Northern Terminal (NT) to Neerabup Terminal (NBT) 330kV Transmission Line

Environmental Review Document

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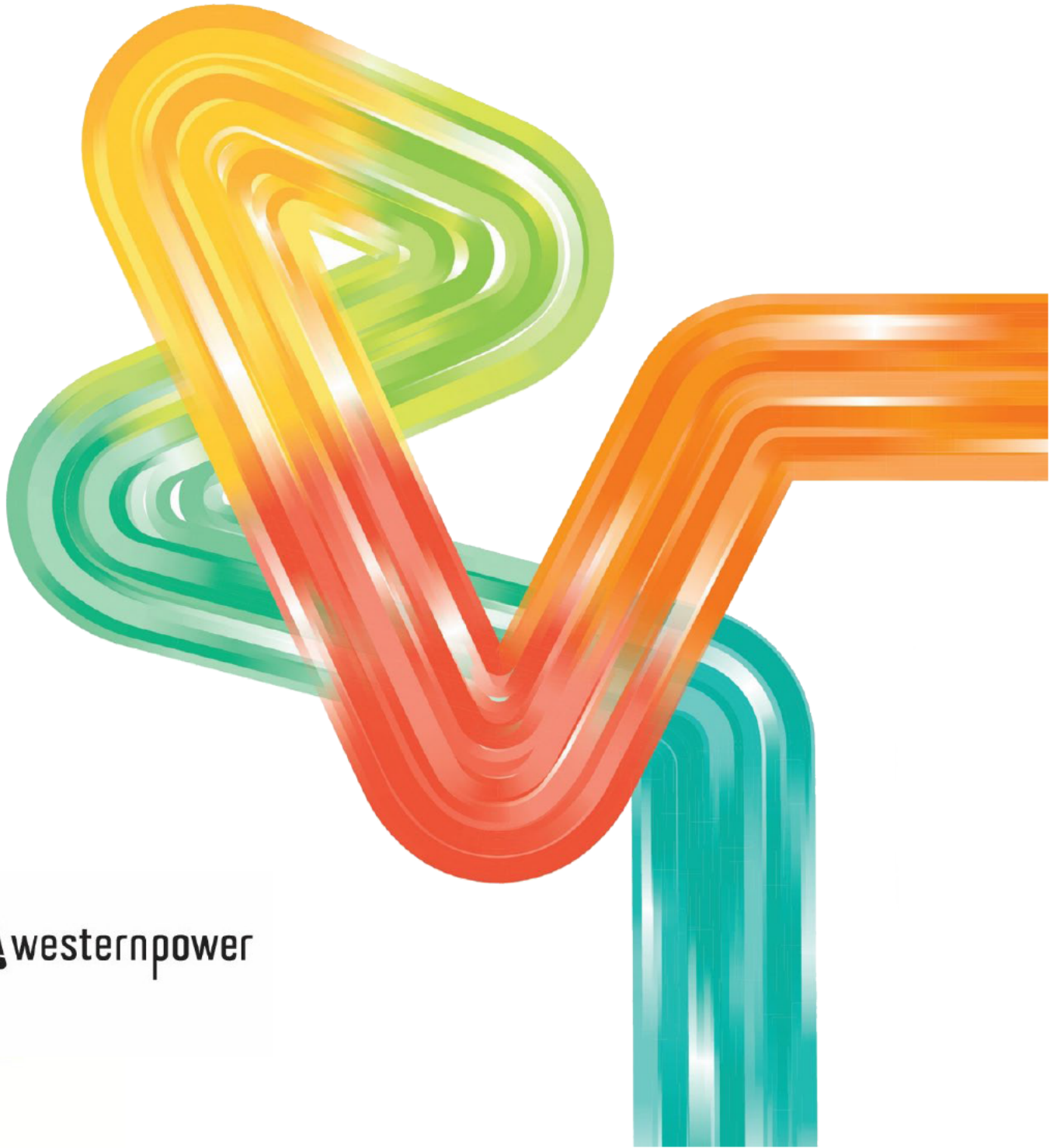

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Document Control

Document version history

Version	Date	Amendment
0	27/08/2025	Western Power v0
1.0	20/11/2025	Updates following DWER review
2.0	27/01/2026	Updates following public advertisement of ERD

Declaration of accuracy

In making this declaration, I am aware that section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed [redacted]

Full name (please print) [redacted]

Organisation (please print) Western Power

Date 27/01/2026

Abbreviations

Abbreviation	Definition
ABS	Australian Bureau of Statistics
ACH	Aboriginal Cultural Heritage
ACHC	Aboriginal Cultural Heritage Committee
ACHIS	Aboriginal Cultural Heritage Inquiry System
AHA	Aboriginal Heritage Act 1972
AoLA	Atlas of Living Australia
ANZECC	Australia and New Zealand Environment and Conservation Council
ASS	Acid Sulfate Soil
BAM Act	Biodiversity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BCE	Bamford Consulting Ecologists
CALM	Department of Conservation and Land Management
CBD	Central Business District
CCW	Conservation Category Wetland
CD	Conservation Dependent
CE	Critically Endangered
CEMP	Construction Environmental Management Plan
CO2-e	Carbon Dioxide Emissions
CR	Critically Endangered
DAWE	Department of Agriculture, Water and Environment
DBCA	Department of Biodiversity, Conservation and Attractions

Abbreviation	Definition
DBH	Diameter at breast height
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DoE	Department of the Environment
DE	Development Envelope
DEE	Department of Environment and Energy
DER	Department of Environmental Regulation
DPAW	Department of Parks and Wildlife
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DSEWPaC	Department of Sustainability, Environment, Water, Population and Communities
DSP	District Structure Plan
DWER	Department of Water and Environmental Regulation
E	Endangered
EIA	Environmental Impact Assessment
EMF	Electromagnetic Field
EN	Endangered
EP Act	Environmental Protection Act 1986
EPA	Environmental Protection Authority
EPBC Act	Environmental Protection Biodiversity and Conservation Act 1999
ERD	Environmental Review Document
ES	Executive Summary
ESA	Environmentally Sensitive Area

Abbreviation	Definition
FCT	Floristic Community Type
FVF	Flora, Vegetation and Fauna
FVEMP	Flora and Vegetation Environmental Management Plan
GPS	Global Positioning System
ha	Hectares
HMP	Hygiene Management Plan
IBRA	Interim Biogeographic Regionalisation for Australia
IBSA	Index of Biodiversity Surveys for Assessments
IWEMP	Inland Waters Environmental Management Plan
km	Kilometres
kV	Kilovolt
LGA	Local Government Area
m	Metres
mAHD	Metres Above Australian Height Datum
MI	Migratory
MNES	Matters of National Environmental Significance
MW	Megawatt
NBT	Neerabup Terminal
NREP	North Region Energy Project
NT	Northern Terminal
NVCP	Native Vegetation Clearing Permit
NVIS	National Vegetation Information System

Abbreviation	Definition
OPGW	Optical Ground Wire
OS	Other Specially Protected
P	Priority
PDE	Project Development Envelope
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
REW	Resource Enhancement Wetland
RIWI Act	Rights in Water and Irrigation Act 1914
SCP	Swan Coastal Plain
SOBN	State Observation Bore Network
SPRAT	Species Profile and Threats
SWALSC	South West Aboriginal Land and Sea Council
SWIS	South West Interconnected System
t	Tonnes
TDS	Total Dissolved Solids
TEC	Threatened Ecological Community
TFEMP	Terrestrial Fauna Environmental Management Plan
TSSC	Threatened Species Scientific Committee
UFI	Unique Feature Identifier
V	Vulnerable
VSA	Vegetation System Association

Abbreviation	Definition
VU	Vulnerable
WA	Western Australia
WAC	Whadjuk Aboriginal Corporation
WAPC	Western Australian Planning Commission
WAH	Western Australia Herbarium
WP	Western Power

Executive Summary

Western Power proposes to construct a double circuit 330 kilovolt (kV) powerline between the Neerabup Terminal in Pinjar and Northern Terminal in Malaga (the Proposal), a distance of approximately 29 kilometres (km). It is assumed that the Proposal will include construction of transmission towers/poles and connect to the North Region Network, the northern area of the Western Power transmission network from Northern Terminal to Geraldton zone substation consisting of a mix of 330 kV and 132 kV networks.

This revised Environmental Review Document (ERD) is submitted to the Environmental Protection Authority (EPA) as a supporting document for the referral of the Proposal under Part IV of the *Environmental Protection Act 1986* (EP Act). The ERD has also been submitted to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) to support assessment of the Proposal as a '*controlled* action' under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) due to likely significant impacts on one or more Matters of National Environmental Significance (MNES).

Through consultation with the EPA, the following key environmental factors have been identified as relevant to the Proposal:

- Flora and Vegetation
- Terrestrial Fauna
- Inland Waters
- Social Surroundings

The potential impacts of the Proposal on these factors will be addressed by applying the environmental impact management hierarchy: avoid, minimise, rehabilitate and offset, in accordance with the Statement of environmental principles, factors, objectives and aims of Environmental Impact Assessment (EIA) (EPA, 2023a).

A summary of the Proposal is provided in the following tables (Table 1-3) as per the EPA's current Environmental Review Document guideline documents.

Rationalisation of Values

Western Power acknowledges there are inconsistences in the disturbance figures provided within the ERD for total fauna habitat impacted and total vegetation impacted (100.5 ha vs 98.08 ha). A review of the mapping provided by the AECOM flora and vegetation survey team and the AECOM fauna survey team has identified discrepancies in the classification of cleared areas, habitat areas and vegetation units.

The Impact Area produces the following clearing ratios from each of the survey teams:

- Flora and Vegetation survey team mapping
  - 65.35 ha of native vegetation
  - 32.73 ha of non-native vegetation
- Fauna survey team mapping
  - 39.57 ha of native vegetation
  - 60.85 ha of modified vegetation

A condition for a 100.5 ha clearing limit ensures that all clearing for the Proposal will be captured by the approval. However, impact assessments for each significant factor have been informed by the respective mapping completed for each factor, as well as all corresponding trigger and threshold criterion in supporting Environment Management Plans and any offsets required. This ensures that:

- the Proposal's impacts to native vegetation are not underestimated, as would be the case if the clearing ratios mapped by the Fauna survey team were used for the impact assessment for Flora and Vegetation
- The value of modified fauna habitats to conservation significant fauna species identified within the PDE, particularly black cockatoos are similarly not underestimated, as would be the case if the Flora and Vegetation survey team mapping were used for the impact assessment.

Impacts for the Proposal will be set out in the ERD in the following format when discussing the Proposal's impacts to Flora and Vegetation and Inland Waters (wetland/riparian vegetation):

- An Impact Area of 100.5 ha, comprising:
  - 65.35 ha of native-vegetation
  - 32.73 ha of non-native vegetation

Impacts for the Proposal will be set out in the ERD in the following format when discussing the Proposal's impacts to Terrestrial Fauna:

- An Impact Area of 100.5 ha, comprising:
  - 39.57 ha of native-vegetation

60.85 ha of modified habitat

Table 1 General Proposal Content Description

Proposal title	Northern Terminal to Neerabup Terminal 330kV Transmission Line
Proponent name	Electricity Networks Corporation trading as Western Power (Western Power) (ABN 18 540 492 861).
Short description	The Northern Terminal to Neerabup Terminal 330kV Transmission Line proposal (the Proposal) is located approximately 13 km north of Perth in the City of Swan and City of Wanneroo. The Proposal is for the construction of a new 330kV dual circuit transmission line between Northern Terminal in Malaga and Neerabup Terminal in Pinjar, a length of approximately 29 km. Additionally, the Proposal includes **expansion of the two existing Western Power substations, Northern Terminal and Neerabup Terminal.** The purpose of the proposal is to reinforce the North Region transmission network to remove constraints on existing connected generation, provide additional capacity to connect large-scale renewable energy generation and meet future demand. The proposed transmission line will be in parallel to the existing 330kV transmission line between Northern Terminal and Neerabup Terminal.

Table 2 Proposal Content Elements

Proposal element	Location / description	Maximum extent, capacity or range
Physical elements		
The transmission line comprises the following physical components: • Transmission infrastructure. For the purposes of this referral, 74 steel lattice towers are assumed. • 330kV conductors (dual circuit). • Optical Ground Wire (OPGW) and underground fibre. • Permanent maintenance access track. • Vegetation clearance zone.	Figure 1 Figure 1 Proposal Development Envelope	Total indicative Disturbance Footprint for the Proposal is 100.5hectares (ha) within a 217.24 ha Development Envelope. The Disturbance Footprint is comprised of (refer to Section 1.2): • 65.35 ha of native vegetation to be cleared • 32.73 ha of non-native vegetation to be cleared • 11.15 ha of already cleared/previously disturbed areas The following overarching construction elements will be located within the Proposal Development Envelope: • The Transmission Corridor (174.13 ha) • The Northern Terminal (19.56 ha) • The Neerabup Terminal (11.71 ha).
Construction elements		
• Dewatering to construct tower footings.	Figure 1 Proposal Development Envelope	Dewatering during construction only Construction will take approximately2 years.
Operational elements		
Operation and maintenance of transmission infrastructure.	Figure 1 Proposal Development Envelope	Transmission along 330kV overhead conductors, grounding wires, steel lattice towers and communications wires. A 4-m wide maintenance track will be maintained centred on the line route with ongoing clearing of vegetation regrowth within permanently cleared areas (maintenance access track, around transmission towers and vegetation clearance zone).
Proposal elements with greenhouse gas emissions		
Construction elements:		

Proposal element	Location / description	Maximum extent, capacity or range
Scope 1	12,000 tonnes (t) Carbon Dioxide emissions (CO2-e) Scope 1 emissions have been calculated using emission factors as per the National Greenhouse and Energy Reporting (Measurement) Determination based on available project projections and/or existing operational data for fuel use (transport and stationery) and land clearing. Supporting documentation can be provided on request due to commercially sensitive information used in emissions modelling.	
Scope 2	Nil	
Scope 3	N/A Scope 3 emissions are excluded in this estimate due to the lack of consistent available methods to provide a reliable estimate across range of associated Scope 3 categories associated with the project.	
Operation elements:		
Scope 1	125 t CO2-e /yr Scope 1 emissions have been calculated using emission factors as per the National Greenhouse and Energy Reporting (Measurement) Determination based on available existing operational data for fuel use associated with operational and maintenance activities (transport), and use of SF6 within circuit breakers.	
Scope 2	10,000 t CO2-e /yr Based on electricity losses during transmission (line losses). Scope 2 emissions calculated as per the National Greenhouse and Energy Reporting (Measurement) Determination 2008, Method A1 for estimating emissions from electricity consumption. 10,000 CO2-e/yr represents year one losses. Scope 2 emissions are projected to decrease year on year as this project, together with other network augmentation projects facilitates further connection of renewable energy generation to the SWIS.	
Scope 3	N/A Scope 3 emissions are excluded in this estimate due to the lack of consistent available methods to provide a reliable estimate across range of associated Scope 3 categories associated with the project.	
Rehabilitation		
Areas cleared for temporary construction activities will be rehabilitated following completion of construction.		
Commissioning		
Commissioning will include testing and assurance at the end of construction. These activities are included in the extent of construction elements.		

Proposal element	Location / description	Maximum extent, capacity or range
Decommissioning		
Decommissioning is not anticipated within life of asset (>50 years). Prior to the end of design life, the transmission line and associated infrastructure will be reviewed to determine the ongoing needs of the network and whether assets will be removed, upgraded or replaced.		
Other elements which affect extent of effects on the environment		
Proposal time*	Maximum project life	Permanent infrastructure (>53 years)
	Construction phase	1-2 years
	Operations phase	>50-year design life
	Decommissioning phase	N/A

* Proponents should only provide realistic timeframes to avoid unnecessary change to proposal applications at referral (section 38C), assessment (section 43A) or post assessment (section 45C).

Table 3 Summary of Potential Impacts, Proposed Mitigation and Proposed Environmental Outcomes

Flora and Vegetation	
Potential impacts	**Direct** – vegetation clearing of a maximum of 100.5ha, including 65.35 ha of native vegetation and 32.73 ha of non-native vegetation (refer to Section 1.2). Clearing of 2.23 ha of the Banksia Woodlands Threatened Ecological Community (TEC) and 0.44 ha of the Tuart Woodlands TEC/Priority Ecological Community (PEC). Clearing of vegetation within Bush Forever Sites will not exceed 15.0ha. Clearing of 59.5 ha within the Department of Biodiversity Conservation and Attractions (DBCA) managed Gnangara-Moore River State Forest. **Indirect** – edge effects, introduction and/or spread of weeds and dieback.
Mitigation hierarchy	Avoid: • Powerline Alignment has been coordinated with existing easements to minimise additional clearing of Banksia Woodlands TEC, Bush Forever Sites and native vegetation, where practicable. • Strategic placement of transmission towers has been employed to avoid impacts on Banksia Woodlands TEC and Bush Forever Sites, including spanning over vegetation where feasible. Following consultation with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve. Existing public roads and powerline tracks within the Proposal corridor will be utilised to avoid additional clearing.

	Minimise: • Native vegetation clearing will not exceed 65.35 ha. • A Proposal specific Flora and Vegetation Environmental Management Plan has been developed with objective and outcome-based targets aimed at minimising impacts to native flora and vegetation. Rehabilitate: • A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent.
Residual impacts, including assessment of significance	• Clearing of 98.08 ha of vegetation, comprising 65.35 ha of native vegetation and 32.73 ha of non-native vegetation. • Clearing of Banksia Woodlands TEC of 2.23 ha and clearing of 0.44 ha of Tuart Woodlands TEC/PEC. • Clearing of native vegetation in Bush Forever Sites of up to 15.0ha. • Clearing of 59.5 ha within the DBCA managed Gnangara-Moore River State Forest. • The majority of the 98.08 ha of native and non-native vegetation to be cleared is in Completely Degraded or worse condition. Only 4.05 ha of clearing is proposed for vegetation in Degraded or better condition. Considering the clearing impacts outlined above, the Proposal is anticipated to have significant residual impacts on the biological diversity and ecological integrity of local and regional flora and vegetation. The residual impacts will be addressed via an Offset Strategy.
Proposed environmental outcomes	Clearing will be limited to the limits specified in the Proposal Content Document: • Clearing will not exceed 98.08 ha, comprising a maximum of 65.35 ha of native vegetation and 32.73 ha of non-native vegetation (refer to Section 1.2). • Clearing of TEC/PECs within the Project Development Envelope will not exceed: – 2.23 ha of the Banksia Woodlands of the Swan Coastal Plain TEC – Endangered which is inclusive of 2.03 ha of State listed PECs, comprising: – 0.59ha of Low lying *Banksia attenuata* woodlands or shrublands (floristic community type (FCT) 21C) – Priority 3 – 0.36ha of Swan Coastal Plain *Banksia attenuata – Banksia menziesii* woodlands (FCT 23b) – Priority 3 1.08 ha of Banksia woodlands of the Swan Coastal Plain – Priority 3 0.44 ha of Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain • Clearing of Bush Forever areas will not exceed 15ha within the Project Development Envelope.

Assessment of offsets (if relevant)	The Proposal will have significant residual impacts to Banksia Woodland TEC/PEC. Western Power has secured the Orange Springs site which will be used to offset 100% of the significant residual impacts to Banksia Woodlands through a combination of protection and management of existing high-quality remnants of the TEC and rehabilitation of cleared areas targeting a vegetation community composition representative of the TEC. Offsets for Bush Forever sites are required in accordance with the *State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region.*
Terrestrial Fauna	

Potential impacts	**Direct** – fauna habitat loss, loss of fauna individuals and changes to fauna habitat structure and composition resulting in reduced fauna habitat.
	
	Clearing of a maximum of 100.5 ha of fauna habitats, comprising 39.57 ha of native fauna habitat and 60.85 ha of modified fauna habitats (refer to Section 1.2)[1]
	• Loss of the following Black Cockatoo foraging habitat:
	  • 100.5 ha of Carnaby's Black Cockatoo foraging habitat
	  • 75.8 ha of Baudin's Black Cockatoo foraging habitat
	  • 46.9 ha of Forest Red-Tailed Black Cockatoo habitat
	
	Clearing of 54 potential nesting trees, none of which contain hollows or suitable hollows..
	
	Indirect – habitat fragmentation, loss of fauna habitat connectivity, spread of pest fauna and degradation impacts associated with dust, noise and vibration.

Mitigation hierarchy	Avoid: • Powerline Alignment has been coordinated with existing easements to minimise clearing of potential nesting trees, where practicable. • Strategic placement of transmission towers has been employed to avoid impacts on high-quality Black Cockatoo foraging habitat, including spanning over vegetation where feasible. • Following consultation with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve. • Existing public roads and powerline tracks within the Proposal corridor will be utilised to avoid additional clearing. Minimise: • Clearing of fauna habitat will not exceed 100.5 ha, comprising 39.5ha of native fauna habitat and 60.85 ha of modified fauna habitat. • Clearing of Black Cockatoo suitable nesting trees will not occur during peak breeding season for Black Cockatoos.

[1] Differences in the total native vegetation clearing area and total native fauna habitat clearing area are due to the reclassification of the Adenanthos/Plantation fauna habitat type as non-native (modified), whereas the corresponding mapped vegetation community (PeAcCe) is classified as native.

	• No more than one of the identified suitable and/or potential nesting trees for Black Cockatoos will be cleared. • A Proposal specific Terrestrial Fauna Environmental Management Plan (TFEMP) has been developed with objective and outcome based targets aimed at minimising impacts to terrestrial fauna Rehabilitate: • A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent.
Residual impacts, including assessment of significance	The Proposal will result in: Clearing of 100.5 ha of fauna habitats, comprising 39.57 ha of native fauna habitat and 60.85 ha of modified fauna habitats (refer to Section 1.2). Loss of the following black cockatoo foraging habitat,: – 100.5 ha of Carnaby's Black Cockatoo foraging habitat – 75.8ha of Baudin's Black Cockatoo foraging habitat – 46.9 ha of Forest Red-Tailed Black Cockatoo habitat Residual impacts from clearing of black cockatoo habitat are expected to be significant and require offsets. This will be managed via the Proposal's Offset Strategy.
Proposed environmental outcomes	The Proposal aims to deliver the following outcomes: • Impact to black cockatoo foraging habitat will be limited to a total of 100.5 ha, comprising: – 100.5 ha of Carnaby's Black Cockatoo foraging habitat – 75.8 ha of Baudin's Black Cockatoo foraging habitat – 46.9 ha of Forest Red-Tailed Black Cockatoo habitat • No clearing of suitable breeding trees within the PDE • No death or injury to threatened fauna as a result of Proposal activities • Minimise indirect impacts to threatened fauna habitat quality from incidence and spread of weeds and/or disease, fragmentation and fire.
Assessment of offsets (if relevant)	The Proposal will have significant residual impacts to black cockatoo foraging habitat. Western Power has secured the Orange Springs and Hopeland sites which will be used to offset 100% of the significant residual impacts to black cockatoos through a combination of protection and management of existing high-quality foraging habitat and rehabilitation of cleared areas targeting foraging habitat with a quality score of 6 at minimum (as per BCE 2020 foraging habitat scoring tool)..
Inland Waters	
Potential impacts	**Direct** –Excessive propagation of drawdown cone due to temporary dewatering during tower construction, leading to changes in existing groundwater levels Direct clearing of (refer to Section 1.2):

	• 0.8 ha of Conservation Category Wetlands (CCWs) • 7.5 ha of Multiple Use Wetlands • 4.0 ha of Resource Enhancement Wetlands • 3.1 ha of native vegetation growing in or associated with a water course or wetland. **Indirect** – Impacts to groundwater dependent vegetation communities (Banksia TEC) from groundwater drawdown. Impacts to groundwater and surface water quality from disturbance of acid sulfate soils (ASS) through excavation and/or dewatering activities.
Mitigation hierarchy	Avoid: • The powerline Alignment has been coordinated with existing easements to minimise additional clearing of wetlands. • Tower locations have been adjusted to avoid areas of wetlands as much as possible. • A flexible design and construction approach has been adopted, enabling contractors to propose alternative foundation methods and piling depths which will avoid the requirements for dewatering at some tower locations. • Existing public roads and powerline tracks within the Proposal corridor will be utilised to reduce total required clearing. Minimise: • An Inland Waters assessment was completed to rank the potential risk to the environment of dewatering for each tower location. • An Acid Sulfate Soils Management Plan will be developed prior to any excavation and/or dewatering, detailing the strategies for managing ASS. • The tower construction method employed minimises the requirements for dewatering such that the cone of drawdown is minimised or will not occur Rehabilitate • A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent.
Residual impacts, including assessment of significance	Direct clearing of (refer to Sectionn 1.2): • 0.8 ha of Conservation Category Wetlands (CCWs) • 7.5 ha of Multiple Use Wetlands • 4.0 ha of Resource Enhancement Wetlands • 3.1 ha of native vegetation growing in or associated with a water course or wetland. Pre-construction investigations of ASS occurrence and implementation of Inland Waters Environment Management Plan are sufficient to ensure residual impacts to Inland Waters are not significant.

Proposed environmental outcomes	• No Proposal attributable impacts to groundwater or surface water quality at medium and high-risk tower locations (as identified in the Inland Waters Assessment conducted by Tetra Tech Coffey, 2025) at the conclusion of construction works • Clearing of wetlands within the PDE will be limited to 12.3 ha, comprising (refer to Section 1.2): – 0.8 ha of Conservation Category Wetlands – 7.5 ha of Multiple Use Wetlands – 4.0 ha of Resource Enhancement Geomorphic Wetlands • Clearing of native vegetation that is growing in or associated with a water course or wetland will be limited to 3.1 ha
Assessment of offsets (if relevant)	No offsets are proposed for impacts on Inland Waters.
Social Surroundings	
Potential impacts	**Direct** – impact to two Registered Aboriginal Cultural Heritage Sites: *Bennett Book in Toto* (Legacy ID S02254) and *South Ballajura Camp* (Legacy ID S02728) and clearing of culturally significant flora *Nuytsia floribunda*. **Indirect** – impacts to surrounding heritage values and adverse effect on the health and quality of life of receptors exposed to impacts associated with dust, noise and vibration.
Mitigation hierarchy	Avoid: • The powerline Alignment has been coordinated with existing easements to minimise impacts on sensitive values. • Design evolution has been informed by specialist surveys and stakeholder engagement. • Following consultation with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve. • Existing public roads and powerline tracks within the Proposal corridor will be utilised to avoid reduce total required clearing. • The Impact Area avoids clearing 89 of the 90 individuals of *Nuytsia floribunda* identified within the PDE. Minimise: • Development of a Construction Environmental Management Plan (CEMP) to address impact associated with dust, noise and vibration. • Ongoing stakeholder engagement, including engagement with Traditional Owners to seek relevant consents and approvals to manage and mitigate impacts to Register Aboriginal Cultural Heritage Places. Rehabilitate • A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent.

Residual impacts, including assessment of significance	The Proposal is expected to result in minor, manageable impacts to the DBCA managed Dick Perry Reserve and controlled disturbance to identified Aboriginal Cultural Heritage Sites (managed in accordance with section 18 consents issued under the *Aboriginal Heritage Act 1972*). Potential impacts related to dust, noise and vibration will be actively mitigated through a Proposal specific CEMP. Ongoing engagement with both the DBCA and Traditional Owners to manage impacts to sensitive values, and ongoing processes to obtain relevant approvals, supports the expectation that the Proposal will not have a significant residual impact on social surroundings.
Proposed environmental outcomes	The Proposal aims to deliver the following outcomes: • Manage disturbance of known Aboriginal Heritage sites in accordance with relevant approvals • Minimise indirect impacts to social surroundings from noise, dust and vibration • Minimise clearing of *Nuytsia floribunda* within the PDE
Assessment of offsets (if relevant)	No offsets are proposed for impacts on Social Surroundings.

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1. Proposal

1.1 Background

Western Power (the Proponent) proposes to construct a new double circuit 330 kilovolt (kV) high voltage powerline between the Northern Terminal (NT) in Malaga and the Neerabup Terminal (NBT) in Pinjar, covering a distance of approximately 29 kilometres (km) (the Proposal) (), as part of the North Region Energy Project (NREP). This Proposal, referred to as the "NT-NBT 330kV Line" or "NREP," falls within the North Region network, the northern area of the Western Power transmission network from Northern Terminal to Geraldton zone substation, consisting of a mix of 330 kV and 132 kV networks.

1.1.1 Proposal Referral Background

On 22 February 2024, Western Power referred the Proposal to the Environmental Protection Authority (EPA) under Part IV, Section 38 (s38) of the *Environmental Protection Act 1986* (EP Act). Prior to setting the Level of Assessment, the EPA advertised the proposal for a 7-day public comment period, during which it received 12 submissions, all of which advocated for assessment via a Public Environmental Review. On 20 March 2024, the EPA set the Level of Assessment as Assessment on Referral Information with additional information, with 2 weeks of public review period. On 25 March 2024, the EPA requested additional information under s.40(2)(a) of the EP Act to assess the Proposal.

Western Power referred the Proposal under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) in February 2024. The Commonwealth Minister for Environment and Water determined the Proposal to be a 'Controlled Action' due to likely significant impacts on one or more Matters of National Environmental Significance (MNES). On the referral form to the EPA, Western Power requested that the proposal be assessed under a Bilateral Agreement with the Commonwealth Department of Climate Change, Energy, the Environment, and Water (DCCEEW). Since no Bilateral Agreement is currently in place, the EPA will be assessing the controlled action as an accredited process (EPBC 2024/09799).

AECOM Australia Pty Ltd (AECOM) has been engaged by Western Power to provide a revised Environmental Review Document (ERD), technical memorandum and additional fauna surveys to address information requests from the EPA and DCCEEW. The full list of comments and actions is provided in Appendix A.

The Proposal Development Envelope (PDE) consists of the boundaries of all involved land parcels where consent has been granted for development of the Proposal and wherein all infrastructure will be contained. The PDE is 217.24 ha, and includes the following three overarching construction elements:

- The Transmission Corridor (174.13 ha)
- The Northern Terminal (19.56 ha)
- The Neerabup Terminal (11.71 ha).

The Proposal's Disturbance Footprint (Impact Area) is 100.5ha within the PDE.

For the purposes of this report, the Survey Study Area refers to the locations surveyed for the Proposal, including flora, vegetation, fauna and Black Cockatoo assessments for the defined linear corridor between Malaga and Pinjar. This is an area of up to 603.20 hectares (ha), wholly encompassing and extending beyond the PDE to consider surrounding environmental impacts. All surveys are discussed individually throughout the ERD.

1.2 Rationalisation of values used

Western Power acknowledges there are inconsistences in the disturbance figures provided within the ERD for total fauna habitat impacted and total vegetation impacted (100.5 ha vs 98.08 ha). A review of the mapping provided by the AECOM flora and vegetation survey team and the AECOM fauna survey team has identified discrepancies in the classification of cleared areas, habitat areas and vegetation units.

The Impact Area produces the following clearing ratios from each of the survey teams:

- Flora and Vegetation survey team mapping
  - 65.35 ha of native vegetation
  - 32.73 ha of non-native vegetation
- Fauna survey team mapping

  - 39.57 ha of native vegetation
  - 60.85 ha of modified vegetation

A condition for a 100.5 ha clearing limit ensures that all clearing for the Proposal will be captured by the approval. However, impact assessments for each significant factor have been informed by the respective mapping completed for each factor, as well as all corresponding trigger and threshold criterion in supporting Environment Management Plans and any offsets required. This ensures that:

- the Proposal's impacts to native vegetation are not underestimated, as would be the case if the clearing ratios mapped by the Fauna survey team were used for the impact assessment for Flora and Vegetation
- The value of modified fauna habitats to conservation significant fauna species identified within the PDE, particularly black cockatoos are similarly not underestimated, as would be the case if the Flora and Vegetation survey team mapping were used for the impact assessment.

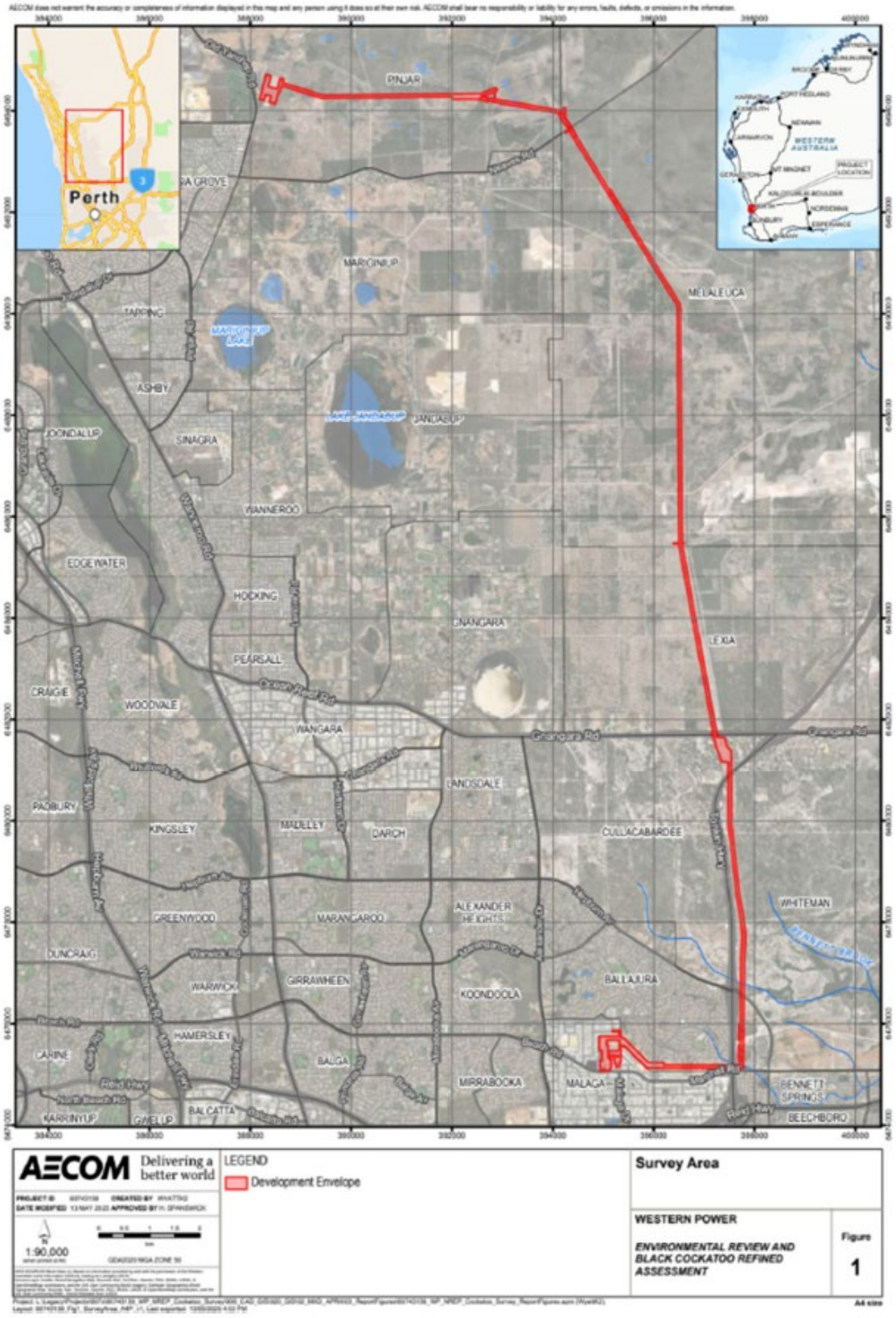
Impacts for the Proposal will be set out in the ERD in the following format when discussing the Proposal's impacts to Flora and Vegetation and Inland Waters (wetland/riparian vegetation):

- An Impact Area of 100.5 ha, comprising:
  - 65.35 ha of native-vegetation
  - 32.73 ha of non-native vegetation

Impacts for the Proposal will be set out in the ERD in the following format when discussing the Proposal's impacts to Terrestrial Fauna:

- An Impact Area of 100.5 ha, comprising:
  - 39.57 ha of native-vegetation
  - 60.85 ha of modified habitat

Figure 1 Proposal Development Envelope



1.3 Proposal Alternatives

1.3.1 Significance of the Proposal for the State

The Western Australian Government's announcement to retire coal generation by 2030 requires the removal of constraints on existing connected generation and additional capacity to allow connection of new generators to the SWIS. It is part of the South West Interconnected System Transmission Plan, which sets out the State Government's vision for Western Power's transmission network and builds on extensive modelling and system planning carried out in the Whole of System Plan 2020, the South West Interconnected System Demand Assessment: 2023 and 2024, and the South West Interconnected System Planning Update. These Plans are publicly available on the WA government website and Western Power website.

The Proposal's construction of a new 330kV transmission line between NT and NBT is required to transmit power produced in the north region of the transmission network. This will provide capacity to connect additional large-scale renewable generation to the SWIS. Reinforcing the north region 330kV network is integral to meeting predicted future power demand and will help to achieve Western Australia's net-zero emissions targets.

1.3.2 Alternatives Considered

The purpose of the Proposal is to significantly increase transmission capacity within the South West Interconnected System to support WA's energy transition. This scale of increased transmission capacity can only be achieved by constructing new transmission lines, with the Proposals second 330kV transmission line between NT and NBT achieving this aim.

Western Power considered different alignments and options during the early development of the Proposal, such as:

- Straight line: this was not considered feasible due to the extensive social impacts, large number of private residences and existing infrastructure that would be impacted.
- Undergrounding: requires significant trenching works and resulted in a greater environmental impact due to the inability to 'span over' sensitive areas with this methodology.
- Utilise existing infrastructure areas and following existing transmission alignments: typically allows for favouring historically impacted, cleared and degraded areas as far as practicable, attempting to balance overall impacts to financial considerations and social and environmental values.

Whilst alternative routes were reviewed, the entry into NT is highly constrained from surrounding urban development, restricting the available line route to the existing Western Power easement between NT and Tonkin Highway. Co-locating the proposed transmission line with the existing 330kV transmission line was considered to have the least impact on surrounding current and future land uses and will minimise environmental impacts by constructing the transmission line in existing disturbed corridor. Other alternative would have increased either the social impacts via proximity to further residential areas or environmental impacts via additional clearing of longer routes in State Forest.

1.3.3 Design Evolution to Avoid and Minimise Impacts

The Proponent has evolved the design and made changes to the line route to avoid important areas, such as significant vegetation, wherever possible. The proposed new line corridor route has been placed adjacent to the existing 330kV and 132kV lines to reduce additional fragmentation of significant vegetation patches along the line route, such as Bush Forever Sites and identified Priority and Threatened Ecological Communities. Design considerations such as where new lines can be strung over patches of vegetation and selection of tower locations have been made with the aim of minimising clearing requirements of areas of identified significant vegetation.

Guidance such as State and Federal conservation advice for identified PEC/TECs as well as State Planning Policies for water resources and bushlands (2.9 and 2.8 respectively) were also consulted to ensure that PEC/TEC values, Conservation Wetland Values and Bush Forever Site values were protected and potential impacts from Proposal construction minimised as far as practicable.

Following discussions and advice from the Department of Biodiversity Conservations and Attractions (DBCA), the new transmission line route was swapped to the western side of the existing transmission line to avoid the Dick Perry Reserve. This reserve protects historically significant pines and recreational areas.

Western Power has undertaken a review of the proposed Impact Area for the Proposal following the receipt of detailed design information. The review was aimed at reducing the proposed clearing of significant environmental values identified within the

Proposal Development Envelope (PDE) and has produced a significantly reduced Impact Area. This revision of the ERD submitted in support of Western Power's response to public submissions has been updated to.

1.4 Local and regional context

1.4.1 Bioregion

The Proposal is within the Swan Coastal Plain bioregion, described in CALM (2002), which includes Perth and the outer suburbs (excluding the Hills suburbs). The Swan Coastal Plain comprises a narrow belt less than 30 km wide of aeolian, alluvial and colluvial deposits of Holocene or Pleistocene age (Gibson *et al.*, 1994). A complex series of seasonal freshwater wetlands, alluvial river flats, coastal limestone and several offshore islands are included in the bioregion. Younger sandy areas and limestone are dominated by heath and/or Tuart woodlands, while Banksia and Jarrah-Banksia woodlands are found on the older dune systems.

1.4.2 Land Systems, Soil and Geology

Land systems are broad descriptions of landform, geology and soils. The Proposal's Survey Study Area is situated across two land systems, which are characterised as follows:

- **Bassendean System**: Sand dunes and sandplains with pale deep sand, semi-wet and wet soils with Banksia-Paperbark woodlands and mixed heathlands. This system occurs across the majority of the Impact Area.
- **Pinjarra System**: Poorly drained coastal plain with variable alluvial and aeolian soils. Vegetation is variable and includes Jarrah, Marri, Paperbark, Sheoak and Flooded Gum. This system occurs across the most southern extent of the Survey Study Area.

A review of Acid Sulfate Soil (ASS) risk (Figure 2) indicates there is a low to high-risk of ASS within 3 m of the natural surface throughout the Impact Area. ASS can become acidified if disturbed or dewatered, potentially contaminating groundwater with acid and heavy metals.

The high-risk areas are primarily associated with wetlands in the southern section of the Impact Area, with a few smaller high-risk sections spread across the remainder of the Survey Study Area. Further details on ASS and associated management and mitigation are presented in Section 8.

1.4.3 Regional Vegetation

Beard *et al*. (2013) mapping is used to determine the extent of remnant vegetation remaining when compared to pre-European vegetation extents. Three vegetation associations are recorded across the Survey Study Area, described in Table 1 with detail of percentage remaining across regional boundaries.

Further details on flora and vegetation and fauna habitats within the Impact Area, based on surveys completed for the Proposal, are provided in Sections 6 and 7.

Table 1 Regional Vegetation Associations and Percent Remaining (Beard *et al*, 2013 & Govt. of WA, 2019)

Vegetation System Association (VSA)	Description	Percentage Remaining (%)			
		Western Australia	Swan Coastal Plain IBRA Region	City of Wanneroo	City of Swan
6	Medium woodland; Tuart & Jarrah	23.72	23.72	21.94	3.13
949	Low woodland; *Banksia*	56.42	57.28	46.30	49.09
1001	Medium very sparse woodland; Jarrah, with low woodland; *Banksia* & *Casuarina*	22.05	22.05	27.71	26.18

1.4.4 Surface Water

The Proposal is located in an area characterised by a complex series of seasonal freshwater wetlands and alluvial river flats. A review of the Geomorphic Wetlands of the Swan Coastal Plain dataset published by the DBCA identified a total of 15 geomorphic wetlands intersected by the PDE (Figure 3).

These comprise all three categories of geomorphic wetland (Resource Enhancement, Multiple Use and Conservation Category), with three Conservation Category Wetlands (CCWs):

- UFI 8439
- UFI 13956
- UFI 8077.

The Proposal also crosses the upper reaches of a tributary of the Bennett Brook, a Registered Aboriginal Heritage site which is discussed in Section9.Further detail on inland waters is provided in Section 8.

1.4.5 Groundwater

The Proposal is located on the Gnangara Mound, a basin of water-holding sands and gravels that forms aquifers used for drinking water and irrigation water. It underlies Perth between the Hills and the coast and the area from the Swan River to Gingin Brook and forms Perth's largest natural water resource. The Proposal is predominantly located in areas utilised for public drinking water abstraction, with the Impact Area passing through the Gnangara Underground Water Pollution Control Area, a Public Drinking Water Source Areas (PDWSA). The Proposal passes through proclaimed Priority 1 to Priority 3 PDWSAs, with the majority of the Impact Area occurring within a Priority 1 area (Figure 4).

- Priority 1 (P1) areas are generally located over land under government ownership, such as state forests. The objective in P1 areas is to avoid unnecessary water quality contamination risks.
- Priority 2 (P2) areas are located on land zoned rural, such as farm land and rural-residential lots. The objective in P2 areas is to minimise water quality contamination risks.
- Priority 3 (P3) areas are located on land zoned urban, commercial and light industrial. The objective in P3 areas is to manage water quality contamination risks.

Works in PDWSA are required to be undertaken in a manner that maintains drinking water quality through conditions on local government Development Applications.

Mapped groundwater contours across the Proposal site show groundwater levels ranging from the surface to more than 20 m depth.

There is one known Department of Water and Environmental Regulation (DWER) registered contaminated site location within the Impact Area in Malaga. The contaminated site (Parcel ID: 14996), located at the southernmost section near Tower 70A, is classified as "Remediated for restricted use" (2017) and has hydrocarbons present in the groundwater beneath the site. Groundwater abstraction is not permitted at this site, and the site is restricted to commercial or industrial land use.

Further detail on inland waters is provided in Section 8.

1.4.6 Climate

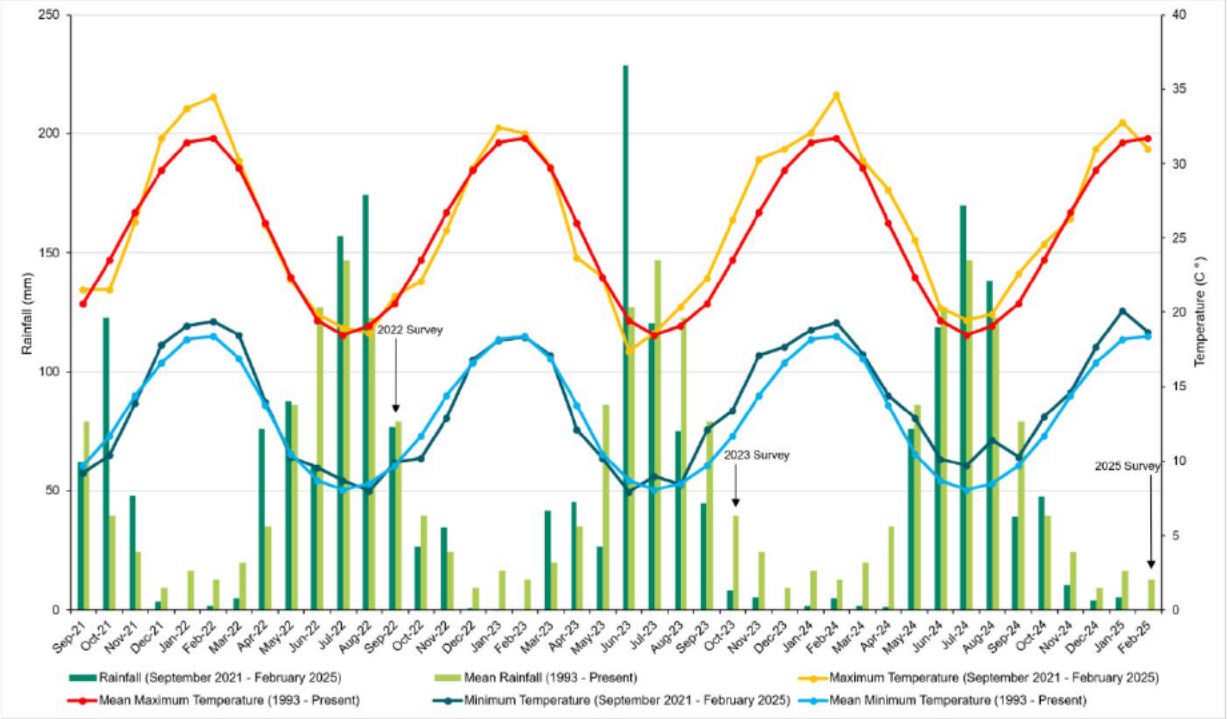
The Proposal is situated approximately 11.4 km north of Perth Central Business District (CBD) at the NT and extends north to NBT in Pinjar, approximately 30.2 km north of Perth CBD. The climate is warm Mediterranean with mild wet winters and hot dry summers. Precipitation occurs predominantly during the winter months, with the possibility of some summer storms.

Climate data was gathered from the Perth Metro WA station (station number 009225), located approximately 7.5 km south of the Proposal's southernmost area (the NT in Malaga). Long-term rainfall and temperature data is compared across 2022, 2023 and 2025 to account for all associated field flora / vegetation and fauna surveys.

For the years 1993 - 2025, annual mean long-term rainfall in the region is 717.40 mm, with a mean annual maximum and minimum temperature of 24.9 and 13.0 respectively (BoM, 2025).

The site elevation ranges between 40 and 70 mAHD.

Figure 5 Rainfall and Temperature Data from Perth Metro WA from September 2021 to February 2025 (station number 009225)



1.4.7 Conservation Areas

The Proposal intersects the DBCA managed Gnangara-Moore River State Forest (116.44 ha) and also intersects with 70.97 ha of Environmentally Sensitive Areas (ESAs) of which, 25.31 ha is associated with Bush Forever Sites and 25.09 ha with wetlands (Table 2) (Figure 6).

Table 2 Conservation Reserves and ESAs

Area	Development Envelope Extent (ha)
Gnangara- Moore River State Forest	116.44 ha
Bush Forever Sites 104, 198, 304, 398, and 399.	45.88 ha
Wetlands	25.09 ha

1.4.8 Social Context

The Proposal extends between Malaga in the City of Swan and Pinjar in the City of Wanneroo.

The City of Swan covers an area of approximately 1,042 km² and has a population of 152,974 (ABS, 2021a). The City is an urbanised area, centred approximately 20 km north-east of Perth' CBD.

The City of Wanneroo is located to the north of the Proposal, covering a smaller area of approximately 685.8 km². The City is more densely populated, with a population of 209,111 (ABS, 2021b) and is centred approximately 25 km north of Perth's CBD.

2. Legislative context

2.1 Environmental Impact Assessment Process

2.1.1 State

In Western Australia, the EP Act is the primary legislative document for environmental regulation and impact assessment. Environmental Impact Assessment (EIA) is covered under Part IV of the EP Act and a process has been developed to assist proponents in determining if a proposal is likely to have significant environmental impact and therefore requires a referral (EPA, 2023a). Proposals with potential to have significant effects are referred to the EPA under Section 38 of the EP Act. If a proposal is deemed "a significant proposal", the EPA will formally assess it to determine the extent of the proposal's direct and indirect impacts, and whether the EPA environmental factor objectives can be met.

Under section 39 of the EP Act, the EPA is required to issue a public notice for eery referred proposal, regardless of whether it decides to assess the proposal or not. If the EPA determines that the likely environmental effects of the proposal are so significant to warrant a formal assessment, the EPA Chair will issue a section 39 notice advising that the proposal can be appropriately managed under other statutory processes.

This document forms the Proposal referral under Section 38 of the EP Act and has been prepared in accordance with *EPA Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* (EPA, 2024a) and *Instructions: How to prepare an environmental review document* (EPA, 2024b).

2.1.2 Commonwealth

The EPBC Act is administered by the DCCEW. Under the EPBC Act, the Minister for the Environment and Water determines whether an action is a '*controlled action*' which would have, or is likely to have, a significant impact on MNES or Commonwealth land. If this is the case, the action may not be undertaken without prior approval from the Minister for the Environment and Water.

If the outcome of a self-assessment concludes an action likely to have a significant impact on any MNES, or if the impact is undetermined, the action should be referred to the Minister. If the Minister determines the action is likely to have a significant impact, then the action will be determined as a controlled action requiring approval under the EPBC Act.

An assessment of MNES relevant to this Proposal, in accordance with the *Matters of National Environmental Significance - Significant Impact Guidelines 1.1* (DoE, 2013a), is provided in Section 11. Based on this assessment, Western Power referred the proposal to the DCCEEW in February 2024.

2.2 Other Approvals and Regulation

Other statutory decision-making processes that are able to assess and regulate impacts of the Proposal on native vegetation, flora and fauna are listed in Table 3.

Table 3 Additional Regulations and Approvals

Authority	Legislation	Approval Required	Relevance to Impact Assessment and Regulation
Department of Planning, Lands and Heritage (DPLH)	*Planning and Development Act 2005*	Development Application Bush Forever sites	**Yes** The Development Application process considers conflicting and compatible land uses. This will require supporting documentation in line with the impact assessment requirements of *State Planning Policy 2.8: Bushland Policy for the Perth Metropolitan Region*. This process can be used to set offsets for clearing of Bush Forever. A Development Application will be lodged with the City of Swan and City of Wanneroo concurrently with the EPA referral.

Authority	Legislation	Approval Required	Relevance to Impact Assessment and Regulation
	Aboriginal Heritage Act 1972	Section 18 Application	**Yes** A Section 18 will be lodging concurrently with DPLH supported by the cultural heritage survey and engagement feedback.
Department of Water and Environmental Regulation (DWER)	*Rights in Water and Irrigation Act 1914* (RiWI Act)	-	**Yes** The Proponent is exempt from requiring a 5C Licence to take groundwater under the RiWI Act for any proposed dewatering activities due to the rights conferred under Section 49 of the *Energy Operators (Powers) Act 1979*. However, permission to discharge waste water is still required from affected landowner/s or relevant regulatory agency (e.g. Water Corporation). Dewatering discharge will be managed in accordance with the *Water Quality Protection Note 13 Dewatering of soils at construction sites.*
	RiWI Act - Section 11, 17 and 21A	Beds and Banks Permit	**Yes** Under the bed and banks permit application process, an assessment of key environmental considerations is typically conducted. This assessment outlines the management measures to be implemented to minimise environmental impacts on watercourses. A bed and banks permit will be applied for in relation to any proposed watercourse crossings.
Department of Biodiversity Conservation and Attractions (DBCA)	*Biodiversity Conservation Act 2016* - Section 40	Authorisation to Take	**Yes** There is the potential for threatened flora to be impacted by clearing activities associated with the construction of the Proposal. Pre-clearance targeted flora surveys will identify the extent of the species *Calectasia elegans* within the PDE and an application under section 40 of the BC Act applied for any unavoidable impacts to the species.

2.2.1 Decision-making in parallel to an environmental assessment process under Part IV, EP Act

Consistent with the recent amendment to the EP Act, all the secondary approvals listed in the table above should be applied for in parallel to the assessment under Part IV, unless they are prescribed as either a restricted decision under the definition of that term in section 41(1A) as inserted by section 13(1) of the amending Act. The following information provides more context to the parallel decision-making process.

In response to the *Independent Review of WA Environmental Approvals Processes and Procedures*, the WA Government has undertaken legislative reforms to the EP Act to remove the previous restrictions under s.41(3) and enable Decision Making Authorities (DMAs) to make decisions in parallel with an environmental assessment process under Part IV of the EP Act.

We acknowledge that to ensure the environmental protection is maintained, no decision made in parallel with a Part IV assessment will authorise a proposal to be implemented before a final decision is made under Section 45 of the EP Act as to whether a proposal may be implemented.

This amendment is applicable to all DMAs from the time that they are served a notice from the EPA under s38G(1)(b)(iii) or (5) of the EP Act of its decision to assess a proposal and only in relation to decisions that relate to that proposal.

3. Stakeholder Engagement

3.1 Stakeholder Identification and Engagement Process

Western Power began engaging with primary stakeholders in mid-2022, conducting community consultation to identify key stakeholders and their areas of interest. Stakeholder Engagement has focused on the following objectives:

- Informing stakeholders about the Proposal and its potential impacts, including confirmation that the route will utilise the existing easement where possible.
- Gathering insights from local community members and stakeholder groups to ensure their perspectives are considered throughout Proposal design evolution.
- Initiating early discussions with regulars to identify their interests and any potential concerns that could influence the Proposal's development.

Key stakeholders and their areas of interest have been outlined in Table 4 below.

Table 4 Identified Key Stakeholders

Stakeholder Group	Stakeholder	Primary Areas of Interest
State Government	Department of Planning, Lands and Heritage (DPLH)	• Potential impacts on Malaga Station Precinct • Extent of Proposal's easement
	Department of Conservation, Biodiversity and Attractions (DBCA)	• Impacts to the Dick Perry Reserve • Construction management
	Western Australian Planning Commission / Whiteman Park	• No concern re the alignment presented
	Metronet	• No concerns re the alignment presented
	Main Roads WA	• Alignment in relation to ongoing MRWA operations.
	Local Member for Swan	• Alignment in relation to residents and ongoing planning.
Local Government	City of Swan	• Alignment in relation to residents and ongoing planning.
	City of Wanneroo	• Alignment in relation to residents and ongoing planning.
Traditional Owners	Aboriginal Traditional Owners	• Impacts to Registered Aboriginal Heritage Places Bennett Book in Toto (Legacy ID S02254) and South Ballajura Camp (Legacy ID S02728)
Surrounding Landowners	Landowners in the Ballajura easement corridor	• Property devaluation • Visual amenity • Electromagnetic field (EMF) • Noise • Environment and biodiversity impacts • Overhead design • Proximity to homes • Use of land within the easement by landowner

Stakeholder Group	Stakeholder	Primary Areas of Interest
	Landowners near the Proposal corridor, with no easement over property	• Property devaluation • Visual amenity • EMF • Noise
	Landowners in Ballajura and Malaga within 1 km of the Proposal	• Ongoing engagement leading up to construction.
Local Communities	Community members, local businesses	• Cyrenian House – proximity of the Proposal to the childcare centre

3.2 Stakeholder Consultation

Community consultation and engagement has been undertaken via engagement methods presented in Table 5.

Table 5 Stakeholder Engagement Mechanisms

Mechanism	Targeted Stakeholder
Project briefing / meetings	Commonwealth, State and Local Government agencies, Landowners in the Ballajura easement corridor, Traditional Owners
Letters / correspondence / email / phone calls	State and Local Government agencies, Traditional Owners, surrounding landowners, local communities
Survey / feedback form	Landowners in the Ballajura easement corridor, Landowners near the Proposal corridor, with no easement over property
Engagement events	Cities of Swan and Wanneroo, Local Member for Swan
Community information sessions	Surrounding landowners
Personal meeting / home visit	Landowners in the Ballajura easement corridor

3.3 Stakeholder consultation outcomes

Significant consultation with State and Local Regulatory authorities has been completed, in addition to engagement with key landowners, Traditional Owners and local community groups and members. A summary of outcomes from consultation undertaken to date is presented below in Table 6.

Table 6 Stakeholder Consultation Outcomes

Stakeholder	Date/s	Issue/Topics Raised	Proponent Responses/Outcomes
State Government Stakeholders			
Department of Planning, Lands and Heritage (DPLH)	April 2023 – present	Discussion around potential impacts on Malaga Station Precinct planning area, and whether widening of the Proposal easement is required. The draft precinct structure plan for the Malaga Station Precinct refers to the easement and consultation with Western Power prior to the consideration of future development applications in the area.	Noted. The Proposed transmission line can fit within the existing easement.
Department of Conservation, Biodiversity and Attractions (DBCA)	Completed	Discussion around the area north of Gnangara Road, a preference that the line follows the west side of the corridor to minimise impacts on the Dick Perry Reserve.	The alignment has moved to the west side of the corridor.
Western Australian Planning Commission / Whiteman Park	February 2023	No concerns raised about the alignment presented.	Updates will be provided through the planning and construction phases of the Proposal to keep Whiteman Park and WAPC informed.
Metronet	September 2023	No concerns raised about the alignment presented.	N/A
Local Government Stakeholders			
City of Swan	April 2023 – present	No concerns raised about the alignment presented. Would like to be kept informed as the Proposal evolves.	Updates will be provided through the planning and construction phases of the Proposal to keep the City of Swan informed.
City of Wanneroo	April 2023 – present	No concerns raised about the alignment presented. Would like to be kept informed as the Proposal evolves.	Updates will be provided through the planning and construction phases of the Proposal to keep the City of Wanneroo informed.
Local Member for Swan	June 2023 – present	No concerns raised about the alignment presented. Would like to be kept informed as the Proposal evolves.	Updates will be provided through the planning and construction phases of the Proposal to keep the Member for Swan informed.

Stakeholder	Date/s	Issue/Topics Raised	Proponent Responses/Outcomes
Traditional Owner Stakeholders			
Aboriginal Traditional Owners	November & December 2023 August & September 2024	Potential impacts to the Registered Aboriginal Heritage Places *Bennett Book in Toto* (Legacy ID S02254) and *South Ballajura Camp* (Legacy ID S02728). Participation in ethnographic and archaeological surveys.	An archaeological survey was completed in November 2023, followed by an ethnographic survey in December 2023, in collaboration with Whadjuk Traditional Owners. An Archae-aus anthropologist, employed by Western Power, contacted Whadjuk Traditional Owners in August and September 2024 to discuss the Proposal's heritage report and the Proponent's Section 18 application.
Landowner and Local Community Stakeholders			
Landowners in the Ballajura easement corridor	April 2022 – present	Discussions around impacts associated with property devaluation, visual amenity, EMF, noise, environment and biodiversity, overhead design, proximity to homes and the use of land within the easement by landowners. A petition objecting to the Proposal was signed by 50 residents and business owners in Ballajura and Malaga.	A noise and EMF study has been completed.
Landowners near the Proposal corridor, with no easement over property	July 2023	Discussions around impacts associated with property devaluation, visual amenity, EMF and noise.	A noise and EMF study has been completed.
Landowners in Ballajura and Malaga within 1 km of the Proposal	Planned	N/A	N/A
Cyrenian House	Completed	Discussion around the proximity of the line to the childcare centre.	The alignment has been relocated further away from the facility.

4. Object and principles of the EP Act

The objects and principles of the EP Act are outlined in Section 4A, with the objective being to protect the Western Australian environment through adherence to the five principles. Table 7 summarises how the Proposal has considered each of these five principles.

Table 7 Object and Principles of the EP Act

Principle	Proposal Consideration
1. The precautionary principle *Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.* *In this 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 range of baseline studies and investigations have been undertaken to determine the environmental, heritage and social impacts associated with the Project Impact Area. These studies enabled careful evaluation of potentially relevant environmental factors and have informed Proposal design to avoid and minimise potential impacts as far as practicable. Assessments have been completed by qualified consultants and undertaken in accordance with the relevant EPA guidelines where available. There is a high degree of confidence in the data used for these assessments, and the subsequent conclusions drawn. The conclusions of these studies were used to apply the precautionary principle through the following avoidance measures: Prioritising use of the existing transmission alignment and limiting vegetation clearing to 100.5 ha. Proposal design evolution and placement of Proposal infrastructure to avoid sensitive values where practicable, including TEC, native vegetation and Aboriginal and Historical places.
2. The principle of intergenerational equality *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 will utilise modern technologies to enable greater connection between the Perth Metropolitan energy users to current and proposed renewable energy generation in the mid-West. This will assist in the phasing out of coal fired power generation over the next seven years and reduce the carbon emissions of the South West Interconnected System as a whole. The Proposal will ultimately help to reduce climate change, reducing future impacts to flora, fauna and ecological communities.
3. Principles in relation to improved valuation, pricing and incentive mechanisms *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 wastes.* *Environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.*	Western Power is committed to providing access to affordable and clean energy for local customers, while reducing the greenhouse gas emissions in support of decarbonisation. The economic costs associated with the Proposal will be borne by the proponent. The proponent has factored in the costs associated with implementing environmental management, monitoring and offsetting costs. The Proposal also aligns with the Western Australia State Government's target to retire coal generation by 2030.
4. The principle of conservation of biological diversity and ecological integrity *Conservation of biological diversity and ecological integrity should be a fundamental consideration.*	Environmental studies have considered the presence of Threatened and Priority flora, vegetation and fauna communities and vegetation condition, in accordance with the EPA guidelines. These assessments have informed the design and operation of the Proposal to ensure biological diversity and ecological integrity of the site is not

Principle	Proposal Consideration
	compromised. Mitigation measures have been developed so as not to compromise biodiversity or ecological integrity.
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.*	The hierarchy of waste controls will be applied and all reasonable and practicable measures to reduce waste generation will be implemented to minimise waste, including: • Avoidance and reuse of waste at source. • Reuse and recycling measures adopted where practicable. • Collection and removal of all waste from site.

5. Environmental Factors and Objectives

To determine whether the Proposal is likely to have significant residual impacts on the environment, the scope and activities of the Proposal were considered against the EPA's Statement of environmental principles, factors, objectives and aims of EIA (EPA, 2023a).

The EPA has 14 environmental factors, grouped into five themes: Sea, Land, Water, Air and People. Each factor has an associated environmental objective, which is used to determine whether the impact can be deemed significant (EPA, 2023a).

Western Power considered the Proposal activities and environmental context to identify the Key Environmental Factors and Other Environmental Factors relevant to the Proposal. Table 8 lists the environmental factors and classifications relevant to this Proposal and indicates the Section number for each factor. The MNES are identified where relevant under each factor and summarised in Section 11.

Analysis of all key factors has already been provided for consideration by the EPA on 22 February 2024. This document will only discuss those four factors determined relevant by the EPA Chair (Assessment No 2410), when the level of assessment was set on 20 March 2024:

- Flora and Vegetation (Section 6)
- Terrestrial Fauna (Section 7)
- Inland Waters (Section 8)
- Social Surroundings (Section 9)

The remaining environmental factors are not deemed relevant to the Proposal and are not discussed further.

Table 8 Consideration of EPA Factors and Objectives and relevance to the Proposal

Environmental Factor	Objective	Classification	Basis of Classification	Section
Sea				
Benthic communities and Habitat	To protect benthic communities and habitat so that biological diversity and ecological integrity are maintained	Not assessed environmental factor	The Proposal is not within or surrounded by any marine environments.	N/A
Coastal Processes	To maintain the geophysical processes that shape coastal morphology so that the environmental values of the coast are protected.	Not assessed environmental factor		N/A
Marine Environmental Quality	To maintain the quality of water, sediment, and biota so that environmental values are protected.	Not assessed environmental factor		N/A
Marine Fauna	To protect marine fauna so that biological diversity and ecological integrity are maintained.	Not assessed environmental factor		N/A

Environmental Factor	Objective	Classification	Basis of Classification	Section
Land				
Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.	**Key Environmental Factor**	The Proposal will result in clearing of up to 98.08 ha of vegetation, including 65.35 ha of native vegetation (refer to Section 1.2). Additionally, clearing of 2.67 ha of TEC/PECs is required.	Section 6
Landforms	To maintain the variety and integrity of distinctive physical landforms so that environmental values are protected.	Not assessed environmental factor	There are no significant landforms within the Proposal area, and no landforms will be removed.	N/A
Subterranean Fauna	To protect subterranean fauna so that biological diversity and ecological integrity are maintained.	Not assessed environmental factor	The Impact Area is part of the broader Gnangara Mound which forms an extensive aquifer. No conservation significant subterranean fauna have been identified through desktop assessment (AECOM, 2023).	N/A
Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.	Not assessed environmental factor	Dewatering for footings installation may impact Acid Sulfate Soils within the Impact Area. This will be managed in accordance with DWER guidance on *Treatment and management of soil and water in acid sulfate soil landscapes* (DER, 2015).	N/A
Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.	**Key Environmental Factor**	The Proposal requires clearance of up to 100.5 ha of fauna habitat, comprising 39.57 ha of native fauna habitat and 60.85 ha of modified fauna habitat (refer to Section 1.2). This includes habitat for conservation significant species, including black cockatoo species.	Section 7
Water				
Inland Waters	To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.	**Key Environmental Factor**	The Proposal requires clearing of 0.8 ha within CCWs, with additional potential impacts to groundwater and surface water quality due to soil acidification risks to the identified wetlands.	Section 8

Environmental Factor	Objective	Classification	Basis of Classification	Section
Air				
Air Quality	To maintain air quality and minimise emissions so that environmental values are protected.	Not assessed environmental factor	The main potential impact to air quality will be the generation of dust during construction. Dust impacts will be managed using standard practices and implementation of the project Construction Environmental Management Plan (CEMP). The Proposal is not envisaged to impact on air quality.	N/A
Greenhouse Gas Emissions	To minimise the risk of environmental harm associated with climate change by reducing greenhouse emissions as far as practicable.	Not assessed environmental factor	The construction of the Project will result in the generation of greenhouse gases. The operation of the transmission line itself will not generate Scope 1 greenhouse gas emissions. Ultimately, through the improvement in efficiency of transmission of electricity, the transmission line will reduce greenhouse gas emissions per unit of energy consumed.	N/A
People				
Social Surroundings	To protect social surroundings from significant harm.	**Key Environmental Factor**	The Proposal presents potential impacts to two Registered Aboriginal Cultural Heritage sites, one Registered Historic Heritage site and the DBCA managed Dick Perry Reserve, through construction activities associated with noise, vibration and dust.	Section 9
Human Health	To protect human health from significant harm	Not assessed environmental factor	There will be no mining, processing, transporting, storage or emission of radioactive materials. The proposed line will adhere with ICNIRP reference levels for both electric and magnetic fields.	N/A

6. Flora and Vegetation

The EP Act defines native vegetation as indigenous aquatic or terrestrial vegetation. For the purposes of EIA, flora is defined as native vascular plants, and vegetation is defined as groupings of different flora patterned across the landscape that occur in response to environmental conditions (EPA, 2016a).

6.1 EPA Objective

The EPA's objective for the factor of Flora and Vegetation is "to protect flora and vegetation so that biological diversity and ecological integrity are maintained" (EPA, 2016a).

6.2 Relevant Policy and Guidance

Table 9 summarises the relevant policy and guidance considered for the factor Flora and Vegetation.

Table 9 Policy and Guidance - Flora and Vegetation

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Flora and Vegetation (EPA, 2016a).	This guidance was used to inform the impact assessment undertaken for Flora and Vegetation and the significance of the potential environmental impacts.
Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016b).	This document guides the appropriate obtainment and collation of flora and vegetation data to be used in EIA. All studies conducted for the Proposal are in accordance with this guidance document.
Instructions on how to prepare an Environmental Review Document (EPA, 2024b).	This document has been prepared in accordance with these instructions. This applies to all sections of the ERD.
Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA) (EPA, 2021)	All data gathered from field surveys has been prepared and submitted in accordance with IBSA guidelines. This applies to all sections of the ERD.
Other State or Commonwealth Legislation or Guidance	
Biodiversity Conservation Act 2016 (BC Act) (WA)	The Proposal has avoided disturbance of native vegetation as far as reasonably practicable.
Biosecurity and Agriculture Management Act 2007 (BAM Act) (WA)	Declared pests under the BAM Act will be considered and managed during the construction and operational phases of the Proposal.
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	The Proposal is undergoing referral under the EPBC Act. An assessment against MNES has been undertaken to support the referral.
Matters of National Environmental Significance- Significant Impact Guidelines (No. 1.1): (DoE, 2013a)	This guidance was adhered to during the preparation of the EPBC referral to meet current referral standards.

6.3 Receiving Environment

6.3.1 Surveys and Studies

Flora and vegetation surveys and assessments have been undertaken within the Proposal's Survey Study Area to determine the baseline environment and inform Proposal avoidance and design. Details of these surveys are presented in Table 10 and Figure 7.

Table 10 Flora and Vegetation Surveys

Survey	Survey Description	Survey Guidance
NREP 1-NT-NBT 330kV Line Flora, Vegetation and Fauna Assessment (AECOM, 2023)	Survey completed by 3 botanists and included 23 quadrats, 12 relevés and 8 observation points across the Survey Area (576 ha). Targeted surveys for threatened flora species identified as having the potential to occur, including *Caladenia heugelii,* were also undertaken. Survey completed over 5, 8 and 9 September, 5-7 October, and 8 November 2022.	EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment* DoE (2013b) Draft *Survey Guidelines for Australia's Threatened Orchids*
Clean Energy Link Swan Coastal Plain Flora, Vegetation and Fauna Assessment (AECOM, 2024)	An additional unpublished report for Western Power, completed by AECOM (2024) for the Clean Energy Link Swan Coastal Plain project. The survey consisted of four distinct survey areas, two of which intersect the DE, the Neerabup Terminal to East Wanneroo survey area (204.98 ha) and the Northern Terminal survey area (25.78 ha). Refer to Appendix D for further information.	EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*
Environmental Review and Black Cockatoo Refined Assessment – NT to NBT 330kV Double Circuit (AECOM, 2025)	A component of this survey included an environmental review to address data gaps related to flora and vegetation within the amended DE for the Proposal. The review aimed to identify any new or previously unassessed ecological values and reconcile inconsistencies between earlier assessments and the refined DE.	EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*

An addendum to on the Flora and Vegetation surveys completed for the Proposal is presented in Appendix C.

Desktop Assessment Methodology

A comprehensive desktop assessment was undertaken prior to conducting flora and fauna field surveys to identify significant environmental values potentially present within the survey area, including flora species and vegetation communities. Desktop database searches were requested from the following government databases (including a variable radius)

- DBCA Threatened Species and Communities database including Threatened and Priority flora, communities and Threatened and Priority fauna within a 20 km buffer of the Study Survey Area.
- Western Australian Herbarium (WAH, 1998-) records.
- EPBC Act Protected Matters Search Tool (PMST) (20 km buffer from Study Survey Area).
- Atlas of Living Australia (AoLA) database.
- BirdLife Australia (Birdlife Australia, 2024).
- Index of Biodiversity Surveys for Assessments (IBSA) portal.

The likelihood of occurrence for significant flora and fauna species was systematically evaluated using a point-based methodology. This assessment considered factors such as proximity (defined as within 5 km) recency of known records (within the past 20 years), presence within the Local Government Area (LGA) and habitat suitability (Table 11).

Table 11 Categories of Likelihood of Occurrence for Flora Species

Likelihood of Occurrence	Definition
Known	Species is known to occur in the survey area.
High (Likely)	Not known to occur in the survey area however there are records within 5 km and suitable habitat for the species is known or likely to be present within the survey area.

Likelihood of Occurrence	Definition
Moderate (Possible)	Species is not known to occur within the survey area however there are within 5 km AND/OR recent records OR records within the LGA AND suitable habitat for the species is known or likely to be present within the survey area. OR Not known to occur within the survey area but there are records nearby AND recent records AND records within the LGA, and suitable habitat for the species may be present (marginal habitat).
Low (Unlikely)	Species is not known to occur within the survey area but there are records nearby OR recent records OR within the LGA AND suitable habitat for the species may be present (marginal habitat).
Negligible (Suitable Habitat not Present)	Despite records nearby OR being present within the LGA OR recent records, no suitable habitat is present within the survey area and therefore the likelihood of the species occurring is negligible.

Flora and Vegetation Survey Methodology

A detailed flora and vegetation assessment was completed across a number of days in September, October and November 2022, utilising methods outlined in the *Flora Survey Technical Guide* (EPA, 2016b). Floristic data was collected from 23 quadrats, 12 relevés, and 8 observation points as well as mapping notes. Data collected included the presence of plant species, their cover abundance, structural composition of vegetation, physical environment and presence/absence of disturbance.

Each site was given a unique site number, and the following parameters recorded:

- date
- location using hand-held GPS (accuracy of 5 m)
- sample site type and size.
- photograph (north-west corner)
- soil details (type, colour, moisture)
- landform
- vegetation condition
- fire history
- species list including estimated height and estimated percentage cover

Any species unable to be identified in the field were collected for identification in AECOM's in-house herbarium and the specimens and taxonomic references and keys at the Western Australian Herbarium (WAH). Naming of species followed the convention of the WAH (1998-).

Vegetation Mapping

Vegetation communities were described and mapped based on change in dominant species composition and landform. Vegetation community descriptions were based on the Association Level V in accordance with the National Vegetation Information System (NVIS) Framework (DCCEEW, 2024a). Delineation of vegetation communities was supported by analysing floristic data collected within quadrats.

Vegetation condition was determined using the Keighery (1994) vegetation condition scale as recommended in the *Flora Survey Technical Guide* (EPA, 2016b).

The Survey Study Area lies within the known range of the Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community (Banksia Woodlands TEC). Patches that included a dominant or co-dominant overstorey of *B. attenuata, B. menziesii B. prionotes* or *B. ilicifolia* were considered for further assessment. Patches that were clearly not associated with Banksia Woodlands, e.g. had no Banksia overstorey species, were excluded.

For each patch, the key diagnostic characteristics, condition, size and relevant contextual information was considered as published in the Conservation Advice (DCCEEW, 2016). The condition of the patch was informed by species richness of quadrat data compared to available datasets, most notably the Keighery *et al.* (2012) Swan Coastal Plain (SCP) dataset and weed cover.

The condition of the patch and size thresholds are then used to determine whether the quality of the patch is suitable to meet the federally protected ecological community standards.

Targeted Flora Searches

Targeted searches were undertaken for conservation significant flora species that were known or likely to occur. A detailed field guide was produced which included photographs and describing morphological features that would assist in identifying the species in the Survey Study Area.

Where a potential significant flora species was encountered, the following was recorded:

- location (using a hand-held tablet)
- the number of individuals in the immediate population, or an estimate of the size (number) of the population with an estimated radius of its spatial extent plant height
- vegetation condition
- associated dominant species.
- soil type and colour
- topography
- additional information relevant to the area including key characteristics and landforms.

Floristic Community Type Analysis

Floristic Community Type (FCT) analysis was undertaken for two quadrats situated in Banksia Woodlands in very good condition. The Keighery (2012) and Gibson *et al*. (1994) SCP datasets were used for the FCT analysis. The survey data was reconciled with this dataset. Analysis was undertaken using Primer-e, adding three quadrats separately to the SCP dataset. This avoids skewing the original clustering results of the data. Methods were undertaken as best as practicable according to draft DBCA methods (DBCA, 2021).

The analysis considered the Keighery *et al* (2012) (herein after referred to as Keighery SCP) dataset with 1,098 quadrats. The following steps were taken in accordance with the DBCA (2021) TEC identification guidelines:

- Nomenclature was reconciled between the Project, Keighery SCP and Gibson SCP data
- Species were amalgamated or removed, including hybrids, singletons, indeterminate taxa, or species that are difficult to differentiate
- Single-site insertion was used for datasets
- Presence/absence matrices were produced.
- Primer-E was used to undertake the following:
- Bray-Curtis coefficient was used to generate resemblance matrices. Sites with the highest similarity were extracted and documented in the results table.
- Agglomerative hierarchical clustering using group average linkage method to produce dendrograms that represent relationships between the Project quadrats and SCP groups and sites.

The Bray Curtis dissimilarity measure was used to quantify the compositional similarity between the quadrats based on presence / absence data. This method is easily interpretable and provides meaningful results. A sense check was completed incorporating appropriate geology, soils, landscape and the description provided in the Gibson *et al*. (1994) reference material and Bush Forever (Govt. of WA, 2000). Critical analysis of relevant features include soil, landform, hydrological status, and common species was undertaken for all inferred FCTs.

6.3.2 Adequacy of Surveys

Surveys were undertaken in accordance with EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*, including appropriate survey timings and by suitably qualified consultants with more than 15 years' experience.

The entire Survey Study Area was not accessible on foot and several private properties were not accessible. However, this was not considered to be a limitation as the private properties represented degraded vegetation, while extensive survey records existed for other areas of the Survey Study Area.

Opportunistic collections were made of additional species not collected within quadrats, where encountered.

The flora and vegetation surveys provide suitable information which form the basis for the environmental assessment of flora and vegetation in the Impact Areas.

6.3.3 Survey Findings

Desktop Assessment

Three vegetation associations were identified as intersecting the Survey Study Area, as mapped by Department of Primary Industries and Regional Development (DPIRD) (2019). Beard *et al.* (2013) mapping is used to determine the current extent of remnant vegetation remaining when compared to Pre-European vegetation extent. The three vegetation associations are described below and in Table 1:

- Medium woodland; Tuart & Jarrah (VSA 6)
- Low woodland; *Banksia* (VSA 949)
- Medium very sparse woodland; Jarrah, with low woodland; *Banksia* & *Casuarina* (VSA 1001)

The desktop assessment identified 108 significant flora species with the potential to occur within the Survey Study Area. Of these, eight species are considered to have a 'high' likelihood of occurrence (seven Priority flora species and one Threatened species, *Caladenia huegelii*).

A further twenty-two (22) significant flora species were considered to have a 'moderate' likelihood, with the remaining 76 considered to have a 'low' to 'negligible' likelihood based on lack of suitable habitat (refer to Appendix B - AECOM (2023) Flora and Vegetation Assessment).

Twelve conservation significant orchid species were identified in desktop assessments (AECOM, 2023). Only one species, *C. huegelii*, was considered to have a high likelihood of occurrence with the remaining 11 species considered to have a low to negligible likelihood of occurrence due to a lack of recent records (<20 years old), distance (>5 km) and habitat suitability.

Interrogation of the DBCA's Threatened and Priority Ecological Communities (TECs/PECs) Database identified sixteen listed communities, including seven communities listed under the EPBC Act and eight listed under the *Biodiversity Conservation Act 2016* (BC Act). Five TECs have a buffer that overlaps with the Survey Study Area, and another two occur within 1 km. These are described below in Table 12.

Comprehensive flora and vegetation desktop results are presented in Appendix B, Appendix C and Appendix D.

Table 12 Threatened Ecological Communities identified in the Desktop Assessment

Community Name and Description	Cons. Status*		Distance from Survey Study Area
	EPBC	WA	
Banksia Dominated Woodlands of the Swan Coastal Plain IBRA Region	E	P3	0 km
Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson *et al.* (1994))	(E)	EN	0.7 m
Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c)	(E)	P3	0 km
Banksia ilicifolia woodlands (floristic community type 22)	(E)	P3	0 km
Swan Coastal Plain *Banksia attenuate-Banksia menziesii* woodlands (floristic community type 23b)	(E)	P3	0 km
Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	E	CR	0.3 km

Community Name and Description	Cons. Status*		Distance from Survey Study Area
	EPBC	WA	
Southern wet shrublands, Swan Coastal Plain (floristic community type 2 as originally described in Gibson *et al*. (1994))	-	EN	0 km

*Acronyms in brackets indicate it is part of, or entirely representative of a federally listed TEC
E – Endangered, EN – Endangered, CR – Critically Endangered, P3 – Priority 3

Field Surveys

Vegetation Communities

A total of fifteen (15) vegetation communities were defined and mapped in the initial 2022 biological surveys completed by AECOM (Table 13) (Figure 8), including five Banksia Woodlands, three Eucalypt Woodlands and five Wetlands. Native vegetation was mapped for 175.01 ha, encompassing 30% of the Survey Study Area (576.3 ha). The remaining 401.29 ha represents modified areas such as cleared land or plantations (70%). Following this survey, Western Power amended the PDE and proposed disturbance footprint. AECOM undertook a survey in 2025 to reconcile the differences in PDE boundaries and also refined the vegetation unit mapping. This resulted in a reclassification of portions of the Adenanthos Pine Plantation vegetation unit (PpAcCe) from non-native to native vegetation due to the presence of native species in the understorey. The revised vegetation units are detailed in the assessment of impacts sections of this document (Table 24, Section 6.6.1).

The most dominant vegetation communities are non-native, being Plantation – Pinus pinaster for 132.23 ha (23.3%) and Paddock for 188.51 ha (33.2%). Cleared areas devoid of any vegetation extends across 67.37 ha, representing 12% of the Survey Study Area.

Table 13 Vegetation Communities mapped within the Proposal Survey Study Area

Community	Description	Condition	Extent within the Survey Study Area (ha)
Banksia Woodlands			
BaBeAn	*Banksia attenuata* and *Banksia menziesii* low open woodland over *Beaufortia elegans, Jacksonia sternbergiana* and *Bossiaea eriocarpa* mid to low open shrubland over *Alexgeorgea nitens, Desmocladus flexuosus* and *Lyginia barbata* low sedgeland. **Represents Banksia Woodland TEC.**	Very Good - Excellent	9.52 ha (1.6%)
BaCpSr	*Banksia attenuata* and *Banksia menziesii* low open woodland over *Conostephium pendulum*, *Melaleuca trichophylla* and *Xanthorrhoea preissii* mid to low sparse shrubland over *Scaevola repens*, *Lobelia heterophylla* and *Phlebocarya ciliata* low open forbland. **Represents Banksia Woodland TEC.**	Excellent	0.42 ha (<1%)
BaXpPo	*Banksia attenuata, Banksia menziesii* and *Nuytsia floribunda* low woodland over *Xanthorrhoea preissii, Beaufortia elegans* and *Melaleuca seriata* mid to low open shrubland over *Patersonia occidentalis, Lyginia barbata* and *Stylidium repens* low open forbland. **Represents Banksia Woodland TEC.**	Excellent	20.18 ha (3.5%)
EtHsLb	*Eucalyptus todtiana, Banksia attenuata* and *Banksia menziesii* low open woodland over *Hibbertia subvaginata*, *Adenanthos cygnorum* var. *cygnorum* and *Hemiandra glabra* tall to low shrubland over *Lyginia barbata, Patersonia occidentalis* and *Alexgeorgea nitens* low sparse forbland. **Represents Banksia Woodland TEC.**	Good - Excellent	41.58 ha (7.3%)
BaEpPo	*Banksia attenuata*, *Banksia menziesii* and *Eucalyptus todtiana* low woodland over *Eremaea beaufortioides*, *Beaufortia elegans* and *Hibbertia hypericoides* low shrubland over *Patersonia occidentalis*,	Very Good – Excellent	1.17 ha (<1%)

Community	Description	Condition	Extent within the Survey Study Area (ha)
	Alexgeorgea nitens and *Phlebocarya ciliata* low to mid open herbland. **Represents Banksia Woodlands of the Swan Coastal Plain TEC.** **Represents both FCT 23b northern *B. attenuata-B. menziesii* woodlands.**		
Total			72.87 ha (12.6%)
Eucalypt Woodlands			
CcSxDf	*Corymbia calophylla* and *Eucalyptus todtiana* low open woodland over *Styphelia xerophylla, Xanthorrhoea preissii* and *Eremaea pauciflora* low sparse shrubland over *Desmocladus flexuosus, Mesomelaena* and *Conostylis aurea* low forbland.	Very Good	3.10 ha (<1%)
EmHhMp	*Eucalyptus marginata, Banksia menziesii* and occasional *Banksia attenuata* low open woodland over *Hibbertia hypericoides, Xanthorrhoea preissii* and *Brachyloma preissii* mid to low shrubland over *Mesomelaena pseudostygia, Lomandra sonderi* and *Patersonia occidentalis* low open sedgeland (or sedge-like).	Very Good	1.83 ha (<1%)
CcXpHg	*Corymbia calophylla* and *Nuytsia floribunda* mid to low woodland to open woodland over *Xanthorrhoea preissii, Acacia saligna* and *Stirlingia latifolia* tall sparse shrubland over **Hypochaeris glabra, *Ursinia anthemoides* and **Podotheca gnaphalioides* low open forbland.	Completely Degraded – Degraded	52.14 ha (9%)
Total			57.07 ha (9.9%)
Wetland			
MpHaDb	*Melaleuca preissiana, Nuytsia floribunda* and *Banksia ilicifolia* low open woodland over *Hypocalymma angustifolium, Xanthorrhoea preissii* and *Adenanthos obovatus* tall to low open to sparse shrubland over *Dasypogon bromeliifolius, *Hypochaeris glabra* and *Podotheca gnaphalioides* low forbland.	Good - Excellent	13.13 ha (2.3%)
MpKgDs	*Melaleuca preissiana* low open woodland over *Kunzea glabrescens, Regelia inops* and *Hypocalymma angustifolium* mid shrubland over *Dielsia stenostachya, Patersonia occidentalis* and *Desmocladus flexuosus* low open to closed forbland.	Very Good - Excellent	4.10 ha (<1%)
KmHg	*Kunzea micrantha, Xanthorrhoea preissii* and *Leucopogon squarrosus* tall to mid shrubland over **Hypochaeris glabra, Lepidosperma pubisquameum* and *Dasypogon bromeliifolius* low forbland.	Very Good - Excellent	4.10 ha (<1%)
MlCa	*Melaleuca lateritia* and *Acacia pulchella* mid sparse shrubland over *Centrolepis aristata, Lepidosperma longitudinale* and *Drosera glanduligera* low forbland with **Briza maxima* low open grassland.	Good	5.30 ha (<1%)
MpXpCe	*Melaleuca preissiana* low sparse trees over *Xanthorrhoea preissii* tall shrubland over **Carpobrotus edulis, *Petrorhagia dubia* and **Ursinia anthemoides* low open forbland.	Completely Degraded – Degraded	5.94 ha (1%)
Total			32.57 ha (5.6%)

Community	Description	Condition	Extent within the Survey Study Area (ha)
Modified Native			
Trees	Scattered native species including *Eucalyptus, Banksia, Acacia, Xanthorrhoea* and *Hypocalymma* species.	Completely Degraded	12.50 ha (2%)
Non-Native Communities			
Paddock	Grassland and cleared areas with occasional native tree/shrub.	Completely Degraded	188.51 ha (33.2%)
PpAcCe	**Pinus pinaster* tall isolated trees over *Adenanthos cygnorum* var. *cygnorum*, *Xanthorrhoea preissii* and *Macrozamia fraseri* tall to mid sparse shrubland over **Carpobrotus edulis, *Pelargonium capitatum* and **Ornithopus pinnatus* low sparse forbland. Eclectic mix of species including *E, todtiana, Acacia pulchella, Rhagodia baccata, Hardenbergia comptoniana*. Isolated stands of juvenile *Banksia* species were noted.	Completely Degraded – Degraded	132.23 ha (23.3%)
Plantation	Dominated by**Pinus pinaster* or recently cleared and largely devoid of native species.	Completely Degraded	13.18 ha (2%)
Total			333.92 (57.9%)

Floristic Community Type Analysis

Analysis results confidently inferred five FCTs for the 23 quadrats analysed. Three quadrats represent hybrid FCTs, and two quadrats were inconclusive. A brief description of each is presented below in Table 14, with further detail presented in Appendix B

.

Table 14 FCT Analysis

FCT	Species Name	Description
4	*M. preissiana* damplands	This FCT was inferred for three quadrats (8, 9 and 25). All three quadrats are situated in wetland basins and support *M. preissiana* overstorey from open woodland to forest. Two of these quadrats represent regenerated vegetation post-disturbance in Gnangara State Forest.
21a	Central *Banksia attenuata – Eucalyptus marginata* woodlands	Inferred for one quadrat (29) situated at the northern end of the Survey Study Area. This quadrat is one of the few quadrats on the Spearwood system and included an overstorey of *E. marginata* over *Banksia*. Species diversity was comparable (48 spp. in quadrat compared to 52 spp. in SCP dataset).
21c	Low lying Banksia attenuata woodlands or shrublands	Four quadrats represent FCT 21c (11, 14, 19, 22). These quadrats represent three different communities however they all are situated in low-lying areas, potentially winter-wet, and can include an overstorey of *M. preissiana* or *E. marginata*. All four quadrats were in excellent condition vegetation.
23a	Central *Banksia attenuata – B. menziesii* woodlands	Two quadrats represent FCT 23a (32 and 34). These quadrats are situated at the edge of a patch of Banksia woodland along Pederick Road in Wanneroo
23b	Northern *Banksia attenuata-B. menziesii* woodlands	FCT 23b was the most common across the Survey Study Area, inferred for seven quadrats (10, 12, 13, 21, 23, 27 and 28). These quadrats represent four different vegetation communities. FCT 23b represents a Priority 3 Ecological Community.

FCT	Species Name	Description
-	Hybrids	Three quadrats represent hybrid FCTs, that is characteristics from two FCTs were prevalent based on published data and the floristic data collected.

Conservation Significant Vegetation

Two TECs listed under the EPBC Act were identified as intersecting the PDE:

- Banksia Woodlands of the Swan Coastal Plain TEC – Endangered
- Tuart Woodlands and Forests of the Swan Coastal Plain TEC –Critically Endangered

The Banksia Woodlands TEC was mapped across eight patches within the Survey Study Area, extending for 64.4 ha. All eight patches were assessed against the key diagnostic characteristics outlined in the DEE (2016) Conservation Advice and it was determined that all patches met the criteria, size and condition of the Commonwealth listed TEC. All patches were in Good to Excellent condition and considered suitable habitat for *Caladenia huegelii*.

A detailed patch assessment can be found in Section 6.1.3.1 of the FVF Assessment (Appendix B).

A total of 15.21 ha of the Banksia Woodlands TEC was mapped within the PDE (Figure 9).

This area is inclusive of three PECs listed as Priority 3 by the DBCA (2022), identified through FCT analysis:

- Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c) (FCT 21c) (PEC) (3.38 ha).
- Northern *Banksia attenuata-B. menziesii* woodlands (floristic community type 23b) (FCT 23b) (PEC), also referred to as Swan Coastal Plain *Banksia attenuata-B. menziesii* woodlands by DBCA (2022) (6.71 ha).
- Banksia dominated woodlands and shrublands of the Swan Coastal Plain (Banksia Woodlands PEC) (5.12ha).

FCT 21c was inferred for four quadrats situated in low-lying areas. It includes some areas with an overstorey of *Melaleuca preissiana* and *Eucalyptus marginata*. This PEC does not correlate with the Banksia Woodlands TEC at all locations, particularly the edge of wetlands/winter-wet areas.

FCT 23b corresponds with the Banksia Woodlands TEC.

The remaining TEC corresponds to Priority 3 PEC Banksia dominated woodlands and shrublands of the Swan Coastal Plain, where no other PEC was recognised (FCT could not be inferred). Further detail on Banksia Woodlands is presented in Appendix B, Appendix C and Appendix D.

The Tuart Woodlands TEC within the PDE consists of 0.59 ha of a 1.71ha patch mapped entirely within the Survey Study Area (AECOM, 2024). The vegetation comprising the patch is not a naturally occurring patch and is a rehabilitated vegetation community, with the area originally being a pine plantation, historically cleared by Western Power as part of the Neerabup Terminal development. Rehabilitation efforts for the area have been successful to the level that AECOM's analysis of the vegetation determined that the 1.71ha patch met the key diagnostic characteristics for the federally protected Tuart Woodland TEC.

Vegetation Condition

Vegetation across the Survey Study Area was predominantly 'Completely Degraded' (370.55 ha, 73%), representing paddocks and cleared areas with native shrubs and trees, or areas where Pine plantation has been removed, and native species were slowly regenerating.

Those areas of native vegetation (excluding disturbed areas) within the Survey Study Area were mostly considered in Excellent condition (41.36 ha, 8%). Minor weed invasion was present, which is expected on the SCP, particularly where parcels of vegetation have been dissected by tracks, fences, powerlines, or similar linear infrastructure. Areas where rubbish or more aggressive weeds were present were mapped as Very Good (12.92 ha, 3%). No areas of Pristine vegetation were encountered, since the Survey Study Area generally follows existing powerlines and associated access tracks.

Condition decline was prevalent in Whiteman Park paddocks, on private properties, and in Gnangara Moore River State Forest where historical clearing has occurred. Here, vegetation was mapped as Good or Degraded.

Cleared areas, representing hardstand such as buildings and roads, are not included in percentage calculations for vegetation condition. Vegetation condition for the Survey Study Area is mapped in Table 15.

Table 15 Vegetation condition of the Survey Study Area

Condition Rating	Extent (ha)	Percent of Total Area
Excellent	41.36	8%
Very Good	12.92	3%
Good	34.39	7%
Degraded	49.85	10%
Completely Degraded	370.55	73%
Total	**509.07**	**100%**
Cleared	67.37	

Flora

The field survey recorded a total of 291 discrete flora taxa within the Survey Study Area, including 246 native species and 45 weed species. Native species were best represented by Myrtaceae (31 species) and Fabaceae (25 species), followed by Asparagaceae (17 species), Orchidaceae (16 species) and Stylidiaceae (15 species). A total of 16 orchid species were identified.

A comprehensive species list, organised by family and the community they occur in, is presented in Appendix B and Appendix D.

Significant Flora

A total of 16 orchid species were recorded during the field survey, none of which were of conservation significance. No records of *Caladenia huegelii* were found during the targeted field survey, which involved walking 10 m transects over all suitable Banksia Woodland habitat for *Caladenia huegelii* presence.

One Threatened flora species listed under the BC Act, *Calectasia elegans,* was collected in the Survey Study Area. The collected sample was submitted to the Western Australian Herbarium (WAH) for formal identification. The species was observed at a single location within the Survey Study Area, situated between Towers 11 and 13, approximately 15 m from the boundary of the Impact Area. There are no records of the species within the PDE. The following vegetation units were identified as suitable habitat for the species:

- BaXpPo
- EtHsLb
- BaBeAn

It is noted that the conservation status was updated from Priority 2 to Threatened post the 2022 survey (2023 Flora & Vegetation Assessment) and historical documents will reflect the earlier status.

No additional Priority or Threatened flora species or Commonwealth listed species were recorded in the Survey Study Area.

Introduced Flora

A total of 53 weed species were recorded within the PDE, represented by 251 individuals during the 20222 and 2023 flora and vegetation surveys completed by AECOM. Weed diversity is considered to be typical of the Swan Coastal Plains (AECOM, 2023). This is due to historical and current uses as a plantation and grazing land. No weeds listed as Declared Pests or Weeds of National Significance (WONS) were identified during either survey

Phytophthora dieback

A dieback survey was undertaken for the PDE to assess the presence of dieback. A total area of 413.8 ha was surveyed, inclusive of the PDE, with the occurrence of dieback outlined in Table 16.

Table 16 Dieback occurrence within the PDE

Dieback Occurrence	Extent within PDE (ha)
Infested	46.21
Uninfested	24.78
Excluded (cleared/developed areas)	140.66
Total	24.78

All construction and operation activities associated with the Proposal will be subject to a Hygiene Management Plan (HMP).

Bush Forever Sites

Bush Forever protects regionally significant bushland within the Swan Coastal Plain area of the Perth Metropolitan Region, aiming to protect a comprehensive representation of all ecological communities originally occurring within the region (GoWA, 2000). Clearing of Bush Forever areas requires approval from Western Australian Planning Commission under *State Planning Policy 2.8 Bushland Policy for the Perth Metropolitan Region* (SPP2.8).

The Proposal intersects five Bush Forever Sites, as outlined in Table 17.

Table 17 Bush Forever Sites impacted by the Proposal

Site Number	Vegetation Complex present	Total Size of Bush Forever Site (approx. ha)	Extent of Bush Forever Site within PDE (ha)
104	Bassendean Complex-North Pinjar Complex	1.54	0.81
198	Bassendean Complex-Central and South Southern River Complex	474	9.98
304	Bassendean Complex-Central and South	2,800	19.56
398	Bassendean Complex-North Bassendean Complex-North-Transition	1,021	3.99
399	Bassendean Complex-North	4,184	11.63
Total		**8,480.54**	**45.88**

SPP 2.8 aims to protect at least 10% of the original extent of the vegetation complexes protected within Bush Forever sites, within the Perth Metropolitan Region. Table 18 provides the vegetation complexes present within each Bush Forever Site within the PDE and the proportion of the complex remaining of these complexes within the Perth Metropolitan Region.

Table 18 Vegetation Complexes within Bush Forever Sites

Vegetation Complexes within Bush Forever Sites	Pre-European Extent (ha)	Current extent of complex within the Perth Metropolitan Region (ha)	Proportion of pre-European extent remaining (%)	Extent of complex within the PDE (ha)
Bassendean Complex-North	79057.34	56470.36	71.43	14.05
Bassendean Complex-North-Transition	20856.54	18407.85	88.26	2.15
Bassendean Complex-Central and South	87476.26	20819.97	23.80	22.32
Southern River Complex	58781.48	10302.86	17.53	7.2
Pinjar Complex	4892.64	1408.93	28.80	0.12
Total				**45.8**

The vegetation condition of the Bush Forever Sites that intersect the PDE is provided in Table 19. Noting that a 1.5 ha area was unsurveyed, and vegetation condition has been inferred using aerial imagery and field survey data collected by AECOM (2023) of directly adjacent areas. The 1.5 ha of inferred vegetation condition was all classified as either Completely Degraded or Cleared. The inferred values for vegetation condition are presented in Table 19 in brackets following the mapped vegetation condition value obtained from AECOM (2023) field surveys.

Table 19 Vegetation condition of Bush Forever Sites within the PDE

Bush Forever Site	Vegetation Condition				
	Cleared (ha)	Completely Degraded (ha)	Degraded (ha)	Very Good (ha)	Excellent (ha)
104	0.0	0.8	0.0	0.0	0.0
198	0.14	4.78 (0.51)	4.54	0.0	0.0
304	0.33	12.63 (0.38)	6.19	0.0	0.0
398	0.46	0.68	0.0	2.0	0.71
399	0.23 (0.59)	0.0 (0.03)	0.0	8.51	1.91

Conservation Reserves and Environmentally Sensitive Areas

A total of 116.44 ha of the PDE lies within the DBCA Managed Gnangara-Moore River State Forest, where historical clearing has occurred. Here vegetation was mapped as Good or Degraded. Paddocks and cleared areas with scattered native shrubs and trees, or areas where Pine plantation has been removed and native species were slowly regenerating, were mapped as Completely Degraded.

The Proposal also intersects with a number of Environmentally Sensitive Areas (ESA), with a total of 70.97 ha mapped within the PDE. These are associated with Bush Forever Sites (discussed in the preceding section) and DBCA listed Geomorphic wetlands.

Fifteen geomorphic wetlands intersect the PDE, of these, five wetland vegetation types were identified (Table 13). All wetlands encountered were considered 'typical' of the Bassendean land system, i.e. shallow wetlands between dune swales on sandy soils. A total of 25.09 ha of wetlands are located within the PDE.

Conservation Reserves and ESAs associated with the Proposal are outlined below in Table 20.

Table 20 Conservation Reserves and ESAs associated with the Proposal

Area	Mapped in Survey Area (ha)	Within Development Envelope (ha)
Gnangara- Moore River State Forest	434	116.44
Environmentally Sensitive Areas	98.69	70.97
Bush Forever Sites 104, 198, 304, 398, and 399.	63.88	45.88
Wetlands	34.81	25.09

6.4 Potential Environmental Impacts

The Proposal has the potential to impact on flora and vegetation within the Development Area. Potential direct and indirect impacts are listed below.

6.4.1 Potential Direct Impacts

The Proposal may result in the following potential direct impacts to flora and vegetation.

Table 21 Potential Direct Impacts to Flora and Vegetation

Proposal Activity	Potential Direct Impact
Clearing of native vegetation	Loss of conservation significant flora and vegetation communities
	Loss of native vegetation

6.4.2 Potential Indirect Impacts

The Proposal may result in the following potential indirect impacts to flora and vegetation.

Table 22 Potential Indirect Impacts to Flora and Vegetation

Proposal Activity	Potential Indirect Impact
Construction and Operation activities	Introduction and/or spread of invasive species and dieback
Establishment of linear infrastructure	Edge effects leading to reduced vegetation condition in proximity to cleared areas – notably ecological linkage of the Gnangara-Moore River State Forest
Hot works and operational activities	Loss of native vegetation in the event of a fire.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 6.6 for both direct and indirect impacts.

6.5 Mitigation and Avoidance

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a). *State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region* (SPP 2.8) was also used to inform avoidance and mitigation measures for the Proposal, in the context of the potential impacts to Bush Forever Sites identified within the PDE. Impact avoidance has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on flora and vegetation.

These principles, and the order in which they have been applied, are:

- **Avoid**: reducing the Impact Area and locating activities to avoid direct and indirect impacts on significant flora and vegetation.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.
- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery.
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

Numerous Proposal design iterations have been undertaken with consideration of ecological values identified and mapped through surveys. Avoidance mechanisms have particularly been applied for areas of Banksia Woodlands TEC and Bush Forever Sites through the adjustment of tower and powerline locations.

Table 23 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to significant flora and vegetation during the scoping phase of the Proposal.

Table 23 Mitigation and avoidance actions proposed for flora and vegetation

Design or management measure	Description
Avoid	
Proposal alignment and siting	Where viable, powerline locations were designed to be placed within existing easements to avoid additional clearing of Banksia Woodland and Tuart Woodland TECs, Bush Forever Sites native vegetation. Tower locations have been adjusted to avoid patches of Banksia Woodlands TEC and Bush Forever Sites and span over vegetation as much as possible. Span over areas have been identified for patches of conservation significant vegetation, such as Bush Forever Sites and TEC/PECs, where no clearing is permitted for a defined section of the transmission line corridor.
Stakeholder Engagement	Following engagement with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve.
Use of existing infrastructure	Use of existing public roads and powerline tracks within the Proposal corridor to avoid additional clearing.
Minimise	
Vegetation clearing	Vegetation clearing will not exceed 98.08 ha, including 65.35 ha of native vegetation (refer to Section 1.2). Clearing of TEC/PECs within the PDE will not exceed 2.67 ha. Clearing of Bush Forever Sites within the PDE will not exceed 15.0 ha. Vegetation in completely degraded condition has been preferentially targeted for clearing and siting of infrastructure. Placement of the new proposed transmission line adjacent to the existing transmission line corridor to minimise additional fragmentation of vegetation patches and compounding of edge effects.
Management Plans	A Proposal specific Flora and Vegetation Environmental Management Plan (FVEMP) has been developed with objective and outcome-based targets aimed at minimising impacts to native flora and vegetation. A Hygiene Management Plan for the Proposal has been developed which includes management measures to minimise the risk of spread of weeds and disease, such as dieback, during construction.
Rehabilitate	

Design or management measure	Description
Vegetation rehabilitation	A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent.
Offsets	
Offset Strategy	The Proposal will have significant residual impacts to Banksia Woodland TEC/PEC. Western Power has secured the Orange Springs site which will be used to offset 100% of the significant residual impacts to Banksia Woodlands through a combination of protection and management of existing high-quality remnants of the TEC and rehabilitation of cleared areas targeting a vegetation community composition representative of the TEC. The Offset includes: • Protection and implementation of threat abatement activities to preserve the condition of 122.78 ha Banksia Woodland TEC in Very Good to Excellent condition at Orange Springs • Rehabilitation of 2.0 ha of degraded land at Orange Springs targeting establishment of the Low lying *Banksia attenuata* woodlands of the Swan Coastal Plain PEC (FCT21c) Offsets for Bush Forever sites are required in accordance with the *State Planning Policy 2.8 – Bushland Policy for the Perth Metropolitan Region.*

6.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impacts of the Proposal on significant flora and vegetation types, following implementation of the mitigation measures detailed above. Significant flora and vegetation types within the PDE comprise:

EPBC Act listed Banksia Woodlands TEC, comprising three DBCA listed PECs:

- Low lying *Banksia attenuata* woodlands or shrublands (Floristic Community Type 21c)
- Swan Coastal Plain *Banksia attenuata-B. menziesii* woodlands (Floristic Community Type 23b)
- Banksia Dominated Woodlands of the Swan Coastal Plain
- EPBC Act listed and DBCA Priority 3 (P3) Tuart Woodlands TEC.
- Five Bush Forever sites
- Gnangara-Moore River State Forest
- Geomorphic Wetlands

The EPA's objective for flora and vegetation *'to protect flora and vegetation so that biological diversity and ecological integrity are maintained'* has been considered in undertaking the following assessment.

6.6.1 Direct Residual Impacts to Flora and Vegetation

Flora and Vegetation

Native vegetation clearing has been avoided and minimised wherever possible within the Proposal's Impact Area. Total clearing will be limited to a maximum of 98.08 ha (refer to Section 1.2), comprising:

- 65.35 ha of native vegetation.
- 32.743 ha of non-native vegetation

The highest represented vegetation communities across the Proposal's Impact Area are non-native Plantation (25.78 ha) and native PpAcCe Pine Plantation (23.72 ha). Vegetation community extents within the Proposal Impact Area are outlined in Table 24. Areas that have been mapped as 'Cleared' have been removed from the total vegetation clearing limit.

The majority of the 98.08 ha of vegetation to be cleared is in Degraded or worse condition. Only 4.05 ha of clearing is proposed for vegetation is in Good or better condition, representing <5% of the total clearing area (Table 25)..

Temporarily cleared land will be rehabilitated following construction completion.

Table 24 Vegetation Community Extent within the Proposal Impact Area

Vegetation Association	Extent within PDE (ha)	Impact Area(ha)
Native Vegetation		
BaBeAn	1.39	0.1
BaRcGt	3.03	1.08
BaXpPo	7.27	1.35
CcSxDf	1.49	0.53
CcXpEc	1.12	1.24
CcXpHg	36.53	17.13
EgGlCe	0.96	0.54
EmHhMp	0.03	0.00
ErAcCc	7.95	8.75
EtHsLb	7.84	1.03
KmHg	1.57	0.28
MpHaDb	3.85	0.8
MpKgDs	0.43	0.43
MpXpCe	3.89	1.59
PpAcCe	48.76	23.72
Trees	5.91	4.5
Un-Surveyed (inferred)	5.56	2.28
Total	**137.58 ha**	**65.35**
Non-native Vegetation		
Planted	3.52	1.4
Paddock	7.37	3.8
Plantation	50.15	25.78
Un-Surveyed (inferred)	5.56	1.75
Total	**61.04**	**32.73**

Table 25 Direct Impact to Vegetation Condition in the Proposal Impact Area

Vegetation Condition	Extent within PDE (ha)	Impact Area(ha)
Excellent	12.05	1.18
Very Good	5.05	0.76
Good	3.4	2.11
Un-surveyed	17.0	-
Degraded	24.2	12.69
Completely degraded (inferred)	-	10.93
Completely Degraded	137.62	70.41

Conservation Significant Flora

A single record of *Calectasia elegans* was opportunistically recorded during the 2022 biological survey of the transmission line corridors (AECOM, 2023). No targeted surveys have been completed for the species at the time of record due to the location of the record being within a span over area of the PDE where no clearing is proposed and its conservation status being P2 at the time of survey. The specie has since had its conservation category revised to critically endangered under the BC Act as of April 2024.

Suitable habitat for the species within the envelope generally aligns with the occurrences of the Banksia Woodland PEC/TEC and is represented by the following vegetation units:

- BaXpPo
- EtHsLb
- BaBeAn

The Proposal will result in the clearing of up to 2.48 ha of suitable habitat for *C. elegans*, which represents only 15% of the available habitat mapped within the PDE. Where clearing of *C. elegans* cannot be avoided, a section 40 Authorisation to Take, issued under the BC Act will be sought.

The Proposal has sought to minimise clearing of Banksia Woodland PEC/TEC, and thus suitable habitat for *C. elegans*, as far as practicable, with the revised clearing footprint submitted with this revision of the ERD reducing the proposed clearing of the TEC from 4.44 ha to 2.23 ha. Additional controls, such as the requirement for targeted pre-clearance surveys for the flora species when clearing within suitable habitat have also been included in the Proposal FVEMP to ensure there is no significant impact to the species.

Conservation Significant Vegetation

The Proposal will involve clearing of 2.23 ha of EPBC Act listed Banksia Woodlands of the Swan Coastal Plain TEC, which is inclusive of 2.03 ha of State listed PECs comprising:

- 0.59 ha of Low lying *Banksia attenuata* woodlands or shrublands (FCT 21c, PEC)
- 0.36ha of Northern *Banksia attenuata-B. menziesii* woodlands (FCT 23b, PEC)
- 1.08 ha of the PEC Banksia dominated woodlands and shrublands of the Swan Coastal Plain.

The Proposal will also require the clearing of 0.44 ha of rehabilitated pine plantation that now supports a vegetation community that meets the classification requirements of the EPBC Act Listed Tuart Woodlands and Forests of the Swan Coastal Plan TEC.

A total of 2.67ha of TEC/PEC will be cleared within the Proposal's Impact Area.

TEC Extent

A total of 63.18 ha of Banksia Woodlands TEC was identified within the Proposal Survey Study Area, with 15.21 ha mapped within the PDE. This extent is associated with the Gnangara Moore River State Forest and Whiteman Park. The TEC extends for an additional 11,370 ha in the City of Swan, with 253,540 ha mapped across the SCP (TSSC, 2016). Within a local and regional context,

the Proposal's impact to 2.23 ha of Banksia Woodlands TEC represents a loss of 0.02% in the City of Swan, and 0.001% across the wider region.

A total of 0.44 ha of the Tuart Woodlands TEC was mapped within the Proposal's Impact Area, located at the NBT in Pinjar. The TSSC (2019) identified the remaining extent of the Tuart Woodlands TEC as approximately 4,418 ha for the area where the Proposal is located, within the TEC's north distribution range (north of Burns Beach Road, Joondalup). The fewest remaining patches of the TEC are located within the northern range, with a mean patch size of 37 ha.

Within this local context, the Proposal's impact to the Tuart Woodlands TEC represents a loss of 0.001%. Additionally, the 0.44ha of Tuart Woodland TEC proposed to be cleared consists of rehabilitated vegetation, previously a pine plantation that was cleared during the initial terminal development and planted following the yard establishment, however within areas also set aside to reinforce, in time, increased capacity to serve the northern corridor. No net loss of environmental values given the TEC was never a part of the natural native vegetation within the area.

The Proposal's residual impact to TECs/PECs is presented in Table 26.

Table 26 Residual Impacts to TECs/PECs

TEC/PEC	Impact Area Extent (ha)	Regional Extent (ha)	Proportion of regional extent impacted (%)
Banksia Woodlands of the Swan Coastal Plain TEC/PEC			
Banksia Woodlands of the Swan Coastal Plain TEC	2.23	11,370	0.02
Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c) (FCT 21c) (PEC)	0.59		
Northern *Banksia attenuata-B. menziesii* woodlands (floristic community type 23b) (FCT 23b) (PEC)	0.36		
Banksia dominated woodlands and shrublands of the Swan Coastal Plain (Banksia Woodlands PEC)	1.08		
Tuart Woodlands and Forests of the Swan Coastal Plain TEC			
Tuart Woodlands (TEC)	0.44	4,418	0.001

The Banksia Woodland TEC is considered to be partially groundwater dependent. Potential impacts to this TEC from construction dewatering activities are discussed in Section 8.

Fragmentation

The Proposal largely follows existing powerlines and tracks in order to minimise further fragmentation of patches of significant vegetation such as Banksia TEC/PEC and Bush Forever Sites.

The Proposal design has also evolved to reduce impact to the Banksia Woodlands TEC and Bush Forever Sites, with tower locations adjusted to avoid TEC and Bush Forever Site patches and span over vegetation as far as practicable.

Environmentally Sensitive Areas (ESAs)

Of the 116.44 ha of the Gnangara-Moore River State Forest located within the PDE, a total of 59.5 ha of clearing is required within the Impact Area.

Vegetation proposed for clearing is well represented and vegetation condition ranges from Completely Degraded to Excellent. No vegetation proposed for clearing in the conservation area is of better condition than the surrounding remaining vegetation.

The Proposal's impact on ESAs is outlined in Table 27, with further detail on impact to wetlands and Bush Forever sites discussed below.

Table 27 Environmentally Sensitive Areas (ESAs) within the Proposal Impact Area

Area	Development Envelope Extent (ha)	Impact Area Extent(ha)
Gnangara- Moore River State Forest	116.44	59.5
Bush Forever Sites 104, 198, 304 398, and 399.	45.88	15.0
Wetlands	25.09	12.3

Wetlands

Potential impacts to wetlands and native vegetation growing in or in association with a watercourse or wetlands are discussed in detail in Section 8.

Bush Forever

Five Bush Forever sites intersect the Proposal's Impact Area, with a combined impact of a loss of 15.0 ha. Table 28 outlines the proportion of the total extent of the Bush Forever Sites proposed to be cleared for construction of the Proposal,

The five affected Bush Forever sites have a combined area of approximately 8,480 ha. The proposed clearing represents a loss of approximately 0.19% of this total area.

The majority of vegetation clearing is proposed within Bush Forever site no.304 (8.3 ha). This site is currently dissected by the Tonkin Highway, and pre-existing Western Power infrastructure is located along the eastern borderline of the Bush Forever site..

Bush Forever site no. 104 is the site proportionally most affected by the Proposal with the proposed clearing resulting in a19.4% reduction of the site's overall extent. This site forms part of the wider State Forest 65 - Gnangara Plantation Bushland, which hosts an additional twenty-one (21) Bush Forever sites, with site attributes well represented in the region.

Proposal design has evolved to avoid and minimise impacts to Bush Forever Sites as far as practicable, in accordance with the SPP2.8 outcomes. The selected proposed line route was aligned with an existing transmission line corridor to minimise fragmentation of Bush Forever Sites and potential compounding of edge effects. The utilisation of the existing corridor also ensures there is a reduced risk of introducing and spreading weeds and disease by reducing new access points to the Bush Forever Sites.

Additionally, span over areas have been identified where no clearing of significant vegetation is permitted for defined sections of the new transmission line corridor. These span over areas have allowed the Proposal to avoid clearing a portion of Bush Forever Site 399.

Table 28 Bush Forever Sites impacted by the Proposal

Site Number	Site Name and Location	Total Size (approx.) (ha)	PDE Extent (ha)	Impact Area Extent (ha)	Proportion of total extent impacted by the Proposal (%)
104	Gnangara Plantation Bushland (6) Northern portion of the Proposal, situated between towers 3 and 4	1.54	0.81	0.3	19.4

Site Number	Site Name and Location	Total Size (approx.) (ha)	PDE Extent (ha)	Impact Area Extent (ha)	Proportion of total extent impacted by the Proposal (%)
198	Beechboro Road Bushland Cullacabardee/Ballajura Southern portion of the Proposal, intersecting the Tonkin Highway.	474	9.98	4.3	0.91
304	Gnangara Road Bushland Southern portion of the Proposal, intersecting Tonkin Highway	2,800	19.56	8.4	0.3
398	Chitty Road Bushland, Pinjar Northern portion of the Proposal.	1,021	3.99	0.4	0.04
399	Melaleuca Park and Adjacent Bushland, Bullsbrook/Lexia Northern portion of the Proposal.	4,184	11.63	1.6	0.04
Total		**8,480.54 ha**	**45.88**	**15**	**0.18**

The Proposal has prioritised clearing of degraded sections of Bush Forever Sites as far as practicable. Of the 15 ha of Bush Forever Sites that will be impacted by clearing activities for the Proposal, 13.4 ha is in Degraded or Completely Degraded Condition, with the remainder (1.6 ha) in Excellent or Very Good condition.

Table 29 Condition of the remaining extents of Bush Forever Sites Impacted by the Proposal

Bush Forever Site	Extent of Bush Forever Site pre-clearing (ha)	Remaining extent of Bush Forever Site post-clearing (ha)	Vegetation Condition composition of remaining extent				
			Cleared (pre-existing) (ha)	Completely Degraded (ha)	Degraded (ha)	Very Good (ha)	Excellent (ha)
104	0.81	0.51	0.3	0.51	0.0	0.0	0.0
198	9.98	5.68	0.14	2.69	2.89	0.0	0.0
304	19.56	11.16	0.33	7.78	3.03	0.0	0.0
398	3.89	3.49	0.46	0.36	0.0	2.0	0.69
399	11.63	10.02	0.23 (0.59)	0.0	0.0	7.79	1.72

The Bush Forever Sites protect five vegetation complexes that the SPP2.8 aims to protect by maintaining greater than 10% of their original Pre-European extent within the Perth Metropolitan Region. Table 30 outlines the amount of each vegetation complex that is proposed to be cleared and the extent of each complex remaining post-clearing in the context of the Perth Metropolitan Region.

Results in Table 30 show that the proposed clearing within Bush Forever Sites will not reduce the remaining extent of any of the vegetation complexes below 10% within the Perth Metropolitan Region.

Table 30 Impacts to vegetation complexes as a result of clearing within Bush Forever Sites

Vegetation Complexes within Bush Forever Sites	Pre-European Extent (ha)	Current extent of complex within the Perth Metropolitan Region (ha)	Proportion of original extent remaining (%)	Bush Forever Site complex is within	Extent of complex within the BF site within PDE	Extent of complex within BF site within Impact Area	Remaining extent of complex post clearing of Impact Area	Proportion of original extent remaining post clearing of Impact Area (%)
Bassendean Complex-North	79057.34	56470.36	71.43	104	0.69	0.27	56468.22	71.43
				398	1.7	0.32		
				399	11.28	1.55		
Bassendean Complex-North-Transition	20856.54	18407.85	88.26	398	2.16	0.06	18407.79	88.26
Bassendean Complex-Central and South	87476.26	20819.97	23.80	198	2.89	1.18	20810.31	23.80
				304	19.52	8.4		
Southern River Complex	58781.48	10302.86	17.53	198	7.1	3.19	10299.67	17.52
Pinjar Complex	4892.64	1408.93	28.80	104	0.13	0.03	1408.9	28.80

6.6.2 Indirect Residual Impacts to Flora and Vegetation

Conservation Significant Vegetation

Edge effects refer to the environmental differences between the edge and interior of a vegetation patch, encompassing changes in vegetation structure, species composition, ecological functioning, fauna and their habitats and soil characteristics (Murcia, 1995). These effects are often driven by microclimatic shifts at habitat boundaries, such as increased light exposure, elevated temperatures, reduced humidity, and altered soil moisture. Such changes can result in residual impacts to remnant vegetation and significantly influence ecological processes, particularly in existing fragmented landscapes. (Murcia, 1995).

As the majority of the 98.08 ha of vegetation proposed to be cleared is in Completely Degraded to worse condition (Table 25), any edge effects that do occur are unlikely to result in significant impact to the integrity of these patches. Additionally, the Proposal is located in an area of high historical disturbance, including existing transmission lines and associated infrastructure. Aligning the new proposed line corridor adjacent to the existing transmission line corridor avoids further fragmenting existing significant vegetation patches and compounding edge effects.

Construction activities within the Proposal's Impact Area have the potential to increase the incidence and species of weeds as a result of vehicle or heavy equipment movement, land clearing, or movement of soil and plant materials. This includes the spread of weeds dieback causing the death of plants and reduction to health of susceptible vegetation communities. A Hygiene Management Plan has been developed for the Proposal to manage risks associated with weeds and disease and their potential impacts to flora and vegetation (Appendix N).

The Proposal's construction and operational activities, such as hot works and use of diesel powered equipment present a potential fire risk.

Western Power has a Bushfire Management Strategy which will be implemented for both the construction and operation stages of the Proposal. Additional management measures to minimise risk of impacts to vegetation from fires are also detailed in the Flora and Vegetation Environment Management Plan for the Proposal.

Potential indirect impacts to vegetation from dust emissions is considered to be insignificant due to limited intensity and duration of activities in any one location as works are transient along the linear corridor. Standard industry controls are considered adequate to manage the potential risk and these will be addressed in the Principal Contractor's Construction Management Plan supplied to Western Power prior to construction of the Proposal

Conservation Significant Flora

It is not anticipated that there will be any significant residual indirect impacts to the potential threatened flora, *Calectasia elegans*, identified approximately 15m from the Proposal PDE. The flora record is located in a section of the PDE where no clearing is proposed as the proposed new transmission line will span over the existing native vegetation.

The previously cleared track adjacent to the flora record will be used for access by vehicles and equipment, but this will be limited to a short duration during the construction period. Use of this adjacent access track has the potential to introduce risk of indirect impacts from weeds, disease, dust and fire. These risks and the proposed mitigation measures are addressed in the Proposal FVEMP. The mitigation measures in the Proposal FVEMP are considered sufficient such that no significant residual impacts to *C. elegans* are anticipated.

6.6.3 Significance of Residual Impact

The assessment has determined that the Proposal is likely to have a significant residual impact on flora and vegetation due to the direct impacts of clearing, which will require the implementation of an Offset Strategy. Table 31 provides an assessment of the significance of residual impacts with reference to the '*consideration of significance*' matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023a).

Table 31 Assessment of Significance of Residual Impact on Flora and Vegetation

Significant matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	The Proponent has completed specialist surveys, undertaken by suitably qualified consultants, to assess flora and vegetation and reduce scientific uncertainty. Surveys were completed in accordance with EPA guidelines. The Proposal design has focused strongly on avoidance of impacts wherever practicable, informed by the surveys and assessments completed. Avoidance of impacts to the point of lowest possible impact is a precautionary approach which limits reliance on minimise, rehabilitate and offset impacts. The precautionary principle has been applied through: • Evolving Proposal design informed by environmental studies to minimise impacts, as demonstrated by the revised Impact Area developed for the Proposal that has had a 48% reduction in proposed clearing of native vegetation. • Design to place powerline locations within existing easements to avoid additional clearing of Banksia Woodland TEC, Bush Forever Sites and native vegetation, where viable. • Tower locations have been adjusted to avoid patches of Banksia Woodlands TEC and Bush Forever Sites and spans over vegetation as much as possible. • Restricting clearing to a maximum of 98.08 ha, including 65.35ha of native vegetation and 32.73 ha of non-native vegetation (refer to Section 1.2). The Proposal's design evolution has prioritised use of areas of vegetation mapped as being in degraded condition.

Significant matters	Significance of residual impact of the Proposal in the regional context
Values, sensitivity and quality of the environment that is likely to be impacted	No Threatened Flora were identified within the Impact Area. The FVEMP requires pre-clearance targeted flora surveys for *Calectasia elegans* to be completed, with any individuals identified within the clearing area to be managed under a section 40 Authorisation to Take issued under the BC Act. Potential indirect impacts to the threatened flora conservation significant vegetation are not considered significant due to the record being adjacent to a span over area within the PDE and the implementation of a Proposal FVEMP with mitigation measures aimed at minimising impacts from weeds, disease, dust and fire. Clearing of native vegetation will be limited to a maximum of 65.35 ha (refer to Section 1.2). Vegetation proposed for clearing is largely in a degraded condition. The majority of the 98.08 ha of native and non-native vegetation to be cleared is in Degraded or worse condition, with only 4.05 ha of clearing occurring in vegetation in Good or better condition. This represents <5% of the total clearing area.. Clearing of the Banksia Woodlands TEC will be limited to a maximum of 2.23 ha, which is inclusive of 2.03 ha of State listed PECs comprising: • 0.59 ha of Low lying *Banksia attenuata* woodlands or shrublands (FCT 21c, PEC) • 0.36 ha of Northern *Banksia attenuata-B. menziesii* woodlands (FCT 23b, PEC) • 1.08 ha of the PEC Banksia dominated woodlands and shrublands of the Swan Coastal Plain. This represents a 0.02% reduction in the estimated extent of the Banksia Woodland TEC within the City of Swan LGA. Clearing of the Tuart Woodlands TEC will be limited to 0.44 ha. This represents a 0.001% reduction in the estimated extent of the Tuart Woodlands TEC within the local region. A total of 16.5 ha of Bush Forever site and 59.5 ha of vegetation within the Gnangara-Moore River State Forest is proposed to be cleared. Western Power has prepared an Offsets Strategy to counterbalance the significant residual impacts of the Proposal resulting from clearing on flora and vegetation.
All stages and components of the Proposal	The impact assessment considers all components of the Proposal that might impact flora and vegetation.
Extent (intensity, duration, magnitude and footprint) of likely impacts	Indirect impacts from weed, disease and fire are limited to the construction period. The FVEMP requires a review of the final cleared footprint one month following completion of construction to identify any areas within the PDE that can be rehabilitated. The condition stipulates rehabilitation will be managed via a Revegetation Management Plan. The Proposal construction period is expected to last 3 years, with an operational life of >50 years (permanent infrastructure).

Significant matters	Significance of residual impact of the Proposal in the regional context
Resilience of the environment to cope with the impacts, including pressures such as climate change	A significant proportion of the Proposal's Impact Area is already degraded or disturbed. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. As the Proposal is seeking to upgrade the SWIS to enhance renewable energy generation in the area, it will therefore seek to mitigate climate change pressures.
Application of the mitigation hierarchy	Refer to Table 23.
Consequence of the likely impacts	Likely impacts will reduce the extent of TEC/PECs within the local area and patch extents, increasing the risk of edge effects. Native vegetation, including TECs/PECs are considered to be primarily in Degraded condition, and Proposal activities have the potential to contribute to further degradation. Likely impacts will reduce the extent of Bush Forever Sites in the local area.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Likely environmental outcomes are presented in Section 6.7.
Cumulative effects	The Proposal is not expected to result in significant cumulative impacts, particularly given its location within the Perth Metro area, where land has been historically extensively cleared and is now primarily utilised for residential use. The Proposal has been designed to integrate with existing infrastructure and easements to reduce impact to environmental values, utilising areas of degraded vegetation and avoiding high value areas wherever practicable.
Holistic impacts	The Proposal involves clearing up to 65.35ha of native vegetation, resulting in the loss of native flora, TECs, ESAs (including Bush Forever sites and DBCA-managed land), and fauna habitat. This may lead to direct fauna mortalities, visual amenity loss, weed invasion, and degradation of nearby ecosystems. Wetland removal could alter hydrological regimes and affect surrounding vegetation health.
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were completed on the basis of the maximum area of land that will be cleared for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, making predicted residual impacts an over-estimate of the likely direct impact to flora and vegetation.
Public interest about the likely effect on the environment	12 public comments were received on the initial referral to the EPA and DCCEEW. Comments requesting an assessment via Public environmental review. Commentary was predominantly focused on the significant factors of Flora & Vegetation, Terrestrial Fauna and Inland Waters. Three public comments were received following the publication of the Environmental Review Document for the Proposal. Commentary was predominantly focused on the suitability of proposed offsets and assessment of impacts to Banksia TEC and the three threatened species of black cockatoo.

6.7 Environmental Outcomes

Environmental outcomes and conditions to protect significant flora and vegetation values are proposed in Table 32.

Implementation of the Proposal in accordance with the Proposal Content Document and the below proposed outcomes will protect flora and vegetation so that biological diversity and ecological integrity in the region are maintained.

Table 32 Proposed Environmental Outcomes for Flora and Vegetation

Proposed environmental outcomes	How environmental outcomes can be measured and assured	Consistent with EPA objective
Clearing of up to 98.08 ha of vegetation comprising (refer to Section 1.2): • 65.35 ha of native vegetation • 32.73 ha of non-native vegetation	In accordance with the Flora and Vegetation Environmental Management Plan	Yes
Clearing of TEC/PECs within the PDE will not exceed: • 2.23 ha of the Banksia Woodlands of the Swan Coastal Plain TEC – Endangered, which is inclusive of 2.03 ha of State listed PECs comprising: – 0.59ha of Low lying *Banksia attenuata* woodlands or shrublands (floristic community type (FCT) 21C) – Priority 3 – 0.36ha of Swan Coastal Plain *Banksia attenuata* – *Banksia menziesii* woodlands (FCT 23b) – Priority 3 – 1.08 ha of Banksia woodlands of the Swan Coastal Plain – Priority 3. • 0.44 ha of Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain		
Clearing of Bush Forever areas will not exceed 15ha		
No introduction of new Declared weeds or Weeds of National Significance (WONS) within the DE.		
No spread of dieback into uninfested areas mapped within the PDE		

7. Terrestrial Fauna

The EPA guidelines define terrestrial fauna as "animals living on land or using land (including aquatic systems) for all or part of their lives. Terrestrial fauna includes vertebrate (birds, mammals including bats, reptiles, amphibians, and freshwater fish) and invertebrate (arachnids, crustaceans, insects, molluscs and worms) groups"; and fauna habitat as "the natural environment of an animal or assemblage of animals, including biotic and abiotic elements, that provides a suitable place for them to live (e.g. breed, forage, roost or seek refuge)" (EPA, 2016c).

7.1 EPA Objective

The EPA's objective for the factor of Terrestrial Fauna is "to protect terrestrial fauna so that biological diversity and ecological integrity are maintained" (EPA, 2016c).

7.2 Relevant Policy and Guidance

Table 33 summarises the relevant policy and guidance considered for the factor Terrestrial Fauna.

Table 33 Policy Guidance - Terrestrial Fauna

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016c).	This guidance was used to inform the impact assessment undertaken for terrestrial fauna and the significance of the potential environmental impacts.
Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020).	This document guides the appropriate obtainment and collation of fauna data to be used in EIA. All studies conducted for the Proposal are in accordance with this guidance document.
Technical Guidance: Sampling of short-range endemic invertebrate fauna	This guidance was used to inform the impact assessment undertaken for short-range endemic invertebrates and the significance of the potential environmental impacts.
Other State or Commonwealth Policy or Guidance	
Biodiversity Conservation Act 2016 (BC Act) (WA)	The Proposal has avoided disturbance of native vegetation as far as reasonably practicable.
Biosecurity and Agriculture Management Act 2007 (BAM Act) (WA)	Declared pests under the BAM Act will be considered and managed during the construction and operational phases of the Proposal.
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	The Proposal is undergoing referral under the EPBC Act. An assessment against MNES has been undertaken to support the referral.
Significant Impact Guidelines 1.1 - Matters of National Environmental Significance	This guidance was adhered to during the preparation of the EPBC referral to meet current referral standards.

7.3 Receiving Environment

7.3.1 Surveys and Studies

A range of fauna surveys and assessments have been undertaken within the Impact Area and Additional Survey Study Area to determine baseline environment and inform Proposal avoidance and guidance.

Survey methods for terrestrial fauna were developed and undertaken in accordance with the EPA (2020) Technical Guidance—Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment. The DCCEEW (DAWE, 2022) Referral Guideline for 3 WA Threatened Black Cockatoo Species was used as guidance for the black cockatoo habitat assessment, with assessments made under the Bamford Consulting Ecologist (2024) (BCE) methodology. Fauna surveys were conducted within representative locations of all fauna habitat types.

Details of these surveys and survey effort are presented in Table 34 and illustrated in Figure 10.

Table 34 Fauna Survey Techniques and Effort

<table>
<tr><th>Technique</th><th>Description</th><th>Survey Timing and Effort</th></tr>
<tr>
<td>NREP 1-NT-NBT 330kV Line Flora, Vegetation and Fauna Assessment (AECOM, 2023)</td>
<td>
AECOM (2023) was engaged to undertake a spring flora, vegetation, fauna and black cockatoo assessment to determine baseline values to inform the design of the Proposal.

A comprehensive desktop assessment was undertaken prior to the field survey to identify significant environmental values likely to be present in the Survey Study Area including flora, fauna and vegetation communities. Desktop database searches were requested from the following government databases:
• DBCA Threatened Species and Communities database including Threatened and Priority flora, communities and Threatened and Priority fauna with a 20 km buffer
• Western Australian Herbarium (WAH, 1998-) records.
• EPBC Act Protected Matters Search Tool (PMST) (20 km buffer from survey area).
• Atlas of Living Australia (AoLA) database.
• BirdLife Australia (Birdlife Australia, 2024).
• Index of Biodiversity Surveys for Assessments (IBSA) portal.

Significant fauna species' likelihood of occurrence was assessed systematically using a point-based system, taking into account proximity (defined as less than 5 km) and date of known records (defined as less than 20 years old), presence within the Local Government Area (LGA) and habitat suitability (Table 35).

The likelihood of significant ecological communities occurring was assessed based upon the presence of suitable landforms, land systems, known occurrences and distance of known occurrences.

Table 35 Categories of Likelihood of Occurrence for Fauna Species
<table>
<tr><th>Likelihood of Occurrence</th><th>Definition</th></tr>
<tr><td>Known</td><td>Species is known to occur in the survey area</td></tr>
<tr><td>High (Likely)</td><td>Not known to occur in the survey area but there are records within 5 km of the survey area and suitable habitat for the species is known to be, or likely to be, present within the survey area OR not known to occur within the survey area but there are recent records in close proximity of the survey area and suitable habitat for the species is known to be, or likely to be present within the survey area OR not known to occur within the survey area but there are recent records and suitable habitat for the species may be present.</td></tr>
<tr><td>Moderate (Possible)</td><td>Not known to occur within the survey area but there are recent records within 5 km/within the LGA and suitable habitat for the species may be present (marginal habitat) OR suitable habitat present.</td></tr>
<tr><td>Low (Unlikely)</td><td>Records present within the LGA, and marginal suitable habitat is present within the survey area, therefore the likelihood of the species occurring there is low OR marginal habitat present OR recent record within LGA</td></tr>
</table>
</td>
<td>
Desktop assessment of literature review and database searches completed across 5, 8 and 9 September 2022.

The survey encompassed a 576.3 ha Survey Study Area.

Completed in accordance with:
• EPA (2016b) Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment.
• EPA (2020) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment

Field survey completed by 1 x Zoologist across 5-7 October and 8 November 2022.

The survey encompassed a 603.20 ha survey area.

Completed in accordance with:
• EPA (2016b) Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment.
• EPA (2020) Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment
</td>
</tr>
</table>

Technique	Description	Survey Timing and Effort
	Negligible (Suitable Habitat not Present): No nearby records or suitable habitat OR recent record with no suitable habitat within the survey area OR records nearby with no suitable habitat within the survey area Fauna habitat assessments were conducted throughout the Survey Study Area and were used to define the structure, complexity, condition and continuity of the habitat present, and documented the presence and abundance of habitat features that included but were not limited to presence or absence of large mature trees, water bodies, dense vegetation, hollows, and leaf litter. The habitat assessment was used to verify the findings in the desktop survey as per the EPA (2020) Technical Guidance. Potential usage within the Survey Study Area of conservation significant fauna was recorded, using hand-held GPS (accuracy of 5 m). In addition to recording all observed fauna and birds identified from distinctive calls, details of indirect evidence such as scats, tracks and diggings were documented. Attention was given to searching for conservation significant species identified in the desktop assessment as having the potential to occur in the area. All observations were made between daylight hours of 0700 and 1700. The survey also included a Black Cockatoo Assessment to identify potential breeding, roosting and foraging habitat.	
Clean Energy Link Swan Coastal Plain Flora, Vegetation and Fauna Assessment (AECOM, 2024)	An additional unpublished report for Western Power, completed by AECOM (2024) for the Clean Energy Link Swan Coastal Plain project. The survey consisted of four distinct survey areas, two of which intersect the PDE, the Neerabup Terminal to East Wanneroo survey area (204.98 ha) and the Northern Terminal survey area (25.78 ha). Refer to Appendix D for further information.	Completed in accordance with: • EPA (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.* • EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*

Technique	Description	Survey Timing and Effort
Environmental Review and Black Cockatoo Refined Assessment – NT to NBT 330kV Double Circuit (AECOM, 2025))	An additional refined black cockatoo survey was undertaken by AECOM (2025) to inform the presence and potential impacts on threatened black cockatoo species, specifically Carnaby's cockatoo (*Zanda latirostris*), Baudin's cockatoo (*Zanda baudinii*), and the Forest red-tailed black cockatoo (*Calyptorhynchus banksii naso*). Key components included a desktop review, field surveys, and habitat assessments targeting breeding, roosting and foraging behaviours, conducted in accordance with current environmental guidelines. Detail of survey methodology is presented in the below sections, with the full Black Cockatoo Assessment presented in Appendix E.	Survey completed on 27 February 2025 by 1 x Zoologist, with specialist input from industry leader Mike Bamford. Completed in accordance with: • EPA (2016b) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment.* • EPA (2020) *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment.* • DAWE (2022) Referral Guidelines. • The Bamford Consulting Ecologist (BCE) Method (2024). • Survey Guidelines for Australia's Threatened Birds (DEWHA, 2010)

Refined Black Cockatoo Survey Methodology

In response to queries from the EPA and DCCEEW, refined Black Cockatoo surveys were undertaken to provide more accurate assessment of habitat quality and ecological significance within the PDE. A summary of survey methodology is presented below, with further detail outlined in Appendix E.

All previously identified potential nesting trees within the defined Survey Study Area were reinspected using updated methods developed by industry expert Mike Bamford. This included drone imagery and reassessment of hollow suitability as per the Bamford Consulting Ecologist (2024) (BCE) method including dimensions, shape and form, as well as evidence of use.

Additional Black Cockatoo habitat inspections of vegetation within the Survey Study Area were conducted in conjunction with the refined hollow assessments. These included:

- Collecting detailed information on non-native foraging habitats, including resolving inconsistencies in previously reported habitat extents and documenting the condition and distribution of mature and regrowth pine areas within the development footprint.
- Mapping indicators of plant disease (e.g., *Phytophthora* dieback) within Black Cockatoo habitats to inform assessments of habitat quality.
- Verifying the presence and extent of known roosting habitats within a 6 km radius of the PDE, based on field observations and guidance from subject matter experts.
- Ground-truthing vegetation types and habitat structures within the updated PDE.
- Evaluating known roosting sites that intersect with the PDE.

A summary of survey methodology is presented below, with further detail outlined in Appendix E.

Breeding Habitat

All potential nesting trees previously inspected using binoculars during the Fauna Habitat Assessment (AECOM, 2023) were revisited and reevaluated during the targeted survey, using a drone to determine the status of hollows.

The Bamford methodology for evaluating Black Cockatoo nesting habitat was applied to determine the current nesting value of a site for Black Cockatoos. This process involved evaluating each tree previously identified as a potential nesting tree and assigning it a suitability score (ranging from 1 to 5) based on nesting potential (Table 36). The tool considered several factors including:

- Size of tree
- Structure of tree
- Angle of nesting chamber
- Size of nesting chamber
- Size of entrance.

Table 36 BCE breeding trees ranking system for the assessment of potential nest trees for black cockatoos

Rank	Description
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow. Can also be used for a known nest tree active in the previous 12 months (although this should be noted in the description). Note that activity at a hollow does not absolutely mean that breeding is occurring unless a young bird in hollow is observed.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present - as suggested by structure of tree, such as large, vertical trunk broken off at a height of >8m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in at heights of <5m so in a Wheatbelt breeding site a lower criterion may be more appropriate.
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos. Also, a tree with hollows that might be large enough for a black cockatoo, but in a trunk or branch of insufficient diameter to contain a hollow of preferred size. Trees with low

Rank	Description
	but otherwise suitable hollows can also be assigned a rank or 4, depending on the context (e.g. south-west forest or Wheatbelt).
5	Tree lacking large hollows or broken branches that might have large hollows, a tree with more or less intact branches and a spreading crown.

An additional suitability ranking was given to each hollow; categorised under the following scheme based on field inspection:

- **Active hollow**: Exhibits fresh signs of chewing, either around the entrance or internally, generally linked to black cockatoo activity, indicating nesting behaviour, or cockatoos seen interacting with the hollow.
- **Previously active hollow**: Exhibits old evidence of chewing, either around the entrance or internally, generally linked to black cockatoo activity, indicating nesting behaviour.
- **Inactive hollow**: Appears suitable for black cockatoos to nest in, but no clear evidence of nesting has been observed. Chew marks are not always present on hollows that have been used for nesting.
- **Unsuitable hollow**: Initially considered appropriate for black cockatoo nesting based on preliminary assessments from the ground, but upon further study, does not meet the necessary criteria for nesting.
- **No hollow**: A tree found to have no hollows, possibly due to precautionary hollow assessments conducted from the ground, where a feature was tentatively identified as a hollow but did not meet the criteria upon reinspection.
- **Unable to confirm**: A tree that was either not located or not revisited. Some were inaccessible due to being on private property, while others could not be found or accurately identified at the given coordinates.

Previous Breeding Habitat Methodology

Potential breeding habitat was assessed during the previous surveys by quantifying the number of trees that have the potential to form hollows (based on their diameter at breast height [DBH]), and those with potentially suitable hollows). Any hollow forming native *Eucalyptus* with a DBH > 500 mm were assessed and the GPS location was recorded.

Potential breeding trees are categorised as follows:

- Suitable nesting trees: Trees with suitable nesting hollows present, although no evidence of use. Note that any species of tree may develop suitable hollows for breeding.
- Suitable nest hollow: Any hollow with dimensions suitable for use for nesting by black cockatoos. Characteristics of hollows used by each species is available in the SPRAT (Species Profile and Threats) database. Suitable nest hollows are only found in live trees with a DBH of at least 500 mm. Usually this will be a natural hollow, but artificial hollows may also be suitable in some circumstances (for example, where the artificial hollow has been specifically designed for use by black cockatoos).
- Potential nesting trees: Trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH. *Note: that many species of eucalypt may develop suitable hollows for breeding.*

Hollows are considered potentially suitable when the entrance hole is above a size of 10 cm in diameter and the hollow appears to continue inwards to reach a hollow with a base size greater than 30 cm. Tree hollow presence and suitability is assessed from ground level with the use of binoculars. Suitability and utilisation by Black Cockatoos cannot always be assessed adequately at ground level, and hence the precautionary principle is used where appropriate.

For all potential nesting trees, data was limited to tree genus (*Eucalyptus* spp.) or identified as a stag. Where suitable nesting trees were observed, data including tree species, hollow dimensions, DBH and other significant features was recorded.

Foraging Habitat

Foraging habitat scoring methods were applied through the detailed scoring tool by Bamford Consulting Ecologists (BCE) (2024). The tool considers native vegetation, proximity of known breeding, roosting and foraging habitat, and field observations such as foraging evidence, and is descried below.

Bamford Scoring Tool

The Bamford (2024) scoring tool was applied to assess habitat quality, incorporating factors such as the presence of preferred foraging species (referred to as site condition), updated site context, and species stocking rates. This method allows for the differentiation of vegetation areas based on their current and future value as high-quality foraging habitat. Areas scoring above '2' are subject to further evaluation, focusing on the site context and species stocking rate. Site context is determined by factors including site size, proximity to other habitat areas, and the availability of nearby breeding sites (see Table 37). For the purpose of this assessment, the 'local area' is defined as a 15 km radius from the Survey Study Area, exceeding the maximum known foraging distance of 12 km for Carnaby's Cockatoo when feeding chicks (BCE, 2024).

Table 37 Site context weighting

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents	
	'Local' breeding known/likely	'Local' breeding unlikely
3	>5%	>10%
2	1-5%	5-10%
1	0.1-1%	1-5%
0	<0.1%	<1%

A species stocking rate score was then applied, consistent with the definition in the Offsets Assessment Guide (DSEWPaC, 2012a) as "the usage and/or density of a species at a particular site". While this concept implies the presence of a discrete population, it is less applicable to highly mobile species such as Black-Cockatoos. The species density score of either 0 or 1 is assigned based on observed abundance. A score of 1 is given where Black Cockatoos are regularly observed or reported and/or there is clear evidence of foraging. 'Regularly' is defined as sighting occurring every few days or weeks over several months of the year. A score of 0 is applied when the sightings are rare and foraging evidence is minimal or absent. In cases where direct observation data is limited, the score may be inferred from landscape features and site context. For example, a site with moderate habitat condition that forms part of a broader habitat network known to support Black Cockatoos may be assigned a score of 1, whereas a site with low predicted usage may receive a score of 0.

The Bamford tool scoring is converted into categories as follows: a score of 0 indicates "None," 1 is "Negligible," 2 is "Low," 3 is "Low to Moderate," scores.

The Bamford tool scoring is transposed into one of the following categories:

- 0: None.
- 1: Negligible.
- 2: Low.
- 3: Low to Moderate.
- 4-6: Moderate.
- 7: Moderate to High.
- 8-10: High

Moderation may be applied to ensure the scoring tool accurately reflects value, taking into account contextual factors such as proximity to breeding areas and nearby foraging habitat. Both context and species density scores can be reduced to 0, if the vegetation composition, condition and structure score is 2 or lower (BCE, 2024).

The 2025 refined assessment included a review of the fauna habitats of the 2023 and 2022 surveys to clarify the value of particularly non-native foraging habitat present in the Survey Study Area. This involved delineating between the ages of the pine plantation which split the area originally mapped as one habitat (Non-native Plantation) into three categories reflecting the three different levels of value provided to Black Cockatoos:

- Mature Pine (>10 but <30 years old)
- Juvenile Pine (<10 years old)
- Burnt Pine

Roosting Habitat

Roosting habitat was assessed by considering preferred features such as water sources, tall trees, and specific tree species. A potential roosting tree is defined as a tall tree of any species within proximity to water. For the purposes of this assessment a tall tree was defined as any tree with a suitable DBH, (300-500 mm DBH) and close proximity was defined as 1 km – 6 km (Average roosting distance), with 12 km aligning with the known maximum roosting range (DAWE, 2022; Kabat, 2012). A proximity map was established to identify suitable roosting habitat within the Survey Study Area. This was created utilising recorded mature suitable roosting trees intersected with proximity to water sources.

The targeted surveyed included specific consideration of the habitat and vegetation present within a 500 m radius of the known roost sites and collecting information to inform the potential impact on known roost sites within 6 km of the Survey Study Area.

7.3.2 Adequacy of Surveys

Surveys were undertaken in accordance with EPA (2020) *Technical Guidance—Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. However, the Fauna Habitat Assessment surveys were conducted during a period of increased temperature, which may have reduced fauna sightings. Additionally, some private residential lots and large-scale construction sites were not accessible by foot and data has been inferred from street views and surrounding accessible areas.

Fire was documented within the targeted Black Cockatoo Survey Study Area. This was noted and included in the report results. Additionally, one tree marked for reassessment was not accessible due to its location on a private property.

However, these limitations were considered minor, and no limitations were identified that would influence the outcome of the fauna surveys.

The assessment for the potential for SREs within the PDE was limited to a desktop assessment. Due to the inherent scarcity in nature of many of the species, it was considered that targeted field surveys were unlikely to have a beneficial outcome to the species, and that avoidance and minimisation of key habitat where species were identified as having a high LOO would achieve the best mitigation outcomes for the species.

7.3.3 Survey Findings

Desktop Assessment

The desktop assessment identified a total of 72 significant fauna species with the potential to occur in the Survey Study Area. This included 41 bird, 14 mammal, 12 invertebrate, four reptile and one fish species. Species identified in the desktop that are oceanic species, or strictly marine were excluded from the desktop assessment as the survey does not include marine waters.

Short-range endemic invertebrates

Conservation significant and SRE invertebrates have been considered as part of the environmental surveys for the PDE through a combination of detailed vegetation and targeted flora and basic fauna assessments (AECOM 2023, 2024a, 2024b, 2025). Some areas of Banksia woodland habitat between the Malaga-Ellenbrook Train and Tonkin Highway have previously been surveyed for SRE and conservation significant invertebrates (Invertebrate Solutions, 2020). The key habitats for SRE and conservation significant invertebrates that occur on the northern SCP (Four native bees, one mygalomorph spider and one day flying moth) are primarily Banksia woodland, and to a lesser extent, *Adenanthos* shrubland, and heathland areas of remnant vegetation that retain habitat values (Table 38).

Field Surveys

Fauna Habitats

Results from the field survey conducted by AECOM (2025) are presented below for fauna habitat types.

Ten fauna habitats were mapped across the Proposal's Survey Study Area (AECOM, 2025a), representing 535.75 ha. Four native fauna habitats and six modified fauna habitats were recorded, including three refined habitats representing Pine Plantation.

Native fauna habitat represents 176.83 ha (29.32%) of the Survey Study Area, with the remaining area represented by modified fauna habitat (358.91 ha) and cleared areas (67.46 ha).

Of the total modified fauna habitat, 167.38 ha was mapped as Pine Plantation. The remainder of the modified fauna habitat is described as mixed native introduced vegetation, urbanised land, plantations, clearing, tracks and infrastructure. Note that there is

discrepancy in the native vegetation values provided in Section 6 Table 20 for vegetation units and the native fauna habitat values provided in this section. This is due to the different values considered when assessing and classifying suitable fauna habitat. In particular, portions of the Pine Plantation habitat (considered modified fauna habitat) were classified as native vegetation in the vegetation mapping completed during the Flora and Vegetation surveys. This was due to the presence of native species in the understorey.

The fauna habitats mapped within the PDE are presented in Table 38, including habitat suitability for conservation significant fauna species, and habitat value.

The remaining Survey Study Area encompasses cleared areas (67.46 ha, 11.18%), referring to areas where vegetation has been completely removed such as roads or tracks. Although fauna species may utilise these cleared regions as corridors between adjacent vegetation of higher value, it does not provide critical habitat for any conservation significant species.

Table 38 Proposal Faunal Habitat Types within Survey Study Area

Habitat Type and Description	Conservation Significant Species Potentially Utilising Habitat	Area within Survey Study Area(ha)
Native Fauna Habitats		
Banksia Woodlands Dense *Banksia* sp. woodlands with mixed understorey with Jarrah and Marri scattered overstorey. Moderate understorey density including *Xanthorrhoea preissii*. Containing species including *Gastrolobium* spp., *Leschenaultia* sp. and *Lomandra hermaphrodita*. Leaf litter and debris common over light loose sand. Frequent logs of large mature.	• Baudin's Cockatoo *Zanda baudinii* • Black-striped Burrowing Snake Neelaps calonotos • Carnaby's Cockatoo Zanda latirostris • Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso • Graceful Sunmoth Synemon gratiosa • Chuditch Dasyurus geoffroii • Quenda Isoodon fusciventer • South-western Brush-tailed Phascogale tapoatafa wambenger • Swan Coastal Plain Shield-backed Trapdoor Spider Idiosoma sigillatum • Western Brush Wallaby Notamacropus Irma • Woollybush Bee Hylaeus globuliferus • Woylie Bettongia pen*icillata ogilbyi* • A short-tongued bee (*Leioproctus contrarius*)	71.48 ha (11.85%)
Eucalyptus Woodlands Marri (*Corymbia calophylla*), Costal Blackbutt (*Eucalyptus todtiana*) and Jarrah (*Eucalyptus marginata*) dominate low open woodland with mixed understorey. Leaf litter and debris common.	• Baudin's Cockatoo Zanda baudinii • Black-striped Burrowing Snake Neelaps calonotos • Carnaby's Cockatoo Zanda latirostris • Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso • Peregrine Falcon Falco peregrinus • Chuditch Dasyurus geoffroii • Quenda Isoodon fusciventer • South-western Brush-tailed Phascogale tapoatafa wambenger • Western Brush Wallaby Notamacropus Irma • Woylie Bettongia penicillata ogilbyi,	70.90 ha (11.75%)
Wetlands Mixed ephemeral Paperbark (*Melaleuca preissiana)* wetlands, with *Kunzea micrantha* dominated shrub and mixed heath patches. Thick vegetation, Thick ground covering. Moist sandy soils.	• Australian Little Bittern Ixobrychus dubius • Glossy Ibis Plegadis falcinellus • Western Swamp Tortoise Pseudemydura umbrina • Black-stripe Minnow Galaxiella nigrostriata	32.05 ha (5.31%)

Habitat Type and Description	Conservation Significant Species Potentially Utilising Habitat	Area within Survey Study Area(ha)
Mixed Shrubland Grasstree (*Xanthorrhoea preissii)* dominated shrublands, with mixed native understorey. Grasstrees have full skirts, and the soil present is sandy. Signs of native diggings were common. Infrequent Paperbark (*Melaleuca preissiana*) and other native trees.	• Black-striped Burrowing Snake Neelaps calonotos • Chuditch Dasyurus geoffroii • Quenda Isoodon fusciventer. • Western Brush Wallaby Notamacropus Irma • Woylie Bettongia penicillata ogilbyi,	2.40 ha (0.40%)
Modified Fauna Habitats		
Juvenile Plantations Pine (*Pinus pinaster)* plantation estimated to be less than 10 years old or recently cleared land containing minimal to no native species. Consistent fine leaf litter. No understorey present and frequent logs common. Trees are comparatively short, with a simple branch structure. Branches are bushier, letting less light through and obscuring branches. Fruit and seed can be produced in smaller quantities. Insect activity is limited.	• Carnaby's Cockatoo *Zanda latirostris*	68.52 ha (11.36%)
Mature Plantations Pine (*Pinus pinaster)* plantation that is estimated to be over 10 years old. Consistent fine leaf litter with little to no bare ground. No understorey present and frequent logs common. Trees are thickly stocked and are able to produce large amounts of seed and fruit, with well established branches and canopies. Insect activity is likely high. Sandy ground is compact. Gravel moderately common	• Baudin's Cockatoo Zanda baudinii, • Carnaby's Cockatoo Zanda latirostris • Forest Red-Tailed Black Cockatoo Calyptorhynchus banksii naso	50.83 ha (8.43%)
Burnt Plantations Pine (*Pinus pinaster)* plantation that is estimated to be over 10 years old and recently burnt. Minimal leaf litter. No understorey present and frequent logs common. Trees are burnt, resulting in minimal to no canopy cover. Trees are severely limited in their fruiting and seeding ability. Some trees may recover or avoided the fire resulting in a patchy mosaic of cover in the future. Insect activity is likely absent.	• Baudin's Cockatoo Zanda baudinii, • Carnaby's Cockatoo Zanda latirostris • Forest Red-Tailed Black Cockatoo Calyptorhynchus banksii naso	48.03 ha (7.96%)
Adenanthos / Plantation Isolated pine (*Pinus pinaster*) over Woollybush (*Adenanthos cygnorum* var. *cygnorum), Grasstree* (*Xanthorrhoea preissii)* and *Macrozamia fraseri.* Proximately Woollybush, with minimal leaf litter and scattered native shrub on sandy soil.	• Carnaby's Cockatoo Zanda latirostris • Quenda Isoodon fusciventer • Swan Coastal Plain Shield-backed Trapdoor Spider Idiosoma sigillatum • Woollybush Bee Hylaeus globuliferus • Woylie Bettongia penicillata ogilbyi,	164.18 ha (27.22%)
Trees over Cleared Scattered native species including *Eucalyptus, Banksia, Acacia, Xanthorrhoea* and *Hypocalymma* species over cleared land. Sandy soils, with minimal leaf litter and logs. Ground cover includes paddock weeds and grasses.	• Baudin's Cockatoo Zanda baudinii, • Carnaby's Cockatoo Zanda latirostris • Forest Red-tailed Black Cockatoo Calyptorhynchus banksii naso • Peregrine Falcon Falco peregrinus	6.19 ha (1.03%)

Habitat Type and Description	Conservation Significant Species Potentially Utilising Habitat	Area within Survey Study Area(ha)
Urban / Residential Mixed urban/residential land, containing both scattered native and introduced vegetation. Unnaturalised debris potentially utilised by native species as makeshift habitat.	The area is unlikely to provide suitable habitat for significant fauna. However, the Peregrine Falcon (*Falco peregrinus)* may engage in opportunistic hunting within the area, attracted by the presence of invasive pests present. Urbanised habitat types tend to support higher populations of pests and introduced species, which may influence predator activity.	21.16 ha (3.51%)
Cleared These areas are largely devoid of vegetation and include infrastructure and historically cleared tracks. Cleared tracks between vegetation are likely to be used as a crossing to other vegetated areas.	Not suitable for significant fauna.	67.46 ha (11.18%)

Vertebrate Fauna

Results of the field survey completed by AECOM (2023) are presented below for fauna species.

A total of 22 fauna species were recorded during the field survey, comprising 17 birds and five mammals (AECOM, 2023).

Three introduced species were also recorded, all of which are listed as Declared Pests under s22(2) of the *Biosecurity and Agriculture Management Act 2007* (BAM Act):

- Cat *(Felis catus).*
- European Red Fox (*Vulpes vulpes).*
- European Rabbit (*Oryctolagus cuniculus*).

Conservation Significant Fauna

Evidence of four conservation significant fauna species were recorded within the Survey Study Area:

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksia naso* (EPBC Act and BC Act Vulnerable).
- Baudin's Cockatoo *Zanda baudinii* (EPBC Act and BC Act Endangered).
- Carnaby's Cockatoo *Zanda latirostris* (EPBC Act and BC Act Endangered).
- Quenda *Isoodon fusciventer* (Priority 4 BC Act).

Forest Red-tailed Black Cockatoos, Baudin's Cockatoo and Carnaby's Cockatoo were all seen or heard during the survey. Foraging evidence for Carnaby's Cockatoos and Forest Red-tailed Black Cockatoos was identified (Appendix E).

A post-survey likelihood of occurrence assessment was completed and identified an additional 11 fauna conservation significant species with a 'high' or 'moderate' likelihood of occurrence. These species are presented below in Table 39.

Table 39 Conservation Significant Fauna Species with a 'high' or 'moderate' likelihood of occurrence

Class	Scientific Name	Common Name	Conservation Status		Ecology
			BC Act / DBCA[2]	EPBC Act[1]	
High likelihood					
Mammal	*Notamacropus eugenii derbianus*	Tammar Wallaby	P4	-	A small nocturnal Tammar Wallaby subspecies that is native to south-western Western Australia and five offshore islands. The species shelters in dense low vegetation during daylight and moves to open grassy areas to feed after dark. They inhabit coastal scrub, heath, dry sclerophyll forest, and thickets in mallee and woodland (DEC, 2012a). Moderate likelihood of occurrence.
Mammal	*Dasyurus geoffroii*	Chuditch	V	VU	The Chuditch, also known as Western quoll or Western native cat, was once widespread across all Australian states, but now only occupies less than five percent of its former range. In Western Australia, its range has retracted to patches of the Jarrah Forrest and the south coast of Western Australia and occurs in low numbers between Moora and Perth (DEC, 2012b). Moderate likelihood of occurrence.
Mammal	*Bettongia penicillata ogilbyi*	Woylie	CR	E	Populations of Woylies in south-western Australia inhabit woodlands and adjacent heaths with dense understorey of shrubs, particularly *Gastrolobium spp.* Moderate likelihood of occurrence.
Fish	*Galaxiella nigrostriata*	Black-stripe minnow	EN	E	Largely restricted to near-coastal wetlands from Augusta to Albany, although populations are also known near Bunbury and in the Ellen Brook catchment north of Perth (DWER, 2023). Moderate likelihood of occurrence.
Bird	*Falco peregrinus*	Peregrine Falcon	OS	-	The Peregrine Falcon is widespread across Australia and inhabits a variety of habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey, and secure nest sites and prefers coastal and inland cliffs or open woodlands near water and may even be found nesting on high city buildings (DCCEEW, 2023). Moderate likelihood of occurrence.
Reptile	*Neelaps calonotos*	Black-striped Burrowing Snake	P3	-	The Black-striped Snake is mostly confined to the Swan Coastal Plain between Mandurah and Lancelin. It takes shelter in upper layers of loose soil beneath leaf litter in Eucalyptus/Banksia woodlands, typically at the base of trees and shrubs (Bush *et al.*, 2010). High likelihood of occurrence.

Class	Scientific Name	Common Name	Conservation Status		Ecology
			BC Act / DBCA[2]	EPBC Act[1]	
Reptile	*Pseudemydura umbrina*	Western Swamp Tortoise	CR	CE	The Western Swamp Tortoise has a very small geographic range, and its geographic distribution is very restricted. The species is currently known from a single viable naturally occurring population within Ellen brook Nature Reserve, and two populations maintained through translocation of captive-bred individuals (Twin Swamps Nature Reserve and Mogumber Nature Reserve) (TSSC, 2021). Moderate likelihood of occurrence.
Invertebrate	*Hylaeus globuliferus*	Woollybush Bee	P3	-	This species is believed to feed on flowers from *Adenanthos cygnorum* and also *Banksia attenuata* (Houston, 2018). High likelihood of occurrence.
Invertebrate	*Idiosoma sigillatum*	Swan Coastal Plain Shield-backed Trapdoor Spider	P3	-	The Swan Coastal Plain Shield-backed Trapdoor Spider occurs in remnant habitats in Banksia woodland and heathland on sandy soils (Rix *et al*., 2018). High likelihood of occurrence.
Invertebrate	*Leioproctus contrarius*	A short-tongued Bee	P3	-	A short-tongued native bee found in Western Australia, associated with *Goodenia sp.* and *Leschenaultia sp*. (Houston, 2018). High likelihood of occurrence.
Invertebrate	*Synemon gratiosa*	Graceful Sun-moth	P4	-	The Graceful Sun Moth occurs throughout the Swan Coastal Plain and extends north into the Geraldton Sandplains (DEC, 2011). It is associated with two habitat types: 1. Coastal heathland on Quindalup dunes where it is restricted to secondary sand dunes due to the abundance of the host plant *Lomandra maritima*. 2. Banksia woodland on Spearwood and Bassendean dunes, where the second known host plant *L. hermaphrodita* is widespread. High likelihood of occurrence.

7.3.4 Conservation Significant Fauna Occurrence and Potential Habitat

Further information on the distribution, occurrence, threats and potential habitat within the PDE is provided below for species threatened under the EPBC Act and BC Act with a known likelihood of occurrence assessment rating.

Threatened Black Cockatoo Species

All three species of Black Cockatoo have been recorded within the Proposal Survey Study Area:

- Forest Red-tailed Black Cockatoo *Calyptorhynchus banksii* subsp. *naso* (Vulnerable under the EPBC Act and under the BC Act).
- Baudin's Cockatoo *Zanda baudinii* (Endangered under the EPBC Act and the BC Act)
- Carnaby's Cockatoo *Zanda latirostris* (Endangered under the EPBC Act and the BC Act)

The following sections describe the distribution and habitat requirements, threats, and occurrence and potential habitat within the Proposal Impact Area and broader region for these species.

Distribution and Habitat Requirements

The Forest Red-tailed Black-Cockatoo is endemic to the south-west of WA, ranging from Gingin in the north, east to Mount Helena, North Bannister and Mount Saddleback, and south to around Albany (Johnstone & Storr, 2004). In recent years there has been a distinct expansion of the range of this species to the Swan Coastal Plain, including many suburbs within the Perth metropolitan area, as well as east into the Wheatbelt region. The species is generally restricted to areas of Jarrah-Marri forest, farmlands with remnant trees and urban landscapes. They are currently considered not to undergo regular migration but may make seasonal movements in response to food resource and water availability (DCCEEW, 2024c).

The Baudin's Black Cockatoo is endemic to the south-west of WA, from the Perth area to around Albany. Similar to the Forest Red-tailed Black-Cockatoo, the species distribution has recently expanded on to the Swan Coastal Plain, including many suburbs within the Perth metropolitan area. It is generally restricted to areas of Jarrah-Marri forest and farmlands with remnant trees or pine plantations.

Both the Forest Red-tailed Black Cockatoo and Baudin's Black Cockatoo are diurnal granivores, feeding predominantly on the seeds of Jarrah and Marri (Johnstone *et al.*, 2013a; Johnstone & Kirkby, 2019). They are also adapted to foraging on urban (introduced) plant species.

Woodland or forest are generally used for breeding, but the species may also breed in former woodland or forest now present as isolated trees. Pairs nest in hollows 6.5 m to 33 m above ground in very large and very mature Marri (Johnstone *et al.*, 2013b), though they will nest in other eucalypts such as Tuart (Johnstone & Kirby, 2016), utilising hollows that are in close proximity to each other, rather than hollows throughout the landscape (Johnstone *et al.*, 2013a).

Carnaby's Black-Cockatoo is endemic to south-western WA, ranging from Kalbarri in the north, east to Merredin and Ravensthorpe, and then further east along the south coast to the Esperance area (Johnstone & Storr, 1998). The species breeds (July to December) predominantly in the east of its range, migrating to coastal areas in the non-breeding period. In recent years, however, the species has expanded its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain (DCCEEW, 2023). Carnaby's Black-Cockatoo are heavily reliant on areas of Banksia woodland and proteaceous shrubland/heath for foraging (Johnstone & Storr, 1998).

Carnaby's Black-Cockatoo are also diurnal granivores, predominantly feeding on the seeds of the Proteaceae (especially banksias). They are also known to feed on variety of plants, including non-native ornamentals and plantation species such as pine (DPAW, 2013; Johnstone & Kirby, 2016). They are reliant on large tree-hollows in eucalypts (especially smooth barked species such as Wandoo and Salmon Gum) for breeding (Johnstone & Storr, 1998).

Threats

Primary threats to Black Cockatoos include habitat loss and degradation, including loss and degradation of foraging and roosting habitat, and isolation of mature, hollow-bearing trees necessary for breeding (and replacement stock) as well as

secondary impacts such as introduction of dieback caused by *Phytophthora cinnamomi* (and other plant diseases). Interactions with humans (e.g. vehicle or train strike) can also cause death or injury to individuals.

Feral honeybees (*Apis mellifera*) also pose a significant threat to the ability of Black Cockatoo species to survive and breed. Hollow invasion by feral honeybees is likely to increase with the southward movement of bees in response to the predicted warmer climate in south-west WA (Chapman, 2008).

Occurrence and Potential Habitat in the Survey Study Area

The desktop assessment identified approximately 42,724 ha of native vegetation habitat mapped within 15 km of the Survey Study Area. Foraging and breeding habitat has been identified in the areas adjacent to the Proposal, particularly in the surrounding Gnangara Pine Plantations.

DBCA data indicates 71 Black Cockatoo roosting sites are located within 20 km of the Survey Study Area, with the closest located approximately 250 m to the south west of the NBT.

The Survey Study Area is not located within any mapped, confirmed, or unconfirmed breeding site for Black Cockatoos. The nearest mapped breeding site is approximately 7 km west of the Survey Study Area (DBCA-063). A summary of mapped roosting and breeding sites in the vicinity of the Proposal is presented in Table 40 (Figures 4 and 5 of Appendix E).

Table 40 Black Cockatoo Mapped Roosting and Breeding Sites within 20 km of the Proposal Survey Study Area (DBCA)

Dataset number	Dataset Name	Number of sites within 20km
DBCA-050	Carnaby's Cockatoo Confirmed Roost Sites (DBCA, 2018)	38
DBCA-051	Carnaby's Cockatoo Unconfirmed Roost Sites (DBCA, 2018)	24
DBCA-064	Black Cockatoo Roosting Sites - Buffered (1 km) (DBCA, 2019)	63
DBCA-063	Black Cockatoo Breeding Sites - Buffered (4 km) (DBCA, 2019)	2
DBCA-054	Carnaby's Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA, 2018)	4
DBCA-055	Carnaby's Cockatoo Unconfirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA, 2018)	4
DBCA Database request	All black cockatoo roosting sites	71
DBCA Database request	All white-tailed black cockatoo breeding sites	17

To understand the occurrence of Black Cockatoos across the PDE, an additional targeted Black Cockatoo Survey was completed for the Survey Study Area in 2025, in accordance with the EPA Technical Guidance for Terrestrial Vertebrate Surveys. Ecological values were based on the definitions of breeding foraging and roosting habitat as per the EPBC Act DAWE (2022) Referral Guidelines, which were later refined using the BCE (2024) method.

Desktop assessments determined that the Proposal's Survey Study Area intersects five separate 1 km buffers of confirmed roost sites for black cockatoos and Carnaby's Cockatoo specific roost sites (DBCA, 2019).

During the 2025 survey, foraging evidence for all three Black Cockatoo species were recorded within or directly adjacent to the Survey Study Area (AECOM, 2025a), including chewed Marri nuts, Pinecone and *Banksia* sp. foraging. Whereas during the 2022 survey, foraging evidence was limited to the Carnaby's Cockatoo (*Zanda latirostris*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) (AECOM, 2023) (refer to Table 10 in Appendix E).

Foraging Habitat

Ten fauna habitats were mapped across the Survey Study Area (Table 38), representing varying degrees of value for Black Cockatoos. Habitats were categorised to represent a range of conditions, complexities, and habitat values, resulting in four 'Native fauna habitat' and six 'Non-native fauna habitat' types. Refer to Appendix E for comprehensive detail.

The Proposal's Survey Study Area contains Banksia Woodlands and Marri Woodlands with Jarrah native fauna habitats that support suitable foraging species, along with non-native (modified) habitats of Adenanthos and pine plantations. These trees represent prime suitable foraging habitats for all three Black Cockatoo species.

A refined foraging habitat value was allocated to each habitat using the unpublished updated BCE (2024) methodology, provided by Mike Bamford to AECOM.

The BCE habitat foraging scores for habitat extents within the Survey Study Area for each black cockatoo species is listed below in Table 41.

Table 41 Bamford (2024) refined foraging score calculation

Fauna Habitat Type	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black Cockatoo	Extent of Survey Study Area (ha)
Native				
Banksia Woodlands	8	4	3	71.48 (11.85%)
Eucalyptus Woodland	6	6	7	70.90 (11.75%)
Wetlands	2	2	2	32.05 (5.31%)
Mixed Shrubland	3	2	2	2.40 (0.40%)
Non-native (modified)				
Juvenile Pine Plantation	2	0	0	68.52 (11.36%)
Mature Pine Plantation	7	0	0	50.83 (8.43%)
Burnt Pine Plantation	2	0	0	48.03 (7.96%)
Adenanthos/Plantation	2	1	0	164.18 (27.22%)
Trees Over Cleared	1	2	3	6.19 (1.03%)
Urban/Residential	1	1	2	21.16 (3.51%)
Cleared	0	0	0	67.46 (11.18%)

Breeding Habitat

The targeted Black Cockatoo survey determined that of the 603.20 ha Survey Study Area, 169.73 ha (28.14%) contains potential breeding habitat. All habitats that contain tall eucalyptus trees that have the potential to form a suitable hollow if left undisturbed are considered potential breeding habitat, and include:

- Trees Over Cleared (6.19 ha, 1.03%)
- Banksia Woodland (71.48 ha, 11.85%)
- Eucalyptus Woodland (70.90 ha, 11.75%)
- Urban/Residential (21.16 ha, 3.51%)

During the 2022 survey, a total of 217 trees with a suitable DBH (>500 mm) were recorded as potential nesting trees (AECOM, 2023) within the Survey Study Area. This consisted of 172 Marri (*Corymbia calophylla*), 18 Jarrah (*Eucalyptus marginata*), ten Stags, nine Coastal Blackbutt (*Eucalyptus todtiana*), two introduced species, one Flooded Gum (*Eucalyptus rudis*), and five unidentified Eucalypt species. Of these potential nesting trees, 10 (14 hollows) were determined from the ground using binoculars to have a hollow with suitable entrance sizes for black cockatoos (BCE, 2024).

The 2025 targeted Black Cockatoo survey reassessed the 10 potentially suitable trees utilising drone imagery, with input from Mike Bamford. Two trees, totalling three hollows were determined to possess dimensions and characteristics described by Johnstone & Kirkby (2010) and Groom & Mawson (2019) that would be suitable to support breeding for Black Cockatoos. One tree could not be assessed due to its location on private property. None of the identified hollows were found to be actively in use at the time of either survey (Table 42).

Table 42 Black Cockatoo Breeding and Potential Breeding Trees with Hollows reassessed in the 2025 survey *(Highest rated hollow indicated by green highlight)*

Tree ID	Species	Height (m)	DBH (cm)	BCE score	Hollow Suitability (revised)	Coordinates	
7	Marri (*Corymbia calophylla*)	20-25	128	5	No Hollow	115.9178338	31.8098632
9	Stag	5-10	98	2	Previously Active Hollow	115.9175183	31.8085776
10	Stag	10-15	105	4	Unsuitable Hollow	115.917501	31.80761604
11	Stag	5-10	60	5	No Hollow	115.9174619	31.80690047
18	Stag	20-25	110	3	Inactive Hollow	115.9174888	31.8042759
18	Stag	20-25	110	3	Inactive Hollow	115.9174888	31.8042759
87	Stag	5-10	83	4	Unsuitable Hollow	115.8864656	31.6890502
87	Stag	5-10	83	4	Unsuitable Hollow	115.8864656	31.6890502
101	Coastal Blackbutt (*Eucalyptus todtiana*)	15-20	110	4	Unsuitable Hollow	115.9173776	31.80191304
156	Marri (*Corymbia calophylla*)	20-25	84	3	Unable to Confirm	115.9153696	31.79914635

Tree ID	Species	Height (m)	DBH (cm)	BCE score	Hollow Suitability (revised)	Coordinates	
160	Marri (*Corymbia calophylla*)	20-25	68	4	Unsuitable Hollow	115.9171117	31.8013066
160	Marri (*Corymbia calophylla*)	20-25	68	4	Unsuitable Hollow	115.9171117	31.8013066
160	Marri (*Corymbia calophylla*)	20-25	68	4	Unsuitable Hollow	115.9171117	31.8013066
166	Marri (*Corymbia calophylla*)	15-20	70	4	Unsuitable Hollow	115.9171558	31.80092704

Roosting Habitat

No roosting activity was observed during both surveys, and no roosting sites were identified. However, given the abundance of nearby water sources, including lakes, rivers, and urban systems, and the survey area's proximity to urban environments, opportunistic roosting is considered likely where suitable habitats exist.

Therefore, roosting habitat is considered to be present to some extent across all areas that contain tall trees. These habitats mapped within the Survey Study Area include:

- Trees Over Cleared (6.19 ha, 1.03%)
- Banksia Woodland (71.48 ha, 11.85%)
- Mature Pine Plantation (50.83 ha, 8.43%)
- Eucalyptus Woodland (70.90 ha, 11.75%)
- Urban/Residential (21.16 ha, 3.51%)
- Burnt pine (48.03 ha, 7.96%).

Summary

- Evidence of all three Black Cockatoo species was recorded. Carnaby's Cockatoo (*Zanda latirostris*) and the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) were seen and heard, as well as recorded through foraging evidence. Baudin's Cockatoo (*Zanda baudinii*) were recorded to be present exclusively through foraging evidence.
- Two trees, totalling three hollows were determined to possess dimensions and characteristics suitable to support black cockatoo nesting. One of these hollows was noted as being previously active during the refined hollow assessment. One potential tree was unable to be assessed due to restricted access.
- Up to 100.5 ha of Black Cockatoo foraging habitat mapped using the Bamford Consulting Ecologists (2024) method occurs within the PDE.
- Although no roosting activity or sites were recorded during surveys conducted between 07:00 and 17:00 (outside typical roosting hours), the proximity of the entire Survey Study Area to water sources (within 6 km) and the presence of tall trees suggest that roosting habitat is likely present opportunistically across 217.76 ha of the survey area.

7.3.5 Other Listed Species Occurrence and Potential Habitat

An assessment of the potential occurrence and impact to conservation significant species identified as having a 'high' likelihood of occurrence, based on the habitats observed and mapped during field surveys, is presented in Table 49. This includes input from an additional assessment of fauna for impacts prepared to address comments raised by DCCEEW following the Proposal's initial referral (Appendix F).

7.4 Potential Environmental Impacts

The Proposal has the potential to impact on fauna habitats within the PDE, namely through clearing of the Proposal's Impact Area. Potential direct and indirect impacts are discussed below.

7.4.1 Potential Direct Impacts

Implementation of the Proposal may result in potential direct impacts to fauna, as outlined in Table 43.

Table 43 Potential Direct Impacts to Fauna

Proposal Activity	Potential Direct Impact
Clearing of native vegetation and earthworks	Fauna habitat loss.
Construction and operation activities	Loss of threatened fauna individuals through vehicles strike or entrapment within infrastructure.
	Loss of fauna, including significant invertebrate species and SREs, during clearing activities

7.4.2 Potential Indirect Impacts

Implementation of the Proposal may result in potential indirect impacts to terrestrial fauna, outlined in Table 44.

Table 44 Potential Indirect Impacts to Fauna

Proposal Activity	Potential Indirect Impact
Construction activities	Dust, noise and vibration impacts
	Introduction of invasive species
	Temporary fauna displacement due to construction activities
	Loss of fauna habitat or individuals due to fire
	Entrapment and/or injury to fauna from excavation and trenching works
Establishment of linear infrastructure corridor	Loss of habitat connectivity
	Habitat fragmentation and reduced distribution
Hot works and operational activities	Loss of fauna habitat or individuals due to fire

7.5 Mitigation and Avoidance

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023a). Avoiding impacts has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on terrestrial fauna.

These principles, and the order in which they have been applied, are:

- **Avoid**: reducing the Impact Area and locating activities to avoid direct and indirect impacts on significant fauna habitat.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.

- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery.
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

Table 45 outlines the mitigation and avoidance measures proposed to reduce potential impacts to terrestrial fauna during the scoping phase of the Project, including design evolution to reduce impacts to high value fauna habitat.

Table 45 Mitigation and avoidance actions proposed for terrestrial fauna

Design or management measure	Description
Avoid	
Proposal alignment and siting	Where viable, powerline locations were designed to be placed within existing easements to avoid additional clearing of high value fauna habitats. . Western Power has revised the Impact Area to avoid clearing of all suitable nesting trees identified within the PDE and to span over areas of Banksia Woodlands TEC, which is high-value foraging habitat for black cockatoos.
Stakeholder Engagement	Following engagement with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve.
Use of existing infrastructure	Use of existing public roads and powerline tracks within the Proposal corridor to avoid additional clearing requirements.
Minimise	
Management Plans	A Terrestrial Fauna Environmental Management Plan has been developed with objective and outcome based targets aimed at minimising impacts to conservation significant fauna during construction and operation of the Proposal. •
Rehabilitate	
Vegetation rehabilitation	A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent
Offsets	

Design or management measure	Description
Offset Strategy	The Proposal will have significant residual impacts to the three threatened species ofblack cockatoo. Western Power has secured the Orange Springs and Hopeland sites which will be used to offset 100% of the significant residual impacts to black cockatoos through a combination of protection and management of existing high-quality foraging habitat and rehabilitation of cleared areas targeting a foraging habitat quality score of 6 at minimum (in accordance with the Bamford 2020 foraging habitat quality assessment tool). The Offset includes: – Protection and management of 122.78 ha of High (8) quality foraging habitat for Carnaby's Cockatoo at Orange Springs. – Rehabilitation of 62.42 ha of cleared land at the Orange Springs site targeting a foraging habitat quality score of 6 for Carnaby's Cockatoo – Rehabilitation of 46.82 ha of degraded land at the Hopeland site, targeting a foraging habitat quality score of 7 for the three threatened species of black cockatoo

7.6 Assessment and Significance of Residual Impacts

The assessment of impacts focuses on potential residual impacts of the Proposal on fauna habitats and conservation significant fauna. The assessment assumes that the mitigation measures detailed above are implemented.

7.6.1 Fauna Habitat Types

Direct Residual Impact on Fauna Habitat

The Proposal has sought to utilise existing areas of low-lying vegetation and cleared areas associated with the existing transmission corridor to minimise clearing to the lowest amount practicable.

Unavoidable impacts to fauna habitat within the PDE, include clearing of a maximum of 100.5 ha of fauna habitat (refer to Section 1.2), comprising:

- 39.57 ha of native fauna habitat.
- 60.85 ha of modified fauna habitat.

The Proposal's direct impacts to fauna habitat types is presented below in Table 46. Cleared areas are not suitable for any fauna species and have therefore been excluded. Residual impacts to black cockatoo habitat are discussed separately in Section7.6.2. Areas of Banksia Woodlands have been strategically avoided as a priority, with the greatest proportional impact affecting modified fauna habitats. The terrestrial fauna habitats proposed for clearing are well represented throughout the Perth region and no conservation significant vertebrate fauna species are known to be restricted to or reliant on the habitat within the Impact Area.

Table 46 Residual Impacts to Fauna Habitats

Habitat Type	Extent within the Survey Study Area (ha)	Impact Area (ha)
Native Fauna Habitats		
Banksia Woodlands	71.48	3.01

Habitat Type	Extent within the Survey Study Area (ha)	Impact Area (ha)
Eucalyptus Woodlands	70.90	32.2
Wetlands	32.05	3.38
Mixed Shrubland	2.40	0.98
Total	**176.83**	**39.57**
Modified Fauna Habitats		
Juvenile Plantations	68.52	16.1
Mature Plantations	50.83	7.3
Burnt Plantations	48.03	1.27
Adenanthos / Plantation	164.18	28.86
Trees over Cleared	6.19	1.68
Urban / Residential	21.16	5.64
Total	**337.75**	**60.85**

Indirect Residual Impacts on Fauna Habitat Types

The Proposal includes development of linear infrastructure, which has the potential to impact on fauna habitat by influencing habitat fragmentation and loss of habitat connectivity.

As the PDE and Impact Area corridor are located within a largely disturbed and metropolitan area, reflected by the significant proportion of modified fauna habitat types recorded,existing remnant patches of vegetation are already fragmented.

As high value fauna habitats are well represented in the surrounding area (Gnangara Moore River State Forest), and the Proposal is located in an area of relatively high existing disturbance, faunal dispersal is unlikely to be significantly impacted.

Field surveys identified that the Proposal site supports three introduced fauna species, listed as pests under the BAM Act - the European Red Fox (*Vulpes vulpes*), the European Wild Rabbit (*Oryctolagus cuniculus*) and the Cat (*Felis catus*).

Potential indirect impacts to threatened fauna from noise, vibration, light and dust emissions to be insignificant due to limited intensity and duration of activities in any one location as works are transient along the linear corridor. Standard industry controls are considered adequate to manage the potential risk to threatened fauna from noise, vibration, light and dust emissions and these will be addressed in the Principal Contractor's Construction Management Plan supplied to Western Power prior to construction of the Proposal. Standard control measures can include:

- Adherence to the noise guidelines under the Environmental Protection (Noise) Regulations 1997, Regulation 13 (no construction prior to 7am or after 7pm on weekdays and no construction to occur on Sundays or public holidays unless special approval is granted)
- Use of water carts for dust suppression, where required.
- Work must follow Australian Standard AS 2436-2010, which provides guidance on noise and vibration control.
- Lighting towers to be directed towards the ground.

7.6.2 Short Range Endemics and Significant Invertebrate Species

The key habitats for SRE and conservation significant invertebrates that occur on the northern SCP (Four native bees, one mygalomorph spider and one day flying moth) are primarily Banksia woodland, and to a lesser extent, *Adenanthos* shrubland, and heathland areas of remnant vegetation that retain habitat values (Table 38) (Appendix F).

Within the PDE, only 3.01 ha of the Banksia Woodland fauna habitat type (comprised of 2.23 ha of Banksia TEC) is proposed to be cleared (Table 46), and all occurrences of Banksia woodland have contiguous occurrences, thus minimising any localised impacts to invertebrates that may occur from the Proposal construction. Most areas of Banksia Woodland and other key areas of remnant vegetation will be avoided by spanning over them to avoid clearing. When considering linear infrastructure, impacts to SRE invertebrates are generally lower than for nonlinear infrastructure, especially where the width of corridors is narrow in context of the landscape and particular habitats being traversed.

Whilst undertaking surveys, both targeted and baseline for SRE and conservation significant invertebrates, would provide some additional clarity regarding specific locations for occurrence and avoidance, the most likely habitats for occurrence would be the Banksia woodland habitats. This conclusion was determined by an SME based on assessment of existing biological survey data and desktop assessment. Undertaking field survey increases the confidence in likelihood of occurrence rating for species, both presence and absence, however, due to many of the species' inherent scarcity in nature they are infrequently recorded even in their primary habitat, so an absence of occurrence during a targeted survey does not guarantee an absence of presence within a potential area of suitable habitat.

As a result, further surveys are not likely to be beneficial to SRE species in the context of substantially changing the outcomes for the species from the implementation of the Proposal. Impacts to the species have been avoided and minimised by limiting the clearing of areas which have the highest likelihood of occurrence as a habitat for SREs and conservation significant invertebrates, being Banksia Woodland. Clearing for the Proposal will result in the removal of only 3.01 ha of the total 71.48 ha of habitat mapped within the surveyed area (Table 38). In consideration of the limited impacts from linear infrastructure projects to SREs, these measures implemented by Western Power will preserve the habitats of SREs and conservation significant invertebrates and minimise impacts such that there is no significant residual impact.

7.6.3 Conservation Significant Fauna Species

Terrestrial fauna and the habitats upon which they depend on may be directly and indirectly impacted by the Proposal.

An assessment of impacts for conservation significant fauna species identified within the Proposal's Survey Study Area is presented in the sections below.

Black Cockatoos (Threatened)

The three species of black cockatoo listed under the BC Act are:

- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*): Vulnerable
- Baudin's Black-Cockatoo (*Zanda baudinii*): Endangered
- Carnaby's Black-Cockatoo (*Zanda latirostris*): Endangered.

Direct Residual Impacts to Threatened Black Cockatoos

As per the BCE (2024) method, a total of 100.5 ha of potential black cockatoo foraging habitat was mapped within the Proposal's Impact Area (refer to Section 1.2). The Proposal presents the following impacts to black cockatoo foraging habitat (Table 47):

- Carnaby's Black Cockatoo – 100.5 ha
- Baudin's Black Cockatoo – 75.8 ha
- Forest Red-Tailed Black Cockatoo – 46.9 ha

Table 47 Refined Black Cockatoo Foraging Scores and Impact (BCE, 2024)

	Extent within Development Envelope (ha)	Impact Area (ha)
Carnaby's Habitat (foraging)		
None (0)	17.95	10.8
Negligible (1)	18.02	7.4
Low (2)	98.73	49.6
Low to Moderate (3)	1.22	1.0
Moderate (4-6)	50.46	32.2
Moderate to High (7)	13.18	7.3
High (8-10)	17.68	3.0
Baudin's Habitat (foraging)		
None (0)	63.52	35.4
Negligible (1)	71.36	34.5
Low (2)	14.22	6.1
Moderate (4)	68.14	3.0
Moderate (6)		32.2
Forest Red-Tailed Habitat (foraging)		
None (0)	120.88	64.2
Low (2)	28.22	11.7
Low to Moderate (3)	17.68	3
Moderate to High (7)	50.46 ha	32.2

A total of 169.73 ha of potential breeding habitat was identified within the Survey Study Area (AECOM, 2025a) A total of 217 potential nesting trees (suitable DBH, >500mm) were recorded within potential breeding habitat within the Survey Study Area in the initial 2022 surveys. Ten of these trees (14 hollows) were identified as having potentially suitable hollows from an on-ground assessment using binoculars. The refined Black Cockatoo assessment completed in 2025 reassessed these 10 potentially suitable nesting trees using drone imagery. Two of the 10 potentially suitable trees were determined to have suitable hollows for Black Cockatoos. None of the identified hollows recorded evidence of use by Black Cockatoos during the 2022 or 2025 surveys, however one was noted as being previously active. One potential nesting tree could not be assessed for both surveys due to restricted access.

The Proposal will result in the clearing of the 54 potential nesting trees identified within the PDE, none of which contained hollows or suitable hollows.

Proposal design has prioritised areas of low quality foraging and breeding habitat and aimed to avoid high value Black Cockatoo breeding and foraging habitat where practicable.

Table 48 Black Cockatoo Potential Breeding Habitat Impacts

Potential Breeding Habitat Type	Extent within Development Envelope (ha)	Impact Area (ha)
Eucalyptus Woodlands	50.46	32.2
Banksia Woodlands	17.68	3.01
Trees over Cleared	4.02	1.68
Urban / Residential	9.20	5.64
Total	**81.36**	**42.53**

No known roosting sites or roosting activity were recorded within the Impact Area, however, six of the fauna habitat types were considered to represent potential roosting habitat for black cockatoos:

- Trees over cleared
- Banksia woodland
- Mature Pine Plantation
- Eucalyptus Woodland
- Urban/Residential
- Burnt Pine

Clearing within these areas will result in a total impact of up to 51.1 ha of roosting habitat within the PDE.

Indirect Residual Impacts to Threatened Black Cockatoos

Indirect residual impacts to Black Cockatoos as a result of the implementation of the Proposal include dust, noise, vibration and light emissions and impacts to habitat quality from the spread/introduction of invasive species and disease. None of these residual indirect impacts are considered to be significant due to limited intensity and duration of activities in any one location as works are transient along the linear corridor. Standard industry controls are considered adequate to manage the potential risk to threatened fauna from noise, vibration, light and dust emissions and these will be addressed in the Principal Contractor's Construction Management Plan supplied to Western Power prior to construction of the Proposal

Priority and Other Listed Fauna Species

A summary of impacts to Priority species known to occur within the Impact Area and conservation significant fauna identified as having a 'high' likelihood of occurrence within the Impact Area (Section 7.3.5) is presented below in Table 49. This includes evaluation of species' potential likelihood of occurrence and availability of suitable habitat, to assess overall impact.

Additional literature reviews and assessments were made for the following species:

- Black-Stripe Minnow and Western Swamp Tortoise (SLR, 2024) – Appendix G.
- Woylie and Chuditch (AECOM, 2025b) – Appendix F.

Further detail of impact to conservation significant species is also provided in Appendices B and D.

Table 49 Potential Impact to Conservation Significant Fauna Species with a 'High' or 'Moderate' Likelihood of Occurrence

Species	Conservation Status		Assessment of Potential Occurrence Likelihood, Habitat Suitability and Overall Impact
	BC Act / DBCA	EPBC Act	
Quenda	P4	-	**Known** Evidence of Quenda footprints was recorded within the Survey Study Area under existing transmission lines and within transmission line easements during field survey observations. The species is likely to utilise the Adenanthos/Plantation habitats within the Proposal's Survey Study Area as the low dense shrubland and sandy soil is ideal for foraging and predation protection. The low woodlands assemblage of vegetation in the Banksia Woodlands habitat type also provides the preferred habitat for food and shelter (Van Dyck & Strahan, 2008). Quenda can also be expected to utilise Marri Woodland and Xanthorrhoea Shrubland habitats within the Survey Study Area. While suitable habitat may be present, clearing impacts are considered to be insignificant due to the species widespread populations in the surrounding area.
Tammar Wallaby (*Notamacropus eugenii derbianus*)	P4	-	**Low** While there is moderate potential that the species may inhabit woodland habitats within the Proposal's Impact Area, extensive similar quality habitat exists locally. Therefore, it is unlikely the Tammar Wallaby will be significantly impacted by the Proposal.
Chuditch (*Dasyurus geoffroii*)	V	VU	**Moderate** A total of 39 DBCA records from Chuditch occur within 20 km of the Proposal's Survey Study Area, of which 13 have been recorded within the last 20 years. The closest of which was located approximately 2 km east of the Survey Study Area. All other records are over 12 km east within the northern Jarrah forest, where large areas of intact habitat are present. The Proposal's Impact Area contains habitat types known to support the Chuditch, including Banksia Woodland, Eucalypt Woodland and Mixed Shrubland. However, it is not likely to support a permanent population. This is due to the absence of large, contiguous tracts of intact native vegetation, the lack of suitable den sites within the Survey Study Area and its proximity to urban areas. The PDE expands on existing Western Power infrastructure and will not change the area's existing habitat fragmentation. Chuditch may occur only as a transient visitor and is unlikely to be significantly impacted by the Proposal.
Woylie (*Bettongia penicillata ogilbyi*)	CR	E	**Low** While four identified habitats within the Proposal's Survey Study Area represent suitable habitat for the Woylie, no historical records or evidence of presence occur within the Survey Study Area.

Species	Conservation Status		Assessment of Potential Occurrence Likelihood, Habitat Suitability and Overall Impact
	BC Act / DBCA	EPBC Act	
			The closest records occur within Whiteman Park, 2 km east of the Survey Study Area. These records are associated with a translocated population moved to the Native Animal Rescue Facility in Malaga in 2010. This translocated colony have expanded within the fenced Woodland Reserve (Whiteman Park, 2024) and represent the account for a 'high' likelihood of occurrence in the area surrounding the Proposal. Given no records of the species within 20 km of the Proposal occur outside the fenced boundaries of Whiteman Park or Native Animal Rescue Facility, and no direct or indirect evidence of the species was observed during field surveys, it is unlikely the species occurs within the Survey Study Area.
Black Stripe Minnow (*Galaxiella nigrostriata*)	EN	E	**Low** The species inhabits seasonally or permanently inundated wetlands. The Black-stripe minnow is known to occur at Whiteman Park, but there are limited suitable habitats within the Proposal's Survey Study Area. Given the Proposal area's lack of wetland connectivity to known Black-Stripe Minnow habitat, and the potential disturbance of natural vegetation in the surrounding area and physio-chemical variability, presence is unlikely (SLR, 2025).
Peregrine Falcon (*Falco peregrinus*)	OS	-	**Low** The Proposal Impact area provides suitable habitat for the species, and it may occur intermittently foraging throughout the area. However, due to the extent of similar suitable quality habitat, impact is not likely to be significant.
Black-striped Burrowing Snake (*Neelaps calonotos*)	P3	-	**Low** The species utilises layers of loose soil beneath leaf litter in Eucalypt and Banksia Woodlands and is likely to occur. However, due to the extent of similar suitable quality habitat, impact is likely to be insignificant.
Western Swamp Tortoise (*Pseudemydura umbrina*)	CR	CE	**Low** The species has a very restricted geographic range and is limited to secure Nature Reserves (TSSC, 2021). While there may be suitable wetland habitats within the Survey Study Area, there are limited records of the species. The Western Swamp Tortoise is considered highly unlikely to occur within the Proposal area, given the distance of fragmentation between habitat and known populations, habitat disturbance, size of habitat and increased predation risk (SLR, 2025).
Woollybush Bee (*Hylaeus globuliferus*)	P3	-	**Low** The species frequent 'Woollybush' plants (*Adenanthos* spp.), *Banksia, Jacksonia* and *Grevillea* spp. Several of these plant genera were recorded throughout the Survey Study Area (AECOM, 2023), with Banksia Woodland identified as a suitable habitat. There are 10 DBCA records for the species occurring within 20 km of the Proposal, between 1957 to 1996. The

Species	Conservation Status		Assessment of Potential Occurrence Likelihood, Habitat Suitability and Overall Impact
	BC Act / DBCA	EPBC Act	
			species was therefore assessed as having a 'high' likelihood of occurrence due to the presence of suitable habitat and proximity of historical records. However, given the abundance of suitable habitat outside of the Proposal's Survey Study Area, notably patches of Banksia Woodland extending from approximately 10 to 1,000 ha beyond the Proposal's boundary, including protected areas such as reserves and Whiteman Park, it is unlikely that the habitat within the Proposal's Survey Study Area is critical to the species survival.
Swan Coastal Plain Shield-back Trapdoor Spider (*Idiosoma sigillatum*)	P3	-	**Low** The Proposal is located at the eastern range limit of the species, which is the sandy foothills of the Darling Escarpment (Rix *et al.* 2018). A total of 124 DBCA records of the species occur within 20 km of the Proposal, with nine recorded in the last 20 years. The closest record is located approximately 1.5 km west of the Proposal. As suitable habitat extends considerably throughout the Swan Coastal Plain, the likelihood of the species occurring with the Survey Study Area is low as the amount of suitable habitat is minimal compared to the quality and proportion within the surrounding area.
A short-tongued Bee (*Leioproctus contrarius*)	P3	-	**Low** The species utilised Banksia Woodland, similar to the Woollybush Bee. A total of three DBCA historical records of the species occur within 20 km of the Proposal, between 1954 – 1982. One record is located at the northern end of the Survey Study Area. The species is considered to have a high likelihood of occurrence due to suitable habitat. However, given the extensive Banksia Woodland habitat surrounding the Proposal, and the limited known records of the species within 20 km, the Proposal is not likely to have a significant impact on the species or its potential habitat.
Graceful Sun-moth (*Synemon gratiosa*)	P4	-	**Low** The species occurs in Banksia Woodlands and Woollybush on deep sands of the Swan Coastal Plain and is widespread across southwestern Western Australia. Suitable habitat was identified within the Proposal's Survey Study Area (AECOM, 2023) and nearby records approximately 2 - 3 km from the Proposal. The species is considered likely to occur within the Banksia Woodland habitat within the Survey Study Area. However, as this habitat is extensive across the surrounding area, it is not likely to be critical to the survival of the species.

Key to status: CR/CE = Critically Endangered, En/E = Endangered, Vu/V = Vulnerable, OS = Other Specially Protected, P1 – P4 = Priority 1 – 4.

Indirect Residual Impacts to Conservation Fauna

Introduction of non native species

As discussed above in Section 7.6.2, field surveys have determined that the Proposal site supports several introduced fauna species, listed as pests under the BAM Act.

Given that these species are well established in the area, and a TFEMP has been prepared, the Proposal is unlikely to impact conservation significant fauna as a result of further introductions or spread of feral animals.

Dust, light, noise and vibration

Proposal construction activities associated with vegetation clearing and vehicle movements have the potential to introduce increased dust, noise and vibration emissions, resulting in impacts to local fauna population health and movements.

The Proposal does not involve any night-works and therefore no indirect impacts to fauna from light emissions are expected.

Dust, noise and vibration impacts are expected to be limited in duration as works proceed along the linear corridor and are not concentrated in any location for an extended period. As such, standard industry management measures for dust, noise and vibration are considered sufficient to manage any potential impacts to fauna.

Vehicle strike

Vehicle movements associated with construction and operational activities has the potential to cause or increase the risk of fauna death, injury, or displacement due to interaction with heavy and light vehicles.. A TFEMP has been prepared to manage and mitigate the potential impacts associated with vehicle movements during construction and operational activities.

Entrapment within trenches and excavations

Excavation and trenching works required for the construction of the proposal has the potential to cause or increase the risk of fauna injury or death due to entrapment. The TFEMP includes conditions for the installation of fauna egress within any open excavations or trenches and the requirement for twice daily (am/pm) inspections of any trenches that will remain open for greater than a one-day period.

Fire Risk

The Proposal's construction and operational activities, such as hot works and use of diesel powered equipment present a potential fire risk.

Western Power has a Bushfire Management Strategy which will be implemented for both the construction and operation stages of the Proposal. Additional management measures to minimise risk of impacts to vegetation from fires are also detailed in the Terrestrial Fauna Environment Management Plan for the Proposal.

Further detail on the assessment of impacts to conservation significant fauna species is outlined in Appendix F, Appendix G and Appendix H, with an assessment of Matters of National Environmental Significance (MNES) presented in Section 11.

7.6.4 Significance of Residual Impact

The Proposal is expected to have a significant residual impact to conservation significant fauna and fauna habitats in the region and will be managed via the implementation of an Offsets Strategy. Table 50 provides an assessment of the significance of residual impact with reference to the "consideration of significance" matters listed in the Statement of environmental principles, factors, objectives and aims of EIA (EPA, 2023a).

Table 50 Significance of Residual Impact to Terrestrial Fauna

Significant matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	The Proponent has completed specialist surveys, undertaken by suitably qualified consultants, to assess terrestrial fauna and reduce scientific uncertainty. Surveys were completed in accordance with EPA guidelines. The Proposal design has strongly focused on the avoidance of impacts, directly informed by completed surveys, and multiple design iterations have been developed. This approach has avoided impacts to the point of lowest possible impact and is a precautionary approach which limits a reliance on minimisation, rehabilitation and offset impacts. The precautionary principle has been applied through: • Evolving Proposal design informed by environmental studies to minimise impacts • Design to place powerline locations within existing easements to avoid impacts to potentially suitable nesting trees and high quality foraging habitat. As such all suitable nesting trees identified within the PDE will not be impacted by clearing. • Restricting clearing of fauna habitats to a total of 100.5 ha, comprising 39.57 ha of native fauna habitat and 60.85 ha of modified fauna habitat.
Values, sensitivity and quality of the environment that is likely to be impacted	Four listed conservation significant fauna species were recorded in the PDE, including all three threatened black cockatoo species and one priority species (Quenda, P4). The primary fauna habitats in the Proposal's Impact Area are plantations, Banksia Woodland and Marri Woodlands. Up to 100.5 ha of fauna habitat will be cleared, comprised of up to 39.57 ha of native fauna habitat and 60.85 ha of modified fauna habitat (refer to Section 1.2). The Proposal will result in the clearing of black cockatoo foraging habitat, comprising: • 100.5 ha of Carnaby's Black Cockatoo foraging habitat • 75.8 ha of Baudin's Black Cockatoo foraging habitat • 46.9 of Forest Red-Tailed Black Cockatoo foraging habitat The loss of 54 potential nesting trees, none of which contain hollows or suitable hollows.
All stages and components of the Proposal	The impact assessment considers all components of the Proposal that might impact fauna.
Extent (intensity, duration, magnitude and footprint) of likely impacts	The FVEMP requires a review of the final cleared footprint one month following completion of construction to identify any areas within the PDE that can be rehabilitated. The condition stipulates rehabilitation will be managed via a Revegetation Management Plan. .Indirect impacts from dust, noise, vibration and light emissions are expected to be insignificant and limited to the construction period. Construction and clearing actions will take place progressively over a three-year period, with an operational life of >50 years (permanent infrastructure).

Significant matters	Significance of residual impact of the Proposal in the regional context
Resilience of the environment to cope with the impacts, including pressures such as climate change	A significant proportion of the Proposal's Impact Area is already degraded or disturbed. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. As the Proposal is seeking to upgrade the SWIS to enhance renewable energy generation in the area, it will therefore seek to mitigate climate change pressures.
Application of the mitigation hierarchy	Refer to Table 45
Consequence of the likely impacts	Direct loss of threatened fauna habitat leading to a decline in the populations of threatened Black Cockatoo species in the area.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Refer to Section 7.7 for further information.
Cumulative effects	The Proposal is not expected to result in significant cumulative impacts, particularly given its location within the Perth Metro area, where land has been historically extensively cleared and is now primarily utilised for residential use. The Proposal has been designed to integrate with existing infrastructure and easements to reduce impact to environmental values, utilising areas of degraded vegetation and avoiding high value areas wherever practicable.
Holistic impacts	The Proposal involves clearing up to 98.08 ha of vegetation, resulting in the loss of native flora, Threatened Ecological Communities, Environmentally Sensitive Areas (including Bush Forever sites and DBCA-managed land), and fauna habitat. This may lead to direct fauna mortalities, visual amenity loss, weed invasion, and degradation of nearby ecosystems. Wetland removal could alter hydrological regimes and affect surrounding vegetation health. Construction and operation activities may directly impact fauna, through the introduction of light, noise and dust emissions, disturbing fauna and impact behaviour and breeding patterns, with the additional potential of construction vehicle strike. Impacts to fauna will be managed through the TFEMP.
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were based on assessing the maximum area of fauna habitat that will be cleared for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, therefore the predicted residual impacts over-estimate the likely impact to terrestrial fauna.
Public interest about the likely effect on the environment	12 public comments were received on the initial referral to the EPA and DCCEEW. Comments requesting an assessment via Public environmental review. Commentary was predominantly focused on the significant factors of Flora & Vegetation, Terrestrial Fauna and Inland Waters. Three public comments were received following the publication of the Environmental Review Document for the Proposal. Commentary was predominantly focused on the suitability of proposed offsets and assessment of impacts to Banksia TEC and the three threatened species of black cockatoo.

7.7 Environmental Outcomes

Implementation of the Proposal will achieve the environmental outcomes listed in Table 51 to protect significant terrestrial fauna environmental values, consistent with the EP objective *"to protect terrestrial fauna so that biological diversity and ecological integrity are maintained".*

Table 51 Proposed Environmental Outcomes for Terrestrial Fauna

Proposed environmental outcomes	How environmental outcomes can be measured and assured	Consistent with EPA objective
Maximum total clearing of up to 100.5 ha of Black Cockatoo foraging habitat (refer to Section 1.2), comprising: • 100.5 ha of Carnaby's Cockatoo foraging habitat • 75.8 ha of Baudin's Cockatoo foraging habitat • 46.9 ha of Forest Red-tailed Black Cockatoo foraging habitat	In accordance with the Terrestrial Fauna Environmental Management Plan	Yes
No clearing of suitable nesting trees for black cockatoos within the PDE.		
No death or injury to threatened fauna as a result of Proposal activities.		
Minimise indirect impacts to threatened fauna habitat quality from incidence and spread of weeds and/or disease, fragmentation and fire.		

8. Inland Waters

The EPA guidelines define inland waters as "the occurrence, distribution, connectivity, movement, and quantity (hydrological regimes) of inland water including its chemical, physical, biological and aesthetic characteristics (quality)" (EPA, 2018).

8.1 EPA Objective

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

8.2 Relevant Policy and Guidance

Table 52 summarises the relevant policy and guidance considered for the factor Inland Waters.

Table 52 Policy and Guidance - Inland Waters

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Inland Waters (EPA, 2018).	This guidance was used to inform the impact assessment undertaken for inland waters and the significance of the potential environmental impacts.
Other State or Commonwealth Legislation or Guidance	
Rights in Water and Irrigation Act 1914 (RIWI Act)	The Act establishes the legislative framework for managing and allocating water resources in Western Australia.
Metropolitan Water Sewerage and Drainage Act 1909	This Act establishes the method of control, and for other purposes incidental thereto, for water supply, sewerage and drainage.
Treatment and Management of Soil and Water in Acid Sulfate Soil Landscapes (DER, 2015)	This guidance document supports development and construction activities that may disturb Acid Sulfate Soils.

8.3 Receiving Environment

8.3.1 Surveys and Studies

Inland Waters surveys and assessments have been undertaken within the Survey Study Area to determine the baseline environment, used to inform Proposal avoidance and design. Details of these surveys are presented in Table 53.

Table 53 Inland Waters Surveys

Survey	Survey Timing	Survey Guidance	Survey Effort
Desktop Assessment (AECOM)	5, 8 and 9 September 2022	Environmental Factor Guideline: Inland Waters (EPA, 2018).	Literature review and database searches
Inland Waters Assessment and ASS and Dewatering Management (Tetra Tech Coffey, 2025)	Assessment completed in May 2025.		Three stage assessment of potential impacts: • Preliminary (qualitative) risk impact assessment • Detailed (quantitative) risk impact assessment • Recommended management actions for impact mitigation

Desktop Assessment Methodology

A comprehensive desktop assessment was undertaken prior to flora and fauna field surveys to identify significant environmental values likely to be present in the Survey Study Area (603.20 ha), including inland waters. Desktop searches included government databases, inclusive of, but not limited to, DBCA mapped wetlands, DWER ASS risk mapping, and a review of PDWSAs and Depth to Groundwater (DWER).

Detailed Inland Waters Assessment Methodology

Tetra Tech Coffey Pty Ltd (Tetra Tech Coffey) completed an assessment of potential impacts from the Proposal to surface water hydrology, groundwater and wetlands within the PDE, and provided recommendations of water management strategies to manage any identified potential impacts.

This scope of works also included an assessment of potential groundwater drawdown impacts from dewatering activities associated with the Proposal's construction, inclusive of potential hydrological and soil acidification impacts to the identified wetlands within the PDE.

The Inland Waters assessment was completed in three stages, with the objective of:

- Establishing a standard method to quantify the potential environmental impact (i.e. water table decline, change in recharge, ASS, dewatering requirements) across the entire PDE by developing generic assessment tools,
- Categorisation and assessment of each site (tower location) undertaken in a consistent manner, and
- Application of impact minimisation approaches to multiple sites, rather than individual detailed assessments for each tower location.

This three-stage assessment process consisted of the following sub-assessments:

1. Preliminary (Qualitative) Risk Impact Assessment
2. Detailed (Quantitative) Risk Impact Assessment
3. Recommended Management Actions for Impact Minimisation

Further detail of the assessment methodology is presented in Appendix H.

8.3.2 Adequacy of Surveys

For the Inland Waters assessment, the scale of dewatering was subject to assumptions including the trench dimensions and local hydrological conditions.

For the assessment, a trench length and width of 3.5 x 3.5 m was assumed, which is approximately equivalent to trench excavation dimension of four individual pile foundation excavations each with a diameter of 2 m. The foundation excavations are each assumed to be 15 m deep (Tetra Tech Coffey, 2025).

The superficial aquifer is assumed to be homogeneous and isotropic with the following properties:

- The average saturated thickness of the aquifer is assumed as 30 m (Davidson & Yu, 2006).
- The average hydraulic conductivity of the aquifer matrix is taken as 15 m/day (Davidson & Yu 2006)
- The average specific yield of the aquifer matrix is taken as 0.2 (Davidson & Yu, 2006).

8.3.3 Desktop Assessment Findings

Hydrogeology

A review of the Hydrological Atlas of Western Australia indicated the presence of two aquifers in the region, the Perth Superficial Swan Aquifer and the Leederville Aquifer. The Leederville Aquifer is deep relative to the proposed alignment and tower constructions and is not considered relevant to the Proposal (Tetra Tech Coffey, 2025).

A review of the DWER Perth Groundwater Atlas indicates that the groundwater level elevation surrounding the Proposal area ranges between 29 – 63 mAHD within the Gnangara Mound. The approximate groundwater level contours range from about 29 – 32 mAHD at the southern end of the alignment near Malaga and rise to approximately 42 mAHD where the Proposal's transmission line crosses Gnangara Road (Tetra Tech Coffey, 2025). The groundwater level contours then continue to rise as the

alignment stretches north to a maximum groundwater elevation of approximately 63 mAHD at the northeast area of the Proposal. The groundwater contour level then drops to about 43 mAHD at the northwest portion of the Proposal near the Neerabup Terminal (Tetra Tech Coffey, 2025).

Geotechnical investigations by WSP in December 2023 recorded groundwater levels across the Proposal's Development Envelope ranging between 0.8 and 5.8 m below ground level (mbgl).

The groundwater flow direction is reportedly towards west underneath NBT, while the groundwater flow direction is towards the south below the NT in Malaga and much of the proposed north-south route alignment (Tetra Tech Coffey, 2025).

At a regional scale, the groundwater is generally fresh within the Proposal area with salinity less than 500 mg/L Total Dissolved Solids (TDS) (Tetra Tech Coffey, 2025).

Groundwater

The Proposal is located on the Gnangara Mound, a basin of water-holding sands and gravels that forms aquifers used for drinking and irrigation waters. It underlies Perth, between the Hills and the coast, and the area from the Swan River to Gingin Brook. The Proposal is predominantly located in areas used for public drinking water abstraction and passes through proclaimed Priority 1 to Priority 3 PDWSA (Figure 4).

Wetlands and Surface Water

A review of the Geomorphic Wetlands of the Swan Coastal Plain dataset published by the DBCA identified a total of 15 geomorphic wetlands intersect the PDE (Figure 3).

These wetlands comprise all three types of geomorphic wetland (Resource Enhancement, Multiple Use Wetland and Conservation Category Wetland. The PDE intersects 25.09 ha of DBCA mapped wetlands (refer to Section 1.2), including:

- Conservation - 4.64 ha
- Resource Enhancement – 6.95 ha
- Multiple Use – 13.50 ha

Further detail on wetlands can be found in Appendix H.

No waterways were identified as intersecting the PDE. The PDE intersects the upper tributaries/catchment area of Bennett Brooke.

Acid Sulfate Soils

The ASS risk for the Proposal is mapped in Figure 2 and indicates that the majority of the Proposal is located in areas of Low to Moderate risk of ASS occurring within 3 m of the natural surface. There are some areas of High to Moderate risk, primarily associated with wetlands in the Gnangara Moore River State Forest and wetlands surrounding Whiteman Park areas.

The Inland Waters assessment determined the risk levels in relation to the potential presence of ASS. ASS may present a risk when completing development work involving ground disturbance or changes to groundwater levels within land classified as at risk of ASS. Risk mapping is a preliminary risk assessment method and can only provide an indication that ASS may be present at the site. Risk maps do not describe the actual severity of ASS in a particular area. Further investigation is required to determine the presence of ASS and if concentrations pose a risk to the environment.

Based on the proposed foundation methods, the following towers were identified as requiring additional investigation:

- For bored and cased piles, with hydraulic containment and dewatering from bottom only, all towers, with the exception of 2, 3 and 31, require additional investigation.
- For driven piles with pile cap excavation and shallow dewatering, tower numbers 5, 14, 18, 19, 24, 25, 26, 27, 58, 61, 63, 64 and 65 require additional investigation.

Vegetation Communities

The Proposal is located within the SCP, an area consisting of aeolian, alluvial and colluvial deposits of Holocene or Pleistocene age. A complex series of seasonal and freshwater wetlands and alluvial flats are located in the region, along with sand dune and sandplains with deep sand, semi-wet and wet soils, vegetated by Banksia-Paperback woodlands and mixed heathlands. Groundwater dependent ecosystems (GDEs) are included among the Proposal's mapped vegetation communities. GDEs rely on

subsurface water to sustain ecological processes and include wetlands, riparian zones and deep-rooted vegetation communities, such as the Banksia Woodlands of the Swan Coastal Plain TEC, mapped for 2.23 ha within the Proposal's Impact Area, including:

- **BaBeAn:** high diversity woodland recorded in Gnangara State Forest surrounding Neaves Road in Melaleuca area.
- **BaXpPo:** high diversity woodland recorded in Gnangara State Forest surrounding Neaves Road and east of Seismic Road in Melaleuca area, supports denser understory than BaBeAn.
- **EtHsLb:** Banksia and Eucalypt woodland occurring sporadically in Gnangara State Forest and Whiteman Park area, includes historically cleared areas that's floristically appear to be regenerating towards a natural state of Banksia woodland.

The Banksia Woodlands TEC is a partial GDE, with groundwater drawdown and changes to hydrological regimes having been identified as a key threat to the ecological community (DCCEEW, 2016), particularly during dry seasonal periods when surface water availability is limited. The TEC relies on access to groundwater to maintain physiological function and ecological resilience and changes to groundwater regimes can result in altered species composition and increased vulnerability to secondary stressors such as disease and fire (DBCA, 2023).

Detailed assessment of flora and vegetation communities is presented in Section 6 and Appendix B, Appendix C and Appendix D.

Groundwater and Surface Water Quality

Groundwater quality data was sourced from groundwater wells monitored under the State Observation Bore Network (SOBN). The available groundwater and surface water quality data was searched within DWER's Water Information Reporting portal, including a search criterion of sites sampled within the last 5 years surrounding the Proposal (Tetra Tech Coffey, 2025).

Sixty-five monitoring sites were filtered for water quality data that included physiochemical parameters, metals, and nutrients concentrations. The subsequent sites were grouped into groundwater observation or surface water observation. The bores screening deeper aquifers other than the superficial aquifer were excluded and the surface water sites were further filtered to include only natural channels. This resulted in available water quality data for eight groundwater bores and three surface water locations (refer to Appendix H for further detail).

Table 54 presents the result of the available online physiochemical parameters and compares to the ANZECC water quality guidelines for wetlands (Tetra Tech Coffey, 2025).

Table 54 Regional groundwater and surface water quality data

Parameters	Average groundwater quality	Average surface water quality	ANZECC Guidelines
pH	5.4	5.1	7.0 – 8.5
Electrical Conductivity (mS/cm)	0.41	1.45	0.3 – 1.5
Fe (mg/L)	4.9	5.8	N/A
NH4+ (mg/L)	-	-	0.04
NO_2 (mg/L)	<0.01	-	N/A
NOx (mg/L)	<0.04	0.07	0.1
Total Nitrogen (mg/L)	0.73	0.84	1.5
Reactive Phosphorus (mg/L)	0.04	<0.05	0.03
Total Phosphorus (mg/L)	0.04	0.01	0.06

Analysis of the monitored physical parameters indicates that groundwater and surface water is fresh, acidic with low levels of oxygen, and the results are considered consistent with the nature of soils in the region. The total nitrogen is mainly in the organic form as expected due to the extent of the native vegetation on-site and limited agricultural activities (Tetra Tech Coffey, 2025).

8.3.4 Inland Waters Assessment Findings

The results of the Inland Waters Assessment (Tetra Tech Coffey, 2025) are summarised below, with detailed analysis presented in Appendix H.

Preliminary Risk Impact Assessment

The preliminary assessment of likelihood of risk to environmental factors of the proposed 70 tower locations was based on geospatial analysis of the available datasets with reference to approximate depth to water table at each tower location (Table 51). Each tower location was buffered by up to 20 m to align with clearing for construction purposes within a 20 m wide corridor centred on the line route.

Depth to water table has been rasterized from the available online DWER dataset – *Gnangara Jandakot Depth to Groundwater (Contours) – 2019 Max (DWER-096)*. The approximate depth to water table at each tower location was estimated using zonal statistics over the 20 m buffered tower location polygon through geospatial analysis.

The presence or absence of environmental factors at each tower location are scored as 0 (absent) or 1 (present). ASS is ranked from 1 to 2 based on ASS risk category: 2 – Class I ASS mapping, 1 – Class I ASS mapping. Wetlands are ranked from 1 to 3 based on importance: 3 – conservation category, 2 – resource enhancement, and 1 – multiple use. This scoring approach resulted in preliminary likelihood of risk scores ranging from 0 to 6, with higher scores indicating greater impact-risk. The impact-risk scores are categorised as follows:

- risk score 1 – risk category low; presence of Class II ASS mapping with depth to water table greater than 10 m, other environmental factors are absent; thus low risk to environment
- risk score 2 – risk category medium; presence of Class II ASS mapping with depth to water table less than 10 m, other environmental factors are absent; thus medium risk to environment
- risk score 3 – risk category medium-high; presence of Class I ASS mapping with shallow depth to water table (<10 m) or presence of Class II ASS along with presence of additional environmental factors; further assessment is required
- risk score 4-6 – risk category high; shallow depth to water table (<10 m) along with presence of two or more environmental factors, or a higher category of wetland; further assessment is required

The following Proposal tower locations were identified as having a medium-high risk of impact to environmental values associated with ASS, wetlands and TECs from the preliminary risk assessment (Table 55) (Tetra Tech Coffey, 2025).

Table 55 Summary of tower locations with medium-high impact risk from preliminary assessment

Tower / Structure Number	Approx. depth to water table (mbgl)	Environmental Factors				Risk Score	Risk Category
		ASS	Wetlands	TEC	DTW <10m		
14	4	Class I	CC	-	yes	5	high
18	2.8	Class II	CC	-	yes	4	high
25	1.1	Class I	RE	-	yes	4	high
26	1.7	Class I	MU	-	yes	3	high
63	2.3	Class I	RE	-	yes	4	high
65	3.4	Class I	RE	-	yes	4	high
5	7.4	Class I	-	-	yes	2	Medium-high
17	4.8	Class II	-	Banksia TEC	yes	2	medium-high
21	7.9	Class II	-	Banksia TEC	yes	2	medium-high

Tower / Structure Number	Approx. depth to water table (mbgl)	Environmental Factors				Risk Score	Risk Category
		ASS	Wetlands	TEC	DTW <10m		
50	3.7	Class II	MU	-	yes	2	medium-high
52	3.9	Class II	MU	-	yes	2	medium-high
57	3.7	Class II	MU	-	yes	2	medium-high
60	3.9	Class II	MU	-	yes	2	medium-high
64	3.4	Class I	-	-	yes	2	medium-high

ASS – presence of Acid Sulfate Soil risk mapping

Class I – high to moderate risk of ASS occurring within 3m of natural soil surface
Class II – moderate to low risk of ASS occurring within 3m of natural soil surface

CC – Conservation Category Wetland
RE – Resource Enhancement Category Wetland
MU – Multiple Use Category Wetland
TEC – Threatened Ecological Community
DTW – Depth to Water Table
'-' – Not Applicable

Preliminary Dewatering Assessment

Tower locations with a preliminary risk-impact category of 'medium-high' to 'high' (Table 55) were used to estimate dewatering impacts at these locations.

The required abstraction rates and the potential extent of drawdown from dewatering of the foundation excavations were estimated using an empirical modelling method and an open-cut excavation method with no hydraulic containment was assumed (Tetra Tech Coffey, 2025). The key assumptions for the model are detailed in the full Tetra Tech Coffey (2025) report provided as Appendix H.

Results of the preliminary dewatering assessment indicate groundwater level drawdown of between approximately 7 to 14 meters in the selected 14 tower locations which will result in a cone of depression with radius ranging approximately between 278 to 544 meters.

The assessment concluded that complete dewatering for foundation excavation with no hydraulic containment is not feasible or practical as the construction method results in a large cone of depression and unsustainable abstraction rates (in the order of 41 to 61 L/s) (Tetra Tech Coffey, 2025).

Detailed Risk Impact Assessment

The detailed assessment considered dewatering impact from the following different foundation construction methods:

1. Bored pile with dewatering without hydraulic containment
2. Bored and cased pile with hydraulic containment and dewatering from bottom only
3. Driven piling with pile cap excavation and shallow dewatering

It is noted that construction method 1 (bored pole with dewatering without hydraulic containment) is not proposed for these works and as such the results are not presented or discussed further in the following section.

In the absence of site-specific groundwater levels and seasonal water table fluctuation data at each tower location, it was considered unnecessary to estimate the dewatering impact at each tower location individually. Doing so would result in estimation of radius of cone of depression and dewatering abstraction rate at each location with high uncertainty given the absence of finer resolution of groundwater level data (Tetra Tech Coffey, 2025). The 70 tower locations have been grouped into three classes with varying depth to water table to provide ranges of dewatering estimates for each group:

- 0-5 mbgl
- 5-10 mbgl
- 10-15 mbgl

The results for the dewatering assessment for Construction method 2 is presented in Table 56.

Table 56: Construction method 2: Bored and cased pile with hydraulic containment and dewatering from bottom only

Depth to water table (mbgl)	Tower / Structure Number	Number of tower locations	Assumed average foundation depth (m)	Maximum drawdown outside excavation (m)	Cone of depression radius (m)	Estimated abstraction rate (L/s)
0-5	14, 15, 17, 18, 19, 24, 25, 26, 27, 28, 29, 38, 39, 40, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 69, 61, 62, 63, 64, 65, 66, 67, 68, 69	40	15	10-15	6-12	4.9-9.6
5-10	5, 6, 7, 8, 9, 10, 11, 12, 13, 16, 20, 21, 23, 30, 32, 34, 35, 36, 37, 41, 42, 59, 70	23	15	5-10	4-6	1.7-4.9
10-15	1, 4, 22, 33	4	15	0-5	0-4	0-1.7
>15	2, 3, 31	3	15	-	-	-

Yellow cells = medium risk ranking (presence of Class I or Class II ASS mapping with drawdown greater than 10 m and cone of depression <100 m but >20 m.
White cells = low risk ranking (presence of Class I or Class II ASS mapping with drawdown less than 10 m and limited cone of depression.

The results for the dewatering assessment for Construction method 3 is presented in Table 57.

Table 57 Construction Method 3: Dewatering assessment for pile caps with foundation pad excavation and dewatering

Depth to water table (mbgl)	Tower / Structure Number	Number of tower locations	Assumed average foundation depth (m)	Maximum drawdown outside excavation (m)	Cone of depression radius (m)	Estimated abstraction rate (L/s)
0-1.5	25	1	2.5	1.5-2.5	59-98	18-25
1.5-2.5	26, 27, 63	3	2.5	0-1.5	0-59	0-18

2.5-4	14, 18, 19, 24, 28, 29, 46, 47, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 64, 65, 66, 68, 69	25	2.5	-	-	-
>4	All other locations	41	-	-	-	-

Yellow cells = medium risk ranking (presence of Class I or Class II ASS mapping with drawdown greater than 10 m and cone of depression <100 m but >20 m.
White cells = low risk ranking (presence of Class I or Class II ASS mapping with drawdown less than 10 m and limited cone of depression.

The preliminary risk impact categorisation for each tower locations were reassessed, and the risk impact categorisation was updated based on the detailed risk impact assessment and revised dewatering estimates for construction methods 2 and 3 (this excludes construction method 1, which was ruled out in the preliminary stage) (Tetra Tech Coffey, 2025).

The results indicate that if either construction method 2 or 3 is used for the towers, the following environmental impact risk levels apply:

- 50 towers present a low to very low risk of environmental impact
- 18 towers present a medium risk of environmental impact
- 2 towers present a high risk of environmental impact

The risk categories are defined as:

- High – cone of depression >100m and interacting with one or more environmental factors
- Wetlands or ASS, damage to environment likely
- Medium – cone of depression >50m an interacting with one or more environmental factors
- Wetlands or ASS, damage to environment likely
- Low – cone of depression between 5-10m and limited interaction with one or more environmental factors
- Wetlands or ASS, damage to environment minimal
- Very low – cone of depression less than 5m and minimal interaction with environmental factors
- Wetlands or ASS, damage to environment unlikely

Detailed data for towers with a medium risk of environmental impact or above are provided in Table 58.

Table 58 Risk impact categorisation for medium and high risk tower locations

Tower Number	Coordinates (GDA94)		Approx. depth to water table (mbgl)[1]	Environmental factors within 50 m			Environmental Risk Impact based on construction method 2 or 3
	Easting	Northing		ASS[2]	Wetlands[3]	DTW <10m	
18	394551.64	6493294.40	2.8	Class II	CCW	Yes	Medium
19	394770.31	6492943.10	3.5	Class I	CCW	Yes	Medium
24	395884.08	6491153.77	2.9	Class II	-	Yes	Medium
25	396097.07	6490811.59	1.1	Class I	RE	Yes	High
26	396289.24	6490502.85	1.7	Class I	MU	Yes	High

27	396499.91	6490164.41	2.3	Class II	-	Yes	Medium
28	396504.13	6489611.76	3.2	Class II	-	Yes	Medium
50	397509.16	6480656.78	3.7	Class II	MU	Yes	Medium
53	397569.88	6479421.33	3.1	Class II	-	Yes	Medium
54	397622.21	6478965.72	3.8	Class II	-	Yes	Medium
55	397669.47	6478554.22	3.5	Class II	-	Yes	Medium
56	397715.15	6478156.45	3.4	Class II	-	Yes	Medium
57	397764.61	6477725.83	3.7	Class II	MU	Yes	Medium
61	397748.99	6475969.80	3.0	Class I	-	Yes	Medium
63	397741.69	6475148.31	2.3	Class I	RE	Yes	Medium
64	396177.51	6475198.70	3.4	Class I	-	Yes	Medium
65	397409.01	6475149.80	3.4	Class I	RE	Yes	Medium
66	395883.78	6475200.50	3.7	Class II	-	Yes	Medium
68	395644.19	6475435.75	3.3	Class II	-	Yes	Medium
69	396407.22	6475154.27	3.0	Class II	-	Yes	Medium

1: depth to water table at each tower location is approximated from DWER's dataset – Gnangara Jandakot Depth to Groundwater (Contours) – 2019 Max (DWER-096).
2: ASS – presence of Acid Sulfate Soil Risk Mapping (Class I – High to moderate risk of ASS occurring within 3m of natural soil surface and Class II – moderate to low risk of ASS occurring within 3m of natural soil surface).
3: Wetland categories – CCW = Conservation category wetland, RE = resource enhancement category wetlands, MU = multiple use category wetland.

A full summary of results is presented in Appendix H.

8.4 Potential Environmental Impacts

The Proposal has the potential to impact on Inland Waters within the Impact Area. Potential direct and indirect impacts are listed below.

8.4.1 Potential Direct Impacts

The Proposal may result in the following potential direct impacts to inland waters.

Table 59 Potential Direct Impacts to Inland Waters

Proposal Activity	Potential Direct Impact
Construction and operation activities	Excessive propagation of drawdown cone due to temporary dewatering during tower construction, leading to changes in existing groundwater levels
	Direct clearing of (refer to Section 1.2): • 0.8 ha of Conservation Category Wetlands (CCWs) • 7.5 ha of Multiple Use Wetlands • 4.0 ha of Resource Enhancement Wetlands • 3.1 ha of native vegetation growing in or associated with a water course or wetland

8.4.2 Potential Indirect Impacts

The Proposal may result in the following indirect impacts to inland waters.

Table 60 Potential Indirect Impacts to Inland Waters

Proposal Activity	Potential Indirect Impact
Construction activities	Impacts to groundwater and surface water quality from disturbance of acid sulfate soils (ASS) through excavation and/or dewatering activities.
	Hydrological impacts to sensitive vegetation communities and GDEs, including the Banksia Woodland TEC, resulting in degradation of vegetation health.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 8.6 for both direct and indirect impacts.

8.5 Mitigation and Avoidance

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023a). Impact avoidance has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on inland waters.

- **Avoid**: reducing the Impact Area and locating activities to avoid direct and indirect impacts on inland waters.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.
- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery.
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

The Inland Waters assessment (Tetra Tech Coffey, 2025) recommended a range of mitigation and management measures to reduce impacts associated with inland waters. Table 61 provides a summary of all mitigation and avoidance measures that have been considered to reduce potential impacts to inland waters during the scoping phase of the Proposal.

Table 61 Mitigation and Avoidance Actions for Inland Waters

Design or management measure	Description
Avoid	

Design or management measure	Description
Design evolution	Proposal design has considered the locations of surrounding wetlands and has avoided impact as far as practicable by spanning over CCWs.. The Proponent has adopted a flexible approach to design and construction, allowing contractors to nominate alternative foundation methods and piling depths.
Use of existing infrastructure	Use of existing public roads and powerline tracks within the Proposal corridor to avoid additional clearing
Minimise	
Tower Locations	Tower locations have been chosen to minimise impacts to CCWs and Banksia Woodland TEC
Baseline monitoring	ASS investigations will be undertaken for medium and high risk tower locations (Table 58) prior to the commencement of any excavation and/or dewatering works. Baseline groundwater and surface water monitoring will be undertaken for medium and high-risk tower locations prior to dewatering, if dewatering is to occur (Table 58).
Management Plans	An Inland Waters Environment Management Plan (IWEMP) has been developed for the proposal which includes objective and outcome-based management targets aimed at minimising potential Proposal impacts to Inland Waters. An ASS Management Plan will be developed prior to any excavation or dewatering for the towers and once baseline soil sampling is completed.
Schedule of works	Dewatering works will be scheduled for drier periods to reduce dewatering requirements.
Rehabilitate	
Vegetation rehabilitation	A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent

8.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impacts of the Proposal on Inland Waters, following implementation of the mitigation measures detailed above. Notable environmental values for the factor of Inland Waters within the PDE are:

- 25.09 ha of wetlands, including three Conservation Category Wetlands
- 4.44 ha of potential GDVs represented by Banksia Woodland TEC
- Areas of High to Moderate risk of Acid Sulfate Soil (ASS) risk
- Upper tributaries/catchment of Bennett Brook

The EPA objective for inland waters "to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected" has been considered in undertaking the following assessment.

8.6.1 Direct Residual Impacts to Inland Waters

The Proposal's Impact Area includes 12.3 ha of wetlands (refer to Section 1.2), comprising all three geomorphic wetland types – Resource Enhancement, Multiple Use and CCWs (Table 62).

Table 62 Clearing within Geomorphic Wetlands

Wetland Type	Development Envelope Extent (ha)	Impact Area Extent (ha)
Multiple Use	13.50	7.5
Resource Enhancement	6.95	4.0
Conservation	4.64	0.8
Total	**25.09**	**12.3**

An additional 3,1 ha of native vegetation growing in, or in association with, a watercourse or wetland is proposed to be cleared– including vegetation units KmHg, MpHaDb, MpKgDs, MpXpCe (Table 24).

8.6.2 Indirect Residual Impacts to Inland Waters

It is not considered likely that dewatering will have a significant impact to Banksia Woodland TEC as a GDE, given the two proposed construction methods have a modelled cone of drawdown that does not extend outside of the cleared footprint for the tower construction. If any dewatering does occur, it will be limited in duration, being only for the purposes of allowing for the construction of the tower footings.

Dewatering assessments have identified 20 tower locations as having a medium or higher risk of impact to the environment (Table 58) due to the likely presence of ASS and proximity of sensitive environmental values. Baseline groundwater and surface water quality monitoring will be undertaken if dewatering is to occur at any of the tower locations listed in Table 53. Additionally, monitoring of groundwater quality and abstraction during dewatering will be undertaken, if dewatering occurs at any of the towers listed in Table 53.

Desktop assessment identified that the PDE intersects the upper tributaries of Bennett Brook. However, no surface expression of tributaries mapped waterways intersect the PDE. Given this, and that none of the Proposal elements consist of infrastructure that will impede the flow of surface water (isolated towers and overhead transmission lines), it is not considered that there will be any disturbance to beds, banks or waterways.

8.6.3 Significance of Residual Impact

The residual impact of the Proposal to Inland Waters is not considered significant, if the proposed mitigation and avoidance measures are implemented. Additionally, the proposed dewatering works are not considered to represent a significant impact to the environment given the short duration of the proposed abstraction and the minimal volumes required to be abstraction as part of the Proposal's construction works. Table 63 provides an assessment of the significance of residual impacts with reference to the '*consideration of significance*' matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2023a).

Table 63 Assessment of Significance of Residual Impact on Inland Waters

Significant matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	The proponent has completed specialist surveys, undertaken by suitably qualified consultants, to assess inland waters and reduce scientific uncertainty. Surveys were completed in accordance with EPA guidelines. The Proposal design has focused strongly on avoidance of impacts wherever practicable, informed by the surveys and assessments completed. Avoidance of impacts to the point of lowest possible impact is a precautionary approach which limits reliance on minimise, rehabilitate and offset impacts. The precautionary principle has been applied through: • Evolving Proposal design informed by environmental studies to minimise impacts. • Design to place tower locations within existing easements to avoid additional clearing of Banksia Woodland TEC, native vegetation and wetlands, where viable. • Development of a an IWEMP and ASS MP to be developed following baseline sampling.
Values, sensitivity and quality of the environment that is likely to be impacted	Sensitive vegetation communities are present as the Proposal intersects three Conservation Category Wetlands, where a total 0.8 ha of clearing is required. Two towers are located within a potential GDE, the Banksia Woodland TEC. The Proposal intersects the upper reaches of a tributary of the Bennet Brook, a culturally significant Aboriginal Heritage site. Impacts to the Bennett Brook, namely the *Bennett Brook in Toto* (Legacy ID S02254) site are discussed in Section 9.0.
All stages and components of the Proposal	The impact assessment considers all components of the Proposal that might impact inland waters.
Extent (intensity, duration, magnitude and footprint) of likely impacts	Dewatering is limited to the construction period (3 years) and will occur for limited periods within that time at specific tower locations. No Proposal elements will impede the flow of surface water once constructed. The FVEMP requires a review of the final cleared footprint one month following completion of construction to identify any areas within the PDE that can be rehabilitated. The condition stipulates rehabilitation will be managed via a Revegetation Management Plan. The Proposal construction period is expected to last 3 years, with an operational life of >50 years (permanent infrastructure).
Resilience of the environment to cope with the impacts, including pressures such as climate change	A significant proportion of the Proposal's Impact Area is already degraded or disturbed. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. As the Proposal is seeking to upgrade the SWIS to enhance renewable energy generation in the area, it will therefore seek to mitigate climate change pressures.
Application of the mitigation hierarchy	Refer to Table 61.

Significant matters	Significance of residual impact of the Proposal in the regional context
Consequence of the likely impacts	The impact assessment considers both direct and indirect impacts. Indirect impacts are not expected to extend beyond the Impact Area.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Refer to Section 8.7 for further information.
Cumulative effects	The Proposal is not expected to result in significant cumulative impacts, particularly given its location within the Perth Metro area, where land has been historically extensively cleared and is now primarily utilised for residential use. Additionally, impacts are limited to the construction period, with no ongoing impacts to Inland Waters expected as part of the operation of the Proposal. The Proposal has been designed to integrate with existing infrastructure and easements to reduce impact to environmental values, utilising areas of degraded vegetation and avoiding high value areas wherever practicable.
Holistic impacts	The Proposal involves clearing up to 98.08 ha of vegetation, resulting in the loss of native flora, Threatened Ecological Communities, Environmentally Sensitive Areas (including Bush Forever sites and DBCA-managed land), and fauna habitat. This may lead to direct fauna mortalities, visual amenity loss, weed invasion, and degradation of nearby ecosystems. Wetland removal could alter hydrological regimes and affect surrounding vegetation health. The Proposal's construction and operation also presents an increased groundwater quality risk within a PDWSA due to potential spills and contamination, with the potential for changes to groundwater levels and geochemistry, including acidification and leaching of metals. Impacts to Inland Waters will be managed through the IWEMP.
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were completed on the basis of the maximum area of land that will be cleared for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, making predicted residual impacts an over-estimate of the likely direct impact to inland waters.
Public interest about the likely effect on the environment	12 public comments were received on the initial referral to the EPA and DCCEEW. Comments requesting an assessment via Public environmental review. Commentary was predominantly focused on the significant factors of Flora & Vegetation, Terrestrial Fauna and Inland Waters. Three public comments were received following the publication of the Environmental Review Document for the Proposal. Commentary was predominantly focused on the suitability of proposed offsets and assessment of impacts to Banksia TEC and the three threatened species of black cockatoo.

8.7 Environmental Outcomes

Environmental outcomes and conditions to protect inland waters are proposed in Table 64.

Implementation of the Proposal in accordance with the Proposal Content Document and the below proposed outcomes will protect inland waters and maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

Table 64 Proposed Environmental Outcomes for Inland Waters

Proposed environmental outcomes	How environmental outcomes can be measured and assured	Consistent with EPA objective
No Proposal attributable impacts to groundwater or surface water quality at medium and high-risk tower locations (Table 53) at the conclusion of construction works	As per the Inland Waters Environmental Management Plan	Yes
Clearing of wetlands within the PDE will be limited to 12.3 ha (refer to Section 1.2), comprising: • 0.8 ha of CCWs • 7.5 ha of Multiple Use Wetlands • 4.0 ha of Resource Enhancement Wetlands		
Clearing of native vegetation that is growing in or associated with a water course or wetland will be limited to 3.1 ha.		

9. Social Surroundings

The EPA guidelines define social surroundings as "the social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings" (EPA, 2016d). This, in effect, means there must be a clear link between a proposal or scheme's impact on the physical or biological surroundings and the subsequent impact on a person's aesthetic, cultural, economic or social surroundings (EPA, 2023b).

9.1 EPA Objective

The EPA's objective for the factor of Social Surroundings is "*to protect social surroundings from significant harm*" (EPA, 2023b).

9.2 Relevant Policy and Guidance

Table 65 describes the relevant policy and guidance considered for the factor Social Surroundings.

Table 65 Policy Guidance - Social Surroundings

Policy and Guidance	Consideration
EPA Policy and Guidance	
Environmental Factor Guideline: Social Surroundings (EPA, 2023b)	The information provided in Section 5.3 addresses the 'considerations for environmental impact assessment' listed in this document.
Technical Guidance: EIA of Social Surroundings – Aboriginal Cultural Heritage (EPA, 2023c)	This document guides the appropriate obtainment and collation of Aboriginal Cultural Heritage data to be used in EIA. All studies conducted for the Proposal are in accordance with these guidelines.
Other State or Commonwealth Legislation or Guidance	
Environment Protection (Noise) Regulations 1997 (Noise Regulations)	The Regulations operate as a prescribed standard under the Environmental Protection Act 1986 and set limits on noise emissions for Western Australia.
Planning and Development Act 2005	Administered by Western Australian Planning Commission (WAPC), this act provides regulation for the zoning and management of land within Western Australia.
City of Swan Town Planning Scheme No. 17 City of Wanneroo District Planning Scheme No. 2	These Schemes outline the planning framework, zoning, land use controls, and approval requirements, guided by the Local Planning Strategy and policies, for the City of Swan and City of Wanneroo.
Aboriginal Heritage Act 1972	This Act defines and protects Aboriginal Heritage in Western Australia, by requiring approval for any activities that could potentially harm Aboriginal sites.
Heritage Act 2018	This Act recognises, protects, and promotes understanding of Western Australia's cultural heritage.

9.3 Receiving Environment

9.3.1 Surveys and Studies

Table 66 outlines relevant surveys completed for Social Surroundings to determine baseline environment and inform Proposal avoidance and design.

Table 66 Social Surroundings Surveys

Survey	Survey Methodology and Effort	Survey Guidance and Adequacy
Desktop Assessment (AECOM, 2023)	A desktop assessment for social surroundings factors for the Proposal's Survey Study Area and surrounding landscape was completed by AECOM (2023).	The desktop assessment was completed in accordance with the EPA's Environmental Factor Guideline for Social Surroundings (EPA, 2023b) and Technical Guidance – Aboriginal Cultural Heritage (2023c)
Archaeological Survey (Archae-aus, 2023)	An archaeological survey was completed between 13 – 16 November 2023 (Archae-aus), including a team of suitably qualified consultants (anthropologist and archaeologists) and Traditional Owner representatives.	The archaeological survey was completed in accordance with the following: • *Aboriginal Heritage Act (AHA) 1972* • *The EPA's Environmental Factor Guideline for Social Surroundings (EPA, 2023b)* • *The EPA's Technical Guidance for Aboriginal Cultural Heritage (2023c)*
Ethnographic Survey (Archae-aus, 2023)	An ethnographic survey was completed on 13 December 2023 (Archae-aus), including a team of suitably qualified consultants (anthropologist and archaeologists) and Traditional Owner representatives.	The ethnographic survey was completed in accordance with the following: • *Aboriginal Heritage Act (AHA) 1972* • *The EPA's Environmental Factor Guideline for Social Surroundings (EPA, 2023b)* • *The EPA's Technical Guidance for Aboriginal Cultural Heritage (2023c)*
Malaga-Ballajura Transmission Line Noise and EMF Assessment (2024)	An electromagnetic and noise monitoring and assessment was prepared by GHD to assess levels from both existing and proposed operations. Short and long term measurements were undertaken during July-August 2023 through the residential section of the corridor.	The Environmental Noise Assessments were completed in accordance with: • *The Western Australia Environmental Protection (Noise) Regulations 1997 (Noise Regulations)* EMF measurements compared against international guidelines • *ICNIRP 2010, Guidelines for limiting exposure to time-varying electric and magnetic fields (1 Hz - 100 kHz), noting ARPANSA have adopted this guideline* • *WHO Guideline 2007, Environmental Health Criteria 238 Extremely Low Frequency Fields*

9.3.2 Survey Findings

Aboriginal Cultural Heritage

Native Title and Cultural Context

The Proposal is within Noongar Country of the Whadjuk people of the South West Native Title Settlement, represented by Whadjuk Traditional Owner representatives, the Whadjuk Aboriginal Corporation (WAC) and the South West Aboriginal Land and Sea Council (SWALSC).

Aboriginal community consultation is ongoing with Traditional Owner representatives. This engagement process complies with the Whadjuk Agreement Group and the SWALSC.

Aboriginal Cultural Heritage Sites

A search of the DPLH Aboriginal Cultural Heritage Inquiry System (ACHIS) indicated that the Proposal's Impact Area may intersect with the boundaries of five Aboriginal Cultural and Historic Places. Advice was sought from the DPLH to confirm the actual and/or

public boundary of these sites to determine the Proposal's impact. The DPLH confirmed that the Proposal's Impact Area will intersect with the boundary of two Registered Aboriginal Cultural Heritage (ACH) Places:

- *Bennett Brook: in toto* (ID 3692) – Creation / Dreaming Narrative
- *South Ballajura Camp* (ID 3426) – Camp Place

Both sites intersect the southern section of the Proposal's Impact Area (Figure 12).In November/December 2023, Western Power engaged Archae-aus to undertake an archaeological and ethnographic heritage assessment of the Project Area. The archaeological survey was completed using a sampling methodology targeting areas of low disturbance, sparse vegetation, and remnant bushland. Survey areas were selected in consultation with Whadjuk Noongar Traditional Owners, who also identified additional areas of interest. Areas considered low risk were inspected from vehicles to confirm no remnant vegetation that could contain cultural evidence.

The ethnographic consultation was conducted on Country with Traditional Owners to assess cultural significance. This included whole group discussions and one-on-one interviews to identify intangible heritage values. Information from these consultations was combined with the archaeological survey and background research to prepare a heritage report, which found no new Aboriginal sites and recommended measures to manage impacts on existing sites during works.

For the two registered Aboriginal heritage sites intersecting the PDE, South Ballajura Camp (ID 3426) is located within a park in the southern portion of the Proposal and is surrounded by residential development, with only a small cleared section intersecting the PDE; it is likely that development has removed any surface evidence of the site. Bennett Brook: In Toto (ID 3692) is situated within remnant bushland in the southern half of the PDE, where no artefacts were identified, although poor surface visibility may have obscured cultural material along the waterway. Both sites were assessed and considered during the survey, with no additional cultural materials or values identified.

The presence of *Nuytisia floribunda* (WA Christmas Tree) within the PDE was noted by the Traditional Owners due to its cultural significant not only as a resource but due to its spiritual connections as well (Archae-aus, 2024). It was requested that impacts to the species be minimised during clearing for the Proposal. Review of the biological survey data identified 90 individuals of *Nuytsia floribunda* were recorded within the PDE (AECOM, 2023).

No new archaeological or ethnographic sites were identified during the heritage assessment from Neerabup to Northern Terminal. The Traditional Owners consulted overall did not object to the proposed works, however, put forward several concerns and heritage management recommendations to mitigate potential cultural harm. A list of the cultural heritage management recommendations can be found in the attached Heritage Report and Western Power has lodged an s18 application under the *Aboriginal Heritage Act 1972.*

Historic Heritage

A desktop assessment identified two sites on the City of Wanneroo's Municipal Heritage Site, located approximately in the Proposal's surrounding area: 1km northeast of the Neerabup Terminal:

- Albert Thomas House (ID 9492) – located approximately 1 km northeast of the Neerabup Terminal
- Gnangara Lake (ID 09535) - located approximately 3.5 km west of the Proposal's Impact Area
- These sites do not carry any statutory protection and are located outside of the Proposal's Impact Area.

One State Registered Historic Heritage Site is located adjacent to the Proposal:

- Whiteman Park (ID 25868)
- The Proposal's Impact Area is located directly adjacent to this site, with separation primarily provided by the Hennessey Road and Tonkin Highway. The site has been excluded from the Proposal's Impact Area (Figure 12).
- There are no State Registered Historic Heritage Places identified within the Proposal's Impact Area.
- The Dick Perry Reserve has also been identified to the west of Ellenbrook as containing 'mature pine trees with significant historical/heritage value'. The Reserve is managed by DBCA.

Landscape and Visual Amenity

The Proposal is primarily situated within rural and plantation areas, with limited interaction with residential areas such as Malaga and Bennett Springs. These residential areas are already located adjacent to existing high voltage powerlines. Therefore, social interaction with the Proposal's Impact Area is expected to be limited.

Noise and Vibration

The Proposal is predominantly located within State Forest and rural land, with the exception of its southern section, which intersects existing and planned residential areas.

SLR (2025a, 2025b) conducted two Environmental Noise Assessments, one for the Northern Terminal (NT) and one for the Neerabup Terminal (NBT), to assess whether noise emissions from both proposed and existing operations comply with the Western Australia *Environmental Protection (Noise) Regulations 1997* (the Noise Regulations).

Evening noise measurements were undertaken at the sites, focusing on existing transformers and associated cooling fans. Using both measured and supplied data, noise models were developed to predict noise levels at identified sensitive receptors, including nearby residential and commercial properties. This was based on the assumption that if predicted noise levels at these receptors are compliant, it is assumed that receptors located further away will also meet compliance requirements.

Full detail of the applied methodology is presented in Appendix I.

9.4 Potential Environmental Impacts

The Proposal has the potential to impact on Social Surroundings within the defined Impact Area. Potential direct and indirect impacts are listed below.

9.4.1 Potential Direct Impacts

The Proposal may result in the following direct impacts to Social Surroundings (Table 67).

Table 67 Potential Direct Impacts to Social Surroundings

Proposal Activity	Potential Direct Impact
Aboriginal Cultural Heritage	
Construction and Operation activities	Impact to two Registered Aboriginal Cultural Heritage Sites: • *Bennett Book in Toto* (Legacy ID S02254) • *South Ballajura Camp* (Legacy ID S02728) Clearing of the culturally significant flora species *Nuytsia floribunda*
Historic Heritage	
Construction and Operation activities	No State Registered Historic Heritage sites are located within the Proposal's Impact Area. Impact to the DBCA managed Dick Perry Reserve.
Landscape and Visual Amenity	
Construction and operation activities	Impact on landscape character, views and visual amenity of local places of interest and value.
Noise and Vibration	
Construction activities	Adverse impacts to the health and quality of life of receptors exposed to prolonged increased noise and vibration levels from construction related activities.

9.4.2 Potential Indirect Impacts

The Proposal may result in the following indirect impacts to Social Surroundings (Table 68).

Table 68 Potential Indirect Impacts to Social Surroundings

Proposal Activity	Potential Indirect Impact
Aboriginal Cultural Heritage and Historic Heritage	
Construction and operation activities	Impacts to the cultural values of the site due to degradation of environmental quality.
	Potential impacts to Cultural Heritage site accessibility during construction.
Noise and Vibration	
Construction and Operation activities	Noise impacts during the construction phase.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in Section 9.6 for both direct and indirect impacts.

9.5 Mitigation and Avoidance

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a). Impact avoidance has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on social surroundings.

- **Avoid**: reducing the Impact Area and locating activities to avoid direct and indirect impacts on social surroundings.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.
- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery.
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

Table 69 outlines the mitigation and avoidance measures that have been considered to reduce potential impacts to social surroundings during the scoping phase of the Proposal.

Table 69 Mitigation and Avoidance Actions for Social Surroundings

Design or management measure	Description
Avoid	
Site selection and location	Design evolution to prioritise alignment of powerline with existing easements.
	Design evolution to avoid sensitive receptors identified through specialist surveys and stakeholder engagement.
	Clearing for the Proposal has avoided 89 of the 90 individuals of *Nuytsia floribunda* recorded within the PDE.
Stakeholder Engagement	Following engagement with the DBCA, the Proposal alignment has been relocated to avoid the Dick Perry Reserve.
Use of existing infrastructure	Use of existing public roads and powerline tracks within the Proposal corridor to avoid minimise the extent of visual impacts of new infrastructure.
Minimise	

Design or management measure	Description
Management Plans	A Construction Management Plan (CEMP), addressing dust, fire, noise and vibration impacts and mitigation controls, will be prepared by the Principal contractor and supplied to Western Power prior to commencement of any construction works.
Stakeholder Engagement	The Whadjuk Traditional Owners were involved in the ethnographic and archaeological surveys for the Proposal and informed of the requirement to apply for a section 18 consent to disturb under the *Aboriginal Heritage Act 1972* (AH Act). Affected local governments were contacted and informed of the Proposal. Landowners and local community stakeholders were contacted. Noise EMF study and environmental impact assessments completed. Consultation with DBCA regarding impacts on the Dick Perry Reserve.
Consents and Approvals	The Proponent is seeking relevant consents and approvals to manage and mitigate impacts to Registered Aboriginal Cultural Heritage Places, in collaboration with Traditional Owners.
Rehabilitate	
Vegetation rehabilitation	A review of the clearing footprint at the end of construction will be completed to identify cleared areas that can be rehabilitated. This will be completed in accordance with the outcome-based criteria specified in the Proposal's Flora and Vegetation Environment Management plan (FVEMP). Significant residual impacts have been calculated by conservatively assuming all clearing approved within the PDE is permanent

9.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impact of the Proposal on Social Surroundings, following implementation of the mitigation measures detailed above. Notable environmental values for the factor of Social Surroundings in the vicinity of the Proposal are:

- Two Registered Aboriginal Cultural Heritage sites: *Bennett Brook in Toto* (Legacy ID S02254) and *South Ballajura Camp* (Legacy ID S02728).
- Culturally significant flora species *Nuytsia floribunda*
- Affected private landowners.

The EPA objective for Social Surroundings to "*protect social surroundings from significant harm*" has been considered in undertaking the following assessment.

9.6.1 Direct Residual Impacts to Social Surroundings

Aboriginal Cultural Heritage

The Proposal's Impact Area contains two Registered Aboriginal Cultural Heritage Sites:

- *Bennett Brook in Toto* (Legacy ID S02254)
- *South Ballajura Camp* (Legacy ID S02728)

Archaeological and ethnographic survey have been conducted in collaboration with Traditional Owners to identify and discuss potential impacts to ACH places. Engagement with Traditional Owners will continue as the Proponent works with DPLH to secure all relevant approvals.

Western Power will submit an application for consent under Section 18 of the *Aboriginal Heritage Act 1972* to undertake ground disturbing activities within registered Aboriginal heritage sites. This process provides legal authorisation for activities that my otherwise breach Section 17 of the Act, which prohibits damage or alteration to Aboriginal sites without consent. The application will be submitted in collaboration with the Whadjuk Traditional Owners, who participated in all aspects of the heritage surveys and expressed unanimous support for the Proposal, along with a set of recommendations. No further concerns were raised during

consultation, and feedback was generally supportive of the application. Due to the sensitive personal information contained within the application, it will be submitted to the EPA as a confidential attachment to the ERD and is not for external distribution.

The PDE contains 90 records of the culturally signficant flora species *Nuytsia floribunda*. The Imapct Area for the Proposal will result in the clearing of one individual of *N. floribunda*. The FVEMP for the Proposal has been updated to include a management target for limiting the clearing impacts to *N. floribunda.*

Landscape and Visual Amenity

The Proposal will be located in a predominantly cleared plantation area, in alignment with existing transmission line easements to minimise the extent of visual impacts to affected landowners and local community.

Noise and Vibration

The Proposal is predominantly located within rural and plantation areas, with interaction with residential areas largely limited to the southern section of the Proposal at the NT.

Dust, noise and vibration impacts associated with the construction of the Proposal will be managed through a CEMP provided by the Principal Consultant to Western Power prior to commencement of construction works.

During the Proposal's operational phase, impacts associated with noise and vibration will be managed in accordance with standard industry regulation, including, but not limited to:

- Adherence to the noise guidelines under the Environmental Protection (Noise) Regulations 1997, Regulation 13 (no construction prior to 7am or after 7pm on weekdays and no construction to occur on Sundays or public holidays unless special approval is granted)
- Work must follow Australian Standard AS 2436-2010, which provides guidance on noise and vibration control.

With the implementation of standard industry management measures, residual noise and vibration impacts are not expected to be significant.

9.6.2 Indirect Residual Impacts to Social Surroundings

Ongoing consultation with Traditional Owners throughout construction and operation will ensure that access to any Cultural Heritage sites is maintained.

Potential impacts to the value of Cultural Heritage sites through the degradation of the environmental quality will be managed through the controls detailed in sections 7.0-9.0 of the ERD and associated EMPs.

9.6.3 Significance of Residual Impact

The residual impact of the Proposal to Social Surroundings is not expected to be significant. Table 70 provides an assessment of the significance of residual impacts with reference to the '*consideration of significance*' matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021a).

Table 70 Assessment of Significance of Residual Impact on Social Surroundings

Significant matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	The Proponent has completed specialist surveys, undertaken by suitably qualified consultants, to assess social surroundings and reduce scientific uncertainty. Surveys were completed in accordance with EPA guidelines. The Proposal design has strongly focused on the avoidance of impacts, directly informed by completed surveys, and multiple design iterations have been developed. This approach has avoided impacts to the point of lowest possible impact and is a precautionary approach which limits a reliance on minimisation, rehabilitation and offset impacts. The precautionary principle has been applied through: • Evolving Proposal design to prioritize alignment of powerline with existing easements. • Completion of specialist surveys to identify additional risks. • Ongoing engagement with Traditional Owners. • Engagement and discussion with affected landowners and consideration of any issues raised.
Values, sensitivity and quality of the environment that is likely to be impacted	Two Registered Aboriginal Cultural Heritage sites intersect the Proposal: *Bennett Brook in Toto* (Legacy ID S02254) and *South Ballajura Camp* (Legacy ID S02728). These sites encompass a large area that has been extensively developed and contains similar existing infrastructure to that of the Proposal. Culturally significant flora species *Nuytsia floribunda*. Private landowners within easement corridors. Private landowners adjacent to easement corridors.
All stages and components of the Proposal	The impact assessment considers all components of the Proposal that might impact Social Surroundings.
Extent (intensity, duration, magnitude and footprint) of likely impacts	The Proposal construction period is expected to last 3 years, with an operational life of >50 years (permanent infrastructure). Indirect impacts from dust, noise and vibration from construction activities are predominantly located in rural areas, not in the vicinity of sensitive receptors. Impacts to visual amenity have been minimised by siting new infrastructure adjacent to existing transmission line infrastructure, where practicable.
Resilience of the environment to cope with the impacts, including pressures such as climate change	A significant proportion of the Proposal's Impact Area is within extensively developed, urban areas. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. As the Proposal is seeking to upgrade the SWIS to enhance renewable energy generation in the area, it will therefore seek to mitigate climate change pressures.
Application of the mitigation hierarchy	Refer to Table 69.

Significant matters	Significance of residual impact of the Proposal in the regional context
Consequence of the likely impacts	Impacts are not likely to represent a significant impact given the existence of similar infrastructure within the area and the lack of proximal sensitive receptors to the majority of the proposed infrastructure.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Likely environmental outcomes are presented in Section 9.7.
Cumulative effects	The Proposal is not expected to result in significant cumulative impacts, particularly given its location within the Perth Metro area, where land has been historically extensively cleared and is now primarily utilised for residential use. The Proposal has been designed to integrate with existing infrastructure and easements to reduce impact to environmental values, utilising areas of degraded vegetation and avoiding high value areas wherever practicable.
Holistic impacts	The Proposal involves clearing up to 185.39 ha of vegetation, resulting in the loss of native flora, Threatened Ecological Communities, Environmentally Sensitive Areas (including Bush Forever sites and DBCA-managed land), and fauna habitat. This may lead to direct fauna mortalities, visual amenity loss, weed invasion, and degradation of nearby ecosystems. Wetland removal could alter hydrological regimes and affect surrounding vegetation health.
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were based on assessing the maximum area of land that will be cleared for the Proposal and associated infrastructure. Actual disturbance is likely to be lower. Therefore, the predicted residual impacts over-estimate the likely direct impact to social surroundings.
Public interest about the likely effect on the environment	12 public comments were received on the initial referral to the EPA and DCCEEW. Comments requesting an assessment via Public environmental review. Commentary was predominantly focused on the significant factors of Flora & Vegetation, Terrestrial Fauna and Inland Waters. • Three public comments were received following the publication of the Environmental Review Document for the Proposal. Commentary was predominantly focused on the suitability of proposed offsets and assessment of impacts to Banksia TEC and the three threatened species of black cockatoo.

9.7 Environmental Outcomes

Environmental Outcomes and conditions to protect Social Surroundings are proposed in Table 71.

Implementation of the Proposal in accordance with the Proposal Content Document and the below proposed outcomes will protect Social Surroundings from significant harm.

Table 71 Proposed Environmental Outcomes for Social Surroundings

Proposed environmental outcomes	How environmental outcomes can be measured and assured	Consistent with EPA objective
Managed disturbance of known Aboriginal Heritage sites in accordance with relevant approvals.	The Proposal Content Document defines the extent of the PDE. Regular environmental compliance reporting and internal procedures and record keeping.	Yes
Minimise indirect impacts from noise, dust and vibration.		
Minimise clearing of *Nuytsia floribunda* within the PDE.		

10. Significant Residual Impacts and Offsets

Under the WA Environmental Offsets Policy (Government of Western Australia, 2011) environmental offsets are required to counterbalance significant residual impacts generated through the implementation of a Proposal. Residual impacts are unavoidable impacts that remain after avoidance, minimisation and rehabilitation were pursued.

Implementation of the Proposal is likely to result in the following significant residual impacts after the application of the mitigation hierarchy:

Clearing of 98.08 ha, comprising 65.35 ha of native vegetation (refer to Section 1.2).

Clearing of 2.23 ha of the EPBC Act-listed Banksia Woodland TEC, comprising three State listed PECs:

- 0.59 ha of Low lying *Banksia 102ttenuate* woodlands or shrublands (FCT 21c, PEC)
- 0.36 ha of Northern *Banksia 102ttenuate-B. menziesii* woodlands (FCT 23b, PEC)
- 1.08 ha of the PEC Banksia dominated woodlands and shrublands of the Swan Coastal Plain.

Clearing of 15 ha of Bush Forever Sites and 59.1 ha of clearing within the DBCA managed Gnangara-Moore River State Forest.

Clearing of 100.5 ha of Black Cockatoo foraging habitat (refer to Section 1.2), comprising.

- 100.5 ha of Carnaby's Cockatoo foraging habitat
- 75.8 ha of Baudin's Cockatoo foraging habitat
- 46.9 ha of FRTBC foraging habitat

Significance of residual impacts has been assessed in line with the "*consideration of significance*" matters listed in the Statement of environmental principles, factors, objectives and aims of EIA (EPA, 2021a).

Taking this into consideration, an Offset Strategy has been prepared in accordance with *the WA Environmental Offset Policy 2011* and *Environment Offset Guidelines 2014*. The Offset Strategy will outline how Western Power will counterbalance 100% of the Proposal's significant residual impacts.

11. Matters of National Environmental Significance

A separate assessment of impacts to MNES has been developed to support assessment of the Proposal as a 'controlled action' under the EPBC Act. This assessment was completed against the MNES *Significant Impact Guidelines 1.1.* (Department of the Environment, 2013).

Desktop and field assessments identified several MNES as occurring within the Proposal's Survey Study Area. A total of three MNES Threatened fauna species were confirmed as present:

- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksia naso)* – Vulnerable
- Baudin's Black Cockatoo (*Zanda baudinii*) – Endangered
- Carnaby's Black Cockatoo (*Zanda latirostris)* – Endangered

Two TECs were confirmed to be present within the Proposal's Survey Study Area:

- Banksia Woodlands of the Swan Coastal Plain TEC – EPBC Act Endangered
- Tuart Woodlands and Forests of the Swan Coastal Plain - EPBC Act Critically Endangered

No MNES flora species were recorded within the Proposal's Survey Study Area.

Assessments of the Proposal's potential impact on the above MNES species are presented in the sections below.

11.1 Threatened Black Cockatoo Species

Black cockatoos are long-lived, slow-breeding birds that display strong pair bonds, characteristics that are considered to exacerbate the effects of population decline and habitat loss, resulting in slow population recovery (DSEWPaC, 2012b). All three species are endemic to south-west Western Australia: the Forest Red-Tailed Black Cockatoo, Baudin's Black Cockatoo and Carnaby's Black Cockatoo. Evidence of each species has been recorded within the Proposal's Survey Study Area.

All three species generally utilise woodland or forest for breeding, favouring large hollow-bearing trees – particularly eucalypts. Hollows large enough for nesting black cockatoos are usually only found in trees that are more than 200 years old (DSEWPC, 2012b).

Overall populations of Western Australia's black cockatoo species are declining, largely driven by habitat loss. Key threats facing the species, as outlined by the EPBC Act Referral Guidelines for Three Threatened Black Cockatoo Species (DSEWPC, 2012b), and relevant to the Proposal, include:

Habitat loss and degradation

- Loss and isolation of mature, hollow-bearing trees required for breeding
- Lack of younger trees required to replace older trees, leading to future hollow shortages
- Loss, degradation and fragmentation of foraging habitat

Interactions with humans

- Death or injury due to vehicle strike
- Disturbance to birds from noise, light and vibrations.

Clearing of suitable foraging habitat for Black Cockatoos will be limited to a maximum of 70.8 ha, with the majority of clearing impacting vegetation in Degraded or worse condition. This area includes both native and non-native (modified) habitats given the extensive pine plantations within the PDE. The Proposal has sought to utilise existing cleared and disturbed areas wherever possible, noting the lower fauna habitat value. A breakdown of the foraging habitat area impacted (refer to Section 1.2) for each species is outlined below (as per the BCE, 2024 method):

- Carnaby's Black Cockatoo – 100.5 ha
- Baudin's Black Cockatoo – 75.8 ha
- Forest Red-Tailed Black Cockatoo – 46.9 ha

The Proposal Survey Study Area identified 217 potential nesting trees. Drone assessment of hollows found of these, only two trees have suitable hollows to support Black Cockatoo breeding. One of these hollows was noted as being previously active. No suitable

nesting trees will be cleared as part of the Proposal. The Proposal will impact 54 potential nesting trees, none of which had hollows or suitable hollows.

The Proposal's residual impact to Black Cockatoos is considered significant and will be managed via the Proposal's Offset Strategy

11.2 Banksia Woodlands of the Swan Coastal Plain Threatened Ecological Community

Banksia Woodlands TEC is listed as Endangered under the EPBC Act.

The TEC is a woodland associated with the Swan Coastal Plain, typically comprising of a prominent tree layer of *Banksia* with the scattered eucalypts and other tree species present within or above the Banksia canopy (DCCEEW, 2016). The understorey is species rich with wildflowers, including sclerophyllous shrubs, sedges and herbs.

Banksia Woodlands can vary in structure across the Swan Coastal Plain but generally are all united dominant Banksia component which contains one of the four key species – *Banksia attenuata, B. menziesii, B. prionotes* and/or *B. ilicifolia* (DCCEEW, 2016).

The TEC provides vital habitat for several conservation significant species, including Carnaby's Black Cockatoos and Forest Red-Tailed Black Cockatoos, and also provides various ecosystem services for surrounding landscapes including flood mitigation, carbon storage and recreational amenities (DCCEEW, 2016).

Identified threatening processes for Banksia Woodlands communities (DCCEEW, 2016), relevant to the Proposal include:

- Vegetation clearance resulting in fragmentation.
- Impacts from weed invasion, including dieback diseases.
- Fire regime change, including altered frequency, intensity and seasons.
- Hydrological degradation
- Climate change

Banksia Woodlands TEC was mapped for 64.40 ha within the Proposal's Survey Study Area and 11,370 ha is mapped within the Local Government Area (City of Swan. The PDE contains 15.21 ha, 2.23 ha of this is within the Impact Area and will be cleared for construction of the Proposal.

Banksia Woodlands populations within the LGA are associated with the DBCA managed parks and reserves, such as the Gnangara Moore River Estate and Whiteman Park (refer to Section 6.6 for further information).

The Proposal's residual impact to the Banksia Woodlands TEC is considered significant and will be managed via the Proposal's Offset Strategy.

11.3 Tuart Woodlands and Forests of the Swan Coastal Plain Threatened Ecological Community

Tuart Woodlands and Forests of the SCP TEC is listed as Critically Endangered under the EPBC Act.

The TEC is comprised of woodlands or forests with the presence of Tuart (*Eucalyptus gomphocephala*) trees in the uppermost canopy as the defining feature. Other native trees such as Peppermint, Bull Banksia, Candlestick Banksia or Jarrah are also often present (DEE, 2019). Tuart Woodlands occur within the Swan Coastal Plain in Western Australia, ranging from Jurien in the north and Busselton in the south, including some remnants in the Perth metropolitan area.

The TEC has been significantly historically cleared, with all remaining patches having been disturbed to some degree (DEE, 2016b). Identified threatening processes for Tuart Woodlands communities, relevant to the Proposal include:

Clearing and fragmentation associated with:

- Agriculture and grazing
- Urban development and infrastructure
- Invasive flora and fauna
- Tree dieback and pathogens

- Altered fire regimes
- Climate change
- Water extraction and hydrological changes
- Loss of fauna supporting key ecological processes

The Tuart Woodlands TEC was mapped for 0.59 ha within the PDE and the local extent estimated at 4,418 ha (TSSC, 2019). The Proposal will clear the 0.44 ha of the TEC mapped within the PDE. (refer to Section 6.6 for further information).

The Proposal's residual impact to the Tuart Woodlands TEC is not considered significant given the vegetation comprising the patch is not a naturally occurring patch and is a rehabilitated vegetation community, with the area originally being a pine plantation, historically cleared by Western Power as part of the Neerabup Terminal development. Rehabilitation efforts for the area have been successful to the level that AECOM's analysis of the vegetation determined that the 1.71ha patch met the key diagnostic characteristics for the federally protected Tuart Woodland TEC. broader distribution in the region.

12. Holistic Impact Assessment

While the preceding sections have evaluated the potential impacts of the Proposal on individual environmental factors, it is important to recognise that the Proposal will not affect these factors, flora and vegetation, terrestrial fauna, inland waters and social surroundings in isolation, and they are inherently interconnected. This section presents a holistic assessment of the Proposal's impacts, focusing on the interactions across these key environmental factors.

A summary of the assessment findings and their alignment with the EPA's environmental principles and objectives, following application of the EPA's environmental mitigation hierarchy, is presented in Table 8 (Section 5).

The Proposal requires clearing of up to 98.08 ha of vegetation to facilitate the development of linear infrastructure and support ongoing operations. This clearing will result in the direct loss of native flora and vegetation, TECs and ESAs including Bush Forever sites and DBCA managed land. Land clearing will also directly reduce habitat availability for conservation significant fauna.

Vegetation loss may contribute to visual amenity reduction and increase the risk of weed invasion, which can degrade surrounding flora and fauna habitat, inland water quality, and social values. The removal of wetland habitat types may alter local hydrological regimes and impact surrounding vegetation health.

Construction and operation activities may further impact fauna, through the introduction of light, noise and dust emissions which can disrupt behaviour and breeding patterns, and movement. The risk of vehicle strike during both construction and maintenance phases may also contribute to fauna mortality.

Proposal construction of towers may require dewatering, presenting potential risks to groundwater through changes to groundwater levels and geochemistry, including acidification from exposure of ASS. These risks are particularly relevant in areas with shallow water tables, wetlands and potential GDEs

Social surroundings may be affected by reduced visual amenity and increased noise and vibration, particularly in residential areas such as Malaga and Bennett Springs. However, these areas are already adjacent to existing high-voltage infrastructure, and social interaction with the Impact Area is expected to be limited.

Importantly, the Proposal supports the broader transition to renewable energy in Western Australia. By facilitating the integration of renewable energy into the South West Interconnected System (SWIS), the Proposal contributes to reducing greenhouse gas emissions and mitigating climate change, one of the most significant threats to conservation-significant fauna, including black cockatoos.

In conclusion, the holistic assessment indicates that the integrated impacts of the Proposal on these factors are consistent with those identified for each environmental factor individually. Through strategic route selection, targeted environmental surveys, ongoing stakeholder engagement, and the implementation of robust mitigation and offset strategies, the Proposal aligns with the EPA's environmental objectives. The Proposal is expected to deliver a net environmental benefit by supporting renewable energy generation and contributing to climate resilience in the Mid-West region.

13. Cumulative Environmental Impact Assessment

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA, 2024a). The EPA (2023a) defines reasonably foreseeable future activities as "*Third party (or Proponent) activities which are already approved, are in a government approvals process, or are otherwise reasonably likely to proceed or be ongoing*".

This section examines the cumulative environmental impacts associated with the proposed Northern Terminal to Neerabup Terminal 330kV Transmission Line (NT–NBT Line), in the context of existing and future developments within Perth's northern corridor. These include the Neerabup Gas-Fired Power Station (Ministerial Statement 759), the Malaga to Ellenbrook Rail Works (Ministerial Statement 1156), the East Wanneroo District Structure Plan (EW DSP) approved by the Minister for Planning in August 2021, and the Whiteman Yanchep Highway (WYH) which is a proposed infrastructure project with protected land but no confirmed construction timeline, given their close geographic proximity, concurrent development timelines, and collective influence on land use, ecological integrity, and community infrastructure within Perth's rapidly expanding northern corridor.

The NT–NBT Line spans approximately 29 km and is strategically aligned with existing infrastructure corridors, including Tonkin Highway and existing Western Power easements. This alignment minimises the need for new land clearing and leverages previously disturbed areas, thereby reducing additional environmental and community impacts. Within the 576.38 ha Proposal Survey Area, approximately 70% is already cleared or modified, with the remaining 30% comprising fragmented patches of native vegetation. The Proposal has been designed to avoid high-value ecological areas wherever practicable and to integrate with existing infrastructure to reduce its environmental impact footprint.

The Neerabup Gas-Fired Power Station, while operationally intermittent, contributes to cumulative impacts through emissions, land use, and infrastructure presence. Although its footprint is relatively contained, its proximity to the NT–NBT Line and other developments adds to regional air quality pressures and land transformation. The EPA has addressed these impacts through updated ministerial conditions and ongoing monitoring, ensuring that its contribution to cumulative effects remains within acceptable thresholds.

The Malaga to Ellenbrook Rail Works, part of the METRONET expansion, introduces additional linear infrastructure through areas already undergoing urbanisation. While it supports sustainable transport and regional connectivity, construction activities and long-term land use changes contribute to cumulative impacts such as noise, vegetation clearing, and habitat fragmentation. These effects are particularly relevant in areas like Whiteman Park and East Wanneroo, where ecological values are under increasing pressure.

The northern corridor, encompassing suburbs such as East Wanneroo, Neerabup, and Yanchep, is undergoing rapid transformation driven by population growth and strategic planning. The EW DSP proposes the development of over 8,000 hectares to accommodate approximately 150,000 new residents, resulting in extensive land clearing, habitat fragmentation, and increased stress on biodiversity. Similarly, the WYH will facilitate regional mobility but also contribute to cumulative impacts such as noise, air pollution, and visual disturbance.

Despite these overlapping developments, the NT–NBT Line is a critical enabler of Western Australia's renewable energy transition. It is designed to alleviate transmission constraints and support the integration of large-scale renewable energy sources into the SWIS While the Proposal involves some vegetation clearing and construction-phase impacts, its long-term environmental benefits, particularly in reducing reliance on fossil fuels, substantially offset these effects. Compared to the scale and intensity of surrounding developments, the NT–NBT Line's contribution to cumulative environmental impacts is minor.

The EPA's cumulative impact framework emphasises that cumulative significance is context dependent. In this case, the NT–NBT Line is situated within a historically cleared and urbanised landscape, where the majority of land is already used for residential and infrastructure purposes. Its incremental impact is therefore limited. Overall, the NT–NBT Line represents a low-impact, high-benefit infrastructure investment that aligns with broader sustainability and energy transition goals for the region.

14. References

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Figures

Appendices

Appendix A - Referral Comments Register

Appendix B - AECOM (2023) Flora and Vegetation Assessment

Appendix C - AECOM (2025a) Addendum to AECOM (2023) Flora and Vegetation Assessment

Appendix D - AECOM (2024) Flora and Vegetation Assessment

Appendix E - AECOM (2025) Refined Black Cockatoo Assessment

Appendix F - AECOM (2025b) Fauna Technical Memorandum

Appendix G - SLR (2024) Fauna Technical Report – Black Striped Minnow and Western Swamp Tortoise

Appendix H - TetraTech (2025) Inland Waters Assessment

Appendix I - GHD (2024) Malaga-Ballajura Transmission Line Noise and EMF Assessment

Appendix J – Terratree (2024) CEL North Dieback Survey

Appendix K – Flora and Vegetation Environment Management Plan

Appendix L – Terrestrial Fauna Environment Management Plan

Appendix M - Inland Waters Environment Management Plan

Appendix N – Hygiene Management Plan