a report on the outcome of its assessment of a proposal and provide this assessment report to the Minister for Environment. The report must set out:

- what the EPA considers to be the key environmental factors identified during the assessment
- the EPA's recommendations as to whether or not the proposal may be implemented and, if the EPA recommends that implementation be allowed, the conditions and procedures to which implementation should be subject.

The EPA may also include any other information, advice and recommendations in the assessment report as it thinks fit.

The proponent referred the proposal to the EPA on 7 July 2017. On 31 July 2017, the EPA decided to assess the proposal and set the level of assessment at level of Public Environmental review, with a Public Review period of four (4) weeks. The EPA approved the Environmental Scoping Document (ESD) for the proposal on 21 December 2017. The Environmental Review Document (ERD) was released for public review from 1 October 2018 to 29 October 2018.

1.1 EPA procedures

The EPA followed the procedures in the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Administrative Procedures 2016* and the *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016*.

1.2 Assessment on behalf of Commonwealth

The proposal was determined to be a controlled action by a delegate of the Commonwealth Minister for the Environment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 7 November 2017 as it will, or is likely to, have a significant impact on the following Matters of National Environmental Significance (MNES):

- listed threatened species and communities (section 18 and 18A).

The proposal was assessed as an accredited assessment between the Commonwealth and Western Australian governments.

2. The proposal

2.1 Proposal summary

The proponent, Fortescue, proposes to develop the Eliwana Iron Ore Mine Project, located 90 kilometres (km) west-north-west of Tom Price in the Pilbara region of Western Australia (WA) (Figure 1).

The proposal includes disturbance of up to 7,900 hectares (ha) of native vegetation within a 43,804 ha Mine Development Envelope (MDE). The development envelope is delineated in Figure 2. The proposal includes the development of mine pits and associated infrastructure, processing facilities, infrastructure for groundwater abstraction and surplus water disposal, temporary and permanent waste rock landforms, and tailings storage facilities (Figure 2).

The key characteristics of the proposal are summarised in Tables 1 and 2 below. A detailed description of the proposal is provided in Section 2 of the ERD. (FMG 2018).

Table 1: Summary of the proposal

| | |
|-------------------|---|
| Proposal title | Eliwana Iron Ore Mine Project |
| Short description | <p>The proposal is to develop above and below watertable iron ore deposits, and associated infrastructure at the Eliwana Iron Ore Mine, located 90 km west-north-west of Tom Price, in the Pilbara region of Western Australia.</p> <p>The proposal includes processing facilities, water management infrastructure for groundwater abstraction and surplus water disposal, temporary and permanent waste landforms, and tailings storage facilities.</p> |

Table 2: Location and proposed extent of physical and operational elements

| Element | Location | Proposed extent |
|------------------------------------|----------|--|
| Physical elements | | |
| Mine and associated infrastructure | Figure 2 | 7,900 ha within a 43,804 ha Development Envelope |
| Operational elements | | |
| Mining voids | N/A | <p>Eliwana Area:</p> <ul style="list-style-type: none"> • Above and below watertable mining • Permanent and episodic pit lakes post-closure. |

| Element | Location | Proposed extent |
|---------------------------|----------|---|
| | | Flying Fish Area: <ul style="list-style-type: none"> • Above watertable mining • Episodic mining void water body. |
| Ore processing (waste) | N/A | Disposal of up to 1.2 gigatonnes (Gt) of waste rock to temporary and permanent waste dumps. |
| Ore processing (tailings) | N/A | Disposal of up to 84 million tonnes (Mt) of tailings into tailings storage facilities. |
| Power supply | N/A | Overhead transmission line or onsite power generation. |
| Water supply | N/A | Up to 12 gegalitres per annum (GL/a), supplied from a combination of mine dewatering and water supply borefields. |
| Dewatering | N/A | Abstraction of up to 14 GL/a of groundwater. |
| Surplus water management | N/A | Up to 4 GL/a of surplus water will be managed through a combination of surface discharge and controlled aquifer reinjection. |



Figure 1: Eliwana Iron Ore Mine Regional Location

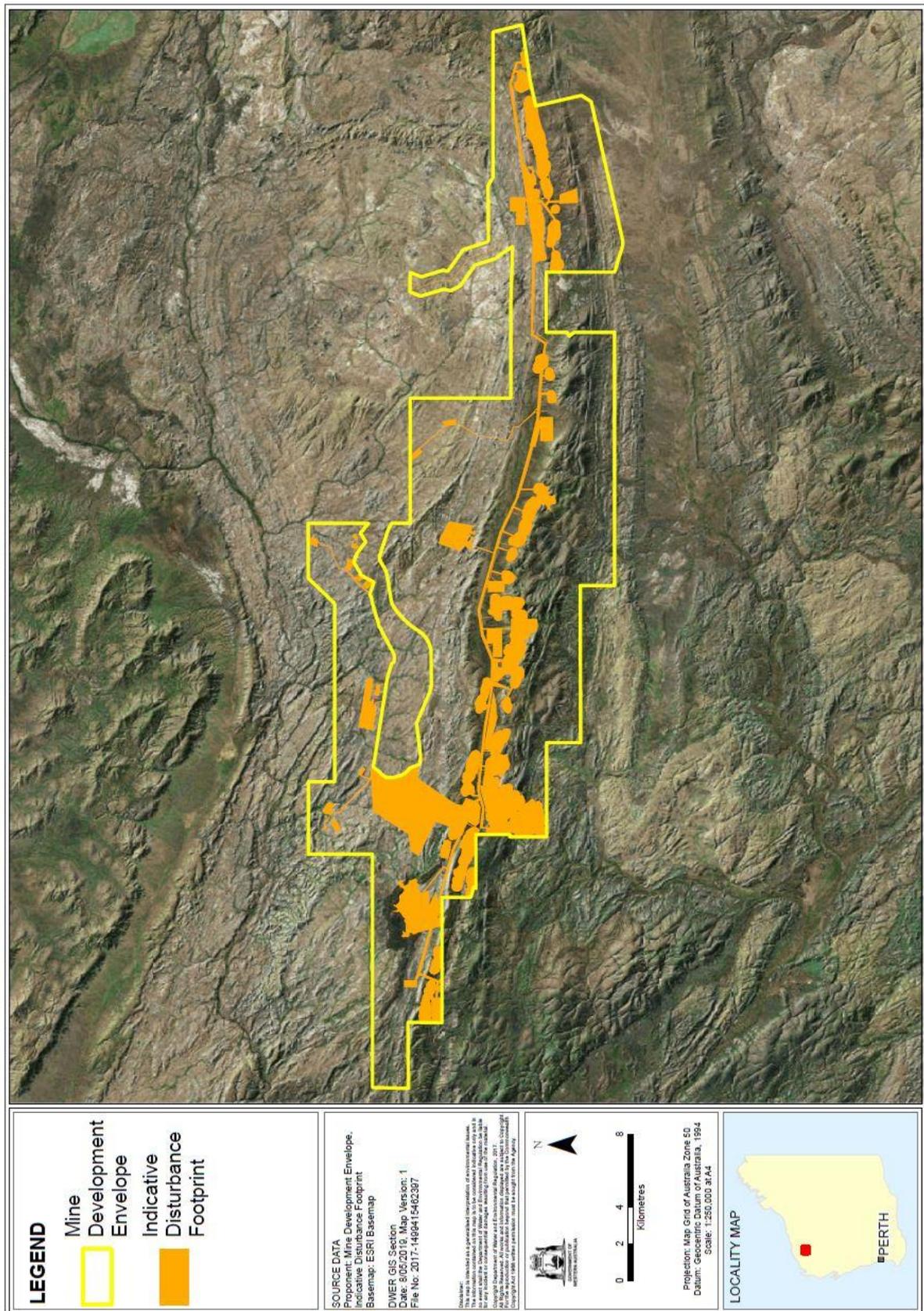


Figure 2: Eliwana Iron Ore Mine – Mine Development Envelope (MDE) and Indicative Disturbance Footprint (IDF)

2.2 Changes to the proposal during assessment

Fortescue requested EPA consent to change the proposal on two occasions during the course of the assessment. On 27 March 2018, Fortescue requested the following proposed changes to the proposal:

- overall reduction of the development envelope from 70,000 ha to 53,000 ha
- widening of the development envelope within the mine access road area
- reduction of the eastern extent of the development envelope as a result of the withdrawal of one proposed mine pit in the Flying Fish area.

The Chairman, as a delegate of the EPA, concluded that the changes were unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under section 43A of the EP Act to the change on 16 April 2018.

In advance of the public review of the proposal, on 17 August 2018 Fortescue sought the EPA's consent to a further change the proposal. The change pertained to:

- overall reduction of the development envelope from 53,000 ha to 43,804 ha
- reduction in the indicative disturbance footprint from 8,560 ha to 7,900 ha
- removal of the Northern Access Road from the development envelope
- removal of four mine pits and associated ground disturbance.

The Chairman, as a delegate of the EPA, concluded that the changes were unlikely to significantly increase any impact that the proposal may have on the environment and gave consent under section 43A of the EP Act to the change on 7 September 2018.

Tables 1 and 2 above reflect these changes.

2.3 Context

The proposal is located 90 km west-north-west of Tom Price in the Shire of Ashburton and lies within the Hamersley Ranges. The iron ore deposits consist of a bedded iron ore type within enriched units of the Brockman and Marra Mamba Iron Formations of the Hamersley Group.

The proposal area is located in a valley which is up to two kilometres in width and bound by hills with varying height of 50 to 150 metres from the valley floor. The valley is a consequence of erosion of the more resistant Brockman Iron Formation to the south which forms high, steep ridges and the Marra Mamba Iron Formation forming lower rounded hills along the north of the valley.

Iron ore mining for the proposal will involve deposits within both the Brockman Iron Formation and Marra Mamba Iron Formation.

The proposal overlies tenure managed by Fortescue prescribed under the *Mining Act 1978*, tenure managed by a third party, State Agreement Tenure, and unallocated crown land. The development envelope also overlies a number of pastoral leases.

The surrounding land use in the region is dominated by pastoral activities and mining. Nearby mining operations operated by the Rio Tinto Iron Ore Group located within 50 km of the proposal include:

- Nammuldi-Silvergrass Iron Ore Project
- Brockman Syncline 4 Iron Ore Mine
- Western Turner Syncline Iron Ore Project.

3. Consultation

The EPA advertised the referral information for the proposal for public comment in July 2017 and received one (1) submission. The submission requested 'Assess – Public Environmental Review'.

The proponent consulted with government agencies and key stakeholders during the preparation of the ERD. The agencies and stakeholders consulted, the issues raised, and the proponent's response are detailed in Table 8 of the proponent's ERD (FMG 2018).

Eight (8) agency submissions and one (1) stakeholder submission were received during the public review period. The key issues raised relate to:

- impacts to flora and vegetation
- impacts to subterranean fauna
- impacts to surface water and groundwater regimes
- risks to water quality associated with AMD, and
- impacts to Aboriginal heritage including impacts to significant sites.

The proponent addressed the issues raised in the Response to Submissions document (FMG 2019).

The EPA considers that the consultation process has been appropriate and that reasonable steps have been taken to inform the community and stakeholders about the proposed development. Relevant significant environmental issues identified from this process were taken into account by the EPA during its assessment of the proposal.

4. Key environmental factors

In undertaking its assessment of this proposal and preparing this report, the EPA had regard for the object and principles contained in s4A of the EP Act to the extent relevant to the particular matters that were considered.

The EPA considered the following information during its assessment:

- the proponent's referral information and ERD and, if relevant, anything else provided by the proponent
- public comments received on the referral, stakeholder comments received during the preparation of the proponent's documentation, and public and agency comments received on the ERD.
- the proponent's response to submissions raised during the public review of the ERD
- the EPA's own inquiries
- the EPA's *Statement of Environmental Principles, Factors and Objectives*
- the relevant principles, policy and guidance referred to in the assessment of each key environmental factor in sections 4.1 to 4.6.

Having regard to the above information, the EPA identified the following key environmental factors during the course of its assessment of the proposal:

- **Inland Waters** – Direct impacts to water regimes associated with groundwater drawdown, diversion or interception of surface water flows, discharge of excess water. Direct impacts to water quality as a result of AMD seepage from waste rock and tailings, and from degradation of water within mine pit voids after closure.
- **Flora and Vegetation** – Direct impacts associated with clearing of native vegetation. Indirect impacts associated with groundwater drawdown, changes to surface water regimes, and increases in weed diversity and extent.
- **Terrestrial Fauna** – Direct impacts associated with loss of habitat, and mortality during construction, with particular regard to MNES. Indirect impacts associated with increase in feral animal occurrence and vehicle strike.
- **Subterranean Fauna** – Direct impacts associated with groundwater drawdown, and excavation of habitat, indirect impacts associated with adverse changes to groundwater quality.
- **Social Surroundings** – Direct impacts from clearing and excavation within cultural heritage sites, and changes to water regimes associated with significant sites. Loss of access to lands to perform cultural activities. Indirect impacts including noise, dust, vibration, and visual impacts.
- **Air Quality** – Direct impacts from emissions during construction and operation, including emissions of volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and particulate matter. Greenhouse gas emissions.

Having regard to the EP Act principles, the EPA considered that the following principles were particularly relevant to its assessment of the proposal:

1. **The precautionary principle** – The EPA has considered whether the proponent’s investigations into the biological and physical environment provide the means to assess risk and identify measures to avoid or minimise impacts. Where the proponent’s investigations do not provide sufficient certainty that the risks are well understood, the EPA has recommended conditions to ensure that certainty is provided.
2. **The principle of intergenerational equality** – The EPA has considered whether the health, diversity and productivity of the environment would be maintained or enhanced during the implementation of this proposal, with particular regard to the diversity and productivity of the social and cultural environment. The EPA has recommended conditions to ensure that cultural sites and practices are maintained for the benefit of future generations.
3. **The principle of the conservation of biological diversity and ecological integrity** – The EPA has considered the impacts on Flora and Vegetation, Terrestrial Fauna (including Short Range Endemic (SRE) fauna) and subterranean fauna. The EPA has recommended conditions to manage impacts to conservation significant flora and fauna so that biological diversity is maintained. It has also recommended an offset condition to counterbalance the significant residual impacts associated with this proposal.
4. **The principle of waste minimisation** – The EPA notes that the proponent proposes to apply the waste management hierarchy to this proposal, with particular regard to the generation of waste and waste water generated at accommodation camps during construction and operation of the proposal. The proponent proposes to utilise water on site where possible, with discharge of water to the environment to be considered an option of last resort.

Appendix 2 provides a summary of the principles and how the EPA considered these principles in its assessment.

The EPA’s assessment of the proposal’s impacts on the key environmental factors is provided in sections 4.1 – 4.6. These sections outline whether or not the EPA considers that the impacts on each factor are manageable. Section 7 provides the EPA’s conclusion as to whether or not the proposal as a whole is environmentally acceptable.

Assessment on behalf of Commonwealth

The EPA assessed the proposal on behalf of the Commonwealth Minister for Environment as an accredited assessment. The EPA has addressed MNES under each relevant factor and has summarised its assessment of MNES in section 6.

4.1 Inland Waters

EPA objective

The EPA's environmental objective for this factor is *to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Inland Waters* (EPA 2018)
- WA Environmental Offsets Policy (Government of Western Australia 2011)
- WA Environmental Offsets Guidelines (Government of Western Australia 2014).

The considerations for environmental impact assessment (EIA) for this factor are outlined in *Environmental Factor Guideline – Inland Waters* (EPA 2018).

In addition to the current relevant policy and guidance above, the EPA gave regard to the *Guidelines for Preparing Mine Closure Plans* (DMP & EPA 2015), to ensure the proposal is decommissioned and rehabilitated in an appropriate manner.

EPA assessment

The proposal has the potential to impact Inland Waters through:

- changes to surface water regimes
- changes to groundwater regimes, and
- changes to groundwater and surface water quality.

Surface water regimes

Surface water flows in the project area support riparian vegetation and some semi-permanent and permanent pools. These vegetation communities and pools are likely to provide habitat and refuge for significant fauna. Surface water flows in the project area, with particular regard to Duck Creek to the north of the proposal, may also have Aboriginal heritage values.

Impacts to riparian vegetation from changes to surface water are addressed in section 4.2 – Flora and Vegetation, which notes that, based on the modelled extent of changes to surface water flows, these impacts can be managed to meet the EPA's objective for this factor.

Surface water regimes within and outside the MDE have the potential to be impacted through direct disturbance to drainage lines, including excavation for pits and clearing for infrastructure, and through diversion of surface water around mine pits, infrastructure, and waste landforms. There is also potential for surface water regimes to be changed through the release of excess water from dewatering to the environment.

The proponent has conducted modelling of impacts based on a worst-case scenario, with no diversion of surface water around pits. Where practicable, pit diversions would be put in place to limit both environmental and operational impacts, however the presence of geological features such as gorges, and tenure constraints may prevent this in some areas.

The modelled changes to surface water, including both reduction in surface water and discharge of excess dewater, are shown in Figure 3, which demonstrates that:

- there would be a reduction in surface water flows downstream of disturbance areas in several of the smaller creeks and drainage lines, and
- the proposed discharge of dewater from a single point within Pinarra Creek would result in surface water flows up to 10 km downstream of the MDE.

These changes to surface water flows have the potential to impact the health of riparian vegetation, and to impact any permanent surface water pools which are reliant on periodic surface water flows. Modelling indicates that it is unlikely that any changes to surface water flows would impact Duck Creek and its associated ecological and heritage values.

Three permanent pools have been identified in areas that will be subject to changes in surface water flows. Two of these pools have the potential to be groundwater fed, and are addressed under groundwater regimes below.

The remaining pool, Pool 5, is located downstream of a potential Tailings Storage Facility (TSF), and may be impacted by changes to surface water if this facility is constructed (FMG 2019). The pool is not considered to have any unique ecological values beyond the inherent values of pools within an arid environment (FMG 2019).

The EPA notes that there are a large number of pools to the north of the project area within Duck Creek, and to the south of the project area within Boolgeeda Creek. Given that many of these pools are associated with high quality fauna habitat, the EPA considers that the loss of environmental values including habitat values associated with Pool 5 does not represent a significant regional impact to biodiversity.

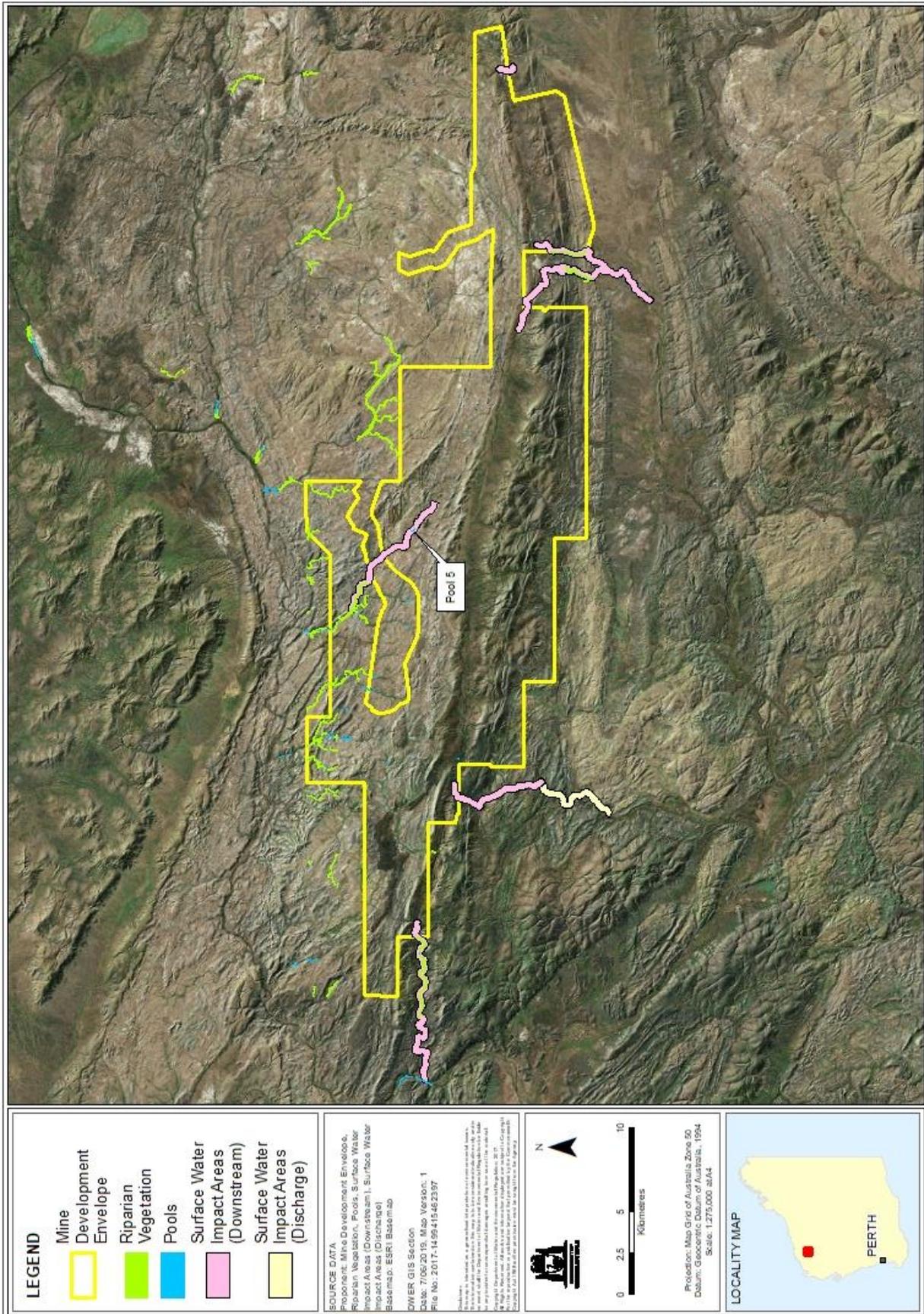


Figure 3: Changes to Surface Water Regime

Groundwater regimes

Groundwater drawdown in the project area has the potential to impact vegetation in groundwater dependent ecosystems (GDE) and groundwater fed pools which support high value fauna habitat and refuge, including habitat for significant fauna and Short Range Endemic fauna (SRE). Groundwater fed pools in the Pilbara also have the potential to have Aboriginal heritage values. Groundwater drawdown may also impact stygofauna populations.

Groundwater in the project area is confined to the north and south by non-transmissive geological formations including the Jeerinah Formation of the Fortescue Group to the north and the Yandicoogina Shale of the Brockman Iron Formation to the south. Together with these formations, dolerite dykes running generally north-south across the mine valley result in highly compartmentalised groundwater sub-catchments with little through flow between them (Golder 2017) (Figure 4).

The proposal has the potential to impact groundwater regimes through groundwater drawdown from abstraction to facilitate mining below the watertable and for the purposes of water supply, and groundwater mounding as a result of re-injection of surplus mine dewatering water or from release of water into inactive mine voids.

Impacts associated with groundwater mounding include impacts to vegetation and subterranean fauna through waterlogging. Impacts to vegetation are addressed under section 4.2 (Flora and Vegetation), and impacts to subterranean fauna are considered under section 4.4 (Subterranean Fauna). The EPA notes that groundwater mounding as a result of re-injection and seepage is well understood by Fortescue and can be managed to meet the EPA's objectives for these factors, subject to the implementation of recommended conditions.

The proponent has prepared hydrogeological models and assessed potential drawdown associated with the proposal based on a preliminary mine plan (Golder 2017). The EPA considers that the work conducted to date is sufficient to enable the EPA's assessment of groundwater drawdown associated with the proposal.

The proposal would require dewatering of up to eight below watertable pits to facilitate mining. Modelling predicts a range of drawdowns across the mine valley from 30 metres (m) to 166 m in a worst-case scenario following dewatering of all below watertable pits by 2024. Groundwater is predicted to recover slowly, resulting in residual drawdown of one metre to 37 m across the project area 100 years post-closure.

Drawdown would be contained within the compartments across the mine valley and is unlikely to affect areas outside of the model boundaries (Figure 4). It is therefore highly unlikely that any groundwater drawdown would extend northwards towards Duck Creek, or pose any risk to the ecological or heritage values of any groundwater fed pools in that area.

Two permanent pools, Pool 1 and Pool 2, have been identified within the boundaries of the groundwater model (Figure 5). These pools are also within areas likely to be impacted by changes to the surface water regime. Fortescue expects that Pool 1 is likely to become dry as a result of the proposal. There is uncertainty regarding the

extent of potential impacts to Pool 2, as this pool has recently been identified as having less reliance on groundwater than previously expected (FMG 2019).

The EPA notes that there are a large number of permanent pools to the north of the project area within Duck Creek, and to the south of the project area within Boolgeeda Creek. Given that many of these pools are associated with high quality fauna habitat, the EPA considers that the loss of environmental values, including habitat values associated with Pool 1 and Pool 2, does not represent a significant risk to regional biodiversity.

The EPA notes that the predicted magnitude of impacts to GDE, groundwater fed pools, fauna habitat, and stygofauna associated with groundwater drawdown is subject to validation of the groundwater model, and finalisation of the mine plan. The EPA has therefore recommended condition 9, which would require the proponent to validate the groundwater and surface water models to verify the extent of impacts to these vegetation types, and to monitor and minimise impacts to key environmental receptors within and outside the MDE accordingly.

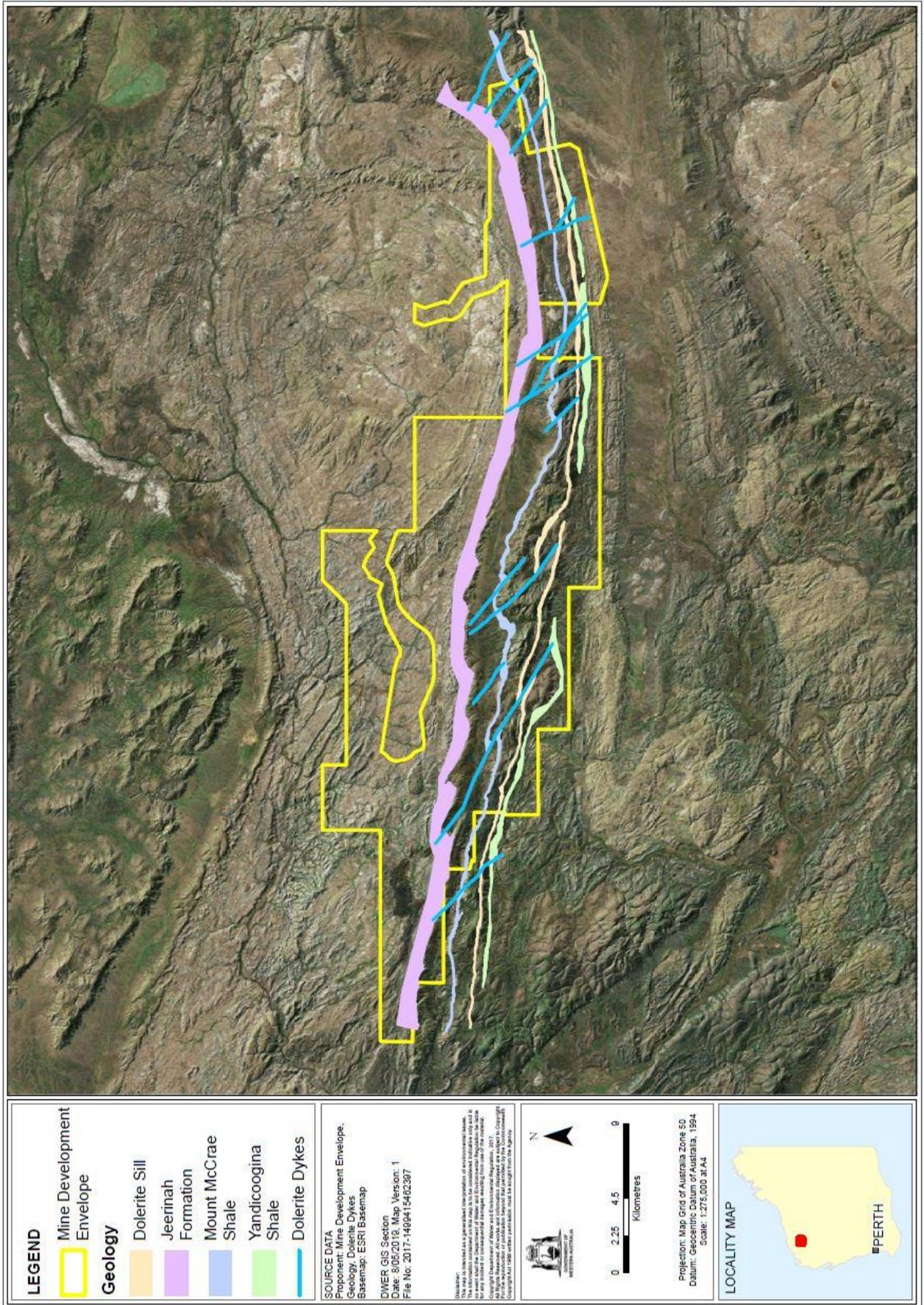


Figure 4: Compartmentalisation of groundwater in the project area

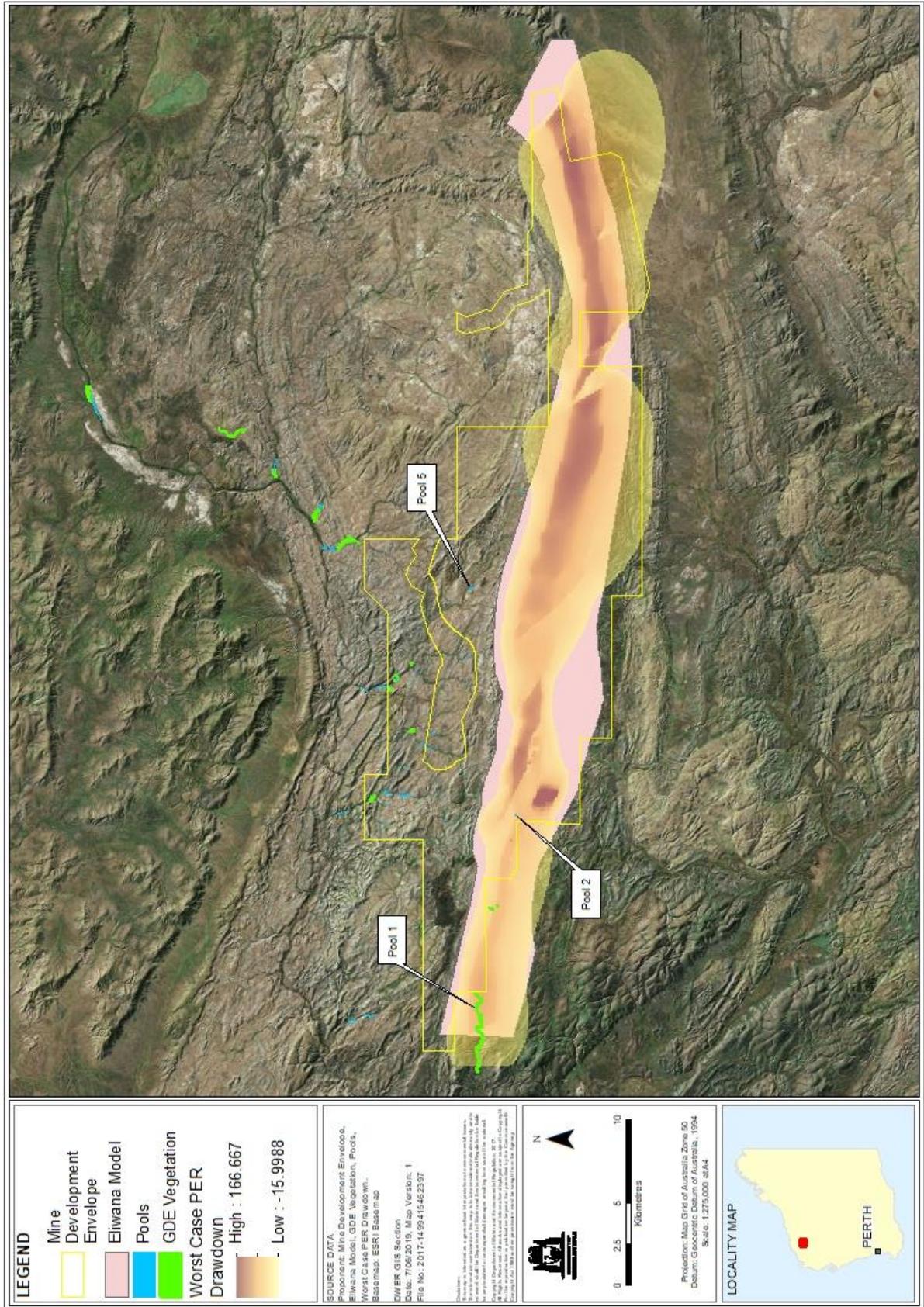


Figure 5: Groundwater drawdown and groundwater dependent vegetation

Water quality

The proponent has conducted preliminary investigations into groundwater and surface water quality in the project area. The EPA considers that the investigations conducted to date are sufficient to inform the assessment of the proposal, however further investigations would be required to adequately monitor and manage any impacts to water quality from the proposal. The EPA has recommended condition 9, requiring the proponent to complete baseline water quality studies.

Water quality in the project area is generally good, with elevated concentrations of some metals including boron, aluminium and iron (FMG 2018). No water source protection areas, public drinking water source areas, national parks, or conservation estates have been identified in the proposal area (FMG 2018).

The proposal has the potential to significantly impact groundwater and surface water quality through:

- AMD generated from waste rock dumps and tailings storage facilities intercepting groundwater or surface water, and
- pit void lakes with deteriorating water quality overtopping during rainfall events into surface water systems, or seeping into groundwater.

The EPA notes that other potential impacts to water quality, including sedimentation and erosion from constructed landforms, discharge of excess dewater, discharge of mine void water, and hydrocarbon or chemical spills, can be managed to meet the EPA's objectives for this factor, subject to the implementation of recommended condition 9.

The proponent has conducted geochemical characterisation of ore and waste materials that would be produced by the proposal, including acid-based accounting and short-term sequential leaching tests. Kinetic testing to determine long-term weathering potential is ongoing, and would continue through 2020 (FMG 2018a).

The EPA considers that the characterisation conducted to date is adequate to enable the assessment of the proposal, but notes that further kinetic testing and ongoing geochemical characterisation is required to inform the design of the proposal to ensure that closure objectives can be met, and to inform water management measures required by the recommended condition 9. The EPA has recommended condition 8 requiring the proponent to prepare an AMD Investigation Plan which would include kinetic testing and ongoing geochemical testing of materials.

Waste rock and tailings

There is a risk of AMD generation from up to eight per cent of materials that would be exposed by the proposal. (FMG, 2018a) Tailings material are unlikely to cause acid or saline drainage generation, but could result in minor chromium drainage (FMG 2018a).

Fortescue has committed to on-going detailed geochemical assessment of waste rock and continuous updating of the geological model which informs the mine plan. These investigations would facilitate the identification, segregation, and appropriate disposal of deleterious material within Waste Rock Landforms (WRLs) and TSFs

(FMG 2018). WRLs would be designed to encapsulate or otherwise manage deleterious materials. Investigations have indicated that there are sufficient benign materials available at site to encapsulate deleterious material (FMG 2018b).

The EPA considers that, provided these strategies are implemented, impacts to water quality associated with seepage from WRLs and TSFs can be managed to meet the EPA's objectives for this factor.

The EPA has recommended condition 8 to require the proponent to conduct ongoing geochemical testing to identify deleterious materials. The EPA has also recommended condition 9, requiring the proponent to prepare and implement a water management plan, which would be informed by ongoing geochemical testing and would include monitoring and adaptive management of impacts to water quality.

The EPA notes that mine closure would be regulated under the *Mining Act 1978*, and that a Mine Closure Plan (MCP) would be required to be submitted under that Act, to be revised every three years.

Pit lake voids

The proposal would include below watertable mining in up to eight mine pits. It is expected that each of these pits would form permanent pit lakes on closure through a combination of groundwater inflows and surface water flows.

In a worst-case scenario, where no management is applied, there is a risk that material identified as deleterious in preliminary characterisation studies, including Mount McRae Shale and West Angela Member, would remain exposed in pit walls at closure (FMG 2018). In this instance, pit lake water quality would deteriorate over time, resulting in high salinity and dissolved metals.

Four of the proposed below watertable pits are likely to be groundwater-fed only. Modelling indicates that these pit lakes would be terminal, evaporative sinks that would have no connection to groundwater or surface water pathways. Fortescue considers that the likelihood of this water impacting the environment is low given the lack of pathways to groundwater or surface water (FMG 2018).

Three of the proposed below watertable pits would be fed by a combination of groundwater and surface water, with water released to the environment only during very rare flooding events. Fortescue considers that degradation of water from these pits would be less severe given the inflow of surface water, and that any outflows during storm events would have an extremely large dilution factor, such that downstream impacts to surface water quality would be small (FMG 2018).

The final pit, known as Broadway west, would also be fed by a combination of groundwater and surface water, but is likely to have outflows to the environment on average every year (FMG 2018). This pit would experience constant inflow of surface water, which may mitigate any degradation of water quality. There is potential for outflow from this pit to impact Duck Creek to the north of the project area, which has significant ecological and cultural values (FMG 2018b).

With regards to all pits, Fortescue notes that any unanticipated impacts to groundwater are likely to be contained within the area due to the compartmentalised nature of the groundwater throughout the mine valley (FMG 2018).

The EPA notes that the existence of poor quality pit lakes in the environment may present an inherent impact to the ecological and heritage values of the landscape, regardless of the lack of pathways to surface water and groundwater receptors. Further, the EPA notes that there is potential for terrestrial fauna to be attracted to pit lakes and to be impacted by bioaccumulation of elements in the water.

However, the EPA also notes that the potential degradation of pit lake water is based on a worst-case scenario with no management of pit lakes applied at closure, and no avoidance of impacts during the mine planning and prior to closure.

Fortescue has indicated that kinetic testing and ongoing geochemical testing is intended to inform the mine plan and the MCP, including the design and redesign of mine pit voids to avoid impacts to pit void lake water quality through exposure of deleterious material at closure (FMG 2018a). The EPA considers that this adaptive management strategy is appropriate and would decrease the risk of significantly degraded pit lake water following closure of the mine.

In the event that pit lake water is determined to be degrading after closure, Fortescue has indicated that a range of management actions are available, including removal of deleterious material from pit walls, partial or full backfill options, and use of passive wetland treatment systems (FMG 2018). The EPA considers that the proposed management actions are appropriate and can be used to mitigate impacts to Inland Waters such that the EPA's objectives for this factor can be met.

Fortescue has prepared a MCP for the proposal in accordance with the *Guidelines for preparing Mine Closure Plans* (DMP and EPA 2015). The MCP includes appropriate closure objectives, including ensuring that water quality does not adversely impact downstream environmental and heritage values, and ensuring that pit lakes do not present a significant risk to ecological values.

The EPA notes that the proponent would be required to submit the MCP to the Department of Mines, Industry Regulation and Safety (DMIRS) under the *Mining Act 1978*, and that the MCP would be reviewed and updated every three years under that Act, ensuring that mine closure strategies would be progressively developed and reviewed throughout the mine life to ensure the closure objectives relating to water quality can be met on closure.

The EPA considers that this adaptive management strategy is appropriate, and has recommended condition 8 to require the proponent to carry out ongoing geochemical testing.

The EPA notes that Fortescue's conclusions regarding the likely impacts of proposed pit lakes are based on current modelling, and that the model would require validation and updating to confirm this conclusion. The EPA has recommended condition 9 requiring the proponent to prepare a water management plan, providing details of the validation of the groundwater model and demonstrating how these will be incorporated into the mine closure plan to meet the closure objectives.

The EPA considers that, subject to the implementation of the EPA's recommended condition 9 and condition 8, and the implementation and revision of the Mine Closure Plan required under the *Mining Act 1978*, the proposal can be managed to meet the EPA's objectives for the factor of Inland Waters with regard to water quality.

Summary

The EPA has paid particular attention to the:

- relevant principles, guidance and policy
- proponent's predicted impacts to surface water and groundwater regimes based on current modelling
- potential for AMD arising from the exposure and management of deleterious materials in the project area
- proponent's proposed management of deleterious materials within WRLs and TSFs, and
- proponent's proposed ongoing adaptive management strategy to ensure that closure objectives are met.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Inland Waters, that the impacts to this factor are manageable and would no longer be significant, provided there is:

- Implementation of recommended condition 9, requiring the preparation and implementation of a Water Management Plan including monitoring and management actions to address impacts to riparian vegetation, GDEs, Duck Creek, and permanent and semi-permanent pools in the project area.
- Implementation of recommended condition 8, requiring the preparation and implementation of an Acid and Metalliferous Drainage Investigation Plan, including provision for further and ongoing geochemical testing and characterisation of ore, waste materials, and tailings.
- Revision of the MCP required under the *Mining Act 1978* to ensure that mine closure strategies are progressively identified and developed to meet the closure objectives, with regard to the outcomes of studies required by the recommended condition 9 and condition 8.

4.2 Flora and Vegetation

EPA objective

The EPA's environmental objective for this factor is *to protect flora and vegetation so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016)
- *Technical Guidance – flora and vegetation surveys for environmental impact assessment* (EPA 2016a)
- WA Environmental Offsets Policy (Government of Western Australia 2011)
- WA Environmental Offsets Guidelines (Government of Western Australia 2014).

The considerations for environmental impact assessment (EIA) for this factor are outlined in *Environmental Factor Guideline – Flora and Vegetation* (EPA 2016).

In addition to the current relevant policy and guidance above, the EPA had regard to the *Guidelines for Preparing Mine Closure Plans* (DMP & EPA 2015), to ensure the proposal is decommissioned and rehabilitated in an appropriate manner.

EPA assessment

The proponent has undertaken flora and vegetation surveys within the development envelope (Biota 2017). These surveys were conducted in accordance with the EPA's *Technical Guidance – Flora and vegetation surveys for environmental impact assessment* (EPA 2016a), and are considered to be sufficient to enable the EPA's assessment of this factor.

The proposal has the potential to significantly impact flora and vegetation through direct disturbance as a result of clearing and excavation for mine pits and supporting infrastructure, and indirect impacts including groundwater drawdown and changes to surface water flows.

There is potential for impacts to flora and vegetation to occur as a result of changes to water quality. Changes to water quality are addressed in section 4.1 (Inland Waters) of this report. The EPA considers that these impacts can be managed to meet the EPA's objectives for this factor, subject to implementation of the recommended conditions.

There is potential for increased weed diversity and extent to impact native flora and vegetation as a result of the proposal. Other indirect impacts to flora and vegetation include fragmentation, dust deposition, and changes to fire regimes. The EPA considers that impacts to native flora and vegetation as a result of weeds can be

managed to meet the EPA's objective for this factor, subject to implementation of the EPA's recommended condition 7.

Direct clearing

The proposal would include clearing of up to 7,900 ha of native vegetation within the 43,804 ha MDE (Figure 1), representing a significant residual impact associated with the clearing of 'Good to Excellent' condition native vegetation in the Hamersley IBRA subregion of the Pilbara.

No Threatened Ecological Communities have been identified within the MDE, however one Priority Ecological Community (PEC) was identified. Sixteen Priority flora species have been identified within the MDE, including one Priority 1 and three Priority 2 species.

The Priority 3 *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC was identified as occurring within the MDE (Figure 6), with 596.1 ha of this community mapped in the local area (FMG 2018). This is a significant increase in the known extent of the PEC, of which 66 ha is currently recorded in public databases (FMG 2018).

The proposal would directly impact up to 41.4 ha of the PEC, resulting in impacts to up to 6.9 per cent of the known local extent. *The Eliwana Flora and Vegetation Survey – Phase 2* (Biota 2017) notes that a greater area of this PEC has been mapped by other surveys in the area, indicating that the community is likely to be more widespread in the area than indicated by publicly available surveys.

Given the increase in the known extent of this PEC, the relatively low direct impacts, and the potential for this PEC to occur outside the surveyed area, the EPA considers that impacts to this community can be managed to meet the EPA's objectives for this factor, subject to limitation of direct impacts to that currently predicted, and management of indirect impacts through the preparation and implementation of the Flora and Vegetation Management Plan required by the EPA's recommended condition 7.

The proposal is not expected to result in direct impacts to any Priority 1 or Priority 2 flora species. The proposal would result in direct impact to four Priority 3 species, and five Priority 4 species. None of these species would be impacted by more than 20 per cent of their known individuals, with the exception of *Triodia basitricha*, a Priority 3 spinifex species.

T.basitricha would be impacted by up to 38.1 per cent of the recorded individuals by this proposal. Further, the cumulative impact of Fortescue proposals in the vicinity, including the Eliwana Railway Project and the Solomon Iron Ore Mine, have the potential to impact up to 70.4 per cent of the known individuals of this species.

Fortescue considers that the potential cumulative impacts of 70.4 per cent of *T.basitricha* individuals is overstated as a result of the concentration of surveys in the project area. As populations of the species have been identified over a range of 500 km (FMG 2019a), Fortescue considers that it is likely that further unsurveyed populations of the species exist such that the cumulative impacts of Fortescue projects in the area would not result in a significant impact to the species (FMG 2019a).

Given the demonstrated range of the species, the EPA considers that this conclusion is reasonable. However, as there remains uncertainty regarding the potential impacts, the EPA has recommended condition 7, requiring the proponent to avoid and minimise impacts to this species.

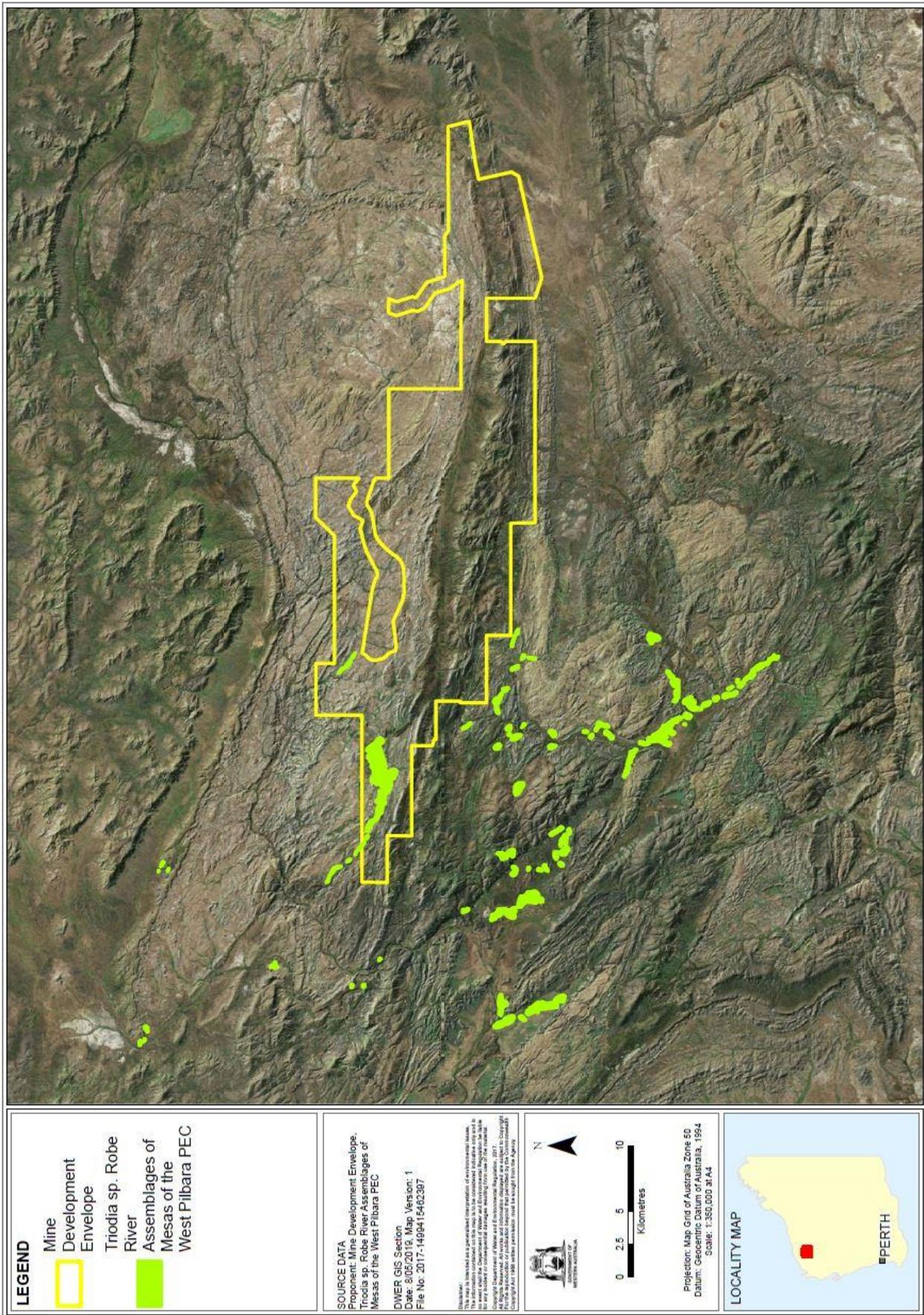


Figure 6: *Triodia* sp. Robe River assemblages of mesas of the West Pilbara PEC

Groundwater drawdown

The predicted magnitude and management of groundwater drawdown is discussed in section 4.1 (Inland Waters), of this report.

Groundwater drawdown would impact up to 20.6 ha of GDE, located outside of the MDE to the west of the proposal area. It is expected that this area of vegetation would be significantly impacted, with loss of some trees and a significant decline in vegetation health likely. The cumulative extent of GDE impacted as a result of the proposal (including from groundwater drawdown and surface water reduction), would be approximately 25 per cent of the local extent of GDE known from Fortescue's studies. No direct clearing of GDE is proposed.

The EPA considers that the magnitude of the predicted impacts to vegetation associated with groundwater drawdown is unlikely to represent a significant threat to the conservation status of the vegetation types and their associated species and habitat values. However, the loss of 20.6 ha of GDE outside of the MDE represents a significant residual impact inherent in the degradation of native vegetation which is in 'Good to Excellent' condition, and which has high values as fauna habitat and refuge in the context of the surrounding arid environment. Fortescue has recognised this significant residual impact and has proposed the provision of an offset to counterbalance the impact associated with drawdown beneath 20.6 ha of GDE.

The EPA also notes that the predicted magnitude of impacts associated with groundwater drawdown is subject to validation of the groundwater model, and finalisation of the mine plan. The EPA has therefore recommended condition 9, which would require the proponent to validate the groundwater and surface water models to confirm the extent of impacts to these vegetation types, and condition 7, to ensure that impacts to vegetation are monitored and minimised appropriately.

Changes to surface water regimes

The predicted magnitude and management of changes to surface water regimes is described in section 4.1 (Inland Waters), of this report.

Up to six vegetation types in the project area have been identified by the proponent as being subject to predicted changes in surface water flows. These riparian vegetation types occur in and around drainage lines likely to be impacted by a reduction in surface water flows during rainfall events due to disturbance or diversion of upstream surface water, or in the area downstream of the proposed single point from which excess dewater would be discharged (Figure 3). The combined areal extent of these vegetation types in the project area has been mapped as 8,162.4 ha.

It is likely that reduction in water flows and discharge of excess water into drainage lines would not result in the complete loss of these vegetation types, but would result in a decline in health of some vegetation. Discharge of excess water may result in short-term changes to the composition of vegetation communities resulting in a decline in vegetation health following the cessation of discharge.

There are numerous overlaps between areas of vegetation which are predicted to be subject to reductions in surface water, discharge of excess water, clearing, and groundwater drawdown. The cumulative impact of these activities to the riparian vegetation types subject to changes in the surface water regime would be up to 610

ha, representing 5.5 per cent of the area of these vegetation types mapped in the project area. Of this, 455 ha would be indirect impacts including changes to surface water and groundwater regimes.

Given that changes to surface water are likely to result in a decline in vegetation health rather than loss of vegetation, the EPA considers that the magnitude of the predicted impacts to vegetation associated with changes to surface water is unlikely to represent a significant threat to the conservation status of the vegetation types and their associated species and habitat values.

However, The EPA also notes that the predicted magnitude of impacts associated with changes to surface water regimes is subject to validation of the surface water model, and finalisation of the mine plan. The EPA has therefore recommended condition 9, which would require the proponent to validate the surface water models to confirm the extent of impacts to these vegetation types, and condition 7 to ensure that monitoring and minimisation of impacts to flora and vegetation are carried out accordingly.

Mitigation and management

The proponent has proposed mitigation and management actions to minimise the residual impacts to flora and vegetation as a result of this proposal, including:

- identification of priority flora by appropriate signage and flagging prior to clearing
- review of mine design against flora and vegetation survey data to avoid and minimise clearing of significant flora and vegetation
- protection of drainage lines from construction impacts where possible
- establishment of monitoring sites to monitor impacts to flora and vegetation and, where necessary, mitigate impacts
- implementation of weed hygiene measures including vehicle wash-down and inspection procedures
- implementation of dust suppression measures, and
- completion of rehabilitation in accordance with appropriate closure objectives.

Summary

The EPA has paid particular attention to the:

- EPA's *Statement of Environmental Principles, Factors and Objectives*
- Environmental Factor Guideline: *Flora and Vegetation*
- WA Environmental Offsets Policy and Guidelines
- significant residual impact associated with clearing of up to 7,900 ha of native vegetation in good to excellent condition, including up to 41.4 ha of the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC
- demonstrated range of the species *T.basitricha*, and
- magnitude of indirect impacts associated with groundwater drawdown and changes to surface water, as described in section 4.1 (Inland waters).

The EPA considers, having regard to the relevant EP Act principles and environmental objectives for Flora and Vegetation, that the impacts to this factor are manageable and would no longer be significant, provided there is:

- limitation of impacts to native vegetation and to the PEC through the authorised extent in in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- implementation of measures to avoid and minimise impacts to flora and vegetation through the preparation and/or implementation of a Flora and Vegetation Monitoring and Management Plan (condition 7)
- implementation of measures to avoid and minimise impacts to groundwater and surface water regimes, through the preparation and implementation of a Water Management Plan (condition 9), and
- implementation of offsets (see section 5 and condition 15) to counterbalance the significant residual impact of clearing of 7,900 ha of native vegetation in good to excellent condition, including up to 41.4 ha of clearing within the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC, and impacts to 20.6 ha of GDE as a result of groundwater drawdown.

4.3 Terrestrial Fauna

EPA objective

The EPA's environmental objective for this factor is *to protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c)
- *Technical Guidance – Sampling methods for terrestrial vertebrate fauna* (EPA 2016d)
- *Technical Guidance – Terrestrial Fauna Surveys* (EPA 2016e), and
- *Technical Guidance – Sampling of short range endemic invertebrate fauna* (EPA 2016f).

The considerations for environmental impact assessment (EIA) for this factor are outlined in *Environmental Factor Guideline – Terrestrial Fauna* (EPA 2016c).

EPA assessment

The proponent has conducted surveys and studies to assess the impacts of the proposal to Terrestrial Fauna, including vertebrate fauna (Ecoscape 2017) and Short Range Endemic (SRE) invertebrate fauna (Phoenix 2018). The EPA considers that the studies and surveys provided in the ERD and in the relevant appendices meet the requirements of EPA guidance for this factor.

Short Range Endemic (SRE) invertebrate fauna

One invertebrate species was confirmed as a SRE species. This species, a millipede identified as *Antichiropus* 1012DNA02, has only been recorded from within the MDE and may occur within the proposed disturbance footprint. It is currently known only from the original record, collected from a single site in the MDE (Phoenix 2018).

There is potential for this species to be more widespread, given that a similar species, *Antichiropus* 1012DNA01 has been found over a wide area within and outside the MDE, and that the wooded drainage line habitat within which the specimen was collected extends outside of the MDE (FMG 2018).

The proponent has committed to further surveys to identify whether this species can be found outside of the disturbance footprint and, in the event that it cannot, to investigate the potential for translocation of the species, and to re-design the proposed infrastructure to avoid the area if required (FMG 2019). The EPA considers that impacts to this species can be managed to meet the EPA's objectives for this factor, subject to implementation of these commitments. The EPA has recommended condition 10 requiring the proponent to conduct further surveys and implement actions to ensure that impacts to *Antichiropus* 1012DNA02 are managed.

Vertebrate fauna

Ten conservation significant fauna species were identified within the MDE, with a further three considered likely to occur based on the extent of preferred habitat in the project area (Ecoscape 2017).

Nine of these species, comprising highly mobile or widespread bird species and Priority listed species, may be impacted by loss of habitat and other indirect impacts associated with the proposal. However, given the extent of habitat for these species identified outside the disturbance area, these impacts are likely to be manageable to meet the EPA's objectives for this factor, subject to implementation of the EPA's recommended condition 10, requiring the proponent to prepare and implement a significant fauna management plan to monitor and manage direct and indirect impacts to significant fauna.

The remaining four significant species, which are listed as vulnerable or endangered under both the EPBC Act and the *Biodiversity Conservation Act 2016* (the BC Act), include the:

- Pilbara leaf-nosed bat (EPBC Act: Vulnerable; BC Act: Vulnerable)
- ghost bat (EPBC Act: Vulnerable; BC Act: Vulnerable)
- Pilbara olive python (EPBC Act: Vulnerable; BC Act: Vulnerable)
- northern quoll (EPBC Act: Endangered; BC Act: Endangered).

The night parrot is also discussed in this report, as it has been included as a controlling provision for assessment under the EPBC Act.

Pilbara leaf-nosed bat (Rhinonicteris aurantia)

The Pilbara leaf-nosed bat has been recorded from 13 locations within the MDE. The timing of the calls recorded relative to sunset and sunrise indicate that there are no

diurnal roosting sites within the MDE, and none of caves investigated within the MDE showed signs of diurnal roosting.

Fauna habitats mapped within the MDE that represent habitat for this species include:

- 307 ha of Gorges and Gullies representing potential roosting habitat (critical habitat), of which 11.7 per cent (36 ha) may be disturbed for the proposal (Figure 7)
- 539.5 ha of Drainage line/River/Creek (major) representing possible foraging habitat, of which 10.2 per cent (54.9 ha) may be disturbed for the proposal (Figure 7)
- 5,335.5 ha of Hills/Ranges/Plateaux habitat representing potential foraging and nocturnal roost habitat, of which 17.7 per cent (944 ha) may be disturbed for the proposal
- 26,025 ha of Lower Slopes/Hillslopes representing potential foraging habitat, of which 16.8 per cent (4,347.9 ha) may be disturbed for the proposal.

Foraging habitat within the MDE for the Pilbara leaf-nosed bat is unlikely to be critical habitat, given the absence of any demonstrated diurnal roosting sites. Impacts to any of the foraging habitats within the MDE are unlikely to be significant, noting that these habitats extend significantly outside the MDE. The EPA considers that impacts to habitat for the Pilbara leaf-nosed bat are unlikely to be significant, beyond the significant residual impact inherent in clearing of habitat, and particularly critical habitat, for significant species.

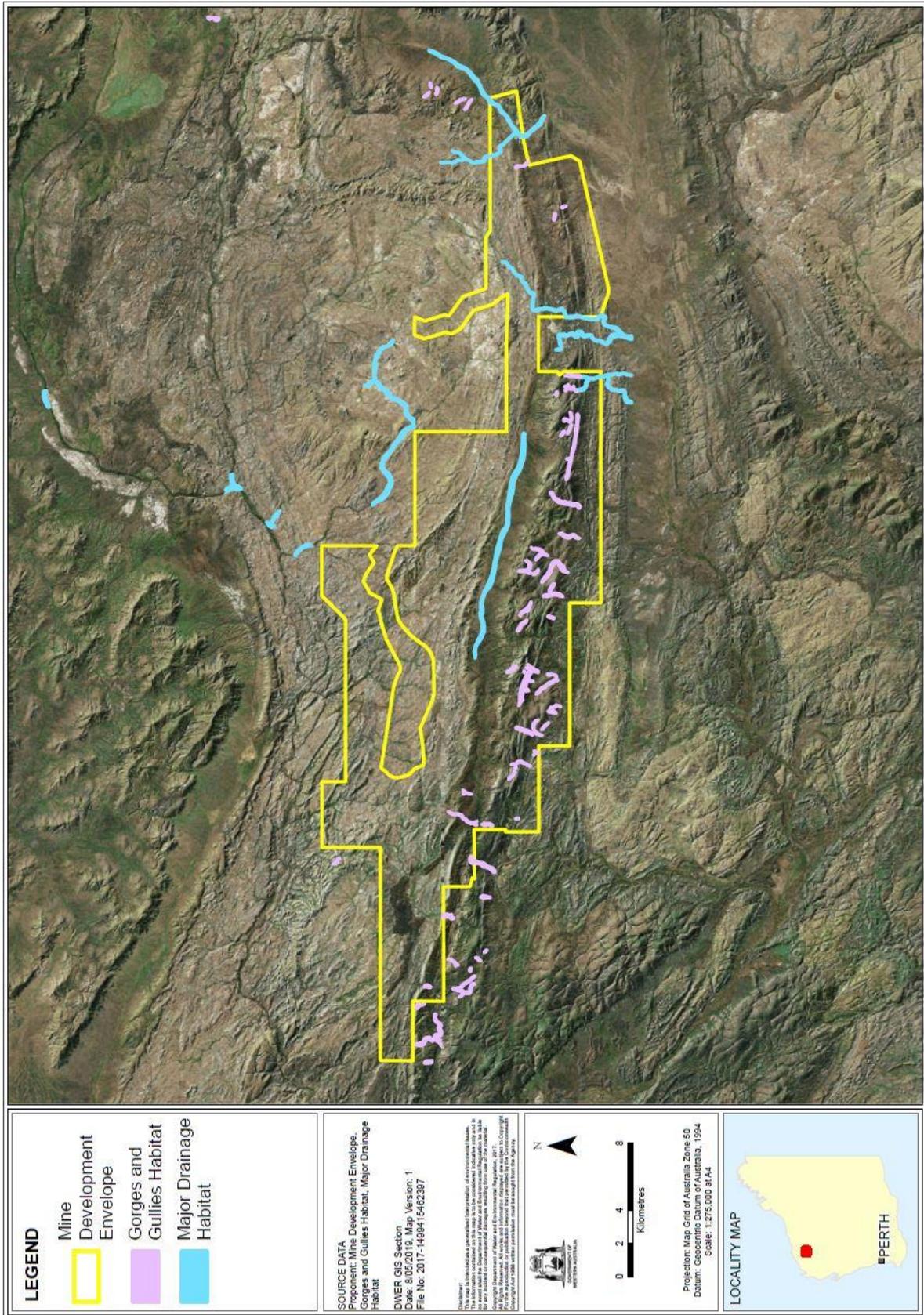


Figure 7: Critical habitat – Gorges and Gullies and Drainage lines/Rivers/Creeks (Major)

Ghost bat (Macrodermis gigas)

The ghost bat has been recorded on four occasions in the MDE, including one sighting of a ghost bat flying, discovery of the remains of ghost bat prey, and two recordings of calls. No ghost bats were recorded during targeted bat surveys conducted in 2017, however they were recorded outside of the MDE.

Based on these recordings, it is unlikely that any diurnal roost sites for this species occur within the MDE.

Fauna habitats mapped within the MDE that represent habitat for this species include:

- 307 ha of Gorges and Gullies representing potential roosting habitat (critical habitat), of which 11.7 per cent (36 ha) may be disturbed for the proposal.

All other vegetation in the MDE could be considered as potential foraging and dispersal habitat for the ghost bat. Total clearing within the MDE represents 12 per cent of the MDE.

Given the lack of demonstrated diurnal roosting sites for this species, and the widespread nature of foraging and dispersal habitat, the EPA considers that impacts to habitat for the ghost bat are unlikely to be significant, beyond the significant residual impact inherent in clearing of habitat, and particularly critical habitat, for significant species.

Ghost bats may be at risk of collision with fences, with a number of known occurrences of this happening, particularly where barbed wire is used (FMG 2018). The proponent has committed to minimising fencing around the project area where practicable. The ghost bat may also be at risk for competition with feral animals who share prey species. The proponent has committed to management of waste to prevent attraction by feral animals. The EPA has recommended condition 10 to ensure that the proposal is implemented to avoid and minimise impacts to the ghost bat where possible.

Pilbara olive python (Liasis olivaceus barroni)

Two Pilbara olive python individuals have been recorded in the MDE. There is a relatively small area of critical drainage line, creek, gorges and gullies habitat for this species within the MDE, however as this species is quite mobile it also has the potential to disperse across hills and ranges and could be encountered in the MDE at any time.

Habitat mapping conducted by Fortescue indicates that habitat for the Pilbara olive python includes:

- 539.5 ha of Drainage line/River/Creek (major) critical habitat of which 10.2 per cent (54.9 ha) may be disturbed for the proposal (Figure 7)
- 307 ha of Gorges and Gullies critical habitat, of which 11.7 per cent (36 ha) may be disturbed for the proposal.

- 5,335.5 ha of Hills/Ranges/Plateaux habitat for winter shelter and dispersal, of which 17.7 per cent (944 ha) may be disturbed for the proposal

Extensive areas of critical habitat for this species occur in Boolgeeda Creek to the south, and Duck Creek and Caves Creek to the north of the project area, therefore the extent of disturbance of critical habitat for this proposal is small in relation to the local extent of this habitat type. Indirect impacts to drainage line and pools are addressed in section 4.1 (Inland Waters) of this report, and are considered unlikely to be significant. The EPA therefore considers that impacts to habitat associated with this proposal are unlikely to be significant for the Pilbara olive python, beyond the significant residual impact inherent in clearing of habitat for significant species.

Pilbara olive pythons are susceptible to vehicle strike, as they are known to bask on roads after dark. There is also potential for this species to be impacted by increases in feral animals. Fortescue has proposed management actions to minimise indirect impacts to terrestrial fauna, including speed limit restrictions, and management of waste to prevent attraction by feral animals. The EPA has recommended condition 10 to ensure that the proposal is implemented to avoid and minimise impacts to the Pilbara olive python where possible.

Northern quoll (Dasyurus hallucatus)

Two northern quoll individuals have been recorded in the MDE. Based on the season of recording and the scarcity of individuals and scats recorded it is likely that these recordings were of transient individuals (Ecoscape 2017).

Fortescue's habitat mapping identified habitat for the northern quoll within the MDE as follows:

- 5,335.5 ha of Hills/Ranges/Plateaux habitat for foraging and dispersal, of which 17.7 per cent (944 ha) may be disturbed for the proposal
- 539.5 ha of Drainage line/River/Creek (major) for foraging and dispersal, of which 10.2 per cent (54.9 ha) may be disturbed for the proposal
- 307 ha of Gorges and Gullies for denning and foraging habitat, of which 11.7 per cent (36 ha) may be disturbed for the proposal (Figure 7).

Given the extent of regional habitat outside the proposal area for this species, and the likely transient nature of populations using the area, the EPA considers that impacts to northern quoll habitat from this proposal are unlikely to be significant, beyond the significant residual impact inherent in clearing of habitat for significant species, with particular regard to denning habitat.

Indirect impacts including increased feral animals, vehicle movements, blasting noise, vibrations and increased risk of fire may impact any northern quoll populations that do occur within the MDE, however the EPA considers that these impacts can be managed to meet the EPA's objective for this factor. The EPA has recommended condition 10 to ensure that the proposal is implemented to avoid and minimise impacts to the northern quoll where possible.

Night parrot (Pezoporus occidentalis)

Terrestrial fauna surveys undertaken by the proponent did not locate any suitable habitat (dense, long, unburnt spinifex grasslands or chenopod shrub land) for the night parrot within the MDE. Based on this lack of suitable habitat the EPA considers that impacts to the night parrot are unlikely to occur as a result of this proposal.

Summary

The EPA has paid particular attention to the:

- EPA's *Statement of Environmental Principles, Factors and Objectives*
- *Environmental Factor Guideline - Terrestrial Fauna* and associated Technical Guidance documents
- WA Environmental Offsets Policy and Guidelines, and
- disturbance of areas that are habitat for Pilbara leaf-nosed bat, ghost bat, Pilbara olive python and northern quoll.

The EPA considers, having regard to the relevant EP Act principles and environmental objectives for Terrestrial Fauna, that the impacts to this factor are manageable and would no longer be significant, provided there is:

- implementation of measures to avoid and minimise impacts to significant fauna and their habitat through the preparation and implementation of a Significant Fauna Environmental Management Plan (condition 10)
- implementation of offsets (see section 5 and condition 15) to counterbalance the significant residual impact of disturbance to habitat for the Pilbara leaf-nosed bat, ghost bat, northern quoll and Pilbara olive python, with particular regard to the disturbance of:
 - up to 36 ha of gorges and gullies representing critical roosting habitat for the Pilbara leaf-nosed bat and the ghost bat, critical habitat for the Pilbara olive python, and critical denning habitat for the northern quoll, and
 - up to 54.9 ha of drainage line/river/creek (major) habitat, representing critical habitat for the Pilbara olive python.

4.4 Subterranean Fauna

EPA objective

The EPA's environmental objective for this factor is *to protect subterranean fauna so that biological diversity and ecological integrity are maintained.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Subterranean Fauna* (EPA 2016g)

- *Technical Guidance – Subterranean fauna survey* (EPA 2013)
- *Technical Guidance – Sampling methods for subterranean fauna* (EPA 2007)

The considerations for environmental impact assessment (EIA) for this factor are outlined in *Environmental Factor Guideline – Subterranean fauna* (EPA 2016g).

EPA assessment

The proponent has conducted subterranean fauna surveys in accordance with relevant EPA guidance for stygofauna and troglofauna in the proposal area. The EPA considers that the information provided in the ERD, in conjunction with the supplementary information provided in the proponent's Response to Submissions (FMG 2019), is sufficient to allow the EPA to assess the significance of the proposal's impacts to subterranean fauna.

Troglofauna

Based on geological information provided by the proponent, including core samples and detailed geological cross-sections, troglofauna habitat is understood to be well connected throughout the MDE and to extend outside the areas of impact. This is supported by the distribution of widespread species such as *Hemiptera* sp B2, which was recorded extensively from multiple locations within and outside the indicative mine disturbance footprint.

Based on this demonstrated habitat connectivity, the EPA considers that impacts to troglofauna as a result of the proposal can be managed to meet the EPA's objectives for this factor.

There is potential that any re-injection of excess water could impact troglofauna habitat. Fortescue has committed to managing re-injection with consideration for habitat for restricted or priority subterranean fauna species. The EPA notes that Fortescue has extensive experience in managing re-injection for other project areas. The EPA has recommended condition 11, requiring the proponent to prepare and implement a subterranean fauna management plan, including management of re-injection to minimise impacts to troglofauna.

Stygofauna

While there is minimal groundwater connectivity between aquifers as discussed in section 4.1 (Inland Waters), stygofauna habitat appears to be widespread throughout the MDE. This may be through seasonally occurring saturation in detrital material within the dykes, or through structural weathering causing small conduits within dykes. These conduits would be insignificant in providing connectivity for groundwater, but may permit migration of subterranean fauna (FMG, 2019).

Habitat connectivity is demonstrated by the widespread nature of stygofauna biological surrogates, including *Diacyclops humphreysi humphreysi*; *Paramelitidae* sp. B36 and B58; *Orbuscyclops westaustraliensis*; and *Phreodrilidae* AP SVC spp. These species have been identified within and outside the MDE.

Nine species of stygofauna have been recorded only within the MDE. However, none of these species were identified as being restricted to pits that would be entirely dewatered. It is expected that pits associated with restricted species would be dewatered such that, in the worst case, at least 15-20 metres depth of stygofauna habitat would remain.

There is potential that changes to groundwater quality could impact stygofauna populations. Groundwater quality has been addressed in section 4.1 (Inland Waters), and can be managed to meet the EPA's objectives for this factor.

The EPA considers, given the demonstrated connectivity of habitat for stygofauna within and outside the MDE and the expected extent of habitat remaining below the predicted level of drawdown, that impacts to stygofauna can be managed to meet the EPA's objectives for this factor.

However, the EPA recognises that the predicted extent of groundwater drawdown, and impacts to groundwater quality, are subject to the validation of groundwater modelling predictions and the finalisation of the mine plan. Further, while impacts can be managed to meet the EPA's objectives, direct impacts are expected to be high in areas of high groundwater drawdown. The EPA has recommended condition 11 requiring the proponent to manage impacts to subterranean fauna arising from groundwater drawdown, groundwater injection, and changes to groundwater quality.

Summary

The EPA has paid particular attention to the:

- EPA's *Statement of Environmental Principles, Factors and Objectives*
- *Environmental Factor Guideline - Subterranean Fauna* and associated Technical Guidance documents
- extent of impacts to troglifauna and stygofauna habitat predicted for this proposal, and
- demonstrated connectivity of habitat for troglifauna and stygofauna within and outside the proposal area.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for subterranean fauna, that the impacts to this factor are manageable and would no longer be significant, provided there is:

- implementation of measures to avoid and minimise impacts to subterranean fauna and their habitat through the preparation and implementation of an Environmental Management Plan (condition 11).

4.5 Social Surroundings

EPA objective

The EPA's environmental objective for this factor is *to protect social surroundings from significant harm*.

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- the EPA's *Statement of Environmental Principles, Factors and Objectives* (EPA, 2016), with particular regard to the Principle of Intergenerational Equity, and
- *Environmental Factor Guideline – Social Surroundings* (EPA 2016h)

The considerations for environmental impact assessment (EIA) for this factor are outlined in *Environmental Factor Guideline – Social Surroundings* (EPA 2016h).

EPA assessment

The determined native title holders and Traditional Owners of the proposal area are the Puutu Kunti Kurrama and Pinikura (PKKP) people. They are represented by the PKKP Aboriginal Corporation (PKKP AC) as the registered native title body corporate.

The EPA's Social Surroundings Guideline considers that *"the EP Act can complement the Aboriginal Heritage Act 1972 (the AH Act) in cases where actual physical protection is required to protect sites of heritage significance"*.

Impacts to Social Surroundings, including Aboriginal sites, significant cultural associations and cultural activities, may occur through activities that disturb the ground, developments that generate noise or vibration, and activities that may impact aesthetic values.

The proponent has undertaken surveys and consultation with the PKKP people during the development and assessment of the proposal, and has provided this information to the EPA where deemed appropriate, with consideration for culturally sensitive information.

In addition to this, the PKKP AC has provided the EPA with submissions during the public review period of the EPA's assessment, and with supplementary documentation to further inform the assessment. Representatives of the EPA also met with members of the PKKP people on site.

Based on the information provided by Fortescue and the PKKP AC, the EPA considers that the following aspects of the proposal's Social Surroundings comprise the significant receptors likely to be physically impacted by the proposal, and which therefore require assessment under the EP Act:

- direct and indirect impacts to significant sites, including but not limited to:

- Eagles Nest
- Kangaroo Gorge
- Duck Creek
- PK10-004
- surface water and groundwater flows to water resources known to have Aboriginal Heritage values
- access to lands in order to undertake traditional activities, and
- culturally significant flora and fauna.

Culturally significant sites

The PKKP AC has provided the EPA with statements and documentation describing the cultural values and significance of the sites known as Duck Creek, Kangaroo Gorge, PK10-004 (a rock art site), and Eagles Nest. Fortescue has acknowledged the heritage values of each of these sites (FMG 2018) (FMG 2019), with particular regard to the heritage values of Eagles Nest.

The EPA considers that the descriptions and documentation provided by the PKKP AC and by Fortescue adequately demonstrate that these sites are culturally significant to the PKKP people. There is potential for some of these sites to be impacted directly by the proposal footprint, and for each of the sites to be impacted by indirect impacts including dust, noise, vibration, access by non-PKKP people, visual impacts, and changes to surface water and groundwater flows.

Direct disturbance

Duck Creek flows to the north of the MDE, and no direct disturbance to the creek is proposed for this project. Direct disturbance to this site is prevented by the requirement to restrict disturbance associated with the proposal to within the MDE in accordance with Schedule 1.

The EPA notes that small areas of Kangaroo Gorge are within the current indicative disturbance footprint. However, Fortescue has stated that it is committed to maintaining an exclusion zone around Kangaroo Gorge to protect the heritage values of the site (FMG 2019). The EPA supports Fortescue's intention to avoid this place, and has recommended condition 12 to ensure that there is no impact to the site within the boundaries supplied by the PKKP AC.

PK10-004 (Rock Art site) does not currently fall within the indicative disturbance footprint. Fortescue has committed to avoiding all rock art identified within the proposal area at the time of finalisation of the Response to Submissions. (FMG 2019) The EPA supports Fortescue's intention to avoid this place, and has recommended condition 12 to ensure that there is no impact to the site within the boundaries supplied by the PKKP AC.

Areas of Eagles Nest fall within the currently proposed indicative disturbance footprint. There is therefore potential for direct impacts to this site. In accordance with its internal cultural avoidance policy and Land Access Agreements with the

PKKP AC, Fortescue has committed to avoiding impacts to Eagles Nest, until such time as the heritage values of the area are understood and further consultation has been undertaken.

The EPA notes that the PKKP AC has stated in relation to Eagles Nest that “this place should never be disturbed” and has indicated on several occasions that their view on this will not change. The EPA supports Fortescue’s intention to avoid this place, and has recommended condition 12 to ensure that there is no impact to the site within the boundaries supplied by the PKKP AC.

Indirect impacts

Changes to surface water and groundwater regimes associated with cultural heritage values are addressed below. Other indirect impacts with the potential to impact the values of the culturally significant sites mentioned above include dust, noise, vibration, and access to sites by non-PKKP people. Each site has the potential to be impacted by different processes and would be impacted differently by the proposal. Fortescue and the PKKP people are committed to working together to manage indirect impacts (FMG 2019b).

Fortescue has noted that dust, noise, and vibrations will be managed for the proposal in accordance with operating procedures established at other Fortescue operations. The EPA considers that indirect impacts to Social Surroundings associated with the proposal can be managed to meet the EPA’s objectives for this factor subject to ongoing monitoring and management undertaken in consultation with the PKKP people.

The EPA has also recommended condition 13, requiring the proponent to prepare a Social, Cultural and Heritage Management Plan, in consultation with the PKKP people, which includes the development of monitoring and management actions to address indirect impacts to the above-mentioned cultural heritage sites.

Surface water and groundwater flows to water resources known to have Aboriginal heritage values.

Changes to surface water and groundwater regimes associated with the proposal are addressed in section 4.1 (Inland Waters) of this report.

Groundwater and surface water flows which have been identified as supporting social heritage values in the project area include:

- surface water and groundwater flows connected to Duck Creek to the north of the MDE, and
- surface water and groundwater flows to ‘Pool 2’ (Figure 5).

Duck Creek has been identified by the PKKP AC as a place of cultural significance to the PKKP people, and a length of the creek to the north and west of the MDE has been added to the Register of Aboriginal Sites.

As discussed in section 4.1 (Inland Waters) of this report, changes to groundwater flows and surface water flows as a result of this proposal are unlikely to result in

changes to flows within Duck Creek. The creek does not lie within the area anticipated to be impacted by groundwater drawdown (Golder 2017), and the predicted reduction in surface water flows from West Creek into Duck Creek is insignificant relative to the volume of flows experienced by Duck Creek during rainfall events (FMG 2018c). The EPA therefore considers that changes to water regimes are unlikely to impact the heritage values of Duck Creek.

The pool identified by Fortescue as Pool 2 (Figure 5) has been identified by the PKKP AC as having significant cultural value as a result of its close proximity to and association with other heritage sites of outstanding cultural significance. Fortescue acknowledges the cultural values of Pool 2 (FMG 2019) and has indicated that the pool would not be directly impacted by the proposal, but is within areas likely to be impacted by both groundwater drawdown and reductions in surface water flows.

Recent investigations have indicated that Pool 2 is unlikely to have the strong connection to groundwater previously assumed, with changes in the pool's water level not reflecting changes to groundwater over the same period, and chemical characterisation of pool water supporting the theory that this pool is surface water fed (FMG 2019).

Based on this assessment, Fortescue considers that any impact to Pool 2 arising from the proposal as a result of changes to surface water flows may be managed through supplementation, or that other management measures may be agreed with the PKKP people to ensure that heritage values associated with the pool are not lost (FMG, 2019b).

The EPA considers that this conclusion is reasonable and that impacts to heritage values as a result of changes in water flows to this pool can be managed to meet the EPA's objectives for this factor. The EPA has recommended condition 13 requiring the proponent to monitor and manage impacts to cultural heritage, including indirect impacts associated with changes to water regimes, in consultation with the PKKP people.

Access to lands in order to undertake traditional activities

There is potential for the proposal to impact cultural activities and associations by creating a physical barrier to accessing areas of cultural significance, or areas where traditional activities such as hunting or gathering bush tucker are carried out.

The EPA considers that impacts to access as a result of this proposal can be managed to meet the EPA's objectives for Social Surroundings, provided that ongoing consultation with the PKKP people is conducted throughout the final design and construction phase to determine how these impacts can be minimised.

The EPA has recommended condition 13, requiring the proponent to manage impacts to cultural values, including potential loss of access, through ongoing consultation and cooperation with the PKKP people.

Impacts to culturally significant flora and fauna

Culturally significant flora and fauna may be utilised by Traditional Owners for food, medicine, and ceremonial activities. Impacts to these species may impact the ability to carry out traditional activities including hunting, gathering bush tucker, and ceremonies. The EPA particularly notes the PKKP people's concerns with regard to changes to water and vegetation resources driving species commonly used for hunting away from the area.

Impacts to flora and fauna are addressed in sections 4.2 (Flora and Vegetation) and 4.3 (Terrestrial Fauna).

The EPA acknowledges that the environmental values and cultural values of flora and fauna may place emphasis on different species. The EPA considers that management of cultural values associated with flora and fauna would require on-going consultation with the PKKP people through all phases of the proposal, including closure and rehabilitation, to determine the cultural values to be protected.

The EPA has recommended condition 13, requiring the proponent to manage impacts to cultural values, including impacts to culturally significant flora and fauna, through ongoing consultation and cooperation with the PKKP people.

The EPA notes that the Mine Closure Plan prepared by the proponent for the project, which would be required to be implemented under the *Mining Act 1978* includes a stakeholder consultation plan, and that the stakeholder consultation plan includes consultation with relevant Traditional Owner Groups. The EPA considers that the PKKP people should be consulted as key stakeholders in determining closure objectives for flora, vegetation, and fauna of cultural significance in the project area.

Summary

The EPA has paid particular attention to the:

- EPA's *Statement of Environmental Principles, Factors and Objectives*
- *Environmental Factor Guideline - Social Surroundings*
- proponent's commitments to avoiding areas of significant cultural significance, including Rock Art
- information provided by the PKKP AC during this assessment, and to information provided directly to the EPA during site visits, and
- EPA's assessment of the impacts to physical and environmental values associated with the proposal as they may relate to cultural and heritage values.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Social Surroundings that the impacts to this factor are manageable and would no longer be significant, provided there is:

- implementation of the recommended condition 12 requiring the proponent to avoid impacts to identified significant sites, and

- implementation of measures to minimise direct and indirect impacts to Aboriginal social, cultural and heritage values through the preparation and implementation of an Aboriginal Social, Cultural and Heritage Management Plan (condition 13).

4.6 Air Quality

EPA objective

The EPA's environmental objective for this factor is *to maintain air quality and minimise emissions so that environmental values are protected.*

Relevant policy and guidance

The EPA considers that the following current environmental policy and guidance is relevant to its assessment of the proposal for this factor:

- *Environmental Factor Guideline – Air Quality* (EPA 2016i).

The considerations for EIA for this factor are outlined in *Environmental Factor Guideline – Air Quality* (EPA 2016i).

EPA assessment

Fortescue has used data from its existing iron ore mining operations (Solomon and Christmas Creek iron ore mines) to estimate emissions to air that may impact air quality. In addition, Fortescue has analysed historical drilling data to determine if the presence of fibrous minerals could impact air quality. The closest sensitive receptor to the operations is the proposed Eliwana Mine Camp. The development envelope is located more than 10 km from the nearest homestead and at least 50 km from the closest town.

The proposal may impact air quality as a result of air emissions during construction and operation. Emissions include:

- volatile organic compounds (VOCs), oxides of nitrogen (NO_x), and particulate matter arising from electricity generation and diesel combustion by fixed and mobile plant
- greenhouse gas emissions (measured as tonnes of carbon dioxide equivalent) from generation of electricity and combustion of diesel by fixed and mobile plant
- particulate dust emissions from mining operations including, but not limited to, vehicle movement, construction activities, blasting activities, excavation, stockpiling, processing, and transportation of iron ore and waste (including potentially fibrous mineral materials).

Fortescue have assessed a number of options for electricity generation in the ERD. The maximum annual greenhouse gas emissions for the proposal is 272,315 tonnes of carbon dioxide equivalent. Based on the 2015 National Greenhouse Gas Inventory, Fortescue has estimated the annual emissions are equivalent to 0.05 per cent of Australia's emissions and 0.31 per cent of emissions in the State.

Fortescue has committed to the management of greenhouse gas emissions in accordance with relevant legislation and national and State strategies relating to greenhouse gas emissions.

Even though the proposal would be a minor contributor to the State's greenhouse gas emissions, the EPA has recommended condition 14 requiring the proponent to report annually, in order to maintain a robust dataset on the State's greenhouse gas emissions.

Fortescue has identified specific measures to manage dust during construction and operation including, but not limited to, minimising haulage distances, dust control measures, use of water carts, and minimising vegetation clearing.

Summary

The EPA has paid particular attention to the:

- *Environmental Factor Guideline – Air Quality* (EPA 2016i)
- intensity of greenhouse gas emissions
- Fortescue's commitment to dust management measures, and
- Fortescue's commitment to implement a Fibrous Minerals Management Procedure during the development and operation of the Eliwana Iron Ore Mine.

The EPA considers, having regard to the relevant EP Act principles and environmental objective for Air Quality, that the impacts to this factor are manageable and would no longer be significant, provided there is:

- control through authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4), and
- a condition requiring the annual reporting of greenhouse gas emissions, benchmarking, and continuous improvement to the Department of Water and Environmental Regulation (DWER) (condition 14).

The EPA notes that there is a requirement for:

- licensing of emissions and discharges from prescribed activities by the DWER, and
- compliance with the *Mines Safety and Inspection Act 1994* in relation to fibrous minerals management.

The EPA considers that impacts to air quality from electric power generation and ore processing are not so significant to require a condition and can be adequately managed by the DWER under the requirements of Part V of the EP Act.

The EPA considers that the health risks to mine site personnel from the presence of mineral fibres can be adequately managed by the DMIRS under the *Mines Safety and Inspection Act 1994*.

5. Offsets

Relevant policy and guidance

The EPA considers that the following policy and guidance is relevant to its assessment of offsets for the proposal:

- WA Environmental Offsets Policy (Government of Western Australia 2011)
- WA Environmental Offset Guidelines (Government of Western Australia 2014)
- *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2016* (EPA 2016).

The EPA has considered its strategic advice on *Cumulative environmental impacts of development in the Pilbara Region – Advice of the Environmental Protection Authority to the Minister for Environment under Section 16 (e) of the Environmental Protection Act 1986* (EPA 2014), for the assessment of offsets.

EPA Assessment

Environmental offsets are actions that provide environmental benefits which counterbalance the significant residual impacts of a proposal. The EPA may apply environmental offsets where it determines that a proposal's residual impacts are significant after avoidance, minimisation, and rehabilitation have been pursued.

Mitigation measures are assessed under the relevant environmental factor (see sections 4.1 – 4.6). In applying the residual impact significance model (Government of Western Australia 2014), the EPA considers that the proposal would have a significant residual impact in the Hamersley subregion as a result of:

- clearing of up to 7,879 ha of 'Good to Excellent' condition vegetation including including up to 41.4 ha of to the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC, and habitat suitable for conservation significant fauna species (northern quoll, ghost bat, Pilbara leaf-nosed bat and Pilbara olive python)
- clearing of up to 36 ha of Gorges and Gullies critical habitat for the Pilbara leaf-nosed bat, the ghost bat, the Pilbara olive python, and the northern quoll
- clearing of up to 539.5 ha of Drainage lines/River/Creek (Major) critical habitat for the Pilbara olive python, and
- degradation of 20.6 ha of riparian groundwater dependent *Melaleuca argentea* dominated vegetation (MaMgCyPv) or *Eucalyptus camululensis* dominated vegetation (EcAcEUaTe) through groundwater drawdown.

In its advice on the cumulative impacts in the Pilbara (EPA 2014), the EPA considered that, without intervention, the increasing cumulative impacts of development and land use in the Pilbara region will significantly impact on biodiversity and environmental values.

The EPA considers that the clearing of native vegetation and impacts on other associated environmental values in the Pilbara IBRA bioregion is significant where the cumulative impact may reach critical levels if not managed. The proposal is entirely located within the Hamersley subregion.

Consistent with the Residual Impact Significance Model in the *WA Environmental Offsets Guidelines*, where the cumulative impact may reach critical levels if not managed, the clearing of native vegetation in 'Good to Excellent' condition, and impacts to Matters of National Environmental Significance including conservation significant fauna requires an offset to counterbalance the significant residual impact of the clearing. The *WA Environmental Offsets Guidelines* also identifies that clearing of native vegetation that is watercourse or wetland dependent may be a significant residual impact that requires an offset. Consistent with this, the degradation of 20.6 ha of groundwater dependent *Melaleuca argentea* dominated vegetation (MaMgCyPv), or *Eucalyptus camululensis* dominated vegetation (EcAcEUaTe) through groundwater drawdown constitutes a significant residual impact that requires an offset. The EPA notes the 7,879 ha of vegetation in 'Good to Excellent' condition incorporates habitat for the Pilbara olive python, northern quoll, ghost bat and Pilbara leaf-nosed bat and, as such, represents a significant residual impact to these species and is offset accordingly.

Conservation areas in the Pilbara bioregion total about eight per cent of the area, with the remainder mostly crown land overlain with mining tenements and pastoral leases. The EPA recognises that the opportunity for proponents to undertake individual offsets in the Pilbara region is constrained by overlapping land tenure arrangements and limited land access to undertaken on-ground offset actions. Traditional approaches to offsets, namely land acquisition and management offsets are therefore limited.

In its advice on cumulative impacts in the Pilbara (EPA 2014), the EPA proposed the establishment of a strategic conservation initiative for the Pilbara as a mechanism to pool offset funds to achieve biodiversity conservation outcomes. Such an approach would provide a mechanism to overcome some of the offset implementation constraints. A pooled offset approach is consistent with the WA Environmental Offsets Policy, which states that environmental offsets will be focused on longer-term strategic outcomes (Principle 6). Strategic approaches, such as the use of a fund, can provide a coordinating mechanism to implement offsets across a range of land tenure (Government of Western Australia 2014).

A contribution to a strategic conservation initiative focused on these or similar types of actions will allow for an outcome that counterbalances the significant residual impacts from this proposal. The EPA considers that there should be a clear target outcome for each offset project supported by the offset funds. A clear link must be drawn between the outcomes and the significant residual impacts of the individual proposal. Funds should be used for landscape scale on-ground actions in the Pilbara IBRA region and indirect actions (such as research) that will directly counterbalance the significant residual impacts and contribute to biodiversity conservation outcomes in the region.

The EPA has stated that the type of environmental offset in the Pilbara that contributes to a strategic conservation initiative will ensure a consistent and

transparent approach and contribute to longer term strategic outcomes, with contributions based on an assessment of the significance of environmental impacts.

The EPA's view is that project funding for offsets should not be used to provide substitute funding for existing government programs or proponent obligations.

Commensurate with other decisions within the Pilbara, the EPA recommends that the following offset rates should apply in the form of a contribution to a Pilbara strategic conservation initiative for landscape-scale actions to protect biodiversity in the Pilbara:

- \$805 per hectare for the clearing of native vegetation in 'Good' to 'Excellent', condition, including up to 41.4 ha of to the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC, dispersal habitat for the Pilbara olive python, foraging and dispersal habitat for the northern quoll, and dispersal and foraging habitat for the Pilbara leaf-nosed bat and ghost bat.
- \$1,611 per hectare of groundwater dependent *Melaleuca argentea* dominated vegetation (MaMgCyPv) or *Eucalyptus camululensis* dominated vegetation (EcAcEUaTe), degraded as a result of the proposal within Area B of the Development Envelope within the Hamersley IBRA subregion, as shown in Figure of Schedule 1 and described in the spatial data in Schedule 2.
- \$1,611 per hectare of Gorges and Gullies critical habitat for ghost bat, Pilbara leaf-nosed bat, northern quoll, and Pilbara olive python; and Drainage line/River/Creek (Major) critical habitat for Pilbara olive python.

Summary

The EPA recommends that an offset condition (condition 15) is imposed to counterbalance the significant residual impacts of the proposal. The EPA recommends that offset contribution rate of \$805 per hectare in the Hamersley IBRA subregion be applied for the clearing of 7,879 ha of 'Good to Excellent' condition native vegetation, including habitat for conservation significant vertebrate fauna species. The EPA recommends a higher offset contribution rate of \$1,611 per hectare be applied for the degradation of groundwater dependent *Melaleuca argentea* dominated vegetation (MaMgCyPv) or *Eucalyptus camululensis* dominated vegetation (EcAcEUaTe) as a result of groundwater drawdown. The higher rate of \$1,611 per hectare is also recommended to apply to the loss of critical habitat for MNES species, including Gorges and Gullies, and Drainage line/river/creek (major) habitats.

6. Matters of National Environmental Significance

The Commonwealth Minister for the Environment has determined that the proposal is a controlled action under the EPBC Act as it is likely to have a significant impact on one or more MNES. It was determined that the proposed action is likely to have a significant impact on the following matters protected by the EPBC Act:

- Listed threatened species and communities (section 18 and 18A).

Further information received from the Department of Environment and Energy (DoEE) on 20 November 2017 indicated that the following species are relevant to the Commonwealth's assessment of the proposal:

- Pilbara leaf-nosed bat (*Rhinonicteris aurantia*)
- ghost bat (*Macroderma gigas*)
- Pilbara olive python (*Liasis olivaceus barroni*)
- northern quoll (*Dasyurus hallucatus*)
- night parrot (*Pezoporus occidentalis*)

The EPA has assessed the controlled action on behalf of the Commonwealth as an accredited assessment under the EPBC Act.

This assessment report is provided to the Commonwealth Minister for Environment who will decide whether or not to approve the proposal under the EPBC Act. This is separate from any Western Australian approval that may be required.

Commonwealth policy and guidance

The EPA had regard to the following relevant Commonwealth guidelines, policies and plans during its assessment:

- Commonwealth EPBC Act Environmental Offsets Policy (Commonwealth 2012)
- Approved Conservation Advice for *Liasis olivaceus barroni* (Olive Python – Pilbara subspecies) (DoEE 2008)
- Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*). (Commonwealth 2005)
- Conservation advice *Macroderma gigas* Ghost bat (DoEE 2008)
- Conservation Advice *Pezoporus occidentalis* Night Parrot (DoEE 2016b)
- EPBC Act referral guideline for the endangered Northern Quoll (*Dasyurus hallucatus*) (DoEE 2016c)
- National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*. (Hill & Ward 2010)
- Research priorities for the Northern Quoll (*Dasyurus hallucatus*) in the Pilbara region of Western Australia (Cramer, et al. 2016b)

- Research Priorities for the Pilbara Leaf-nosed bat (*Rhinonicteris aurantia* Pilbara Form (Cramer, et al. 2016a)
- Survey Guidelines for Australia's Threatened Bats, EPBC Act survey guidelines 6.1 (DSEWPAC 2010)
- Survey Guidelines for Australia's Threatened Birds 6.2 (DEWHA 2010)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPAC 2011a)
- Survey guidelines for Australia's threatened reptiles, EPBC Act survey guidelines 6.6 (DSEWPAC 2011b)
- Threat abatement plan for predation by feral cats (Commonwealth 2015)
- Threat abatement plan for predation by the European red fox (DEWHA 2008)
- Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by Cane Toads (Commonwealth 2011)
- Threat abatement plan to reduce the impacts on northern Australia's biodiversity by the five listed grasses (DSEWPAC 2012)

EPA assessment

Impacts to the environment, including MNES, are covered under the key environmental factors of Flora and Vegetation, Terrestrial Fauna, and Inland Waters where relevant.

Pilbara leaf-nosed bat and ghost bat

The proposal would include disturbance of up to 36 ha of Gorges and Gullies critical habitat for the Pilbara leaf-nosed bat and the ghost bat. There would also be impacts to foraging and dispersal habitat for these species, however, given the absence of identified diurnal roosts within the MDE, impacts to habitat for these species are unlikely to change their conservation status. The EPA has assessed indirect impacts to both the Pilbara leaf-nosed bat and the ghost bat from feral animals, vehicle strike, and fencing.

The EPA has recommended a condition to minimise and manage impacts to these species (condition 10), and an offset condition (condition 15) to counterbalance the significant residual impact associated with clearing of foraging and dispersal habitat, and disturbance to critical habitat for these species.

Pilbara olive python

Two Pilbara olive pythons have been recorded within the MDE. The proposal would disturb up to 90.9 ha of critical habitat for this species, however, there is extensive critical habitat both to the south and north of the project area and the disturbance is small in relation to the local extent of critical habitat. The EPA has assessed indirect impacts to the Pilbara olive python as a result of vehicle strike and increase in feral animals. Changes to surface water flows, which may indirectly impact this species, have been addressed in section 4.1 (Inland Waters).

The EPA has recommended a condition to minimise and manage impacts to the Pilbara olive python (condition 10), and an offset condition (condition 15) to counterbalance the significant residual impact associated with clearing of habitat for this species.

Northern quoll

Two northern quoll have been recorded within the MDE, however based on the season of recording and the scarcity of individuals it is likely that these individuals were transitory. Areas of suitable denning and foraging habitat for this species exist within the MDE with up to 36 ha of gorge and gully habitat potentially disturbed. The EPA considers that indirect impacts to the northern quoll as a result of vehicle strike and increase in feral animals as a result of this proposal are unlikely, given the small area of available habitat and small number of observations of this species within the MDE.

The EPA has recommended a condition to minimise and manage impacts to the northern quoll (condition 10), and an offset condition (condition 15) to counterbalance the significant residual impact associated with clearing of habitat for this species.

Night parrot

Terrestrial fauna surveys undertaken by the proponent did not locate any suitable habitat (dense, long unburnt spinifex grasslands or chenopod shrub land) for the night parrot within the MDE. Based on this lack of suitable habitat the EPA considers that impacts to the night parrot are unlikely to occur as a result of this proposal.

Summary

The EPA has recommended the following environmental conditions to minimise impacts on MNES:

- Condition 1 requiring the proposal to be implemented within a defined authorised extent, including a limit on the clearing of native vegetation
- A limit on the clearing of native vegetation through the authorised extent in schedule 1 of the Recommended Environmental Conditions (Appendix 4)
- Preparation and implementation of a Significant Fauna Management Plan (condition 10).

The EPA considers that there will be a significant residual impact from the clearing of habitat, including critical habitat, for significant fauna species. The EPA has recommended an offset in condition 15 (see section 5) which takes into account the significant residual impact to habitat for listed fauna species.

The EPA's view is that the impacts from the proposal on the above-listed MNES are therefore not expected to result in an unacceptable or unsustainable impact on the conservation status of the listed MNES species.

7. Conclusion

The EPA has considered the proponent's proposal to develop the Eliwana Iron Ore Mine, located 90 km west-north-west of Tom Price in the Pilbara Region of Western Australia.

The EPA notes that the proposal has been changed during the assessment process, including an overall reduction in the development envelope, removal of the northern access road from the proposal, reduction in the indicative disturbance footprint and removal of four mine pits from the proposal. The changes to the proposal are not considered to result in a reduction of the magnitude of environmental impacts associated with the proposal.

Application of mitigation hierarchy

Consistent with relevant policies and guidance, the proponent has addressed the mitigation hierarchy by identifying measures to avoid, minimise, and rehabilitate environmental impacts including:

- avoidance and minimisation of clearing of significant flora, vegetation and habitats during the design phase of the proposal
- avoidance of known places of cultural significance in the location of infrastructure
- minimisation of impacts to significant fauna through training and education of staff and contractors to protect fauna and fauna habitats
- minimisation of risks to fauna from vehicle strike by implementation of appropriate mitigation measures including speed limit restrictions, right of way for fauna, and the prohibition of off-road driving
- management of groundwater abstraction in accordance with the *Rights in Water and Irrigation Act 1914*
- management of lighting to minimise the potential for light overspill resulting in fauna disturbances
- management of weeds where increases in diversity or extent are identified as a result of the proposal
- management of feral animal attraction through waste minimisation and management
- implementation of dust suppression measures, and
- progressive rehabilitation of disturbed areas at the end of their operational life.

Offsets

The EPA considers there would be a significant residual impact from the following:

- clearing of up to 7,900 ha of 'Good to Excellent' condition vegetation including up to 41.4 ha of to the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC, and habitat suitable for conservation significant fauna

species (northern quoll, ghost bat, Pilbara leaf-nosed bat and Pilbara olive python)

- Clearing of up to 36 ha of Gorges and Gullies critical habitat for the Pilbara leaf-nosed bat, the ghost bat, the Pilbara olive python, and the northern quoll
- Clearing of up to 539.5 ha of Drainage lines/River/Creek (Major) critical habitat for the Pilbara olive python, and
- degradation of 19.6 ha of riparian groundwater dependent *Melaleuca argentea* dominated vegetation (MaMgCyPv) through groundwater drawdown.

The EPA has recommended a condition (condition 15) to offset this significant residual impact through contribution to the Pilbara Environmental Offsets Fund in accordance with the WA Offsets policy.

Conclusion

The EPA has taken the following into account in its assessment of the proposal as a whole:

- the impacts to all the key environmental factors
- the EPA's confidence in the proponent's proposed mitigation measures
- relevant EP Act principles and the EPA's objectives for the key environmental factors
- the EPA's view that the impacts to the key environmental factors are manageable, provided the recommended conditions are imposed.

Given the above, the EPA has concluded that the proposal is environmentally acceptable and therefore recommends that the proposal may be implemented subject to the conditions recommended in Appendix 4.

8. Other advice

Acid and Metalliferous Drainage

The EPA notes that Acid and Metalliferous Drainage (AMD) is managed by the DMIRS under the Mining Act 1978. The EPA has recommended conditions to ensure that AMD investigations are carried out adequately to inform the Water Management Plan required by recommended condition 9, however this condition (condition 8) does not include management of AMD.

The EPA recommends that the DMIRS consider the results of the AMD investigations required by recommended condition 8 in relation to the management of AMD during mine planning and mine closure.

Closure objectives

The EPA supports the proponent's commitment to consulting with traditional owners in relation to post-closure land uses. The EPA considers that the traditional owners of the project area, the PKKP people, should be consulted in the development of closure objectives, with particular regard to culturally significant flora and fauna, such that post-closure land uses are supported.

The EPA requests that the DMIRS consider this requirement in the finalisation and revision of the MCP for this proposal.

Eagles Nest

The EPA notes that the proponent has not provided a commitment to avoid all impacts associated with the proposal to Eagle's Nest on an ongoing basis, and that the proponent considers there is potential for future consultation with the traditional owners to result in the area being accessed without significant impact to heritage values occurring.

The EPA notes that, in the event that Fortescue is able to demonstrate through further comprehensive surveys and consultation that impacts to cultural heritage would not be significant, Fortescue may apply to alter the conditions of implementation for this proposal through s46 of the EP Act.

9. Recommendations

That the Minister for Environment notes:

1. That the proposal assessed is for the development of the Eliwana Iron Ore Mine, including mining of above and below watertable iron ore deposits, and associated infrastructure at the Eliwana Iron Ore Mine, located 90 km west-north-west of Tom Price, in the Pilbara region of Western Australia.
1. The key environmental factors identified by the EPA in the course of its assessment are Inland Waters, Flora and Vegetation, Terrestrial Fauna, Subterranean Fauna, Social Surroundings, and Air Quality, set out in section 4.
2. The EPA has concluded that the proposal may be implemented, provided the implementation of the proposal is carried out in accordance with the recommended conditions and procedures set out in Appendix 4. Matters addressed in the conditions include the following:
 - a) exclusion area to avoid impacts to areas of outstanding cultural significance
 - b) environmental management plans to minimise impacts to Water, Flora and Vegetation, Terrestrial Fauna, and Subterranean Fauna
 - c) Acid and Metalliferous Drainage Investigation Plan to investigate the risk of generation of acid and metalliferous drainage
 - d) Social, Cultural and Heritage management plan to protect cultural values
 - e) offset to counterbalance the significant residual impact associated with:
 - clearing of up to 7,900 ha of 'Good to Excellent' condition vegetation including including up to 41.4 ha of to the *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC
 - clearing of habitat (including critical habitat) suitable for conservation significant fauna species, and
 - degradation of 19.6 ha of riparian groundwater dependent vegetation through groundwater drawdown.
3. Other advice and recommendations provided by the EPA, set out in section 8.

References

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Appendix 1: List of submitters

Organisations:

Department of Water and Environmental Regulation – various divisions

Department of Planning Lands and Heritage

Department of Mines, Industry Regulation and Safety

Department of Biodiversity, Conservation and Attractions

Shire of Ashburton

Department of Environment and Energy

PKKP Aboriginal Corporation

Appendix 2: Consideration of principles

| EP Act Principle | Consideration |
|---|---|
| <p>1. The precautionary principle</p> <p><i>Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In application of this precautionary principle, decisions should be guided by –</i></p> <p>a) <i>careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and</i></p> <p>b) <i>an assessment of the risk-weighted consequences of various options.</i></p> | <p>In considering this principle, the EPA notes that Inland Waters, Flora and Vegetation, Terrestrial Fauna, Subterranean Fauna, Social Surroundings and Air Quality could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>Investigations into the biological and physical environment have been undertaken by the proponent, and have provided sufficient certainty to assess risks and identify measures to avoid or minimise impacts. Consultation with regard to Social Surroundings has been undertaken to provide certainty that risks to cultural heritage and significant sites are understood.</p> <p>The EPA has recommended conditions to ensure that risks are minimised or avoided where possible, and that relevant measures are undertaken by the proponent to manage residual impacts.</p> <p>From its assessment of this proposal the EPA has concluded that there is no threat of serious or irreversible harm, provided that the recommended conditions are implemented.</p> |
| <p>2. The principle of intergenerational equity</p> <p><i>The present generation should ensure that the health, diversity and productivity of the environment is maintained and enhanced for the benefit of future generations.</i></p> | <p>In considering this principle, the EPA notes that that Inland Waters, Flora and Vegetation, Terrestrial Fauna, Subterranean Fauna, Social Surroundings and Air Quality could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>The EPA notes that the proponent has identified measures to avoid and minimise impacts to these factors. The EPA has considered these measures during its assessment, and has recommended conditions to ensure that appropriate measures, including avoidance of impacts, are implemented.</p> |

| EP Act Principle | Consideration |
|--|--|
| | <p>In particular, the EPA has recommended conditions to avoid impacts to significant heritage sites, to ensure that cultural practices continue to benefit future generations.</p> <p>From its assessment of this proposal the EPA has concluded that that the environmental values will be protected and that the health, diversity and productivity of the environment will be maintained for the benefit of future generations.</p> |
| <p>3. The principle of the conservation of biological diversity and ecological integrity</p> <p><i>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</i></p> | <p>In considering this principle, the EPA notes that Flora and Vegetation, Terrestrial Fauna, and Subterranean Fauna could be significantly impacted by the proposal. The assessment of these impacts is provided in this report.</p> <p>The EPA notes that the proponent has conducted adequate surveys and provided analysis of the flora, vegetation and fauna of the proposal area, and proposed measures to avoid or minimise impacts to biological diversity, including avoidance and management of significant species. The EPA notes that no Threatened Ecological Communities or flora species have been identified in the proposal area.</p> <p>From its assessment of this proposal the EPA has concluded that the proposal would not compromise the biological diversity and ecological integrity of the affected areas.</p> |
| <p>4. Principles relating to improved valuation, pricing and incentive mechanisms</p> <p>(1) <i>Environmental factors should be included in the valuation of assets and services.</i></p> <p>(2) <i>The polluter pays principles – those who generate pollution and waste should bear the cost of containment, avoidance and abatement.</i></p> | <p>In considering this principle, the EPA notes that the proponent would bear the cost relating to waste and pollution, including avoidance, containment and rehabilitation.</p> <p>The EPA has had regard to this principle during the assessment of the proposal.</p> |

| EP Act Principle | Consideration |
|--|--|
| <p>(3) <i>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 waste.</i></p> <p>(4) <i>Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structure, including market mechanisms, which enable those best placed to maximise benefits and/or minimize costs to develop their own solution and responses to environmental problems.</i></p> | |
| <p>5. The principle of waste minimisation</p> <p><i>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</i></p> | <p>In considering this principle, the EPA notes that the proponent proposes to apply the waste minimisation hierarchy to all waste products, including waste water and landfill generated at accommodation camps.</p> <p>The EPA has had regard to this principle during the assessment of the proposal.</p> |

Appendix 3: Evaluation of other environmental factors

No factors were identified at scoping that were not considered to be key factors for the assessment, therefore no other factors have been evaluated as part of this assessment.

Appendix 4: Identified Decision-Making Authorities and Recommended Environmental Conditions

Identified Decision-making Authorities

Section 44(2) of EP Act specifies that the EPA's report must set out (if it recommends that implementation be allowed) the conditions and procedures, if any, to which implementation should be subject. This Appendix contains the EPA's recommended conditions and procedures.

Section 45(1) requires the Minister for Environment to consult with decision-making authorities (DMAs), and if possible, agree on whether or not the proposal may be implemented and, if so, to what conditions and procedures, if any, that implementation should be subject.

The following decision-making authorities have been identified:

| Decision-making Authority | Legislation (and Approval) |
|---|--|
| 1. Minister for Environment | <i>Biodiversity Conservation Act 2016</i> (Taking of flora and fauna) |
| 2. Minister for Water | <i>Rights in Water and Irrigation act 1914</i> (Water abstraction licence) |
| 3. Minister for Aboriginal Affairs | <i>Aboriginal Heritage Act 1972</i> (Section 18 clearances) |
| 4. Minister for Mines and Petroleum | <i>Mining Act 1978</i> |
| 5. Executive Director Environment Division, Department of Mines, Industry Regulation and Safety | <i>Mining Act 1978</i> – Mining Proposals including Mine Closure Plan. <i>Dangerous Goods Safety Act 2004</i> – Dangerous Goods license and approvals |
| 6. State Mining Engineer | <i>Mines Safety and Inspection Act 1994</i> |
| 6. Director General, Department of Water and Environmental Regulation | <i>Environmental Protection Act 1986</i> Clearing permit, Works Approval and Licence |
| 7. CEO, Shire of Ashburton | <i>Building Act 2011</i> (Building permit for worker accommodation) |

Note: In this instance, agreement is only required with DMAs 1 to 4, since these DMAs are Ministers.

RECOMMENDED ENVIRONMENTAL CONDITIONS
STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED
(Environmental Protection Act 1986)

ELIWANA IRON ORE MINE PROJECT

Proposal: The proposal is to develop and operate the Eliwana iron Ore Mine, including above and below water table ore deposits and associated infrastructure including processing facilities, water management and waste landforms, 90 km west-north-west of Tom Price, in the Pilbara region of Western Australia.

Proponent: Fortescue Metals Group Limited
Australian Company Number 002 594 872

Proponent Address: Level 2, 87 Adelaide Terrace
EAST PERTH WA 6004

Assessment Number: 2129

Report of the Environmental Protection Authority: XXXX

Pursuant to section 45 of the *Environmental Protection Act 1986*, it has been agreed that the proposal described and documented in Table 2 of Schedule 1 may be implemented and that the implementation of the proposal is subject to the following implementation conditions and procedures:

1 Proposal Implementation

1-1 When implementing the proposal, the proponent must not exceed the authorised extent of the proposal as defined in Table 2 of Schedule 1, unless amendments to the proposal and the authorised extent of the proposal have been approved under the EP Act.

2 Contact Details

2-1 The proponent must notify the CEO of any change of its name, physical address or postal address for the serving of notices or other correspondence within twenty-eight (28) days of such change. Where the proponent is a corporation or an association of persons, whether incorporated or not, the postal address is that of the principal place of business or of the principal office in the State.

3 Time Limit for Proposal Implementation

- 3-1 The proposal must be substantially commenced within five (5) years from the date on this Statement.
- 3-2 The proponent must provide to the CEO documentary evidence demonstrating they have complied with condition 3-1 no later than 14 days after the expiration of five (5) years from the date of this statement.

4 Compliance Reporting

- 4-1 The proponent must prepare, and maintain a Compliance Assessment Plan which is submitted to the CEO at least two (2) months prior to the first Compliance Assessment Report required by condition 4-6, or prior to implementation of the proposal, whichever is sooner.
- 4-2 The Compliance Assessment Plan must indicate:
 - (1) the frequency of compliance reporting;
 - (2) the approach and timing of compliance assessments;
 - (3) the retention of compliance assessments;
 - (4) the method of reporting of potential non-compliances and corrective actions taken;
 - (5) the table of contents of Compliance Assessment Reports; and
 - (6) public availability of Compliance Assessment Reports.
- 4-3 After receiving notice in writing from the CEO that the Compliance Assessment Plan satisfies the requirements of condition 4-2 the proponent must assess compliance with conditions in accordance with the Compliance Assessment Plan required by condition 4-1.
- 4-4 The proponent must retain reports of all compliance assessments described in the Compliance Assessment Plan required by condition 4-1 and must make those reports available when requested by the CEO.
- 4-5 The proponent must advise the CEO of any potential non-compliance within seven (7) days of that non-compliance being known.
- 4-6 The proponent must submit to the CEO the first Compliance Assessment Report on the 31 March following the date of issue of this Statement addressing the period from the date of issue of this Statement to the 1 March following the date of issue of this statement, and then annually from the date of submission of the first Compliance Assessment Report, or as otherwise agreed in writing by the CEO.

The Compliance Assessment Report must:

- (1) be endorsed by the proponent's Chief Executive Officer or a person delegated to sign on the Chief Executive Officer's behalf;
- (2) include a statement as to whether the proponent has complied with the conditions;
- (3) identify all potential non-compliances and describe corrective and preventative actions taken;
- (4) be made publicly available in accordance with the approved Compliance Assessment Plan; and
- (5) indicate any proposed changes to the Compliance Assessment Plan required by condition 4-1.

5 Public Availability of Data

5-1 Subject to condition 5-2, within a reasonable time period approved by the CEO of the issue of this Statement and for the remainder of the life of the proposal the proponent must make publicly available, in a manner approved by the CEO, all validated environmental data (including sampling design, sampling methodologies, empirical data and derived information products (e.g. maps)), management plans and reports relevant to the assessment of this proposal and implementation of this Statement.

5-2 If any data referred to in condition 5-1 contains particulars of:

- (1) a secret formula or process; or
- (2) confidential commercially sensitive information;

the proponent may submit a request for approval from the CEO to not make these data publicly available. In making such a request the proponent must provide the CEO with an explanation and reasons why the data should not be made publicly available.

6 Condition Environmental Management Plans

6-1 The proponent must prepare and submit Condition Environmental Management Plans:

- (1) Prior to the commencement of ground disturbing activities, or as otherwise agreed in writing by the CEO, the proponent must prepare and submit Condition Environmental Management Plans to demonstrate that the environmental objectives in conditions 7-1, 9-1, 10-1, 11-1, and 13-1 will be met.

6-2 The Condition Environmental Management Plan(s) must:

- (1) specify the **environmental objectives** to be achieved, as specified in conditions 7-1, 9-1, 10-1, 11-1, and 13-1;
 - (2) specify risk-based **management actions** that will be implemented to demonstrate compliance with the environmental objectives specified in conditions 7-1, 9-1, 10-1, 11-1, and 13-1;
 - (3) specify measurable **management target(s)** to determine the effectiveness of the risk-based management actions;
 - (4) specify **monitoring** to measure the effectiveness of management actions against management targets, including but not limited to, parameters to be measured, baseline data, monitoring locations, and frequency and timing of monitoring;
 - (5) specify a process for **revision** of management actions and changes to proposal activities, in the event that the management targets are not achieved. The process must include an investigation to determine the cause of the management target(s) being exceeded;
 - (6) provide the format and timing to demonstrate that conditions 7-1, 9-1, 10-1, 11-1, and 13-1 have been met for the reporting period in the Compliance Assessment Report required by condition 4-6 including, but not limited to:
 - (a) verification of the implementation of management actions; and
 - (b) reporting on the effectiveness of management actions against management target(s).
- 6-3 After receiving notice in writing from the CEO that the Condition Environmental Management Plan(s) satisfies the requirements of condition 6-2 for conditions 7-1, 9-1, 10-1, 11-1, and 13-1, the proponent must:
- (1) implement the provisions of the Condition Environmental Management Plan(s); and
 - (2) continue to implement the Condition Environmental Management Plan(s) until the CEO has confirmed by notice in writing that the proponent has demonstrated the objectives specified in conditions 7-1, 9-1, 10-1, 11-1, and 13-1 have been met.
- 6-4 Failure to implement one or more of the management actions required by condition 6-2 (2) represents non-compliance with these conditions.
- 6-5 In the event that monitoring, tests, surveys or investigations indicate non-achievement of management target(s) specified in the Condition Environmental Management Plan(s), the proponent must:

- (1) report the non-achievement in writing to the CEO within 21 days of the non-achievement being identified;
- (2) investigate to determine the cause of the management targets being exceeded;
- (3) provide a report to the CEO within 90 days of the non-achievement being reported as required by condition 6-5 (1). The report must include:
 - (a) cause of management targets being exceeded;
 - (b) the findings of the investigation required by conditions 6-5 (2);
 - (c) details of revised and/or additional management actions to be implemented to prevent non-achievement of the management target(s); and
 - (d) relevant changes to proposal activities.

6-6 In the event that monitoring, tests, surveys or investigations indicate that one or more management actions specified in the Condition Environmental Management Plan(s) have not been implemented, the proponent must:

- (1) investigate to determine the cause of the management action(s) not being implemented;
- (2) investigate to provide information for the CEO to determine potential environmental harm or alteration of the environment that occurred due to the failure to implement management actions;
- (3) provide a report to the CEO within 28 days of the non-compliance being identified. The report must include:
 - (a) cause for failure to implement management actions;
 - (b) the findings of the investigation required by conditions 6-6 (2);
 - (c) relevant changes to proposal activities; and
 - (d) measures to prevent, control or abate the environmental harm which may have occurred.

6-7 The proponent:

- (1) may review and revise the Condition Environmental Management Plan(s); or
- (2) must review and revise the Condition Environmental Management Plan(s) as and when directed by the CEO.

6-8 The proponent must implement the latest revision of the Condition Environmental Management Plans required by condition 6-1, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 6-2.

7 Flora and Vegetation

7-1 The proponent must manage the development and implementation of the proposal during all phases of the proposal to meet the following **environmental objectives**:

- (1) Avoid where possible, or minimise direct and indirect impacts to:
 - (a) *Triodia sp. Robe River Assemblages of mesas of the West Pilbara* PEC.
 - (b) Riparian vegetation
 - (c) Ground Water Dependent Vegetation
 - (d) *Triodia basitricha*
 - (e) *Eremophila magnifica* subsp. *velutina*
 - (f) *Indigofera sp. Bungaroo Creek* (S. van Leeuwin 4301)
 - (g) *Triodia sp. Robe River* (M.E Trudgen et al. MET 12367)
- (2) Prevent the introduction of new weed species and ensure there is no net increase in the current extent of weed species within the mine development envelope shown in Figure 1 and described in the spatial data in Schedule 2 as a result of the implementation of the proposal.

7-2 The proponent must prepare and submit a Flora and Vegetation Monitoring and Management Plan required by condition 6-1, that satisfies the requirements of condition 6-2, to meet the objective required by condition 7-1 to the requirements of the CEO.

7-3 The plan required by condition 6-1 must include provisions required by condition 6-2 to address impacts to vegetation including, but not limited to: changes to surface water regimes and quality, changes to groundwater regimes and quality, clearing, fragmentation, dust, and weeds.

8 Acid and Metalliferous Drainage Investigations

8-1 The proponent must ensure that deleterious material with the potential to generate acid and/or metalliferous drainage are investigated and identified appropriately to enable the protection of groundwater and surface water quality during all phases of the proposal.

- 8-2 The proponent must complete kinetic testing of mining and process waste to the satisfaction of the CEO.
- 8-3 The proponent must carry out continued detailed geochemical assessment of materials to be excavated or exposed to the satisfaction of the CEO to inform the Water Management Plan required by condition 9.
- 8-4 Prior to the commencement of operations, the proponent must prepare and submit an Acid and Metalliferous Drainage Investigation Plan to the satisfaction of the CEO. The plan must include:
- (1) The methodology and timing for each stage of investigations required by condition 8-2 and 8-3.
 - (2) Timing for revisions of the plan to incorporate the results of investigations required by conditions 8-2 and 8-3 when available.
 - (3) The results of investigations required by conditions 8-2 and 8-3 when available.
 - (4) Details of how the results of investigations required by conditions 8-2 and 8-3 will be, or have been, incorporated into the Water Management Plan required by condition 9.
- 8-5 The proponent may review and revise the Acid and Metalliferous Drainage Investigation Plan.
- 8-6 The proponent must review and revise the Acid and Metalliferous Drainage Investigation Plan as required by condition 8-4 (2), or as and when directed by the CEO.
- 8-7 The proponent must implement the latest revision of the Acid and Metalliferous Drainage Investigation Plan required by condition 8-4, which the CEO has confirmed by notice in writing, satisfies the requirements of condition 8-1.

9 Inland waters

- 9-1 The proponent must manage the development and implementation of the proposal to ensure that the hydrological regimes and quality of surface water and groundwater are not greater than predicted in the *Eliwana Iron Ore Mine: Environmental Review Document (FMG, October 2018)*, and to avoid or minimise direct and indirect impacts of the proposal on:
- (1) Surface water regimes and surface water quality inside and within 10km of the mine development envelope shown in Figure 1 and described in the spatial data in Schedule 2.

- (2) Groundwater regimes and groundwater quality vegetation inside and within 10 km of the mine development envelope shown in Figure 1 and described in the spatial data in Schedule 2.
 - (3) Water flows and water quality within Duck Creek as shown in Figure 2 and described in the spatial data in Schedule 2.
 - (4) Permanent and semi-permanent pools inside and within 10 km of the mine development envelope shown in Figure 1 and described in the spatial data in Schedule 2.
- 9-2 The proponent must prepare and submit a Water Management Plan required by condition 6-1 that satisfies the requirements of condition 6-2 to meet the objectives specified in condition 9-1.
- 9-3 The Water Management Plan required by condition 6-1 must include provisions required by 6-2 to address impacts on hydrological regimes and water quality, from, but not limited to, water abstraction, managed aquifer recharge, disposal of mine dewater to surface systems, diversion and interception of surface water systems, discharge of wastes including storm water, management of hydrocarbon and chemical spills, exposure of acid sulfate soils and creation of acid or metalliferous drainage.
- 9-4 The Water Management Plan required by 6-1 must include the following:
- (1) Methodology and timing for completion of baseline investigations for surface water quality and groundwater quality, and timing for incorporation of baseline water quality results into the Water Management plan.
 - (2) Timelines for testing and verification of the groundwater and surface water models presented in the Environmental Review Document (October 2018) and appendices, and incorporation of results into the Water Management Plan.
 - (3) Incorporation of the results of investigations required by the Acid and Metalliferous Drainage plan required by condition 8 into the Water Management Plan.
 - (4) Parameters for the location and design of tailings storage facilities, including investigations into the ecological and heritage values of sensitive receptors downstream of the proposed location(s).
 - (5) Details of the locations of dolerite dykes within the Mine Development Envelope, and details of management actions to be implemented during mining activities to prevent impacts on hydrological regimes, including avoidance of mining within dolerite dykes.

10 Terrestrial Fauna

- 10-1 The proponent must manage the implementation of the proposal during all phases of the proposal to meet the following **environmental objectives**:
- (1) Avoid where possible, and minimise direct and indirect impacts to significant fauna and their habitat, including, but not limited to:
 - (a) Pilbara Leaf-nosed bat;
 - (b) Ghost Bat;
 - (c) Pilbara Olive Python; and
 - (d) Northern Quoll.
 - (2) Avoid all impacts to the known location of the short-range endemic species *Antichiropus* 1021DNA02 as described in *Eliwana Iron Ore Mine Project: Environmental Review Document (FMG, October 2018)* until the species has been demonstrated to the satisfaction of the CEO to exist in an area unlikely to be disturbed by any foreseeable proposal.
- 10-2 The proponent must prepare and submit a Significant Fauna Monitoring and Management Plan required by condition 6-1 that satisfies the requirements of condition 6-2, to meet the objectives specified in condition 10-1 to the CEO.
- 10-3 The plan required by condition 6-1 must include provisions required by condition 6-2 to address impacts to significant fauna and their habitat including, but not limited to: clearing of habitat, fragmentation of habitat, vehicle strike, increased feral animals, light and noise.

11 Subterranean Fauna

- 11-1 The proponent must manage the implementation of the proposal during all phases of the proposal to meet the following **environmental objectives**:
- (1) Avoid where possible, and minimise direct and indirect impacts to subterranean fauna and their habitat.
- 11-2 The proponent must prepare and submit a Subterranean Fauna Monitoring and Management Plan required by condition 6-1, that satisfies the requirements of condition 6-2, to meet the objective specified in condition 11-1 to the CEO.
- 11-3 The plan required by condition 6-1 must include provisions required by condition 6-2 to address impacts to subterranean fauna and their habitat including, but not limited to: excavation, groundwater drawdown, groundwater injection, and changes to groundwater quality.

12 Avoidance of Significant Heritage Sites

- 12-1 The proponent must design and implement the proposal to meet the following outcomes:
- (1) No implementation of the proposal within the boundaries of Eagles Nest as described in the spatial data in Schedule 2, with the exception of “Previously disturbed Eagles Nest Areas” as described in the Spatial data in Schedule 2.
 - (2) No implementation of the proposal within the boundaries of Kangaroo Gorge PK12-044 as described in the spatial data in Schedule 2.
 - (3) No implementation of the proposal within the boundaries of site PK10-004 as described in the spatial data in Schedule 2.

13 Social, Cultural and Heritage Management Plan

- 13-1 The proponent must implement the proposal to meet the following environmental objective:
- (1) Minimise direct and indirect impacts to social, cultural and heritage values within and surrounding the mine development envelope, including from, but not limited to:
 - (a) disturbance of the ground that may impact cultural associations and heritage;
 - (b) potential loss of access to areas to undertake traditional activities;
 - (c) indirect impacts, including visual, noise, dust, and vibration impacts to social and cultural places and activities, including the sites specified in condition 12-1;
 - (d) access to cultural heritage sites by personnel that are not members of the relevant native title group;
 - (e) impacts to culturally significant flora and fauna; and
 - (f) changes to water regimes of water resources known to have Aboriginal heritage values.
- 13-2 The proponent must consult with relevant Native Title Holders and prepare a Social, Cultural and Heritage Management Plan required by condition 6-1 that satisfies the requirements of condition 6-2, to meet the objectives specified in condition 13-1.
- 13-3 The Social, Cultural and Heritage Management Plan required by condition 13 - 2 must:

- (1) Provide evidence of consultation required by condition 13-2 and the outcomes of this consultation.
- (2) Provide a framework for future consultation with relevant Native Title holders to be undertaken in relation to the proposal, including the timing of consultation relative to the stages of the project, the form of consultation for each stage identified, information to be provided before and during consultation, including spatial data, and actions to be implemented in the event that consultation cannot be conducted due to inability to schedule consultation events. In the event that all attempts to schedule consultation are unsuccessful, the proponent must continue to implement the plan.
- (3) Provide details of proponent commitments to providing opportunities for relevant Native Title holders to participate in monitoring and management activities.

14 Air Quality

- 14-1 The proponent must manage the implementation of the proposal to meet the following environmental objective:
- (1) avoid, where possible, and minimise greenhouse gas emissions as far as practicable.
- 14-2 Prior to the commencement of construction, the proponent must prepare a Greenhouse Gas Management Plan to meet the objective specified by condition 14-1.
- 14-3 The Greenhouse Gas Management Plan must address the following matters:
- (1) benchmarking against applicable standards at the time of commencement of construction;
 - (2) design of the proposal to minimise greenhouse gas emissions as far as practicable;
 - (3) monitoring and public reporting; and
 - (4) opportunities for continuous improvement and minimising net emissions in the future within the existing design of the proposal.
- 14-4 After receiving notice in writing from the CEO that the Greenhouse Gas Management Plan satisfies the requirements of conditions 14-2 and 14-3 the proponent must implement the Greenhouse Gas Management Plan.
- 14-5 The proponent may review and revise the Greenhouse Gas Management Plan.

- 14-6 The proponent must review and revise the Greenhouse Gas Management Plan as and when directed by the CEO.
- 14-7 The proponent must continue to implement the version of the Greenhouse Gas Management Plan most recently approved by the CEO until the CEO has confirmed by notice in writing that the plan meets the objective specified in condition 14-1.

15 Offsets

- 15-1 In view of the significant residual impacts and risks as a result of the implementation of the proposal, the proponent must contribute funds to the Pilbara Environmental Offset Fund calculated in accordance with conditions 15-2 to 15-4, subject to any reduction approved by the CEO under condition 15-10.
- 15-2 The proponent's contribution to the Pilbara Environmental Offset Fund must be paid biennially, with the amount to be contributed calculated based on the clearing undertaken in each year of the biennial reporting period in accordance with the rates in condition 15-3. The first biennial reporting period must commence from ground disturbing activities of the environmental values identified in condition 15-3.
- 15-3 Calculated on the 2017-2018 financial year, the contribution rates are:
- (1) \$805 (excluding GST) per hectare of 'Good' to 'Excellent' condition native vegetation, including impacts to *Triodia sp. Robe River assemblages of mesas of the West Pilbara* PEC and foraging, dispersal or shelter habitat for the Pilbara Olive Python; Northern Quoll, Pilbara Leaf-nosed bat and Ghost bat, cleared within Area A of the Mine Development Envelope within the Hamersley IBRA subregion, as shown in Figure 3 of Schedule 1 and described in the spatial data in Schedule 2.
 - (2) \$1611 (excluding GST) per hectare of groundwater dependent vegetation (*Melaleuca argentea* dominated vegetation (MaMgCyPv); *Eucalyptus camululensis* dominated vegetation (EcAcEUaTe)) , cleared or degraded as a result of the proposal within Area B of the Development Envelope within the Hamersley IBRA subregion, as shown in Figure 4 of Schedule 1 and described in the spatial data in Schedule 2.
 - (3) \$1611 (excluding GST) per hectare of critical habitat for the Ghost bat, Pilbara Leaf-nosed bat, Northern Quoll, or Pilbara Olive Python (Gorges and Gullies; Drainage Line/River/Creek (Major)) cleared within Area C of the Development Envelope within the Hamersley IBRA subregion, as shown in Figure 5 of Schedule 1 and described in the spatial data in Schedule 2.

- 15-4 From the commencement of the 2017-2018 financial year, the rates in condition 15-3 will be adjusted annually each subsequent financial year in accordance with the percentage change in the CPI applicable to that financial year.
- 15-5 Prior to ground disturbing activities within the Mine Development Envelope as shown in Figure 1 of Schedule 1 and described in Spatial data in Schedule 2, the proponent must prepare and submit an Impact Reconciliation Procedure to the CEO.
- 15-6 The Impact Reconciliation Procedure required pursuant to condition 15-5 must:
- (1) state that clearing calculation for the first biennial reporting period will commence from ground disturbing activities in accordance with condition 15-2 and end on the second 30 June following commencement of ground disturbing activities;
 - (2) state that clearing calculations for each subsequent biennial reporting period will commence on 1 July of the required reporting period, unless otherwise agreed by the CEO;
 - (3) include a methodology to calculate the amount of clearing undertaken during each year of the biennial reporting period for each of the environmental values identified in condition 15-3; and
 - (4) Indicate the timing and content of the Impact Reconciliation Reports.
- 15-7 The proponent must not commence ground disturbing activities within the Mine Development Envelope, unless otherwise agreed by the CEO, until the CEO has confirmed in writing that the Impact Reconciliation Procedure satisfies the requirements of condition 15-6.
- 15-8 The proponent must submit an Impact Reconciliation Report in accordance with the Impact Reconciliation Procedure approved pursuant to condition 15-7.
- 15-9 The Impact Reconciliation Report required pursuant to condition 15-8 must provide the location and spatial extent of the clearing undertaken within Areas A, B and C during each year of each biennial reporting period.
- 15-10 The proponent may apply in writing and seek the written approval of the CEO to reduce all or part of the contribution payable under condition 15-2 where:
- (1) a payment has been made to satisfy a condition of an approval under the *Environment Protection and Biodiversity Conservation Act 1999* in relation to the proposal;
 - (2) the payment counterbalances impacts of the proposal on matters of national environmental significance; and

- (3) the payment counterbalances the significant residual impacts to the environmental values identified in condition 15-3.

Schedule 1

Table 1: Summary of the Proposal

| | |
|--------------------------|---|
| Proposal Title | Eliwana Iron Ore Mine Project |
| Short Description | The Proposal is to develop above and below watertable iron ore deposits, and associated infrastructure at the Eliwana Iron Ore Mine, located 90 km west-north-west of Tom Price, in the Pilbara region of Western Australia. The Proposal includes processing facilities, water management infrastructure for groundwater abstraction and surplus water disposal, temporary and permanent waste landforms and tailings storage facilities. |

Table 2: Location and authorised extent of physical and operational elements

| Column 1 Element | Column 2 Location | Column 3 Authorised Extent |
|------------------------------------|------------------------------|--|
| Mine and associated infrastructure | Figure 1 | Clearing of up to 7,900 ha of native vegetation within the 43,804 ha development envelope, including up to 42 ha of <i>Triodia sp. Robe River Assemblages of mesas of the West Pilbara</i> PEC |
| Surplus water management | N/A | Up to 4GL/a surplus water to be discharged to the environment through a combination of surface discharge and controlled aquifer reinjection. |

Table 3: Abbreviations and Definitions

| Acronym or Abbreviation | Definition or Term |
|--------------------------------|--|
| CEO | The Chief Executive Officer of the Department of the Public Service of the State responsible for the administration of section 48 of the <i>Environmental Protection Act 1986</i> , or his delegate. |
| CPI | The All Groups Consumer Price Index numbers for Perth compiled and published by the Australian Bureau of Statistics |
| EP Act | <i>Environmental Protection Act 1986</i> |
| Ground Disturbing Activity | Activities that are associated with the substantial implementation of a proposal including but not limited to, digging (with mechanised equipment), blasting, earthmoving, vegetation clearance, grading, gravel extraction, construction of new or widening of existing roads and tracks. |
| ha | Hectare |
| IBRA | Interim Biogeographic Regionalisation for Australia |
| Km | Kilometre |

| | |
|-----------------------------------|--|
| Pilbara Environmental Offset Fund | A special purpose account created pursuant to section 16(1)(d) of the Financial Management Act 2006 by the Department of Water and Environmental Regulation. |
| Environmental Weed | Any plant declared under section 22(2) of the Biosecurity and Agriculture Management Act 2007, any plant listed on a National Weeds List and any weeds listed on DBCA's Pilbara Impact and Invasiveness Ratings list as amended or replaced from time to time. |

Figures

- Figure 1 - Eliwana Iron Ore Mine Project Development Envelope and Indicative Disturbance Footprint
- Figure 2 - Duck Creek
- Figure 3 - Offsets Area A, comprising 'good' to 'excellent' vegetation in the Mine development envelope, excluding areas within Areas B and C as described below
- Figure 4 - Offsets Area B, comprising groundwater dependent vegetation within areas with the potential to be subjected to groundwater drawdown as a result of the proposal
- Figure 5 - Offsets Area C, comprising Gorges and Gullies (critical habitat for Ghost bat, Pilbara Leaf-nosed bat, Northern Quoll and Pilbara Olive Python), and Drainage line/River/Creek (major) (critical habitat for Pilbara Olive Python).

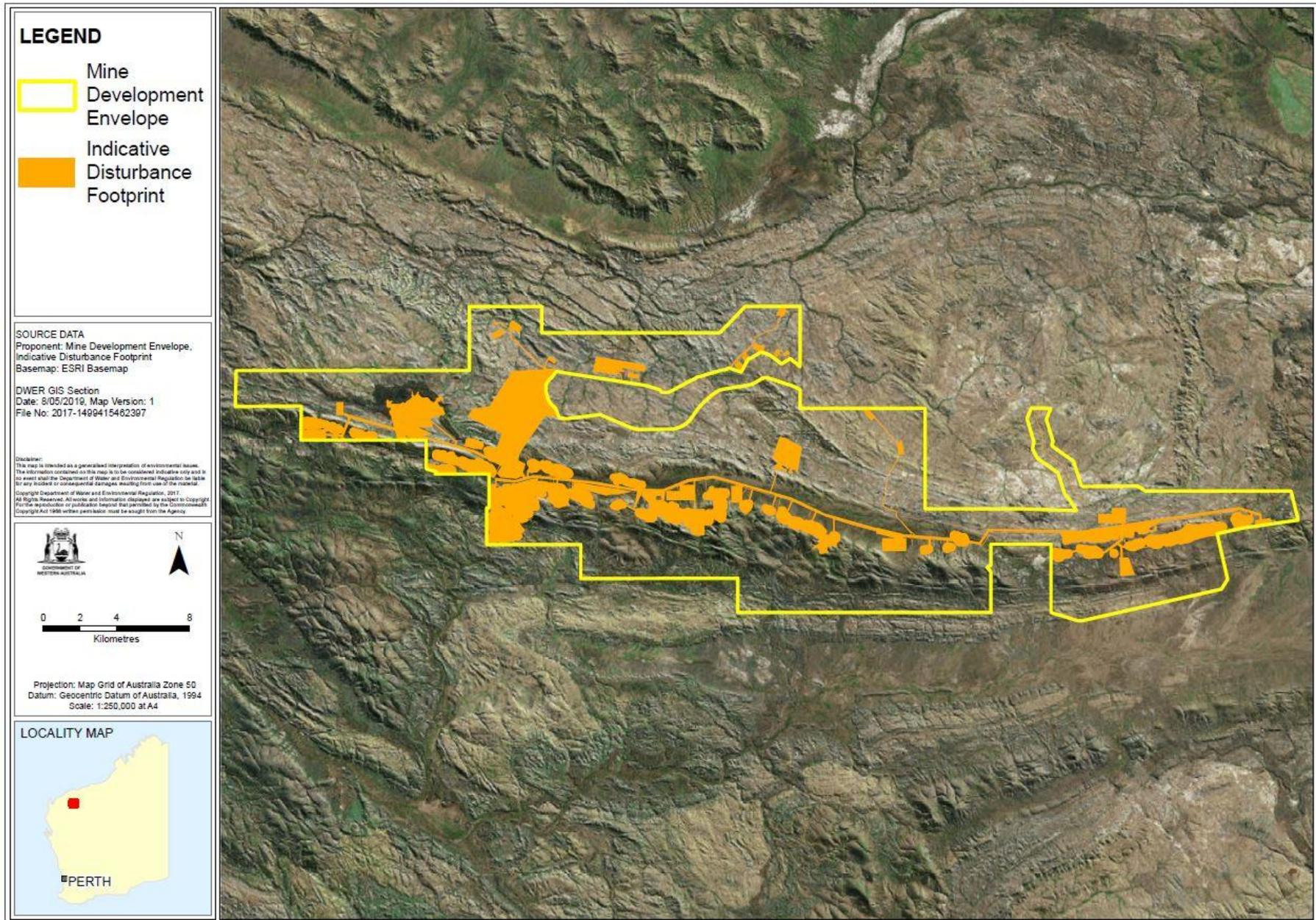
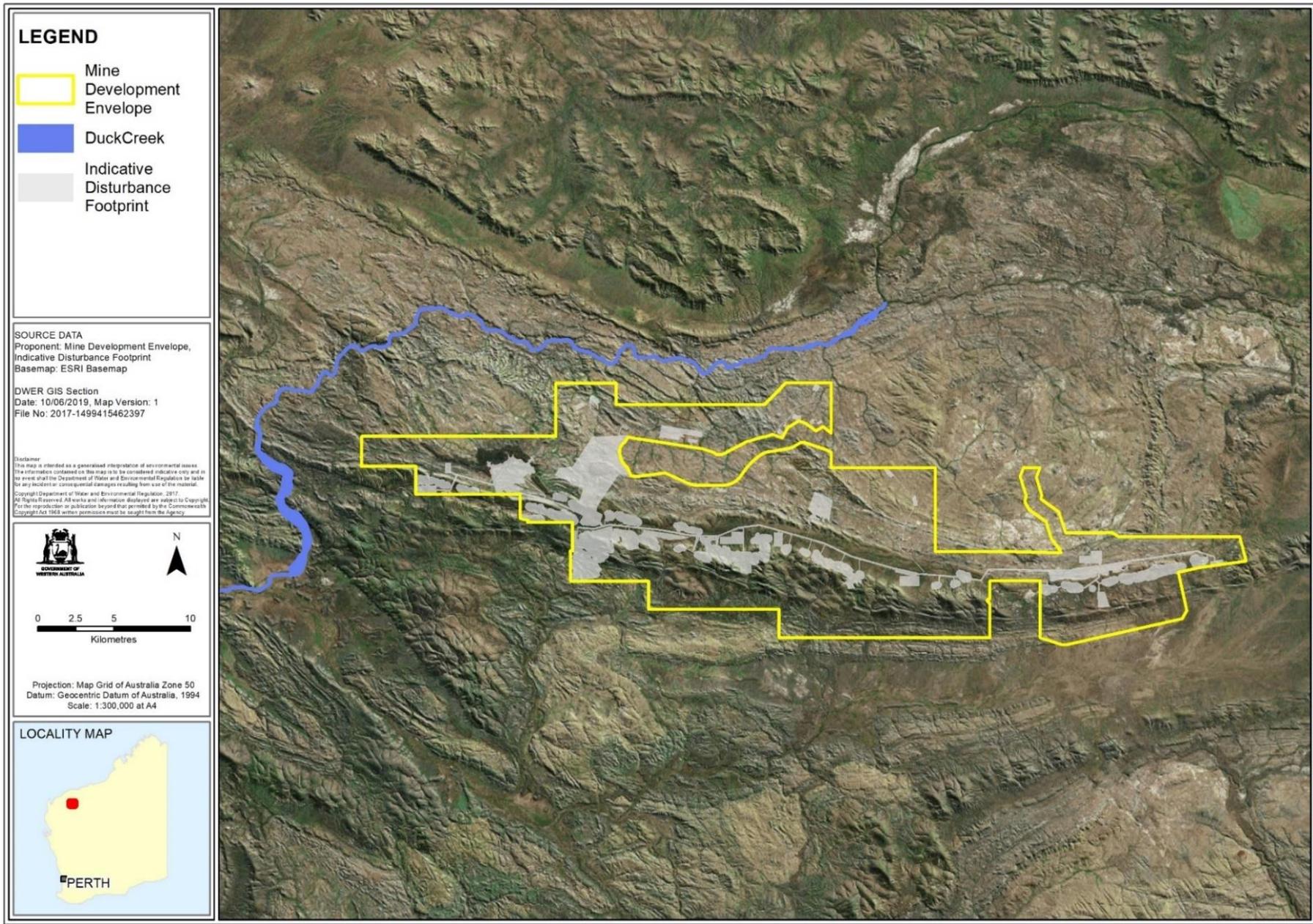
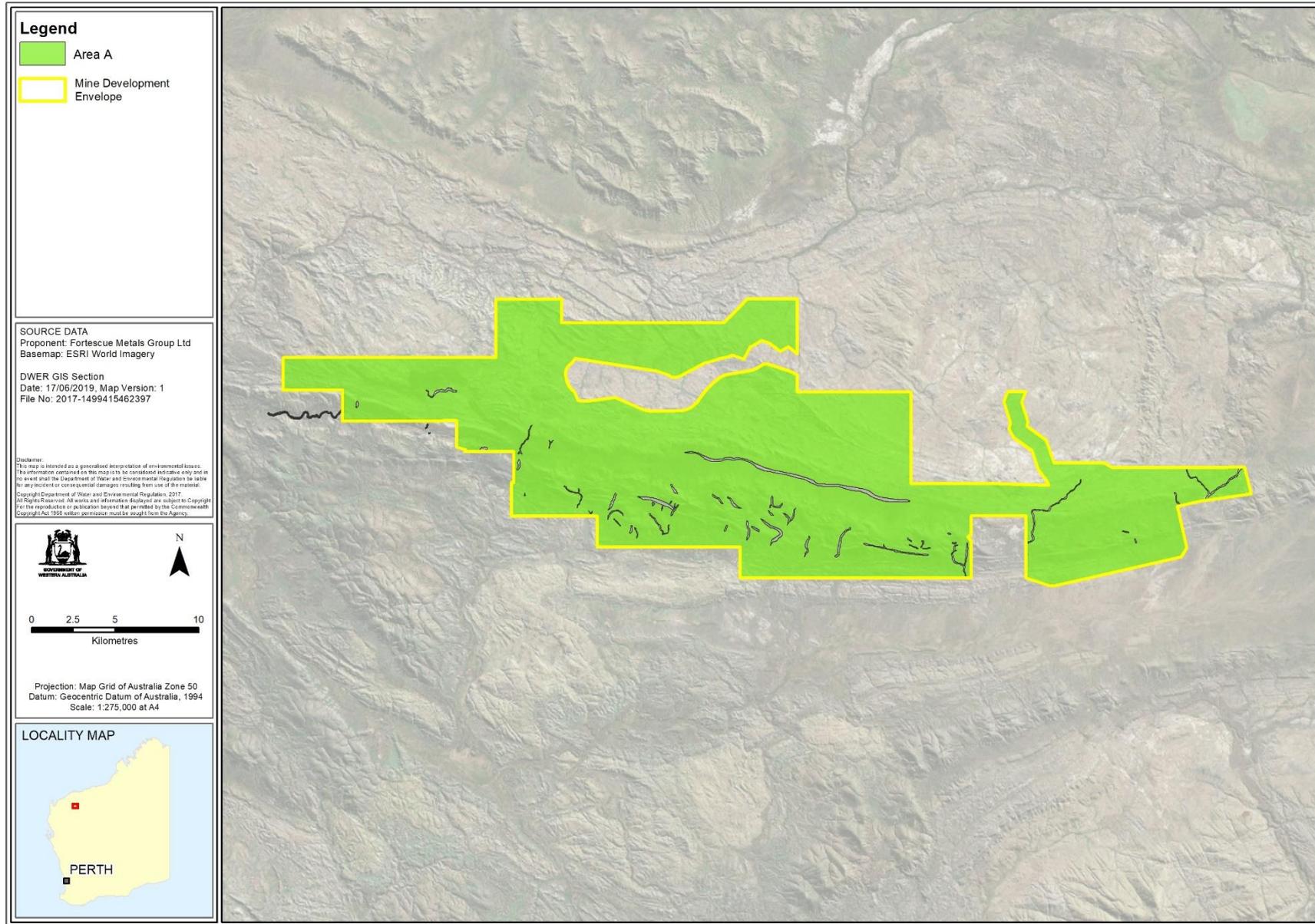


Figure 1 – Eliwana Iron Ore Mine Development Envelope (MDE) and Indicative Disturbance Footprint



Unique Record ID

Figure 2 – Duck Creek



Unique Record ID:

Figure 3 – Offsets Area A – comprising good to excellent condition vegetation within the Mine Development Envelope, and excluding Offset Area B and Offset Area C.

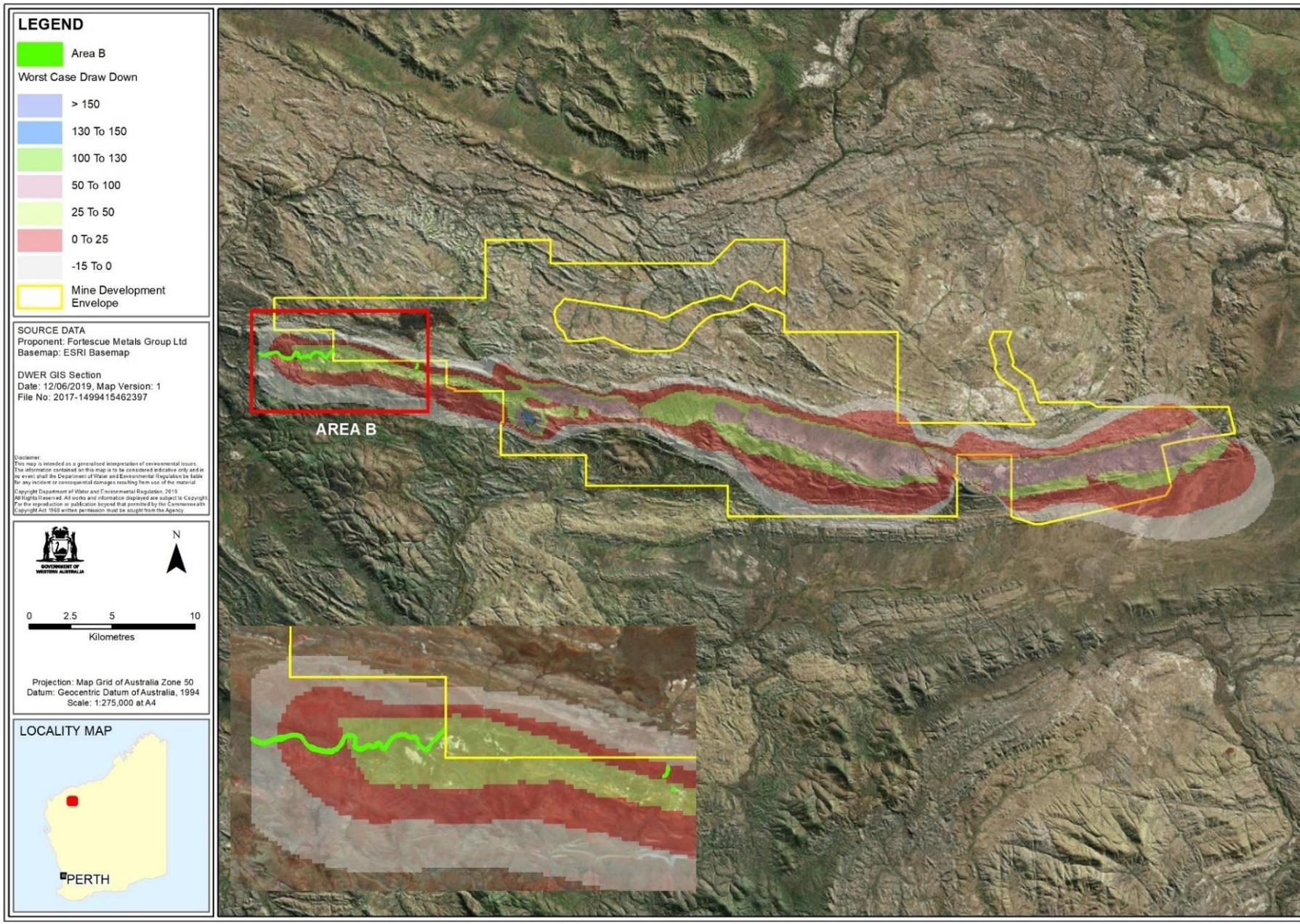


Figure 4 – Offset Area B – comprising Groundwater dependent vegetation within the predicted area of groundwater drawdown

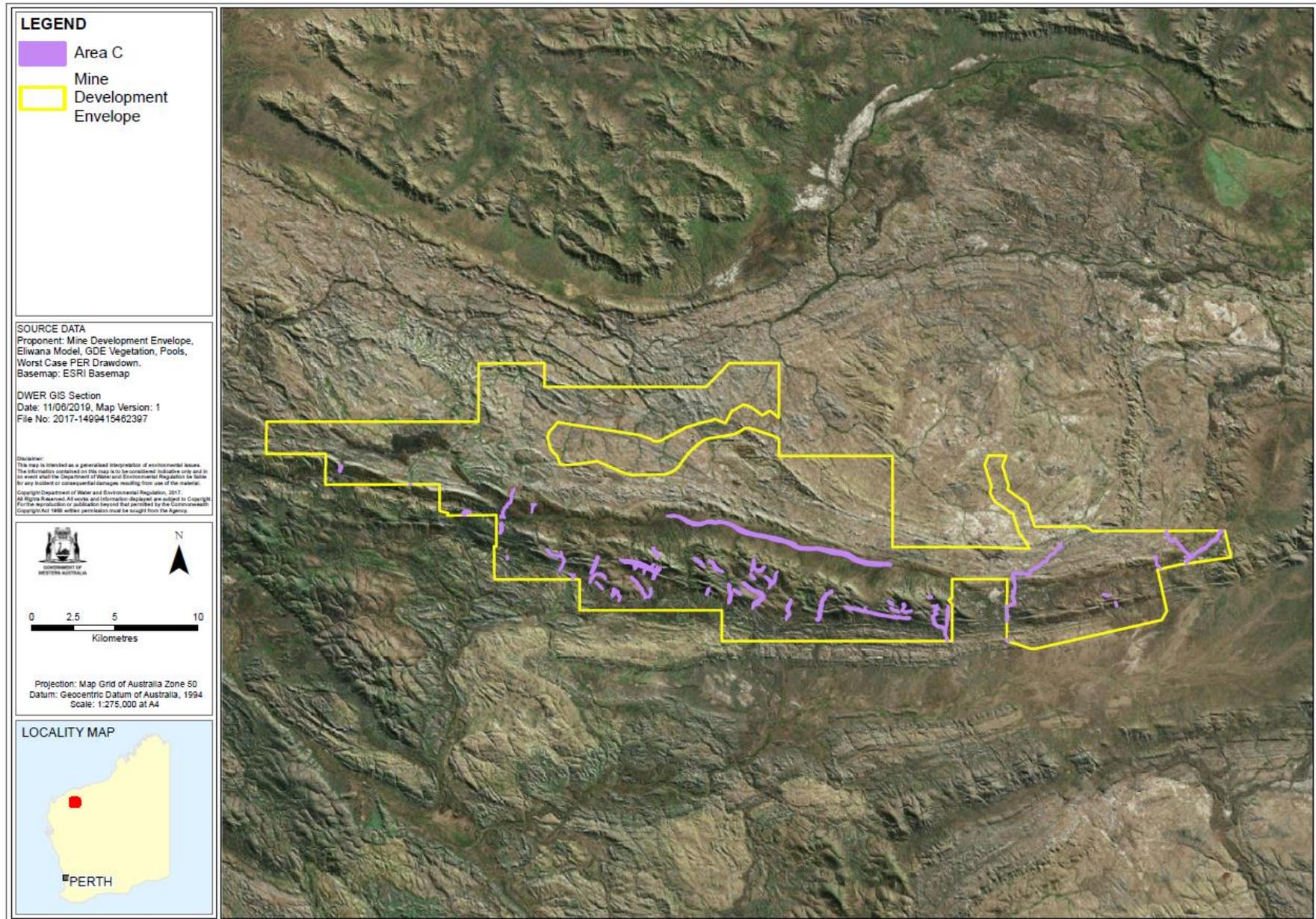


Figure 5 – Offsets Area C - comprising Gorges and Gullies (critical habitat for Ghost bat, Pilbara Leaf-nosed bat, Northern Quoll and Pilbara Olive Python), and Drainage line/River/Creek (major) (critical habitat for Pilbara Olive Python).

Schedule 2

Co-ordinates defining the areas referred shown in Figures 1 and 2 of Schedule 1, and referred to in Ministerial Conditions 7, 9, 12 and 15 are held by the Department of Water and Environmental Regulation (DWER) under the following reference numbers:

- Eliwana Iron Ore Mine Project Mine Development Envelope and Indicative Disturbance Footprint (**Figure 1**) – 2018-1535503741340
- Boundaries of the Eagles Nest heritage site (**No Figure**) – A1795289
- Previously disturbed Eagles Nest Areas (**No Figure**) – A1797837
- Boundaries of the Kangaroo Gorge heritage site (**No Figure**) – A1795292
- Boundaries of the PK10-004 heritage site (**No Figure**) – A1796928
- Boundaries of Duck Creek (**Figure 2**) – A1795289
- Area A, comprising 'good' to 'excellent' vegetation in the Mine development envelope, excluding areas within Areas B and C as described below (**Figure 3**) – A1797564
- Area B, comprising groundwater dependent vegetation within areas with the potential to be subjected to groundwater drawdown as a result of the proposal (**Figure 4**) – A1797478
- Area C – comprising Gorges and Gullies (critical habitat for Ghost bat, Pilbara Leaf-nosed bat, Northern Quoll and Pilbara Olive Python (**Figure 5**) – A1797485