Clearing of native vegetation within the DE is considered unlikely to have a significant impact on the environmental values of local vegetation units for the following reasons:

- For nine of the vegetation units, significant impacts will not occur as they will maintain over 70% of their total mapped extent following clearing activities.
- For conservation significant vegetation ChAspTe, significant impacts are not expected as clearing would result in a direct loss of less than 1% of their total mapped extent. Although this vegetation unit is considered locally significant due to occasional populations of *Neptunia longipila* (P2), the species is not considered restricted to this unit.
- For the vegetation unit ChAaTs, significant impact is considered unlikely as the potential loss of more than 70% of its mapped extent only considers the survey area, and the vegetation is known to be well represented beyond the survey boundary (SLR , 2025).
- For the vegetation unit ChAaTC, significant impact is considered unlikely as clearing would result in a direct loss of less than 18% of the total mapped extent. This vegetation unit is dominated by *T. chichesterensis*; however, this species is not restricted to this community and was recorded more widely.

7.6.1.2 Clearing of Conservation Significant Flora

Implementation of the Proposal would result in the potential loss of conservation significant flora as outlined in Table 7-14 and shown in Figure 7-6.

Table 7-14: Potential Loss of Conservation Significant Flora

Taxon (significance)	No. Individuals in Survey Area	No. Individuals in DE	No. Individuals in IDF	No. Database Records within 50 km of SLR Survey Area		
				Fortescue	TPFL[2]	WA Herb
Euploca mutica (P3)	695	507 (73%)	502 (72%)	208	-	37
Triodia chichesterensis (P3)	17,544,000 – 24,561,600	~3,310,000 – 4,634,000 (19%)	~3,104,000 – 4,345,600 (18%)	12	-	26
Portulaca digyna (range extension)	1,631	1,510 (92.5%)	500 (31%)	NA (range extension of ~600 km)		
Trianthema aff. *Oxycalyptrum* (potentially novel taxon)	148	23 (15.5%)	23 (15.5%)	NA (potentially novel taxon)		

Table notes:

1 Fortescue's Flora Database

2 *Threatened and Priority Flora List (TPFL) database request (custom search)* (DBCA, 2022a)

3 *Western Australia Herbarium Flora Database (custom search)* (DBCA, 2022b)

* Estimate based on 20,000 – 28,000 individuals per ha of ChAaTc vegetation type. 360 Environmental (2024) opportunistically recorded an additional 37,480 individuals from 13 locations outside the survey areas.

\# Includes opportunistic records from outside survey area

Euploca mutica (P3)

Euploca mutica (P3) is known from the Chichester and Roebourne subregions and Florabase shows the Proposal as located near the centre of the known distribution (refer to distribution map in Table 7-7. *E. mutica* is well-represented in the locality, with 695 individuals recorded from 71 locations within the survey area and database records (Table 7-14) for an additional 245 locations within 50 km of the Proposal. The taxon was considered to occur in much higher numbers throughout the survey areas than what was reported as it is inconspicuous among spinifex grasslands.

Implementation of the Proposal would result in the direct loss of up to 502 known individuals of *E. mutica* from 38 locations. *E. mutica* was not restricted to a vegetation type and was recorded from over a third of the mapped vegetation units; approximately 76% of the mapped extents of these vegetation units are outside the DE (i.e. will not be directly impacted by the Proposal). The taxon is expected to occur sparsely over open plains (360 Environmental, 2024).

Implementation of the Proposal is therefore unlikely to have a significant impact on the taxon's abundance or distribution at the local or regional level or affect the conservation status of *E. mutica*.

Triodia chichesterensis (P3)

Triodia chichesterensis (P3) is known from the Chichester subregion. Florabase shows the distribution as occurring in a north-south spread from just south of South Hedland to Coonarrie Creek (Table 7-7), placing the Proposal near the centre of the distribution. Within the survey areas, the taxon occurred as a dominant or co-dominant spinifex (with *T. wiseana*) across the low rolling hills of vegetation type ChAaTc. This vegetation type supports an estimated 20,000 – 28,000 individuals per hectare. The taxon is well-represented in the locality, with an estimated 17,544,000 to 24,561,600 individuals within the survey area, opportunistic records of 37,480 individuals from 13 locations outside of the survey areas (360 Environmental, 2024), and database records (Table 7-14) for an additional 38 locations within 50 km of the Proposal. The taxon was noted as being widespread and common where it occurred.

Implementation of the Proposal would result in the clearing of up to 18% of the estimated number of individuals within the survey area based on proposed clearing of vegetation type ChAaTc. Priority 3 taxa are somewhat data deficient but are known from several locations or have a wide distribution with large population and/or large areas of suitable habitat with no known imminent threats (Table 7 10). For example, *T. chichesterensis* is noted as being a common species in the Wodgina area, with an estimated 1,951,574 individuals recorded from 1,928 locations (Umwelt , 2022).

Implementation of the Proposal is therefore unlikely to have a significant impact on the distribution or abundance of *T. chichesterensis* at the local or regional level or affect the conservation status of the taxon.

Portulaca digyna (range extension)

Observations of *Portulaca digyna* from the survey areas represented a 600 km southwest expansion of the taxon's known distribution, which had been restricted to the IBRA bioregions of Central Kimberley, Dampierland, Northern Kimberley, Ord Victoria Plain, and Victoria Bonaparte (Western Australian Herbarium , 1998 - 2004) (Plate 7-1) (SLR , 2025) considered it likely that the taxon is more widespread in the Pilbara than currently known, given that *Portulaca digyna* is a relatively inconspicuous herb even when flowering, and observations of this taxon during the surveys may have benefited from the recent fires.

Plate 7-1: Florabase Distribution of *Portulaca digyna*

Image source: Western Australian Herbarium (1998-2004).

The surveys for the Proposal recorded 1,631 individuals from 11 locations within the survey areas and opportunistically recorded an additional five individuals from one location outside the survey areas (SLR , 2025). Implementation of the Proposal would result in the loss of up to 31% of these individuals and one of the locations; however, this does not affect the southwest range extension recorded by the surveys as the other nine locations are located to the south and west of the Proposal. The taxon itself is not of conservation significance.

Trianthema aff. *Oxycalyptrum* (potentially novel taxon)

Trianthema aff. *oxycalyptrum* was considered by SLR (2023) as likely to be a novel taxon. The taxon bears similarities to *T. oxycalyptrum* and *T. glossostigmum*, and Mark Hislop of the WA Herbarium advised (pers. comm. 2022) that further investigation into the entire genus would be required to determine where the taxon lies.

The surveys for the Proposal recorded 148 individuals of *Trianthema* aff. *oxycalyptrum* from 15 locations within the survey areas and opportunistically recorded an additional 50 individuals from one location outside the survey areas (SLR , 2025) (Figure 7-6). *Trianthema* aff. *oxycalyptrum* was recorded from sandy plain landforms, typically within vegetation types AeTe and AoTe but the taxon was not restricted to these vegetation types.

Implementation of the Proposal would result in the loss of up to 23 individuals and four locations of *Trianthema* aff. *oxycalyptrum*. This is unlikely to affect the abundance or distribution of this taxon, given that a maximum of 15.5% of the recorded individuals would be cleared, there are records to the north, east, south and west of the proposed clearing, and approximately 80% of the combined extent of AeTe and AoTe is outside of the DE (i.e. not

directly impacted). As such, implementation of the Proposal is considered unlikely to have a significant impact on *Trianthema* aff. *oxycalyptrum*.

7.6.2 Indirect Impacts

7.6.2.1 Fragmentation of Populations or Habitat

Localised degradation of vegetation may occur in areas of contamination or downstream of such areas. The sensitivity of vegetation to fragmentation is greater where ecological linkages do not exist or in higher value vegetation types, such as drainage lines and granite outcrops.

The existing local landscape is partly fragmented into relatively large areas by road and rail infrastructure. Clearing for the Proposal would contribute to this fragmentation however this has been minimised through optimised design of two large, cleared areas (and associated access corridors).

Fragmentation from the Proposal has been minimised through design optimisation by using existing cleared areas and clearing of two large areas rather than several smaller ones, thus limiting edge effects. Clearing within minor drainages has been minimised as far as possible. The isolated patches of native vegetation to be retained for heritage include granite outcrops, which are already isolated landforms, and fragmentation itself does not prevent continuation of its existing environmental values.

Therefore, it is not expected that the Proposal will have a significant impact on the fragmentation of populations or habitat.

7.6.2.2 Introduction and/or Spread of Weeds

Construction and operation of the Proposal may introduce weeds to an area or increase the extent or abundance of existing weeds. Weeds may outcompete native taxa for available nutrients, water, space and sunlight, all of which can be exacerbated following a disturbance event such as clearing or fire.

Approximately 98% of the DE and 97% of the IDF is in very good or excellent condition (SLR , 2023; 360 Environmental, 2024). Two weed taxa (Kapok Bush and Buffel Grass) were recorded from the DE and an additional six weed taxa were recorded from the survey areas (refer to Section 7.4.8.3). These are mostly weeds which are widespread in the Pilbara and typically dispersed by wind, water, and cattle. Some are important pastoral species (e.g. Buffel Grass and Birdwood Grass) and reflect the existing land use of cattle grazing. One taxon, Calotrope, is a Declared Pest and was recorded approximately 320 m south of the south DE within the drainage line-associated vegetation community EcAtTe.

The DE has been designed to avoid vegetation community EcAtTe and other drainage landform vegetation units, which reduces the opportunity for existing weeds to spread or invade new areas.

Fortescue has existing long-standing management procedures to mitigate and manage the potential impacts from weed introduction and spread and these are incorporated into the Proposal EMP. Kapok Bush, Calotrope, and Spiked Malvastrum have been identified as priority weeds for weed management for the Proposal; this approach targets weed

management to weeds with higher ecological impact and invasiveness potential which are not of value for pastoral use.

With implementation of the mitigation measures presented in Table 7-20, it is unlikely that introduction or spread of weeds associated with the Proposal would have a significant residual impact to vegetation condition.

7.6.2.3 Dust Deposition on Vegetation

Dust deposition on vegetation can affect photosynthesis through interception of solar radiation, alteration of the radiant energy balance, and act as a barrier to gas diffusion on leaf surfaces (Doley, 2006). Research shows that the impact of dust depends on leaf traits such as surface roughness and posture. Implementation of the Proposal will 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.

The risk of dust deposition is dependent on the activity, the distance from the sensitive receptor (i.e. vegetation) and wind (speed, duration, direction) (ETA, 2024). Based on this, sensitive receptors comprising vegetation in the vicinity of the DE have been considered along the Turner River and Turner River West.

The Turner River is located outside the wind arc and to the east of the Northern DE away from the dominant south easterly winds (ETA, 2024). Potential impacts due to dust deposition on vegetation located in proximity to the Turner River are considered negligible. The Turner River West is located approximately 600 m west from the Southern DE boundary and is within the wind arc for the dominant south easterly winds during summer.

With reference to EPA (EPA , 2015) guidance and the ETA assessment (ETA, 2024) it is considered that dust deposition impacts on vegetation would likely be confined to within 500 m of the IDF during construction and within 300 m during operation. The ETA assessment (ETA, 2024) indicates that accumulation of deposited dusts is anticipated to only be evident during the dry season (late spring to summer). The assessment found that total suspended particulate matter (TSP) emissions during construction were 2,473 tonnes/year without controls. During operation, dust emissions drop to 141 tonnes/year without controls.

By way of comparison, dust deposition modelling for Alinta's Port Hedland project (ETA, 2022) found that the 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 dust deposition rates on bordering vegetation and in particular vegetation in proximity to the Turner River and Turner River West drainage channels. The Alinta project required clearing of approximately 250–280 ha of vegetation and 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 DWER (2021) guidance for nuisance dust/amenity.

Fortescue notes that construction activities are short term and any dust deposition during construction is likely to be limited and temporary. Dust generation from operational activities is anticipated to be minimal and limited to vehicle movements, which are infrequent. It is therefore considered that dust impacts during the operational phase will be negligible.

7.6.2.4 Contamination of Soil and Surface Water

Proposal activities require the use of some hazardous materials (e.g. fuel, lubricants) which could potentially leak or spill if transported, stored, or used inappropriately. The Proposal would also generate waste during its construction and decommissioning, including general waste and unused and decommissioned infrastructure, which may adversely affect soil and water quality if improperly managed.

The Proposal is unlikely to result in contamination of soil or surface through spills, leaks, or inappropriate waste disposal. Only minor amounts of chemicals and hydrocarbons will be used within the DE and the proposed mitigation measures are well established practices and are known to be effective in the prevention and remediation of contamination.

Appropriate waste management using the waste hierarchy (avoid, reduce, re-use, recycle, and disposal as a last resort) will reduce waste generation and ensure non-polluting disposal of any wastes generated.

7.6.2.5 Altered Hydrological Regimes

The construction and physical presence of the solar panels, associated infrastructure, roads and buildings will modify local topography and may directly impact patterns of surface water flow. The quantity of surface water flow may also increase locally due to reduced infiltration and absorption as a result of vegetation clearing, compaction of soil, and increase in impermeable structures (e.g. solar panels).

The DE is situated in a relatively flat area outside of the Turner River West floodplain. Hydrological modelling for the Proposal shows that natural flooding events have no interaction with the DE, and there is little meaningful interaction between concentrated catchment flows and the DE (Fortescue, 2024b). Surface water flows in the DE comprise surface flows and shallow channels of low velocity which are unlikely to result in scouring and channel movement. Earthworks for the Proposal are not anticipated to substantially alter the existing topography and resulting in minimal changes to flow paths, depths and velocities.

The Proposal has been designed to ensure minimal impacts on surface water flows and major and minor drainage lines have been avoided as far as reasonably possible. Further, stormwater drainage infrastructure for the Proposal will be designed and implemented to minimise erosion and sedimentation. Therefore, the Proposal is unlikely to result in altered surface water flows which would significantly impact on vegetation inside or outside the IDF.

No groundwater abstraction activities are included as part of this Proposal. All water requirements will be sourced from existing groundwater bores with approved abstraction allocation located along Fortescue's exiting rail line and outside of the DE. Therefore, there is no impact to groundwater from the Proposal within the DE or any risk to GDE vegetation.

7.6.2.6 Altered Fire Regimes

Construction and operation activities such as the use and movement of equipment and vehicles can provide sources of ignition and thus increase the risk of an unplanned fire. Increased frequency and intensity of fire incidents can affect vegetation through removal or reduction of biomass, alteration of vegetation structure, increase of weeds due to decrease of competition for resources and alteration of seed dispersal and germination, consequently affecting the vegetation composition within the affected area (Stavi, 2019; Fisher et al., 2009).

Fire risk will be managed in accordance with Fortescue standard control measures, which aim to minimise risks as far as practical. In addition, firebreaks will be constructed around the solar farm and fuel loads are considered to be generally low across the entire DE.

Proposed mitigation measures (refer to Table 7-20) include compliance with State and Local Government restrictions on fire and vehicle / plant movement and equipment usage and implementation of the EMP, which includes provisions for fire-fighting readiness and reduction of the risk of unplanned fires. Therefore, increased risk of bushfires associated with the proposal is not expected to pose a significant risk to native vegetation.

7.6.3 Cumulative Impacts

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA, 2021). This section outlines the potential cumulative impacts to flora and vegetation values as a result of the Proposal and other surrounding developments either recently approved or currently under assessment.

7.6.3.1 Cumulative Impacts on Regional Vegetation

At a regional vegetation scale, the Proposal has been considered with respect to the Chichester IBRA subregional boundaries of the pre-European vegetation associations of VA 93.4 (per Figure 7-2). This vegetation association is demonstrated to be widespread in the Chichester IBRA sub-bioregion (Section 7.4.2). *Note, association 626.1 has been omitted as only a very minor insignificant fraction of the DE occurs within this pre-European vegetation system.*

The Projects selected for Cumulative Assessment are presented in Table 7-15 (Part IV) and Table 7-16 (Native Vegetation Clearing Permits (NVCP)). The following parameters were used to identify projects for inclusion.

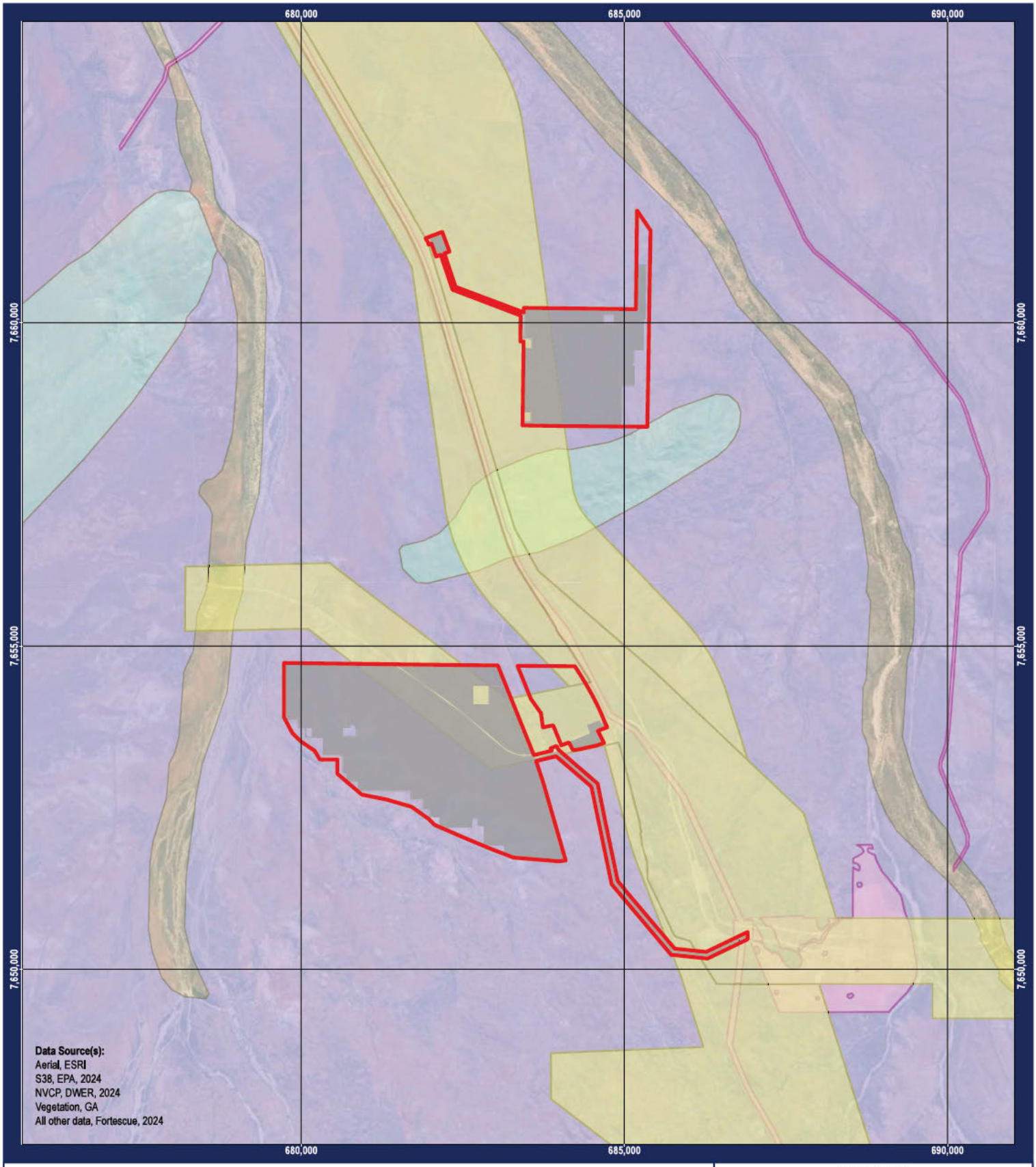
- Only projects in the Chichester IBRA Sub-bioregion were considered.
- The DBCA statewide vegetation statistics from 2019 was used as a baseline. All projects approved prior to 2019 were considered to have been implemented and their clearing included in the 2019 update. Therefore, these projects were excluded from further consideration. The exception was the BHP Strategic Assessment, where it is observed that almost all of the potential projects in the strategic assessment are yet to commence.
- Projects approved post-2019, currently under assessment are included for assessment.
    - Where approval documentation provides a hectare value for clearing of Vegetation Association 93.4, a quantitative assessment will be undertaken.
    - Where approval documentation does not provide a hectare value for Vegetation Association 93.4, a qualitative assessment will be undertaken.

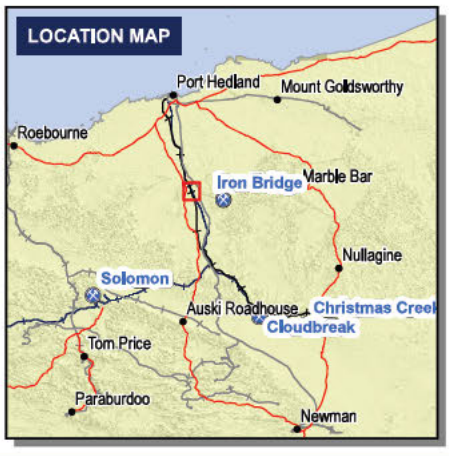
Table 7-15: Part IV Referred Projects with Potential Cumulative Impacts on Regional or Local Vegetation

Project	Proponent	Description	Clearing Extent (ha)	Level of Assessment	Project Status
BHP Pilbara Expansion Strategic Proposal	BHP Billiton Iron Ore	Strategic proposal for BHP's Pilbara operations over the next 50 – 100 years. Includes: New mining operations: Caramulla, Coondiner, Gurinbiddy, Jinidi, Marillana, Mindy, Ministers North, Mudlark, Munjina/Upper, Marillana, Ophthalmia/Prairie Down, Rocklea, Roy Hill, and Tandanya Expansions to new mining operations listed above and existing mining operations at Jimblebar, Mining Area C, Newman and Yandi.	98,500	s.38 – PER	Approved (MS1105; 11/07/2019)
East Hamersley Railway Project	The Pilbara Infrastructure Pty Ltd	Transport (rail), and electricity and water pipeline infrastructure	4,837	s.38 – PER	Assessment in progress
Hemi Gold Project	De Grey Mining Ltd	Mine and supporting infrastructure	5,830	s.38 – API	Assessment in progress
Sulphur Springs Zinc-Copper Project has footprint	Venturex Resources	Mine and ore processing	314	s.38 – API	Approved (MS1134; 20/05/2020)

Table 7-16: Clearing Permits with Potential Cumulative Impacts on Regional or Local Vegetation

Applicant	Project	Clearing Permit	Area (ha)	Clearing Period
Atlas Iron Pty Ltd	Abydos Haul Road Project	9394/1	40.7	22/02/2022 - 21/02/2027
Commissioner of Main Roads Western Australia	-	9475/2	500	26/02/2022 - 26/02/2027
Ell Gas Transmission Service WA (Operations) Pty Ltd	Telfer Gas Pipeline	8399/1	265.4	05/10/2019 - 04/10/2024
Fortescue Metals Group Ltd	Pilbara Transmission Project	8716/1	114.0	04/01/2020 - 31/01/2025
Fortescue Metals Group Ltd	Pilbara Transmission Project	8834/1	90.3	30/05/2020 - 29/05/2025
MARBL Lithium Operations Pty Ltd	Wodgina Lithium Project	9911/1	448.4	16/03/2023 - 15/03/2028
Mobile Concreting Solutions Pty Ltd	Indee Sand Quarry	10507/1	102.0	04/05/2024 -03/05/2029
North West Quarries Pty Ltd	Pippingarra Quarry	10176/1	72.6	05/10/2023 - 04/10/2028
Pilbara Energy (Generation) Pty Ltd	North Star Junction Solar Project	9541/1	353.2	19/07/2022 - 18/07/2027
Pilbara Minerals Limited	-	7793/1	0.3	20/01/2018 - 20/01/2023
Pilgangoora Operations Pty Ltd	Pilgangoora Lithium-Tantalum Project	10388/1	650.0	11/04/2024 - 10/04/2029
PMR Quarries Pty Ltg	-	9828/1	45.8	22/10/2022 - 21/10/2027
RBH Mining Pty Ltd	-	9195/1	50.0	17/04/2021 - 16/04/2026
Regional Power Corporation TA Horizon Power	-	9520/1	70.0	24/09/2022 - 24/09/2029
Roy Hill Infrastructure Pty Ltd	-	9903/1	163.0	02/09/2023 - 01/09/2031
Roy Hill Infrastructure Pty Ltd	Mulga Downs Hub and Rail Spur	9910/1	177.0	02/09/2023 - 01/09/2031





Legend

- Development Envelope
- Indicative Disturbance Footprint

s38 – Referral

- DWER-120

Native Vegetation Clearing Permit

- DWER-076

Pre European Vegetation (DPRID-006)

SA Code

- 93.4
- 626.1

N

0 0.5 1 1.5 2 2.5
Kilometres

Figure 7-8
Cumulative Impact Assessment
Pre-European System Associations

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:80,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.018

Date: 14/01/2025
Size: A4P
Revision: 1
Confidentiality: 0

Fortescue.

[This page has been left blank intentionally]

Through this exercise, a total of four Part IV assessments and 16 NVCP were included for cumulative assessment. However, analysis of all post-2019 applications has demonstrated that almost exclusively, there is no record of the number of hectares of VA 93.4 that will be disturbed for any of these proposals. Therefore, only a qualitative cumulative impact assessment was undertaken.

As discussed in Section 7.4.2, a total of 2,473,007 of VA 93.4 remains with in the Chichester Sub-bioregion at 2019, representing 99.86% of its pre-European extent. Even if the footprints of the projects identified in Table 7-15 and Table 7-16 were to only clear VA 93.4 and no other vegetation association, this would have a negligible impact to the remaining extent of VA 93.4.

Therefore, the impact of clearing 1108.2 ha of VA 93.4 in combination with other post-2019 approved proposals will not have a significant impact on the regional representation of vegetation.

7.6.3.2 Cumulative Impacts on Local Vegetation Units

Assessment of potential cumulative impacts on local vegetation units can only be undertaken where the vegetation mapping is comparable across the projects. This requires the availability of a regional vegetation dataset, or coverage by third-party biological survey data which has been consolidated in a usable form to provide for like-for-like comparisons, usually at a similar scale (NVIS Level 5). As such, only developments within the mapped extent of the Proposal vegetation surveys can be used for local cumulative impact assessment (CIA).

The projects with the potential for cumulative impacts (post-2019) on vegetation are Fortescue's NSJ 100 MW solar farm project. In addition, Fortescue's North Star Magnetite Project (Ministerial Statement 993) is now operational and for the purpose of this cumulative assessment has been included (Figure 7-9). Both these projects utilise vegetation mapping ((Ecologia, 2012) (Ecoscape, 2021) that is consistent across all three Project areas.

Table 7-17 identified one vegetation community that is common across the Proposal and NSJ 100. No common vegetation communities were identified between the Proposal and the North Star Magnetite Project.

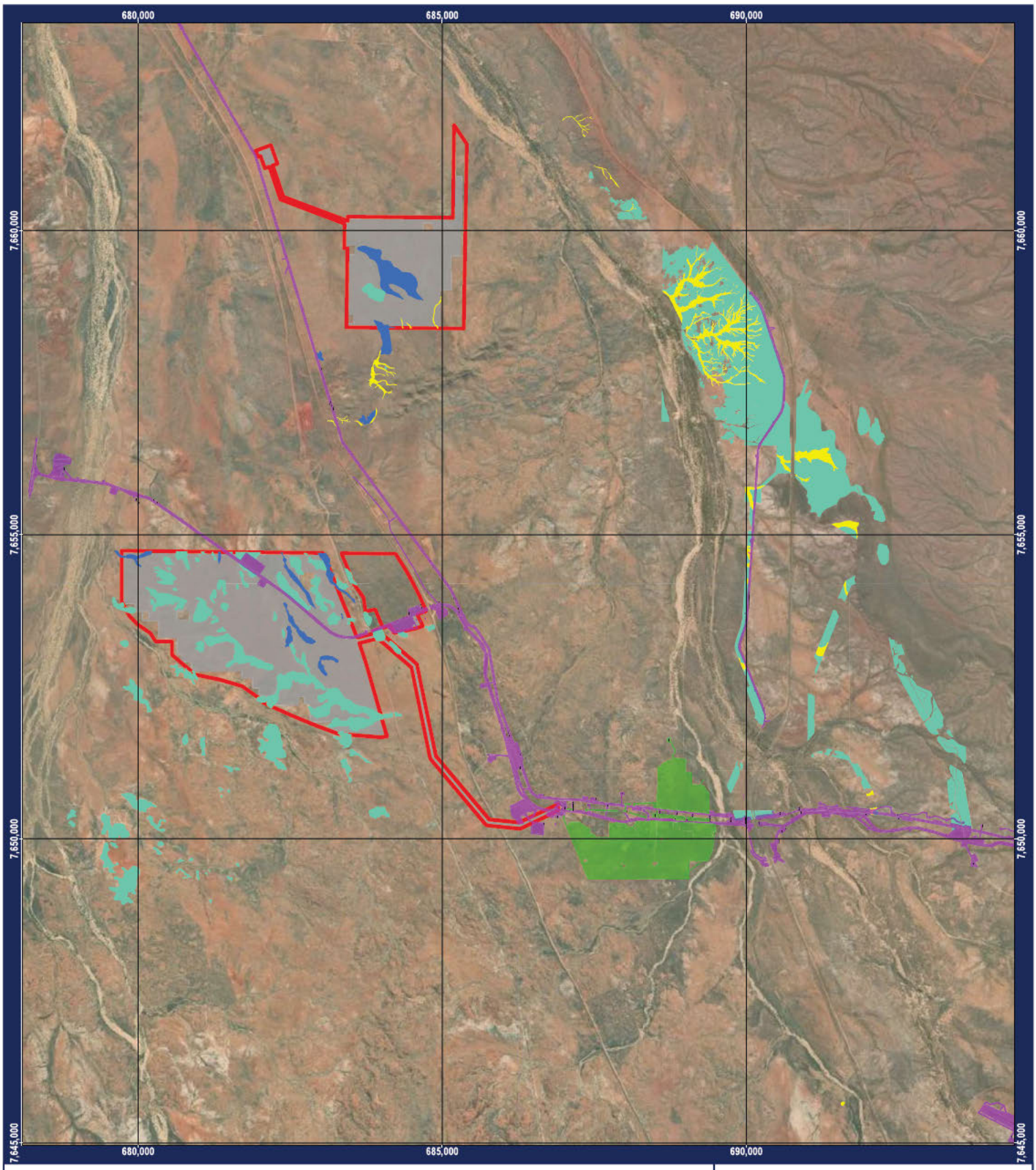
Table 7-17: Cumulative Impact Assessment on Local Vegetation Units

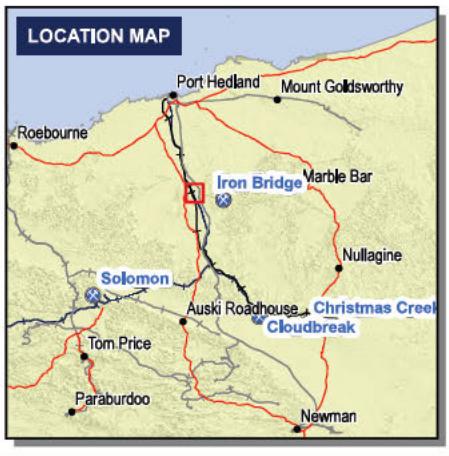
Ecologia 2012 (North Star Flora and Vegetation Assessment)	Ecoscape 2021 (NSJ100 Flora and Fauna Assessment)	Detailed Flora and Vegetation Assessment (SLR 2025)	Total Area Mapped (ha)	Total Area of Clearing Across All Projects
	AiTw	AiTw	158.87	0

Fortescue also highlights that many of the vegetation communities recorded across each vegetation assessment are very similar in terms of their description, with minor differences in terms of structure or floristics. It is evident that the vegetation communities in the local area are well represented, with minor statistical variations identified by each survey, which is to be expected given yearly seasonal fluctuations and longitudinal changes in levels of disturbance which can result in annual changes in species composition.

As can be seen in Table 7-17, the cumulative impact to vegetation community AiTw is negligible as a result of the implementation of the two projects (NSJ100 and Turner River Solar Hub).

[This page has been left blank intentionally]





Legend

- Development Envelope
- Indicative Disturbance Footprint

Conservation Significant Vegetation Communities

- ChAaTc
- ChAaTs
- ChAspTe

Disturbance Footprints

- North Star Magnetite footprint
- North Star Junction 100 footprint

N

0 0.5 1 1.5 2
Kilometres

Figure 7-9
Cumulative Impacts on Local Vegetation

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:85,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.021_r0
Data Source(s):
Aerial, ESRI
NVCP, DWER, 2024
All other data, Fortescue, 2024

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

Fortescue.

[This page has been left blank intentionally]

7.6.3.3 Cumulative Impacts on Conservation Significant Flora

Two priority flora taxa, *Euploca mutica* (P3) and *Triodia chichesterensis* (P3), will be directly impacted by the Proposal. The potential for other projects (existing and proposed) within 50 km of the Proposal to have cumulative impacts with the Proposal upon these two taxa is presented in Table 7-18 and Table 7-19. These projects were identified through database searches and review of the associated environmental documentation.

Table 7-18 demonstrates that *E. mutica* is widely represented in the Pilbara region and highly variable in its abundance when recorded. Predicted direct losses for projects within 50 km of the Proposal range from <1% to 32%. The clearing permit CPS 7449/3 for the Pilgangoora Lithium-Tantalum Project allowed for an unspecified extent of a significant population to be impacted, with no other records within 15 km, but states implementation is unlikely to impact its conservation status. This is reflective of *E. mutica* being both cryptic and a disturbance/fire opportunist (SLR , 2023), and likely to be more widespread than surveys suggest. Given that the species has been so widely recorded, and typically with <5% of its individuals impacted by development, the Proposal is considered unlikely to have a significant cumulative impact on *E. mutica.*

Table 7-19 shows that *T. chichesterensis* (P3) is widespread in the local area, with most projects avoiding direct impacts to known records. Just four projects have been assessed as presenting a direct impact, and the direct loss for three of these has been limited to 5% of records in the immediate vicinity. The Hemi Gold Project has the biggest impact with a loss of 26% of known records from the survey and surrounding region (RPM Global, 2023); however, the cumulative effect with the Proposal is lessened by a separation distance of ~30 km. The Hemi Gold Project is currently undergoing EPA assessment at the level of 'Referral Information with additional information and public review'. Given that the species has been so widely recorded, and typically with <5% of its individuals impacted in the vicinity of the Proposal, the Proposal is considered unlikely to have a significant cumulative impact on *T. chichesterensis*.

Implementation of the Proposal therefore is not anticipated to result in significant cumulative impacts to conservation significant flora.

[This page has been left blank intentionally]

Table 7-18: Cumulative Impact Assessment for *Euploca mutica* (P3) within 50km

Project	Proponent	Distance from DE (km)	Occurrence	Potential Impact
The Proposal			695 individuals recorded from 71 locations within survey areas. The DE contains 507 individuals from 40 locations, and the IDF contains 502 individuals.	Loss of up to 502 individuals from 40 locations (75% of recorded individuals from the survey; 60% of recorded locations from the survey area)
Investigative works for an off-highway haul road	Atlas Iron	Intersects (corridor runs to Port Hedland)	Known from application area but no impact	Unlikely (no direct loss identified)
Mt Dove DSO Project	Atlas Iron	36 km northwest	May occur (suitable habitat, nearest record <10 km)	Unlikely (no direct loss identified)
West Star Drilling Programme	Fortescue	21 km east	May occur (suitable habitat, nearest record 21 km)	Unlikely (no direct loss identified)
Pilbara Transmission Project	Fortescue	Intersects	Recorded within the permit area from four locations (CPS 8834/1).	Unlikely (no direct loss identified). Project designed to avoid known locations.
North Star Hematite Project	Fortescue (IB Operations)	21 km east	May occur. Identified within the survey area but not the application area.	Unlikely (no direct loss identified)
Pippingarra and Wodgina Roads	Fortescue (IB Operations)	3 km east	There are 78 records of this species in WA and 31 records within the local area.	Loss of 3% of individuals (1 of 31) in local area.
Iron Bridge (North Star	Fortescue	Intersects	Survey recorded 20 individuals from 12 locations and an additional six are within the Florabase records for the region (Ecologia, 2012). The PER (Fortescue, 2013) notes that two	One location may be directly impacted (<1% of known locations from the project area and surrounds)

Project	Proponent	Distance from DE (km)	Occurrence	Potential Impact
Magnetite Project)			surveys of the Port Hedland area for BHP Billiton Iron Ore recorded 7,121 individuals from 2,730 locations.	
NSJ 100 MW Solar Farm	Fortescue	Intersects	May occur (suitable habitat, nearest record 3 km)	Unlikely (no direct loss identified)
Wodgina Lithium Project	MARBL Lithium Operations Pty Ltd	4 km west	May occur. Identified within the survey area but not the application area.	Unlikely (no direct loss identified)
Indee Sand Quarry	Mobile Concreting Solutions Pty Ltd	47 km north-northwest	There are 76 locations within the Pilbara IBRA region and one individual was recorded within the application area (CPS 10507/1). There is also suitable habitat available within the surrounding area.	Loss of one individual (1% of locations)
Pilgangoora Lithium-Tantalum Project	Pilbara Minerals Limited	5 km north	Recorded within the amended application area. Based on survey data, it is estimated that this species is well represented in the local area; 651 individuals were recorded from 73 locations (CPS 7449/3). The population is considered significant in terms of the number recorded and could be locally significant given that no other records exist within 15 km.	Unspecified. Permit states implementation is unlikely to impact its conservation status.
Pilgangoora Lithium-Tantalum Project	Pilgangoora Operations Pty Ltd	11 km northeast	Recorded. A total of 31 individuals from four locations, with all occurring withing the permit area (CPS 10388/1). There are 29 records of *E. mutica* within 40 km of the application area with abundances ranging from 1-100 for each record.	Loss of 32% of individuals (10 of 31) at a local scale, but this is not significant at the bioregion region scale (>100 individuals)
Pilgangoora Lithium-Tantalum Project	Pilgangoora Operations Pty Ltd	5 km north	There are 33 locations within 50 km of the application area, and 708 confirmed individuals across 94 point locations within the broader Pilgangoora Lithium-Tantalum Project. 492 individuals are located within the application area.	Approximately 56 individuals have been cleared under CPS 8175/1 (8% of records within the broader project). The mine expansion footprint lies outside the area of the remaining *E. mutica* population and is not expected to impact the species.

Project	Proponent	Distance from DE (km)	Occurrence	Potential Impact
Hemi Gold Project	De Grey Mining Ltd	30 km northwest	Surveys for the Hemi Gold Project recorded 59 individuals, with an additional 374 individuals identified in the region based on Florabase, for a total of 433 individuals. The project development envelope contained 53 individuals, with 22 individuals within the indicative footprint (RPM Global, 2023).	No further clearing of *E. mutica* (or within 10 m) is permitted unless first approved by the CEO

[This page has been left blank intentionally]

Table 7-19: Cumulative Impact Assessment for *Triodia chichesterensis* (P3) within 50km

Project	Proponent	Distance from DE (km)	Occurrence	Potential Impact
The Proposal			An estimated 17,544,000 – 24,561,600 individuals within the survey areas. An estimated 3,310,000 – 4,364,000 estimated individuals occur within the DE, and an estimated 3,104,000 – 4,345,600 within the IDF.	Loss of up to 4,345,600 individuals (18% of estimated individuals within the survey area)
Abydos	Atlas Iron	32 km east (with related works 12 km east)	May occur	Unlikely (no direct loss identified)
Mt Dove DSO Project	Atlas Iron	36 km northwest	May occur (suitable habitat, nearest record <20 km) (CPS 4861/4)	Unlikely (no direct loss identified)
Miralga Creek DSO Project	Atlas Iron	42 km east	Recorded (500 individuals from one location outside of the application area)	Unlikely (no direct loss identified)
Pippingarra and Wodgina Roads	Fortescue (IB Operations)	3 km east	May occur (suitable habitat, nearest record ~80 m) (CPS 6687/2)	Unlikely (no direct loss identified)
NSJ 100 MW Solar Farm	Fortescue	Intersects	Recorded 3,800 individuals from 10 locations (including 200 individuals from one location within the application area) (CPS 9541/1).	Loss of 5% of individuals (200 of 3,800)
Wodgina Lithium Project	MARBL Lithium Operations Pty Ltd	4 km west	*T. chichesterensis* is a common species in the Wodgina area with an estimated 1,951,574 individuals recorded from 1,928 locations (Umwelt, 2022, as cited in CPS 9911/1). The application contains 477,929 individuals from 634 locations (~24% of individuals recorded in the local area). The proposed clearing is for 101,215 individuals (~5% of individuals recorded in the local area).	Loss of 5% individuals (101,215 of 1,951,574)
Pilgangoora Lithium Project	Ngungaju Lithium Pty Ltd	6.5 km north	Recorded in 2018 as a dominant taxon within a vegetation type, comprising a population of ~1,000 individuals. Considered likely that the population has persisted in the area but will have declined due to disturbance for access roads and tracks (CPS 7246/5). Species is well represented locally outside the application area and their habitat requirements are common and widespread within the region (CPS 7246/5).	Unspecified.
Pilgangoora Lithium-Tantalum Project	Pilgangoora Operations Pty Ltd	11 km northeast	Recorded 8,591 individuals, of which 3,760 (43%) are located within the application area (CPS 10388/1). There are 25 records within 40 km, with each ranging from one to >500 individuals.	Limited to a loss of 5% of individuals (430 of 3,800)

Project	Proponent	Distance from DE (km)	Occurrence	Potential Impact
Pilgangoora Lithium-Tantalum Project	Pilgangoora Operations Pty Ltd	5 km north	May occur (suitable habitat, surveys of adjacent areas recorded 8,500 individuals from four locations/populations (CPS 8175/3).	Unlikely (no direct loss identified)
Hemi Gold Project	De Grey Mining Ltd	30 km northwest	Surveys for the Hemi Gold Project recorded 72,941 individuals, with an additional 2,237 individuals identified in the region based on Florabase, for a total of 75,178 individuals. The project development envelope contained 23,281 individuals, with 19,210 individuals within the indicative footprint (RPM Global, 2023).	Predicted loss of 26% of individuals in region (19,210 of 75,178)

7.7 Mitigation

During 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 as shown in Table 7-17. In accordance with the hierarchy, most mitigation actions are avoidance-based and the IDF was designed to avoid areas that may support significant biodiversity values or heritage values. Areas that have been avoided, where practicable include drainage lines, GDEs and granite outcrops.

All native vegetation clearing would occur during construction of the Proposal and where required would be maintained as cleared areas for the safe and efficient operation of the Proposal. Fortescue is investigating whether it is feasible to actively promote vegetation regrowth beneath solar panels or otherwise to allow vegetation to regenerate naturally. Other opportunities for rehabilitation post-construction will be investigated but may be limited due to design optimisation the IDF within the DE. Rehabilitation is proposed following infrastructure construction for temporarily cleared areas. A decommissioning plan will be prepared at a minimum five years before the end of operations and will include rehabilitation of the site.

Table 7-20 outlines the proposed mitigation measures to manage potential adverse impacts to flora and vegetation.

[This page has been left blank intentionally]

Table 7-20: Avoidance, Management and Mitigations of Impacts to Flora and Vegetation

Potential Inherent Impact	Avoid	Minimise	Manage/ Rehabilitation	Residual Impact
Direct impacts including: Loss of native vegetation at a local and regional scale Loss of conservation significant taxa Loss of culturally significant flora and vegetation	DE and IDF designed to avoid drainage vegetation types (these vegetation types included potential GDEs and locally significant vegetation types). DE and IDF designed to avoid mapped areas of conservation significant flora (i.e. high density and higher priority species) and/or vegetation as far as practicable Location of proposal within an area where impacted vegetation is widely represented in the region. Use of existing access tracks and disturbance where practicable. Clearing limited to the minimum required to support construction and operation. Infrastructure layout optimised to avoid clearing of locally significant vegetation Ensure any non-disturbance (no-go) areas are identified on the ground by appropriate signage or flagging and clearly demarcated on site maps.	Staged clearing, to be conducted on an as-needed basis Conduct activities in accordance with the LUC Procedure (100-PR-TA-0001) Environmental awareness training (e.g. induction work packs and toolboxes) of site personnel to include conservation significant flora/vegetation prior to undertaking works. Maintain a database with the location of significant flora and vegetation on site Infrastructure location, design, construction and operation to minimise disturbance to conservation significant flora species and vegetation where possible.	At completion of operations, the site will be decommissioned and rehabilitated to reinstate native vegetation. The long-term aim of rehabilitation will be to return disturbed areas to a condition similar to adjacent, undisturbed areas. Fortescue consider that rehabilitation efforts will be successful in returning the area to its pre-disturbance conditions given the disturbance is limited to surface (no significant excavations required). Progressively rehabilitate disturbed land that is not required to support ongoing operations with local native plant species to create self-sustaining native vegetation communities. Development of a decommissioning management plan a minimum of five years prior to site closure.	Vegetation units and vegetation associations, as per Beard (1975), will not be cleared to an extent to reduce the remaining vegetation below 30%.
Conservation Significant Flora	Where significant flora or vegetation occurs close to the DE, 'no-go' zones will be demarcated prior to construction activities to protect the conservation significant flora species from impacts such as accidental clearing or disturbance.	Conduct activities in accordance with the LUC Procedure (100-PR-TA-0001) Implement Fortescue Dust Management Plan (IO-PL-EN-0001) Implementation of the Proposal EMP and Weed Hygiene Procedure (45-PR-EN-0035) to ensure all vehicles, plant and equipment, including trailered equipment,	At completion of operations, the site will be decommissioned and rehabilitated to reinstate native vegetation. The long-term aim of rehabilitation will be to return disturbed areas to a condition similar to adjacent, undisturbed areas.	Small numbers of individual conservation significant flora will be disturbed by the clearing.

Potential Inherent Impact	Avoid	Minimise	Manage/ Rehabilitation	Residual Impact
		are clean, inspected and certified prior to entry into the Fortescue controlled site.	Development of a decommissioning management plan a minimum of five years prior to site closure.	
Fragmentation of Populations or Habitats	Clear demarcation of clearing areas. Design to avoid disturbance to conservation significant flora/vegetation where possible	Conduct activities in accordance with the LUC Procedure (100-PR-TA-0001) Minimise clearing to areas required to support construction and operation only.	Progressive rehabilitation of any areas not required for ongoing operations.	Few areas of fragmented habitat would occur within the DE as most of the envelope will be disturbed. The area around the DE is mostly undisturbed vegetation, although some existing disturbance occurs in the local area (roads and railways).
Introduction and/or Spread of Weeds	Design of Proposal has avoided major drainage lines which may act as a vector for weed movement. Avoid off-road access.	Conduct activities in accordance with the LUC Procedure (100-PR-TA-0001) Minimise clearing to areas required to support construction and operation only Implementation of strict hygiene practices during construction and operation. Implementation of the EMP and Weed Hygiene Procedure (45-PR-EN-0035) to ensure all vehicles, plant and equipment, including trailered equipment, are clean, inspected and certified prior to entry into the Fortescue controlled site.	Monitoring and management of weeds during construction and operation in accordance with the EMP and Weed Management Plan (45-PL-EN-0033). Targeted measures will be implemented as needed. Maintenance of cleared areas (i.e. removal of vegetation regrowth and weeds) throughout life of Proposal and progressive rehabilitation of cleared areas which are no longer required for operation.	Weed species are unlikely to proliferate as a result of management actions.

Potential Inherent Impact	Avoid	Minimise	Manage/ Rehabilitation	Residual Impact
Dust Deposition	Avoid dust generating activities during unfavourable weather conditions (e.g. high wind speed) and unfavourable wind directions, where practicable	Implement Fortescue Dust Management Plan (IO-PL-EN-0001) Water trucks will be used for dust suppression on access tracks, cleared areas, and high traffic areas Staged clearing and excavation works during construction to minimise areas of exposed earth. Speed limits of 30 km/hr to minimise dust lift-off. Daily forecast and works planning so that controls (e.g. use of water carts, temporary suspension of activities) are appropriate to the predicted wind speed and direction.	Progressive rehabilitation and stabilisation of soils for any areas not required for ongoing operations.	Dust will not impact on vegetation health
Leaks or spills of hazardous materials (e.g. fuels, lubricants), and Inappropriate waste disposal	Hazardous materials brought to, stored, and used on site to be limited to those necessary for safe and efficient construction and operation.	Implement Fortescue controls/procedures for non-mineral waste management (IO-PL-EN-0003), hydrocarbon storage and handling (100-PL-EN-0011, 100-PR-EN-1064), and spillages. This includes: All hazardous materials to be stored appropriately, an away from watercourses or drainage areas. All hazardous material to be stored in designated areas and in accordance with relevant Australian Standards (AS 1940, AS 3833 or AS 3780). No fuelling of plant or equipment outside of designated and appropriately bunded refuelling areas.	Hazardous material and waste management plans to prevent and respond to spills and unauthorised discharges, with all spills to be remediated.	The risk to the environment from spills and leaks is negligible.

Potential Inherent Impact	Avoid	Minimise	Manage/ Rehabilitation	Residual Impact
		All waste to be disposed of in accordance with a site waste management to appropriately licenced receival facilities.		
Altered Hydrological Flows	Proposal located to avoid impacts to major drainage lines and potential GDEs. Minor drainage lines have been avoided as far as possible. No abstraction of water on site	Installation of appropriate stormwater drainage infrastructure to prevent erosion and sedimentation while maintaining flows to the Turner River and Turner River west. Implement the Surface Water Management Plan 100-PL-EN-1015 Appropriate design of stormwater drainage infrastructure, including erosion and sedimentation protection, to prevent impacts to downstream vegetation Drainage infrastructure location, design, construction and operation to minimise interference and disruption of natural surface water flows and quality Vegetation associated with drainage landforms (i.e. riparian vegetation) will be avoided where possible.	Where watercourses are disturbed, the surface flow is maintained. This includes installation of appropriately sized culverts or floodways where road access crosses tributaries.	Surface water will continue to flow towards Turner River and Turner River West with minimal impact.
Altered Fire Regimes	Compliance with all Department of Fire & Emergency Services (DFES) and Town of Port Hedland restrictions on fire and vehicle / plant movement and equipment usage.	Implement Fortescue Fire Management Plan (45-PL-EN-0020). Project Environmental Management Plan (PEMP) to include site specific management practices to reduce the risk of bushfires as a result of the Proposal, including the following provisions: Vehicle and equipment maintenance safety checks to reduce fire hazards.		It is unlikely that any fire originating from the DE would spread to surrounding areas due to management actions.

Potential Inherent Impact	Avoid	Minimise	Manage/ Rehabilitation	Residual Impact
		Site and vehicles to be equipped with suitable firefighting equipment and infrastructure. When constructing a fire break or carrying out a prescribed burn where significant flora and/or vegetation have been identified, adhere to the requirements outlined in the Project Environmental Management Plan Fire Management Plan (45-PL-EN-0020). Firebreaks to be maintained during operation.		

[This page has been left blank intentionally]

7.8 Residual Impacts

The residual impacts expected after mitigation measures are applied are summarised in Table 7-21.

Table 7-21: Summary of Residual Impacts for Flora and Vegetation following Mitigation

Potential Impact	Residual Impact after Management	Regional Significance
Clearing of Native Vegetation	Clearing of 1,108.2 ha of native vegetation, including 1,090.1 ha in 'Very Good to Excellent' condition.	Vegetation units and vegetation associations, as per Beard (1975), will not be cleared to an extent to reduce the remaining vegetation below 30%. Fortescue consider that as a result of the disturbance being confined to the ground level, the prospects of rehabilitation success is very good. Therefore, clearing of native vegetation and flora through the implementation of the Proposal will not result a significant impact.
Clearing of Conservation Significant Flora	Clearing of no more than: • 502 individuals of the Priority 3 *Euploca mutica* • ~4,345,600 individuals of the Priority 3 species *Triodia chichesterensis* • 23 individuals of the potentially novel taxon *Trianthema* aff. *oxycalyptrum*	At a regional level, both in isolation and cumulatively, the loss of priority flora species through implementation of the Proposal is not significant.
Degradation from weeds, dust, altered fire regimes, fragmentation, and altered surface water flows	With implementation of standard weed and fire management practices, impacts to native vegetation from weeds and fire are unlikely to be significant. Remnant vegetation around the DE will likely experience negligible levels of degradation from edge effects and dust deposition for the life of the Proposal. Decommissioning and rehabilitation an end of life will likely restore ecological linkages and reduce dust sources. Changes in surface water flow will be restricted to the disturbance footprint, with no interruption to flows outside the footprint.	At a regional level, the impact to vegetation from weeds and fire is likely to be very low. Impacts from fragmentation are likely to be localised and not regionally significant

7.9 Environmental Outcomes

The Flora and Vegetation values recorded within the DE are not considered unique to the area and are known to be widespread in the region. Following the implementation of the management measures, the predicted environmental outcomes for the Proposal are:

- Clearing of no more than 1,108.2 ha of 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)).

- Negligible degradation from fragmentation, weeds and altered fire regimes.

The outcomes are considered consistent with the EPA's objective for flora and vegetation as biological diversity and ecological integrity are likely to be maintained.

7.10 Offsets

Fortescue contends that the prospects of rehabilitation and revegetation being successful in returning disturbed areas to functional vegetation communities 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 significant residual impact.

Should the EPA form the view that the proposed clearing is a significant residual impact, Fortescue propose to contribute funds to the Pilbara Environmental Offsets Fund (PEOF) to offset this significant residual impact. The PEOF delivers environmental offset outcomes through a strategic, large-scale approach in which offset payments provide for larger conservation projects and landscape-scale projects (DWER, 2024). In doing so, the offset outcomes are greater than the sum of individual smaller and isolated activities.

8 TERRESTRIAL FAUNA

8.1 EPA Objective

The WA EPA objective for the terrestrial fauna environmental factor is '*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained*' (EPA, 2016c). The WA EPA defines terrestrial fauna as '*animals living on land or using land (including aquatic systems) for all or part of their lives*' (EPA, 2016c).

8.2 Policy and Guidance

Table 8-1 outlines the range of policy and guidance instruments specific to the Terrestrial Fauna environmental factor. Fortescue has specifically considered guidance documents in the following ways:

- Undertaken and commissioned fauna surveys across the entire DE, to ensure that there is sufficient knowledge of terrestrial fauna and their associated habitat values within impacted areas. This includes commissioning of additional surveys where information gaps are identified.
- Identification of activities which may lead to impacts to terrestrial vertebrate fauna
- Application of the mitigation hierarchy in elements of the Proposal design
- Ensured the associated development activities are well understood and non-polluting as far as reasonably possible.

Table 8-1: Terrestrial Fauna Policy and Guidance

Author, Year	Title	Consideration
EPA (2016c)	Environmental Factor Guideline – Terrestrial Fauna	The information provided in this chapter addresses the 'considerations for environmental impact assessment' listed in this document.
EPA (2021c)	Technical guidance – Sampling of short-range endemic invertebrate fauna	This document guides short-range endemic invertebrate fauna sampling and data used for EIA. The content of this guidance has not yet been updated to reflect the EPA's framework for environmental considerations in EIA and includes the same content as Guidance Statement No. 20 – Sampling of short-range endemic invertebrate fauna for environmental impact assessment in Western Australia (EPA, 2009).
EPA (2020)	Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment	This document guides terrestrial vertebrate fauna surveys and data used in EIA.
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.

Author, Year	Title	Consideration
DBCA (2017)	Guidelines for surveys to detect the presence of bilbies and assess the importance of habitat in Western Australia.	This document provides guidelines for detecting current or recent presence, or asserting the absence of bilbies, and assessing the importance of the habitat proposed to be impacted. It addresses the targeted search requirement for Conservation Significant fauna as recommended for the reconnaissance survey component of a Level 1 survey. The targeted Greater Bilby survey completed for the Proposal aligns with the 2-hectare plot technique defined within these guidelines.
DEWHA (2010a)	Survey Guidelines for Australia's Threatened Birds	The purpose of these documents is to provide proponents and assessors with a guideline for surveying Australia's threatened, birds, bats, mammals and reptiles listed under the EPBC Act. Used as guidance in the 360 Environmental and Spectrum surveys.
DEWHA (2010b)	Survey Guidelines for Australia's Threatened Bats	
DSEWPaC (2011a)	Survey Guidelines for Australia's Threatened Mammals	
DSWEPaC (2011b)	Survey Guidelines for Australia's Threatened Reptiles	
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.
DEWHA (2008a)	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 and 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)
DoE (2015a)	Wildlife Conservation Plan for Migratory Shorebirds	Guidance on Migratory Birds that visit Australia and are protected under the EPBC Act.
DEWHA (2008b)	Threat Abatement Plan for predation by the European red fox	National framework for guidance on the impacts of the Red Fox on Australia's Biodiversity.
DoEE (2016)	Threat abatement plan for competition and land degradation by rabbits	National framework to guide and coordinate Australia's response to the impacts of European Rabbits on biodiversity.

Author, Year	Title	Consideration
DoE (2015b)	Threat abatement plan for predation by feral cats	Background document for guidance on Australia's response to the impacts of feral cats on biodiversity.
DSWEPaC (2011c)	Threat abatement plan for the biological effects, including lethal toxic ingestion, caused by cane toads	Guidance on the threat abatement plan on the response to Cane Toads.
Bullen (2021a)	A review of ghost bat ecology, threats and survey requirements.	Survey requirements guidance prepared for Department of Agriculture, Water and the Environment (DAWE) for the Ghost Bat, WA.
Bullen (2021b)	A review of Pilbara leaf-nosed bat ecology, threats and survey requirements.	Survey requirement guidance prepared for DAWE for the Pilbara Leaf-nose Bat, WA.
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.
DCCEEW (2023)	National Light Pollution Guidelines for Wildlife.	Guidance to assess whether artificial lighting is likely to affect wildlife, and the management tools to manage artificial light so that wildlife is (1) not disrupted within, or displaced from, important habitat, and (2) able to undertake critical behaviours such as foraging, reproduction and dispersal.

8.3 Studies and Surveys

Detailed terrestrial vertebrate fauna surveys were completed across the entire DE. These are summarised below and further detailed in Table 8-2.

- Northern Area: covered by a detailed vertebrate fauna assessment comprising a desktop assessment and single-phase detailed and targeted fauna survey in March 2022 (360 Environmental, 2023). The survey included surrounding areas outside of the DE.
- Southern Area: covered by a detailed terrestrial vertebrate fauna assessment comprising a desktop assessment and two-phase detailed and targeted vertebrate fauna survey in May 2023 and September/October 2023 (Spectrum, 2025).
- Northern and Southern Area: covered by a targeted Greater Bilby survey, comprising species distribution modelling for the species and targeted searches for the species in August 2024, with additional survey sites completed in July/August 2024 as part of Fortescue's Fauna Monitoring Program (Spectrum, 2024b).

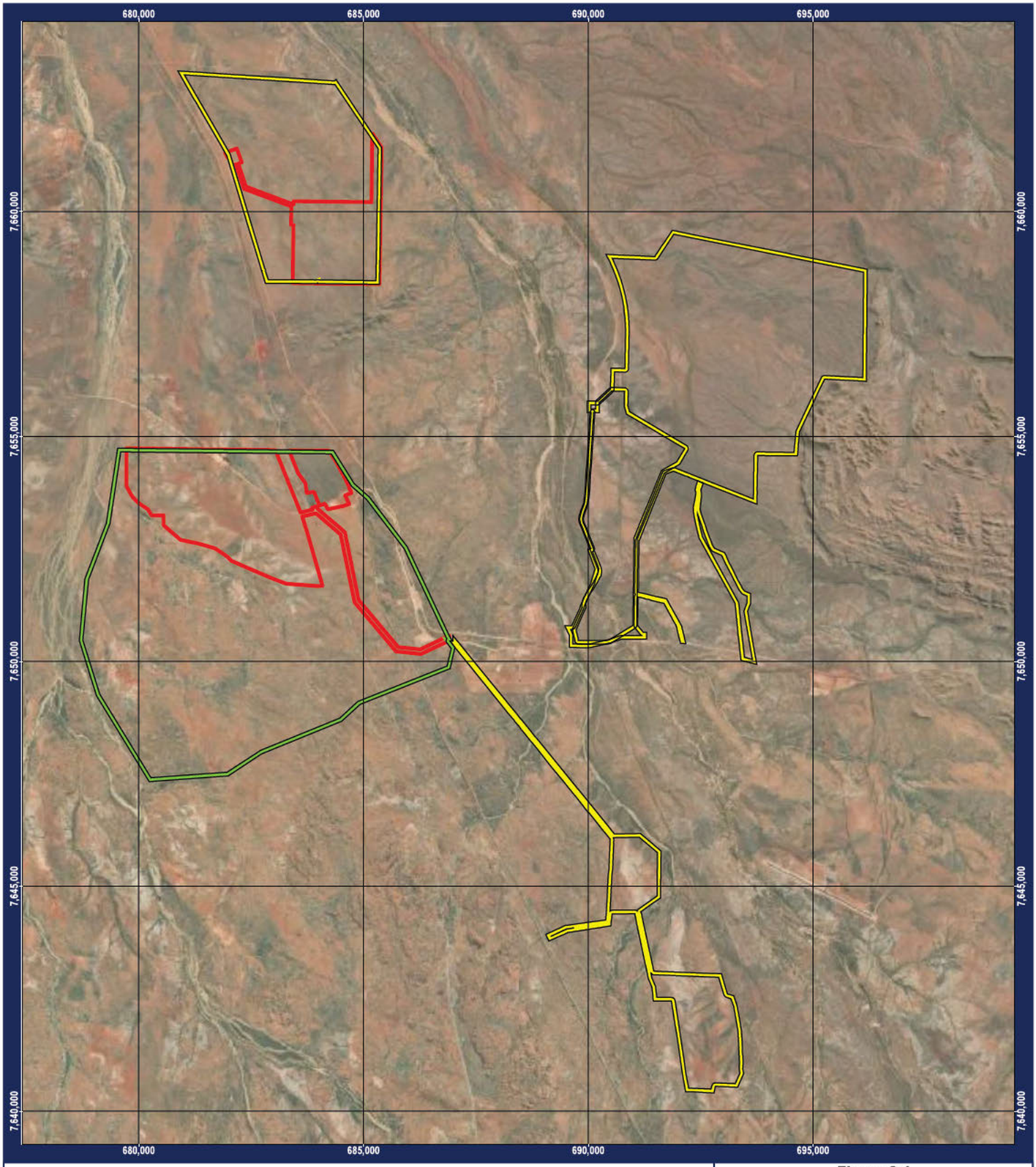
The surveys were completed in accordance with and meet the requirements of EPA (2020) technical guidance in relation to terrestrial vertebrate fauna. The survey effort is considered adequate to assess the terrestrial fauna values and provide information required to support EIA and approvals applications for the Proposal.

No significant limitations were identified for surveys covering the southern DE, and this section of the Proposal has been subjected to sufficient survey effort to assess terrestrial fauna values and impacts. However, 360 Environmental (2023) noted some limitations during the survey covering the northern DE relating to climate, access and survey events. The survey effort is described in Table 8-2 and the survey areas are shown in Figure 8-1.

Table 8-2: Terrestrial Fauna Studies and Surveys

Survey/ Study	Description	Survey Timing	Results/ Summary
North Star Junction Renewable Energy Infrastructure Project: Vertebrate Fauna Assessment (360 Environmental, 2023). [Appendix B]	Desktop assessment. Single phase detailed vertebrate fauna survey in the northern area (Figure 8-1). The survey involved: • Fauna habitat mapping • Trapping • Motion-sensitive camera traps to target Northern Quolls • Song Meter ultrasonic autonomous recording units (ARUs) to target bats and Song Meter standard ARUs to target Night Parrot. • Five targeted Greater Bilby searches undertaken along transects.	15 – 27 March 2022	• Four fauna habitats were mapped, including Plain (sand), Plain (stony/gibber), Drainage Line (Minor) and Hills/Ranges/Plateaux • Four conservation significant fauna species were identified as having a high likelihood of occurrence based on records and suitable habitat. • Four introduced mammal species were recorded.
North Star Junction West: Detailed Terrestrial Vertebrate Fauna Assessment (Spectrum, 2025) [Appendix C]	Two-phase detailed vertebrate fauna survey over the southern area (Figure 8-1). The survey involved: • Basic site/opportunistic survey • Pitfall traps, funnel traps, Elliot traps, cage traps and motion cameras • Systematic bird surveys • Passive ultrasonic recording units for bats.	Phase 1: 15 – 25 May 2023 Phase 2: 27 September – 6 October 2023	• Four fauna habitats were mapped, including Spinifex Sand Plain (Plain (sand)), Spinifex Rocky Plain (Plain (stony/gibber)), Minor Drainage Line (Drainage Line/River/Creek (minor)) and Granite Domes and Boulder Piles (Granite Outcrops (boulder piles)) • Two conservation significant fauna species were recorded, including Greater Bilby (*Macrotis lagotis*) and Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*). • A further eight species were assessed to have a medium to high likelihood of occurrence based on previous regional records and habitat types present.

Survey/ Study	Description	Survey Timing	Results/ Summary
Wodgina Project: Targeted Greater Bilby Survey (Spectrum, 2024b) [Appendix D]	The targeted Greater Bilby survey involved the following over both the northern and southern areas (Figure 8-2): • Targeted searches over the survey area and additional searching between sites using transects. • Targeted searches for Greater Bilby evidence including tracks, scats, diggings and burrows • Scat collection and DNA analysis • Motion sensing cameras Species Distribution Modelling (SDM) was completed across the entire Pilbara IBRA region and was used to inform the targeted Greater Bilby survey (Figure 8-3).	4 – 9 August 2024 Additional survey sites completed 31 July and 1 August.	• The entire DE is categorised as Medium or High likelihood of presence. Medium and high likelihood habitat surrounds the DE and there are continuous areas of high potential adjacent to known Greater Bilby burrows. • Greater Bilby presence was confirmed from three sites. Evidence suggests the Greater Bilby has been inhabiting the area of these sites for some time and may be occupying areas adjacent to the survey areas. Potential evidence (ambiguous old diggings and burrows) was recorded elsewhere. • Records of three non-target conservation significant fauna.



Legend

- 360 Environmental Study Area
- Spectrum Environmental Study Area
- Development Envelope

N

0 0.5 1 1.5 2 2.5
Kilometres

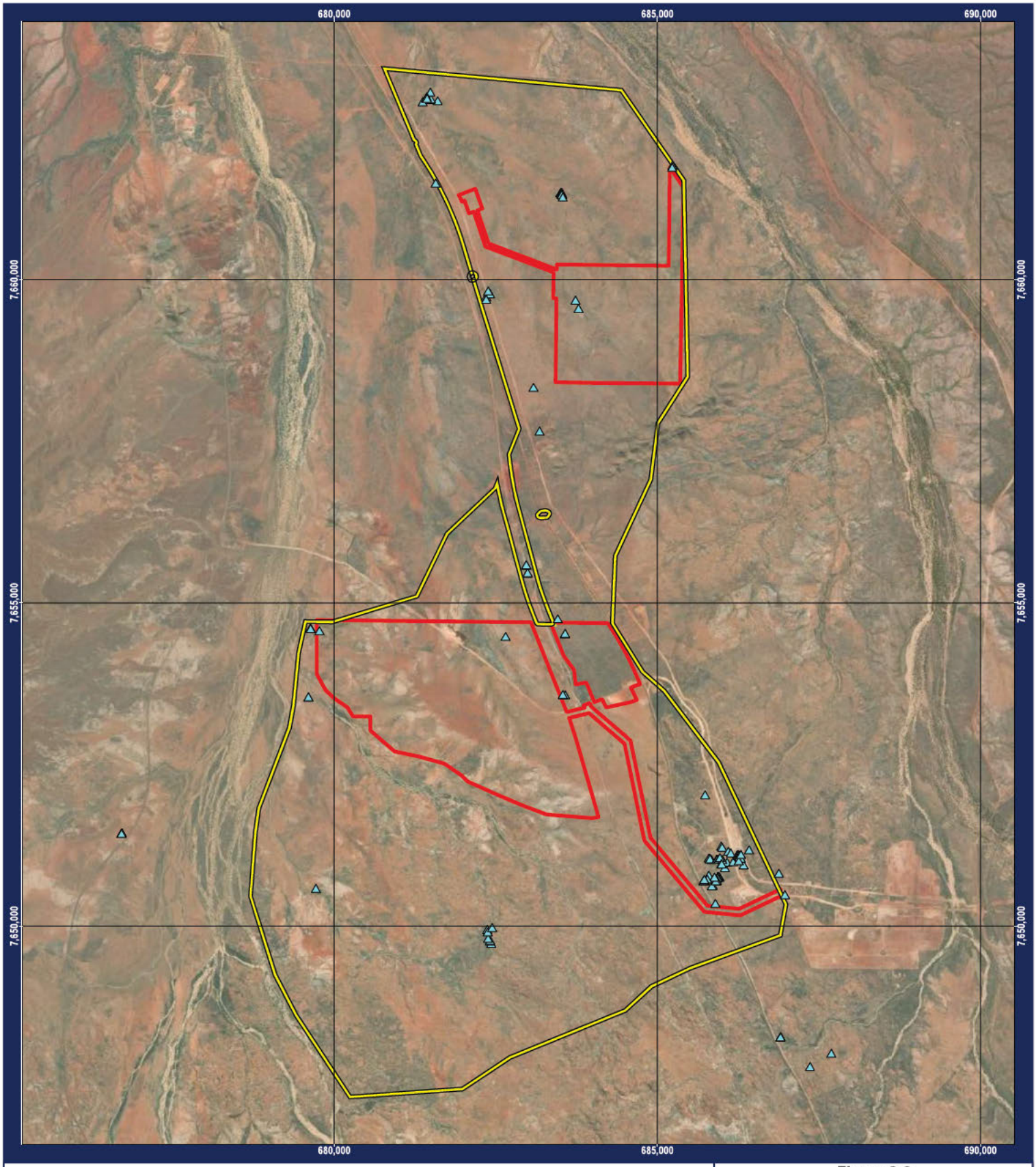
Figure 8-1
Detailed Terrestrial Vertebrate Assessment Study Area

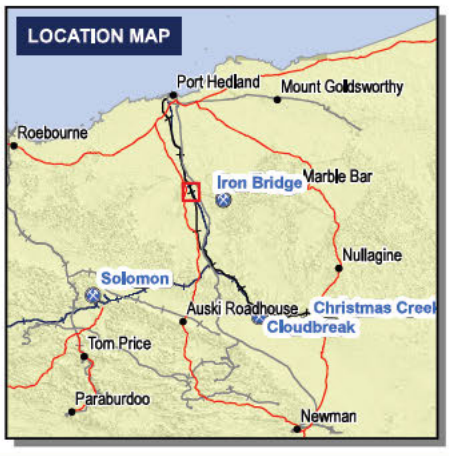
Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:115,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.022
Data Source(s):
Aerial, ESRI
IBRA, DBCA, 2024
All other data, Fortescue, 2024

Date: 15/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

Fortescue.

[This page has been left blank intentionally]





Legend

- Greater Bilby Records
- Survey Area
- Development Envelope

N

0 0.5 1 1.5 2 2.5
Kilometres

Figure 8-2
Greater Bilby Targeted Survey Area and Records

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:80,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.024

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

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

Fortescue.

[This page has been left blank intentionally]

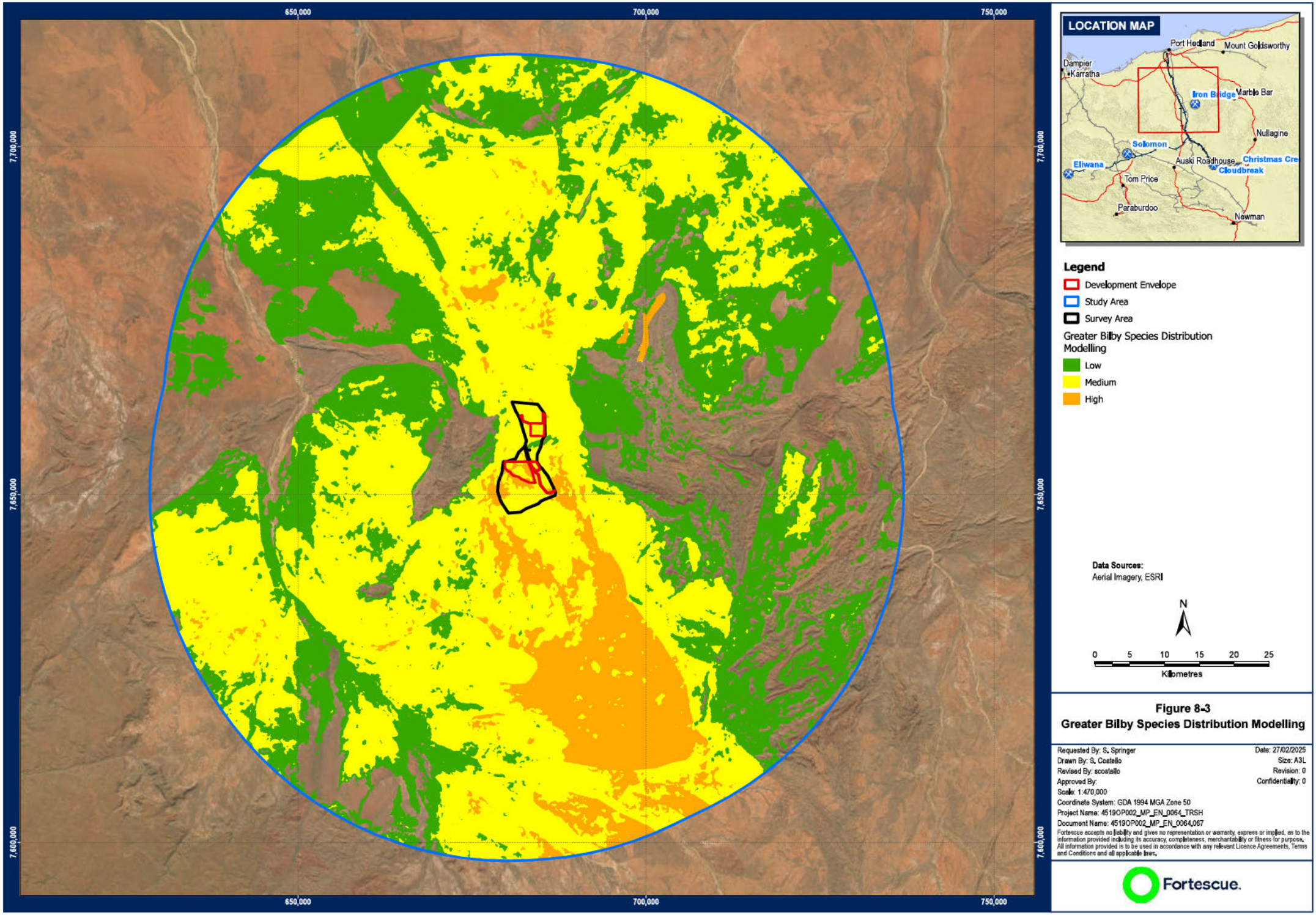


Figure 8-3
Greater Bilby Species Distribution Modelling

Requested By: S. Springer
Drawn By: S. Costello
Revised By: scostello
Approved By:
Scale: 1:470,000
Coordinate System: GDA 1994 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064_067

Date: 27/02/2025
Size: A3L
Revision: 0
Confidentiality: 0

Fortescue.

[This page has been left blank intentionally]

8.4 Receiving Environment

8.4.1 Regional Fauna Habitat – Land Systems

Detailed fauna habitat mapping has been completed within the vicinity of the Proposal (360 Environmental, 2023; Spectrum, 2025) (refer to Section 8.4.2); however detailed mapping at a similar scale and with consistent descriptors is not available at the regional level.

In lieu of fine-scale habitat mapping, land systems as assessed by DPIRD (2022) can be used as a broad-scale surrogate for fauna mapping as there are demonstrated associations of conservation significant fauna species with specific land systems. For example, the majority of Northern Quoll records in the Pilbara are from the Rocklea, Macroy and Robe land systems (DCCEEW, 2024; Biota , 2008). These land systems contain rocky hills, mesas, plateaux, drainages and granite tor fields which comprise the Northern Quoll's preferred habitat (Biota , 2008). These three land systems made up 54% of the compiled Pilbara records, despite those records intersecting 26 different land systems. Many of the Northern Quoll records from outside their preferred habitat are likely to be foraging individuals (Biota , 2008).

Similarly, Bullen (Bullen, A review of Pilbara leaf-nosed bat ecology, threats and survey requirements. Report prepared for the Department of Agriculture, Water and Environment, 2021b) notes that there is generally a very low chance of bat detection within flat land systems unless there is an adjacent land system which provides rocky outcrops and caves.

As an example of the importance of Land Systems to species occurrence, Spectrum (2024b) undertook species distribution modelling for the Greater Bilby over the entire Pilbara bioregion, with the final model highly effective at determining Greater Bilby presence and pseudo-absence (Figure 8-3). Of the 37 environmental variables tested, land systems and soil environmental variables contributed the most to the model, with 37.7% and 30.3% contribution respectively (Spectrum, 2024b).

Terrestrial fauna assessments (360 Environmental, 2023; Spectrum, 2025) undertaken for the Proposal intersect eight land systems as shown in Table 8-3. Three of these (Boolaloo, Macroy, and Uaroo) are present within the DE and IDF and are described in further detail in Section 2.3.1.3. The local fauna habitats associated with these land systems are noted in Table 8-3. Each land system comprises a variety of habitats, however Table 8-4 shows how closely the dominant landforms within each land system correspond to the local mapped fauna habitats.

[This page has been left blank intentionally]

Table 8-3: Land Systems, Landforms and Habitats within the DE

Land System Area within Chichester (ha)	Landforms Description	% of Land System	Area (ha)	Local Habitats (refer to section xxx) Habitat	Area within IDF (ha)	% of Landform within IDF
Boolaloo 159,040	Hills, tor heaps and hill slopes	70	111,328	Granite Outcrop	-	-
	Stony plains	13	20,675	Plain (stony/gibber)	-	-
	Sandy plains	10	15,904	Plain (sand)	2.30	<0.01
	Tracts receiving run-on	5	7,952	Drainage line/River/Creek (minor)	-	-
	Narrow drainage floors and channels	2	3,181	Drainage line/River/Creek (major)	-	-
Macroy 488,730	Low hills and ridges	5	66,403	Granite Outcrop	-	-
	Stony plains and interfluves	70	929,637	Hills/Ranges/Plateaux	-	-
				Plain (stony/gibber)	12.88	<0.01
	Sandy plains	10	13,2805	Plain (sand)	806.95	0.01
	Calcrete plains	3	3,9842	Not applicable	-	-
	Drainage floors and channels	12	159,366	Drainage line/ River/ Creek (minor)	2.06	<0.01
	Not Applicable	-	-	Cleared	20.72	-
Uaroo 1,328,052	Low hills	<1	4,887	Hills/Ranges/Plateaux	6.75	<0.01
	Low rises	3	14,662	Plain (stony/gibber)	38.11	<0.01
	Pebbly plains	8	39,098			
	Sandy/loamy plains	82	400,759	Plain (sand)	218.37	-<0.01
	Calcrete plains	1	4,887	Not Applicable-	-	-
	Tracts receiving sheet flow	6	79,683	Drainage line/River/Creek (minor)	-	-

[This page has been left blank intentionally]

8.4.2 Local Fauna Habitats

360 Environmental (2023) and Spectrum (2025) mapped six broad fauna habitats (excluding cleared areas) within the Survey Areas (9,291 ha). All six habitats extend beyond the survey area and are considered typical of the Pilbara bioregion (360 Environmental, 2023; Spectrum, 2025).

The Granite Outcrops and the Drainage Line/River/Creek (Major and Minor) habitats are considered the highest value for conservation significant fauna, followed by the Plain (sand) habitat (valued by burrowing species such as the Greater Bilby and Brush-tailed Mulgara) (Spectrum, 2025). Further detail on habitat values is provided in Section 8.4.3, with discussion of species-specific habitat values in Section 8.4.6.

The DE has entirely avoided the Drainage Line/River/Creek (major) habitat and the IDF has avoided any direct impact on Granite Outcrop habitat. Habitats within the DE are as follows:

- Plain (stony/gibber): 86.22 ha (6.09%)
- Plain (sand): 1,283.76 ha (90.63%)
- Granite Outcrops: 0.04 ha (<0.01 %)
- Hills/Ranges/Plateaux: 6.75 ha (0.48%)
- Drainage Line/River/Creek (minor): 6.52 ha (0.46%)
- Cleared: 33.26 ha (2.35%).

Fauna habitat and species records within the DE are shown in Table 8-4 and Figure 8-4. Habitat condition varied throughout the DE, with disturbances including recent and historical clearing for infrastructure, cattle tracks, scats and weeds. The surrounding area had evidence of recent burning (estimated to be within a year) in a number of areas, however, the Southern DE was unburnt.

[This page has been left blank intentionally]

Table 8-4: Fauna Habitats within the DE and IDF

Habitat Type & Associated Land Systems	Habitat Description	Habitat Photo	Occurrence in DE	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Fauna Group	Potential Species
Plain (sand)	*Acacia orthocarpa* and *A. ancistrocarpa* over patches of A. *stellaticeps* over *Triodia epactia* and T. *lanigera* low hummock grasses. The substrate varies with mostly sand, or sandy-loam with some patches of quartz or granitic stones and low granitic outcropping scattered throughout. Isolated patches of *Corymbia hamersleyana* scattered trees over Acacia acradenia over *Triodia schinzii* low hummock grasses with calcrete and quartz stones. Some small patches were recorded that comprised of sparse vegetation on clay, however the small size of the area is unlikely to support a distinct fauna assemblage. Leaf and wood litter spars, generally restricted to underneath vegetation. Fauna microhabitats: *Triodia* hummocks, *Corymbia* trees (flowers, leaf litter & bark), shrubs, and substrate for burrowing.		Northern and Southern	5,491.11	1,283.76	1,027.63	Mammals	Significant: Greater Bilby (Macrotis lagotis) likely to utilise this habitat (critical habitat), Brush-tailed Mulgara (*Dasycercus blythi*), Spectacled Hare-wallaby (*Lagorchestes conspicillatus*). Occasionally Ghost Bat (*Macroderma gigas*), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is likely to use this habitat for foraging. **Other:** Desert Mouse (*Pseudomys desertor*), Sandy Inland Mouse (*Pseudomys hermannsburgensis*), Delicate Mouse (*Pseudomys delicatulus*).
							Birds	**Significant:** Grey Falcon (*Falco hypoleucos*), Night Parrot (*Pezoporus occidentalis*) – in proximity to Samphire only, Oriental Plover (*Charadrius veredus*), Pilbara Grasswren (*Amytornis whitei whitei*). **Other:** Painted Finch (*Emblema pictum*), Kestrel (*Falco cenchroides*), Whistling Kite (*Haliastur sphenurus*), Little Buttonquail (*Turnix velox*), Australian Bustard (*Ardeotis australis*).
							Herpetofauna	**Significant:** none **Other:** Smooth Knob-tailed Gecko (Nephrurus levis), North-western Sandslider (Lerista bipes), Narrow-banded Shovel-nosed Snake (Brachyurophis fasciolatus), Sand Goanna (Varanus gouldii), Pygmy Desert Goanna (Varanus eremius).
Plain (stony/gibber)	Sparse *Corymbia hamersleyana*, over *Acacia acradenia*, over *Triodia schinzii* low hummock grasses, on abundant ironstone stones/pebbles and some quartz. Leaf and wood litter generally sparse and restricted to underneath vegetation on loamy clay. Fauna microhabitats: *Triodia* hummocks, *Corymbia* trees (flowers, leaf litter & bark), shrubs, and substrate for burrowing.		Northern and Southern	2,550.33	86.22	51.04	Mammals	**Significant:** Western Pebble-mound Mouse (*Pseudomys chapmani*). Occasionally Ghost Bat (*Macroderma gigas*), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is likely to use this habitat for foraging. Greater Bilby (*Macrotis lagotis*) may also utilise this habitat for foraging, dispersal and breeding. **Other:** Pilbara Ningaui (*Ningaui timealeyi*) & Euro (*Osphranter robustus*)
							Birds	**Significant:** Night Parrot (*Pezoporus occidentalis*) – in proximity to Samphire only, Grey Falcon (*Falco hypoleucos*) **Other:** Spinifex Pigeon (*Geophaps plumifera*), Little Buttonquail (*Turnix velox*), Weebill (*Smicrornis brevirostris*), Brown Falcon (*Falco berigora*), Whistling Kite (*Haliastur sphenurus*), Pilbara Death Adder (*Acanthophis wellsi*).
							Herpetofauna	**Significant:** None

Habitat Type & Associated Land Systems	Habitat Description	Habitat Photo	Occurrence in DE	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Fauna Group	Potential Species
								Other: Rock Ctenotus (*Ctenotus saxatilis*), Western Ring-tailed Dragon (*Ctenophorus caudicinctus*), Short-tailed Pygmy Monitor (*Varanus brevicauda*), Moon Snake (*Furina ornata*), Southern Phasmid Gecko (*Strophurus jeanae*), Pilbara Ground Gecko (*Lucasium wombeyi*), Pilbara Death Adder (*Acanthophis wellsi*).
							Birds	**Significant:** Grey Falcon (*Falco hypoleucos*) and Peregrine Falcon (*Falco peregrinus*) are likely to use this habitat for dispersal and foraging. When inundated: Common Greenshank (*Tringa nebularia*), Common Sandpiper *(Actitis hypoleucos*), Wood Sandpiper (*Tringa glareola*), occasionally Osprey (*Pandion haliaetus cristatus*) **Other:** Blue-winged Kookaburra (*Dacelo leachii*), Collared Sparrowhawk (*Accipiter cirrocephalus*), Pheasant Coucal (*Centropus phasianinus*), Sacred Kingfisher (*Todiramphus sanctus*), White-plumed Honeyeater (*Ptilotula penicillata*). Inland Dotterel (*Peltohyas australis*), Grey Teal (*Anas gracilis*) when inundated.
							Herpetofauna	**Significant:** Often contains permanent or semi-permanent pooling of water, which is critical habitat for the Pilbara Olive Python (*Liasis olivaceus barroni*) **Other:** Pilbara Toadlet (*Uperoleia saxatilis*), Little Red Tree Frog (*Litoria rubella*), Long-nosed Dragon (*Gowidon longirostris*), Shaded-litter Rainbow-skink (*Carlia munda*), Monk Snake (Parasuta monachus), Flat-shelled Turtle (*Chelodina steindachneri*).
Drainage Line/ River/ Creek (minor)	*Acacia trachycarpa* and *Acacia tumida* over *Triodia epactia* and *Triodia longiceps* low hummock grasses over mixed herbs and grasses on a sandy substrate. Some leaf and wood litter present. Fauna microhabitats: woody debris, sandbanks for construction of burrows and tunnels, and intermittent pools of water. The overstorey vegetation provides valuable nesting and foraging habitat for birds and may be used by significant taxa.		Northern and Southern	197.75	6.52	2.07	Mammals	**Significant:** Northern Quoll (*Dasycercus hallucatus*) is likely to use this habitat for foraging and dispersal (potential critical habitat), Greater Bilby (*Macrotis lagotis*), Brush-tailed Mulgara (*Dasycercus blythi*), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is likely to use this habitat for foraging. Ghost Bat (Macroderma gigas). **Other:** Delicate Mouse (*Pseudomys delicatulus*), Sandy Inland Mouse (Pseudomys *hermannsburgensis*), Desert Mouse (*Pseudomys desertor*).
							Birds	**Significant:** Grey Falcon (*Falco hypoleucos*) and Peregrine Falcon (*Falco peregrinus)* may utilise the habitat, including overstorey vegetation for nesting and foraging. When inundated: Common Greenshank (*Tringa nebularia*), Common Sandpiper (*Actitis hypoleucos*), Wood Sandpiper (*Tringa glareola*). **Other:** Willie Wagtail (*Rhipidura leucophrys*), Chestnut-rumped Thornbill (*Acanthiza uropygialis*), Grey-crowned Babbler

Habitat Type & Associated Land Systems	Habitat Description	Habitat Photo	Occurrence in DE	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Fauna Group	Potential Species
								(*Pomatostomus temporalis*), White-winged Triller (*Lalage tricolor*), Crested Bellbird (*Oreoica gutturalis*), Brown Honeyeater (*Lichmera indistincta*).
							Herpetofauna	**Significant:** Pilbara Olive Python (*Liasis olivaceus barroni*) (potential critical habitat) **Other:** Long-nosed Dragon (*Gowidon longirostris*), Sharp-snouted Delma (*Delma nasuta*), North-western Shovel-nosed Snake (*Brachyurophis approximans*), Common Dwarf Skink (*Menetia greyii*), Variegated Gehyra (*Gehyra variegata*).
Granite Outcrops	Dominated by large, exposed boulder piles and domes, the vegetation is sparse with *Terminalia circumalata* over *Acacia eriopoda* and *A. tumida* over *Triodia epactia* hummocks. A sandy substrate between granite piles and domes with very sparse leaf and wood litter. Fauna microhabitats: Cracks and crevices, small caves, overhangs, underside of rocks.		Southern	183.43	0.04	This Habitat does not occur within the IDF	Mammals	**Significant:** Northern Quoll (*Dasycercus hallucatus*) is likely to be using this habitat for breeding (critical habitat) in the DE, Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is likely to use this habitat for foraging and potentially limited temporary and infrequent nocturnal roosting during wet season, Ghost Bat (*Macroderma gigas*). Potentially habitat for the Greater Bilby: foraging and dispersal. **Other:** Rothschild's Rock Wallaby (*Petrogale rothschildi*), Rock Rat (*Zyzomys argurus*).
							Birds	**Significant:** None **Other:** Willie Wagtail (*Rhipidura leucophrys*), Nankeen Kestrel (*Falco cenchroides*), Brown Falcon (*Falco berigora*), Spinifex Pigeon (*Geophaps plumifera*), Painted Finch (*Emblema pictum*).
							Herpetofauna	**Significant:** None **Other:** Southern Pilbara Rock Monitor (*Varanus hamersleyensis*)
Hills/ Ranges/ Plateaux	Rocky ironstone hills and slopes with rocky outcropping and thin soils over shallow bedrock. Vegetation consists of open *Acacia* shrublands over *Triodia* hummock grasslands. Microhabitats include *Triodia* hummocks which provide shelter for a variety of species and rocky outcrops which contain abundant crevices for small fauna species. Small breakaways containing shallow overhangs were occasionally observed. Habitat had been recently burnt in many areas and was heavily impacted by vehicle tracks and drill pads in some areas		Northern	503.05	6.75	6.75	Mammals	**Significant:** The preferred habitat of the Western Pebble-mound Mouse (*Pseudomys chapmani*). Northern Quoll (*Dasycercus hallucatus*) may use this habitat for dispersal and foraging. Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*) is likely to use this habitat for foraging. Greater Bilby may utilise this habitat sporadically.

Habitat Type & Associated Land Systems	Habitat Description	Habitat Photo	Occurrence in DE	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Fauna Group	Potential Species
Cleared/ Disturbed	Areas that have been cleared and do not contain vegetation. These areas generally do not contain suitable habitat of value to fauna taxa.	-	Southern	192.25	33.26	20.72	-	-

LOCATION MAP

Legend

- Development Envelope

Fauna Records

- Brush-tailed Mulgara, P4
- Greater Bilby, VU
- Pilbara Leaf-nosed Bat, VU
- Western Pebble-mound Mouse, P4

Fauna Habitat

- Cleared
- Drainage line/River/Creek (minor)
- Granite Outcrop
- Hills/Ranges/Plateaux
- Plain (sand)
- Plain (stony/gibber)

N

0 0.5 1 1.5 2
Kilometres

Figure 8-4
Fauna Habitats and records 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_0064.026
Data Source(s):
Aerial, ESRI
Fauna, Fortescue and DBCA
All other data, Fortescue, 2024

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

Fortescue.

[This page has been left blank intentionally]

8.4.3 Habitat Value and Fauna Corridors

Of the six habitats identified across the DE, Plain (sand), Drainage Line (Minor) and Granite Outcrops habitats are considered to have the most significant value for conservation significant species as potential habitat for Northern Quoll, Greater Bilby, Pilbara Leaf-nosed Bat, Ghost Bat, Brush-tailed Mulgara, Grey Falcon, Pilbara Olive Python, and Migratory Birds (Spectrum, 2025). The Plain (sand) habitat covers the majority of the DE (90.6%). Drainage Line/River/Creek (minor) and Granite Outcrop habitats only cover 0.5% and 0.002% of the DE respectively.

The Plain (sand) and Plain (stony/gibber) habitats are widespread in the surrounding regional landscape (Spectrum, 2025). These habitats contain fewer microhabitat opportunities than the other surveyed habitats but are considered important habitats for key species (Spectrum, 2025). Within the wider survey area, Plain (sand) habitat was confirmed to be used by taxa that inhabit burrows, including the Greater Bilby and Brush-tailed Mulgara. The Plain (stony/gibber) habitat was confirmed to be used by the Western Pebble-mound Mouse, although 360 Environmental (2023) noted that the species is typically found in stony slopes rather than plains and is likely to use the Hills/Ranges/Plateaux habitat.

The Drainage Line (Minor) habitat is of greater habitat value due to an abundance of microhabitats such as hollow-bearing trees, logs, leaf litter, and overall higher vegetation densities than most other habitats identified within the survey area (Spectrum, 2025) Significant bird species such as the Peregrine Falcon and Grey Falcon may find nesting opportunities in the emergent Eucalyptus trees (Spectrum, 2025). The Drainage Line (Minor) habitat was identified as valuable for its role as an ecological linkage through the landscape, as it provides continuous corridors of vegetation cover that allow fauna to traverse large distances (Spectrum, 2025). Other significant species such as the Northern Quoll, Pilbara Olive Python and Greater Bilby are likely to use this habitat for dispersal. This habitat may also occasionally be inundated with water, providing a temporary water source for fauna species (Spectrum, 2024a).

The Granite Outcrops habitat contains numerous crevices and cavities that provide excellent refuge for a wide variety of small fauna taxa, particularly reptiles. The habitat is also high value for the Pilbara Leaf-nosed Bat, Ghost Bat, Grey Falcon and migratory birds as it provides potential roosting and nesting habitat (Spectrum, 2025). It is also likely to provide habitat critical to the survival of the Northern Quoll. Large parts of this habitat type have recently been burnt, and its value may be limited until further regeneration of vegetation occurs (360 Environmental, 2023). Minimal vegetation and leaf litter remain, and food and shelter availability are likely to be impacted. Aerial imagery and field observations indicate that Granite Outcrops are abundant in the region surrounding the DE, and only a small area (0.03 ha) is located within the DE (360 Environmental, 2023).

8.4.4 Fauna Diversity

The desktop assessments completed by Spectrum (2025) and 360 Environmental (2023) covered a broader area than the DE. Spectrum's assessment included a 50 km buffer around the Southern DE, while 360 Environmental included a 100 km buffer covering the Northern DE, associated surveys areas and the surrounds. Together, these desktop surveys identified a total of 392 vertebrate fauna species, of which 66 species were classified as significant/priority species.

Across the north and south DE, these species included:

- 10 amphibians
- 188 birds (46 Significant/Priority Species)
- 54 mammals (15 Significant/Priority Species)
- 140 reptiles (5 Significant/Priority Species).

The number of species identified through the desktop assessment does not accurately represent the actual numbers found within the DE. The desktop assessments cover areas that overlap and draw from a diverse range of sources, encompassing data collected over varied time periods and seasons. These assessments also likely include species from habitats which are not present within the DE, such as the Drainage Line/River/Creek (Major) habitat type.

The combined results from the fauna field surveys within the north and south areas identified 161 vertebrate fauna species, of which 14 were classified as significant species (360 Environmental, 2023; Spectrum, 2025).

The combined results from each survey are described in Table 8-5.

Table 8-5: Fauna Species Identified within the Development Envelope

Species	Northern DE		Southern DE						
	Species Count	Significant Species	Species Count	Significant Species	Species Recorded in Both DE	Species Recorded in Northern DE Only	Species Recorded in Southern DE Only	Total Species Recorded	Total Significant Species
Amphibians	3	0	2	0	1	2	1	4	0
Birds	37	8	54	1	23	14	32	69	9
Mammals	17	3	27	4	15	2	12	29	4
Reptiles	53	1	42	0	31	22	11	62	1
Total	**110**	**12**	**125**	**5**	**70**	**40**	**56**	**164**	**14**

Source: 360 Environmental (2024)and Spectrum (2025)

[This page has been left blank intentionally]

Within the DE, the following specific characteristics may be highlighted from the respective surveys:

- **Northern DE:** Of the species recorded during the 360 Environmental (2023) survey, the most recorded bird species were Budgerigar (Melopsittacus undulatus) and Zebra Finch (*Taeniopygia guttata*). The most recorded mammal species were Western Pebble-mound Mouse (*Pseudomys chapmani* [P4]) and Spinifex Hopping Mouse (*Alexis alexis*). The most diverse reptile family was Scincidae. All amphibian taxa were recorded after a localised thunderstorm.

- **Southern DE:** Results from the Spectrum survey (2025) identified a similar number of mammal species recorded during both Phase 1 and Phase 2. Bird activity was higher in Phase 1 with 49 species recorded compared to 34 in Phase 2. Eighteen bird species, including four birds of prey, were only observed in Phase 1. The number of reptile species observed increased significantly from 23 in Phase 1, to 40 in Phase 2. The presence of amphibians in Phase 2 is potentially due to out-of-season rainfall prior to the survey.

Introduced mammal species recorded across the combined survey areas included European Cattle (*Bos primigeniustaurus*), Dog/Dingo (*Canis familiaris*), Horse (*Equus ferus caballus*) and Feral Cat (*Felis catus*).

8.4.5 Short Range Endemics

The surface lithologies present across the Proposal area, and which are closely related to fauna habitats, were identified as being dominated by monzogranites. Monzogranites are a common geological unit within the Pilbara. It is considered that landforms associated with this geological unit, and which may be 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).

Microhabitats are known to provide a range of potential habitat for SREs. Within the DE, microhabitats were identified in all fauna habitats. However, Spectrum (2025) noted that the majority of the survey area is dominated by the Plain (sand) and Plain (stony/gibber habitats), which do not offer as great a diversity of microhabitats. Therefore, the potential for SRE invertebrates across the majority of the DE is very low.

Drainage Line habitats contained an abundance of microhabitats (360 Environmental, 2023). Drainage Line (Minor) microhabitats include woody debris, leaf litter, peeling bark, hollow trees and logs, hummock grasslands, banks for construction of burrows and tunnels and intermittent pools of water.

Granite Outcrops (boulder piles) microhabitats include cracks and crevices, small caves, overhands and underside of rocks. Hills/ranges/plateaux microhabitats include *Triodia* hummocks which provide shelter for a variety of species and rocky outcrops which contain abundant crevices for small fauna species.

It is noted that these two habitat types occupy very small areas of the DE, and the Granite Outcrop habitat type has been avoided by the IDF.

8.4.6 Conservation Significant Fauna

Threatened fauna are protected under the BC Act and/or the EPBC Act. These species are in need of conservation and are allocated a conservation status ranging from Critically Endangered to Vulnerable. A likelihood of occurrence assessment was conducted for conservation significant fauna taxa identified by the desktop searches as potentially occurring within the survey areas. Likelihood was informed by the field surveys and assessed using the criteria in Table 8-6.

The likelihood assessment identified eight Threatened fauna species as known to occur within the survey area, and three species as having a high likelihood of occurrence within the survey areas (Table 8-7). Four of these species were recorded within the DE. Records of conservation significant fauna species within close proximity to the DE are shown on Figure 8-4.

Discussion of conservation significant fauna in the following subsections is limited to the eleven species listed below:

- **Seven mammal species:**
    - One Endangered (EN): Northern Quoll (*Dasyurus hallucatus*)
    - Three Vulnerable (VU): Greater Bilby (*Macrotis lagotis*), Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*), and Ghost Bat (*Macroderma gigas*)
    - Three Priority 4 (P4): Brush-tailed Mulgara (*Dasycercus blythi*), Western Pebble-mound Mouse (*Pseudomys chapmani*), and Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*).
- **Three bird species**:
    - One VU: Grey Falcon (*Falco hypoleucos*)
    - One other specially protected (OS): Peregrine Falcon (*Falco peregrinus*)
    - One P4: Pilbara Grasswren (*Amytornis whitei whitei*)
- One VU **reptile species**: Pilbara Olive Python (*Liasis olivaceus barroni*).

As outlined in Table 8-6, species with a likelihood of 'Medium' or lower have an infrequent occurrence in the locality and/or limited suitable habitat within the survey area and are therefore unlikely to be significantly impacted by the Proposal.

Table 8-6: Likelihood of Occurrence Criteria

Likelihood	Criteria
Recorded	Recorded from the survey area during the field surveys
Previously Recorded	Recorded from the survey area within the last ten years (per database record)
High (Likely to occur)	• There are existing records within the survey area, but these are more than ten years ago • There are existing records of the taxon within 20 km of the survey area and: • Taxon is strongly linked to a specific habitat present in the survey area; or • Taxon has more general habitat preferences and suitable habitat is present in the survey area. • Species is easily detectable using standard survey methods.
Medium (May Occur)	• There are existing records within the survey area, but these are more than 20 years ago • There are existing records of the taxon within 40 km of the survey area, however: • Taxon is strongly linked to a specific habitat which is limited in the survey area; or • Taxon has more general habitat preferences, but limited suitable habitat is present in the survey area. • Suitable habitat is present in the survey area, but the taxon is recorded infrequently in the locality, or species is not easily detectable using standard survey methods
Low (Unlikely to Occur)	• Taxon is linked to a specific habitat, which is absent from the survey area • Suitable habitat is present, but there are no existing records within the last 50 years of the species from the locality (despite reasonable previous search effort in suitable habitat); or • Suitable habitat is limited in the survey area and the taxon is very infrequently recorded in the locality.
Very Low (Considered absent)	Suitable habitat does not occur within the survey area
Excluded	Unlikely to occur in vicinity of survey area given the known distribution and ecological (e.g. unlikely to occur inland as far as the survey area)

Source: 360 Environmental (2023) and Spectrum (2025)

[This page has been left blank intentionally]

Table 8-7: Likelihood of Occurrence Assessment

Species	Conservation Status			Preferred Habitats	Records	Likelihood	Presence in the DE
	EPBC Act	BC Act	DBCA				
Mammals							
Northern Quoll (*Dasyurus hallucatus*)	EN	EN	-	Habitats within the survey area which meet the criteria for habitat critical to survival of the Northern Quoll are: • Granite outcrops: denning / breeding • Hills/Ranges/Plateaux and Drainage Line/River/Creek (major and minor): dispersal Field survey evidence suggests that a low-density population may utilise the entire survey area for dispersal and foraging. The Plain (stony/gibber and sand) may be used for dispersal or foraging but the Northern Quoll would not depend on these habitats.	Recorded via trapping, camera, and secondary evidence (scat). Has also been previously recorded within the survey area (Fortescue Internal Database). The DBCA database shows hundreds of records within 10 km (200+ records) and 50 km (700+ records) of the survey area	**Recorded**	No records within the DE (recorded <500 m from DE). Limited critical habitat present (Figure 11-2)
Greater Bilby (*Macrotis lagotis*)	VU	VU	-	May utilise a variety of habitats within the survey area, however, is expected to favour the Plain (sand) habitat because it is suitable for burrowing. It may also occur in Plain (stony/gibber) habitat, but this less likely as the substrate is more difficult for digging. The Greater Bilby may also occur in the vicinity of Drainage Line/River/Creek (major and minor) habitats. The Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (minor) are considered critical habitats for the Greater Bilby (refer to Section 8.4.6.3.	Recorded via trapping, camera, and secondary evidence including burrows and diggings. A resident female was recorded from the southeast of Spectrum's (Spectrum, 2024a; 2024b) survey area. There are at least 136 DBCA records within 3 km of the survey area, some of which are <10 years ago	**Recorded**	Secondary evidence recorded within the DE. Habitat type present (including critical habitat).
Pilbara Leaf-nosed Bat (*Rhinonicteris aurantia*)	VU	VU	-	Habitat present in the survey area consists of foraging habitat only. Conservation Advice for the Pilbara Leaf-nosed Bat (TSSC, 2016) indicates that the habitats within the survey area are prioritised for foraging as follows: • Priority 3 – rocky outcrops: Granite Outcrops • Priority 4 – major watercourses: Drainage Line/River/Creek (Major and Minor) • Priority 5 – open grassland and woodland: Plain (sand) and Plain (stony/gibber). These foraging habitats are not considered to be critical habitat as there is no known or suspected roost site/colony nearby (TSSC, 2016b). The Granite Outcrops may potentially be suitable for infrequent and temporary nocturnal roosting during the wet season when conditions are humid. The habitat lacks the deep crevices and humid caves required for diurnal roosting.	Recorded from audio, however the records were not close to sunset/ sunrise which indicates there are no roosts nearby. Recorded previously from the survey area in 2013 and 2016, and there are numerous other records within 50 km.	**Recorded**	Recorded (calls) in DE but no roost nearby. Foraging habitat present. (Figure 11-1).
Ghost Bat (*Macroderma gigas*)	VU	VU	-	Foraging is likely to occur infrequently within the Drainage Line/River/Creek (major and minor) and Granite Outcrop habitats. The Plain (sand and stony/gibber) habitat is of low suitability for foraging, however infrequent foraging could occur. Habitats in the survey area are unlikely to be utilised for roosting due to the lack of deep, humid crevices or caves, although crevices present in the Granite Outcrops habitat could potentially be used intermittently as a transient roost.	Previously recorded from the survey area in 2014 (Spectrum, 2025) and numerous records (Table 8-16) in and around the survey area indicates there may be potential roost sites nearby.	**Recorded Previously**	Potential roost sites nearby but not recorded within DE. Limited foraging habitat present. (Figure 11-1)

Species	Conservation Status			Preferred Habitats	Records	Likelihood	Presence in the DE
	EPBC Act	BC Act	DBCA				
Brush-tailed Mulgara (*Dasycercus blythi*)	-	-	P4	Most likely to use Plain (sand) habitat for burrowing and may utilise the Drainage Line/River/Creek (minor) for foraging and dispersal.	Likely a resident within the survey area as was trapped, recorded on camera, and secondary evidence was observed through the Spectrum survey area. Numerous records within 10 km of the survey area.	**Recorded**	Recorded (burrows and diggings). Habitat present.
Western Pebble-mound Mouse (*Pseudomys chapmani*)	-	-	P4	Likely to use the Hills/Ranges/Plateaux habitat. Most records within the survey area were within the Plain (stony/gibber) habitat but species is more typically found on stony slopes rather than plains.	Active, recently active, and inactive mounds recorded. Also, many historical and contemporary DBCA records within the survey area and its vicinity.	**Recorded**	Recorded within the DE. Habitat present.
Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*)	-	-	P4	Likely to use unburnt areas within the Plain (stony/gibber), Plain (sand), and habitats, and Drainage Line/River/Creek (major and minor).	153 DBCA records within 40 km of survey area, of which several are within the last 10 years. Recorded <500 m from survey area in 2022. Possible tracks recorded between the northern and southern DEs in 2024 (Spectrum, 2024b).	High	No records within the DE but some within 500 m. Habitat present
Long-tailed Dunnart (*Antechinomys longicaudatus*)	-	-	P4	Most likely to use the Hills/Ranges/Plateaux habitat.	Recorded approximately 15 km from the survey area in 2017 and likely to be distributed throughout the region	Medium	Limited habitat present
Short-tailed Mouse (*Leggadina lakedownensis*)	-	-	P4	Habitats within the survey area are not optimal as species typically inhabits cracking crays. Potential habitats may include Plain (sand) and Plain (stony/gibber).	Two records within 50 km from 2001, but more toward the Chichester range.	Medium	Some habitat present
Birds							
Grey Falcon (*Falco hypoleucos*)	VU	VU	-	Suitable nesting habitat may be present in the Eucalyptus trees of the Drainage Line/River/Creek (major and minor). All of the habitats of the survey area may be used for hunting.	Observation of an individual (sighted twice from Drainage Line/River/Creek (major) and a pair. The pair were frequently sighted south of the Spectrum (2024a; 2024b) survey and along the powerlines adjacent to the Fortescue Main Line Rail, suggesting the species is breeding within the survey area or in its vicinity. Species has also been recorded within 10 km of the survey area in 2012 and 2014, and there are several other records within 50 km.	**Recorded**	No records within the DE. Habitat present. (Figure 11-3)
Pilbara Grasswren (*Amytornis whitei whitei*)	-	-	P4	Likely to use all habitat types of the survey areas, but likely to favour areas of tall, dense spinifex, which were present in Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (major and minor) habitats	Calls heard within the Plain (sand) habitat.	**Recorded**	Not recorded within the DE (call recorded ~1.7 km north of the northern DE). Habitat present.

Species	Conservation Status			Preferred Habitats	Records	Likelihood	Presence in the DE
	EPBC Act	BC Act	DBCA				
Peregrine Falcon (*Falco peregrinus*)	-	OS	-	Suitable nesting habitat may be present in the Eucalyptus trees of the Drainage Line/River/Creek (major and minor). Hunting may occur within the Drainage Line/River/Creek (major and minor) habitats, particularly after rainfall when these habitats may be inundated. Hunting may also possibly occur within the Plains (sand) and Plain (stony/gibber) habitats.	DBCA records within 12 km of the survey area from 2013 and 2017. Considered a sporadic bird of prey in the Pilbara region.	High	Not recorded within the DE. Habitat present.
Common Sandpiper (*Actitis hypoleucos*)	MI	MI	-	Suitable habitat may be present within the Drainage Line/River/Creek (Major and Minor) habitats when inundated after rainfall.	Two DBCA records in 2017 which are ~12 km from the survey area.	Medium	Limited habitat present
Pacific Swift (Fork-tailed Swift) (*Apus pacificus*)	MI	MI	-	Almost exclusively aerial. May use the airspace above the survey area but will not be reliant on any terrestrial habitats within the survey area.	Two previous DBCA records from 2011-2014, located <10 km from the survey area.	Medium	Limited habitat present
Oriental Plover (*Charadrius veredus*)	MI	MI	-	Occurs infrequently in a variety of habitats, particularly after rainfall. The survey area may be visited occasionally (most likely the Plain (sand) habitat.	One DBCA record ~21 km from the survey area in 1999.	Medium	Habitat present
Common Greenshank (*Tringa nebularia*)	MI	MI	-	Habitat within the survey area is marginally suitable habitat under wet conditions. Visits are for foraging only, with the species most likely to occur sporadically after rainfall events in inundated areas, such as within the vicinity of the Turner River (Drainage Line/River/Creek (Major)) and nearby Plain (sand) habitat where clay-dominated areas retain surface water.	Has been recorded three times in the past 20 years from within 50 km of the survey area.	Medium	Limited habitat present
Night Parrot (*Pezoporus occidentalis*)	EN	CR	-	Species is unlikely to be present in the survey area as suitable Triodia hummocks are sparse and there is a lack of drainage/saline wetlands which would support foraging activity. However, the Chichester subregion is a DBCA High Priority Survey Bioregion, and the occurrence of Night Parrot must be considered in the planning and assessment of proposals (DBCA, 2024). There is limited potential for occurrence in proximity to Samphire within the Plain (stony/gibber) and Plain (sand) habitats.	No records within the survey area or surrounds; however, the species is rare and cryptic with very few confirmed records and lack of certainty regarding its current distribution.	Low	Limited habitat present
Red Goshawk (*Erythrotriorchis radiatus*)	VU	VU	-	Preferred habitat is open forest and woodland along streams, swamps and wetlands. If present, the species could potentially utilise the Drainage Line/River/Creek (Major)) habitat.	No records within 50 km of survey area. Species was not known from the Pilbara until recent records extended the southern limit of the species' known range by 500 km (undetermined whether the extension is related to individuals breeding or just passing through).	Low	No habitat present
Red-necked Stint (*Calidris ruficollis*)	MI	MI	-	Preferred habitat is tidal flats, mangroves, beaches, and rocky shorelines but may inhabit inland temporary waters. Marginal habitat is present after rainfall events when drainage lines or other low areas are inundated, such as within the vicinity of the Turner River	No records within the survey area or surrounds.	Low	Limited habitat present

Species	Conservation Status			Preferred Habitats	Records	Likelihood	Presence in the DE
	EPBC Act	BC Act	DBCA				
				(Drainage Line/River/Creek (Major)) and nearby Plain (sand) habitat where clay-dominated areas retain surface water.			
Osprey (*Pandion haliaetus*)	MI	MI	-	Marginal suitable habitat within survey area. The Drainage Line/River/Creek (Major) habitat may provide for occasional use when inundated.	No records of this species within the survey area. Nearest existing records are from Chichester Gorge, >20 km from the survey area. Species only occasionally occurs inland.	Low	No habitat present
Wood Sandpiper (*Tringa glareola*)	MI	MI	-	May occasionally fly over and utilise the Drainage Line/River/Creek (Major) habitat may provide for occasional use when inundated.	Two DBCA records <50 km from the survey area (recorded in 2005 and 2007).	Low	No habitat present
Curlew Sandpiper (*Calidris ferruginea*)	CR	CR	-	Field survey and aerial imagery show that optimal habitat (tidal wetlands, ephemeral and permanent lakes or waterholes with bare edges) is not present within the survey area.	Nil within 50 km.	Very Low	No habitat present
Australian Painted Snipe (*Rostratula benghalensis australis*)	EN	EN	-	Field survey and aerial imagery show that suitable habitat (terrestrial wetlands with fringing vegetation) is not present within the survey area.	Nil within 50 km.	Very Low	No habitat present
Sharp-tailed Sandpiper (*Calidris acuminata*)	MI	MI	-	Field survey and aerial imagery show that suitable habitat (inland lakes) is not present within the survey area.	Nil within 50 km.	Very Low	No habitat present
Pectoral Sandpiper (*Calidris melanotos*)	MI	MI	-	Field survey and aerial imagery show that suitable habitat (temporary or permanent wetlands (typically coastal) with heavy fringing vegetation) is not present within the survey area.	Nil within 50 km.	Very Low	No habitat present
Oriental Pratincole (*Glareola maldivarum*)	MI	MI	-	Field survey and aerial imagery show that suitable habitat (wetlands in open areas near tidal flats or beaches) is not present within the survey area.	Nil within 50 km.	Very Low	No habitat present
Far Eastern Curlew (*Numenius madagascariensis*)	MI	MI	-	Unlikely to occur far from the coastline.		Excluded	NA
Barn Swallow (*Hirundo rustica*)	MI	MI	-	Unlikely to occur far from the coastline.		Excluded	NA
Grey Wagtail (*Motacilla cinerea*)	MI	MI	-	Unlikely to occur far from the coastline.		Excluded	NA
Eastern Yellow Wagtail	MI	MI	-	Unlikely to occur far from the coastline.		Excluded	NA

Species	Conservation Status			Preferred Habitats	Records	Likelihood	Presence in the DE
	EPBC Act	BC Act	DBCA				
(*Motacilla tschutschensis (flava*))							
Reptiles							
Pilbara Olive Python (*Liasis olivaceus barroni*)	VU	VU	-	Permanent or semi-permanent pools are critical habitat for the species. The observed individual is likely to have a home range that encompasses portions of the survey area adjacent to the pool, particularly in Drainage Line/River/Creek (major and minor) habitats which are likely to be used for dispersal and possibly foraging. Granite Outcrops in the vicinity of Drainage Line/River/Creek (major) habitat are likely used for foraging and potentially used for breeding.	One individual was observed during the field surveys but ~300 m outside the survey area next to a permanent pool of water along a major drainage line (~11.2 km east of the DE). Species is known to have a large range (one individual recorded with a home range of ~450 ha). Species is known <25 km from the survey area at Iron Bridge (which has more favourable habitat) and there are 16 DBCA records <25 km from the period 2011 – 2017.	High	Not recorded in DE. Limited habitat present. (Figure 11-4)
Pin-striped Finesnout Ctenotus (*Ctenotus nigrilineatus*)	-	-	P1	Most likely to use Plain (sand) habitat within areas dominated by hummock grasslands and adjacent to Granite Outcrops habitat and watercourses (i.e. Drainage Line/River/Creek (major and minor) habitats).	One record approximately 15 km from the survey area from 2001, another within 25 km in 2012, and four others within 50 km.	Medium	Habitat present
Gane's Blindsnake (*Anilios ganei*)	-	-	P1	Most likely to use Drainage Line/River/Creek (major and minor) habitats that intersect Hills/Ranges/Plateaux habitat, and potentially Plain (sand) habitat dominated by hummock grasses, as these habitats are sheltered and likely to retain some soil moisture.	Two DBCA records ~11 km from the survey area in 2005 and another ~17 km in 2018. Species is cryptic and subterranean, reducing likelihood of records.	Medium	Limited habitat present

Source: 360 Environmental (2023) and Spectrum (2025; 2024b)

Table notes:

1 Critically Endangered (CR): facing an extremely high risk of extinction in the wild in the immediate future.
Endangered (EN): facing a very high risk of extinction in the wild in the near future
Vulnerable (VU): facing a high risk of extinction in the wild in the medium-term future.
Migratory (MI): listed under international agreement.
Other specially protected species (OS): otherwise in need of special protection to ensure their conservation
Priority 1 (P1): known from one or a few locations (generally five or less) which are potentially at risk as all the occurrences are either very small or at risk due to land use / threatening processes. Appear to be under imminent threat.
Priority 2 (P2): known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation (i.e. conservation land with secure tenure). Appear to be at threat from known threatening processes.
Priority 3 (P3): known from several locations, or from a few widespread locations with large populations or large areas of suitable habitat. Not considered under imminent threat.
Priority 4 (P4): adequately known and are considered rare but do not meet the criteria for Threatened or have been recently (<5 years) removed from the list of Threatened species for reasons other than taxonomy.

2 PMST: DCCEEW's (2022) Protected Matters Search Tool
DBCA: DBCA's Threatened and Priority fauna database
NatureMap: DBCA (2022) online search tool
FID: Fortescue internal database

3 The subspecies *Trichosurus vulpecula arnhemensis* (Northern Brushtail Possum) is listed as VU; however its distribution is the Kimberley bioregion and there is taxonomic uncertainty regarding the subspecies status of *T. vulpecula* in the Pilbara.

4 PA: within Night Parrot Priority Area

5 Record is from the Atlas of Living Australia (ALA) database (CSIRO, n.d.)

[This page has been left blank intentionally]

8.4.6.1 Northern Quoll (*Dasyurus hallucatus*) - Recorded

The Northern Quoll is a small omnivorous marsupial, predominantly nocturnal and solitary. The species is characterised by white spots on a reddish-brown coat, a long tail, and a pointy snout. The Northern Quoll is the smallest of the four Australian quolls and is listed as Endangered under the BC Act and Endangered under the EPBC Act (TSSC, 2005).

The Northern Quoll previously inhabited most of northern Australia, however, has contracted from east to west since European colonisation and coinciding with the spread of introduced cane toads (DBCA, 2023a). 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). In the Pilbara, the distribution of the Northern Quoll is bounded by desert (Great Sandy Desert, Gibson Desert, and Little Sandy Desert) to the north, east and south (DCCEEW, 2024). 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). 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).

The Northern Quoll is widely distributed throughout the Pilbara region. Monitoring undertaken by DBCA recorded an average of 3.61 individuals per 100 trap nights across 15 locations throughout the Pilbara region (360 Environmental, 2023).

Presence in the DE

A number of Northern Quolls were recorded to the east of the southern DE (Spectrum, 2025). All records were made within the Granite Outcrops (boulder piles) habitat. The species is considered likely to be using this habitat for breeding and denning (critical habitat) due to the presence of rocky areas with suitable cavities (360 Environmental, 2023). Drainage Line/River/Creek (minor) and Hills/Ranges/Plateaux habitats are also considered important habitats for dispersal and foraging. They are considered to represent habitat critical to the survival of the species (as shelter) consistent with the EPBC Act referral guidelines (DoE, 2016). These habitats are all very limited within the DE. The Plain (sand) and Plain (stony/gibber) may be used by the species for dispersal or foraging, however, it is noted the Northern Quoll does not depend on these habitats (360 Environmental, 2023).

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

The Pilbara Leaf-nosed Bat is a separate form of the orange leaf-nosed bat that is endemic to the Pilbara region (DoE, 2016). The species is described as an obligate deep-roosting cave species, with an area of occupancy defined by available diurnal roost sites with high humidity and stable temperatures (DoE, 2016). The species occurs from the Kimberley to the top end of the NT, to north-western Queensland (DoE, 2016). 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 (DoE, 2016). The species has been detected across most of the Pilbara, however the area of occupancy is estimated to be less than 1,000 ha excluding foraging habitat given specific roosting requirements (DoE, 2016). Suitable roosts have a scattered distribution (DoE, 2016).

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). The Pilbara Leaf-nosed Bat 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, 2016). 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). 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). Foraging habitats utilised by the species are classified as Priority 1, 2, 3, 4 or 5 (TSSC, 2016b).

Presence in the DE

The species was recorded (calls) within the DE, with call patterns indicating that the DE is used for foraging (Spectrum, 2025) but that there are no roost sites in close proximity (360 Environmental, 2023). Given the lack of nearby roost sites, the DE is not considered to contain any critical habitat for the species. Within the DE, the Pilbara Leaf-nosed Bat is considered to potentially utilise all habitat for foraging, with the following identified as higher value for foraging (Figure 11-1) (Spectrum, 2025; TSSC, 2016b).

- Priority 3 (rocky outcrop) habitat: Granite Outcrops (boulder piles)
- Priority 4: (major watercourse) habitat: Drainage Line/ River/ Creek (minor)
- Priority 5 (open grassland and woodland) habitat: Plain (sand) and Plain (stony/gibber).

Granite Outcrops (boulder piles) habitat was 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). The DE has largely avoided Granite Outcrop habitats, and it does not occur within the IDF.

8.4.6.3 Greater Bilby (*Macrotis lagotis*)

The Greater Bilby formerly occupied over 70% of the Australian mainland, across several habitat types within the arid and semi-arid zones (DBCA, 2023a). However, this species has experienced severe population decline due introduced species, landscape modification and altered fire regimes (DBCA, 2023a). Naturally occurring Greater Bilby populations now only occur within central and northern WA, the NT and an isolated area in QLD (DBCA, 2023a). 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 50 km west of Port Hedland and to the south-east of Newman (DBCA, 2023a). The species also occurs to the east and south-east of the Pilbara in the Great Sandy, Little Sandy and Gibson Deserts, south into the Gascoyne and north into the Kimberley (DBCA, 2023a).

The remaining populations of the species 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 Bilbies 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).

Presence in the DE

The Greater Bilby has been recorded within the DE and in close proximity to the DE (Spectrum, 2025; Spectrum, 2024b) (Figure 8-2). 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 (Figure 8-2) (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 220m from the DE in the southeast corner of Spectrum's (Spectrum, 2024b; Spectrum, 2025) survey area, along the existing railway. These records are within Plain (sandy) habitat and clustered around a section of Drainage Line/River/Creek (minor) habitat which extends into the DE. The recorded cluster is understood 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, 2025; 2024b). There are numerous previous records in close proximity to the DE, and it is unknown if the recent burns have temporarily reduced habitat suitability within the DE for the nearby population (Spectrum, 2025).

The species is considered to potentially utilise all habitats within the DE as it is highly mobile and forages widely. However, only the Drainage Line/River/Creek (minor), Plain (sand) and

Plain (stony/gibber) are considered suitable for burrowing and contain plant species which may be used 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). The Greater Bilby is most likely to be found in Plain (sand) habitat 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 (SDM) was undertaken for the Pilbara region and the model was shown to be highly efficient at measuring species presences and pseudo-absences (Spectrum, 2024b). All habitats within the DE were modelled as having either a medium or high species likelihood of occurrence, as illustrated within Figure 8-3. The modelling shows medium and high likelihood habitat surrounding all sides of the DE, in particular continuous areas of high potential adjacent to known Greater Bilby burrows.

Historically, the Greater Bilby has occupied a wide range of climatic zones, landforms, and soil and vegetation types; however the species' Recovery Plan (DCCEEW, 2023) notes that the principal limitation on its distribution is the availability of soils suitable for burrowing, such as sand habitats where burrowing is easier. Descriptions for its preferred known habitats vary by geographic location, and as such the available guidance has not been able to provide a definition for habitat critical to survival of the species. Instead, interim guidance (DCCEEW, 2023) has flagged critical habitat as including:

- Any area where the SPRAT (DCCEEW, 2024) distribution shows the Greater Bilby as known or likely to occur.
- Any location where bilbies are found to occur.
- Any area, between the areas noted above, that may be periodically occupied by bilbies.
- Any area which bilbies may naturally colonise or may feasibly be reintroduced.

The DE is within the SPRAT distribution for critical habitat (Figure 8-3), however, as noted above, only the Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (minor) are considered critical for the Greater Bilby. While the Greater Bilby may occasionally disperse or forage through other parts of 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.

8.4.6.4 Grey Falcon (*Falco hypoleucos*)

The Grey Falcon has a sparse distribution across the arid and semi-arid region of Australia (360 Environmental, 2023). 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 1000 individuals (Spectrum, 2025).

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

Presence in the DE

The species was not recorded in the DE but was recorded in surrounding areas during the Proposal surveys. An individual was sighted twice along Drainage Line/River/Creek (major) habitat to the west of the southern DE, and a pair were observed south of the southern DE along the powerlines adjacent to the Fortescue Main Line Rail (Spectrum, 2025) (Figure 11-3). It is considered the species likely breeds within the survey area or in its vicinity (Spectrum, 2025).

Within the DE, Grey Falcon may use Eucalyptus trees within the Drainage Line/River/Creek (minor) habitat for breeding (360 Environmental, 2023) and utilise all habitats for hunting (Spectrum, 2025). 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).

8.4.6.5 Ghost Bat (*Macroderma gigas*)

The Ghost Bat is endemic to Australia, currently patchily distributed across the NT, Queensland and the Kimberley and Pilbara regions of WA (DBCA, 2023a). 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).

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 inhabits a variety of roosts but relies on permanent underground roosts with that provide stable warm and humid conditions (DBCA, 2023a). Critical roost habitat comprises the following categories (Bullen, R D, 2021a):

- Category 1: maternity/diurnal roost caves with permanent ghost bat occupancy. Caves known to have a permanent occupancy are assumed to be maternity caves; these act

as a source population for the surrounding district. These caves are essential for daily and long-term survival of the species.

- Category 2: maternity/diurnal roost caves with regular occupancy. These caves have periodic (not continuous) occupancy over long periods and typically have several other caves/shelters (e.g. Category 3 roosts) within a few hundred metres which collectively form an 'apartment block' that supports daily and long-term presence of the species.
- Category 3: diurnal roost caves with occasional occupancy. These are typically less developed structures that serve as temporary refuges.
    - Isolated Category 3 caves may enable long-distance movement of individuals (thus contributing to genetic exchange between colonies) but are not considered critical habitat for the ongoing presence of the species in the area.
    - Category 3 roosts adjacent to a Category 2 roost are considered part of the Category 2 'apartment block' and are considered critical habitat.
- Category 4: nocturnal roost caves with opportunistic usage. These are shallow caves or deep overhangs that may be used as a one-off or occasional visit for a resting or feeding session. There are not considered critical habitat.
- Viability of the species within the Pilbara currently appears to be linked to the maintenance of interconnected roosts across the landscape (DBCA, 2023a)Potential Impacts

Current best practice considers semi, and permanent water sources within 5 km of a Category 1 or 2 root to be important habitat, but not critical habitat (2021a). Review of the literature indicates that no critical habitat has been defined with respect to foraging areas for Ghost Bats.

Presence in DE

Within the DE, the species is considered to potentially utilise all habitat types for infrequent foraging. However, the Plain (sand and stony/gibber) habitat was considered to be of low foraging suitability (Spectrum, 2025) (Figure 11-5). The species was not recorded within the DE, and no critical habitat was identified within the DE; however, the species does not call when hunting (360 Environmental, 2023) and so numerous records from Wodgina, and previous records of calls from within the survey area, indicate that a potential roost site may be nearby (Spectrum, 2025). 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).

8.4.6.6 Pilbara Olive Python (*Liasis olivaceus barroni*)

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). Estimating population size for this subspecies is difficult due to its cryptic nature, the lack of any reliable trapping or census techniques and the narrow range of reliable surveys (DEWHA, 2008a).

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). Critical habitat definitions for the species has proven difficult due to lack of research, however a default definition includes rocky gorges, gullies and permanent waterholes

(DEWHA, 2008a). One report states that this subspecies population is sizable in pockets, with some remote populations restricted from threatening process (DEWHA, 2008a). 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 (DEWHA, 2008a). The species is known to have a large range, with studies recording a home range of 450 ha for one individual ~450 ha) (360 Environmental, 2023).

Presence in DE

The Pilbara Olive Python was not recorded from the DE or wider survey area, however, an individual was observed approximately 300 m east of the 360 Environmental (2023) survey area (approximately 11.2 km east of the northern DE (Figure 11-4). within the DE, the Granite Outcrop and Drainage Line/River/Creek (minor) habitats may both provide foraging habitat, while the Drainage Line/River/Creek (minor) habitat may also provide for dispersal (360 Environmental, 2023; Spectrum, 2025).

Permanent or semi-permanent pools of water are considered critical habitat for the species; however, these occur primarily within the Drainage Line/Rive/Creek (major) habitat (360 Environmental, 2023) which has been avoided by the DE. Granite Outcrop habitat in the vicinity of Drainage Line/River/Creek (major) habitat may potentially be used for breeding (Spectrum, 2025), but habitat mapping for the Proposal shows this is very limited within the DE.

8.4.6.7 Brush-tailed Mulgara (*Dasycerus blythi*)

The Brush-tailed Mulgara occupies the arid and semi-arid interior of Australia, and has been recorded within WA, the NT, South Australia and Queensland (Spectrum, 2025). The species occurs between the Western and Simpson Deserts and has a low dispersal once a home range is established (Spectrum, 2025). The Proposal is located in the west of the species distribution (360 Environmental, 2023).

Preferred habitats include sandy and loamy flats vegetated with hummock and/or tussock grasses (Spectrum, 2025). The species has also been recorded in stony gibber plains where wind-blown soil or sand has accumulated and allowed burrowing (Spectrum, 2025).

Presence in DE

The Brush-tailed Mulgara is likely a resident within the survey area and was recorded from the DE and the surrounding area (Spectrum, 2025; Spectrum, 2024b)(Figure 8-4). The species was recorded from Plain (sand) habitat with one burrow / digging location within the northern DE and three burrow / digging locations within the southern DE (Figure 8-4) (Spectrum, 2024b). The species is most likely to utilise Plain (sand) habitat as it provides optimal conditions for burrowing and may also utilise Drainage Line/River/Creek (minor) habitat for this purpose (360 Environmental, 2023; Spectrum, 2025).

8.4.6.8 Western Pebble-mound Mouse (*Pseudomys chapmani*)

The Western Pebble-mound mouse is endemic to the Pilbara region, with a distribution extending from the southern and central Pilbara to the Little Sandy Desert (Spectrum, 2025).

The species inhabits pebbled soil in arid tussock grassland, and acacia woodland on gentle slopes of rocky ranges, with hard spinifex and scattered shrubs (Spectrum, 2025). They are known to occur in groups of up to 12 individuals, utilising several burrows (Spectrum, 2025). The species constructs an underground burrow system with a permanent arrangement of stones above ground at the entrance (Spectrum, 2025).

Presence in DE

Secondary evidence (mounds) of the Western Pebble-mound Mouse was recorded within Hills/Ranges/Plateaux and Plain (stony/gibber) habitat within the DE (360 Environmental, 2023). The species was also recorded within the broader survey area and surrounds. Most mounds within the survey area were found within Plain (stony/gibber) habitat but the species is more typically found in stony slopes rather than plains, therefore Hills/Ranges/Plateaux habitat is likely to be its preferred habitat within the DE (360 Environmental, 2023; Spectrum, 2025). Hills/Ranges/Plateaux habitat is limited in the DE, and both Plain (stony/gibber) and Hills/Ranges/Plateaux habitats occur more widely in the surrounding region (360 Environmental, 2023).

8.4.6.9 Pilbara Grasswren (*Amytornis whitei whitei*)

The Pilbara Grasswren occurs across the ironstone Chichester, Hamersley, Ophthalmia and Parry Ranges, bisected by the Fortescue River (360 Environmental, 2023). An additional population is located south of Ashburton River in the Barlee Range (360 Environmental, 2023). The species distribution is considered wide but variable, and generally uncommon (360 Environmental, 2023).

Presence in DE

While no records of the species were made within the DE, calls made by Pilbara Grasswren were recorded within Plain (sand) habitat in the survey area, approximately 1.7 km north of the northern DE (360 Environmental, 2023). The species is considered likely to utilise all habitats within the DE, but would favour areas of tall, dense spinifex in Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (minor) habitats (360 Environmental, 2023).

8.4.6.10 Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*)

Limited information is known about the distribution and ecology of the Spectacled Hare-wallaby and the species was presumed extinct in the east Pilbara and East Kimberley region until recently (Spectrum, 2025). The distribution of this species within the Pilbara has declined significantly, potentially due to a combination of fox predation and loss of large spinifex hummocks following frequent burning (Spectrum, 2025). The species has a home range of up to 177 ha, and individuals are expected to be nomadic in response to local environmental conditions (Spectrum, 2025). The species is rarely recorded due to its elusive nature (Spectrum, 2025).

The Spectacled Hare-wallaby primarily inhabits tussock and hummock grasslands, where it tunnels below hummocks (Spectrum, 2025). It is known to inhabit hummock grasslands with a mid-dense or sparse understorey, and shelters under long, unburnt spinifex (Spectrum, 2025).

Presence in DE

No records of the species were made within the survey areas or the DE during the fauna assessments, however the species was recorded by motion camera in 2022, less than 500 m from the DE (Spectrum, 2025). Potential species tracks were also identified between the northern and southern DE (Spectrum, 2024b). Within the DE, the species is considered likely to use unburnt areas where tall, dense spinifex is present, including Plain (stony/gibber), Plain (sand), and Drainage Line/River/Creek (minor) habitats (360 Environmental, 2023).

8.4.6.11 Peregrine Falcon (*Falco peregrinus*)

The Peregrine Falcon is one of the most widespread birds in the world, and breeds on almost all continents (Spectrum, 2025). The species is found throughout most of Australia; however, it is uncommon and considered rare across all states and territories (Spectrum, 2025). Within the Pilbara, the species is sporadic (Spectrum, 2025).

The Peregrine Falcon is known to inhabit cliffs, coastal habitats, rivers, wooded water courses, lakes and urban habitats (Spectrum, 2025). Hunting often occurs above drainage lines and rivers (Spectrum, 2025).

Presence in DE

The Peregrine Falcon was not recorded within the DE or wider survey area; however, it may utilise the Drainage Line/River/Creek (minor) habitat within the DE for hunting, and potentially the Plain (sand) and Plain (stony/gibber) habitats as well (Spectrum, 2025). Hunting activity is more likely to occur following rainfall when these habitats are inundated (360 Environmental, 2024). Overstorey vegetation (e.g. *Eucalyptus* trees, stick nests of other large birds) in the Drainage Line/River/Creek (minor) habitat may provide nesting opportunities but this habitat is limited within the DE (360 Environmental, 2024). The regional population is unlikely to be dependent on habitats within the DE or wider survey area as the habitats occur more widely in the region (360 Environmental, 2023).

8.5 Potential Impacts

Potential impacts on terrestrial fauna due to Proposal activities are outlined in Table 8-8.

Potential impacts have been considered for all phases of the Proposal including construction, operation and decommissioning. Potential cumulative impacts are also considered, taking into account the impact of other operations in the surrounding area (as defined in Section 8.6.3).

[This page has been left blank intentionally]

Table 8-8: Potential Direct and Indirect Impacts on Terrestrial Fauna from the Proposal

Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
Direct Impacts			
Loss of Regional Fauna Habitat	Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure.	Construction, Operations and Decommissioning	Clearing of habitat around and near Granite Outcrops restricting fauna dispersal, particularly Northern Quoll and Pilbara Olive Python. Reduction in potential foraging or burrowing habitat, and potential critical habitat for the Greater Bilby. Increased exposure of fauna species, including significant species, to predators and decreased prey availability
Loss of Local Fauna Habitat			
Loss of Short-Range Endemic Habitat			
Loss of Conservation Significant Fauna Habitat			
Indirect Impacts			
Fragmentation of Fauna Habitat	Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure.	Construction, Operations and Decommissioning	Decrease in habitat quality for significant fauna species, reducing availability of quality habitat for local populations.
Altered Fauna Behaviour	Altered light, noise levels or physical barriers associated with construction and operation activities.		Avoidance by fauna in response to altered noise or light.

[This page has been left blank intentionally]

8.6 Assessment of Impacts

8.6.1 Direct Impacts

The Proposal includes installation of solar arrays and associated infrastructure to support the safe transmission of energy via transmission lines and substations to Fortescue operations. Overall, the total clearing of vegetation will result in a loss of 1,108.2 ha of fauna habitat.

The design of the Proposal has been optimised to minimise clearing to as small area as possible and has avoided direct impacts to Drainage Line/River/Creek (major) habitat through omitting all of this habitat type from the DE (refer to Section 8.6.1.2). The Proposal design has also avoided direct impacts to the very small areas of Granite Outcrops that occur within the DE. Any areas of land disturbed during construction (e.g. temporary laydown areas) that are not required to support ongoing operations will be progressively rehabilitated. The potential impacts from clearing of fauna habitat are assessed in the following sections.

8.6.1.1 Loss of Regional Fauna Habitat

There are three land systems intersecting the DE (refer to Table 2-3). Implementation of the Proposal could result in a loss of habitat across the land systems as follows:

- Up to 2.30 ha of Boolaloo land system
- Up to 842.67 ha of Macroy land system
- Up to 263.23 ha of Uaroo land system.

In sections 8.4.1 and 8.4.2, Fortescue has demonstrated how the landforms in these land systems align with the fauna habitat mapped within the DE, and compared habitat available within the wider land system and the disturbance associated with the Proposal. As demonstrated in Table 8-3, no mapped fauna habitat will have more than 0.01% of its regional extent cleared within the three land systems. Therefore, the loss of fauna habitat following implementation of this Proposal will have almost no impact to the representation of those fauna habitats at a regional scale.

8.6.1.2 Loss of Local Fauna Habitat

There are four fauna habitats (excluding cleared areas) mapped within the DE (Table 8-4). Implementation of the Proposal could result in the loss of the following habitat extents:

- Up to 51.04 ha of Plain (stony/gibber) or 2% of its mapped extent.
- Up to 1,027.63 ha of Plain (sand) or 19% of its mapped extent.
- Up to 6.75 ha of Hills/Ranges/Plateaux or 1.3% of its mapped extent.
- Up to 2.07 ha of Drainage Line/ River/ Creek (minor) or 1% of its mapped extent.

These habitats have value to conservation significant fauna that have either been recorded or have a high likelihood of occurrence in the DE as discussed for each species in Section 8.4.6. design of the DE has entirely avoided the Drainage Line/ River/ Creek (major) habitat.

[This page has been left blank intentionally]

Table 8-9: Direct Loss of Local Fauna Habitats

Local Habitat	Total Mapped Extent (ha)	Extent within DE		Extent within IDF		Critical	Assessment of Significance
		Area (ha)	% of Total Extent	Area (ha)	% of Total Extent		
Plain (stony/gibber)	2,550.33	86.22	3.38	51.04	2.00	Critical burrowing and foraging habitat for Greater Bilby	**Negligible:** Plain (stony/gibber) is of lower habitat value and is widespread in the surrounding regional landscape. A local loss of 2% of its mapped extent within the survey area is unlikely to significantly impact any of the fauna species utilising this habitat type.
Plain (sand)	5,491.11	1,283.76	23.38	1,027.63	18.71	Critical burrowing and foraging habitat for Greater Bilby	**Unlikely to be significant:** Plain (sand) is widespread in the surrounding regional landscape. The local loss of up to 18.71% of its mapped extent will reduce the area of possible occupation by burrowing species (e.g. Greater Bilby, Brush-tailed Mulgara) but these species are mobile, and the fauna surveys showed these species have a demonstrated persistence in areas adjacent to development. The Spectrum (2024b) SDM demonstrated that the high and medium potential Greater Bilby habitat is well represented across the region and Pilbara.
Hills/ Ranges/ Plateaux	503.1	6.75	1.34	6.75	1.34	Critical dispersal and foraging habitat for Northern Quoll	**Negligible:** Hills/ Ranges/ Plateaux is a lower value habitat and is widespread in the surrounding regional landscape. A local loss of 1.34% of its mapped extent within the survey area is unlikely to significantly impact any of the fauna species utilising this habitat.
Drainage Line/ River/ Creek (minor)	197.75	6.52	3.30	2.07	1.04	Critical dispersal and foraging habitat for Northern Quoll. Critical burrowing and foraging habitat for Greater Bilby.	**Negligible**: Drainage Line/ River/ Creek (minor) is a high value habitat that provides an ecological linkage through the landscape. The local loss of up to 1.04% of its mapped extent within the survey area is unlikely to significantly impact the fauna species utilising this habitat type.
Cleared / Disturbed	192.25	33.26	17.30	20.72	10.78	Nil	**Nil**: Use of existing cleared / disturbed areas results in an overall lower impact to fauna habitat.

Source: 360 Environment (2023) and Spectrum (2025; 2024b)

[This page has been left blank intentionally]

The assessment of significance in Table 8-9 shows that clearing of fauna habitats within the DE is considered unlikely to have a significant impact on the associated environmental values. Implementation of the Proposal will directly impact up to 1,108.2 ha of mapped habitat types within the DE, however, site selection and Proposal design has avoided fauna habitats that may support conservation significant fauna where possible and limited proposed clearing to the extent necessary for safe and efficient operation.

The Granite Outcrops and the Drainage Line/River/Creek (major and minor) habitats are considered the highest value for conservation significant fauna, followed by the Plain (sand) habitat (Spectrum, 2025). Design of the DE has entirely avoided the Drainage Line/River/Creek (major) habitat and reduced the direct impact on Granite Outcrop habitat to the edges of a single outcrop area; both habitats are absent from the IDF. The greatest direct loss is up to 18.71% of the mapped extent of Plain (sand); however, this is unlikely to be a significant loss given the habitat is widespread in the surrounding landscape and the affected species can readily disperse if needed.

8.6.1.3 Loss of Short-Range Endemic Habitat

As identified in Section 8.4.5, microhabitats have been identified in all fauna habitat types mapped within the DE. These microhabitats have the potential to provide habitat for SREs. Clearing of habitat within the DE will result in the loss of these microhabitats where they occur. Fortescue highlights the extent of the mapped habitat types as discussed in Section 8.4.2 and the large extent of habitat that will remain post-clearing within the local area. Whilst there is potential for SRE invertebrates to occur within the IDF, these microhabitats are likely to be well represented in the wider area. Fortescue also notes that the majority of the habitat to be cleared Plain (Sand) and Plain (Stony/Gibber) have a low likelihood for SRE invertebrates. Impacts to any SRE invertebrate species as a result of the loss of local habitat is likely to be low.

8.6.1.4 Loss of Conservation Significant Fauna Habitat

As discussed in Section 8.4.6, a number of conservation significant vertebrate fauna species have been either recorded within the DE or have a high likelihood of occurring within the DE. For the purpose of this assessment, those species listed under the EPBC Act as MNES will be discussed separately in Section 11 of this document. This section will discuss those species of conservation significance listed at the WA State level.

Western Pebble-mound Mouse (*Pseudomys chapmani*)

Based on the habitat descriptions and records for the Western Pebble-mound Mouse described in Section 8.4.6.8, the DE contains potential habitat for the species within the Plain (stony/gibber) and Hills/Ranges/Plateaux habitat. Although only secondary evidence was recorded within the DE, the recently active mounds suggest that the species is utilising habitats within the DE.

Through design, both habitats have been avoided where possible, and the DE size was reduced throughout the design stage to decrease the magnitude of impact. The maximum percentage of Western Pebble-mound Mouse habitat impacted within the DE is provided below in Table 8-10 and shows that up to 1.89% of habitat within the survey area would be directly impacted by the Proposal.

Table 8-10: Potential inherent impacts to Western Pebble-mound Mouse habitat from the Proposal

Habitat Type	Habitat Value	Survey Area (ha)	Extent within DE		Extent within IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Plain (stony/gibber)	Potential habitat	2,550.33	86.22	3.38	51.04	2.00
Hills/ Ranges/ Plateaux		503.05	6.75	1.34	6.75	1.34
Total		**3,053.38**	**92.97**	**3.04**	**57.79**	**1.89**

Source: 360 Environmental (2023) and Spectrum (2025)

It is possible that active Pebble-mouse Mounds may occur within the IDF. However, as noted in Table 8-10, there remains large areas of suitable, or more suitable habitat for Pilbara Pebble-Mouse in the local area.

Following application of mitigation measures identified in Section 8.7 and consideration of potential cumulative impacts, the Proposal is considered unlikely to significantly impact on the species given that 98% of the total mapped habitat for the species will remain. Any impact to this species will be restricted to the local area only.

Pilbara Grasswren (*Amytornis whitei whitei*)

Based on the habitat descriptions and records for the Pilbara Grasswren described in Section 8.4.6.9, the species is considered likely to utilise all habitats within the DE but would favour the Plain (sand), Plain (stony/gibber), and Drainage Line/River/Creek (minor) habitats. No specific habitat values for breeding or foraging were identified for the species within the DE, and no habitat types are considered unique or isolated within the broader landscape. As a result, no habitat within the DE is considered significant for the species.

The maximum percentage of Pilbara Grasswren habitat impacted within the DE is provided below in Table 8-11.

Table 8-11: Potential inherent impacts to Pilbara Grasswren habitat from the Proposal

Habitat Type	Habitat Value	Survey Area (ha)	Extent within DE		Extent within IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Drainage Line/ River/ Creek (major)	Favoured habitat	172.79	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Plain (sand)		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

Habitat Type	Habitat Value	Survey Area (ha)	Extent within DE		Extent within IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Hills/ Ranges/ Plateaux	Potential habitat	503.05	6.75	1.34	6.75	1.34
Granite Outcrops		183.43	0.04	0.02	0	0
Total		**9,098.46**	**1,383.29**	**15.20**	**1,087.53**	**11.95**

Source: 360 Environmental (2023) and Spectrum (2025)

It is clear that large areas of suitable habitat for the Pilbara Grasswren occur more widely outside of the DE and even beyond the extent surveyed by 360 Environmental (2023) and Spectrum (2025). impacts to this species from the Proposal are expected to be negligible.

Spectacled Hare-wallaby (*Lagorchestes conspicillatus leichardti*)

Based on the habitat descriptions and records for the Spectacled Hare-wallaby described in Section 8.4.6.10, the DE contains potential habitat for the species within the Plain (stony/gibber), Plain (sand), and Drainage Line/River/Creek (minor) habitats (360 Environmental, 2023).

The maximum percentage of Spectacled Hare-wallaby habitat impacted within the DE is provided below in Table 8-12 which demonstrates that up to 12.85% of potential habitat for the Spectacled Hare-wallaby within the survey area would be directly impacted by the Proposal.

Table 8-12: Potential inherent impacts to Spectacled Hare-wallaby habitat from the Proposal

Habitat Type	Habitat Value	Survey Area (ha)	Extent within DE		Extent within IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Plain (stony/gibber)	Potential habitat	2,550.33	86.22	3.38	51.04	2.00
Plain (sand)		5,491.11	1,283.76	23.38	1,027.63	18.71
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
Total		**8,411.98**	**1,376.50**	**16.36**	**1,080.74**	**12.85**

Source 360 Environmental (2023) and Spectrum (2025)

Whilst the habitat within the DE may be utilised by the Spectacle Hare-wallaby, there remains extensive areas in the local area for this species. The DE was reduced throughout the design stage to avoid the Plain (stony/gibber) habitat within the south DE, with an undisturbed section

of native vegetation left between the one recorded patch of Plain (stony/gibber) habitat to nearby undisturbed native vegetation. No specific habitat values for breeding or foraging were identified for the species within the DE, and no habitat types are considered unique or isolated within the broader landscape. As a result, no habitat within the DE is considered significant for the species.

Peregrine Falcon (*Falco peregrinus*)

Based on the habitat descriptions and records for the Peregrine Falcon described in Section 8.4.6.11, the DE contains potential foraging habitat for the species within the Drainage Line/River/Creek (minor), Plain (stony/gibber) and Plain (sand) habitats. The species may also utilise the Drainage Line/River/Creek (minor) habitat for nesting where large trees are present.

The maximum percentage of Peregrine Falcon habitat impacted within the DE is provided below in Table 8-13 and shows that up to 12.85% of potential habitat within the survey area would be directly impacted by the Proposal.

Table 8-13: Potential inherent impacts to Peregrine Falcon habitat from the Proposal

Habitat Type	Habitat Value	Survey Area (ha)	Extent within DE		Extent within IDF	
			Area (ha)	% of Survey Extent	Area (ha)	% of Survey Extent
Plain (stony/gibber)	Potential foraging	2,550.33	86.22	3.38	51.04	2.00
Plain (sand)		5,491.11	1,283.76	23.38	1,027.63	18.71
Drainage Line/ River/ Creek (major)	Potential foraging and nesting	172.79	0	0	0	0
Drainage Line/ River/ Creek (minor)		197.75	6.52	3.30	2.07	1.04
Total		**8,411.98**	**1,376.50**	**16.36**	**1,080.74**	**12.85**

Source: 360 Environmental (2023) and Spectrum (2025)

The DE was designed to reduce clearing within the Drainage Line/River/Creek (minor) habitat, with only 1.04% of the mapped habitat impacted. Although habitat within the DE is considered significant for the species in terms of the habitat values provided, no habitat types are considered unique or isolated within the broader landscape. Fortescue notes that there are extensive areas of suitable nesting and hunting habitat available to the Peregrine Falcon outside of the IDF. Impacts to the Peregrine Falcon as a result of habitat loss are therefore not considered significant.

8.6.1.5 Increased risk of vehicle strike

During the construction phase, vehicle movements will increase through the DE, associated with the transit of the personnel increasing the risk of vehicle strikes within the area. This risk will be reduced during the operational phase, with personnel only required for maintenance operational activities. In addition, there is also risk of mortality with heavy plant and machinery during clearing activities (for example collision with dozers as they clear).

The risk of vehicle strike will remain throughout the construction phase and this impact would be similar for all diurnal species likely to occur in the DE (some of the Threatened and Migratory species discussed in this report). However, for those that are predominantly nocturnal, including the Northern Quoll and Greater Bilby there would be a reduced risk of collision with construction or operational vehicles given the anticipated substantial reduction in site activity during the night when these species are most active.

Collision with vehicles could lead to injury or mortality of fauna species. However, with implementation of the standard mitigation measures as outlined in Section 8.7, the anticipated collision numbers would be low. Therefore, the potential collision impacts are not considered to be significant for any of the species identified.

8.6.2 Indirect Impacts

8.6.2.1 Fragmentation of Fauna Habitat

Many species in the Pilbara are adapted to specific habitats, the clearing of which can threaten their survival. Terrestrial vertebrate fauna species may be impacted by habitat fragmentation and edge effects as a result of the Proposal. This is particularly likely where habitats of high value or ecological linkage exist, including Drainage Line (major and minor) and Granite Outcrops. Removal of Drainage Line (major and minor) habitats could result in isolated pockets of these habitats drying out, due to disconnection from the main water source.

Clearing of fauna habitat may cause barriers to fauna movement, however all of the identified fauna habitats extend beyond the survey area as contiguous areas of larger ecosystems and key habitats for conservation significant fauna such as Drainage Lines/River/Creek (major) have been entirely avoided within the DE and Granite Outcrops have been avoided in the IDF.

The Drainage Line/River/Creek (minor) habitat has been largely avoided, aside from one infrastructure crossing in the southeast corner of the southern DE and the Proposal design will maintain water flows where possible to minimise impacts to habitat connectivity (Section 10). In doing so, design of the DE and IDF has minimised the impacts of fragmentation and edge effects to habitats of highest ecological value, including fauna corridors/dispersal habitats, which are most susceptible to the impacts of fragmentation. Fragmentation and the generation of edge effects due to the Proposal has also been minimised through optimisation of the Proposal to use existing cleared areas and limit clearing to two larger areas rather than several smaller ones.

Design of the Proposal has avoided/minimised fragmentation and is unlikely have a significant residual impact on fauna habitats or the species utilising the habitats.

8.6.2.2 Altered Fauna Behaviour

Construction and operations associated with the Proposal may result in indirect impacts to fauna behaviour through terrestrial barrier effects. These occur where species are either unable or are unwilling to move between suitable areas of habitat due to the imposition of a barrier. This can include a habitat type that has become unsuitable (e.g. cleared areas devoid of vegetation or structure), a physical barrier such as a fence, railway line, or a non-physical barrier created by light or noise.

Noise will be at its greatest during the construction phase, however, it is noted that construction activities will be short-term in duration, and it is likely that fauna may temporarily move out of areas subject to high levels of noise (i.e. move into areas perpendicular to the alignment that contains bushland which will act to reduce noise exposure). It is expected that this avoidance behaviour will be short-term in nature and will only last for the duration of the construction activities.

Any avoidance behaviour by fauna in response to noise is expected to return to near-baseline during Proposal operation.

Lighting will be designed and managed in accordance with the National Light Pollution Guidelines for Wildlife (DCCEEW, 2023). This reflects best practise and is consistent with conservation advice and/or recovery plans for conservation significant fauna, including MNES, such as Pilbara Leaf-nosed Bat, Ghost Bat and Northern Quoll. Lighting will have its greatest impact during construction, with lighting reduced to that required for safe and efficient operation once construction has concluded.

Construction of the Proposal may have a potential indirect impact of a “lake effect” (Hathcock, 2018). It has been proposed that the glint or glare from solar panels may confuse bird species by mimicking the appearance of large bodies of water and potentially causing collisions with the solar arrays.

Altered fauna behaviour from indirect impacts associated with construction activities are expected to be short-term and with the implementation of mitigation measures, the Proposal is considered unlikely to have a significant residual impact on fauna behaviour.

8.6.2.3 Degradation of Fauna Habitat

Activities that may lead to degradation of fauna habitat from the construction and operation of the Proposal include weed infestation and altered fire regimes. These have been identified and assessed for vegetation and therefore are not replicated here. It is assumed that indirect impacts to vegetation would also have a similar impact to the fauna habitat supported by the vegetation. Refer to Section 7.6.2.

8.6.3 Cumulative Impacts

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA, 2021).. This section outlines the potential cumulative impacts to terrestrial fauna as a result of the Proposal and other surrounding developments either recently approved or currently under assessment.

In undertaking a cumulative impact assessment, the following assumptions are noted:

- Cumulative impacts resulting from third-party operations are based on information available in the public domain for third party operators and does not encapsulate impacts for all third-party operations in the region.

- Cumulative impact calculations generally do not take into consideration areas outside of those assessed under Part IV of the EP Act, or EPBC Act referrals, for each relevant

proposal. Where relevant, large clearing permits under Part V of the EP Act may also be included depending on the quantity and quality of information available.

- The accuracy of data from external sources will not be verified and it is assumed that data publicly available is accurate and collected in accordance with standard industry guidelines.

8.6.3.1 Cumulative Impacts on Regional Fauna Habitat

At a regional vegetation scale, the Proposal has been considered with respect to the Chichester IBRA subregional boundaries of the available land systems mapping. As noted in Section 8.4.1, detailed mapping undertaken for the Proposal is not available at the same scale, or with consistent descriptions at a regional level, and the broad landscape units provided by systems mapping may be used as a fauna habitat surrogate for Cumulative Impact Assessment (CIA).

The DE intersects the Boolaloo, Macroy, and Uaroo Land Systems, which are considered widespread and have an extensive occurrence throughout the Pilbara. This CIA has considered projects that occur within the three land systems and those with publicly available information including proposed disturbance (ha) by habitat type that align with the fauna habitats described within the DE.

Existing and proposed developments identified for consideration in the cumulative impact assessment (CIA) are presented in Table 8-14 and were identified based on a review of significant proposals referred to the EPA (DWER-120) in addition to PEG's NSJ 100 MW solar farm (CPS 9541/1). Unlike pre-European vegetation associations (refer to Section 7.6.3.1), there are no statewide land system statistics reflecting the remaining extent and therefore all of the identified developments were reviewed.

The Proposal will not impact other land systems and therefore will not have a cumulative impact on other land systems.

Limitations

The following limitations were identified when considering the cumulative impacts as presented in Table 8-14:

- The list of projects within the Chichester Sub-bioregion only includes those with fauna habitat hectare values. There are other Projects within the scope of the CIA that have been omitted from the quantitative assessment due to a lack of fauna habitat hectare values. As a result, the outcome of Table 8-14 may under-represent the impacts to terrestrial fauna habitat at the regional scale. To manage this, Fortescue has also included a qualitative assessment.

- Several of the projects in Table 8-14 have already been implemented and therefore the impacts to fauna habitat values have already been realised. Only future projects would add to the impacts to fauna values in a cumulative sense.

- There are other implemented and future projects that may impact on habitat with similar values and importance to fauna species in other land systems. Fortescue has chosen to only focus on the three land systems intersected by the Proposal as there

is a strong correlation between fauna habitat within the DE and the landforms within the three land systems.

Table 8-14: Cumulative Impact Assessment for Regional Fauna Habitat

Project	Proponent	Hills, Ranges and Plateaux	Minor Drainage Line	Plain (sand)	Plain (stony/gibber)	Conservation Significant Species	Associated Land System
This Proposal	Fortescue	6.75	2.07	1,027.63	51.04	Clearing of critical habitat for: • Greater Bilby - 1,080.74 ha • Northern Quoll - 8.82 ha Clearing of Potential habitat for: • Western Pebble-mound Mouse - 57.7 ha • Pilbara Grasswren - 1,087.53 ha • Spectacled Hare-wallaby - 1,080.74 ha • Peregine Falcon - 1,080.74 ha	Boolaloo, Macroy & Uaroo
Hemi Gold Project	De Grey Mining	33.3	-	5,037.10	-	A quantifiable amount of critical habitat to be removed is not available; however, no significant impacts are reported.	Uaroo
North Star Junction (NSW) 100 MW project	Fortescue	-	1.3	-	-	A quantifiable amount of critical habitat to be removed is not available; however, no significant impacts are reported.	Macroy
Solomon Iron Ore Project - Sustaining Production	PEG (Fortescue)	2,966	-	-	13,467	Clearing of critical habitat for: • Northern Quoll - 3,235 ha Other habitat clearing for: • Western Pebble-mound Mouse – 16,523 ha • Peregine Falcon – 342 ha	Macroy
Spinifex Ridge Molybdenum Project	Moly Metals Australia	-	86.78	8.85	-	Clearing of critical habitat for: • Northern Quoll - 61.46 ha Other habitat clearing for: • Western Pebble-mound Mouse – 422.18 ha	Macroy

Project	Proponent	Hills, Ranges and Plateaux	Minor Drainage Line	Plain (sand)	Plain (stony/gibber)	Conservation Significant Species	Associated Land System
						• Peregine Falcon - 51.39 ha	
North Star Magnetite Project Extension	Fortescue	1,355.20	19.2	-	-	Clearing of critical habitat for Northern Quoll - 178 ha Clearing of potential habitat for Peregine Falcon - 14.9 ha	Boolaloo, Macroy & Uaroo
Miralga Creek DSO Project	Atlas Iron Pvt Ltd	167.4	-	67.7	306.5	Clearing of critical habitat for Northern Quoll - 59.6 ha. A quantifiable amount of critical habitat to be removed for other significant species is not available; however, no significant impacts are reported.	Macroy & Uaroo
Warrawoona Gold Project	Calidus Resources	227.3	8.5	11.1	141.5	Clearing of critical habitat for: • Northern Quoll - 0.8 ha. • Greater Bilby - 11 ha • Western Pebble-mound Mouse - 280 ha	Macroy
North Star Magnetite Project	Fortescue	3,584	22	716	87	A quantifiable amount of critical habitat to be removed is not available; however, no significant impacts are reported.	Boolaloo, Macroy & Uaroo
Mulga Downs Hub and Rail Spur	Roy Hill Infrastructure Pty Ltd	48.54	56.72	-	1,010.14	Clearing of critical habitat for: • Northern Quoll - 1,193.27 ha. • Western Pebble-mound Mouse - 1,136.08 ha	Macroy
Total		**8,388.49**	**196.57**	**6,868.38**	**15,063.18**		

It is evident from the CIA (Table 8-14) that when considered in a cumulative sense, the Proposal will have a small incremental increase in loss of fauna habitat within the three land systems. However, this incremental increase is in the order of 0.01% or less. For instance, the Proposal will result in 6.75 ha of disturbance within the Hills/Ranges/Plateaux habitat type which is less than 1% increase in cumulative disturbance. Proportionally, the largest impact from the proposal is disturbance to Sandy Plain habitat. The proposal will increase disturbance to this habitat type by 1,027.63 ha, which is a 17.6% increase in cumulative disturbance. This cumulative impact is negligible at a regional scale.

Given the low proportionate impacts on the habitat, and the wider habitat available outside of the DE for all species discussed, the cumulative impact of this Proposal on terrestrial fauna habitat is not significant.

8.6.3.2 Cumulative Impacts on Local Fauna Habitat

One project was considered suitable to assess cumulative impacts to local fauna habitat, Fortescue's NJW 100 MW Project. Clearing for NSJ 100 MW was undertaken after the surveys for the Proposal had been conducted.

The clearing permit for NSJ 100 MW (CPS 9541/1 purpose permit for clearing of 353.2 ha within a boundary of 371.68 ha).The Proposal and NSJ 100 MW will have a cumulative loss of up to 51.04 ha (2%) of Plain (stony/gibber), 1,379.53 ha (25%) of Plain (sand) and 3.37 ha (1.7%) of drainage line/river/creek (minor) habitat (Table 8-15). This cumulative loss is not considered to be of local significance as these habitats are consistent with habitats identified by other surveys in the region and extend beyond the survey area as part of larger ecosystems (360 Environmental, 2023).

Table 8-15: Cumulative Impact Assessment for Local Fauna Habitat

Unit	Mapped Extent	The Proposal IDF	NSJ 100MW Footprint	Cumulative Impacts	% (Cumulative Loss/ Mapped Extent)
Granite Outcrop	183.43	0	0	0	0
Plain (stony/gibber)	2,550.33	51.04	0	51.04	2
Plain (sand)	5,491.11	1,027.63	351.90	1,379.53	25
Drainage line/River/Creek (minor)	197.75	2.07	1.3	3.37	1.7

8.6.3.3 Cumulative Impacts on Loss of Conservation Significant Species

All conservation significant fauna species that are known or highly likely to occur within the DE may be affected by (cumulative impacts) from existing or future developments in the wider region. An assessment of the impacts of cumulative habitat loss on conservation significant fauna in the local area (<50 km) is provided in Table 8-16. This assessment takes into consideration the availability of habitat within and outside the Proposal survey area and potential occurrence of conservation significant fauna species at local developments.

The assessment shows that cumulative impacts on conservation significant fauna are unlikely to be significant, given that:

- Over 85.5% of habitat within the survey area is retained and as observed, less than 0.01% of any fauna habitat type within the region will be disturbed by the Proposal.
- All the habitats within the survey area extend into the surrounding area to form larger ecosystems
- Records and habitat for local developments show that conservation significant fauna are well-represented and supported in the local area.

Table 8-16: Cumulative Impact Assessment on Conservation Significant Fauna

Significant Fauna Species	Local Fauna Habitat						Cumulative Impact on Local Fauna Habitat	Cumulative Impact on Species
	Plain (stony/gibber)	Plain (sand)	Granite Outcrops	Hills/ Ranges/ Plateaux	Drainage Line/ River/ Creek (major)	Drainage Line/ River/ Creek (minor)		
*Total extent in survey area (ha)**	*2,550.33*	*5,491.11*	*183.43*	*503.05*	*172.79*	*197.75*		
**Maximum cumulative loss (DE + NSJ 100 MW) (ha)*	*102.04*	*1,110.51*	*0.32*	*6.75*	*0*	*6.52*		
Western Pebble-mound Mouse	Potential habitat	-	-	Potential habitat	-	-	Loss of up to 108.79 ha (3.6%) of habitat	Unlikely to be significant. The loss of potential habitat is negligible (3.6%).
Pilbara Grasswren	Favoured habitat	Favoured habitat	Potential habitat	Potential habitat	Favoured habitat	Favoured habitat	Loss of up to 1,226.14 ha (13.5%) of habitat	Unlikely to be significant. No critical foraging or roosting habitats are present and the non-critical foraging habitats extend well beyond the survey area. The loss of up to 13.5% of mapped habitat is not significant.
Spectacled Hare-wallaby	Potential habitat	Potential habitat	-	-	Potential habitat	Potential habitat	Loss of up to 1,219.07 ha (14.5%) of habitat	Unlikely to be significant. Habitats extend well beyond the survey area so the loss of up to 14.5% within the survey area is not significant.

Significant Fauna Species	Local Fauna Habitat						Cumulative Impact on Local Fauna Habitat	Cumulative Impact on Species
	Plain (stony/gibber)	Plain (sand)	Granite Outcrops	Hills/ Ranges/ Plateaux	Drainage Line/ River/ Creek (major)	Drainage Line/ River/ Creek (minor)		
Peregrine Falcon	Potential foraging	Potential foraging	-	-	Potential foraging and nesting	Potential foraging and nesting	Loss of up to 1,219.07 ha (14.5%) of habitat (including up to 6.52 ha (1.8%) of potential nesting habitat))	Unlikely to be significant. Habitats extend well beyond the survey area so the loss of up to 14.5% within the survey area is not significant. Loss of nesting habitat is negligible (1.8%). Species is known or likely to occur at 8 of 11 local developments.

Table notes:

* From Table 8-15

^ Species-specific habitat values per potential impact assessment in Section 8.6.1

\# Informed by known/likely presence at local (<50 km) developments (refer to Table 8-15).

8.7 Mitigation

During 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 terrestrial fauna as far as practicable. Following completion of the fauna surveys, the data was reviewed against the project design to avoid/minimise clearing of significant species habitat. The Proposal's IDF has been designed to avoid areas that may support significant biodiversity values or heritage values such as drainage lines and granite outcrops.

Potential impacts to terrestrial fauna are likely to be experienced predominantly during the construction phase of the Proposal through activities associated with the clearing of native vegetation.

The mitigation hierarchy has been applied to avoid and minimise impacts to terrestrial fauna where possible (Table 8-17). During initial Proposal design and siting, environmental constraints were considered and avoided where possible. Consequently, the DE location was significantly reduced in size and relocated north of the Drainage Line (Major) which constitutes important fauna habitat for conservation significant species (Figure 2-1). The DE was further reduced in size throughout the design phase to avoid and minimise impacts. An evaluation of alternatives to the Proposal was also completed as part of the impact mitigation process (2.1.1).

The application of mitigation measures has sought to ensure that the residual impact and environmental outcome is not significant. Table 8-17 outlines proposed mitigation measures which may be implemented to manage potential adverse impacts terrestrial fauna from design through to operation.

[This page has been left blank intentionally]

Table 8-17: Mitigation Measures for Terrestrial Fauna

Potential Inherent Impact	Avoid	Minimise	Manage/Rehabilitate	Residual Impact
Loss and fragmentation of fauna habitat due to clearing and earthworks.	The Proposal has been designed and planned (Section 2) to avoid disturbance to high quality and critical fauna habitat where possible. Clear demarcation of no-go zones to avoid disturbance of important fauna habitat outside of the proposed impact areas.	Internal Land Use Certification (LUC) (100-PR-TA-0001) and Land Use Disturbance Permit will be required prior to commencement of activities. Minimise clearing to areas required to support construction and operation only. Appropriate inductions and toolboxes will be undertaken.	Progressive rehabilitation of temporary cleared areas will be undertaken where practicable. Decommissioning and Rehabilitation will return the area to functional fauna habitat.	As a result of careful and considered design/ planning/ location selection to avoid/minimise impacts to and loss of habitat for conservation significant species, including potential critical habitat for the Greater Bilby, as well as the likely success of future rehabilitation efforts, the residual impacts of the proposal on fauna habitat are greatly reduced.
Restriction of fauna movement and dispersal.	Carefully plan the layout and placement of solar panels, access roads, and other infrastructure components to minimise disruption to wildlife movement patterns. Leave adequate buffer zones near water bodies, vegetation patches, or known wildlife movement routes. Before starting any ground disturbance activities, identify and mark the known locations of environmentally sensitive areas that need to be preserved and protected.	Clearing of vegetation will be undertaken slowly and directionally, to avoid trapping fauna and allow dispersal away from the cleared area. Design will maintain water flows where possible to minimise impacts to habitat connectivity, particularly in areas of mapped drainage lines. Implement Fortescue Surface Water Management Plan (100-PL-EN-1015) for construction of pipelines and infrastructure. Appropriate inductions and toolboxes will be undertaken.	Removal of infrastructure during decommissioning and reinstate fauna corridors	Residual impact reduced to acceptable through avoidance of major drainage lines which provide significant dispersal corridors through the landscape and the restoration of the area following decommissioning.

Potential Inherent Impact	Avoid	Minimise	Manage/Rehabilitate	Residual Impact
Habitat degradation due to weed introduction, increase in feral predator presence and/or spread, dust deposition, altered fire regimes and leaks or spills.	To prevent any degradation of priority fauna habitat, it is important to ensure that all vehicles, plant and equipment, including any trailered equipment, are thoroughly cleaned, inspected, and certified before entering Proponent controlled sites. Ignition of fires and altered fire regimes will be avoided through use of a permit system for hot works, installation of fire breaks around critical infrastructure, provision of fire extinguishers in all vehicles and emergency responses as required.	Fire prevention regimes will be implemented, with region specific fire management implemented to promote vegetation mosaic and heterogenous structure where possible. Management of non-mineral waste materials and on-site landfill facilities will be implemented in line with the Waste Management Plan (IO-PL-EN-0001) to ensure proper measures are taken to handle and dispose of waste, reducing potential harm to fauna and prevent ignition sources. Implement Fortescue's Dust Management Plan (IO-PL-EN-0001). Implement Fortescue's Weed Management Plan (IO-PL-EN-0035). Feral species management to be implemented throughout construction and operation, to decrease impacts to native fauna, including conservation significant species. Management measures to be documented within the Project Environmental Management Plan. Appropriate inductions and toolboxes will be undertaken.	Rehabilitate disturbed areas that are no longer needed for ongoing operations	Residual impact negligible through implementation of industry standard practices for weed, fire, hydrocarbon and waste management.

Potential Inherent Impact	Avoid	Minimise	Manage/Rehabilitate	Residual Impact
Injury or mortality of fauna due to equipment and/or vehicle strike or entrapment.	Off-track driving will be avoided, and vehicles confined to defined roads or access tracks. Vegetation clearing will be avoided in habitat areas of known fauna activity, including active mounds or burrows.	Excavations and trenches will be kept open only a long as needed for the works. Trenches and excavations will be checked daily for trapped animals. Temporary fencing to be placed around excavation pits overnight to prevent fauna entrapment. Pre-clearance surveys for conservation significant fauna. Clearing of vegetation will be undertaken slowly and directionally, to avoid trapping fauna and allow dispersal away from the cleared area. Implement appropriate mitigation measures such as speed limit restrictions, right of way for fauna and the prohibition of off-road driving. Appropriate inductions and toolboxes will be undertaken Personnel trained in fauna handling will be employed during trenching operations to clear open trench of fauna on a daily basis and prior to backfilling (45-PR-EN-0026 Fauna handling, relocation and rehabilitation procedure) Conduct activities in accordance with the LUC Procedure (100-PR-TA-0001).	Injured fauna will be reported to the site environmental officer who will determine the appropriate course of action. Fauna mortalities involving EPBC Act, BC Act or DBCA Priority listed species will be reported to DBCA and DCCEEW as required.	Residual impact negligible through implementation of industry standard practices and company procedures for vehicle management, vehicle strike and clearing.

[This page has been left blank intentionally]

8.8 Residual Impacts

The Proposal will result in the clearing of 1,108.2 ha of fauna habitat, some of which may provide habitat for conservation significant fauna. The residual impacts expected after mitigation measures are applied are summarised in Table 8-18.

Table 8-18: Summary of Residual Impacts for Terrestrial Fauna following Mitigation

Potential Impact	Residual Impact after Management	Regional Significance
Loss of habitat	Loss of up to 1,108.2 ha of fauna habitat. However, habitat types with the greatest value to conservation significant species have been avoided where possible, and completely avoided within the current IDF. All of the impacted habitats extend into the surrounding region as larger ecosystems. There will be minor impacts to critical habitat for the Northern Quoll and Greater Bilby as follows: 1. Plain (sand): up to 1,027.63 ha 2. Plain (stony/gibber): up to 51.04 ha 3. Hills/ Ranges/ Plateaux: up to 6.75 ha 4. Drainage Line/ River/ Creek (minor): up to 2.07 ha	Not likely to be a significant impact, due to adjacent remaining habitat and avoidance of highest value habitats for most species. Habitat types recorded within the DE are considered well represented in the surrounding region.
Fragmentation of habitat	The infrastructure and associated clearing will fragment some areas of habitat, however, design of the DE and IDF has minimised the impacts of fragmentation and edge effects to habitats of highest ecological value, including fauna corridors/dispersal habitats, which are most susceptible to the impacts of fragmentation	Impacts from fragmentation are likely to be localised and not regionally significant
Altered fauna behaviour	Potential impacts to fauna behaviour may occur. However, surrounding adjacent vegetation will provide shelter and directional clearing will be undertaken. Activity will be limited during operation, with limited personal present at the site during operation. Construction works will occur for a limited time, and impacts are expected to be short-lived and temporary during this period.	Not likely to be a significant impact, due to adjacent remaining habitat
Vehicle Interactions	There is a residual risk of fauna collision with vehicles associated with construction and operation of the Proposal, however with the implementation of the recommended mitigation measures, such as adherence to strict speed limits on site, impacts are not anticipated to be significant.	No significant impacts anticipated on a regional scale.
Degradation from weeds, dust, altered fire regimes and altered surface water flows	With implementation of standard weed and fire management practices, impacts to native vegetation from weeds and fire are unlikely to be significant. Remnant vegetation around the DE will likely experience negligible levels of degradation from edge effects and dust deposition for the life of the Proposal. Decommissioning and rehabilitation an end of life will likely restore ecological linkages and reduce dust sources. Changes in surface	No significant impacts anticipated on a regional scale.

	water flow will be restricted to the disturbance footprint, with no interruption to flows outside the footprint.	

8.9 Environmental Outcomes

The Terrestrial Fauna values recorded within the DE are not considered unique to the area and are known to be widespread in the region. Implementation of the Proposal would likely result in:

- Direct loss of up to 1,108.2 ha of fauna habitat within a DE of 1,416.6 ha
- Direct loss of fauna habitat of value to conservation significant species:
    - Drainage Line/River/Creek (minor): loss of up to 1.04% of total mapped extent (6.52 ha within DE, 2.07 ha within IDF). This is critical dispersal and foraging habitat for Northern Quoll and critical burrowing and foraging habitat for Greater Bilby.
    - Plain (sand): loss of up to 18.71% of total mapped extent (1,283.76 ha within DE, 1,027.63 ha within IDF). This is critical burrowing and foraging habitat for Greater Bilby.
    - Plain (stony/gibber): loss of up to 2% of total mapped extent (86.22 ha within DE, 51.04 ha within IDF). This is critical burrowing and foraging habitat for Greater Bilby.
    - Hills/Ranges/Plateaux: loss of up to 1.34% of total mapped extent (6.75 ha within DE, 6.75 ha within IDF). This is critical dispersal and foraging habitat for Northern Quoll.
- Negligible degradation from fragmentation and other indirect effects (refer to Section 8.6.2).

The outcomes are considered consistent with the EPA's objective for terrestrial fauna as biological diversity and ecological integrity are likely to be maintained. 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.

8.10 Offsets

The Proposal is not expected to have a significant residual impact on terrestrial fauna. Consequently, no offsets are proposed for this environmental factor.

9 SOCIAL SURROUNDINGS

9.1 EPA Objective

The WA EPA environmental objective for this factor is "*to protect social surroundings from significant harm*" (EPA, 2023b).

9.2 Policy and Guidance

In addition to legislative context outline in Section 3 the polices and guidance relevant to this key environmental factor have been listed in Table 9-1.

Table 9-1: Social Surroundings Policy and Guidance

Source	Title	Consideration
EPA policy and Guidelines	Statement of environmental principles, factors, objectives and aims of EIA (EPA, 2023a)	This document guides how to prepare an EIA. Including principles, aims, environmental factors and objectives, consideration of significance and mitigation hierarchy.
	Environmental Factor Guideline – Social Surroundings (EPA, 2023b)	The information provided in this chapter addresses the 'considerations for environmental impact assessment' listed in this document.
	Technical Guidance – Environmental impact assessment of Social Surrounds – Aboriginal Cultural Heritage (EPA, 2023c)	This document provides guidance on assessing impacts to Aboriginal cultural heritage and outlines how these impacts can be managed in accordance with the Aboriginal Cultural Heritage Act 1972.
Other Policy and Guidance	DWER Draft Guideline "Assessment of environmental noise emissions", May 2021 (DWER, 2021)	This document provides guidance on assessing impacts to noise emissions and give guidance for environmental impact assessments of proposals under Part IV of the EP Act.
	Regulation 13 of the *Environmental Protection (Noise) Regulations 1997* (Western Australian Government, 1997)	The Regulations define noise emissions that, if found to be in contravention of the standard prescribed in the noise regulations, would be considered to be unreasonable.
	DWER- Dust Emissions Guideline (DWER, 2021)	The dust emissions guidelines provide framework for industries and businesses to effectively manage and minimise the emission of dust particles that could have environmental and health implications.
	Aboriginal Heritage Act 1972 (WA)	This Act makes provisions for the preservation of sites and objects traditionally used by, or belonging to, the original inhabitants of Australia or their descendants.
	Native Title Act 1993 (Cth)	This Act recognises and protects the rights of indigenous Australians to their traditional land and waters. the Act provides a legal framework for Indigenous people to claim native title rights. It sets out the process for determining native title claims, establishes the Native Title Tribunal, and provides for negotiations and agreements between Indigenous groups and other parties, such as governments and developers.

Source	Title	Consideration
	Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (Cth)	A federal law in Australia designed to provide protection for significant Aboriginal and Torres Strait Islander areas and objects from threats of injury or desecration. The Act allows for the preservation and maintenance of places, areas, and objects of particular significance to Indigenous Australians according to their traditions.

9.3 Surveys and Studies

Fortescue has undertaken surveys and studies to identify existing social surroundings values within the Proposal, and to determine potential adverse impacts and appropriate management outcomes. A combination of desktop assessments, field assessments and consultation has been undertaken with representatives from the Kariyarra Native Title Group.

9.3.1 Desktop Assessments

Desktop assessments have been undertaken using a number of databases to identify aboriginal cultural heritage and historic heritage places within the Proposal area. The following databases were used:

- Aboriginal Cultural Heritage Inquiry System (ACHIS)
- InHerit Database Search / Heritage Council WA – State Register
- Australian Heritage Database:
    - World Heritage List
    - National Heritage List
- Atlas of Living Australia (completed for Traditional Ecological Knowledge survey)
- Birdlife Australia (Birdlife) (completed for Traditional Ecological Knowledge survey).

9.3.2 Traditional Owner Consultation

Fortescue has undertaken Social Surroundings consultation for the Proposal with the Kariyarra Traditional Owners for the Proposal facilitated through the Kariyarra Aboriginal Corporation (KAC). Consultation has been undertaken with Traditional Owner representatives and knowledge holders to identify the social, cultural and heritage values within and surrounding the Proposal DE (Fortescue, 2024).

Social Surroundings consultation was undertaken through several formats including on-country consultation and off-site consultation by means of heritage sub-committee and Proposal specific meetings. The consultation engagements were to provide updates on the Proposal, discuss approval requirements, and share the results of heritage surveys and social surrounds consultations.

The first consultation trip with Kariyarra Traditional Owners was completed on 21 July 2024, which introduced the Proposal and sought to identify key environmental, social, cultural, and heritage features that might be impacted. The on-country meeting allowed Kariyarra Traditional Owners to visit the Proposal area, engage directly with Fortescue personnel and subject matter experts, and raise concerns. Key outcomes included support for the consultation process and the proposed development, contingent on completion of necessary studies.

The Turner River and its major tributaries were identified as important cultural environmental sites. During consultation questions were raised about management of heritage places, culturally significant water sources, access to country, sensitive cultural receptors such as dust, noise and visual amenity, and culturally significant plants and animals. Kariyarra Traditional Owners expressed a desire for ongoing involvement in environmental surveys, monitoring and rehabilitation (Fortescue, 2024).

A second social surrounds consultation trip for the Turner River Solar Hub, scheduled for March 2024, was cancelled due to inclement weather. This meeting was rescheduled with a consultant to KAC on 7 March 2024 in Perth. Fortescue presented the Proposal, proposed locations for dust, noise, and visual impact assessments and mitigation strategies of potential impacts.

Fortescue has offered KAC the opportunity to review the Proposal ERD and provide feedback prior to submission.

9.3.3 Field Assessments

9.3.3.1 Heritage & TEK Surveys

Nine archaeological and three ethnographical surveys have been completed across the northern and southern DE and surrounding areas between 19 March – 5 May 2024. A summary of the surveys is provided in Table 9-2 (Fortescue, 2024).

Table 9-2: Aboriginal Heritage Surveys completed for the Proposal

Survey ID	Date	Survey Type
2023_KAR_Trip1a	19-26 March 2023	Archaeological Survey
2023_KAR_Trip1b	24 – 26 March 2023	Ethnographic Survey
2023_KAR_Trip2	18 – 23 April 2023	Archaeological Survey
2023_KAR_Trip3	13 – 21 May 2023	Archaeological Survey
2023_KAR_Trip4b	12 June 2023	Ethnographic Survey
2023_KAR_Trip5	8 – 14 August 2023	Archaeological Survey
2023_KAR_Trip6	31 August – 8 September 2023	Archaeological Survey
2023_KAR_Trip7	4 – 13 October 2023	Archaeological Survey
2024_KAR_Trip1	29 February – 11 March 2024	Archaeological Survey
2024_KAR_Trip2b	28 March – 8 April 2024	Archaeological Survey
2024_KAR_Trip2b	7 – 9 April 2024	Ethnographic Survey
2024_KAR_Trip3	29 April – 5 May 2024	Archaeological Survey

Two Traditional Ecological Knowledge (TEK) surveys were undertaken with Kariyarra Knowledge Holders to identify and record traditional and ecological values within the study area (Biologic, 2024; VLA, 2024). The surveys included desktop and literature reviews, followed by field surveys with the appropriate Kariyarra Knowledge Holders:

- Trip one: Biologic Environmental Survey between 7–13 August 2023
- Trip two: Vicky Long and Associates between 15 – 20 April 2024.

Fortescue incorporated the findings of the surveys into the planning and design of the solar farm infrastructure to avoid areas or sites of cultural significance.

9.3.3.2 Social Surroundings Studies

Fortescue has undertaken further studies which include noise and vibration, dust, visual impact, glint and glare for the Proposal. A summary of the studies is summarised in Table 9-3.

Table 9-3: Social Surrounding Studies

Study	Report Author	Summary
Noise and Vibration (Talis, 2024) Appendix H	Talis	A baseline environmental Noise Assessment was undertaken for the Proposal study area between March and April 2024. The assessment identified the current ambient noise in the Proposals vicinity as a baseline for assessment against potential noise and vibration impacts generated during construction and operation. This study considered potential impacts on receptors in the surrounding areas, including accommodation camps and points of interest (identified through consultation with relevant stakeholders).
Dust Risk Assessment (ETA, 2024)	ETA	A Dust Assessment was undertaken in June 2024 for Proposal study area. The purpose of the assessment was to evaluate and mitigate the potential air quality impacts from dust emissions during the construction phase, and to a lesser extent operation phase, of the Proposal on social surroundings and Aboriginal Cultural Heritage (ACH).
Glint and Glare Assessment – NSJ West Solar Farm (DNV, 2024a)	DNV	An independent Glint and Glare Assessment was completed in February 2024. The purpose of the assessment was to identify potential glint and glare impacts to dwellings, roads, railways and aviation activity located within the vicinity of the southern DE This assessment was completed to address concerns by Kariyarra Traditional Owners and identify potential impacts flights and nearby road users.
Glint and Glare Assessment – Turner River Solar Hub (DNV, 2024b)	DNV	An independent Glint and Glare Assessment was completed in December 2024 to identify potential glint and glare impacts to dwellings, roads, railways and aviation activity located within vicinity of the northern DE. This assessment also completed a cumulative impact assessment using DNV (2024a) to understand the combined glare effect of the entire Proposal on any receptors identified for both the northern and southern DE.
Visual Impact Assessment (SLR, 2024) Appendix G	SLR	A Visual Impact Assessment (VIA) was undertaken by over four days; 11 March, 13 March, 18 April and 19 April 2024 for the Proposal study area. The VIA assessed the potential impact of Fortescue's activities on visual amenities at 17 nominated viewpoints within, and surrounding, the Proposal area.

9.4 Receiving Environment

The Proposal is situated in a remote area between the Turner River and Turner River West, within the Kangan pastoral lease (N049839) approximately 120 km south of Port Hedland and 12 km southeast of Fortescue's Iron Bridge Mine. The land is designated under the Port Hedland Scheme no 7 and is zoned entirely as rural. The surrounding land is predominantly rural outback, with mining related infrastructure and pastoral activities.

9.4.1 Native Title

The Proposal is situated within the Kariyarra Native Title Determination (WCD2018/015) (Figure 9-5).

The registered Native Title body corporate for the Kariyarra Traditional Owners is the Kariyarra Aboriginal Corporation (KAC). All consultations and engagements with Kariyarra Traditional Owners were facilitated through KAC.

For more information on Native Title refer to Section 2.3.3.1.

9.4.2 Kariyarra Social, Cultural and Heritage Values

9.4.2.1 Social Surroundings Consultation

KAC facilitated the consultation with Kariyarra Traditional Owner representatives for the Proposal between 2023 – 2024.

Fortescue has completed multiple consultations and heritage surveys with Kariyarra Traditional Owners to assess potential impacts from the Proposal on Social Surroundings and understand culturally important values. These consultations ensured two-way communication was maintained and allowed for concerns or questions regarding the Proposal to be addressed. The information was then used in the design and planning of the Proposal to avoid and minimise potential significant impacts on the Social Surroundings (Fortescue, 2024).

Concerns raised regarding potential impacts to social surroundings from the Proposal are summarised in Section 4.4 and assessment of potential impacts can be found in Section 9.6.

9.4.2.2 Aboriginal Cultural Heritage

A search of the Department of Planning, Lands and Heritage (DPLH) Aboriginal Cultural Heritage Inquiry System (ACHIS) on 1 August 2024 identified 21 registered and 40 lodged Aboriginal heritage places within a 2 km buffer of the Proposal. No Registered Sites, Lodged Places or Historic Places (stored data) were identified within the DE (Figure 9-1).

Not all heritage data is available on the ACHIS system. Therefore, a search of Fortescue's internal heritage database system was also undertaken. A total of 15 Heritage Places and one Heritage Restriction Zone (HRZ) are located within the DE. None of the Heritage Places or HRZs within Fortescue's heritage database fall within the IDF (Table 9-4).

[This page has been left blank intentionally]

Fortescue's heritage database identified 15 Heritage Places within the DE (Fortescue, 2024) (Table 9-4 and Figure 9-2). The Heritage Places have been identified through archaeological and ethnographic surveys undertaken by KAC and Fortescue. All of the identified Heritage Places are located outside of the IDF and will not be directly impacted by the Proposal's activities.

Heritage Restriction Zones

Heritage Restriction Zones (HRZs) are a defined area containing social, cultural, or heritage values whereby restrictions (or preceding actions) may apply prior to the commencement of any works within the HRZ boundary. Restrictions applied to HRZs may include (but are not limited to):

- Further consultation or recording of cultural values contained within,
- Limitations or restrictions on access requirements, or
- Limitations on the types of works that may be undertaken within the HRZ boundary.

HRZs are an internal management measure implemented by Fortescue to provide an additional layer of protection for places of cultural significance.

No HRZs are located within the IDF, however one HRZ (HRZ-1565) is located within the DE. Additionally, several other HRZs are in the vicinity of the Proposal which are associated with the Turner River and it's major tributaries. These HRZs were identified during social surrounds consultations and Traditional Ecological Knowledge surveys (Figure 9-2).

[This page has been left blank intentionally]

[This page has been left blank intentionally]

9.4.2.3 Culturally Significant Water Sources

Fortescue recognises, through consultation with the Kariyarra Traditional Owners, the significant cultural value of water sources. During heritage surveys and social surrounds consultation, several culturally significant water sources were identified around the proposal DE.

Concerns regarding culturally significant water sources include:

- Impacts to water flow and quality of the Turner River West and Turner River, and main tributaries.
- Preference to minimise crossings over main creek lines to reduce disturbance.
- Potential for increased sediment to negatively impact the Turner River and Turner River West.

No culturally significant water sources have been identified within the DE itself, although known in the near surrounds. The identified sources include:

- Turner River (west) (DPLH ID 6653): Located west of the southern DE, this water source has ethnographic and spiritual significance and was historically a travel route for Kariyarra Traditional Owner ancestors.
- Turner River Tributaries (HRZ-1367): Situated south of the southern DE, these tributaries are essential for maintaining the natural flow of the Turner River West.
- Turner River (DPLH ID 6653): Located east of the northern DE, this water source also holds ethnographic and spiritual significance and served as a travel route for Kariyarra Traditional Owner ancestors.

These sources are protected as part of Fortescue's efforts to safeguard the Kariyarra Traditional Owner cultural heritage and have been excluded from the DE.

9.4.2.4 Access to Country

No specific hunting or camping areas were identified during the social surroundings consultation. Hunting and camping areas are typically located in various locations within their Native Title Claim. However, Turner River and Turner River West were identified as significant sites still used for contemporary camping (Fortescue, 2024).

It was requested that access to Turner River and its tributaries remain unrestricted by the Proposal, and that continued access to heritage place KAR23-026, which is rich in cultural material and can be used to teach younger generations about traditional practices and how their ancestors utilised the area (Figure 9-2).

9.4.2.5 Aesthetics and Amenity of Country

During the social surroundings consultation, potential impacts from changes to the visual amenity, noise, and dust generated by the Proposals activities were discussed. A general concern was expressed about the overall impact of visual amenity, noise and dust within the area. Based on key values identified in the area through consultation, Fortescue proposed

several locations for inclusion in the dust, noise, and visual impact assessments (Section 9.6.2).

Most assessment locations were general points of interest (POI) to gauge potential impacts across the broader area, helping narrow down specific concerns, particularly where the area is generally utilised. Specific receptors were noted where relevant.

The following sections identify the principles for selection of POIs for each study:

Dust

POI for the dust assessment included Heritage Places with grinding patches and engravings due to concerns about the impact of dust on their integrity (ETA, 2024). Additionally, areas used for potential camping, where excessive dust might pose health or aesthetic issues, were considered. Specific receptors for dust included 101 Heritage Places and four HRZs (Figure 9-2) within and around the DE. A total of 30 POI locations were used within the dust assessment to cover all potential dust impacts on Heritage Places (refer to Section 9.4.4.4 for location of dust POI).

Noise and Vibration

POI for the noise and vibration assessment included Heritage Places listed as vibration sensitive sites within the DE and areas used for potential camping or hunting by the Kariyarra Traditional Owners (Talis, 2024). Only one specific receptor for noise and vibration, KAR23-026, was identified during consultation, with all other points classed as general locations.

Visual Amenity

POI for the visual impact assessment included areas used for potential camping or visitation, or where the project could be seen from an access road. Specific visual receptors identified were the Turner River and KAR23-026, with all other points being general locations (SLR, 2024).

9.4.2.6 Traditional Ecological Knowledge

TEK values play an important role in Kariyarra Culture and traditional practices (Fortescue, 2024). These values encompass culturally significant plants and animals used for bush tucker or medicine, areas designated for traditional activities such as camping and hunting, and important ecological features with cultural associations.

The TEK surveys (Biologic, 2024; VLA, 2024) identified a number of values including several flora and fauna species of traditional and cultural use. The survey also identified the Turner River, Turner River West, and associated main tributaries (mapped as HRZ-1367) as areas containing culturally significant flora and fauna that Kariyarra Traditional Owners wish to be maintained and protected (Section 9.4.2.3) (Biologic, 2024).

Table 9-5 defines the meaning to each value and their importance to the Kariyarra Traditional Owners.

Table 9-5: Definitions of values for Kariyarra Traditional Owners

Value	Definition
Traditional Use	Plants and animals that have a Kariyarra language or name or association, irrespective of use or value.
Cultural Value	The Kariyarra Traditional Owners identify plants, animals, and ecosystems tied to their ceremonies, lore, and stories as culturally significant. These ecosystems include habitats of species deemed important and may also hold other cultural values, such as engravings, not directly related to the report's purpose.
Culturally Significant	Plants, animals and ecosystems that are defined as having cultural value but were told by the Kariyarra Traditional Owners that they are the most important to them in the Survey Area.

Source: Biologic (2024)

Results from the field survey focused on three areas including ethnobotany, ethnozoology and ecosystems of cultural value and significance.

Flora and Fauna of Cultural Significance

Flora and fauna of cultural value and significance identified within the survey area included 59 flora species and nine fauna species of traditional use by the Kariyarra Traditional Owners. Flora and fauna species were categorised as either being used for food, medicine, ceremonial use and/or 'other' (Biologic, 2024; VLA, 2024).

Forty (40) of the 59 flora species were identified as having traditional and contemporary use, of which twelve species were identified as having traditional use only as structural components (such as baskets, fishing nets etc), food uses and medicinal practices. Two species, parsnip bean (*Vigna lanceolata*) and kapok bush (**Aerva javanica*) were identified to have contemporary use only (Biologic, 2024; VLA, 2024).

Eighteen of the flora species were identified as being culturally significant (Table 9-6) Two of the 18 species were identified as having increased cultural significance to the Kariyarra People (Biologic, 2024):

- **Mirli (*Melaleuca argentea*)**: A lush, shady paperbark tree primarily found along significant drainage lines and watercourses. It has various cultural and traditional uses for the Kariyarra People, providing shade and shelter both historically and in modern times. Mirli serves as an excellent indicator of water presence and land health, being very sensitive to surface and groundwater changes. It is one of the most well-known species for detecting groundwater changes in arid Australia (Graham, Landman, Adams, & Grierson, 2003; McLean, 2014; O'Grady, Eamus, Cook, & Lamontagne, 2006). Dense and mature stands of Mirli were frequently observed in the Turner River area, north of the Survey Area, and likely extend along the western boundary, though this would need to be confirmed on-site (Biologic, 2024).

- **Parrkalya (*Acacia trachycarpa*)**: A common curled-bark (minni ritchi) Acacia species that predominantly grows along drainage lines of various sizes in the Pilbara bioregion. It is especially prevalent in sandy medium and minor drainage lines in the western and northern Pilbara. Within the Survey Area, Parrkalya was primarily found along the tributaries of the Turner River. This species has multiple traditional and cultural uses,

as frequently mentioned by the Kariyarra Traditional Owner representatives: "*its leaves are used in smoking ceremonies, and both its leaves and branches serve as cooking surfaces, serving platforms, and seating areas during large group feasts*" (Biologic, 2024).

Table 9-6: Culturally Significant Flora Species for Kariyarra Traditional Owners

Species	Kariyarra Name	Northern DE (Yes / No)	Southern DE (Yes / No)	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
							Food	Medicine	Ceremony	Other
Salt wattle *(Acacia ampliceps)*	Walykarri	No	Yes	Common	Yes	Yes	Edible seeds, roots contain grubs	Treats eyes and sores	Dancing	N/A
Fitzroy Wattle *(Acacia ancistrocarpa)*	Paripi	Yes	Yes	Common	Yes	Yes	Edible seeds, roots contain grubs	Leaves and stems for healing		Branches used for tools (brooms)
Leather-leaved wattle *(Acacia coriacea subsp. pendens)*	Warntany	Yes	Yes	Common	Yes	Yes	Edible Seeds, roots contain grubs, leave used to wrap meat.	N/A	Boomerangs, shields, spears and mis ash with tobacco	N/A
Pindan wattle *(Acacia tumida var. pilbarensis)*	Mukarli	No	Yes	Common	Yes	Yes	Edible seeds, roots contain grubs	N/A	Spears	N/A
Ghost Gum *(Corymbia candida)*	Wilagura (interpreted)	No	Yes	Common	Yes	Yes	Good for finding honey	Bark used as sunscreen	Tools, weapons and shelters	N/A
Bloodwood *(Corymbia hamersleyana)*	Punara	Yes	Yes	Common	Yes	Yes	Edible galls. Good for finding honey	Gum used to treat sores, heart (blood pressure), ulcers and headache.		Shelter and bark can be tied around legs for sharp spinifex protection.

Species	Kariyarra Name	Northern DE (Yes / No)	Southern DE (Yes / No)	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
							Food	Medicine	Ceremony	Other
River Gum *(Eucalyptus camaldulensis)*	Wurrangkura	No	Yes	Common	Yes	Yes	Edible grubs under bark, seed gums from sap, trucks often contain hollows for nesting birds.	Sap for tea for high blood pressure, stomach ache and other digestion problems. Bath with sap for sores and skin infections.	Flowers, sap, ash, and seeds from the following plants are used as medicine, decoration and/or symbolism ceremonies (e.g. dancing ceremonies) Wood for tools, weapons and shelters	Wood for tools, weapons and shelters
Blackheart gum *(Eucalyptus victrix)*	Yamarrara	Yes	Yes	Common	Yes	Yes	Good for finding grubs and lerp, truck hollows for nesting birds	Boil sap for cuts	Wood for tools, weapons and shelters, ash with tobacco	
Wild Cotton/ Desert Rose *(Gossypium robinsonii)*	Mula	No	Yes	Common	Yes	No	N/A	N/A	Dancing sticks and whipping sticks	Spears
Silver Cadjeput[1] *(Melaleuca argentea)*	Mirli	Yes	Yes	Common	Yes	Yes	Finding honey, edible seeds, trunks with hollows for nesting birds. Meat or fish for large feasts is cooked in these	Bark and leaves in hot bath for sores and skin infections	Food for large feasts, barks provide clothing, leg protection, yandies, shields, spears, houses, bedding and firesticks	Good indicator of permanent water

Species	Kariyarra Name	Northern DE (Yes / No)	Southern DE (Yes / No)	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
							Food	Medicine	Ceremony	Other
							sheets of bark and leaves.			
Poverty bush *(Acacia stellaticeps)*	Panmangu	Yes	Yes	Common	Yes	Yes	N/A	Leaves and branches as tea for colds	Leaves used in smoking ceremonies to protect infants and used in lore	N/A
Minni Ritchi[1] *(Acacia trachycarpa)*	Parrkalya	Yes	Yes	Common	Yes	Yes	Food contains grubs. Meat or fish for large feasts is cooked in these sheets of bark and leaves.	N/A	Leaves used in smoking ceremonies to protect infants and used in lore	Shady resting spots in creek lines, branches and foliage for seating and lying mats, cooking, spears, clubs and axe handles.
Wild tobacco *(Nicotiana benthamiana)*	Purlku	No	Yes	Common	Yes	Yes	N/A	N/A	For healing and ceremony (some individuals found at male only site)	Chewing and smoking tobacco
Nicotiana umbratica (P3)	Purlku	No	Yes	Common in survey area but generally uncommon in Pilbara	Yes	Yes	N/A	N/A	For healing and ceremony (some individuals found at male only site)	Sweeter tobacco, chewing and smoking

Species	Kariyarra Name	Northern DE (Yes / No)	Southern DE (Yes / No)	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
							Food	Medicine	Ceremony	Other
*Cullen leucochaites**	Jamirri	No	Yes	Common	Yes	Yes	N/A	Leaves for boils	Boy dancing ceremony. Flowers, sap, ash, and seeds from the following plants are used as medicine, decoration and/or symbolism ceremonies (e.g. dancing ceremonies)	N/A
Caustic Bush *(Grevillea pyramidalis)*	Jamirri	Yes	Yes	Common	Yes	Yes	Edible nectar	N/A	Yellow paint for mens scarring in lore ceremony. Flowers, sap, ash, and seeds from the following plants are used as medicine, decoration and/or symbolism ceremonies (e.g. dancing ceremonies)	N/A
Cockroach bush, Emu bush	Yalini	Yes	Yes	Common	Yes	Yes	Good place to find grubs	N/A	Seeds for painting (black paint for mens	Used to track emus

Species	Kariyarra Name	Northern DE (Yes / No)	Southern DE (Yes / No)	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
							Food	Medicine	Ceremony	Other
(Senna notabilis)									ceremony) and paintings. Flowers, sap, ash, and seeds from the following plants are used as medicine, decoration and/or symbolism ceremonies (e.g. dancing ceremonies)	
Sturt's desert pea *(Swainsona Formosa)*	Unknown*	No	Yes	Common	Yes	Yes	Edible nectar and seeds	N/A	Flowers, sap, ash, and seeds from the following plants are used as medicine, decoration and/or symbolism ceremonies (e.g. dancing ceremonies)	N/A

Source ((Biologic, 2024; VLA, 2024)

Table notes:

* unknown or missing information or name

1 plant species were identified as being of increased cultural significance to the Kariyarra Traditional Owners in the Survey Area

2 Abundance of species found in the survey area and surrounds

[This page has been left blank intentionally]

All nine fauna species were identified as having traditional use by Kariyarra Traditional Owners (Table 9-7). With the exception of jartunmarra (Northern quoll – *Dasyurus hallucatus*), all species are still used today, particularly for bush tucker and ceremonial purposes. The Northern quoll is no longer hunted for food in modern times due to the availability of larger and more abundant fauna species such as kangaroo, emu and bustard, as well as modern-day food options (Biologic, 2024).

There was no indication that any particular plant was especially significant to the Kariyarra Traditional Owners, and it was mentioned by the Kariyarra Traditional Owner representatives that “all plants and animals are part of our lore” (Fortescue, 2024).

Five fauna species were identified as having cultural value to the Kariyarra Traditional Owners in ceremony and as food sources within the survey area. Of these species, one species (Greater Bilby) was identified of being of increased cultural significance used as a totemic species of cultural significance in tribal lore for young men. Additionally, the bilby serves as a valuable indicator of the health of the land, as its low population numbers suggest impacts from introduced animals such as cats, foxes, and cows, or the loss of suitable habitat (Biologic, 2024). Table 9-7 describes each species and their uses in more detail.

[This page has been left blank intentionally]

Table 9-7: Culturally Significant Fauna Species for Kariyarra Traditional Owners

Species	Kariyarra Name	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
					Food	Medicine	Ceremony	Other
Greater bilby (*Macrotis lagotis*)	Pirtirra	Generally uncommon in area	Yes	Yes	N/A	N/A	Important totemic species and are used in tribal lore for young men	N/A
Northern Quoll (*Dasyurus hallucatus*)	Jartunmarra	Likely fairly common in area	Yes	No	Bush tucker	N/A	N/A	An indicator of Country health.
Brush-tailed mulgara (*Dasycercus cristicauda*)	Unknown*	Likely fairly common in area	Yes	Yes	N/A	N/A	Important totemic species and are used in tribal lore for young men	N/A
Euro, wallaroo (*Osphranter robustus*)	Jarlungmarra / wijunu	Common in Pilbara	Yes	Yes	Bush tucker	N/A	Important food sources as they can feed large parties.	Their skins, fur and feathers can be used for clothing, bedding or decoration.
Emu (*Dromaius novaehollandiae*)	Jarnkurna	Common throughout Australia	Yes	Yes	Bush tucker	N/A	Important food sources as they can feed large parties.	Skins and feathers used for clothing and bedding.
Australian bustard, bush turkey (*Ardeotis australis*)	Partukalara	Common in Pilbara	Yes	Yes	Bush tucker	N/A	Important food sources as they can feed large parties.	Their skins, fur and feathers can be used for clothing, bedding or decoration.
Spiny-tailed monitor	Warntijurri / maranthu	Common in Pilbara	Yes	Yes	Bush tucker	N/A	N/A	N/A
Perentie	Purrangura	Common in Pilbara	Yes	Yes	Bush tucker	N/A	N/A/	N/A

Species	Kariyarra Name	Species Abundance	Traditional Use (Yes / No)	Contemporary Use (Yes / No)	Type of use			
					Food	Medicine	Ceremony	Other
(Varanus giganteus)								
Pilbara Olive Python *(Liasis olivaceus)*	Marilya	Likely rare in the survey area	Yes	Yes	Bush tucker	N/A	N/A	An indicator of Country health

Source: Biologic (2024)

Table note:

1 Abundance of species found in the survey area and surrounds

9.4.3 Non-Indigenous Heritage

In Western Australia, the Heritage Act 2018 recognises the importance of, and promotes understanding and appreciation of, Western Australia's cultural heritage (Western Australian Government, 2018). It also provides for the identification and documentation of places of cultural heritage significance and the conservation, use, development and adaptation of such places. Places of World, and National heritage significance are protected under Subdivision A and AA of the EPBC Act.

Public databases including inHerit identified no heritage sites intersect the DE. The nearest site is Indee Sation (site of plane crash), located approximately 50 km north-west.

9.4.4 Amenity

9.4.4.1 Noise

Fortescue engaged Talis Consultants to undertake an environmental noise assessment of the potential impacts from the Proposal construction activities and operations on the surroundings (Talis, 2024). The noise assessment is summarised in this document and provided in Appendix H.

Due to the remoteness of the Proposal location, the area has a limited number of (sensitive) receptors. Two locations surrounding the Proposal are identified as noise sensitive premises (Figure 9-3) with reference to the *Environmental Protection (Noise) Regulations 1997*:

- Fortescue's Junction construction camp (2.5 km from Proposal infrastructure); and
- Mineral Resources' Wodgina Camp (7 km from Proposal infrastructure).

Assigned threshold noise levels (LA10) for the sensitive receivers include:

- Night-Time – 35 (db(A))
- Evening – 40 (db(A))
- Daytime – 45 (db(A)).

In addition to the two noise sensitive receivers identified above, a further eight POI were identified in consultation with Kariyarra Traditional Owners (Figure 9-3) (Talis, 2024). Traditional activities which have noise related value include:

- Camping (at night): Noise could result in sleep disturbance and annoyance.
- Hunting: It is expected that hunting will only take place during daylight hours where the hunter uses visual cues. Night-time hunting is not expected but if undertaken will require low noise levels as the hunter is dependent on auditory cues.
- Day use / Ceremonial use: Speech intelligibility and annoyance need to be considered when considering activities during the day or ceremonial use.

The POI and any potential activities undertaken in these areas are not included in the definition of noise sensitive receivers in the *Environmental Protection (Noise) Regulations 1997*. Suggested noise targets based on activity and use of an area have been used to evaluate, if received noise in these areas could be considered as unreasonable (Talis, 2024) and are outlined in Table 9-8 below.

Table 9-8: Activity Based Noise Target Levels

Activity	Target Noise Level (dB(A))	Comment
Camping (night-time)	30	The night-time threshold levels are based on avoiding noise induced sleep disturbance and annoyance. The threshold levels adopted have used the Noise Regulations and AS2107 noise levels for sleeping areas.
Hunting (daytime)	45	The daytime hunting threshold levels are based on the assigned levels in the Noise Regulations and assume that the hunter uses visual cues during the day (whereas the hunter is more dependent on auditory cues during night).
Day use / Ceremonial	35/45	The threshold levels are based on avoiding annoyance. It should be noted that these levels are set for activities where speaking to others is involved. The threshold levels adopted are based on AS2107 levels for educational buildings. 45 dB(A) applies to ceremonies if amplification through a microphone speaker system is used.

Source: Talis (2024)

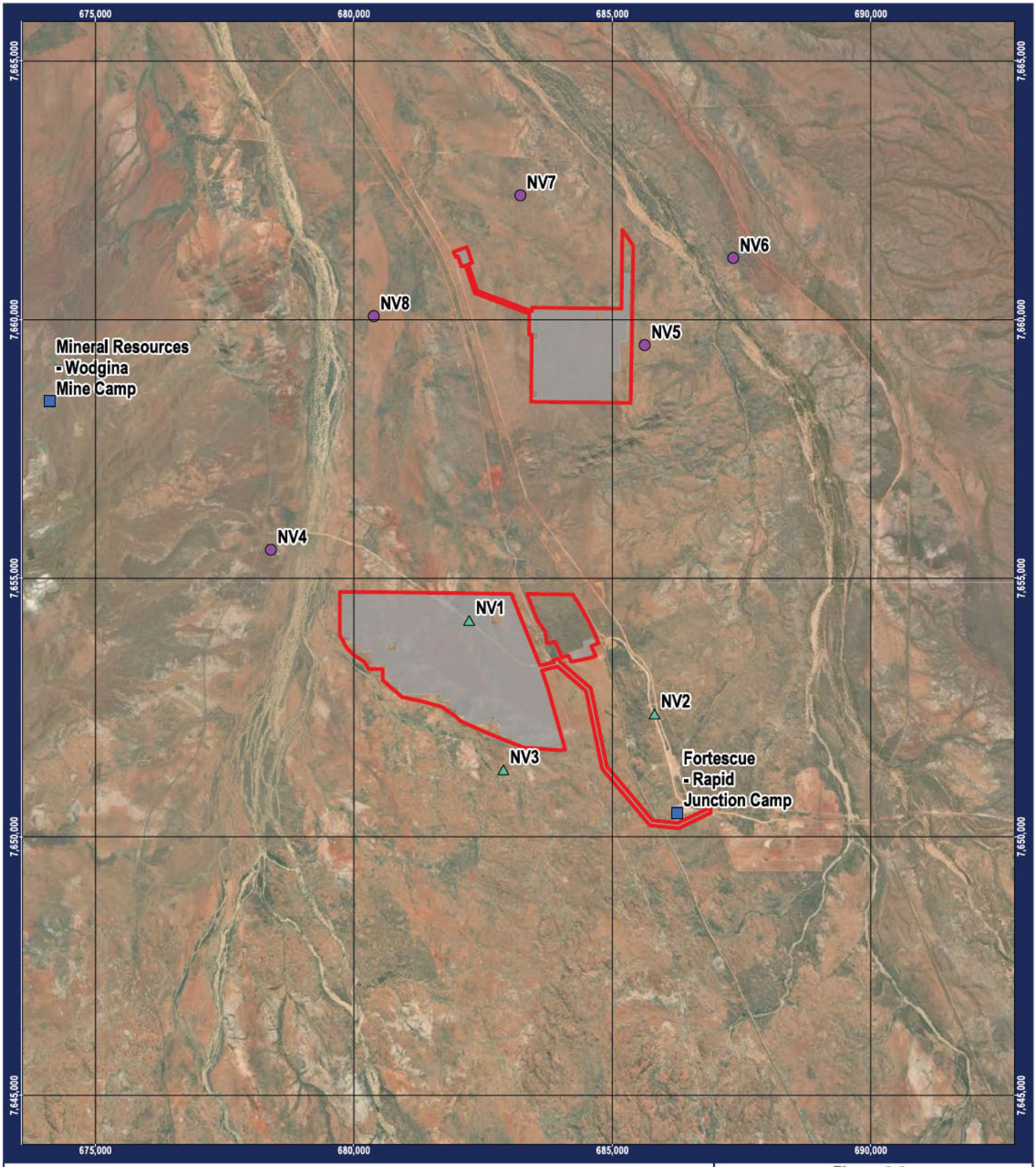
Baseline noise monitoring was undertaken at three locations to understand the ambient noise levels with Proposal area. Baseline monitoring was undertaken at three monitoring locations. Identified sensitive receivers, POI and noise monitoring locations are shown in Figure 9-3.

Table 9-9 provides a summary of the noise results at each monitoring location, separated into day (7am to 7pm), evening (7pm to 10pm) and night (10pm to 7am). The noise parameter LA10 which is the noise level present for 10% of the time during each time of the day has been used.

Table 9-9: Baseline Noise Monitoring Results (dB(A))

Receptor	Time of Day*	Maximum LA10	Minimum LA10	Average LA10
L1	Day	61.8	29.9	48.8
	Evening	54.2	28.9	43.1
	Night	59.2	29.4	43.3
L2	Day	65.5	29.2	49.5
	Evening	58.5	30.8	45.7
	Night	64.3	27.6	46.9
L3	Day	62.2	24.8	48.3
	Evening	62.1	24.8	46.7
	Night	59.1	24.7	43.9

Source: Talis (2024)



Legend

- Noise Monitoring Location
- Sensitive Receivers
- Point of Interest Sites
- Development Envelope
- Indicative Disturbance Footprint

N

0 1 2 3 4
Kilometres

Figure 9-3
Sensitive Receivers and Noise Monitoring Locations

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:100,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.052

Date: 17/01/2025
Size: A4P
Revision: 1
Confidentiality: 0

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

Fortescue.

[This page has been left blank intentionally]

Blasting

Blasting activities in solar farm construction are generally rare and only occur under specific circumstances where the site's terrain requires significant alteration. Blasting may be necessary in cases of hard rock formations, site preparation, trenching and excavation, access roads, and foundations preparation.

Geotechnical investigations are scheduled to determine if blasting may be required (for foundation construction and trenching works).

9.4.4.2 Visual Amenity

A visual impact assessment was undertaken by SLR Consulting (2024), to characterise the existing landscape and provide an assessment of the potential impacts to landscape and visual amenity from the Proposal on the DE and wider landscape context. POI were identified by Fortescue in consultation with Kariyarra Traditional Owners or based on principles for potential third-party use of the area.

The assessment was informed by the Western Australian Planning Commission's (WAPC) Visual Landscape Planning in Western Australia: A manual for evaluation, assessment, siting and design (WAPC, 2007) has established three broad Visual Management Objectives (VMOs) for the VIA, which are:

- Best practice siting and design.
- Protection and enhancement.
- Restoration of degraded character or enhancement opportunities.

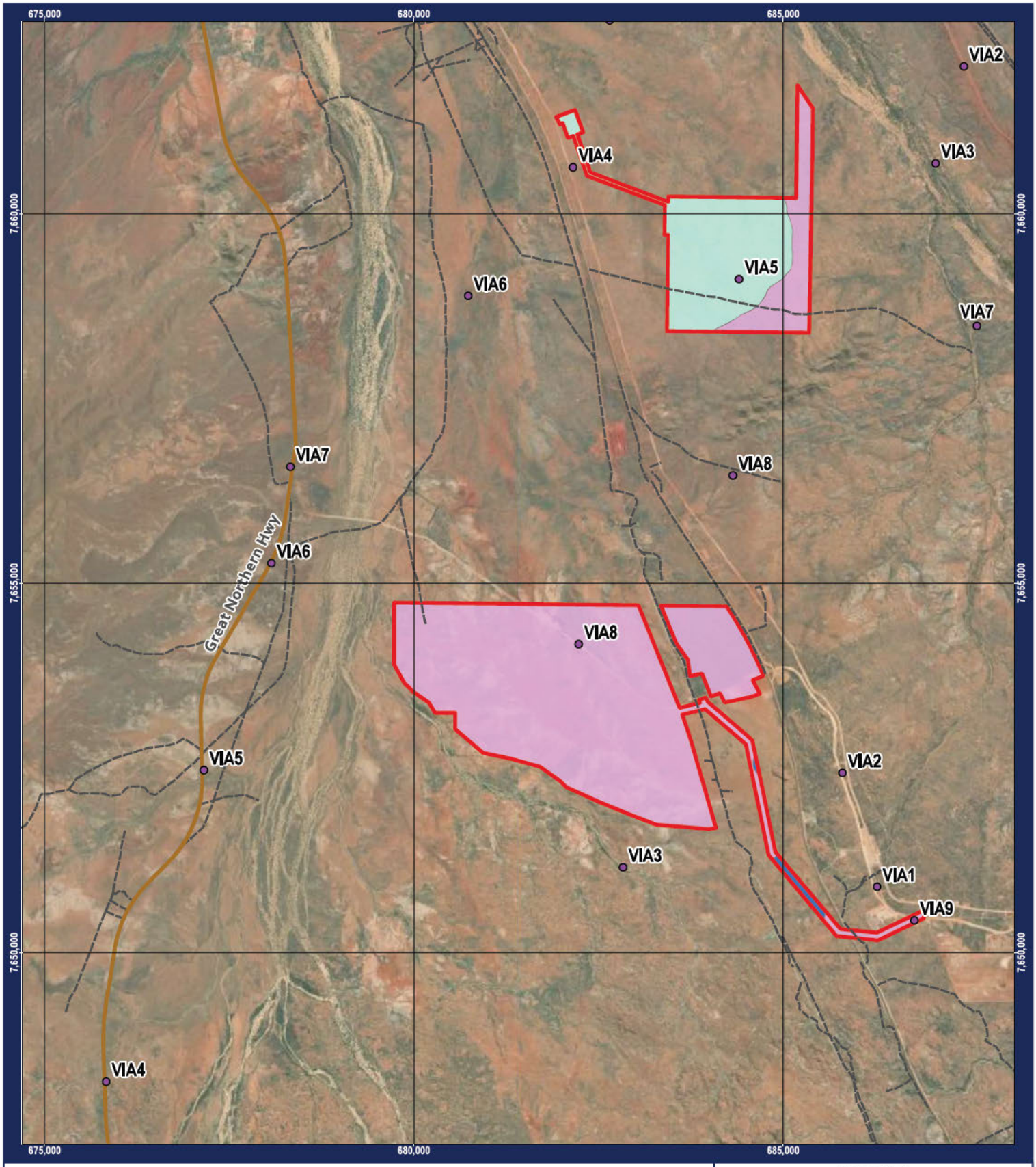
Additionally, the New South Wales Department of Planning and Environment (2016) definition of visibility distance zones, which categorises view distances of 1 km as the far foreground, noting that the apparent size of developments decreases with increased view distance has been used.

A desktop assessment was undertaken to define an appropriate study area and to classify Landscape Character Units (LCU). LCUs were classified through a combination physical/environmental, aesthetic and socio-cultural element. Landscape values were also classified based on their rarity: landscapes covering more than 20% of the study area were deemed 'not rare,' those covering between 5% and 20% were considered 'somewhat rare,' and landscapes comprising less than 5% of the study area were classified as 'rare' (SLR, 2024). Five LCUs were identified within the study area, these are defined in Table 9-10 and shown on Figure 9-4.

Table 9-10: LCUs Identified in the Visual Impact Assessment

LCU	Area (ha)	Landscape Value	VIA perspective, Landscape Value and Impacts for LCU	Typical View of LCU
Plains	131,960 (48%)	Not Rare	Medium value and minor-moderate impact	
Ranges, hills and low rises	91,691 (33%)	Not Rare	Medium value and minor-moderate impact	
River Plains	10,148 (4%)	Rare	High value and minor-moderate impact	
Sand Plains	35,548 (0.74%)	Somewhat Rare	High value and moderate impact	
Modified Elements	6,556 (2%)	Rare	Low value and minor-negligible impact	

Source: SLR (2024)



Legend

- Viewpoints
- NationalHighway
- Minor Track
- Development Envelope

Turner River Landscape Character Units

- Plains
- Ranges, hills and low rises
- Sandplains

N

0 0.5 1 1.5 2
Kilometres

Figure 9-4
Landscape Character Units and Visual Impact Assessment Viewpoints

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:70,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.056_r1
Data Source(s):
Aerial, ESRI
Roads, LGATE
All other data, Fortescue, 2024

Date: 16/01/2025
Size: A4P
Revision: 1
Confidentiality: 0

Fortescue.

[This page has been left blank intentionally]

9.4.4.3 Glint and Glare

DNV Australia completed two glint and glare assessments (DNV, 2024a; DNV, 2024b) to identify potential impacts on dwellings, roads, railways, aviation activity and other sensitive areas located within the vicinity of the Proposal. The assessment was conducted separately for both the northern and southern DEs, including a cumulative impact assessment to understand potential effects from each area on all receptors. Using specialist glint and glare modelling software, the assessment analysed predicted glare for receptors using a simplified backtracking algorithm of fixed resting angle of 0 degrees.

The assessment was based on predicted ocular impact following three ocular hazard colour codes, green, yellow and red as defined below (DNV, 2024a; DNV, 2024b):

- Green: glare with low potential to cause temporary after-image (i.e. lingering image in a viewer's eye associated with a flash of light) to a viewer prior to a typical blink response time.
- Yellow: glare with potential to cause temporary after-image to a viewer prior to a typical blink response time.
- Red: glare with potential to cause retinal damage to a viewer prior to a typical blink response time.

Solar PV modules are designed to absorb as much light as possible and typically reflect less than 2% of incoming sunlight (when pointed perpendicular to the sun). When glint and glare does occur, it is typically for short periods of time and requires specific geometric and atmospheric conditions.

The glare assessments considered a number of receptors for each area including observation points, route receptors such as railways and roads, and flight paths, as summarised in Table 9-11. All glare intensities predicted in the current analysis are below the threshold for permanent eye damage with yellow glare being the highest glare intensity predicted.

The cumulative assessment found that no combined glare impacts on the receptors are expected.

[This page has been left blank intentionally]

Table 9-11: Glare Assessment Results

Receptor Type/ID	Location Description	Glare results – Backtracking Rest Angle 0°
Northern Development Envelope (DNV, 2024b)		
Railway (RR 01)	Roy Hill Railway Line	Green & yellow glare
Railway (RR 02)	Fortescue Railway Line	No glare
Road (RR 03)	Fortescue Railway Maintenance Track	Green & yellow glare
Road (RR 04)	Great Northern Highway	Green glare
2-mile Flight Path (FP 01)	Iron Bridge Airport – Approach from the West	No glare
2-mile Flight Path (FP 02)	Iron Bridge Airport – Approach from the East	No glare
Southern Development Envelope (DNV, 2024a)		
Dwelling (OPR 1)	North-west of solar farm	No glare
Dwelling (OPR 2)	South-east of solar farm	No glare
Road (RR 1)	Great Northern Highway	No glare
Road (RR 2)	Local Dirt Road – bisects solar farm	Green & yellow glare
Railway (RR 3)	Mining Railway Line – east of solar farm	Green & yellow glare
2-mile Flight Path (FP 1)	Iron Bridge Airport – Approach from the East	No glare
2-mile Flight Path (FP 2)	Iron Bridge Airport – Approach from the West	Green glare

Source: DNV (DNV, 2024a; DNV, 2024b).

[This page has been left blank intentionally]

9.4.4.4 Dust

Fortescue engaged Environmental Technologies and Analytics (ETA) to undertake a dust risk assessment related to potential impacts from the Proposal (ETA, 2024). Construction and operational activities have the potential to affect air quality through generation and deposition of dust, with key considerations including heritage values, surface water bodies and overall aesthetics/amenity (ETA, 2024). The assessment identified potential sources of dust generation, pathways for deposition and the potential risk to POI.

The Pilbara region is a naturally dusty area with wind-blown dust a significant contributor to particulate loading (ETA, 2024). An aggregated emission inventory for the Pilbara was undertaken by (SKM, 2003) for the 1999/2000 financial year. This study calculated approximately 170,000 tonnes were emitted as a result of wind erosion and approximately 195,000 tonnes from wildfires.

Existing land uses within two kilometres of the Proposal area that may contribute to existing dust levels include two mining railways operated by Roy Hill and Fortescue.

Other existing sources of dust emissions in the local area include (ETA, 2024):

- Dust entrainment due to vehicle movements along unsealed public roads.
- Transport of iron ore.
- Agricultural/pastoral land uses.

A total of 30 POI were identified through consultation with Kariyarra Traditional Owners, and on nearby receptors (Fortescue's Junction Camp). The POI were located both within and outside the boundaries of the Proposal DE.

The POI were classified into four receptor types:

1. Dust deposition on rock art and engravings, risking degradation or erosion.
2. Dust on surface water bodies and flora/fauna habitats, risking contamination, sediment buildup, and water discolouration.
3. Aesthetic impacts due to dust covering surfaces.
4. Visual impacts of dust.

9.4.5 Economic Activity

The Pilbara region is known as a powerhouse of economic growth for WA and Australia. The economy has continued to grow over the last year and contributes nearly 15% of WA's total economic output (PIlbara Development Commission, 2024). 80% of WA's resource sales come from the Pilbara region, and growth is considered to be continuing with 170 billion worth of projects planned or in construction.

The Town of Port Hedland supports 10,985 jobs with an annual economic output of $15.564 billion dollars. The mining industry sector has the greatest contribution to the economic output of the region (78.57%), with the industry sector employing the largest number of people (33.53% of total employment within the region) (REMPLAN, 2024). It includes the world's largest bulk exporting port, with 57% of national resource exports in 2021 (PIlbara Development Commission, 2024).

9.4.6 Town and Population Centres

The Proposal is located approximately 120 km south from Port Hedland within the Pilbara region, one of the largest regions of Western Australia. It includes approximately 507,896 km2, and is made up of the Ashburton, East Pilbara, Port Hedland and Karratha local government areas (PIlbara Development Commission, 2024). Approximately 60,000 people live in the Pilbara, with 17,247 of these in the Town of Port Hedland (REMPLAN, 2024).

The closest residential receptors include Fortescue's The Rapid Junction construction camp located directly next to the access route within the southern DE, and the Wodgina Camp, approximately 6.75 km northwest from the Proposal. Other nearby receptors include the Indee Station Village (DeGray mining Wingina camp), approximately 46 km to the north, and Marble Bar town, approximately 100 km to the east (Figure 9-5).

9.4.7 Recreation and Tourism

Tourism in the Pilbara region is driven by the area's unique and globally recognised natural features, alongside activities related to mining, construction, and business travel (DPIRD, 2024). This sector is viewed as a vital avenue for economic diversification in the region (Kelley, 2005). The Pilbara's natural environment supports a range of outdoor tourism activities, including camping, boating, and fishing (Pilbara Development Commission, 2014). Key tourist attractions include the Ex Meentheena National Park, located 179 km to the east of the Proposal, Mungaroona Range Nature Reserve, 97 km southwest, the gorges of Karijini National Park, 179 km southwest, and Millstream Chichester National Park, approximately 182 km west-southwest direction (Figure 9-5).

9.4.8 Pastoral

The Proposal is located within the boundaries of the Kangan Pastoral Station covering a total of 122,804 ha (Western Australian Government , 2024). The Kangan homestead is located approximately 25 km northwest of the Proposal Figure 9-5.

No known mustering routes are found in the area. The closest stock and domestic bore (BOM, 2024) is approximately located over 15 km south of the DE.