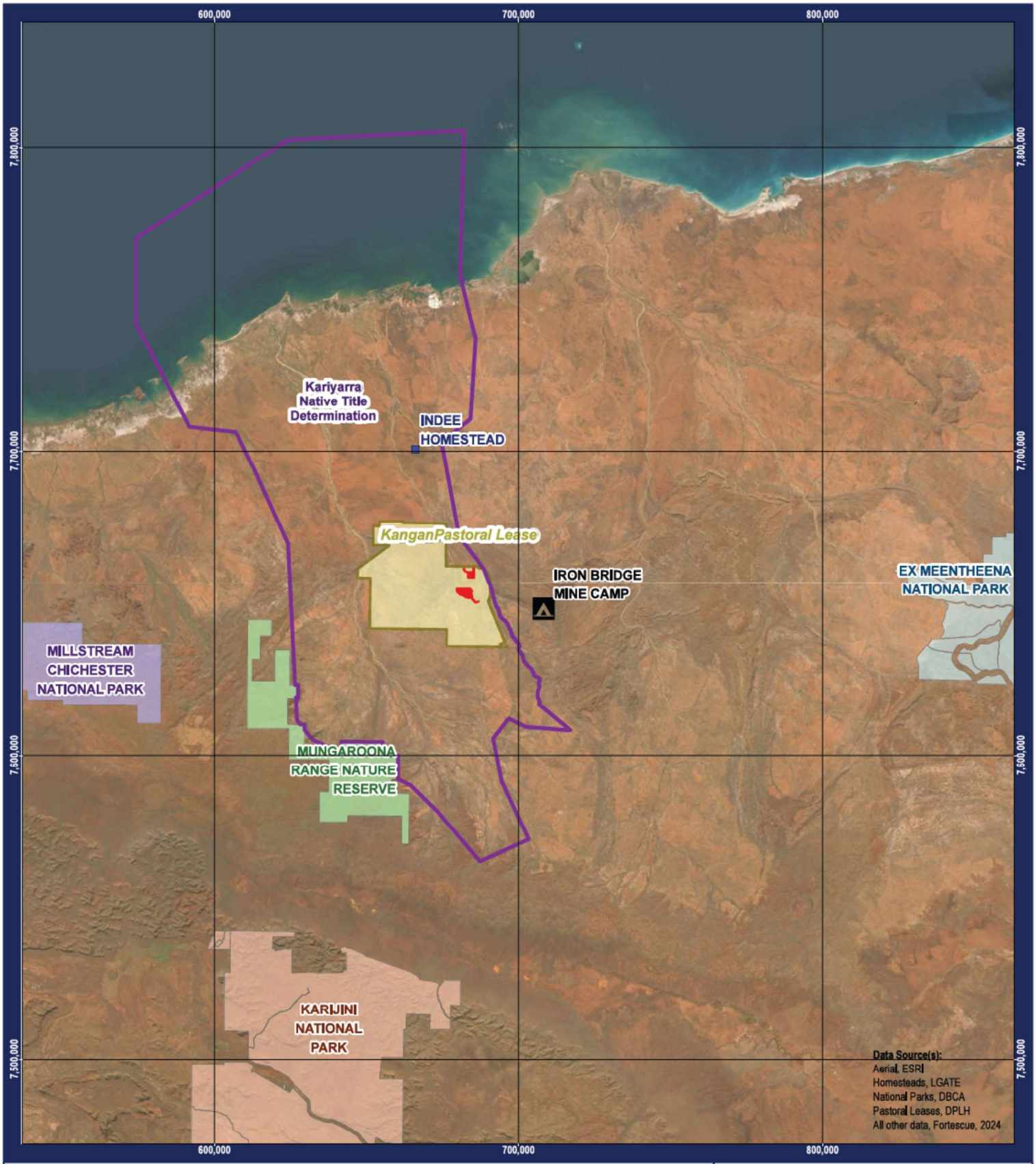

Legend

- Iron Bridge Mine Camp
- Indee Homestead
- Development Envelope
- Kariyarra Native Title Determination
- Karijini National Park
- Millstream Chichester National Park
- Mungaroona Range Nature Reserve
- ex Meentheena National Park
- Kangan Pastoral Lease

N

0 10 20 30 40
Kilometres

Figure 9-5
Social Setting and Surrounding Land Use

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:1,700,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH_r1
Document Name: 4519OP002_MP_EN_0064.059_r0

Date: 25/02/2025
Size: A4P
Revision: 2
Confidentiality: 0

Fortescue.

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9.5 Potential Impacts

Potential impacts have been considered for all phases of the Proposal including construction, operation and decommissioning. Proposal activities that may impact upon terrestrial fauna, and impacts associated with these activities are outlined in the sections below.

9.5.1 Aboriginal Cultural Heritage & Cultural Values

The potential direct and indirect impacts from the Proposal on Aboriginal Cultural Heritage and Cultural values are outline in Table 9-12.

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Table 9-12: Potential Direct and Indirect Impacts on Cultural Values from the Proposal

Value / Receptor	Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
Direct Impacts				
Heritage Places	• Unauthorised disturbance of heritage places and places of cultural significance. • Unauthorised access to heritage places by Fortescue personnel and contractors.	• Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure. • Increase movement of vehicles, equipment and people.	Construction, Operation and Decommissioning	• Potential breach of Aboriginal Heritage Act 1972 (WA) for unauthorised impacts to heritage places. • Loss of cultural information and connection to ancestors.
Plants and Animals	• Loss of culturally significant species. • Loss of habitats removing culturally significant species from the area	• Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure. • Increase movement of vehicles, equipment and people.	Construction, Operation and Decommissioning	• Loss of cultural totems. • Loss of traditional medicines and cultural practices.
Access to Country	• Reduced use of the area or inability of access the area for traditional activities resulting in loss of connection to Country and cultural practices.	• Presence of Proposal infrastructure.	Construction and Operation	• Loss of connection to Country and culture to this area.
Indirect Impacts				
Dust	• Increased dust from construction and operation reducing aesthetics at culturally significant areas and the wider cultural landscape. • Dust deposition impacting on visibility and integrity of engravings. • Decline of plant health for culturally significant flora in high-risk areas.	• Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure. • Presence and activity of people, vehicles and equipment.	Construction	• Loss of cultural information and connection to ancestors. • Potential breach of Aboriginal Heritage Act 1972 (WA) for unauthorised impact to heritage sites.

Value / Receptor	Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
Visual Amenity	• Decrease in visual amenity to cultural heritage places and areas of cultural use. • Decrease in visual amenity to areas of cultural use due to glint and glare.	• Presence of Proposal from Culturally Significant areas or sites (POI). • Installation of artificial lighting, including floodlights, site lighting and vehicle lighting. • Presence of solar panels.	Construction and Operation	• Loss of natural landscape and connection to country / cultural to this area.
Noise and Vibration	• Excessive noise and vibration levels prevent or impede cultural activities including Camping (at night), Hunting and Day Use/ Ceremonial Use being undertaken at receptors.	• The use of heavy equipment including scrapers, dozers, loaders, Moxy truck, concrete vibrator, compressor, concrete truck, concrete pump, trenching machine for clearing and construction; and inverters during operations.	Construction, operation	• Loss of connection to traditional lands and cultural practices.
Water	• Altered hydrological regime of culturally significant water sources impacting health of waterways and natural characteristics.	• Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure. • Presence of infrastructure.	Construction and Operation	• Loss of healthy ecosystems • Loss of traditional medicines, bush foods and other resources within these waterways • Cultural responsibility for downstream impacts on neighbouring language group country. • Reduced surface water quality.

9.5.2 Non-Aboriginal Heritage

No non-Aboriginal heritage was identified in the area and therefore no potential impacts to non-Aboriginal heritage were identified from the Proposal.

9.5.3 Amenity

The construction and decommissioning phases of the Proposal could have temporary impacts on amenity through the movement of construction vehicles through the DE and surrounds changing the activity and character of the area in an otherwise remote and natural landscape.

The operation of the Proposal will result in a permanent visual impact due to the placement of infrastructure in an otherwise natural landscape.

The potential direct and indirect impacts from the Proposal on amenity are outlined in Table 9-13.

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Table 9-13:Potential Impacts to Amenity from the Proposal

Value / Receptor	Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
Dust	• Increased dust emissions in the surrounding area.	• Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure. • Presence and activity of people, vehicles and equipment.	Construction and Operation	• Increase of dust particulates suspended in air affecting human health.
Visual Amenity	• Impacts to third parties due to visual impacts from the Proposal. • Impacts to third parties due to glint and glare from the Proposal.	• Presence of solar panels. • Presence of Proposal infrastructure.	Construction and Operation	• Loss of natural landscape. • Decreased pilot, train and public driver safety due to impairment of vision, increasing risks of accidents.
Noise and Vibration	• Increase in baseline noise levels during construction. • Increase in baseline noise levels during operation.	• Presence and activity of people, vehicles and equipment.	Construction and Operation	• Area is unable to be used due to excessive noise or vibration levels.

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9.6 Assessment of Impacts

9.6.1 Aboriginal Cultural Heritage & Cultural Values

9.6.1.1 Heritage Places

Removal or damage of Heritage Places and heritage features, and unauthorised access to Heritage Places by Fortescue personnel may result in loss of cultural information, loss of connection to ancestors and potential breach of AH Act for unauthorised impact to Heritage Sites.

Through the Proposal design and development process, Fortescue has implemented the mitigation hierarchy by avoiding and minimising impact to identified Heritage Places and HRZs (Section 2). This was based on the results of stakeholder engagement and technical studies, where several Heritage Places and water sources (recorded as HRZs) were identified.

The Proposal has avoided all Heritage Places and HRZs to ensure that there are no direct impacts on these areas as a result of implementation of the Proposal. While two Heritage Places are located within the Proposal area, the design of the Proposal has avoided the sites within the IDF. This includes the implementation of appropriate buffers to prevent unauthorised access and disturbance (under the AH Act).

Continued consultation with the Kariyarra will assist with developing a greater understanding of the significance and extent of values under the AH Act.

As such, significant impacts to Heritage Places from the Proposal are not expected.

9.6.1.2 Culturally Significant Plants and Animals

The Kariyarra Traditional Owners place significant cultural value on various flora and fauna species used for bush food, medicine and/or ceremonies. Implementation of the Proposal will result in clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha and may potentially impacts ecological areas of cultural value and flora and fauna species of cultural significance.

As discussed in Section 9.4.2.6, 18 flora species of which two were recorded to have increased cultural value and nine fauna species of cultural value. The planning and design process for the Proposal, the mitigation hierarchy (avoid, minimise and rehabilitate) was applied to assess, avoid and minimise potential impacts to flora and vegetation as far as practicable. The IDF has been designed to avoid areas that may support significant biodiversity values or heritage values. The flora species of cultural significance recorded in the DE are predominantly all common across the Pilbara region.

All identified flora species of cultural value are common throughout the Pilbara and surrounding areas. The IDF has avoided the identified two flora species of increased cultural significance Mirli (*Melaleuca argentea*) and Parrkalya (*Acacia trachycarpa*) during planning and design.

The culturally significant fauna species were associated with both traditional and contemporary uses (predominantly related to bush tucker). Fauna species with cultural value for hunting and other purposes are expected to avoid and move away from the noise and

activity of construction areas. The Greater Bilby was identified as a significant species that has been reported in the area and occurrences of known activity have been identified outside of the Proposal.

This species has importance as a totem in ceremonies, however this connection is understood to be widespread and not related to the local occurrence of the species. The potential impact for Greater Bilby within the area in regard to cultural values are negligible as the species is not required to be present to honour the species as a totem. For further information of potential impacts and management of the Greater Bilby refer to Section 11.5.1.

Therefore, implementation of the Proposal is not expected to disturb culturally significant values of flora and fauna used for bush food, medicine and ceremonies. As such, an impact to culturally significant species is considered to be negligible.

9.6.1.3 Access to Country

Reduced access to Country may result in loss of connection to Country and cultural practices. Access to culturally important places such as waterways, granite outcrops and sandy plains which are used for bush food, medicine, and/or ceremonies can affect their cultural, mental, and physical health.

While the development of the Proposal involves some impacts, including restricting access to the land on which it will be developed, no specific areas within the DE have been identified as requiring access for traditional activities during the construction and operation phases. Access to other adjacent areas might be restricted for safety reasons due to existing train infrastructure and mine access roads, which may form barriers to connected habitats around the DE.

Although no specific areas for hunting or camping were identified during social surroundings consultations, the Turner River, Turner River West and their main associated tributaries were highlighted as significant sites for contemporary camping activities. This includes heritage place KAR23-026 which holds substantial educational value for teaching younger generations about traditional activities and ancestral use of the area. These areas are located outside the DE. Supervised access to these areas may be required during construction of the Proposal.

Where access within the DE is required to visit Heritage Places, supervised access for Kariyarra Traditional Owners will be provided (Figure 9-2). Access to the Turner River, Turner River West, and their main associated tributaries is maintained, including heritage place KAR23-026 has been requested by Kariyarra Traditional Owners.

As part of Fortescue's Land Access Agreement (LAA) with the Kariyarra Traditional Owners, Fortescue is obliged to return safe access to any Heritage Places that may have been isolated due to development and operation, on completion of its operation.

Due to these commitments and ongoing consultations with the Kariyarra Traditional Owners, the Proposal is not considered to have a significant potential impact on social surroundings through loss of access to Country. Ongoing access will be discussed with the Kariyarra Traditional Owners during the finalisation of the Environmental Management Plan.

The Kariyarra Traditional Owners have expressed that they will not need access to the areas within the DE and are able to access those outside of the Proposal boundaries for these purposes. As such, a significant impact from changes to access to Country is not expected.

9.6.1.4 Dust

Implementation of the Proposal would generate dust through activities such as clearing, ground disturbance and haulage of materials on unsealed roads during the construction period, and vehicle movements and wind erosion of cleared / unsealed surfaces during operation. Without appropriate management it has the potential to impact, through deposition on POI and airborne dust, sites of cultural heritage and amenity.

The dust assessment (ETA, 2024) found that total suspended particulate matter (TSP) emissions during construction were 2,473 tonnes/year without controls, reducing to 2,096 tonnes/year with controls such as watering. During operation, dust emissions drop to 141 tonnes/year without controls and 70 tonnes/year with controls. This demonstrates the effectiveness of dust controls and a substantial reduction in dust emissions after construction.

Dust deposition modelling for Alinta's Port Hedland project (ETA, 2022) indicated a maximum rate of deposition was 0.2 g/m2/month under both 'land-clearing' and 'wind erosion only' scenarios. This maximum rate occurred within the project itself (or within its immediate vicinity) and would reflect potential dust deposition rates on the surrounding area and identified POI. The Alinta project required clearing of approximately 250–280 ha (of vegetation) and so is approximately one-fifth the size of the Proposal, however it provides a useful indication of dust deposition rates that may be experienced for the Proposal. The 0.2 g/m2/month rate is under the level of 2 g/m2/month of maximum increase (i.e. above 2 g/m2/month above background) recommended by guidance for nuisance dust/amenity (DWER, 2021).

Dust emissions are expected to be generated by construction activities, vehicle movements, and wind erosion during the construction phase and during operations from reduced vegetation cover. Nuisance dust could affect dust-sensitive receptors. However, since the Proposal is situated away from communities and other such sensitive receptors, impacts from nuisance dust are expected to be minimal. Nonetheless, camping sites, heritage sites, and the general land area may experience limited dust-related impacts.

The Construction Dust Risk assessment completed by (ETA, 2024) identified 15 POI that have a high or medium potential to be impacted from construction activities including activities likely to generate dust, including stripping/earthworks, loading/transporting materials, stockpiling, vehicle movement, and wind erosion.

Dust emissions from construction are expected to be temporary. Dust generation during operations is not anticipated to be significant.

Fortescue proposes to manage dust emissions for the life of the Proposal and especially during construction by implementing the Dust Management Plan (IO-PL-EN-0001) and the Proposal EMP (as detailed in Section 9.7 and Table 9-14.), Dust management efforts will primarily be focused during the construction phase, with minimal impacts anticipated during operations. Consequently, generation and deposition can be minimised and largely contained within the construction period of the Proposal.

9.6.1.5 Visual Amenity

Presence of Proposal

Results from the visual impact assessment found that the Proposal is expected to have minimal impact on visual amenity. Most viewpoints had limited visibility of the Proposal due to natural landforms and vegetation providing screening, resulting in a negligible change to the visual appeal and landscape character. Differences in visual impact between the northern and southern DE sites were due to their locations within different land systems, with the southern DE benefiting from more natural screening (SLR, 2024).

Overall, any alteration to visual amenity is limited, owing to the vegetation screening that reduces the visibility of the solar arrays due to their height (approximately 2 m above existing ground level). The VIA revealed predicted visibility at five of the 17 POI viewpoints for either the northern DE or southern DE. There was no visibility of the Proposal at the remaining 12 POI. No viewpoints had visibility of both portions of the Proposal DE.

The impact was determined to be minimal due to existing modified elements within a majority of the views. Higher impact ratings were assigned in instances where the Proposal introduced new elements into the landscape or was highly visible, thereby altering the character of the view. Despite some changes in visual amenity, these impacts are not considered significant, as the Proposal is generally located in the mid to background of the view and/or partially screened by landforms or vegetation. The Proposal was deemed to have met the specific Visual Management Objectives (VMOs).

In general, it is considered that the Proposal will have a limited visual impact. During the construction phase, visual impacts are temporary and mostly related to dust. the Proposal is not considered to have a significant residual impact on Kariyarra Traditional Owners ability to undertake activities due to presence of the Proposal.

Glint and Glare

Potential impacts from glint and glare (DNV, 2024a; DNV, 2024b) can affect key stakeholders, specifically by reflecting light onto the surroundings and potentially impairing or harming vision. Glint and glare could disrupt cultural activities undertaken by the Kariyarra Traditional Owners.

The glint and glare assessments determined that the Proposal will only generate green and yellow glare at a limited number of receptors (DNV, 2024a; DNV, 2024b). No red glare (glare with potential to cause retinal damage) was predicted for any of the glint and glare receptor types (as outlined in Table 9-11).

Potential glare associated with the Proposal will be below the threshold for permanent eye damage, with yellow glare being the highest glare intensity predicted. Glare intensity from the PV array is likely to be lower than or equal to glare caused by direct sunlight, noting that these may occur in different fields of view. It is also noted that the assessment did not model local obstructions such as the local vegetation, which may have the potential to further reduce or eliminate glint and glare.

As such, a significant impact from glint and glare from the Proposal is not expected to impact Kariyarra Traditional Owners ability to undertake activities within the area.

9.6.1.6 Noise and Vibration

Noise was considered to be a potential impact to traditional activities undertaken by Kariyarra Traditional Owners on country. The baseline noise modelling assessment (Talis, 2024) identified two POI would experience noise levels during construction which exceeded target levels (Table 9-8).

Construction of the Proposal through operation of plant and machinery, earthworks and ground disturbing activities will temporarily elevate noise levels. POIs NV1 and NV5 will receive noise levels that may adversely impact on hunting, camping and ceremonial activities (Figure 9-6). However, given these impacts are short-term and the sites are infrequently visited it is unlikely to represent a significant impact.

Temporary vibrations may occur during construction from machinery, plant, earthworks, general ground disturbing and localised blasting (dependent on geotechnical studies for foundations for buildings). The vibration from construction activities will be temporary and is not expected to significantly impact Aboriginal Cultural Heritage. Vibration impacts during construction will be managed under Fortescue's 'Blasting Near Heritage Places Procedure' (100-PR-HE-0003). As such, significant impacts to Aboriginal Cultural Heritage from vibration during blasting are not expected.

Operational noise sources, mainly vehicle movements and inverters (co-located with solar panels), is anticipated to be negligible with noise emissions below target levels (Table 9-8;).

Therefore, implementation of the Proposal is not expected to impact Kariyarra Traditional Owners ability to undertake activities within the area.

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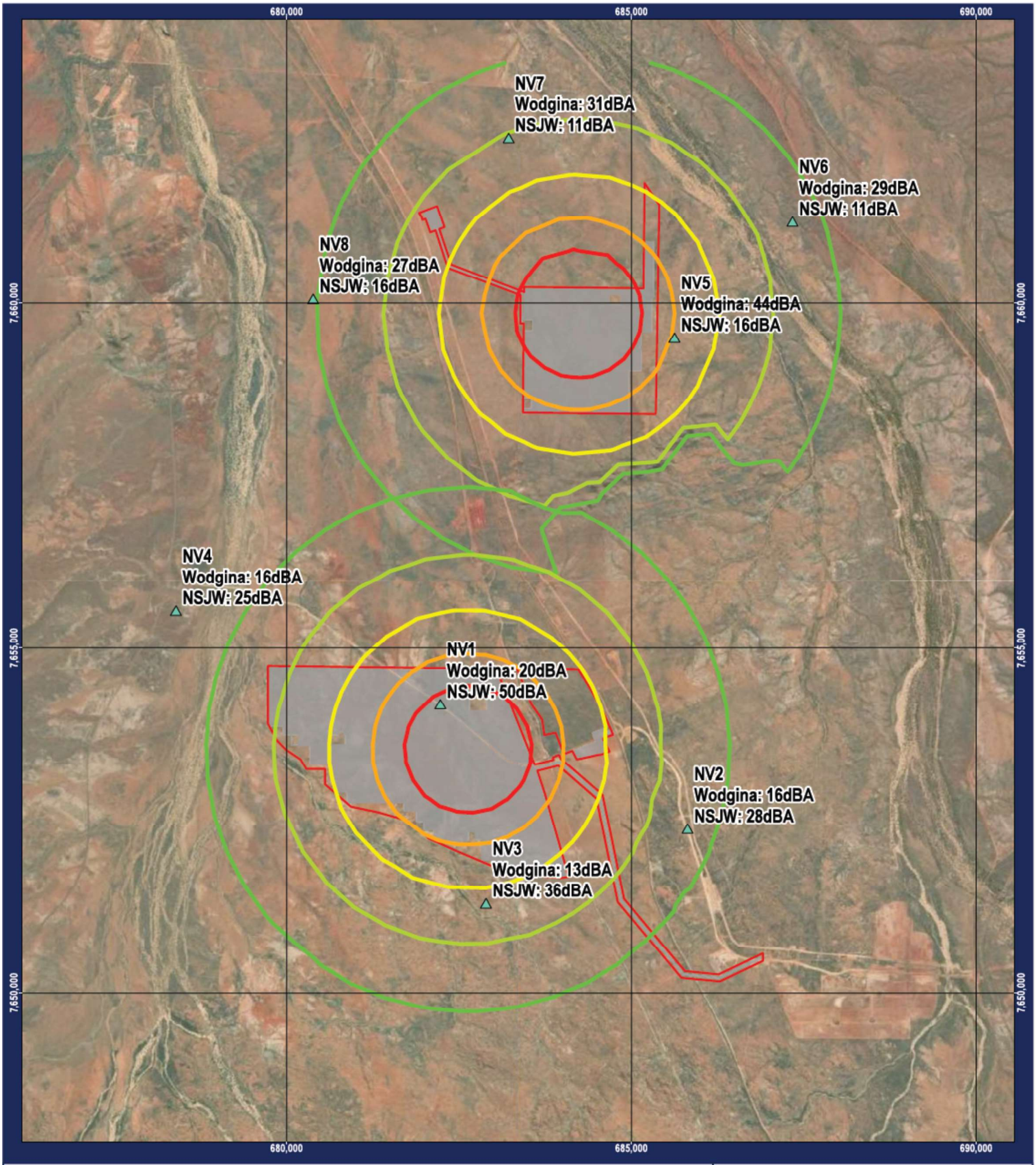

Legend

- Noise Monitoring Location
- Development Envelope
- Indicative Disturbance Footprint

Construction (Clearing) Noise

- 30dBA
- 35dBA
- 40dBA
- 45dBA
- 50dBA

N

0 1 2 3

Kilometres

Figure 9-6
Construction Noise Contour Map

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:75,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.054

Date: 15/01/2025
Size: A4P
Revision: 1
Confidentiality: 0

Data Source(s):
Aerial, ESRI
All other data, Fortescue, 2024

Fortescue.

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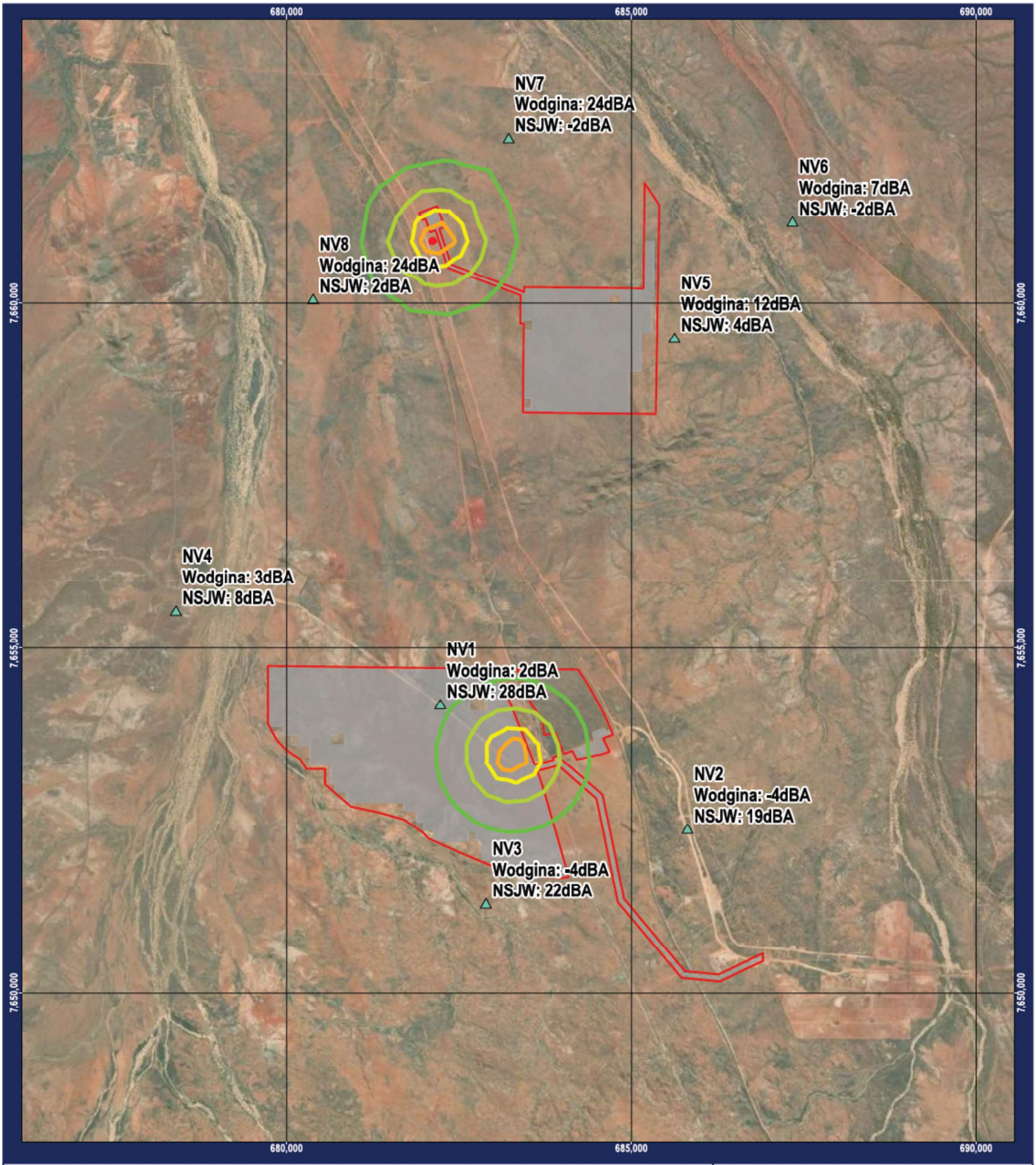

Legend

- Noise Monitoring Location
- Indicative Disturbance Footprint
- Development Envelope

Operations (Clearing) Noise

- 30dBA
- 35dBA
- 40dBA
- 45dBA

N

0 1 2 3
Kilometres

Figure 9-7
Operations Noise Contour Map

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:75,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.055

Date: 15/01/2025
Size: A4P
Revision: 1
Confidentiality: 0

Data Source(s):
Aerial, ESRI
All other data, Fortescue, 2024

Fortescue.

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9.6.1.7 Culturally Significant Water Sources

The interception and diversion of water flows could impinge on areas of cultural importance, culturally significant flora and traditional practices reliant on natural surface water regimes, including the Turner River and its tributaries. The construction and physical presence of the Proposal may impact surface water drainage channels, potentially increasing erosion and diverting flows from natural drainage paths.

Surface water impacts are discussed further in Section 10.3 (Inland Waters). The Proposal has been designed to avoid major rivers (Turner River and Turner River West) and major tributaries. Minor drainage lines have been avoided as far as reasonably practicable.

The baseline surface water assessment (Fortescue, 2024b) concluded that the Proposal's impact to surface water flows would be localised with minimal interactions between concentrated flows and the Proposal's design. Bulk earthworks are not anticipated to substantially alter the existing flow paths within the DE.

During construction, there is potential for impacts on surface water quality through increased erosion, sedimentation, and localised contamination from potential leaks and spills of hydrocarbons and waste. Impacts from construction will be temporary and managed through the Proposal's EMP.

During operations no impacts to surface water flows are not anticipated from presence of the Proposal's infrastructure.

Alteration of surface water flows are unlikely due Proposal design and mitigation measures. All culturally significant water sources have been avoided by the Proposal design.

As such, no significant impacts to culturally significant water sources are not anticipated. Further information with respect to alteration of surface water flows and surface water quality are outlined in Section 10.3.3.

9.6.2 Amenity

9.6.2.1 Dust

Dust emissions are expected to be generated by construction activities, vehicle movements, and wind erosion during the construction phase and during operations from reduced vegetation cover. Nuisance dust could affect dust-sensitive receptors. However, since the Proposal is situated away from communities and other such sensitive receptors, impacts from nuisance dust are expected to be minimal. Nonetheless, camping sites, heritage sites, and the general land area may experience limited dust-related impacts.

The Construction Dust Risk assessment completed by (ETA, 2024) identified 15 POI that have a high or medium potential to be impacted from construction activities including activities likely to generate dust, including stripping/earthworks, loading/transporting materials, stockpiling, vehicle movement, and wind erosion (Section 9.4.4.4).

Dust emissions from construction are expected to be temporary. Dust generation during operations is not anticipated to be significant.

Fortescue proposes to manage dust emissions for the life of the Proposal and especially during construction by implementing the Dust Management Plan (IO-PL-EN-0001) and the Proposal EMP (as detailed in Section 9.5 and Table 9 30.), Dust management efforts will primarily be focused during the construction phase, with minimal impacts anticipated during operations. Consequently, generation and deposition can be minimised and largely contained within the construction period of the Proposal.

9.6.2.2 Visual Amenity

Presence of Proposal

The Proposal is located approximately 125 km south of Port Hedland in a sparsely populated rural area. Infrastructure and development in the area primarily consist of mining operations and associated train lines. No significant impacts on visual amenity are expected from the Proposal due to its remoteness, the distance (1.7 km) from the Great Northern Highway to the west of the DE and the surrounding vegetation growth along the Turner River.

The POI were chosen in consultation with Kariyarra, however several (VIA4 - 7) were located on the Marble Bar Road for potential impacts to third parties. These POI were determined to have a negligible impact due to lack of visibility (SLR, 2024).

Where the Proposal was visible, the potential impact was minimal due to existing modified elements within most views. Despite some changes in visual amenity, they are not considered significant as the Proposal was generally located in the mid to background of the view and/or partially screened by landforms or vegetation (SLR, 2024).

Over time, the visual impact of the Proposal will lessen. Initially, the construction phase will reveal a large area of bare ground, but this will gradually improve as natural revegetation occurs, further reducing visual impacts.

In general, it is considered that the Proposal will have a limited visual impact and is not considered to have a significant residual impact to social surroundings due to visual impacts.

Glint and Glare

Potential impacts of glint and glare (DNV, 2024a; DNV, 2024b) can affect key stakeholders, specifically by reflecting light onto the surroundings and potentially impairing or harming vision. This impact is particularly concerning for drivers of vehicles, trains and planes in the area.

The glint and glare assessment determined that the Proposal will only generate green and yellow glare at a limited number of receptors (DNV, 2024a; DNV, 2024b). No red glare (glare with potential to cause retinal damage) was predicted for any of the glint and glare receptor types (as outlined in tables Table 9-11).

Potential glare associated with the Proposal will be below the threshold for permanent eye damage, with yellow glare being the highest glare intensity predicted. The Proposal may cause glare impacts for some vehicle and train operators with glare occurring throughout the day. However, the glare intensity from the PV array is likely to be lower than or equal to glare

caused by direct sunlight, noting that these may occur in different fields of view. It is also noted that the assessment did not model local obstructions which may have the potential to further reduce or eliminate glint and glare, such as the local vegetation.

With management measures implemented, it is considered that the impacts to social surrounding can be avoided and mitigated through the implementation of measures outlined in Table 9-14. the Proposal is not considered to have a significant impact to social surroundings due to glint or glare.

9.6.2.3 Noise and Vibration

The baseline noise assessment (Talis, 2024) identified two sensitive receivers (Fortescue's Junction Camp and Mineral Resources' Wodgina Camp) within the surroundings of the Proposal.

Noise modelling for the Proposal indicated that both sensitive receivers would experience noise below threshold levels (9.4.4.1) during construction and operations (Figure 9-6 and Figure 9-7). Noise emissions from the Proposal at both sensitive receivers are unlikely to be audible due to background noise generated from camp activities.

Therefore, implementation of the Proposal is not expected to impact sensitive receivers and is expected that impacts will be negligible.

9.7 Mitigation

Initial design and planning of the Proposal has applied the mitigation hierarchy (avoid, minimise) to reduce the inherent environmental impacts to Social Surroundings (Section 2). The extent and location of the Proposal was informed by engagement with Kariyarra Traditional Owners, heritage surveys, environmental surveys and impact assessments to avoid areas of high conservation and cultural sensitivity such as culturally significant water ways and heritage places.

The majority of impacts to Social Surroundings would be experienced during the construction of the Proposal and are associated with the clearing of native vegetation across the IDF.

The mitigation hierarchy has been applied to avoid, minimise and mitigate impacts to Social Surroundings where possible (Table 9-14). Mitigation measures identified ensure the residual impact and environmental outcome is not significant. These mitigation measures have been allowed for within the Proposal design and costing, from design through to operation and decommissioning.

To minimise the likelihood of the precautionary principle affecting the environmental outcomes of the assessment and residual impact, Fortescue has:

- Ensured the associated development activities are well understood and non-polluting
- Undertaken adequate surveys in accordance with guidance across the entire DE, to ensure that there is sufficient knowledge of Social Surroundings values within and surrounding impacted areas.

Table 9 30 outlines the avoidance, minimisation, and mitigation measures proposed for Social Surrounds in relation to the inherent and provides a summary of the anticipated residual impacts. Further discussion of residual impacts is presented in Section 9.8.

Fortescue commits to an ongoing consultation and co-management framework with Kariyarra Traditional Owners, ensuring that their values, which extend beyond just heritage sites, are adequately protected during the implementation of the Proposal.

Table 9-14: Proposed Mitigation Measure for Impacts to Social Surroundings

Value / Receptor	Potential Impacts	Avoid	Minimise	Manage / Rehabilitate
Aboriginal Cultural Heritage & Values				
Heritage Places	Unauthorised disturbance of heritage places and places of cultural significance. Unauthorised access to heritage places by Fortescue personnel and contractors.	All heritage places are outside of the indicative footprint and will be avoided. All Heritage Places and HRZs are identified in Fortescue's GIS system. Relevant Heritage surveys are undertaken in unsurveyed land prior to ground disturbance activities.	Implement the Proposal during construction and operation in accordance with the AH Act and Fortescue's Heritage management procedures. All Fortescue employees and contractors to undertake activities under an approved Land Use Certificate (LUC) and comply with all Heritage conditions applied (where applicable). All Fortescue personnel and contractors to undertake relevant mobilisation inductions, including cultural awareness. Complete all works in compliance with the Fortescue procedures and the Project Environmental Management Plan	Where disturbance to heritage places cannot be avoided, Fortescue will seek the relevant heritage approvals under the AH Act.
Culturally Significant Plants and Animals	Loss of culturally significant species. Loss of habitats removing culturally significant species from the area	All areas of culturally significant flora and / or fauna identified are stored in Fortescue's GIS system as HRZ. Proposal design developed to avoid direct disturbance to the Turner River, Turner River West, and associated tributaries (HRZ-1367). 100 m buffer placed over Turner River, Turner River West, and associated tributaries (HRZ-1367) (where in proximity to the Proposal), and noted as containing culturally significant flora and / or fauna within Fortescue's GIS System.	All Fortescue employees and contractors to undertake activities under an approved Land Use Certificate (LUC) procedure (100-PR-TA-0001) and comply with all Heritage conditions applied (where applicable). Any management of culturally significant plants or animals to be managed under the EMP. Minimise loss of culturally significant flora species by reducing clearing activities. Develop and implement management targets to minimise or reduce impacts to species of cultural value. Including implementing weed and feral animal management strategies, pre clearance bilby surveys and implement waste management protocols.	Progressive rehabilitation of any areas not required for ongoing operations. Allow flora and vegetation regrowth to occur naturally after construction. Traditional Owners and other stakeholders will be consulted when preparing decommissioning plans and provide opportunities to participate in rehabilitation management activities.

Value / Receptor	Potential Impacts	Avoid	Minimise	Manage / Rehabilitate
Access to Country	Reduced use of the area or inability of access the area for traditional activities resulting in loss of connection to Country and cultural practices.	Proposal design will avoid places / areas requested by Kariyarra to maintain access (Turner River, Turner River West, HRZ-1367, and KAR23-026).	Ensure any design plan changes to not restrict or cut off access to Turner River, Turner River West, HRZ-1367, and KAR23-026. Consult with Kariyarra to identify other places requiring access should design plans change.	Where access within the DE is required to visit Heritage Places, supervised access for Kariyarra Traditional Owners will be provided As part of Fortescue's Land Access Agreement (LAA) with the Kariyarra Traditional Owners, Fortescue is obliged to return safe access to any Heritage Places that may have been isolated due to development and operation, on completion of its operation.
Aesthetics and Amenity of Country	Dust: Increased dust from construction and operation reducing aesthetics at culturally significant areas and the wider cultural landscape. Dust deposition impacting on visibility and integrity of engravings. Decline of plant health for culturally significant flora in high-risk areas.	Based on dust assessment identify high-risk areas requiring management to minimise / reduce dust levels. Forecast and works planning to consider high wind events Topsoil stripping will not commence during the following conditions: High wind events. when it is saturated or when very dry. Directional specific relative to a POI within 200 metres of an activity.	Implement Fortescue's Dust Management Plan (IO-PL-EN-0001). Key measures include: Water trucks will be used for dust suppression on access tracks, cleared areas, and high traffic areas during construction. Watering of surface area prior to commencing topsoil stripping - by water truck – when POI within wind arc direction and within 500 metres of an activity relative to the prevailing wind direction. Reduce vehicle speed limits on site and access roads.	Progressive rehabilitation and stabilisation of soils for any areas not required for ongoing operations
	Visual Amenity: Decrease in visual amenity to cultural heritage places and areas of cultural use. Decrease in visual amenity to areas of cultural use due to glint and glare.	No areas to undertake traditional activities were identified within or surrounding the Proposal. Use of solar panels with anti-reflective coating and a photovoltaic height of 2 m above ground.	Limit lighting usage during hours of darkness to key operational areas – control room. Optimisation of the backtracking algorithm to reduce or eliminate glare.	Progressive rehabilitation and stabilisation of soils for any areas not required for ongoing operations

Value / Receptor	Potential Impacts	Avoid	Minimise	Manage / Rehabilitate
	Noise and Vibration: Noise (and vibration) disturbance for cultural activities including Camping (at night), Hunting and Day Use/ Ceremonial Use.	No areas to undertake traditional activities were identified within or surrounding the Proposal.	Manage noise in accordance with the EMP. Manage noise in accordance with Fortescue procedure for blasting near Aboriginal Heritage Places (100-PR-HE-0003) Site design such that noise limits comply with the Environmental Protection (noise) Regulations 1997 (WA)	-
Culturally Significant Water Sources	Altered hydrological regime of culturally significant water sources impacting health of waterways and natural characteristics.	Proposal designed to avoid culturally significant water sources identified in proximity to the Proposal. Culturally significant water sources are recorded in Fortescue's GIS system as Heritage Places or HRZ. 100 m buffer placed over Turner River, Turner River West, and associated tributaries (HRZ-1367) (where in proximity to the Proposal). No direct disturbance/ clearing of land within the Turner River West and tributary buffers during construction or operation of the Proposal. No abstraction of water on site. Hydrological modelling for the Proposal shows that natural flooding events have no interaction with the Proposal.	Appropriate design on stormwater drainage.	-
Amenity				
Dust	Increased dust emissions in the surrounding area.	Road surface design, preparation and construction. Forecast and works planning to consider high wind events	Road surface design, preparation and construction of all roads and access track undertaken in a way to minimise dust Implement Fortescue's Dust Management Plan (IO-PL-EN-0001). Key measures are:	Progressive rehabilitation and stabilisation of soils for any areas not required for ongoing operations

Value / Receptor	Potential Impacts	Avoid	Minimise	Manage / Rehabilitate
		Topsoil stripping will not commence during the following conditions: High wind events. when it is saturated or when very dry. Directional specific relative to a POI within 200 metres of an activity.	Water trucks will be used for dust suppression on access tracks, cleared areas, and high traffic areas. Watering of surface area prior to commencing topsoil stripping - by water truck, where necessary Reducing vehicle speed limits	
Visual Amenity	Impacts to third parties due to visual impacts from the Proposal. Impacts to third parties due to glint and glare from the Proposal.	The VIA identified no impact to visual amenity for the Public therefore no management is required. Use of solar panels with anti-reflective coating and a photovoltaic height of up to 2 m above ground.	Optimisation of the backtracking algorithm to reduce or eliminate glare. Ensure all personnel that use access roads with glare impacts to follow Fortescue safety procedures.	Progressive rehabilitation and stabilisation of soils for any areas not required for ongoing operations
Noise and Vibration	Increase in baseline noise levels during construction. Increase in baseline noise levels during operation.	Site design such that noise limits comply with the Environmental Protection (noise) Regulations 1997 (WA). Impact from noise and vibration is not expected to impact the general public.	Plan construction works accordingly to minimise noise (and vibration) impacts and managed in accordance with the Environment Protection (Noise) Regulations 1997. Develop appropriate management strategies to manage noise sensitive receptors at high-risk areas Undertake blasting activities (if required) in accordance with Fortescue procedures (blasting, safety)	-

9.8 Residual Impacts

A summary of residual impacts expected after the application of mitigation and management measures is provided in Table 9-15.

Table 9-15: Summary of Residual Impacts to Social Surroundings following Mitigation

Value / Receptor	Potential Impact	Residual Impact after Management	Regional Significance
Aboriginal Cultural Heritage & Values			
Heritage Places	Unauthorised disturbance of heritage places and places of cultural significance. Unauthorised access to heritage places by Fortescue personnel and contractors.	The loss or disturbance of Aboriginal cultural heritage sites is unlikely to cause significant impacts due to the design of the Proposal (DE location and IDF layout) to avoid these values.	Unlikely to be regionally significant. Not likely to be a (local) significant impact, due to the design of the IDF avoiding known sites of Aboriginal cultural heritage.
Culturally Significant Plants and Animals	Loss of culturally significant species. Loss of habitats removing culturally significant species from the area	Potential impacts to flora and fauna of cultural value are unlikely to cause significant impacts, due to the Proposal design and the abundance of species and species individuals in the surrounding areas.	Not likely to be a (regional or local) significant impact, due to adjacent remaining flora, fauna and ecosystems. Cultural values within the Proposal are considered well represented in the surrounding region.
Access to Country	Reduced use of the area or inability of access the area for traditional activities resulting in loss of connection to Country and cultural practices.	Potential impacts to access of heritage places of areas of land for traditional activities are unlikely to be significant due to the effectiveness of the management measures identified in Section 9.7. Access to be provided to key sites (Turner River, Turner River West, HRZ-1367, and KAR23-026) as advised by Kariyarra. Disturbance and access to HRZs by others avoided through early identification of these areas.	Unlikely to be regionally significant. Not likely to be locally significant, Kariyarra Traditional Owners will maintain their right to access their cultural land managed through existing Land Access Agreement.
Aesthetics and Amenity of Country	**Dust:** Increased dust from construction and operation reducing aesthetics at culturally significant areas and the wider cultural landscape. Dust deposition impacting on visibility and integrity of engravings. Decline of plant health for culturally	Potential impacts for cultural activities are unlikely to be significant due to the limited use by Traditional Owners in the area and short-term construction timeline.	Unlikely to be significant regionally

Value / Receptor	Potential Impact	Residual Impact after Management	Regional Significance
	significant flora in high-risk areas.		
	Visual Amenity: Decrease in visual amenity to cultural heritage places and areas of cultural use. Decrease in visual amenity to areas of cultural use due to glint and glare.	Potential impacts for cultural activities are unlikely to be significant due to the limited use by Traditional Owners in the area and short-term construction timeline.	Unlikely to be significant
	Noise and Vibration: Noise (and vibration) disturbance for cultural activities including Camping (at night), Hunting and Day Use/ Ceremonial Use.	Potential impacts for cultural activities are unlikely to be significant due to the limited use by Traditional Owners in the area and short-term construction timeline.	Unlikely to be significant
Culturally Significant Water Sources	Altered hydrological regime of culturally significant water sources impacting health of waterways and natural characteristics.	Potential impacts to hydrological regimes are unlikely to be significant due to the design of the DE and IDF (Section 10.3).	Unlikely to be significant
Amenity			
Dust	Increased dust emissions in the surrounding area.	Potential impacts to visual amenity from dust deposition, presence of the Proposal and noise and vibration are unlikely to be significant due to lack of sensitive receptors and management measures identified in Section 9.7.	Unlikely to be significant
Visual Amenity	Impacts to third parties due to visual impacts from the Proposal. Impacts to third parties due to glint and glare from the Proposal.		
Noise and Vibration	Increase in baseline noise levels during construction. Increase in baseline noise levels during operation.		

9.9 Environmental Outcomes

Following completion of the assessment of residual impacts in Section 9.6, it is considered that the Proposal will not have significant residual impacts on Social Surroundings as a result of the implementation of the measures described in Table 9-14. As a result, the Proposal meets the EPA objective for this factor such that social surroundings are protected from significant harm.

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10 OTHER ENVIRONMENTAL FACTORS

As identified in Section 6, there are five environmental factors that are relevant to the Proposal which may be termed other factors. These factors were not identified as key factors through the EIA process as the Proposal is considered unlikely to cause significant impacts. Other environmental factors include the following: Landforms, Terrestrial Environmental Quality, Inland Waters, Air Quality and Greenhouse Gas Emissions.

10.1 Landforms

The EPA's objective for the Landforms factor is "*to maintain the variety and integrity of significant physical landforms so that environmental values are protected*" (EPA, 2018b).

Landforms are defined by the EPA as "*the distinctive, recognisable physical features of the earth's surface having a characteristic shape produced by natural processes. A landform is defined by the combination of its geology (composition) and morphology (form)*" (EPA, 2018b).

The guidance for the landforms factor further clarifies that the EPA focusses on impacts to potentially significant landforms during their assessment. Landforms are considered part of a landscape, which is defined by the EPA as "*All the features of an area that can be seen in a single view, which distinguish one part of the earth's surface from another part. Landscapes can be either natural (largely unaffected by human activity) or anthropogenic (created or largely modified by human activity)*" (EPA, 2018b).

10.1.1 Receiving Environment

Fortescue commissioned a soils and landforms assessment of the Proposal area (Landloch, 2024) to identify any potential significant landforms present. Land systems across the DE include Boolaloo System, Macroy System and Uaroo System (refer to Section 2.3.1.3).

Landforms within the Proposal area were generally aligned with the land system elements within the Proposal area were assessed based on percentage of occurrence within the land systems intersecting the Proposal area. Six landform types were identified as to be present across the Proposal area, including Stony Plains and interfluves, Sand/loamy plains, Pebbly plains, Drainage floors and channels, Low hills and ridges and Tor heaps. The majority of the Proposal area is defined by Sandy/loamy plains (55.5%) and Stony plains and interfluves (38.5%) (Figure 2-5; (Landloch, 2024).

The identified landform elements observed across the DE, are also present across a large area of the Pilbara. These landforms are therefore not considered significant or unique landforms (Landloch, 2024).

10.1.1.1 Assessment of Landform Types

An assessment of landforms within the Proposal area was completed by (Landloch, 2024), for the five landform types identified as potentially present within the Proposal area. This assessment is provided below in Table 10-1.

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Table 10-1: Assessment of Landform Significance

Criteria	Stony Plains and Interfluves	Sandy/Loamy Plains	Pebbly Plains	Drainage Floors and Channels	Low Hills and Ridges	Tor Heaps
Variety	The stony plains and interfluves are well represented locally, regionally and nationally. Within the Macroy land system alone, this landform is estimated to cover an area of 916,650ha	Sandy/loamy plains occur across the Pilbara. Within the Uaroo land system alone this landform is estimated to cover an area of 629,842ha.	Less common landform associated only with the Uaroo land system. It is estimated that this landform comprises an area of 61,448ha.	Varieties of drainage floors and channels occur throughout the Pilbara. Within the Macroy land system, this landform is estimated to cover an area of 157,140ha.	The low hills and ridges are well represented locally, regionally and nationally. Within the Macroy land system alone, this landform is estimated to cover an area of 61,448ha.	Tor heaps occur across four land systems within the Pilbara region. However, they are typically not separated out as a single landform, but rather form part of other landform types. In the nearby area (within ~10km of the Project area), examples of Tor heaps can be seen.
Integrity	This landform is intact and in good condition at the local level.	This landform is intact and in good condition at the local level.	This landform is intact and in good condition at the local level.	This landform is intact and in good condition at the local level.	This landform is highly weathered and in a generally poor condition.	Highly weathered, fractured and broken. Tor heaps present on site are in a poor condition compared to other local examples.
Ecological importance	One observation of a brush tailed Mulgara was noted within this landform at the northern section of the site.	One observation of Magpielark was recorded in the southern section of the site.	Flora and fauna surveys of the Project area did not identify any rare or unique species present within this landform.	Fauna surveys indicate that several species make use of drainage channels in general (Northern Quoll, Ghost Bat, Pilbara Olive Python etc.)	Fauna surveys note that the Northern Quoll prefers granitic outcrops as a denning habitat, but none were encountered within the survey area. Preferred transient roost for Ghost Bats, and shelter for Pilbara Olive Python.	Fauna surveys note that the Northern Quoll prefers granitic outcrops as a denning habitat, but none were encountered within the survey area. May be used as transient roost for Ghost Bats, and shelter for Pilbara Olive Python. However, given the condition of the Tor Heaps they are unlikely to be used by these species.

Criteria	Stony Plains and Interfluves	Sandy/Loamy Plains	Pebbly Plains	Drainage Floors and Channels	Low Hills and Ridges	Tor Heaps
Scientific Importance	Depositional landform, as such there is little evidence of past ecological processes.	Depositional landform, as such there is little evidence of past ecological processes.	Depositional landform, as such there is little evidence of past ecological processes.	Depositional landform, as such there is little evidence of past ecological processes.	An erosional landform, and as such may provide some insight into past geological processes.	Given the extent of weathering that has occurred on these Tor heaps, there may be some scientific interest from a geomorphological and geological perspective, however unlikely.
Rarity	Described as 'commonly occurring in the Pilbara' by (van Vreeswyk, Payne, Leighton, & Hennig, 2004).	Comprises ~4% of the Pilbara (van Vreeswyk, Payne, Leighton, & Hennig, 2004).	Comprises 31ha of the Proposal area, estimated to comprise 61,448ha of the Pilbara.	Present in over 10 other land systems within the Pilbara region. Common landform that occurs extensively.	Present within three other land systems within the Pilbara region. Common landform that occurs extensively	While Tor heaps form part of four land systems within the Pilbara, they are not a common feature and can be considered rare.
Social Importance	Potential use for grinding patches.	Potential use for grinding patches.	Potential use for grinding patches.	Major drainage lines are considered culturally sensitive.	Potential use for grinding patches.	Potential use for grinding patches.
Significance	**Unlikely to be significant**	**Unlikely to be significant**	**Unlikely to be significant**	**Unlikely to be significant**	**Unlikely to be significant**	**Unlikely to be significant**

Source: (Landloch, 2024).

The assessment identified that none of the six landform types present within the Proposal area are likely to be significant (Table 10-1). Two landform systems are mapped across 99% of the Proposal Area (Macroy System and Uaroo System) and are considered common throughout the Pilbara (Landloch, 2024).

10.1.2 Potential Impacts

No significant impacts have been identified. No significant landform types have been identified within the Proposal area.

10.1.3 Environmental Outcomes

It is considered unlikely that the Proposal will impact on any significant landforms. Therefore, further assessment of the Proposal against the environmental objective for landforms is **not required** as the EPA's objective for this factor is considered to be met.

10.2 Terrestrial Environmental Quality

The EPA's objective for the Terrestrial Environmental Quality (TEQ) factor is "*to maintain the quality of land and soils so that environmental values are protected*" (EPA, 2016e).

For assessment purposes, terrestrial environmental quality is defined by the EPA as "*the chemical, physical, biological and aesthetic characteristics of soils*" (EPA, 2016e).

The EPA notes that the environmental objective is based on the fundamental link between soil quality and the protection of ecological and social values that good soil quality supports. The focus of EIA is on how changes to soil quality may impact environmental values.

10.2.1 Receiving Environment

Fortescue commissioned a soils and landforms assessment of the Proposal area (Landloch, 2024, to identify soil characteristics (Landloch, 2024).

The receiving environment encompasses three distinct land systems, each with unique soil characteristics (Landloch, 2024).

- The Macroy land system consists of erosional terrains with gently rolling stony plains and sandy-surfaced areas. This results in a variety of soils, including red shallow sands and loams, red sandy earths, and red shallow sandy duplex soils.
- The Uaroo land system features a depositional environment with sandy plains and limited drainage, characterised by red sandy earths, red deep sands, and red loamy earths.
- The Boolaloo land system, a minor part of the area, includes granite hills and sandy plains, with soils such as stony soils, red shallow loams, and red deep sands.

Soils within the DE have been classified into three Soil Mapping Units (SMUs).

- **SMU1: Loamy/clayey soils –** occurring in the sandy/loamy plains within both topsoil and subsoil layers and are likely to be present within the drainage floors and channels.

The defining feature of these soils is the higher abundance of clay content than the other SMUs. These soils comprise approximately 49% of the Proposal area.

- **SMU2: Rocky soils –** occurring mainly within the stony plains and interfluves landform types, however, are associated with pebbly plains and low hills and ridges. The defining feature of these soils is a high abundance of coarse fragments (i.e. rocky soils). These soils comprise approximately 42% of the Proposal area.

- **SMU3: Sandy soils –** occurring within the sandy/loamy plains landform types. The defining feature of these soils is the very low abundance of clay throughout the soil profile. These soils comprise approximately 9% of the Proposal area.

Disturbance of the three SMUs within the DE are unlikely to result in significant degradation of soil quality. The soil types of the SMUs are typical rangeland soils generally low in fertility and consist of benign chemical properties.

The disturbance of soils through compaction, stripping and stockpiling results in the destruction of soil structure, and the removal of plant matter that reduces their fertility. However, as these soils have no structure, and their fertility is already low, any disturbance is unlikely to have a significant impact on their quality.

10.2.1.1 Acid Sulfate Soils

National acid sulfate soils (ASS) mapping indicated a low probability of potential acid sulfate soils (PASS) occurring within the Proposal area. Soils associated with PASS in the region were noted to be sodosols, chromosols and dermosols with ASS occurring where present in the upper 1 m of the soil profile. The sediments, underlying geology and associated lithologies within the Proposal area were identified as not typically associated with sulfide bearing minerals and not indicative of ASS presence. The desktop assessment indicated ASS is unlikely to be present within the Proposal area (Landloch, 2024).

ASS field investigation and testing was completed in accordance with DER 2015 guidelines (DER, 2015a). Results from the in-field ASS testing indicate that none of the soils tested were ASS or PASS including:

- Field pH values were above the required threshold to be considered ASS and as such are not considered to be actively generating acid.

- The pH oxidisation values were all above the required thresholds, and as such are not considered to have potential to generate acid.

- Although reactions were often strong or volcanic, results of the fizz test indicate that this is likely a result of carbonaceous material and/or organic matter reacting with the acid, rather than a direct reaction with potentially sulfidic materials.

Soil testing indicated that all soil samples taken were considered non-saline and none of the in-field testing indicated presence of ASS or PASS. Based on these results the risk associated with ASS is considered to be very low (Landloch, 2024).

10.2.2 Potential Impacts

Potential issues associated with the Proposal which may impact the soil quality and hence TEQ include:

- Land use practices causing erosion impacts to soil quality:
    - Clearing of native vegetation and disturbance of topsoil increasing vulnerability to wind and water erosion
    - Mechanical disturbance through topsoil stripping, excavation (for trenches) and grading can lead to/increase disturbance in soil structure, making it more susceptible to erosion
    - Increased sedimentation in local surface water drainage channels
- Acid Sulfate Soils:
    - Disturbance during excavation (for foundations) can lead, where these soils are present, to acidification
    - Leaching of acidic soils may lead, in turn, to leaching of heavy metals
- Hydrocarbons and fuels:
    - Contamination of soils as a result of leaks and spills from stored hydrocarbons and/or during fuelling/servicing activities.
- Waste storage facilities:
    - Risk from accidental spills or leaks.

No waste structures or facilities are planned for the Proposal. All waste materials including potential contaminants will be disposed of an offsite licenced landfill facility.

10.2.3 Assessment of Impacts

It is considered that the impacts to soil quality from erosion, ASS and waste can be avoided and mitigated through the application of recognised industry management techniques. The significance of impact to TEQ is therefore considered negligible.

10.2.4 Mitigation

The development of the Proposal will result in the clearing of up to 1,108.2 ha of native vegetation. This will expose soils to potential erosion (wind, surface water) and subsequent degradation of soil quality. Soil type across the Proposal was considered strongly influenced by landscape position, with soil types broadly categorised as either finer texture soils in low lying areas or coarse textured soils in the upper landscape (Landloch, 2024).

Management of erosion, disturbance of soils, dust generation, local contamination of soils and contamination of water runoff (through sedimentation) and associated potential impacts during

construction and operation will be captured in the Proposal EMP. These measures include and are not limited to:

- Implementation of a clearing plan, excavation and rehabilitation program (for temporary cleared areas)
- Dust minimisation via measures included in the Fortescue Dust Management Plan (IO-PL-EN-0001) and which include:
    - Dust suppression (with water) during clearing and construction activities.
    - Limiting of vehicle speed.
- Waste and contaminates minimisation:
    - Use of designated refuelling areas.
    - Bunding and appropriate storage of hydrocarbons and chemicals on site.
- Erosion and sediment control measures for surface water as per the Proposal EMP.

Based on the mitigation measures outlined the impacts to soil quality and TEQ across the DE are considered to be negligible and require no further assessment.

10.2.5 Environmental Outcomes

As a result of this assessment, it is considered unlikely that the Proposal will impact on TEQ. Further assessment of the Proposal against the environmental objective for TEQ is **not required** as the EPA's objective for this factor is considered to be met.

10.3 Inland Waters

The EPA's environmental objective for the Inland Water factor is "*to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected*" (EPA, 2018a).

For assessment purposes Inland Waters are defined by the EPA as "*The occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality)*" (EPA, 2018a).

10.3.1 Receiving Environment

The Proposal is located in the Pilbara region, within the Pilbara Groundwater Area and Pilbara Surface Water Area, which are both proclaimed under the RIWI Act. The DE does not intersect any Public Drinking Water Source Areas.

10.3.1.1 Surface Water

A Baseline Surface Water Assessment was completed by (Fortescue, 2024b) to characterise the current hydrological regime of the Proposal. This included hydrological and hydraulic

modelling of the 1% Annual Exceedance Probability (AEP) event for both the Turner River West and Turner River catchments and local catchments contributing to flooding in the Proposal area. The aim of this assessment was to ensure the siting of key infrastructure was located outside of the floodplain to minimise potential impacts associated with the Proposal.

The Proposal is located within the Turner River and the Turner River West catchments (Figure 2-6). The Turner River West catchment is considered generally hydrologically similar to the Turner River catchment upstream of the Pincunah gauge. Both catchments are relatively flat with mainstream equal area slopes of 2.1 and 1.6 m/km, respectively (Fortescue, 2024b). Soils are similar, with both catchments dominated by Monzogranite groups with some colluvial/alluvial deposits in watercourses. Their adjacency results in mostly identical climatic conditions, and both catchments are of a similar order of magnitude.

The DE hydrology is influenced by flat terrain that facilitates substantial rainfall infiltration. Major river systems in the vicinity, such as the Turner River, experience flow predominantly following heavy rainfall events often associated with summer thunderstorms and tropical cyclones. Annual rainfall in this region ranges from 250 mm to 450 mm, with the majority occurring in the summer months (Section 2.3.1.4). This leads to intermittent river flows and the potential for flash flooding. The Turner River catchment covers an area of about 500,000 ha, with a mainstream length of 116 km and an average slope of 2.05 m/km (LandCorp, 2013), factors that significantly influence surface runoff patterns and flood potential.

Surface water quality is influenced by the land use and activities within the catchment. Given the current semi-natural and pastoral conditions, the water quality is likely to be unaffected by current activities in the catchment, though there is no baseline data in the DE for comparison.

10.3.1.2 Groundwater

Groundwater levels in the Pilbara region can be highly variable and are typically influenced by the sporadic nature of rainfall that leads to irregular recharge through surface infiltration. Measurement during aquifer testing (“slug testing”) programs and other hydrogeological assessments for similar projects in the Pilbara indicate that the groundwater table in fractured rock aquifers can range from 21 metres below ground level (mbgl) to 53 mbgl. Groundwater flow in this region generally follows an east to west hydraulic gradient, consistent with the broader topographic slopes and drainage patterns. Given that the Proposal is in the upper catchment areas, the groundwater throughflow is likely to be limited.

The local hydrogeology is defined by the fractured rock aquifers which yield moderate volumes of groundwater stored within fissures and fractures of the rock matrix. Additionally, there are alluvial aquifers located along riverbeds and floodplains that offer significant water storage. These alluvial aquifers are recharged predominantly during episodic flooding events related to the Turner River's flow, though their shallow nature makes them susceptible to seasonal fluctuations.

Water for the Proposal (construction and operation) will be sourced from existing and approved production bores approximately 2.5 km east of the DE. As a result, there will be no new applications for groundwater abstraction associated with this Proposal as the project will make use of existing groundwater bores nearby. It is therefore expected that development of the Proposal will have **no impact** on groundwater.

10.3.2 Potential Impacts

Proposal impacts that may impact upon Inland Waters (surface water) include:

- Altered surface water flows:
    - Construction activities and modifications of local surface topography (elevations) may locally increase surface water flows and potentially increase the risk of erosion and sedimentation.
- Increased runoff by creation of impervious surfaces:
    - The construction of solar panels and other infrastructure will create impervious surfaces and lead to the concentration of surface runoff. In turn there may be an increase in surface water flows, increased risk of erosion and sedimentation
- Alterations to water quality:
    - Construction activities, including earthworks and machinery operation, can increase the risk of sedimentation and pollution of surface waters.

10.3.3 Assessment of Impacts

The results of the Baseline Surface Water Assessment (Fortescue, 2024b) modelling indicated that the 1% AEP event flooding driven by Turner River West has no interaction with the DE. It also identified the south of the DE is located outside of the Turner River West floodplain and provides corridors for flow along the main tributaries. Flow velocities were identified as typically low within the south of the DE, with scour and channel movement unlikely to be an issue.

Within the Turner River catchment, but outside of the floodplain of Turner River, minor catchments contribute to small tributaries and sheet flow within the DE, however flows are shallow (typically < 0.5 m deep) and slow (< 1 m/s). Minimal interaction between concentrated flows and the Proposal is observed. As the solar farm bulk earthworks are not expected to substantially alter the existing landform geometry, changes to flow paths, depths and velocities are expected to be negligible as a result of the development (Fortescue, 2024b).

As the northern DE and southern DE sit high within their respective catchments and away from concentrated flows, it was determined that significant flood protection from the Turner River and the Turner River West and its associated tributaries that intersect the DE will not be required. Management of local flows through appropriately sized culverts or floodways is considered sufficient for management of drainage and inland waters.

Excavation for foundation construction for the Proposal (e.g. solar panels, transmission towers) is not anticipated to intercept the groundwater table, based on regional groundwater data. No impacts to groundwater are expected.

10.3.4 Mitigation

Measures to manage potential impacts to surface water during construction and operation will be implemented as per the requirements of Fortescue' Water Management Procedure (200-0000-PR-EN-0006). These include and are not limited to:

- Erosion and sediment control measures, including sediment fences or sediment traps during construction
- Sequential rehabilitation undertaken as soon as reasonably possible to reduce the exposed areas to erosion (Rehabilitation Construction Procedure: 200-0000-PR-EN-0005).
- Stabilising temporarily disturbed land as soon as practicable (e.g. spreading of aggregate, hydro mulching, or other placement of other materials).
- Bulk earthworks designed to avoid substantial changes to the natural landform, ensuring that surface water flow paths, depths, and velocities remain largely unchanged.
- There will be no on-site water trapping to maintain continuity of flow into the wider Turner River and Turner River West systems. Appropriately sized culverts or floodways will be adopted where and if necessary to maintain flows.
- Establishing vegetation buffers of at least 100 m between cleared areas and the Turner River, Turner River West, and significant tributaries to slow down flows and allow sediment to settle before entering the wider stream network.

10.3.5 Environmental Outcomes

Impacts associated with the Proposal to surface waters have been avoided and minimised during the site selection and design phases for the Proposal.

The main drainage systems and tributaries (i.e. Turner River and Turner River West) have been intentionally avoided. Bulk earthworks have been designed not to substantially alter the existing landform geometry. The anticipated changes to associated flow paths, water depths and velocities are expected to be negligible as a result of the development.

Surface water modelling has concluded that any remaining impacts to surface water are negligible.

No impacts to groundwater are anticipated as water for the life of the Proposal is to be sourced from the adjacent existing approved production bores.

Through the application of recognised industry management techniques and adherence to the EMP, any potential impacts can be further avoided and mitigated. Therefore, the significance of impacts to Inland Waters (surface water, groundwater) is considered negligible.

As a result of this assessment, it is unlikely that the proposal will impact Inland Waters. Consequently, further assessment of the proposal against the EPA's objective for Inland Waters is **not required**, as the objective for this factor is considered to be met.

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11 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The EPBC Act is Commonwealth legislation, administered by DCCEEW, that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, termed MNES. Specifically, the EPBC Act protects the following MNES under the Significant Impact Guideline 1.1 (DoE, 2013):

- World heritage places
- National heritage places
- Ramsar wetlands of international importance
- Listed threatened species and ecological communities
- Listed migratory species
- Commonwealth marine environment
- The Great Barrier Reef Marine Park
- Nuclear actions
- A water resource, in relation to coal seam gas development and large coal mining development.

Additionally, protected matters include the environment where proposed actions will affect Commonwealth land or proposed actions are being undertaken by a Commonwealth agency.

Under the EPBC Act, any proposed action that has, will have, or is likely to have a significant impact on a MNES must be referred to the Federal Minister for the Environment. The Minister will then determine whether the proposed action requires formal assessment and approval under the EPBC Act.

Several fauna species listed as MNES have been recorded within the Proposal area. The Proposal will be referred to DCCEEW under the EPBC Act. This chapter provides the formal environmental impact assessment for MNES. If a potential significant impact is likely, the Proposal will be referred to DCCEEW under the EPBC Act.

For consistency, the term Proposal is used in place of the “Proposed Action” and Development Envelope used in place of the “Proposed Action area” for this section of the document.

11.1 Policy and Guidance

Potential impacts of the Proposal on MNES were considered with reference to the Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Significant Impact Guidelines) (DoE, 2013). The Significant Impact Guidelines inform whether a referral is required under the EPBC Act.

Other relevant policies and guidelines referenced throughout this chapter and used to inform the assessments are provided in Table 11-1.

Table 11-1: Matters of National Environmental Significance Policy and Guidance

Source	Title	Consideration
(DoE, 2013)	Matters of National Environmental Significance: Significant Impact Guidelines 1.1	The purpose of this document is to provide a guideline on potential impacts and their significance on Matters of National Environmental Significance.
(DoE, 2016)	EPBC Act Referral Guideline for the Endangered Northern Quoll *Dasyurus hallucatus*	The document has been developed to promote avoidance of impact on the northern quoll, and to avoid significant impacts to the species. The vertebrate fauna field surveys for the Proposal and this chapter are consistent with this document.
(TSSC, 2016a)	Threatened Species Scientific Committee: Conservation Advice *Macroderma gigas* Ghost Bat	The purpose of this document is to provide conservation advice for the Ghost Bat listed as 'Vulnerable' under the EPBC Act.
(TSSC, 2016b)	Threatened Species Scientific Committee: Conservation Advice *Rhinonicteris aurantia* (Pilbara form) (Pilbara Leaf-nosed Bat)	The purpose of this document is to provide conservation advice for the Pilbara Leaf-nosed Bat listed as 'Vulnerable' under the EPBC Act.
(TSSC, 2016c)	Threatened Species Scientific Committee: Conservation Advice *Macrotis lagotis* Greater Bilby	The purpose of this document is to provide conservation advice for the Greater Bilby listed as 'Vulnerable' under the EPBC Act.
(TSSC, 2008)	Threatened Species Scientific Committee: Conservation Advice for *Liasis olivaceus barroni* (Olive Python- Pilbara subspecies)	The purpose of this document is to provide conservation advice for the Olive Python-Pilbara subspecies listed as 'Vulnerable' under the EPBC Act.
(DCCEEW, 2023)	National Recovery Plan for the Greater Bilby *Macrotis lagotis*	The purpose of this document is the provide national guidance to support the recovery of the Greater Bilby.
(Hill & Ward, 2010)	National Recovery Plan for the Northern Quoll *Dasyurus hallucatus*	The purpose of this document is the provide national guidance to support the recovery of the Northern Quoll listed as 'Endangered' under the EBPC Act.
(TSSC, 2005)	Threatened Species Scientific Committee: Commonwealth Listing Advice on Northern Quoll (*Dasyurus hallucatus*)	Conservation advice for the Northern Quoll (TSSC recommendation)
(DBCA, 2024)	Guidelines for determining the likely presence and habitat usage of night parrot (Pezoporus occidentalis) in Western Australia	Guidance on how to determine and assess the likely presence of Night Parrots, including assessment of habitat potential.

11.2 Proposal and Assessment

The Proposal will require the clearing of up to 1,108.2 ha of native vegetation, which provides habitat for conservation significant fauna. A summary of existing environmental values relating to MNES is provided in Section 8. Based on the outcomes of the environmental assessments

completed to date, it is considered that listed threatened species will be impacted by the Proposal. There are no Commonwealth listed TEC within the DE or study areas.

Environmental values of the Proposal in relation to the EPBC Act have been determined based on the outcomes of:

- A Protected Matters Search Tool (PMST) report.
- Environmental assessments completed for the Proposal with consideration of other non-Proposal related environmental assessments in the surrounding area.
- Known and available information on each EPBC Act listed species in relation to their habitat requirements.

The following sections provide an overview of potential impacts to MNES from the Proposal, including key threats associated with each species.

11.3 Assessment of Potential Impacts

Environmental assessments completed for the Proposal by Spectrum (2024a; 2024b) and 360 Environmental (2023) recorded the following species within the DE during surveys:

- Greater Bilby
- Pilbara Leaf-nosed Bat.

Additionally, the following species were considered highly likely to occur within the DE, and are also considered within this section:

- Northern Quoll
- Grey Falcon
- Ghost Bat
- Pilbara Olive Python.

These species are considered further in the following sections.

11.4 Significant Impact Criteria

The following section outlines the significant impact criteria as per Significant Impact Guidelines 1.1 (DoE, 2013), for MNES identified as likely or known to occur within the DE.

An action will require approval if it has, will have, or is likely to have a significant impact on a species listed in any of the following categories:

- Extinct in the wild
- Critically endangered

- Endangered
- Vulnerable.

For the purpose of assessing the significance of impacts to MNES, the Significant Impact Guidelines specify that the threshold for significance will only be met if there is a "real chance or possibility" that an action will meet the significant impact criteria.

11.5 Threatened Species Recorded in the Development Envelope

11.5.1 Greater Bilby (*Macrotis lagotis*)

11.5.1.1 Description

The Greater Bilby is listed as Vulnerable under the EPBC Act. The species is a medium-sized burrowing marsupial, with large ears and a long, pointed snout. The species is solitary and shelters during the day in a burrow, with multiple burrows used throughout its range (TSSC, 2016c) (Plate 11-1). In the Pilbara bioregion, the species is largely distributed across the eastern half with recent records indicating the western boundary of the species range is approximately 50km west of Port Hedland and to the south-east of Newman (DBCA, 2023a).

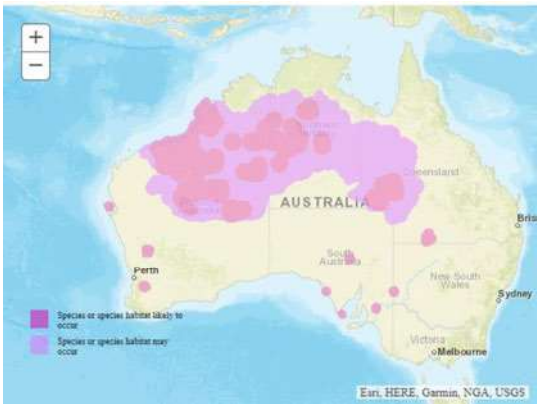

Plate 11-1:Greater Bilby Image and Mapped Distribution

Photo credit: (DCCEEW, 2023), Distribution map Species Profile and Threats Database (DCCEEW, 2024)

11.5.1.2 Habitat Preference

The remaining populations of the Greater Bilby are known to occupy three main habitats; open tussock grassland on uplands and hills, (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas (TSSC, 2016c). Within the north of WA, this species occupies a wide range of substrate and vegetation types, including sand plain formations with low shrub cover (DBCA, 2023a). Greater Bilby distribution is limited by the availability of soils suitable for burrowing, such as sandy areas, where burrow excavation is easier (DCCEEW, 2023).

Greater Bilby habitat varies across its range and no one description or definition of habitat critical to survival of the species exists (DCCEEW, 2023). An interim guide, however, indicates

that habitat critical to the survival of the species includes any area where the species is known or likely to occur, any records outside the known or likely distribution, any area between the predicted extent and records, and any area where the Greater Bilby may naturally colonise or may feasibly be reintroduced (DCCEEW, 2023). The species Conservation Advice notes that there can be many active and disused burrows within the home range, and new burrows can be constructed on average every 2.5 weeks (TSSC, 2016c).

11.5.1.3 Threats

The National Recovery Plan for the Greater Bilby (DCCEEW, 2023) identifies the following threatening processes for the Greater Bilby:

- Predation by and competition from introduced and feral species including herbivores.
- Habitat loss and degradation.
- Population size reduction and fragmentation.
- Changed fire regimes.

The Recovery Plan notes there is variation in known and potential species threats, and that there is significant interaction between threats. For example, following extensive fires and large areas of homogenous regrowth can limit foraging, dispersal and recolonisation (DCCEEW, 2023).

11.5.1.4 Species Recovery Objectives

The Recovery Plan suggests that long-term survival of the species in its natural habitat can be affected by:

- The levels of mortality, longevity and rate of reproduction.
- The extent and quality of habitat.
- The size of and connectivity between populations.

The above parameters are noted to be influenced by threatening processes and affect the species ability to withstand threatening processes and events. Ecological priorities over the 10 years of the Recovery Plan are to increase the population size and extent, prevent local extinction and to maintain genetic diversity. The social priority is to increase the involvement of Indigenous people in species conservation.

Defined objectives of the Recovery Plan include:

- The size of the Greater Bilby population has grown.
- The extent of occurrence and area of occupancy of the Greater Bilby has been maintained or increased.
- The genetic diversity of the Greater Bilby has been maintained and retains the potential for evolutionary change through adaptation and selection.

- Indigenous organisations, communities, and individuals have a greater role in Greater Bilby conservation.

11.5.1.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment, 45.5 hours of searches for secondary evidence and 22 motion cameras deployed between three to 45 nights with 5,448 hours of combined recording (Spectrum, 2025). In the northern DE survey area, five targeted Greater Bilby searches were undertaken across a total transect length of 32 km (360 Environmental, 2023).

A targeted Greater Bilby survey was completed across the DE, which aligns with the 2-hectare plot technique defined within the species survey guidelines (Spectrum, 2024b). Searches were completed at 62 plots within a survey area encompassing both the northern and southern DE's. Searches were completed to record any evidence in the form of tracks, scats, diggings and burrows for approximately 50 person minutes at each site. A total of 65.8 person-hours were spent searching along 130.4 km traverses within and surrounding the survey area (Figure 8-2).

Targeted Greater Bilby surveys were recently conducted within 10 km of the Proposal area, including by Spectrum between 2019 and 2023 and 360 Environmental in 2018. Stantec also recorded the species as part of a basic fauna survey in 2018. The species has also been previously recorded in close proximity to the DE, including four recent records within 1 km of the DE (Spectrum, 2025). Additionally, targeted species searches were completed over part of the southern DE survey area by Bamford in 2010 (Bamford, 2010) and Terrestrial Ecosystems in 2011 (Terrestrial Ecosystems, 2011). Spectrum also undertake an annual fauna monitoring program for Fortescue, which includes some monitoring sites within the DE. Previous records of the Greater Bilby within the DE and surrounding region are provided in Map 4.3 of the targeted Greater Bilby report (Spectrum, 2024b).

The Greater Bilby has been recorded within the DE and in close proximity to the DE (Spectrum, 2024a; 2024b). Figure 8-2 displays all recordings within and adjacent to the DE. Greater Bilby diggings were recorded in the far west corner of the southern DE (Spectrum, 2025) and the targeted Greater Bilby survey recorded possible evidence of the species (old, ambiguous diggings and burrows) at two locations in the northern DE (one within the IDF) and three locations in the southern DE (two within the IDF) (Spectrum, 2024b).

Outside of the DE, most of the Greater Bilby records from the field surveys are concentrated in a cluster in the southeast corner of Spectrum's (Spectrum, 2024a; 2024b) survey area, along the existing railway. These records are within Plain (sandy) habitat but clustered around a section of Drainage Line/River/Creek (minor) habitat. The recorded cluster is thought to belong to a resident female Greater Bilby (trapped during survey) who is likely crossing the existing roads to regularly move between its burrows and foraging areas (Spectrum, 2024a; 2024b). Whilst this record cluster is restricted to the east of the DE, given the proximity to the DE (approximately 220m) and that the Drainage Line/River/Creek (minor) habitat intersects the DE, it is likely that this resident female frequents the DE.

The species is considered to potentially utilise all habitats within the DE as it is highly mobile and forages widely. Within the DE, the Drainage Line/River/Creek (minor), Plain (sand) and Plain (stony/gibber) are considered suitable habitats for burrowing and contain plant species

that the Greater Bilby uses as a food source (Spectrum, 2024b). Plain (sand) habitat was identified as the preferred habitat for this species within the DE and provides suitable habitat for residing/breeding, foraging and dispersal (Spectrum, 2024b), particularly in the vicinity of Drainage Line/River/Creek (minor) habitat (Spectrum, 2025). Plain (stony/gibber) habitat is considered less favourable due to the substrate making digging difficult (360 Environmental, 2023).

Granite Outcrops (boulder piles) habitat was considered typically not suitable for the species, however some digging opportunities were identified within sandier areas between outcrops within the habitat type (Spectrum, 2024b). The Hills/Ranges/Plateaux habitat type was considered generally unsuitable for the species due to its rocky substrate and shallow soils, however areas with lower elevation were considered likely to be utilised occasionally by the species for foraging and dispersal (Spectrum, 2024b). This species is unlikely to be reliant on habitat within the DE as there is considerable suitable habitat adjacent to the DE and across the wider region (360 Environmental, 2023).

Species distribution modelling was undertaken for the Pilbara region as part of the targeted Greater Bilby survey (Figure 8-3) (Spectrum, 2024b). The model was highly efficient at measuring species presences and pseudo-absences (Spectrum, 2024b). Habitats within the DE were predominantly modelled as having either a medium or high species likelihood of occurrence. The species distribution modelling identified medium and high likelihood habitat within and surrounding the DE, in particular continuous areas of high potential habitat to the east of the DE and adjacent to known Greater Bilby burrows (Spectrum, 2024b).

11.5.1.6 Potential Impacts

Potential direct impacts to the Greater Bilby from the Proposal include:

- Clearing of species habitat, including critical habitat. The extent of habitat available to the Greater Bilby is highlighted in Table 11-2.
- Injury or loss of Greater Bilby individuals through vehicle and machinery movements and strikes.

Potential indirect impacts to the Greater Bilby in relation to the Proposal include:

- Degradation of Greater Bilby habitat, including fragmentation and edge effects resulting in:
    - Restricted access to habitat or water resources
    - Increased competition for resources
    - Increased exposure to predators
    - Degradation of habitat through spread of invasive weed species.

Reduction in species richness and diversity

- Altered species behaviour, due to noise, dust, light, and increased traffic or movement within the site.

- Cumulative impacts from other projects within the region.

Table 11-2: Potential Impacts to Greater Bilby Habitat within the DE

Habitat Type	Habitat Value	Survey Area (ha)	DE		IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Plain (sand)	Critical habitat for Residing/ Breeding, Foraging and Dispersal	5,491.11	1,283.76	23.38	1,027.63	18.71
Plain (stony/gibber)		2,550.33	86.22	3.38	51.04	2.00
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Drainage Line/ River/ Creek (major)		172.79	0	0	0	0
Granite Outcrops (boulder piles)	Potential foraging and dispersal	183.43	0.04	0.02	0	0
Hills/ Ranges/ Plateaux		503.05	6.75	1.34	6.75	1.34
Total		**9,098.46**	**1,383.29**	**15.20**	**1,087.56**	**11.95**
Total critical habitat		**8,411.98**	**1,376.50** (Total clearing up to 1,108.2	**16.36** (Total clearing up to 13.17)	**1,080.74**	**12.85**

Table 11-2 demonstrates that nearly all the IDF could be considered suitable habitat for Greater Bilby burrowing and foraging activities. However, it is also clear that this is only a small proportion of available burrowing habitat in the surrounding region.

11.5.1.7 Proposed Mitigation Measures

Mitigation measures proposed as part of the Proposal to address potential impacts to terrestrial fauna, including the Greater Bilby, are outlined in Section 8.7. The proposed mitigation measures are considered consistent with the recovery actions provided within the conservation advice and Recovery Plan for the species.

11.5.1.8 Assessment of Significance

An assessment of the potential impacts to the Greater Bilby from the Proposal is provided in Table 11-3.

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Table 11-3: Significant Impact Assessment – Greater Bilby

Criteria	Assessment of Significant Impact
Lead to a long-term decrease in the size of an important population of a species	**Unlikely** The remaining Greater Bilby populations occur within the Northern Territory, south-west Queensland and within central and northern WA (DCCEEW, 2023). The population size is estimated to be less than 10,000 mature individuals, and the species is considered a single population even though fragmentation and isolation may have resulted in local adaptation (DCCEEW, 2023). Greater Bilby diggings were recorded in the far west corner of the southern DE (Spectrum, 2025) and the targeted Greater Bilby survey recorded possible evidence of the species (old, ambiguous diggings and burrows) at two locations in the northern DE (one within the IDF) and three locations in the southern DE (two within the IDF) (Spectrum, 2024b). The species distribution modelling indicates the DE contains predominantly either medium or high potential habitat. This aligns with habitat mapping, which confirms that all habitats may be utilised by the species. The targeted Greater Bilby survey did not identify any burrows within the DE. Fortescue will undertake pre-clearance surveys to identify and relocate any Bilbies that may have moved into the IDF between the previous targeted survey and the commencement of construction. The species distribution modelling indicates that there is medium and high potential habitat adjacent to the DE which can likely provide connectivity between remaining habitat and burrows outside of the DE. A total of 8,411.98 ha of Greater Bilby habitat was mapped during the Proposal surveys and a total of 1,080.74 ha of habitat that is considered critical to the Bilby will be directly impacted by clearing. This consists of: • Up to 1,027.63 ha of Plain (Sand) habitat which is considered critical habitat for burrowing, foraging and dispersal. • Up to 51.04 ha of Plain (stony/gibber) habitat which is considered critical habitat for burrowing, foraging and dispersal habitat, although it is of lesser burrowing potential than Plain (Sand) habitat. • Up to 2.07 ha of Drainage Line/River/Creek (minor) habitat, which is considered critical habitat for burrowing, foraging and dispersal. Drainage Line/River/Creek (major) habitat mapped by (Spectrum, 2025) and (360 Environmental, 2023) provides critical habitat for the species, for residing, breeding, foraging and dispersal purposes. However, this habitat type has been avoided within the DE. Granite Outcrops (boulder piles) and Hills/Ranges/Plateaux habitat are considered generally unsuitable for the species, however, may provide foraging and dispersal purposes in lower elevation areas. Outside of the DE, most of the Greater Bilby records from the field surveys are concentrated in a cluster around a section of Drainage Line/River/Creek (minor) habitat in the southeast corner of Spectrum's (2024a; 2024b) survey area. DNA testing of scats collected from this location identified a single individual and are thought to belong to a resident female Greater Bilby (trapped during survey). This individual is likely crossing the existing roads to regularly move between its burrows and foraging areas (Spectrum, 2024a; 2024b). The record cluster is contained to the east of the DE (i.e. the DE alignment does not pass through these records, thus reducing the potential for Proposal-related direct impacts); however, the records are approximately 220 m east of the DE and the Drainage Line/River/Creek (minor) habitat intersects the DE, suggesting this individual likely utilises the habitat within the DE on occasions. It is considered likely that the Greater Bilby have been inhabiting the area surrounding the record cluster for some time and could be occupying further areas adjacent to the DE. The habitat within the DE provides potential burrowing, breeding, foraging and dispersal opportunities for the Greater Bilby. However, none of habitat types within the DE are restricted, and are found widely in the surrounding region. Species distribution modelling indicates that the DE

Criteria	Assessment of Significant Impact
	contains approximately 68.68% of the medium probability habitat and 31.32% of high probability habitat as modelled for the Pilbara IBRA region. Additionally, there is high and medium likelihood habitat modelled adjacent to the DE which can likely provide a corridor between the existing burrow locations and surrounding habitat. Given that the species is highly mobile and known to forage over large areas, the species is likely to utilise habitats across the DE and surrounding area. Following application of suitable mitigation measures and considering the availability of habitat types in the DE within the surrounding area, the Proposal is considered to have the potential to result in a long-term decrease in the size of the species population.
Reduce the area of occupancy of an important population	**Unlikely** Within the DE, the species is considered to potentially utilise all habitat types. The species Recovery Plan identifies any habitat where the species is likely to or known to occur, or has been recorded, is critical habitat (DCCEEW, 2023). The DE is within the Species Profile and Threats Database (SPRAT) distribution for critical habitat and the Plain (sand), Plain (stony/gibber) and Drainage Line/River/Creek (minor) habitats are considered critical habitat within the DE. While the Greater Bilby may occasionally disperse or forage through Granite Outcrops and Hills/Ranges/Plateaux habitats within the DE, these areas are considered to lack the key habitat features required to support periodical occupation of the species, and as such are not considered critical habitat. Up to 1, 080.74 ha of critical habitat (Plain (sand), Plain (stony/gibber) and Drainage Line/River/Creek (minor)) will be directly impacted within the DE. The targeted Greater Bilby survey and assessment identified that the predicted extent of the Greater Bilby within the Pilbara IBRA region represents 8,558,206 ha (Spectrum, 2024b). Within this area, 254,385.4 ha is considered high potential habitat, 2,891,663.8ha is considered medium potential habitat, and 5,412,156.8ha is considered low potential habitat for the species. The DE contains approximately 31.32% of the total high potential habitat and 68.68% of medium potential habitat modelled for the Pilbara IBRA region. The Proposal is considered unlikely to reduce the area of occupancy of the species within the Pilbara, as all habitats identified within the DE are not restricted or unique within the surrounding region, and over 99.95% of modelled high and medium potential habitat for the species remains within the broader Pilbara IBRA region following removal of habitat within the DE.
Fragment an existing important population into two or more populations	**Unlikely** There are a number of Greater Bilby records within 50 km of the Proposal, primarily to the north and south (Spectrum, 2024b). Additionally, species distribution modelling indicates there is medium and high potential habitat adjacent to the DE (Figure 8-3) (Spectrum, 2024b). It is anticipated that Greater Bilby individuals will be able to utilise surrounding habitat to disperse throughout the landscape, and the clearing within the DE is not anticipated to present a significant physical barrier to dispersal and result in fragmentation of the species within the surrounding region. Indeed, Bilby are likely already moving across areas cleared for access tracks to move between habitat areas. As a result, the Proposal is considered unlikely to fragment an existing important population of the species into two or more populations.
Adversely affect habitat critical to the survival of a species	**Potentially** The species is considered to potentially occur in all habitats within the DE, however, only the Drainage Line/River/Creek (minor), Plain (sand) and Plain (stony/gibber) are considered suitable for burrowing and contain plant species that the Bilby may use as a food source (Spectrum, 2024b). The remaining habitats may provide occasional foraging and dispersal opportunities, however, they lack the key habitat features required to support periodical occupation

Criteria	Assessment of Significant Impact
	of the species. These other habitats are therefore not considered critical habitat. No evidence of the species was recorded within these habitat types, during the Proposal surveys. Species distribution modelling indicates that the DE is impacting up to approximately 443.67 ha (31.32%) of high potential habitat and 972.90 ha (68.68%) of medium potential habitat. These habitats are not restricted to the DE and broader survey area and are well represented across the region and Pilbara (Spectrum, 2024b). The Proposal will result in adverse impacts to habitat critical to the survival of the species, although the impact to the species at a local and regional level is not significant.
Disrupt the breeding cycle of an important population	**Unlikely** The targeted Greater Bilby survey confirmed that the Drainage Line/River/Creek (minor), Plain (sand) and Plain (stony/gibber) are considered suitable for burrowing and contain plant species that the species uses as a food source (Spectrum, 2024b). Greater Bilby diggings were recorded in the far west corner of the southern DE (Spectrum, 2025) and the targeted Greater Bilby survey recorded possible evidence of the species (old, ambiguous diggings and burrows) at two locations in the northern DE (one within the IDF) and three locations in the southern DE (two within the IDF) (Spectrum, 2024b). The targeted Greater Bilby survey identified a single Greater Bilby female has been previously captured to the east of the southern DE, with scat samples and DNA sequencing confirming only one individual female – which was likely the same individual captured during previous surveys (Spectrum, 2024b). It is likely that this female is crossing the nearby road regularly to move between her burrows and foraging areas, with an area of occupancy including a small, fragmented area across the road that is surrounded by infrastructure and other disturbances (Spectrum, 2024b). The burrow is located outside of the DE, highlighting that the species is utilising habitats adjacent to the DE, potentially for breeding purposes. No active burrows were recorded within the DE during the Proposal surveys, despite the targeted species survey. As there are not active burrows within the IDF, no impacts to breeding cycle are anticipated. Should borrows be constructed in the intervening period between the last survey and construction, a pre-clearance survey is proposed to identify these burrows and relocate individuals to suitable nearby habitat.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The Proposal will directly impact a combined total of 1,080.74 ha of critical habitat within the IDF, consisting of Plain (Sand), Plain (stony/gibber) and Drainage Line/River/Creek (minor) habitat. Given that all habitat types identified within the DE are not considered unique within the surrounding landscape, and high and medium potential habitat exists in close proximity to the DE, direct impacts are not likely to result in a species decline. Appropriate mitigation measures will be applied to manage potential indirect impacts to remaining habitat extent and quality. The Proposal will impact up to 443.67 ha of modelled high potential habitat and 972.90 ha of medium potential habitat. However, more than 99.97% of modelled medium and 99.83% of modelled high suitability habitat will remain within the Pilbara IBRA region following implementation of the Proposal. The Proposal is considered unlikely to impact habitat to the extent that the species would be likely to decline.
Result in invasive species that are	**Unlikely**

Criteria	Assessment of Significant Impact
harmful to a vulnerable species becoming established in the vulnerable species' habitat	Within the DE and targeted Greater Bilby survey area, a number of introduced species were recorded, including Feral Cat, Dingo/Dog, European Cattle, Horses and Donkeys (Spectrum, 2024b). These species are either known threats to the species, or degrade Greater Bilby habitat through overgrazing, soil compaction and damage to regenerating vegetation. Mitigation measures such as cleaning and inspection of vehicles, feral species management, management of waste materials on site and rehabilitation of disturbed areas no longer required for ongoing operations will reduce the likelihood of the introduction or increase in invasive weed species and feral species within the DE and surrounds. The Proposal is considered unlikely to result in the establishment of invasive species within habitat for the species.
Introduce disease that may cause the species to decline	**Unlikely** There are no known disease risks for the species, and no diseases are considered a key threat for the species. Mitigation measures will be implemented to avoid introducing invasive weed species and feral predators within the DE and surrounds. The Proposal is considered unlikely to result in the introduction of disease to the DE and surrounding region, that could cause the species to decline.
Interfere substantially with the recovery of the species	**Unlikely** Recovery objectives identified within the species Recovery Plan include a growth in the species population, increase in or maintenance of the species extent of occurrence and area of occupancy, maintenance of genetic diversity and a greater role of Indigenous organisations, communities in Greater Bilby conservation. The Proposal therefore is considered unlikely to interfere substantially with the recovery of the species as the species will continue to persist in the surrounding area due to the presence of large areas of suitable habitat and that the proposal will not impact on any active Bilby burrows.

11.5.1.9 Predicted Outcome

The Proposal has the potential to have a significant impact on the Greater Bilby, based on the significant impact assessment and impacts to mapped critical Greater Bilby habitat and potential breeding habitat within the DE. However, suitable habitat for this species occurs widely in the surrounding landscape. Over 99.5% of potential Greater Bilby habitat and critical habitat remains within the broader Pilbara IBRA region. Following assessment and application of appropriate mitigation measures (Section 8.7) it is anticipated that the Proposal is not likely to have a significant impact on the Greater Bilby.

11.5.2 Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)

11.5.2.1 Description

The Pilbara Leaf-nosed Bat (PLNB) is listed as Vulnerable under the EPBC Act. The species is a bright orange to yellow, white and brown with a distinctive nose leaf (DBCA, 2023a) (Plate 11-2). The PLNB is an obligate deep-cave roosting species, with an area of occupancy defined by available diurnal roost sites with high humidity and stable temperatures (DBCA, 2023a). The species occurs from the Kimberley to the top end of the NT, to north-western Queensland (DBCA, 2023a) (Plate 11-2). Within the Pilbara, permanent diurnal roosts have been detected throughout the Chichester and Hamersley subregions, and to a smaller extent in the Ashburton (south) and Little Sandy Desert (east) bioregions (DBCA, 2023a). The PLNB often travels large distances to forage and has been observed foraging in a variety of habitats, including Triodia hummock grasslands typical of the Pilbara. The species is noted to favour highly productive and complex riparian areas where water is permanently available and insect biomass is sufficient (DoE, 2024).

The species in the Pilbara and upper Gascoyne represent one interbreeding biological population with multiple colonies and is considered to be of national significance given evidence of divergence (TSSC, 2016b).

Plate 11-2:Pilbara Leaf-nosed Bat Image and Mapped Distribution

Photo credit: (Australian Museum, 2024), Distribution map Species Profile and Threats Database (DCCEEW, 2024).

11.5.2.2 Habitat Preference

The PLNB often travels large distances to forage and has been observed foraging in a variety of habitats, including Triodia hummock grasslands typical of the Pilbara (DBCA, 2023a). The species is noted to favour highly productive and complex riparian areas where water is permanently available and insect biomass is sufficient and nearby small watercourses amongst granite boulder terrain (DoE, 2024). The species is most commonly encountered over small pools of water in rocky gullies and gorges, and these sites are ideal for detection and monitoring (DoE, 2024) Underground refuges considered critical habitat for the species are classified into Priority 1, 2 and 3 (TSSC, 2016b). Priority 4 underground refuges are not considered critical habitat but are important for persistence in a local area (TSSC, 2016b). Only relatively deep, complex caves and disused underground mines contain appropriate roosting conditions: these are relatively uncommon and limit the area of occupancy of the species (TSSC, 2016b). Foraging habitats utilised by the species are classified as Priority 1, 2, 3, 4 or 5 (TSSC, 2016b). Foraging habitat around known or suspected roost sites can be critical to the survival of the species, however, it is noted that defining critical foraging habitat can be difficult (TSSC, 2016b).

Based on the priority foraging criteria, the following category of foraging habitat occurs within the DE:

- Priority 3 – Rocky outcrop, mapped as Granite Outcrops (boulder piles)
- Priority 4 – Major watercourses, mapped as Drainage Line/River/Creek (minor)
- Priority 5 – Open grassland and woodland mapped as Plain (sand) and Plain (stony/gibber).

Granite Outcrops (boulder piles) habitat was also identified as potentially suitable for infrequent and temporary nocturnal roosting during the wet season; however, the lack of deep crevices and humid caves would limit activity to humid weather conditions (Spectrum, 2025).

11.5.2.3 Threats

Known and perceived threats for the PLNB outlined within the species conservation advice (TSSC, 2016b) include:

- Habitat loss, modification and/or degradation
- Restricted geographical distribution (area of occupancy and extent of occurrence)
- Habitat destruction, disturbance and/or modification due to mining activities
- Human induced disturbance due to unspecified activities.

11.5.2.4 Species Recovery Objectives

The conservation advice for the PLNB identifies the following national conservation actions:

- Ensure that activities within the range of the species do not have a significant impact under the EPBC Act

- Eliminate key threats to the species and halt the predicted decline of the species through best practice mining design and construction and better coordinated regional management

- Protect and manage all known roost sites to support the recovery and long-term persistence of the species

- Identify and protect sufficient high value foraging habitat around roost sites to support the long-term persistence of species colonies

- Support coordinated research on the occurrence, population size and ecological requirements of the species so best practice management options can be developed to minimise anticipated impacts from new and existing mining activity.

The following priority conservation actions have been identified as necessary to stop the species decline and support recovery:

- Discover new occurrences: Conduct field surveys for the species in environmental assessments for proposed development projects using bat detectors to better understand the area of occurrence and highlight potential roost sites. Acoustic surveys should be undertaken in a manner consistent with currently prevailing wisdom on acceptable methods and equipment, so as to maximise the potential for encounter.

- Discover new roosts: Include targeted searches for new roosts in environmental assessments for proposed development projects to determine whether critical roosting habitat of the species coincides with development interests, and to better define the size and occurrence of colonies in the regional population.

- Confirm diurnal roosts: Assess, with a sufficiently robust method, the likelihood of diurnal roosting in caves and underground mines within and adjacent to proposed development projects to determine their importance to the species and allow the risk of the project to the regional population to be assessed.

- Protect roosts: Protect confirmed and suspected diurnal roost sites—especially those occupied permanently and used for breeding—by establishing adequate buffers and restrictions around them and implementing other management actions as appropriate to the local context. Consideration should be given to managing and protecting colonies of the species in historical underground mine workings occurring within a development project area.

- Monitor the population: Monitor all known colonies of the species using robust and non-invasive methods to understand changes in usage across seasons and at times they are known to breed and raise young. From monitoring activity levels, assess the relative importance of roost sites based on estimated colony size and/or frequency of usage. Sites with the largest colonies should be designated as critical habitat.

- Assess and protect foraging habitat: For development projects, retain and preserve an adequate extent of observed or predicted high value foraging habitat near critical roost habitats of the species to support the persistence of any existing colony and their continued usage of roosts.

- Develop and support coordinated research: Undertake research projects, with the involvement of qualified biologists, to better understand the occurrence, population size and ecological requirements of the species in a regional and population-wide context (i.e. greater than local scale development project assessments).

- Encourage submission of occurrence data: Environmental consultants, development proponents and researchers are encouraged to provide new information on the occurrence of the species to database resources managed by the Western Australian Department of Parks and Wildlife, with embargoes and confidentiality maintained to the general public as appropriate.

- Suitably control public access to all known roost sites on both private and public lands.

- Implement a separate regional management plan: This plan should be linked to a dynamic database that provides information on occurrence and roosting for context to local developments, and provides further detailed guidance on surveying for, protecting and managing the species.

Information and data are required to inform the development of national conservation objectives and identification of priority conservation actions. The following information and research priorities can be used for directing future research and environmental offsets, and include:

- Review and collate unpublished information, particularly that collected by mining companies

- Clarify the number and distribution of day roosts

- Characterise natural roosts

- Characterise and map foraging habitat

- Understand the role of landscape connectivity and resource availability for the movement between roosts

- Understand population and colony size and social behaviour

- Increase knowledge of appropriate buffer size for mining activities

- Develop protocols for artificial roost construction

- Develop a regional management plan that prevents destruction of or significant disturbance to roost sites.

11.5.2.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment and deployment of ultrasonic recorders for a total of 78 trap nights. It was possible through bat call analysis to identify the species unambiguously from good quality echolocation calls. Echolocation calls associated with the species are considered distinctive. Within the northern DE survey area, survey methods included deployment of ultrasonic autonomous recording units across two habitats for a total of 14 trap nights. Units were placed in locations containing likely habitat for this species and were active for more than four consecutive nights at each location, and abundance of calls was noted. Habitat assessments, opportunistic observations, active searches and spotlighting were also completed.

GHD recorded the species as part of a targeted species survey in 2022 within 10 km of the DE. Ecologia Environment also recorded the species in 2011 as part of a detailed terrestrial vertebrate fauna assessment, and 360 Environmental recorded the species in 2018 as part of monitoring for the species within 10 km of the DE. Fortescue can confirm that PLNB are known to roost nightly at the nearby North Star Magnetite Iron Ore Mine and several other diurnal roosts are known from other nearby mining operations.

Pilbara Leaf-nosed Bat calls were recorded from seven sites within the survey area associated with the southern DE, with only one site located within the DE (Spectrum, 2025). No calls were recorded from the survey area associated with the northern DE, with Pilbara Leaf-nosed bat only being recorded from one site located 11 km southeast of the northern DE (360 Environmental, 2023). Call patterns from both surveys indicate that the areas are only used for foraging, and no suitable roost sites were recorded (Spectrum, 2025; 360 Environmental, 2023).

The species conservation advice categorises critical foraging habitat based on number of encounters per night and the condition of habitats as important for supporting a neighbouring colony (TSSC, 2016b). Habitat meeting the description of Priority 3, 4 and 5 foraging habitats has been identified within the DE, however no known roosts or colonies are located within the DE or surrounding area, and therefore no critical habitat was recorded within the DE (Figure 11-1).

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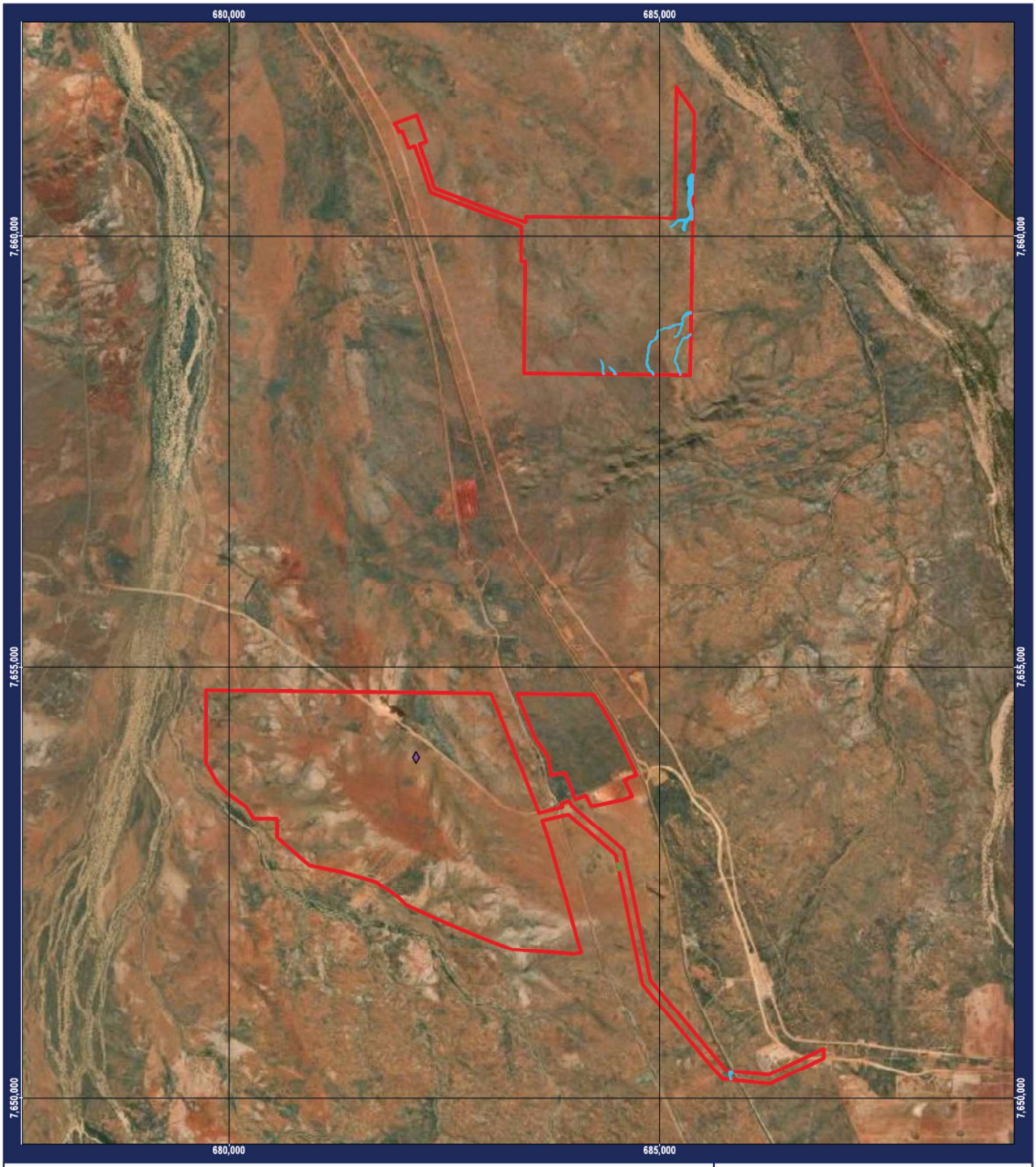

Legend

- Pilbara Leaf-nosed Bat, VU
- Development Envelope

Pilbara Leaf-nosed Bat Supporting Fauna Habitat

- Drainage line/River/Creek (minor)
- Granite Outcrop

N

0 0.5 1 1.5 2

Kilometres

Figure 11-1 - Mapped Habitat and Records of the Pilbara Leaf-nosed Bat within the Development Envelope

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:60,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.062
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 0
Confidentiality: 0

Fortescue

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11.5.2.6 Assessment of Significance

An assessment of the potential impacts to the PLNB from the Proposal is provided in Table 11-4.

Table 11-4: Significant Impact Assessment – Pilbara Leaf-nosed Bat

Criteria	Assessment of Significant Impact
Lead to a long-term decrease in the size of an important population of a species	**No Impact** PLNB do not roost within the DE and the area is only visited infrequently by the species for foraging or dispersal. Therefore, the proposal will have no impact on the size of an important population of the species.
Reduce the area of occupancy of an important population	**No Impact** The foraging habitat within the DE is unlikely to occur within proximity of a known diurnal roost and therefore would not be considered supporting habitat. Therefore, the proposal will not reduce the area of occupancy for the PLNB.
Fragment an existing important population into two or more populations	**No Impact** The foraging habitat within the DE is unlikely to occur within proximity of a known diurnal roost and therefore would not be considered supporting habitat. PLNB do not roost within the DE and the area is only visited infrequently by the species for foraging or dispersal. The species is highly mobile, and the proposed clearing does not pose a barrier to their movement and dispersal. Therefore, the proposal will not fragment an important population into two or more populations.
Adversely affect habitat critical to the survival of a species	**No Impact** There is no habitat critical to the survival of the species within the DE.
Disrupt the breeding cycle of an important population	**No Impact** PLNB do not breed within the DE and the area is not supporting habitat for a breeding population. Therefore, the proposal will not disrupt the breeding cycle of the PLNB.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**No Impact** PLNB were recorded foraging with the DE on an infrequent basis and there is extensive areas of similar foraging habitat within the wider area. Therefore, the proposal will not Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**No Impact** PLNB are only likely to be predated on by feral animals in their diurnal roost. No such roost exists within the DE. There is no risk to the species from invasive species as a result of this proposal.
Introduce disease that may cause the	**No Impact** There is no known disease impacting the PLNB. There is no risk to the PLNB from the introduction of a disease.

Criteria	Assessment of Significant Impact
species to decline	
Interfere substantially with the recovery of the species	**No Impact** Given the proposal will have no impact on the conservation of the species, there is no risk of this proposal interfering with the recovery of the species, noting there is no recovery plan for PLNB.

11.5.2.7 Predicted Outcome

The Proposal poses no risk to the conservation of the PLNB at a local or regional level. No diurnal roosts are recorded within the DE and the species has been recorded visiting the area infrequently, either to forage or disperse between diurnal roosts. The loss of foraging habitat within the IDF is not a significant impact to the PLNB.

11.6 Threatened Species Highly Likely to Occur in the Development Envelope

11.6.1 Northern Quoll (*Dasyurus hallucatus*)

11.6.1.1 Description

The Northern Quoll is listed as Endangered under the EPBC Act. The Northern Quoll is a small quoll species with white spots and a pointy snout (TSSC, 2005) (Plate 11-3). It is a solitary, carnivorous marsupial that makes dens in rock crevices, tree holes and occasional termite mounds (TSSC, 2005). The species currently persists in four separate populations, including the Pilbara, Kimberley and islands, top end and islands of the NT and Queensland (DBCA, 2023a) (Plate 11-3).The Pilbara is considered an important stronghold for the species and has experienced less range and niche contraction when compared to other areas likely due to topography and absence of cane toads (DBCA, 2023a). The species Recovery Plan notes it has been recorded from many areas in the Kimberley and several areas in the Pilbara, including the lower reaches of the Fortescue River (Hill & Ward, 2010). Within the Pilbara, the Northern Quoll is considered most prevalent in complex rocky areas to the north, west and centre of the region (DBCA, 2023a).

Plate 11-3: Northern Quoll Image and Mapped Distribution

Photo credit: (DCCEEW, 2024), Distribution map Species Profile and Threats Database (DCCEEW, 2024)

11.6.1.2 Habitat Preference

The Northern Quoll is not considered to have specific habitat requirements (Hill & Ward, 2010). They occur in a variety of habitats across their range, with non-specific shelter sites ranging from rocky outcrops, tree hollows, hollow logs to human dwellings (Hill & Ward, 2010). Habitat critical to the survival of the species is considered to be where the species is least exposed to threats or least likely to be in the future, including rocky areas and offshore islands (Hill & Ward, 2010).

The species occupies a range of habitats but demonstrates a preference for complex rocky areas in the Pilbara (DBCA, 2023a). Rocky areas provide prime habitat for the species, with their ability to retain water, have a diversity of microhabitats and floristic diversity or productivity and greater prey density (Hill & Ward, 2010). Complex, rocky landforms in close proximity to permanent water are considered critical habitat due to refuge values, absence of threats, access to food and shelter for denning (DBCA, 2023a). Watercourses are also noted to facilitate connectivity for dispersal and foraging (DBCA, 2023a). Foraging or dispersal habitat for the species is recognised as land comprising predominantly native vegetation that is connected to shelter habitat within the range of the species (DoE, 2016). The species is noted to be less prevalent in rocky habitat with increasing levels of fragmentation, and favour patches with high vegetation cover, higher den availability, less edge habitat relative to patch size and greater rocky extent (DBCA, 2023a).

11.6.1.3 Threats

As outlined in the species Recovery Plan (Hill & Ward, 2010), Cane Toads (*Rhinella marina*) are considered the main threat to Northern Quoll populations in parts of their range. However, the species is also declining in areas without cane toads with evidence to suggest the decline is associated with habitat degradation (Hill & Ward, 2010). Inappropriate fire regimes are considered an issue for many threatened and declining species, and habitat degradation caused by inappropriate grazing regimes is considered another potential cause of species decline. Competition and direct predation from the Red Fox may also be contributing to species decline, due to an overlap in distribution.

Within the Pilbara, key threats to the species have been identified as inappropriate fire regimes, predation and competition from Feral Cats and Foxes (and potentially Dingoes), habitat loss and fragmentation and degradation from mining and infrastructure developments (DBCA, 2023a). Future invasion of Cane Toads in the Pilbara is anticipated by 2037-2046 and may threaten the Pilbara population of the Northern Quoll (DBCA, 2023a). Other potential threats include mortality from road and rail collisions, emission of noise and light and climate change (DBCA, 2023a). Further research is required to understand how multiple threats interact and impact the species, in particular, between predation, grazing and fire (DBCA, 2023a).

11.6.1.4 Species Recovery Objectives

The overall objective of the species Recovery Plan is to minimise the rate of decline of the Northern Quoll in Australia, to ensure viable populations remain in each of the major areas of distribution in the future (Hill & Ward, 2010).

Specific species recovery objectives include:

- Protect Northern Quoll populations on offshore islands from invasion and establishment of cane toads, cats and other potential invasive species
- Foster the recovery of Northern Quoll sub-populations in areas where the species has survived alongside cane toads
- Halt Northern Quoll declines in areas not yet colonised by cane toads
- Halt declines in areas recently colonised by cane toads
- Maintain secure populations and source animals for future reintroductions/introductions, if they become appropriate
- Reduce the risk of Northern Quoll populations being impacted by disease
- Reduce the impact of feral predators on Northern Quolls
- Raise public awareness of the plight of Northern Quolls and the need for biosecurity of islands and WA.

11.6.1.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment, eight hours of searches for secondary evidence, 140 nights of cage trapping in the Granite Outcrops (boulder piles) habitat and 60 motion cameras were deployed between four to 45 nights with 45,312 hours of combined recording.

Within the northern DE survey area, 40 motion sensitive camera traps were deployed over 210 total camera trap nights to target Northern Quolls, with sites selected based on preferred Northern Quoll habitat.

Outback Ecology recorded the species as part of a targeted species survey in 2010 and 2013 within 10 km of the Proposal area. Part of the southern DE survey area had also been subject to targeted searches for the species by Bamford in 2010 and Terrestrial Ecosystems in 2011 (Spectrum, 2025).

The Northern Quoll was recorded multiple times to the east and west of the Southern DE habitat, through secondary camera recordings, captures and scat evidence (Figure 11-2). All records were located within the Granite Outcrops (boulder piles) habitat. The species is considered likely to be using Granite Outcrop habitat for breeding and denning (critical habitat) due to the presence of rocky areas with suitable cavities (360 Environmental, 2023). However, no evidence of the species was recorded within the DE, noting that the DE has excluded much of the Granite Outcrop in the local area.

The EPBC Act Referral Guideline for Northern Quoll (DoE, 2016) describes the following habitat types with reference to their importance to the species:

- Shelter Habitat: Rocky areas or structurally diverse woodland or forest used for shelter purposes. Important habitat for breeding and refuge from fire and/or predation.

- Foraging and Dispersal Habitat: any land comprising predominantly native vegetation in the immediate area (within 1km) of shelter habitat or quoll records.

- Further to this, shelter habitat and connected dispersal and foraging habitat within 1km is considered habitat critical to the survival of the species (DoE, 2016).

360 Environmental (2023) and Spectrum (2025) identify Granite Outcrops as potential denning (shelter) habitat for the Northern Quoll and 0.04 ha of this habitat type occurs within the DE.

Based on these DoE descriptions above, 357.97 ha of foraging or dispersal habitat that may be considered critical to the survival of the species (i.e. within 1 km of the Granite Outcrop and records (both capture and secondary evidences)) is present within the DE, consisting mainly of Plain (Sand) habitat (341.27 ha) followed by Plain (Stony/gibber) and Minor drainage line habitats with 14.66 ha and 2 ha respectively. Of this, 248.46 ha will be disturbed by implementation of the Proposal.

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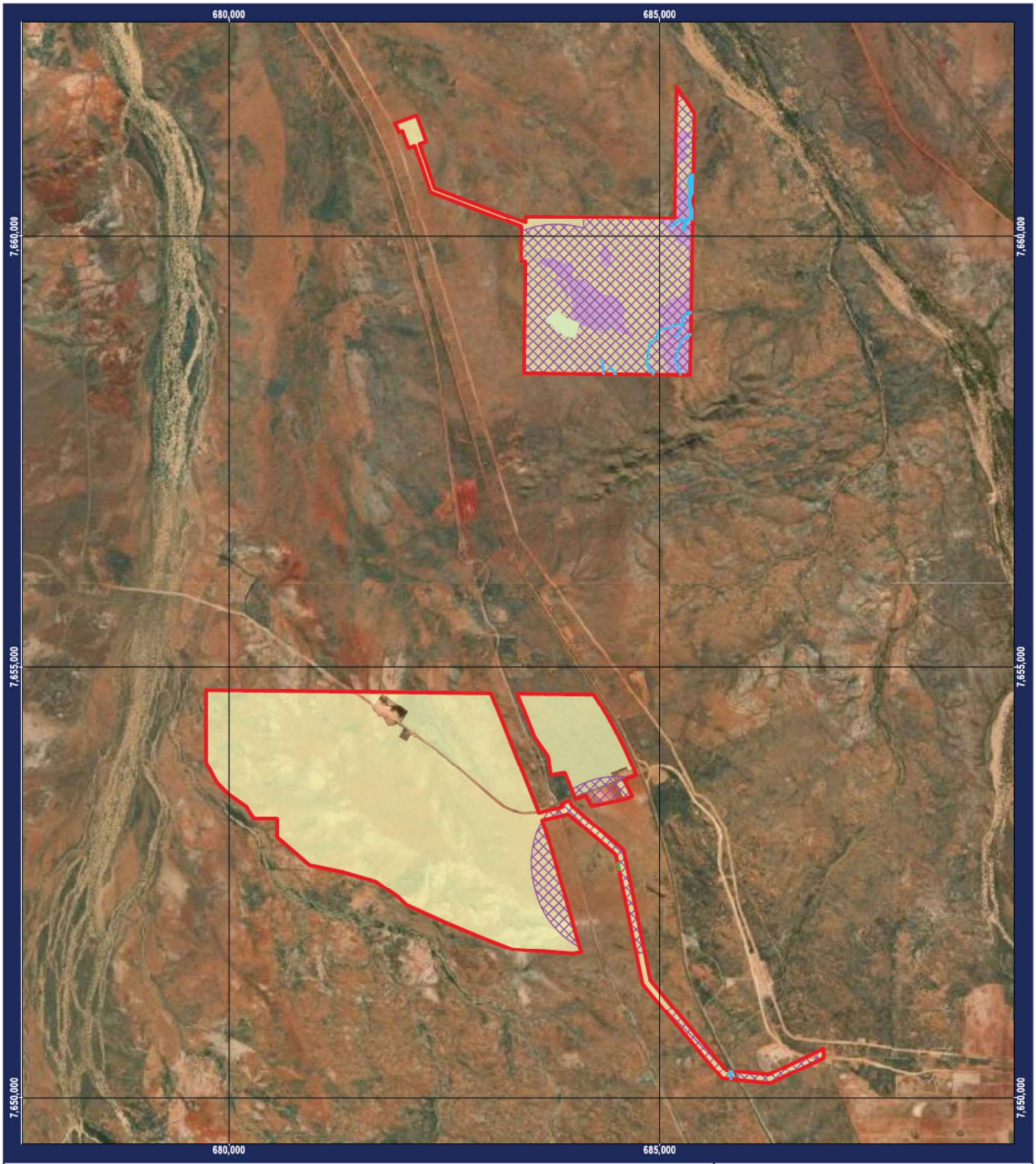

Legend

- Development Envelope
- Critical Supporting Northern Quoll Habitat (1km from Critical Habitat)

Critical Northern Quoll Habitat

- Drainage line/River/Creek (minor)
- Granite Outcrop
- Hills/Ranges/Plateaux

Supporting Northern Quoll Habitat

- Plain (sand)
- Plain (stony/gibber)

N

0 0.5 1 1.5 2
Kilometres

Figure 11-2
Mapped Habitat of the Northern Quoll within the Development Envelope

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:60,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.063
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 0
Confidentiality: 0

Fortescue

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11.6.1.6 Potential Impacts

Potential **direct impacts** to the Northern Quoll in relation to the Proposal include:

- Fragmentation and clearing of potential species habitat, including potential critical dispersal, foraging and breeding habitat, other dispersal habitat and other foraging habitat (Table 11-5).
- Injury or loss of Northern Quoll individuals through vehicle and machinery movements and strikes.

Potential **indirect impacts** to the Northern Quoll in relation to the Proposal include:

- Degradation of Northern Quoll habitat, including fragmentation and edge effects resulting in:
    - Restricted access to habitat or water resources
    - Increased competition for resources
    - Increased exposure to predators
    - Degradation of habitat through greater penetration of invasive species
    - Reduction in species richness and diversity
    - Increased numbers of feral or invasive species.
- Altered species behaviour, due to noise, dust, light, and increased traffic or movement within the site
- Cumulative impacts from other projects within the region.

Table 11-5: Potential Direct Impacts to Northern Quoll

Habitat Type	Habitat Value	Survey Area (ha)	Critical Habitat within Survey Area (ha)	DE		IDF	
				Area (ha)	% of Critical Habitat within Survey Area	Area (ha)	% of Critical Habitat within Survey Area
Hills/ Ranges/ Plateaux	Critical dispersal and foraging	503.05	200.20	0	0	0	0
Drainage Line/ River/ Creek (major)		172.79	57.69	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	67.66	2.00	2.96	0.05	0.07
Granite Outcrops	Critical – shelter and breeding	183.43	183.43	0.04	0.02	0	0
Plain (sand)	Dispersal and foraging	5,491.11	2,756.89	341.27	12.38	239.48	8.69
Plain (stony/gibber)		2,550.33	759.68	14.66	1.93	9.15	1.20
Total		**9,098.46**	**4,025.56**	**357.97**	**8.89**	**248.46**	**6.18**

11.6.1.7 Proposed Mitigation Measures

Mitigation measures proposed as part of the Proposal to address potential impacts to terrestrial fauna, including the Northern Quoll, are outlined in Section 8.7. The proposed mitigation measures are considered consistent with the Recovery Plan for the species.

11.6.1.8 Assessment of Significance

An assessment of the potential impacts to the Northern Quoll from the Proposal is provided in Table 11-6.

Table 11-6: Significant Impact Assessment – Northern Quoll

Criteria for Endangered Species	Assessment of Significant Impact
Lead to a long-term decrease in the size of a population	**Unlikely** No Northern Quoll population was identified within the DE; however, the species has been previously recorded within the surrounding area. Given suitable habitat for the species has been mapped within the DE and multiple records exist within 500m of the DE, it is highly likely that the species utilises habitat within the DE, most likely for foraging or dispersal. Records of Northern Quoll from the wider survey area were all within Granite Outcrops (boulder piles) habitat; this habitat is likely to be used for breeding / denning (Shelter habitat according to DoE, 2016) and is considered critical habitat for the species. Whilst Northern Quoll were not recorded within the DE from Granite Outcrop habitat, this habitat may be suitable for the species when there are appropriate environmental conditions. The DE contains just 0.04 ha of Granite Outcrop, and no Granite Outcrop habitat will be disturbed by the IDF. Within the DE, 62.09 ha of Plain (Sand) habitat occurs within 1km of the Granite Outcrop habitat and may be considered habitat critical to the survival of the species (DoE, 2016). Of this, 36.52 ha will be disturbed. It is likely that the area within the DE is marginal habitat for Northern Quoll and without a resident population, it is considered unlikely that the Proposal will lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of the species	**Unlikely** Within the surveyed areas, Granite Outcrop is recognised as potential habitat for breeding, consistent with the (DoE, 2016) guidance. A total of 0.04 ha of Granite Outcrop occurs within the DE. A further 62.09 ha of supporting habitat, consistent with the DoE guidance has been identified within the DE, of which 36.52 ha will be disturbed. These habitats are not considered unique in the surrounding landscape and extend outside of the DE (360 Environmental, 2023). No quolls were recorded in the DE, although they may occasionally occur there. Given the availability of suitable habitat in the local and regional area and known records of the species outside of the DE, it is considered unlikely that the Proposal will reduce the area of occupancy for the Northern Quoll.
Fragment an existing population into two or more populations	**Unlikely** Substantial survey effort has been undertaken within suitable habitat in the DE and surrounding area for the Northern Quoll. Current information suggests that there is no major physical barriers to dispersal within the Pilbara (DBCA, 2023a). The Pilbara population as a whole is considered homogenous and genetically distinct from the Kimberley and NT populations (DBCA, 2023a). Through design, impacts to mapped critical breeding habitat has been almost entirely avoided. Areas of foraging habitat connecting to critical breeding, dispersal and foraging habitat will largely remain intact, with only 36.52 ha of supporting habitat to be removed by the Proposal. The Proposal is considered unlikely to fragment a population of Northern Quoll.
Adversely affect habitat critical to the survival of a species	**Unlikely** All habitat types mapped within the DE are considered common throughout the surrounding region (360 Environmental, 2023). Just 0.04 ha of Granite Outcrop occurs within the DE and this has been avoided by the IDF. A further 62.09 ha of supporting habitat, considered critical in accordance with the DoE guidance occurs in the DE, with 36.52 ha to be disturbed. Fortescue notes that no Quolls have been recorded within the DE, although they may occur there periodically either, most likely for foraging or dispersal.

Criteria for Endangered Species	Assessment of Significant Impact
	The remainder of the proposed disturbance occurs in areas that are not considered habitat critical to the survival of the species. Given the avoidance of critical shelter habitat and the small area of disturbance to Plain (Sand) habitat occurring within 1km of the Granite Outcrop habitat, it is unlikely that the proposal will adversely impact habitat that is critical to the survival of the species.
Disrupt the breeding cycle of a population	**Unlikely** The Granite Outcrops habitat is considered critical shelter habitat that is suitable for denning and breeding. Only 0.04 ha of mapped Granite Outcrop occurs within the DE, and this is not proposed for disturbance. Subsequently, there is no risk that the proposal will disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** The removal of up to 36.52 ha of potential critical habitat is considered unlikely to decrease the availability of habitat to the extent that the species is likely to decline, given that extensive areas of similar habitat will not be impacted. No quolls were recorded using this habitat. Consequently, the Proposal is considered unlikely to impact habitat to the extent that the species would be likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	**Unlikely** The Proposal could potentially result in an increase in the number of feral predators within the DE, which may impact the species. A number of introduced species were recorded within the DE and surrounding area, including the Feral Cat, Dingo/Dog, European Cattle, Horses and Donkeys (Spectrum, 2024b). Of these, the Feral Cat and Dingo are known or potential predators of the species. A number of mitigation measures are proposed to manage and reduce the potential for any feral animals or pests within the DE and surrounding area. This includes management of waste materials, feral species management and cleaning and inspection of plant and equipment prior to entry to site in accordance with the Environmental Management Plan. Education of contractors of appropriate measures to reduce the potential to attract feral animals will be provided as part of toolbox meetings. The potential for indirect impacts to the species through the introduction of weeds and feral animals are considered to be unlikely, following application of appropriate mitigation measures.
Introduce disease that may cause the species to decline	**Unlikely** Mitigation measures will be applied to avoid introducing or increasing the spread of invasive species and feral animals within the DE and surrounding area. Following application of mitigation measures it is considered unlikely that the Proposal will lead to the introduction of diseases that would significantly impact the Northern Quoll.
Interfere with the recovery of the species	**Unlikely** Recovery objectives for the species include the management and recovery of the species populations from Cane Toads, reduction in the risk of impacts through disease, reduction in the impact of feral predators and raising awareness of the species status.

Criteria for Endangered Species	Assessment of Significant Impact
	The Proposal will not compromise the objectives of the Recovery Plan for the species, and therefore is unlikely to interfere with the recovery of the species.

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11.6.1.9 Predicted Outcome

The DE contains a total of 62.09 ha of habitat considered critical to the survival of the Northern Quoll, consistent with the DoE (2016) guidance, consisting of just 0.04 ha of shelter habitat (Granite Outcrop) and 62.09 ha of foraging and dispersal habitat (Sand Plain) within 1km of the Granite Outcrop. Just 36.52 ha of this foraging and dispersal habitat will be removed. Noting that there is no resident population of Northern Quoll using the Granite Outcrop habitat within the DE, this disturbance is unlikely to have a significant impact on the Northern Quoll.

11.6.2 Grey Falcon (*Falco hypoleucos*)

11.6.2.1 Description

The Grey Falcon is listed as Vulnerable under the EPBC Act. The Grey Falcon is an elusive medium-sized raptor, with a pale-grey colour and black-barred tail (TSSC, 2020) (Plate 11-4).The Grey Falcon has a sparse distribution across the arid and semi-arid region of Australia (360 Environmental, 2023) (Plate 11-4). It is considered restricted to areas with high average temperatures and average rainfall less than 500 mm (360 Environmental, 2023). It is the rarest falcon in Australia, with an estimated population size of less than 1,000 individuals (Spectrum, 2025).

Plate 11-4: Grey Falcon Image and Mapped Distribution

Photo credit: D. Portelli, Threatened species of the Northern Territory – Grey Falcon, Distribution map Species Profile and Threats Database (DCCEEW, 2024).

11.6.2.2 Habitat Preference

The species favours habitat that includes lightly timbered and un-timbered low plains crossed by watercourses (360 Environmental, 2023). However, it also frequents grassland and sand dune habitats and typically utilises nests in Eucalypt lined drainage lines and waterholes (360 Environmental, 2023). The species forages in open landscapes such as rocky plains with hummock grasslands, low shrublands and minor drainage lines (Spectrum, 2025).

11.6.2.3 Threats

The species conservation advice (TSSC, 2020) notes that there are limited focused studies on the species, and therefore all published threats are based on general considerations and extrapolations (TSSC, 2020). The following threat factors are considered to impact the Grey Falcon:

- Invasive species – predation by cats
- Climate change - increased temperatures in arid and semi-arid Australia
- Demographic and genetic stochastic events - small species population size
- Habitat loss and fragmentation – grazing by exotic herbivores and nest shortage
- Disturbance – birdwatchers and photographers
- Direct mortality – collision with traffic and collision with fences and powerlines
- Harvesting – egg collecting and falconry.

11.6.2.4 Species Recovery Objectives

There is currently no Recovery Plan in place for the Grey Falcon. However, the conservation advice identifies the following conservation and management priorities for the species:

- Habitat loss, disturbance and modifications:
    - Support improved fire and grazing management in areas where Grey Falcons are known to occur
    - Protect known nesting trees and include adequate exclusion buffers with regards to proposed developments and land clearing activities
    - Support the establishment and survival of replacement nest trees in areas where the Grey Falcon
    - Retain artificial structures with known or potential Grey Falcon nests.
- Invasive species:
    - Control invasive cats and camels in areas where Grey Falcons are known to occur, especially in known roosting and nesting areas.

11.6.2.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment, 1.3 hours of bird surveys in suitable habitat, 30.2 hours of targeted searches in suitable habitat and 20 hours of bird surveys across a variety of habitats. Survey methods for bird species within the northern DE survey area included habitat assessments, opportunistic observations, active searches, spotlighting and unbounded bird surveys in conjunction with active searches at each trap site for a minimum of one hour.

The species was recorded within 10 km of the Proposal area by Ecologia Environment in 2012, and the DBCA record made in 2014 also occurs within 10 km of the Proposal area (Spectrum, 2025).

The species was not recorded within the DE but was sighted twice during the Proposal surveys along Drainage Line/River/Creek (major) habitat to the west of the southern DE (Spectrum, 2025). A pair were also observed south of the southern DE along the powerlines adjacent to the Fortescue Main Line Rail (Spectrum, 2025) as shown in Figure 11-3. The species was considered likely to breed within the survey areas or within its vicinity (Spectrum, 2025). Within the DE, the species is considered to potentially use Eucalyptus trees (or refurbished nests of other large birds) within the Drainage Line/River/Creek habitat for breeding (360 Environmental, 2023) and utilise all habitats for hunting (Spectrum, 2025).

It is noted that the Drainage Line/River/Creek (major) habitat provides suitable conditions for breeding (Spectrum, 2025) including larger Eucalypt species suitable for breeding. However, both the Drainage Line/River/Creek (major and minor) habitats have been considered as potential nesting habitat (360 Environmental, 2023). The species is also noted to use human infrastructure such as repeater towers or powerlines (360 Environmental, 2023). The regional population is considered unlikely to be dependent on habitats within the DE as these occur more widely throughout the surrounding region (360 Environmental, 2023).

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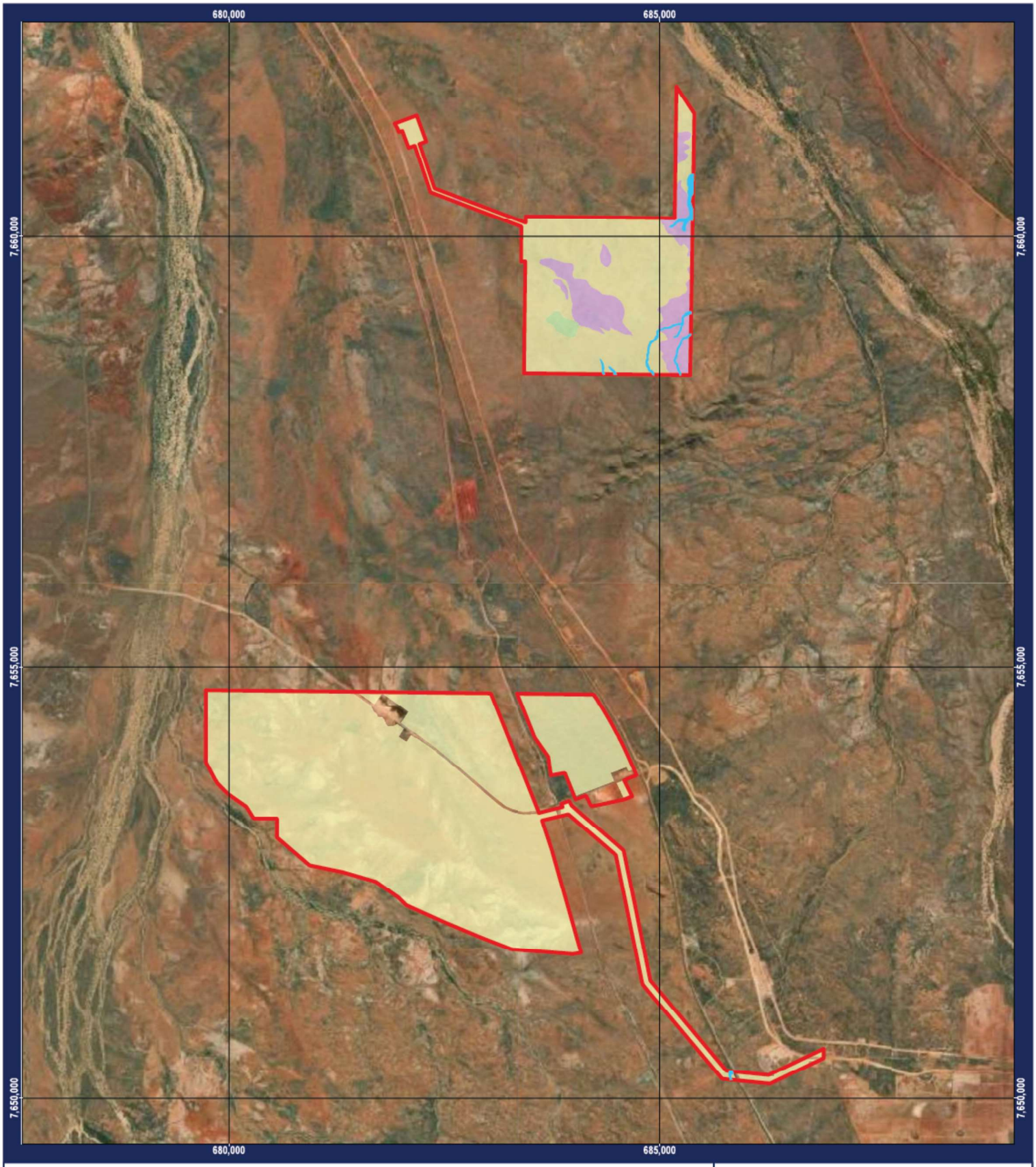

Legend

- Development Envelope

Critical Grey Falcon Habitat

- Drainage line/River/Creek (minor)

Supporting Grey Falcon Habitat

- Granite Outcrop
- Hills/Ranges/Plateaux
- Plain (sand)
- Plain (stony/gibber)

N

0 0.5 1 1.5 2

Kilometres

Figure 11-3
Mapped Habitat of the Grey Falcon within the Development Envelope

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:60,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.064
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 0
Confidentiality: 0

Fortescue

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11.6.2.6 Potential Impacts

Potential **direct impacts** to the Grey Falcon in relation to the Proposal include:

- Clearing of potential species habitat, including potential critical habitat and foraging habitat (Table 11-7).
- Injury or loss of Grey Falcon individuals through vehicle and machinery movements and strikes.

Potential **indirect impacts** to the Grey Falcon in relation to the Proposal include:

- Degradation of Grey Falcon habitat, including fragmentation and edge effects resulting in:
    - Restricted access to habitat or water resources
    - Increased competition for resources
    - Increased exposure to predators
    - Degradation of habitat through greater penetration of invasive species
    - Reduction in species richness and diversity
    - Increased numbers of feral or invasive species
    - Altered species behaviour, due to noise, dust, light, and increased traffic or movement within the site.
    - Cumulative impacts from other projects within the region.

Table 11-7: Potential Impacts to Grey Falcon Habitat within the Development Envelope

Habitat Type	Habitat Value	Survey Area (ha)	DE		IDF	
			Area (ha)	% of Critical Habitat within Survey Area	Area (ha)	% of Critical Habitat within Survey Area
Drainage Line/ River/ Creek (major)	Hunting and potential nesting habitat	172.79	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Plain (sand)	Hunting	5,491.11	1,283.76	23.38	1,027.63	18.71
Plain (stony/gibber)		2,550.33	86.22	3.38	51.04	2
Granite Outcrops (boulder piles)		183.43	0.04	<0.01	0	0
Hills/ Ranges/ Plateaux		503.05	6.75	1.34	6.75	1.34
Total		**9,098.46**	**1,383.29**	**15.20**	**1,087.49**	**11.95**

11.6.2.7 Proposed Mitigation Measures

Mitigation measures proposed as part of the Proposal to address potential impacts to terrestrial fauna, including the Grey Falcon, are outlined in Section 8.7. The proposed mitigation measures are considered consistent with the recovery actions provided within the conservation advice for the species

11.6.2.8 Assessment of Significance

An assessment of the potential impacts to the Grey Falcon from the Proposal is provided in Table 11-8.

Table 11-8: Significant Impact Assessment – Grey Falcon

Criteria for Vulnerable Species	Assessment of Significant Impact
Lead to a long-term decrease in the size of an important population of a species	**Unlikely** The Grey Falcon is considered one single population within Australia, with an estimated population size of less than 1,000 mature individuals (TSSC, 2020). The species small population size is considered a high-risk threat, with mitigation actions and an adaptive management plan required (TSSC, 2020). The precautionary principle should be applied in relation to the species populations size (TSSC, 2020). The Grey Falcon was not recorded within the DE; however, multiple sightings were recorded within the broader survey area. It is considered likely that the species breeds in the vicinity on a regular basis and utilises all habitats within the DE for hunting. No nesting trees were identified within the DE. Suitable nesting habitat may be present within the Eucalyptus trees of the Drainage Line/River/Creek (minor) (360 Environmental, 2023) but this habitat has minor representation within the DE (6.52 ha) and is not restricted to the DE. Up to 1,087.49 ha of Grey Falcon habitat within the DE will be impacted as a result of the Proposal, representing clearing of up to 11.95% of the total mapped habitat extent for the species. All habitats are known to be widespread in the regional landscape. The Proposal is therefore considered unlikely to lead to a long-term decrease in the size of an important population.
Reduce the area of occupancy of an important population	**Unlikely** The Grey Falcon may utilise all habitats within the DE for intermittent transient roosting and hunting, and the Drainage Line/River/Creek (minor) habitat for potential nesting. It is considered likely that the species breeds in the vicinity on a regular basis and utilises all habitats within the DE for hunting. No nesting trees were identified within the DE; suitable nesting habitat may be present within the large Eucalyptus trees of the Drainage Line/River/Creek (minor), but this habitat has minor representation within the DE (6.52 ha) and is not restricted to the DE. The Proposal is considered unlikely to reduce the area of occupancy for the species given they have the potential to overfly all habitats within the DE, no nesting trees were recorded, and potential nesting habitat has been avoided where possible. No Drainage Line/River/Creek (major) habitat, which is more likely to contain suitable nesting trees for the species, will be directly impacted by the proposal.
Fragment an existing important population into two or more populations	**Unlikely** The species is confined to the arid and semi-arid zone of Australia, with presence and modelled habitat suitability highly variable between seasons and years (BirdLife International, 2024). The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread (Schoenjahn, 2018). The Proposal is considered unlikely to fragment the existing population, given the species' aerial nature and widespread distribution across Australia.

Criteria for Vulnerable Species	Assessment of Significant Impact
Adversely affect habitat critical to the survival of a species	**Unlikely** Critical habitat for this species has not been defined, however, the Drainage Line/River/Creek (major and minor) habitats are noted to potentially provide nesting habitat for the species (360 Environmental, 2023). Design of the DE has avoided Drainage Line/River/Creek (major) habitat and heavily minimised Drainage Line/River/Creek (major) habitat. Both habitats are considered widespread in the surrounding region. The Proposal is considered unlikely to affect habitat critical to the survival of the species, following design and habitat mapping.
Disrupt the breeding cycle of an important population	**Unlikely** The Drainage Line/River/Creek (major and minor) habitats are noted to potentially provide nesting habitat for the species. However, no nesting trees were recorded within the DE. Design of the DE has avoided Drainage Line/River/Creek (major) habitat and heavily minimised Drainage Line/River/Creek (major) habitat. Both habitats are considered widespread in the surrounding region. The Proposal is considered unlikely to disrupt the breeding cycle of the species population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** It is considered unlikely that the Proposal will modify, destroy, remove, isolate or decrease habitat availability or habitat quality to the extent that the species could decline. The Grey Falcon has a wide distribution across Australia, and significant areas of mapped habitat identified during the Proposal surveys will not be directly impacted. The Proposal will impact up to 1,087.49 ha of potential habitat. However, extensive areas of habitat will remain following clearing. The Proposal is considered unlikely to impact habitat to the extent that the species would be likely to decline, given availability of habitat in the local and regional area and the wide species distribution.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** One of the identified threats for the species is potential predation from Feral Cats. A number of introduced species were recorded within the DE and surrounding area, including the Feral Cat, Dingo/Dog, European Cattle, Horses and Donkeys (Spectrum, 2024b) Inherent risks associated with the Proposal include the potential to increase feral animal populations within the DE and surrounding area. However, appropriate mitigation measures will be implemented during the life of the Project (Section 0), to reduce the potential for feral animal populations to increase or impact on the Grey Falcon. The Proposal is considered unlikely to result in the establishment of invasive species within habitat for the Grey Falcon.
Introduce disease that may cause the species to decline	**Unlikely** There are no known diseases that affect this species. Appropriate mitigation measures will be implemented during the life of the Project to reduce the risk of introducing new diseases or increasing the spread of any diseases within the DE and surrounds (Section 0). The Proposal is considered unlikely to result in the introduction of disease to the DE and surrounding region, that could cause the species to decline.

Criteria for Vulnerable Species	Assessment of Significant Impact
Interfere substantially with the recovery of the species	**Unlikely** The proposed mitigation measures (Section 0) are not considered to interfere with the threat abatement measures and objectives identified for the species within the conservation advice. The Proposal therefore is considered unlikely to interfere substantially with the recovery of the species.

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11.6.2.9 Predicted Outcome

The proposal poses no risk to the conservation of the Grey Falcon. Whilst 1,089.49 ha of suitable habitat for the species will be disturbed, this is a very small proportion of available habitat for this species at a local or regional level. Furthermore, the most important habitat for Grey Falcon, being Major Drainage lines have been excluded from the DE.

11.6.3 Pilbara Olive Python (*Liasis olivaceus barroni*)

11.6.3.1 Description

The Pilbara Olive Python is listed as Vulnerable under the EPBC Act. The Pilbara Olive Python is a separate subspecies of the olive python, which is endemic to the Pilbara and Gascoyne regions of WA (DBCA, 2023a). It is unpatterned, with a dull olive-grey or red-brown colour and cream-white belly (DBCA, 2023a) (Plate 11-5).The species subpopulation is considered sizeable in pockets and some remote populations have been described as isolated from threatening processes (TSSC, 2008) (Plate 11-5).The species is cryptic and non-venomous and inhabits rocky and riparian environments in low densities (DBCA, 2023a).

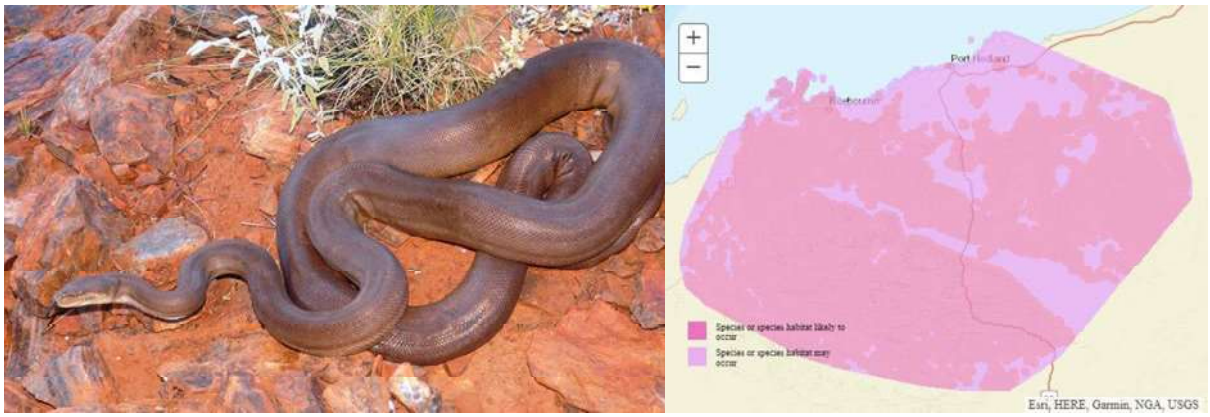


Plate 11-5: Pilbara Olive Python Image and Mapped Distribution

Photo credit: D. Pearson, Particle – Scitech, Distribution map Species Profile and Threats Database (DCCEEW, 2024)

11.6.3.2 Habitat Preference

The species habitat preferences vary between populations; however, males are known to potentially travel large distances in search of females during the breeding season (DBCA, 2023a). The species is known to prefer deep gorges and water holes within the Pilbara region (TSSC, 2008). Critical habitat definitions for the species have proven difficult due to lack of research, however, a default definition includes rocky gorges, gullies and permanent waterholes (TSSC, 2008). One report states that this subspecies population is sizable in pockets, with some remote populations isolated from threatening process (TSSC, 2008). It has been noted that the species spends cooler winter months hiding in caves and rock crevices away from water sources and is usually in close proximity to water and rock outcrops in summer months (TSSC, 2008).

11.6.3.3 Threats

Threatening processes associated with the species are considered poorly understood and speculative (DBCA, 2023a). However, the main identified threats listed within the species conservation advice include predation by feral cats and foxes, particularly of juveniles, predation of food sources by foxes, and destruction of habitat due to gas and mining developments (TSSC, 2008). The destruction of habitat during mining processes and infrastructure developments are considered likely to have profound impacts on resident species populations (DBCA, 2023a).

A recent summary of knowledge on the species by the DBCA identifies possible threats to the species include:

- Habitat fragmentation and degradation due to resource development and pastoralism resulting in the loss or reduction of habitat quality, shelter sites and/or prey resources
- Local populations near transport corridors may be impacted by vehicle collisions
- Predation by, and competition with, introduced predators
- Loss or suppression of prey species where introduced predators occur, or where other factors impact prey populations. Loss of important prey items may delay species maturation and breeding frequency, especially in females
- Feral cats impact on juveniles
- Altered fire regimes
- Emission of noise and light
- Future invasion of cane toads, and potential impacts to juveniles
- Overgrazing and trampling by domestic and introduced livestock in riparian zones, reducing important shelter and ambush sites for juveniles
- Mining associated with dewatering, altering regional hydrology by lowering water tables or drying waterholes/springs and reducing foraging habitat
- Dewatering leading to increased and constant flows, altering the use of some ambush and shelter sites
- Deliberate road kills and public killing as a result of misidentification
- Tourism related disturbance, such as visitation to waterholes.

11.6.3.4 Species Recovery Objectives

The species conservation advice identifies the following highest priority recovery and threat abatement actions to support the recovery of the species:

- Habitat loss, disturbance and modification:

- Identify populations of high conservation priority
- Ensure road widening, maintenance activities, and gas infrastructure development (or development activities) in areas where the Olive Python (Pilbara subspecies) occurs do not adversely impact on known populations
- Manage any changes to hydrology which may result in changes to the water table levels, increased run-off, sedimentation or pollution
- Investigate further formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.

- Animal predation or competition:
  - Implement Threat Abatement Plan for the control and eradication of foxes and cats in the local region.

- Conservation information:
  - Raise awareness of the species within the local community
  - Use road signage to raise awareness of the species with road users on or near roads.

- Enable recovery of additional sites and/or populations:
  - Investigate options for linking, enhancing or establishing additional populations.

11.6.3.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment and eight hours of searches along major drainage lines. Within the northern DE survey area, habitat assessments were completed, in addition to trap sites, opportunistic observations, active searches, and spotlighting.

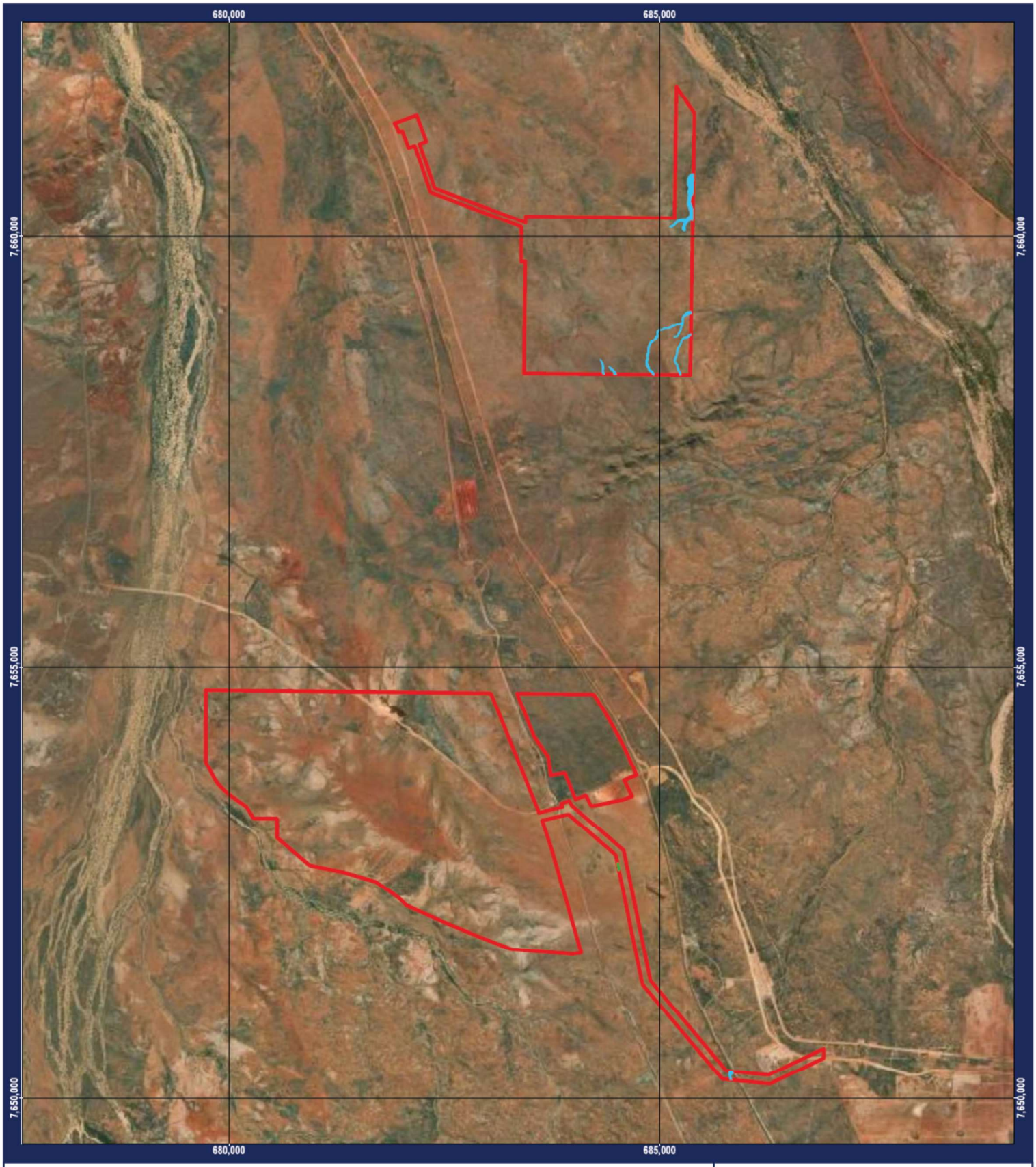
Ecologia Environment recorded the species as part of a targeted species survey in 2011 within 10 km of the Proposal area. Part of the southern survey area had also been subject to targeted searches for the species by Bamford in 2010.

Drainage Line/River/Creek (major) habitat type is considered the most important habitat within the survey areas as it may be utilised by the species for foraging and dispersal during the wet season. However, this habitat does not contain the permanent waterholes described as critical habitat for the species. This habitat type has been excluded from the DE.

Within the DE, the species may utilise the Drainage Line/River/Creek (minor) habitat for foraging and dispersal (Figure 11-4). This habitat does not contain the permanent waterholes described as critical habitat for the species. The DE does not contain any rocky gorges or gullies that would also represent potential critical habitat for the species.

Through design, impacts to the Drainage Line/River/Creek (minor) habitat have been avoided where possible. Granite Outcrops (boulder piles) were identified as potential foraging habitat for the species, however, impacts to this habitat type have also been avoided.

One Pilbara Olive Python individual was observed during field surveys for the Proposal next to a permanent water pool along a major drainage line, approximately 300 m outside of the survey area (360 Environmental, 2023). This individual was located approximately 11.2 km east of the northern DE, across the Turner River. Note, no permanent water pools occur within the Major Drainage habitat recorded within proximity to the DE, however, the record indicates that individuals may use this habitat, particularly during the wet season when surface water is more likely to be present.



Legend

- Development Envelope

Supporting Pilbara Olive Python Habitat

- Drainage line/River/Creek (minor)
- Granite Outcrop

N

0 0.5 1 1.5 2

Kilometres

Figure 11-4

Mapped Habitat of the Pilbara Olive Python within the Development Envelope

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:60,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.066
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 0
Confidentiality: 0

Fortescue

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11.6.3.6 Potential Impacts

Potential **direct impacts** to the Pilbara Olive Python in relation to the Proposal include:

- Fragmentation and clearing of potential species habitat, including potential critical dispersal, foraging and breeding habitat, other dispersal habitat and other foraging habitat (Table 11-9)
- Injury or loss of Pilbara Olive Python individuals through vehicle and machinery movements and strikes.

Potential **indirect impacts** to the Pilbara Olive Python in relation to the Proposal include:

- Degradation of Pilbara Olive Python habitat, including fragmentation and edge effects resulting in:
    - Restricted access to habitat or water resources
    - Altered dispersal
    - Genetic isolation and disruption of gene flow
    - Increased competition for resources
    - Increased exposure to predators
    - Degradation of habitat through greater penetration of invasive species
    - Reduction in species richness and diversity
    - Increased numbers of feral or invasive species.
- Altered species behaviour, due to noise, dust, light, and increased traffic or movement within the site
- Cumulative impacts from other projects within the region.

Table 11-9: Potential Impacts to Pilbara Olive Python Habitat within the DE

Habitat Type	Habitat Value	Survey Area (ha)	DE		IDF	
			Area (ha)	% of Critical Habitat within Survey Area	Area (ha)	% of Critical Habitat within Survey Area
Granite Outcrops (boulder piles)	Potential foraging	183.43	0.04	<0.01	0	0
Drainage Line/ River/ Creek (major)	Potential foraging and dispersal	172.79	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Total		**553.97**	**6.56**	**1.18**	**2.07**	**0.37**

11.6.3.7 Proposed Mitigation Measures

Mitigation measures proposed as part of the Proposal to address potential impacts to terrestrial fauna, including the Pilbara Olive Python, are outlined in Section 8.7. The proposed mitigation measures are considered consistent with the conservation advice for the species.

11.6.3.8 Assessment of Significance

An assessment of the potential impacts to the Pilbara Olive Python from the Proposal is provided in Table 11-10.

11.6.3.9 Predicted Outcome

No records of the Pilbara Olive Python were identified within the DE, or in close proximity to the DE. The Proposal has the potential to remove up to 2.07 ha of foraging and/or dispersal habitat for the species, within the Drainage Line/River/Creek (minor) habitat type. Considering the amount of suitable foraging and dispersal habitat that occurs in the local and regional area, the potential impacts to the Pilbara Olive Python are considered not significant.

Table 11-10: Significant Impact Assessment – Pilbara Olive Python

Criteria for Vulnerable Species	Assessment of Significant Impact
Lead to a long-term decrease in the size of an important population of a species	**Unlikely** Population size estimates are difficult due to the Pilbara Olive Python's cryptic nature and lack of reliable trapping or census techniques (TSSC, 2008). There are previous records of Pilbara Olive Python from the surrounding area, with one record located approximately 6 km from the survey area. Additionally, one individual was observed during field surveys for the Proposal next to a permanent water pool along a major drainage line, approximately 300 m outside of the survey area (360 Environmental, 2023). It is considered that the species home range likely includes parts of the Drainage Line/River/Creek (minor and major) habitats in proximity to this record. This record was located approximately 11.2 km east of the northern DE, across the Turner River. Some marginal habitat for the species was identified in Turner River (East), that runs adjacent to the western boundary of the southern DE. Known sites for the species include Iron Bridge Minesite, approximately 25 km away, which provides more favourable habitat, including Gorges and Gullies (Spectrum, 2025). No individuals of this species were recorded within the DE, and the design has avoided impacts to Major Drainage habitat. A small area of Minor Drainage habitat occurs with the DE, although this is less suitable habitat than the Major Drainage habitat outside the DE. Considering that more favourable habitat exists outside of the DE, and the distance between the DE and records of the species, it is considered unlikely that the Proposal will result in a long-term decrease in the size of an important population of the species.
Reduce the area of occupancy of an important population	**Unlikely** The species is distributed throughout the Pilbara, and suitable habitat is located to the east of the DE (Major Drainage habitat). The Proposal has avoided impacts to Major Drainage Line habitat, which may provide suitable habitat for the species. The species may utilise the Granite Outcrops (boulder piles) and Drainage Line (minor) habitats as potential foraging, and potential foraging and dispersal habitats. However, impacts to Granite Outcrops (boulder piles) habitat has been avoided and minor areas (2.07 ha) of Drainage Line (minor) habitat will be impacted as a result of the Proposal. Given that both habitat types are not considered unique or isolated in the broader landscape, and are not critical habitat for the species, the Proposal is considered unlikely to lead to a long-term decrease in the size of an important population of the species.
Fragment an existing important population into two or more populations	**Unlikely** The Proposal will result in direct impacts to just 2.07 ha of foraging and/or dispersal habitat for the species. The habitat most likely to be utilised by Pilbara Olive Python in the local area is the Major Drainage habitat, which has been excluded from the DE. No records of the species were made within the DE, with the closest record during the Proposal surveys approximately 11.2 km away. The Proposal is considered unlikely to fragment an existing important population into two or more populations, given that there does not appear to be any likelihood of a resident population within the DE and that the most suitable dispersal habitat remains undisturbed.

Criteria for Vulnerable Species	Assessment of Significant Impact
Adversely affect habitat critical to the survival of a species	Unlikely The DE does not contain deep gorges or permanent sources of water considered as preferred habitat by the Threatened Species Scientific Committee (TSSC, 2008). The habitat present within the DE is not critical to the survival of the Pilbara Olive Python. The Proposal has avoided impacts to Drainage Line/River/Creek (major) habitat, which may provide suitable habitat for foraging and dispersal during the wet season. Therefore, the Proposal is considered unlikely to adversely impact habitat critical to the survival of a species.
Disrupt the breeding cycle of an important population	**No Impact** No habitat within the DE was identified as breeding habitat for the species. Male Pilbara Olive Pythons are known to travel large distances (up to 3 km) in search of females during breeding season. Mitigation measures (Section 8.7) including the management of water flows in areas of mapped Drainage Line (minor) habitat within the DE and reduce any impacts to species dispersal for breeding within the landscape. The lack of critical habitat within the DE, the avoidance of Major Drainage and the lack of a resident Pilbara Olive Python population means there is no possibility that the implementation of the proposal will disrupt the breeding cycle of an important population of this species.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** Impacts to the Drainage Line/River/Creek (minor) habitat will be managed to reduce impacts to surface water flows, and any changes caused by increased run-off, sedimentation or pollution. Connectivity will be maintained where possible, to allow any individuals to utilise the habitat for dispersal and foraging. The Proposal will result in direct impacts to the species habitat, through a loss of up to 2.05 ha of potential foraging and/or dispersal habitat. However, extensive areas of suitable foraging and dispersal habitat will remain post-clearing. As a result, impacts from the proposal are unlikely to decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** The Proposal has the potential to indirectly impact on food resources available to the Pilbara Olive Python through an increase in number of feral animals, which may in turn increase predation on the preferred prey species of the Pilbara Olive Python. A number of introduced species were recorded within the DE and surrounding area, including the Feral Cat, Dingo/Dog, European Cattle, Horses and Donkeys (Spectrum, 2024b). Following application of appropriate mitigation measures (Section 8.7), including feral species management as part of the Project Environmental Management Plan, the likelihood that prey species will be reduced is low. The Proposal is unlikely to result in the establishment of invasive species within habitat for the Pilbara Olive Python.

Criteria for Vulnerable Species	Assessment of Significant Impact
Introduce disease that may cause the species to decline	**Unlikely** There are no known disease risks for the species, and no diseases are considered a key threat for the species. Mitigation measures will be implemented to avoid introducing invasive weed species and feral predators within the DE and surrounds (Section 8.7). The Proposal is considered unlikely to result in the introduction of disease to the DE and surrounding region, that could cause the species to decline.
Interfere substantially with the recovery of the species	**Unlikely** The mitigation measures proposed (Section 8.7) are consistent with the conservation advice for this species. The Proposal is considered unlikely to interfere substantially with the recovery of the species.

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11.6.4 Ghost Bat (*Macroderma gigas)*

11.6.4.1 Description

The Ghost Bat is listed as Vulnerable under the EPBC Act. The Ghost Bat is a large carnivorous bat, with long joined ears and a simple nose leaf (DBCA, 2023a) (Plate 11-6). The Ghost Bat is endemic to Australia, currently patchily distributed across the NT, Queensland and the Kimberley and Pilbara regions of WA (DBCA, 2023a) (Plate 11-6). The species range has contracted northwards due to more arid conditions and European colonisation (DBCA, 2023a). Populations of this species are highly structured, being genetically distinct at both regional and local scales (TSSC, 2016a). The species has been recorded across most of the Pilbara, including all four IBRA subregions. The largest colonies in the Pilbara have been recorded from abandoned mines in the Chichester subregion, with smaller colonies recorded in natural caves across the Pilbara and particularly within the Hamersley subregion (DBCA, 2023a).

Ghost Bat populations are highly structured, being genetically distinct at both regional and local scales (Bullen, R D, 2021a). Loss of breeding females from northern areas of the species distribution therefore have the potential to significantly reduce the area of occupancy and population size (Bullen, R D, 2021a). Approximately 1,850 individuals are known to occur in the Pilbara region (Bullen, R D, 2021a).

Plate 11-6: Ghost Bat Image and Mapped Distribution

Photo credit: R&A Williams, Australian Museum, Distribution map Species Profile and Threats Database (DCCEEW, 2024)

11.6.4.2 Habitat Preference

The Ghost Bat has a surface foraging strategy, however, there is limited information available on foraging habitat. Across the Pilbara, the Ghost Bat forages in productive habitat including drainage lines, alluvial plains supporting tussock grassland, sparse woodland on ridge lines and cave entrances (DBCA, 2023a). Nightly flight path distances have been recently documented to exceed 40 km, and the species is known to move periodically between roosts due to season or prey availability (DBCA, 2023a). The species relies on permanent underground roosts (DBCA, 2023a).

Critical habitat is defined as Category 1 (maternity/diurnal roost caves with regular diurnal occupancy essential for daily and long term survival of the species), Category 2 (maternity/diurnal roost caves with regular diurnal roost caves supporting daily and long term presence of the species), and Category 3 (roost caves with occasional occupancy) (only when adjacent to Category 2 caves) (Bullen, R D, 2021a). Important (but not critical) habitats include isolated Category 3 roosts, Category 4 roosts (defined as nocturnal roosts with opportunistic usage), and water sources (semi- and permanent) within 5 km of a Category 1 or 2 roost (Bullen, R D, 2021a). Viability of the species within the Pilbara currently appears to be linked to the maintenance of interconnected roosts across the landscape (DBCA, 2023a).

11.6.4.3 Threats

The species does not have an adopted Recovery Plan, however, the approved conservation advice notes that the key threat to the Ghost Bat is habitat loss and degradation due to mining activities (TSSC, 2016a). The species slow reproductive rate and lack of suitable habitat restricting movement mean it is vulnerable to threats and localised extinctions. The genetic isolation of each subpopulation indicates that areas are unlikely to be colonised if a local extinction occurs.

Threats to the species includes:

- Habitat loss (destruction of, or disturbance to, roost sites and nearby areas) due to mining
- Disturbance of (human visitation at) breeding sites
- Modification to foraging habitat
- Collision with fences, especially those with barbed wire
- Collapse or reworking of old mine adits
- Contamination by mining residue at roost sites
- Disease
- Poisoning by cane toads
- Competition for prey with Foxes and Feral Cats.

11.6.4.4 Species Recovery Objectives

There is no species-specific Recovery Plan in place. However, the Threatened Species Scientific Committee has recommended that a Plan should be in place for the species. Current primary conservation actions include the protection of roost sites from mining, human disturbance and collapse.

Conservation and management actions include:

- Active mitigation of threats:

- Protect land with significant colonies
- In barbed wire fences close to roost sites, replace the top strand with single-strand wire, and put a metal disc (around 10x10cm) between the top and second strands
- Protect roost sites and surrounding foraging areas from disturbance, including the loss of habitat quality due to changes to fire and grazing regimes
- Where appropriate, modify roost site areas to reduce risks of collapse, and ensure mine-adits that are known roost sites for ghost bats are maintained following the cessation of mining activities

- Captive breeding
- Quarantining isolated populations
- Translocation
- Community education:
  - Educate people not to disturb roost sites
- Reduce disturbance of roost sites:
  - Where there are known roosts in proximity to mining or other activities, ensure disturbance is minimised by undertaking environmental assessment, considering alternative locations for works and impact mitigation measures.

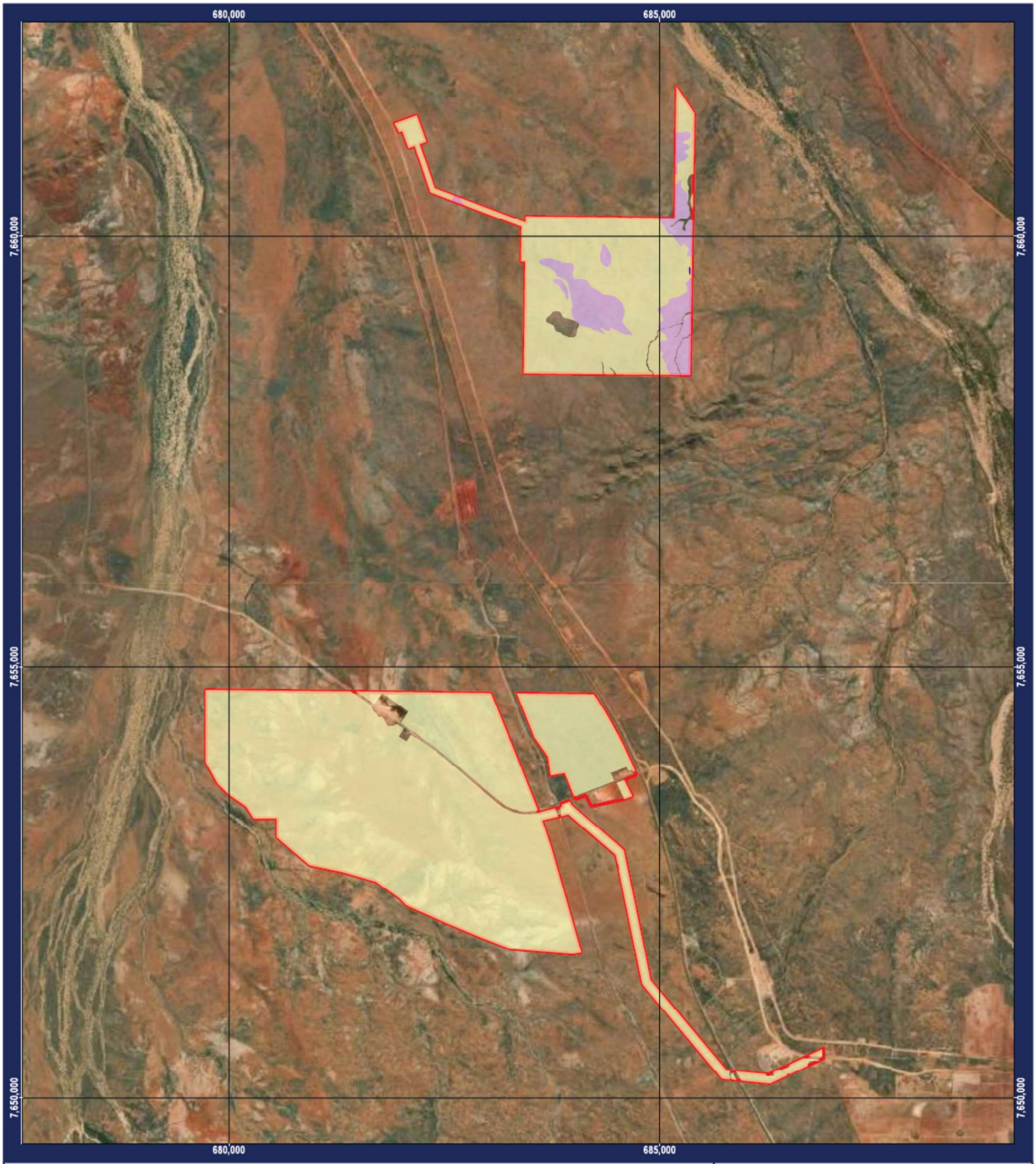
11.6.4.5 Survey Effort and Results

Within the southern DE survey area, survey methods for this species included a habitat assessment and deployment of ultrasonic recorders for a total of 78 nights. Within the northern DE survey area, survey methods included deployment of ultrasonic autonomous recording units across two habitats for a total of 14 audible autonomous recording unit trap nights. Units were placed in locations containing likely habitat for this species and were active for more than four consecutive nights at each location, and abundance of calls was noted. Habitat assessments, opportunistic observations, active searches and spotlighting were also completed.

Ecologia Environment recorded the species within 10 km of the DE in 2011 as part of a detailed terrestrial vertebrate fauna assessment. Part of the southern DE survey area had also been subject to a targeted Ghost Bat survey by Biologic and Bat Call WA in 2014. This survey recorded the species within the Spectrum survey area and in close proximity to the east of the DE (see Figure 3.1 of the Spectrum report).

Within the DE, the species is considered to potentially utilise all habitat types for infrequent foraging (Figure 11-5). However, the Plain (sand and stony/gibber) habitat was considered to be of low foraging suitability (Spectrum, 2025). The species was not recorded within the DE, and no critical habitat was identified within the DE. However it is noted that the species can be difficult to detect, given limited suitable survey methods (Spectrum, 2025) and the lack of

calls the species makes during hunting (360 Environmental, 2023). No suitable roosts or caves considered likely to support permanent roosts were recorded. Crevices within the Granite Outcrops (boulder piles) habitat may provide potential intermittent transient roosts (i.e. potentially a Category 4 roost), however, lacked the deep, humid crevices or caves required for a diurnal roost site (Spectrum, 2025).



Legend

- Development Envelope

Supporting Ghost Bat Habitat

- Plain (sand)
- Plain (stony/gibber)

N

0 0.5 1 1.5 2

Kilometres

Figure 11-5
Mapped Habitat of the Ghost Bat within the Development Envelope

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:60,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.065
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 0
Confidentiality: 0

Fortescue

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11.6.4.6 Potential Impacts

Potential **direct impacts** to the Ghost Bat in relation to the Proposal include:

- Clearing of potential foraging habitat (Table 11-11)
- Injury or loss of Ghost Bat individuals through vehicle and machinery movements and strikes.

Potential **indirect impacts** to the Ghost Bat in relation to the Proposal include:

- Degradation of Ghost Bat habitat, including fragmentation and edge effects resulting in:
    - Restricted access to habitat or water resources
    - Increased competition for resources
    - Increased exposure to predators
    - Degradation of habitat through greater penetration of invasive species
    - Reduction in species richness and diversity
    - Increased numbers of feral or invasive species.
- Altered species behaviour, due to noise, dust, light, and increased traffic or movement within the site
- Cumulative impacts from other projects within the region.

Table 11-11: Potential Impacts to Ghost Bat Habitat Surveyed within the Development Envelope

Habitat Type	Habitat Value	Survey Area (ha)	DE		IDF	
			Area (ha)	% of Critical Habitat within Survey Area	Area (ha)	% of Critical Habitat within Survey Area
Plain (sand)	Infrequent foraging – low suitability	5,491.11	1,283.76	23.38	1,027.63	18.71
Plain (stony/gibber)		2,550.33	86.22	3.38	51.04	2.00
Hills/ Ranges/ Plateaux	Infrequent foraging	503.05	6.75	1.34	6.75	1.34
Drainage Line/ River/ Creek (major)		172.79	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Granite Outcrops	Potential intermittent transient roosting (nocturnal)	183.43	0.04	<0.01	0	0
Total		**9,098.46**	**1,383.29**	**15.20**	**1,087.49**	**11.95**

11.6.4.7 Proposed Mitigation Measures

Mitigation measures proposed as part of the Proposal to address potential impacts to terrestrial fauna, including the Ghost Bat, are outlined in Section 8.7. The proposed mitigation measures are considered consistent with the recovery actions provided within the conservation advice for the species.

11.6.4.8 Assessment of Significance

An assessment of the potential impacts to the Ghost Bat from the Proposal is provided in Table 11-12.

11.6.4.9 Predicted Outcome

No Ghost Bat roosts were identified within the DE, although the Granite Outcrops (boulder piles) habitat provides potential intermittent transient roosting for the species. No Granite Outcrop will be disturbed by the proposal. No critical habitat for the species has been identified within the DE and the foraging habitat within the DE is considered low quality. As a result, the impact to Ghost Bat as a result of the implementation of the proposal are considered to be negligible.

Table 11-12: Significant Impact Assessment – Ghost Bat

Criteria for Vulnerable Species	Assessment of Significant Impact
Lead to a long-term decrease in the size of an important population of a species	**Unlikely** The Pilbara population of the Ghost Bat has been recorded across all four IBRA regions, with the largest colonies currently known from four abandoned gold and copper mines in the Chichester subregion (DBCA, 2023a). Smaller colonies are known from natural caves and small man-made adits across the Pilbara, in particular the Hamersley subregion (DBCA, 2023a). The species is experiencing population declines of >30% across its range, including the loss of roost sites in the Pilbara and destruction of two of the largest Pilbara colonies. The total population is estimated to be less than 10,000 individuals, with an estimated 1,300-2,000 individuals in the Pilbara region (DBCA, 2023a). The Ghost Bat was not detected within the DE during the Proposal surveys. The species was previously recorded in close proximity to the southern DE in 2014, and infrequent records of the species exist to the north and south from culverts and other foraging sites (Spectrum, 2025). All habitats within the DE may be used by the species for foraging. Roosting habitat within the DE was considered unlikely due to the lack of deep, humid crevices or caves in the Granite Outcrops (boulder piles) habitat and lack of suitable roost sites in the other habitat types. However, crevices in the Granite Outcrops (boulder piles) habitat were identified as potential intermittent transient roosts. Given that significant survey effort has been undertaken both within the DE and in close proximity to the DE, it is considered unlikely that a Ghost Bat roost or important population of Ghost Bats occurs within the DE. All Granite Outcrop habitat has been avoided. Additionally, the dominant habitat impacted within the DE (Plain (sand) and Plain (stony gibber)) is considered to be of low suitability for foraging (Spectrum, 2025). Following application of avoidance and mitigation measures (Section 8.7), the Proposal is considered unlikely to result in a decrease in a size of a population of this species, given the lack of roost sites or known colonies within the DE or in close proximity to the DE.
Reduce the area of occupancy of an important population	**Unlikely** Given the Ghost Bat is able to utilise all habitat types for foraging, a total of 9,098.46 ha of Ghost Bat has been mapped by the Proposal surveys. Overall, the Proposal will impact up to 1,087.49 ha of potential Ghost Bat foraging habitat. However extensive areas of foraging habitat across the Proposal survey area and the wider region will remain following the implementation of the proposal. No roost habitat or caves were recorded within the DE or survey areas. Therefore, given the extensive areas of foraging habitat remaining at both a local and regional scale and that the habitat present represents low quality foraging habitat, the area of occupancy for this species is considered unlikely to be significantly reduced as a result of the Proposal.
Fragment an existing important population into two or more populations	**Unlikely** Up to 1,087.49 ha of low-quality foraging habitat will be cleared as a result of the Proposal. All of the mapped habitats extend outside of the DE (and wider survey area) to form larger ecosystems. No roosts or caves have been recorded within the DE, with only potential intermittent transient roosting habitat associated with the Granite Outcrops (boulder piles). It is therefore considered unlikely that the Proposal will result in the fragmentation of the Pilbara species population into two or more populations.

Criteria for Vulnerable Species	Assessment of Significant Impact
Adversely affect habitat critical to the survival of a species	**Unlikely** Up to 1,087.49 ha of low-quality foraging habitat will be impacted as a result of the Proposal. These habitats are typical of the Pilbara bioregion and extend outside of the DE (and wider survey area) (Spectrum, 2025). No habitat considered critical to the survival of the species was identified within the DE. The habitats identified within the DE are considered well represented in the surrounding region, and no nearby roosts were identified within proximity to the DE. The species may utilise habitat within the DE to forage intermittently. Habitat identified as potential intermittent transient roosting (Granite Outcrops (boulder piles)), has been avoided. Following application of relevant mitigation measures (Section 8.7) and as a result of locating the DE within areas of least foraging value for the species, it is considered highly unlikely that the Proposal will adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	**Unlikely** No caves or breeding habitat for the species was identified within the DE and surrounding area. As a result, it is considered unlikely that the Proposal would disrupt the breeding cycle of the Pilbara Ghost Bat population.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely** No species roosts or caves potentially utilised by the species are present within the DE or surrounding surveyed area. The Proposal will result in the removal of up to 1,087.49 ha of low-quality foraging habitat. Extensive areas of similar foraging habitat will remain following the implementation of the proposal. Application of appropriate mitigation measures to reduce the potential for indirect impacts to remaining habitat will ensure that the remaining foraging habitat quality is maintained and improved where possible (Section 251). Based on the above, it is considered unlikely that the Proposal will modify, destroy, remove, isolate or decrease the availability of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Unlikely** Feral species and weeds are not considered key threatening processes for the Ghost Bat. Appropriate mitigation measures will be implemented during the life of the Proposal, to reduce the potential for feral animal populations to increase Section 8.7). The Proposal is considered unlikely to result in the establishment of invasive species within habitat for the Ghost Bat.
Introduce disease that may cause the species to decline	**Unlikely** The risk of introducing disease to the species population is considered low, as there are no identified suitable transmission pathways. However, appropriate mitigation measures (Section 8.7) will be implemented during the life of the Proposal to reduce the risk of introducing new diseases or increasing the spread of any diseases within the DE and surrounds. The Proposal is considered unlikely to result in the introduction of disease to the DE and surrounding region, that could cause the species to decline.

Criteria for Vulnerable Species	Assessment of Significant Impact
Interfere substantially with the recovery of the species	**Unlikely** The Proposal is considered unlikely to interfere substantially with the recovery of the species, given that the Proposal does not compromise any of the management actions identified for the species.

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11.7 Unpredictable or Irreversible Impacts to MNES

Impacts to species protected under the EPBC Act are considered quantifiable, given the extensive fauna assessments and surveys which have mapped potential fauna habitats and identified MNES species that occur or are likely to occur within the DE. Following validation of desktop results with site surveys, and consideration of existing information on each species, fauna values associated with each of the habitat types are well understood. The potential impacts have been predicted with a high degree of confidence, based on Fortescue's knowledge of the Pilbara region and experience completing similar developments within Western Australia. Progressive rehabilitation of temporary cleared areas will be undertaken where practicable. The area would be rehabilitated on decommissioning and Fortescue consider that given the type of disturbance (surface clearing only) prospects for successful rehabilitation are good.

Based on the assessment against the relevant EPBC Act Significant Impact Guidelines 1.1 for all MNES present within or adjacent to the Proposal, it is possible that implementation of the Proposal may represent a significant impact on the Greater Bilby (Table 11-3) due to the loss of burrowing and foraging habitat and the proximity of known individuals to the DE. Impacts to all other MNES species are not considered significant or are negligible.

A referral under the EPBC Act will be submitted for the Proposal, to confirm whether the impacts to species identified within this chapter are considered significant and require assessment under the EPBC Act.

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12 HOLISTIC IMPACT ASSESSMENT

The EIA process needs to consider the connections and interactions between parts of the environment to inform a holistic view of impacts to the environment as a whole. The environment is a complex dynamic of connections and interactions, and while an effect on a particular factor(s) may be minor in isolation, its impact across these interconnections may result in a significant impact.

The EPA defines the holistic impacts as the "Connections and interactions between impacts, and the overall impact of the proposal on the environment as a whole". Fortescue has sought to understand the environment, using information derived from technical surveys and investigations of the environment and the views and concerns raised through consultation (to date and ongoing) with relevant stakeholders, including the Kariyarra Traditional Owners. The inputs and perspectives of the Traditional Owners continues to be vital in growing this understanding of the whole environment and the balance between its many interconnected elements.

12.1 Assessment Approach

The holistic assessment has been undertaken with reference to the following controls and assumptions:

- Where an impact(s) has been completely avoided, it is considered not to contribute to holistic environmental effects and does not require consideration.
- Where an impact is already considered potentially significant and the mitigation hierarchy applied in relation to one factor, additional mitigation measures to address combined environmental effects are unlikely to be required.
- Where an impact(s) has been considered to likely result in a significant impact across two or more factors, and the mitigation hierarchy has been applied in isolation per factor, consideration has been given if further measures are required to mitigate this combined impact.
- Where there are multiple overlapping minor impacts, or a minor impact affects multiple values and has been assessed as insignificant in the context of an individual factor, these may require further holistic consideration.
- The environmental principles of intergenerational equity, and conservation of biological diversity and ecological integrity are considered the most relevant and have been a foundation when considering potential significance of the holistic effect of the Proposal (refer Section 5).

12.2 Connections and Interactions between Environmental Factors

The environmental surveys and studies undertaken for the Proposal have considered and assessed potential impacts at both a local and regional scale. The results of these surveys and studies have informed the Proposal site selection process and design (refer Section 3), impact assessment and development of appropriate measures to mitigate the identified potential impacts. While the Proposal's predicted outcomes have been considered independently in relation to the environmental principles and the EPA's environmental objectives for each preliminary environmental factor (refer Sections 7 to 9), Fortescue recognises the complex linkages between the preliminary key environmental factors: flora and vegetation, terrestrial fauna and social surroundings.

In the Pilbara, the most important cultural values often coincide with elements of the landscape with high visual amenity, botanical diversity and fauna habitat values. Additional combined environmental effects may become significant and require additional mitigation. The connectivity between the preliminary key environmental factors; flora and vegetation, terrestrial fauna, social surroundings and, to a lesser extent Inland waters (as an 'other factor') as illustrated in Plate 12-1.

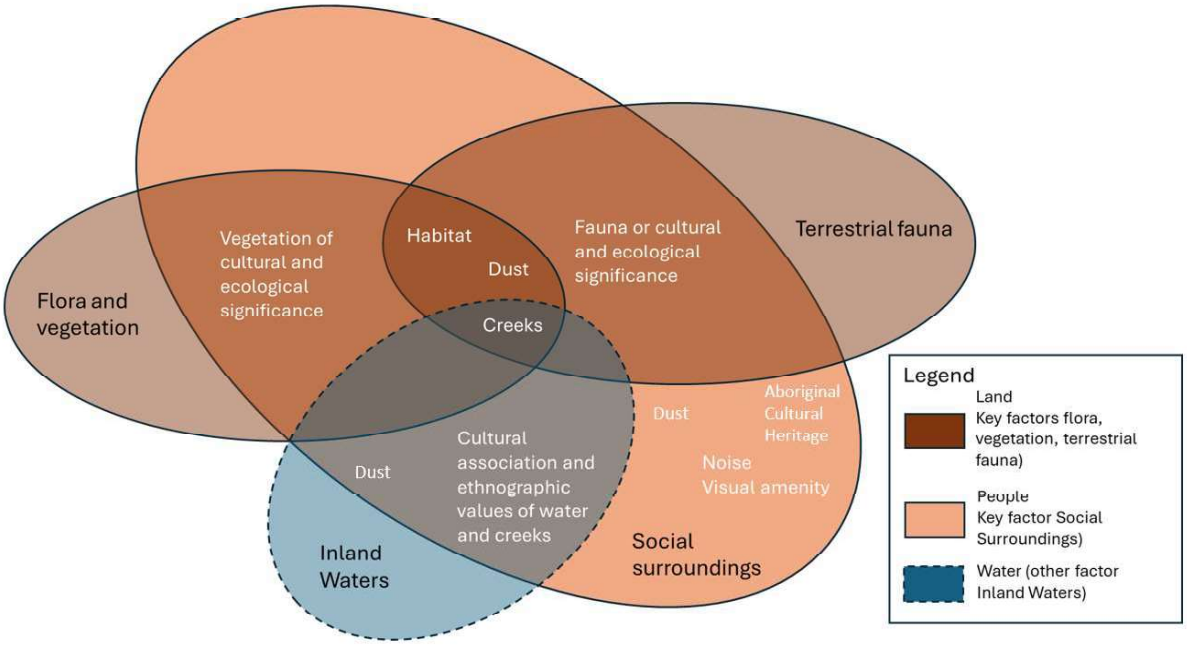

Plate 12-1: Intrinsic Interactions Between Environmental Factors

The key Proposal activities likely to result in impacts across multiple environmental factors and combined impacts to environmental receptors are:

- Vegetation and land clearing
- General Construction and Maintenance Activities.

These are discussed in further detail in Sections 11.2.1 to 11.2.3. Table 11 1 summarises the relevant holistic impacts associated with construction and operation of the Proposal

12.2.1 Vegetation and Land Clearing

To facilitate construction and operation of the Proposal, the works will result in the permanent clearing of 1,108.2 ha of in 'Very Good to Excellent' condition native vegetation. The combined impacts associated with vegetation clearing include:

- Loss of conservation significant flora and supporting habitat (Flora and Vegetation).
- Loss of culturally significant flora (Flora and Vegetation and Social Surroundings).
- Loss of habitat for conservation significant and culturally significant fauna species (Terrestrial Fauna and Social Surroundings).
- Habitat fragmentation for conservation significant and culturally significant fauna species (Terrestrial Fauna and Social Surroundings).
- Direct fauna mortality through collisions with plant and machinery (Terrestrial Fana and Social Surroundings).
- Introduction and spread of weeds which can outcompete conservation and culturally significant flora, reduce the quality of fauna habitat, increase feral herbivore activity and increase the risk of bushfires (Flora and Vegetation, Social Surroundings and Terrestrial Fauna).

Therefore, through the clearing of vegetation, which primarily effects flora and vegetation, the Proposal has the potential to result in impacts terrestrial fauna by removing and altering fauna habitat, or direct mortality through collision with construction machinery.

Vegetation units and vegetation associations, as per Beard et al. (2013), will not be cleared to an extent that will reduce the remaining vegetation below 30%, with over 97% of all vegetation associations remaining at the State level, Pilbara IBRA bioregional and Chichester subregional levels, or the Local Government Area (shire of East Pilbara). Therefore, clearing of vegetation at a regional scale will not lead to compounding impacts that would result in significant effects on the identified environmental values and their connections, including the provision of habitat for conservation and culturally significant flora and fauna species.

Clearing activities and associated vehicle movements can introduce invasive plant species. These weeds often outcompete native species, leading to reduced plant diversity and altered habitat structure. High weed coverage can alter fire regimes by increasing flammable biomass, which may raise the frequency and intensity of bushfires, further degrading habitats. It is

anticipated that the introduction and spread of weeds will be adequately controlled during the construction phase through the implementation of specific weed management measures that will be outlined in the EMP, such that no significant holistic impacts would occur.

Overall, the proposed mitigation and management measures for each environmental factor, as summarised in Table 12-1, along with offsets to address impacts on vegetation and flora, will ensure that impacts on other environmental factors, including terrestrial fauna and social surroundings align with the EPA's environmental objectives.

12.2.2 Construction and Maintenance Activities

The construction period for the Proposal is anticipated to take up to 30 months. Combined impacts resulting from vegetation clearing during construction are addressed above. Other construction activities (such as operation of plant and machinery, earthworks, and installation of infrastructure), and to a lesser extent some operational maintenance activities, can simultaneously increase noise, dust and artificial light emissions, increase the risk of spills and attract feral fauna to the DE, resulting in combined impacts to Terrestrial Fauna, Flora and Vegetation, Terrestrial Environmental Quality, Inland Waters and Social Surroundings.

General construction activities can lead to the following combined impacts:

- Disturbance to fauna and social surroundings from noise and vibration (Terrestrial Fauna and Social Surroundings).
- Increased dust emissions generated during construction can settle on plants, ultimately affecting the health of flora and vegetation of conservation and cultural significance (Flora and Vegetation, and Social Surroundings).
- Attraction of feral animals causing impacts to flora and vegetation, and terrestrial fauna of conservation and cultural significance through predation, competition and degradation of habitat (Flora and Vegetation, Terrestrial Fauna and Social Surroundings).
- Disturbance of fauna and social surroundings from artificial lighting (Terrestrial Fana and Social Surroundings).
- Contamination of soil and watercourses through accidental spills (Social Surroundings and Inland Waters).

Holistic impacts on terrestrial fauna and social surroundings receptors may arise from combined disturbances during construction, including noise and vibration, artificial lighting, and increased dust emissions. Noise and light emissions can cause fauna to avoid certain areas, and, given the cultural significance of some species (as discussed in Chapter 8), this may affect the traditional practices of the Kariyarra traditional Owners if these fauna species become less common. However, with the implementation of an EMP, and subsequent CEMP produced by the appointed contractor, during construction and the mitigation measures outlined in Table 12-1, potential impacts will be minimised to a level where they are not considered significant, either individually or holistically.

In addition, any impacts from disturbance during construction would be temporary, for intermittent periods, and therefore no long-term significant holistic impacts on surrounding receptors are likely.

Overall, it is considered that the proposed mitigation and management measures, as summarised in Table 12-1, and the implementation of the EMP will ensure impacts on values that are interconnected between the identified factors are likely to be consistent with the EPA's environmental factor objectives.

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Table 12-1: Holistic Impact Assessment Summary

Proposal Activity	Holistic Impacts	Mitigation and Management Measures	EPA Objective Achieved (Y/N)	Additional Mitigation Required for Holistic Impact?
Land Clearing	• Loss of conservation significant flora and supporting habitat. • Loss of culturally significant flora. • Loss of habitat for conservation significant and culturally significant fauna species. • Habitat fragmentation for conservation significant and culturally significant fauna species. • Direct fauna mortality through collisions with plant and machinery. • Introduction and spread of weeds and increasing risk of bushfires.	• Where significant flora or vegetation occurs close to the IDF, areas will be clearly demarcated prior to construction activities to protect the conservation significant flora species and vegetation from impacts such as accidental clearing or disturbance (Chapter 7). • Areas to be cleared will be demarcated on the ground (either physically or using GPS enabled methods) (Chapter 7). • Comprehensive weed hygiene management through implementation of specific weed management measures to be outlined in the EMP (Chapter 7). • Strict speed limits will be enforced around the site to avoid fauna strikes during clearing and construction (Chapter 8).	Yes – When considered holistically, the likely environmental effects from the Proposal will not result in combined environmental effects that significantly impact the environment as a whole.	No
Disturbance from Construction works	• Disturbance to fauna and social surroundings from noise and vibration. • Increased dust emissions generated during construction can settle on plants, ultimately affecting the health of flora and vegetation of conservation and cultural significance.	• Dust deposition will be managed through standard construction measures (e.g., water application and exposed surface stabilisation) to minimise dust generation and avoid impacts on vegetation in line with the dust management measures to be outlined in the EMP for the Proposal (Chapter 7). • All food waste will be removed from site at the end of each shift. Waste will be stored at the depot and regularly removed to minimise attraction of feral animals (Chapter 8).	Yes – When considered holistically, the likely environmental effects from the Proposal will not result in combined environmental effects that significantly impact the environment as a whole.	No

Proposal Activity	Holistic Impacts	Mitigation and Management Measures	EPA Objective Achieved (Y/N)	Additional Mitigation Required for Holistic Impact?
	• Attraction of feral animals causing impacts to flora and vegetation, and terrestrial fauna of conservation and cultural significance through predation, competition and degradation of habitat. • Disturbance of fauna and areas of cultural significance from artificial lighting. • Contamination of soil and watercourses through accidental spills.	• Lighting will be designed and managed in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023c) (Chapter 8). • Standard construction noise management measures will be implemented (Chapter 8), including: • Machinery and vehicles are regularly serviced and operated/maintained in accordance with the manufacturer's specifications, and preferential use of modern equipment that generally operate more quietly. • Plant and machinery on site will be switched off and not left idling when not in use. • Scheduling the construction activities to ensure the noisiest tasks occur during times that will cause the least disturbance. • Undertake blasting activities in accordance with Fortescue's Blasting Near Heritage Place Procedure (100-PR-HE-0003) (Chapter 9). • Any identified ASS will be managed in accordance with 'Treatment and management of soil and water in acid sulfate soil landscapes' (DWER, 2015) (Chapter 10). • Spills will be managed through standard site pollution prevention measures (Chapter 10).		

13 OFFSETS

The WA Environmental Offsets Guidelines (Government of WA, 2014) defines environmental offsets as '*actions that provide environmental benefits which counterbalance the significant residual environmental impacts or risks of a project or activity*'. Unlike mitigation actions, which are implemented on-site to reduce the direct impacts of the project, offsets are undertaken outside of the project area and counterbalance significant residual impacts.

Environmental offsets are applied when the residual impacts of a project are deemed significant, after efforts to avoid, minimise, and rehabilitate have been exhausted.

Fortescue contends that the prospects of rehabilitation and revegetation being successful in returning disturbed areas to functional vegetation communities and fauna habitat is very good, considering that the proposed disturbance is limited to the surface only. Decommissioning of the site is not complicated, with solar panels to be dismantled and stored topsoil and vegetation spread back over disturbed areas. Additional seeding or planting can assist to return species that may not readily establish. Therefore, the proposed clearing should not be viewed as a permanent loss of vegetation or fauna habitat.

The Environmental Management Plan will incorporate fauna monitoring for conservation significant and culturally significant species within the DE. This monitoring will be implemented to monitor impacts to species populations and will be undertaken as part of the current site fauna monitoring at the adjacent rail infrastructure.

Consequently, no offsets are proposed for the Proposal.

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14 CONCLUSION

Fortescue is proposing to develop a renewable energy hub, the Turner River Solar Hub, comprising of solar generation and 220 kV transmission line spurs connecting to Fortescue's existing Power Network in the Pilbara region of Western Australia.

The Proposal includes the installation of solar PV modules and substation, with a total capacity of up to 644 MW. The proposed 220 kV transmission line spurs will integrate the solar farm into Fortescue's PEC system, enabling energy supply across operations in the Pilbara. The Proposal involves disturbance of up to 1,108.2 ha of vegetation within a 1,416.6 ha Development Envelope (DE).

The Proposal has the potential to adversely impact the environmental and social values within the DE. These factors and any significant residual impacts are summarised below.

Flora and Vegetation

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

The Proposal will result in the clearing of 1,108.2 ha of native vegetation. The following residual impacts are expected after mitigations measures are applied:

- Clearing of no more than 1,108.2 ha of native vegetation, and 1,090.1ha of 'Very Good to Excellent' condition native vegetation within a DE of 1,1416.6 ha.
- Clearing of conservation significant flora, including:
    - Up to 502 individuals of *Euploca mutica* (P3) from 40 locations (76% of total known individuals from survey area; 60% of known locations from survey area)
    - Up to 3,104,000 – 4,345,600 individuals of *Triodia chichesterensis* (P3) (18% of estimated total of individuals from survey area)
    - Up to 23 individuals of the potentially novel taxon *Trianthema* aff. *oxycalyptrum* (12% of total identified individuals during the survey (survey area and opportunistic observations from outside survey area)).

The impacts of this clearing are not significant at the local or regional scale. Through avoidance and minimisation of impacts, the biological diversity and ecological integrity of the area will be maintained. The Proposal is therefore consistent with the EPAs environmental objective for flora and vegetation.

Terrestrial Fauna

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

The Proposal will result in the clearing of 1,108.2 ha of fauna habitat, some of which provides potential habitat for conservation significant fauna. The following residual impacts are expected after mitigation measures are applied:

- Clearing of 2.07 ha of Drainage Line/River/Creek (minor) habitat which is critical dispersal and foraging habitat for Northern Quoll and critical burrowing and foraging habitat for Greater Bilby.

- Clearing of 1,027.63 ha of Plain (sand) habitat which is critical burrowing and foraging habitat for Greater Bilby.

- Clearing of 51.04 ha of Plain (stony/gibber) habitat which is critical burrowing and foraging habitat for Greater Bilby.

- Clearing of 6.75 ha of Hills/Ranges/Plateaux: habitat which is critical dispersal and foraging habitat for Northern Quoll.

Other potential direct and indirect impacts to terrestrial fauna associated with the Proposal will not be significant at a local or regional scale. Throughout the design phase of the Proposal, the DE has been significantly reduced in size and relocated further north than the initial location to avoid major drainage and potential habitat for conservation significant fauna species. Through the avoidance and minimisation of impacts, the Proposal will ensure the biological and ecological integrity of the area is maintained. The Proposal is therefore consistent with the EPAs environmental objective for terrestrial fauna.

Social Surroundings

To protect social surroundings from significant harm.

No impacts to nearby towns, surrounding industry, amenity (visual, noise, vibration or dust), landscape, Aboriginal Cultural Heritage and values or non-Aboriginal heritage are expected to occur as a result of the Proposal.

Fortescue is committed to minimising impacts on Heritage Places and areas of cultural significance and will continue to consult with Kariyarra. Where impacts to Heritage Places cannot be avoided by the Proposal, Fortescue will consult with Kariyarra for all relevant approvals applied for under the AH Act. Fortescue will comply with the AH Act and any approval conditions set by the Minister of Aboriginal Affairs at all times during construction and operations of the Proposal. Fortescue will continue to consult with Kariyarra to ensure appropriate management of cultural values during implementation of the Proposal.

No significant residual impacts to social surrounds have been identified and the Proposal is consistent with the EPAs objective for social surroundings.

Other Factors

Through the implementation of standard mitigation measures, and controlled through other legislation and regulations, no significant impacts are anticipated as a result of the Proposal with regards to inland waters, terrestrial environmental quality and landforms.

15 REFERENCES

360 Environmental. (2023). *Vertebrate Fauna Assessment: North Star Junction Renewable Energy Infrastructure Project (Rev2). Report prepared for Fortescue Metals Group Ltd.* Perth: 360 Environmental Pty Ltd.

360 Environmental. (2024). *North Star Junction: Flora and Vegetation Assessment (v2).* Perth.

Australian Museum. (2024). *Orange Leaf-nosed Bat.*

Bamford. (2010). *Targeted Fauna Assessment of the Rail Duplication.* Bamford Consulting Ecologists.

Biologic. (2024). *North Star Junction West Solar Farm: Kariyarra Tradtional Ecological Knowledge Survey.* Perth: Biologic Environmental.

Biota. (2008). *Hope Downs IV Northern Quoll Position Paper.* Perth: Biota Environmental Sciences. Retrieved from https://www.environment.gov.au/epbc/notices/assessments/2008/4636/d-northern-quoll-position-paper.pdf

BirdLife International. (2024). *Species factsheet: Grey Falcon Falco hypoleucos.*

BoM. (2024). *Climate Data Online* .

BOM. (2024). *Groundwater Dependent Ecosystems Atlas.* Retrieved from http://www.bom.gov.au/water/groundwater/gde/map.shtml

Bullen, R D. (2021a). *A review of ghost bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and Environment.* Perth: Batt Call WA Pty Ltd. Retrieved from https://www.dcceew.gov.au/environment/epbc/publications/review-ghost-bat

Bullen, R. D. (2021b). *A review of Pilbara leaf-nosed bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and Environment.* Perth: Bat Call WA Pty Ltd.

Bullen, R. D. (2021b). *A review of Pilbara leaf-nosed bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and Environment.* Perth: Bat Call WA Pty Ltd.

Christian , C., & Stewart , G. (1953). General Report on Survey of Katherine-Darwin Region 1946. *Australian Land Research Series 1, CSIRO*.

CSIRO. (n.d.). *Atlas of Living Australia*. Retrieved from Commonwealth Scientific and Industrial Research Organisation: https://bie.ala.org.au/

DBCA. (2017). *Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia (v1).* WA Department of Biodiversity, Conservation and Attractions : DBCA.

DBCA. (2019). *2018 Statewide Vegetation Statistics incorporating the CARReserve Analysis (Full Report).* Perth: WA Department of Biodiversity, Conservation and Attractions. Retrieved from https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics

DBCA. (2022). *NatureMap*. Retrieved from WA Department of Biodiversity Conservation and Attractions: https://naturemap.dpaw.wa.gov.au

DBCA. (2022a). *Threatened and Priority Flora List (TPFL) database request (custom search)*. Retrieved from WA Department of Biodiversity, Conservation and

Attractions: https://www.dbca.wa.gov.au/management/threatened-species-and-communities/resources/threatened-species-and-communities-database-searches

DBCA. (2022b). *Western Australia Herbarium Flora Database (custom search)*. Retrieved from WA Department of Biodiversity, Conservation and Attractions: https://www.dbca.wa.gov.au/management/threatened-species-and-communities/resources/threatened-species-and-communities-database-searches

DBCA. (2023, April 27). *Pilbara Impact and Invasiveness Ratings.* Retrieved from Department of Biodiversity, Conservation and Attractions: https://www.dbca.wa.gov.au/management/threat-management/weeds

DBCA. (2023a). *Summary of knowledge for six faunal species that are Matters of National Environmental Significance in the Pilbara, Western Australia.*

DBCA. (2024). *Guidelines for determining the likely presence and habitat usage of night parrot (Pezoporus occidentalis) in Western Australia (v1).* Perth: WA Department of Biodiversity, Conservation and Attractions.

DCCEEW. (2021). *Australia's Bioregions (IBRA) .* Retrieved from https://www.dcceew.gov.au/environment/land/nrs/science/ibra

DCCEEW. (2022). *Protected Matters Search Tool*. Retrieved from Commonwealth Department of Climate Change, Energy, the Environment and Water: https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

DCCEEW. (2023). *National Light Pollution Guidelines for Wildlife (v2.0) .* Canberra: Commonwealth Department of Climate Change, Energy, the Environment, and Water.

DCCEEW. (2023). *Recovery Plan for the Greater Bilby (Macrotis lagotis).* Canberra: Department of Climate Change, Energy, the Environment, and Water. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/recovery-plan-greater-bilby-2023.pdf

DCCEEW. (2024, June 11). *Australia's Strategy for Nature*. Retrieved from Commonwealth Department of Climate Change, Energy, the Environment and Climate Change: https://www.dcceew.gov.au/environment/biodiversity/conservation/strategy

DCCEEW. (2024). *Species Profile and Threats Database*. Retrieved from Commonwealth Department of Climate Change, Energy, the Environment and Water: http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl

Department of Planning and Environment. (2016). *Wind Energy: Visual Assessment Bulletin.* Government of New South Wales. Retrieved from https://www.planning.nsw.gov.au/sites/default/files/2023-03/wind-energy-visual-assessment-bulletin.pdf

DER. (2015). *Identification and investigation of acid sulfate soils and acidic landscapes.* Department of Environmental Regulation.

DER. (2015a). *Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes.* Retrieved from https://www.wa.gov.au/system/files/2023-04/Identification-and-investigation-of-acid-sulfate-soils-and-acidic-landscapes.pdf

DER. (2015b). *Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes .* Retrieved from https://www.wa.gov.au/system/files/2023-04/Treatment-and-management-of-soil-and-water-in-acid-ss-landscapes.pdf

DEWHA. (2008a). *Approved Conservation Advice for Liasis olivaceus barroni (Olive Python - Pilbara subspecies).* Canberra: Commonwealth Department of the Environment,

Water, Heritage and the Arts. Retrieved from https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66699

DEWHA. (2008b). *Threat Abatement Plan for predation by the European Red Fox.* Commonwealth Department of the Environment, Water, Heritage and the Arts.

DEWHA. (2010a). *Survey Guidelines for Australia's Threatend Birds: Guidelines for detecting birds listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999.*

DEWHA. (2010b). *Survey Guidelines for Australia's Threatend Bats: Guidelines for detecting Bats listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999.*

DNV. (2024a). *Glint and Glare Assessment: NSJ West Solar Farm.* Sydney: DNV Australia Pty Limited.

DNV. (2024b). *Glint and Glare Assessment: Turner River Solar Hub.* Sydney: DNV Australia Pty Limited .

DoE. (2013). *Significant Impact Guideline 1.1: Matters of National Environmental Significance .* Canberra : Commonwealth Department of the Environment .

DoE. (2015a). *Wildlife Conservation Plan for Migratory Shorebirds.* Canberra: Commonweath Department of Environment.

DoE. (2015b). *Threat abatement plan for predation by feral cats.* Canberra: Commonwealth Department of Environment.

DoE. (2016). *EPBC Act referral guideline for the endangered northern quoll Dasyurus hallucatus: EPBC Act Policy Statement.* Canberra: Commonwealth Department of the Environment. Retrieved from https://www.dcceew.gov.au/environment/biodiversity/threatened/publications/referral-guideline-northern-quoll

DoE. (2024). *Rhinonicteris aurantia (Pilbara form) — Pilbara Leaf-nosed Bat*. Retrieved from Species Profile and Threats Database : https://www.environment.gov.au/sprat

DoEE. (2016). *Threat Abatement Plan for Competition and Land Degredation by Rabbits .* Commonwealth Department of the Environment and Energy.

Doley, D. (2006). Airborne Particles and Vegetation: Review of Physical Interactions. *Clean Air and Environmental Quality*, 36-42.

DoW. (2009). *Water Quality Protection Note no.84. Rehabilitation of disturbed land in public drinking water source areas .* Retrieved from https://www.wa.gov.au/system/files/2022-04/WQPN-84-Rehabilitation-of-disturbed-land-in-public-drinking-water-source-areas.pdf

DoW. (2010). *Pilbara Regional Water PLan 2010-2030.* Retrieved from https://www.wa.gov.au/system/files/2022-10/Pilbara-regional-water-plan-2010-2030.pdf

DoW. (2015). *Water Quality Protection Note no.65. Toxic and hazardous substances.* Retrieved from https://www.wa.gov.au/system/files/2022-04/WQPN-65-Toxic-and-hazardous-substances.pdf

DPIRD. (2022, July 18). *Soil and Landscape Mapping - Systems (DPIRD-064)*. Retrieved from WA Department of Primary Industries and Regional Development : https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems

DPIRD. (2022). *Soil Landscape Mapping.* Retrieved from https://catalogue.data.wa.gov.au/dataset/soil-landscape-mapping-systems

DPIRD. (2024). *Pilbara Development Commission.*

DPLH. (2024). *Aboriginal Cultural Heritage Inquiry System.* Retrieved from https://espatial.dplh.wa.gov.au/ACHIS/index.html?viewer=ACHIS

DSEWPaC. (2011a). *Guidelines for detecting mammals listed as Threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Canberra: Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

DSEWPaC. (2011b). *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999.* Canberra: Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

DSWEPaC. (2011c). *Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads.* Canberra: Commonwealth Department of Sustainability, Environment, Water, Population and Communities.

DWER. (2021). Draft Guideline: Assessment of Environmental Noise Emissions. Retrieved from https://www.wa.gov.au/system/files/2022-03/Draft%20Guideline%20Assessment%20of%20environmental%20noise%20emissions.pdf

DWER. (2021). Draft Guideline: Dust Emissions. Retrieved from https://www.wa.gov.au/system/files/2022-03/Draft%20Guideline%20-%20Dust%20emissions.pdf

DWER. (2021). *Water Quality Protection Note no.25. Land use compatibility tables for public drinking water source areas .* Retrieved from https://www.wa.gov.au/system/files/2022-04/Land-use-compatibility-tables-for-public-drinking-water-source-areas.pdf

Ecologia. (2012). *North Star Flora and Vegetation Assessment.*

Ecoscape. (2021). *NSJ100 Flora and Fauna Assessment .* Perth.

Ecoscape. (2022). *North Star Flora and Vegetation Assessment.* Perth.

Environment Australia. (2001). *National Objectives and Targets for Biodiversity Conservation 2001-2005.* Canberra: Commonwealth of Australia. Retrieved from https://library.dbca.wa.gov.au/static/FullTextFiles/020395.pdf

EPA . (2015). *DRAFT Envrionmental Assessment Guideline for Separation Distances between INdustrial and Sensitive Land Uses.* Perth: Environmental Protection Authority WA.

EPA. (2008). *Guidance Statement No. 33: Environmental Guidance for Planning and Development.* Perth: WA Environmental Protection Authority. Retrieved from https://www.epa.wa.gov.au/policies-guidance/environmental-guidance-planning-and-development-gs-33

EPA. (2008). *Guidance Statement No. 33: Environmental Guidance for Planning and Development .* Perth: WA Environmental Protection Authority.

EPA. (2008b). *Environmental Guidance for Planning and Development. Guidance Statement No. 33. Government of Western Australia .* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/GS33-270508.pdf

EPA. (2016). *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment.* Perth: WA Environmental Protection Authority. Retrieved from

https://www.epa.wa.gov.au/policies-guidance/technical-guidance-flora-and-vegetation-surveys-environmental-impact-assessment

EPA. (2016a). *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EPA%20Technical%20Guidance%20-%20Flora%20and%20Vegetation%20survey_Dec13.pdf. Accessed on 09/04/2024.

EPA. (2016b). *Environmental Factor Guideline: Flora and Vegetation.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Flora-Vegetation-131216_4.pdf. Accessed on 09/04/2024.

EPA. (2016c). *Environmental Factor Guideline: Terrestrial Fauna.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Terrestrial-Fauna-131216_3.pdf. Accessed on 09/04/2024.

EPA. (2016d). *Technical Guidance – Sampling methods for Terrestrial Fauna.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Tech%20guidance-%20Sampling-TV-fauna-Dec2016.pdf

EPA. (2016e). *Environmental Factor Guideline – Terrestrial Environmental Quality .* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Terrestrial-Environmental-Quality-131216_2.pdf

EPA. (2016e). *Environmental Factor Guidelines – Subterranean Fauna.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Subterranean-Fauna-131216_3.pdf.

EPA. (2018a). *Environmental Factor Guideline: Inland Waters.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Inland-Waters-29062018.pdf

EPA. (2018b). *Environmental Factor Guideline - Landforms.* Environmental Protection Authority. Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline-Landforms-29062018.pdf

EPA. (2020). *Technical Guidance - Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/2020.09.17%20-%20EPA%20Technical%20Guidance%20-%20Vertebrate%20Fauna%20Surveys%20-%20Final.pdf

EPA. (2021). *Environmental Impact Assessment (Part IV Divsions 1 and 2) Procedures Manual .* Perth : Environmental Protection Authority WA.

EPA. (2021c). *Technical Guidance – Subterranean fauna surveys for EIA.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Technical%20Guidance%20-%20Subterranean%20fauna%20surveys%20for%20EIA.pdf

EPA. (2021d). *Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2020.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/EIA%20%28Part%20IV%20Divisions%201%20and%202%29%20Procedures%20Manual_1.pdf

EPA. (2023a). *Statement of Environmental Principles, Factors, Objectives and aims of EIA.* Retrieved from https://www.epa.wa.gov.au/statement-environmental-principles-factors-and-objectives

EPA. (2023b). *Environmental Factor Guideline: Social Surroundings.* Retrieved from https://www.epa.wa.gov.au/policies-guidance/environmental-factor-guideline-social-surroundings

EPA. (2023c). *Technical Guidance: Environmental Impact Assessment of Social Surroundings - Aboriginal Cultural Heritage.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Technical%20Guidance%20EIA%20of%20Social%20Surroundings%20-%20Aboriginal%20Cultural%20Heritage%20%28Nov2023%29_2.pdf

EPA. (2024a). *Instructions - How to Prepare an Environmental Review Document.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Forms_and_Templates/Instructions-%20How%20to%20prepare%20an%20Environmental%20Review%20Document_0.pdf

EPA. (2024b). *Environmental Factor: Greenhouse Gas Emissions.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Policies_and_Guidance/Guideline%20%E2%80%93%20GHG%20Emissions%20-%20November%202024.pdf

ETA. (2022). *ALinta Energy Solar Farm Project, Port Hedland (v2), Report prepared for Alinta Energy Development Pty LTd.* Environmental Technologies & Analytics Pty Ltd.

ETA. (2024). *North Star Junction West & Wodgina – Solar Farm: Construction Phase Dust Risk Assessment (vD). Report prepared for Fortescue Pty Ltd.* Perth: Environmental Technologies & Analytics Pty Ltd.

Fortescue. (2024). *Turner River Solar Hub Social Surrounds Consulation Summary Report.* Fortescue.

Fortescue. (2024b). *Baseline Surface Water Assessment: North Star Junction West Solar Farm (v1).* Fortescue.

George, et al . (2011). *A biodiversity survey of the Pilbara region of Western Australia 2002-2007.* WA: Western Australian Museum.

Geoscience Australia. (2012). *Surface Geology of Australia 1:1 million scale dataset 2012 edition.* Australian Government. Retrieved from https://data.gov.au/data/dataset/surface-geology-of-australia-1-1-million-scale-dataset-2012-edition

Hathcock, C. (2018). Literature review on impacts to avian. Retrieved from https://www.energy.gov/sites/prod/files/2019/03/f61/Hathcock%202018.pdf

Hill, B. M., & Ward, S. J. (2010). *National Recovery Plan for the Northern Quoll Dasyurus hallucatus.* Darwin: Department of Natural Resources, Environment, The Arts and Sport. Retrieved from https://www.dcceew.gov.au/sites/default/files/documents/northern-quoll.pdf

Keighery, B. J. (1994). *Bushland Plant Survey: a Guide to Plant Community Survey for the Community.* Perth, WA: Wildflower Society of WA (Inc.).

Kelley, I. (2005). *Australian Regional Tourism Handbook. Perth: Australian Tourism Centre.*

Kendrick and McKenzie. (2001). *Pilbara 1 (PIL1 - Chichester subregion).*

LandCorp. (2013). *Boodarie Strategic Industrial Area (BSIA) Turner River Flood Study.* Retrieved from https://www.epa.wa.gov.au/sites/default/files/Referral_Documentation/Attachment%2010%20Hydrology%20study%20%28GHD%2C%202013%29.pdf

Landloch. (2024). *NSJW Solar Farm Soil and Landform Assessment: Interim Report.*

McKenzie, N., May, J., & McKenna, S. (2003). *Bloregional Summary of the 2002 Biodiversity Audit for Western Australia.* Western Australia: Department of Conservation and Land Management.

Pepper, M., Doughty , P., & Keogh, J. (2013). Geodiversity and endemism in the iconic Australian Pilbara region: a review of landscape evolution and biotic response in an ancient refugium. *Journal of Biogeography*, 1225-1239.

Pilbara Development Commission. (2014, August 8). *The Region.* Retrieved from Regional Profile on Pilbara Development Commission: http://www.pdc.wa.gov.au/regional-information/

PIlbara Development Commission. (2024). *Invest in the Pilbara.* PIlbara Development Commission. Retrieved from https://www.pdc.wa.gov.au/our-region/invest-in-the-pilbara.aspx

REMPLAN. (2024). *Town of Port Hedland: Economy, Jobs and Business Insights.* Compelling Economics Pty Ltd. Retrieved from https://app.remplan.com.au/porthedland/economy/summary

RPM Global. (2023). *Hemi Gold Project Section 38 Referral Supporting Document .* De Grey Mining Ltd.

Schoenjahn, J. (2018). *Adaptations of the rare endemic Grey Falcon Falco hypoleucos that enable its permanent residence in the arid zone of Australia.* University of Queensland.

SKM. (2003). *Aggregated Emissions Inventory for the Pilbara Airshed.* Department of Environmental Protection, WA.

SLR . (2023). *Detailed Flora and Vegetation Assessment: North Star Junction West (v2.0).* Perth: SLR Consulting Australia .

SLR . (2025). *Detailed Flora and Vegetation Assessment - Turner River Consolidated .* Perth: SLR Consulting .

SLR. (2024). *Visual Impact Assessment: Turner River Solar Hub.* Perth: SLR Consulting Australia.

Spectrum. (2024b). *Wodgina Project - Targeted Bilby Survey .* Perth: Spectrum Ecology Pty Ltd.

Spectrum. (2025). *North Star Junction West: Detailed Terrestrial Vertebrate Fauna Assessment (v2). Report prepared for Fortescue Metal Group.* Spectrum Ecology Pty Ltd: Perth.

Talis. (2024). *Turner River Solar Hub Project - Environmental Noise Assessment.* Perth: Talis Consultants.

Terrestrial Ecosystems. (2011). *Conservation Significant Vertebrate Fauna Species Habitat Assessment: Roy Hill Infrastructure Rail Corridor from Port Hedland to Chainage 262.* Unpublished report for Roy Hill Infrastructure.

Town of Port Hedland. (2024). *Town of Port Hedland Ecomonic Profile*. Retrieved from Town of Port Hedland: https://www.porthedland.wa.gov.au/about-council/doing-business-with-the-town-of-port-hedland/economic-profile.aspx

Trudgen, M. E. (1988). *A Report on the Flora and Vegetation of the Port Kennedy Area. Unpublished report prepared for Bowman Bishaw and Associates.* Perth WA.

TSSC. (2005). *Commonwealth Listing Advice on Northern Quoll (Dasyurus hallucatus).* Canberra: Threatened Species Scientific Committee.

TSSC. (2005). *Northern Quoll (Dasyurus hallucatus).* Retrieved from https://www.dcceew.gov.au/environment/biodiversity/threatened/assessments/dasyurus-hallucatus-2005#:~:text=TSSC%20acknowledges%20that%2C%20due%20to,the%20vulnerable%20and%20endangered%20categories.

TSSC. (2008). *Approved Conservation Advice for Liasis olivaceus barroni (Olive Python – Pilbara subspecies.* Threatened Species Scientific Committee, Commonwealth Department of the Environment.

TSSC. (2016a). *Conservation Advice: Macroderma gigas (Ghost Bat).* Canberra: Threatened Species Scientific Committee, Commonwealth Department of the Environment. Retrieved from https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=174

TSSC. (2016b). *Conservation Advice: Rhinonicteris aurantia (Pilbara form) (Pilbara Leaf-nosed Bat).* Canberra: Threatened Species Scientific Committee, Commonwealth Department of the Environment. Retrieved from https://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82790

TSSC. (2016c). *Conservation Advice: Macrotis lagotis (Greater Bilby).* Canberra: Threatened Species Scientific Committee, Commonwealth Department of the Environment. Retrieved from http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=282

TSSC. (2020). *Conservation Advice - Falco hypoleucos, Grey Falcon.* Retrieved from https://environment.gov.au/biodiversity/threatened/species/pubs/929-conservation-advice-09072020.pdf

Umwelt . (2022). *Flora, vegetation and fauna impact assessment: Wodgina Lithium Project (v4). Report prepared for MARBL Lithium OPerations Pty Ltd.* Perth: Umwelt (Australia) Pty Limited.

van Vreeswyk, A. M., Payne, A. M., Leighton, K. A., & Hennig, P. (2004). *An Inventory and Condition Survey of the Pilbara Region, Western Australia. Technical Bulletin No. 92.* Perth: WA Department of Agriculture and Food. Retrieved from https://library.dpird.wa.gov.au/tech_bull/7/

VLA. (2024). *Kariyarra - Wodgina Project Traditional Ecological Knowledge Survey.* Karratha: vicki long & associates.

WAPC. (2007). *Visual Landscape Planning in Western Australia: A manual for evaluation, assessment, siting and design .* Western Australian Planning Commission.

Western Australian Government . (2024). *Western Australian Government Auunal Reports.* Retrieved from https://www.parliament.wa.gov.au/publications/tabledpapers.nsf/displaypaper/4012495c7c33d42993f9582f482583c300069e8b/$file/tp-2495.pdf

Western Australian Government. (1997). *Environmental Protection (Noise) Regulations 1997 (amended 2024).* Government of Western Australia. Retrieved from www.legislation.wa.gov.au

Western Australian Government. (2018). *Heritage Act 2018 (amended 2024).* Government of Western Australia. Retrieved from www.legislation.wa.gov.au

Western Australian Herbarium . (1998 - 2004). *Florabase - the Western Australian Flora*. Retrieved from Department of Biodiversity, Conservation and Attractions : https://florabase/dbca.wa.gov.au/

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DOCUMENT CONTROL

Section 38 Referral - Environmental Review Document		
Status	IFU - Issued for Use	01-Mar-25
Summary of Changes		
Author	Sofie Springer and Aurecon	sofie.springer Digitally signed by sofie.springer DN: cn=sofie.springer, email=sofie.springer@fortescue.com Date: 2025.02.28 19:06:51 +08'00' Signature
Checked or Squad Review# (if applicable)	Matthew Dowling	matthew.dowling Digitally signed by matthew.dowling DN: cn=matthew.dowling, email=matthew.dowling@fortescue.com Date: 2025.03.04 15:58:05 +08'00' Signature
Approved	Jarrod Pittson	jarrod.pittson Digitally signed by jarrod.pittson DN: cn=jarrod.pittson, email=jarrod.pittson@fortescue.com Date: 2025.03.04 12:02:03 +08'00' Signature
Next Review Date (if applicable)		

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APPENDIX A DETAILED FLORA AND VEGETATION ASSESSMENT – TURNER RIVER CONSOLIDATED (SLR, 2025)

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APPENDIX B VERTEBRATE FAUNA ASSESSMENT: NORTH STAR JUNCTION RENEWABLE ENERGY INFRASTRUCTURE PROJECT (360 ENVIRONMENTAL, 2023)

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APPENDIX C NORTH STAR JUNCTION WEST: DETAILED TERRESTRIAL VERTEBRATE FAUNA ASSESSMENT (SPECTRUM, 2024)

This report has been provided separately.

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APPENDIX D WODGINA PROJECT – TARGETED BILBY SURVEY (SPECTRUM, 2024)

This report has been provided separately.

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APPENDIX E BASELINE SURFACE WATER ASSESSMENT: NORTH STAR JUNCTION WEST SOLAR FARM (FORTESCUE, 2024)

This report has been provided separately.

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APPENDIX F NSJW SOLAR FARM SOIL AND LANDFORM ASSESSMENT (LANDLOCH, 2024)

This report has been provided separately.

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APPENDIX G VISUAL IMPACT ASSESSMENT: TURNER RIVER SOLAR HUB (SLR, 2024)

This report has been provided separately.

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APPENDIX H TURNER RIVER SOLAR HUB PROJECT – ENVIRONMENTAL NOISE ASSESSMENT (TALIS, 2024)

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