Fortescue™

TURNER RIVER SOLAR HUB

Environmental Review Document

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Report

Section 38 Referral - Environmental Review Document

Turner River Solar Hub

1 March 2025

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EXECUTIVE SUMMARY

Pilbara Energy (Generation) Pty Ltd (PEG), a wholly owned subsidiary of Fortescue Ltd (Fortescue), is proposing to develop a renewable energy hub, the Turner River Solar Hub (TRSH) (the Proposal), comprising of solar generation and 220 kV transmission line spurs connecting to Fortescue's existing Power Network in the Pilbara region of Western Australia.

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

Background and Context

The purpose of this Environmental Review Document (ERD) is to present an environmental impact assessment of the Proposal for consideration by the Environmental Protection Authority (EPA). This document includes a detailed impact assessment and description of proposed mitigation and management measures for the environmental factors identified in this report.

This ERD has been prepared in accordance with the EPA's *'Instructions on how to prepare an Environmental Review Document'* (EPA, 2024a) and is based on project and study information available at the time of writing.

Overview of the Proposed Project

Fortescue's decarbonisation strategy seeks to transition Fortescue operations to renewable energy by 2030 through renewable energy generation including solar and wind farms, power transmission and battery installations.

The physical, construction and operational elements required under Section 38 of the EP Act are summarised in Table E 1-1 and Table E 1-2.

Table E 1-1: Proposal Summary

Item	Description
Proposal title	Turner River Solar Hub
Proponent name	Pilbara Energy (Generation) Pty Ltd
Short Description	The Proposal is for the construction and operation of a renewable energy solar generation hub to power Fortescue mining operations in the Pilbara region. The Proposal is located approximately 120 km south of Port Hedland and is within the Kariyarra Native Title determination area. The Development Envelope (DE), spanning an area of 1,416.6 ha, demarcates the Proposal boundary. An Indicative Disturbance Footprint (IDF) of 1,108.2 ha has been identified within the DE. The DE is strategically located approximately 25 km west of Fortescue's existing North Star Magnetite Project and is separated across two distinct areas approximately 3.7 km apart and linked via an existing unsealed access road, adjacent to Fortescue's existing mainline rail.

Item	Description
	The Proposal comprises the installation of solar panels, 220 kV transmission line spurs connecting the Proposal to Fortescue's existing Pilbara Energy Connect (PEC) transmission system, substations, associated supporting infrastructure, and linear supporting infrastructure such as roads and corridors for overhead electrical reticulation. Electricity will be exported from the solar farm to the Fortescue integrated electricity network by connecting into the PEC North Star Junction substation being constructed as part of the Pilbara Transmission Project. **To be clear the PEC transmission infrastructure is not a component of this referral.** The solar array is split into two areas (North and South), capacity currently planned for the Southern area is 456 MW and Northern area is 188 MW; acknowledging that this may vary pending final design. Importantly, all infrastructure is to be located within the nominated DE. Fortescue highlights that the MW output is nominal only. Future improvements in solar panel technology may allow for higher power generation output from the same footprint.

Table E 1-2: Proposal Content Elements

Element	Location	Proposed Extent
Physical Elements		
Solar PV Farm: • Solar farm PV modules • Control room • Overhead transmission lines (220 kV) • Switchyards • Substations and associated battery energy storage systems (BESS).	Figure 2-3	Development Envelope of 1,416.6 ha, including clearing of native vegetation up to 1,108.2 ha. Rows of solar panels will be adjoined creating arrays positioned 0.1 m – 4 m above ground level. Access tracks between the panels to facilitate ongoing maintenance. An optimised panel layout will be determined during a later detailed design phase.
Transmission line elements: • 220 kV transmission line spurs • 33 kV transmission distribution line • Transmission line power poles and associated hardstands • Transmission line service corridor		Power will be exported to the existing PEC transmission network via a 5 km 220 kV transmission line spurs. The 33 kV distribution lines will be throughout the PV farm, linking the PV array's back to the substation
Supporting and ancillary infrastructure elements: • Access roads and service corridors • Laydown areas • Concrete batching • Waste management • Borrow pits • Site offices and workshops • Battery storage • Fencing (external)		The Proposal will source water from existing approved water infrastructure for construction and operation phases. Existing water pipelines and turkey's nests will be used to transport and store water.

Element	Location	Proposed Extent
Construction Elements		
Earthmoving and associated construction plant/equipment		For duration of construction.
Concrete batching plant		Maximum output capacity of 50 m^3/hr. For duration of construction.
Backup Power Supply • Diesel Generators • Battery Storage	Figure 2-3	Up to 4 MW (instantaneous load requirement).
Operational Elements		
Solar Energy Generation		Design capacity based on current technologies (higher output may be achievable in future).
Backup Power Supply • Diesel Generators • Battery Storage		Up to 1 MW (instantaneous load requirement).
Proposal elements with greenhouse gas emissions		
Construction Elements		
Scope 1:	Scope 1 emissions for the construction and installation phase of the Proposal are estimated to be approximately 75,000 tCO2-e, with a peak rate of approximately 62,000 tCO2-e in the first year of construction.	
Scope 2:	No Scope 2 emissions are anticipated from the Proposal in construction as all electrical power will be self-generated.	
Scope 3:	Emissions during construction of facility and equipment are not expected to be significant.	
Operational Elements		
Scope 1:	No significant ongoing Scope 1 emissions.	
Scope 2:	No Scope 2 emissions are anticipated from the Proposal in operations as all electrical power will be self-generated	
Scope 3:	Scope 3 emissions during operations are expected to be approximately 35,951 tCO_2-e per annum.	
Total Emissions (based on annual average Scope 1 and Scope 2)		
Total Scope 1 and Scope 2 emissions are expected to be approximately 75,000 tCO2-e.		
Rehabilitation		
Topsoil to be stored in allocated storage areas and used to rehabilitate areas disturbed for temporary facilities following construction. At the completion of the Proposal, any infrastructure no longer required will be removed and disturbed areas rehabilitated consistent with the surrounding landscape. Topsoil from permanent clearing will be spread consistent with the surrounding landscape or stockpiled.		

Element	Location	Proposed Extent
Commissioning		
The commissioning of the solar farm will be undertaken subject to operational limits above. Collector groups will be energised progressively as they are constructed. Before any operational activity begins, comprehensive system testing will be conducted on all solar panels, electrical infrastructure, and grid connections to ensure that all components meet safety, performance, and environmental standards. Performance testing will be completed after commissioning if required.		
Decommissioning		
At completion of the operational phase, the decommissioning of the solar farm will involve the removal of all solar modules, towers, foundations (to a specified depth), transformers, cabling, and other above-ground infrastructure. Underground components, such as cables or foundations below a certain depth, may be left in place if deemed environmentally preferable, in line with regulatory guidelines. All removed materials will be handled responsibly, with recyclable components sent to appropriate facilities and non-recyclable waste disposed of according to local regulations. Works will be planned to minimise environmental impact and restore the site to its pre-development condition as much as feasible and in consultation will all relevant stakeholders. A decommissioning and rehabilitation management plan will be prepared at a minimum of five years prior to the last planned electricity generation activity on the site.		
Other elements which affect extent on the environment		
Proposal time	Maximum project life	25 years At the end of life, the site will either be repowered or decommissioned.
	Construction phase	18 months for each stage.
	Operations phase	Operations across the proposed site will be achieved once commissioning of all stages is complete. Infrastructure to be maintained and then replaced at the end of asset life (approximately every 25 years).
	Decommissioning Phase	Approximately 24 months.

SUMMARY OF POTENTIAL IMPACTS, PROPOSED MITIGATION AND OUTCOMES

Table E 1-3: Summary of Potential Impacts, Proposed Mitigation and Outcomes

Flora and Vegetation	
EPA Objective	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Policy and Guidance	• Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a). • Environmental Factor Guideline – Flora and Vegetation (EPA, 2016b).
Potential Impacts	**Direct impacts:** o Clearing up to 1,108.2 ha of native vegetation. o Clearing up to 502 known individuals of *Euploca mutica* (P3) o Clearing up to 4,345,600 estimated individuals of *Triodia chichesterensis* (P3) (18% of estimated individuals from the survey) o Clearing up to 23 individuals of *Trianthema* aff. *oxycalyptrum* (potentially novel taxon) (15.5% of recorded individuals from the survey) o Clearing of up 500 individuals of *Portulaca digyna* (range extension) (31% of recorded individuals from the survey). **Indirect Impacts** o Fragmentation of populations or habitats o Edge effects on three conservation significant flora species. o Introduction or spread of weed species. o Increase of dust deposition. o Altered hydrological regimes o Altered fire regimes **Cumulative Impacts** o Combined impacts to the remaining extent of pre-European vegetation associations associated with the Proposal and other developments in the surrounding area. o Combined clearing of *Euploca mutica* and *Triodia chichesterensis* reducing the extent of occurrence of the species.
Mitigation	**Avoidance** o Where significant flora or vegetation occurs close to the IDF, areas will be clearly demarcated prior to construction activities commencing to protect the conservation significant flora species and vegetation from impacts such as accidental clearing or disturbance. o Areas to be cleared will be demarcated on the ground (either physically or using GPS enabled methods).

	Minimisation ○ All clearing areas will be checked and confirmed post-clearing through inspection of aerial imagery of clearing areas and comparison to the IDF. ○ Comprehensive weed hygiene management through implementation of weed management measures in accordance with the Weed Management Plan. ○ Dust deposition will be managed through standard construction measures (e.g. water application and exposed surface stabilisation) to minimise dust generations and avoid impacts on vegetation in line with the dust management measures that will be outline in the EMP for the Proposal. ○ Implementation of fire risk management measures will be undertaken (see Section 7.7 for further detail).
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. Potential direct and indirect impacts to flora and vegetation associated with the Proposal will not be significant at the local or regional scale. Through avoidance and minimisation of impacts, the Proposal is consistent with the EPA's environmental objective for Flora and Vegetation.
Terrestrial Fauna	
EPA Objective	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
Policy and Guidance	• Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA, 2020) • Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016c) • Technical Guidance – Sampling methods for Terrestrial Vertebrate Fauna (EPA, 2016d).
Potential Impacts	**Direct impacts:** ○ Clearing of fauna habitat within the DE, including habitat critical to the survival of Threatened species (Greater Bilby, Northern Quoll, Ghost Bat, Pilbara-Leaf nosed Bat, Grey Falcon, Western Pebble-mound Mouse, Pilbara Grasswren, Spectacled Hare-wallaby and Peregrine Falcon). ○ Loss of habitat for Short-range Endemic species ○ Fauna mortality through collision with vehicles during the construction and operational phase. **Indirect Impacts** ○ Fragmentation of fauna habitat ○ Altered fauna behaviour ○ Degradation of fauna habitat **Cumulative Impacts** ○ Combined impacts from clearing on general fauna habitats associated with the Proposal and other developments in the surrounding area. ○ Combined impacts from clearing of habitat critical for the survival of Threatened species associated with the Proposal and other developments in the surrounding area.

	○ Combined disturbance to Threatened species from construction and operational activities associated with the Proposal and other developments in the surrounding area.
Mitigation	**Avoidance** ○ The Proposal has been significantly reduced in size and designed to avoid habitat for conservation significant fauna where possible. ○ Prior to conducting ground disturbance activities, ensure known locations of environmentally sensitive areas (such as areas of critical habitat) to be retained and protected from disturbance are identified on the ground by appropriate signage, fencing or flagging. **Minimisation** ○ Clearing and ground disturbing activities limited to the defined clearing limits and boundaries described within the approval documentation. ○ All site operatives and personnel attending the site will undergo an induction regarding threatened fauna and direct and indirect impacts. ○ Strict speed limits will be enforced around the site in order to avoid fauna strikes during clearing and construction. ○ Comprehensive weed hygiene management through implementation of weed management measures to be outlined in the EMP. ○ Implementation of fire risk management measures will be undertaken (see Section 7.7 for further detail).
Outcomes	The Proposal will result in the clearing of up to 1,108.2 ha of fauna habitat, some of which will provide habitat for conservation significant fauna. Critical habitat will be lost for the Greater Bilby and Northern Quoll, Grey Falcon, PLNB, Ghost Bat, and Grey Falcon. Other potential direct and indirect impacts to terrestrial fauna associated with the Proposal will not be significant at the local or regional scale. The terrestrial fauna values recorded within the DE are not considered unique to the area and are known to be widespread in the region. Through proposed avoidance and minimisation methods, impacts will not be significant, and the Proposal is considered consistent with the EPA's environmental objective for Fauna.
Social Surroundings	
EPA Objective	To protect social surroundings from significant harm.
Policy and Guidance	• Statement of Environmental Principles, Factors and Objectives (EPA, 2023a) • Environmental Factor Guideline – Social Surroundings (EPA, 2023b) • Technical Guidance: EIA of Social Surroundings – Aboriginal Cultural Heritage (EPA, 2023c)
Potential Impacts	**Aboriginal Cultural Heritage and Cultural Values** **Direct impacts:** ○ Unauthorised disturbance of heritage places and places of cultural significance. ○ Unauthorised access to heritage places and places of cultural significance by Fortescue personnel and contractors. ○ Loss of culturally significant flora species. ○ Loss of habitats removing culturally significant fauna species from the area

	○ Reduced use of the area or inability of access the area for traditional activities resulting in loss of connection to Country and cultural practices. **Indirect Impacts** ○ Increased dust from construction and operation reducing aesthetics at culturally significant areas and the wider cultural landscape. ○ Dust deposition impacting on visibility and integrity of engravings. ○ Decline of plant health for culturally significant flora in high-risk areas. ○ Decrease in visual amenity to cultural heritage places and areas of cultural use. ○ Decrease in visual amenity to areas of cultural use due to glint and glare. ○ Noise (and vibration) disturbance for cultural activities including camping (at night), hunting, and day use/ ceremonial use. **Non-Aboriginal Heritage** ○ No potential impacts to non-Aboriginal heritage were identified from the Proposal. **Amenity** ○ Increased dust emissions in the surrounding area. ○ Impacts to third parties due to visual impacts from the Proposal. ○ Impacts to third parties due to glint and glare from the Proposal. ○ Increase in baseline noise levels during construction. ○ Increase in baseline noise levels during operation.
Mitigation	**Aboriginal Cultural Heritage and Cultural Values** **Avoidance** ○ All Heritage Places and Heritage Restriction Zones (HRZs) are outside of the indicative footprint and will be avoided. ○ All Heritage Places and HRZs are identified in Fortescue's GIS system. ○ Relevant Heritage surveys are undertaken in unsurveyed land prior to ground disturbance activities. ○ All areas of culturally significant flora and / or fauna (where identified) are stored in Fortescue's GIS system as HRZ. ○ Proposal design developed to avoid direct disturbance to the Turner River, Turner River West, and associated tributaries (HRZ-1367). ○ 100 m buffer placed over Turner River, Turner River West, and associated tributaries (HRZ-1367) (where in proximity to the Proposal). ○ Proposal design will avoid places / areas requested by Kariyarra to maintain access (Turner River, Turner River West, HRZ-1367, and KAR23-026). ○ Based on dust assessment identify high-risk areas requiring management to minimise / reduce dust levels. ○ Forecast and works planning to consider high wind events ○ Topsoil stripping will not commence during high wind events, when it is saturated or when very dry. ○ No specific areas to undertake traditional activities were identified within or surrounding the Proposal to recorded as HRZs. ○ Proposal designed to avoid culturally significant water sources identified in proximity to the Proposal. ○ 100 m buffer placed over Turner River, Turner River West, and associated tributaries (HRZ-1367) (where in proximity to the Proposal). ○ No direct disturbance/ clearing of land within the Turner River West and tributary buffers during construction or operation of the Proposal.

	○ Hydrological modelling for the Proposal shows that natural flooding events have no interaction with the Proposal.
	
	Minimisation
	○ Implement the Proposal during construction and operation in accordance with the *Aboriginal Heritage Act 1972 (WA)* (AH Act) and Fortescue's Heritage management procedures.
	○ All Fortescue employees and contractors to undertake activities under an approved Land Use Certificate (LUC) and comply with all Heritage conditions applied (where applicable).
	○ All Fortescue personnel and contractors to undertake relevant mobilisation inductions, including cultural awareness.
	○ Complete all works in compliance with the Fortescue procedures and the Project Environmental Management Plan (EMP)
	○ Any management of culturally significant plants or animals to be managed under the Project EMP such as:
	  ○ Minimise loss of culturally significant flora species by reducing clearing activities.
	  ○ Develop and implement management targets to minimise or reduce impacts to species of cultural value. Including implementing weed and feral animal management strategies, pre-clearance bilby surveys and implement waste management protocols.
	○ Ensure any design plan changes to not restrict or cut off access to Turner River, Turner River West, HRZ-1367, and KAR23-026.
	○ Consult with Kariyarra to identify other places requiring access should design plans change.
	○ Implement Fortescue's Dust Management Plan (IO-PL-EN-0001). Key measures include:
	  ○ Water trucks will be used for dust suppression on access tracks, cleared areas, and high traffic areas during construction.
	  ○ Watering of surface area prior to commencing topsoil stripping - by water truck – when POI within wind arc direction and within 500 metres of an activity relative to the prevailing wind direction.
	  ○ Reduce vehicle speed limits on site and access roads.
	○ Limit lighting usage during hours of darkness to key operational areas – control room.
	○ Optimisation of the backtracking algorithm to reduce or eliminate glare.
	○ Manage noise in accordance with the EMP.
	○ Site design such that noise limits comply with the Environmental Protection (noise) Regulations 1997 (WA)
	○ Manage vibration from blasting activities (where undertaken) for Vibration Sensitive Sites (VSS) in accordance with Fortescue procedure for blasting near Aboriginal Heritage Places (100-PR-HE-0003)
	○ Appropriate design on stormwater drainage.
	
	Amenity
	○ The Visual Impact Assessment (VIA) identified no impact to visual amenity for the Public therefore no management is required.
	○ Optimisation of the backtracking algorithm to reduce or eliminate glare.

Outcomes	Following completion of the assessment of residual impacts, it is considered that the Proposal will not have significant residual impacts on Social Surroundings as a result of the implementation of the measures described in Table 9 16. As a result, the Proposal meets the EPA objective for this factor such that social surroundings are protected from significant harm.

Other Factors	
Inland Waters	
EPA Objective	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.
Policy and Guidance	• Environmental Factor Guideline: Inland Waters (EPA, 2018a) • Water Quality Protection Note no.25. Land use compatibility tables for public drinking water source areas (DWER, 2021) • Water Quality Protection Note no.65. Toxic and hazardous substances (DoW, 2015) • Water Quality Protection Note no.84. Rehabilitation of disturbed land in public drinking water source areas (DoW, 2009).
Outcomes	No significant impacts are expected as a result of construction or operation of the Proposal with regards to Inland Waters. Potential impacts to surface waters have been avoided and minimised during the site selection and design phases for the Proposal. The main drainage systems and tributaries (i.e. Turner River and Turner River West) have been intentionally avoided. Bulk earthworks have been designed not to substantially alter the existing landform geometry. The anticipated changes to associated flow paths, water depths and velocities are expected to be negligible as a result of the development. Surface water modelling has concluded that any remaining impacts to surface water are negligible. No impacts to groundwater are anticipated as water for the life of the Proposal is to be sourced from the adjacent existing approved production bores. Through the application of recognised industry management techniques and adherence to the EMP, any potential impacts can be further avoided and mitigated. Therefore, the significance of impacts to Inland Waters (surface water, groundwater) is considered negligible. As a result of this assessment, it is unlikely that the Proposal will impact Inland Waters. Consequently, further assessment of the Proposal against the EPA's objective for Inland Waters is not required, as the objective for this factor is considered to be met.
Terrestrial Environmental Quality	
EPA Objective	To maintain the quality of land and soils so that environmental values are protected.
Policy and Guidance	• Statement of Environmental Principles, Factors and Objectives (EPA, 2023a) • Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016e) • Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER, 2015a) • Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER, 2015b).
Outcomes	With the implementation of standard mitigation measures listed in Section 10.2.4, no significant residual impacts to terrestrial environmental quality have been identified and the EPA's objective for the terrestrial environmental quality factor 'to maintain the quality of land and soils so that environmental values are protected' can be met.

Landforms	
EPA Objective	To maintain the variety and integrity of significant physical landforms so that environmental values are protected.
Policy and Guidance	• Statement of Environmental Principles, Factors and Objectives (EPA, 2023a) • Environmental Factor Guideline – Landforms (EPA, 2018b)
Outcomes	The assessment identified that none of the six landform types present within the Proposal area are likely to be significant. Therefore, further assessment of the Proposal against the environmental objective for landforms is not required as the EPA's objective for this factor is considered to be met.

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ABBREVIATIONS

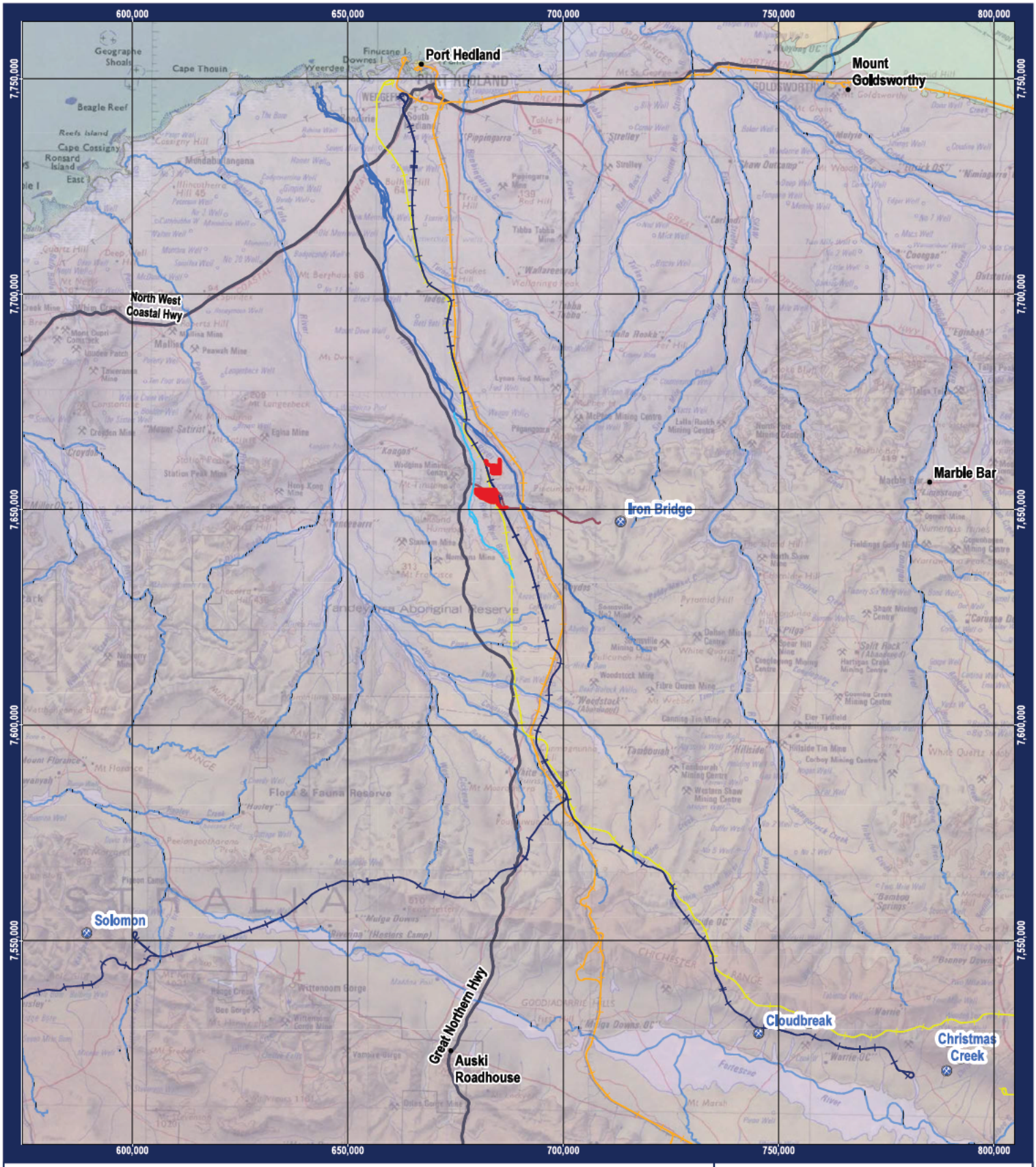
Abbreviation	Definition
ACHIS	Aboriginal Cultural Heritage Inquiry System
AEP	Annual Exceedance Probability
AH Act	*Aboriginal Heritage Act 1972 (WA)*
AHD	Australian Height Datum
AIATSIS	Australian Institute of Aboriginal and Torres Strait Islander Studies
ALA	Atlas Living of Australia
ANZG	Australian and New Zealand guidelines
ARI	Assessed on Referral Information
ASRIS	Australian Soil Resource Information System
ASS	Acid Sulfate Soils
BC Act	*Biodiversity Conservation Act 2016*
Birdlife	Birdlife Australia
BoM	Bureau of Meteorology
BESS	Battery energy storage systems
°C	Degrees Celsius
CPI	Consumer Price Index
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CO_2-eq	CO_2 Equivalent
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAWE	Department of Agriculture, Water and the Environment
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy the Environment and Water
Development Envelope	The maximum area within which the footprint for the Proposal will be located
DE	Development Envelope
DEMIRS	Department of Energy Mines, Industry Regulation and Safety
DoH	Department of Health
DP	Declared Pest
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Authority (WA)
EP Act	*Environmental Protection Act 1986* (WA)

Abbreviation	Definition
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERD	Environmental Review Document
ESA	Environmentally Sensitive Areas
ETA	Environmental Technologies and Analytics
Fortescue	Fortescue Ltd
GDE	Groundwater Dependent Ecosystems
GHG	Greenhouse Gas
GIS	Geographic Information System
ha	Hectare
HRZ	Heritage Restriction Zones
IBRA	Interim Biogeographic Regionalisation for Australia
ICIP	Indigenous Cultural and Intellectual Property
IDF	Indicative Disturbance Footprint – The indicative location where ground disturbance for the physical elements of the Proposal will occur. The extent of this footprint is used to determine impacts. The spatial location of this footprint may vary as the design is refined.
ILUA	Indigenous Land Use Agreement
JTSI	Department of Jobs, Tourism, Science and Innovation
KAC	Kariyarra Aboriginal Corporation
Kariyarra	The native title holders, traditional custodians, representatives, or knowledge holders, for the Kariyarra native title determination area.
km	kilometres
kV	Kilovolt
LAA	Land Access Agreement
LAA Act	*Land Administration Act 1997*
LCU	Landscape Character Units
LGA	Local Government Authority
LPS4	Shire of East Pilbara Local Planning Scheme No. 4
LPS7	Town of Port Hedland Local Planning Scheme No. 7
LUC	Land Use Certificates
m	Meter
m/s	Metres per second
Main Road	Main Roads Western Australia
mbgl	Metres below ground level
mm	Millimetre
Mining Act	*Mining Act 1978* (WA)
MNES	Matter of National Environmental Significance
MW	Megawatts

Abbreviation	Definition
NT	Northern Territory
NNTT	National Native Title Tribunal
NRM	Natural Resource Management
NVCP	Native Vegetation Clearing Permit
NVIS	National Vegetation Information System
P1	Priority one species
P2	Priority two species
P3	Priority three species
P4	Priority four species
PBC	Prescribed Body Corporate
PDC	Pilbara Development Commission
PEC	Pilbara Energy Connect
PEG	Pilbara Energy (Generation) Pty Ltd
PEOF	Pilbara Environmental Offset Fund
PMST	Protected Matters Search Tool
POI	Points of Interest
PTP	Pilbara Transmission Project
PV	Photovoltaic
PVC	A synthetic resin made from the polymerization of vinyl chloride
RFI	Request for information
RIWI Act	*Rights in Water and Irrigation Act 1914*
SPRAT	Species Profile and Threats Database
SRE	Short Range Endemic
TAP	Threat Abatement Plan
TEK	Traditional Ecological Knowledge
TL	Transmission Line
TO	Traditional Owner
TSSC	Threatened Species Scientific Committee
UNFCCC	United Nations Framework Convention on Climate Change
VA	Vegetation Associations
VMO	Visual management objective
WA	Western Australia
WAOL	Western Australian Organism List
WoNs	Weeds of National Significance

1 INTRODUCTION

Pilbara Energy (Generation) Pty Ltd (PEG), a wholly owned subsidiary of Fortescue Ltd (Fortescue), is proposing to develop the Turner River Solar Hub (the Proposal) in the Pilbara region of Western Australia (WA). The Proposal is located approximately 120 km south of Port Hedland and about 25 km west of Fortescue's North Star Project (refer to Figure 1-1). The Proposal will generate renewable energy to support Fortescue's mining operations within the Pilbara, and forms part of Fortescue's objective to achieve carbon neutrality across its operations by 2030.



Legend

- Towns
- FMG Mines
- FMG Rail Alignments
- BHPB Rail
- Roy Hill Rail
- Highway
- Ironbridge Mine Access Road
- Turner River
- Turner River West
- All other Major Rivers
- Development Envelope

IBRA Regions

- Dampierland
- Great Sandy Desert
- Pilbara

N

0 10 20 30 40 50

Kilometres

Figure 1-1
Proposal Location

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:1,200,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.001

Date: 14/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

Data Source(s):
Aerial, ESRI
IBRA, DBCA
Topography, GA
All other data, Fortescue, 2024

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1.2 Purpose and Scope

The purpose of this Environmental Review Document (ERD) is to present an environmental impact assessment of the Proposal for public review and consideration by the Environmental Protection Authority (EPA). This ERD has been prepared in accordance with the EPA's *'Instructions on how to prepare an Environmental Review Document'* (EPA, 2024a) and is based on project and study information available at the time of writing.

1.3 Proponent Details

Pilbara Energy (Generation) Pty Ltd (PEG) is the Proponent of the Turner River Solar Hub (TRSH) Proposal.

Table 1-1: Proponent Details

Proponent	Pilbara Energy (Generation) Pty Ltd (PEG)
Australian Business Number (ABN)	31 631 303 305
Registered Address	Ground Floor, 256 St Georges Terrace, Perth WA 6000
Proponent Contact	
Name	Matthew Dowling
Position	Manager Environment, Primary Approvals
Email	primaryenvironmentapprovals@fortescue.com
Proponent Representative	
Name	Jarrod Pittson
Position	Group Manager Environment and Closure
Email	primaryenvironmentapprovals@fortescue.com

2 PROPOSAL

2.1 Justification

Fortescue's strategy for decarbonisation involves establishing and commissioning a number of solar and wind farms, transmission infrastructure, substations and battery installations to cater for the energy needs of all ongoing and future iron ore operations. The aim is to transition Fortescue from using diesel power and gas to renewable energy by 2030. To achieve the 2030 target of real zero, a total capacity of 1,500 MW of solar PV generation is required. The Proposal constitutes approximately one quarter of this total solar generation output. The Pilbara is regarded as being one of the best locations for solar generation in Australia and globally.

The power generated from the Proposal will be distributed to areas in need of power through the PEC 220 kV transmission network. The Proposal is ideally located for a solar development to support Fortescue's North Star Magnetite Iron Ore Mine and Pilbara Port operations due to its proximity to the existing Pilbara Transmission Project (PTP) Stages 1 and 3 transmission lines and the associated North Star Junction substation. The terrain in this region is also highly suitable for solar farm installations.

2.1.1 Alternatives Considered

2.1.1.1 Proposal Location and Layout

The Development Envelope (DE) and Indicative Disturbance Footprint (IDF) have been subject to an iterative site selection process that assessed potential site locations and layouts using the hierarchy of risk management (avoid, minimise, mitigate) to reduce the Proposal's environmental risk profile. The size of the DE was significantly reduced following baseline environmental surveys to avoid large areas of potential habitat for conservation significant fauna (Figure 2-1).

Location alternatives for this Proposal were assessed with reference to the following key criteria:

- Underlying tenure
- Avoidance of registered sites of cultural heritage based on pre-existing Aboriginal cultural heritage surveys and knowledge
- Avoidance of environmental values: flora and vegetation, habitat for listed threatened species specifically Greater Bilby, areas of groundwater dependent ecosystems through:
    - Use of pre-existing studies to identify constraints and sensitive receptors
    - Layout of the solar panels and support infrastructure
    - Co-location of Proposal components, for example access roads to be located within proposed fire breaks.

- Proximity to Fortescue's existing infrastructure, for example the 220 kV transmission network and associated substations/infrastructure
- Surface topography with a focus on areas of flat land to minimise earthworks and associated disturbance
- Avoidance of areas with large trees and vegetation
- Avoidance of major creeks or drainages within the DE based on satellite imagery
- Proximity to cyclone risk areas – focus on Regions A and B (due to solar panel sensitivity)
- Reasonable road access is required and proximity to common infrastructure.

Through application of the above criteria, a conceptual layout for the Proposal was developed. The layout considered flood modelling, surface contours and Aboriginal cultural heritages surveys to achieve a fit for purpose design.

2.1.1.2 Power Reticulation

Lessons learnt from the adjacent Fortescue 117 MW North Star solar project influenced the Proposal design including power reticulation and transmission. In combination with design related studies (e.g. geotechnical) it was determined that:

- Power infrastructure should be above ground as geotechnical studies identified only a thin layer of soil above bedrock. Burial of cabling would increase construction effort, disturbance, cost and schedule risks.
- Above ground reticulation has a reduced impact on the environment and ground clearance.

2.1.1.3 Alternative Power Generation Project

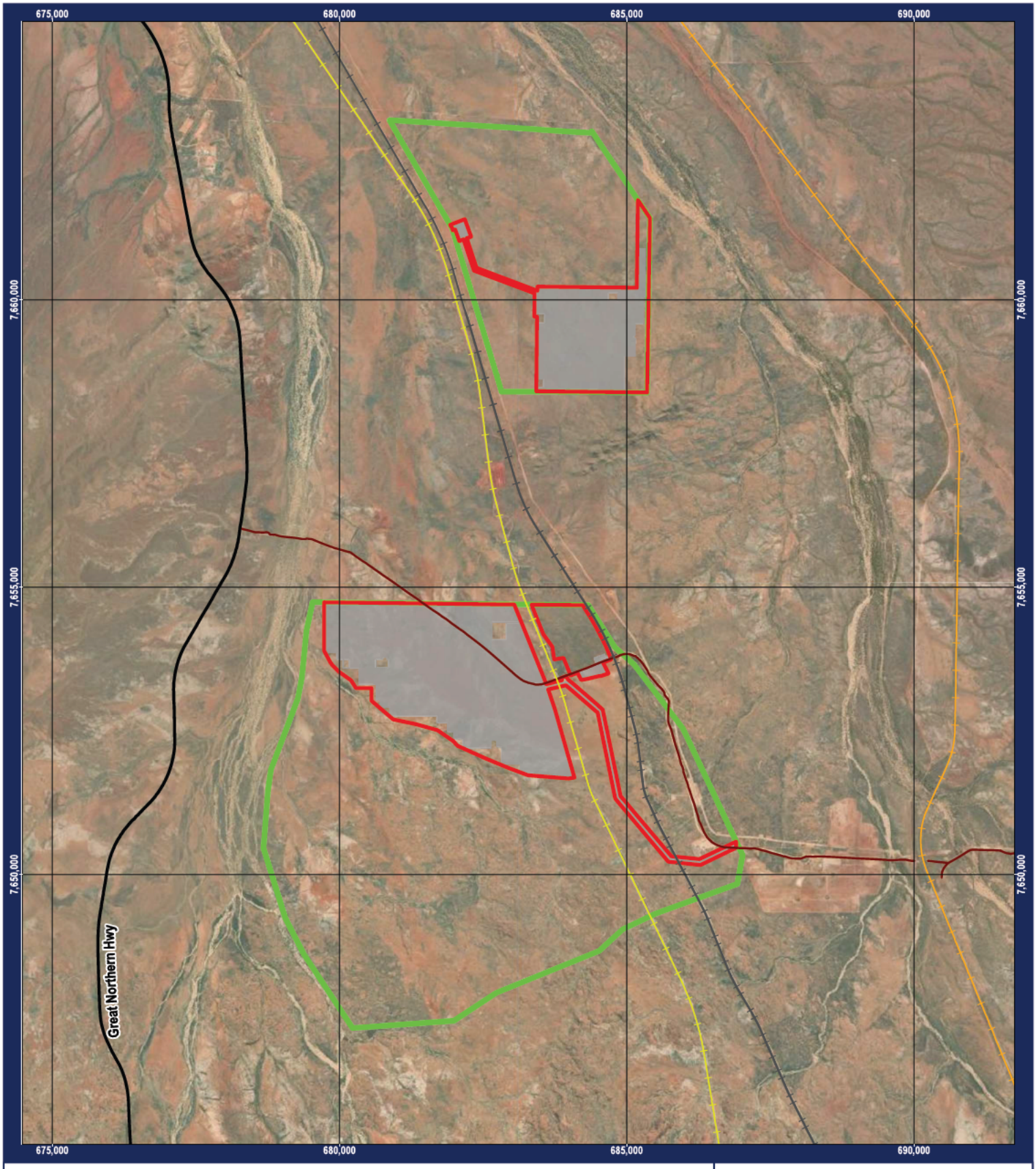
Fortescue has previously considered alternative power supply sources. The greenhouse gas emissions associated with these alternatives are at odds with the Paris Agreement 2016, which aims to limit global warming to less than 2°C compared to pre-industrial levels. The alternatives were also inconsistent with the EPA's Greenhouse Gas Guidance (EPA, 2024b). Alternative power options to the Proposal include:

- Extension of Fortescue River Gas Pipeline to provide gas-fired power generation specifically to FMG's Chichester Hub and North Star operations.
- Small scale solar farm infill in and around mining operations, constrained by mining and operational factors
- Utilisation of existing third-party power generation infrastructure.

2.1.1.4 No Development Option

If Fortescue did not develop the Proposal, this would further delay the clean energy transition and decarbonisation of heavy industry. A loss of renewable energy required for Fortescue's decarbonisation, may result in future projects unable to proceed without a hydrocarbon fuelled electrical power supply, consequently requiring operations to be powered by an on-site diesel and/or gas power station for the life of the mine.

Further, this would hinder Fortescue's ability to achieve its goal of zero carbon across its operations by 2030, in line with the Paris Agreement.



Legend

- FMG Rail Alignments
- BHPB Rail
- Roy Hill Rail
- Highway
- Ironbridge Mine Access Road
- Proposal Development Envelope
- Indicative Disturbance Footprint
- Alternative Proposal Location

N

0 0.5 1 1.5 2 2.5
Kilometres

Figure 2-1
Alternative Proposal Location

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:90,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.068

Date: 28/02/2025
Size: A4P
Revision: 2
Confidentiality: 0

Data Source(s):
Topography, GA
All other data, Fortescue, 2024

Fortescue.

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2.2 Proposal Description

The Proposal is for the construction and operation of a solar farm, a 220 kilovolt (kV) transmission line, and additional supporting infrastructure in the Pilbara region, Western Australia (Figure 1-1). The transmission line will integrate the solar farm into Fortescue's PEC system, enabling energy supply across operations in the Pilbara. The key elements of the Proposal are summarised in Table 2-1.

Table 2-1: Key Elements of the Proposal

Key Elements	Proposed Extent
Renewable Infrastructure	The Proposal is defined by a Development Envelope separated across two areas (Northern DE and Southern DE). • Development Envelope – 1,416.6 ha • Indicative Disturbance Footprint – 1,108.2 (Figure 2-2) • Clearing of native vegetation up to 1,108.2 ha.
Supporting Electrical Infrastructure	
Supporting Infrastructure	
Water Infrastructure	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. Transfer and storage of water across the DE will consist of water pipelines and turkey's nests for construction and operations.1,1085
Operation & Maintenance	The operation phase of the Proposal is expected to commence in 2029 and will operate 24 hours per day.
Decommissioning & Rehabilitation	Expected life of 25 years (with asset life extension, can operate indefinitely).

2.2.1 Renewable Energy Infrastructure

The Proposal will consist of modules mounted onto a tracking system, either fixed or tilting positioned 0.1 m – 4 m above ground level. The tracking structure will be secured to the ground using embedded piers, which will typically be embedded 1.5 - 2.5 m below the surface level, depending on the geotechnical conditions at the location. It is anticipated that the solar panels will be arranged in rows, with access tracks between them to facilitate ongoing maintenance. An optimised solar panel layout will be determined during a later detailed design phase (refer to Figure 2-3).

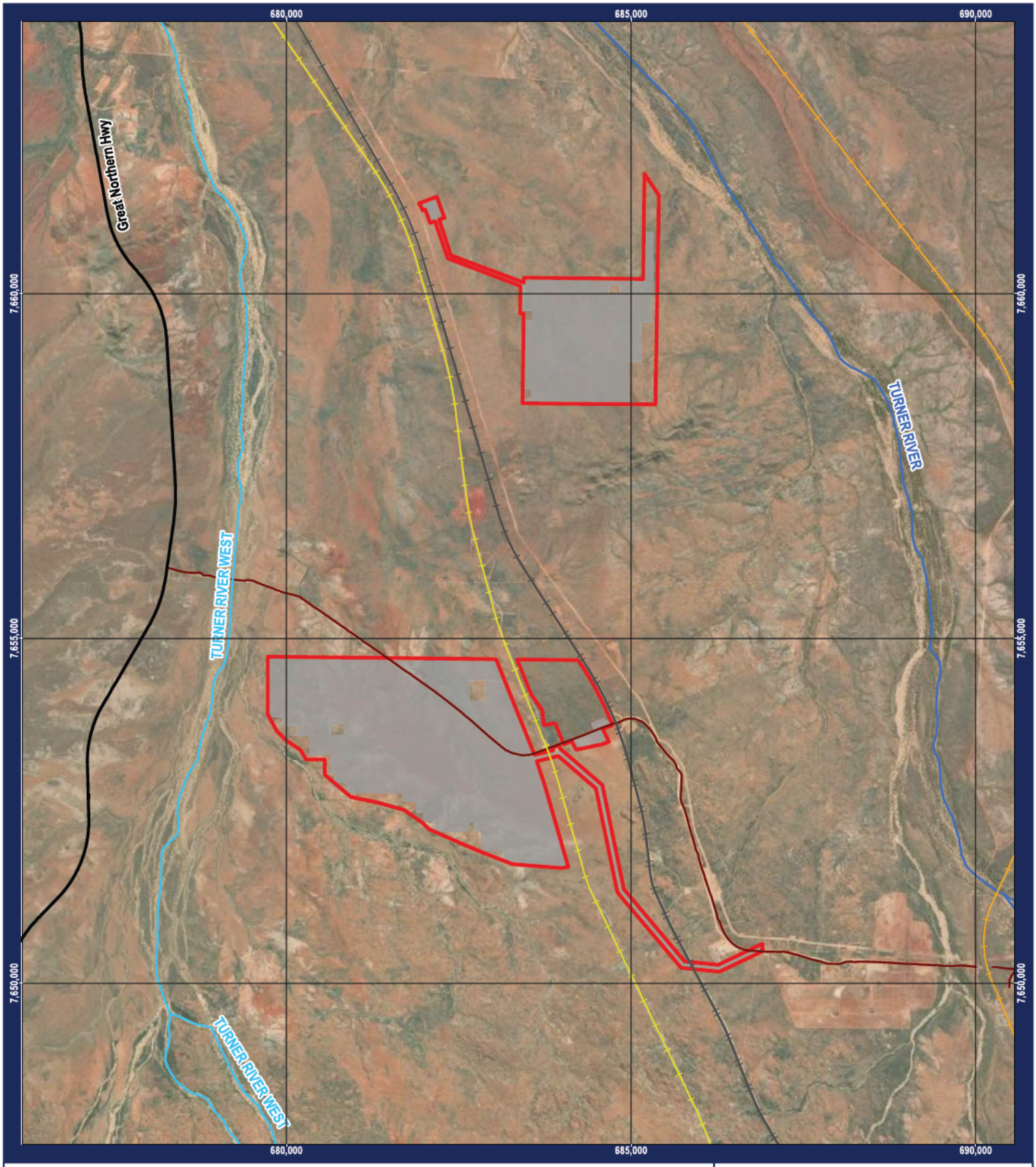
The perimeter of the solar infrastructure will have a firebreak and fencing installed. Fencing will be located a sufficient distance from the solar panels to allow maintenance and emergency response vehicles to move freely within the solar farm.

The total expected disturbance associated with the development of the solar farm and supporting infrastructure is 1,108.2 ha (Figure 2-2).

2.2.2 Supporting Electrical Infrastructure

Overhead power distribution lines will be constructed throughout the solar farm to transfer the solar energy to a centralised substation before it is exported to the existing 220 kV PEC transmission network via an approximately 5 km, 220 kV transmission line spurs (Figure 2-3)

Power poles and hardstands will be constructed on 25 x 25 m pads, with transmission lines installed up to 45 m above the ground and foundations up to 8 m deep. A service corridor road, approximately 6 m wide, will also be established to facilitate access and maintenance.



Legend

- FMG Rail Alignments
- BHPB Rail
- Roy Hill Rail
- Turner River
- Turner River West
- All other Major Rivers
- Highway
- Ironbridge Mine Access Road
- Development Envelope
- Indicative Disturbance Footprint

N

0 0.5 1 1.5 2 2.5
Kilometres

Figure 2-2
Indicative Disturbance Footprint

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:75,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.002

Date: 14/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

Data Source(s):
Topography, GA
All other data, Fortescue, 2024

Fortescue.

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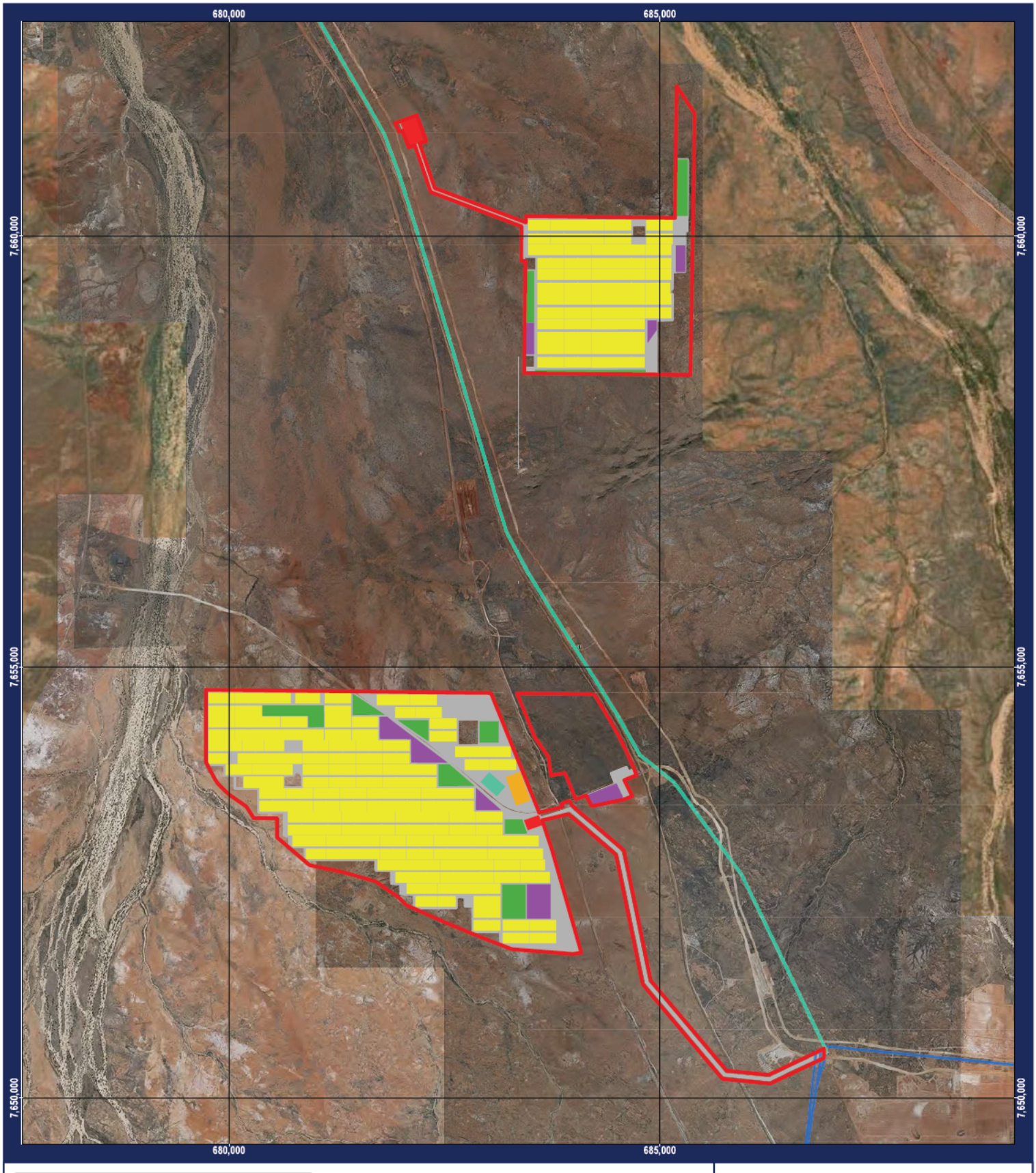

Legend

- Development Envelope
- Indicative Disturbance Footprint

Existing Transmission Network

- PEC1
- PEC3

Conceptual Solar Farm Layout

- BESS
- Building
- Laydown
- Panels
- Substation
- Topsoil Stockpile

N

0 0.5 1 1.5 2
Kilometres

Figure 2-3
Conceptual Proposal Layout

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_0064.006

Date: 14/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

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

Fortescue.

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2.2.3 Additional Supporting Infrastructure

Further to the above, additional infrastructure and support facilities will be required for the Proposal.

2.2.3.1 Access and Internal Roads

The main access to the Proposal will be via the Great Northern Highway or via internal roads. An internal network of site access tracks will connect the infrastructure for construction and operational activities, including between the solar arrays. These tracks will be unsealed with an average width of approximately 6 m to allow two-way traffic flow and have been designed to avoid areas subject to flooding where practical.

A firebreak will be established around the solar array. Where practical, this fire break will incorporate/be co-located with internal roads.

2.2.3.2 Accommodation

The Proposal will utilise the existing Fortescue accommodation village at North Star Junction for the purposes of construction and operation.

2.2.3.3 Water Storage

The Proposal will utilise water from nearby existing water infrastructure for both the construction and operation phases. The transfer and storage of water across the designated area will involve the use of water pipelines and storage facilities (a combination of turkey's nests, dams and/or above ground water tanks), during both construction and operational stages. Relevant approvals will be sought prior to the installation of new water infrastructure.

2.2.3.4 Hydrocarbon and Chemical Storage

Temporary fuel storage and refuelling areas will be required for servicing and fuelling light vehicles and mobile plant during construction. Facilities at the North Star Junction Camp will be used during operations.

All fuel will be stored in bunded facilities in a manner that complies with relevant environmental, health and safety regulations. Consideration will be given to alternative fuel sources for on-site vehicles over time in line with Fortescue's decarbonisation strategy and commitments.

2.2.3.5 Temporary Power Supply

The Proposal considers the need for power supply during construction of up to 4 MW of instantaneous load, which is likely to be provided by diesel electricity generation infrastructure. Fortescue will develop and apply approaches to continue to reduce emissions from its construction activities, utilising renewable energy where practicable.

2.2.3.6 Waste Management

Waste management for the Proposal will seek to minimise the generation of waste and the disposal of waste to landfill, which may include making use of regional recycling facilities. All waste will be disposed of offsite.

2.2.3.7 Communications

A communication tower and in-ground fibre optic cabling will be installed to support operational requirements.

2.2.3.8 Laydown Areas

Laydown areas will be required to store solar panel modules and electrical infrastructure as part of the installation and assembly process. These areas will be sited with consideration of environmental and heritage values during detailed construction planning and rehabilitated once no longer required.

2.2.3.9 Concrete Batching Plant

The Proposal will use mobile concrete batching facilities which will be established by a third party for the duration of the construction phase.

2.2.3.10 Topsoil Stockpiles

Clearing of vegetation and topsoil is required to construct and install the proposed infrastructure. Vegetation and topsoil will be stripped and stored separately in designated stockpiled areas and used to progressively rehabilitate temporarily disturbed areas following completion of construction activities.

2.2.3.11 Temporary Infrastructure

During construction, various temporary works will be required for the Proposal. At completion of the construction works, all construction facilities that are no longer required for operational purposes will be removed and the areas rehabilitated.

2.2.4 Proposal Timeline

The Proposal is a critical component of Fortescue's decarbonisation commitment to achieve net-zero emissions from mining operations by 2030.

Construction works will commence immediately following the receipt of all necessary approvals and is scheduled to take approximately 30 months. Generation and electrical transmission infrastructure will be progressively commissioned during construction. The renewable energy generation and its supporting infrastructure will be maintained as needed, with a projected lifespan of 25-30 years.

2.2.5 Operation and Maintenance

The operation phase of the Proposal is expected to commence in February 2029, with a small workforce operating the solar farm. Activities are mainly restricted to the operation and maintenance of the solar farm and supporting electrical infrastructure.

2.2.6 Decommissioning and Rehabilitation

The Proposal is expected to operate for 25-30 years, and with asset life extension, can operate indefinitely. Decommissioning and rehabilitation are intended to restore the environmental values of the Proposal area post-operation. Decommissioning requirements will be determined through stakeholder consultation, and activities will include removal of all infrastructure, recycling or disposal of waste and rehabilitation of disturbed areas.

Rehabilitation activities will ensure all tracks are reprofiled back to the natural terrain, and any excavations backfilled and recontoured to achieve a gentle slope consistent with the surrounding natural landscape to reduce erosion. Vegetation and topsoil removed during construction will be spread over cleared areas, and all potentially contaminated soil will be removed to an appropriately licensed facility, and rubbish will be removed from the site and disposed of appropriately. All compacted areas will be ripped / scarified to loosen compacted soil and promote vegetation regrowth.

2.3 Location and Regional Context

2.3.1 Physical Environment

2.3.1.1 Climate

The Pilbara is a semi-arid and arid region, which experiences approximately 300 mm of rainfall annually (McKenzie, May, & McKenna, 2003). The weather station at Marble Bar (Site 004106) shows a long-term annual rainfall of 386 mm, with rain experienced predominately in January, February and March (BoM, 2024). Annual mean temperatures within the region range from 12.1°C in winter to 42.1°C in summer (BoM, 2024). Plate 2-1 outlines the monthly rainfall and temperature averages for the Marble Bar station (BoM, 2024).

Assessment of terrain and seasonal and diurnal wind roses (ETA, 2024) determined that annual windspeed across most of the DE is 7-11 km/hr, increasing to 11-14 km/hr at the southern end of the northern DE. Wind speeds tend to be higher during the day and reduce overnight. Annually, most winds are south-easterly, with the following seasonal patterns:

- Autumn and winter: predominantly slower, south-easterly winds with a wind arc of 75 to 175 degrees.
- Spring and summer: mixture of north-westerly and south-easterly winds, but more frequently from the north-west with a wind arc of 290 to 340 degrees.

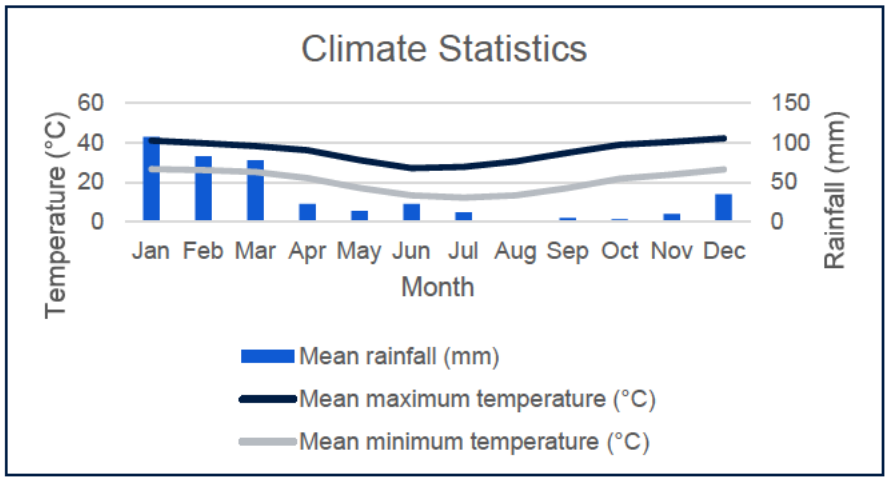

Plate 2-1: Marble Bar Climate Data (Site No. 004106) (BoM, 2024)

2.3.1.2 Geology

The Pilbara craton is composed of Archaean and Proterozoic rocks that have been eroded to form the iconic landforms seen today, including the Hamersley Ranges, gorges, and the Fortescue River valley (Pepper, Doughty , & Keogh, 2013). The DE comprises of six geological units described in Table 2-2 and Figure 2-4 (Geoscience Australia, 2012).

The Proposal is sited within a region characterised by undulating Archaean granite and basalt plains with significant basaltic ranges (Kendrick and McKenzie, 2001). The location is generally flat, or gently undulating, with larger creeks associated with Turner River, its tributaries and other drainage lines hosting shallow alluvium, colluvium and calcrete deposits.

Table 2-2: Geological Units within the DE (Geoscience Australia, 2012)

Geological Units	Description	Area within the DE (ha)	Proportion within the DE (%)
Alluvium 38485	Channel and flood plain alluvium; gravel, sand, silt, clay, locally calcreted	8.94	0.63
Calcrete 38497	Pisolitic, nodular or massive calcrete; ferruginous inclusions; calcareous cementing of bedrock and transported materials; locally with intercalated chalcedony; as low mounds, in playa lakes, or as valley calcrete; locally dissected and karstified	125.16	8.84
Colluvium 38491	Colluvium, sheetwash, talus; gravel piedmonts and aprons over and around bedrock; clay-silt-sand with sheet and nodular kankar; alluvial and aeolian sand-silt-gravel in depressions and broad valleys in Canning Basin; local calcrete, reworked laterite	840.88	59.36
Numbana Monzogranite	Porphyritic to equigranular muscovite-biotite monzogranite, leucogranite; weakly foliated to massive; contains xenoliths and rafts of greenstone, granodiorite and other granitoids	324.33	22.90
Pincunah Monzogranite	Quartz(-feldspar)-phyric hornblende-biotite monzogranite with foliation and phenocryst alignment	13.53	0.96
Sisters Supersuite	Undifferentiated granitoid intrusions of the Sisters Supersuite; leucogranite (locally schlieric or pegmatitic), monzogranite, granodiorite, tonalite, diorite, tonalitic orthogneiss, rhyolite dykes, pegmatite; interleaved in places	103.73	7.32

2.3.1.3 Land Systems and Soils

Land systems consist of various recurring forms of topography, soils, and vegetation, which are described through a series of land units (Christian & Stewart , 1953). The Department of Agriculture (now part of the Department of Primary Industries and Regional Development [DPIRD]) categorised the land systems within the Pilbara region based on ecological information, vegetation characteristics, patterns of variation, conservation status, gradational association, and representation of land systems.

There are three land systems within the DE, of which the Macroy system covers 79% of the total area (Table 2-3 and Figure 2-5) (DPIRD, 2022).

Table 2-3: Land Systems within the DE (Van Vreeswyk et al., 2004)

Land System	Description	Total WA Extent (ha)	Area within the DE (ha)	% within DE
Boolaloo System (283Bo)	Granite hills, domes, tor fields and sandy plains supporting spinifex grasslands with scattered shrubs.	247,383	11.76	1 %
Macroy System (280/283Mc)	Stony plains and occasional tor fields based on granite supporting hard and soft spinifex shrubby grasslands.	1,330,430	1,121.05	79 %
Uaroo System (283Ua)	Broad sandy plains, pebbly plains and drainage tracts supporting hard and soft spinifex hummock grasslands with scattered acacia shrubs.	1,381,842	283.76	20 %

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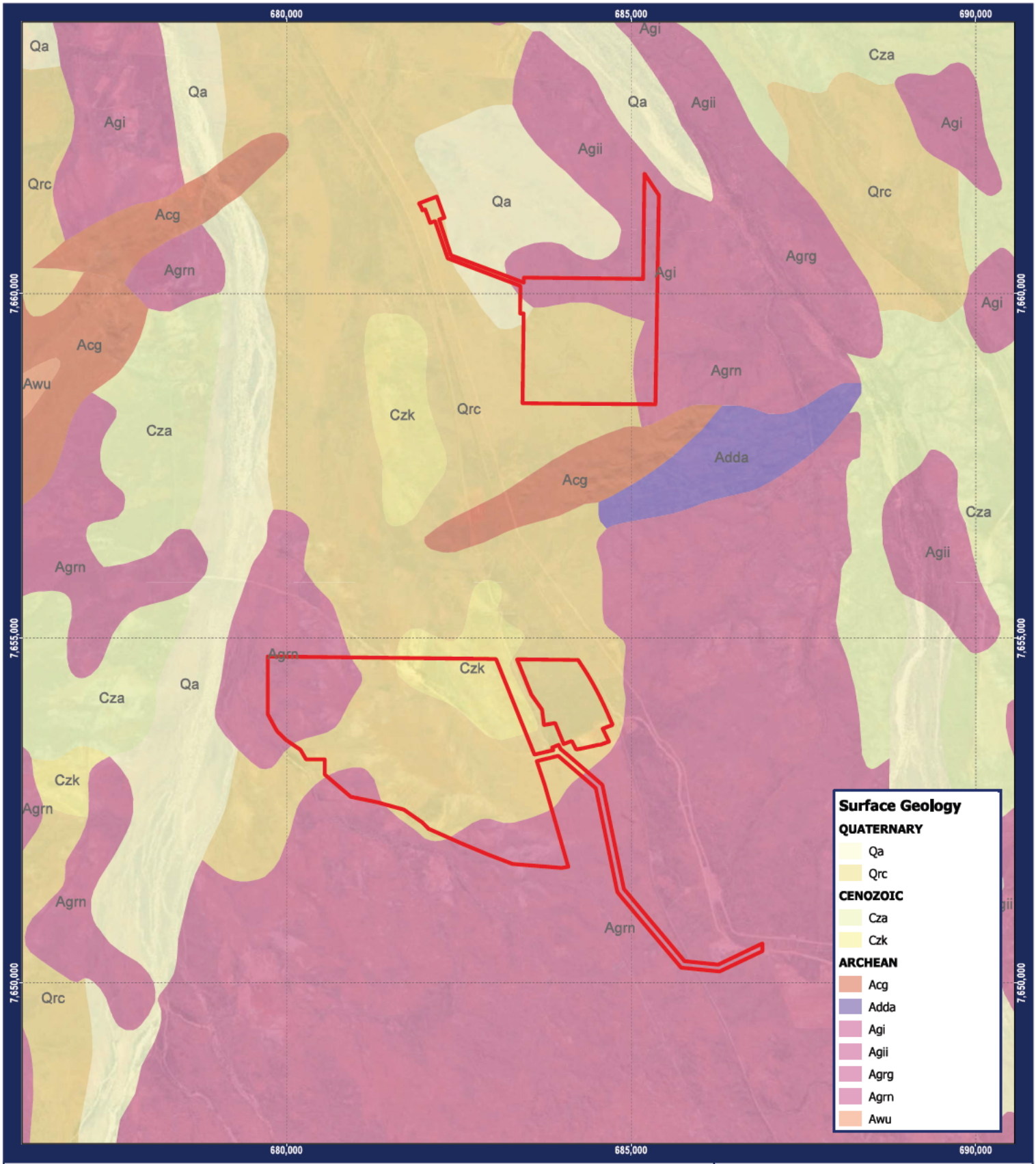

Legend

Development Envelope

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 2-4
Geological Units

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:75,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.008
Data Source(s):
Aerial, ESRI
Geology, GA
All other data, Fortescue, 2024

Date: 14/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

Fortescue.

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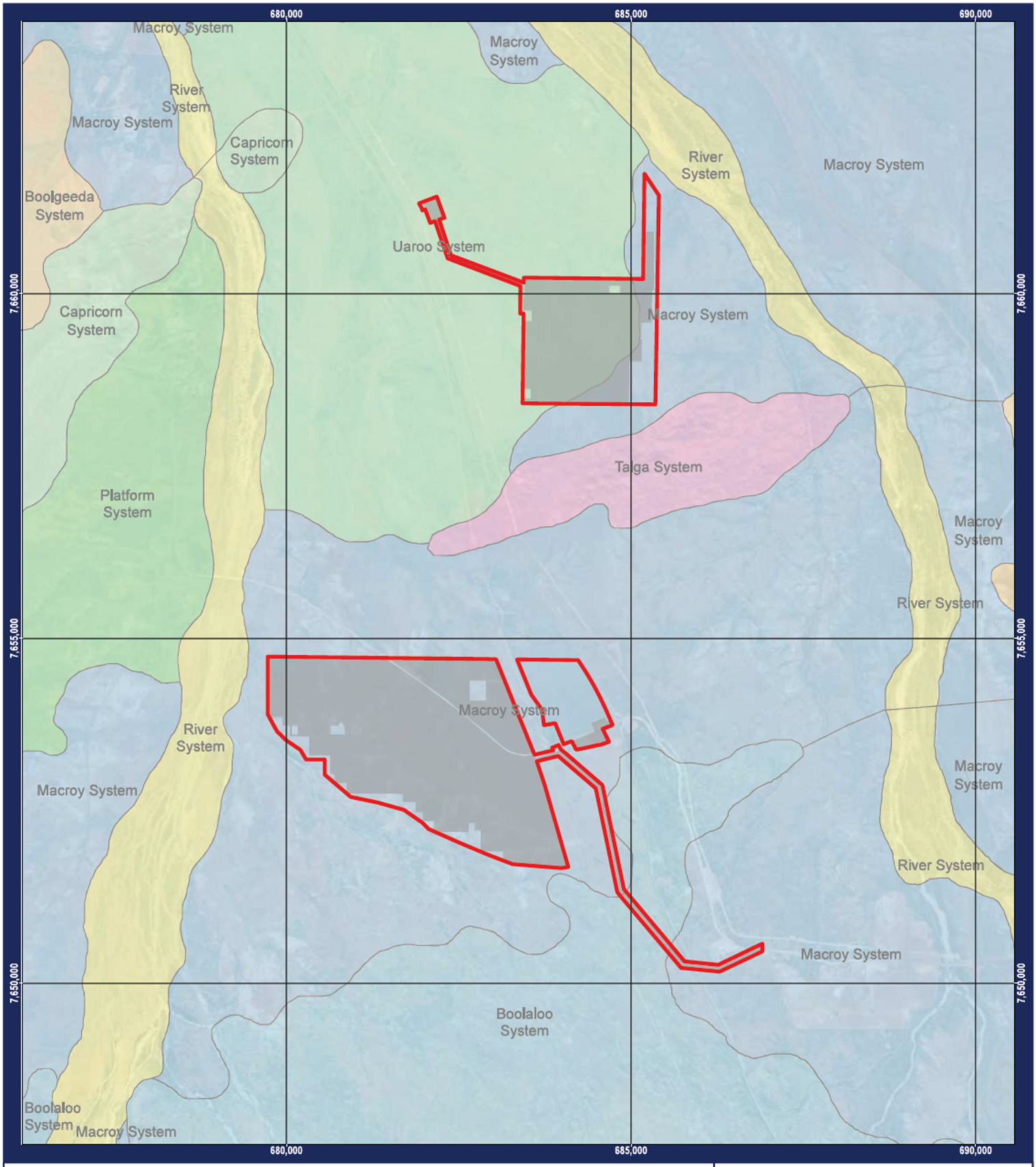

Legend

- Development Envelope
- Indicative Disturbance Footprint

WA Land Systems

- Boolaloo System
- Boolgeeda System
- Capricorn System
- Macroy System
- Platform System
- River System
- Robe System
- Talga System
- Uaroo System

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 2-5
Land Systems within the Development Envelope and Adjacent Areas

Requested By: R. Hughes
Drawn By: S. Bowyer — Date: 23/10/2024
Revised By: sarfuso — Size: A4P
Approved By: — Revision: 0
Scale: 1:75,000 — Confidentiality: 0
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.009_r0
Data Source(s):
Aerial, ESRI
Land Systems, DPIRD, 2024
All other data, Fortescue, 2024

Fortescue.

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2.3.1.4 Hydrology and Hydrogeology

The hydrology of the Pilbara region is characterised by its flat terrain, high rainfall infiltration and major rivers that flow mainly after heavy rains. Streamflows are seasonal and variable. The region, prone to droughts and floods, faces increasing water variability due to a drying trend (DoW, 2010).

The Proposal is located within two local catchments the Turner River West and Turner River (Figure 2-6). The Turner River West (major tributary) is situated 150 m west of the Proposal and Turner River (minor river) is located 500 m to the east. These tributaries flow north towards Port Hedland. Their confluence is located approximately 11 km to the north-west of the Proposal.

The southern DE is largely located within the Turner River West catchment, with a small part of the area within the Turner River catchment. Turner River West flows along the eastern boundary of tenement L45/692 with some minor drainage paths within the development footprint of the southern DE. To the east of Turner River West is the Turner River, on which the Pincunah streamflow gauge (709010) is installed (Fortescue, 2024).

The northern DE is located both within the Turner River West and Turner River catchments. Like the southern DE, some minor drainage paths flow within the development footprint of the area. The northern DE is also approximately 1.5 km downstream of the Pincunah streamflow gauge.

The Turner River West catchment is generally hydrologically analogous to Turner River catchment upstream of the Pincunah gauge. Both catchments flow in a northerly direction and are relatively flat with slopes of 2.1 and 1.6 m/km, respectively. Soils are similar with both catchments dominated by Monzogranite groups with some colluvial/alluvial deposits in watercourses, their adjacency results in largely identical climatic conditions, and their sizes are in the same order of magnitude.

The hydrogeology is dominated by exposed, low-permeability Archaean, Proterozoic, and Palaeozoic rocks, which where fractured, result in the development of minor aquifers that provide limited groundwater resources.

Groundwater recharge rates are low, occurring in fractured rock zones that are connected to drainage lines/creeks, where infiltration can occur.

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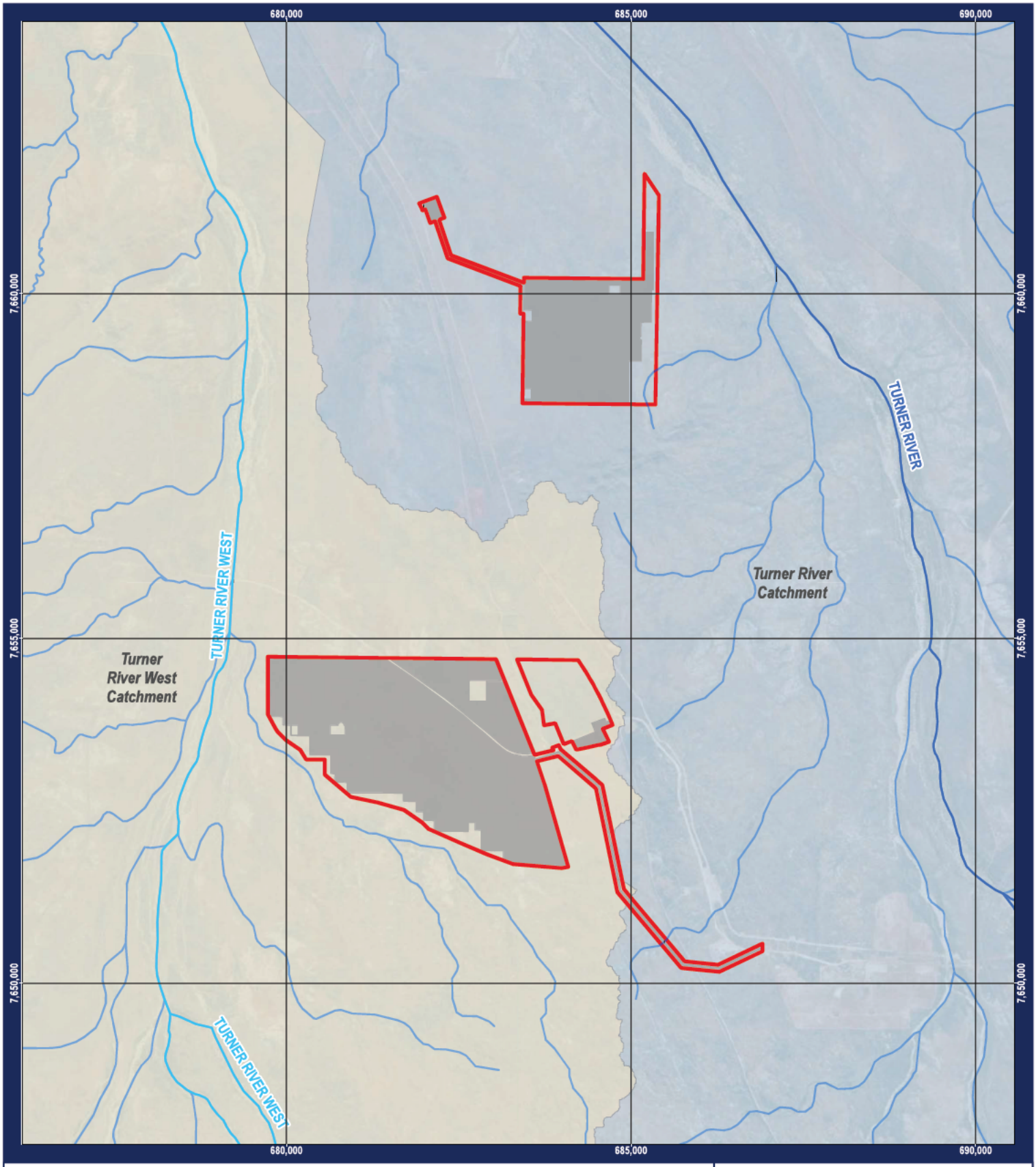

Legend

- Turner River
- Turner River West
- Minor Drainage
- Development Envelope
- Indicative Disturbance Footprint

Catchment

- Turner River West
- Turner River

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 2-6
Inland Water Features

Requested By: R. Hughes
Drawn By: S. Bowyer
Revised By: scostello
Approved By:
Scale: 1:75,000
Coordinate System: GDA2020 MGA Zone 50
Project Name: 4519OP002_MP_EN_0064_TRSH
Document Name: 4519OP002_MP_EN_0064.010
Data Source(s):
Aerial, ESRI
Catchments, DWER
IBRA, DBCA
All other data, Fortescue, 2024

Date: 25/02/2025
Size: A4P
Revision: 3
Confidentiality: 0

Fortescue.

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2.3.2 Biological Environment

2.3.2.1 Bioregions

There are 89 recognised Interim Biogeographic Regionalisation for Australia (IBRA) regions (DCCEEW, 2021).The Proposal is located within the Pilbara IBRA bioregion, and the Chichester (PIL01) subregion. The Chichester subregion (PIL1), described by Kendrick and Mckenzie (2001) as “undulating Archaean granite and basalt plains include significant areas of basaltic ranges”. The vegetation within this subregion consists of shrub steppe characterised by *Acacia inaequilatera* over *Triodia wiseana* (formerly known as *Triodia pungens*) hummock grasslands, with *Eucalyptus leucophloia* tree steppes on ranges. Land use within the area includes grazing, native pasture, conservation, urban and mining (Kendrick and McKenzie, 2001).

2.3.2.2 Pre-European Vegetation

Pre-European vegetation mapping based on Beard (1975; 1990) describes two vegetation associations (VA) within the DE. The DE is predominantly composed of VA 93 (99.99%) and VA 626 (<0.01%). The Pre-European Vegetation Associations within the DE and their current extent are discussed further in Chapter 7.

2.3.2.3 Threatened and Priority Ecological Communities

No vegetation types considered representative of any State or Commonwealth-listed Priority or Threatened Ecological Communities (PECs/TECs) were identified within the DE. The nearest known occurrence of a PEC or TEC is a Priority 1 PEC, approximately 20 km west-northwest of the northern DE.

2.3.2.4 Conservation Areas

The Proposal does not intersect any identified conservation reserves. The nearest conservation area is Mungaroona Range Nature Reserve, which is located 50 km south-west of the Proposal and is vested under the Conservation Commission of Western Australia.

The Proposal does not intersect with any nationally significant wetlands or RAMSAR Wetlands. The closest wetland of national significance is the Fortescue Marsh, located approximately 100 km south of the Proposal, in the Fortescue IBRA sub-region.

2.3.3 Social Context

2.3.3.1 Native Title

The *Native Title Act 1993* (NT Act) (Commonwealth) acknowledges the rights and interests of Aboriginal and Torres Strait Islander people in land and waters, as per their traditional laws and customs.

The Proposal is located within the Kariyarra native title determination area and is relevant to the Kariyarra People (WCD2018/015) (Figure 9-5). Fortescue is a current party to seven major Native Title agreements with Native Title groups in the Pilbara region, three of which are underpinned by registered Indigenous Land Use Agreements (ILUAs). This includes the Kariyarra (ILUA and Land Access Agreement (LAA), NTT Number WI2016/013), which intersects the DE.

2.3.4 Land Use

The Proposal is located approximately 120 km south of Port Hedland and about 25 km west of Fortescue's North Star Project in the Pilbara region of WA (Figure 1-1). The Proposal is located within the Town of Port Hedland in an area zoned as 'Rural' under the Port Hedland Local Planning Scheme 7. Port Hedland is a key regional centre in the Pilbara region, with several surrounding towns that contribute to its diverse community. In addition to Port Hedland itself, the main towns include South Hedland, Wedgefield and Cooke Point and Aboriginal communities including Kariyarra, Nyamal and Palyku.

Port Hedland is the second largest town in the Pilbara, and hosts the worlds largest bulk exporting port, with a record annual tonnage of over 566.5 million tonnes in 22/23. The Port of Port Hedland generated $64 billion in export value and 57% of resource exports nationally in 2021 (Town of Port Hedland, 2024).

The DE is located within the Kangan pastoral station (Lease N049839) which is managed under the *Land Administration Act 1997* (LA Act). Areas of the DE that overlap mining tenure are provided in Table 2-4.

The Proposal is located in a predominantly undisturbed area; however, evidence of existing disturbances includes weeds, cattle, some existing roads or cleared areas and railway tracks (360 Environmental, 2024). Parts of the Proposal area have been impacted by recent fires, with vegetation significantly impacted and fire scars evident.

Large sections of the Proposal area are included within amended purpose clearing permits issued to Roy Hill Infrastructure Pty Ltd and IB Operations Pty Ltd. One expired purpose permit held by Atlas Iron Limited also extends across part of the Proposal area. Historical exploration activity has also occurred within the Proposal area, including reconnaissance geological mapping and stream sediment surveys, however no mineral exploration has been recorded. The Fortescue tenements within the DE and their associated tenure status are listed in Table 2-4.

Table 2-4: Fortescue Tenements within the DE and their associated status

Tenement	Status	Tenement Holder
E 4506324	Pending	Pilbara Energy (Generation) Pty Ltd
E 4506325	Pending	FMG Pilbara Pty Ltd
AL 7000001	Live	The Pilbara Infrastructure Pty Ltd
L 4500293	Live	FMG Magnetite Pty Ltd
L 4500294	Live	FMG Magnetite Pty Ltd
L 4500317	Live	Pilbara Water and Power Pty Ltd
L 4500332	Live	Pilbara Gas Pipeline Pty Ltd
L 4500359	Live	FMG Magnetite Pty Ltd
L 4500360	Live	Pilbara Water and Power Pty Ltd
L 4500366	Live	FMG Magnetite Pty Ltd
L 4500462	Live	Pilbara Energy Company Pty Ltd
L 4500475	Live	Pilbara Energy Company Pty Ltd

Tenement	Status	Tenement Holder
L 4500515	Live	Pilbara Energy (Generation) Pty Ltd
L 4500625	Live	Pilbara Water and Power Pty Ltd
L 4500692	Live	Pilbara Energy (Generation) Pty Ltd
L 4500693	Live	Pilbara Energy (Generation) Pty Ltd
L 4500694	Live	Pilbara Energy (Generation) Pty Ltd
L 4500729	Pending	Pilbara Energy (Generation) Pty Ltd

3 LEGISLATIVE CONTEXT

3.1 Environmental Impact Assessment Process

3.1.1.1 *Environmental Protection Act 1986*

The *Environmental Protection Act 1986* (EP Act) is the key legislative tool for environmental protection in WA. The EP Act provides for the prevention, control and abatement of pollution and environmental harm; and for the conservation, preservation, protection, enhancement and management of the environment. The Proposal has been referred under Part IV of the EP Act (environmental impact assessment), which is administered by the Environmental Protection Authority (EPA) and the WA Minister of Environment.

This document has been prepared in accordance with the Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual 2020 (EPA, 2021d) and the Instruction: How to Prepare an Environmental Review Document (EPA, 2024a) to provide sufficient information for the EPA to assess this Proposed Amendment at Referral Stage.

This ERD is a supporting document describing the specific studies and investigations conducted by Fortescue in relation to the key environmental factors and has been prepared to a standard consistent with that of similar Environmental Reviews for mining developments in WA.

3.1.1.2 Environment Protection and Biodiversity Conservation Act 1999

If a Proposal is likely to have a significant impact on a Matter of National Environmental Significance (MNES) it requires approval from the Commonwealth under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The Proposal will be referred to the Commonwealth under the EPBC Act due to potential impact on MNES.

3.2 Other Approvals and Regulation

Beyond the Proposal's assessment under Part IV of the EP Act and EPBC Act, other assessments and authorisations may be necessary prior to the Proposal's implementation. These are summarised in Table 3-1 along with the corresponding decision-making authorities (DMA). It is worth noting that the EP Act (Section 44 (2AA)) permits the EPA and the Minister for the Environment to consider other statutory decision-making processes that could lessen environmental impacts and ensure the achievement of environmental factor objectives.

Table 3-1: Other Approvals and Regulations

Decision making authority	Legislation	Type of Approval	Proposed Activity	Can process mitigate impacts on environment?
Department of Water and Environmental Regulation	*Environmental Protection Act 1986 (Part V)*	Works Approvals and Operating Licences	Construction and operation of prescribed premises. Construction and operation of a concrete batching plant	Licensing process to prevent, control, abate, and mitigate pollution or environmental harm. Set limits on the emissions associated with the construction and operation of concrete batching plants.
	Rights in Water and Irrigation Act 1914 (RiWi Act)	Water for the Proposal will be obtained from the adjacent North Star operations. A water abstraction permit (s5C) or borehole construction permit (s26D) will not be required. A Bed and Banks Permit may be required if disturbance impacts the minor drainage lines.	Interference with or taking water from a watercourse.	Sets limits on the location and quantity of water abstraction to ensure impacts to groundwater levels and quality are minimised.
Department of Planning, Lands, and Heritage	*Aboriginal Heritage Act 1972 (WA)*	Ministerial Consent under s18	Disturbance of Registered Aboriginal sites	Sets conditions for disturbing within a Registered Aboriginal Site (wholly or partially).
Department of Biodiversity Conservation and Attractions	*Biodiversity Conservation Act 2016* and *Biodiversity Conservation Regulations 2018*	s40 Ministerial Authorisation	Clearing or disturbance of threatened species	Authorisation process for removal or disturbance of threatened species.
Department of Health DWER	*Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974* *Environmental Protection Act 1986*	Health approvals EP Act Part V Registration	Operation of wastewater treatment facilities at construction camps	Sets conditions with respect to the construction and operation of wastewater treatment facilities to maintain human health standards and minimise impacts to the environment.
Department of Energy, Mines, Industry Regulation and Safety	*Mining Act WA 1978* (Mining Act)	Mining Proposal and Closure Plan per the Mining Act for development on Mining Act tenure.	Project construction and operation on mining tenure	

4 STAKEHOLDER ENGAGEMENT

4.1 Key Stakeholders

A stakeholder identification process was undertaken by Fortescue to identify community and government stakeholders with an interest in the Proposal, or those that may be directly and/or indirectly affected. These key stakeholders have been and will continue to be engaged with throughout the assessment process and life of the solar farm (Table 4-1).

Table 4-1: Key Stakeholders

Stakeholder Category	Organisation	Primary Area of Interest
Government Agencies	Department of Water and Environment Regulation (DWER) – EPA Services, Licensing, Regional Services.	Understanding of impacts to Preliminary Key Environmental Factors Environmental impact assessment
	Department of Biodiversity, Conservation and Attractions (DBCA).	Environmental impact assessment
	Department of Mines, Industry Regulation and Safety (DMIRS).	Environmental impact assessment
	Department of Jobs, Tourism, Science and Innovation (JTSI).	Development of renewable energy asset
	Department of Climate Change, Energy, Environment and Water (DCCEEW).	Understanding of impacts to MNES Environmental impact assessment
	Department of Planning, Lands and Heritage (DPLH)	Appropriate land use (post mining)
	WA Treasury	Economic impacts of the Proposal
Indigenous Groups	Kariyarra Traditional Custodian, Knowledge Holders, and representatives. Kariyarra Aboriginal Corporation – native title body corporation representative of the Kariyarra Native Title Determination Area.	Understanding of impacts to Aboriginal cultural heritage as defined under Social Surroundings Factor and heritage places. Project development on Kariyarra country in accordance with LAA and ILUA.
Local Government	Town of Port Hedland	Project development Project economic benefits during constructions and operations phases
Land Holders	Kangan Pastoral Station	Pastoral lease holder - impacts to pastoral activity
Adjacent Tenement Holders	Roy Hill Holdings Pty Ltd	Project development and tenure
Community and Special Interest Groups	Association of Mining and Exploration Companies (WA)	Project development
	Chamber of Minerals and Energy (WA)	Project Development

Stakeholder Category	Organisation	Primary Area of Interest
	Beeliar Group	Potential impacts to environmental values, threatened species and communities. Environmental management.
	Conservation Council WA	Potential impacts to environmental values, threatened species and communities. Environmental management.
	Australian Conservation Fund	Potential impacts to environmental values and threatened species.
	Wildflower Society	Potential impacts to environmental values in particular listed plants and vegetation communities
	World Wildlife Fund (Australia)	Potential impacts to environmental values, in particular threatened species including the Bilby
	Greening Australia	Potential impacts to environmental values and threatened species.
	Kimberley Pilbara Cattlemen's Association	Potential impacts to pastoral activities and viability of pastoral stations. Land use.
	Pilbara Mesquite Management Committee	Potential environmental impacts such as weed introduction and spread.
	Rangelands NRM	Potential impacts and changes to land use. Potential environmental impacts such as weed introduction and spread, fire management, feral species, threatened species habitat.
	Save the Bilby Fund	Potential impacts to environmental values in particular Bilby Habitat.
	The Wilderness Society of WA Inc	Potential impacts to environmental values and threatened species.
	Birdlife WA	Potential impacts to environmental values in particular threatened birds including the Night Parrot and migratory birds that may utilise Fortescue Marsh.
	Australian Wildlife Conservancy	Potential impacts to environmental values and threatened species.
	Care for Hedland	Potential impacts to environmental values and threatened species.

4.3 Stakeholder Engagement Process

Fortescue commenced consultation for the proposal in early 2023 through a combination of face-to-face meetings, presentations and letters to key community stakeholders.

Consultation undertaken to date has provided Fortescue with the opportunity to discuss the Proposal with stakeholders and gain valuable feedback. This feedback was considered during the development of the Proposal.

In order to undertake effective consultation, a consultation program was developed specifically for this Proposal. The objectives of the consultation program included the following:

- To identify and engage key stakeholders
- To identify and verify areas of stakeholder feedback for social and environmental values
- To establish a robust consultation approach and demonstrate that appropriate consultation has been undertaken
- To assess stakeholder issues/concerns so that proposed impacts are minimised to 'as low as reasonably practicable'.
- Key consultation activities included the following:
    - Correspondence to potentially impacted parties providing information on the Proposal, requesting feedback and offering detailed briefings
    - Meetings with decision making authorities to discuss and obtain feedback on the Proposal
    - One-on-one briefings and feedback sessions with specific stakeholders.

4.4 Consultation Outcomes

Detailed consultation has been undertaken with key Federal, State and Local regulatory authorities in addition to consultation with Traditional Owner groups and key landholders. Consultation on the Proposal will continue throughout the environmental impact assessment and for the life of the Proposal. A summary of consultation undertaken to date is shown in Table 4-2.

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Table 4-2: Consultation Summary

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
Government Agencies and Regulators				
Department of Climate Change, Environment, Energy and Water (Cth) (DCCEEW)	6 June 2024	In person meeting: DCCEEW • Kylie Calhoun (Branch Head, Nature Positive Regulation Division) • Candice Cooke (Director, Nature Positive Regulation Division) Fortescue • Matthew Dowling – Manager Environment, Primary Approvals and Governance • Jarrod Pittson – General Manager Environment	Meeting to provide an update on the following projects: • East Pilbara Generation Hub • Bonney Downs Wind • Nullagine Pilot Wind • NSJ West Solar (now Turner River Solar Hub) • Mindy South and Nyidinghu • Western Hub	DCCEEW expressed support for the design principles for the proposed solar and wind projects.
Department of Biodiversity, Conservation and Attractions (DBCA)	25 Oct 2024	In person meeting DBCA: • Harley Taylor – A/Principle for North Team • Luke Porter – A/Senior in Pilbara Region • Michelle Corbellini • Todd Gibson	Meeting to provide an update on the following projects and preliminary EIA • East Pilbara Generation • Turner River Solar Hub • Mindy South	DBCA was supportive of the design principles the proposed for solar and wind projects.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
		• Murray Baker – Green Energy Officer • Cho Lamb – Enviro Officer for Pilbara Region Fortescue • Matt Dowling – Manager Environment, Primary Approvals • Sofie Springer – Senior Primary Approvals • Karen Fairweather – Senior Primary Approvals		
Department of Water and Environment Regulation – EPA Services (Green Energy Division) (**GED**)	23 April 2023	In person meeting: • Alicia Dudzinska – Manager Solar and Wind • Samara Rogers – Senior Environmental • Koby Anderson Senior Environmental Fortescue • Matthew Dowling – Manager Environment, Primary Approvals and Governance • Parveen Bauer – Manager Environmental Mining Approvals	Updates provided on decarbonisation project definition and timeframes and streamlining green energy approvals timeframes.	EPA / GED was generally supportive of the proposed projects and approvals pathway. Encouraged a pre-referral meeting to go through defined projects and potential impacts on preliminary environmental factors.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
		• Jacob Azzarello – Principal Environment		
	30 October 2023	In person meeting. DWER - • Shaun Meredith • Tracey Hassell • Tania Ashworth • Carrie Sunderland Fortescue - • Jarrod Pittson • Matt Dowling	Follow-up meeting from 12/10/23 to discuss possible environmental approval pathways.	GED requested further information regarding life cycle of green energy technologies and consideration of transport of infrastructure.
	16 January 2024	In person meeting: EPA / GED • Tania Ashworth – Manager Solar and Wind • Samara Rogers – Senior Environmental • Koby Anderson Senior Environmental Fortescue • Jarrod Pittson – Group Manager Environment and Governance	Overview of environmental studies and preliminary key environmental factors (flora and vegetation, terrestrial fauna and social surroundings), sensitive receptors identified, surveys outcomes discussed and ongoing work. Preferred environmental approvals pathways discussed.	EPA / GED was supportive of the proposed project and approvals pathway.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
		• Lazaro Roque-Albelo – Functional Lead Biodiversity & Science • Jacob Azzarello – Principal Environment • Rikki Hughes - Environmental Advisor		
	30 Oct 2024	In person meeting EPA/GED • Sam Rycken • Helen Lafuente • Tayla Hunter Fortescue • Matt Dowling – Manager – Primary Approvals • Jacob Azzarello – Principal Environment • Sofie Springer – Senior Environmental Advisor	Meeting held at EPA premises to provide an overview on the Proposal: • Proposal Content (scope), • Identified preliminary key environmental factors & other factors. • Key information describing receiving environment. • Approval and development timelines.	
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)	18 Nov 2024	POW Submission	Approval request to conduct early Geotechnical investigations of the Turner River Solar Hub proposed site	Approval Granted
Department Jobs, Tourism, Science and Innovation (JTSI)	12 October 2023	Meeting with JTSI, DWER and DMIRS JTSI	Presentation of key Decarbonisation Projects to the Green Energy Directorate (GED),	Supportive of Fortescue Decarbonisation projects however indicated that sufficient information

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
		• Lakshmi Jones - Project Support Officer Green Energy Major Projects • David Alexander DWER • Shaun Meredith - Executive Director Green Energy Directorate DMIRS • Dan Endacott - General Manager Mining Environment Fortescue • Matthew Dowling – Manager Environment, Primary Approvals and Governance • Jacob Azzarello – Principal Environment	Department of Energy, Mines, Industry and Safety (DEMIRS) and JTSI. Assessment pathways for the proposed decarbonisation projects were discussed outlining the preferred approach; key projects discussed included: Main goals for the decarb projects include: • Fortescue requires ~1 GW solar and ~1 GW of wind, planned to be built in tranches - 2023 - 2028 to achieve 2030 Business Decarbonisation target. • Support for efficient and accelerated approval pathways - interagency cooperation.	for projects will be required to facilitate streamlined approvals / assessments.
Local Government				
Town of Port Hedland	13 Sept 2024	In person and online meeting. ToPH • Chaz Robert - Manager Town Planning & Development • Lee Furness – Director Infrastructure Services	Fortescue presented information on the Proposal and the environmental approvals being sought under the EP Act (WA) and EPBC Act, including any environmental impacts and outcomes relevant to this Project and the ToPH.	No concern/issues were raised during this consultation regarding the environmental impacts of the Project and the ToPH was pleased with the presented information. No further actions resulted from this consultation.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
		• Shanna Crispin – Manager Public Affairs Fortescue • Laura Hawes - Superintendent Community • Juliana Newman - Senior Community Advisor • Katie Voss - Manager Community (via Teams) • Rikki Hughes - Environmental Advisor - Primary Approvals (via Teams) • Gregory Street - Power Development Lead (via Teams) • Adrian Mullan - Project Manager – Solar (via Teams)		
	18 Oct 2024	Pre-referral notification letter sent via email to Chaz Roberts – Manager Planning and Economic Development.	Notification of the environmental assessment process for the Proposal and update on Fortescue's plan to submit a referral under Part IV of the EP Act to the Western Australian EPA.	No response or outcome documented
Kariyarra				
Kariyarra Working Group	18 Oct 2022	Meeting	Introduction of Social Surroundings Factor and Fortescue's consultation process ahead	Kariyarra looking forward to undertaking social surrounds consultation.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
			of engagement with Kariyarra on upcoming solar developments.	
	10 Mar 2023	Meeting	Fortescue provided update on NSJ West project details and outlined upcoming heritage surveys and social surrounds consultation Fortescue will engage Kariyarra on.	No response captured
	1 Aug 2023	Meeting	Update on NSJ West project including outcomes of the first social surrounds consultation trip to the Working Group members.	Fortescue to provide KAC with a relevant proposal(s) regarding shared partnership, co-design, co-build. Fortescue to organise on country consult with Working Group for NSJ West.
Kariyarra Heritage Sub-Committee (HSC)	9 Mar 2023	Meeting	Introduction of NSJ West project to HSC and update on upcoming heritage and social surrounds consultation.	Kariyarra raised concerns about potential song lines that may be in proximity to the proposed project area. Fortescue reiterated the consultation process and heritage surveys will provide opportunity for these values to be identified.
	2 Aug 2023	Meeting	Updates on NSJ West project including outcomes of the first social surrounds consultation trip to the HSC members.	Kariyarra raised concerns about the project affecting Turner River. Fortescue reaffirmed that water studies had been undertaken to ensure Turner River values have been managed and not being impacted. Fortescue to provide Kariyarra with information surrounding construction and operation of NSJ West Solar Farm.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
	30 Nov 2023	Meeting	Update provided on NSJ West project and approvals pathway for the Part IV. Fortescue discussed opportunity for Kariyarra to review the Part IV approval documents and sought feedback on how best this process could work for KAC. Fortescue presented the amended boundary for HRZ-1367 to delineate the major tributaries associated with Turner River. At the request of Kariyarra, Fortescue also presented 100 m buffers on the tributaries and Turner River for the HSC to approve.	The HSC approved the revised boundary for HRZ-1367 and authorised Fortescue to supersede the previous version. The HSC also approved the 100 m buffers placed on the Turner River and two main tributaries. The HSC further requested that Fortescue ensure the NSJ West footprint avoided the buffers.
Kariyarra Representatives	17-21 Ju 2023	Social Surrounds Consult	Social Surrounds Trip 1 (2023_KAR_SSC_Trip1): On-country consultation with Kariyarra knowledge holders. Key objectives for the trip were to understand social surroundings values within and surrounding the NSJ West project area and identify key concerns Kariyarra may have regarding the implementation of the Proposal.	Kariyarra representatives provided in principle support for the proposed project however, requested further information regarding construction activities and recycling of the solar panels after operations. Concerns were also raised regarding potential impacts to Turner River and associated major tributaries. Kariyarra requested Fortescue confirm the main tributaries and place a 100 m buffer around these and the Turner River. Fortescue to present this buffer at an upcoming consult. Kariyarra were pleased that heritage places would be avoided by the project footprint. It was acknowledged the consultation process is ongoing and updates would be provided at upcoming trips.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
	17-13 Aug 2023	Field Survey	Traditional Ecological Knowledge (TEK) survey for the NSJ West project area (2023_KAR_TEK_Trip1). Purpose of this trip was to identify plants and animals of traditional use or value to Kariyarra, and document cultural associations with species or ecological systems of particular cultural significance.	The NSJ West TEK Survey identified 50 flora species of traditional use with 17 of these species being culturally significant. Turner River and its associated tributaries were identified as culturally significant features in the landscape to be protected. The Northern Quoll and Bilby were also identified as culturally significant species. While these species are not hunted by Kariyarra today, they have cultural significance and are important indictors of healthy country.
	15-19 Apr 2024	Field Survey	TEK survey for the Wodgina project area (2024_KAR_TEK_Trip2). Purpose of this trip was to identify plants and animals of traditional use or value to Kariyarra, and document cultural associations with species or ecological systems of particular cultural significance.	The outcomes of the Wodgina TEK Trip is pending the draft report. Preliminary advice confirmed several plants in the project area have traditional use and reiterated the importance of waterways to be protected.
	6-8 Mar 2024	Social Surrounds Consult	Social Surrounds Trip 2 (2024_KAR_SSC_Trip1) was proposed to continue consultation on the NSJ West project. Unfortunately, this trip was cancelled due to bad weather. As KAC had engaged a consultant to advise Kariyarra on the social surrounds consult, Fortescue requested to meet with the consultant since the trip was unable to go ahead.	KAC approved Fortescue to meet with consultant and provide an update on the social surrounds consultation and proposed project. Fortescue to propose new dates for the trip to be rescheduled.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
KAC Consultant	7 Mar 2024	Meeting	Update on social surrounds consultation with Kariyarra on the NSJ West project to date and ran through the presentation that would have been presented to Kariyarra had Social Surrounds Trip 2 not been cancelled. Fortescue sought input on proposed locations for inclusion in the dust, noise, and visual impact assessments to be undertaken.	KAC Consultant provided inputs on the locations for inclusion in the dust, noise, and visual impact assessments, and requested further information on potential sediment controls to be presented at the next social surrounds consultation.
KAC CEO (acting) KAC Heritage & Environment Manager	18 Mar 2024	Email	Fortescue requested meeting with acting CEO and Heritage & Environment Manager to discuss inclusion of new solar farm area (Wodgina) into the NSJ West Part IV approval.	KAC advised to contact interim acting CEO while acting CEO is on leave.
KAC CEO (interim acting) KAC Heritage & Environment Manager	21 Mar 2024	Email	Further requested meeting with interim acting CEO and Heritage & Environment Manager to discuss inclusion of new solar farm area (Wodgina) into the NSJ West Part IV approval.	Several dates were proposed however, a meeting was not undertaken.
	26 Mar 2024	Email	As meeting with KAC interim CEO was unable to be organised, Fortescue provided an email outlining the new solar area (Wodgina) to be included in the NSJ West Part IV approval. The email provided details of the project and how engagement with Kariyarra would be included in the social surrounds consultation for NSJ West.	KAC interim acting CEO responded on 27 Mar 2024. No objection was provided on the inclusion of Wodgina in the NSJ West approval. A request was made for Fortescue to provide information on any economic benefits for Kariyarra.
Kariyarra Aboriginal Corporation (KAC)	8 May 2024	Email	Fortescue received request from KAC Heritage & Environment Manager to reschedule Social Surrounds Trip 3	Fortescue worked with KAC to reschedule the trip for 8-11 July.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
			(2024_KAR_SSC_Trip2 proposed for 13-16 May) due to consultant availability. Purpose of this trip was to continue consultation on the NSJ West project and introduce the Wodgina area that will be included in the Part IV approval.	
	4 July 2024	Email	Fortescue received email from KAC cancelling Social Surrounds Trip 3 (2024_KAR_SSC_Trip2 rescheduled for 11-14 June).	Fortescue sought clarity from KAC to understand why the trip had been cancelled and if there was opportunity to reschedule.
	1 Aug 2024	Email	Fortescue received email from KAC ceasing all social surrounds consultation and heritage surveys until otherwise advised by the KAC Board.	Fortescue continues to engage with KAC Board to resolve any issues.
	11 Nov 2024	Email	Presentation of project updates and outcomes of studies planned to be presented on Social Surrounds Trip 3, provided to KAC for review and feedback, including a copy of this Social Surrounds Summary Report. Fortescue offered KAC opportunity to review the Referral and Environmental Review Document (ERD).	Awaiting feedback from KAC on documentation provided, and confirmation on offer to review the Referral and ERD approval documents.
Surrounding Land Owners				
Kangan Pastoral Station	2023 – 2024	Numerous email notifications over 2023 and 2024	Email notifications sent for various environmental and Heritage surveys.	Notification only, response not required.

Stakeholder	Date	Engagement Type & List of Participants	Topics Raised / Discussed	Response / Outcome
	18 Oct 2024	Pre-referral notification letter sent via email to Chaz Roberts – Manager Planning and Economic Development.	Notification of the environmental assessment process for the Proposal and update on Fortescue's plan to submit a referral under Part IV of the EP Act to the Western Australian EPA.	No response or outcome documented

5 OBJECT AND PRINCPLES OF THE EP ACT

The EP Act has five core principles of environmental protection, which align with the principles of Ecologically Sustainable Development outlined in section 3A of the EPBC Act (Cth). Table 5-1 describes how each of the five principles of the EP Act have been applied to the Proposal.

Table 5-1: Principles of Environmental Protection

Principle	Consideration of Principle
1. The precautionary principle Where there are threats of serious irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by: • Careful evaluation to avoid, where practicable, serious or irreversible damage to the environment; and • An assessment of the risk-weighted consequences of various options.	A comprehensive desktop survey and field studies were undertaken within the DE to assess the impact of the Proposal. Studies included: • Flora and Vegetation • Terrestrial fauna, including subterranean fauna • Heritage and Traditional Ecological Knowledge (TEK) surveys • Noise and Vibration assessment • Visual impact assessment • Dust assessment • Soil and landform assessment. These scientific studies were used to identify the potential impacts of each Key Environmental Factor. Once identified, avoidance and mitigation measures were proposed to ensure these impacts are environmentally acceptable. The conceptual layout has been designed to avoid sensitive cultural heritage and environmental receptors identified through baseline surveys and to utilise existing infrastructure nearby (refer to Sections 2.3.2, 7 to 10).
2. The principle of intergenerational equity The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.	The Proposal is for a renewable energy development that has the potential to significantly reduce the reliance on fossil fuel power for Fortescue's critical mineral operations, reducing greenhouse gas emissions and resulting in associated beneficial climate change impacts. The Proposal will allow Fortescue to reduce Scope 1 and Scope 2 emissions from its operations by replacing diesel and gas-fired stationery power generation with renewable sources. The Proposal will also make a sustained contribution to Western Australia's economy through provision of jobs and long-term clean energy. The Proposal will ensure the health, diversity and productivity of the environment is maintained by retaining as much habitat as possible and by minimising environmental impacts where practicable.
3. The principle of the conservation of biological diversity and ecological integrity Conservation of biological diversity and ecological integration should be a fundamental consideration.	The Proposal meets the principle of conservation of biological diversity and ecological integrity by reducing the clearing of native vegetation within the DE, where practicable.

Principle	Consideration of Principle
	The conservation of biological diversity and ecological integrity is a fundamental consideration in the assessment of this Proposal. Design principles of the Proposal included: • Avoid disturbance to high quality and critical fauna habitat where possible. • Avoidance of mapped areas of conservation significant flora where possible. • Infrastructure layout optimised to avoid clearing of locally significant vegetation • Avoidance of creeks and drainage lines. • Use of existing access tracks and disturbance where practicable. Additionally, as discussed above, the Proposal will reduce greenhouse gas emissions, contributing to the protection of biodiversity from the impacts of global warming.
4. Principles relating to improved valuation, pricing, and incentive mechanisms • Environmental factors should be included in the valuation of assets and services. • The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. • The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste. • Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which benefit and/or minimise costs to develop their own solutions and responses to environmental problems.	Fortescue acknowledges the need for improved valuation, pricing and incentive mechanisms and has aimed to pursue these principles when appropriate. For example: • Environmental factors were considered to determine the location of the IDF, including avoidance of high value areas (as discussed further in Sections 7 to 10). • By its nature, the Proposal will not generate intractable or large volume waste streams, with hydrocarbon and putrescible wastes management during construction and operations being the key considerations, which can be readily contained and managed through standard practices. • The cost of eventual decommissioning and rehabilitation has been incorporated into the financial modelling for the Proposal.
5. The principle of waste minimisation All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.	Waste management will be addressed during construction and operation activities to avoid and reduce waste, reuse and recycle where practicable, and treat and/or dispose in accordance with regulated requirements. Fortescue consider that an industry for the recycling of solar panels and their materials will develop as large-scale solar farms being to generate used panels. The decommissioning plan at the end of operations will identify the appropriate recycling and re-use of solar panels.

6 ENVIRONMENTAL FACTORS

6.1 Identification of Environmental Factors

The EPA uses environmental principles, factors and associated objectives as the foundation for assessing a proposal. Fortescue has considered the Proposal activities and environmental landscape to identify possible Key Environmental Factors and Other Environmental Factors relevant to the Proposal (EPA, 2023a).

An assessment of each of these environmental factors as they apply to the Proposal is presented in Table 6-1.

Table 6-1: Preliminary Assessment of Environmental Factors

Theme	Factor	Objective	Relevance to the Proposal	Preliminary Key Environmental Factor
Sea	Benthic Communities and Habitats	To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained.	No credible pathway – The Proposal is not located in or close to the marine environment.	No
	Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.		
	Marine Environmental Quality	To maintain the quality of water, sediment and biota so that environmental values are protected.		
	Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.		
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	Credible pathway – The Proposal will involve the clearing of up to 1,108.2 ha of native vegetation.	Yes – Chapter 7
	Landforms	To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.	No credible pathway – No impacts to significant landforms from the Proposal.	No
	Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	No credible pathway – The Proposal will utilise water from existing and approved water infrastructure. Construction is not anticipated to intercept groundwater.	No
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	No credible pathway – Low potential of disturbing Acid Sulfate Soils, land erosion and contamination of soil. Through preliminary assessment and analysis significant impacts are not considered likely and this factor has been covered in Chapter 10 (Other Factors).	No
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	Credible pathway – The Proposal will involve the clearing of up to 1,108.2 ha of fauna habitat.	Yes – Chapter 8

Theme	Factor	Objective	Relevance to the Proposal	Preliminary Key Environmental Factor
Water	Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	No credible pathway – The Proposal will utilise water from existing and approved water infrastructure. Through preliminary assessment and analysis significant impacts are not considered likely and this factor has been covered in Chapter 10 (Other Factors).	No
Air	Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	No credible pathway – The Proposal is located in a remote location with limited sensitive receptors nearby. It is not anticipated to effect local or regional air quality and will decarbonise existing energy supply once operational.	No
	Greenhouse Gas (GHG) Emissions	To minimise the risk of environmental harm associated with climate change by reducing greenhouse gas emissions as far as practicable.	No credible pathway - Construction or operational activities not anticipated to exceed the threshold of 100,000 tonnes CO2-e per year for scope 1 or 2 emission. Scope 3 emissions will occur through the supply of raw materials during all stages in the life cycle. However, there is no assessment threshold for this. Additionally, Scope 1,2, and 3 emissions will be reduced where possible in line with Fortescue's Real Zero by 2030 target.	No
People	Social Surroundings	To protect social surroundings from significant harm.	Credible pathway – No known Aboriginal or historical heritage sites will be impacted by the Proposal. The Proposal will result in increased noise and dust emissions predominantly during construction.	Yes – Chapter 9
	Human Health	To protect human health from significant harm.	No credible pathway – The Proposal is located in a remote location and appropriate mitigation controls will be in place for site operatives.	No

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7 FLORA AND VEGETATION

7.1 EPA Objective

The WA EPA objective for the flora and vegetation environmental factor is '*To protect flora and vegetation so that biological diversity and ecological integrity are maintained*' (EPA, 2023a).

The WA EPA defines flora as 'native vascular plants', and vegetation as *'groupings of different flora patterned across the landscape that occur in response to environmental conditions'* (EPA, 2016a).

7.2 Policy and Guidance

The following EPA policies and guidelines have been considered during the preparation of this ERD and the supporting technical studies:

- Environmental Guidance for Planning and Development. Guidance Statement No. 33. Government of Western Australia (EPA, 2008b).
- Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a)
- Environmental Factor Guideline – Flora and Vegetation (EPA, 2016b)
- Statement of Environmental Principles, Factors and Objectives and Aims of EIA (EPA, 2023a)
- Instructions – How to Prepare an Environmental Review Document (EPA, 2024a).

The Environmental Factor Guideline has been considered during the identification of Flora and Vegetation values within the DE, and the issues identified in the guideline have been considered in relation to potential impacts from the Proposal.

Flora and Vegetation surveys for the Proposal have been planned and executed in accordance with the EPA's technical guidance for this factor. Any survey limitations relative to the technical guidance are noted in the Flora and Vegetation survey report (360 Environmental, 2024; SLR, 2023a).

To minimise the likelihood of the proposal significantly impacting on the environment, Fortescue has specifically considered guidance documents in the following way:

- Undertaken and commissioned adequate surveys in accordance with guidance across the entire DE, to ensure that there is sufficient knowledge of flora and vegetation and their associated ecological values within impacted areas.
- Identification of activities which may lead to impacts to flora and vegetation.
- Embedding the Project Design Principles outlined in Section 2.1.1.1. These Principles align with the mitigation hierarchy.

7.3 Studies and Surveys

7.3.1 Baseline Surveys

A range of flora and vegetation surveys have been completed within the DE and surrounding area to determine the baseline environment and inform the design of the Proposal. Details of these surveys are presented in Table 7-1.

The surveys were completed in accordance with and meet the requirements of EPA (2016a) technical guidance in relation to flora and vegetation. The combined survey effort is therefore considered adequate to assess the flora and vegetation values and provide information required to support EIA and approvals applications for the Proposal.

Fortescue notes a recent fire affecting approximately 80% of the southern DE prior to the 2023 survey (SLR , 2023). Mapping reliability in this burnt area was considered moderate-high; the dominant Acacia spp. was less evident amongst the many juveniles sprouting post-fire, but the availability of pre-fire high resolution aerial imagery provided some confidence in mapping vegetation types. The survey effort is described in Table 7-1 and the areas surveyed are shown in Figure 7-1.

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Table 7-1: Flora and Vegetation Studies and Surveys

Survey/ Study /	Description	Survey Timing	Consistency with Guidance
North Star Junction: Flora and Vegetation Assessment (360 Environmental, 2024)	Desktop assessment Two-phase field survey of an area of approximately 4,757 ha, comprising nine polygons as shown in Figure 7-1 Polygon L45-615 covers the northern extent of the DE. The survey recorded the floristic composition and vegetation types from 92 flora sites (36 quadrats, 56 relevés) of 50 m x 50 m (or equivalent area), 674 mapping notes, and opportunistic observations.	Phase 1: 1 -7 April 2022 Phase 2: 20 – 29 June 2022	The biological surveys were undertaken in accordance with: • *Technical Guidance - Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016a). • *Significant impact guidelines 1.1: Matters of National Environmental Significance* (DoE, 2013). The surveys were considered complete for a detailed flora and vegetation survey, all vegetation types were surveyed and delineated within the Project Area and a minimum of three quadrats was surveyed for each vegetation type where possible. Three of the 23 vegetation types were sampled with fewer than three sites, due to restricted distribution of the vegetation and landforms. This is not considered a limitation.
Detailed Flora and Vegetation Assessment: North Star Junction West (SLR , 2023)	Desktop assessment Two-phase field survey of an area of approximately 4,533 ha as shown in Figure 7-1. The survey recorded the floristic composition and vegetation types from 39 flora sites (26 quadrats, 13 relevés) of 50 m x 50 m (or equivalent area), 290 mapping notes, and opportunistic observations.	Phase 1: 29 March – 4 April 2023 Phase 2: 18 – 24 August 2023	
Detailed Flora and Vegetation Assessment – Turner River Consolidated (SLR , 2025) *[Appendix A]*	Desktop assessment Two-phase field survey of an area approximately 1,767 ha as shown in Figure 7-1.	Phase 1: 22 – 28 April 2024 Phase 2: 5 – 10 August 2024	

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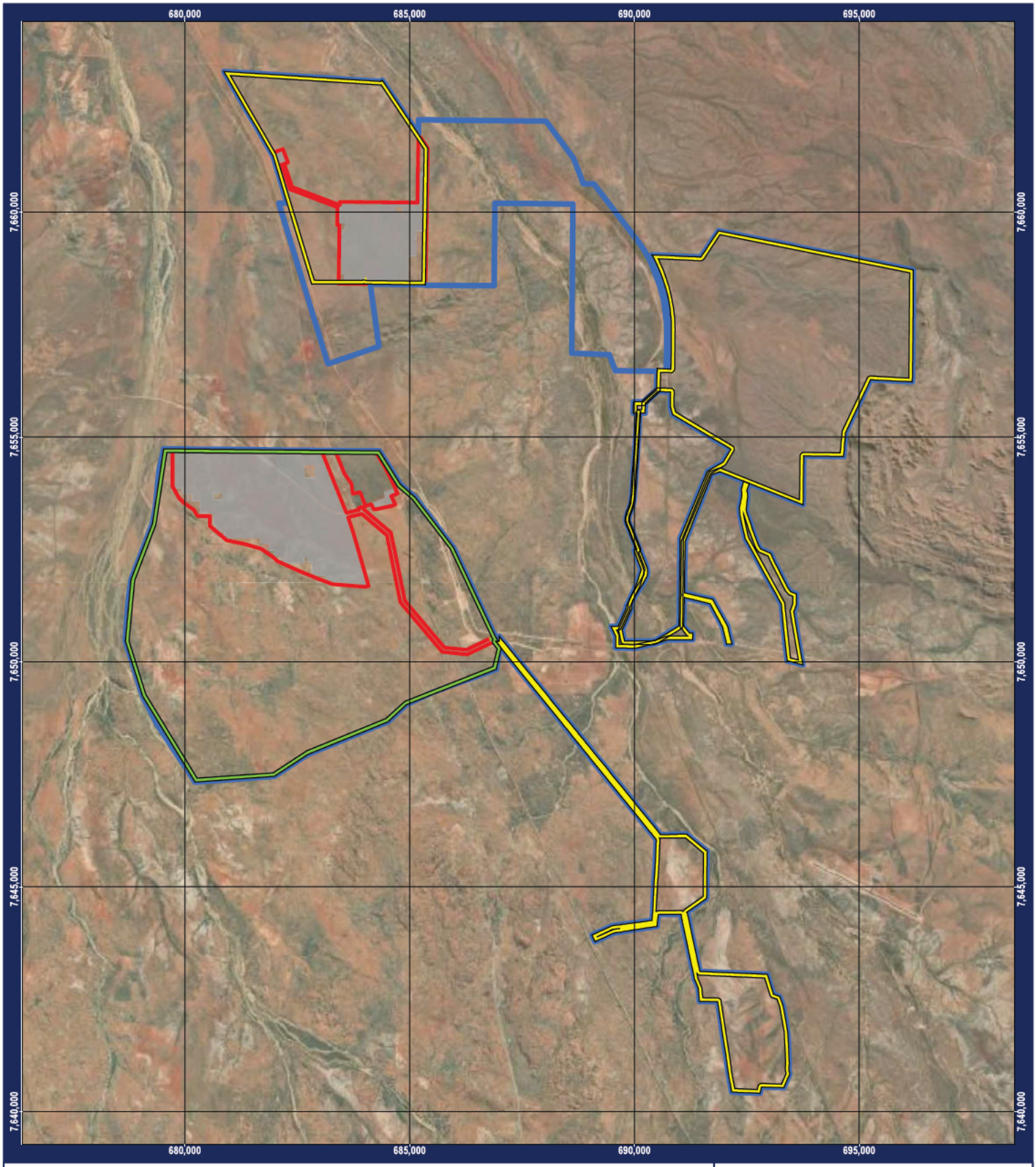

Legend

- 360 Environmental Study Area
- Spectrum Environmental Study Area
- Turner River Consolidated Flora and Vegetation Assessment
- Development Envelope
- Indicative Disturbance Footprint

N

0 1 2 3 4
Kilometres

Figure 7-1
Flora and Vegetation Survey 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_r1
Document Name: 4519OP002_MP_EN_0064.012

Date: 25/02/2025
Size: A4P
Revision: 3
Confidentiality: 0

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

Fortescue.

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7.4 Receiving Environment

7.4.1 Regional Vegetation

The Proposal is located within the Chichester subregion (PIL1), which is described as being dominated by scrub steppe on Archaean granite and basalt plains and ranges. *Acacia inaequilatera* is the most typical shrub, growing over *Triodia wiseana*, a hummock grass, with *Eucalyptus leucophloia* tree steppes on ranges (George, et al , 2011).

7.4.2 Pre-European Vegetation

Pre-European vegetation mapping based on Beard (1975; 1990) describes two vegetation associations within the DE which form part of the Abydos Plain – Chichester system as described below:

- **'Abydos Plain – Chichester 93'** (VA: 93.4): comprises most of the DE (1,416.5 ha, or 99.99%). This vegetation association is predominantly limited to the Pilbara IBRA region and the Chichester (PIL01) subregion and is estimated to have 99.86% of its pe-European extent remaining (DBCA, 2019).

- **'Abydos Plain – Chichester 626'** (VA: 626.1): intersected by the southeast corner of the northern DE area and comprises just 0.13 ha (<0.01%) of the DE. This vegetation association is restricted to the Chichester (PIL01) subregion and has an estimated 99.55% of its pre-European extent remaining (DBCA, 2019).

These vegetation associations and their remaining extent are described in Table 7-2 and shown in Figure 7-2. The actual extents remaining are likely out of date to some extent, given that in 2018 the DBCA ceased to update the Statewide Vegetation Statistics (DBCA, 2019), therefore any impacts post-2018 are not accounted for. However, given the scale of the mapping any divergence would be negligible.

The EPA (2008) considers that ecological communities should be maintained above a threshold level of 30% of their original (pre-clearing / pre-European) extent. Below this threshold, species loss appears to accelerate exponentially. This is a minimum threshold, and a higher percentage should be retained as necessary to protect rare and geographically confined communities or to maintain important ecosystem services, such as the hydrological function of deep-rooted vegetation. As shown in Table 7-2, each of the vegetation associations intersecting the DE have over 99% of their original extent remaining within WA, the Pilbara bioregion, Chichester subregion, and local government area.

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Table 7-2: Pre-European Vegetation Associations within the DE

Vegetation Associations		Context	Pre-European extent (ha)	Extent Remaining (ha)[1]	Extent Remaining (%)	Current Extent in DBCA Managed Lands (%)	Area in DE (ha)	Proportion of DE (%)
93.4	Shrub-steppe: Hummock grassland with scattered shrubs or mallee *Triodia* spp. *Acacia* spp., *Grevillea* spp. *Eucalyptus* spp.	Western Australia	2,481,889.08	2,478,504.06	99.86	1.49	1,416.5	99.99
		Pilbara IBRA Region	2,480,781.79	2,477,408.16	99.86	1.49		
		Chichester IBRA Sub-Region	2,476,377.59	2,473,007.05	99.86	1.49		
626.1	Sparse shrub-steppe: Hummock grassland with sparse shrubs *Triodia* spp., *Acacia* spp.	Western Australia	117,724.44	117,198.13	99.55	15.59	0.13	<0.01
		Pilbara IBRA Region	117,724.44	117,198.13	99.55	15.59		
		Chichester IBRA Sub-Region	117,724.44	117,198.13	99.55	15.59		
						Total	**1,416.63**	**100%**

(Source: Dataset - DPIRD, 2019; Statistics - Government of Western Australia, 2019)

[1] Source: Government of Western Australia. (2019). 2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (Full Report). Current as of March 2019. WA Department of Biodiversity, Conservation and Attractions, Perth, https://catalogue.data.wa.gov.au/dataset/dbca-statewide-vegetation-statistics.

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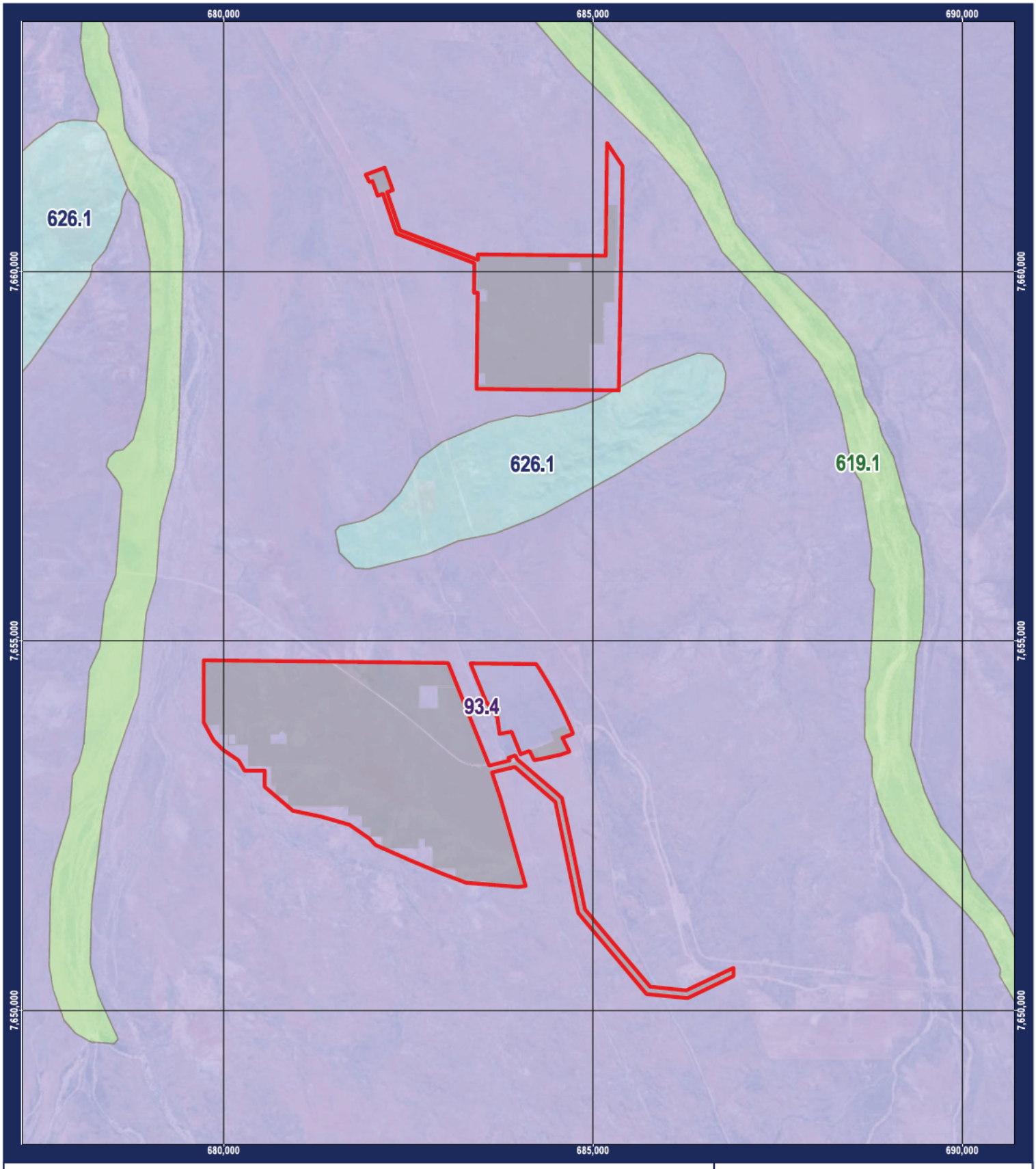

Legend

- Development Envelope
- Indicative Disturbance Footprint

Pre European Vegetation

System Association

- 93.4
- 619.1
- 626.1

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-2
Pre-European Vegetation

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_0064.013
Data Source(s):
Aerial, ESRI
Vegetation, DPIRD-006
All other data, Fortescue, 2024

Date: 17/01/2025
Size: A4P
Revision: 2
Confidentiality: 0

Fortescue.

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7.4.3 Vegetation Units

Field surveys have mapped 23 vegetation types across five broad landforms within the survey area. However, only eleven of these vegetation types intersect with the DE as described in Table 7-3 and shown in Figure 7-3 (SLR , 2025).

The accuracy of the vegetation mapping is considered high for the northern DE and moderate-high, to high for the southern DE, from a recent fire in January 2022 which affected approximately 80% of the southern DE. Vegetation in burnt areas exhibited minimal recovery, with dominant species of *Acacia* and *Triodia* resprouting and not as readily identifiable; however, mapping confidence was supported by pre-fire high resolution aerial imagery.

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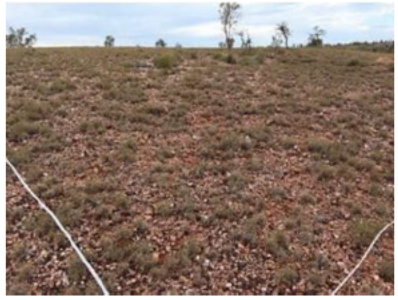
Table 7-3: Vegetation Units Recorded within the Development Envelope

Local Landform	Vegetation Unit and Description	Environmental Values (refer to Section 7.4.7 for Significance)	Photograph (SLR , 2025)	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)
Drainage						
Broad open drainage plain between low hills.	**ChAspTe:** *Corymbia hamersleyana* low isolated trees over mixed *Acacia* spp. mid to tall shrubland over **Cenchrus ciliaris* (*Chrysopogon fallax*) low isolated tussock grassland over *Triodia epactia* low open hummock grassland. **Vegetation condition:** Degraded to Excellent	Locally significant due to occasional populations of *Neptunia longipila* (P2) on ecotonal clay boundaries. Dominant species not restricted.		177.83 (1.61%)	1.31 (0.09%)	1.14 (0.1%)
Minor Drainage	**ChAspTrc:** *Corymbia hamersleyana* low isolated trees over *Acacia eriopoda*, *A. trachycarpa*, and *A. colei* var. *colei* tall open shrubland over *Tephrosia rosea* var. *clementii*, *Triumfetta ramosa*, and *A. stellaticeps* mid to low open shrubland over *Themeda triandra* (**Cenchrus ciliaris*) low tussock grassland over *Triodia epactia* low open hummock grassland **Vegetation condition:** Very Good	None noted.		309.88 (2.80%)	0.22 (0.02%)	0.05 (<0.01%)

Local Landform	Vegetation Unit and Description	Environmental Values (refer to Section 7.4.7 for Significance)	Photograph (SLR , 2025)	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)
Plains						
Plains	**AanTl:** *Acacia ancistrocarpa* (*A. orthocarpa, A. tumida* var. *pilbarensis*) mid to tall shrubland over *Triodia lanigera* (*T. epactia*) low open hummock grassland **Vegetation condition:** Excellent	None noted.		163.32 (1.48%)	144.15 (10.18 %)	104.76 (9.45%)
Plains (Low rise)	**AiAbTw:** *Acacia inaequilatera* tall, isolated shrubs over *A. acradenia* and *A. bivenosa* mid open shrubland over *Triodia wiseana* low open hummock grassland **Vegetation condition:** Very Good to Excellent	None noted.		323 (2.92%)	13.27 (0.94%)	11.01 (0.99%)
Plains	**AoTe:** *Acacia orthocarpa (A. ancistrocarpa)* mid to tall open shrubland over *Triodia epactia* and *T. lanigera* low open hummock grassland. **Vegetation condition:** Very Good to Excellent	Records of *Euploca mutica* (P3) predominantly in recently burnt areas, one record of *Goodenia obscurata* (P3), and *Trianthema* aff. *Oxycalyptrum.*		4,146.79 (37.5%)	653.43 (46.13 %)	475.93 (42.94%)

Local Landform	Vegetation Unit and Description	Environmental Values (refer to Section 7.4.7 for Significance)	Photograph (SLR , 2025)	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)
Plains	**AsTla:** *Acacia stellaticeps* and *Pluchea ferdinandi-muelleri* low open shrubland over *Triodia lanigera* (*T. epactia*) low hummock grassland **Vegetation condition:** Very Good to Excellent	None noted.		350.74 (3.17%)	37.88 (2.67%)	15.85 (1.43%)
Undulating plains/low hills	**ChAaTc:** *Corymbia hamersleyana* low isolated trees over *Acacia acradenia*, *Petalostylis labicheoides*, and *Grevillea wickhamii* (*A. inaequilatera*) tall sparse shrubland over *Triodia chichesterensis* and *Triodia wiseana* low hummock grassland **Vegetation condition:** Very Good to Excellent	Supports very large numbers of *Triodia chichesterensis* (P3) (dominant spinifex). Other records of conservation significant flora: *Euphorbia clementii* (P3).		877.22 (7.93%)	165.54 (11.69 %)	155.15 (13.99)
Plains	**ChAaTs:** *Corymbia hamersleyana* low isolated trees over *Acacia acradenia* tall, isolated shrubs over *Triodia schinzii* low hummock grassland **Vegetation condition:** Very Good to Excellent	Locally restricted. However, dominated by species that are not restricted.		70.81 (0.64%)	56.77 (4.01%)	55 (4.96%)

Local Landform	Vegetation Unit and Description	Environmental Values (refer to Section 7.4.7 for Significance)	Photograph (SLR , 2025)	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)
Plains	**ChAspTla:** *Corymbia hamersleyana* low isolated trees over *Acacia inaequilatera* (*Grevillea wickhamii* subsp. *hispidula*) tall isolated shrubs over a mosaic of *Acacia ancistrocarpa*, *A. acradenia*, and *Petalostylis labicheoides* mid open shrubland over *Triodia lanigera* and *Triodia epactia* (*T. longiceps*, *T. wiseana*) low hummock grassland **Vegetation condition:** Very Good to Excellent	None noted.		1,526.82 (13.81%)	260.52 (18.39 %)	234.21 (21.13%)
Plains with minor sheet flow	**PfTlo**: *Pluchea ferdinandi-muelleri* (*Acacia stellaticeps*) low open shrubland over *Triodia longiceps* (*T. epactia*) low open hummock grassland. **Vegetation condition:** Very Good to Excellent	Records of *Rothia indica* subsp. *Australis* (P3).		359.77 (3.25%)	43.83 (3.09%)	35.11 (3.17%)

Local Landform	Vegetation Unit and Description	Environmental Values (refer to Section 7.4.7 for Significance)	Photograph (SLR , 2025)	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)
Outcroppings						
Minor granite outcroppings	**AeTe:** *Acacia eriopoda* and *A. tumida* var. *pilbarensis* tall sparse shrubland over *Triodia epactia and T. lanigera* low open hummock grassland. **Vegetation condition:** Excellent	Records of *Trianthema* aff. *Oxycalyptrum.*		129.43 (1.17%)	9.16 (0.65%)	1.81 (0.16%)
Other						
-	Cleared Vegetation condition: Completely degraded	Existing rail, roads, and infrastructure.	-	230.03 (2.08%)	30.49 (2.15%)	18.22 (1.64%)
			Total	8,665.53	**1,416.6**	**1,108.2**

Table notes:

* Brackets indicate species that may or may not be present, but were observed as dominant at some of the sites that make up the vegetation type

\# potentially novel taxon (refer to Section 7.4.8.2).

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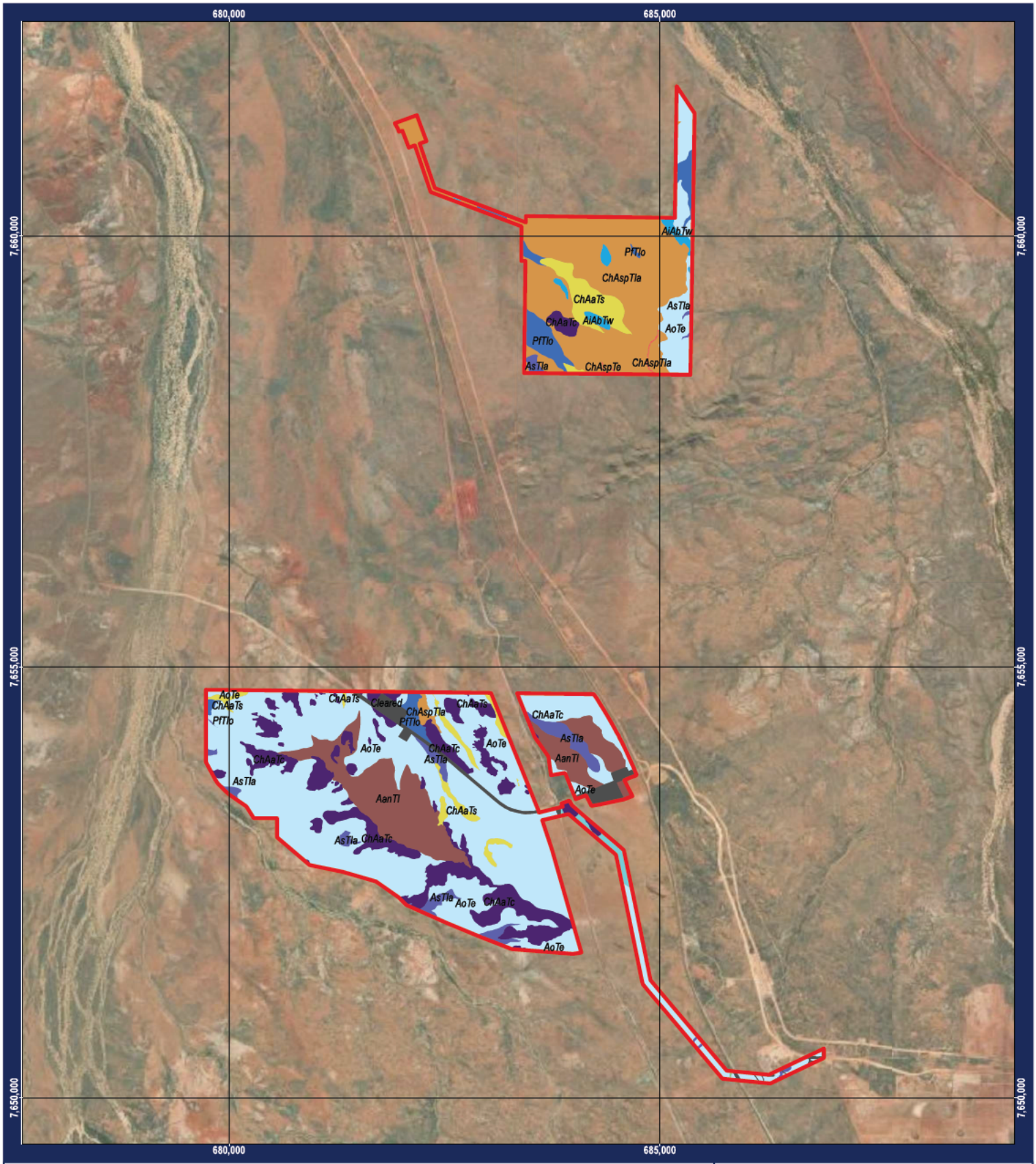

Legend

- Development Envelope

Vegetation Units

- AanTl
- AeTe
- AlAbTw
- AoTe
- AsTla
- ChAaTc
- ChAaTs
- ChAspTe
- ChAspTla
- ChAspTrc
- PfTlo
- Cleared

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-3
Vegetation Units 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_r1
Document Name: 4519OP002_MP_EN_0064.014

Date: 25/02/2025
Size: A4P
Revision: 4
Confidentiality: 0

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

Fortescue.

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7.4.4 Vegetation Condition

Vegetation condition of the DE ranges from excellent to completely degraded (cleared) as indicated in Table 7-4 and shown in Figure 7-4, with 98% of the DE and 97% of the IDF in Very Good or Excellent condition. Evidence of disturbance included existing clearing (recent and historical), weeds, and introduced fauna scats and tracks (notably cattle). Areas of burnt vegetation were mapped as 'excellent' unless associated with other signs of disturbance, such as weed regrowth. As weed presence may not have been evident in burnt areas, Fortescue considers that it is reasonable to assume that vegetation within burnt areas would be in similar condition to adjacent vegetation.

Table 7-4: Vegetation Condition within the DE

Vegetation Condition (VC)	Description (Eremaean Botanical Province)[1]	Extent within DE (ha)	Extent within IDF (ha)
Excellent	Pristine or nearly so, no obvious signs of damage caused by human activities since European settlement.	1,354.2	1,061.7
Very Good	Some relatively slight signs of damage caused by human activities since European settlement. For example, some signs of damage to tree trunks caused by repeated fire, the presence of some relatively non-aggressive weeds, or occasional vehicle tracks.	31.9	28.4
Completely Degraded	Areas that are completely or almost completely without native species in the structure of their vegetation, i.e. areas that are cleared or 'parkland cleared' with their flora comprising weed or crop species with isolated native trees or shrubs.	30.4	18.2

Table note:

1 Vegetation condition assessed in accordance with the vegetation condition scale presented in the EPA's (2016) *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment*. This scale is an adaptation combining the scales outlined in Keighery (1994) for the South West and Interzone Botanical Province, the scales outlined in Trudgen (1988) for the Eremaean and Northern Botanical Province. The Proposal is located within the Eremaean Botanical Province.

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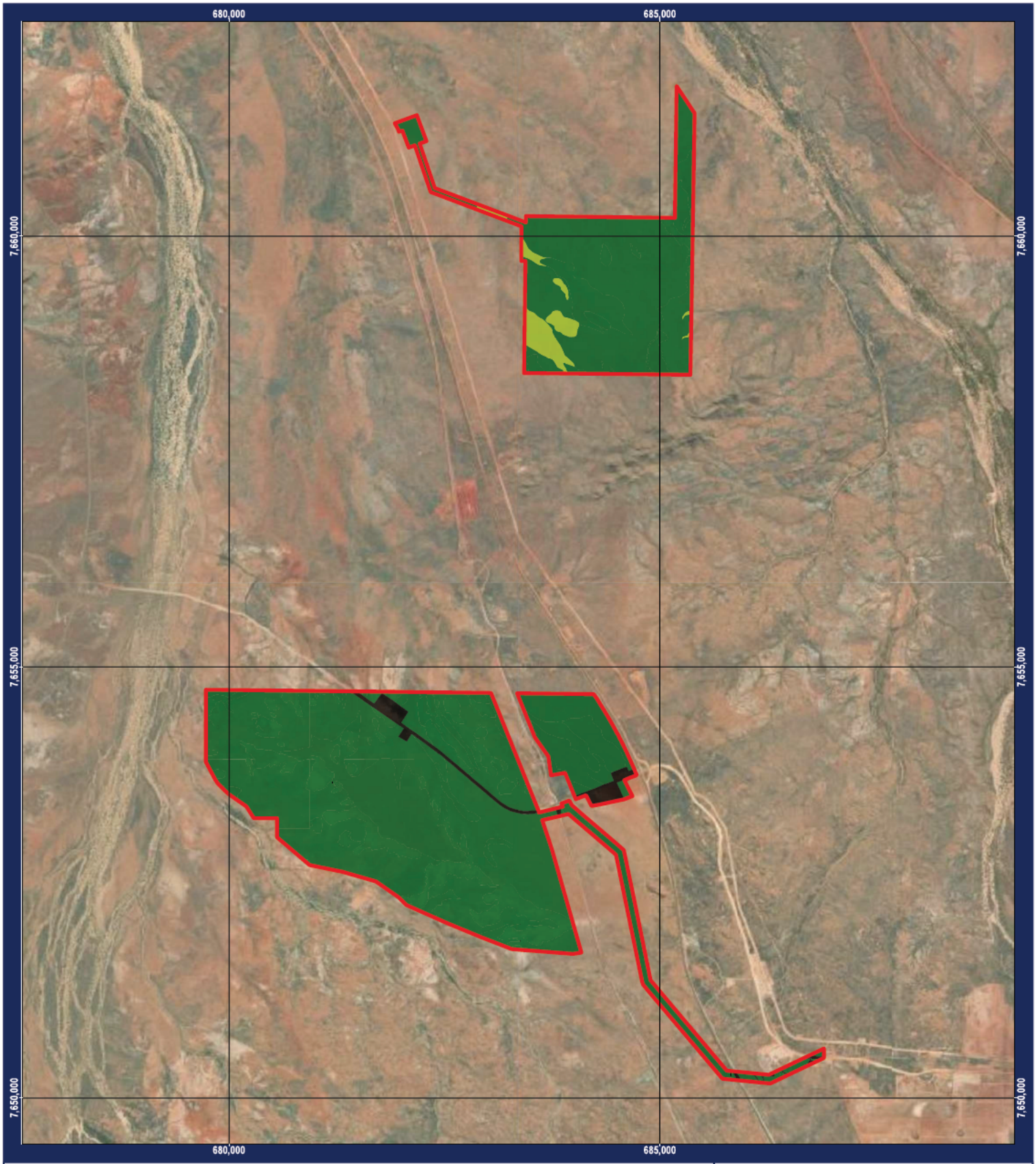

Legend

Development Envelope

Vegetation Condition

- Excellent
- Very Good
- Completely Degraded

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-4
Vegetation Condition 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_r1
Document Name: 4519OP002_MP_EN_0064.015

Date: 25/02/2025
Size: A4P
Revision: 3
Confidentiality: 0

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

Fortescue.

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7.4.5 Threatened and Priority Ecological Communities

An ecological community is a naturally occurring assemblage of organisms, including plants and animals, that occurs in a particular habitat. Ecological communities considered to be at risk of destruction may be declared to be a Threatened Ecological Community under the BC Act or EPBC Act. Ecological communities which are rare but not currently threatened, or which lack sufficient information, may be placed on the WA Priority list as a Priority Ecological Community.

No vegetation types considered representative of any State or Commonwealth-listed Threatened Ecological Communities or Priority Ecological Communities were identified within the DE (SLR , 2025). The nearest known occurrence is a Priority 1 PEC, approximately 20 km west-northwest of the northern DE.

7.4.6 Groundwater Dependent Ecosystems

Most vegetation in the survey areas was comprised of xerophytic species (no interaction with groundwater). Four vegetation units (EcAtTe, EcMgTlo, MaAcpCi, and EvAtTlo) within the survey areas were considered to be GDE or potential GDEs based on the presence of obligate (groundwater dependent) or facultative (infrequent or partial use of groundwater) phreatophyte taxa (SLR , 2025).

No potential groundwater dependent ecosystems (GDEs) are located within the DE as the DE has been designed to avoid any direct disturbance to GDE or potential GDE communities.

7.4.7 Conservation Significance of Vegetation

The conservation significance of vegetation was assessed using the description of the vegetation. Of the 23 vegetation units mapped within the survey areas, 11 recorded environmental values such as significant flora records (priority flora, potentially novel taxa, range extensions), restricted extents / landforms, supported potential GDEs and/or high species diversity, or provided refuge habitat. The vegetation units were assessed by SLR (2025) as significant vegetation for meeting one or more of the following criteria:

- Dominant taxa include taxa that are considered uncommon or restricted.
- Restricted extent (<1% of survey area) and does not appear to be represented outside the survey area (based on opportunistic observations, aerial imagery and other studies).
- Vegetation type is otherwise significant (potential GDE, refuge, restricted landform, high diversity).

Three of these vegetation communities (ChAaTc, ChAaTs, ChAspTe) occur within the DE. These vegetation communities are discussed further below.

ChAaTc

This community was mapped over 877.2 ha. SLR, (2023) reported that this community supported large numbers of *Triodia chichesterensis* (P3) as the dominant spinifex hummock grass. SLR also noted that *T. chichesterensis* was recorded extensively throughout the survey

area. The EPA Flora and Vegetation guidance (2016a) notes that vegetation may have significance where it acts as a refuge for species of conservation significance.

ChAaTs

Vegetation community ChAaTs was mapped over 70.8 ha and was considered locally significant due to restricted distribution within the survey area however was not dominated by any species that are considered uncommon or restricted. This vegetation unit was considered to be well represented outside of the survey area (SLR , 2025).

ChAspTe

This vegetation community was considered by SLR (2025) to be locally significant due to occasional populations of *Neptunia longipila* (P2) on ecotonal clay boundaries. Fortescue notes that this was not considered the main habitat for the flora species, and *N. longipila* was primarily found in vegetation unit AsyAISf which occurs outside of the DE.

7.4.8 Flora

Field surveys recorded a relatively high diversity of flora taxa which were considered typical for the area and aligned with the results of the desktop assessments. The survey areas were not particularly diverse in landform, primarily comprising rolling plains, but differing geology within the plains contributed to the floristic diversity. Rainfall was not considered to be a limiting factor. Approximately 98% of the recorded vascular taxa (293 taxa by SLR (2023) and 377 taxa by 360 Environmental (2024)) were native.

Recent fires (January 2022) were considered to have had a significant positive impact on flora diversity, including the recording of additional taxa locations, but limited the reliability of vegetation mapping in recently burnt areas. The northern DE was unburnt, but approximately 80% of the southern DE was burnt. In burnt areas there was minimal discernible stratum dominant taxa remaining; some of the dominant species were regenerating but it was sometimes unclear which vegetation type(s) best represented the plains or granite outcrop landforms. Many herbs and annual taxa were observed to be responding well post fire and may not have been typically present within more established vegetation, such as the opportunist taxa of *Euphorbia clementii* (Priority 3 (P3)), *Euploca mutica* (P3), *Heliotropium crispatum,* and *Calandrinia* spp. (SLR , 2025).

7.4.8.1 Flora of Conservation Significance

A likelihood of occurrence assessment was conducted for conservation significant flora taxa identified by the desktop searches as potentially occurring with the survey area. Likelihood was informed by the field surveys and assessed using the criteria in Table 7-5. The likelihood of occurrence assessment identified 12 priority taxa that were recorded within the survey areas and a further five priority taxa as having a high or medium likelihood of occurrence within the survey areas (Table 7-6).

No flora listed as Threatened under the BC Act or EPBC Act were identified within the survey areas or considered to have a medium or high likelihood of occurrence within the survey areas.

Of the 12 Priority flora recorded from the survey areas, only three, *Euploca mutica* (P3) *Goodenia obscurata* (P3) and *Triodia chichesterensis* (P3), were identified within the DE as shown in Figure 7-6. These three species and those that have a high likelihood of occurrence are presented in Table 7-7.

Table 7-5: Likelihood of Occurrence Criteria

Likelihood	Criteria
Recorded	Taxon has been recorded from the survey area (per database record or field observation).
High (Likely to occur)	There are existing records of the taxon within 20 km of the survey area 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.
Medium (May occur)	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.

Likelihood	Criteria
	Suitable habitat is present in the survey area, but the taxon is recorded infrequently in the locality.
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 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.

Table 7-6: Likelihood of Occurrence Assessment

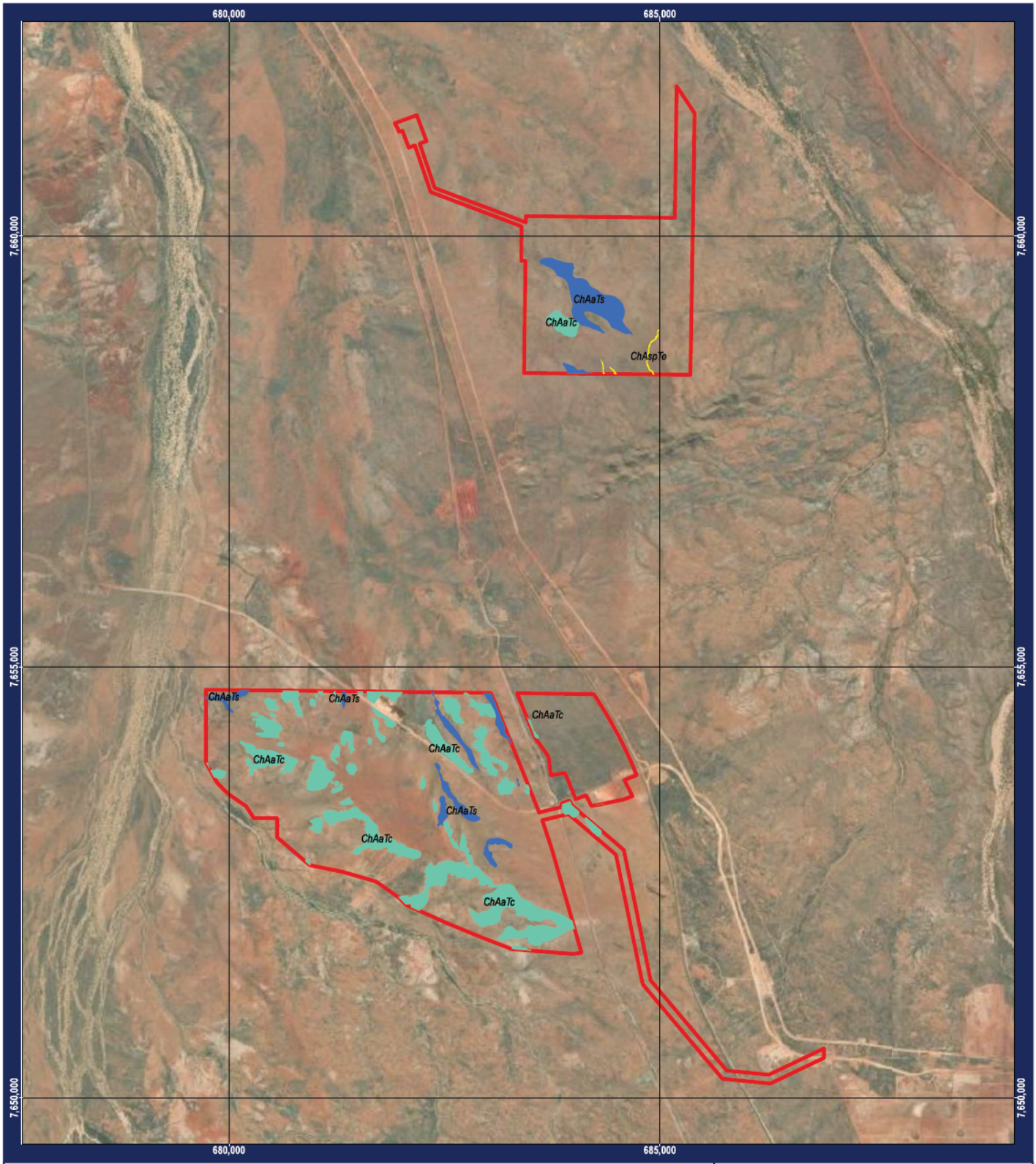
Taxon	Conservation Status		Database			Preferred Habitat	Likelihood of Occurrence
	DBCA	EPBC Act	Fortescue	TPFL	WAHerb		
Quoya zonalis	T	EN	✓	✓	✓	Rocky ironstone or granite or conglomerate steep hill slopes	Low
Acacia leeuweniana	P1	-		✓	✓	Gritty, skeletal red-grey sandy loam, light orange-brown gravelly sand, granite. In rock fissures in outcrops, among boulders.	Low
Corchorus sp. Yarrie (J. Bull & D. Roberts CAL 01.05)	P1	-	-	-	✓	Granite boulders and outcroppings	Low
Josephinia sp. Woodstock (A.A. Mitchell PRP 989)	P1	-	-	-	✓	Red-brown clay loam. Plains, crabhole plains, granitic landscapes.	Low
Themeda sp. Panorama (J. Nelson et al. NS 102)	P1	-	✓	-	✓	Steep rocky slopes	Low
Euphorbia inappendiculata var. *inappendiculata*	P2	-		-	✓	Cracking clays and drainage	Low
Neptunia Longipila	**P2**	-	*	*	*	**Cracking clay or semi-clay soils and gravelly loam on flat or gently sloping terrain.**	**Recorded**
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P3	-	✓	-	✓	Sandy plains. Often grows on disturbance like roadsides.	Medium
Acacia levata	P3	-	-	✓	✓	Sand or sandy loam over granite. Hillslopes.	Medium
Dolichocarpa sp. Hamersley Station (A.A. Mitchell PRP 1479)	P3	-	-	-	✓	Cracking clay pans	Low
Euphorbia clementii	**P3**	-	✓	✓	✓	**Gravelly hillsides, stony grounds. Post burn ephemeral.**	**Recorded**
Euploca mutica	**P3**	-	✓	-	✓	**Flat sandplains**	**Recorded**
Goodenia obscurata	**P3**	-	-	-	-	**Plains**	**Recorded**

Taxon	Conservation Status		Database			Preferred Habitat	Likelihood of Occurrence
	DBCA	EPBC Act	Fortescue	TPFL	WAHerb		
Gomphrena leptophylla#	P3	-	✓	-	✓	Sand, sandy to clayey loam, granite, quartzite. Open flats, sandy creek beds, edges salt pans and marshes, stony hillsides.	Low# (taxonomic uncertainty)
Gymnanthera cunninghamii	**P3**	**-**	✓	✓	✓	**Sandy soils.**	**Recorded**
Heliotropium murinum	P3	-	-	-	✓	Red sand. Plains	Low
Nicotiana umbratica	**P3**	**-**	✓	-	✓	**Shallow soils. Rocky outcrops.**	**Recorded**
Phyllanthus hebecarpus	**P3**	**-**	✓	-	✓	**Granite boulders, granite outcrop, rock land, slopes.**	**Recorded**
Rothia indica* subsp. *Australis	**P3**	**-**	✓	-	✓	**Sandy soils. Sandhills and sandy flats.**	**Recorded**
Stylidium weeliwolli	P3	-	✓	-	✓	Gritty sand soil, sandy clay. Edge of watercourses.	Medium
Terminalia supranitifolia	P3	-	✓	-	✓	Sand. Among basalt rocks. Hill tops.	Low
Triodia basitricha	**P3**	**-**	✓	-	✓	**Stony ground, gravelly hill, crests, hills, in gorges.**	**Recorded**
Triodia chichesterensis	**P3**	**-**	✓	-	✓	**Flat plains, light sandy soil, hill slopes, stony soil.**	**Recorded**
Vigna triodiophila	P3	-	-	-	✓	Stony red-brown clay loam. Among boulders, steep slopes.	Low
Bulbostylis burbidgeae	**P4**	**-**	✓	✓	✓	**Granitic soils. Granite outcrops, cliff bases.**	**Recorded**
Ptilotus mollis	**P4**	**-**	✓	-	✓	**Stony hills and screes.**	**Recorded**

Table notes:

* Not returned by database searches as the taxon was recently revised, splitting *Neptunia longipila* from the common species of *N. dimorphana*.

\# Database record locations were visited during the Proposal surveys, and the species recorded at these locations were confirmed by WA Herbarium taxonomist Mike Hislop as *Gomphrena sordida*. There may be confusion in the literature, or some taxonomic uncertainty, between the species. As such, *G. leptophylla* has conservatively been given a high likelihood of occurrence, with the caveat of potential taxonomic confusion.



Legend

- Development Envelope

Conservation Signifcant Vegetation Communities

- ChAaTc
- ChAaTs
- ChAspTe

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-5 - Conservation Significant Vegetation Communities 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_r1
Document Name: 4519OP002_MP_EN_0064.060

Date: 25/02/2025
Size: A4P
Revision: 1
Confidentiality: 0

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

Fortescue.

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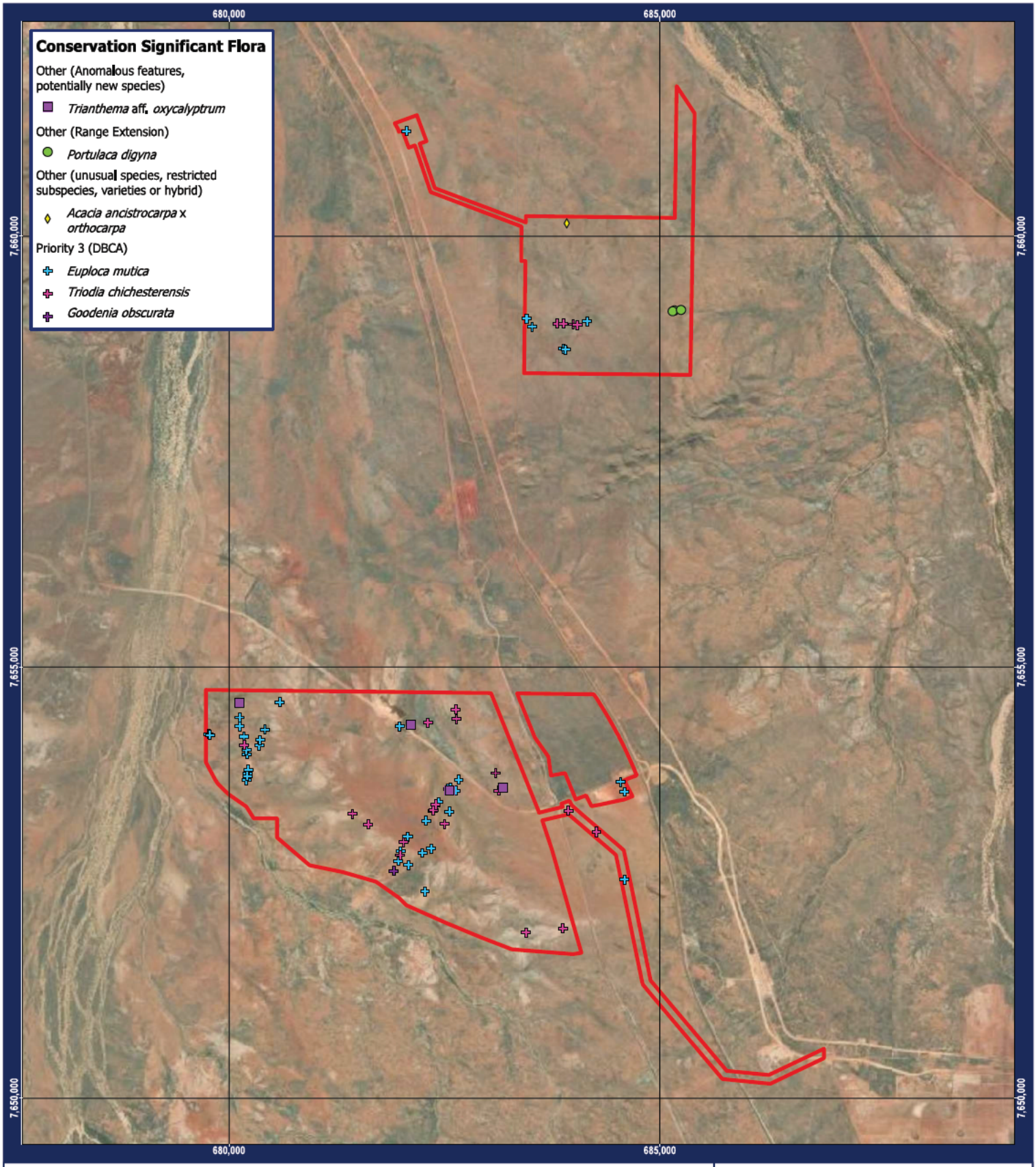

Legend

Development Envelope

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-6

Conservation Significant Flora 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_r2
Document Name: 4519OP002_MP_EN_0064.017

Date: 28/02/2025
Size: A4P
Revision: 3
Confidentiality: 0

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

Fortescue.

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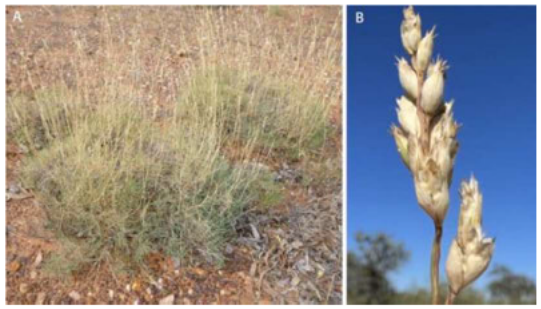
Table 7-7: Conservation Significant Taxa (Known to occur, or, high likelihood of occurrence within the Development Envelope)

Taxon	Description	Distribution (Pilbara Region)	Presence in Surveyed Areas	Presence in DE
Euploca mutica (P3) (previously known as *Heliotropium muticum*)	 Image source SLR (2023) Relatively small, slender shrub, with spindly stems and small green-brown leaves. Flowering occurs during in August.	 Known from the Chichester and Roebourne subregions of the Pilbara.	695 individuals were recorded Occurred sparsely and in low numbers across open plains. The taxon is considered a fire opportunist, and SLR noted that more individuals appeared to grow in recently burnt plains. Individuals were inconspicuous (cryptic) among the spinifex and could only be spotted when in close proximity; as such, it is likely that many more individuals occur across the survey areas. Recorded individuals were observed to be in poor condition, with notably browning on most plants, senescing in the late season. SLR noted that the taxon predominantly occurred within vegetation type AoTe which had recently been burnt, however the taxon was not limited to specific vegetation types; it was also recorded within AanTl, AeTe, AsTla, AtpTe, ChAaTc, ChAaTs, ChAspTe, ChAspTla, ChAspTrc and PfTlo. And one individual was recorded from EcAtTe.	**Recorded within the northern and southern sections of the DE.** Considered likely to occur sparsely across plain landforms.

Taxon	Description	Distribution (Pilbara Region)	Presence in Surveyed Areas	Presence in DE
Triodia chichesterensis (P3)	 Image source SLR (2023) Hard hummock grass up to 0.35 m tall. Commonly grows on brown clay-loam soils, typically with ironstone pebbles and surface quartzite present. It is typically found growing in association with *T. wiseana* and *T. lanigera*.	 Known from the Chichester subregion. The WA Herbarium has 42 records of the species, mostly inland of Port Hedland.	Approximately 121,416 individuals were recorded. SLR and 360 Environmental each noted that the recorded numbers are only a fraction off the taxon's true extent through the survey areas, as it was widespread and common where it occurred. 360 Environmental recorded an additional 37,480 individuals from 13 locations outside of the survey areas. Taxon occurs as a dominant or co-dominant spinifex (with *T. wiseana*) across the low rolling hills of vegetation type ChAaTc. It was usually found in association with semi-calcrete and quartz geology. Taxon was also recorded within AiAbTw,AoTe, and AanTl. The taxon was observed as markedly low-lying amongst other spinifex taxa, given its short and compact leaf form and occurrence in dense clusters of individuals. Based on counts within quadrats, SLR (2025) estimated there are approximately 20,000 – 28,000 individuals present per hectare of ChAaTc. This is a rough estimate, given natural variation within this vegetation type, and equates to a total of between 17,544,000	**Recorded from the north and south sections of the DE.** Expected to occur anywhere within ChAaTc and sparsely where small instances of calcrete geology are present. ChAaTc was limited within the northern DE.

Taxon	Description	Distribution (Pilbara Region)	Presence in Surveyed Areas	Presence in DE
			– 24,561,600 individuals potentially present within the survey areas.	
Goodenia obscurata *(P3)*	This species is a low shrub in the connate bract group of *Goodenia*, and only recently separated from *G. connata*. This taxon was not photographed as it was not known to be of significance during the surveys.	The WA Herbarium has 28 records of this species ranging from ~450km west of the Project Area in the Carnarvon bioregion, with this record representing its most north eastern known range.	Only a single record of this taxon was located opportunistically within the Survey Area in vegetation type AoTe. It was not known to be of significance at the time of survey as it was only described in late 2023 following the survey and identified following a review of species in the consolidated report. It is expected that other individuals of this taxon would be present sparsely across the Project Area. However, this species was split from other similar species in the connate bract group of *Goodenia* and given a Priority 3 status due to restricted information being available on its distribution. Following the review, additional records have been lodged, indicating an expanded distribution. It is now considered unlikely to be as restricted as initially determined.	**One individual recorded.**

Table notes:

1 Images from SLR and 360 Environmental unless cited otherwise

2 Distribution from Florabase (Western Australian Herbarium, 1998–2024)

* Taxon recorded from DE

* Taxon not recorded from DE however vegetation containing records of the taxon occurs within the DE

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7.4.8.2 Other Significant Flora

Flora may be considered of other significance if it represents a range extension, novel taxon, species that play a keystone role in a community, has relic status, is locally endemic, or represents the extent of a species range.

The field surveys identified 18 flora species of other significance (SLR , 2025). Of these, three were range extensions, and six were considered to be significant for taxonomic reasons. Nine of these taxa were considered hybrids (Eight *Acacia*, one *Senna*) of other taxa occurring in the Project Area.

Two flora species of other significance were recorded within the DE – one potentially novel taxon (*Trianthema* aff. *oxycalyptrum*) and one range extension (*Portulaca digyna*). These two species are discussed further in Table 7-8.

For the purpose of this impact assessment, they will not be considered further.

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Table 7-8: Other Significant Flora Species Recorded within the DE

Taxon	Potential Significance	Photograph	Presence in Survey Areas	Recorded within DE
Trianthema aff. *oxycalyptrum*	Potentially novel taxon, bearing similarities to *T. oxycalyptrum* and *T. glossostigmum*. More investigation required in *Trianthema* genus to place this taxon.	 Image source: 360 Environmental (2024)	The surveys recorded 148 individuals of *Trianthema* aff. *oxycalyptrum* from 15 locations within the survey areas.	**Yes.** Vegetation types AoTe and AeTe are also present within the DE, suggesting other potential locations within the DE.
Portulaca digyna	Large range extension of approximately 600 km southwest of its known distribution within the Dampierland and Kimberley bioregions.	 Image source: 360 Environmental (2024)	The surveys recorded 1,631 individuals from 11 locations within the survey areas.	**Yes.** Vegetation types AoTe and AeTe are also present within the DE, suggesting other potential locations within the DE.

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7.4.8.3 Introduced Flora Species

No Weeds of National Significance (WoNS) or State Declared Pests were identified within the DE or the IDF.

Eleven introduced flora taxa (weeds) were recorded from the survey areas (Table 7-9 and Figure 7-7) and were generally recorded from drainage landforms. Of these, **Opuntia ?stricta* (Common Prickly pear) is listed as a Weed of National Signifcaiance and a Declared Pest, under the Western Australian *Biosecurity and Agriculture Management Act 2007* and Calotrope (**Calotropis procera*), is a Declared Pest under the Western Australian *Biosecurity and Agriculture Management Act 2007.* Calotrope was recorded from the major drainage landform vegetation types of EcAtTe, EcMgTlo, EvAtTlo, and MaAcpCi, none of which occur within the DE. The other weed taxa are considered widespread in the Pilbara and are generally dispersed by wind, water, and cattle.

The only weed taxa recorded within the DE were Kapok Bush (**Aerva javanica*) and Buffel Grass (**Cenchrus ciliaris*).

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Table 7-9: Weed Taxa Recorded from the Survey Areas

Scientific Name	Common Namee	BAM Act Status	DBCA Pilbara Assessment		Fortescue Classification	Recorded Within DE
			Ecological Impact	Invasiveness		
**Aerva javanica*	Kapok Bush	Permitted – s11	High	Rapid	Priority	Yes (north DE)
**Bidens bipinnata*	Bipinnate Beggartick	Permitted – s11	Unknown	Rapid	Priority (Pastoral exclusion areas only or where an approval condition requires it)	No
**Calotropis procera*	Calotrope	Declared Pest – s22	Alert		Priority	No
**Cenchrus ciliaris*	Buffel Grass	Permitted – s11	High	Rapid	Priority (Pastoral exclusion areas only or where an approval condition requires it)	Yes (north DE)
**Cenchrus setiger*	Birdwood Grass	Permitted – s11	High	Rapid	Priority (Pastoral exclusion areas only or where an approval condition requires it)	No
**Chloris pumilio1*	-	-	Not listed	Not listed	Other	No
**Flaveria trinervia*	Speedy Weed	Permitted – s11	Not listed	Not listed	Other	No
**Malvastrum americanum*	Spiked Malvastrum	Permitted – s11	Unknown	Unknown	Priority	No
**Opuntia ?stricta (WoNS, DP)*	Common Prickly Pear	Declared Pest -s22	High	Rapid		No
**Pseudognaphalium luteoalbum*		-	-	-		No
**Sonchus oleraceus*	Common Sowthistle	Permitted -s11	Low	Rapid		No

Table notes:

* Indicates an introduced species

\# DBCA impact and invasiveness summary for the Pilbara region (DBCA, 2023).

Ecological impact ranges from Low (minimal disruption to ecological processes or loss of biodiversity) to high (causes acute disruption of ecological processes, dominates and/or significantly alters vegetation structure, composition and function of ecosystems).

Invasiveness refers to the rate of spread in native vegetation with respect to establishment, reproduction, and low distance dispersal (>100 m) and ranges from Slow to Rapid.1 Chloris pumilio is of mixed status, being native in part of its range and a naturalised weed elsewhere. This separation is not geographically defined and so it has been considered as an introduced species for the purposes of this ERD.

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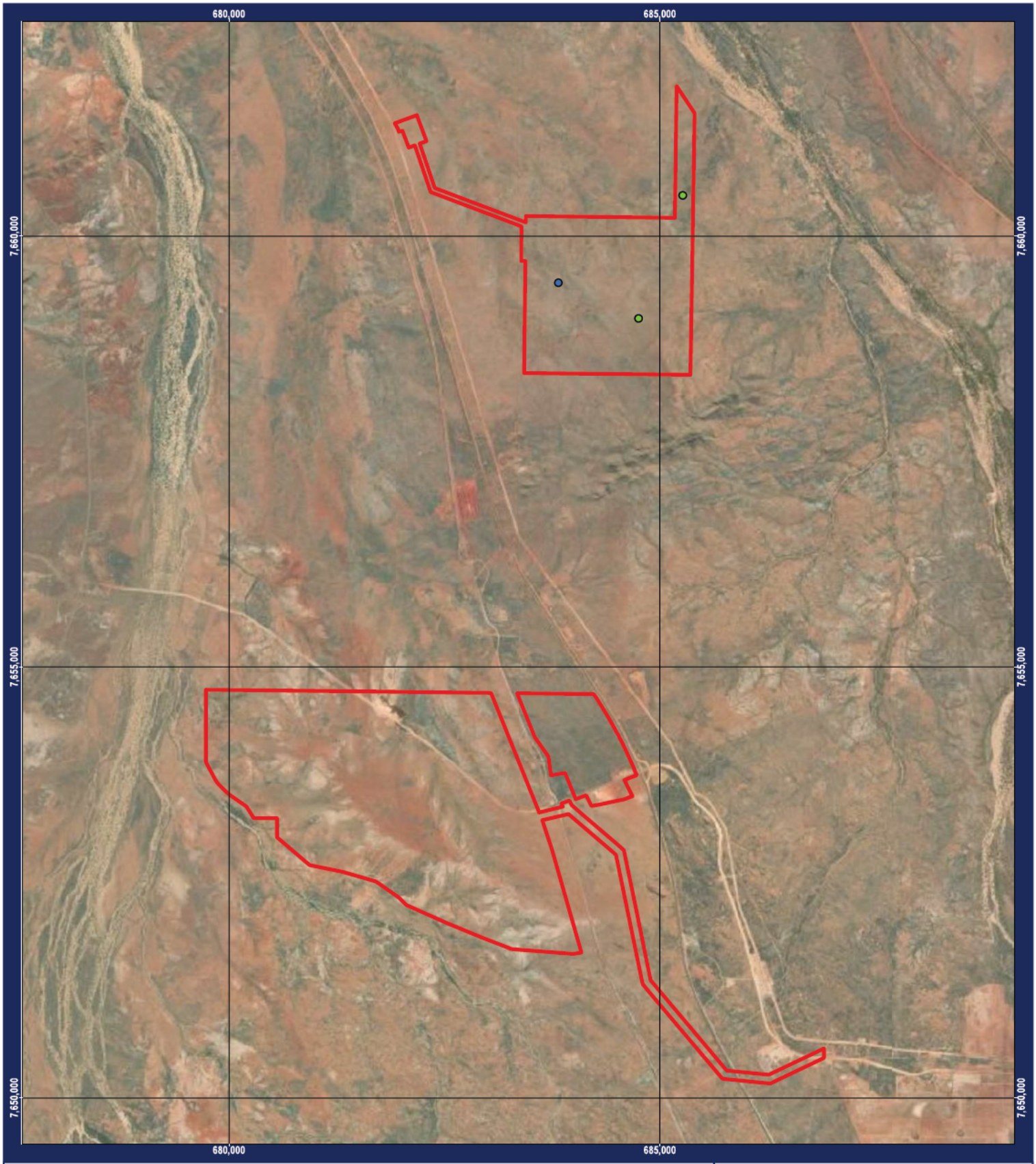

Legend

Development Envelope

Introduced Flora Species

- *Aerva javanica*
- *Cenchrus ciliaris*

N

0 0.5 1 1.5 2 2.5

Kilometres

Figure 7-7
Introduced Flora Species 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_0064.061

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

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

Fortescue.

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7.5 Potential Impacts

Potential impacts on flora and vegetation due to Proposal activities are outlined in Table 7-10.

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 7.6.3).

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Table 7-10: Potential Direct and Indirect Impacts on Flora and Vegetation from the Proposal

Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
Direct Impacts			
Direct loss of native vegetation predominantly in excellent condition	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	Loss of biodiversity within the clearing footprint and DE.
Direct loss of conservation significant vegetation			
Direct loss of individuals of conservation significant flora			
Indirect Impacts			
Fragmentation of populations or habitats, leading to disjunct populations and edge effects	Clearing of up to 1,108.2 ha of native vegetation within a DE of 1,416.6 ha for infrastructure.	Construction and Operations	Fragmentation of populations and vegetation within the DE.
Loss and/ or degradation of vegetation			
Introduction and/or spread of weeds and/or pathogens	Movement of weed material (e.g. seeds) via: • Vehicle, equipment and people movement • Temporary stockpiling of cleared vegetation and excavated soil • Wind and water dispersion • Animal movements.	Construction, Operations and Decommissioning	Weed infestation within clearing footprint Localised loss, disturbance, and degradation of vegetation outside the clearing footprint.
Contamination of soil or water due to leaks or spills of hazardous materials (e.g., fuels, lubricants)	Inappropriate transport, storage, and handling of hazardous materials for the maintenance and refuelling of vehicles and equipment.	Construction, Operations and Decommissioning	Localised disturbance and degradation of vegetation outside the clearing footprint.
Smothering of vegetation from dust deposition	Inappropriate management of dust generated by:		Localised disturbance and degradation of vegetation outside the clearing footprint.

Potential Impact to Value / Receptor	Source / Activity	Timing	Potential Consequence
	• Vehicle, equipment and people movement • Wind dispersion over uncovered soils (i.e. earthworks, temporary stockpiling of excavated soil, cleared areas). • Animal movements		
Contamination of soil or water due to waste materials	Inappropriate waste disposal (general waste, excess construction materials, and decommissioned infrastructure).		Localised disturbance and degradation of vegetation outside the clearing footprint.
Altered hydrological flows (including altered erosion and sedimentation processes)	Vegetation clearing, earthworks and infrastructure resulting in altered topography and drainage pathways.		Localised disturbance and degradation of vegetation outside the clearing footprint.
Altered fire regimes	• Hot works and vehicle movements (ignition source) • Changes in fire management practices • Altered vegetation extent and type (fuel loading)		Localised disturbance and degradation of vegetation outside the clearing footprint.

7.6 Assessment of Impacts

7.6.1 Direct Impacts

7.6.1.1 Clearing of Vegetation

Implementation of the Proposal would result in the clearing of up to 1,108.2 ha of native vegetation. Clearing of vegetation will:

- Reduce the remaining extent of pre-European vegetation associations.
- Reduce areas of specific vegetation units.
- Remove habitat for conservation significant flora.
- Reduce the local extent of vegetation considered to be significant at National, State or Regional level.
- Impacts to vegetation with culturally significance values – this is discussed further in Chapter 9 (Social Surroundings).

Pre-European Vegetation

There are two pre-European vegetation associations mapped by Beard *et al* (2013) that occur within the DE. However, the IDF avoids VA 626.1, and therefore, further discussions in this document at a regional level will only consider VA 93.4. Clearing for the Proposal will result in a reduction of no more than 0.04% of VA 93.4 at the subregion, region or WA level, or no more than 0.11% at the local government area level as detailed in Table 7-11.

As the current extent of these vegetation associations is above 99% of the pre-European extent, the reduction due to clearing from the Proposal comprises a very small percentage of the remaining extent for each vegetation association and scale. Consequently, the proposal will not decrease any of the vegetation associations below 30% at the State level, Pilbara IBRA bioregional and Chichester subregional levels. Therefore, the clearing of pre-European vegetation does not present a significant impact.

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Table 7-11: Clearing Area Extent of pre-European Vegetation

Representation	Vegetation Association	Pre-European Extent (ha)	Current Extent (ha)	Currently Remaining (%)	Extent within DE (ha)	% Remaining if DE cleared	Extent within IDF (ha)	% Remaining if IDF cleared only
Across Western Australia	**93.4**	2,481,889.08	2,478,504.06	99.86	1,416.44	**99.81** *(state reduction of 0.05%)*	1,108.2	**99.82** *(State reduction of 0.04%)*
Across Pilbara Bioregion	**93.4**	2,480,781.79	2,477,408.16	99.86	1,416.44	**99.81** *(state reduction of 0.05%)*	1,108.2	**99.82** *(State reduction of 0.04%)*
Across Chichester (PIL01) Subregion	**93.4**	2,476,377.59	2,473,007.05	99.86	1,416.44	**99.81** *(state reduction of 0.05%)*	1,108.2	***99.84*** *(State reduction of 0.04%)*

Source: DBCA Statewide Vegetation Statistics (DBCA, 2019)

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Vegetation Units

The Proposal will clear 1,108.2 ha of native vegetation, across 11 vegetation units (excluding cleared/degraded). Vegetation condition of the DE ranges from excellent to completely degraded (cleared), with 98% of the DE and IDF in Very Good or Excellent condition. This loss of vegetation would impact biodiversity at a local scale however, vegetation in the surrounding area remains largely undisturbed. Table 7-12 details the disturbance footprint by vegetation unit and vegetation condition.

The Proposal's highest impact within the IDF is on ChAaTs (Plains), affecting 77.7 % of the mapped vegetation extent, followed by AanTl (Plains) at 64.18 % as detailed in Table 7-13. The total clearing area (1,108.2 ha) represents 78.22% of the DE (1,416.6 ha).

Table 7-12: Vegetation Units within the Development Envelope and Indicative Disturbance Footprint

Vegetation Unit	Vegetation Condition	Conservation Significant	Extent within DE (ha)	Extent within IDF (ha)
AanTl	Excellent	No	144.2	104.8
AeTe	Excellent	No	9.2	1.8
AiAbTw	Very Good to Excellent	No	13.3	11.0
AoTe	Very Good to Excellent	No	653.4	475.9
AsTla	Very Good to Excellent	No	37.9	15.9
ChAaTc	Very Good to Excellent	Yes	165.5	155.2
ChAaTs	Very Good to Excellent	Yes	56.8	55.0
ChAspTe	Degraded to Excellent	Yes	1.3	1.1
ChAspTla	Very Good to Excellent	No	260.5	234.2
ChAspTrc	Very Good	No	0.2	0.1
PfTlo	Very Good to Excellent	No	43.8	35.1
Cleared	Completely Degraded	N/A	30.5	18.2
		Total	**1416.6**	**1108.2**

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Table 7-13: Assessment of Significance on Vegetation Units

Landform	Vegetation Unit	Conservation Significant	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Proportion of Impact (%)*	Extent Remaining (%)	Significance of Potential Impacts
Plains	AanTl	No	163.3	144.2	104.8	64.18	35.82	**Unlikely to be Significant** The potential direct impact to AanTl is 64.18% of the total mapped extent. This vegetation unit is not dominated by species considered uncommon or restricted (SLR , 2025), and after clearing activities, AanTl will still have more than 30% of its mapped extent remaining. The implementation of the Proposal is unlikely to affect the conservation status, distribution, or local presence of any flora taxa, vegetation assemblages, or ecological communities in the locality and as such, the impact is unlikely to be significant.
Outcroppings	AeTe	No	129.40	9.2	1.8	1.4	98.61	**Not Significant** The potential direct impact to AeTe is 1.4% of the total mapped extent.
Plains	AiAbTw	No	323.0	13.3	11.0	3.4	96.59	**Not Significant** The potential direct impact to AiAbTw is 3.4% of the total mapped extent. This vegetation unit is not conservation significant and was dominated by *Acacia* and *Triodia* species. It is not like that the clearing of 3.41% of AiAbTw will affect the conservation status, distribution, or local presence of any flora taxa, vegetation assemblages, or ecological communities in the locality. Therefore, impacts will not be significant.
Plains	AoTe	No	4146.8	653.4	475.9	11.5	88.52	**Unlikely to be Significant** The potential direct impact to AoTe is 11.5 % of the total mapped extent. Although records of *Euploca mutica* (P3) were found in this vegetation during the surveys, it is not considered likely that implementation of this Proposal will have a significant impact on the conservation status, distribution, or local presence of any flora taxa.
Plains	AsTla	No	350.70	37.9	15.9	4.5	95.47	**Not Significant** The potential direct impact to AsTla is 4.5 % of the total mapped extent. This vegetation type is predominantly located outside of the DE and it is not dominated by species considered uncommon or restricted. Implementation of the Proposal will not have a significant impact on this vegetation unit.
Plains	**ChAaTc**	Yes	877.2	165.5	155.2	17.7	82.31	**Unlikely to be Significant** The potential direct impact to ChAaTc is 17.7 % 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. Implementation of the Proposal would result in the clearing of up to 18% of the estimated number of individuals within the survey area, however, the taxon is well-represented in the locality, with an estimated 17,544,000 to 24,561,600 individuals within the survey area. Further, the vegetation within the IDF only accounts for approximately 17.7 % of the total mapped extent of ChAaTc. The proposed clearing is therefore unlikely to affect the conservation status, distribution, or local presence of any flora taxa, vegetation assemblages, or ecological communities in the locality.
Plains	**ChAaTs**	Yes	70.8	56.8	55.0	77.7	22.32	**Unlikely to be significant.** The potential direct impact to ChAaTs is 77.7 % of the total mapped extent, however, none of the species that are considered uncommon or restricted dominated this unit, and it is well represented outside the surveyed area (SLR , 2025). As such, the proposed clearing is unlikely to affect the conservation status, distribution, or local presence of any flora taxa, vegetation assemblages, or ecological communities in the locality. Therefore, the impact is unlikely to be significant.
Drainage	**ChAspTe**	Yes	177.8	1.3	1.1	0.6	99.38	**Unlikely to be significant.** The potential direct impact to ChAspTe is only 0.6 % of the total mapped extent. This vegetation unit is considered locally significant due to the occasional populations of *Neptunia longipila* (P2) on ecotonal clay boundaries; however, none of the species that are considered uncommon or restricted dominated this unit. Thus, the proposed clearing is unlikely to affect the conservation status, distribution, or local presence of any flora taxa, vegetation assemblages, or ecological communities in the locality. Therefore, the impact is unlikely to be significant.
Plains	ChAspTla	No	1526.8	260.5	234.2	15.34	84.66	**Unlikely to be significant** The potential direct impact to ChAspTla is 15.34 % of the total mapped extent.

Landform	Vegetation Unit	Conservation Significant	Total Mapped Extent (ha)	Extent within DE (ha)	Extent within IDF (ha)	Proportion of Impact (%)*	Extent Remaining (%)	Significance of Potential Impacts
Drainage	ChAspTrc	No	309.9	0.2	0.1	0.03	99.97	**Not significant** The potential direct impact to ChAspTrc is only 15.34 % of the total mapped extent.
Plains	PfTlo	No	359.8	43.8	35.1	9.76	90.24	**Unlikely to be significant** The potential direct impact to PfTlo is 9.76 % of the total mapped extent.

Table Notes

*. Proportion of impact is calculated from clearing associated within the IDF with respect to the Total Mapped Extent.