August 2025

Kamerunga to Woree Replacement Project

Ministerial Infrastructure Designation Assessment Report

Table of Contents

Acknowledgement of Country

Powerlink acknowledges the Traditional Owners and their custodianship of the lands and waters of Queensland and in particular the lands on which we operate. We pay our respect to their Ancestors, Elders and knowledge holders and recognise their deep history and ongoing connection to Country.

Acronyms

ABS	Australian Bureau of Statistics
AC	alternating current
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ACH Act	*Aboriginal Cultural Heritage Act 2003* (Qld)
AGRD	Austroads Guide to Road Design
AGTTM	Austroads Guide to Temporary Traffic Management
ALARP	As Low as Reasonably Practicable
ALC	agricultural land classes
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
AQIA	Air Quality Impact Assessment
Acquisition of Land Act	*Acquisition of Land Act 1967* (Qld)
ASS	Acid sulfate soils
ATSI	Aboriginal and Torres Strait Islander
Biosecurity Act	*Biosecurity Act 2014* (Qld)
Biosecurity Regulation	*Biosecurity Regulation 2016* (Qld)
BoM	Bureau of Meteorology
CairnsPlan	the Cairns Plan 2016
CEMP	Construction Environmental Management Plan
CEEVNT	critically endangered, endangered, vulnerable or near threatened

CHIDs	Cultural Heritage Implementation Documents
CHMAs	Cultural Heritage Management Agreements
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CMD	Coastal management district
CoPC	contaminants of potential concern
CPM Act	*Coastal Protection and Management Act 1995* (Qld)
CRC	Cairns Regional Council
CSSR	Corridor and Site Selection Report
Cth	Commonwealth
CWAR	Cairns Western Arterial Road
DAF	Department of Agriculture and Fisheries
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DCSSR	Draft Corridor and Site Selection Report
DES	Department of Environment and Science
DESI	Department of Environment, Science and Innovation
DETSI	Department of the Environment, Tourism, Science and Innovation
DHLGPPW	Department of Housing, Local Government, Planning and Public Works
DLGWV	Department of Local Government, Water and Volunteers
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DO	Dissolved Oxygen
DoR	Department of Resources

DSDI	Department of State Development and Infrastructure
DSDIP	Department of State Development, Infrastructure and Planning
DPC	design, procure and construct
DPI	Department of Primary Industries
DTATSIPCA	Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts
DTMR	Department of Transport and Main Roads
DWATSIPM	Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism
EA	Environmental Authority
EIL	Ecological Investigation Levels
Electricity Act	*Electricity Act 1994* (Qld)
Electrical Safety Act	*Electrical Safety Act 2002* (Qld)
ELF	extra low frequency
EMF	Electric and Magnetic Fields
EMP	Environmental Management Plan
EMR	Environmental Management Register
EO Act	*Environmental Offsets Act 2014* (Qld)
EO Reg	*Environmental Offsets Regulation 2014* (Qld)
EP Act	*Environmental Protection Act 1994* (Qld)
EP Reg	*Environmental Protection Regulation 2019* (Qld)
EPP (Air)	*Environmental Protection (Air) Policy 2019* (Qld)
EPP (Noise)	*Environmental Protection (Noise) Policy 2019* (Qld)
EPP (Water and Wetlands)	*Environmental Protection Policy (Water and Wetlands) 2019* (Qld)

EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
ERA	Environmentally Relevant Activity
Ergon Energy	Ergon Energy Queensland
ESCP	Erosion and Sediment Control Plan
ESL	Ecological Screening Level
EWP	Environmental Work Plans
EVNT	Endangered, vulnerable or near threatened
EVs	Environmental values
Fisheries Act	*Fisheries Act 1994* (Qld)
FNQ	Far North Queensland
FTE	Full time equivalent
GDE	Groundwater Dependent Ecosystems
GLCs	Ground Level Concentrations
GTIA	Guide to Traffic Impact Assessment
GWY	Gimuy Walubara Yidinji
HAT	Highest astronomical tide
HDD	horizontal directional drilled
HIL	Health Investigation Levels
HSL	Health Screening Levels
Hz	hertz
IAA	Important Agricultural Area
IAPP	International Association for Public Participation
IAR	Initial Advice Request

ICNIRP	International Commission on Non-Ionising Radiation Protection
ID	Infrastructure designation
IECA	International Erosion Control Association
IEEE	Institute of Electrical and Electronics Engineers
IPCC	Intergovernmental Panel on Climate Change
IRPA	International Radiation Protection Association
JBS&G	JBS&G Australia Pty Ltd
kHz	kilohertz
km	kilometres
KRA	Key Resource Area
m	Metre
mm	millimetres
Land Act	*Land Act 1994*
LGA	Local Government Area
Marine Park Act	*Marine Parks Act 2004* (Qld)
MCU	Material Change of Use
MID	Ministerial Infrastructure Designations
MID Assessment Report	Ministerial Infrastructure Designation Assessment Report
MHz	megahertz
mG	milligauss
MGR	Minister's Guidelines and Rules
MNES	Matters of National Environmental Significance
MRI	magnetic resonance imaging
MSES	Matters of State Environmental Significance

MSPs	Maintenance Service Providers
NAIF	Northern Australia Infrastructure Fund
Native Title Act	*Native Title Act 1993* (Cth)
NCAs	Noise Catchment Areas
NC Act	*Nature Conservation Act 1992* (Qld)
NHMRC	National Health and Medical Research Council of Australia
NOx	Nitrogen oxides
NPI	National Pollutant Inventory
OH	Overhead Line
PFAS	per- and polyfluoroalkyl substances
Planning Act	*Planning Act 2016* (Qld)
Planning Regulation	Planning Regulation 2017(Qld)
PMAV	Property map of assessable vegetation
PMST	Protected Matters Search Tool
PNQ	Pioneer North Queensland
Powerlink	Powerlink Queensland
ppt	percentage points
PSA	Primary Study Area
QHR	Queensland Heritage Register
Qld	Queensland
RAL	reconfiguring a lot
RAP	Reconciliation Action Plan
RE	Regional Ecosystem
Regional Planning Interest Act	*Regional Planning Interests Act 2014* (Qld)

SCL	Strategic Cropping Land
SDP	Soil Disposal Permit
SEIA	Social and Economic Impact Assessment
SMP	Species Management Program
SPP	State Planning Policy
SRI	Significant Residual Impact
SSA	Secondary Study Area
STEL	Short Term Exposure Limits
Stock Route Management Act	*Stock Route Management Act 2002* (Qld)
TECs	Threatened Ecological Communities
TIA	Traffic Impact Assessment
UGOH	Underground to overhead
TSA	Tertiary Study Area

Executive summary

Project overview

This Ministerial Infrastructure Designation Assessment Report (MID Assessment Report) has been prepared by Queensland Electricity Transmission Corporation Limited, trading as Powerlink Queensland (Powerlink), in support of a request to the Minister for State Development, Infrastructure and Planning (the Minister) for the designation of a premises for the proposed Kamerunga to Woree Transmission Line Replacement project, which includes the replacement of the existing Kamerunga Substation and associated site selection. This request seeks the development of infrastructure '*(7) electricity operating works*' in accordance with Schedule 5 of the *Planning Regulation 2017* (Queensland) (Planning Regulation).

Environment and planning approval for the Project is being sought via the Ministerial Infrastructure Designation (MID) process under the *Planning Act 2016* (Queensland) (Planning Act). To obtain a MID, an Infrastructure Entity is required to prepare a MID Assessment Report taking into account the potential environmental, social and economic impacts associated with the construction, operation and maintenance of the Project.

Project justification and feasible alternatives

Powerlink is a leading Australian provider of high-voltage electricity transmission network services. Part of this network includes a 132kV transmission line in Cairns, Queensland, from the Kamerunga Substation to the Woree Substation. The existing Kamerunga to Woree transmission line provides a critical connection for the Barron Gorge Hydro Power Station to the transmission network while also supplying power to northern Cairns. The transmission line structures, and associated foundations, were designed and constructed to have a design service life of approximately 50 years. The Kamerunga to Woree transmission line has reached the end of design service life and requires a full replacement is required. Similarly, substations are designed and constructed to have a design service life of approximately 40 years, with the Kamerunga Substation reaching the end of its design service life and requires replacement.

A Corridor and Site Selection Report was prepared which identified a preferred corridor for the transmission line and site for the substation for the Project. The selected corridor and site, on balance, offer the most appropriate location for the proposed transmission and substation infrastructure when taking into account social, economic and environmental factors, which also incorporated stakeholder and landholder feedback.

Project description

The Project will include:

- Four kilometres (two lattice tower structures and 13 pole structures) of 132kV Overhead (OH) transmission line between the existing Kamerunga Substation to the new substation in Barron and then on to a transition site in Redlynch on a Powerlink-owned greenfield site.
- Underground to overhead (UGOH) transition structure located at a transition site in Redlynch at the Powerlink-owned greenfield site.
- 10.3km of 132kV Underground (UG) cable between the Redlynch transition site and the existing Powerlink Woree Substation.
- The new substation in Barron will be constructed on a Powerlink-owned greenfield site located at located at 3-51 Stewarts Rd Barron, Queensland.

Environmental assessment

Chapter 7 of the Ministers Guidelines and Rules sets out the process for environmental assessment required as part of making a MID application. This MID Assessment Report considers the potential environmental impacts relevant to the Project, through design, construction, operation, maintenance, and decommissioning phases and includes:

- Identification of environmental values relevant to the Project;
- Assessment of the potential impacts on these environmental values from the Project; and
- Identification of suitable avoidance, mitigation, or management measures for these potential impacts.

To demonstrate mitigation and management measures, this MID Assessment Report includes an Environmental Management Plan (EMP) for the relevant construction elements of the Project.

Environmental management

Powerlink is committed to the protection of the environment, which includes avoiding, minimising, mitigating and managing adverse environmental impacts from its activities. Every Powerlink individual is responsible and accountable for environmental management, and Powerlink's leaders are active role models of this commitment.

The mitigation and management measures for this Project have been proposed in line with Powerlink's standard environmental controls. Additional measures have been proposed where required to provide further mitigation and management measures specifically for the Project.

Planning and approval requirements

A number of Commonwealth, State and local pieces of legislation and policy applies to the development of the Project. Powerlink have undertaken a self-assessment against the *Environment Protection and Biodiversity Conservation Act 1999* Significant Impact Guidelines and have identified that the Project is not expected to have a significant impact on any Matters of National Environmental Significance and as such, referral to the Commonwealth Minister for the Environment will not be required.

As the Project is being assessed under the Ministerial Infrastructure Designation (MID) process under the Planning Act 2016, a range of typical approvals under this Act will no longer apply to this Project, as MID makes the development 'accepted development'. Approvals outside of the Planning Act have been identified and will be obtained by Powerlink in the subsequent stages of the Project.

Community and stakeholder consultation

Powerlink seek to connect with relevant stakeholders to ensure a comprehensive, transparent, responsive, and sensitive approach. The Project's proximity to residential, cultural, and commercial interests makes the need for an effective engagement plan imperative to the Project's success.

Powerlink commenced early engagement in 2019 with landholders, Traditional Owner groups and other key stakeholders to inform development for the overhead line replacement component of the project. Planning for this overhead section was paused in early 2020, due to additional investigations into associated projects in the Cairns region. The additional project investigations focused on a potential new substation to replace the existing Kamerunga Substation and line replacement projects (overhead and underground), and the interrelationship between these projects and potential staging arrangements. Initial discussions commenced regarding the new transmission corridor between Redlynch and Woree Substation at the end of 2019 with

Cairns Regional Council, Department of Transport and Main Road (DTMR) and MSF Sugar. Engagement with Queensland Rail commenced in late 2023.

Ongoing engagement has occurred since 2019 and includes correspondence with all project stakeholders and the wider community through establishing a project webpage, providing community notices and project newsletters and hosting a series of community information drop-in sessions across the project area.

Conclusion

This assessment report has identified that the Project has the potential to impact a range of environmental, social and economic values in the Project area and surrounds, both positively and negatively. However, through the implementation of design mitigation and standard and project specific mitigation and management measures, these potential impacts can be minimised and mitigated.

1 Introduction

1.1 Purpose of this report

This Ministerial Infrastructure Designation Assessment Report (MID Assessment Report) has been prepared by Queensland Electricity Transmission Corporation Limited, trading as Powerlink Queensland (Powerlink), in support of a request to the Minister for State Development, Infrastructure and Planning (the Minister) for the designation of a premises for the proposed Kamerunga to Woree Transmission Line Replacement project, which includes the replacement of the existing Kamerunga Substation and associated site selection. This request seeks the development of infrastructure '(7) *electricity operating works'* in accordance with Schedule 5 of the *Planning Regulation 2017* (Planning Regulation).

This report provides an overview of the proposed infrastructure, along with an assessment of matters a designator must be satisfied with pursuant to Section 36 of the Planning Act (Qld) and Chapter 7 of the *Minister's Guidelines and Rules 2016* (MGR).

1.2 Proposed infrastructure designation

Infrastructure Designation is a planning process under Chapter 2, Part 5 of the Planning Act, that allows the Minister to designate premises for certain types of infrastructure for certain infrastructure entities. The process provides infrastructure entities a streamlined, whole-of-government response on a request for infrastructure.

The three statutory instruments which support the Infrastructure Designation function are the:

- Planning Act, which includes provisions for making, amending, extending, or repealing Infrastructure Designations.
- Planning Regulation, which identifies the types of infrastructure that may be designated.
- MGR, which includes the processes for making or amending Ministerial Infrastructure Designations (MID) (Chapter 7 of the MGR).

The Planning Regulation describes the types of infrastructure which may be designated by the Minister, as identified in Section 35 of the Planning Act. Schedule 5, Part 2, Item 7 of the Planning Regulation specifies 'electricity operating works' as infrastructure that may be designated through the MID process, which is the case for this Project.

Section 36(1) of the Planning Act then provides criteria to be satisfied in order for a MID to be made –

1. *To make a designation, a designator must be satisfied that—*

    a. *the infrastructure will satisfy statutory requirements, or budgetary commitments, for the supply of the infrastructure; or*
    b. *there is or will be a need for the efficient and timely supply of the infrastructure.*

The Project achieves the requirements of Section 36(1) of the Planning Act by providing a long-term and stable supply of electricity from the Barron Gorge Hydro Power Station to the broader transmission network, supplying power to northern Cairns.

Section 36 (2) of the Planning Act identifies that –

> *The Minister must be satisfied that adequate environmental assessment, including adequate consultation, has been carried out in relation to the development that is the subject of the designation.*

This MID Assessment Report has been prepared to address the requirements of Section 36(2) of the Planning Act. The Infrastructure Designation will affirm the Project as a premises for electricity operating works and will allow for a streamlined, whole-of-government assessment of the Project.

Table 1-1 provides an overview of the MID process, along with the current Project status.

Table 1-1 Stages of the MID Process

Stage	Commentary	Status
1. Initial Advice Request (IAR)	An IAR was submitted to the then Department of Housing, Local Government, Planning and Public Works (DHLGPPW) (now Department of State Development, Infrastructure and Planning (DSDIP)) on 1 February 2024 to seek pre-lodgement advice with regards to the transmission line only. Pre-lodgement advice was received on the 22 February 2024 which included a summary of relevant matters to be considered within the MID Assessment Report. An amended IAR was then submitted on the 12 April 2024 to the then DHLGPPW (now DSDIP) to include the new substation in Barron (Kamerunga replacement). Amended pre-lodgement advice was then received on the 8 May 2024.	Complete
2. Preliminary Stakeholder Engagement	Powerlink has undertaken preliminary stakeholder engagement as outlined within Section 7, directly with Cairns Regional Council (CRC), elected representatives, State agencies, Traditional Owner groups, affected landholders, surrounding landholders and other relevant stakeholders throughout the Corridor and Site Selection (CSS) phase of the Project, including: • Establishing a project specific webpage to host information about the project, MID process, consultation opportunities and a map showing the proposed new transmission line and new substation in Barron location. • Correspondence with all project stakeholders including providing project information such as a community notice and project newsletter. • Correspondence with the wider community of Cairns providing project information such as a community notice and project newsletter. • Hosting a series of community information drop-in sessions across the project area. • Project briefings with Cairns Regional Council Mayor and relevant Divisional Councillors. • Project briefings with: o Michael Healy – Member for Cairns o Curtis Pitt – Member for Mulgrave (sitting MP prior to 2024 State election) o Craig Crawford – Member for Barron River (sitting MP prior to 2024 State election)	Complete

Stage	Commentary	Status

	• Correspondence with project area Traditional Owner groups:
	  ○ Gimuy Walubara Yidinji (GWY) Elders Aboriginal Corporation
	  ○ Djabugay Aboriginal Corporation
	• Project briefings with Cairns and Far North Environment Centre (CAFNEC)
	• Correspondence and meetings with directly impacted landholders to discuss the project and property considerations.
	• Further information relating to stakeholder engagement, and proposed future engagement is provided in Section 7.
	The CSS Report can be found on Powerlink's website: https://www.powerlink.com.au/projects/kamerunga-redlynch-transmission-line-replacement-project	

3. Endorsement to lodge a MID Proposal	Following preliminary stakeholder engagement and prior to seeking a MID, the entity (Powerlink) wrote to the then Minister of DHLGPPW (now Minister for DSDIP) seeking their endorsement to lodge a MID Proposal (endorsement request). The endorsement request was submitted by Powerlink to the Minister on 6 November 2024 and the endorsement receipt was received on 10 February 2025	Complete
4. Lodgement of an MID Proposal	Following receipt of the endorsement to lodge an MID Proposal, the entity is required to prepare material identified in Schedule 3 of the MGR, along with any additional information identified as required within the pre-lodgement advice. This MID Assessment Report has been prepared in accordance with Chapter 7 of the MGR and provides the information citied within Schedule 3 and the pre-lodgement advice.	Current step
5. Consultation by the Minister	Following receipt of the MID Proposal, the Minister of DSDIP will commence consultation with the local government and landowners, and will invite submissions on the MID.	Future step
6. Consultation by the Entity	A Project Engagement Plan (PEP) is included within Section 7 of this MID Assessment Report. Powerlink will be responsible for undertaking public consultation in accordance with this strategy.	Future step
7. Consideration of submissions	Following completion of consultation, the Minister of DSDIP will give Powerlink a copy of any submissions received. After consideration of the submissions, Powerlink is to provide the Minister with evidence of consultation undertaken, a summary of the matters raised in the submissions, and how these matters have been addressed.	Future step

Stage	Commentary	Status
8. State Agency comments	While consultation is being undertaken, DSDIP will seek comment on the MID Proposal from other State Agencies. Following completion of consultation, the Minister will give Powerlink a copy of any submissions received from State Agencies.	Future step
9. Change to the Proposal	After consideration of the submissions, Powerlink is to provide the Minister with evidence of consultation undertaken, a summary of the matters raised in the submissions, and how these matters have been addressed.	Future step (if required)
10. Decision by the Minister	If any change is made to the MID Proposal (that is considered to warrant additional consultation), either as a consequence of a submission made during the consultation period, or another circumstance, or where the Minister determines that consultation was not adequately completed, further consultation may be required.	Future step
11. Minister issues decision	If the Minister agrees to designate the premises, the Minister will publish a gazette notice about the MID Proposal. Powerlink, the local government CRC and affected parties will be notified of the Minister's decision, including any requirements.	Future step

1.2.1 Environmental assessment report process

Chapter 7 of the MGR sets out the process for environmental assessment and consultation required as part of making a MID application.

For the purposes of this MID Assessment Report, '*environment'* is defined in Section 8 of the *Environmental Protection Act 1994* (Qld) (EP Act) as –

> *(a) ecosystems and their constituent parts, including people and communities; and*
>
> *(b) all natural and physical resources; and*
>
> *(c) the qualities and characteristics of locations, places, and areas, however large or small, that contribute to their biological diversity and integrity, intrinsic or attributed scientific value or interest, amenity, harmony, and sense of community; and*
>
> *(d) the social, economic, aesthetic, and cultural conditions that affect, or are affected by, things mentioned in paragraphs (a) to (c).*

This MID Assessment Report considers the potential environmental impacts relevant to the Project, through design, construction, operation, maintenance, and decommissioning phases and includes:

- Identification of environmental values relevant to the Project;
- Assessment of the potential impacts on these environmental values; and
- Identification of suitable avoidance, mitigation, or management measures for these potential impacts.

Chapter 7, Part 1 of the MGR provides the framework for making an MID application and Schedule 3 identifies the required material to be provided to the Minister about the MID the entity is seeking. This MID Assessment Report provides the relevant information as requested in Chapter 7, Part 1 of the MGR, as identified in Table 1-2.

Table 1-2 Information required as per Schedule 3 of the MGR

Required information		Relevant Section
1	The boundary of the entity's proposal and the cadastral description of all land affected by the proposal.	Appendix A
2	A site and locality description of the entity's proposal.	Section 3
3	Plans, drawings, elevations, images, and perspectives of the entity's proposal that are suitable for assessment and for communicating the scale, intensity, and nature of the proposal to members of the public during consultation.	Appendix B
4	Any existing uses on the premises that would be subject to the entity's proposal.	Section 6.10
5	Information about: a) existing uses on adjoining sites; b) the type of infrastructure proposed relative to the Planning Regulation; c) approval(s) history for the site; and	Section 6.10

Required information		Relevant Section
	d) the intended outcomes of any proposed amendment to uses on the site.	
6	Acknowledgement of any adverse impacts on surrounding properties and how these impacts are proposed to be managed.	Section 6.10
7	Acknowledgement of any off-site impacts such as traffic, noise, infrastructure capacity and how these impacts are proposed to be managed.	Section 6
8	Acknowledgement of any construction impacts and how these impacts are proposed to be managed.	Section 6
9	Any works and land affected outside the boundary of the site that would be subject to the entity's proposal.	Section 6.10
10	Acknowledgement of relevant state interests and planning instruments and how they relate to the entity's proposal.	Section 5
11	Outcomes of any initial stakeholder engagement highlighting if changes were made to the earlier proposal as a result of stakeholder feedback.	Section 7
12	A proposed Project Engagement Plan.	Section 7
13	Plans and technical reports to address any of the matters identified above.	Appendix B – Traffic Impact Assessment Appendix D – Ecological Assessment Appendix E – Hydrology and Flood Impact Assessment Appendix F – Air Quality Impact Assessment Appendix G – Social and Economic Impact Assessment Appendix H – Noise Impact Assessment Appendix I – EMF Study Appendix J – Preliminary Contamination Assessment
14	If the entity does not have acquisition powers under the *Acquisition of Land Act 1967* (Acquisition of Land Act) and is proposing an MID over premises not owned by the entity, the entity must give an assurance to the Minister that the entity will have access to the premises the subject of the proposed MID, in order to construct and operate the infrastructure. This may include written landowner consent or a contractual agreement.	Not applicable. Powerlink has powers under the Acquisition of Land Act to secure appropriate tenure, which will primarily consist of easements and other authorities to occupy land,

Required information		Relevant Section
		were not on land already in Powerlink's ownership.
15	If the entity is the trustee or lessee of the premises, the entity must give an assurance to the Minister that the proposed infrastructure is consistent with the purpose of the trust or lease.	Not applicable

1.3 Project proponent

The owner, developer, operator, and maintainer of the Project is:

Powerlink Queensland
33 Harold Street, Virginia
PO Box 1193, Virginia QLD 4014
Telephone: (07) 3860 2111, Facsimile: (07) 3860 2100
Website: https://www.powerlink.com.au/

Powerlink Queensland is the registered business name of the Queensland Electricity Transmission Corporation Limited (ABN: 82 078 849 233), a Queensland Government Owned Corporation. It was established under the *Government Owned Corporations Act 199*3 (Qld) and is a Transmission Entity under the *Electricity Act 1994* (Electricity Act). Powerlink owns, operates, and maintains Queensland's high voltage electricity transmission network. As a Transmission Network Service Provider in the national electricity market, Powerlink's primary role is to provide a secure and reliable network to transport high voltage electricity from generators to electricity distribution networks. These networks are owned by Energex and Ergon Energy (Ergon Energy Queensland), which supply electricity to nearly 4 million Queenslanders. Powerlink also transports electricity directly to large Queensland customers such as mines, gas producers, industrial smelters, rail network operators, and to New South Wales via the Queensland/New South Wales Interconnector.

Powerlink's operations are guided by the Electricity Act and the *Electrical Safety Act 2002* (Electrical Safety Act). The Electricity Act sets out the requirement which all electricity industry participants must follow to ensure a safe, efficient, and reliable supply of electricity. It also requires the supply of electricity to be undertaken in an environmentally sound manner. Under Section 31(b) of the Electricity Act, a Transmission Entity is required to properly consider the environmental effects of its activities under its transmission authority. The Electrical Safety Act seeks to prevent through regulation, the death, injury, and destruction that can be caused by electricity. Accordingly, the purpose of the Electrical Safety Act is to establish a legislative framework for preventing persons from being killed or injured by electricity; and preventing property from being destroyed or damaged by electricity. The design of the Project will satisfy the requirements of the Electrical Safety Act.

1.3.1 Pre-lodgement advice

Powerlink received initial pre-lodgement advice from the former DHLGPPW (now DSDIP) for the transmission line replacement on the 22 February 2024, with revised pre-lodgement advice then provided on the 8 May 2024 incorporating the substation replacement. A summary of the pre-lodgement advice, and cross references to where this advice has been addressed within this MID Assessment Report is provided in Table 1-3.

Table 1-3 DSDIP pre-lodgement advice

Relevant item	Advice	Relevant section
1	**Traffic** A construction traffic impact assessment should be provided in support of the MID proposal that addresses the following: • impacts on the state and local road networks and any required upgrade/mitigation works; • access arrangements to the transmission line for construction and maintenance; • any temporary road closures and associated impacts; and • impacts to public and active transport routes. Additionally, all infrastructure that crosses State-controlled roads will need to be designed and constructed in accordance with the Department of Transport and Main Roads (Department of Transport and Main Roads (DTMR)) Technical Note 163 – Third Party Utility Infrastructure Installation in State-controlled road Technical Guidelines. Also, the works within the State-controlled road will require a Road Corridor Permit to be obtained prior to the works commencing.	A Traffic Impact Assessment (TIA) has been prepared and is provided in Appendix B. A summary of the findings is included in Section 6.15
2	**Biodiversity** An ecological assessment should be provided in support of the MID that includes/addresses: • the avoid/minimise/mitigate/offset framework; • areas of vegetation to be cleared; • impacts to marine plants; and • any proposed rehabilitation/offsetting.	An Ecological Assessment Report has been prepared and is provided in Appendix D. A summary of the findings is included in Section 6.9.
3	**Water quality** The MID proposal should be supported by a construction environmental management plan including an erosion and sediment control plan, dewatering management plan, and geotechnical investigation to demonstrate how impacts to groundwater quality will be appropriately managed as a result of the proposal.	Water quality is discussed in Section 6.4. The Environmental Management Plan (EMP) is provided in Appendix K.

Relevant item	Advice	Relevant section
4	**Recommended technical reporting and supporting material** It is recommended that the entity consider the following matters when preparing the MID proposal:	Technical assessments were undertaken as recommended. Reference to the locations of these assessments have been provided below.
	• Plans/perspectives;	Appendix B
	• Traffic impact assessment;	Section 6.15 and Appendix B
	• Noise and vibration technical assessment;	Section 6.16 and Appendix H
	• Stormwater management plan;	Section 6.4 and Appendix E
	• Ecology assessment including weed survey;	Section 6.5, 6.6, 6.7, 6.8 and 6.9 and Appendix D
	• Water resources and hydrology assessment;	Section 6.4 and Appendix E
	• Land and land use;	Section 6.1 and 6.10
	• Air quality;	Section 6.3 and Appendix F
	• Protected areas;	Section 6.5 and Appendix D
	• Ecology;	Section 6.5, 6.6, 6.7, 6.8 and 6.9 and Appendix D
	• Matters of National and State Environmental Significance;	Section 6.8 and Appendix D
	• Biosecurity;	Section 6.9 and Appendix D
	• Visual amenity;	Section 6.11
	• Social and economic;	Section 6.12 and Appendix G
	• Heritage indigenous and non-indigenous;	Section 6.13 and 6.14
	• Noise and vibration;	Section 6.16 and Appendix H
	• Electric magnetic fields;	Section 6.18 and Appendix I
	• Bushfire risk;	Section 6.19
	• Waste management;	Section 6.20

Relevant item	Advice	Relevant section
	• Infrastructure;	Section 6.21
	• Cumulative impacts; and	Section 6.22
	• Environmental management.	Section 6.24 and Appendix K

2 Project description

2.1 Proposed development

The Project will include:

- Four kilometres (two lattice tower structures and 13 pole structures) of 132kV Overhead (OH) transmission line between the existing Kamerunga Substation to the new substation in Barron (located at 3-51 Stewarts Rd Barron, Qld within 1/RP716266, 3/SP173007, 4/SP119694, 2/RP716266, and 1/RP720215) and then on to a transition site in Redlynch on a Powerlink-owned greenfield site (located at 1-5 Redlynch Connector Road, Redlynch, Qld within 1/SP279529).
- Underground to overhead (UGOH) transition structure located at a transition site in Redlynch at the Powerlink-owned greenfield site.
- 10.3km of 132kV Underground (UG) cable between the Redlynch transition site and the existing Powerlink Woree Substation. The UG transmission line will include:
    - two electrically separate circuits installed in trenches and filled with an engineered backfill;
    - ten Horizontal Directional Drilled (HDD) sections under crossings of creeks, culverts, and State-controlled road;
        - The location of watercourses intersected by the MID Corridor are outlined in Table 6-6.
        - A list of local roads and State-controlled road that interface with the MID Corridor are outlined in Section 6.15.1 and Appendix A.
        - A list of rail corridors that intersect with MID Corridor are outlined in Section 6.10.1 and Appendix A.
    - eight concrete cable joint bays (approximately 9.5m by 2.5m in size) installed every 800m – 1,000m.
- The new substation in Barron will be constructed on a Powerlink-owned greenfield site located at located at 3-51 Stewarts Rd Barron, Qld within 1/RP716266, 3/SP173007, 4/SP119694, 2/RP716266, and1/RP720215 and will use similar equipment to the existing Kamerunga Substation (air insulated switchgear, OH transmission lines, transformers, control, and amenities buildings).The new substation in Barron will be within a fenced area approximately 300m by 300m. The new substation will also include Ergon Energy infrastructure.

2.2 Site description summary

For the purposes of approval via the MID process, an MID corridor has been established. This encompasses the recommended corridor and site identified within the CSSR. For the OH transmission line, this includes a 60m wide easement. However, for the substation and underground cable component, flexibility within the MID Corridor has been provided for the new substation in Barron to allow for design and construction, as well as for the underground cable component (10.3km). This will allow for flexibility for the Department of the design, procure and construct (DPC) contractor. For the underground cable component, this includes where:

- the MID corridor is over a road parcel it will not encroach into the property boundaries located on either side of the road; and
- the MID corridor is located in open spaces or near waterways it will be tens of metres wide.

The MID Corridor can be seen in Figure 2-1.

All properties (including lot on plans, easements rail corridor and street details) intersected by the Project are provided in Appendix A.

Zoning through the OH Transmission line component, UG cable component, UGOH transition structure and substations of the MID Corridor is detailed in Section 6.10.1.

PROPOSED MID CORRIDOR

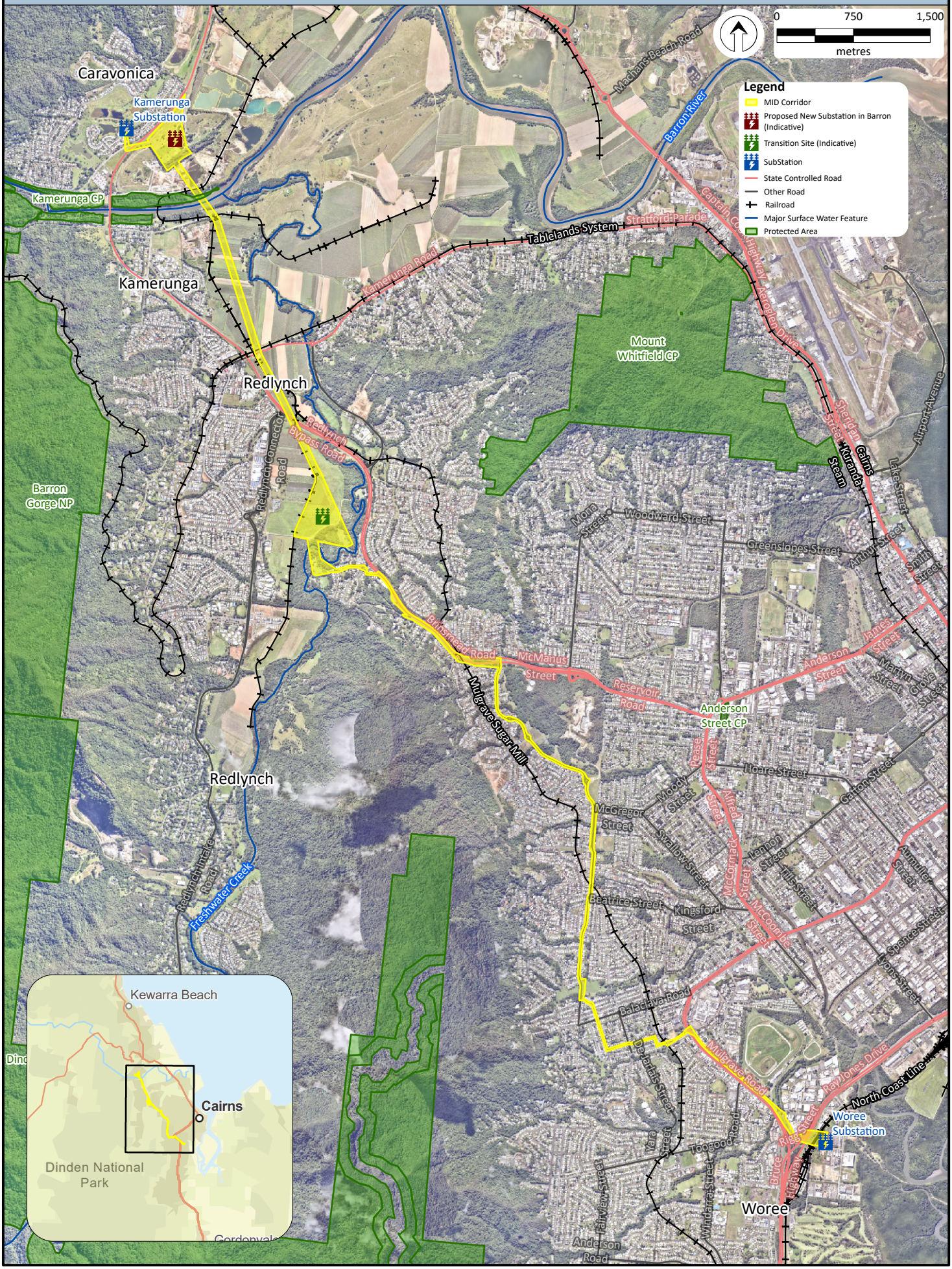


Figure 2-1

3 Project detail

3.1 Construction methodology

3.1.1 Overhead transmission line

The overhead transmission line will be a 132kV double circuit line, constructed predominantly from poles and some steel lattice towers, pending constraints, approximately 4km in length. The final MID Corridor will be located within an easement approximately 60m wide. Transmission infrastructure is generally located either at the centre of the easement or offset from existing towers when co-located with an existing transmission line or offset within the new easement to allow for future lines.

Easements provide legal access over land to construct, operate and maintain energy infrastructure and to regulate certain activities on the easement area, allowing Powerlink to provide a safe, reliable and secure power supply. Landholders continue to own and be responsible for the land on which the easement is located, including land management and other general land maintenance activities. Rules around activities that can and cannot be undertaken on our easements are outlined in the registered easement terms and conditions on property titles, along with the rights of both the landholder and Powerlink. In addition to registered conditions, there are also other rules based on:

- safety for the public, our employees and contractors;
- the risk of damage to property;
- the safe operation of the overhead transmission line, underground cable or other assets; and
- access to the line or associated infrastructure for any future works, including maintenance, upgrading or renewal activities.

Powerlink is committed to working closely with directly affected landholders to understand how they use and manage their property. We do this to ensure we can suitably locate transmission infrastructure within the easement and provide sufficient pole height to avoid or minimise impacts on property operations.

Due to the design and operating requirements of high voltage electricity transmission infrastructure, easements require clearing of vegetation to safely construct and maintain poles and lines. Where possible, Powerlink does not clear the entire easement but rather minimises vegetation clearing for the safe and reliable operation of transmission line. When designing the transmission line, mitigation measures such as selective pole placement and spanning to decrease the amount of required vegetation clearing will be used, particularly in sensitive environments.

Pole pad construction areas will be approximately 40 m x 40 m and spans between towers will be around 300m. Pole heights will be dependent on terrain, topography and land use of the final alignment with shorter poles likely on higher ground and taller poles within low points of the corridor. It is likely 132kV t poles will be around 25m to 50m in height. Generally, the steps involved in building a transmission line include:

- preparing the site;
- installing the foundations;
- assembling the transmission poles and equipment;
- stringing the transmission line;
- testing and commissioning; and
- reinstating the site.

More detail on each step is outlined below.

Preparing the site

Following comprehensive field visits to sample or test soil, vegetation and water, and undertake other detailed investigations, the exact position of each transmission pole is marked on-ground. Vegetation clearing is then undertaken to make way for pads, lay-down areas and access tracks. Clearing is required to ensure the line can operate safely and reliably. Various clearing methods may be used based on existing land use, environmental considerations, maintenance requirements and landholder preferences. To minimise vegetation clearing, existing access tracks are used wherever possible. We will continue to use access tracks beyond construction activities to facilitate safe and streamlined access to poles during operation and maintenance.

Installing the foundations

Based on findings from geotechnical investigations completed prior to construction, the construction crew will commence work to install suitable foundations at each pole site. A large boring machine is generally used to excavate foundations which can be around 8m to 12m deep. Concrete poles are inserted and held in place, while concrete is poured into the excavation.

Lattice towers

Poles

Assembling the structures and equipment

Fabricated and galvanised steel components for poles are sorted and bundled ahead of being delivered to tower sites. Usually, this delivery takes place with a semi-trailer, with tower assembly work completed adjacent to a tower's final location. Specialist crews methodically piece together the towers, with smaller assembled sections lifted with a crane and bolted into place until the tower is fully erected.

Lattice towers

Poles

3.1.2 Stringing the transmission line

Machinery such as helicopters, semi-trailers, cranes and light 4WD vehicles are on-site to string the transmission line. Normally, stringing takes place in 5km to 10km sections at a time. Prior to stringing, large drums of conductor (transmission line wires) are delivered to locations along the line route. A draw wire is run between the assembled towers and used to pull the conductor along a section of line. Helicopters may be used to pull the draw wire. The conductor is fed through the line section and tensioned from the ground using winches. Equipment is then repositioned to the next stringing section to repeat the process until the conductor is strung across all poles.

Testing and commissioning

After a new transmission line is assembled, strung and ready to be energised, a series of thorough inspections and commissioning tests are carried out. This ensures the line is ready to be put into service safely and reliably as it enters the operation and maintenance phase of the Project lifecycle.

Reinstating the site

Powerlink will engage with landholders to determine site and property specific rehabilitation works following completion of construction activities. Depending on the type and level of on-ground works completed, crews reinstate the pole location and surrounding environment to ensure appropriate rehabilitation occurs. This helps to stabilise soil and encourage vegetation re-establishment to occur, preventing erosion. Rehabilitation works will be conducted in line with the Powerlink specifications HSE-SPE-A3011646 - Health Safety and Environment Specification (Version 3.1). This stage also includes reinstating farm infrastructure that may have been impacted during construction works, and remediating paddocks. Installation of identification signs on poles and anti-climb barriers are installed for safety purposes. Access tracks are finalised to allow ongoing access for future maintenance as required.

Powerlink will continue to engage with landholders once the transmission line enters the operation and maintenance phase to undertake a range of activities periodically as required, including:

- routine inspections on easements and infrastructure;
- vegetation management to maintain safety clearances;
- minor works for infrastructure, replacement of parts and emergency repair of damage;
- access track management;
- installing or replacing signage; and
- installing or replacing anti-climbing barriers.

3.1.3 Underground transmission cable

Underground cables usually consist of two electrically separate circuits constructed within a concrete trench. An example of what the underground transmission cable will look like within the trench is provided in Figure 3-1.

Underground cables have solid insulation around the conductor. Overhead lines are insulated by air and supported by towers and insulator strings. Therefore, underground cables require a narrower footprint when compared to overhead infrastructure. For a 132kV underground cable, a 12m footprint (6m either side of the cable) is required.

The narrower footprint and absence of towers makes underground cables more suited to highly constrained locations such as urban areas.

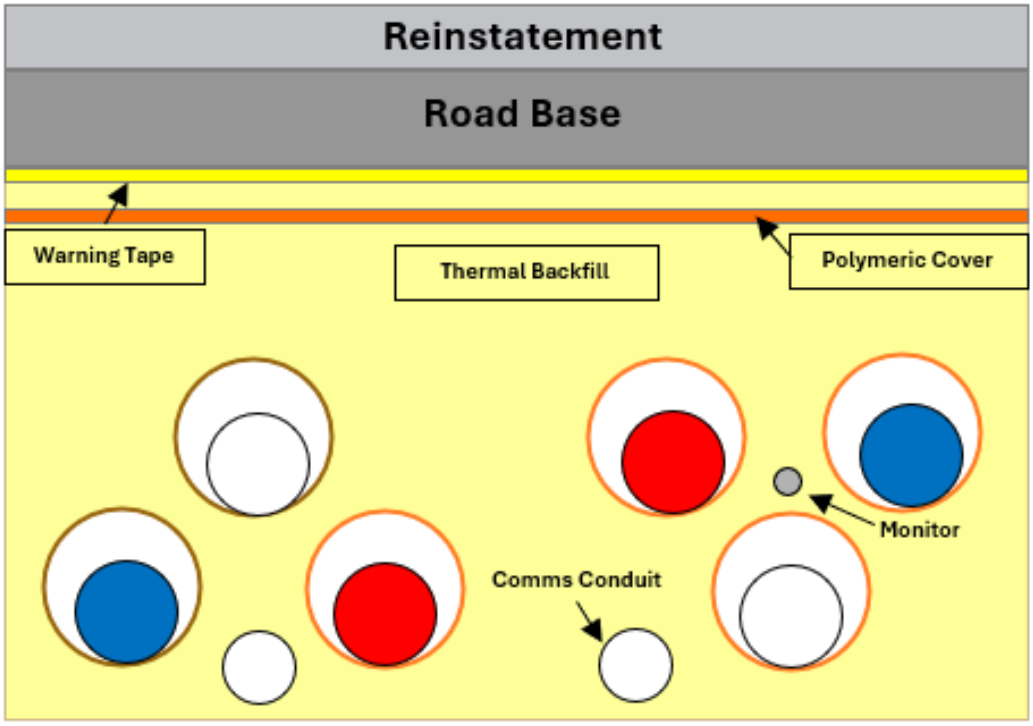


Figure 3-1 Typical trenched roadway cross section

The underground transmission cable is installed in 800-1,200m lengths. To join the lengths of cable together, joint bays are required along the final alignment. Joint bays, and adjacent link boxes, are inspected on a regular (typically annual) maintenance schedule and are positioned to facilitate access requirements. The joint bays are constructed with a concrete floor, walls and lid and are generally 3m x 10 m wide, depending on the voltage of the cables. The sizing of the joint bay is to allow for adequate spacing for construction, cable joining and earthing.

An example of a joint bay can be seen in Figure 3-2.

Figure 3-2 Example of a joint bay under construction

3.2 Transition sites

The transition structures will be located at 1-5 Redlynch Connector Road, Redlynch, Qld within 2/SP279529. The transition structure will facilitate the transfer of the overhead to underground infrastructure and will be required wherever a conversion of overhead/underground occurs. The transition structures will look similar to a steel transmission pole in size, will be located on a raised pad and are commonly referred to as transition sites (Figure 3-3). Transition sites are typically located separate to substations, balancing electrical transmission system requirements with constructability and community expectations.

Figure 3-3 Example of an underground to overhead structure

3.3 Substation

The role of a substation (Figure 3-4) is to monitor and control the flow, stability, quality and voltage of electricity within the transmission network. Equipment within substations is used to transform the voltage of electricity, protect the network, measure the flow of electricity, and switch electricity between the different transmission lines on the grid. A substation is not a power station and therefore it does not generate electricity. Substations may vary in size as a result of the voltage of transmission lines, as well as the number of different transmission lines that it needs to support.

For this Project, a new substation in Barron located at 3-51 Stewarts Rd Barron, Qld within lots 1/RP716266, 3/SP173007, 4/SP119694, 2/RP716266, and 1/RP720215, will be constructed with equipment similar to that at the existing Kamerunga Substation including:

- air insulated switchgear;
- overhead transmission lines;
- transformers;
- control room;
- 22kV gas insulated switch room (managed by a distribution entity such as Ergon Energy; and
- amenities building.

The new substation in Barron will be within a fenced area approximately 210m by 110m and will be located on a raised pad. The majority of infrastructure will be in the form of prefabricated concrete structures, transported to the substation site and assembled in situ.

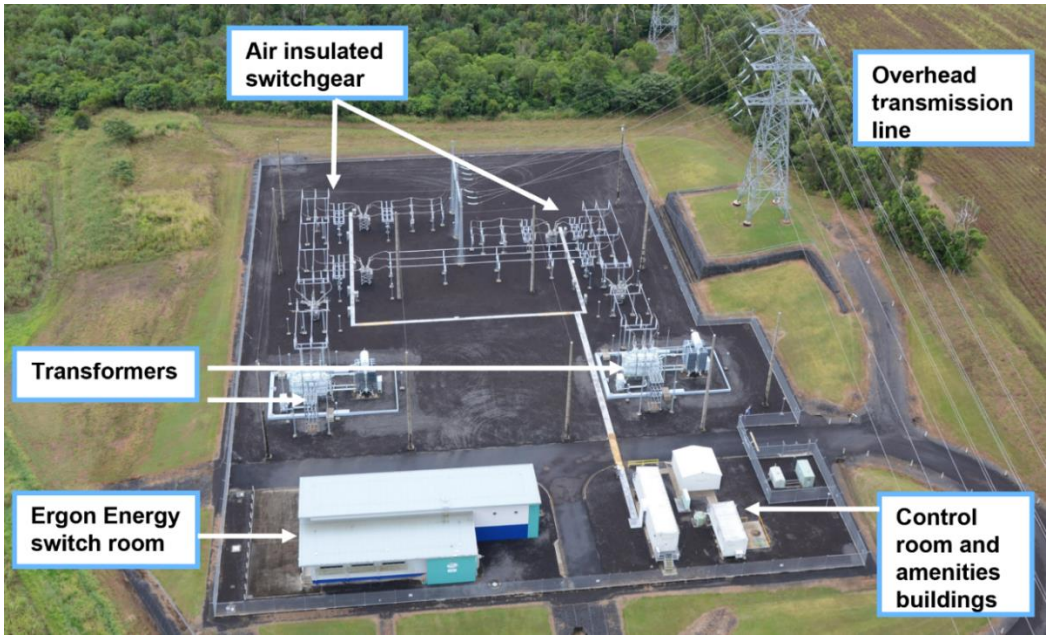


Figure 3-4 Typical substation layout

Once the substation enters the operation and maintenance phase, Powerlink will undertake a range of activities periodically as required, including:

- routine inspections on easements and infrastructure;
- vegetation management to maintain safety clearances;
- minor works for infrastructure, replacement of parts and emergency repair of damage;
- installing or replacing substation signage; and
- installing or replacing anti-climbing barriers on substation fence.

3.4 Decommissioning and removal of existing transmission line and substation

The existing transmission line between the existing Kamerunga and Woree Substations will be decommissioned and removed following the commissioning of the new transmission line and the new substation in Barron, timing yet to be determined. The MID relates to new infrastructure only and the decommissioning of existing infrastructure will form part of future Powerlink projects.

4 Project background and feasible alternatives

4.1 Project background

Powerlink is a leading Australian provider of high-voltage electricity transmission network services, providing electricity to more than five million Queenslanders, and 241,000 businesses. The network extends 1,700 kilometres from Cairns to the New South Wales border, comprising 15,449 circuit kilometres of transmission line and 152 substations.

Part of this network includes a 132kV transmission line in Cairns, Queensland, from the Kamerunga Substation to the Woree Substation. The existing Kamerunga to Woree transmission line provides a critical connection for the Barron Gorge Hydro Power Station to the transmission network while also supplying power to northern Cairns. The transmission line structures, and associated foundations, were designed and constructed to have a design service life of approximately 50 years. The Kamerunga to Woree transmission line was constructed in the 1960s and has reached the end of design service life. To continue operation, the line has received life extending maintenance works, however a full replacement is required.

Substations are designed and constructed to have a design service life of approximately 40 years. Similar to the Kamerunga to Woree transmission line, the Kamerunga Substation has reached the end of design service life having been constructed in the 1970s. Whilst life-extension works have occurred over time, it is now scheduled for replacement.

In anticipation of future transmission network requirements, Powerlink strategically acquired rural land in the nearby vicinity at Stewarts Road, Barron in 2021. A review of capacity and supply of the existing Kamerunga Substation has identified that the existing site is too restricted for any further expansion. The new greenfield substation site is located in a rural zoned area and is not constrained by impacts on nearby residences like the existing Kamerunga Substation.

4.2 Feasible alternatives

A Draft Corridor and Site Selection Report (DCSSR) was prepared for the Project which includes a full breakdown of the alternatives considered for this project. Investigations into a rebuild of a 132kV transmission line the existing easement corridor identified several technical constraints. These constraints emerged due to a combination of high-density population growth and narrow easement width (approximately 20m) resulting in encroachments and/or dwellings in close proximity to the edge of the existing easement corridor. Because of these constraints, it is not possible to rebuild within the existing easement whilst allowing the continued energisation of the existing line throughout construction. Any de-energisation would create an unacceptable risk to the reliability of supply in the Cairns region.

A corridor for the replacement 132kV transmission line builds upon the earlier corridor analysis, to balance the need for the project and project objectives. The project objectives considered as part of this assessment included social, environment and economic.

The methodology for the corridor selection included utilising publicly available information, as well as technical and spatial data, to identify constraints and opportunities from a social, environment and economic perspective. These constraints and opportunities were used to identify a recommended transmission corridor and substation site that, on balance, has the least overall impact.

The DCSSR initially considered an overhead transmission line for the full replacement of the existing transmission line (i.e. from the existing Kamerunga Substation to the existing Woree Substation). Subsequent desktop spatial studies undertaken identified that, due to extensive urban development, as well as the extensive urban footprint from the suburb of Redlynch through to the existing Woree

Substation, an OH transmission line would not be viable for the full replacement. Subsequently, the corridor needed to be segmented into a combination of both overhead and underground transmission infrastructure, providing an opportunity to lessen project impacts on the environment and the community.

As such, the DCSSR identified that the preferred approach would be to:

- construct an overhead transmission line where there was minimal urban development and areas of rural land (i.e. between Kamerunga Substation and the suburb of Redlynch); and
- construct an underground cable where areas were highly urbanised (i.e. from the suburb of Redlynch through to the Woree Substation).

In order to transition the OH transmission line to the UG cable, a transition site is required, and a suitable location has been identified located at 1-5 Redlynch Connector Road, Redlynch Qld, within 2/SP279529. A transition structure facilitates the transfer of the overhead to Underground infrastructure. The transition structure will be similar to a steel transmission pole in size and will be located on a raised pad.

The DCSSR also considered a new substation located in Barron (to replace the existing Kamerunga Substation located at Kamerunga Road Caravonica QLD, within 11/ SP119574. The existing substation is too restricted for any further expansion and therefore a greenfield site was required. A site in the suburb of Barron (east of Cairns Western Arterial Road/Kamerunga Road) has been identified as the recommended site. This site offers reduced social impacts as the greenfield site is located within a rural zoned area, away from the residential areas of Caravonica. The MID Corridor is based on the recommended corridor and site from the CSSR.

5 Regulatory frameworks

5.1 Commonwealth legislation

5.1.1 Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the centrepiece of Commonwealth environmental laws. It provides a legal framework to protect, and manage nationally, and internationally important flora, fauna, ecological communities and heritage places — defined in the EPBC Act as Matters of National Environmental Significance (MNES).

MNES include:

- The world heritage values of a declared world heritage property;
- The national heritage values of a declared national heritage place;
- The ecological character of a declared Ramsar wetland (wetlands of international importance);
- Listed threatened species and ecological communities;
- Listed migratory species;
- Nuclear actions (including uranium mining);
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park; and
- A water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) and establishes a process for environmental assessment and approval of proposed actions that have, will have, or are likely to have a significant impact on MNES.

If a project may cause a significant impact on an MNES, the project must be referred to DCCEEW for assessment of the potential impacts. The Minister will decide whether the project is:

- Not a controlled action: the project does not need to be assessed further;
- Not a controlled action 'particular matter': the project does not need to be assessed further, providing the action is completed in accordance with conditions that are supplied with the decision; and
- A controlled action: the project will need to be assessed against the EPBC Act, through one of several processes available.

Ecological investigations and a subsequent significant impact assessment have been completed to understand the presence of, and potential impacts on, MNES. Outcomes of these investigations are detailed in Section 6.8.1 and it is not expected there will be a significant impact on any MNES within the MID Corridor as a result of the Project and therefore referral to the Commonwealth Minister for the Environment will not be required.

5.1.2 Native Title Act 1993 (Cth)

The *Native Title Act 1993* (Native Title Act) establishes a national framework for the protection and recognition of Native Title, including by conferring on Indigenous people who hold (or claim to hold) Native Title rights and interests in respect of any land or waters, the right to be consulted with and in some cases to participate in decisions about activities proposed to be undertaken.

The MID corridor intersects two native title claims:

- Djabugay Nation Area (QC2024/001); and
- Gimuy Walubara Yidinji People Claim Area (QC2012/017).

Under the Native Title Act, native title cannot be claimed on freehold land as it is extinguished over the area. Where the corridor intersects roads that were declared as roads on or before the 23 December 1996, native title is extinguished and is not required to be considered.

On land where native title exists, Powerlink must comply with the requirements of the Native Title Act to secure an easement for the transmission line. Construction of the transmission line is covered by processes under Section 24KA. Section 24KA validates future acts that consist of the construction, and operation of public infrastructure and suspend the native rights over the land for the duration of the easement. Therefore, the legislative requirements under the Native Title Act are low risk to the Project.

5.2 State planning legislation

5.2.1 Planning Act 2016 (Qld) and Planning Regulation 2017 (Qld)

The Planning Act is administered by the DSDIP and establishes a system of land use planning and development assessment prescribed under the Planning Regulation. The proposed Project is considered 'Electricity Operating Works', which is considered 'infrastructure' and therefore prescribed development under the Planning Regulation.

Under the Planning Act, the Planning Minister is the only Minister with the power to designate land for infrastructure. The 'Minister's Guidelines and Rules' outlines the process for making a ministerial designation.

An approval for a ministerial designation will require submission of an MID Assessment Report that includes requirements about works for the infrastructure (such as the height, shape, bulk, landscaping, or location of works), the use of premises including access and ancillary uses, or lessening the impact of the works or use (such as environmental management procedures).

Under Section 44 of the Planning Act, infrastructure that is designated is considered accepted development and will not require further approvals under the Planning Act; with the exception of building work approval under the *Building Act 1975*.

A MID will be required for construction of the OH and UG transmission line, transition structure and the new substation in Barron.

Works undertaken prior to the MID Approval or outside the approved MID Corridor will need to consider approvals triggered under the Planning Act and Planning Regulation, including but not limited to:

- Material change of use on a premises on the Environmental Management Register (EMR) or Contaminated Land Register (CLR).
- Material change of use for an Environmentally Relevant Activity (ERA).
- Operational work for waterway barrier work.
- Operational work for marine plants.
- Operational works for coastal development.
- Operational work for taking or interfering with water.
- Operational work for clearing native vegetation.
- Development for removing quarry material from a watercourse.

- Operational work that involves construction of a category 2-3 levee.
- Operational work that is high impact earthworks in a wetland protection area.
- Material change of use, reconfiguring a lot and operational works triggered under the CairnsPlan.

5.3 Other relevant state legislation

5.3.1 Aboriginal Cultural Heritage Act 2003 (Qld)

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) is administered by Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism (DWATSIPM) and aims to provide effective recognition, protection, and conservation of Aboriginal cultural heritage.

It establishes the processes for managing activities that may cause potential harm to Aboriginal cultural heritage, which is identified through the Aboriginal Cultural Heritage Database, and Register and the Cultural Heritage Duty of Care Guidelines. A review of the Database was undertaken with the findings provided in Section 6.13.

Should the project be considered to pose a high risk to Aboriginal cultural heritage, engagement with the relevant cultural heritage parties for the area is likely to be required. It may also necessitate preparation of a Cultural Heritage Management Plan or Cultural Heritage Management Agreement. Activities which pose a high risk to Aboriginal cultural heritage which may apply to the project include:

- works in, or within proximity to registered Aboriginal cultural heritage sites or places;
- works in areas with little or no previous ground disturbance; and
- works in proximity to water features.

Powerlink are in the process of undertaking engagement with the relevant parties to discuss the Project and its potential impacts.

5.3.2 Acquisition of Land Act 1967 (Qld)

The Acquisition of Land Act is administered by the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) and sets out the processes for compulsory and voluntary acquisition of land for a public purpose by a constructing authority.

Powerlink's first preference is to negotiate acquisition of land wherever possible and will make all reasonable attempts to reach voluntary agreement for easements and other tenure required for the MID Corridor. Powerlink has established processes for the acquisition of land and easements by both negotiation and compulsory means and seeks to provide fair and reasonable support for landholders impacted by these processes, including access to independent expert advice relating to their compensation claim as early in the process as possible.

Powerlink may acquire freehold land or register an easement over land for the transmission line. Land required for the MID Corridor may be acquired either by voluntary agreement for easements or other tenures required or, where agreement cannot be reached, by compulsory resumption of land.

Temporary occupation

Under s37 of the Acquisition of Land Act land that is not owned by Powerlink and temporary occupation (e.g. laydown areas etc) on that land is required a constructing authority may temporarily occupy and use any land for the purpose of constructing, maintaining or repairing any works. A construction authority may also take stone, gravel, earth, and other material; deposit material; form and use temporary roads;

manufacture bricks or other materials; and erect workshops, sheds, and other buildings of a temporary nature.

Powerlink would need to confirm activities meet the requirements in Schedule 1 (Part 12) of the Acquisition of Land Act and provide written notice to landowners and compensation can be payable in some circumstances.

5.3.3 Biosecurity Act 2014 (Qld)

The *Biosecurity Act 2014* (Biosecurity Act) is administered by the Department of Primary Industries (DPI) and provides a biosecurity system framework which aims to minimise biosecurity risk, and facilitate responses to biosecurity impacts, to ensure the safety, and quality of agricultural inputs, and to align the state's management of biosecurity risk and other requirements for plant and animal responses to biosecurity risk with federal and international obligations. The Biosecurity Act also aims to manage emerging endemic, and exotic pests, and diseases as well as the transfer of diseases between humans and animals and contaminants in carriers.

Under the Biosecurity Act, a general biosecurity obligation is placed on all persons to undertake all reasonable and practicable measures to prevent or minimise biosecurity risk. Additionally, the movement of biosecurity matter must comply with movement restrictions associated with each relevant biosecurity zone, and biosecurity instrument permits are required for the movement of biosecurity matter which cannot comply with movement restrictions.

Biosecurity matters relevant to the project are discussed in Section 6.9.

5.3.4 Environmental Offsets Act 2014 (Qld)

The purpose of the *Environmental Offsets Act 2014* (EO Act) is to establish a framework for environmental offsets to counterbalance the significant residual impacts of particular activities on prescribed environmental matters through the use of environmental offsets and is administered by Department of the Environment, Tourism, Science and Innovation (DETSI).

Prescribed environmental matters are described under the EO Act as a MNES, Matters of State Environmental Significance (MSES) and Matters of Local Environmental Significance (MLES). Prescribed environmental matters that are applicable to the MID Corridor are discussed in Section 6.8 and 6.23.

An environmental offset may be required as a condition of development approval, where following consideration of avoidance and mitigation measures, a prescribed activity is likely to result in a significant residual impact on a prescribed environmental matter. Once the administering authority has decided that a prescribed activity is required to provide an offset, the environmental offset is required to be delivered in accordance with the EO Act, the Environmental Offsets EO Regulation and the Queensland Environmental Offsets Policy.

To avoid duplication between jurisdictions, state and local governments can only impose an offset condition in relation to a prescribed activity if the same, or substantially the same impact, or substantially the same matter has not been subject to assessment under the EPBC Act.

Section 14 of EO Act states an offset condition may be imposed if the prescribed activity will, or is likely to, have a significant residual impact on a prescribed environmental matter. Schedule 1 of the EO Regulation identifies prescribed activities. The Infrastructure Designation process under the Planning Act is not considered a prescribed activity for the purposes of providing an offset under this EO Act.

However, an activity conducted under an authority granted, made, issued or given under the NC Act, are identified as a prescribed activity under schedule 1 of the EO Regulation. As detailed in Section 6.23 the project is likely to have an significant residual on MSES relating to protected areas under the NC Act, and therefore offsets will be required under the EO Act for this matter. An offset calculation was completed for impacts to 0.31ha of Kamerunga Conservation Park (located in the Cairns Regional Council, Wet Tropics bioregion, and Innisfail Subregion). The notional offset area for a proponent-driven offset was 5 ha, while financial offset was $63,620.

5.3.5 Electricity Act 1994 (Qld)

The Electricity Act is administered by the Department of Energy and Climate (to be amalgamated with and declared to be part of Queensland Treasury). Department of Energy and Climate requires that all electricity industry participants must ensure a safe, efficient, and reliable supply of electricity, as well as ensure that the supply of electricity is carried out in an environmentally sound manner.

Section 31 of the Electricity Act

Section 31 of the Electricity Act states that the transmission entity must properly account for the environmental effect of its activities under the transmission authority. Powerlink hold a transmission licence in Queensland and is required to develop its network to meet the security, and reliability standards of the National Electricity Rules, the Electricity Act and the terms of its transmission licence.

The legislative requirements of the Electricity Act are standard to Powerlink projects and pose a low risk to the construction and operation of the transmission line.

Section 102 of the Electricity Act

Under Section 102 of the Electricity Act Powerlink may do any of the following things on a road, with written agreement from the road authority:

(a) build or remove, or alter (other than for maintenance or repair), its electric lines or other works;

(b) maintain, repair or alter for maintenance or repair, its electric lines or other works;

(c) stop obstruction or potential obstruction to, or interference or potential interference with, its electric lines or other works.

The MID Corridor intercepts with both local controlled roads and State controlled roads. Therefore, written agreement from DTMR and CRC will be required for works on these roads.

Section 107 of the Electricity Act

Under Section 107 of the Electricity Act Powerlink as an electricity entity may build, alter or remove works on a railway or break up a railway only if it has the railway operator's written agreement. The MID Corridor intercepts with a railway land. Therefore, written agreement from the relevant rail authority will be required for the project.

5.3.6 Electrical Safety Act 2002 (Qld)

The Electrical Safety Act is administered by the DSDIP and seeks to regulate electricity works to prevent death, injury or destruction caused by electricity. The transmission line must be designed in compliance with the requirements outlined under the Electrical Safety Act. These requirements are standard to Powerlink processes and are considered to have a low risk to the Project.

5.3.7 Environmental Protection Act 1994 (Qld)

The EP Act is administered by DETSI and aims to protect Queensland's environment, while allowing for development that improves the total quality of life, both now and in the future.

General Environmental Duty and duty to notify

The EP Act regulates activities that will or may have the potential to cause environmental harm and prescribes several mechanisms to ensure that objectives are met. The two primary environmental duties that apply to everyone in Queensland are:

- General Environmental Duty – a person must not carry out any activity that causes, or is likely to cause environmental harm, unless all reasonable and practicable measures to prevent or minimise the harm have been taken. Environmental harm is defined in Section 14 of the EP Act as any adverse effect, or potential adverse effect (whether temporary or permanent and of whatever magnitude, duration or frequency) on an environmental value and includes environmental nuisance.
- Duty to notify of environmental harm – a person must inform the administering authority and landowner or occupier when an incident has occurred that may have caused or threatens serious or material environmental harm that is not authorised.

The EP Act also provides the power to administering authorities to order the actions to be taken to improve environmental performance, conduct audits, and environmental evaluations of activities, approve environmental management programs and impose penalties or prosecute persons for non- compliance with the requirements of the EP Act.

Subordinate legislation

The EP Act is supported by the following subordinate legislation:

- *Environmental Protection Regulation 2019* (EP Reg);
- *Environmental Protection (Air) Policy 2019* (EPP (Air));
- *Environmental Protection (Noise) Policy 2019* (EPP (Noise)); and
- *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water and Wetland Biodiversity)).

Soil disposal permit

Where land is located on the EMR or CLR and material (above investigation criteria) is proposed to be removed off site, a Soil Disposal Permit (SDP) from DETSI would be required.

Where contaminated material is identified on land not on the EMR or CLR, notification of the contamination to DETSI will be required. Following this, the land will require listing on the EMR and removal under an SDP. However, while the EMR listing is being sought, material can be removed from site as regulated waste.

Contaminated land is discussed further in Section 6.1.

Environmental authority

Environmentally Relevant Activities (ERA) are prescribed within Schedule 2 of the EP Reg and include industrial or other activities with the potential to release emissions which impact on the environment and surrounding land uses activities. ERA's are not proposed as part of the operation of the Project, however, could be triggered for certain activities required during construction, such as ERA 8 chemical storage, ERA 16 extracting and screening, ERA 63 Sewage treatment.

5.3.8 Fisheries Act 1994 (Qld)

The *Fisheries Act 1994* is administered by DPI and governs the management of fisheries, declared fish habitat areas and marine plants. Works which may cause disturbance to 'waterways' as defined under the Fisheries Act can be subject to assessable operational work for waterway barrier works, unless construction complies with the conditions under the 'Accepted development requirements for operational work that is constructing or raising waterway barrier works.

Should any works within a waterway not comply with the Accepted development requirements, a development permit is ordinarily required under the Planning Act. However, if the project is granted an Infrastructure Designation, operational work for waterway barrier works will be considered accepted development, for those aspects covered within the MID approval, and will not require a development permit.

For those aspects of the Project outside the MID approval, e.g. access tracks and other works required for construction that might cause a waterway obstruction either compliance with the Accepted development requirements or a development permit under the Planning Act would be required. These are aspects are currently unknown, therefore will need to be considered during detailed design and construction.

Section 6.4 identifies waterways intersected by the MID Corridor.

5.3.9 Land Act 1994 (Qld)

The Land Act is administered by the DNRMMRRD and governs the allocation and management of land for development. The Electricity Act provides exemptions to the Land Act for works by transmission entities. Transmission entities are entitled to take necessary action in publicly controlled places (such as unallocated State land) to provide or supply electricity under Section 101 of the Electricity Act, as well as undertake works on road reserves through written agreement from the road authority under Section 102 (refer to Electricity Act above).

Powerlink has begun consultation with local and State road authorities

5.3.10 Local Laws

The Project is located within CRC Local Government Area (LGA). LGAs are subject to individual Local Planning Instruments under the Planning Act, as well as a range of local laws under the *Local Government Act 2009* (Local Government Act).

Local laws under the Local Government Act are used to regulate matters specific to LGAs, particularly relating to pests and weeds, use of local government roads and nuisances such as noise and dust. While the approvals framework for this Project gives rise to legislative and regulatory exemptions, the local laws imposed by the relevant LGAs will still apply and may trigger permits required to be obtained for certain activities.

The local laws that may apply to the Project are provided as follows:

- Local Law No. 3 (Community and Environment); and
- Local Law No. 11 (Local Government Controlled Areas and Roads).

Under Section 102 of the Electricity Act Powerlink must obtained written agreement from CRC (refer to Section 5.3.5) to undertake works on local government-controlled roads.

CRC will be consulted with during the MID process with regards to impacts on local government-controlled roads, prior to the commencement of construction.

5.3.11 Nature Conservation Act 1992 (Qld)

The *Nature Conservation Act 1992* (NC Act) is administered by DETSI and is the primary legislation governing the protection and management of native wildlife, habitat and protected areas in Queensland.

Protected plants

The protected plants flora survey trigger map identifies high risk areas for protected plants to occur and must be used to determine whether a targeted flora survey is required for a particular area. High risk areas are those in which endangered, vulnerable, threatened or near threatened flora is known or likely to exist.

Where clearing is required in an area containing a protected plant species, a clearing permit must be obtained from DETSI.

Species Management Program (SMP)

Removal of native vegetation and habitats has the risk of impacting on animal breeding places. To mitigate risk and impacts, a SMP is required. Where impacts to least concern (non-colonial) species is expected, a low risk SMP is required. If an animal breeding place for an endangered, vulnerable, near threatened, special least concern or least concern (colonial breeder) fauna species is recorded in areas of potential impact then a high risk SMP is required.

Works within a protected area estate

Authorisation is required for installing, operating and maintaining infrastructure (including service facilities and eco-tourism facilities) in protected areas in Queensland. Authorities may be granted under Sections 34, 35 and 35a of the NC Act for these purposes, but only if certain legislative requirements under those sections are satisfied.

As the proposed MID Corridor traverses the Kamerunga Conservation Park (which is protected under the NC Act), the Project will require an application to DETSI and written agreement from DETSI prior to works. The application requires the following to be provided to DETSI:

- Application form for a lease, agreement, licence, permit or other authority under Sections 34, 35 or 35A of the NC Act.
- Submission Report - Outlines how the proposal meets the requirements of the NC Act, and DETSI operational policies.
- EMP - Outlines how the proposed use or activity impacts the relevant protected area and how the protected area's key natural, cultural, social and recreational values will be managed (Guideline – Preparing Environmental Management Plans for Queensland Parks and Wildlife Service and Partnerships authorities).
- Environmental offset proposal - outlines how environmental offsets will be addressed.

- Spatial data - Shows the location of the proposed use or activity within the protected area, and relevant geophysical characteristics.
- An Authority Plan showing the proposed authority area. Authority plans are used to define areas of land in circumstances where a cadastral survey is not required.

Powerlink will progress a request for the appropriate authority under the NC Act and also secure and ongoing lease agreement with DETSI concurrent with the MID request.

Additionally, Powerlink will continue to operate under the Queensland Energy Supply Industry (QESI) Code of Practice which details how Powerlink will maintain electricity corridors and infrastructure within Queensland's national parks and state forests.

5.3.12 Transport Infrastructure Act 1994 (Qld)

The *Transport Infrastructure Act 1994* (Qld) (Transport Infrastructure Act) is administered by DTMR and regulates the management of State-controlled road networks across Queensland. Where construction and/or maintenance access to State-controlled road are required, approvals are to be obtained under the following sections:

- Under Section 33 of the Transport Infrastructure Act, written approval is required from the DTMR to carry out road works on a State-controlled road or interfere with a State-controlled road or its operation. This may include where road works to a Council Road interferes with a State-controlled road or its operations.
- Under Section 50 of the Transport Infrastructure Act, construction, maintenance, and operation of ancillary works and encroachments within State-controlled roads (e.g. placement of a transmission line over the road) can only be completed where written approval has been granted from DTMR.
- Under Section 62 of the Transport Infrastructure Act, written approval is required from DTMR to locate a permitted access on a State-controlled road. A decision of access approval may include conditions or restrictions on the location or use of the permitted road access, type or number of vehicles to use the permitted road access location.
- However, the above approvals are not required under Section 102 of the Electricity Act where Powerlink has obtained written agreement from DTMR. The MID Corridor intercepts State controlled roads. Therefore, written agreement from DTMR and will be required for works on these roads.

5.3.13 Coastal Protection and Management Act 1995 (Qld)

The *Coastal Protection and Management Act 1995* (CPM Act) is governed by the DETSI and seeks to protect the coastal zone and its resources and biological diversity in Queensland.

Development under the Planning Act

Operational works for tidal works or works completely or partly undertaken in a Coastal Management District (CMD) requires a development approval; under Schedule 10 of the Planning Regulation unless it is accepted development under schedule 7 or considered excluded work.

Other triggers under schedule 10 of the Planning Regulation include Material Change of Use (MCU) or Reconfiguring a Lot (RAL) in a CMD.

The MID Corridor crosses the Barron River, approximately 5.5km from its mouth on the east coast of Queensland. The Barron River is tidal at this location. The State Planning Policy (SPP) interactive mapping system (IMS) indicates that the Barron River (located at the suburb of Kamerunga) and Gordon Creek

(located at the suburb of Woree) are mapped as coastal management district which is traversed by OH Transmission line and UG Cable component of MID Corridor.

However, if the project is granted an Infrastructure Designation, operational work for tidal works or works in a CMD or MCU and RAL in a CMD will be considered accepted development under the Planning Act and will not require a development permit.

Quarry material allocation

Where works require the removal of material from land under tidal water for sale, reclamation or fill above the high-water mark, or for land-based disposal, an allocation of quarry material (allocation notice) will be required from DETSI.

5.3.14 Vegetation Management Act 1999 (Qld)

The *Vegetation Management Act 1999* (VM Act) is governed by the DNRMMRRD and seeks to manage native vegetation across Queensland. Regulated Vegetation Mapping identifies categorised areas of remnant vegetation in Queensland and is used to establish whether clearing of native vegetation is considered assessable development requiring a permit.

Vegetation regulated under the VM Act is discussed in Section 6.6.

Clearing of any relevant remnant or regulated regrowth vegetation constitutes operational work under Schedule 10 of the Planning Regulation, which will require development approval unless a vegetation clearing code or exemption applies. Under Section 22A of the VM Act, an application for operational work, including applications where DNRMMRRD is a concurrence agency, cannot be accepted as properly made unless the Chief Executive is satisfied that the development is for a relevant purpose. However, if the Project is granted an Infrastructure Designation, operational work for clearing vegetation will be considered accepted development and will not require a development permit.

Any infrastructure designation or development application will need to demonstrate that Powerlink has sought to reduce the impacts of vegetation clearing through the hierarchy of avoid, minimise and mitigate. Where a significant residual impact remains, an offset, or compensatory measures may be required. Measures to reduce impact from vegetation clearing and aspects are discussed further in Section 6.6 and 6.8.

5.3.15 Water Act 2000 (Qld)

The Water Act 2000 (Water Act) is administered by the Department of Local Government, Water and Volunteers (DLGWV), and provides a legislative framework for the sustainable use, allocation, and management of water resources in Queensland and regulates activities occurring within designated watercourses under the Water Act.

The Watercourse Identification Map categorises water features as either a designated watercourse, drainage feature, downstream limit of a watercourse or lake and is used to determine the assessment requirements for undertaking activities within a watercourse.

All watercourses/waterways intersected by the MID Corridor, including their Water Act identification are summarised in Table 6-6.

Riverine protection permit

Activities including excavating, filling, or destroying native vegetation within a watercourse may require approval under the Water Act in the form of a riverine protection permit. Powerlink is an approved entity exempt from requiring a permit if the self-assessment guidelines under DNRMMRRD's Riverine protection permit exemption requirements are followed.

Operational work

There are a number of activities that trigger approval under Schedule 10 of the Planning Regulation for works in a watercourse, including:

- Operational work for taking or interfering with water under the Water Act;
- Operational work for moving quarry material from a watercourse or lake under the Water Act; and
- Operational work for levees.

However, if the Project is granted an Infrastructure Designation, operational work for watercourse related development will be considered accepted development and will not require a development permit.

Quarry material allocation

If quarry material is required to be used for productive purposes, then a quarry material allocation (in addition to a development permit under the Planning Act) would need to be sought from DNRMMRRD for the extraction of required materials.

5.4 State planning instruments

State planning instruments set out the state and regional planning interests critical to responsible land use planning and development across Queensland. The state government sets out the state and regional planning matters to be preserved and protected (the state interests). It uses two types of instruments, or tools, to do this:

- the *State Planning Policy* (SPP); and
- the regional plans.

5.4.1 State Planning Policy

The SPP identifies matters of State interest requiring protection and enhancement. The SPP is at the top of the planning hierarchy in Queensland and is the overarching policy for all other regional and local planning instruments. The SPP states that the SPP applies to the extent relevant, when designating premises for infrastructure under the Planning Act and development applications.

The SPP expresses the State's interests in land use planning and development. A State interest is defined under the Planning Act as an interest that the Planning Minister considers:

- affects an economic or environmental interest of the State or a part of the State; and
- affects the interest of ensuring that the purpose of the Act is achieved.

In accordance with Chapter 2, Part 5, Section 36 of the Planning Act, the designator must have regard to 'all planning instruments that relate to the premises'. When deciding the designation of land for infrastructure, the designator must have regard to the relevant parts of the SPP as shown in Table 27-1 and in Part B of the SPP.

Table 5-1 outlines the parts of the SPP that are relevant to the designation and is assessed further in the sections below.

Table 5-1 Application of the SPP with regards to designation (as per Figure 3 of the SPP)

Application of the SPP for designating premises for infrastructure	
Application of the SPP	Designating premises for infrastructure
Who is responsible	State and Local Government
Parts of the SPP that are applicable to the extent relevant	
Part A: Introduction and Context Part B: Application and Operation Part C: Purpose and Guiding Principles	✓
Part D: State Interest Statements	✓
Part E: State Interest Policies and Assessment Benchmarks	✓
Part F: Glossary	✓
Part G: Appendix 1 (Categories of Mapping Layers)	✓
Part G: Appendix 2 (Stormwater Management Design Objectives)	✓

Part C (Purpose and Guiding Principles) of the SPP

The SPP outlines the guiding principles and state interests that underpin the delivery of local and regional plans, and development that will advance the social, economic and environmental needs of Queenslanders. The guiding principles should be read in conjunction with each state interest, and are as important as the state interests expressed in the SPP, and include:

- outcomes focused;
- integrated;
- efficient;
- positive; and
- accountable.

The above guiding interests have been considered as part of the assessment of each State interest and as such, have not been individually addressed.

Part D (State Interest Statements) and Part E (State Interest Policies and Assessment Benchmarks) of the SPP

There are 17 state interests that fall under five broad themes:

- Liveable communities and housing.
- Economic growth.
- Environment and heritage.
- Safety and resilience to hazards.
- Infrastructure.

Part E of the SPP lists the state interests policies and assessment benchmarks.

Table 5-2 demonstrates the list of State interests indicated in the SPP and their applicability to the proposed development and provides statements how the proposed development has been assessed against each state interest and policy and assessment benchmark where relevant.

Table 5-2 Applicability of State interests within SPP

Theme	State interest	Relevant	Relevant section of MID Assessment Report
Liveable communities and housing	**Housing supply and diversity** Diverse, accessible and well-serviced housing, and land for housing, is provided and supports affordable housing outcomes.	N/A	N/A The proposal is for the replacement of an existing transmission line and as such, this State interest is not appliable to the proposed designation.
	Liveable communities Liveable, well-designed and serviced communities are delivered to support wellbeing and enhance quality of life.	N/A	N/A Whilst not applicable, the proposal is for the replacement of an existing transmission line that will service the community and as such complies with the intent.
Economic growth	**Agriculture** The resources that agriculture depends on are protected to support the long-term viability and growth of the agricultural sector	Applicable Trigger: The MID Corridor intersects Agricultural land classification (Class A, B, C and D). The MID corridor is not within areas of priority agricultural areas. Further, the MID corridor is not within areas of Important Agricultural Area under the SPP. The MID Corridor does not intersect any stock routes.	Potential impacts on agricultural land classification (Class A, B, C and D) and mitigation measures have been discussed in Section 6.10.
	Development and construction Employment needs, economic growth, and a strong development and construction sector are supported by facilitating a range of residential, commercial, retail, industrial and mixed-use development opportunities.	N/A The MID Corridor does not intersect any State development areas (SDAs) or Priority development areas (PDAs).	N/A Whilst not applicable, the proposal is for the replacement of an existing transmission line that will service the economic growth of the region by facilitating the development of residential, commercial, retail, industrial and mixed-use

Theme	State interest	Relevant	Relevant section of MID Assessment Report
			development opportunities and as such complies with the intent.
	Mining and extractive resources Extractive resources are protected and mineral, coal, petroleum and gas resources are appropriately considered to support the productive use of resources, a strong mining and resource industry, economical supply of construction materials, and avoid land use conflicts where possible.	Applicable Barron River Flats KRA No. 10 is located between the Barron River and Brinsmead Kamerunga Road, including over land traversed by the MID Corridor. MID Corridor intersects with transport route separation area and KRA separation area. Lake Placid Road and unnamed road along the Barron River is mapped as KRA transport route which is traversed by the MID Corridor.	Potential impacts on KRAs and mitigation measures have been discussed in Section 6.1.
	Tourism Tourism planning and development opportunities that are appropriate and sustainable are supported, and the social, cultural and natural values underpinning tourism developments are protected.	N/A The proposal does not involve a tourism related activity. Therefore, this State Interest has no relevance to the proposed designation.	N/A Whilst not applicable, the proposal is for the replacement of an existing transmission line that will service the tourism planning and future development and as such complies with the intent.
Environment and heritage	**Biodiversity** Matters of environmental significance are valued and protected, and the health and resilience of biodiversity is maintained or enhanced to support ecological processes	Applicable Triggers: MSES – Protected area (estate), Regulated vegetation (intersecting a watercourse), Regulated vegetation (category B), Regulated vegetation (essential habitat), Regulated vegetation (category C), Wildlife Habitat (endangered or vulnerable), Wildlife	Potential impacts on matters of environmental significance and mitigation measures have been discussed in Section 6.6 and 6.7

Theme	State interest	Relevant	Relevant section of MID Assessment Report
		Habitat (special least concern animal), Regulated vegetation (category R),	
	Heritage The cultural heritage significance of heritage places and heritage areas, including places of Aboriginal and Torres Strait Islander cultural heritage, is conserved for the benefit of the community and future generations.	N/A Although national heritage place and state heritage place are mapped adjacent to the MID Corridor, none of cultural heritage area is mapped within MID Corridor.	N/A The proposal is for the replacement of an existing transmission line and MID Corridor is not overlapped with area identified as national or state heritage place as such, this cultural heritage interest is not appliable to the proposed designation.
	Coastal environment The coastal environment is protected and enhanced, while supporting opportunities for coastal-dependent development, compatible urban form, and maintaining appropriate public use of and access to, and along, state coastal land.	Applicable Triggers: OH Transmission line component of MID Corridor also crosses a CMD at the Barron River. In addition, UG Cable component of MID Corridor crosses CMD at Gordon Creek.	Potential impacts on the coastal environment and mitigation measures have been discussed in Section 6.4.
	Cultural heritage The cultural heritage significance of heritage places and heritage areas, including places of Aboriginal and Torres Strait Islander cultural heritage, is conserved for the benefit of the community and future generations.	Applicable Triggers: A search of the Australian Heritage Register and QHR identified no recorded heritage places intersected with the MID Corridors The ongoing nature of determining Aboriginal and Torres Strait Islander cultural heritage is acknowledged.	Potential impacts on cultural heritage and mitigation measures have been discussed in Section 6.13 and 6.14

Theme	State interest	Relevant	Relevant section of MID Assessment Report
	Water quality The environmental values and quality of Queensland waters are protected and enhanced.	N/A Ahigh ecological value water areas is mapped approximately 1.6km from OH Transmission line component and 1.2km from UG Cable component of MID Corridor, however none of water quality layers area traversed by MIS Corridor.	N/A The proposal is for the replacement of an existing transmission line and MID Corridor is not overlapped with any water supply buffer, resource catchment and high ecological value water area. However potential impacts on water quality and mitigation measures have been discussed in Section 6.4
Safety and resilience to hazards	**Emissions and hazardous activities** Community health and safety, and the natural and built environment, are protected from potential adverse impacts of emissions and hazardous activities. The operation of appropriately established industrial development, major infrastructure, and sport and recreation activities is ensured.	N/A No high-pressure gas pipeline were identified within and adjacent to the MID Corridor.	Although no high-pressure gas pipeline were identified within and adjacent to the MID Corridor, potential impact and mitigation measure related to other infrastructures have been discussed in Section 6.21.
	Natural hazards, risk and resilience The risks associated with natural hazards, including the projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards.	Applicable Triggers: Flood hazard area (Level 1 – Queensland floodplain assessment overlay), Flood hazard area (Local Government flood mapping area), Medium storm tide inundation area, Bushfire prone area, High storm tide inundation area and Erosion prone area.	Potential impacts from risks associated with natural hazards and mitigation measures have been discussed in Section 6.2, 6.4, 6.17 and 6.19.

Theme	State interest	Relevant	Relevant section of MID Assessment Report
Infrastructure	**Energy and water supply** The timely, safe, affordable and reliable provision and operation of electricity and water supply infrastructure is supported, and renewable energy development is enabled.	Applicable No pump station facilities, water treatment plans, water quality facilities, pipeline, channels, bulk water storage infrastructure and facilities for extracting groundwater were identified within and adjacent to MID Corridor. Existing Kamerunga Substation, Woree Substation and existing transmission line owned by Powerlink are also mapped within and adjacent to MID Corridor. These major electricity facilities are part of this Project.	The proposal is for the replacement of an existing transmission line that will service supply safe, affordable and reliable energy and as such complies with the intent. Potential impacts on energy and water supply and mitigation measures have been discussed in Section 6.21.
	Infrastructure integration The benefits of past and ongoing investment in infrastructure and facilities are maximised through integrated land use planning.	Applicable	Potential impacts and mitigation measures for land use and infrastructure are discussed in Section 6.1 and 6.21.
	Transport infrastructure The safe and efficient movement of people and goods is enabled, and land use patterns that encourage sustainable transport are supported.	Applicable Triggers: Active transport corridor, State-controlled road, railway corridor, future busway corridor, future public passenger transport facility.	The Project includes the replacement of existing electricity infrastructure and therefore promotes efficient, effective and flexible use of existing infrastructure and provides for infrastructure investment and future needs to support growth in the region. Potential impacts and mitigation measures for transport infrastructure are discussed in Section 6.15 and 6.21.

Theme	State interest	Relevant	Relevant section of MID Assessment Report
	Strategic airport and aviation facilities The operation of strategic airports and aviation facilities is protected, and the growth and development of Queensland's aviation industry is supported.	Applicable Triggers: Obstacle limitation surface area, Obstacle limitation surface area contour, Lighting area buffer 6km, Wildlife hazard buffer zone, Aviation facility building restricted area - Area of interest.	Potential impacts on the operation of strategic airports and aviation facilities and mitigation measures for infrastructure is discussed in Section 6.21.
	Strategic ports The operation of strategic ports and priority ports is protected and their growth and development is supported.	N/A	N/A The proposed site is not identified as being near a strategic port. Therefore, this State Interest has no relevance to the proposed designation.

5.4.2 Regional Plan

The MID corridor is subject to the Far North Queensland Regional Plan 2009 – 2031 (Regional Plan). The plan was implemented in 2009 as a statutory plan to guide and manage the region's development, addressing key regional environmental, social, economic and urban objectives.

The Regional Plan provides strategic direction and policies to deliver regional outcomes which align with the State's interests in planning and development, with its key aim being to addresses various rural and natural resource management issues with a land use planning component.

The Regional Plan State Planning Regulatory Provisions (FNQ Regulatory Provisions) allocate all land into one of three regional land use categories:

- RLRPA;
- urban footprint; and
- rural living area.

The overhead transmission line component of the MID Corridor is mapped as RLRPA and urban footprint area. The underground cable component of the MID Corridor is mapped entirely under the urban footprint area. These categories are discussed further in Section 6.10 and provide the spatial context for the preferred pattern of development in the regional plan. Potential impacts on urban and rural land uses and recommended mitigation measures are also detailed in Section 6.10.

The transmission line and substation are consistent with the regional policy for energy of the Regional Plan, to provide continued distribution capacity for the region and to provide for reliability and security of electricity supply to support regional growth.

The Regional Plan is currently being reviewed by DSDIP. The review will provide a 25-year framework to guide growth, support future jobs, and assist in Queensland's decarbonisation journey. At the time of drafting this MID Assessment Report, the draft was unavailable, and therefore no assessment has been undertaken against the objectives of the plan.

5.5 State development assessment provisions

The State Assessment and Referral Agency (SARA) assesses development applications triggered under the Planning Act against the State Development Assessment Provisions (SDAP). SDAP defines the state's interest in development assessment and includes the assessment benchmarks or matters SARA will assess an application against. In accordance with Chapter 3, Part 1, Section 44 of the Planning Act, development on a designated site is accepted development and removes the requirement for development assessment against the SDAP.

The SDAP matters that intersect with the MID Corridor that would be applicable to the project, if not accepted development are identified in Table 5-3.

Table 5-3 Relevant SDAP matters intersected by MID Corridor

Matter of interest	State code	Relevant section of MID Assessment Report
Queensland heritage place Triggers: Queensland heritage place.	State code 14: Queensland heritage	Queensland heritage place identified adjacent to MID Corridor described in Section 6.14 and search results from DAMS.
Coastal protection Triggers: Coastal management district, erosion prone area, medium storm tide inundation area and high storm tide inundation area.	State code 8: Coastal development and tidal works	Potential impact and mitigation measure related to coastal protection are outlined in Section 6.2, 6.4 and 6.17.
Fish habitat area Triggers: Queensland waterways for waterway barrier works.	State code 18: Constructing or raising waterway barrier works in fish habitats	Potential Impact and mitigation measure related to Queensland waterways for waterway barrier works is outlined in Section 6.4.
Native vegetation clearing Triggers: Regulated vegetation management map (Other vegetation categories), Vegetation management coastal and non-coastal bioregions and sub-regions, Essential habitat, Regulated vegetation management map (Category A and B extract) and Vegetation management regional ecosystem map.	State code 16: Native vegetation clearing	Potential impact and mitigation measures related to Native vegetation is outlined in Section 6.5, 6.6, 6.7, 6.8, 6.9 and Appendix D.
Maritime safety and development Triggers: Barron River is mapped as High-risk maritime development zone / and is within Cairns Port Limits where it crosses the Barron River.	State code 7: Maritime safety	The purpose of the code is to protect the safety of people using, and living or working near, navigable waterways. Potential impact and mitigation measures related to maritime safety is outlined in Section 4.21.
State transport corridors Triggers: State-controlled road, Railway corridor, Area within 25m of a railway corridor, Area within 25m of a State-controlled road, Future busway corridor, Area within 100m of a State-controlled road	State Code 1: Development in a State-controlled Road environment State code 2: Development in a railway environment	Potential impact and mitigation measures related to State transport corridor is outlined in Section 6.10, 6.15 and 6.21.

Matter of interest	State code	Relevant section of MID Assessment Report
intersection, Planned upgrade for State-controlled road, Public passenger transport facility, future public passenger transport facility and Limited access roads		
Watercourse under the Water Act	State code 10: Taking or interfering with water State code 15: Removal of quarry material from a watercourse or lake	Potential Impact and mitigation measure related to watercourses under the Water Act is outlined in Section 6.4.
Marine plants	State code 11: Removal, destruction or damage of marine plants.	Potential Impact and mitigation measure related to marine plants is outlined in Section 6.6 and 6.8.

5.6 Local planning framework assessment

The MID Corridor is located within CRC and as such falls under the CairnsPlan. In accordance with Chapter 3, Part 1, Section 44 of the Planning Act, development on a designated site is accepted development and removes the requirement for development assessment against the local categorising instrument. While the designation results in the development being exempt from assessment against the Carins Plan, consideration must still be given to its provisions.

The MID Corridor intersects a number of zoning types, including low density residential, rural zoning, emerging community zone, open space, special purpose and sport and recreation for the OH section of the MID Corridor. The underground cable component of the MID Corridor is mostly situated within road reserve tenure (surrounding zoning generally consists of low, and low to medium density residential zoning and community facilities zoning). Zoning of the new substation in Barron site is rural zoning. Further information on land use and zoning adjacent and within MID Corridor is summarised in Section 6.10.

If the proposal was not accepted development, it would require assessment under the CairnsPlan. Under the Scheule 1 of the Cairns Plan 2016 (CairnsPlan) the proposed electricity infrastructure would be defined as:

- *'Major electricity infrastructure', being: (a) means the use of premises for— (i) a transmission grid or supply network (powerlines greater than 66kV.*
- *'Substation' to as part of a transmission grid or supply network to—(i) convert or transform electrical energy from one voltage to another; or (ii) regulate voltage in an electrical circuit; or (iii) control electrical circuits; or(iv) switch electrical current between circuits.*

According to the tables of assessment in Part 5 of the CairnsPlan a material change of use for 'major electricity infrastructure' and 'substation' are assessable development, subject to impact assessment. Impact assessment would require an assessment to be carried out against the whole of the planning scheme.

5.7 Summary of legislation

A summary of legislation potentially applicable to the MID approval is provided in Table 5-4. Further design and detailed investigations and assessment will be required to confirm the appropriate approval pathway for the Project. For those aspects of the Project outside the MID approval that may be required for construction are currently unknown and have therefore not been considered.

Table 5-4 Summary of legislation

Legislation	Responsible authority	Activity	Licence / permit / approval
Commonwealth			
EPBC Act	DCCEEW	EPBC Act referral is required when a project may potentially significantly impact MNES protected under the EPBC Act. Ecological survey conducted and determined no significant impact for the MID (refer to Section 5.1.1 and Section 6.8.1).	**Not required for the MID**
Native Title Act	National Native Title Tribunal (NNTT) Registered	The MID corridor intersects two native title claims Construction of the transmission line is covered by processes under Section 24KA. Section 24KA validates future acts. (refer to Section 5.1.2).	**Not required for the MID**
State			
Acquisition of Land Act	DNRMMRRD	Under s37 of the Acquisition of Land Act land that is not owned by Powerlink a constructing authority may temporarily occupy and use any land for the purpose of constructing, maintaining or repairing any works claims (refer to Section 5.3.2).	**Potentially applicable during construction.** Temporary occupation under s37 of the Acquisition of Land Act.
ACH Act	DWATSIPM	Should the project be considered to pose a high risk to Aboriginal cultural heritage, engagement with the relevant cultural heritage parties for the area is likely to be required (refer to Section 5.3.1).	**Required for the MID** Engagement with the relevant parties, CHMP and CHMA.
Planning Act / Planning Regulation	DSDIP	Designation of premises for development of infrastructure (electricity operating works) (refer to Section 1.2 and 5.2.1)	**Required for the MID**

Legislation	Responsible authority	Activity	Licence / permit / approval
VM Act	SARA/DETSI	Development permit - operational work vegetation clearing (refer to Section 5.2.1 and 5.3.14).	**Not required for the MID**.
Fisheries Act	SARA/DPI	Development permit - operational work removal, destruction or damage of marine plants (refer to Section 5.2.1 and 5.3.8)	**Not required for the MID**
Fisheries Act	SARA/DPI	Development permit - operational work waterway barrier work (refer to Section 5.2.1 and 5.3.8)	**Not required for the MID**
CPM Act	SARA/DETSI	Development permit - operational work tidal works or within a CMD (refer to Section 5.2.1 and 5.3.13).	**Not required for the MID**
EP Act	SARA/DETSI	Development permit - material change of use on a premises on the CLR or EMR.	**Not required for the MID**
EP Act	SARA/DETSI	Development permit - material change of use for an ERA	**Not required for the MID**
Water Act	SARA/DNRMMRRD	Development permit - operational work • for taking or interfering with water • for moving quarry material from a watercourse or lake • for levees (refer to Section 5.2.1 and 5.3.15).	**Not required for the MID**
EP Act	DETSI	• ERA 8 chemical storage • ERA 16 extracting and screening • ERA 63 Sewage treatment • (refer to Section 5.3.7)	**Potentially applicable during construction** Environmental authority
EP Act	DETSI	Where soils are removed from land listed on the EMR or CLR which exceed investigation thresholds (refer to Section 5.3.7).	**Potentially applicable during construction** SDP
EP Act	DETSI	Where contaminated soils are identified and require removal	**Potentially applicable during construction**

Legislation	Responsible authority	Activity	Licence / permit / approval
			Duty to Notify of contamination to DETSI, EMR/CLR listing and removal via an SDP/as regulated waste
Water Act	DNRMMRRD	Removing quarry material from a watercourse (refer to Section 5.3.15).	**Potentially applicable during construction** Riverine Quarry Material Allocation Notice
Water Act	DNRMMRRD	Excavation, fill and / or removal of vegetation within a watercourse (refer to Section 5.3.15).	**Potentially applicable during construction** Riverine Protection Permit or compliance with the Riverine Protection Permit Exemption Requirements
Coastal Protection and Management Act	DETSI	The removal of quarry material under tidal water and disposal on land. Removing quarry material from tidal water does not include moving, shifting or otherwise placing dredged material from one location to another within tidal waters (refer to Section 5.3.15).	**Potentially applicable during construction** Quarry Allocation Notice
EO Act	DETSI	Residual impacts on MSES (refer to section 5.3.4 and 6.8.2).	**Required for the MID** Environmental offsets
NC Act	DETSI	Clearing within a high-risk flora trigger area where protected plants are identified (refer to Section 5.3.11 and 6.6). Clearing within a high risk flora trigger area where no protected plants are identified (refer to Section 5.3.11 and 6.6).	**Required prior to construction** Completion of a Flora Survey for high-risk areas on the flora survey trigger map with the whole MID Corridor to inform the requirement for either an Exempt Clearing Notification or Protected Plant Clearing Permit under the

Legislation	Responsible authority	Activity	Licence / permit / approval
			Nature Conservation Act 1992 (Qld)
NC Act	DETSI	When undertaking activities which impact on fauna species listed under the NC Act (refer to Section 5.3.11 and 6.7).	**Required prior to construction** Development of a high-risk SMP for interfering with a threatened animal's breeding place under the NC Act (Qld) to be obtained prior to construction works. The high-risk SMP is to be drafted to include threatened species recorded within the survey area (i.e., Macleay's Fig-parrot (vulnerable under the NC Act; Qld; MSES) and Diadems Leaf-nosed Bat (near threatened under the NC Act; Qld; MSES).
NC Act	DETSI	Works within protected area estate (Kamerunga Conservation Park) (refer to Section 5.3.11 and 6.5).	**Required for the MID** Section 34, 35 or 35A Authority
Electricity Act	Queensland Rail	Works on railway land	**Potentially applicable during construction** Written agreement from relevant rail authority under s102 of the Electricity Act
Transport Infrastructure Act	DTMR	Undertaking works within a State-controlled road corridor (refer to Section 5.3.12).	**Potentially applicable during construction** Section 102 Electricity Act 1994 – written agreement with DTMR
Biosecurity Act	DPI	Required for the movement of biosecurity matter not complying with the movement	**Required prior to construction**

Legislation	Responsible authority	Activity	Licence / permit / approval
		restrictions associated with each relevant biosecurity zone (refer to Section 5.3.3).	Obtain a Biosecurity Instrument Permit from Biosecurity Queensland where Electric Ant movement restrictions apply.
Local			
Planning Scheme / Planning Act/Planning Regulation	Cairns Regional Council SARA	Development permit material change of use, operational works, reconfiguring a lot, plumbing and drainage work or building work - assessable under the local government planning scheme (refer to Section 5.6).	**Not required for the MID**
Local Government Act	Cairns Regional Council	Work in a local road corridor (refer to Section 5.3.10).	**Potentially applicable during construction** Section 102 Electricity Act 1994 – written agreement with Cairns Regional Council.

6 Environmental assessment

6.1 Land

6.1.1 Existing environment

Topography

The majority of the MID Corridor is located within low-lying plains, surrounded by high mountain ridges/peaks. Elevation along the MID Corridor has minimal variation, ranging mostly between 5m Australian Height Datum (AHD) and 20m AHD, with elevation reaching a peak of approximately 50m AHD along Brinsmead Road. The substation component of the MID Corridor is located at approximately 7-8m AHD. Figure 6-1 shows the topography within the MID Corridor.

Geology

A search of Queensland Globe identified that the geology units (1:100k) within the MID Corridor includes a mix of alluvium and mudrock, with alluvium being the dominant rock type. This is detailed in Table 6-1 and shown in Figure 6-2.

Table 6-1 Geological formations within the proposed MID Corridor

Geological Unit Name	Dominant Rock Type	Lithological Summary	Locality
Qha/2-QLD	Alluvium	Gravel, sand, silt, and clay; second alluvial terrace	Expansive areas of low-lying plains covering the overhead line and new substation in Barron and stretching southward towards the UGOH transition site and Goomboora Park.
Qpfp-8064	Alluvium	Silty gravel grading to gravelly clay	Intersects the underground cable for a section along Shale Street and then for the remainder of the underground cable from Ramsey Drive to the Woree Substation, with the exception of near Irene Street Flood Plain and the Woree Substation.
Hodgkinson Formation	Mudrock	Mainly dark grey, thin bedded mudstone	Elevated land within Barron Gorge National Park to the west and mountainous regions to the south-east and along Brinsmead Road.
Qpfc	Alluvium	Coarse boulder deposits on granite; steep alluvial and colluvial fans	Intersects the underground cable for a small section along Brinsmead Road.
Qha-QLD	Alluvium	Sand, gravel, silt, and clay; active stream and channels	Within the Irene Street Floodplain Area.
Qpa-QLD	Alluvium	Clay, silt, sand, and gravel; flood-plain alluvium on high terraces	Within the southernmost part underground cable component, near Woree Substation.

TOPOGRAPHY OF THE PROPOSED MID CORRIDOR

Figure 6-1-1

TOPOGRAPHY OF THE PROPOSED MID CORRIDOR

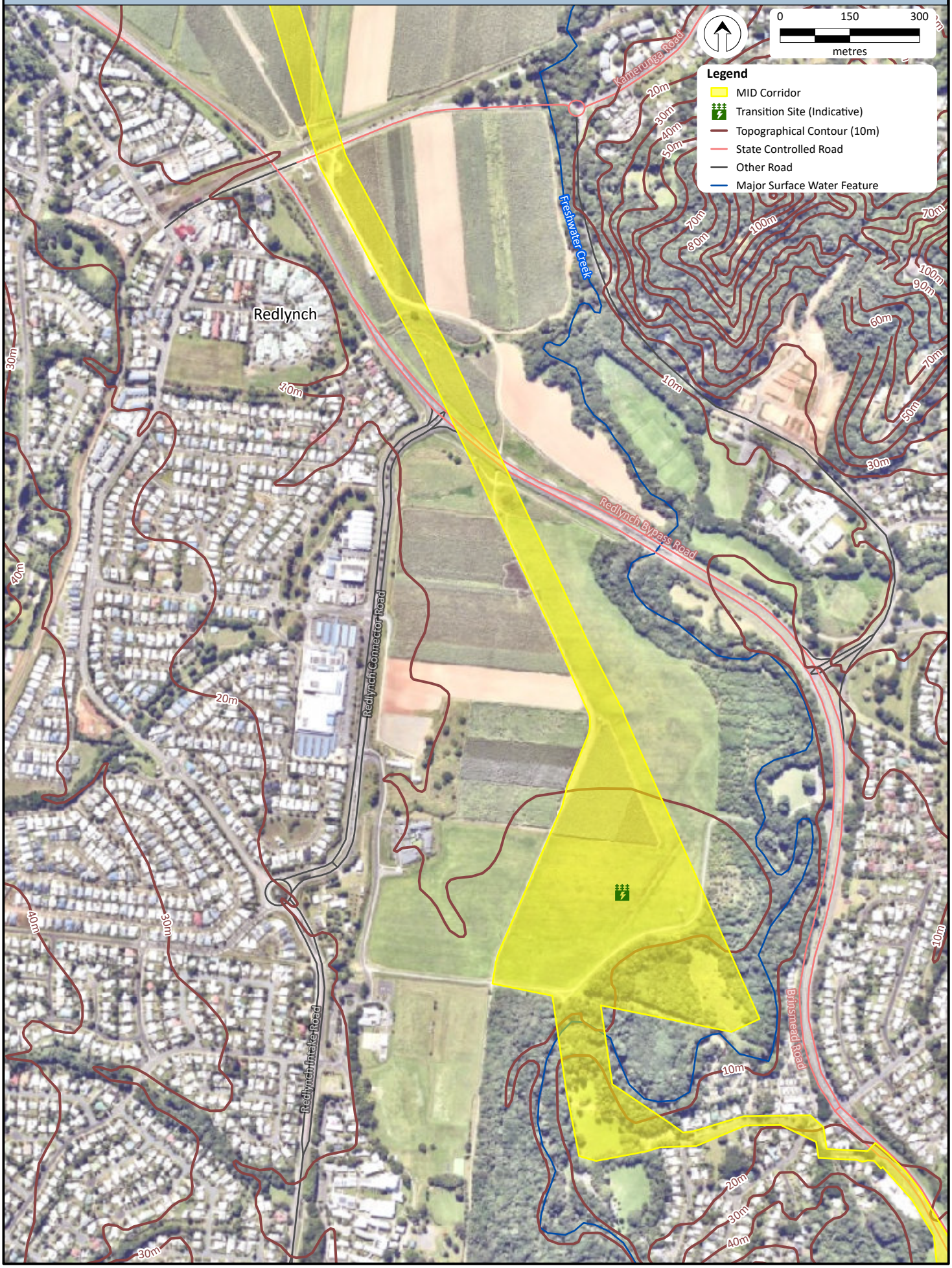


Figure 6-1-2

TOPOGRAPHY OF THE PROPOSED MID CORRIDOR

Figure 6-1-3

TOPOGRAPHY OF THE PROPOSED MID CORRIDOR

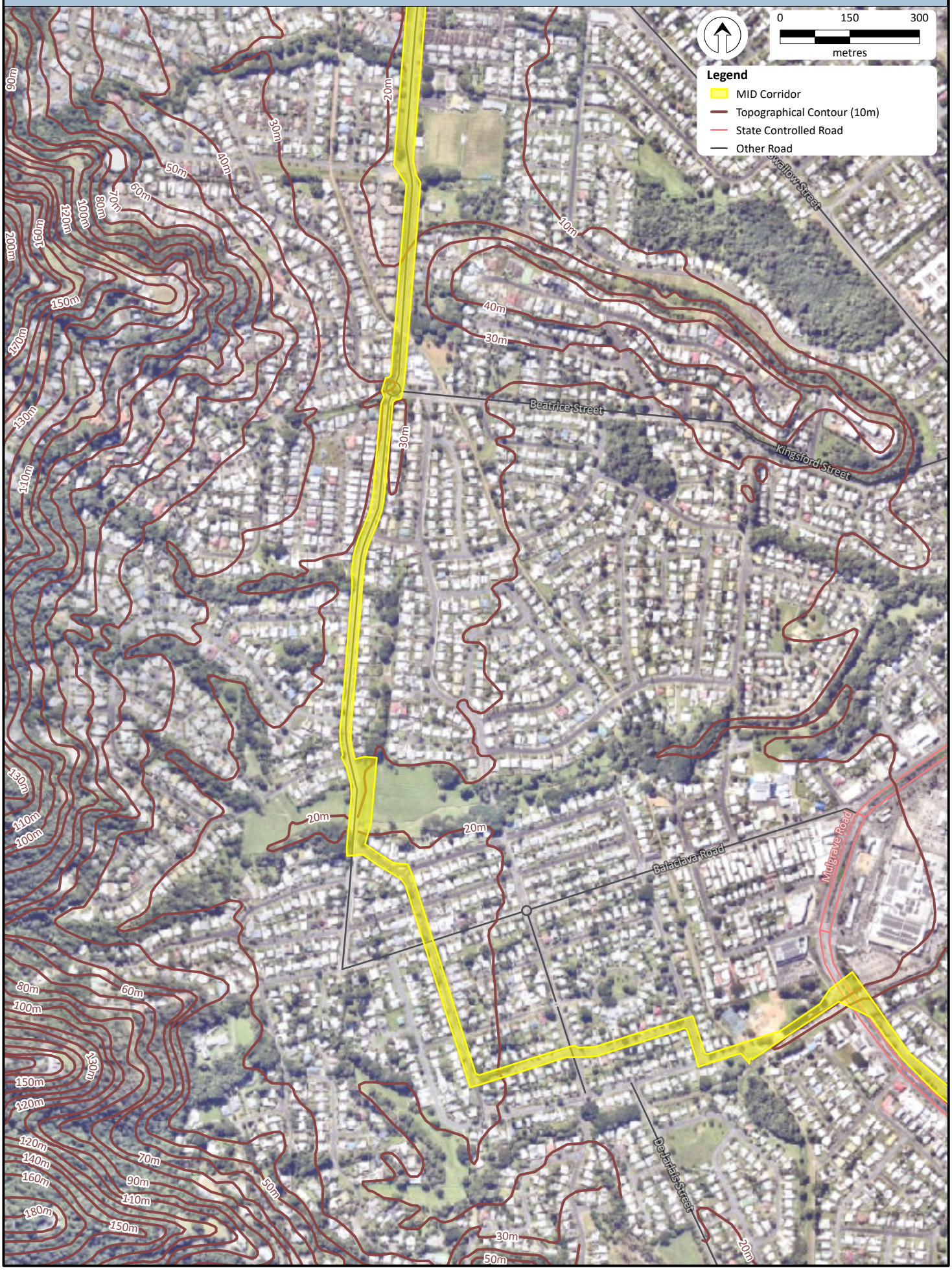


Figure 6-1-4

TOPOGRAPHY OF THE PROPOSED MID CORRIDOR

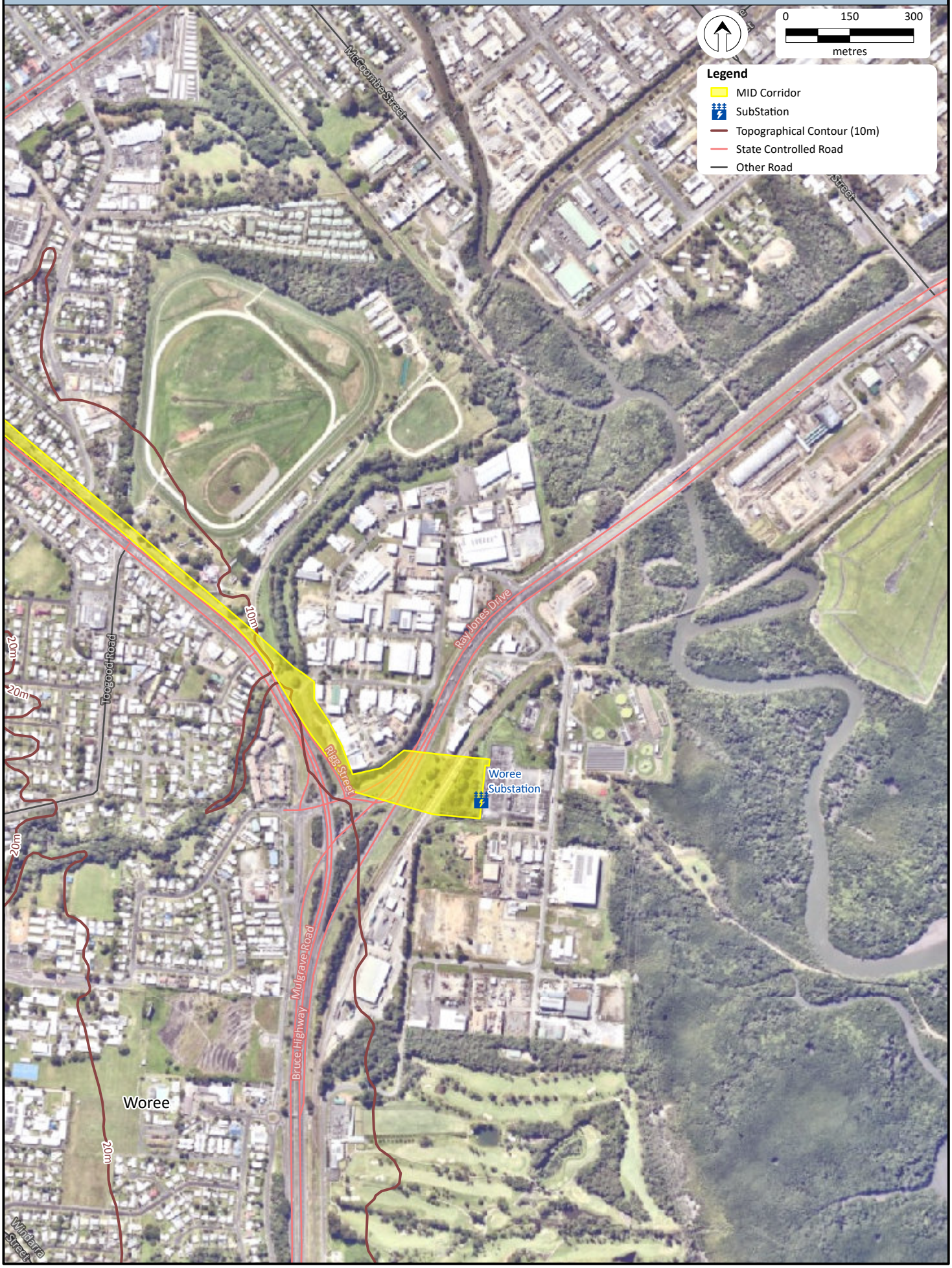


Figure 6-1-5

GEOLOGY OF THE PROPOSED MID CORRIDOR

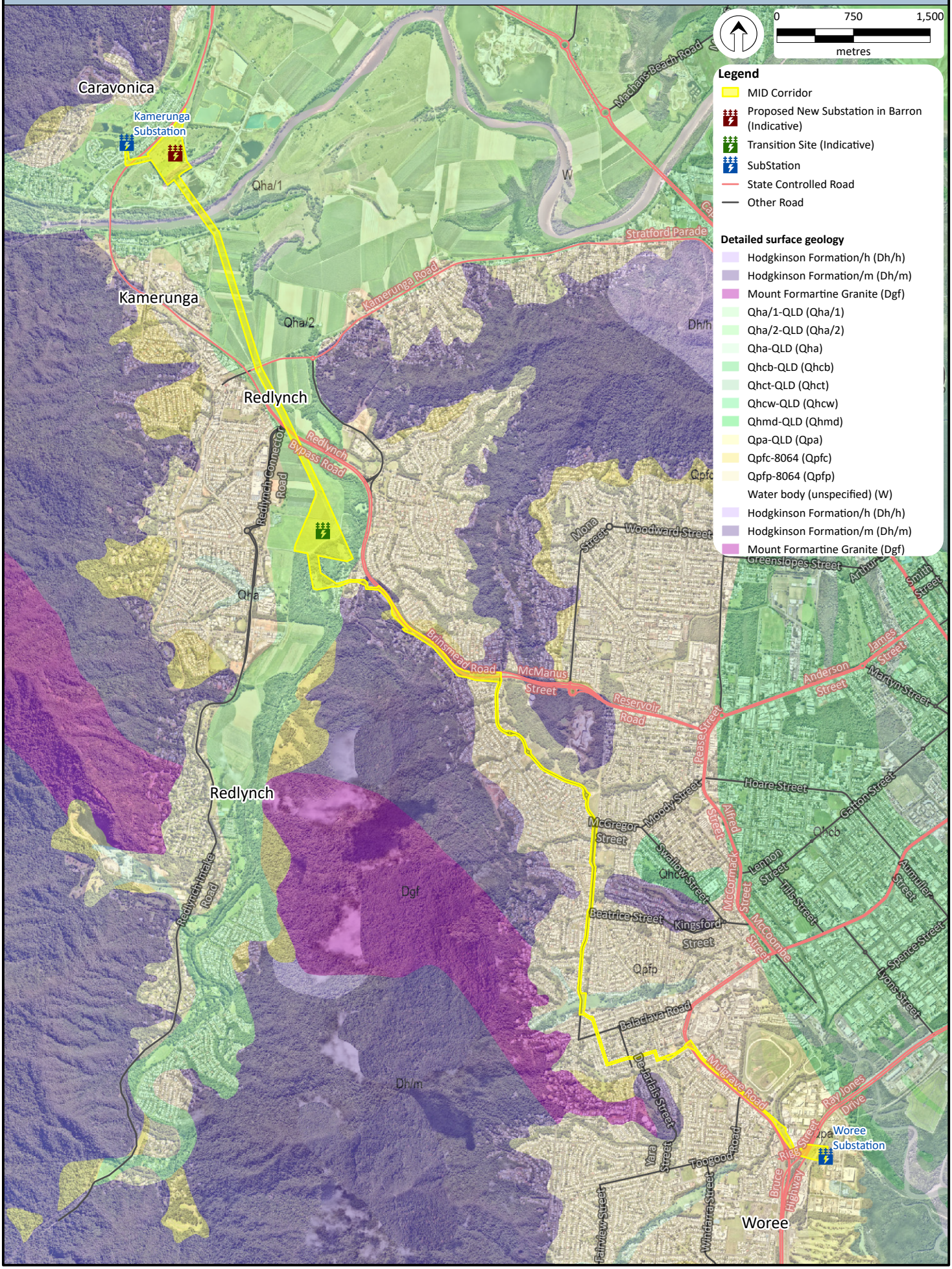


Figure 6-2

Soils

A search of the Australian Soil Classification on Queensland Globe identified that the MID Corridor comprises of the following soil types; Tenosols, Dermosols, Kandosols, Rudosols and Ferrosols. A summary of the soil types found across the MID Corridor is provided in Table 6-2 and shown in Figure 6-3.

Large parts of Cairns, particularly in areas closer to the coast, are located within erosion prone areas and potential landslip hazard areas as mapped under the CairnsPlan, particularly in the following sections:

- MID Corridor intersects a mapped erosion area under the CarinsPlan where it intersects the Barron River
- MID Corridor intersects areas of potential landslip hazard along the Cairns Western Arterial Road (CWAR).

The MID Corridor also intersects with the SPP IMS erosion prone area search which is consistent with the CairnsPlan mapping.

Table 6-2 Soil types within the proposed MID Corridor

Soil type	Description	Locality
Tenosols and rudosols	Uniform fine sandy loams or loam soils on low alluvial flood plains and levees and gravelly or stratified sands on recent alluvium.	Located to the north of the Barron River near the new substation in Barron and on the banks of the River to the south, and along Freshwater Creek.
Dermosols and ferrosols	Friable non-cracking clay or clay loam soils. Structured brown or reddish-brown uniform or gradational soils formed on well drained alluvium.	Located over most of the investigation area, particularly south of the Barron River, to the Redlynch transition site, and in slightly elevated land between low-lying plains and foothills. Located also within the southernmost part of the investigation area near Cannon Park Racecourse and Cairns Golf Course.
Kandosols	Red, yellow or grey loam or earth soils. Red massive gradational textured soils formed on alluvial fans from metamorphic rocks.	Located in low lying areas from the Redlynch transition site to Woree Substation.

Acid sulfate soils

Acid Sulfate Soils (ASS) are soils which contain metal sulphides that, when exposed to oxygen, can produce sulfuric acid, potentially resulting in impacts to water quality, aquatic flora and fauna, and infrastructure such as concrete, iron and steel. ASS forms where there is a combination of waterlogged and/or oxygen free conditions, a source of sulphate, and the presence of organic matter and metals. Many coastal plains have a layer of ASS below the current soil. Coastal areas lower than 5m AHD are likely to have ASS present. ASS can also be found buried beneath newer soils at elevations below 20m AHD.

A review of the Queensland Globe ASS mapping indicates that majority of OH transmission line is located on land above 5m, but below 20m and as such, has a low potential for ASS to be present, particularly around Freshwater Creek. The OH transmission line located adjacent to Kamerunga Conservation Park and Barron River is located on land below 5m as such, has a moderate to high potential for presence of ASS.

UG component of MID Corridor is located on land above 5m, but below 20m and as such, has a low potential for ASS to be present particularly around Trinity Inlet (Figure 6-4A). ASS investigations at geotechnical test locations will be undertaken where there is potential for ASS to be present prior to construction.

SOILS WITHIN THE PROPOSED MID CORRIDOR

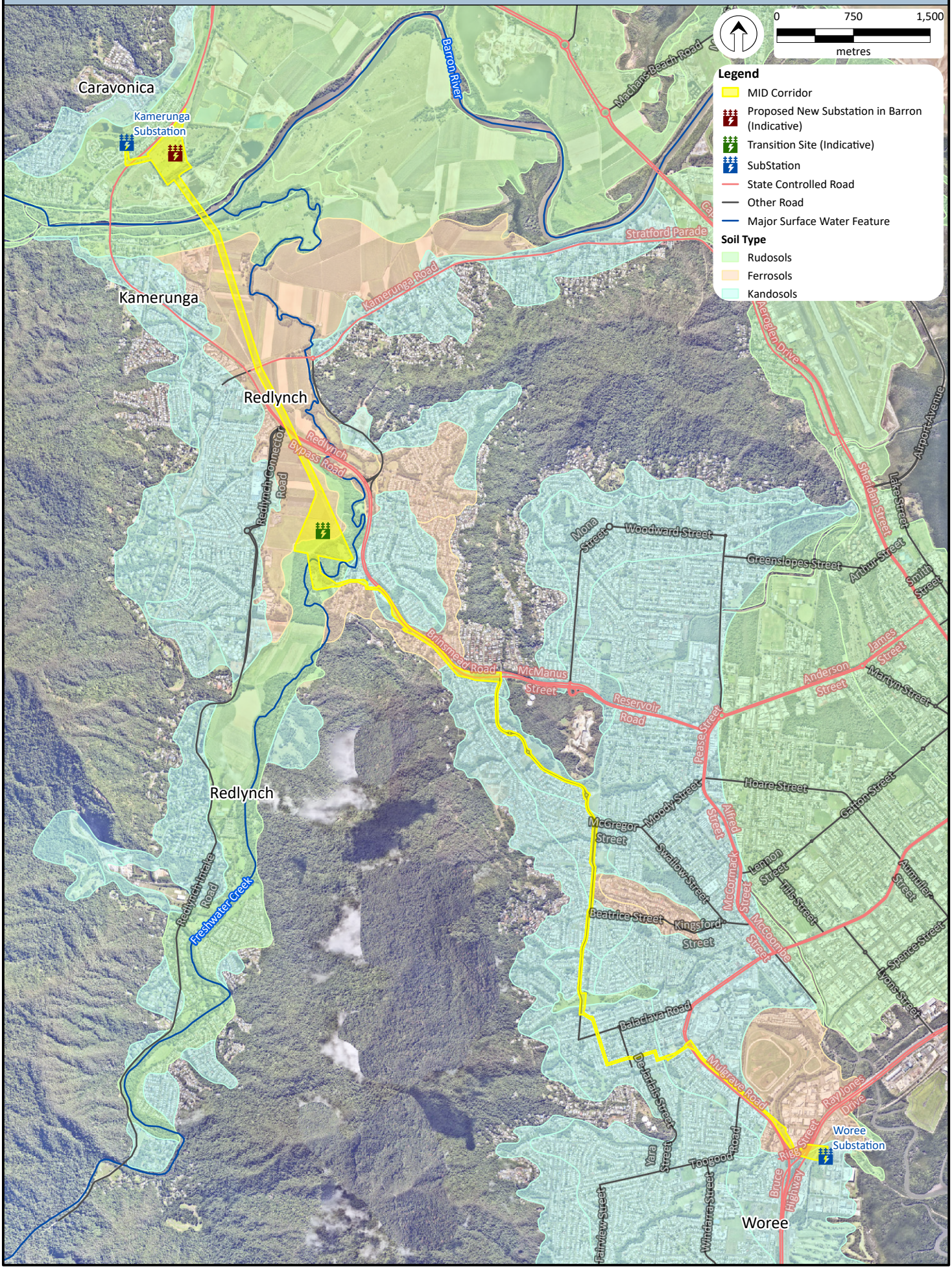


Figure 6-3

ACID SULFATE SOIL WITHIN AND IN PROXIMITY OF MID CORRIDOR

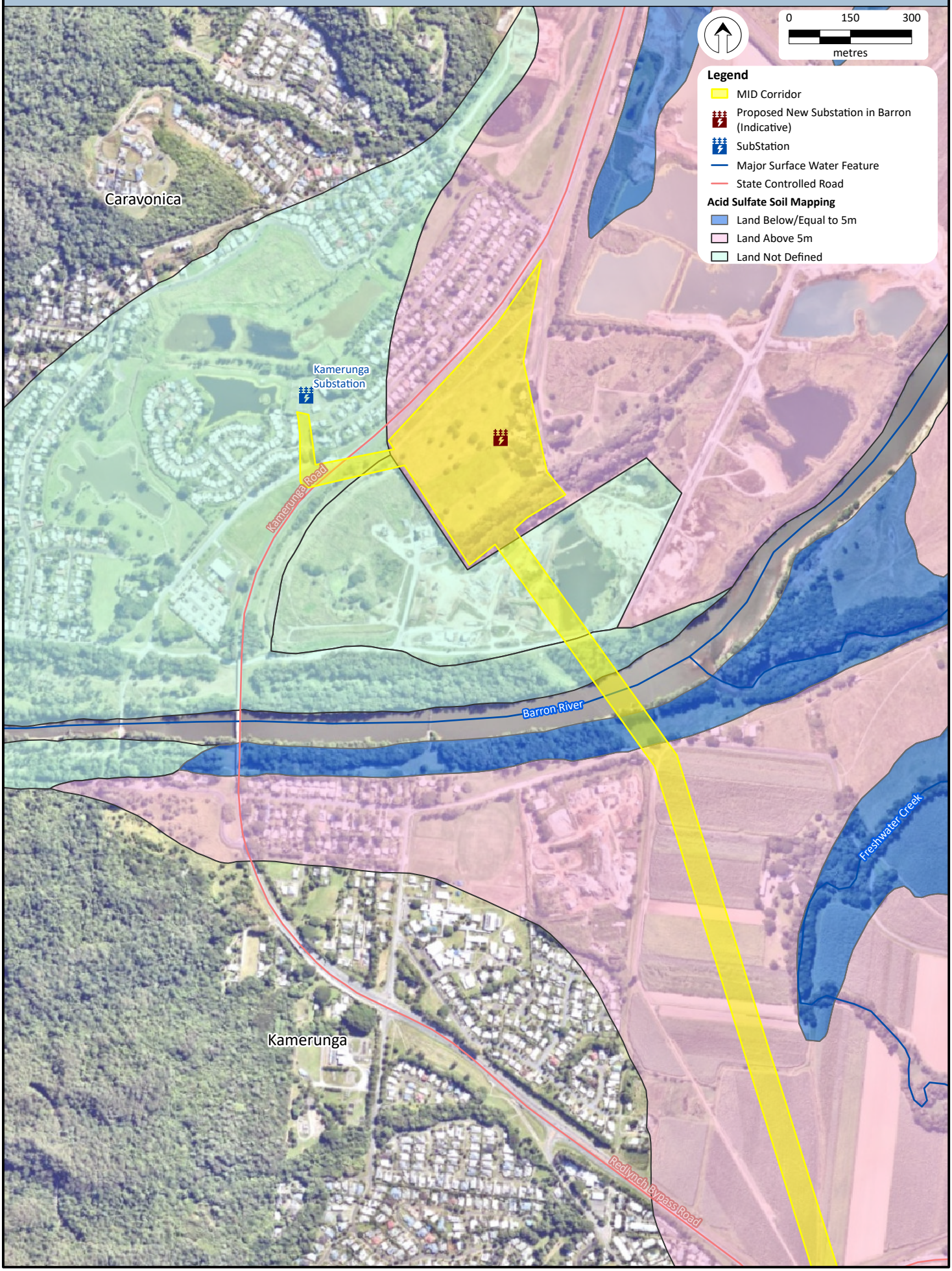


Figure 6-4A-1

ACID SULFATE SOIL WITHIN AND IN PROXIMITY OF MID CORRIDOR

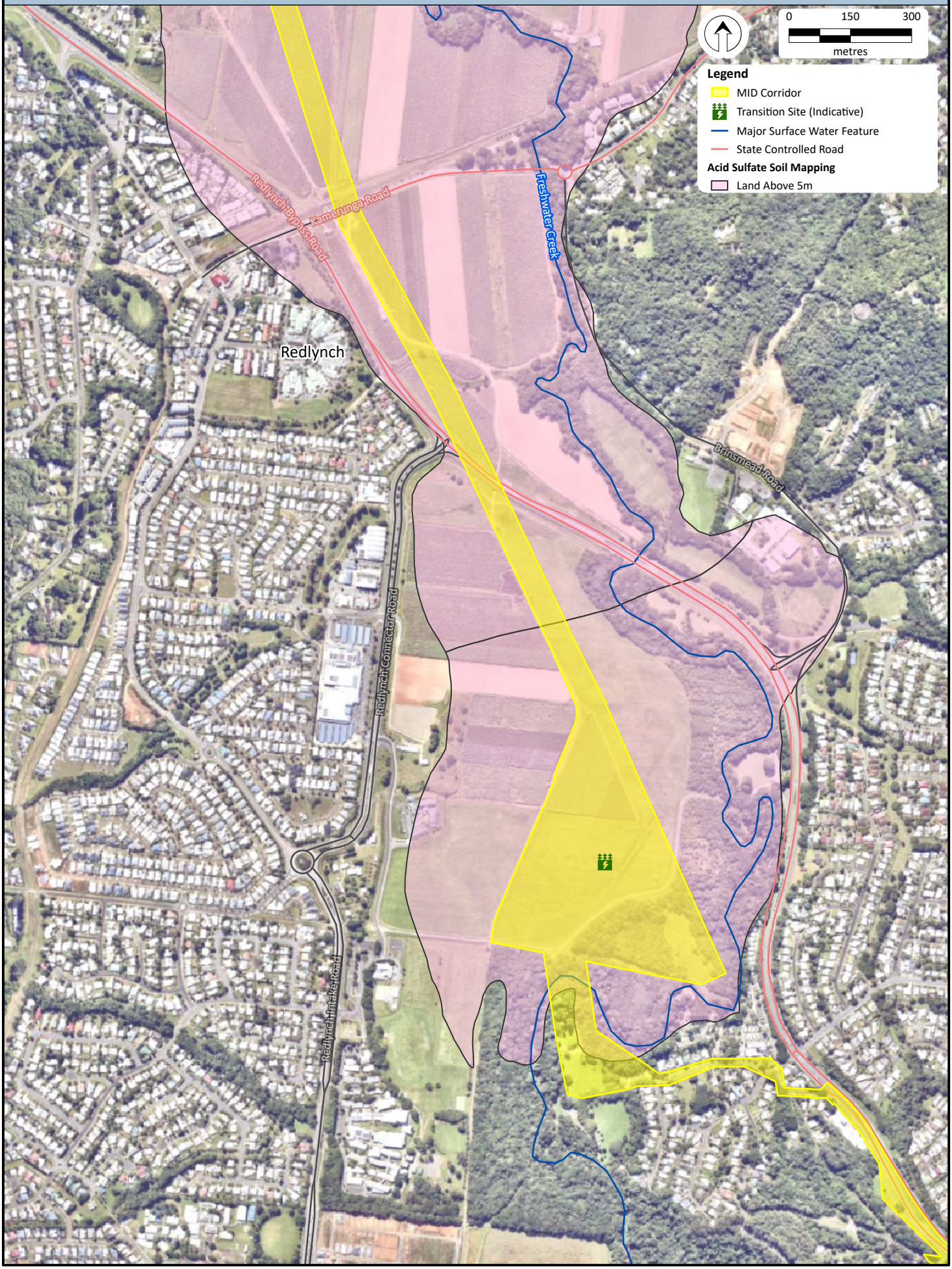


Figure 6-4A-2

ACID SULFATE SOIL WITHIN AND IN PROXIMITY OF MID CORRIDOR

Figure 6-4A-3

ACID SULFATE SOIL WITHIN AND IN PROXIMITY OF MID CORRIDOR

Figure 6-4A-4

ACID SULFATE SOIL WITHIN AND IN PROXIMITY OF MID CORRIDOR

Figure 6-4A-5

Unexploded ordnance

Unexploded Ordnance (UXO) includes any sort of military ammunition or explosive ordnance which has failed to function as intended. UXO can be found in most States and Territories of Australia, with the Department of Defence maintaining a record of sites affected or suspected of being affected. A search of the Department of Defence UXO Mapping (Department of Defence, 2024) did not identify any land subject to potential UXO along the MID corridor.

Resource interests

A review of SPP IMS spatially shows matters of state interest. A review of SPP IMS identified that Barron River Flats Key Resource Area (KRA) No. 10 is located:

- Between the Barron River and Brinsmead Kamerunga Road, including over land traversed by the MID Corridor (Figure 6-4B).
- Over the land parcels for the proposed new substation in Barron (1/RP716266, 3/SP173007, 4/SP119694, 2/RP716266, and 1/RP720215).

Lake Placid Road and an unnamed road along the Barron River are mapped as KRA transport route.

The Extractive Resources Overlay of the CairnsPlan also identifies this area as a 'Resource/Processing Area'. The site is currently used for sand mining, which is co-located with a separate landfill and waste management operation. Plate 1 show the existing transmission line crossing of this KRA.

Plate 1 Existing transmission line crossing the sand mining and landfill site (left) and existing structure north of the Barron River (right)

No exploration or production permits under the *Mineral Resources Act 1989* (Qld), *Petroleum and Gas Production (Production and Safety) Act 2004* (Qld) (Petroleum and Gas Production Act)*, Greenhouse Gas Storage Act 2009* (Qld), or *Geothermal Energy Act 2009* (Qld), or infrastructure permits (*Petroleum and Gas Production Act*) occur along the MID Corridor (GeoResGlobe (Queensland Government, 2024)).

Contaminated land

Historical land uses

A preliminary contamination assessment for the proposed underground power cable installation was undertaken by Douglas Partners Pty Ltd in November 2024 (Appendix J). This investigation considered the broadscale potential contamination risk that may impact on the Project from agricultural land uses, fill from unknown sources and site-specific potential areas of environmental concern.

The preliminary contamination assessment (Appendix J) considered the potential for soil contamination to be low risk in areas of agricultural land use and known fill, however sampling and testing of near-surface soils for related contaminants of potential concern (CoPC) and per- and polyfluoroalkyl substances (PFAS) soil testing at all geotechnical test locations is required in high risk and sensitive areas prior to construction.

Contaminated land register

Contaminated land searches (including searches of the EMR and CLR) were undertaken as part of this assessment to identify any potential lots that may contain contaminated material.

Eight lots were identified on the EMR for a 'notifiable activity' (activities that have the potential to cause land contamination) within and immediately adjacent to the MID Corridor. Two lots (52/SP109372 and 52/SP237150) are located within MID Corridor and rest of listed EMR were identified adjacent/close vicinity of the MID Corridor. Two EMR identified within the MID Corridor are both related to the rail corridor. The notifiable activities listed are associated with service stations, land fill and rail corridor. None of these lots were listed on the CLR. Sites recorded on the registers are detailed in Table 6-3 and shown in Figure 6-4B.

Table 6-3 Contaminated land within and adjacent to the proposed MID corridor

Lot/plan	Adress	Land use	EMR result	Location along the Proposed MID Corridor
Lots on the EMR intersecting the MID Corridor				
52/SP109372	Lot 52 Kamerunga Rd Redlynch QLD 4870	Rail Corridor	Hazardous contaminant This site has been subject to a hazardous contaminant and contains possible high arsenic levels along rail corridor.	Located along the overhead line along with Kamerunga Road.
52/SP237150	Lot 52 Marsh St Woree QLD 4868 4870	Rail Corridor	Hazardous contaminant This site has been subject to a hazardous contaminant and contains possible high arsenic levels along rail corridor.	Located immediately adjacent to the Woree Substation along Bruce Highway.
Lots on the EMR adjacent/within close vicinity of MID Corridor				
5/RP860941	101-115 Brinsmead Rd Brinsmead QLD 4870	Service station	The site has been subject to the Notifiable Activity of operating a commercial service station.	Located immediately adjacent to the UG cable along Brinsmead Road.

Lot/plan	Adress	Land use	EMR result	Location along the Proposed MID Corridor
52/SP109372	Woree Woree 4870	Rail Corridor	Hazardous contaminant This site has been subject to a hazardous contaminant and contains possible high arsenic levels along rail corridor.	Rail corridor adjacent to Kamerunga Road
34/RP857723	78 Lower Freshwater Rd Kamerunga QLD 4870	Land fill	This site has been used as a land fill.	Located, adjacent to the OH transmission line, Lower Freshwater Road located along Barron River.
6/RP860941	1 Christie Dr Brinsmead QLD 4870	Service station	The site has been subject to the Notifiable Activity of operating a commercial service station.	Located immediately adjacent to the UG cable along Christie Drive and Brinsmead Road.
7/RP860941	Lot 7 Brinsmead Rd Brinsmead QLD 4870	Service station	The site has been subject to the Notifiable Activity of operating a commercial service station.	Located immediately adjacent to the UG cable along Christie Drive and Brinsmead Road.
8/RP860941	Lot 8 Christie Dr Brinsmead QLD 4870	Service station	The site has been subject to the Notifiable Activity of operating a commercial service station.	Located immediately adjacent to the UG cable along Christie Drive and Brinsmead Road.

Environmental Authority

In Queensland, an Environmental Authority (EA) is required to undertake an ERA. ERAs are industrial, resource or intensive agricultural activities with the potential to release contaminants into the environment. A review of the EA register was conducted which identified six EAs intersected by, or directly adjacent to the MID Corridor, as detailed in Table 6-4 and shown in Figure 6-4B. A number of other EAs are operated in the broader Cairns region, however, these have not been considered within this assessment.

Table 6-4 Environmental Authorities along the proposed MID Corridor

Environmental Authority	Primary Holder	Environmentally Relevant Activity	Lot on Plan Details	Location along the Proposed MID Corridor
Lots with an EA within the MID Corridor				
EPPR00443213	Lemura Sand Co. Pty. Ltd	ERA 16 - Extraction and screening ERA 54 – Mechanical waste reprocessing ERA 60 – Waste disposal ERA 62 - Resource recovery and transfer facility operation	1/SP173007, 2/SP173007	Located immediately adjacent to the proposed new substation in Barron.
EPPR00676413	Pioneer North Queensland Pty Ltd	ERA 06 - Asphalt manufacturing	2/SP173007	Located immediately adjacent to the proposed new substation in Barron.
Lots with an EA adjacent/within close vicinity of the MID Corridor				
EPPR00814013	Enviroland Site Pty Ltd	ERA 53 - Organic material processing ERA 54 – Mechanical waste reprocessing ERA 60 – Waste disposal ERA 62 – Resource recovery and transfer facility	34/RP857723	Located adjacent to the overhead line.
EPPR00887713	Cairns Regional Council	ERA 63 – Sewage Treatment	6/RP747242 504NR7234	Located adjacent to the overhead line.
EA0000766	Queensland Recycling Metals Pty Ltd	ERA 54 – Mechanical waste reprocessing ERA 62 – Resource recovery and transfer facility	54/RP749186, 12/RP899546	Located adjacent to the Woree Substation.
EPPR00887713	Cairns Regional Council	ERA 60 – Waste disposal ERA 62 – Resource recovery and transfer facility	603/NR835483, 31/C19830	Located adjacent to the Woree Substation.

Environmental Authority	Primary Holder	Environmentally Relevant Activity	Lot on Plan Details	Location along the Proposed MID Corridor
		ERA 63 – Sewage treatment		
EPPR00979913	N Q Resource Recovery Pty Ltd	ERA 53 - Organic material processing (a) ERA 54 – Mechanical waste reprocessing ERA 55 - Other waste reprocessing or treatment ERA 57 - Regulated Waste Transport Transporting regulated waste ERA 61 - Thermal waste reprocessing and treatment ERA 62 – Resource recovery and transfer facility	89/RP912505	Located adjacent to the Woree Substation.

OTHER LAND CONSTRAINTS ALONG THE PROPOSED MID CORRIDOR

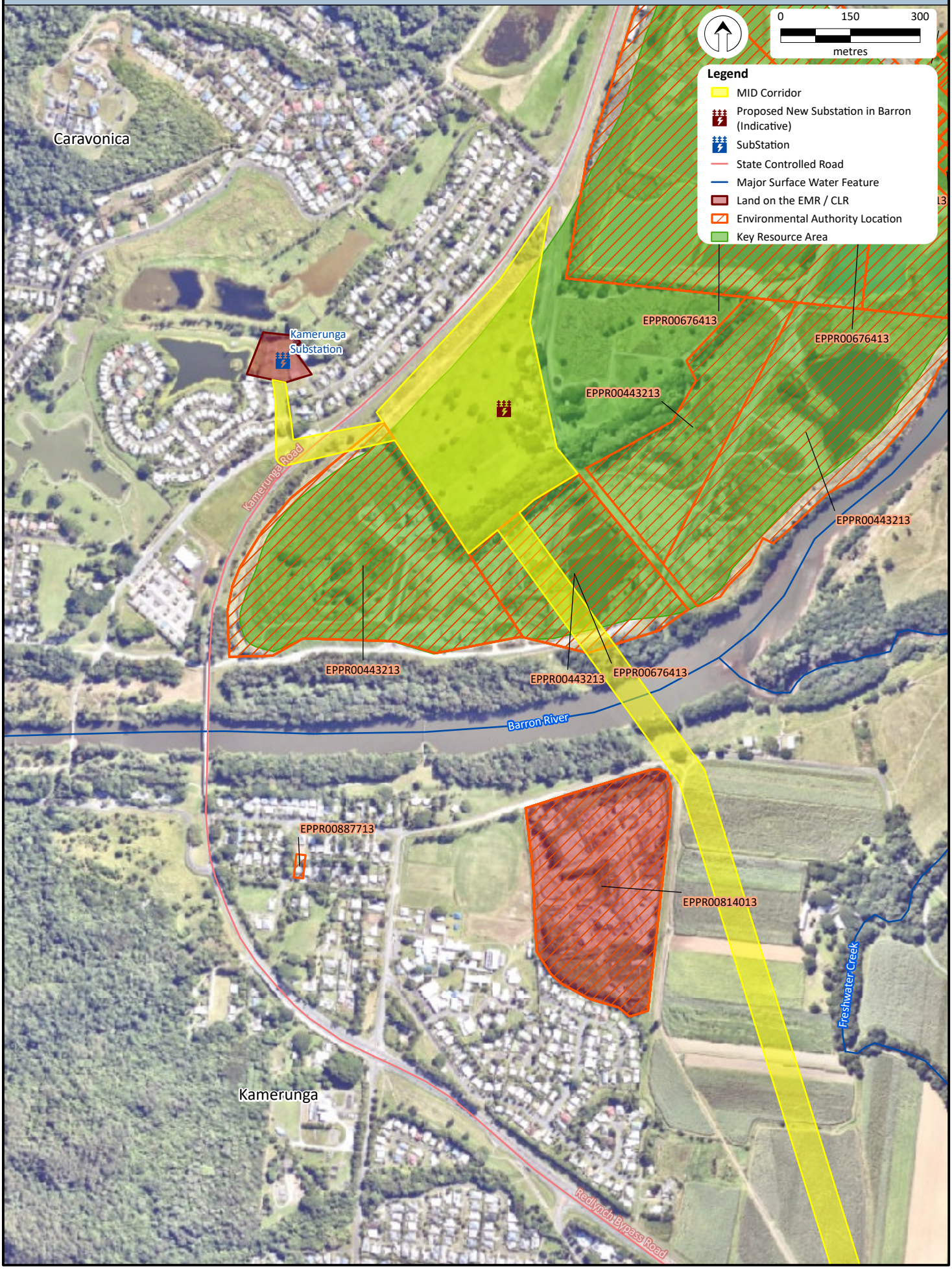


Figure 6-4B-1

OTHER LAND CONSTRAINTS ALONG THE PROPOSED MID CORRIDOR

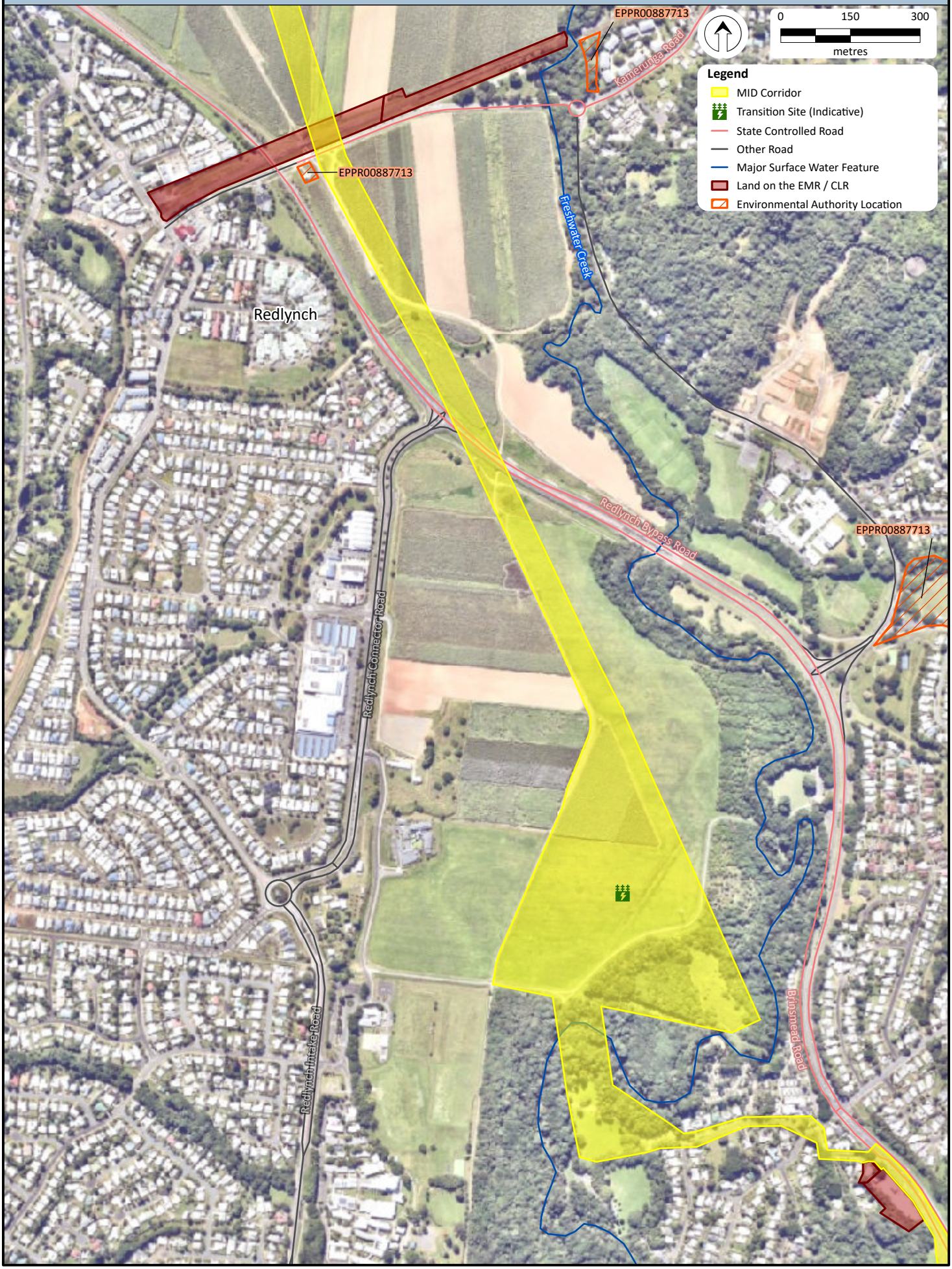


Figure 6-4B-2

OTHER LAND CONSTRAINTS ALONG THE PROPOSED MID CORRIDOR

Figure 6-4B-3

OTHER LAND CONSTRAINTS ALONG THE PROPOSED MID CORRIDOR

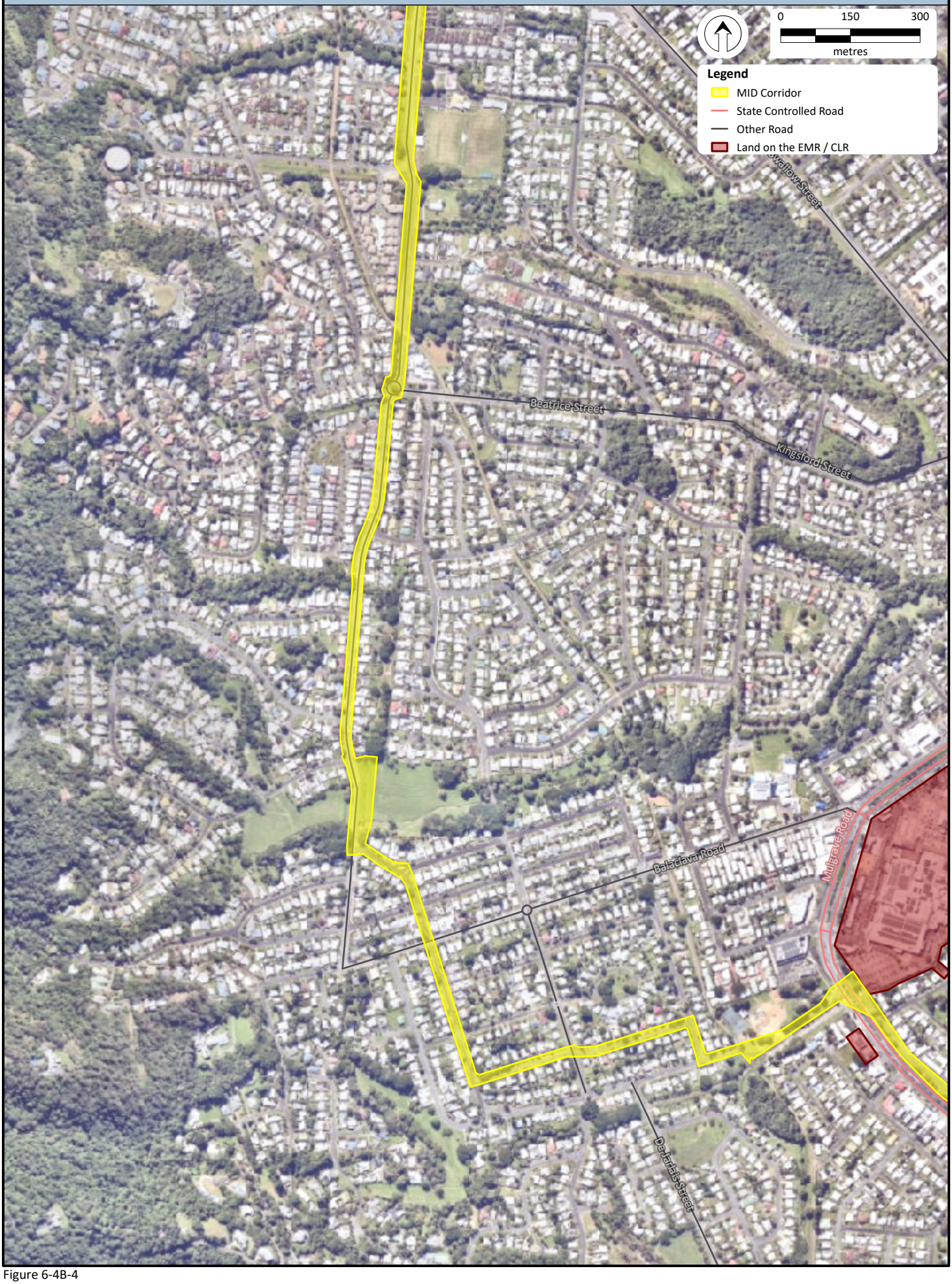


Figure 6-4B-4

OTHER LAND CONSTRAINTS ALONG THE PROPOSED MID CORRIDOR

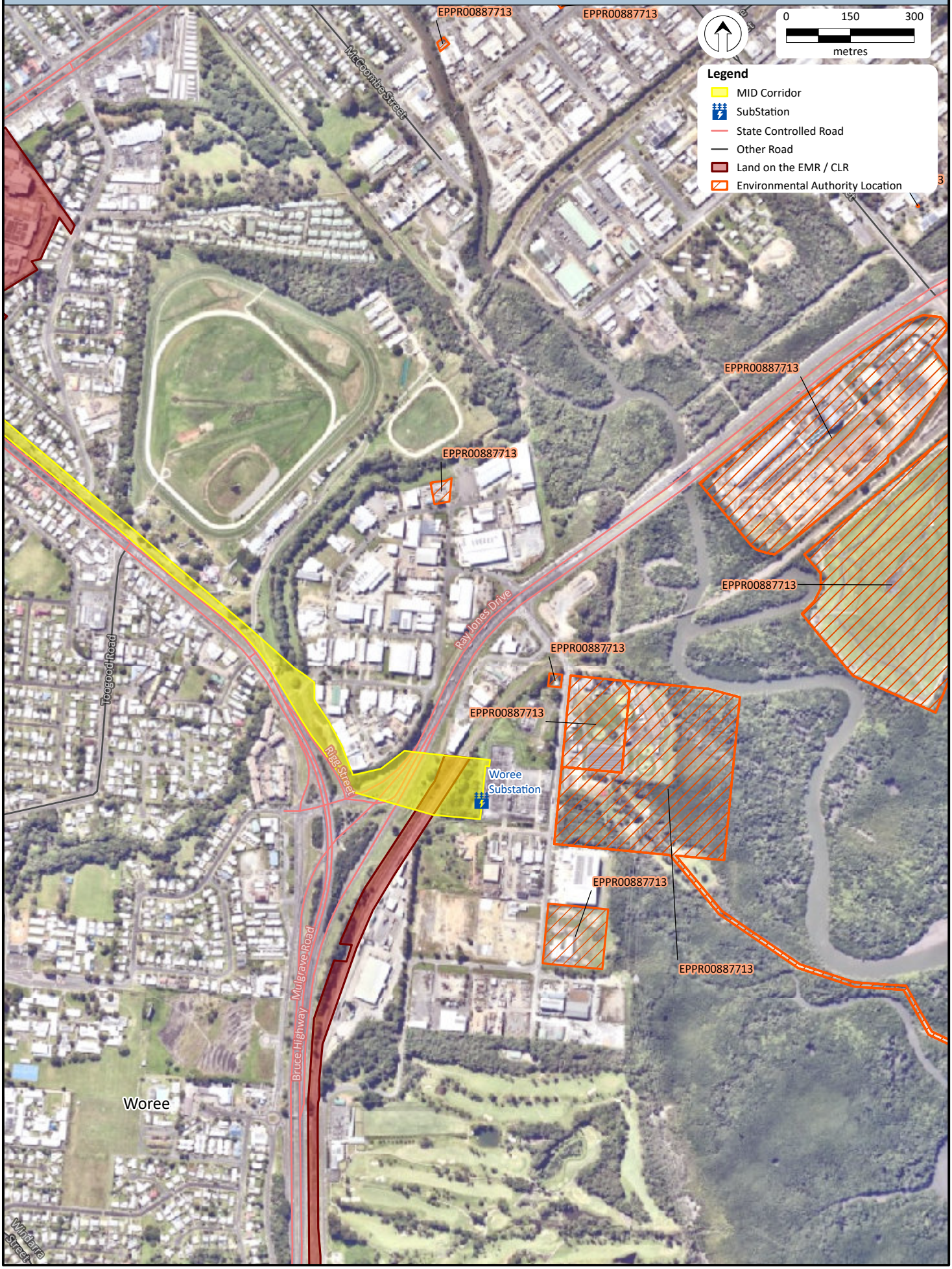


Figure 6-4B-5

6.1.2 Potential impacts and mitigation measures

Construction activities that involve soil disturbance, such as vegetation clearing, excavation and earth works, have the potential to impact on land values. A description of the potential impacts is provided in the following subsections.

Potential impacts to land will be managed during all phases of the Project in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K) and are discussed where relevant further below.

Construction phase – topography

Construction of the Project will involve earthworks to allow for the establishment of substation pads and foundations, transmission line structure foundations, trenching for the underground cable and development of access tracks. Most overhead line structures and cable joint bays will be situated in areas of generally flat terrain, however, where steeper terrain is encountered, cut and fill earthworks will be undertaken to establish safe working areas for assembly and erection of structures. Where this occurs, there is the potential for impacts to land stability.

Construction phase – geology and soils

Geology and soils present a complex set of issues which are required to be considered as part of the design and construction process due to their potential to affect the integrity of infrastructure and the surrounding land. This includes issues such as acidity, erosivity and dispersiveness.

Alluvial soils, as present within the low-lying coastal plain, are comprised of loose materials or sediments such as clay, silt, sand, and gravel. They are typically unconsolidated and are prone to erosion and dispersion. In some instances, alluvial deposits can result in poor ground conditions, necessitating deeper foundations to ensure the integrity of structures in these areas.

Erosion

Topsoils within the coastal plain are the most productive portion of the soil profile and can be eroded where land disturbance occurs without proper management measures in place. The erosion of topsoil has the potential to impact on the surrounding land use, which is predominantly cropping and grazing along the overhead transmission line component of the MID Corridor, if not appropriately managed. Where topsoil is lost, this may lead to a reduced ability of the soil to store water and nutrients, result in higher runoff rates, and the exposure of subsoil. The deposition of eroded soil also has the potential to impact on local waterways through siltation and a potential reduction in water quality, as eroded soils may contain nutrients, fertilisers, herbicides, or pesticides. Erosion also has the possibility of impacting on cropping potential of land.

Compaction

Soil compaction may occur where construction traffic, including heavy machinery, frequently traverses over areas. Impacts from soil compaction can include (Queensland Government,2013):

- poor root growth which can reduce crop yield through poor water and nutrient uptake;
- difficulties with soil cultivation and seedbed preparation;
- a decrease in water entering the soil, either as rain or irrigation;
- a decline in soil structural stability;
- a decline in fertiliser efficiency; and
- a soil that requires more horsepower (and fuel) to cultivate.

All soil disturbance activities will be managed in accordance with the International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control Guidelines 2008 and will be undertaken under a Project Erosion and Sediment Control Plan (ESCP) and will include:

- Upslope storm water/runoff will be diverted, where possible.
- Ground disturbance will be minimised, and any ground cover retained, where possible, to reduce potential erosion surface area.
- Where soil disturbance has taken place, visual assessments must be undertaken for the presence and effectiveness of erosion and sediment control structures and measures preceding significant rainfall events (within 24 hours of expected rainfall while the site is unstable, weekly inspections when rainfall is not expected, or the site is stable). Records of this monitoring will be available on site for inspection.
- Progressive rehabilitation of disturbed areas should be undertaken as soon as practicable to establish ground cover (minimum 70% or equivalent to existing ground cover).
- Where practicable, existing access tracks will be used for the Project in preference to the creation of new tracks, with upgrades or extensions conducted where necessary. Access tracks will be installed in accordance with Powerlink specifications, specifically ASM-SPE-A1016119 for drainage and ASM–GDL–A576805.
- Soil compaction, particularly in areas used for agriculture will be minimised by confining vehicle movements to defined access tracks and locating parking and laydown areas in previously cleared areas and outside of land used for cultivation.
- Soil disturbance in erosion prone and steeply sloping areas must be minimised during clearing activities. Determine appropriate clearing methods for moderate to high erosion prone and steep areas so that the clearing methods minimise soil disturbance and potential for soil loss.
- Any areas required for stockpiling must have topsoil stripped (~100mm depth) prior to placement of any stockpile material to ensure suitable material is available for rehabilitation.

Construction phase – Acid Sulfate Soils

Although benign in their undisturbed state, draining, excavating, or exposing ASS through lowering of the water table causes iron sulfides, present predominantly as the mineral pyrite, to react with oxygen to form sulfuric acid. The release of sulfuric acid can in turn release other heavy metals present within the soil and where mobilised, can result in adverse impacts including:

- Within the natural environment: Oxidisation of ASS can cause ecological damage to aquatic and riparian ecosystems including killing vegetation, increasing disease, and inhibiting spawning of fisheries and tainting groundwater.
- Within the built environment: Oxidisation of ASS can degrade concrete and steel structures over time to the point of failure. If not treated properly, repair or replacement of infrastructure may be required prior to its intended lifespan.

ASS will be managed in accordance with the Project EMP (Appendix K) and will include:

- Prior to any soil excavation work in high-risk areas (below 5m AHD) investigations shall be undertaken in accordance with the Queensland Acid Sulphate Soils Technical Manual to determine the presence of ASS.
- Where ASS has been identified and confirmed, an ASS Management Plan is to be developed in accordance with the Queensland Acid Sulphate Soils Technical Manual.

- Where ASS is present, all soil disturbance work to occur in accordance with the ASS Management Plan.
- All staff and Contractors undertaking soil disturbing work in high-risk areas must complete a detailed ASS specific induction or awareness training on the identification and management of ASS.

Construction phase - resource interests and other operating infrastructure

The MID Corridor includes land mapped as part of the extractive resources overlay on the northern side of the Barron River (also mapped as KRA No. 10). The Project within this area may result in impacts to the functioning of the facility, as well as potential construction-related stability impacts on the transmission line structures within the extractive resources area.

Construction phase - contaminated land

The MID Corridor intersects a number of properties that contain, or have the potential to contain, contaminated material. Earthworks may result in the disturbance of contaminated material, resulting in offsite migration and impacts to the surrounding environment.

Chemicals used during construction will likely include fuel, electrical equipment transformer oil, lubricants, oils, minor quantities of solvents and acids, degreasers, and domestic cleaning agents. The accidental release of these materials during storage, use or transport has the potential to result in land contamination.

Prior to construction, Powerlink will undertake further field assessments to assess parcels of land listed as containing known or suspected (likely) contamination within the Project area. Should contamination be confirmed within the areas of ground disturbance, on-site remediation of contaminated soil is considered best practice, with removal of contaminated soil for treatment or disposal off-site only to be carried out when that option is not practicable.

An SDP from DETSI is required to remove contaminated soil exceeding Health Investigation Levels (HIL), Health Screening Levels (HSL), Ecological Investigation Levels (EIL) and/or Ecological Screening Level (ESL) for the most sensitive land use criteria, from land listed on EMR or CLR for the listed contaminant. If further contaminants are confirmed through testing or on sites not listed on the EMR or CLR, notification to DETSI of additional contamination may be required.

Further detailed geotechnical and contaminated land investigations will occur prior to construction to identify areas of concern relating to geotechnical stability, soil erosivity and contamination.

Construction phase - EAs

ERA's are prescribed within Schedule 2 of the EP Reg and include industrial or other activities with the potential to release emissions which impact on the environment and surrounding land uses activities.). ERA's requiring an EA could be triggered for certain activities required during construction, such as ERA 8 chemical storage, ERA 16 extracting and screening, ERA 63 Sewage treatment.

Operation and maintenance phase - topography, soils and ASS

Operational and maintenance phase activities will include ad-hoc maintenance vehicles traversing along the easement and maintenance activities on the transmission line structures and joint boxes and at the substation. Activities are likely to be minor in nature and not result in a significant impact to topography or soils.

Operation and maintenance phase - resource interests

Operational and maintenance phase activities will include ad-hoc maintenance vehicles traversing along the easement and maintenance activities on the transmission line structures and joint boxes and at the substation. Activities are likely to be minor in nature and not result in a significant impact to the resource interests of the KRAs.

Operation and maintenance phase - contaminated land

Similar to during the construction phase of the Project, the chemicals used during operation and maintenance will include fuel, electrical equipment, transformer oil, lubricants, oils, minor quantities of solvents and acids, degreasers, and domestic cleaning agents. The accidental release of these materials during storage, use or transport has the potential to result in land contamination, however this is considered unlikely to occur or result in contamination of land.

Operation and maintenance phase - EAs

ERA's requiring an EA are not proposed as part of the operation of the Project.

Decommissioning phase - topography, soils and ASS

Transmission life infrastructure generally has a design life of approximately 50 years. After this period, infrastructure may either be replaced, or decommissioned. Activities that may result in land impacts during the decommissioning phase include:

- vegetation clearing where required to access structures;
- vehicle and plant movement over the easement and on access tracks; and
- ground disturbance for the facilitation of rehabilitation of easement, transmission structures and substation location (where the infrastructure is not replaced).

Potential impacts to soils from decommissioning activities are expected to be low, localised, and short-term and will result in improvement to the area through the removal of infrastructure and re-instatement of previous land uses.

Decommissioning phase - resource interests

Infrastructure within a resource interest may result in impacts to the functionality or operating of the operations. As such, where infrastructure that is being decommissioned interferes with a resource interest, consent from the respective authority holder may be required.

Decommissioning phase - contaminated land

The chemicals used during decommissioning may include fuel, electrical equipment, transformer oil, lubricants, oils, minor quantities of solvents and acids, degreasers, and domestic cleaning agents. The accidental release of these materials during storage, use or transport has the potential to result in land contamination, however this is considered unlikely to occur or result in contamination of land.

6.2 Climate

6.2.1 Existing environment

The Bureau of Meteorology (BoM) operates a network of monitoring stations around Australia that have long-term climatic data available for analysis. The closest BoM station to the MID Corridor is Cairns Aero (Station No. 031011) located at -16.8736, 145.7458, approximately 5km south of the MID Corridor. A review of the climate data was undertaken in July 2025 which identified the following.

Climate data across the MID Corridor is consistent with a warm tropical climate. Mean annual temperatures vary from 17.2°C to 31.5°C, with the lowest average temperature recorded at 17.2°C (July) and the highest at 31.5°C (December/January). The highest rainfall occurs during the summer months, with late winter / early spring experiencing the least rainfall. The overall total annual rainfall for the area is 2,018.7mm. The highest average relatively humidity for the area is recorded in February, March and April at 78%, while the lowest average relatively humidity is recorded in September at around 55%.

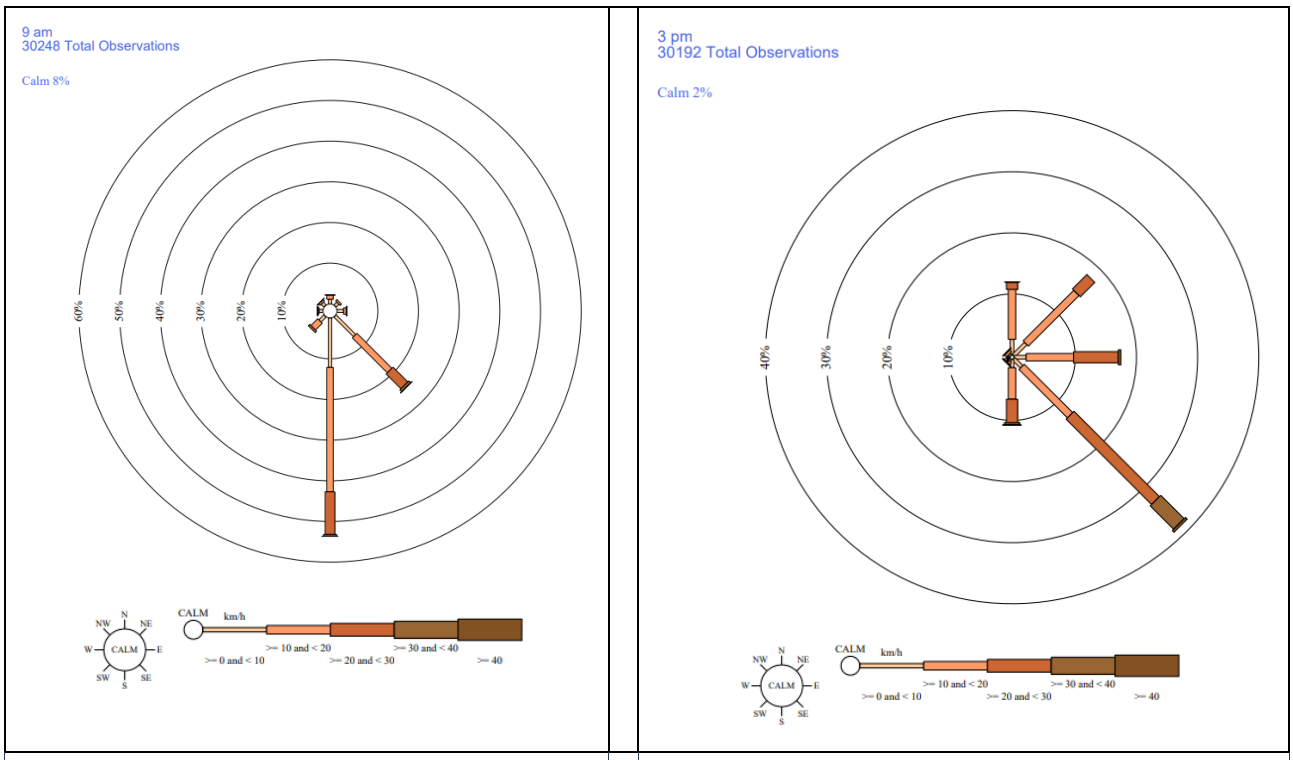
All historical data indicates that the morning periods are higher in relative humidity compared to afternoon periods, with the greatest variations occurring in August during the winter period.

Table 6-5 Climate Data for Cairns Aero Weather Station

Month	Mean Temperature (°C)		Mean Relative Humidity (%)		Mean Wind Speed (km/h)		Rainfall (mm)
	Maximum	Minimum	9 am	3 pm	9 am	3 pm	
January	31.5	23.8	75	66	8.8	15.6	402.1
February	31.3	23.8	78	69	8.9	14.6	437.5
March	30.7	23.2	78	67	12.2	17.3	422.1
April	29.4	21.7	78	65	14.5	19.0	201.8
May	27.7	20.0	76	64	14.7	17.9	91.7
June	26.1	18.0	74	61	15.9	18.1	45.9
July	25.8	17.2	72	58	15.7	18.7	33.5
August	26.7	17.4	70	56	14.8	19.6	26.7
September	28.2	18.8	66	55	13.9	20.5	32.7
October	29.7	20.7	65	57	11.3	19.1	47.2
November	30.8	22.3	68	60	10.0	18.0	88.3
December	31.5	23.4	70	62	9.2	17.0	192.5
Annual	29.1	20.9	72	62	12.5	18.0	2,027.5

Source: BoM 2024; Key: red = highest value, blue = lowest value

Annual average morning (9 am) wind direction throughout the area primarily originates from the south, while afternoon periods (3 pm) are characterised by prevailing south-easterly winds as shown in Figure 6-5. Annual average wind speeds in the morning range from 8.8km/h to 15.9km/h with the lowest wind speeds recorded during the summer period. Afternoon wind speeds are generally higher ranging from 14.6km/h to 20.5km/h.



9 am | **3 pm**

Source: BoM, 22 August 2024

Figure 6-5 Annual average wind direction and speed (9 am and 3 pm) Cairn Aero (5 May 1941 to 26 July 2024)

6.2.2 Potential impacts and mitigation measures

All project phases – extreme climatic conditions

Extreme weather or atypical climatic conditions have the potential to adversely affect the Project during all stages of its lifecycle. Their occurrence during construction and operation may result in construction activities ceasing, damage to infrastructure or the environment and impacts to supply of electricity to the grid.

Project infrastructure will be designed and constructed to reasonably withstand severe weather events. Other impacts to be considered are those associated with flooding such as soil erosion and land degradation, which can lead to reduced or limited access to areas of the Project for construction and maintenance.

Potential impacts to land and water from climatic changes will be managed in accordance with Powerlink's standard environmental controls as outlined in the Project EMP (Appendix K), and will include the following:

- Erosion will be monitored during construction and routine maintenance and mitigation measures implemented as necessary including those detailed in Section 6.1.2 .
- Dust control measures as detailed in Section 6.3.2.
- Implementation of bushfire emergency response procedure, including those detailed in Section 6.19.2

All project phases - extreme climatic conditions - cyclones

Tropical cyclones generally develop from tropical lows between November and April, and can cause damaging winds, flood–producing rainfall, and coastal storm surges. A search of the occurrence of tropical cyclones within and near the Project area (50km radius of Cairns) found 14 cyclones to be historically recorded since 1970 (BoM, 2024).

Given the relatively high frequency of tropical cyclones occurring in the region based on BoM's historical data and the coastal location of the Project, the potential for a tropical cyclone to occur within the proposed MID Corridor during the lifetime of the Project is considered to be high.

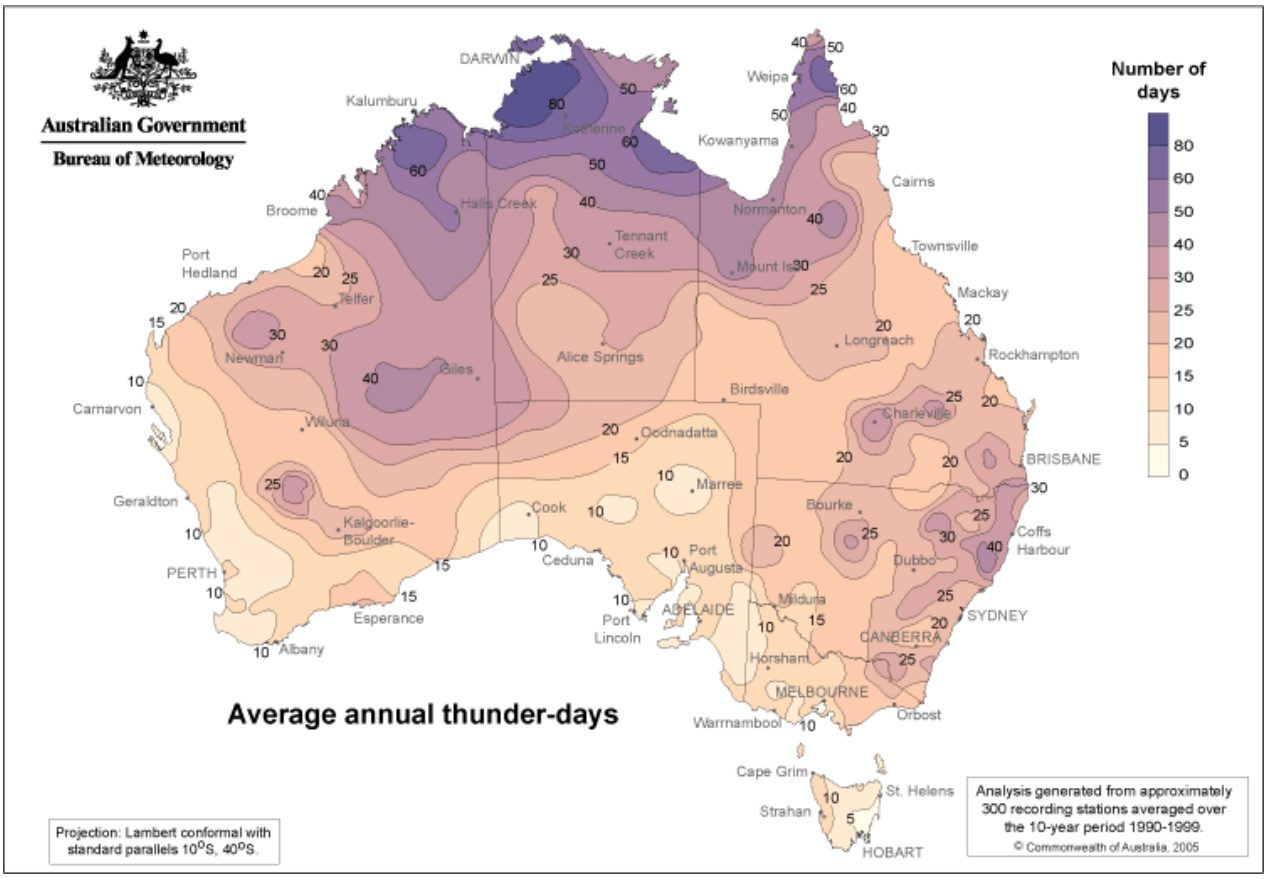
All project phases - extreme climatic conditions - flooding

The Barron River has a flood history going back to the early 1900's. The proposed MID corridor crosses the Barron River downstream of the Kamerunga Bridge. The Barron River delta area can be subject to major flooding with low lying areas being susceptible. Large areas of agricultural land in and residential areas around the Barron River (in the suburbs of Caravonica and Redlynch) can be inundated.

Further information and discussion regarding hydrology and water quality, including SPP IMS and CiarnsPlan overlays within the Project area is provided in Section 6.4. Flood risks to the Project are also discussed further in Section 6.4.2.

All project phases - extreme climatic conditions - thunderstorms

Thunderstorm activity is a common meteorological occurrence in tropical Queensland, particularly during the summer months. Thunderstorm activity can result in environmental, social, or economic impacts, especially severe storms that include heavy rains, strong winds, hail, and flash flooding. Information sourced from BoM (2016) indicates that the Project area can expect an annual average of between 20 and 25 days of thunder activity annually (Figure 6-6).



Source: BoM 2016 (http://www.bom.gov.au/jsp/ncc/climate_averages/thunder-lightning/index.jsp)

Figure 6-6 Average annual days of thunder activity

All project phases - extreme climatic conditions - droughts

Droughts are an increasingly common occurrence in Australia and affect grazing and agricultural land most significantly. Prolonged periods of water shortage can have negative impacts on vegetation growth, erosion, and overall land quality. A review of the Queensland Drought Situation Maps generated by DETSI indicated that, as of 1 December2024, the Project is in an area that has been drought free for more than 72 months.

All project phases - extreme climatic conditions – climate change

The Intergovernmental Panel on Climate Change (IPCC) has prepared an assessment of projected climate change for Australia and New Zealand, with the report identifying that the observed changes in temperature for the region between 1960 and 2019 has been 0.3-0.4°C per decade (Figure 6-7).

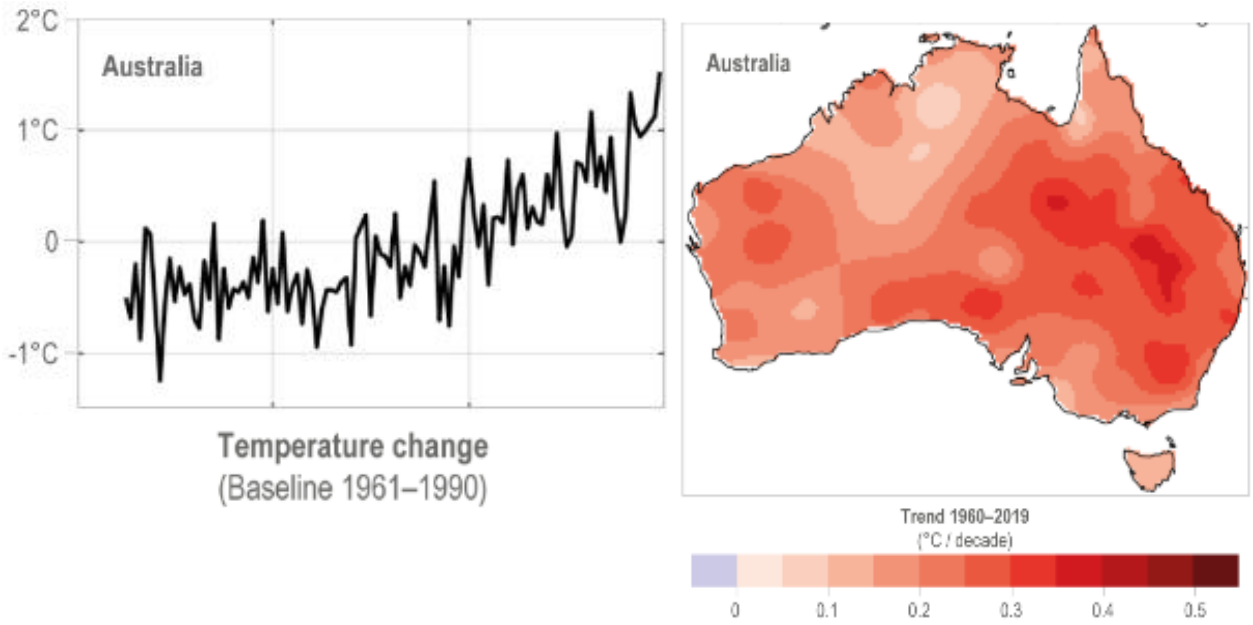


Figure 6-7 Observed temperature changes in Australia (Lawrence et. Al.,2022)

6.3 Air quality

An Air Quality Impact Assessment (AQIA) was completed for the Project by JBS&G (2024) (Appendix F). The AQIA was prepared for the construction phase of the Project, specifically for the open trenching and horizontal directional drilling (HDD under boring) relating to the underground cable component. Construction of the overhead line involves a relatively small area of earthworks compared with the open trench and boring works associated with the UG component and as such, pose a lower risk of emissions impacts. Construction of the proposed new substation in Barron and the proposed Redlynch Transition Site will involve placement of fill material to allow for construction above the Q200 flood level.

It has been assumed that any risks associated with dust emissions and earthmoving equipment exhaust emissions impacts at nearest residential areas will be mitigated by the distances from the construction sites to the residences, and through the implementation of suitable mitigation measures as detailed within the Project Construction Environmental Management Plan (CEMP).

The AQIA did not consider operational impacts from the Project due to the low potential for dust emissions to be created as a result of the Project operation.

A summary of the findings of the AQIA are presented below.

6.3.1 Existing environment

Environmental values relating to air quality relevant to the Project are defined under the Queensland EPP(Air) and include:

- the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems;
- the qualities of the air environment that are conducive to human health and wellbeing;
- the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures, and other property; and
- the qualities of the air environment that are conducive to protecting agricultural use of the environment.

Local emission sources

Sources of emissions

The MID Corridor is situated in an urban/residential area, with some pockets of rural areas utilised for cropping within the northern area (located along the proposed overhead transmission line component). The current, main sources of emissions within the MID Corridor are from:

- major transport routes (e.g. Redlynch Bypass Road /CWAR);
- sand mining and landfill and waste management operations to the north of the Barron River; and
- dust from cane growing and harvesting activities.

Ambient air quality monitoring

DETSI operate a network of ambient air quality monitoring stations across Queensland which monitor for controlled pollutants in areas with large population bases or heavy industry adjacent to residential areas. The closest station to the MID Corridor is located adjacent to Woree State High School (- 16.9617, 145.7435), approximately 780m from the corridor, and has been in operation since 9 March 2023. For air

quality monitoring purposes, Particle PM $_{2.5}$ and PM $_{10}$ have been monitored, with the station also reporting on wind direction and speed, humidity, temperature, solar radiation, and rainfall.

The running average (as at 19 August 2024) of $PM_{2.5}$ is 9µg/m³ (24-hour average) which is below the average stated by the guideline for $PM_{2.5}$ (being 50µg/m³ for hourly average and 25µg/m³ for 24-hour average). The running average (as at 19 August 2024) of PM $_{10}$ is recorded as 16.1µg/m³ (24-hour average) which is also below 1 hour average (100µg/m³) and 24h average (50µg/m³). The air quality for the region is therefore considered 'good'.

National Pollutant Inventory

The National Pollutant Inventory (NPI), regulated by the Australian Government tracks pollution across Australia, from information provided by all major polluters in their annual reports of emissions to air. The NPI has emission estimates for 93 toxic substances and the source and location of these emissions. These substances have been identified as important due to their possible effect on human health and the environment. A NPI search conducted for the Project surrounds shows the following facilities as located near the MID Corridor:

- Barron Sands – Construction Material Mining, Kamerunga Road, Lake Placid;
- Viva Energy Cairns JUHI Airport - Petroleum Product Wholesaling;
- Viva Energy Cairns GA Airport - Aircraft Refuelling;
- Air BP Cairns - Petroleum Product Wholesaling;
- Northern Wastewater Treatment Plant - Sewage Treatment;
- Cairns AU056 – Mineral, metal, and chemical wholesaling; and
- Southern Wastewater Treatment Plant – Sewage Treatment Plant.

Barron Sands is intersected by the MID Corridor. Viva, Air BP and the Northern Wastewater Treatment Plant are located near the Cairns Airport, approximately 5km to the east of the proposed MID Corridor, with Cairns AU056 and the Southern Wastewater Treatment Plant located near Woree Substation, approximately 300m north-east of Woree Substation.

Sensitive receptors

Air sensitive receptors relevant to the Project include residential dwellings, schools, childcare centres, and retirement homes adjacent to the MID Corridor. Specific sensitive receptors were not identified for the assessment of emissions for the entirety of the route of trenching operations, instead, the screening model identified locations where the highest predicted Ground Level Concentrations (GLCs) are predicted.

Potential air quality impacts to these sensitive receptors from the Project are discussed in the following sections.

6.3.2 Potential impacts and mitigation measures

Construction phase

Impacts to local air quality as a result of construction would primarily be associated with dust emissions from the following activities:

- site preparation such as vegetation clearing, topsoil stripping, chipping/mulching, and ground surface levelling;
- transmission structure foundation construction;
- cable laying excavation and installation, including:

  - removal of road surface and road base;
  - excavation of trench;
  - loading and trucking of excavated soils; and

- Construction vehicle and equipment movements over access tracks and work sites, particularly on unsealed surfaces or where ground is exposed.

Exhaust emissions from vehicle and machinery operations will also be produced during construction.

The greatest contributor to air quality emissions would be from activities associated with open trenching of the underground cable. As such, to identify the potential worst-case scenario for the Project, modelling was undertaken for open trenching activities only. The modelling outcomes have been provided below.

Air quality modelling outcomes

Criteria

The AQIA considered a number of National and State criteria in order to identify whether the construction of the Project achieves both National and State air quality requirements. Criteria considered includes:

- National Environmental Protection (Ambient Air Quality) Goals;
- EPP (Air) Quality Objectives;
- Safe Work Australia Exposure Standards; and
- Business Queensland Exposure Standards.

The justification for the use of these criteria is detailed in the AQIA (Appendix F).

Assumptions

The AQIA included an initial screening and dispersion model of the MID Corridor (along the UG cable) to identify locations of potential greatest impact from construction-related air quality impacts.

Dust emission rates for the various activities associated with the trenching of the underground cable have been calculated using estimated volumes of soil handled for those activities and the NPI emission factors.

The trenching operations associated with the underground cable component will involve the following material handling activities:

- removal of road surface and road base;
- excavation of trench to a depth of nominal 1600mm and width of nominal 1380mm;
- trucking of the excavated soil from the excavation site to a location elsewhere for disposal;
- laying of conduits for electrical cabling in the trench;
- encapsulation of the conduits with a low strength cement (thermal backfill); and
- replacement of road base and resurfacing.

The excavation of trenches or underground boring and loading of trucks along the various streets were identified as having the highest emission rates. Total Suspended Particles (TSP) and PM_{10} emission rates from those activities were therefore modelled to provide a conservative (worst-case) understanding of dust impacts at nearby receptors.

Screening model

A screening model was then run to identify locations along the MID Corridor that have been modelled to have the highest ground level concentration of dust as a result of construction activities. Overall, the highest GLCs were predicted at Goomboora Park and along Shale Street (Figure 6-8). This is a result of the

southerly to south easterly air flows appearing to be influenced by the terrain and adversely impact upon dispersion of emissions from the trenching activities in this location.

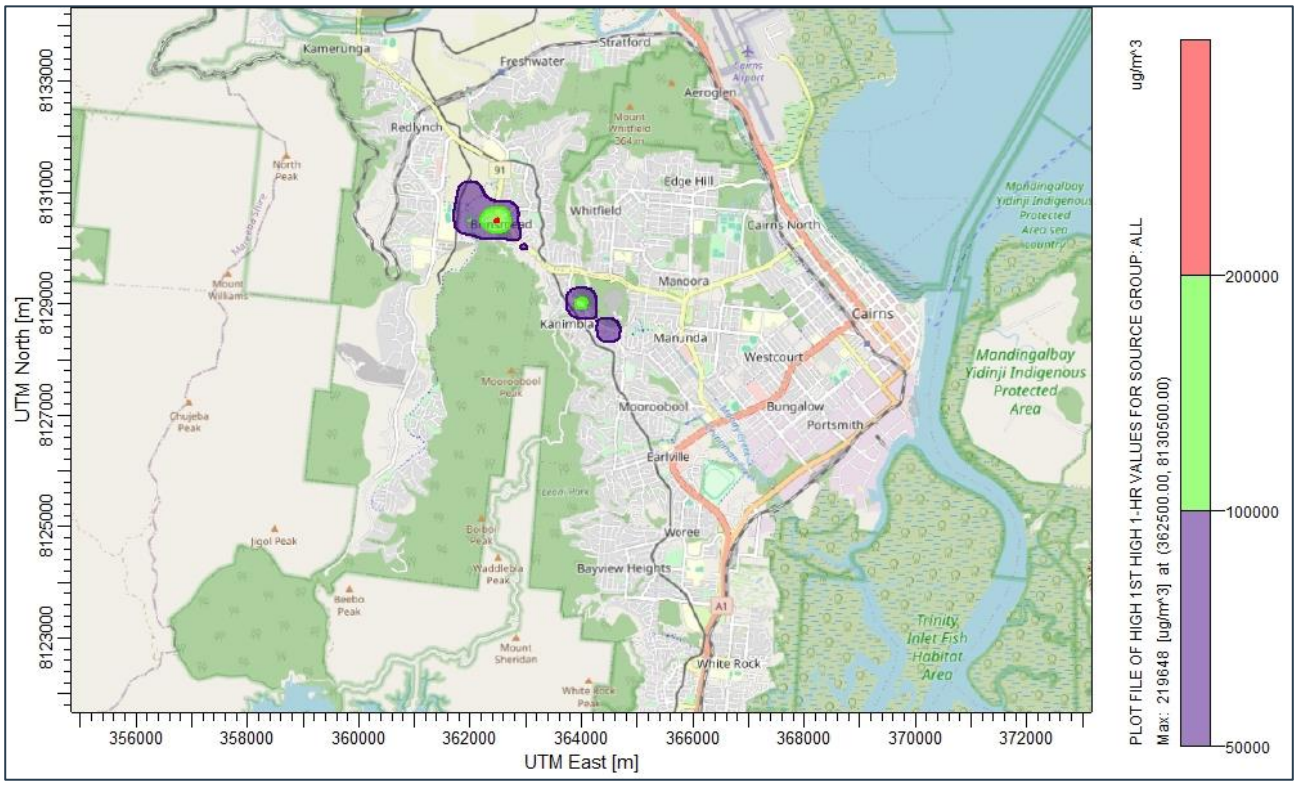


Figure 6-8 Peak 1-hour average isopleth from the screening model

Refined model

A portion of Shale Street was then selected for a refined modelling to provide a worst-case representation of the surrounding locations where trenching is to be carried out (Figure 6-9).

Figure 6-9 Selected sensitive receptor locations for refined dispersion modelling of trenching emissions

The model showed:

- The most significant impacts were observed at a single residence along Shale Street (shown as R1 on Figure 6-9), with the maximum predicted GLCs being 1.04% (TSP), 1.14% (PM_{10}) and 0.94% ($PM_{2.5}$) of the exposure limits. These are indicative of the worst-case scenario for the entire MID Corridor.
- Predicted particulate GLC were below the limits.
- Nitrogen oxides (NOx) was the most significant of the gaseous emission in relation to the exposure standards, with maximum predicted 8-hour GLCs being 17.9% of the Time Weighted Average (TWA) standard at one residence along Shale Street and 11.0% of the TWA standard at another residence on Christie Drive.
- The maximum predicted 15-minute NOx GLCs were 19.5% of the Short Term Exposure Limits (STEL) at a residence on Shale Street and 11.5% of the STEL at a residence on Christie Drive.
- Predicted 8-hour GLCs of all other emissions were below the respective exposure standards.

Overall, the predicted GLCs for all emissions from the trenching activities are below the various exposure standards and limits at residences immediately adjacent to the works. As such, these pollutants present a low risk of adverse health impacts to residents at the locations immediately adjacent to the trenching works at Shale Street and as such, the same outcome is inferred for the entirety of the project route.

Mitigation measures

Measures to manage air quality impacts from construction activities associated with the Project are outlined within the EMP (Appendix K). Additionally, the following will be implemented:

- To minimise impacts from dust and particulate matter:
    - Restrict vehicle movements to within designated access tracks and enforce speed limits (<40km/h) where tracks are unsealed.
    - Apply water or dust suppressants to work areas, stockpiles and access tracks, as required, to prevent dust nuisance.
    - Schedule dust generating activities in proximity to sensitive receptors (i.e. avoiding dry, windy conditions), where possible.
    - Adequately store bulk materials, and ensure vehicles transporting materials to and from site, are covered.
    - Orientate material stockpiles (or cover) in a direction that reduces exposed surfaces to prevailing winds.
    - Stabilise or revegetate disturbed areas or bare earth as soon as practical to minimise wind-blown dust.
- To minimise vehicle and machinery emissions:
    - Ensure stationary plant, construction vehicles and equipment (especially diesel motors) are working correctly and maintained as per manufacturers recommendations (this will also aid in the mitigation of potential odour emissions).
    - Emissions controls on diesel engine machinery are maintained and operated to manufacturer specifications (in particular deNOx and fine particle filters) and comply with best practice emissions control standards.
    - Shut down plant and equipment idling for excessive periods (i.e. longer than 5 minutes) where possible.
    - Avoiding or minimising queuing in roadways approaching the worksites or adjacent to other sensitive activities.

Minimise queuing of construction vehicles and idling for excessive periods (e.g. more than 5 minutes).

Operation and maintenance phase

Potential impacts to air quality during operation and maintenance of the Project are expected to be negligible and associated with maintenance activities such as:

- control of regrowth vegetation in the easements;
- movement of maintenance vehicles and machinery over access tracks and the easements; and
- exhaust emissions from operating maintenance vehicles and machinery.

Potential air quality impacts associated with maintenance activities are expected to be low level, localised and short term due to the time spaced maintenance regimes. Any impacts will be similar to those generated by maintenance activities associated with the existing transmission line and substation.

Measures to manage air quality impacts from operation and maintenance activities associated with the Project are outlined within the EMP (Appendix K).

Decommissioning phase

The design life of the proposed transmission line infrastructure is typically 50 years and it is possible that after this period, the infrastructure may be decommissioned, dismantled and removed. Following construction and commissioning of the Project, the existing transmission line will be decommissioned, and the impacts outlined here are also applicable those decommissioning activities.

Potential impacts to local air quality may occur during the decommissioning phase and would primarily be associated with the following activities:

- clearing and chipping of regrowth vegetation in the easements to allow access for vehicles and machinery;
- vehicle and machinery movement over access roads and the easements;
- exhaust emissions associated with vehicle and machinery operation during decommissioning works; and
- ground surface levelling or grading to better facilitate passive rehabilitation of the easements and transmission line structure locations.

Potential impacts to air quality associated with decommissioning activities are expected to be localised and short term.

6.4 Hydrology

The following flood impact assessments have been undertaken for the Project:

- Flood Impact Assessment for Powerlink's Redlynch Site (Lot 2 SP279529) was completed for the proposed filling associated with a new electrical transmission pole proposed on the site by WMS (January 2025) (Appendix E).
- Flood Impact Assessment for Powerlink's Stewarts Road Site (Lot 1 RP716266 and Lot 3 SP173007) was completed for proposed filling associated with the new substation at Barron by WMS (February 2025) (Appendix E).

The findings of the above flood impact assessments are included in the assessment below.

6.4.1 Existing environment

Surface water

The Barron River rises near Herberton in the Hugh Nelson Range and after flowing across the Atherton Plateau and through the Barron Gorge, enters the Pacific Ocean at Trinity Bay, just north of Cairns. The MID Corridor (overhead line section) intersects the Barron River approximately 12.5km upstream from Trinity Bay, and 900m downstream from Kamerunga Road. The underground cable section crosses under Freshwater Creek, a tributary of the Barron River, within Goomboora Park. The underground cable section also crosses under tributaries of Trinity Inlet, Chinaman Creek, Clarkes Creek and Gordon Creek.

Freshwater Creek, Chinaman Creek, Clarkes Creek, and Gordon Creek are all mapped as defined by the Water Act. The downstream limit for the Barron River under the Water Act is approximately 1,300m upstream from where the MID Corridor intersects the River. The MID Corridor also intersects a tributary of Freshwater Creek which is mapped as a drainage feature under the Water Act. A number of other unmapped tributaries of the abovementioned creeks, not currently mapped under the Water Act, are intersected by the MID Corridor. Water Act watercourses are shown on Figure 6-10.

Waterway barrier works are regulated under the Fisheries Act and are barriers (full or partial) to fish movement that are installed across waterways. Barrier works include construction, raising, replacement and some maintenance works on structures such as culvert crossings, bed level and low-level crossings, weirs, bridges, and dams (both permanent and temporary). Waterway barrier work mapping for waterways intersected by the MID Corridor are shown in Figure 6-11.

All watercourses/waterways intersected by the MID Corridor, including their Water Act identification, waterway barrier work listing under the Fisheries Act, and stream order, are summarised in Table 6-6.

Table 6-6 Watercourses/waterways intersected by the proposed MID Corridor

Watercourse/waterway name	Watercourse ID (Water Act)	Waterway for waterway barrier works impact rating (Fisheries Act)	Stream order (VM Act)
Substation component			
N/A			
Overhead transmission line component			
Barron River	Unmapped	Major	7
Tributary of Freshwater Creek	Drainage feature	Moderate	2
Tributary of Freshwater Creek	Unmapped	Low	1
Tributary of Freshwater Creek	Unmapped	Moderate	2
Underground Cable Component			
Freshwater Creek	Mapped watercourse	Major	4
Unmapped canal	Unmapped	N/A	1
Unmapped canal	Unmapped	N/A	1
Unmapped canal	Unmapped	N/A	1
Unmapped canal	Unmapped	N/A	1
Unmapped canal	Unmapped	Low	1
Unmapped tributary of Chinaman Creek	Unmapped	N/A	1
Chinaman Creek	Mapped watercourse	Moderate	2
Clarkes Creek	Mapped watercourse	Low	1
Gordon Creek	Mapped watercourse	Moderate	2

WATER ACT 2000 WATERCOURSES INTERSECTED BY THE PROPOSED MID CORRIDOR

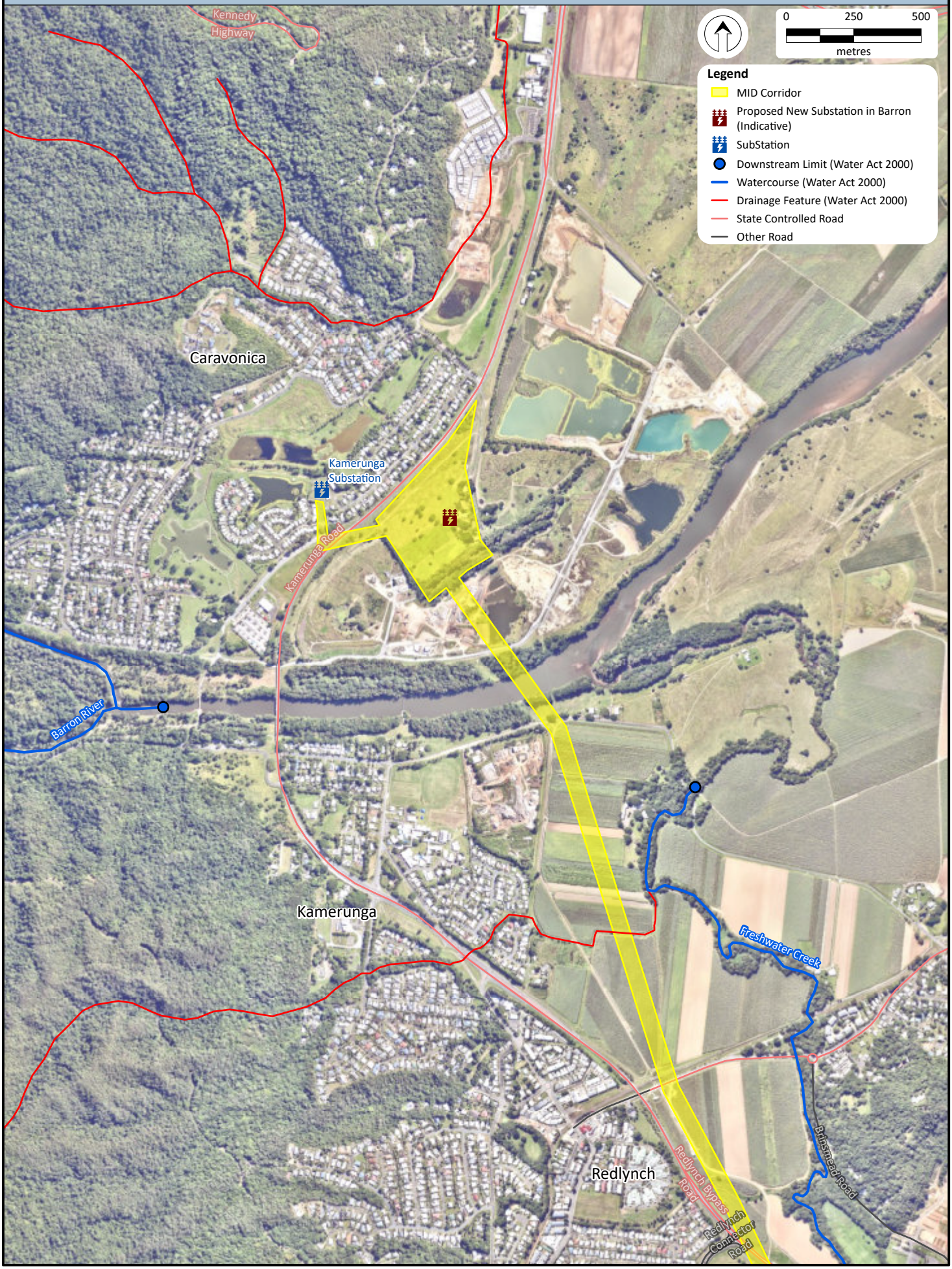


Figure 6-10-1

WATER ACT 2000 WATERCOURSES INTERSECTED BY THE PROPOSED MID CORRIDOR

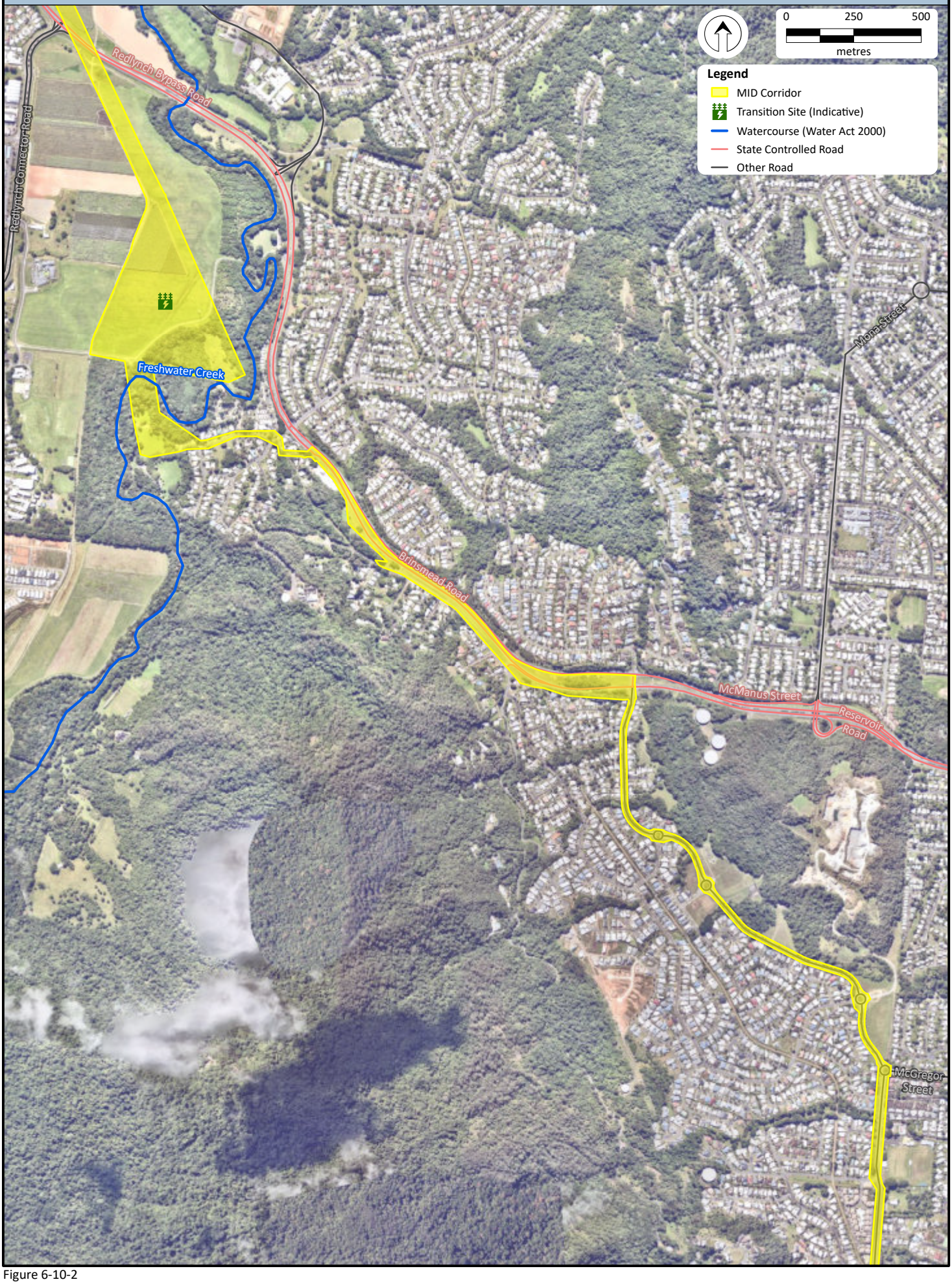


Figure 6-10-2

WATER ACT 2000 WATERCOURSES INTERSECTED BY THE PROPOSED MID CORRIDOR

Figure 6-10-3

FISHERIES ACT 1994 WATERWAYS FOR WATERWAY BARRIER WORKS INTERSECTED BY THE PROPOSED MID CORRIDOR

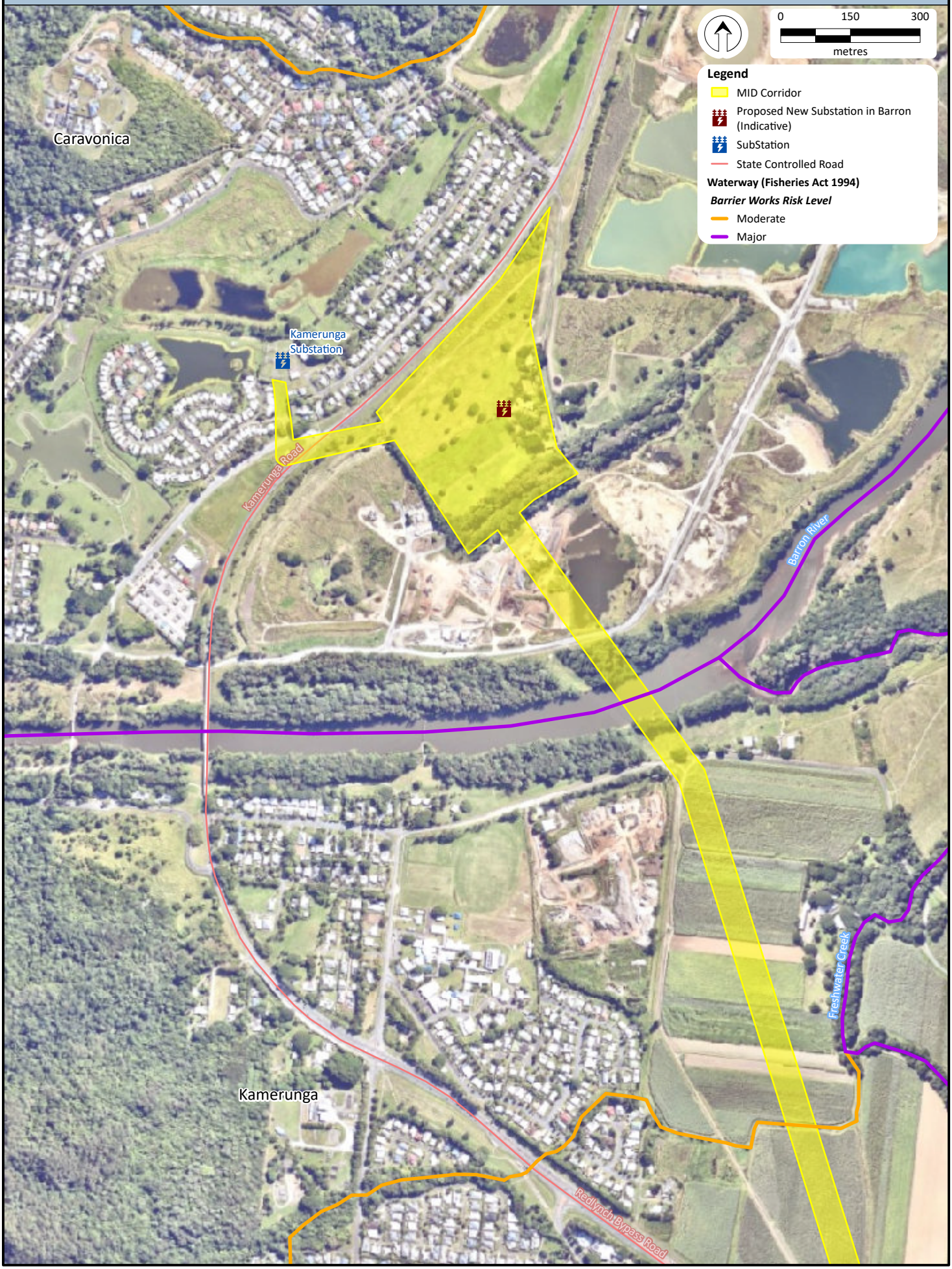


Figure 6-11-1

FISHERIES ACT 1994 WATERWAYS FOR WATERWAY BARRIER WORKS INTERSECTED BY THE PROPOSED MID CORRIDOR

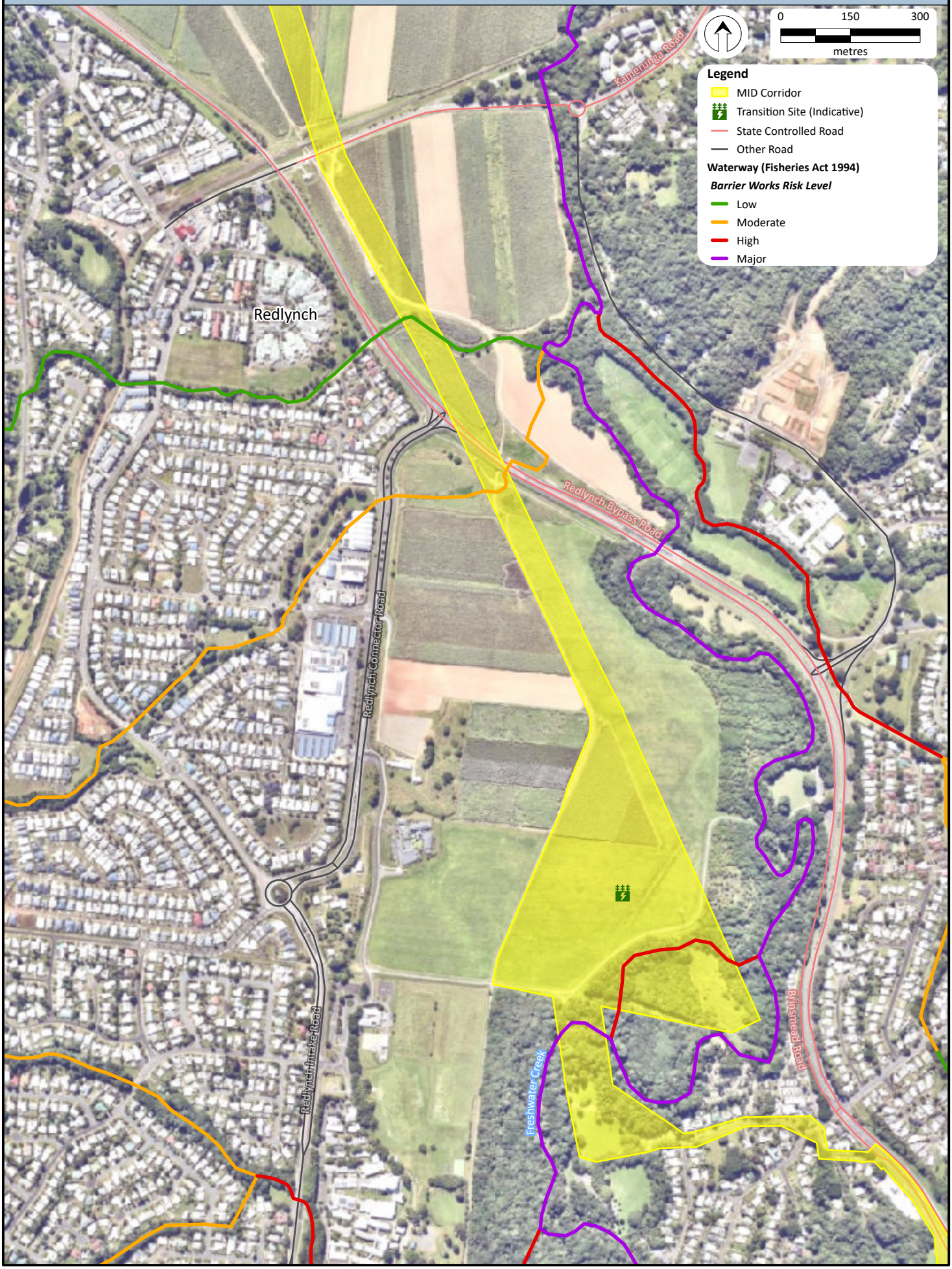


Figure 6-11-2

FISHERIES ACT 1994 WATERWAYS FOR WATERWAY BARRIER WORKS INTERSECTED BY THE PROPOSED MID CORRIDOR

Figure 6-11-3

FISHERIES ACT 1994 WATERWAYS FOR WATERWAY BARRIER WORKS INTERSECTED BY THE PROPOSED MID CORRIDOR

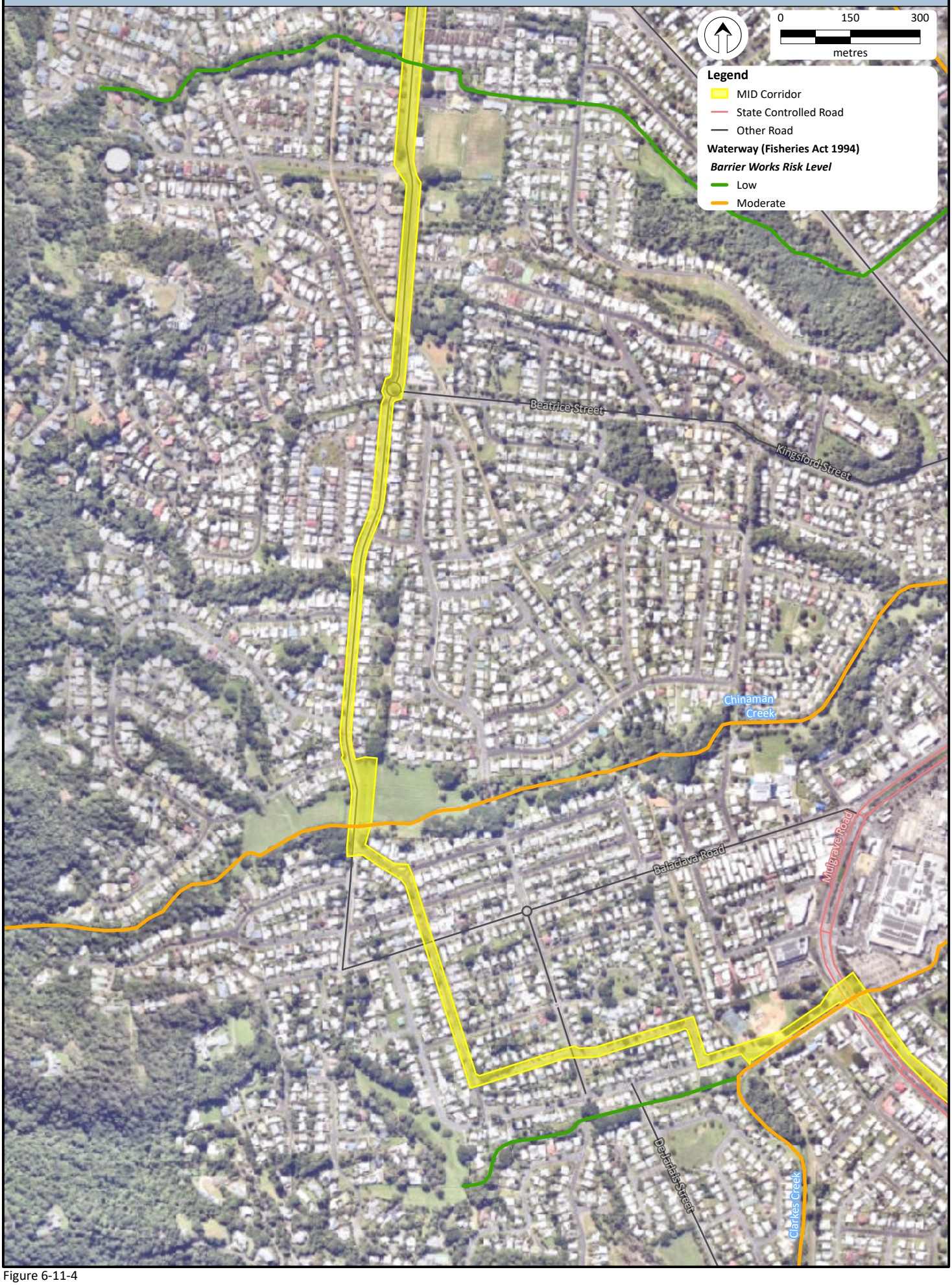


Figure 6-11-4

FISHERIES ACT 1994 WATERWAYS FOR WATERWAY BARRIER WORKS INTERSECTED BY THE PROPOSED MID CORRIDOR

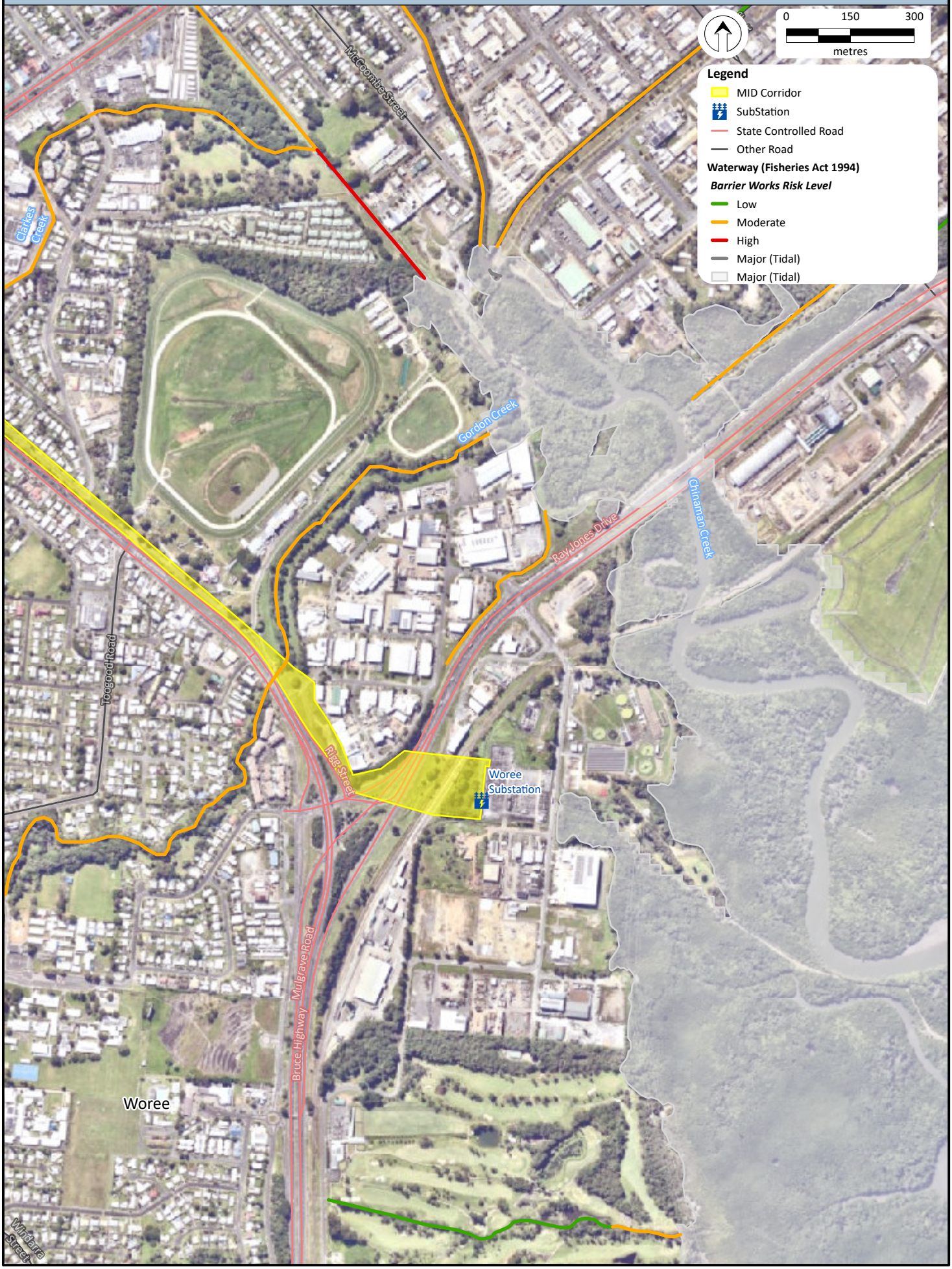


Figure 6-11-5

Environmental values

Environmental values (EVs) are the qualities that make water suitable for supporting aquatic ecosystems and human uses, requiring protection from the effects of habitat alteration, waste releases, contaminated runoff and changed flows s. This ensures healthy aquatic ecosystems and waterways that are safe for community use. The EVs of waters are protected under the EPP (Water and Wetlands). The policy sets water quality objectives (WQOs), which are physical and chemical measures of the water (i.e. pH, nutrients, salinity etc.) to achieve the EVs set for a particular waterway or water body. EVs define the suitable uses of the water (i.e. aquatic ecosystems, human consumption, industrial use etc.).

Schedule 1 of the EPP (Water and Wetlands) lists rivers and catchments as schedule outline where EVs have been determined and issued by the regulatory authority. The Project intersects the following schedule outline Basins, which have EVs designated (Figure 6-12):

- Barron River Basin – EVs and WQOs: Basin No. 110 and adjacent coastal waters (Barron River Basin EVs and WQOs) (DES, 2020); and
- Mulgrave-Russell Rivers Basin - EVs and WQOs: Basin No. 111 and adjacent coastal waters (Mulgrave-Russell Rivers Basin EVs and WQOs) (DES, 2020).

Within two schedule outline, MID Corridor intersects the following Environmental Protection Policy environmental value zone which have EVs designated:

- Chinaman, Skeleton & Blackfellow Creeks with Moderately disturbed [MD] management intent.
- Thomatis & Stratford Creeks with Moderately disturbed [MD] management intent.
- Freshwater Creek with Moderately disturbed [MD] management intent.

The applicable EV values for schedule outline presented above are detailed in Table 6-7.

Water Quality

Relevant WQOs for the Project area are outlined within the EPP Water Plan, as well as within the Australian and New Zealand Environment and Conservation Council (ANZECC) & Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000 guidelines.

Both Water Plans provide water quality objectives for human use environmental values. As the Project intersects waters that have human use environmental values, the water quality objectives set out in each plan are to be considered during the construction and operation phases of the Project. Where more than one EV applies to a given water (for example aquatic ecosystem and recreational use), the adoption of the most stringent WQO for each water quality indicator will then protect all identified EVs. These objectives are provided in Table 6-8.

A review of SPP IMS indicated that the MID Corridor does not intersect with water supply buffer area, water resource catchments and high ecological value water area.

The closest high ecological value water area is mapped approximately 1.6km west from OH Transmission line component and 1.2km south-west of UG Cable component of MID Corridor.

WATER CATCHMENTS INTERSECTED BY THE PROPOSED MID CORRIDOR

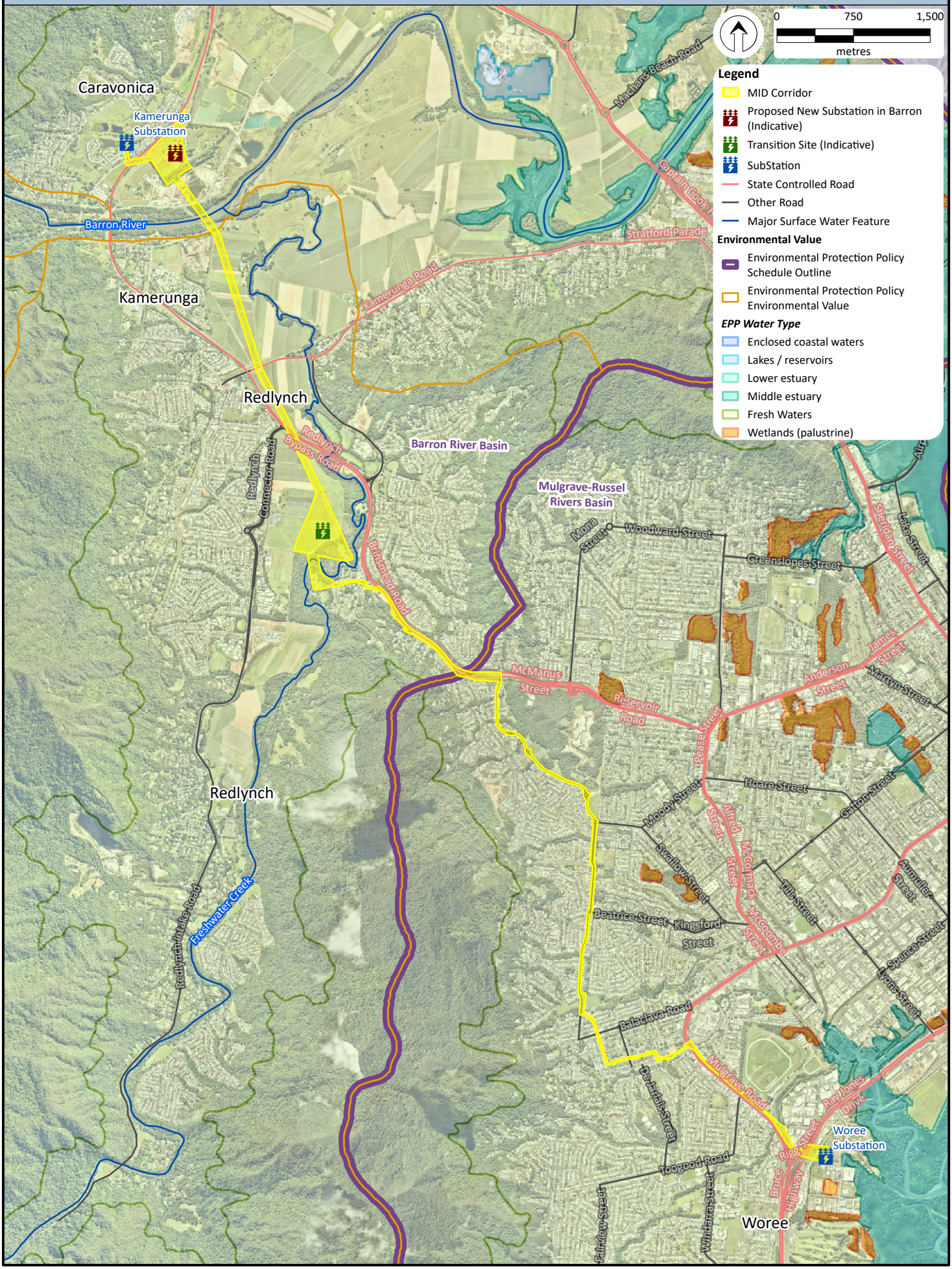


Figure 6-12

Table 6-7 Environmental values applicable to surface waters in proximity to the proposed MID Corridor

Surface water feature	Environmental value								
	Aquatic ecosystems	Stock watering	Human consumer	Primary recreation	Secondary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual
Barron River Basin EVs - Surface fresh waters (rivers, creeks, streams) in developed areas (e.g. urban, industrial, rural, agricultural and farmlands)									
Thomatis and Stratford Creeks	P		P	P	P	P			P
Freshwater Creek	P	P	P	P	P	P	P	P	P
Mulgrave-Russell Rivers Basin EVs - Surface fresh waters (rivers, creeks, streams) in developed areas (e.g urban, industrial, rural, agricultural and farmlands)									
Chinaman, Skeleton and Blackfellow Creeks	P		P	P	P	P			P

Table 6-8 Water quality objectives to protect human use environmental values applicable to surface waters in proximity to the proposed MID Corridor

Basin	Level of Protection	Water type	Water quality indicators													
			Physico-chemical		Nutrients								Algal growth	Water clarity		
			Dissolved Oxygen (DO)	pH	Ammonia N	Oxidised N	Particulate N	Organic N	Total N	FRP	Particulate P	Total P	Chl-a	Turbidity	Secchi	
			% saturation		µg/L											
Barron River Basin EVs	Moderately disturbed waters	All developed fresh waters	85-120	6.0-8.0	<10	<50	nd	nd	<340	<8	nd	<25	<1.5	<15	nd	
Mulgrave-Russell Rivers Basin EVs	Moderately disturbed waters	All developed fresh waters	85-120	6.0-8.0	<10	<50	nd	nd	<340	<8	nd	<25	<1.5	<15	nd	

Notes:

DO: dissolved oxygen, FRP: Filterable Reactive Phosphorous, Chl-a: Chlorophyll-a, TSS: Total Suspended Solids, nd: no (or insufficient) data
Units % saturation: percent saturation, µg/L: micrograms per litre, NTU: nephelometric turbidity units, m: metres, mg/L: milligrams per litre.

Wetlands

A review of the Queensland Government WetlandInfo mapping identified that watercourses along the MID Corridor are mapped as hydrologically natural riverine wetlands. Additionally, the Pioneer North Queensland (PNQ) Sand Mine contains a hydrologically modified lacustrine wetland. No MSES high ecological significant wetlands, or VM Act wetlands are intersected by the MID Corridor.

The location of these within proximity to the MID Corridor are shown on Figure 6-13.

Coastal processes

The MID Corridor crosses the Barron River, approximately 5.5km from its mouth on the east coast of Queensland. The Barron River is tidal at the location. The area intersected by the MID Corridor is mapped on SPP IMS as being subject to coastal hazards such as erosion and storm inundation as shown in Figure 6-14.

The SPP IMS shows OH Transmission line and UG Cable component of MID Corridor as being within the coastal management district where it intersects with the Barron River (located at the suburb of Kamerunga) and Gordon Creek (located at the suburb of Woree).

Flooding and inundation

MID Corridor

The Barron River has a well recorded flood history. The Barron River, which has its headwaters east of Atherton, has a catchment area of about 2,100km^2 above Kamerunga at the mouth of the river delta. There is a strong rainfall gradient across the catchment with the heaviest rain typically falling along the coastal strip around Cairns and Kuranda. In the western area of the catchment, rainfall totals tend to be significantly less. Heavy localised rainfall along the coastal strip up to Kuranda can cause rapid river rises in the lower Barron River around Kamerunga although larger floods tend to be associated with catchment wide heavy rainfalls.

SPP IMS shows the Barron River, Freshwater Creek and extended area along the Barron River and Freshwater Creek are mapped under medium storm tide inundation area and high storm tide inundation area (refer to Table 5-1). Therefore, these areas are more susceptible and have a potential to experience flooding and inundation during the extreme weather event.

CairnsPlan provides a Flood and Inundation Hazard Overlay which identifies areas at higher risk of flood inundation. The extent of land depicted as being affected by the Flood and Inundation Hazard Overlay equates to areas likely to be affected by a Q100 flood event (with an average recurrence interval of 100 years). The low-lying plains adjacent to the Barron River and Freshwater Creek which are crossed by the Project are located within this overlay area. Although predominantly covering flat land under cane production, the Flood and Inundation Hazard Overlay also covers urban areas within Caravonica including the proposed new substation in Barron, the OH Transmission line component, the UGOH transition site and areas around Irene Street Flood Plain Area (Chinaman Creek), Clarkes Creek and Gordon Creek. These areas are mapped as Designated flood hazard area - Flood Inundation trigger area. Additionally, Barron River, Freshwater Creek, its tributaries and its extended area are mapped as being flood inundation areas and storm tide inundation area under overlay (CRC. 2016). In addition, the proposed new substation in Barron site and part of OH Transmission line is mapped under the flood precinct 1 – Barron River Delta. The extent of the MID Corridor affected by flooding as indicated on the Flood and Inundation Overlay is shown on Figure 6-15**.**

It is understood that CRC are undertaking a review of their flood modelling for the Cairns Region which will be updated by the end of 2024. Outcomes of the updated flood modelling and mapping will be incorporated into the detailed design and construction management of the Project.

Substation site

The Flood Impact Assessment prepared by WMS (Appendix E) details that the new substation in Barron remains unaffected by Barron River flooding until flood levels exceed a 1 in 10 year annual exceedance probability (AEP) flood event and is generally consistent with other flood mapping of the area.

In a 1 in 20-year AEP flood event, the Barron River breaks out through Caravonica and areas south of the substation site. Within the new substation in Barron, this breakout flow is generally contained within the natural low flow paths within the site.

During events greater than a 1 in 20-year AEP flood event, increased breakout flow from the Barron River inundates the site.

New electrical transmission pole

The Flood Impact Assessment prepared by WMS (Appendix E) details that the new electrical transmission pole site is located within the Freshwater Creek floodplain, an area that regularly inundates due to the presence of the Cairns Western Arterial Road and its low-lying nature. There is minimal development nearby, with the subject site surrounded by predominately sugar cane farms or densely vegetated natural areas.

A local, site-specific flood model within Freshwater Creek was developed by WMS Engineering for the flood impact assessment in accordance with Australian Rainfall and Runoff 2019 guidelines. The results of the model identified that in a 1 in 50% AEP flood event, low level inundation of the subject site would begin. Velocities in the area would be very low (~0.25m/s) and access to the site would be limited. In more extreme events, the flood depth would continue to rise, with depths in excess of 1.5m expected around the site in a 1% AEP flood event. Velocities would generally increase; however, remain relatively low at <1m/s.

WETLANDS INTERSECTED BY THE PROPOSED MID CORRIDOR

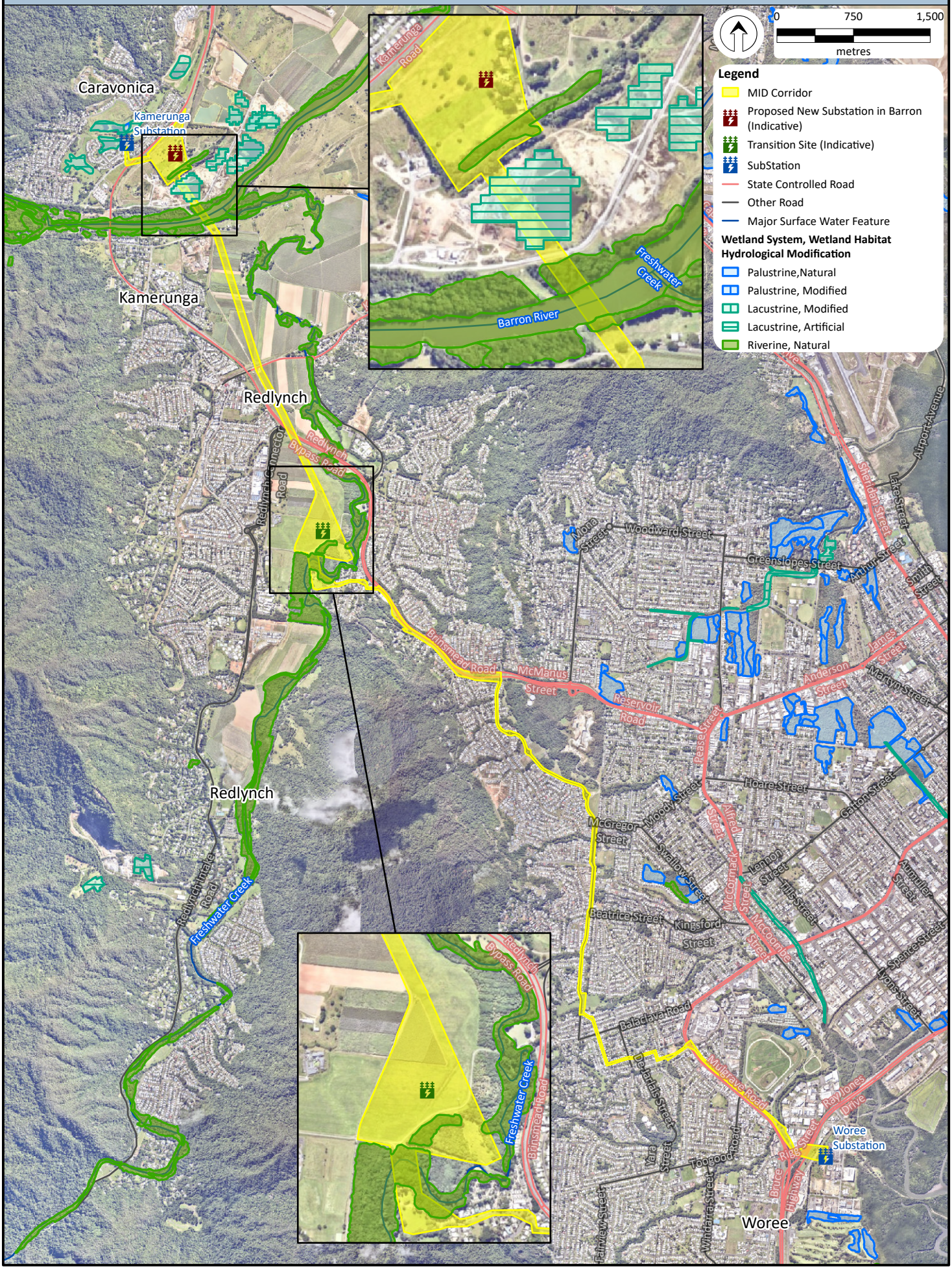


Figure 6-13

COASTAL PROCESSES WITHIN PROXIMITY TO THE PROPOSED MID CORRIDOR

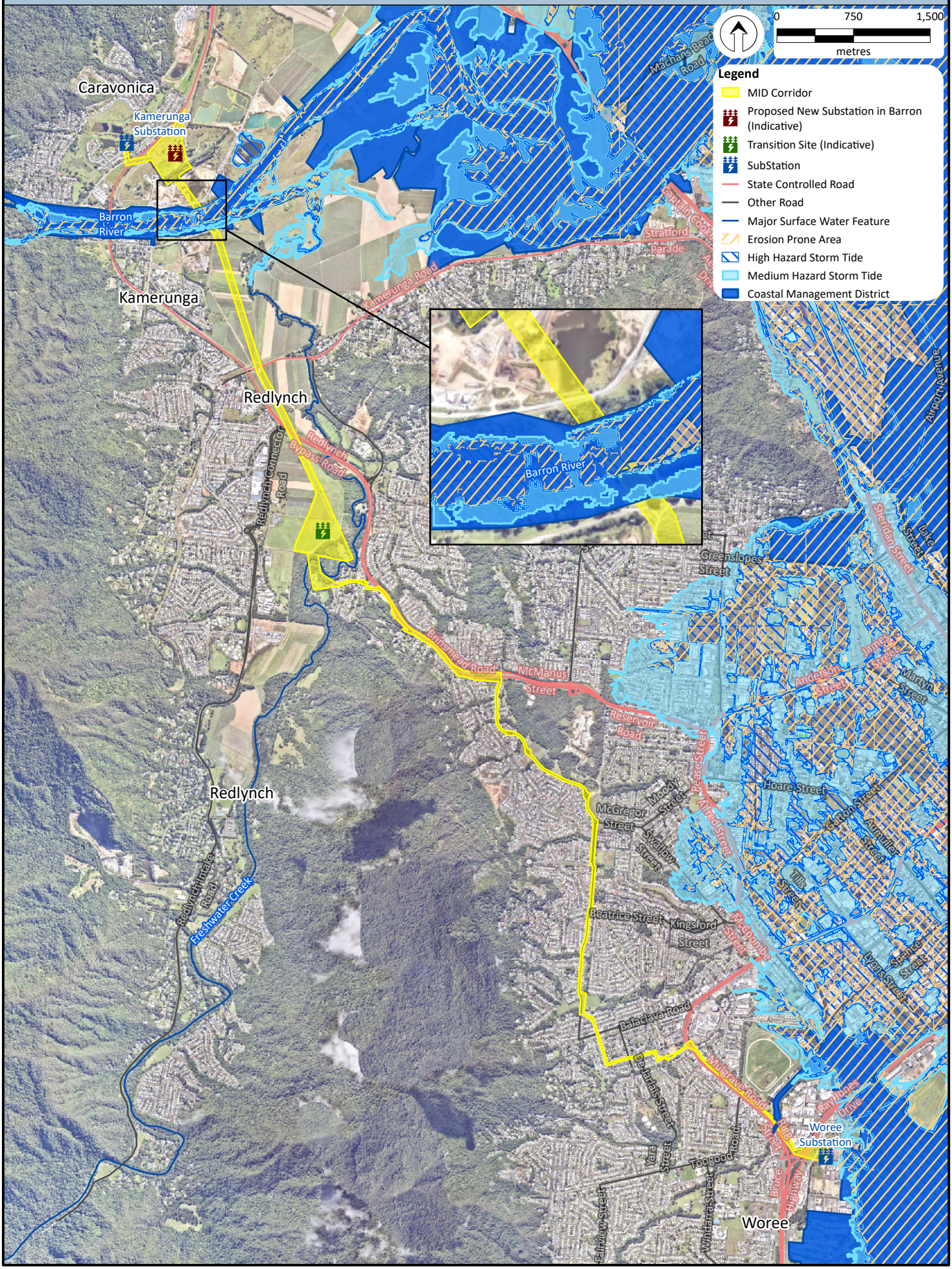


Figure 6-14

FLOODING AND COASTAL PROCESS CONSTRAINTS OF THE PROPOSED MID CORRIDOR

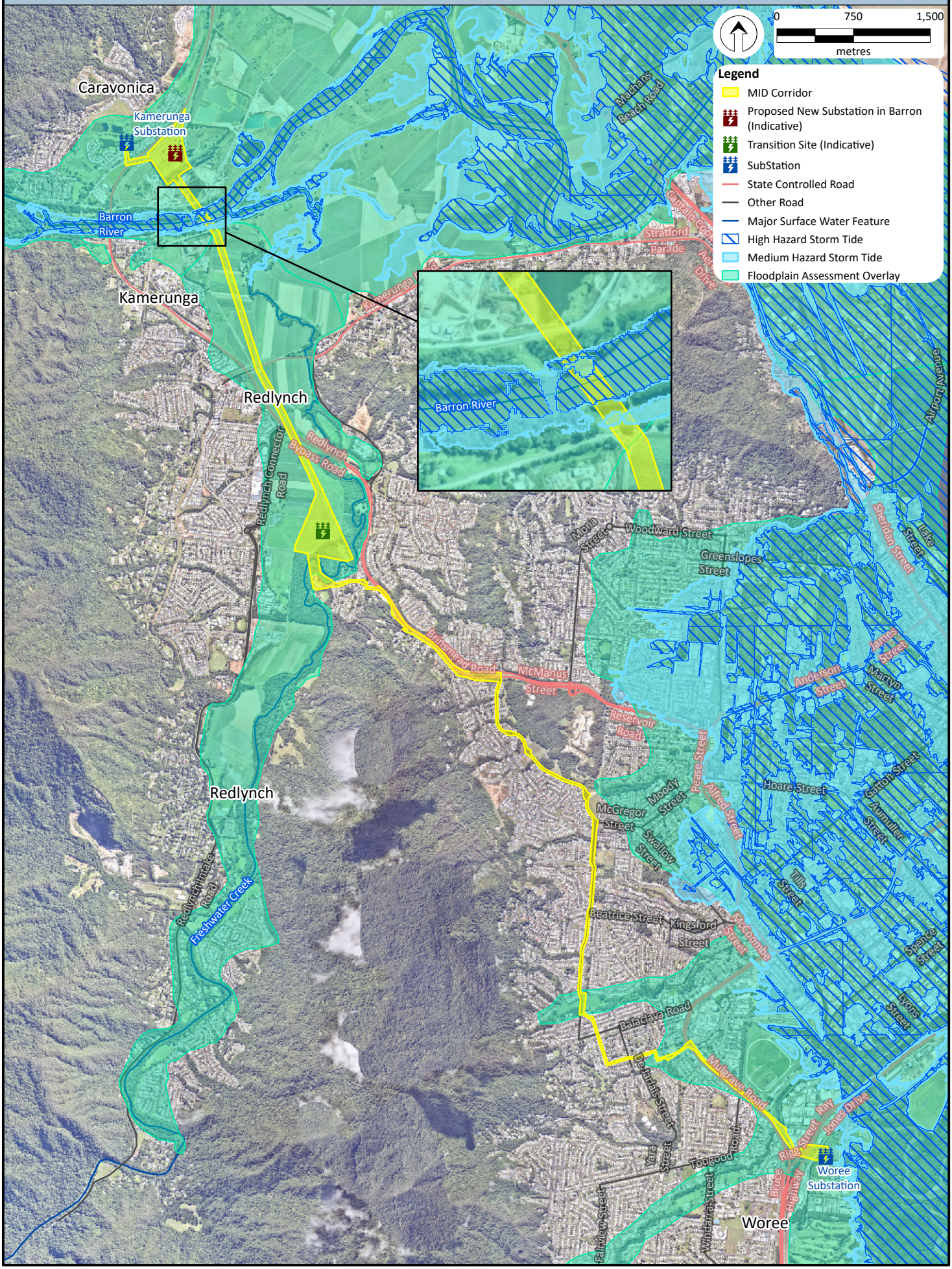


Figure 6-15

Groundwater

There are four registered groundwater bores within the MID Corridor, with a further 18 within 200m of the MID Corridor. Most of these bores are concentrated in the north of the MID Corridor, around the proposed new substation in Barron. Many are associated with the existing sand mining and landfill operations in the area. Groundwater depth information from these bores illustrates that depth to groundwater is generally quite shallow, with levels recorded between -4.8m and 5.8m below ground level.

Limited information relating to groundwater depth is available for the underground cable section of the MID Corridor.

Groundwater dependent ecosystems

Groundwater Dependent Ecosystems (GDE) are ecosystems that require access to groundwater to maintain their functioning. A review of the Queensland Spatial layers for GDEs was undertaken which identified no GDES within the MID Corridor.

6.4.2 Potential impacts and mitigation measures

Infrastructure associated with the Project has the potential to impact on the hydrology of the area, including the movement of water, and impacts to water quality. However, the nature and location of the proposed transmission line and substation means that the likelihood of impacts occurring is small.

The detailed design phase of the Project has not yet been finalised. A number of key items will need to be determined during the detailed design phase. Regardless, potential impacts to hydrology will be managed in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K) and are summarised further below.

Construction phase

Surface water

Construction activities have the potential to cause impact to riparian zones, surface water quality and flow through the clearing of transmission pole sites, trenching areas for the underground cable, access tracks, and general ground disturbance. As a result, impacts to surface water quality are primarily limited to increases in suspended sediment due to runoff from disturbed areas during construction.

Where access tracks are required to be constructed over mapped waterways for waterway barrier works, the ADR for WWBW will be met.

Water quality and erosion and sediment control mitigation measures are summarised below:

- Transmission poles will be set-back from riparian vegetation and the high-bank of a watercourse or drainage line a minimum of 50m, where possible.
- Underboring techniques to be utilised for the underground cable component along watercourses to minimise impacts to the watercourse bed and banks and water quality.
- The substation will be designed to ensure that any chemical, oil or fuel storage is appropriately bunded, generally in accordance with AS1940:2004 (The Storage and Handling of Flammable and Combustible Liquids).
- All soil disturbance activities will be managed in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines 2008 and will be undertaken under a Project ESCP;

- Any areas required for stockpiling must have topsoil stripped (~100mm depth) prior to placement of any stockpile material to ensure suitable material is available for rehabilitation.
- Existing access tracks will be utilised to access proposed poles. New access tracks will only be constructed where there are no available.
- Any spillages of fuel or chemical will be cleaned up immediately and in accordance with the requirements of the EMP.
- Herbicide application is to be undertaken by appropriate licensed operators with equipment approved for weed spraying operations.

Groundwater

Excavation of footings for the transmission line structures and trenching works for the underground cable poses a minor risk to groundwater resources. Footing depths for transmission structures are expected to be in the order of 10m. Given groundwater depths in the Project area have been recorded as below 10m, interference with groundwater may occur during construction.

Trenching activities are unlikely to occur at depths deep enough to interfere with groundwater resources.

Groundwater mitigation measures are summarised below:

- If groundwater is present during construction of pole footings, dewatering may need to occur within the excavated area until the construction of footings is completed.
- Water accumulated in the sumps will be monitored for contaminants of concern. Any contaminated waters will be treated or removed. In accordance with Powerlink's standard environmental control ESCP of the EMP (Appendix K), a dewatering method is to be prepared and implemented for the Project. The objective of this dewatering method is to prevent contamination of land, surface waters or groundwater's by establishing suitable protocols to treat or remove contaminated water from the site.

Coastal processes

In addition to flooding, the OH Transmission line component of MID Corridor also crosses a coastal management district at the Barron River. A review of SPP IMS indicate also indicated that Gordon Creek (located at the suburb of Woree) are mapped as coastal management district which is traversed by UG Cable component of MID Corridor (refer to Table 5-1).

The MID Corridor crosses the Barron River, approximately 5.5km from its mouth on the east coast of Queensland. The Barron River is tidal at the location, where MID Corridor intersects, and area intersected with MID Corridor and land along the Barron River are mapped as being subject to coastal hazards such as erosion and storm inundation.

According to the SPP IMS, the extent of land mapped as being within an erosion prone area, and storm tide inundation area is shown in Figure 6-15.(DSDIP, 2024)

Transmission structures will be placed outside of this land wherever possible. As discussed in Section 6.1.1 an ESCP will be developed for the Project, which will be implemented during construction and will include specific measures to limit adverse impacts associated with erosion and sediment loss.

Flooding

Substation site

The flood impact assessment (Appendix E) of the proposed filling within the substation site was undertaken by WMS to determine the extent and magnitude of afflux. The assessment identified the following:

- Significant afflux is expected to occur west and north of the subject site due to the extent of filling proposed.
- Initial investigations of compensatory earthworks to the west and north of the fill pad has shown a reduction in some flood events however moderate afflux will likely still occur on the property to the west.

Flooding mitigation measures are summarised below:

- Flood mitigation works will be required to offset the significant afflux expected to occur west and north of the substation site.
- Compensatory earthworks to the west and north of the fill pad shows a reduction in some flood events; however, moderate afflux will likely still occur on the property to the west.
- Relocation of the fill pad to the south/east plus compensatory earthworks appear to reduce the offsite afflux in most flood events.
- Further modelling of flood mitigation options is required once civil design works commences.
- To achieve the desired 0.5% AEP flood immunity, a fill pad level of 9.6m AHD is recommended.

The flood impact mitigation measure in relation to the design and construction of the proposed new substation in Barron is detailed in Flood Impact Assessment (Appendix E).

Transmission pole site

Based on the flood impact assessment undertaken by WMP (Appendix E), the following conclusions can be made:

- Afflux up to 40mm is likely to extend up to 30 m into the neighbouring lot (Lot 1 SP279529). As the land being impacted by this afflux is used for growing sugar cane and will already be inundated during frequent flood events, there is no actionable nuisance being created by the flood impact.
- Afflux >10mm is not anticipated to extend to any habitable dwellings.

Flooding mitigation measures are summarised below:

- To achieve the desired 0.5% AEP flood immunity, a fill pad level of 10.9m AHD is recommended. If the flood immunity was reduced to the 1% AEP flood event, a fill pad level of 10.6m AHD is recommended.

Access tracks

Access tracks will be required for the construction phase to move equipment and personnel to each pole construction site and to undertake vegetation clearing. During the operational phase the access tracks will be used for regular inspection and maintenance activities, including vegetation maintenance.

Construction of access tracks has the potential for the following impacts if unmitigated.

- Increased erosion as a result of cut and fill activities.
- Increased sediment movement into downstream areas.
- Affect riparian vegetation through clearing activities.

Water use and sourcing

Detailed water use by the Project is still currently unknown. Preliminary estimates for water use during the construction phase will include the following.

- dust suppression;

- compaction of access tracks;
- vehicle/ machinery wash-down bays; and
- concrete production.

Operation and maintenance phase

Minimal impacts to water quality will occur during operation and maintenance phases due to the limited activities expected. Impacts may occur, such as:

- vegetation maintenance activities resulting in erosion and sediment run off;
- use of herbicides to control vegetation regrowth causing impacts to water quality; and
- accidental fuel or chemical spills associated with maintenance activities on structures or at the substation causing impacts to water quality.

Decommissioning phase

Decommissioning, dismantling, and removing transmission lines, structures, and the substation as the end of their design life have the potential to impact on hydrology, such as increased erosion and sediment runoff and reduction in water quality, including from the following activities:

- vehicle and machinery movement over access roads and existing easement; and
- ground surface levelling or grading for rehabilitation of the easement.

Potential impacts associated with decommissioning activities are expected to be localised and short-term and will result in a net improvement of the environment as a result of removal of infrastructure and rehabilitation of the Project area.

6.5 Protected areas

6.5.1 Existing environment

Protected areas represent areas that are protected for the conservation of natural and cultural values as well as areas managed for production of forest resources, including timber and quarry material.

The MID Corridor does not intersect any Commonwealth Protected Areas; however, it intersects the State-listed Kamerunga Conservation Park on the northern bank of the Barron River. The MID corridor intersects 0.31ha of this Kamerunga Conservation Park. The Kamerunga Conservation Park protects regional ecosystems (REs), protected species under the NC Act, as well as Indigenous cultural heritage values. The extent of Kamerunga Conservation Park in relation to the MID Corridor is shown on Figure 6-16. Other protected areas (both Commonwealth defined by EPBC Act and State-listed defined by NC Act) within 2km of the MID Corridor have been summarised in Table 6-9.

Table 6-9 Protected areas within 2 km of the proposed MID Corridor

Name	Governing legislation	Proximity to the proposed MID Corridor
Dinden National Park	EPBC Act	Approximately 1.3km south/south-west
Barron Gorge National Park	EPBC Act	Approximately 1.8km west
Kuranda National Park	EPBC Act	Approximately 1.9km north
Mount Whitfield Conservation Park	NC Act	Approximately 1.6km west
Anderson Street Conservation Park	NC Act	Approximately 1.4km east

6.5.2 Potential impacts and mitigation measures

The overhead component of the MID Corridor intersects 0.31ha of the Kamerunga Conservation Park adjacent to the Barron River (shown on Map 10 of Appendix D). Conservation Parks are protected under the NC Act and are considered a prescribed environmental matter (MSES; protected area) under the EO Act. OH Component of the Project intersects 0.31ha of this Kamerunga Conservation Park. While regulated vegetation clearing may be required in this Conservation Park, micrositing of the vegetation clearing requirements will be undertaken prior to construction to avoid tree and shrub clearing where possible to minimise impacts.

Authorisation is required for installing, operating and maintaining infrastructure (including service facilities and eco-tourism facilities) in protected areas in Queensland. Authorities may be granted under Sections 34, 35 and 35a of the NC Act for these purposes, but only if certain legislative requirements under those sections are satisfied.

Through design of the Project, Powerlink will seek to minimise vegetation loss in this location. This will be achieved by:

- reducing the need for new easements by locating the new infrastructure as close as possible to the existing transmission line, taking into consideration safety factors;
- siting structures in-step with existing structures which are over 100m from the banks of the Barron River;

- micrositing of the vegetation clearing requirements will be undertaken prior to construction to avoid tree and shrub clearing where possible to minimise impacts; and
- aerial stringing of the transmission line.

Powerlink will undertake engagement with the DETSI to discuss the approval requirements for these works within the Kamerunga Conservation Park. Additionally, Powerlink will development and implement an EMP in accordance with the Guideline for Preparing Environmental Management Plans for Queensland Parks and Wildlife Service and Partnerships authorities for protection of the Kamerunga Conservation Park.

PROTECTED AREAS WITHIN PROXIMITY TO THE PROPOSED MID CORRIDOR

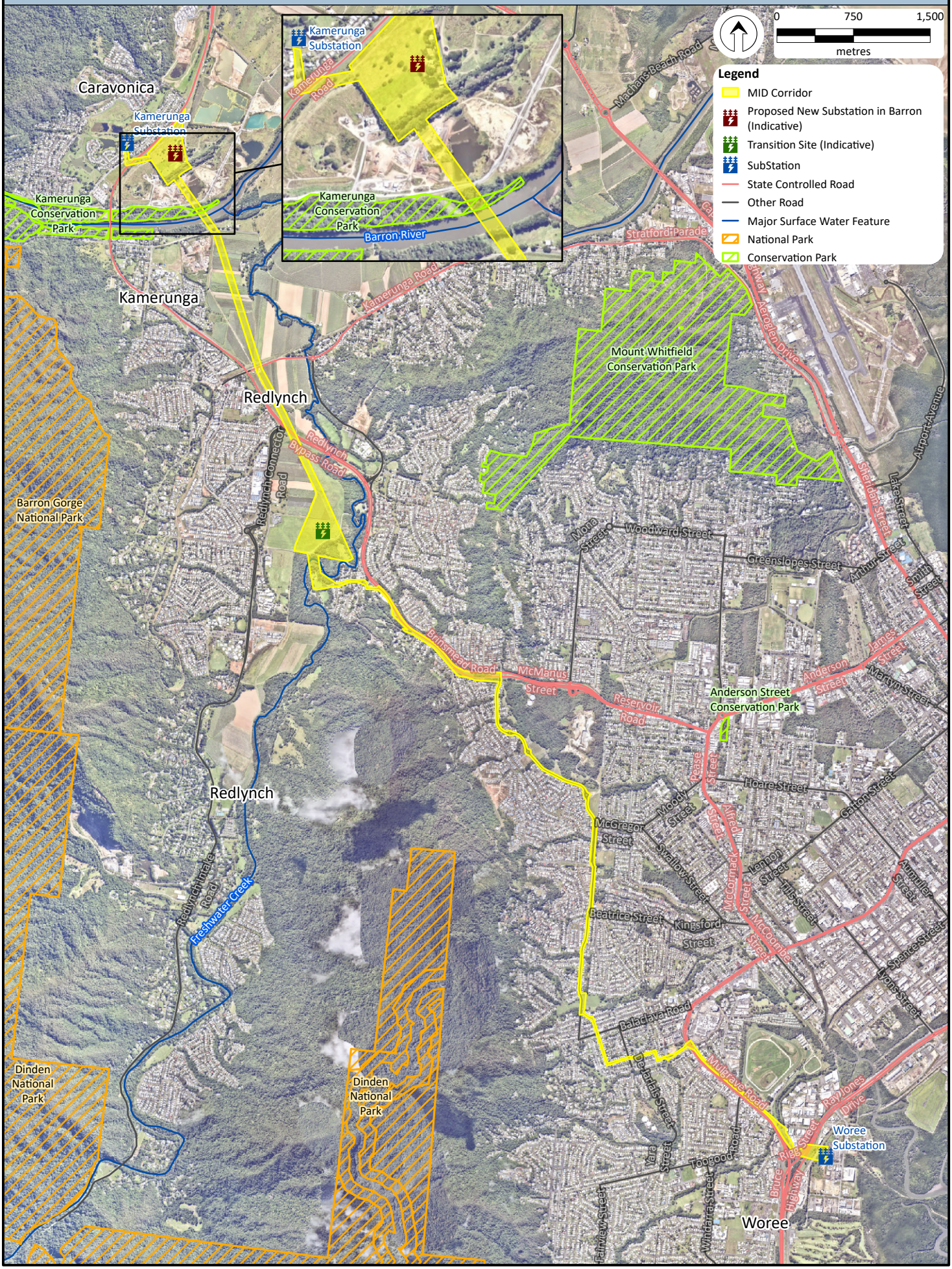


Figure 6-16

6.6 Flora

An Ecological Assessment Report was completed for the Project by Trend Environmental (2025) (Appendix D). The Ecological Assessment included an ecological field assessment undertaken across three survey events within the MID Corridor and a greater survey area by two Trend Environmental ecologists. The surveys were undertaken in July 2023 (dry season; winter) and February and March 2024 (wet season; summer). Section 3.2.1 of the Ecological Assessment Report (Appendix D) provides a breakdown of the methodology utilised for the field assessment. A summary of the findings of the report are presented below.

6.6.1 Existing environment

Desktop assessment results

Threatened ecological communities

An EPBC Act Protected Matters Search Tool (PMST) report was undertaken for the MID Corridor (refer to Desktop Protected Matters Assessment Report (2024) in Appendix A of Appendix D) to identify the MNES that are known or may occur within one kilometre of the MID Corridor. The report identified three Threatened Ecological Communities (TECs).

A determination of the likelihood of presence of the TECs was undertaken by reviewing whether any of the corresponding REs listed within the DCCEEW Conservation or Listing Advice were mapped within the MID Corridor (refer to Appendix A of Appendix D). Based on a determination of the likelihood of presence of the TECs, one TEC (*Lowland tropical rainforest of the Wet Tropics*) was considered likely to occur within the Corridor as having the potential to occur, as summarised in Table 6-10**.**

Table 6-10 Threatened ecological communities identified in the desktop assessment

Threatened ecological community	Status under the EPBC Act	Presence	Corresponding regional ecosystems[1]
Broad leaf tea-tree (*Melaleuca viridiflora*) woodlands in high rainfall coastal north Queensland	Endangered	Unlikely	No corresponding REs that constitutes the TEC are mapped within the MID Corridor.
Lowland tropical rainforest of the Wet Tropics	Endangered	Likely to occur	RE 7.3.10, 7.3.23 and 7.11.7 are mapped within the MID Corridor and could constitute this TEC.
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Unlikely	No corresponding REs that constitutes the TEC are mapped within the MID Corridor.

[1] These REs will only be considered TEC if they meet the description and benchmarks within the relevant Conservation or Listing Advice.
Note: TECs that are unlikely to be present within the MID Corridor due to lack of corresponding REs have been greyed out.

Regulated vegetation

In Queensland, remnant and high value regrowth vegetation is described and mapped by the Queensland Herbarium as REs. REs are vegetation communities within a bioregion that consistently associate with a particular combination of geology, landform and soil type (Neldner et al., 2022). A number of REs have been mapped (from a desktop level) within the MID Corridor, as detailed in Table 6-11 and shown in Figure 6-17. The mapped REs are present as homogenous polygons (detailed map is attached as Map 2 in Appendix A of Appendix D).

Majority of the MID Corridor is mapped as non-remnant vegetation that has previously been cleared to support urban development. There are, however, some mapped scattered patches of Category B (remnant), Category C (high-value regrowth) and Category R (reef regrowth watercourse vegetation) vegetation throughout the MID Corridor. These areas are mapped as least concern, of concern or endangered REs.

Table 6-11 Dominant regional ecosystems mapped within the proposed MID Corridor

Regional ecosystem	Category[1]	Description	VMA class[2]
7.3.10a	B, C and R	Mesophyll vine forest. Moderately to poorly drains alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. Not a wetland	OC
7.3.12a	R	*Eucalyptus tereticornis* (Queensland Blue Gum), *Corymbia tessellaris* (Moreton Bay Ash), *E. pellita* (Large-fruited Red Mahogany), *C. intermedia* (Pink Bloodwood), *Melaleuca dealbata (*Blue Paperbark) and *Lophostemon suaveolens (*Swamp Mahogany) woodland to open forest, often with a secondary tree layer of *Acacia mangium* (Brown Salwood) and *A. crassicarpa* (Northern Wattle). Alluvial plains of lowlands. Not a wetland.	EN
7.3.23a	B and R	Simple-complex, semi-deciduous notophyll to mesophyll vine forest. Lowlands on alluvium, predominantly riverine levees of the moist and dry rainfall zones. Riverine.	EN
7.3.26	B	*Casuarina cunninghamiana* woodland to open forest on alluvium fringing streams.	OC
7.3.28a	B	Open water within natural non-tidal rivers. Rivers and creeks. Riverine.	OC
7.3.45b	R	*Corymbia clarksoniana* (Clarkson-s Bloodwood) woodland to open forest. May include small areas of A*. leptostachya* shrubland. Alluvial plains. Not a wetland.	LC
7.11.7a	R	Complex notophyll vine forest (with emergent Agathis robusta; Kauri Pine). Foothills and uplands of areas excluding the Seaview Range Subregion. Moist rainfall zone. Not a wetland.	LC
7.11.18a	R	*C. intermedia* open forest to tall open forest. Coastal metamorphic headlands and near-coastal foothills. Not a wetland.	OC
7.11.19a	R	*C. intermedia, E. tereticornis, Allocasuarina torulosa* (Forest Oak*), A. littoralis* (Black Sheoak) and *L. suaveolens* open forest, low open forest	OC

Regional ecosystem	Category[1]	Description	VMA class[2]
		and woodland with *A. cincinnata* (Daintree Wattle), A. flavescens (Yellow Wattle), *Banksia aquilonia* (Northern Banksia) and *Xanthorrhoea johnsonii* (Grass Tree). Uplands on *metamorphics*. Not a wetland.	
7.11.44	B and C	*E. tereticornis* open forest to woodland on coastal metamorphic foothills.	OC

[1] Regulated Vegetation Category: Category B (remnant vegetation), Category C (high-value regrowth vegetation) and Category R (reef regrowth vegetation)
[2] *Vegetation Management Act 1999* Status: EN (Endangered), OC (Of Concern) and LC (Least Concern)

DESKTOP MAPPED REGIONAL ECOSYSTEMS WITHIN THE PROPOSED MID CORRIDOR

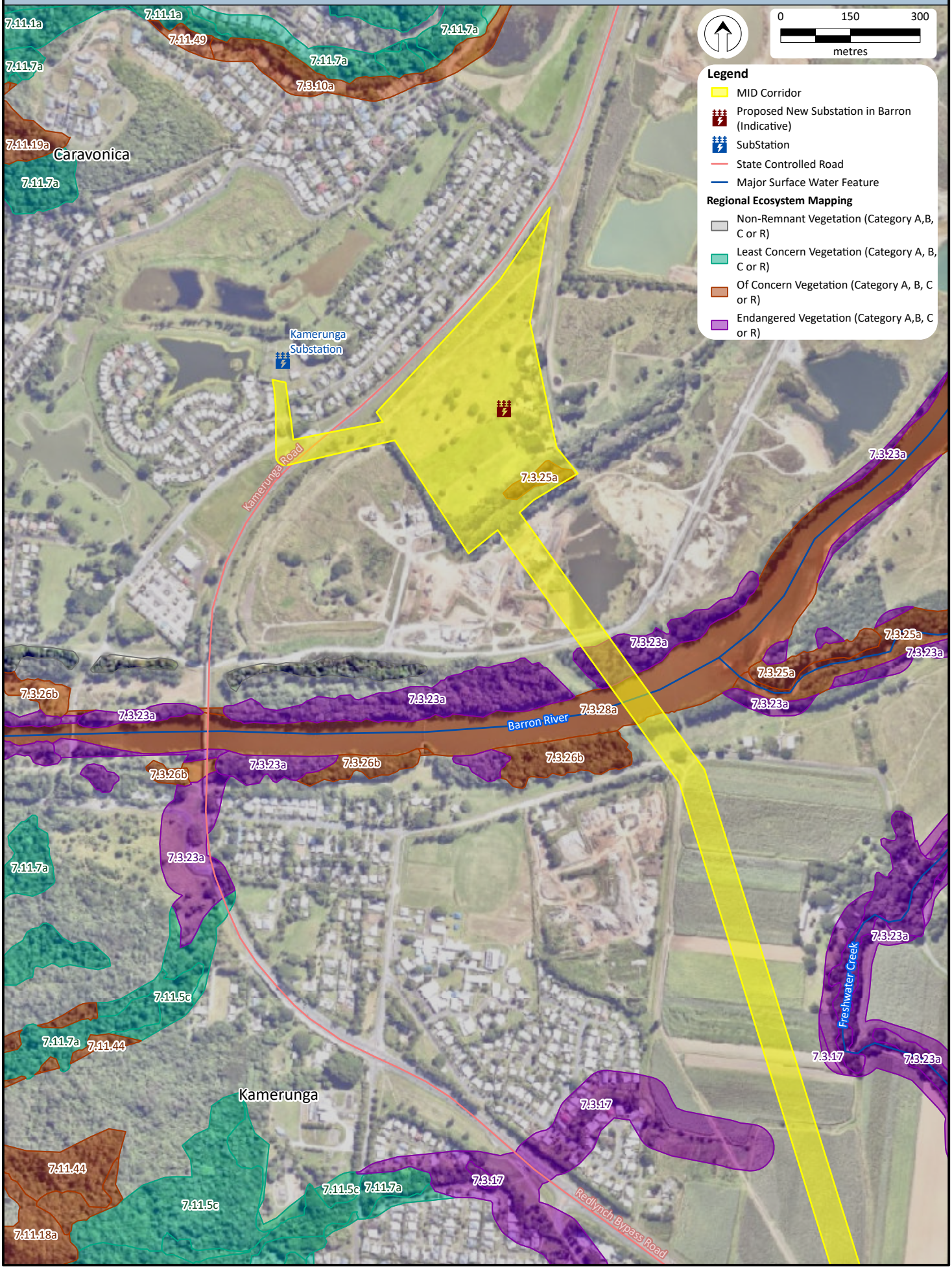


Figure 6-17-1

DESKTOP MAPPED REGIONAL ECOSYSTEMS WITHIN THE PROPOSED MID CORRIDOR

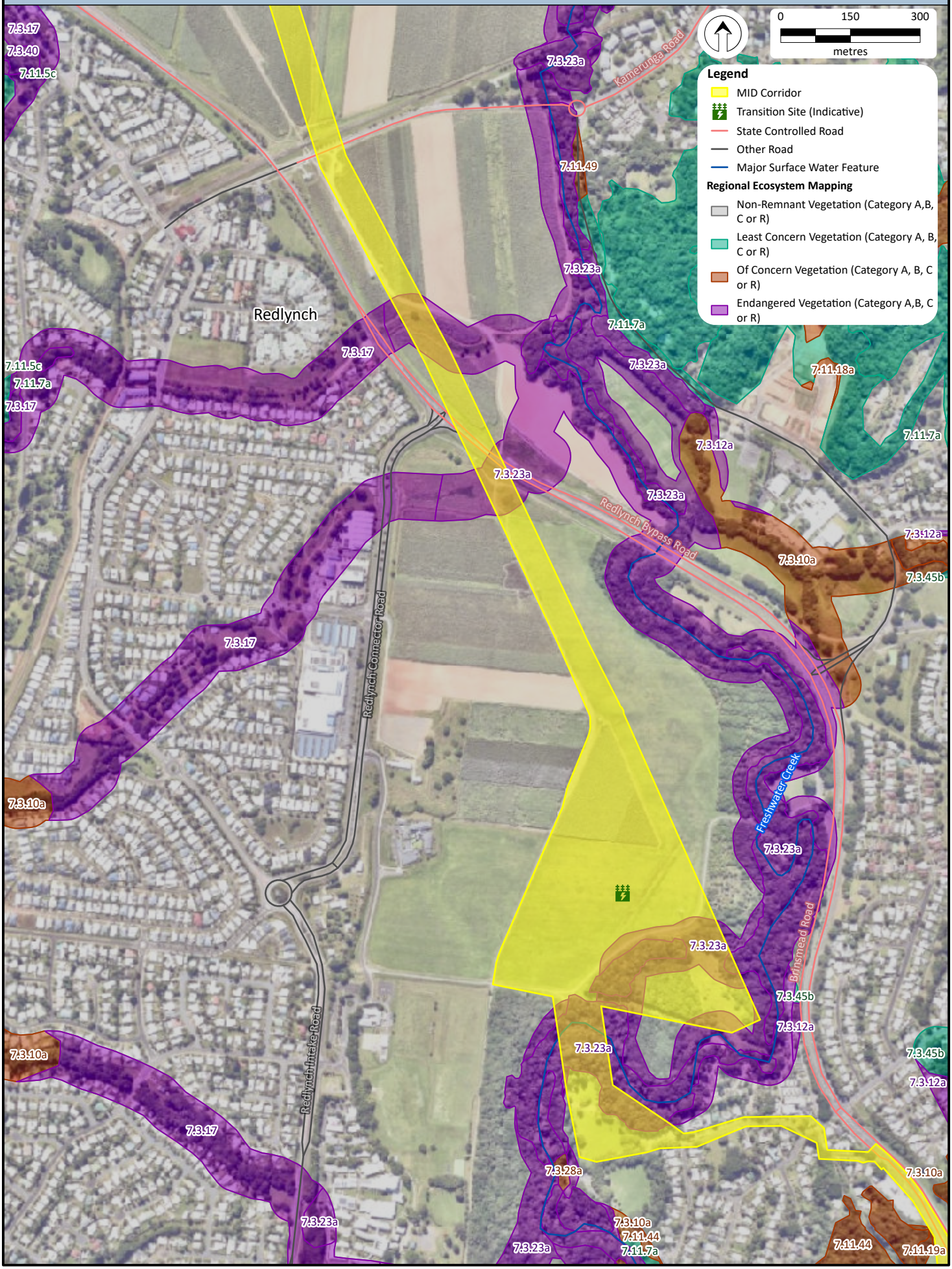


Figure 6-17-2

DESKTOP MAPPED REGIONAL ECOSYSTEMS WITHIN THE PROPOSED MID CORRIDOR

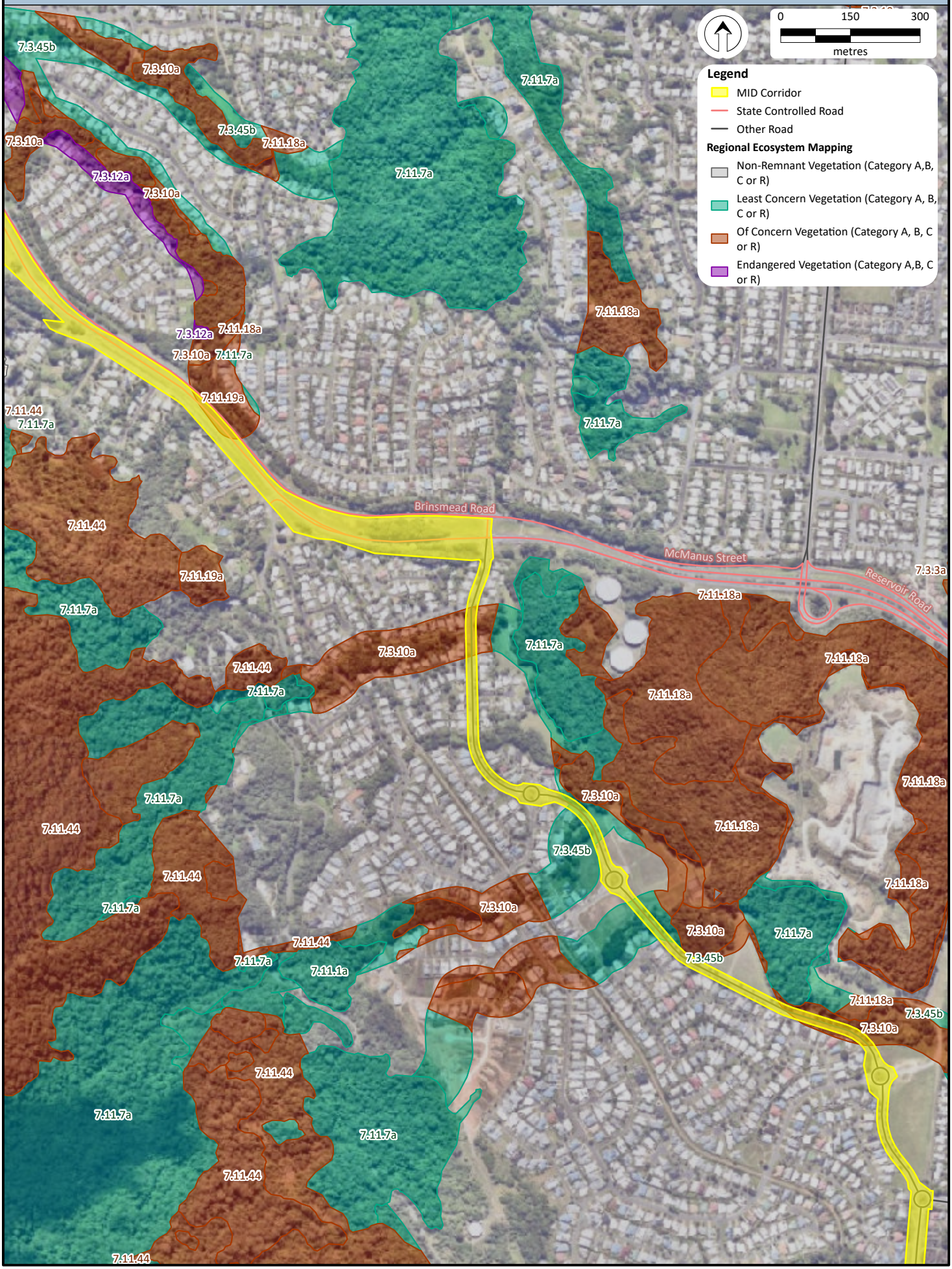


Figure 6-17-3

DESKTOP MAPPED REGIONAL ECOSYSTEMS WITHIN THE PROPOSED MID CORRIDOR

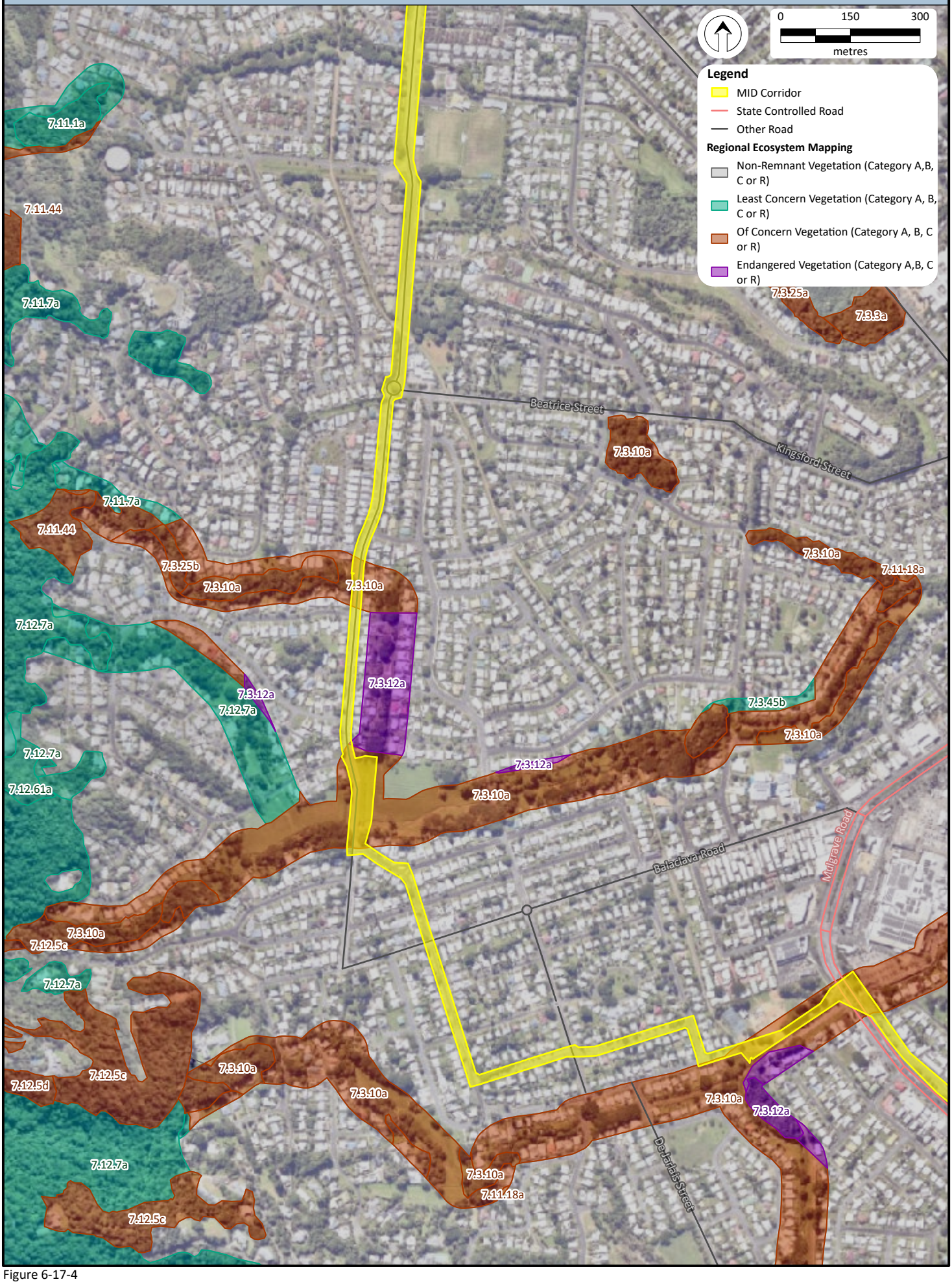


Figure 6-17-4

DESKTOP MAPPED REGIONAL ECOSYSTEMS WITHIN THE PROPOSED MID CORRIDOR

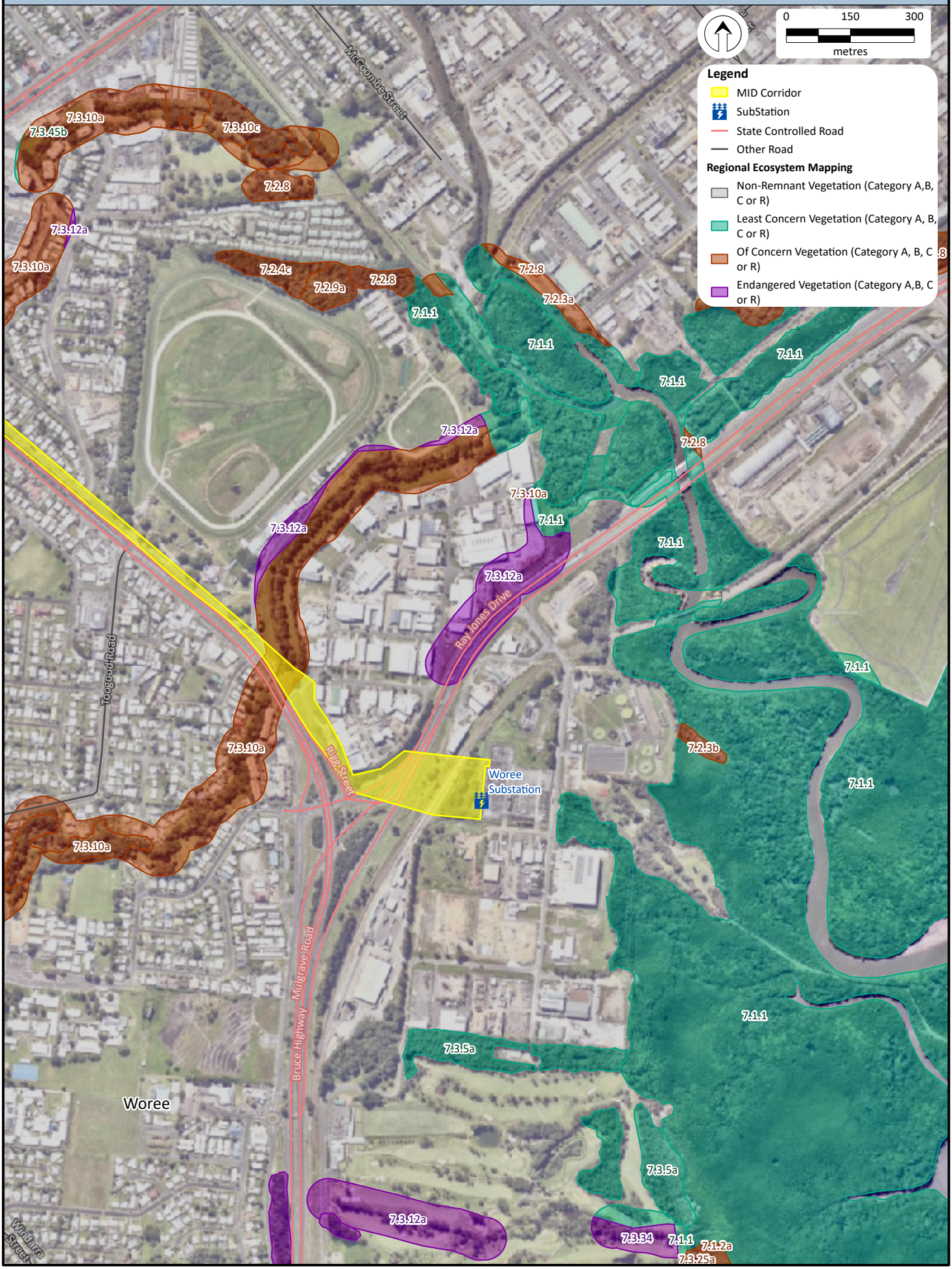


Figure 6-17-5

Threatened flora species

The EPBC Act PMST report identified eleven Commonwealth listed flora species as likely to occur or may occur within the MID Corridor. Additionally, a review of the WildNet conservation significant species database, which provides critically endangered, endangered, vulnerable or near threatened (CEEVNT) species records for a specified area, recorded nine MSES flora species within a 5km buffer of the MID Corridor.

A likelihood of occurrence assessment was completed for MNES and MSES flora species (Table 6-12) to identify what the likelihood of each species occurring in the MID Corridor would be based on species habitat requirements and known records. This assessment identified 15 CEEVNT flora species (four species as likely to occur and eleven as may occur) within the MID Corridor.

Table 6-12 Commonwealth and State-listed CEEVNT flora species considered likely to, or may occur within the proposed MID Corridor

Scientific name	Common name	Status[1]		Likelihood of occurrence[2]
		AUS	QLD	
Leichhardtia araujacea	-	CR	CR	May occur
Diplazium cordifolium	-	VU	VU	May occur
Canarium acutifolium	-	VU	VU	Likely to occur
Acalypha lyonsii	-	-	VU	May occur
Wetria australiensis	-	-	VU	May occur
Polyphlebium endlicherianum	Middle Filmy Fern	EN	VU	May occur
Phlegmariurus filiformis	Rat's Tail Tassel Fern	EN	LC	May occur
Phlegmariurus squarrosus	Water Tassel Fern	CR	CR	May occur
Phlegmariurus tetrastichoides	Square Tassel Fern	VU	VU	May occur
Carronia pedicellate	-	EN	EN	Likely to occur
Rhodamnia sessiliflora	Iron Malletwood	-	EN	Likely to occur
Dendrobium nindii	Blue Orchid	EN	EN	May occur
Spathoglottis paulinae	-	-	NT	May occur
Myrmecodia beccarii	Ant Plant	VU	VU	Likely to occur
Alloxylon flammeum	Queensland Waratah	VU	VU	May occur

[1] Australian Status (EPBC Act): CR (Critically Endangered), VU (Vulnerable) and EN (Endangered); Queensland Status (NC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), NT (Near Threatened), and LC (Least Concern).
[2] Based on the likelihood of occurrence assessment included in Appendix D.

High risk area for protected plants

Areas of 'high-risk' for protected plants identified on the DETSI flora survey trigger map (protected under the NC Act) occur in the vicinity of the Barron River, in Kamerunga and Freshwater Creek in Redlynch (Map 4 of Appendix A of Appendix D).

Essential habitat

Essential habitat is defined under the VM Act as habitat for CEEVNT wildlife prescribed under the NC Act. The MID Corridor intersects areas of essential habitat mapping (Map 2 of Appendix A of Appendix D) which align with mapped Category B (remnant) areas along the northern half of the MID Corridor.

Corridors and connectivity

Connectivity areas are considered an MSES prescribed environmental matter under the EO Act. A review of the Terrestrial Biodiversity and Aquatic Conservation Values for the area of interest identified riparian corridors, and state and regional corridor buffers intersecting the northern section of the MID Corridor associated with Freshwater Creek (Map 6 of Appendix D). This northern section of the MID Corridor contains remnant and regrowth REs, with unconstrained habitat connectivity to the Lamb Range (west) which is considered a connectivity area. Lamb Range also contains both regional and state biodiversity corridors and is considered State habitat for EVNT taxa (Map 6 of Appendix D).

Field assessment results

Field validated threatened ecological communities

Patches of the field *verified Alluvial notophyll to mesophyll vine forest vegetation community* detailed in Table 6-14 were identified as having the potential to conform to the EPBC listed endangered *Lowland tropical rainforest of the Wet Tropics TEC* which conform to RE7.3.10a, RE7.3.23a and RE7.3.23b. The Ecological Assessment Report included an assessment to confirm if the *Alluvial notophyll to mesophyll vine* vegetation communities conform to the key diagnostic characteristics contained in the *Approved Conservation Advice for the Lowland tropical rainforest of the Wet Tropics ecological community*. Detailed key diagnostic criteria has been provided within Table 11 of Appendix D.

The assessment identified that remnant and regrowth sections of the ground-truthed vegetation community conformed to the key diagnostic criteria to be considered the *Lowland tropical rainforest of the Wet Tropics TEC*. The total area of verified TEC within the MID Corridor was 4.74ha with the area intersecting the MID Corridor being adjacent to the Barron River in OH transmission line and Goomboora Park in UG cable of MID Corridor. Location of ground-truthed TEC within the proposed MID Corridor are shown in Map 3 of Appendix D.

TEC condition post-Tropical Cyclone Jasper

Tropical Cyclone Jasper, the wettest cyclone in Australian history, hit the coast north of Cairns on 13 December 2023. This cyclone and the associated flood event greatly impacted on the Barron River and its riparian habitat. Surveys of this area were undertaken post-cyclone event and therefore the ecological assessment captures the condition of the TEC post-Tropical Cyclone Jasper.

While the condition of REs in the vicinity were degraded, these areas were conservatively field verified as remnant vegetation and as *Lowland tropical rainforest of the Wet Tropics TEC*, where it met the key diagnostic criteria within the Approved Conservation Advice. The Conservation Advice recognises that this TEC is subject to relatively frequent (and often high intensity) tropical cyclone events, and it is common for

parts of the community to be naturally within a highly disturbed state. In this respect, cyclone impacted parts still form part of the TEC, as they will recover over time.

Field validated regulated vegetation

The MID Corridor consists primarily of a modified urban landscape; however, the field assessment verified the presence of Category B (remnant), Category C (high-value regrowth) and Category R (reef regrowth watercourse vegetation) and Category X (non-remnant) regulated vegetation within particular areas of the MID Corridor.

Table 6-13 provides a summary of the field validated regional ecosystems within the MID Corridor, as well as the calculated extent of each within the MID Corridor. Locations of these field validated regional ecosystems are shown in Map 3 of Appendix D.

Table 6-13 Field validated regional ecosystems within the proposed MID Corridor

Regional ecosystem	Category[1]	VMA class[2]	Description	MID Corridor extent (ha)
7.3.10a	C	Of Concern	Mesophyll vine forest. Moderately to poorly drains alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. Not a wetland.	0.02
7.3.23a	B	Endangered	Simple-complex, semi-deciduous notophyll to mesophyll vine forest. Lowlands on alluvium, predominantly riverine levees of the moist and dry rainfall zones. Riverine.	4.73
7.3.25	B	Of Concern	*Melaleuca leucadendra* +/- vine forest species open forest to closed forest on alluvium fringing streams	1.34
7.3.28a	B	Of Concern	Open water within natural non-tidal rivers. Rivers and creeks. Riverine. Non vegetated RE.	0.62
Non-remnant	X	-	-	78.37
Total				6.71

[1] *Category of Regulated Vegetation: A= Vegetation offsets/compliance notices/Vdecs, B = Remnant vegetation, C = High-value regrowth, R = Reef Regrowth watercourse vegetation, X = non-remnant vegetation.*

[2] *Vegetation Management Act (VMA) 1999 (Qld) Class: EN = Endangered, OC= Of Concern, LC = Least Concern.*

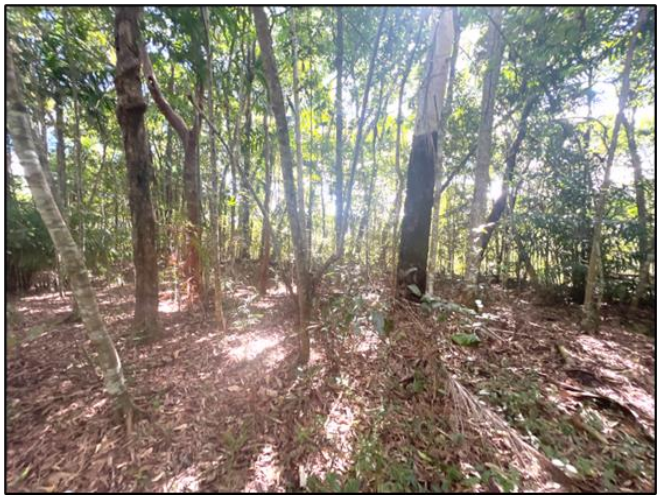
Ground-truthed vegetation communities

Vegetation within the MID Corridor has been categorised into five vegetation communities, including:

1. Alluvial notophyll to mesophyll vine forest;
2. Mixed eucalypt to open forest with vine forest understorey;
3. Regrowth areas;
4. Riverbeds and open waters; and
5. Cleared areas/non-remnant vegetation.

A summary of these vegetation communities is provided in Table 6-14 and Map 4 of Appendix D. Further information relating to the corresponding REs and CEEVNT flora and fauna that these communities provide habitat for is provided within Table 10 of the Ecological Assessment Report in Appendix D.

Table 6-14 Vegetation communities within the proposed MID Corridor

Vegetation community	Description	Photo
Alluvial notophyll to mesophyll vine forest	Scattered patches of notophyll to mesophyll vine forest that surrounded seasonal and permanent watercourses. These vegetation communities contained a high species richness of rainforest species and ranged from 14-24m in height. The groundcover comprised of an abundance of leaf litter and saplings of the canopy species.	
Mixed eucalypt to open forest with vine forest understorey	This vegetation community was characterised by: • A Myrtaceous species emergent layer consisting of *C tessellaris, C. intermedia, E. tereticornis, Eucalyptus grandis* (Rose Gum), and *L. suaveolens*. The canopy height up to 25m, with a canopy cover between 45 (disturbed) – 75 (undisturbed) %. • A well-developed vine forest canopy and understorey was present.	

Vegetation community	Description	Photo
Regrowth areas Areas (considered Category X)	These vegetation communities were disturbed ecosystems that were regrowing but did not meet the floristic characteristics of an RE to be considered high value regrowth. These communities typically consisted of Myrtaceae and Acacia species, including *C. tessellaris, E. grandis, Acacia mangium* (Brown Salwood) and *Acacia flavescens* (Yellow Wattle).	
Riverbeds and open waters	Present within the Barron River, in Kamerunga. Riverine ecosystem with fringing riparian habitats.	
Cleared areas/non-remnant vegetation	Present in non-remnant areas and road verges. It was characterised by a high density of weeds. There were some trees present in some area, including planted species such as *Delonix regia* (Poinciana) and *Mangifera indica* (Mango).	

Threatened flora species

A meander of the entire MID corridor was undertaken to identify CEEVNT species[3]. Both native and introduced flora species were recorded within the MID Corridor, including a total of 109 flora species identified, consisting of 85 native species, and 24 introduced species. There was one CEEVNT flora species (under the NC Act) being, *Myrmecodia beccarii* (Ant Plant) recorded during the field assessment (Figure 6-18). Individuals of this species were observed south of the proposed MID Corridor with records shown in Map 5 of Appendix D. A review of the CRS's TreePlotter database was also undertaken to identify whether any CEEVNT species had previously been recorded by Council within the MID Corridor. No CEEVNT species were identified on the TreePlotter as occurring within the MID Corridor.

Figure 6-18 Ant plant observed adjacent to the proposed MID Corridor

While no other CEEVNT flora species were identified within the proposed MID Corridor during the field assessment, suitable habitat for CEEVNT flora species was identified. The CEEVNT flora species that had suitable habitat present are listed in Table 6-15 and their habitat shown in Map 5 of Appendix D. While not physically sighted during the field assessment, these CEEVNT flora species could not be discounted as occurring as they may have just not been recorded during the field assessment due to their cryptic nature, lack of reproductive material to make a positive identification or seasonal variability[4].

[3] A full flora survey, in accordance with the Protected Plant – Flora Survey Guidelines (DES 2020) has not been completed as part of this scope for the MID Assessment. A flora survey of high-risk areas will be completed prior to construction to inform a protected plant clearing permit. While a flora survey was not completed for this MID Assessment, the whole MID Corridor, particularly in the vicinity of remnant and regrowth vegetation areas was meandered for the purpose of searching for protected plants (the only deviation from the guidelines was that the full 100m buffer area that extends into areas outside the MID Corridor was not surveyed). Based on this, it was considered unlikely a threatened plant species occurs within the MID Corridor.

[4] Note, no flora species were recorded during the field surveys that could not be identified to species level or had similar characteristics to a known threatened species potentially occurring within the region. Hence it was deemed the survey timing for the Project was suitable and a follow-up flora survey was not necessary for this project.

Table 6-15 also describes the vegetation communities within the MID Corridor that provide suitable habitat for each CEEVNT species.

Table 6-15 CEEVNT flora species that have suitable habitat verified within the proposed MID Corridor

Scientific name	Common name	Status[1]		Suitable habitat
		AUS	QLD	
Leichhardtia araujacea	-	CR	CR	Alluvial notophyll to mesophyll vine forest (RE7.3.23a)
Diplazium cordifolium	-	VU	VU	Alluvial notophyll to mesophyll vine forest
Canarium acutifolium	-	VU	VU	
Acalypha lyonsii	-	-	VU	
Wetria australiensis	-	-	VU	
Polyphlebium endlicherianum	Middle Filmy Fern	EN	VU	
Phlegmariurus filiformis	Rat's Tail tassel-fern	EN	LC	
Phlegmariurus squarrosus	Water Tassel-Fern	CR	CR	
Phlegmariurus tetrastichoides	Square Tassel Fern	VU	VU	
Carronia pedicellata	-	EN	EN	
Rhodamnia sessiliflora	Iron Malletwood	-	EN	
Dendrobium nindii	Blue Orchid	EN	EN	
Spathoglottis paulinae	-	-	NT	Mixed Eucalypt woodland to open forest with vine forest understorey
Alloxylon flammeum	Queensland Waratah	VU	VU	
Myrmecodia beccarii	Ant Plant	VU	VU	• Mixed Eucalypt woodland with vine forest understorey • Regrowth areas • Non-remnant areas with host trees

1 Queensland (QLD) Status (Nature Conservation Act 1992; Qld): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern

Australian (CTH) Status (EBPC Act): EX = Extinct, EW = Extinct in Wild, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, - not protected under Act

Notes: - in Common Name = no common name exists.

Marine Plants

Marine plants are protected under the Fisheries Act, as are inherent marine plants, plant material on tidal land and adjacent marine plants.

While the Barron River in the vicinity of the MID Corridor is not mapped as a tidal waterway for waterway barrier works, a review of the highest astronomical tide (HAT) suggests that the Barron River in the vicinity of the MID Corridor can be tidal during large spring tides (Map 9 of Appendix D). As a result, where tidal waters potentially inundate, the vegetation was assessed to determine the present of marine plants, inherent marine plants, plant material on tidal land or adjacent marine plants.

Within the vicinity of the MID Corridor where it is proposed to cross the Barron River, there was no presence of mangroves, salt couch or other tidal plants that would typically be considered a marine plant under the Fisheries Act. However, where the HAT is mapped, the vine forest species that occur would be considered 'material' of an 'other' plant on tidal land, making them a marine plant protected under the Fisheries Act. It was calculated that 463 m^2 of marine plants occur within the MID Corridor.

Corridors and Connectivity

Vegetation throughout the MID Corridor was typically present in fragmented and isolated patches, surrounded by roads and residential communities. The non-remnant areas were densely populated, which greatly impacts the fauna habitat values within these fragmented patches of vegetation. Regardless, they may provide stepping-stone habitat for a range of mobile bird and bat species, and as a result could contribute towards the mosaic of foraging resources throughout the Cairns LGA.

The Lamb Range to the west of the MID Corridor is a significant tract of vegetation that would provide significant flora and fauna habitat values for the region. The Goomboora Park and Freshwater Creek area in the UG cable, and the Barron River in OH Transmission line forms part of the Lamb Range and has the potential to provide an extension of habitat for any fauna present throughout the Lamb Range.

6.6.2 Potential impacts and mitigation measures

Infrastructure associated with the Project has the potential to impact on flora and vegetation communities in the area. Potential impacts during construction, operation and decommissioning are summarised below.

Construction impacts

Potential construction impacts include:

- Vegetation clearing, including:
    - Direct loss of vegetation communities from clearing of remnant endangered and of concern REs within the Barron River vicinity (anticipated to be 1.96ha) to accommodate construction of the overhead transmission component of the transmission line this will result in the loss of:
        - 0.62ha of *Lowland tropical rainforest of the Wet Tropics TEC* and the potential loss of habitat areas for CEEVNT species (MNES and MSES),
        - 1.96ha of CEEVNT species habitat
        - 0.31ha of Kamerunga Conservation Park
        - Minor clearing associated with geotechnical surveys (approximately 0.01ha) to occur around Freshwater Creek in the vicinity of Goomboora Park,
        - Approximately 463m^2 area of marine plants (other marine plants below the HAT) clearing is proposed in the vicinity of the Barron River in Kamerunga.

- Increased edge effect pressure which can result in weed invasion throughout the corridor and surrounding areas. Weeds also compete with native vegetation communities and threaten the biodiversity values of remaining communities.
- Indirect clearance of amenity/street trees as a result of impacts to the root structure of trees. Although all efforts will be made to avoid the root structures of trees along UG cable, some root zones may not be able to be avoided which may result in in a reduction in the amenity of the area and marginal impacts to the verified TEC; however, it is unlikely to result in impacts to MNES and MSES CEEVNT species.
- Construction of the underground cable may increase the risk of ground subsidence occurring.
- Localised soil and bank damage from excavation and heavy vehicle activity may occur during construction of the UG cable which can have downstream implications for water quality, sedimentation and increased potential from erosion.
- Potential for sedimentation and erosion due to soil exposure from excavation and Impacts to soil resources can occur from inversion of the soil profile, loss of structure, and mixing of layers as a result of construction activities.
- Modification of watercourses and wetlands, potentially impacting water quality and loss of aquatic habitats as a result of construction activities.
- Indirect impact to watercourses such as degrading water quality as a result of construction, movement of machinery in close proximity to the watercourses and erosion occurred from disturbance of soils.
- Potential to expose hazardous wastes to the environment

Vegetation clearing

Vegetation clearing is required throughout the Project area to support construction and maintenance activities along the MID Corridor, as well as to reduce vegetation hazards relating to bushfire risk. Vegetation clearing associated with the Project is likely to result in impacts to MNES and MSES through:

- The loss of TECs;
- Removal of CEEVNT and migratory species habitat and microhabitat features;
- Disturbance or removal of potential breeding and foraging habitat sites;
- Potential for injury and mortality of CEEVNT species; and
- The potential for a reduction in condition of the remaining CEEVNT species habitat areas.

Ground-truthing confirmed that the MID Corridor had Category B (remnant), and Category C (high-value regrowth) vegetation present. Category R (reef regrowth watercourse vegetation) areas were also mapped by the State throughout many watercourses within the MID Corridor. Prescribed REs that are endangered and of concern REs, include areas of Category B (remnant vegetation). The extent of remnant endangered and of concern REs within the MID Corridor is 6.71ha.

The total Project area is 85.08ha. Of this, only 1,97ha (1.96ha for construction and 0.01ha for the geotechnical assessment undertaken adjacent to Freshwater Creek in Goomboora Park) of regulated native vegetation will be removed. This represents 2.3% of the total Project area.

The underground cable component of the Project has benefits in terms of being able to retain existing vegetation in areas where an overhead transmission line may not be able to do so. The underground cable only requires minimal regulated vegetation clearing, avoiding the potential of clearing of 4.13ha of remnant, and 0.01ha of regrowth vegetation if the underground cable was instead an overhead transmission line. Vegetation clearing for the underground cable will be restricted to a handful of

amenity/street trees, or trees within Goomboora Park where avoidance to their root structure is not possible, and for the geotechnical assessment, adjacent to Freshwater Creek (proposed 0.01ha of clearing).

Edge effects

Edge effects are the changes in population or community structure that occur at the boundary of habitats. Where small habitat fragments occur, edge effects can be pronounced. Clearing of vegetation throughout the extent of the Project area will result in increased pressure on the remaining habitat areas, in the form of weed invasion and the introduction or spread of fauna pest species. Weeds compete with native vegetation communities, reduce the condition of the remaining habitat areas, and threaten the biodiversity values of remaining communities. While pests can displace native fauna species through predation and competition.

Indirect clearance of amenity

While all efforts will be made to avoid the root structures of trees along UG component, some root zones may not be able to be avoided. This is likely to result in the removal of a handful of existing amenity/street trees. This may be the case where underground boring cannot be achieved at a depth to avoid the root zone, or where restrictions within the roadway (from other UG infrastructure) requires the UG component to intersect with the root zone of a tree. While these individual trees that will require clearing are yet to be known, there were no threatened flora species identified in the vicinity, and as such none are expected to be MNES or MSES threatened species.

Incident of ground subsidence

Ground subsidence may result from faults, earthquakes, changes to groundwater aquifers etc. Construction of UG infrastructure may increase the risk of ground subsidence occurring. Should this occur, it can impact on sensitive areas, such as vegetation communities and watercourses. Subsidence can alter natural drainage, damage vegetation, alter soil profiles, and affect hydrology.

Soil and bank destruction

Localised soil and bank damage from excavation and heavy vehicle activity can occur during construction of the UG component. This can have downstream implications for water quality, sedimentation and increased potential from erosion. The proposed construction methodology near watercourses however will be via HDD, and as such, no excavation works are proposed within the bed or banks of watercourses

Erosion and Sedimentation

Increased potential for sedimentation and erosion due to soil exposure from excavation. Exposure of soil can result in erosion, scouring of banks, and sediments washing into watercourses during rainfall events.

Mobilisation of nutrients is also a potential problem associated with sedimentation because nutrients such as phosphorus have the ability to cling to eroding sediment particles and can be transported to sensitive downgradient areas (e.g., watercourses and wetlands). Sediment deposition in a waterbody can also impact aquatic habitat, and water quality by causing high turbidity, loss of depth, covering of fish spawning areas, and increased algal productivity.

Such disturbances are considered to only be temporary (e.g., during construction), assuming that remediate works are completed in a timely manner and are appropriate for the site.

Disruption of soil profile

Impacts to soil resources can occur from inversion of the soil profile, loss of structure, and mixing of layers as a trench is backfilled. This may result in increased erosion and compaction and less productive soil for vegetation growth.

Increased soil temperatures may also negatively impact organic matter decomposition, mineralisation of different organic materials, soil water content, conductivity and availability to plants (Onwuka & Mang, 2018).

Watercourse modification

Clearing within riparian vegetation has the potential to reduce the integrity of watercourses and wetlands, potentially impacting the water quality, but also reducing instream aquatic habitat.

Watercourses protected under the Fisheries Act (waterways for waterway barrier works) and the Water Act traverse the MID Corridor. Direct impacts to these watercourses are not expected, with the transmission line proposed underground and overhead, both of which avoid direct works within the watercourses. However, access tracks to construct and maintain the transmission line are anticipated to intersect three mapped waterways. As such, all crossings will be required to meet the ADR for WWBW. Indirect impacts from water quality issues or erosion during construction however may occur.

No direct impacts to water quality within the mapped watercourses are expected with works proposed underground or overhead, both of which avoid works directly within the watercourses. Potential indirect impacts to water quality however may occur as a result of construction, movement of machinery in close proximity to the watercourses and erosion occurred from disturbance of soils.

Contamination from hazardous wastes used during the drilling process or arising from the drilling process

The drill process for UG construction has the potential to expose hazardous wastes to the environment. Such hazardous wastes can include drill cuttings, drilling fluid and oil, but may also be contaminated sediments brought to the surface from depth during the drilling process (e.g., acid sulfate soils). Any exposure of hazardous wastes can have downstream implications should they be handled inappropriately and enter watercourses.

Drilling fluid blow-out may also occur. If the drilling process encounters fractured rock there is a possibility that drilling fluid could be forced up through these fissures to the surface and into watercourses along with any associated drill arisings, with potentially adverse consequences for environmentally sensitive receptors (terrestrial and aquatic life). The most frequently used drilling fluid used for HDD is a slurry of bentonite clay which is very high in suspended solids

In addition, there are a variety of other pollutants associated with construction activities. These substances, which can generate hazardous pollution if they are not handled properly, include pesticides, fertilizers, hydrocarbons (e.g., oils, gasoline, hydraulic fluid) from construction vehicles, and rubbish. If not handled correctly, can make their way into watercourses and wetlands, causing impacts.

Noise, lighting and vibration

Dust, light and noise activity are increased during construction, which may impact on adjacent vegetation communities and fauna presence. Noise, lighting and vibration disturbances during construction can

potentially disturb breeding and roosting fauna, including CEEVNT fauna with suitable habitat mapped as present within the MID Corridor.

Dust impact during construction

Heavy machinery activity, drilling activities and excavation of trenches can contribute to airborne particulate matter which can have negative impacts on the surrounding environment, contributing to air pollution and degradation of air quality. When dust settles on vegetation, it can hinder plant growth. When dust accumulates in watercourses it can lead to sedimentation, degrade water quality and be harmful to aquatic life.

Construction mitigation measures

Powerlink have implemented the hierarchy of management principles in the planning and development of this Project, which includes avoid, minimise, mitigation, remediate then offset. These principals are described below:

- Avoidance: Designing the alignment to avoid direct impacts to ecological values (e.g., avoid vegetation clearing where practical).
- Minimise: Minimise direct and indirect impacts where they cannot be completely avoided.
- Mitigate: Implement mitigation and management measures during construction and operation to reduce direct and indirect cumulative impacts.
- Remediate: Actively rehabilitate impacted areas where possible to promote long term recovery.
- Offset: Provide suitable offsets for activities that result in a Significant Residual Impact (SRI) to ecological values after all other management principles have been implemented.
- Night-time works will be limited and restricted to works that cannot be reasonably undertaken during the day.

Table 6-16 describes how impacts on ecological values from the Project will be managed through the hierarchy of management principles approach.

Table 6-16 Impact management for flora

Management Principles	Measure
Avoidance	Findings from the DCSCSR have contributed to determining the best alignment for the Project. The preferred and most feasible option for the Project included both an overhead transmission section (between Kamerunga and Redlynch) and an underground cable section (between Redlynch to Woree). The underground section avoids major environmental impacts associated with vegetation clearing, but also considered a range of social, environmental, and physical factors identified from desktop and field-based analysis, and engagement with landholders, the wider community, and other stakeholders. By constructing the transmission line underground, it avoids the clearing of 4.13 ha of remnant and regrowth regulated vegetation. The proposed route also tracks through mostly road reserves or non-remnant areas, which avoids the potential for impacts to vegetation from a subsidence event.

Management Principles	Measure
Minimisation	Where avoidance of impacts from vegetation clearing has not been possible (i.e., REs adjacent to the Barron River) impacts have been minimised by co-locating the overhead transmission line with the existing transmission line corridor. In this respect, impacts from edge effects are reduced, and impacts are not compounded by having multiple cleared areas in relatively close proximity to each other. In addition, to minimising impacts associated with an underground cable construction, the Project proposes to use undercrossing techniques in sensitive environmental areas (e.g., regulated vegetation areas and watercourses) rather than open cut trenching which would require some vegetation clearing. This will minimise disturbance and impacts for the project.
Mitigation	Once avoidance and minimisation strategies have been implemented, mitigation and management measures have been determined to reduce direct and indirect cumulative impacts during construction and operation. Mitigation measures planned to be implemented include: • Management of depth for undercrossing for the underground section to avoid tree roots and ensure subsidence of vegetated areas and watercourses will not occur. The drill profile will be designed after geotechnical studies are complete, and the locations of existing obstacles and crossings, such as other utilities, are determined. The drill profile will be designed to allow a minimum depth of cover below surface grade and all obstacles. • Following the completion of backfilling of trenches for the underground section, surface profiles shall be reinstated to match their original profile and substrate material. In this respect, impacts from trenching works are expected to be temporary in nature. • Construction to mostly be undertaken during daylight hours, to limit disturbance to nearby nocturnal fauna within remnant and regrowth vegetation areas. Night-time works, if required, to be limited and restricted to works that cannot be reasonably undertaken during the day. • Exclusion areas to be demarcated to avoid unauthorised disturbance to native vegetation communities and CEEVNT species habitat. Vehicles will be restricted from moving outside of the construction area. • Weeds will be monitored throughout the life of the Project with management and control strategies to be provided in the Construction Biosecurity Management Plan, which allows Powerlink to undertake a risk-based approach to managing the risk of spreading or introducing biosecurity matters because of its activities. A Pre-construction weed survey of the whole MID Corridor will also be undertaken to inform the development of the Construction Biosecurity Management Plan. • Powerlink's existing EMP will be implemented which includes mitigation measures for the Project, to be implemented during construction. Such measures will involve management of dust, noise, and light impacts; management of erosion through erosion and sediment control measures; topsoil management; chemical storage, spill containment and management requirements; traffic management including speed restrictions; weed and seed washdown requirements for machinery and vehicles; designated construction working hours etc.

Management Principles	Measure
	• Ground disturbance to be limited to what is necessary to install the transmission line, to avoid sedimentation and erosion issues. • When undercrossing, an appropriate buffer area to the watercourse will be determined during detailed design and provided to reduce erosion issues and limit sedimentation from construction activities from entering the watercourse. Storing heavy machinery or materials in the buffer zone should be avoided because compaction of the ground can provide flow paths for sediment and contaminants into local watercourses. • The MID Corridor traverses marine plants. While approval for clearing marine plants is exempt under the Infrastructure Designation process, the Accepted Development Requirements for operational work that is the removal, destruction or damage of marine plants provides guidance to minimise impacts to marine plants, which should be implemented as best practice. • The MID Corridor traverses the Kamerunga Conservation Park, in which a s34 and s35 – easement arrangement under the NC Act will be applied for. In this conservation park, regulated vegetation clearing may be required however, micro-siting of the vegetation clearing requirements will be undertaken prior to construction to avoid tree and shrub clearing where possible to minimise impacts. Specific mitigation measures that will reduce impacts to natural and cultural values of this park include: o Management in accordance with the Kamerunga Regional Park Management Statement 2015 (DNPSR 2015) including implementation of the following management actions: – Life and property on and adjacent to the park is protected. – Fire is managed to conserve or maintain the condition of the regional ecosystems through the application of planned burn guidelines. – The impacts of existing pest species on neighbouring land uses are mitigated. – Pest threats are managed to conserve or maintain the condition of the recognised endangered and of concern regional ecosystems and animal species of conservation significance. o Development and implementation of an EMP in accordance with the Guideline for Preparing Environmental Management Plans for Queensland Parks and Wildlife Service and Partnerships authorities. The EMP will outline the measures taken to minimise impacts on the protected area and provide for ongoing management of the site, including: – Micro-siting of the vegetation clearing requirements prior to construction to avoid tree and shrub clearing where possible. – Weeds to be monitored throughout the life of the Project with management and control strategies implemented in accordance with Powerlink's Construction Biosecurity Management Plan. A Pre-construction weed survey will be undertaken to inform the development of the Construction Biosecurity Management Plan. – Where possible, liaise and co-ordinate control efforts with the National Parks and Wildlife Service within Kamerunga Conservation Park. – Erosion and sediment control to be implemented in accordance with Powerlink's existing EMP which is used to manage impacts during the construction phase of projects. Under this Plan, the following impacts will also be managed -dust, noise

Management Principles	Measure
	and light impacts; water quality impacts; topsoil management; chemical storage, spill containment and management requirements; traffic management including speed restrictions; weed and seed washdown requirements for machinery and vehicles; and designated construction working hours etc. – Any vegetation clearing to be completed under supervision of an experienced and permitted Fauna Spotter Catcher to manage fauna and safely relocate should they be found during clearing works. – No unauthorised access to Conservation Park areas outside the MID Corridor during construction and operation. – Dispose of construction waste responsibility within authorised landfill locations outside of the park. • The construction principal contractor to be made aware of the Conservation Park's management intent and management measures to be implemented during the tender process. Education of such to groundcrews is required during inductions and daily pre starts.
Remediation	When construction activities have been completed, all excavated or disturbed areas will be rehabilitated to ensure the soil is stable and provides a matrix for vegetation establishment to prevent erosion in line with Powerlink specification - Health, Safety and Environment Specification (HSE-SPE-A3011646).
Offset	Impacts to MNES have been avoided where possible by planning for the underground cable component and as such impacts to MNES within this area will be marginal and mostly indirect. A Significant Impact Assessment has been undertaken in Section 8 of Appendix D to determine whether offsets under the Commonwealth's EPBC Act *Environmental Offsets Policy 2012* are likely to be required for the Project. The findings from this assessment are provided in Section 6.8.

Operation impacts and mitigation measures

Potential operational impacts include:

- increased potential for weed invasions, which can compete with native vegetation communities and threaten the biodiversity values of remaining communities; and
- increased bushfire hazard risk from powerlines, which could result in unmanaged fires.

Potential impacts to flora during operation will be managed in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K).

6.7 Fauna

An Ecological Assessment Report was completed for the Project by Trend Environmental (2025) (Appendix D). As mentioned in Section 6.6, the Ecological Assessment included an ecological field assessment undertaken across three survey events (of both dry season (winter) and wet season (summer) within the MID Corridor and a greater survey area by two Trend Environmental ecologists. A summary of the findings of the report are presented below.

6.7.1 Existing environment

Desktop assessment results

Threatened fauna species

The EPBC Act PMST report identified (refer to Desktop Protected Matters Assessment Report in Appendix A of Appendix D) 41 CEEVNT Fauna Species and 68 Migratory Species which were known to occur or may occur within the 5km buffer area.

Additionally, the WildNet conservation significant species database provides CEEVNT species records for a specified area. A review of the Wildnet Conservation Significant Species Records within a 5km buffer of the survey area identified 23 State-listed (MSES) fauna species including five amphibians, 13 birds, four mammals and one reptile as previously recorded within the MID Corridor.

A likelihood of occurrence assessment was completed for MNES and MSES fauna species and is provided in Table 7 in Appendix A of Appendix D This assessment identified a total of 30 fauna species, listed as either MNES and MSES that either may or are likely to occur within the MID Corridor, including four amphibians, five birds, 13 mammals, one reptile and seven migratory species, as follows:

- The likelihood of occurrence assessment for MNES CEEVNT fauna species and migratory species identified that 15 Commonwealth listed fauna species (one amphibian, four birds and ten mammals), and eight migratory species as likely to occur, or may occur within the MID Corridor.
- The likelihood of occurrence assessment for MSES revealed 18 state-listed fauna species including four amphibians, five birds, eight mammals and one reptile that were considered likely to occur or may occur within the MID Corridor.

These species were determined from the EPBC PMST Report and the WildNet conservation significant species database results and known distributions for special least concern fauna species.

The result of the likelihood of occurrence assessment for the MID Corridor has been provided in Table 6-17.

Table 6-17 Commonwealth and State-listed CEEVNT fauna species considered likely to, or may occur within the proposed MID Corridor

Scientific name	Common name	Status[1]		Likelihood of occurrence[2]
		AUS	QLD	
Amphibians				
Litoria dayi	Australian Lacelid	VU	VU	Likely to occur
Litoria nannotis	Waterfall Frog	-	EN	May occur
Litoria rheocola	Common Mistfrog	-	EN	Likely to occur
Litoria serrata	Tapping Green Eyed Frog	-	VU	May occur
Birds				
Erythrotriorchis radiatus	Red Goshawk	VU	EN	May occur
Hirundapus caudacutus	White-throated Needletail	VU	VU	Likely to occur
Casuarius casuarius johnsonii (southern)	Southern Cassowary	EN	EN	Likely to occur
Cyclopsitta diopjthalma maclaeyana	Macleay's Fig-parrot	-	VU	Likely to occur
Tyto novaehollandiae kimberli	Masked Owl (northern)	VU	VU	May occur
Mammals				
Dasyurus hallucatus	Northern Quoll	EN	LC	Likely to occur
Dasyurus maculatus gracilis	Spotted-tailed Quoll (northern)	EN	EN	May occur
Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheathtail Bat	VU	EN	Likely to occur
Hipposideros diadema reginae	Diadem Leaf-nosed Bat	-	NT	May occur
Hipposideros semoni	Semon`s Leaf-nosed Bat	VU	EN	May occur
Mesembriomys gouldii rattoides	Black-footed Tree-rat	VU	LC	May occur
Ornithorhynchus anatinus	Platypus	-	SLC	Likely to occur
Phascolarctos cinereus	Koala	EN	EN	May occur
Bettongia tropica	Northern Bettong	EN	EN	May occur
Petauroides minor	Northern Greater Glider	VU	VU	May occur
Pteropus conspicillatus	Spectacled Flying-fox	EN	EN	Likely to occur

Scientific name	Common name	Status[1]		Likelihood of occurrence[2]
		AUS	QLD	
Rhinolophus robertsi	Large-eared Horseshoe Bat	VU	LC	May occur
Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	Likely to occur
Reptiles				
Crocodylus porosus	Estuarine Crocodile	M, Mi	VU	Likely to occur
Migratory Species^				
Apus pacificus	Fork-tailed Swift	M, Mi	LC	Likely to occur
Cuculus optatus	Oriental Cuckoo	Mi	LC	Likely to occur
Monarcha melanopsis	Black-faced Monarch	M, Mi	LC	Likely to occur
Myiagra cyanoleuca	Satin Flycatcher	M, Mi	LC	Likely to occur
Rhipidura rufifrons	Rufous Fantail	M, Mi	LC	Likely to occur
Symposiachrus trivirgatus	Spectacled Monarch	M, Mi	LC	Likely to occur
Hirundo rustica	Barn Swallow	Mi	LC	May occur

[1] Australian Status (EPBC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), M (Marine), and Mi (Migratory); Queensland Status (NC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), NT (Near Threatened), LC (Least Concern) and SLC (Special Least Concern).
[2] Based on the likelihood of occurrence assessment included in Appendix D.

^ Due to the large number of migratory species (68) listed in the PMST, only migratory species that have the potential to occur based on habitat preferences within the MID Corridor have been included in the likelihood of occurrence assessment in Appendix A and summarised within this table.

Essential habitat

Essential habitat is defined under the VM Act as habitat for endangered, vulnerable or near threatened (EVNT) wildlife prescribed under the NC Act. The MID Corridor intersects some areas of essential habitat mapping (Map 2 of Appendix A of Appendix D).

This essential habitat corresponds to habitat for the endangered Southern Cassowary (southern population; *Casuarius casuarius johnsonii*), the vulnerable Western Alaskan Bar-tailed Godwit (*Limosa lapponica baueri*), the Estuarine Crocodile (*Crocodylus porosus*) and the Macleay's Fig-parrot (*Cyclopsitta diophthalma maclaeyana*).

Field assessment results

CEEVNT fauna species

The *Desktop Protected Matters Assessment Report* (Appendix A of Appendix D) identified the MNES and MSES as potentially occurring within the MID Corridor listed in Table 6-17. These MNES and MSES were targeted during the field assessment to confirm their presence within the MID Corridor.

A total of 41 fauna species were observed during the field assessment, comprising the following:

- Three amphibians;
- 21 birds;
- 15 mammal species; and
- Two reptiles

A full list of fauna species recorded during the field assessment is available in Appendix C of Appendix D.

From the above recorded fauna species, Table 6-18 identifies the potential impacts on the threatened, special least concern and migratory species that were identified during the field assessment. Map 6 of Appendix D provides detail as to where these species were recorded within proximity to the proposed MID Corridor and the location of suitable habitat.

Table 6-18 CEEVNT and migratory fauna species that have suitable habitat verified within the proposed MID Corridor

Scientific name	Common name	Status[1]		Observation description	Suitable habitat	Potential for impacts
		AUS	QLD			
Birds						
Cyclopsitta diopjthalma maclaeyana	Macleay's Fig-parrot	-	VU	Pair observed nest building in regrowth vine forest in Irene Street Flood Plain Area, within the survey area, adjacent to the MID Corridor (disturbance area).	Alluvial vine forest	No vegetation clearing proposed in this vicinity hence direct impacts to the nest or species habitat in this location not proposed. Potential for indirect impacts however during construction (e.g., from noise, vibration). Mitigation measures proposed.
Mammals						
Hipposideros diadems	Diadems Leaf-nosed Bat	-	NT	Recorded on Anabat near the Barron River in Kamerunga	Alluvial vine forest	Potential for direct impacts during general construction activities, vegetation clearing adjacent to the Barron River in OH Component, and line stringing. Avoidance and mitigation measures proposed to minimise impacts.

Scientific name	Common name	Status[1]		Observation description	Suitable habitat	Potential for impacts
		AUS	QLD			
Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	Recorded on IR Camera in remnant vine forest in Goomboora Park.	All remnant and regrowth areas	Potential for direct impacts during vegetation clearing adjacent to the Barron River in OH Component, and construction in proximity to habitat throughout rest of the MID Corridor. Avoidance and mitigation measures proposed to minimise impacts.
Migratory species						
Apus pacificus	Fork-tailed Swift	M, Mi	LC	Multiple individuals recorded during diurnal bird survey, remnant vine forest in Goomboora Park.	All, aerial species	Aerial species that is unlikely to be directly impacted. Indirect impacts however may occur to species habitat during construction. Mitigation measures proposed.

[1] Australian Status (EPBC Act): M (Marine), and Mi (Migratory); Queensland Status (NC Act): VU (Vulnerable), NT (Near Threatened), LC (Least Concern) and SLC (Special Least Concern).

Suitable habitat for CEEVNT *and migratory species*

Some CEEVNT, migratory, or special least concern fauna species that were considered likely to occur or may occur during the likelihood of occurrence assessment, whilst not detected during the field assessment, had suitable habitat verified within the MID Corridor. These CEEVNT species, and the vegetation communities within the MID Corridor that provide suitable habitat have been described in Table 6-19 and shown on Map 6 of Appendix D.

Table 6-19 CEEVNT and migratory fauna species (other than those observed) that have suitable habitat verified within the proposed MID Corridor

Scientific name	Common name	Status[1]		Suitable habitat
		AUS	QLD	
Amphibians				
Litoria dayi	Australian Lacelid	VU	VU	Alluvial notophyll to mesophyll vine forest (RE7.3.23a in Goomboora Park only)
Litoria nannotis	Waterfall Frog	-	EN	
Litoria rheocola	Common Mistfrog	-	EN	
Litoria serrata	Tapping Green Eyed Frog	-	VU	
Birds				
Erythrotriorchis radiatus	Red Goshawk	VU	EN	Mixed Eucalypt woodland with vine forest understorey
Hirundapus caudacutus	White-throated Needletail	VU	VU	• Alluvial notophyll to mesophyll vine forest • Mixed Eucalypt woodland with vine forest understorey
Casuarius casuarius johnsonii (southern)	Southern Cassowary	EN	EN	
Tyto novaehollandiae kimberli	Masked Owl (northern)	VU	VU	
Mammals				
Dasyurus maculatus gracilis	Spotted-tailed Quoll (northern)	EN	EN	Alluvial notophyll to mesophyll vine forest (Goomboora Park only)
Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheathtail Bat	VU	EN	• Alluvial notophyll to mesophyll vine forest • Mixed Eucalypt woodland with vine forest understorey
Hipposideros semoni	Semon`s Leaf-nosed Bat	VU	EN	
Mesembriomys gouldii rattoides	Black-footed Tree-rat	VU	LC	Mixed Eucalypt woodland with vine forest understorey
Ornithorhynchus anatinus	Platypus	-	SLC	Alluvial notophyll to mesophyll vine forest (Freshwater Creek in Goomboora Park only)
Bettongia tropica	Northern Bettong	EN	EN	• Alluvial notophyll to mesophyll vine forest • Mixed Eucalypt woodland with vine forest understorey
Pteropus conspicillatus	Spectacled Flying-fox	EN	EN	

Scientific name	Common name	Status[1]		Suitable habitat
		AUS	QLD	
Rhinolophus robertsi	Large-eared Horseshoe Bat	VU	LC	• Alluvial notophyll to mesophyll vine forest • Mixed Eucalypt woodland with vine forest understorey
Reptile				
Crocodylus porosus	Estuarine Crocodile	M, Mi	VU	River beds and open water
Migratory species				
Cuculus optatus	Oriental Cuckoo	Mi	LC	Mixed Eucalypt woodland with vine forest understorey
Monarcha melanopsis	Black-faced Monarch	M, Mi	LC	• Alluvial notophyll to mesophyll vine forest • Mixed Eucalypt woodland with vine forest understorey
Myiagra cyanoleuca	Satin Flycatcher	M, Mi	LC	
Rhipidura rufifrons	Rufous Fantail	M, Mi	LC	
Symposiachrus trivirgatus	Spectacled Monarch	M, Mi	LC	

[1] Australian Status (EPBC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), M (Marine), and Mi (Migratory); Queensland Status (NC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), NT (Near Threatened), LC (Least Concern) and SLC (Special Least Concern).

Corridors and connectivity

Vegetation throughout the proposed MID Corridor was typically present in fragmented and isolated patches, surrounded by roads and residential communities. The non-remnant areas were densely populated, which greatly impacts the fauna habitat values within these fragmented patches of vegetation. Regardless, they may provide stepping-stone habitat for a range of mobile bird and bat species, and as a result could contribute towards the mosaic of foraging resources throughout the Cairns LGA.

The Lamb Range to the west of the proposed MID Corridor is a significant tract of vegetation that would provide significant flora and fauna habitat values for the region. The Goomboora Park and Freshwater Creek area, and the Barron River forms part of the Lamb Range and has the potential to provide an extension of habitat for any fauna present throughout the Lamb Range.

6.7.2 Potential impacts and mitigation measures

Project infrastructure has the potential to impact on fauna and their suitable habitat in the area through design, construction, operation and decommission phases, as summarised below and detailed in Appendix D.

Construction impacts

Potential construction impacts include:

- Vegetation clearing, resulting in impacts to MNES and MSES, including:

  - Direct loss of CEEVNT fauna species habitat including:
    - Removal of foraging and dispersal habitat for CEEVNT fauna species including the Diadems Leafnosed Bat (*Hipposideros diadema*) and Shortbeaked Echidna (*Tachyglossus aculeatus*).
    - Removal of potential suitable habitat for CEEVNT and migratory fauna species listed within Table 6-19.
    - Increased fragmentation of habitat, reducing connectivity between fauna habitats.

- Direct and indirect fauna impacts including:
  - Removal of actual or potential animal breeding sites.
  - The loss of microhabitat features such as tree hollows, hollow logs, leaf litter and rocky areas.
  - Noise, lighting, and vibration disturbances that could potentially disturb breeding and roosting fauna.
  - Increased risk of predation due to increased clearing providing access to predators.
  - Potential for fauna injury or mortality from clearing works.

Vegetation clearing

Vegetation clearing is required to support construction activities along the alignment, as well as to reduce vegetation hazards relating to bushfire risk. Vegetation clearing associated with the project is likely to result in impacts to threatened and special least concern fauna species through:

- The loss of TEC and species habitat and microhabitat features;
- Disturbance or removal of potential breeding and foraging habitat sites;
- Potential for injury and mortality of threatened species; and
- Potential for a reduction in condition of the remaining threatened species habitat areas.

The impact area calculations for each prescribed matter (MNES and MSES) are provided in Table 6-21 and

Table 6-22 respectively within Section 6.8.

As described in Section 6.6.2, 1.97ha (1.96ha for construction activities and 0.01ha for the geotechnical assessment undertaken adjacent to Freshwater Creek in Goomboora Park) of regulated native vegetation will be removed for the overhead transmission line component of the MID Corridor through vegetation clearing. In addition, the underground cable requires minimal regulated vegetation clearing and avoids the clearing of 4.13ha of remnant, and 0.01ha of regrowth vegetation within UG component of the MID Corridor through the use of under boring techniques.

As such, any impacts to fauna are expected to be localised to native vegetation patches, rather than throughout the whole Project area. Additionally, as the development is linear infrastructure with a width of only 60m (for the overhead component), vegetation clearing impacts are not expected to be extensive and are not expected to have an adverse impact on the connectivity of the area, due to accessibility and limited restrictive barriers (e.g., lack of fencing).

While the clearing of vegetation within the Project area will slightly reduce connectivity between surrounding native vegetation patches, it will not block or disconnect these patches to a point of being detrimental for fauna passage.

The impact areas for each MNES and MSES threatened and migratory species considered are outlined within Table 6-21 and

Table 6-22. A number of species have similar habitat requirements preferring the two main vegetation communities present within the MID Corridor (being vine forest or eucalypt forest with a vine forest understorey) and will have an impact area of 1.97ha. These species include:

- Threatened species
    - White-throated Needletail
    - Southern Cassowary (southern)
    - Masked Owl
    - Bare-rumped Sheathtail Bat
    - Semon's Leaf-nosed Bat
    - Northern Bettong, Spectacled Flying-fox
    - Large-eared Horseshoe Bat
    - Fork-tailed Swift foraging
    - Black-faced Monarch
    - Satin Flycatcher foraging
    - Rufous Fantail foraging
    - Spectacled Monarch
    - Macleay's Fig parrot
- Migratory species
    - Fork-tailed Swift
    - Black-faced Monarch
    - Satin Flycatcher
    - Rufous Fantail
    - Spectacled Monarch

Impacts to suitable habitat for two other threatened species is likely however will be a lesser impact area then those identified above and include the Australian Lacelid (0.01ha) and the Spotted-tailed Quoll (northern) (0.01ha).

Direct fauna impacts

Fauna impacts can occur from the removal of suitable habitat, or directly through the loss of actual or potential animal breeding sites; the loss of microhabitat features such as tree hollows, hollow logs, leaf litter and rocky areas; noise, lighting and vibration disturbances which potentially disturb breeding and roosting fauna; increased risk of predation due to increased clearing providing access to predators; and the potential for fauna injury or mortality from clearing works.

The highest potential for direct impacts to fauna is expected to occur during the vegetation clearing works for construction. While diurnal and mobile species are expected to disperse away from the clearing front, other species that are not as mobile, including nocturnal or sensitive species, and breeding individuals, have the potential to be impacted.

Other impacts to fauna may result from construction, maintenance, and operational activities, including:

- Dust, light and noise activity is increased during construction, which may impact on adjacent vegetation communities and fauna presence.

- Once constructed, the powerlines have the potential to injure or cause mortality in flying species, such as birds and bats, due to collision or electrocution. Powerlines are generally built within the average bird's flight path but can be hard for birds to see.
- The use of the maintenance tracks has the potential to result in injury or death to fauna by vehicle strike.

Construction mitigation measures

As discussed in Section 6.20, Powerlink have implemented the hierarchy of management principles in the planning and development of this Project, which includes avoid, minimise, mitigation, remediate then offset. Table 6-20 describes how impacts on fauna from the Project will be managed through the hierarchy of management principles approach.

Table 6-20 Impact management for fauna

Management principles	Measure
Avoidance	As per avoidance measures detailed in Section 6.6.2.
Minimisation	As per minimisation measures detailed in Section 6.6.2.
Mitigation	• Once avoidance and minimisation strategies have been implemented, mitigation and management measures have been determined to reduce direct and indirect cumulative impacts during construction and operation. Mitigation measures planned to be implemented include: • Construction to mostly be undertaken during daylight hours, to limit disturbance to nearby nocturnal fauna within remnant and regrowth vegetation areas. Night-time works, if required, to be limited and restricted to works that cannot be reasonably undertaken during the day • Threatened species have the potential to be disturbed by noise and vibration should they be actively nesting or roosting at the time of construction works. Interfering with active breeding places of threatened species will be avoided, and indirect impacts during construction will be managed in accordance with conditions of a high-risk SMP, in particular having a fauna spotter catcher present for clearing works and works in close proximity to known nest locations and avoiding disturbance of active breeding places. A high-risk SMP for interfering with a threatened animal's breeding place under the NC Act should be applied for and in place prior to construction works. The high-risk SMP should be drafted to include threatened species recorded within the survey area (i.e., Macleay's Fig-parrot (vulnerable under the NC Act MSES) and Diadems Leaf-nosed Bat (near threatened under the NC Act MSES). • To further reduce impacts to the breeding pair of Macleay's Fig-parrot, construction in this vicinity will be planned outside of their breeding season (August – December). If this is not possible, an experienced fauna spotter catcher is to be engaged to determine whether the pair are actively nesting in the vicinity of where they were recorded, prior to construction works beginning. Should the pair be nesting, construction should be halted in this area until their young have fledged (8 -10 weeks). • Powerlink's existing EMP will be implemented which includes mitigation measures for the Project, to be implemented during construction. Such measures will involve management of dust, noise, and light impacts; management of erosion through erosion and sediment

Management principles	Measure
	control measures; topsoil management; chemical storage, spill containment and management requirements; traffic management including speed restrictions; weed and seed washdown requirements for machinery and vehicles; designated construction working hours etc. • Any vegetation clearing to be completed under supervision of an experienced and permitted Fauna Spotter Catcher to manage fauna and safely relocate should they be found during clearing works. • The MID Corridor traverses the Kamerunga Conservation Park, in which a s34 and s35 – easement arrangement under the NC Act will be applied for. In this conservation park, regulated vegetation clearing may be required however, micro-siting of the vegetation clearing requirements will be undertaken prior to construction to avoid tree and shrub clearing where possible to minimise impacts. Specific mitigation measures that will reduce impacts to natural and cultural values of this park include: o Management in accordance with the Kamerunga Regional Park Management Statement 2015 (DNPSR 2015) including implementation of the following management actions: – The impacts of existing pest species on neighbouring land uses are mitigated. – Pest threats are managed to conserve or maintain the condition of the recognised endangered and of concern regional ecosystems and animal species of conservation significance. o Development and implementation of an EMP in accordance with the Guideline for Preparing Environmental Management Plans for Queensland Parks and Wildlife Service and Partnerships authorities. The EMP will outline the measures taken to minimise impacts on the protected area and provide for ongoing management of the site, including: • Any vegetation clearing to be completed under supervision of an experienced and permitted Fauna Spotter Catcher to manage fauna and safely relocate should they be found during clearing works.
Remediation	When construction activities have been completed, all excavated or disturbed areas will be rehabilitated to ensure the soil is stable and provides a matrix for vegetation establishment to prevent erosion.
Offset	Impacts to MNES have been avoided where possible by planning for UG Component to be constructed underground and as such impacts to MNES within this area will be marginal and mostly indirect. A Significant Impact Assessment has been undertaken in Section 8 to determine whether offsets under the Commonwealth's EPBC Act *Environmental Offsets Policy 2012* are likely to be required for the Project.

Operation impacts and mitigation measures

Potential operational impacts include:

- Powerlines present a risk to fauna, particularly birds and bats, in the form of potential injury or mortality from collisions. The presence of powerlines may also result in behavioural avoidance of nearby suitable habitat. Such behaviours include avoiding nesting or foraging resources.

- Potential direct impacts to fauna through injury or mortality from any maintenance vegetation clearing required throughout the life of the Project.

Potential impacts to fauna during operation will be managed in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K).

6.8 Matters of environmental significance

An Ecological Assessment Report was completed for the Project by Trend Environmental (2025) (Appendix D). The Ecological Assessment included an ecological field assessment undertaken across three survey events within the MID Corridor and a greater survey area by two Trend Environmental ecologists. The surveys were undertaken in July 2023 (dry season; winter) and February and March 2024 (wet season; summer). Section 3.2.1 of the Ecological Assessment Report (Appendix D) provides a breakdown of the methodology utilised for the field assessment. A summary of the findings of the report are presented below.

6.8.1 Matters of National Environmental Significance (MNES)

Under the EPBC Act, actions that have, or are likely to have a significant impact on a MNES requires approval from the Australian Government Minister for the Environment. The Minister will decide whether assessment and approval is required under the EPBC Act. The EPBC Act covers nine matters, including:

- World Heritage Properties;
- National Heritage Places;
- Wetlands of International Importance (Ramsar Wetlands);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth Marine Areas;
- The Great Barrier Reef Marine Park;
- Nuclear Actions (including uranium mines); and
- Water Resources (that relate to coal seam gas development and large coal mining development).

Extent of Matters of National Environmental Significance within the proposed MID Corridor

The total extent of habitat for each verified MNES within the MID Corridor is provided in Table 6-21. Note, while this is the extent of habitat for each MNES, only minor clearing is proposed to support OH Component and the geotechnical assessment location (in UG Component) for the Project.

Threatened Ecological Communities

The Lowland tropical rainforest of the Wet Tropics Bioregion TEC is typified by the presence of fertile soils in high rainfall areas of the Wet Tropics. It is only located <100m AHD in the Wet Tropics Bioregion and the Starke Coastal Lowlands subregion of Cape York, and is characterised by an uneven, often structurally complex canopy, averaging 20 – 40m in height, with evergreen mesophyll trees, many with well-developed buttresses.

All areas of RE7.3.10a, 7.3.23a and 7.3.23b that were surveyed during the field assessment satisfied the requirements for the TEC diagnostic criteria within the Approved Listing Advice for the Lowland tropical rainforest of the Wet Tropics Bioregion TEC. Three remnant and regrowth patches of vegetation that were considered the TEC overlapped with the MID Corridor, representing 4.74ha.

The impact area of TEC however is 0.63ha (0.62ha of RE7.3.23a in the Barron River vicinity where clearing is required to support the overhead transmission line, and 0.01ha of RE7.3.23a in underground cable section to allow for a geotechnical investigation). The remaining TEC occurs in the vicinity of Goomboora Park where clearing is not proposed as construction of the UG cable will be via undercrossing.

Threatened species

The following MNES listed threatened species were considered likely or may occur within the proposed MID Corridor, and had suitable habitat verified within, or within the near vicinity of the MID Corridor during the field assessment:

- Eleven threatened plant species;
- One amphibian species;
- Four bird species;
- Seven mammal species; and
- Seven migratory species.

Most of these species have similar habitat requirements, preferring vine forest, or eucalypt forest with a vine forest understorey. These are the main two vegetation communities present within the MID Corridor. All other listed threatened species that were listed within the EPBC PMST were excluded due to the MID Corridors not containing suitable habitat for these species.

Table 6-21 Extent of MNES within the proposed MID Corridor

MNES		Scientific name	Common name	Status[1]		Presence[2]	Suitable habitat	Survey area extent (ha)	MID corridor extent (ha)	Direct impact extent (ha)^
				AUS	QLD					
TEC		Lowland tropical rainforest of the Wet Tropics		EN	-	Confirmed	-	7.06	4.74	0.63
Threatened Species	Plants	Leichhardtia araujacea	-	CR	CR	May occur		15.71	4.12	0.01
		Diplazium cordifolium	-	VU	VU	May occur	2	7.74	6.09	1.97
		Canarium acutifolium	-	VU	VU	May occur	2	7.74	6.09	1.97
		Polyphlebium endlicherianum	Middle Filmy Fern	EN	VU	May occur	2	7.74	6.09	1.97
		Phlegmariurus filiformis	Rat's Tail tassel-fern	EN	LC	May occur	2	7.74	6.09	1.97
		Phlegmariurus squarrosus	Water Tassel-Fern	CR	CR	May occur	2	7.74	6.09	1.97
		Phlegmariurus tetrastichoides	Square Tassel Fern	VU	VU	May occur	2	7.74	6.09	1.97
		Carronia pedicellata	-	EN	EN	Likely	2	7.74	6.09	1.97
		Dendrobium nindii	Blue Orchid	EN	EN	May occur	2	7.74	6.09	1.97
		Alloxylon flammeum	Queensland Waratah	VU	VU	May occur	3	1.05	Nil	Nil
		Myrmecodia beccarii	Ant Plant	VU	VU	Likely	3, 4	6.21	3.15	1.34
	Amphibians	Litoria dayi	Australian Lacelid	VU	VU	Likely	1	15.71	4.12	0.01
	Birds	Erythrotriorchis radiatus	Red Goshawk	VU	EN	May occur	3	0.97	Nil	Nil
		Hirundapus caudacutus	White-throated Needletail	VU	VU	Likely	2, 3	8.71	6.09	1.97

MNES		Scientific name	Common name	Status[1]		Presence[2]	Suitable habitat	Survey area extent (ha)	MID corridor extent (ha)	Direct impact extent (ha)^
				AUS	QLD					
		Casuarius casuarius johnsonii	Southern Cassowary (southern)	EN	EN	Likely	2, 3	8.71	6.09	1.97
		Tyto novaehollandiae kimberli	Masked Owl	VU	VU	May occur	2, 3	8.71	6.09	1.97
	Mammals	Dasyurus maculatus gracilis	Spotted-tailed Quoll (northern)	EN	EN	May occur	1	15.71	4.12	0.01
		Saccolaimus saccolaimus nudicluniatus	Bare-rumped Sheathtail Bat	VU	EN	Likely	2, 3	8.71	6.09	1.97
		Hipposideros semoni	Semon's Leaf-nosed Bat	VU	EN	May occur	2, 3	8.71	6.09	1.97
		Mesembriomys gouldii rattoides	Black-footed Tree-rat	VU	LC	May occur	3	0.97	Nil	Nil
		Bettongia tropica	Northern Bettong	EN	EN	May occur	2, 3	8.71	6.09	1.97
		Pteropus conspicillatus	Spectacled Flying-fox	EN	EN	Likely	2, 3	8.71	6.09	1.97
		Rhinolophus robertsi	Large-eared Horseshoe Bat	VU	LC	May occur	2, 3	8.71	6.09	1.97
Migratory Species		Apus pacificus	Fork-tailed Swift	M, Mi	LC	Confirmed	Breeding (-)	Nil	Nil	Nil
							Foraging (All)	29.95	14.98	1.97

MNES	Scientific name	Common name	Status[1]		Presence[2]	Suitable habitat	Survey area extent (ha)	MID corridor extent (ha)	Direct impact extent (ha)^
			AUS	QLD					
	Crocodylus porosus	Estuarine Crocodile	M, Mi	VU	Likely	6	4.76	0.62	Nil
	Cuculus optatus	Oriental Cuckoo	Mi	LC	Likely	Breeding (-)	Nil	Nil	Nil
						Foraging (3)	1.05	Nil	Nil
	Monarcha melanopsis	Black-faced Monarch	Mi	LC	Likely	2, 3	8.71	6.09	1.97
	Myiagra cyanoleuca	Satin Flycatcher	Mi	LC	Likely	Breeding (-)	Nil	Nil	Nil
						Foraging (2, 3)	8.71	6.09	1.97
	Rhipidura rufifrons	Rufous Fantail	M, Mi	LC	Likely	Breeding (-)	Nil	Nil	Nil
						Foraging (2, 3)	8.71	6.09	1.97
	Symposiachrus trivirgatus	Spectacled Monarch	M, Mi	LC	Likely	2, 3	8.71	6.09	1.97

[1] Australian Status (EPBC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), M (Marine), and Mi (Migratory); Queensland Status (NC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), NT (Near Threatened), LC (Least Concern) and SLC (Special Least Concern).
[2] Based on the likelihood of occurrence assessment in the Desktop Protected Matters Assessment Report (Trend Environmental 2023), and Field Assessment Report (Trend Environmental 2024). Categories include likely to occur, may occur or unlikely to occur.
[3] Habitat types include: 1 = Alluvial notophyll to mesophyll vine forest (RE7.3.23a in Goomboora Park only); 2 = Alluvial notophyll to mesophyll vine forest; 3 = Mixed Eucalypt woodland to open forest with vine forest understorey, 4 = Regrowth areas; 5 = Alluvial notophyll to mesophyll vine forest (Freshwater Creek in Goomboora Park only); 6 = River beds and open water
^ From direct clearing (associated with the OH component)

Significant impact assessment

A significant impact assessment has been undertaken for MNES confirmed as present or considered likely to or may occur based on habitat values within the MID Corridor, in accordance with the Significant Impact Guidelines 1.1 (DoE 2013) (Section 8.1 of Appendix D). After considering potential impacts, avoidance, mitigation and minimisation measures, and the significant impact criteria provided, it is not expected there will be a significant impact on any MNES within the MID Corridor as a result of the Project.

6.8.2 Matters of State Environmental Significance (MSES)

Relevant Matters of State Environmental Significance

Relevant MSES prescribed matters for the project relate to regulated vegetation, protected wildlife habitat, waterways for waterway barrier works, marine plants and protected areas. These prescribed matters have the potential to be impacted by the Project.

To avoid duplication of offset conditions between jurisdictions, the State Government can only impose an offset condition in relation to a prescribed matter if the same matter has not been subject to assessment under the EPBC Act. This is particularly important for the protected wildlife habitat assessment, and as such, only threatened and conservation significant species that are not protected under the EPBC Act; considered MNES, have been described in the below assessment for MSES. All other threatened species that have jurisdiction under the EPBC Act have been included in the MNES assessment in Section 6.8.1 above.

The total area of each verified MSES prescribed matter within the MID Corridor, that was deemed applicable for the Project is provided in

Table 6-22. Note, while a formal Property map of assessable vegetation (PMAV) process has not been undertaken to dispute the regulated vegetation management map, the ground-truthed extents (due to slight differences in vegetation communities between the State-mapped regulation vegetation and ground-truthed data) have been provided in the below assessment.

Extent of Matters of State Environmental Significance within the proposed MID Corridor

Regulated vegetation

Ground truthing confirmed that the MID Corridor contains Category B (remnant), Category C (high-value regrowth) vegetation and Category R (reef regrowth watercourse vegetation), with the total extent of regulated vegetation within the MID Corridor being 6.07ha. Most of this vegetation is located within the underground cable component of the MID Corridor and as such will avoid clearing as a result of construction being via undercrossing techniques in areas of vegetation.

There will, however, be some minor clearing of regulated vegetation within the vicinity of the Barron River vicinity. It is anticipated that 1.96ha will be subject to clearing to accommodate construction of overhead component of the transmission line. Minor clearing associated with the geotechnical assessment will also occur, of which 0.01ha will be cleared in the vicinity of Goomboora Park (within the area of underground cable; meeting criteria for exempt clearing works under the VM Act).

Protected wildlife habitat

<u>High-risk areas</u>

Based on the Desktop Protected Matters Assessment Report (Appendix A of Appendix D), high-risk areas were mapped within the MID Corridor. No protected plants were identified within these mapped high-risk areas or within other areas of the MID Corridor during the field assessment in which the whole MID

Corridor was traversed. However, it is noted that *Myrmecodia beccarii* individuals were recorded outside of the MID Corridor.

A full flora survey, in accordance with the Protected Plant – Flora Survey Guidelines (DES 2020) has not been completed for the MID Corridor. It is recommended that a full flora survey in accordance with the guidelines be completed prior to any geotechnical or construction activities within high-risk areas in order to inform a protected plant clearing permit or exemption notification. Hence, the extent of this prescribed matter within the MID Corridor has not been verified. However, some suitable habitat for CEEVNT flora species does exist, with an impact extent of 1.97ha.

Trend Environmental undertook a flora survey within the disturbance area of the Freshwater Creek Geotechnical borehole location (BH01), which forms part of the proposed development. No CEEVNT flora species were identified during the flora survey. As no CEEVNT plants were detected within the clearing impact area, no impacts to protected plants are expected from the project and as such no mitigation measures were considered necessary.

MSES listed CEEVNT species

The following MSES listed threatened species were considered likely or may occur within the MID Corridor, and had suitable habitat verified within, or within near vicinity of, the MID Corridor during the field assessment:

- Four plant species;
- Three amphibian species;
- One bird species; and
- Three mammal species.

Impact extents differ depending on the species and their habitat requirements and are outlined within

Table 6-22, however generally only 0.01 – 1.96ha of the above species habitat will be impacted by vegetation clearing for the Project.

Waterway for Waterway Barrier Works

Ground-truthing confirmed the waterways providing for fish passage do occur within the MID Corridor. While construction of towers and underground infrastructure do not require construction within a waterway impacting on fish passage, three access tracks will require construction over a WWBW waterway. Any bed level crossings installed will be constructed in line with the ADR for WWBW.

Marine Plants

A review of the HAT and ground-truthing confirmed the presence of material or other marine plants protected under the Fisheries Act within OH Transmission line of the MID Corridor, in the vicinity of the Barron River. Map 9 of Appendix D shows the location of the confirmed marine plants. The extent of marine plants within OH Transmission line of the MID Corridor that will be impacted is 463m^2.

Protected Area

The Kamerunga Conservation Park is a protected area under the NC Act and is recognised as a prescribed environmental matter (MSES) under the EO Act. OH Transmission line of the Project intersects 0.31ha of this Kamerunga Conservation Park. While regulated vegetation clearing may be required in this Conservation Park, micro-siting of the vegetation clearing requirements will be undertaken prior to construction to avoid tree and shrub clearing where possible to minimise impacts.

Significant impact assessment

As the Project will obtain a 'Use' approval through the MID process, under Section 44(6)b of the Planning Act, the development becomes 'accepted development' under subsequent legislation e.g., VM Act, Fisheries Act and the Water Act, meaning that development approvals are not required, and offsets cannot be imposed under EO Act for impacts to MSES recognised under legislation. Impacts under the NC Act however (e.g., impacts to protected areas) are not considered accepted development as a result of the MID process, and could carry offset implications under the EO Act.

While offsets cannot be imposed for MSES recognised under the Planning Act, an assessment against the Significant Residual Impact Guideline (DSDIP 2014) has been undertaken to evaluate direct and indirect impacts. This assessment also informs recommendations for avoidance and mitigation measures to minimise overall environmental harm during the construction and operation of the Project.

For impacts relating to protected areas, an assessment against the Significant Residual Impact Guideline (DEHP 2014) has been undertaken to evaluate impacts and identify offset implications for the project under the EO Act.

The outcome of the Significant Residual Impact (SRI) assessments for each identified MSES has been provided in Table 22 of Appendix D. After considering potential impacts, avoidance and minimisation measures, and the State SRI criteria provided within the Significant Residual Impact Guideline (DSDIP 2014), the Project is unlikely have an SRI on most MSES triggered by the project being a prescribed activity due to the Infrastructure Designation process under the Planning Act (Qld; e.g., regulated vegetation, protected wildlife habitat, threatened species habitat and waterway barrier works), however the Project is likely to have an SRI on marine plants.

For MSES (protected areas) triggered by the project being a prescribed activity from impacts to protected areas conducted under an authority granted under the NC Act, there will be an SRI based in criteria provided within the Significant Residual Impact Guideline (DEHP 2014).

To reduce the adversity of these impacts to marine plants and protected areas however, Powerlink proposes to microsite the vegetation clearing requirements in these areas to avoid where possible the clearing of vegetation.

Table 6-22 Extent of MSES within the proposed MID Corridor

MSES		Scientific name	Common name	Status[1]		Presence[2]	Suitable habitat	Survey area extent (ha)	Direct impact extent (ha)^
				AUS	QLD				
Threatened Species	Plants	*Acalypha lyonsii*	-	-	VU	May occur	2	7.74	1.97
		Wetria australiensis	-	-	VU	Likely	2	7.74	1.97
		Rhodamnia sessiliflora	Iron Malletwood	-	EN	Likely	2	7.74	1.97
		Spathoglottis paulinae	-	-	NT	May occur	3	8.71	Nil
	Amphibians	*Litoria nannotis*	Waterfall Frog	-	EN	May occur	1	15.71	0.01
		Litoria rheocola	Common Mistfrog	-	EN	Likely	1	15.71	0.01
		Litoria serrata	Tapping Green Eyed Frog	-	VU	May occur	1	15.71	0.01
	Birds	*Cyclopsitta diopjthalma maclaeyana*	Macleay's Fig-parrot	-	VU	Likely	2	7.74	1.97
	Mammals	*Hipposideros diadema*	Diadems Leaf-nosed Bat	-	NT	Confirmed	1	15.71	0.01
		Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	Likely	All	29.95	1.97
		Ornithorhynchus anatinus	Platypus	-	SLC	Likely	5	0.24	Nil

[1] Queensland Status (NC Act): CR (Critically Endangered), VU (Vulnerable), EN (Endangered), NT (Near Threatened), LC (Least Concern) and SLC (Special Least Concern).
[2] Based on the likelihood of occurrence assessment in the Desktop Protected Matters Assessment Report (Trend Environmental 2023), and Field Assessment Report (Trend Environmental 2024). Categories include likely to occur, may occur or unlikely to occur.
[3] Habitat types include: 1 = Alluvial notophyll to mesophyll vine forest (RE7.3.23a in Goomboora Park only); 2 = Alluvial notophyll to mesophyll vine forest; 3 = Mixed Eucalypt woodland to open forest with vine forest understorey, 4 = Regrowth areas; 5 = Alluvial notophyll to mesophyll vine forest (Freshwater Creek in Goomboora Park only); 6 = River beds and open water
^ From direct clearing (associated with the OH component)

6.9 Biosecurity

An Ecological Assessment Report was completed for the Project by Trend Environmental (2025) (Appendix D). A summary of the findings of the report relevant to biosecurity are presented below.

6.9.1 Existing environment

Biosecurity zones

Biosecurity zones are areas that have legal movement restrictions placed on them to limit the spread of pests and diseases throughout the State. The Queensland Biosecurity Manual (DAF, 2023) sets out the risk minimisation requirements for movement of biosecurity carriers to be followed in compliance with the *Biosecurity Regulation 2016* (Qld) (Biosecurity Regulation).

The MID Corridor is located within a number of biosecurity zones, including (Figure 6-19);

- Northern Banana Biosecurity Zone (Northern Banana Biosecurity Zone);
- Sugar Cane Biosecurity Zone (Sugar Cane Biosecurity Zone 1 (Coen to Townsville)); and
- Electric Ant Biosecurity Zone.

Banana Biosecurity Zone (Northern Banana Biosecurity Zone)

The MID Corridor is entirely mapped within the Banana Biosecurity Zone (Northern Banana Biosecurity Zone). The Banana Biosecurity Zone regulates the movement of banana plants (other than fruit), soil on which a banana plant has been growing, or machinery used in production of the plants out of any banana biosecurity zone, or into the Northern Banana Biosecurity Zone. To move banana material, a Biosecurity Certificate is needed.

Sugar Cane Biosecurity Zone (Sugar Cane Biosecurity Zone 1 (Coen to Townsville))

The MID Corridor is entirely mapped within the Sugar Cane Biosecurity Zone. This zone regulates the movement of Sugar Cane plant material between zones and requires Sugar Cane machinery to be cleaned and inspected if being moved between zones.

Electric Ant Biosecurity Zone

The MID Corridor intersects three (3) electric ant restricted zones within and adjacent to the proposed new substation in Barron. The adjoining quarry and landfill is listed as a restricted zone and the new substation in Barron is mapped under the Caravonica 5 (No. 6) electric ant restricted zones and along Freshwater Creek. In addition, the MID Corridor intersects an electric ant restricted zones near the proposed UGOH transition structure located at a transition site in Redlynch (the adjoining Goomboora Park and portion of Shale Street are listed as a restricted zone). A restricted zone is also adjacent to the MID Corridor along CWAR, near the Dungarvan Drive Reserve.

Electric ants are a category 1 restricted matter under the Biosecurity Act. Under the Biosecurity Act, all Queenslanders have a general biosecurity obligation to manage biosecurity risks and threats that are under their control, they know about, or they are expected to know about. Within the electric ant restricted zone (such as Caravonica 5 and Redlynch 10), restrictions apply on the movement of electric ant carriers such as soil from a property (and at times within the property) and a biosecurity instrument permit (BIP) is likely to be required unless movement restrictions are lifted prior to commencement.

Pest flora species

The search of the Queensland WildNet species database identified 149 introduced flora species records. Two of these species are listed as category 3 restricted invasive plants under the Biosecurity Act as well as Weeds of National Environmental Significance (WoNs). These include *Lantana camara* (Lantana) and *Annona glabra* (Pond Apple).

Terrestrial weeds were present (field verified) within the MID Corridor in variable densities and were most prevalent in cleared areas, along road verges, and along the edges of native vegetation communities. While weeds within the remnant patches of vegetation were relatively low.

Table 6-23 lists the introduced species that were recorded within the MID Corridor that are considered restricted invasive plants under the Biosecurity Act and/or WoNS. There were three introduced species that are listed as a restricted under the Biosecurity Act, however these species are not considered WoNS.

In addition, a locally declared plant under Cairns Regional Council was recorded within riparian habitat along Barron River, *Castilla elastica* (Panama Rubber Tree). This species was found in the Cairns Regional Council 'Prevention Zone'.

Table 6-23 Restricted weeds recorded within the proposed MID Corridor

Scientific name	Common name	*Biosecurity Act* category	WoNS listing	Cairns Regional Council declared plant
Cascabela thevetia	Yellow Oleander	Restricted - Category 3	-	✓
Sphagneticola trilobata	Singapore Daisy	Restricted - Category 3	-	✓
Spathodea campanulata	African Tulip	Restricted - Category 3	-	✓

Pest fauna species

A search of the Queensland WildNet species data base identified 19 introduced flora species records. Of these, the Feral Cat (*Felis catus*), Feral Pig (*Sus scrofa*), Mosquito Fish (*Gambusia holbrooki)* and Spotted Tilapia (*Tilapia mariae*) are listed as restricted invasive terrestrial fauna species under the Biosecurity Act. Field surveys identified one introduced species within the MID Corridor, being the Cane Toad (*Rhinella marina*), which is listed as an invasive animal under Schedule 1, Part 4 of the Biosecurity Act.

BIOSECURITY ZONES WITHIN THE PROPOSED MID CORRIDOR

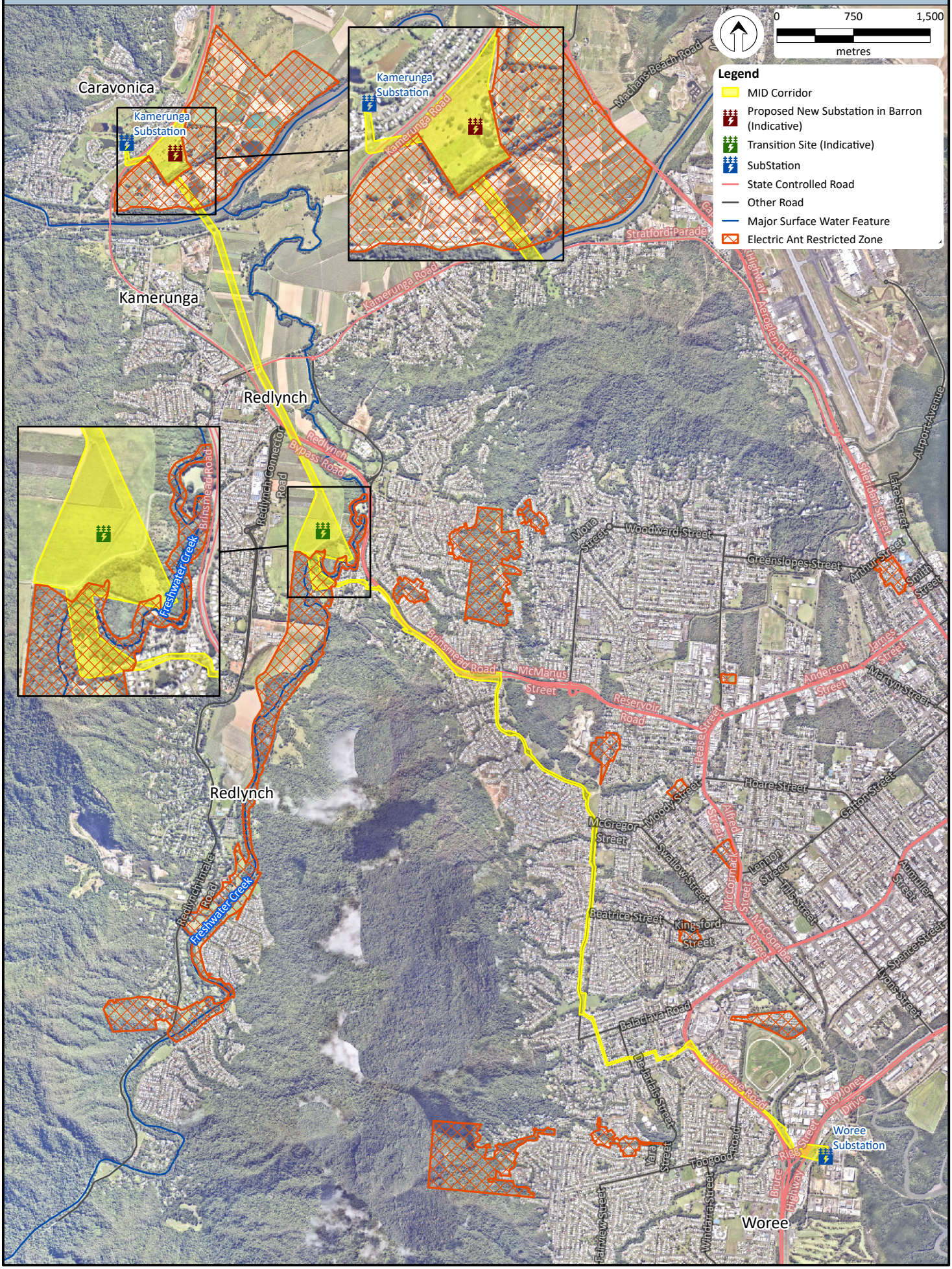


Figure 6-19

6.9.2 Potential impacts and mitigation measures

Biosecurity impacts associated with the construction of the Project are likely to comprise of the following:

- Introduction of weeds: During construction, weeds may be spread or introduced through movement of machinery and plant which is contaminated with weed material, or by importing and using contaminated soils. With favourable climatic conditions, this can result in weeds species proliferating in areas which were previously free of infestation and may result in biodiversity loss by competing with native species and modifying and disrupting ecosystem processes.
- Spread of pest species: The MID Corridor contains areas of known electric fire ant nests and as such, there is the possibility of materials potentially containing electric fire ants to be moved outside of the Project area, which could result in the spread of the extent of electric fire ants within the region. This may result in the species out-competing and displacing other ant species, as well as cause a decline in numbers of invertebrates and small vertebrates, reducing overall biodiversity of the area (Queensland Government 2023).
- Edge effects: Clearing needed to complete the Project may exacerbate edge effects, changing population or community structures of the adjacent retained vegetation, particularly within the Kamerunga Conservation Park. These changing population or community structures can provide opportunities for weeds to establish, further worsening these impacts.
- Habitat degradation: The presence of weed and pest species is often associated with ongoing degradation of habitat as a result of an out-competing native species.

Biosecurity will be managed in accordance with Powerlink's EMP (Appendix K). Measures within the EMP include, but are not limited to:

- Undertaking works in accordance with the Biosecurity Act General Biosecurity Obligation, in addition to Powerlink's mandated controls.
- Consultation with landholders prior to works commencing to discuss property-specific biosecurity requirements, including:
    - property-specific Biosecurity Management Plans;
    - any known biosecurity matters that should be considered;
    - concerns in relation to biosecurity matters; and
    - biosecurity controls implemented on the property.
- Implementing clean down protocols in accordance with Powerlink's mandated controls, property specific requirements and the *Queensland Government's Vehicle and Machinery Clean Down Procedures.*
- Undertaking appropriate disposal of material potentially contaminated with biosecurity matter shall be undertaken in accordance with Biosecurity Act requirements.
- Obtaining appropriate approvals (i.e. Biosecurity Instrument Permits) where works require the movement of materials containing a biosecurity matter (or carrier) outside of a biosecurity zone.
- Develop a Biosecurity Management Plan that will contain a range of measures aimed at ensuring compliance with the Biosecurity Act general biosecurity obligation.

Additional measures to manage the impacts of biosecurity will include:

- Early engagement with Biosecurity Queensland (under the DPI) to discuss electric ant restriction zones and the potential opportunity to eradicate the species from these areas resulting in the removal of

movement restrictions under the Biosecurity Act (and the requirement for a BIP), particularly in relation to the new proposed substation site.

- Undertake a detailed pre-construction weed survey prior to construction activities commencing, and a post-construction weed survey after the first wet season, post construction to identify any changes in weed extent. Where required, Powerlink will implement weed control measures to manage any weed infestations recorded as a result of the Project.

6.10 Land use

6.10.1 Existing environment

Tenure

Land tenure arrangements along the MID corridor are mainly freehold land and road parcels, with a total of 38 land parcels (consisting of freehold, state land and rail corridor) being intersected. The MID corridor also traverses a total of 19 easements. All easements (including lot on plans and details) intersected by the Project are detailed in Appendix A. Forms of land tenure traversed by the Project are outlined in Table 6-24 and Figure 6-20.

Table 6-24 Tenure along the proposed MID Corridor

Land tenure type	Details
Freehold	Most freehold land along the MID Corridor is used for a variety of urban and rural uses.
Unallocated State land	Land within the immediate bed and banks of the Barron River is unallocated State land.
Protected area under the NC Act	Kamerunga Conservation Park is State land dedicated as a protected area under the NC Act and managed by DETSI
Reserve land held in trust	Land forming part of the Harley Street North Park on the southern banks of the Barron River is State land held in trust by CRC for a particular purpose (open space).
Road reserves	Road reserve within the MID Corridor is overseen by the relevant road manager including local roads (CRC) and State-controlled roads (DTMR).
Rail corridor	Cairns-to-Kuranda Railway is State land under a perpetual lease for use for transport purposes held by Queensland Rail

As detailed previously, the proposed tenure arrangement for the MID corridor will be a combination of existing land parcels in Powerlink's ownership, new and/or widened easements and appropriate authorities where traversing road and rail corridors and the Kamerunga Conservation Park.

Native Title

Native Title is defined under s.223 of the Commonwealth Native Title Act. Australian Law recognises native title as being Aboriginal or Torres Strait Islander peoples' rights and interests in land and waters, held in accordance with their traditional laws and customs, and where a connection to their traditional country has been maintained.

Irrespective of whether there is a native title claim or determination, native title rights may continue to exist in relation to the land or waters the subject of any proposed project or dealing. Native title rights and interests may be exclusive or non-exclusive in nature. Exclusive native title rights mean that native title holders can possess, use and occupy an area, to the exclusion of all others. Non-exclusive rights mean native title rights may co-exist with the rights of others, such as a pastoral leaseholder, or are shared with another party.

The MID Corridor and site intersect two native title claim areas, including (Figure 6-26):

- Djabugay Nation Area (QC2024/001); and
- Gimuy Walubara Yidinji People Claim Area (QC2012/017).

Native title is applicable along the MID Corridor where historic land tenure declarations / dedications under Commonwealth and State legislation have not resulted in it being wholly extinguished. This includes the following land tenure:

- Freehold tenure;
- Road reserve dedicated on or before 23 December 1996; and
- Specific State lease land (i.e. Perpetual lease for use for a particular purpose (transport: rail corridor)).

The recommended site for the substation is located entirely within freehold land and as such, native title has been wholly extinguished. The recommended corridor, whilst mostly located within either freehold tenure or road reserve, has certain areas (such as the crossing of Barron River), that intersects with land where native title continues to exist. In accordance with the Native Title Act, Powerlink Queensland will undertake the necessary engagement with the relevant native title party prior to undertaking any works in these areas.

EXISTING TENURE ARRANGEMENTS WITHIN PROPOSED MID CORRIDOR

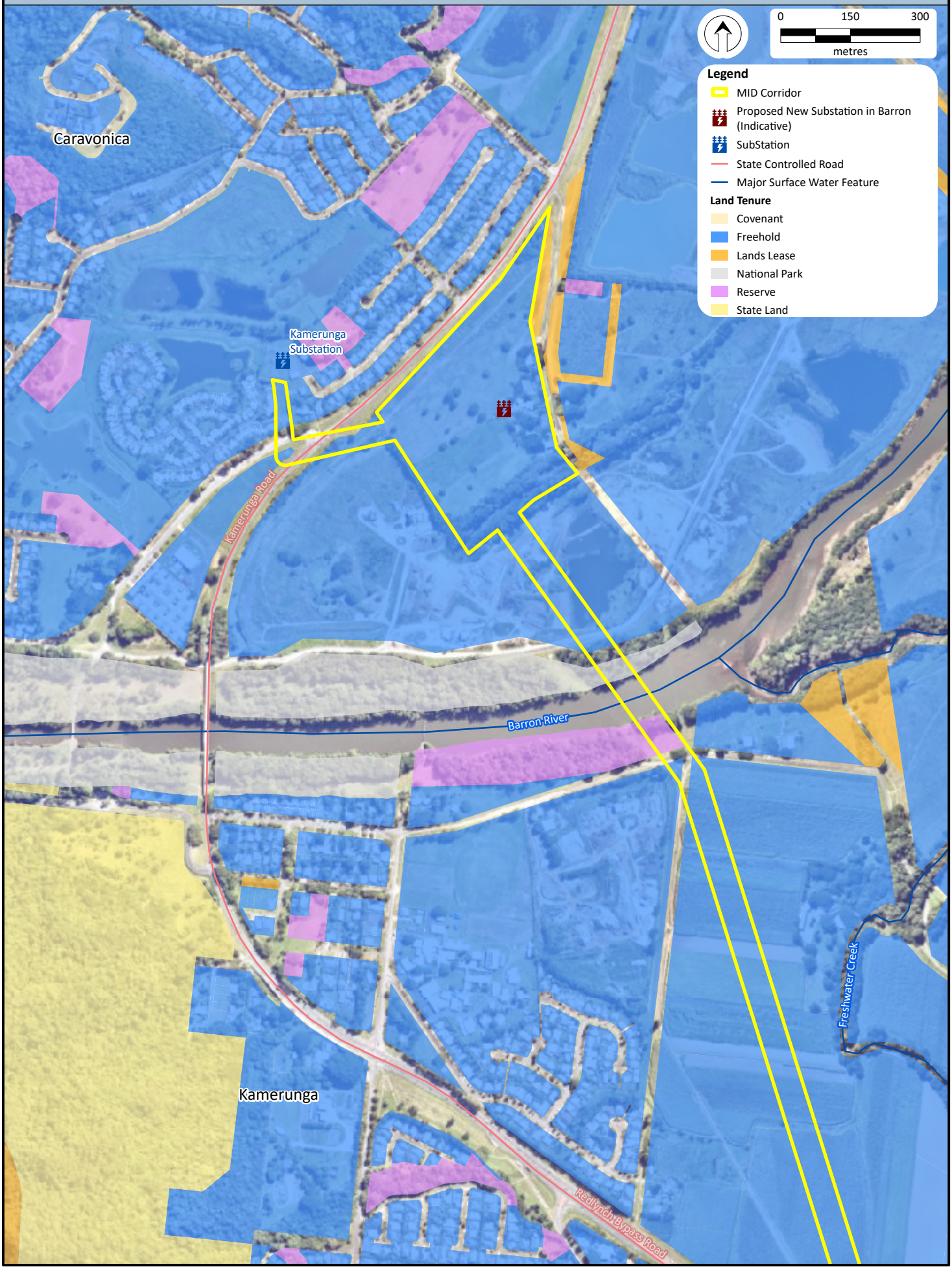


Figure 6-20-1

EXISTING TENURE ARRANGEMENTS WITHIN PROPOSED MID CORRIDOR

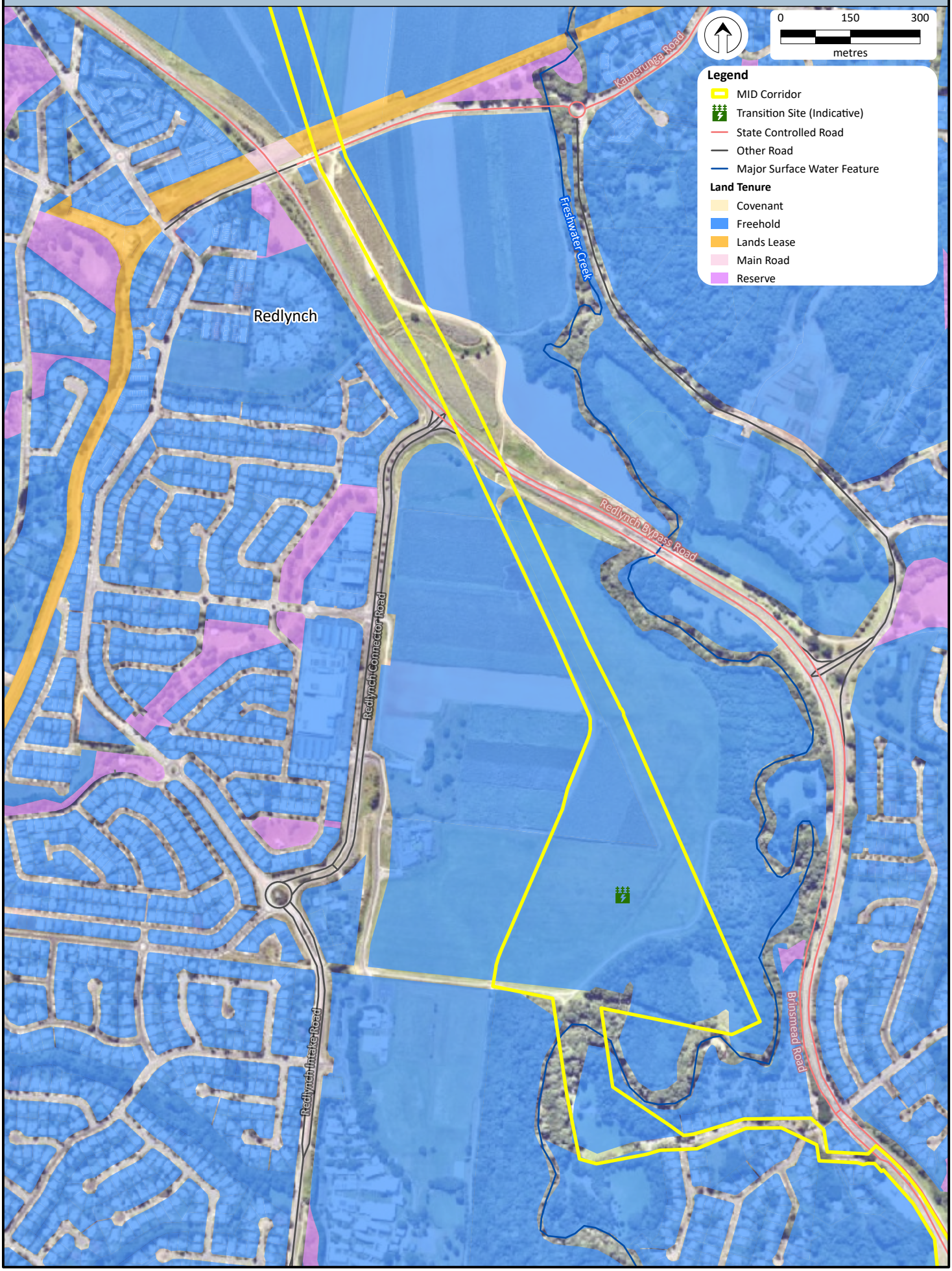


Figure 6-20-2

EXISTING TENURE ARRANGEMENTS WITHIN PROPOSED MID CORRIDOR

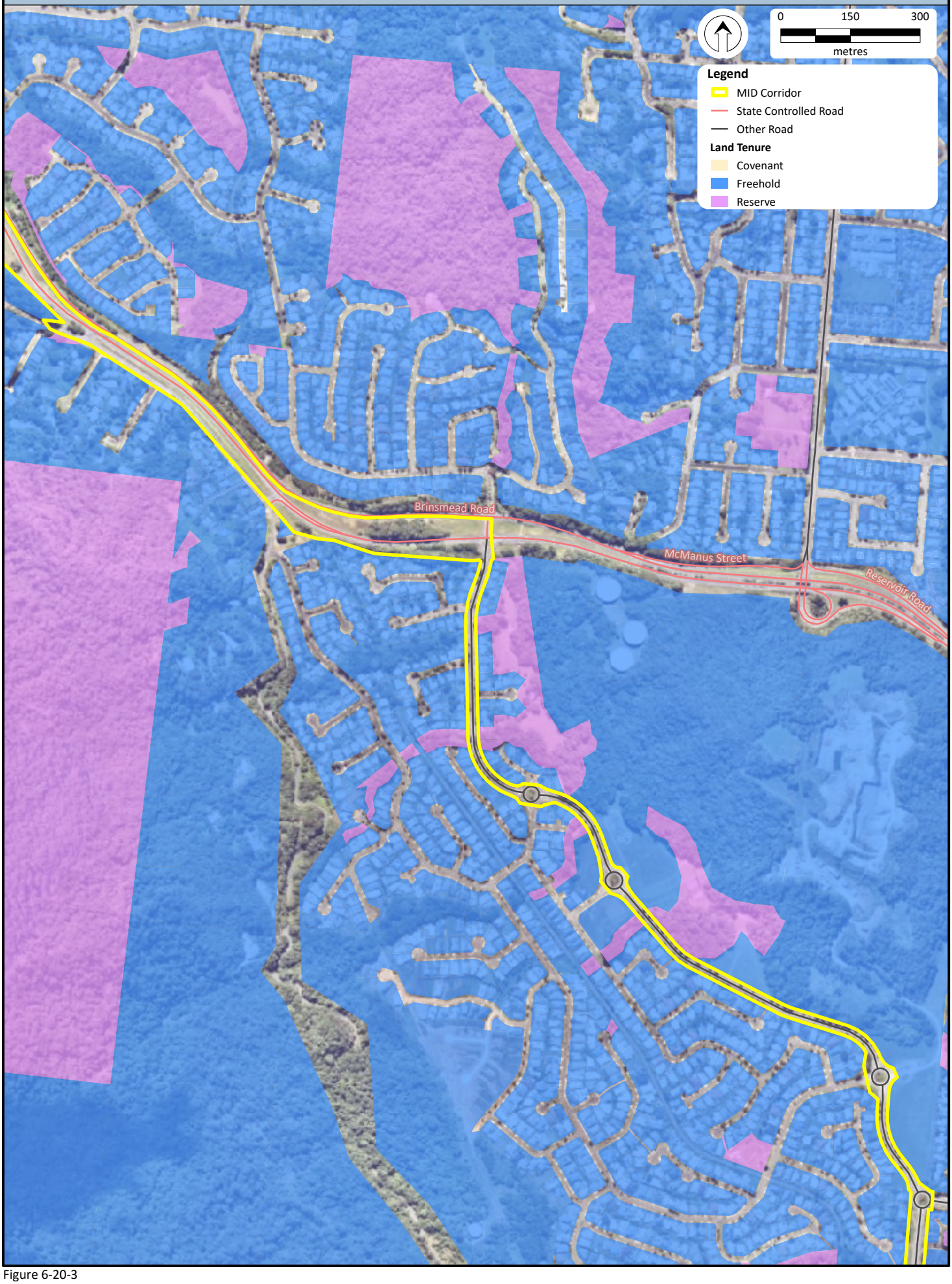


Figure 6-20-3

EXISTING TENURE ARRANGEMENTS WITHIN PROPOSED MID CORRIDOR

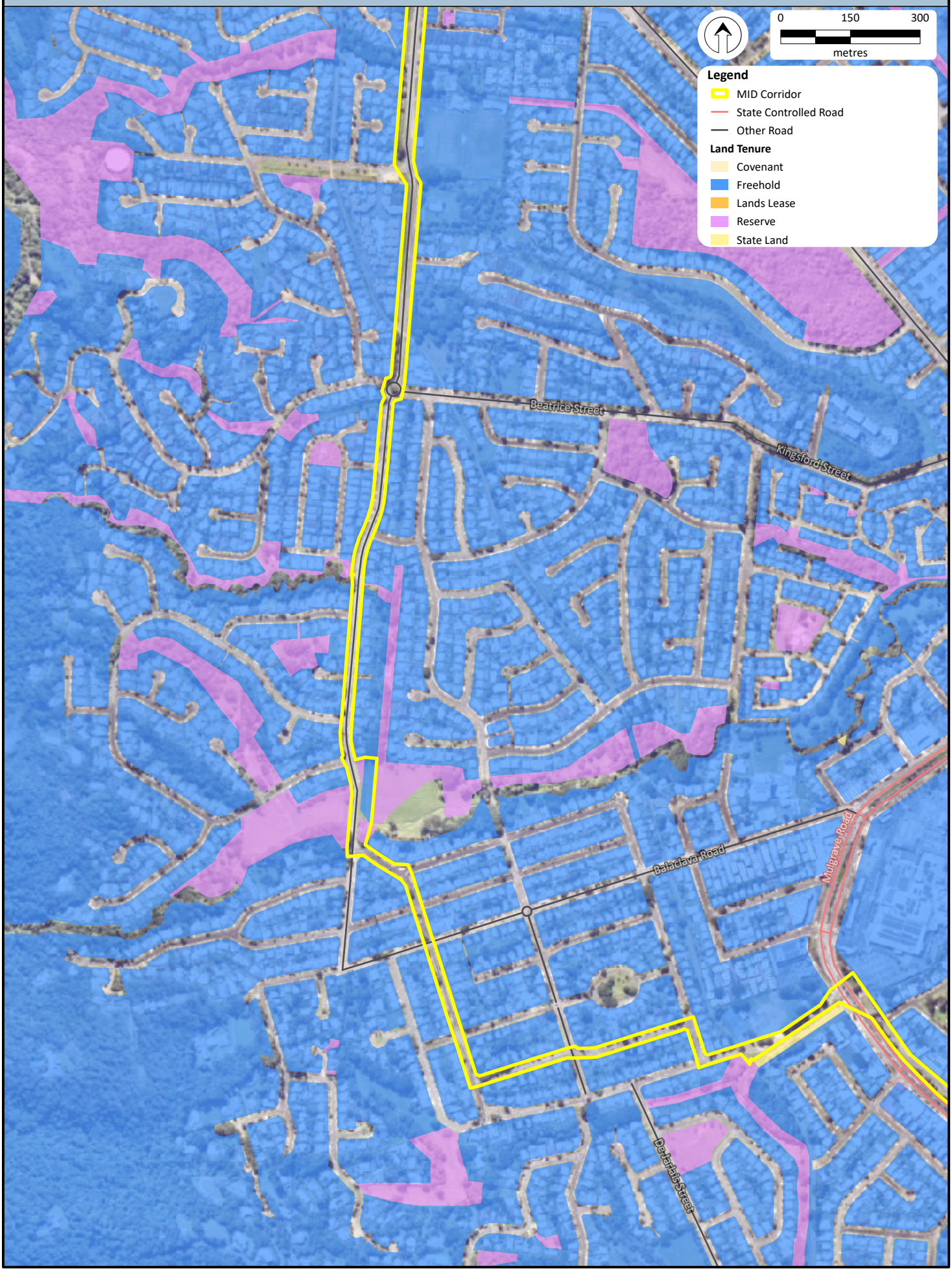


Figure 6-20-4

EXISTING TENURE ARRANGEMENTS WITHIN PROPOSED MID CORRIDOR

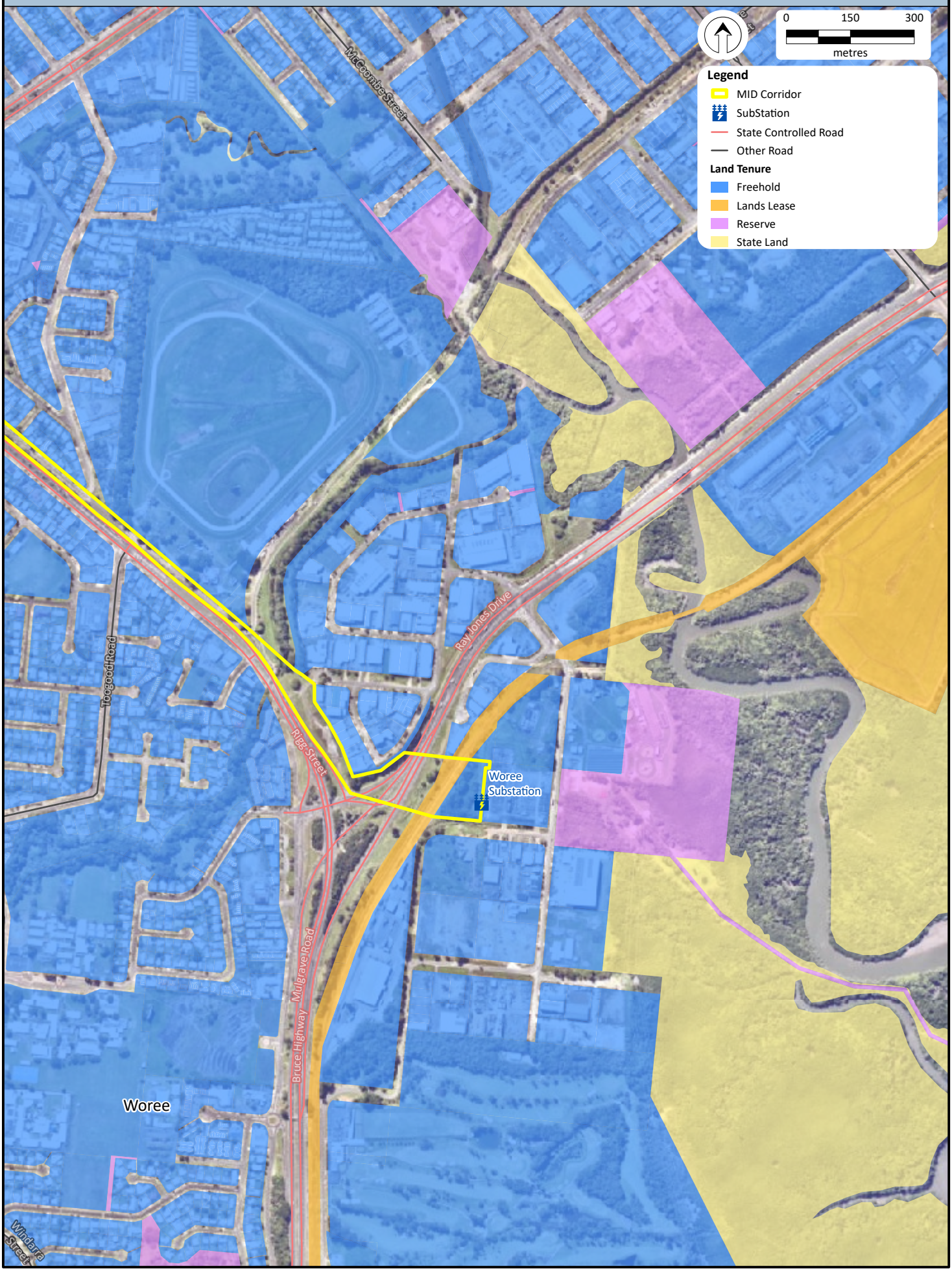


Figure 6-20-5

Zoning, character and amenity

Far North Queensland (FNQ) Regional Plan

The Project is located within the Far North Queensland Regional Plan 2009 – 2031 (Regional Plan) area. Under the Regional land use category of the Regional Plan, the overhead transmission line component of the MID corridor is mapped under the mix of regional landscape and rural production area (RLRPA) and urban footprint area whereas the underground cable component of the MID corridor is mapped entirely under the urban footprint area shown in Figure 6-21.

The urban footprint includes land to provide for the region's urban development needs to 2031. The urban footprint includes existing urban areas and broad hectare land potentially suitable for future urban development. It is to accommodate the full range of urban uses such as infrastructure that support a range of urban uses.

The RLRPA includes lands that have regional landscape, rural production or other non-urban values, and protects these areas from encroachment by inappropriate development, particularly urban or rural residential development.

The FNQ Regulatory Provisions restrict the following in the RLRPA:

- Further fragmentation of land holdings.
- Urban development, except within specific urban zonings.
- Residential development associated with tourist accommodation.
- Expansion of rural residential development.

CairnsPlan

The MID Corridor is located within CRC Local Government Area and is therefore subject to the CairnsPlan. Under the CairnsPlan the MID Corridor intersects a number of zoning types as detailed in Table 6-25 and shown in Figure 6-21.

Zoning through the OH Transmission line component of the MID Corridor generally consists of Rural zoning, with northern most section of the MID Corridor intersecting low density residential zoning and special purpose zoning (at the site of the existing Kamerunga Substation).

The underground cable component of the MID Corridor is mostly situated within road reserve tenure. Surrounding zoning generally consists of low, and low to medium density residential zoning and community facilities zoning. These zones represent the extensive urban development, as well as the extensive urban footprint from the suburb of Redlynch through to the existing Woree Substation and is the major factor for this component of the MID Corridor being underground.

Table 6-25 CairnsPlan zoning intersecting MID Corridor

Cairns Plan Zoning	MID Corridor
OH Transmission line	
Low Density Residential	Where it extends southwards from the Kamerunga Substation and western side of proposed transmission line.
Rural zoning	Predominant land zone traversed by the overhead transmission line component of the MID Corridor. This zoning is utilised for a variety of rural uses including sand mining and waste management within a KRA on the northern side of the Barron River and cane farming within land on the southern side of the Barron River.
Open space	Located along riparian vegetation on the northern and southern banks of the Barron River.
Special Purpose	Land providing for the Cairns-to-Kuranda Railway is identified as being within this zone. A portion of the area adjacent to suburb of Redlynch is identified as being within this zone intended for Australian Turf Management.
Sport and Recreation	Project overlies land within this zone in the south, intended for the Redlynch Sport and Recreation Parklands.
Underground cable	
Open Space	Intersected by the MID Corridor where it traverses Freshwater Creek and Goomboora Park. Adjacent to the MID Corridor at all water crossings along Ramsey Drive.
Low Density Residential and Low-Medium Density Residential	The predominant land zone adjacent to the underground cable component of the MID Corridor.
Medium Density Residential	Located along Mulgrave Road, adjacent to the MID Corridor.
Local Centre	Located along Brinsmead Road and is currently utilised as a service station and is adjacent to the MID Corridor.
Mixed Use	Located along Mulgrave Road, adjacent to the MID Corridor.
Environmental Management	Located along Brinsmead Road, adjacent to the MID Corridor.
Sport and Recreation	Vico Oval, Cannon Park Racecourse and Lions Park, adjacent to the MID Corridor.
Special Purpose	Land utilised by the MSF Sugar Rail Line and Queensland Rail North Coast Line.
Neighbourhood Centre	Located along the low to medium density residential area intended for Cairns Baptist Church;
Community Facilities	Located along Irene Street immediately adjacent to the Vico Oval sport complex.

Cairns Plan Zoning	MID Corridor
Substation	
Rural zoning	Substation site

The existing amenity of the area is defined by elements including air, noise and visual amenity. These elements have been assessed separately within this MID Assessment Report.

Current land use

The overhead transmission line component of the MID corridor is predominantly located within low-lying coastal plains comprising agricultural/ rural land uses such as sugarcane farming, resource extraction and waste management, interspersed with narrow areas of high natural environmental value including the Barron River, Freshwater Creek and the Kamerunga Conservation Park. The urban areas of Caravonica, Kamerunga and Redlynch extend in a linear direction, generally parallel and to the west of the Project. These areas provide for a variety of urban uses comprising a mix of residential dwellings, parks and sporting fields, schools, light industrial and commercial centres and major roads.

The underground cable component of the MID corridor is predominantly located within extensive urban development comprising low, low to medium density residential land use and associated residential centre and sport and recreation such as church and sport complex, shopping complex and park.

The urban area through Redlynch to existing Woree Substation extends along both sides of the proposed UG transmission line. These areas provide for a variety of urban uses comprising a mix of residential dwellings, parks and sporting fields, schools, light industrial and commercial centres and major roads.

Land use zones traversed by the overhead transmission line and underground cable component of the MID corridor are shown in Figure 6-22.

REGIONAL SOCIAL ENVIRONMENT WITHIN PROXIMITY TO THE PROPOSED MID CORRIDOR

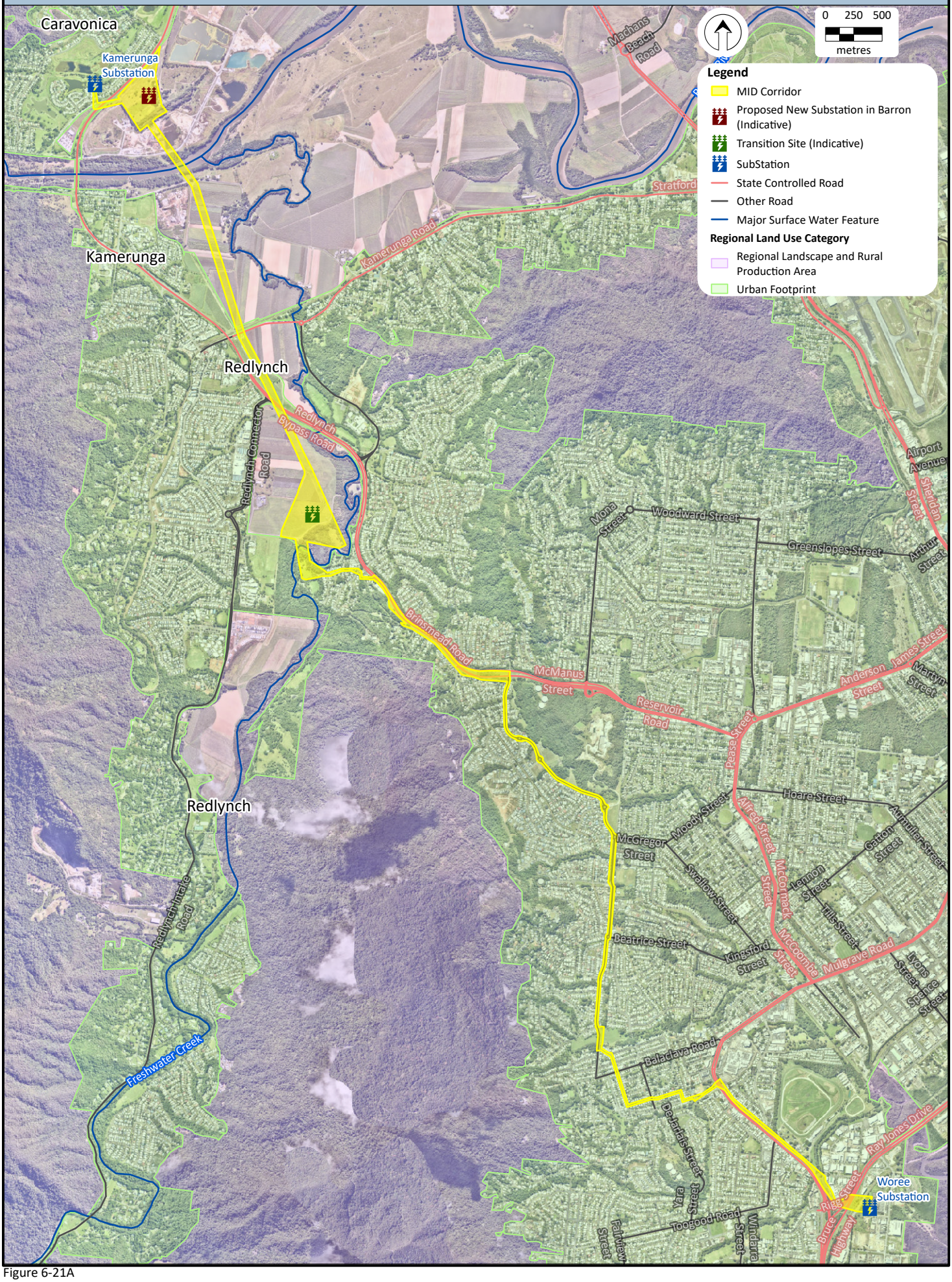


Figure 6-21A

REGIONAL SOCIAL ENVIRONMENT ACROSS THE PROPOSED MID CORRIDOR

Figure 6-21B-1

REGIONAL SOCIAL ENVIRONMENT ACROSS THE PROPOSED MID CORRIDOR

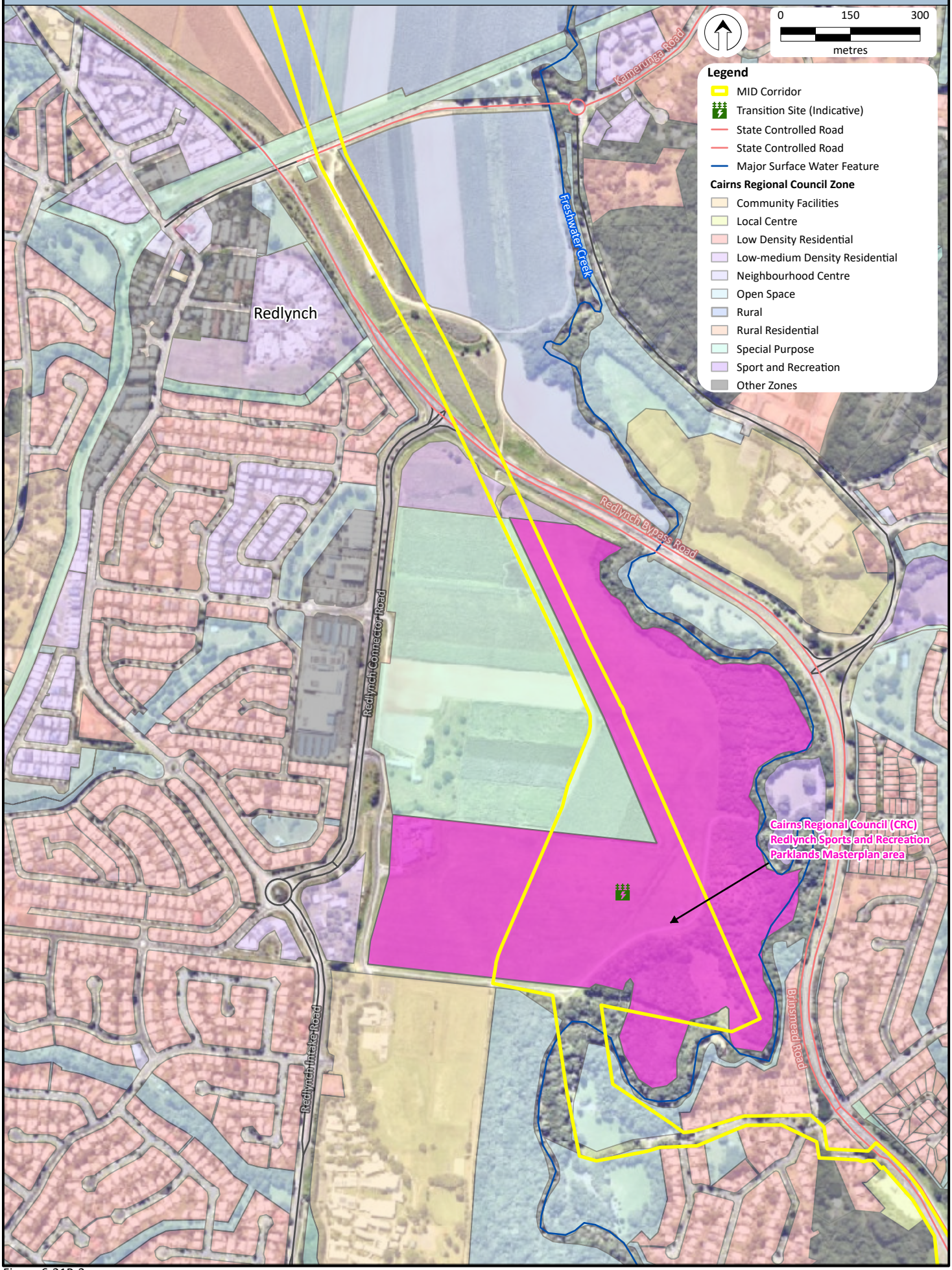


Figure 6-21B-2

REGIONAL SOCIAL ENVIRONMENT ACROSS THE PROPOSED MID CORRIDOR

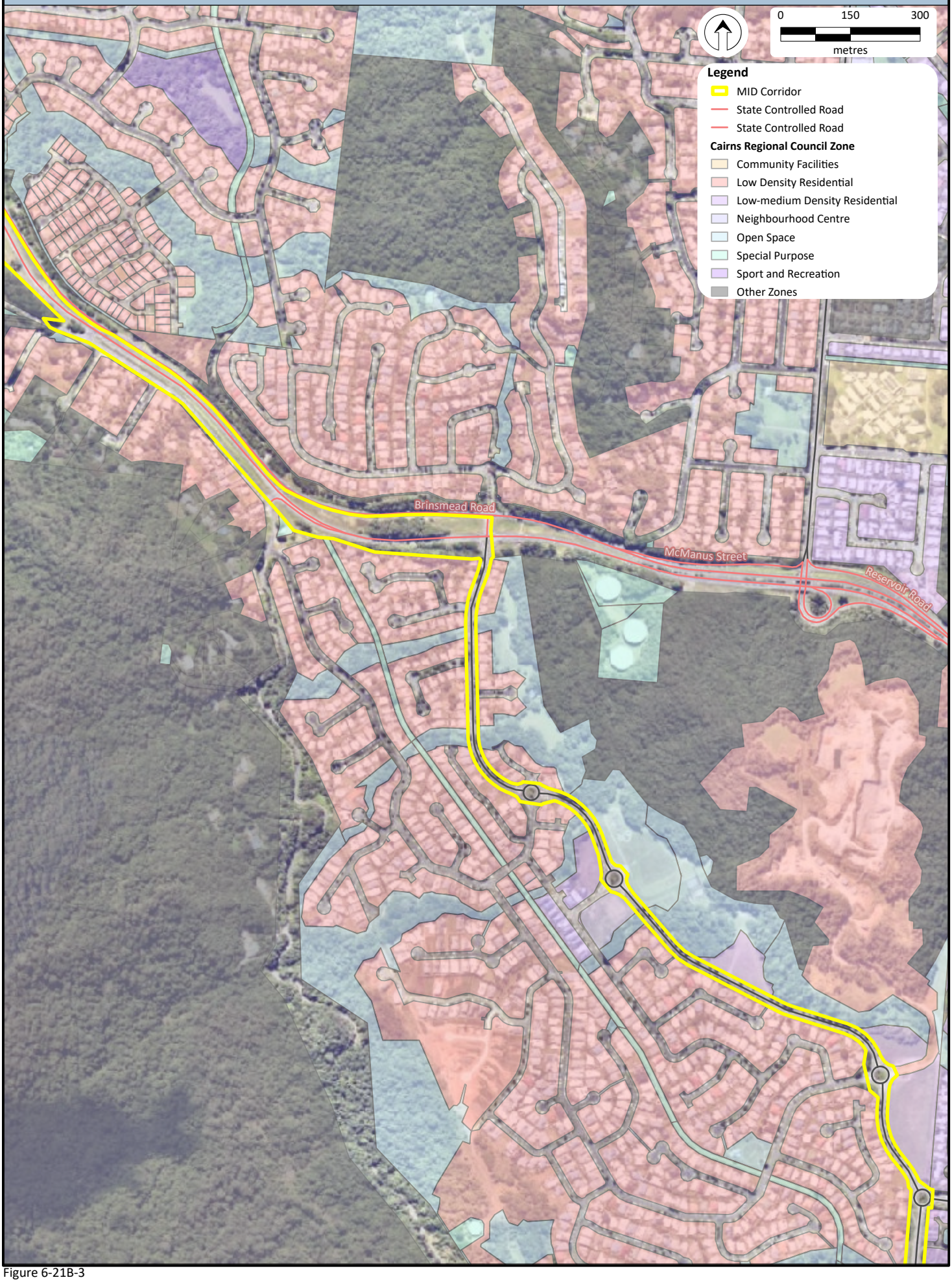


Figure 6-21B-3

REGIONAL SOCIAL ENVIRONMENT ACROSS THE PROPOSED MID CORRIDOR

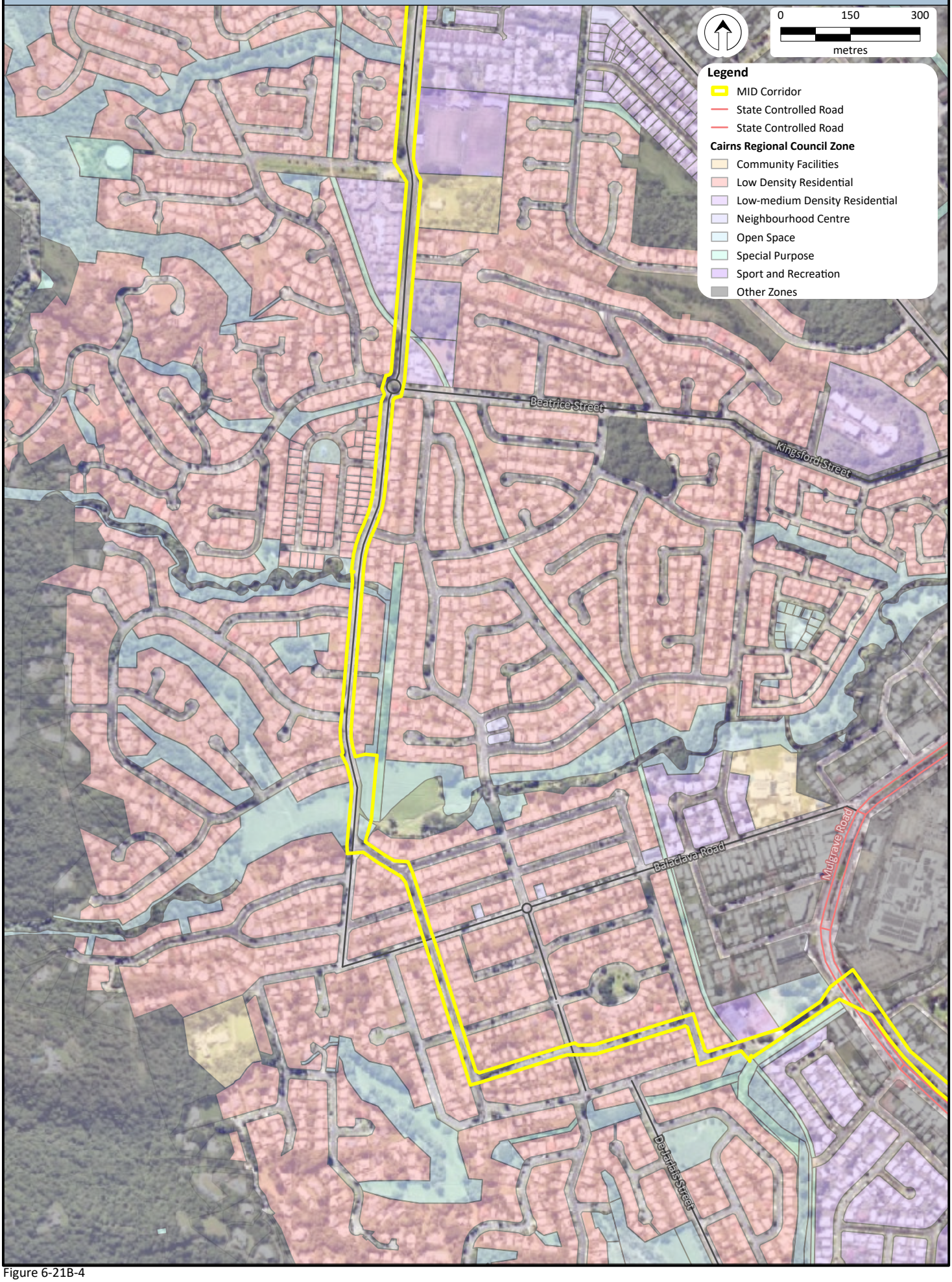


Figure 6-21B-4

REGIONAL SOCIAL ENVIRONMENT ACROSS THE PROPOSED MID CORRIDOR

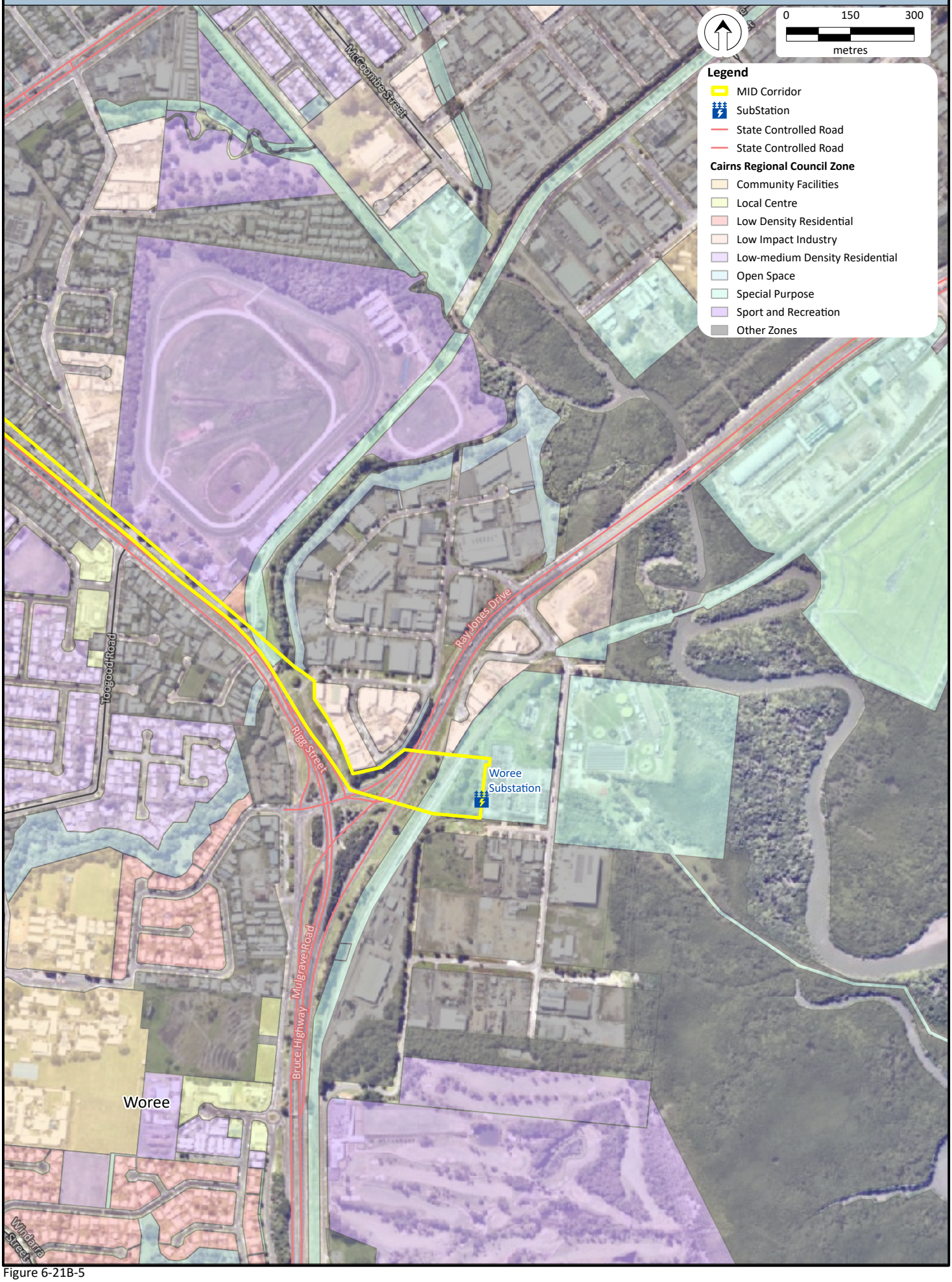


Figure 6-21B-5

LAND USE WITHIN THE PROPOSED MID CORRIDOR

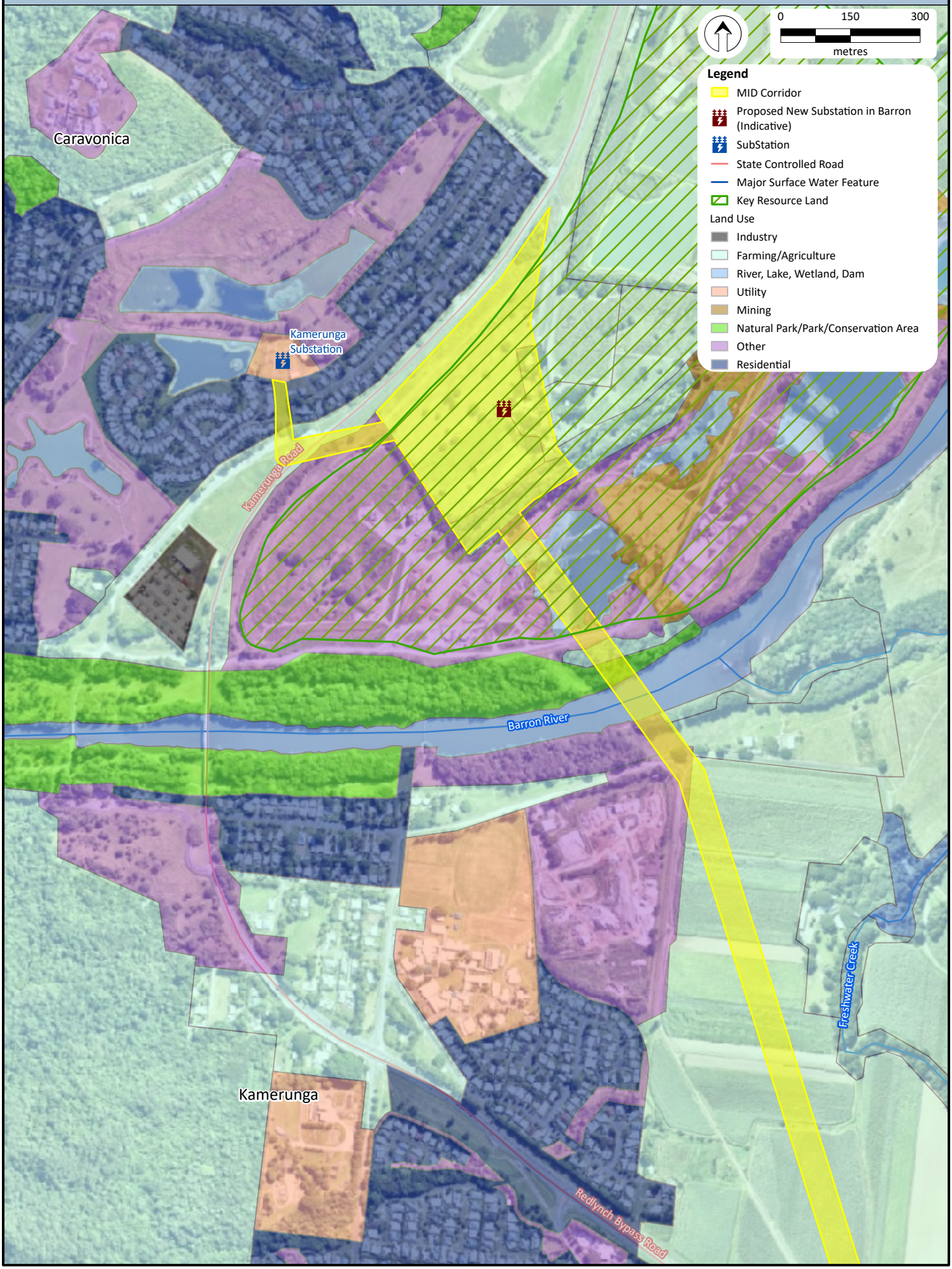


Figure 6-22-1

LAND USE WITHIN THE PROPOSED MID CORRIDOR

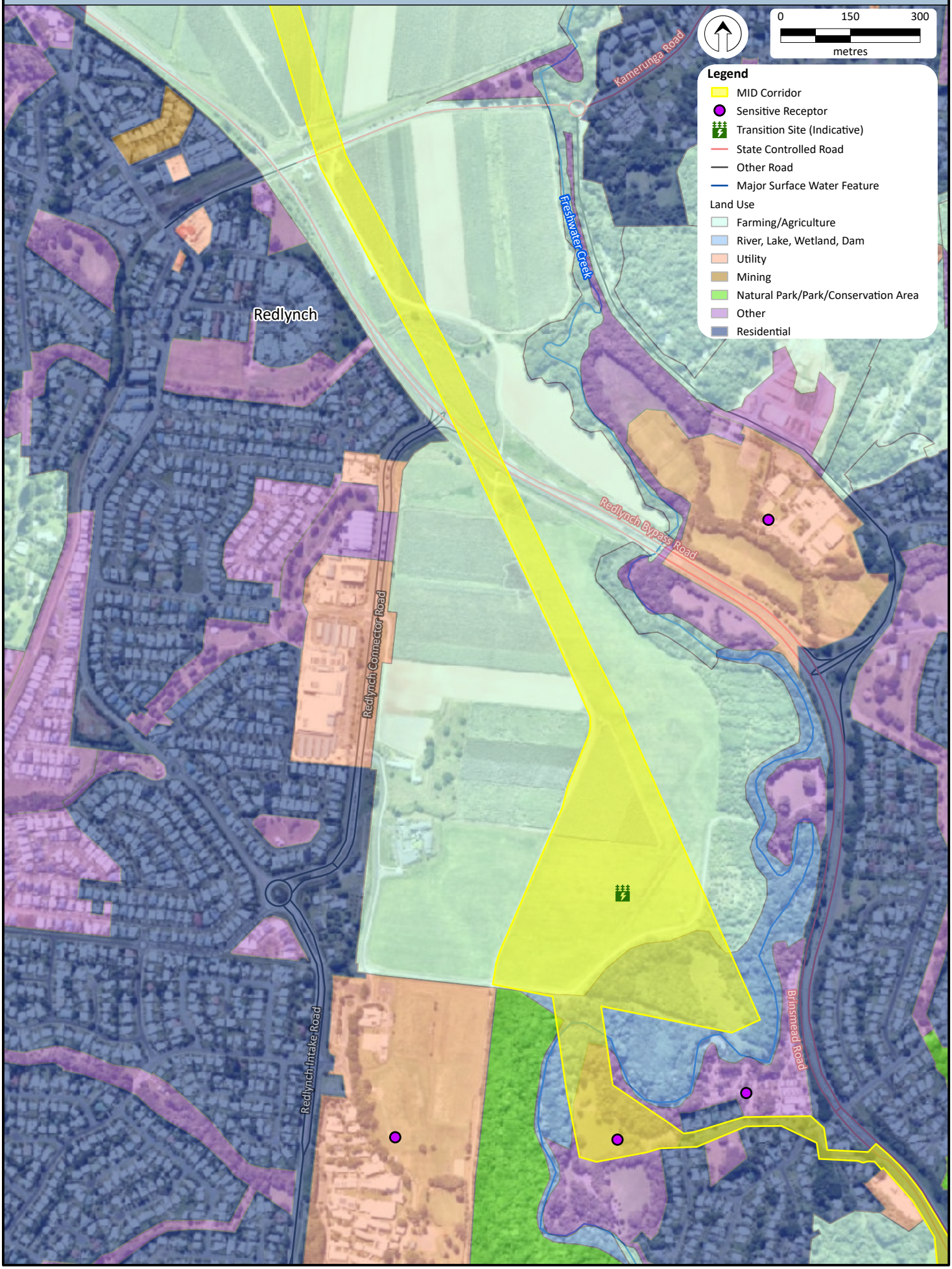


Figure 6-22-2

LAND USE WITHIN THE PROPOSED MID CORRIDOR

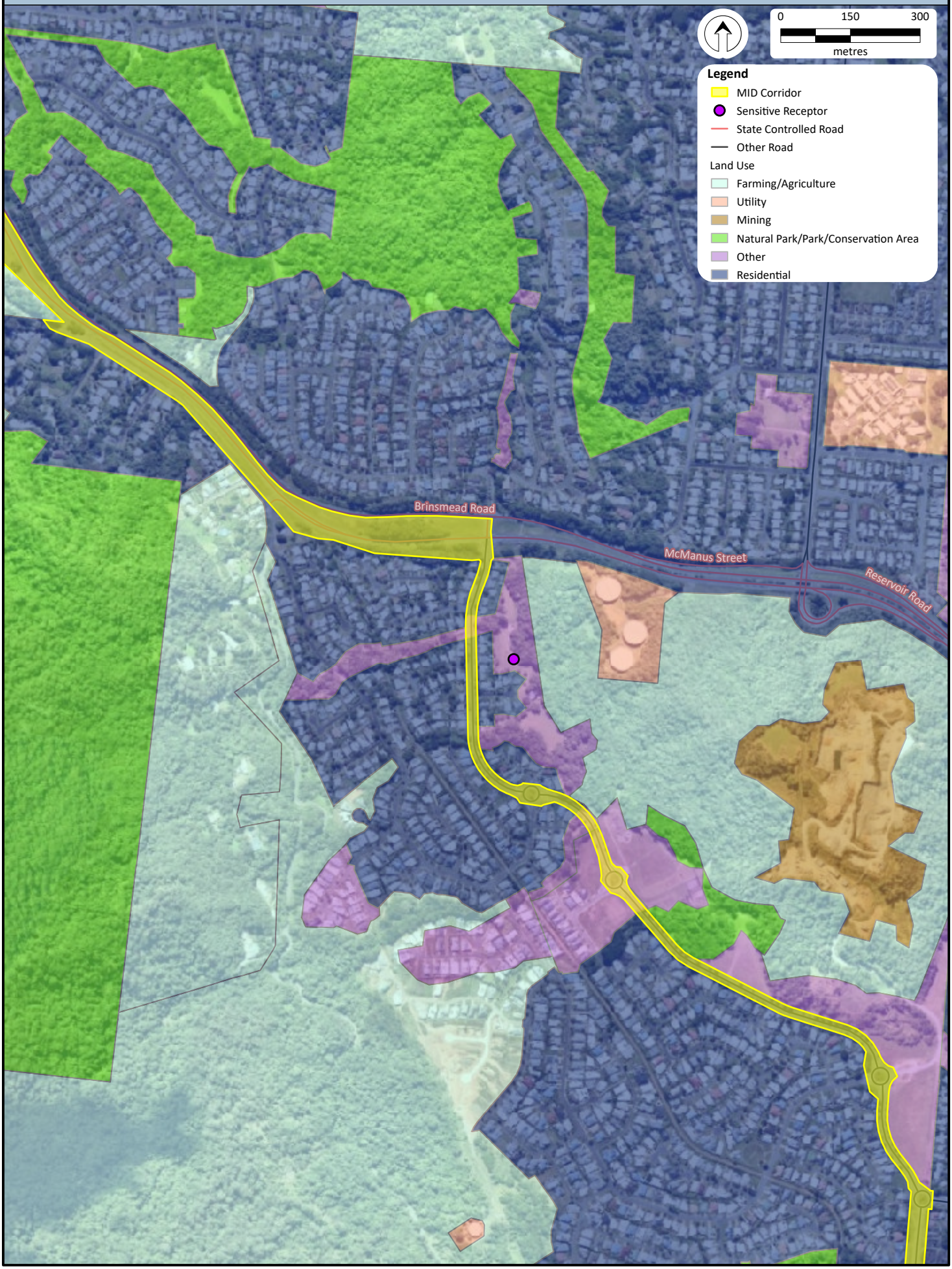


Figure 6-22-3

LAND USE WITHIN THE PROPOSED MID CORRIDOR

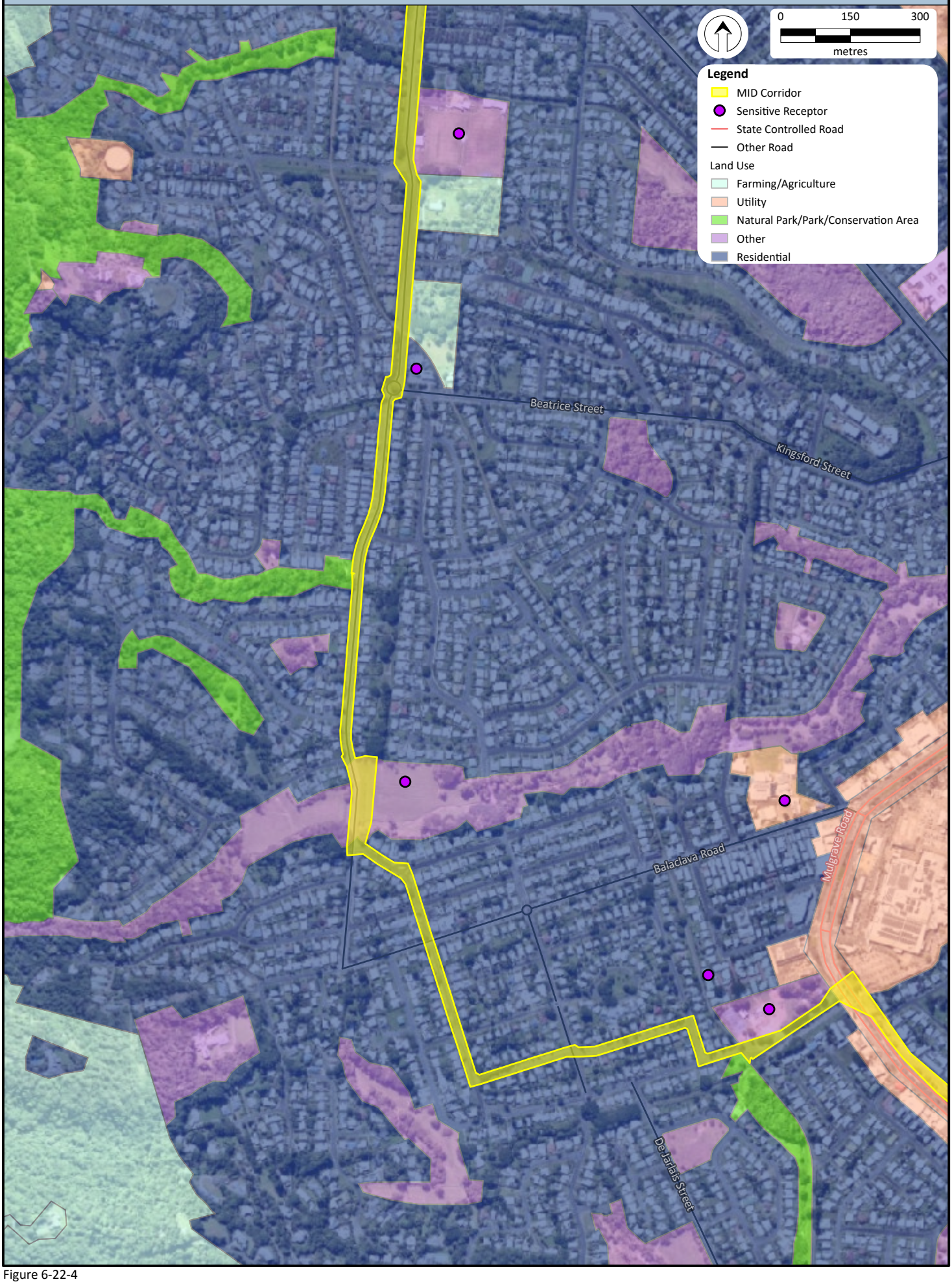


Figure 6-22-4

LAND USE WITHIN THE PROPOSED MID CORRIDOR

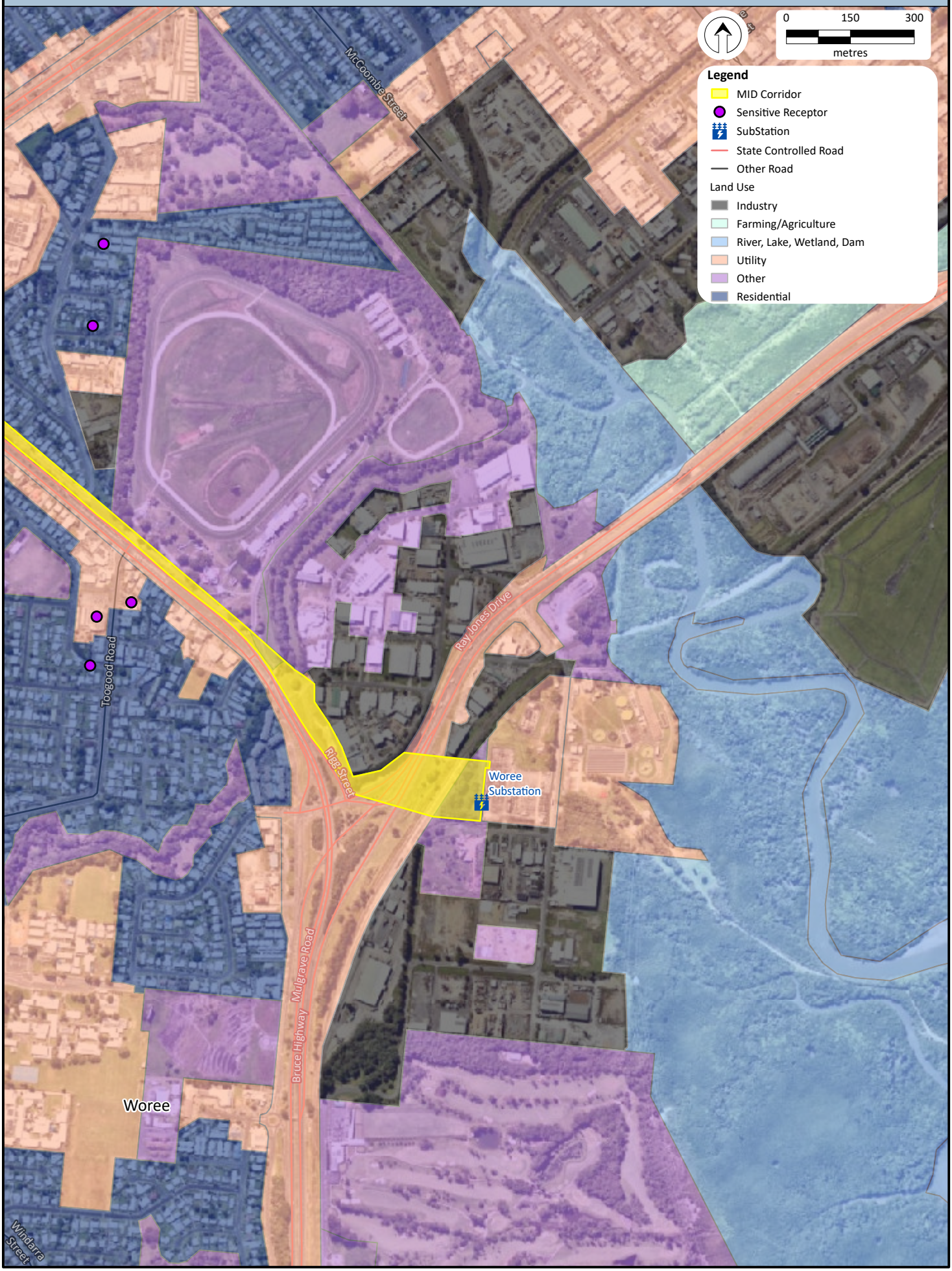


Figure 6-22-5

Agricultural land

Existing rural land uses

Within the overhead transmission component of the MID Corridor, cultivation of sugarcane is the predominant agriculture type in the region and is supported by processing mills within the CRC Local Government Area (LGA) and adjacent shires such as the Mulgrave Sugar Mill. The existing transmission line extends over cane land within a 20m wide easement, and aside from the location of transmission structures and cleared access tracks, farming activities occur in and around the existing infrastructure.

SPP (Agriculture State Interest)

Priority Agricultural Areas are identified in the SPP IMS and comprise the region's strategic areas containing highly productive agricultural land uses. In these areas, Priority Agricultural Land Uses are the land use priority. The MID corridor is not within areas of priority agricultural areas. Further, the MID corridor is not within areas of Important Agricultural Area under the SPP.

The SPP (Agriculture State Interest) protects Agricultural Land Classification Class A and B. A review of SPP IMS identified that whole OH Transmission line component and portion of area within the underground cable component of the MID Corridor along Brinsmead Road, Ramsey Drive, Irene Street, Henley Street, Mulgrave Road, Bruce Highway and Ray Jones Road are mapped under Agricultural land classification - class A and B.

Strategic Cropping Land

A review of Qld Globe Strategic Cropping Land layer indicated that the majority of the land within the MID Corridor is used for sugarcane cultivation and is mapped as Strategic Cropping Land (SCL) which is the land likely to be highly suitable for cropping because of a combination of the land's soil, climate and landscape features and is designated under the *Regional Planning Interests Act 2014* (Qld) (Regional Planning Interest Act). A large portion of OH Transmission line and the proposed new substation in Barron are mapped under SCL. There are no SCL areas are identified within UG Cable component of MID Corridor.

Agricultural Land Classes

The Queensland Globe maps Agricultural Land Classes (ALC) across Queensland, to assist with the identification of important agricultural areas in the State. Types of agricultural land classes include:

- Class A: Crop land that is suitable for a wide range of current and potential crops with nil to moderate limitations to production;
- Class B: Limited crop land that is suitable for a narrow range of current and potential crops due to severe limitations but is highly suitable for pastures. May be suitable for cropping with engineering or agronomic improvements;
- Class C: Pastureland that is suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production; and
- Class D: Non-agricultural land and land not suitable for agricultural uses due to extreme limitations (i.e., undisturbed land with significant conservation values, steep slopes, shallow soils, poor drainage, or is an urbanised area).

The land classes inform strategic policy, planning and investment decisions, including providing protection of locally important agricultural areas and investment in infrastructure which supports agriculture.

Land identified as SCL also roughly corresponds to land identified as Class A under the agricultural land classification scheme, defined as land that is suitable for a wide range of current and potential crops with nil to moderate limitations to production, and worthy of protection from development due to their suitability for crop production.

The area identified along the northern and southern side of the Barron River is identified as Class B under the agricultural land classification which defined as Limited crop land that is suitable for sown pastures and may be suitable for a wider range of crops with changes to knowledge, economics or technology (Figure 6-23).

For the underground cable component of the MID Corridor, no SCL is identified within or adjacent to the proposed transmission line, with this section predominantly located within Class A under the agricultural land classification scheme defined as land that is suitable for a wide range of current and potential crops with nil to moderate limitations to production, and worthy of protection from development due to their suitability for crop production.

A portion of area within the underground cable component of the MID Corridor is located adjacent to Cairns Western Arterial Road, with approximately 0.5ha being mapped as Class C while Sunflower Drive Park located along the Irene Street is categorised as Class B (Figure 6-23).

In addition, the underground cable component of the MID Corridor along Brinsmead Road is partially overlain with Class D land under the agricultural land classification scheme defined as Non-agricultural land that is not suitable for agricultural use, including land alienated from agricultural use (Figure 6-23).

Stock routes

The *Stock Route Management Act 2002* (Qld) (Stock Route Management Act) defines stock routes as ‘a road or route ordinarily used for travelling stock or declared under a regulation to be a stock route’. The Queensland stock route network is mainly used for moving stock, pasture for emergency agistment and long-term grazing. The MID Corridor does not intersect any stock routes. A review of SPP IMS also indicate that no stock route was intersected by MID Corridor (DSDIP, 2024).

AGRICULTURAL LAND CLASSIFICATION WITHIN THE PROPOSED MID CORRIDOR

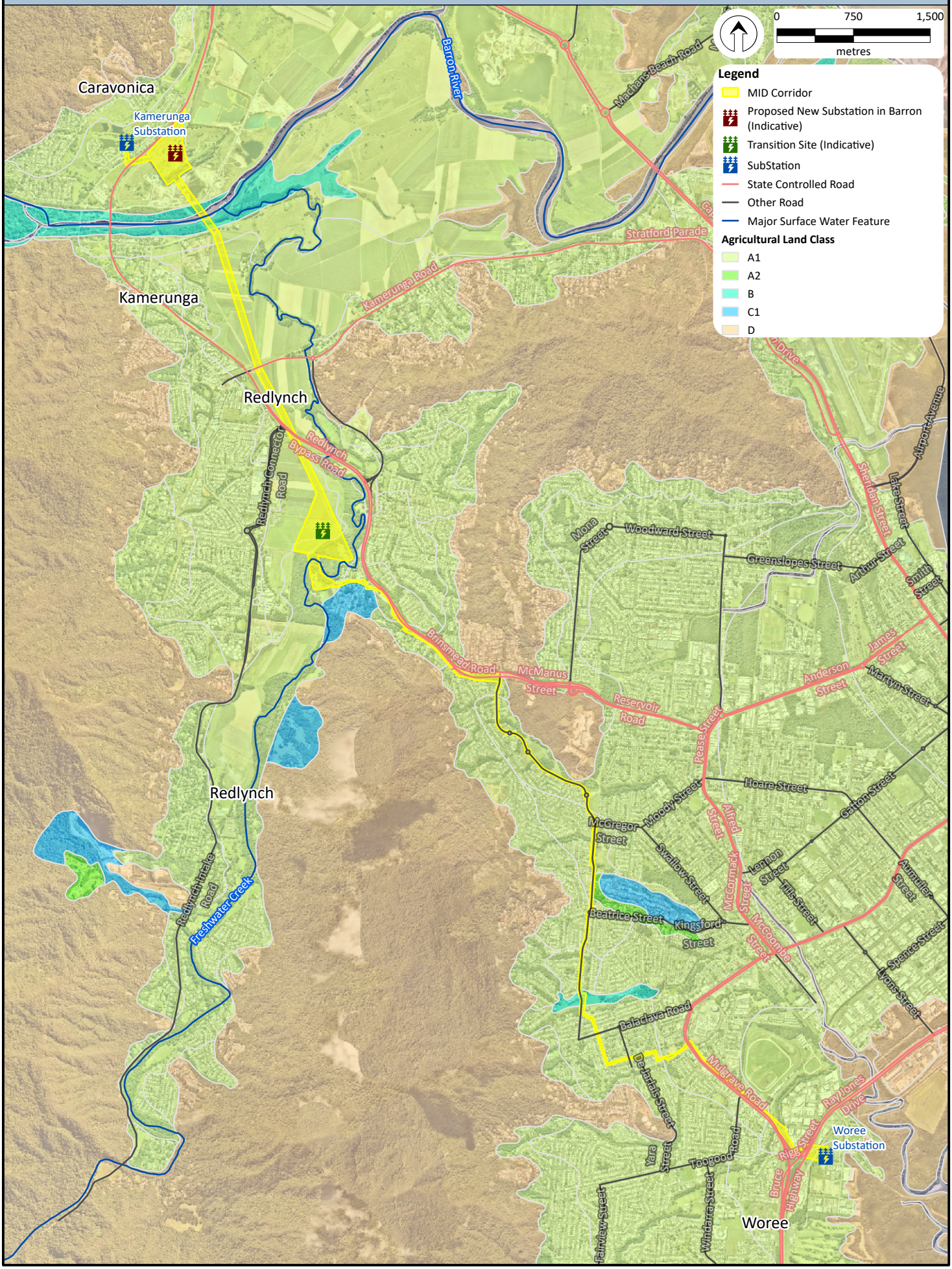


Figure 6-23

Future land use

Several locations in proximity to the MID corridor have been identified as being subject to future land use changes due to known development proposals. Known development proposals within or in proximity to the MID corridor detailed in Table 6-26.

Table 6-26 Detail of proposed future land use adjacent to the MID Corridor

Name	DA reference number	Location	Details
CRC Redlynch Sports and Recreation Parklands Masterplan area	N/A	2/SP279529	The area adjacent to the proposed UGOH Transition Site located at Redlynch (located at 1-5 Redlynch Connector Road, Redlynch, Qld within 1/SP279529) is part of a wider Cairns Regional Council (CRC) Redlynch Sports and Recreation Parklands Masterplan area. This land is earmarked within this Masterplan for the Transition Site. The area within 2/SP279529 is to provide for the future recreation needs of Redlynch and the neighbouring suburbs of Brinsmead, Caravonica, Freshwater Kamerunga and the Redlynch Valley and includes the establishment of new sporting fields, accompanying amenities, internal roads and carparking.
Material Change of Use Service Station, two Food & Drink Outlets, Car Wash and Childcare Centre	12524/2023	1-3, 5-9 Lake Placid Road Caravonica Queensland and described as 322/SP142702	DA was lodged by Gunjal Property Pty Ltd on 06 October 2023. The application is currently being assessed.
Reconfiguring a Lot (Boundary Realignment, 3 Lots Into 3 Lots)	13181/2024	Kamerunga Road, Kamerunga Queensland 4870 described as Lot 116/ SP149839, 4 / SP703109 and 1/ SP703109	DA was lodged by ARO Industries on behalf of the landowners on 15 November 2024. The DA was confirmed as being properly made on 29 November 2024.
Combined Application Material Change of Use for Food and drink outlet, Service station, Health care services, Indoor sport and recreation, Shopping	11621/2022	101-115 Brinsmead Road Brinsmead Queensland and described as 5/RP860941	DA was lodged by Monsoon Rain Pty Ltd on 15 March 2022. The development was approved in full subject to conditions on 30 November 2022. The latest aerial imagery identifies the service station within the area.

Name	DA reference number	Location	Details
centre, Service industry, Veterinary services, Office and Reconfiguring a lot (one Lot into two and creation of access easement).			
Bruce Highway Upgrade Program Master Plan	N/A	Between Mulgrave Road to Bruce highway intersection located adjacent to existing Woree Substation	DTMR are proposing an upgrade to the intersection of Mulgrave Road and the Bruce Highway. This is under the Bruce Highway Upgrade Program to invest in safety, flood resilience and capacity upgrades along the Bruce Highway between Brisbane and Cairns. Construction of the whole master Plan has been completed on stages 3 and 4 and based on the available information, upgrade of intersection of Mulgrave Road and the Bruce Highway is proposed as state 6.
Upgrade of Cairns Western Arterial Road between Redlynch Connector Road and Kamerunga Road.	N/A	Kamerunga Road and Lake Placid Road located adjacent to proposed new substation in Barron area.	DTMR are proposing to widen Kamerunga Road. In October 2020, the Queensland Government committed to a $60 million upgrade of Cairns Western Arterial Road between Redlynch Connector Road and Kamerunga Road. The project is to upgrade of the section of the Cairns Western Arterial Road between Redlynch Connector Road (Kamerunga Road) and Captain Cook Highway to a 4-lane dual carriageway. DTMR is now undertaking scoping activities to refresh the planning and business case details and construction milestones for the project considering the outcome. Construction scope and timeframes for future stages will be determined once detailed design is complete and the outcomes of the planning refresh are approved.

6.10.2 Potential impacts and mitigation measures

Design and construction impacts

Agricultural operations

Potential impacts on land use from the Project are associated with construction and maintenance activities and may include:

- loss or fragmentation of agricultural land;
- disturbance to agricultural operations; and
- disturbance of rural amenity values.

Operation of the Project will not result in limited ongoing impacts to grazing land, as grazing will be able to continue within the transmission line easement (other than pole footprint areas and any access tracks).

Cropping activities can continue to occur around and within the transmission easement, however, minor impacts to manoeuvrability and function of farm machinery may occur. The MID Corridor has been chosen to minimise the amount of cropping land affected by the Project.

Urban areas

The Project transitions to an underground transmission line in the urban areas improving visual amenity and reducing encroachment. Land impacts in these areas will be limited to the eight concrete cable joint bays (approximately 3m x 10m in size) installed every 800m – 1,000m within the MID Corridor. Property impacts are considered minimal in these locations as the MID Corridor will be from property boundary to property boundary and contained within the road parcel.

Amenity

Where possible, the MID Corridor has been co-located with existing electrical infrastructure to minimise impacts on land use, character, and amenity of the area. The existing transmission line will be eventually decommissioned after the proposed OH transmission line becomes operational.

Impacts to amenity have been discussed within:

- Section 6.3 (Air Quality);
- Section 6.16 (Noise and Vibration); and
- Section 6.11 (Visual Amenity).

Native title

Any acts or dealings in relation to land and waters that affect Native Title must comply with the Native Title Act in order to be valid. To the extent that Native Title exists or may exist in the area of the Project, Powerlink will comply with the requirements of the Act for securing an easement for the transmission line. Powerlink typically complies with Section 24KA of the Native Title Act, which applies to facilities for services to the public, for its transmission line easements.

Tourism

Tourism and recreation opportunities exist in the vicinity of the MID Corridor, with access to these areas via the major State-controlled roads in the region, including Kamerunga Road, Redlynch Bypass Road Ray Jones Drive and Brinsmead Road. Construction activities will see an increase in vehicles traversing these roads, as detailed in Section 6.15, which may see an increase in travel times during the construction period, however

no impacts to safety of these roads are anticipated with the implementation of appropriate management measures.

Design and construction mitigation measures

Potential impacts to land will be managed during the design and construction phase of the Project in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K), as well as through the implementation of the following:

- Through landholder and stakeholder engagement and infrastructure design processes, Powerlink has considered the existing land use associated with the Project in order to reduce and mitigate impacts where possible. Powerlink will continue to collaborate with landholders through the Project. Further detail on engagement undertaken with landholders is provided in Section 7.
- Short-term construction impacts are likely to result for both cropping and grazing land. During construction work, areas within agricultural land will be managed to ensure the safety of constructions workers, farming operations and cattle.
- Where possible, the OH transmission line component of the MID Corridor has been co-located with the existing Kamerunga to Woree transmission line in order to minimise impacts on agricultural land. Co-location of infrastructure minimises impacts on existing land by:
    - confining vegetation clearing to a single corridor, instead of multiple corridors;
    - utilising the existing access track;
    - confining biosecurity risks during construction to a single corridor, instead of multiple corridors;
    - minimising the requirement to reconfigure farm infrastructure on properties; and
    - reducing fragmentation of farming operations.

Operation and maintenance impacts

Impacts anticipated with operation and maintenance activities will be limited to impacts to land use and agricultural operations during periods of maintenance and inspections. Maintenance activities and inspections are undertaken on a semi-regular basis and will involve liaison with the landholder prior to entry.

Operation and maintenance mitigation measures

Potential impacts to land will be managed during the operation and maintenance phases of the Project in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K).

6.11 Visual amenity

6.11.1 Existing environment

A high degree of topographical change exists between the low-lying plains and the adjacent mountain peaks/ranges to the east and west. Consequently, major viewsheds are present from a large proportion of urban areas and major roads within the region surrounding the MID Corridor. Due to these major viewsheds, visual elements such as transmission lines are likely to stand out in the landscape from certain viewpoints. As the existing transmission line was constructed during the 1960s, it is a recognised feature within the visual landscape.

6.11.2 Potential impacts and mitigation measures

In general, high voltage transmission lines are considered visually intrusive. It is also recognised that visual impacts of large infrastructure projects are considered greater in areas where there are no existing similar developments. In this case, however, the Project seeks to replace an existing 132kV transmission line, which has been present at its current location since the early 1960s, with a new line. The existing line was constructed prior to many of the existing houses in the region. Between the existing Kamerunga Substation (and replacement with the new substation in Barron), through to the suburb of Redlynch, the new transmission line will be located adjacent to the existing transmission line (which will eventually be decommissioned and removed), and as such, the transmission line is not considered to increase visual amenity impacts to the region.

The existing transmission line is situated within locations that have seen significant development and encroachment and as such, the existing alignment is highly constrained (with residential properties). Evidence of this can be seen in Figure 6-24 which shows residential properties within the easement, and directly adjacent to the transmission line structure. Therefore, from Redlynch to Woree, the Project has identified that an underground transmission line would be most suitable to limit impacts (both physical and visual) to properties within the existing easement and surrounding areas, hence removing the impact to above ground visual amenity.

Figure 6-24 Example of the existing transmission line within an urbanised area of Cairns (Rigg Street, Woree)

The visual impacts associated with the Project are therefore considered minor, mainly as a result of:

- The Project generally being a “like-for-like” replacement of the existing above ground assets with most transmission structures having similar design characteristics which will be indistinguishable from the current transmission infrastructure.
- Where the Project is situated in highly urbanised areas, the transmission line will be underground.
- Design of the Project has kept transmission structures in-step with existing structures.

For the majority of the proposed transmission line, visual impacts will be similar (4km of overhead line to be duplicated). The project will facilitate future improved visual amenity for the residents along/ adjacent to the existing overhead line between Redlynch to Woree once the current infrastructure is decommissioned. Additional impacts may occur through slight amendments to the MID Corridor to avoid constraints, the use of taller structures or clearing of vegetation, although these impacts are considered to be limited. Where the Project transitions to an underground transmission line, visual amenity will be improved.

6.12 Social and economic

A Social and Economic Impact Assessment (SEIA) was completed for the Project by Ethos Urban (2025) (Appendix G). A summary of the findings of the report are presented below.

6.12.1 Existing environment

Community profile

The SEIA included a review of the Australian Bureau of Statistics (ABS) Census of Population and Housing to identify key socio-economic and demographic characteristics of the community within and surround the MID Corridor. The Assessment considered three study areas:

- **Primary Study Area** (PSA) representing the immediate community surrounding the MID Corridor (within 500m of the Project alignment) and includes:
    - Landholders within the new easement
    - Residents in the PSA, including those living close to the alignment in the suburbs of Kamerunga, Caravonica, Kanimbla, Brinsmead, Earlville and Mooroobool
    - Businesses in the PSA
    - Users of recreational areas and community infrastructure in the PSA
- **Secondary Study Area** (SSA) representing the broader local community which may experience some impacts and/or benefits from the proposed development and includes:
    - Residents of the SSA
    - Traditional Owners (Gimuy-walubarra yidi People) and Aboriginal communities
    - Community groups and organisations
    - Retail trade and hospitality businesses in the SSA
- **Tertiary Study Area** (TSA) representing the regional community and economy and includes:
    - Construction and trade workers and businesses
    - Retail trade and hospitality businesses
    - Traditional Owners (Gimuy-walubarra yidi People) and Aboriginal communities

Key findings of the demographic analysis undertaken for the SEIA were as follows:

- A higher proportion of Aboriginal and/or Torres Strait Islander residents, accounting for 11.4% of the PSA population, and 11.6% of the TSA population compared to 5.8% in the SSA and 4.9% in Queensland.
- A slightly higher median age in the PSA of 40.2 years and SSA of 41.2 years, compared to the Queensland median of 38.6 years. This includes a slightly higher share of residents aged 5-19 years in the PSA at 21.7% of the population compared to Queensland at 19.1%.
- A slightly lower income profile, where PSA residents earn a median individual annual income of around $40,250 compared to the SSA median of $43,970, and Queensland median of $41,020.
- High proportion of households that speak a language other than English at home in the PSA (19.4%), compared to the SSA (11.6%) and Queensland (13.8%). Of those in the PSA who speak another language at home, 87.0% spoke English either very well or well, while 13.0% did not speak English well or at all. In the PSA the most common languages spoken other than English included Nepali (2.2%), Japanese (2.2%), Korean (1.1%), and Australian Indigenous languages (1.1%).
- Households predominantly comprised of families, with 66.0% of PSA dwellings occupied by family households compared to 71.0% in Queensland.

- The PSA had a higher dwelling occupancy rate of 93.8%, compared to 90.7% throughout Queensland. This implies that fewer dwellings are vacant within the local area.
- Lower levels of educational attainment in the PSA with 59.2% having completed Year 12 or equivalent compared to 64.0% in the SSA and 61.7% in Queensland.
- Varying levels of socio-economic advantage/disadvantage across the PSA with areas in the north and west around Kamerunga, Redlynch, Brinsmead and Kanimbla generally more advantaged compared to areas in the south and east around Mooroobol, Manunda and Woree generally more disadvantaged.

Key trends that occurred between the 2016 and 2021 Census were outlined in the SEIA and include:

- An increase in the proportion of Aboriginal and/or Torres Strait Islander residents by +1.0 percentage points (ppt) in the PSA and +1.6ppt in the TSA, compared to a +0.9ppt increase in Queensland.
- Fewer residents who spoke English at home, declining by -2.3ppt in the PSA compared to -1.8ppt in Queensland.
- Fewer residents are Australian born, declining by 1-5ppt in the PSA compared to -0.7ppt in Queensland.
- More residents requiring need for assistance, increasing by +1.7ppt in the PSA and +0.8ppt in Queensland.
- The population is getting older, with the proportion of residents aged 65+ increasing in the PSA by +2.8ppt compared to +1.7ppt in Queensland. All other age groups in the PSA declined as a share of the population.

Business and employment trends

Business structure

ABS Business Count data for September 2023 shows that CRC LGA includes some 4,478 construction, manufacturing and transport/warehousing related businesses, representing 30.4% of all businesses located in CRC LGA compared to 28.2 % for Queensland. This data indicates a reasonable regional presence of the types of businesses that have potential to service aspects of the Project, particularly during its construction phase.

Although construction-related businesses will likely be the main beneficiaries of the construction of the Project, businesses in other sectors supporting the project (directly and indirectly) are also likely to benefit, including retail trade, accommodation and food services, rental, hiring and real estate services, and health care and social assistance. These sectors make up approximately 31.9% of all businesses located in CRC LGA compared to 29.0% for Queensland, and their services will likely play a role in supporting the needs of project workers, especially those relocating to the region to work on the Project.

Labour force participation

As of June 2024, CRC LGA had a labour force of 102,230 persons and an unemployment rate of 2.7%, based on information from the Australian Government Small Area Labour Markets data. This reflects some 2,750 residents who are unemployed, but also highlights a comparatively tight labour market, noting the Queensland unemployment rate is much higher at 4.1%.

The construction phase of the Project will require workers and provide new job opportunities in the region. There may be opportunities for unemployed job seekers (subject to appropriate skills match) or 'back filling' employment opportunities associated with jobs vacated by workers taking up project employment. Given the specialist nature of some aspects of the Project, some labour is likely to be sourced from outside the region.

Key affected communities

Considering the outcomes of the social and economic profile within the study areas, the following individuals and communities are likely to be impacted by the MID proposal:

- Neighbouring residents in the PSA who live within close proximity to the MID Corridor. This includes residents in suburbs such as Kamerunga, Caravonica, Kanimbla, Brinsmead, Earlville, and Mooroobool.
- A number of freehold properties (which mostly comprise rural land) will be intersected by the OH transmission line. The remaining properties that will be directly affected by the corridor primarily include a mix of road parcels, river parcels and national parks and reserves etc.
- Community uses located within 500m of the MID Corridor. This includes a range of uses including health and education, civic spaces, seniors living facilities, places of worship, open space and recreation areas, and tourism and accommodation providers.
- Users of community facilities located within 500m of the MID Corridor, including Goomboora Park and St Andrews Catholic College as nearby receivers.
- Neighbouring businesses to the MID Corridor.
- The underground cable will not intersect with any freehold properties or non-rural zoned land.

Consultation feedback

Key findings from the consultation and engagements sessions relevant to the SEIA included:

- The local community is highly sensitive to the risk of flooding in the area, in part a result of the significant flooding in 2023/2024 from tropical cyclone Jasper which had detrimental impacts on local residential areas and community facilities. The community has expressed concern about the potential for increased flooding risk in the local area as a result of the new substation component of the Project.
- The community has expressed a need and desire for improved resilience to natural disasters. In this sense, the community typically had a positive perception of the Project in relation to undergrounding of the transmission line and extending the asset life, in that it will improve the community's preparedness and response to another natural disaster.
- Residents value the environment including surrounding green space. Residents are concerned about the possible loss of trees along the underground corridor between Redlynch and Woree, as well as a loss of green space at the location of the proposed new substation.
- Property amenity and values are important to local residents. Residents located along the current overhead section generally had a positive perception of the Project in relation to potential improvements in property values and improved residential amenity through the removal of the existing overhead line following the undergrounding of the transmission line from Redlynch to Woree.
- Surrounding visual amenity is important to local residents. There are perceived benefits and risks regarding the development of the new substation in relation to view impacts. Residents are generally positive about the long-term benefits of replacing the existing overhead transmission line, although there are some concerns regarding construction impacts to neighbouring residents and community groups.

Based on the information above, it is understood that the community overall had a largely *positive* perception of the Project; however, there were some identified issues of concern as highlighted above.

Major projects and developments

A review of major projects and developments in the SSA shows that there is around $247 million in investment activity either planned, approved or underway, including Mulgrave Road Mixed use

Development, Botonica Cairns, Stage 2 Kingsford Street Units and Mooroobool Townhouses. These projects predominately include residential and mixed-use development projects, and will support an expansion of the resident population, and importantly Cairns as a gateway to growing tourism base in Far North Queensland.

Most of these projects will be completed prior to the replacement and upgrade of the substation facility and transmission line. Accordingly, the likelihood of cumulative impacts on the community are anticipated be moderate over the Project's construction phase.

There is a potential; however, for direct impacts on the Mulgrave Road project which will likely be constructed at a similar time to the Project. In addition to the above, there is an identified childcare centre project located on the corner of Lake Placid Road and Kamerunga Road, within close proximity to the proposed substation site and may be impacted by the Project. To facilitate the development of the overhead component of the Project, a widening of the existing Powerlink easement may be required and could encroach on the mixed use project, which proposes a 100 place childcare centre, service station and ancillary food and drink outlets. Powerlink is working closely with authorities and the proponent for the Mulgrave Road project to reconsider design development in a way that minimises any future risks for the site once developed, particularly in relation to maximising the distance of the proposed childcare centre to the transmission line.

Future socio-economic profile

Population forecasts to 2036 for the study areas were prepared in the SEIA using the Queensland Government's Statistician's Office and latest official Estimated Resident Population (2023) released by the ABS and while the total number of residents in both the PSA and SSA is forecast to increase, this growth is primarily focused on an expansion in elderly and young adult cohorts, with smaller shares or declining rates of growth forecast in children, teenagers and middle-aged cohorts (35-64 years).

Population growth between 2023 and 2036 across each Study Area is shown in Figure 6-25 below.

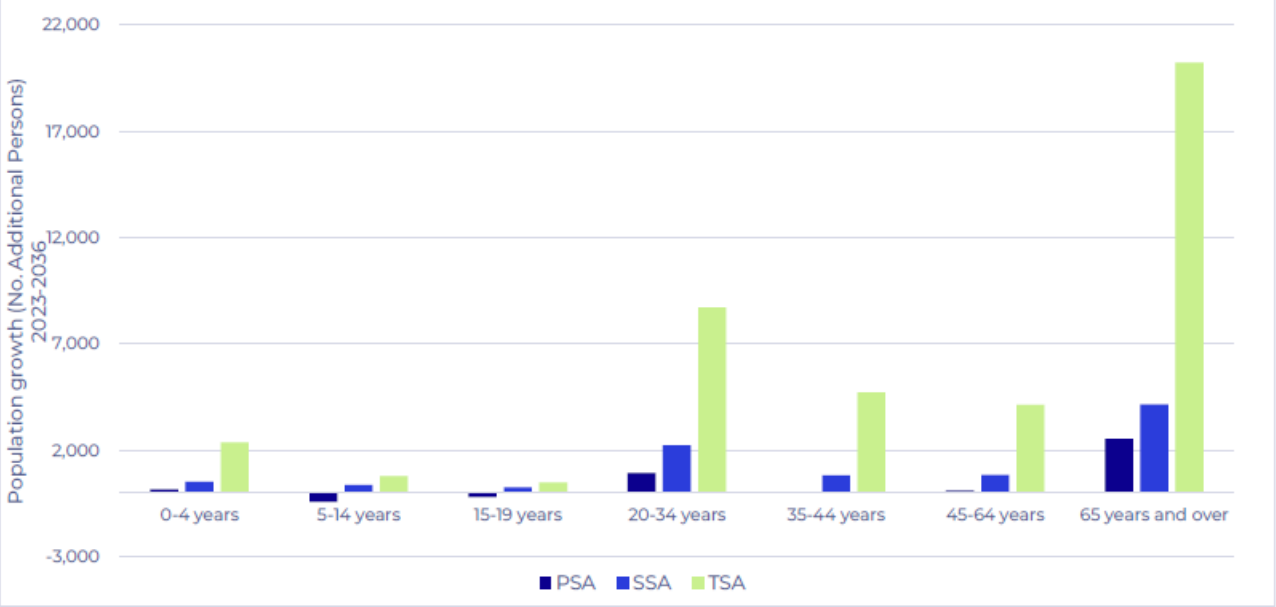


Figure 6-25 Population Growth by Age (2023-2036) – No. Additional Persons (Ethos Urban 2024)

Source: Australian Bureau of Statistics, Queensland Statistician's Office (June 2023 Population Projections)

Likely social environment change

In view of the forecast population growth and development in the region, the PSA is expected to undergo only moderate change whereby there will be a localised increase in the resident population including an older age profile. Based on intercensal trends, both the PSA and SSA could become more culturally and linguistically diverse, and more residents are likely to be living in lone person or smaller households – particularly as the population becomes older.

This level of change will not have a substantiated impact on power supply needs in the PSA. However, the +9,240 residents forecast across the SSA would imply an increase of +3,700 households by 2036 (based on the ABS 2021 average household size of 2.5). This level of change in the SSA will generate increased power supply needs, that are both secure and resilient as natural disasters and extreme weather events become more prevalent as a result of a warming climate. This is particularly prevalent in this part of Queensland, where Energy Networks Australia projects the intensity of storms, cyclones and wind speeds will likely increase and have a more prevalent impact on communities over time. Having a reliable and well-connected electricity grid is one of many solutions to improving resilience of a growing and ageing community in an area at risk from extreme weather.

6.12.2 Potential impacts and mitigation measures

Construction phase impacts

Economic output and employment

The Project will have a positive short to medium term effect on local/regional employment. The capital investment value of the Project is estimated at $200 million, which will support 144 direct FTE construction workers annually over the estimated 3 year construction period (commencing in early 2026). This represents a significant uplift in employment in the area over the period, which has the potential to generate a range of benefits to the local community and economy, including:

- The 144 direct Full Time Equivalent (FTE) construction jobs resulting in an increase in indirect employment in the local Cairns economy of +383 indirect FTE workers. In total, 527 FTE construction jobs will be supported by the Project annually over the 3 year construction period within Cairns LGA.
- The 144 direct FTE workers supported each year will benefit the significant proportion of construction-related businesses (4,478 businesses) located in the SSA.
- An increase in workers within the local area will result in flow on benefits to local businesses and the community through local wage spending stimulus, particularly in relation to housing/accommodation, retail and recreation spending, and other personal services.
- The PSA currently contains 2,750 unemployed labour force participants, some of whom could work on the Project, subject to appropriate skills match.
- At 144 direct FTE construction workers supported, it is estimated that these workers will support a direct value add to the local Cairns LGA economy of $71.86 million annually. When considering total FTE construction workers (direct and indirect), value added of $194.15 million will be supported each year of the construction period in Cairns LGA.
- Australia wide, the Project is estimated to support 752 FTE jobs (direct and indirect) annually over the three-year construction phase.
- Furthermore, it is understood that Powerlink will ensure that capable and competitive local suppliers are given a fair and reasonable opportunity to supply and contribute to the Project.

The proposal represents a significant construction project in the area, that has the potential to benefit construction related business and workers within the local economy and community. The increased number of workers within the local area that will be supported by the construction of the proposed development may result in a range of flow on effects to local businesses and the community overall.

Furthermore, it is understood that Powerlink will ensure that capable and competitive local suppliers are given a fair and reasonable opportunity to supply and contribute to the Project, noting the 4,478 construction related businesses in the SSA.

Overall, workforce management, local business and industry procurement impacts during construction may benefit people and businesses in the PSA, SSA and TSA. In order to ensure this impact is experienced positively, Powerlink should consider ensuring their contractor/s comply with a Workforce Management Plan, that guides the minimisation impacts on community, through consideration of standards of behaviour and minimising temporary impacts to local infrastructure.

Community change

The SEIA identified that the long term significant impacts from traffic, noise and vibration, air quality and visual amenity during construction are considered to be negligible on the social environment.

Amenity impacts

Changes to local amenity such as noise and vibration, dust and air quality may result from construction activities including, vehicle movements, earthworks and excavations and establishment of construction zones. This may impact some people's wellbeing and ability to enjoy their home environments and local surroundings or ability to concentrate, especially if they work from home. Further discussion on the impacts on air quality and noise and vibration are provided in Sections 6.3.2 and 6.16.2.

Construction activities may temporarily alter the visual landscape in areas surrounding the site during construction phases. This would include the presence of construction machinery and infrastructure, trenching works, and construction traffic.

Consultation with residents found that natural environment and green spaces are highly valued with some residents expressing concerns about the potential loss of trees and green space due to construction.

Changes to visual surroundings can impact residents' sense of pride in their local area and can reduce enjoyment of outdoor areas or views from some windows and yards. However, these impacts would be temporary, as construction progresses along the alignment and would not be visible after construction is completed.

Overall, changes to local character and visual amenity during construction may be experienced by people in the PSA and SSA due to their proximity to the proposal. People in the TSA are unlikely to be impacted by changes to the local character and visual amenity as a result of the proposal.

Traffic, transport and access

Construction of the proposal will be undertaken in stages across several years. It is expected that construction workers would access the site in the morning and exit in the afternoon to travel to their homes or accommodation in the evening.

Increased light and heavy vehicle movements may result in disruptions and delays for people travelling along the roads associated with the alignment of the transmission line. This disruption may be experienced as inconvenient for some residents and other road users and could cause frustration. However, as construction activities would move progressively along the alignment, disruptions are expected to be temporary and relatively localised.

Construction activities may also result in disruptions to pedestrian and cycle routes and may reduce safety for cyclists utilising the road shoulders as a cycle path.

Overall, traffic, transport and access impacts may be experienced by people in the PSA and SSA due to their proximity to the proposal. People in the TSA may experience some traffic, transport and access impacts depending on the roads they use and the proposals transport routes.

Further discussion on the impact of the project on traffic and transport is provided in Section 6.15.2.

Property and land use

Construction of the Project has the potential to result in changes to property access and management for landholders along the proposed easement. Construction of the new overhead easement alignment will directly affect 77 parcels of land, of which 27 parcels have been identified as freehold properties which are currently owned by five separate private landholders. The remaining parcels are a mix of road parcels, river parcels, land lease, national park, reserves and unspecified.

Construction of the new underground easement will involve trenching work which will primarily be located within local controlled roads and road reserves to reduce impacts to state-controlled roads and residential land between Brinsmead and Woree. However, access to properties and on-street parking located along the route will be temporarily reduced which may cause disruptions and lead to frustrations for some residents and businesses.

Changes to property and land use may result in increased requirements for landholders to engage with project staff and to provide access to their properties to manage project activities. This time, along with responding to other property management changes, may reduce the time available for regular agricultural or property maintenance activities. This additional investment of time and property maintenance may disrupt day-to-day activities and may result in flow on reduction in property productivity. The impact of construction on productivity of properties would largely depend on the existing activities undertaken in the area under the proposed new easement.

Overall, property and land use impacts are most likely to be experienced by people in the PSA who are in close proximity to the proposal, with particularly pronounced impact to the five separate private landholders discussed above. People in the SSA and TSA are unlikely to be impacted by property and land use impacts as a result of the proposal.

Operational phase impacts

Amenity impacts

Overall, air quality and noise and vibration impacts during operation are unlikely to be experienced by most people in the PSA, SSA and TSA. Reductions in noise impacts during operation are most likely to benefit people in close proximity to the existing Kamerunga substation in the PSA.

The environment in and around the Project already features views of the existing transmission line and associated infrastructure, which will be replaced by the Project. Impacts on the visual amenity are therefore considered to be minor, with operation of the project consistent with the existing context.

Between Redlynch and Woree, replacement of overhead (OH) cables to underground (UG) cables would reduce the visual impacts and is likely to improve the overall visual amenity of the surrounding area.

The proposed relocation of the Kamerunga Substation is also likely to improve the visual amenity for nearby residences. These changes are likely to be viewed positively by surrounding residences.

Property and land use

Most of the land disturbed during the Project's construction would be reinstated during the Project's operation. During operation, a new easement would be maintained for the life of the Project. Generally, landholders would be able to resume pre-construction activities within the easement. There may, however, be some restrictions on vegetation heights or the types of activities or infrastructure that can be undertaken within the new easement which is outlined in further detail in Powerlink's Activities on an easement brochure.

Overall, property and land use impacts during operation may be experienced by people in the PSA due to their proximity to the proposal. Relocation of infrastructure during operation are most likely to benefit people in close proximity to the proposal in the PSA. People in the SSA and TSA are unlikely to be impacted by property and land use impacts as a result of the proposal

Health and community wellbeing

The Project may result in actual or perceived increase in water levels to the west and north of the subject site during flooding events due to the extent of filling proposed. Increased risks of flooding as a result of increased flows have the potential to increase mosquito activity in the surrounding area and potentially impact low lying infrastructure which may increase stress and anxiety for some nearby residents and businesses.

Overall, health and community wellbeing impacts during operation may be experienced by people in the PSA and SSA. People in the TSA are unlikely to be impacted by health and community wellbeing impacts as a result of the proposal.

Economic impacts

Given that the Project involves the replacement of an existing transmission line, it is anticipated that the provision of operational jobs supported by the transmission line currently will remain unchanged as a result of the Project.

Construction and operational mitigation measures

Recommended mitigation

The impacts associated with the Project can be generally addressed and mitigated with the following actions:

- Preparation of a Project Engagement Plan (Construction PEP) that contains measures to effectively communicate and engage with the surrounding community to minimise disruption.
- Commitment to support the intent of the Queensland Procurement Policy 2023 in applying a local benefits approach to the procurement requirements.
- Develop a workforce management plan to be employed by construction contractors that works to minimise impacts on the community
- Implementation of Powerlink's established policies and procedures in relation to land access and landholder compensation.
- Powerlink to engage early with key affected residential and non-residential receivers that may be impacted as a result of the easement adjustment, traffic or access impacts, and potential noise impacts.
- As the Project transitions from developed to construction, engagement activities and tools will be developed and implemented with the purpose of gathering information and seeking opinions from stakeholders on solutions and impacts.

- Consider and implement recommended mitigation measures and conclusions from the Flood Impact Assessment (Appendix E) to as to mitigate potential flood risks identified that could result from the Project.

Recommended enhancement

To promote local/regional economic benefit, efforts should be made to procure local businesses and employees during the construction phase of the Project. Further, social procurement principles should be considered to amplify positive social impact e.g. employ and train/upskill persons from underrepresented groups, such as women in construction and Aboriginal and Torres Strait Islander residents. The development of a Project Procurement Strategy might be considered to assist in maximising local/regional economic and social benefit.

Project benefits

The SEIA identified the following social and economic benefits to local and regional communities as follows:

- Support significant direct investment into the local and regional economy and community. The Project will generate around $200 million in economic investment directly into the Cairns region.
- Improve resilience to disasters – The replacement of an asset that is reaching the end of its useful life will improve the provision of modern energy infrastructure for the community. Importantly, the redeveloped transmission line including undergrounding cabling and new substation will result in a more resilient asset in the face of natural disasters.
- Support economic development through job creation and economic output. The Project is estimated to support 752 direct and indirect FTE jobs annually during the construction period across Australia. Of these jobs, 527 will be supported locally in Cairns LGA, representing a significant benefit to the local economy. These 527 direct and indirect FTE jobs are estimated to support significant economic output of around $194 million in value added to the local Cairns economy annually.
- Flow on economic benefits - Additional workers supported by the Project's construction phase will support flow on benefits to surrounding businesses and communities.
- Support the growing energy needs of the community The SSA population is forecast to increase by +9,240 persons with an implied need for an additional +3,700 dwellings. This growth will result in increased demand for energy infrastructure that can be in part supported by the Project once operational
- Improve the reliability of power supply in the community. The Project will deliver a modern energy asset that will provide consistent and reliable energy connectivity to surrounding residential areas, as well as critical social infrastructure services such as schools, aged care communities, hospitals and businesses.

6.13 Indigenous cultural heritage

6.13.1 Existing environment

A search of the then Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts (DTATSIPCA) now DWATSIPM Cultural Heritage Database and Register was undertaken on the 6 August 2025 for the MID Corridor and a 1km buffer from the centre of the MID Corridor.

Eight cultural heritages sites were identified, including shell middens, a resource area, story places, pathways and cultural sites (Appendix L). None of these are intersected by the MID Corridor. The closest recorded site is approximately 180m from the overhead transmission component of the MID Corridor (Figure 6-26).

The Database identified three cultural heritage parties intersecting the MID Corridor being:

- Djabugay Nation (QC2024/001); and
- Gimuy Walubara Yidinji People (QC2024/001).

in addition, Cairns Bruce Highway Upgrade Project Cultural Heritage Management Plans (CHMP) is present within a 1km buffer from the centre of the MID Corridor. the CHMP is sponsored by Department of Main Roads for Mandingalbay Yidinji People / Gimuy Walubara Yindinji People / Yirrganydji People which was registered on 13 March 2012.

No Cultural Heritage Bodies, Designated Landscape Areas (DLA), Registered Cultural Heritage Study Areas and National Heritage Areas (Indigenous values) recorded within a 1km buffer from the centre of the MID Corridor.

CULTURAL HERITAGE SITES AND NATIVE TITLE CLAIM AREA INTERSECTED BY THE PROPOSED MID CORRIDOR

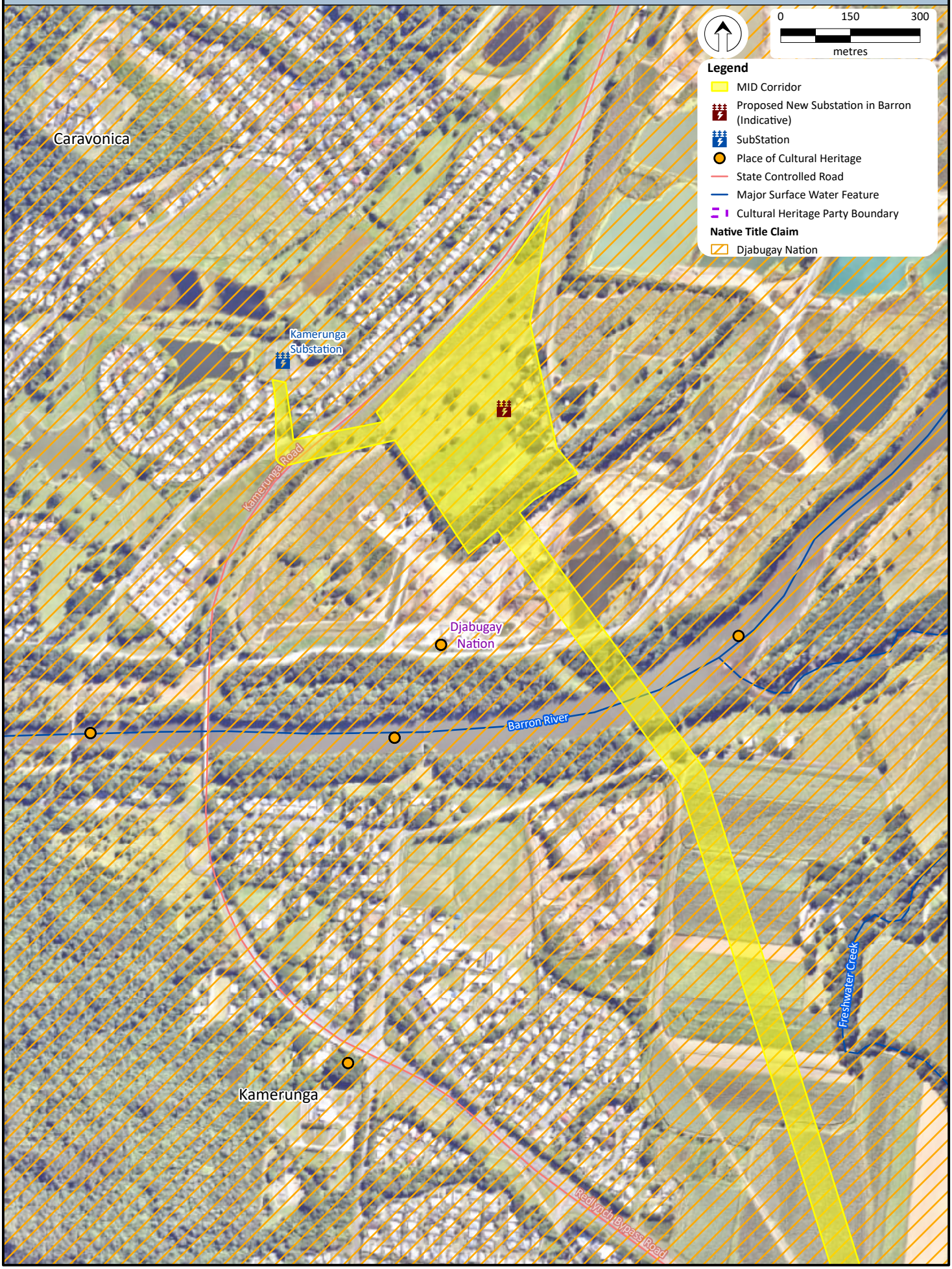


Figure 6-26-1

CULTURAL HERITAGE SITES AND NATIVE TITLE CLAIM AREA INTERSECTED BY THE PROPOSED MID CORRIDOR

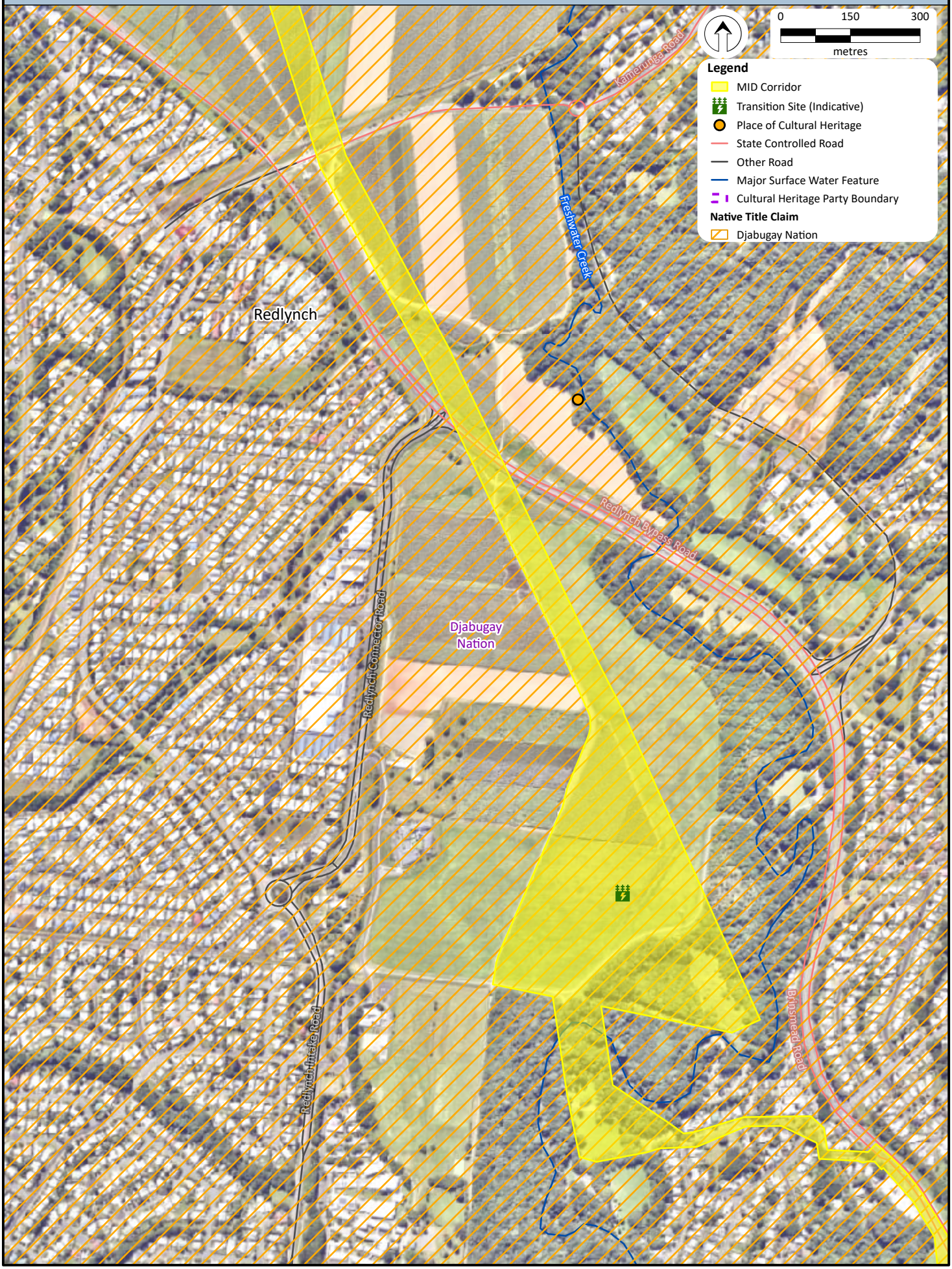


Figure 6-26-2

CULTURAL HERITAGE SITES AND NATIVE TITLE CLAIM AREA INTERSECTED BY THE PROPOSED MID CORRIDOR

Figure 6-26-3

CULTURAL HERITAGE SITES AND NATIVE TITLE CLAIM AREA INTERSECTED BY THE PROPOSED MID CORRIDOR

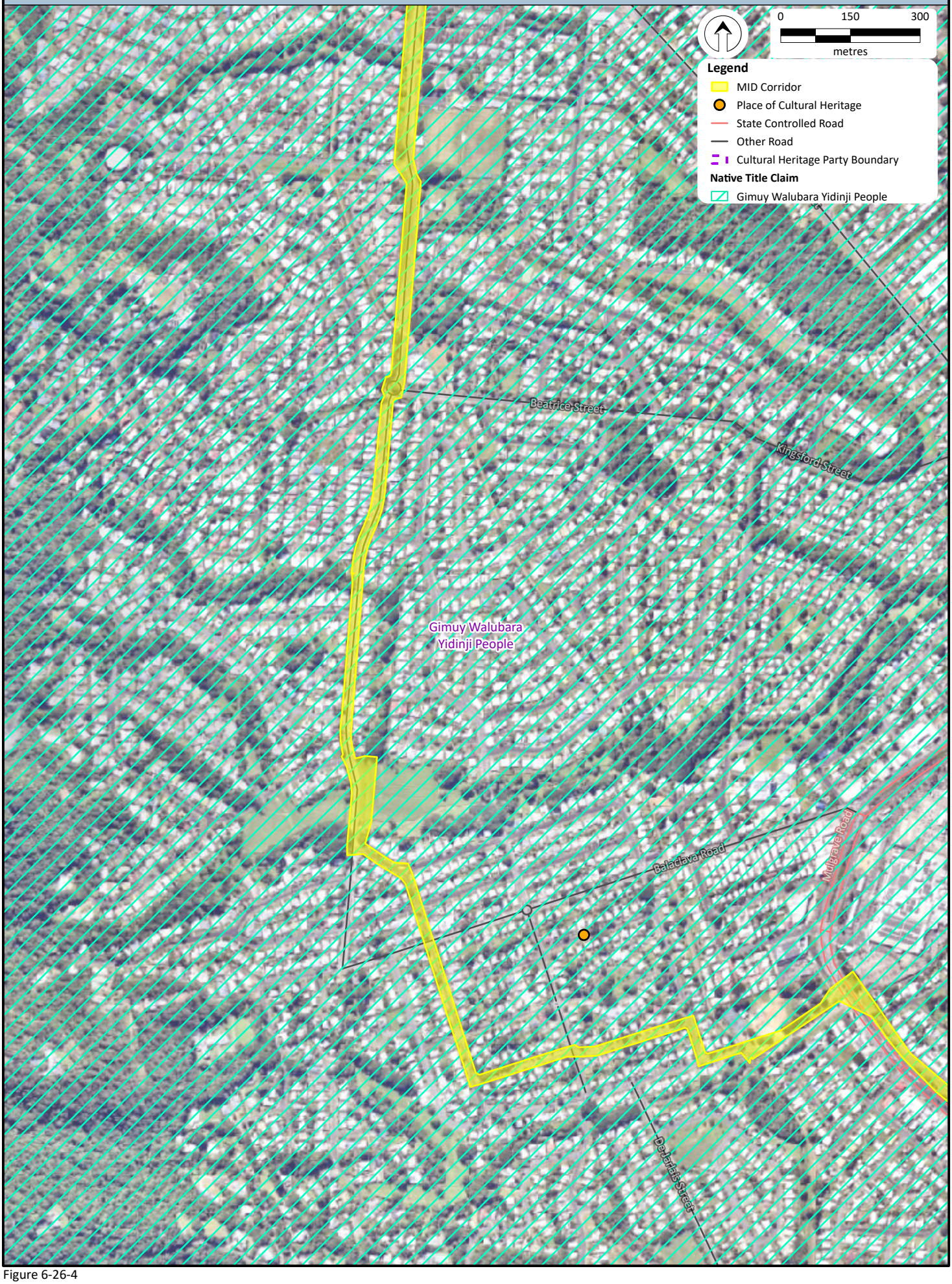


Figure 6-26-4

CULTURAL HERITAGE SITES AND NATIVE TITLE CLAIM AREA INTERSECTED BY THE PROPOSED MID CORRIDOR

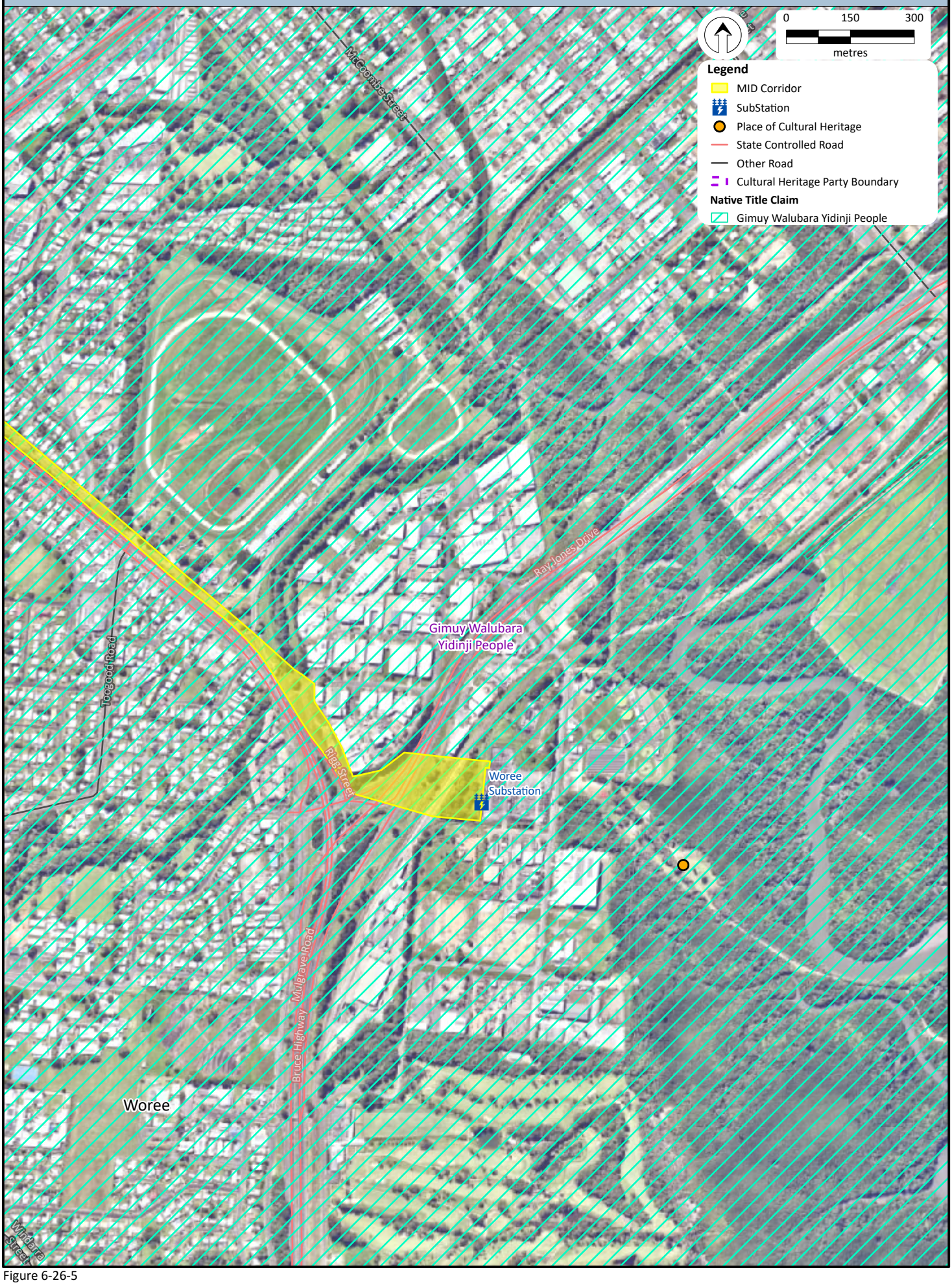


Figure 6-26-5

6.13.2 Potential impacts and mitigation measures

There is potential that ground disturbance works associated with the Project may disturb unknown Aboriginal Cultural Heritage. Over most of the MID Corridor, the risk of encountering indigenous heritage values is considered low due to the highly disturbed nature of the existing land uses such as sugar cane cultivation, sand mining/landfill operations and residential areas. Areas of high risk for potentially encountering indigenous heritage values include the Barron River, Freshwater Creek, and other minor watercourses along the MID Corridor.

Section 23 of the ACH Act requires that a person who carries out an activity must take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage (the Cultural Heritage Duty of Care).

A person is taken to have complied with the Duty of Care if they are:

- in compliance with gazetted *Aboriginal Cultural Heritage Duty of Care Guidelines*;
- under an approved Cultural Heritage Management Plan (CHMP) developed under Part 7 of the Cultural Heritage Acts; and
- under a native title agreement or another agreement with an Aboriginal or Torres Strait Islander party that addresses cultural heritage.

Powerlink Queensland intends to address any Aboriginal cultural heritage risks and meet its Duty of Care through the development and implementation of Cultural Heritage Management Agreements (CHMAs) with the relevant Aboriginal Party, in accordance with the ACH Act. Engagement with the relevant parties is discussed further in Section 7 Community and stakeholder engagement.

It is expected this will include on-site cultural heritage surveys by the Traditional Owners, prior to any construction works commencing and no-go zones implemented for any sensitive areas.

The procedures for the discovery human remains when carrying out development work will be managed during construction and include notifying the Queensland Police immediately. Queensland Police will determine if the remains are related to a criminal investigation. If the remains are likely to be Aboriginal or Torres Strait Islander human remains they must be reported to the Department of Treaty, Aboriginal and Torres Strait Islander Partnerships, Communities and the Arts.

Operation and maintenance will result in no additional ground disturbance to what was undertaken during the construction phase and as such, potential impacts to Aboriginal Cultural Heritage associated with the operation and maintenance phases of the Project are considered unlikely.

6.14 Non-indigenous cultural heritage

6.14.1 Existing Environment

Heritage context

Cairns was officially founded in 1876 and named after the State Governor of the day, Sir William Wellington Cairns. Initial European settlement in the region in the 1860s was driven by fishing and the discovery of gold to the north and Atherton Tableland saw the population increase. Throughout the 1870s and early 1880s, European and Chinese settlers opened up the region to agriculture. The development of the Cairns to Herberton rail line in 1886, and subsequent expansion from Redlynch to Myola, is widely considered the catalyst for the City's expansion. The rail line made travel through the difficult terrain easier and attracted a large number of immigrants during construction. Many of these immigrants settled in the region, establishing the sugarcane industry and extensive fruit orchards. The region was at the forefront of the Battle of the Coral Sea in 1942 and the Pacific offensive in 1943 during World War II.

Heritage places

Queensland Heritage Register

A search of the Australian Heritage Register and Queensland Heritage Register (QHR) was undertaken on 7 November 2024 which identified no recorded heritage places intersected with the MID Corridor. However, the following places are listed on the QHR the within 1km of the MID Corridor.

- Xavier and Sadie Herbert's Cottage (former) (601739) is located approximately 260m west of MID Corridor within suburb of Redlynch.
- The Cairns Railway, section from Redlynch to Crooked Creek Bridge (600755) is located 150m of west of MID Corridor, within suburb of Redlynch.

The MID Corridor however avoids these QHR places (Figure 6-27).

Local heritage significance

A search of CairnsPlan Planning Scheme Policy – Places of local significance identified following place of local significance within 1km of the MID Corridor. Place of local significance identified within 1km of MID Corridor are following:

- Old Smithfield Cemetery;
- Red Beret Hotel (former Redlynch Hotel);
- Redlynch Community Hall; and
- Cannon Park (Cairns Jockey Club)

The CairnsPlan lists the Old Smithfield Cemetery, Red Beret Hotel (former Redlynch Hotel), Redlynch Community Hall and Cannon Park (Cairns Jockey Club) as places of local significance within close proximity to the MID Corridor. Old Smithfield Cemetery, Red Beret Hotel (former Redlynch Hotel), Redlynch Community Hall are located adjacent to the OH Transmisison line component of the MID Corridor. Cannon Park (Cairns Jockey Club) is located adjacent to the UG Cable component of MID Corridor.

According to CairnsPlan, the Old Smithfield Cemetery is of historic importance at the local level. Old Smithfield Cemetery is located at Kamerunga Road, Barron, mapped immediately adjacent to the proposed new substation in Barron land parcel (located at 3-51 Stewarts Rd Barron, Qld within 1/RP716266, 3/SP173007, 4/SP119694, 2/RP716266, and 1/RP720215).It was set aside as an early cemetery reserve to serve the proposed township of Smithfield but came to have only one burial (person unknown) as the

township failed and the population moved into Cairns proper where there was more supporting infrastructure. The Cemetery reserve has not been revoked; it remains an open landscape with mature trees and contains just the one grave.

The Red Beret Hotel (former Redlynch Hotel) is of local significance, located at 401-411 Kamerunga Road, Redlynch approximately 280m west from OH Transmission line component of MID Corridor It is a place of local significance as a surviving hotel and place of accommodation and social importance in what was a small agricultural township. The hotel was completed in 1925-26 by the architect Richard Hill for Mrs Norah Down 'to cope with the urgent local, visiting and passing trade in Redlynch.' The hotel's current name - the Red Beret, referred to an owner from the 1990s, Max Gorman, who was an ex-paratrooper.

The Redlynch Community Hall is of local significance located, at 18 Redlynch Intake Road, Redlynch, approximately 380m west from OH Transmission line component of MID Corridor. The hall has been in use in this format since 1946. It is used by the local community for a variety of functions such as childcare and ballet. It has been in constant use since construction.

Cannon Park (Cairns Jockey Club) is located at 593-619 Bruce Highway, Woree and is 130m north of underground cable component of the MID Corridor. The club held its first race meet in 1911 and continues to be used to this day. Cannon Park became the site for racing after the Cairns Jockey Clubs long search for a home which saw them attending places such as Eight mile near Wrights Creek. The site has been used for various forms of horse racing and at one time Motorcycle racing on the circular track.

The MID Corridor however avoids these places of local significance (Figure 6-27).

6.14.2 Potential impacts and mitigation measures

There are no registered heritage places within the MID Corridor, and therefore there are no impacts to proposed known heritage values. Due to the highly disturbed nature of the corridor, it is considered unlikely that unknown non-Indigenous heritage values will be encountered during construction.

However given the history of the region, there is still some potential for the Project to impact on unidentified archaeological artefact under the *Queensland Heritage Act 1992* (Qld) (Queensland Heritage Act) if discovered during construction. An archaeological artefact means any artefact that is evidence of an aspect of Queensland's history, whether it is located in, on or below the surface of land.

The Project will not impact on any registered heritage places, and while the likelihood is low, the Project will still implement mitigation measures to manage any unexpected finds.

In the event any heritage site or place is located, including archaeological artefacts that are important source of information about an aspect of Queensland's history, new find procedures will be implemented in accordance with the Queensland Heritage Act. This includes:

- stop works;
- contact DETSI immediately and provide details about the find;
- submit the online form Notification of a discovery; and
- not disturb the site of the find for 20 working days unless DETSI give written permission.

Additionally, Powerlink will implement the management of non-indigenous cultural heritage risks through their Cultural Heritage Management Framework. This undertaking an assessment of risk posed by activities

conducted by Powerlink staff, Contractors and Maintenance Service Providers (MSPs) is to be made by Powerlink's cultural heritage practitioners prior to the activity. Non-indigenous cultural heritage constraints are documented within PQ Connect, Environmental Work Plans (EWP's) and Cultural Heritage Implementation Documents (CHIDs).

The procedures for the discovery human remains when carrying out development work will be managed during construction and include notifying the Queensland Police immediately. Queensland Police will determine if the remains are related to a criminal investigation. If the remains are historical you must also report them to DESTI.

Operation and maintenance will result in no additional ground disturbance to what was undertaken during the construction phase and as such, impacts from the operation and maintenance phases of the Project are considered unlikely.

NON-INDIGENOUS CULTURAL HERITAGE SITES WITHIN AND IN PROXIMITY THE PROPOSED MID CORRIDOR

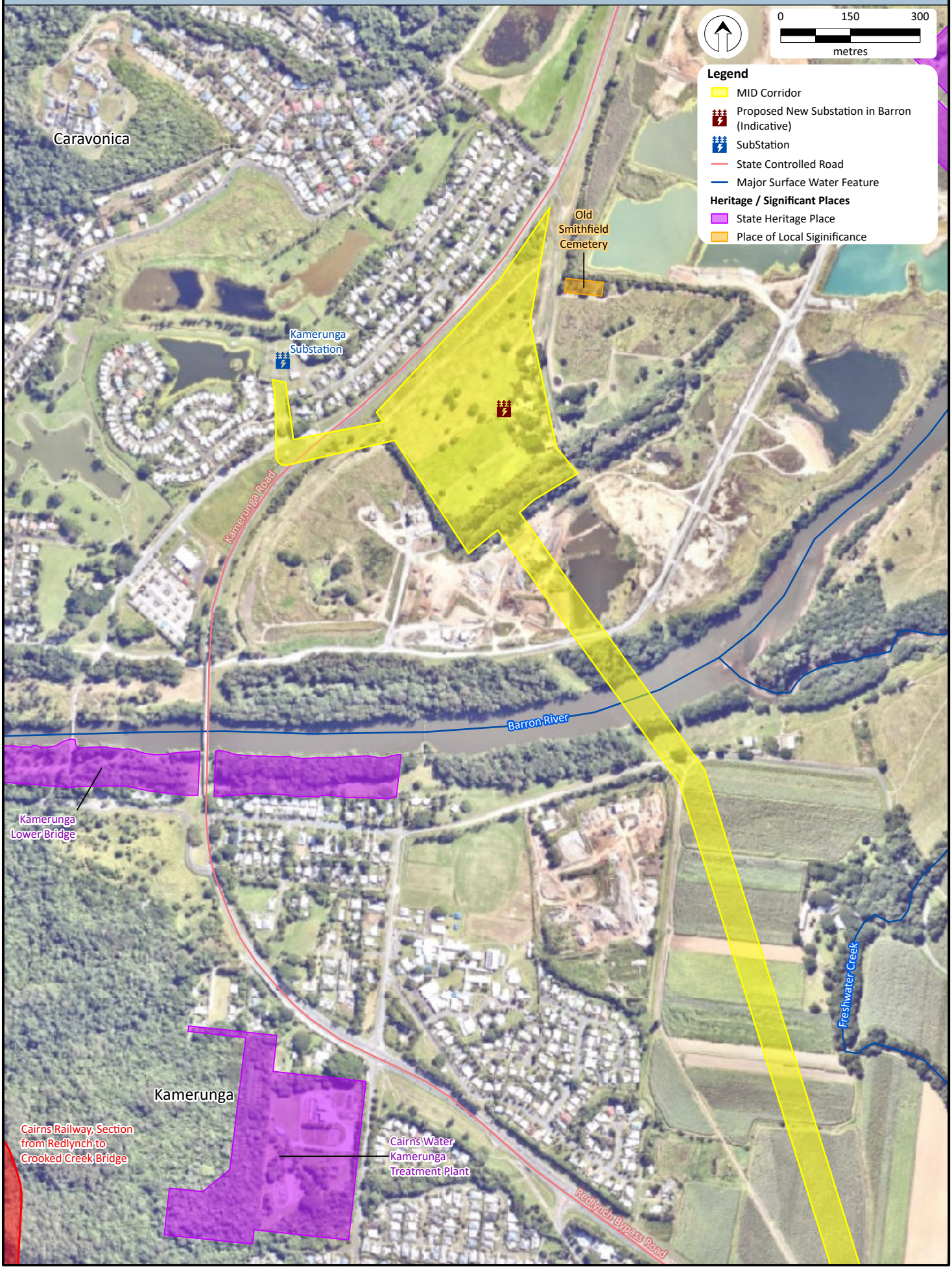


Figure 6-27-1

NON-INDIGENOUS CULTURAL HERITAGE SITES WITHIN AND IN PROXIMITY THE PROPOSED MID CORRIDOR

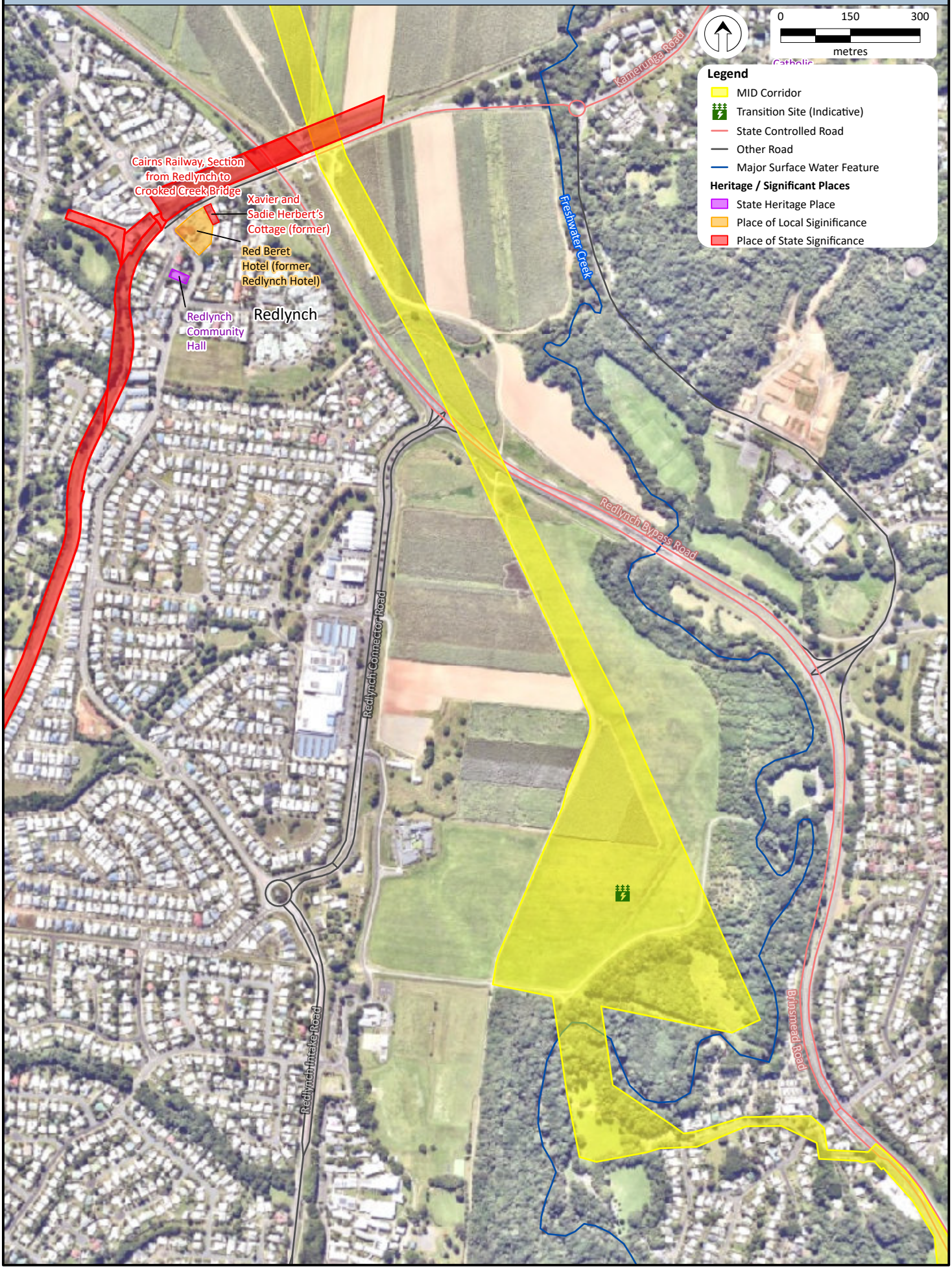


Figure 6-27-2

NON-INDIGENOUS CULTURAL HERITAGE SITES WITHIN AND IN PROXIMITY THE PROPOSED MID CORRIDOR

Figure 6-27-3

NON-INDIGENOUS CULTURAL HERITAGE SITES WITHIN AND IN PROXIMITY THE PROPOSED MID CORRIDOR

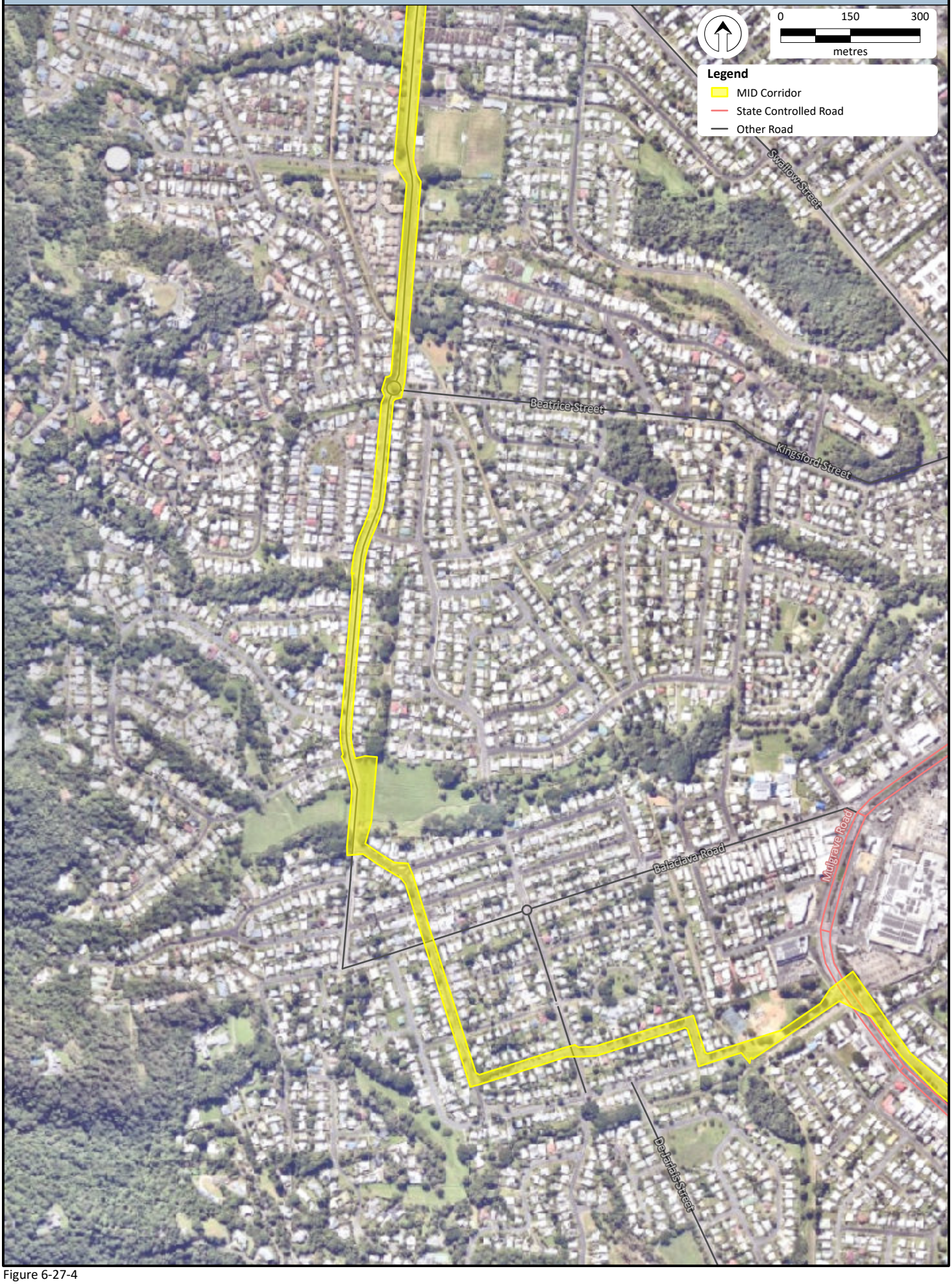


Figure 6-27-4

NON-INDIGENOUS CULTURAL HERITAGE SITES WITHIN AND IN PROXIMITY THE PROPOSED MID CORRIDOR

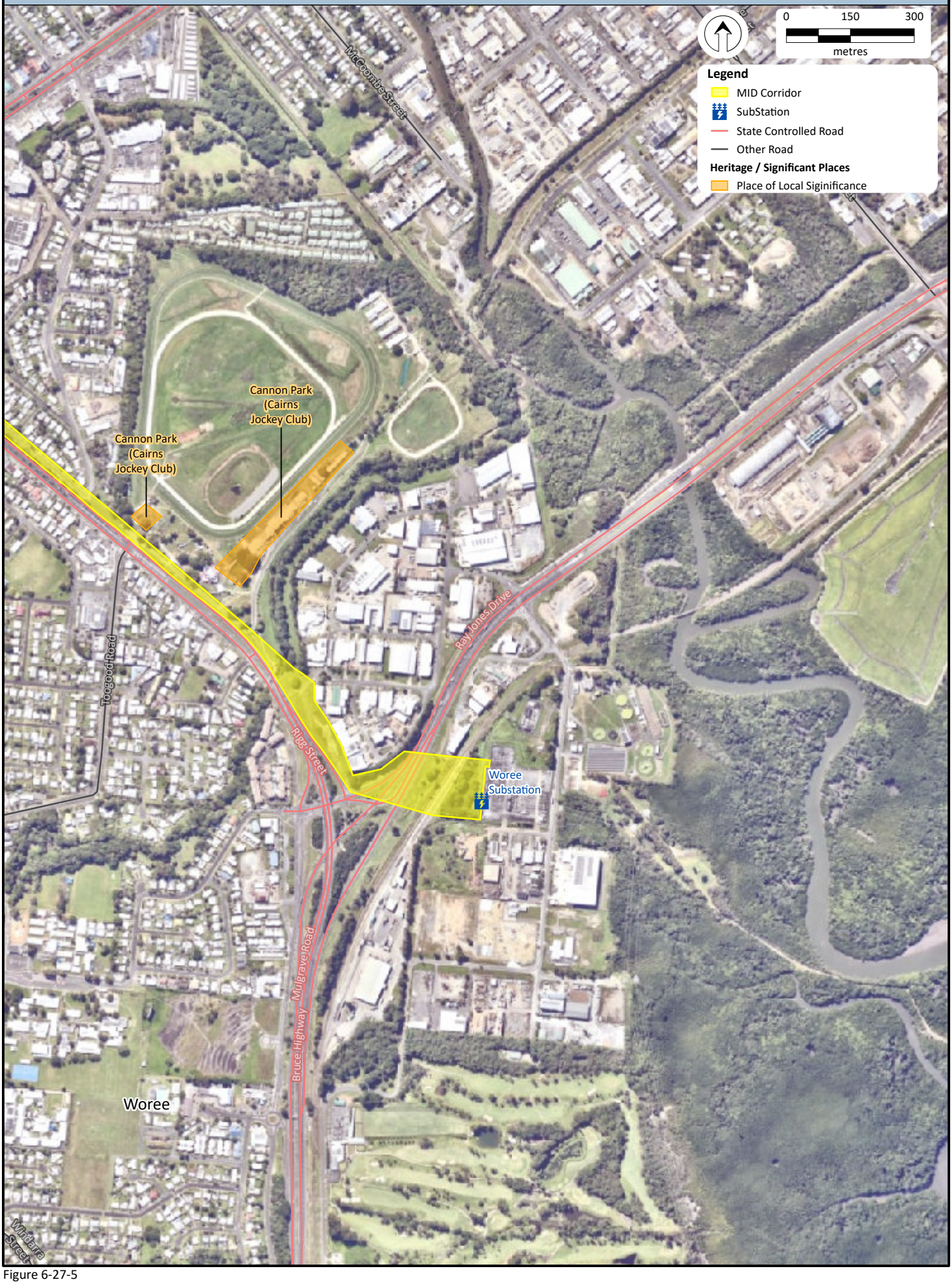


Figure 6-27-5

6.15 Traffic and transport

A Traffic Impact Assessment (TIA) was undertaken for the Project by Point8 Pty Ltd on behalf of Powerlink. The TIA was prepared in accordance with the Guide to Traffic Impact Assessment (GTIA) (DTMR, 2018) to assess traffic-related impacts created by the Project. The full TIA is included in Appendix B while a summary is provided in this section.

6.15.1 Existing environment

Key State Controlled Roads

There are five State Controlled Road (SCR) intersections that interface the Project, being:

- Brinsmead Road/CWAR;
- Mulgrave Road/Bruce Highway;
- Bruce Highway/Ray Jones Drive/Rigg Street;
- Redlynch Bypass Road/CWAR; and
- Kamerunga Road/CWAR.

Details of the key roads, including the road form, speed limit and road classification are outlined in Table 6-27. Further, twelve key intersections within the SCR network will be used by construction traffic to travel to the site access locations. Detailed location of these intersections can be seen in Appendix B.

Table 6-27 Key road network details

Road name	Asset owner	Road description	Road classification
Brinsmead Road	DTMR	• Four lane, two-way • Divided carriageway • 80km/h speed limit	Secondary (Sub-arterial Road)
Mulgrave Road/Bruce Highway	DTMR	• Four lane, two-way • Divided carriageway • 60km/h speed limit	Secondary (Sub-arterial Road)
Bruce Highway/Ray Jones Drive/ Rigg Street	DTMR	• Four lane, two-way • Divided carriageway • 80km/h speed limit	Highway (Arterial Road)/Local Road
Redlynch Bypass Road/Cairns Western Arterial Road (CWAR)	DTMR	• Two lane, two-way • Undivided carriageway • 80km/h speed limit	Secondary (Sub-arterial Road)
Kamerunga Road/Cairns Western Arterial Road (CWAR)	DTMR	• Two lane, two-way • Undivided carriageway • 80km/h speed limit	Secondary (Sub-arterial Road)

Key Local Controlled Roads

There are 20 Local Controlled Roads that interface the Project, being:

- Stewarts Road;
- Lake Placid Road;
- Lower Freshwater Road;
- Unnamed Road Reserve (Redlynch Connector Road / Cairns Western Arterial Road);
- Unnamed Road Reserve (off Portelli Road);
- Shale Street;
- View Street;
- Christie Drive;
- Ferntree Close;
- Brinsmead Terrace;
- Lake Morris Road;
- Ramsey Drive;
- Irene Street;
- Langan Street;
- Watson Street
- Cavendish Street;
- Downing Street;
- Henley Street;
- Mulgrave Road; and
- Ray Jones Drive.

The roads intersected by MID Corridor listed above with the exception of Stewarts Road, unnamed Road Reserve (off Portelli Road), Watson Street, Cavendish Street, Downing Street and Henley Street are mapped as SPP IMS active transport corridors. In addition, the MID Corridor intersects the SPP IMS future busway corridor along the Mulgrave Road to Bruce highway (refer to Table 7 2).

6.15.2 Potential impacts and mitigation measures

Construction impacts

Road safety

In accordance with GTIA Part C Section 9, an assessment of road safety for all intersections is required to identify the potential risk to road safety as a result of the construction activities of the project. According to the TIA, negligible impact on road safety is expected as a result of the project construction. Whilst some traffic impacts will occur from the construction activities, such as road closures or increased traffic as a result of construction vehicles, these activities will only occur for a short period of time. Additionally, all construction activities will be managed under specific design and management requirements of the Queensland Guide Temporary Traffic Management. Further works on roads and traffic management approvals from DTMR will be sought when construction requires.

Access and frontage

In accordance with GTIA Part C Section 10, an assessment of access and frontage at all intersections is required to identify the potential impact to access and frontages as a result of the construction activities of

the project. According to the TIA, negligible impact on access and frontage is expected. Whilst some traffic impact such as road link capacity, intersection delay, road safety and access and frontage will occur from the construction activities, these activities will only occur for a short period of time. Additionally, all construction activities will be managed under specific design and management requirements of the Queensland Guide to Temporary Traffic Management.

Intersection delay

In accordance with GTIA Part C Section 11, an assessment of intersection delay for all impacted intersections is required to identify the potential impact the construction of the project will have on traffic movement through intersections. According to the TIA, the estimated construction generated trips on the SCR network will be below a 5% increase and therefore are not expected to impact intersection delay.

The highest traffic volume calculated for the proposed developments is 131 additional vehicle trips per day during the construction of the underground cable component. For the construction traffic to comprise greater than 5 % of the intersection traffic, the total daily volume of the intersection would need to be 2,620vpd. Due to the nature of the SCR intersections, these volumes are expected to have substantially less than a 5 % impact on the SCR. Therefore, no intersection delay increase is expected to occur across all sites as a result of the operational traffic.

Road link capacity

In accordance with GTIA Part C Section 12, an assessment of the road link capacity (between intersections) is required, based on the construction activities of the proposal.

According to the TIA, across all site locations that interface SCRs, the proposal is not considered to impact road link capacity. The highest traffic volume calculated for the proposed developments is 131 vehicle trips per day during the construction of Stage 2. For the construction traffic to comprise greater than 5% of the link traffic, the total daily volume of the link would need to be 2,620vpd. Due to the nature of the SCR links, these volumes are expected to have substantially less than a 5% impact on the SCR. Therefore, no road link capacity impacts are expected to occur across all SCRs as a result of the operational traffic.

Construction mitigation measures

Construction of the project will be managed in accordance with Powerlink's Standard Environmental Controls and mitigate and manage the effects on traffic and transport will be mitigated by the implementation of suitable mitigation measures as detailed within the Project CEMP.

Additional mitigation measures to manage the effects on traffic and transport prior to and during construction include:

- A minimum of 14 days' notice to residents and businesses along the affected route will be placed in a newspaper in the affected area advising details of any full lane closures.
- Queensland Police (Cairns Traffic Branch) will be contacted at a minimum of 21 days' notice before the event to ascertain if a permit is required.
- Suitably signpost notification of the works at either end of the site 24 hours prior to the commencement of the works.
- Notify Emergency Services of any traffic control which may affect response times.
- Meet all conditions of approval for CRC Application for Temporary Road Closure Form (RC1) to conduct construction works within the road reserve.

- When planning road closures or construction activities within the road reserve, Powerlink Queensland will confirm with CRC relevant bin collection service timings to avoid conflict.
- When planning road closures or construction activities within the road reserve, Powerlink Queensland will check for special events throughout the work period and schedule around events accordingly.

A schedule of overarching guidelines for traffic management principles have been provided in Appendix B. This schedule is to provide DTMR and CRC with an understanding of the potential traffic impacts that may occur as a result of the proposed development construction. Additionally, this schedule will provide guidance to Powerlink for the planning of construction of the transmission line with respect to the safety of the road network users and assist in creating safe construction processes (Appendix C).

Table 6-28 Temporary traffic management principals

Work activity	Management principals
Legislative compliance	• Traffic management is to comply with the relevant Austroads Guide to Temporary Traffic Management (AGTTM) Part 3, QGTTM Part 3 and AS 1742.3 standards and guidance. • Ensure workers preparing or implementing traffic management are appropriately qualified.
Intersections	• Ensure at least one lane in each direction is maintained at all times. • Ensure no greater than a 15-minute delay is incurred as a result of the works. • Undertake works during low volume periods where possible. • Provide short-term detours or side tracks where appropriate.
Shoulder closures	• Ensure appropriate sight distances are maintained between pathways and intersections, driveways, and site access points. • Ensure shoulder closures comply with relevant AGTTM Part 3, QGTTM Part 3 standards and guidance.
Shuttle Flow	• Ensure the maximum lane width provided is 3.5m. • Ensure the swept path can accommodate heavy and over-dimensional vehicles where required, or provide suitable detour. • Ensure single lane section lengths comply with the maximum length requirements outlined in AGTTM Part 3 Section 5.4.4. • Ensure clear communication with property owners prior to commencement.
Driveways and Accesses	• Maintain access to and from premises, where access cannot be maintained an agreed alternative is to be arranged. • Ensure clear communication with property owners prior to commencement. • Maintain minimum sight distance requirements for accesses. • Maintain minimum turn warrant design, as identified in Austroads Guide to Road Design (AGRD) specifications for accesses.

Work activity	Management principals
Footpaths	• Ensure pedestrians and cyclists are not led into direct conflict with works or traffic and are kept safe. • Ensure road shoulders are kept free of hazards including signage or an appropriate tapered treatment is used to close off lanes and direct cyclists to alternative facilities.
Site Compliance	• Ensure regular safety inspections are undertaken on the sites. • Ensure accurate documentation of traffic management arrangements is undertaken.
Oversize vehicle transport	• Ensure relevant permits and loading/unloading plans are organised.

Operation impacts

Due to the nature of the Project, the operational phase is expected to generate limited traffic in the form of periodic maintenance access and activities. As such, the operational phase is expected to have a negligible impact on link capacity, intersection operation, heavy vehicle routes, active or public transport networks and general road safety.

Road safety

In accordance with GTIA Part C Section 9, an assessment of road safety for all intersections is required during the operation of the project. This is to assess if there is an impact on road safety through increased traffic volumes, conflict points, the presence of new infrastructure and changes to site lines, vehicle types and on-street parking. The desired outcome is to ensure that the road's safety is not 'significantly worsened' as a result of the operational traffic.

According to the TIA, the operational phase of the project will not impact road safety. Operational traffic is expected to be very occasional for the project and as such, no road safety impacts are expected to occur as a result of operational traffic.

Access and frontage

In accordance with GTIA Part C Section 10, an assessment of access and frontage at all intersections is required. This is to assess if there is an impact on access and frontage ensuring that safety or efficiency of the SCR is not worsened by the operational traffic. According to the TIA, the proposal will not impact on any road access and frontage.

Intersection delay

In accordance with GTIA Part C Section 11, an assessment of intersection delay for all impacted intersections is required. This is to assess if there is an economic and social impact on the community through increased travel times, driver impatience and associated economic cost of these delays.

According to the TIA, the proposal is not expected to impact intersection delay. Minimal, ad hoc operational traffic is required to service the project and therefore, no intersection delay increase is expected to occur.

Road link capacity

Across all site locations that interface SCRs, the proposal will not impact road link capacity. As stated above, additional movements generated by the proposed developments are considered minimal. Therefore, no road link capacity reduction is expected to occur across all sites as a result of the operational traffic.

Operation mitigation measures

Due to the low traffic numbers to be generated during operation, no mitigation measures are proposed.

Decommissioning impacts

Decommissioning activities are anticipated to have similar impacts to traffic and road use to the construction phase of the project, and therefore traffic impacts during decommissioning are expected to be minimal.

6.16 Noise and vibration

A Noise and Vibration Assessment was undertaken for the Project. The assessment is provided in Appendix H and a summary is presented below.

6.16.1 Existing environment

Noise sensitive receptors

Environmental values relating to noise are defined under the *Environmental Protection (Noise) Policy 2019* (Qld) (EPP (Noise)) and include:

- The qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and
- The qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following—
    - sleep;
    - study or learn;
    - be involved in recreation, including relaxation and conversation; and
- The qualities of the acoustic environment that are conducive to protecting the amenity of the community.

Noise sensitive receptors are defined under the EPP (Noise) and include:

- Residences;
- Libraries and education institutions;
- Childcare centres and kindergartens;
- School and playgrounds;
- Hospitals, surgeries and other medical institution;
- Commercial and retail activities;
- Protected and critical areas under the NC Act;
- Marine parks under the *Marine Parks Act 2004* (Qld) (Marine Park Act); and
- Parks and gardens that are open to the public.

Based on the definition of sensitive receptors within the EPP (Noise), the primary sensitive receivers considered for this assessment are residential receivers adjacent to the MID Corridor. Secondary sensitive receptors include educational facilities and commercial properties. These have been grouped into three separate Noise Catchment Areas (NCAs) set at a distance of 500 m around the MID Corridor and identified due to their similar acoustic environments. Noise sensitive receptors surrounding the Project are detailed in Section 6.3.2.

The NCAs are shown on Figure 1 of Appendix H and described in Table 6-29. The NCAs are shown on Figure 1 of Appendix H and described in Table 6-29.

Table 6-29 Sensitive receiver types along the MID Corridor

Sensitive receiver type	Description
Residential	**NCA 1 (Kamerunga to Redlynch)** Residential areas located around the Cairns Western Arterial Road and Kamerunga Road. This NCA also includes St Johns Community Care (Aged Care Facility) in Redlynch. **NCA 2 (Redlynch to Kanimbla)** Residential areas located around the Cairns Western Arterial Road through Redlynch to Kanimbla. **NCA 3 (Kanimbla to Mooroobool)** Residential areas located around Ramsey Drive through Kanimbla and Mooroobool. **NCA 4 (Earlville to Woree)** Residential areas located around the Bruce Highway through Earlville and Woree.
Educational	**NCA 2 (Redlynch to Kanimbla)** St Andrew's Catholic College and Goodstart Early Learning Brinsmead are both located in NCA2 but educational buildings at each are over 350 m away from the MID Corridor. **NCA 3 (Kanimbla to Mooroobool)** Goodstart Early Learning Kanimbla is located adjacent the MID Corridor under Irene Street in NCA3. Cubby Care Early Learning Centre is also located in NCA3 but is approximately 390 m away from the Project. **NCA 4 (Earlville to Woree)** Balaclava Road Childrens Centre and Goodstart Early Learning Woree are located adjacent the MID Corridor in NCA4. Earlville Early Education and Our Lady Help of Christians School are also located in NCA4 but are approximately 300 m and 400 m away from the Project respectively.
Commercial/industrial	Commercial and industrial uses are located along the MID Corridor and may require consideration when in close proximity to works.

Existing environment

No background noise monitoring has occurred and as such, reference has been made to Appendix A of Noise Impact assessment, provided in Appendix H, Australian Standard AS 1055-2:1997 Description and measurement of environmental noise (AS 1055-2:1997). The reference provides estimated background noise levels for different environments based on their usage and description. Based on a review of the MID Corridor, the environment has been considered to be consistent with the noise level category R3 designation from AS1055-2:1997, which corresponds to areas with medium density transportation or some commerce or industry (Table 6-30).

Table 6-30 Estimated background noise levels from noise impact assessment

Noise area category	Description	Average background A-weighted sound pressure level, dB L_{A90}					
		Monday to Saturday			Sundays and public holidays		
		7 am –6 pm	6 pm – 10 pm	10 pm – 7 am	9 am – 6 pm	6 pm – 10 pm	10 pm – 9 pm
R3	Areas with medium density transportation or some commerce or industry	50	45	40	50	45	40

Existing noise source

A review of the MID Corridor has identified the following existing sources of noise are present:

- operations from the Kamerunga Power Station and Woree Substation;
- local industry;
- local farming operations; and
- vehicle movements along major highways and SCRs.

Background noise monitoring has not been undertaken to date for the Project; however, Powerlink anticipate that the noise levels would be typical of a rural and residential environment with natural noise sources and intermittent contributions from nearby industrial sources and road traffic noise.

6.16.2 Potential impacts and mitigation measures

Construction noise from most phases of works is predicted to present a risk of exceedance of the construction noise criteria, particularly as the MID Corridor passes through residential areas in Noise Catchment Areas 2 to 4. Despite the exceedances, it should be noted that the works immediately adjacent to individual receivers are likely to be completed relatively quickly, typically 1-2 weeks. As such, as the works proceed along the MID Corridor, individual residents are only likely to be exposed to noise levels above the criteria for relatively short periods of time during daytime periods only. During operation and maintenance phases, noise impacts will be limited and restricted to ad hoc maintenance activities and vehicles traversing along the easement.

These impacts and relevant mitigation measures are described further below.

Construction phase impacts

Noise impacts that may occur during construction will most likely be associated with the following activities:

- Overhead transmission line component:
    - Site preparation works, such as vegetation clearing, topsoil stripping, chipping/mulching and earthworks;

  - Excavation and installation of foundations for the transmission structure;
  - Stockpiling of excavated materials;
  - Movement of vehicles and machinery on access tracks or work sites, particularly on unsealed surfaces;
  - Erection of transmission line structures involving cranes;
  - Helicopter noise associated with aerial stringing of lines between transmission line structures.

- Underground cable component:
  - Site preparation works, such as vegetation clearing, topsoil stripping, chipping/mulching and earthworks;
  - Trench and undercrossing excavation and conduit installation;
  - Stockpiling of excavated materials;
  - Movement of vehicles and machinery on access tracks or work sites, particularly on unsealed surfaces;
  - Road reinstatement works
  - Joint bay excavation and installation; and
  - Cable installation, jointing and testing.

- Substation:
  - Site preparation works such as vegetation clearing, topsoil stripping, chipping/mulching, and earthworks;
  - Excavation and installation of foundations for the substation;
  - Stockpiling of excavated materials;
  - Movement of vehicles and machinery on access tracks or work sites, particularly on unsealed surfaces;
  - Assembly of equipment and infrastructure within the substation from mechanical and electrical tool.

Construction noise from most phases of works is predicted to present a risk of exceedance of the construction noise criteria, particularly as the MID Corridor passes through residential areas in Noise Catchment Areas 2 to 4. Works immediately adjacent to individual receivers are likely to be completed in a short timeframe, typically between 1-2 weeks, with individual residents likely to be exposed to noise levels above the criteria for relatively short periods of time during daytime periods only.

Works with the potential to produce perceptible vibration are expected to include:

- excavation;
- drilling; and
- truck movements.

Based on previously measured standard vibration level from potential construction source, vibration impacts will be temporary and short-term in nature. Where vibratory activities are likely to cause an impact on a sensitive receptor such as residential land use, additional mitigation measures will be put in place during the standard hours work. If works are to be conducted outside of standard hours, then the lower vibration criterion of 0.3mm/s PPV for residential uses may be exceeded for distances of up to 25m. Should works be required outside of standard hours and within this distance from residential uses then reasonable and practicable mitigation and management measures should be implemented for excavation, drilling and heavy vehicle usage. This would generally be expected to involve selecting construction methodologies that reduce the risk of vibration, maximising the offset distance to sensitive receivers so far as reasonably

practicable, and providing prior notification to sensitive receivers that they may perceive vibration from construction activities at times.

Construction will be undertaken in stages, and this, on top of the proposed mitigation measures in Section 6.16.2 and the Project's EMP (Appendix K), will result in any localised and short-term impacts only. All reasonable and practicable mitigation and management measures should be implemented during the works.

Construction phase mitigation measures

The EPP (Noise) management hierarchy gives priority to avoiding emissions where reasonable to do so. Where this is not possible, emissions reduction and management are required to be best practice. Potential impacts to noise will be managed in accordance with Powerlink's standard environmental controls as outlined in the EMP for the Project (Appendix K), and will include:

- Works should be undertaken during standard construction hours wherever possible, being 7 am – 6 pm for Monday to Friday, and 8 am – 1 pm for Saturday (excluding public holidays). Where works are required to occur outside of standard construction hours due to safety or traffic management reasons, preference should be given to scheduling these for weekend or evening hours instead of night hours.
- Notify occupants of sensitive land uses at least one week in advance works where predicted noise levels exceed the applicable noise criteria. Notification should include:
    - the reason for the activity;
    - the type of equipment to be on site;
    - expected hours of operation;
    - likely duration and impact of operation at the site; and
    - contact details for further information and complaints.
- Implement and maintain a complaint response procedure for the works including a dedicated phone line.
- Locate plant and equipment to take advantage of barriers provided by existing site features and structures.
- Where plant and equipment is to be located in one position for long periods of time (e.g. construction compounds), consider installing acoustic enclosures and/or temporary shielding to break line-of-sight to the nearest sensitive land uses. Acoustic enclosures and temporary shielding should be constructed with reference to the guidance provided in AS 2436-2010.
- Quieter construction methods should be used where feasible and reasonable to avoid unnecessary noise.
- The offset distance between plant and residences should be maximised.
- The layout of the construction compound should be arranged so that primary noise sources are at a maximum distance from residences, with solid structures (sheds, containers etc) placed between residences and noise sources (and as close to the noise sources as is practical).
- Traffic flow, parking and loading/unloading areas should be planned to avoid the need for reversing near residential areas.
- Ensure that truck tailgates are cleared and locked at the point of unloading and loading and unloading of materials should occur as far as possible from residential areas.
- Site access points, roads and construction traffic routes should be located as far as possible from residential areas.

- Restrict construction traffic to designated roads and avoid unnecessary construction traffic on local roads.
- Plant used intermittently should be shut down or throttled down to a minimum between uses.
- Plant emitting noise in a particular direction should be directed away from residential uses.
- Implement mufflers/silencers on plant and equipment. Undertake regular maintenance of plant and equipment, including silencers, to ensure that noise emissions do not increase over time. Servicing, refuelling and warm-up to be undertaken during standard construction hours.
- Mobile construction equipment that will be on site for more than two days should have non-tonal reversing alarms if working out-of-hours.
- Run plant that has high and low vibration settings on the lowest effective vibration setting.
- Consider implementing noise and/or vibration monitoring in response to complaints, where this is considered an appropriate response.
- The induction of site staff should include a reference to potential noise and vibration impacts and the identification of sensitive land uses.
- 'Toolbox talks' should include a reference to any noise and vibration management measures being implemented on site at the time.
- Vehicle warning devices, such as horns, should not be used as signalling devices.
- No swearing or unnecessary shouting or loud stereos/radios on site.
- No unnecessary dropping of materials from height, throwing of metal items and slamming of doors.

Operation and maintenance phase impacts

The operational and maintenance phase of the Project will have minimal impacts on ambient noise levels, with expected noises resulting from:

- the sound power generated by the new substation in Barron;
- other noise sources from the new substation such as small air conditioning units to service site buildings;
- wind on the lines and transmission line structures (whistling);
- corona discharge (buzzing, crackling, or humming) from transmission line and substation;
- maintenance vehicles traversing along the easement; and
- maintenance activities on the transmission line structures and at the substation via helicopter and/or vehicles.

Based on the assumptions made for the noise prediction model by using international standard ISO 9613-2 prediction methodology, transformers installed within the proposed new substation in Barron is predicted to achieve compliance with the most stringent 37 dB $L_{Aeq,1hr}$ noise criterion for evening and night at a separation distance of 140m. full details of operational noise assessment is provided in Appendix H

Most residential land uses around the proposed new substation in Barron are further than 140m, with the major residential area on the northern side of Kamerunga Road (including residential areas on Yurongi Street) being further than 300m away. These residences already experience increased background noise due to their proximity to Kamerunga Road and as such, will benefit from a reduced noise exposure due to the relocation of the existing substation.

Noise from wind on the transmission lines is expected to be incidental and should only occur during periods of higher wind speeds and would be no different to those currently experienced from the existing line.

Corona discharge may cause noise emissions such as a crackling sound, which is due to ionisation of air at the surface of the conductors and generally occurs during periods of wet weather or high levels of humidity. It is noted that although corona discharge noise may cause a nuisance to sensitive receptors, however the incremental increase to the surrounding acoustic environment is not expected to be significant. Further, it should be noted that modern transmission line design which uses bundled conductors produces much less corona discharge noise than older lines, which have a single conductor per phase. Corona noise from the proposed transmission line is therefore expected to be less than that currently experienced from the existing line and unlikely to be noticeable at the closest sensitive receptors.

Aerial maintenance activities are expected to occur once every twelve months and will result in occasional brief noise emissions. As maintenance inspections are already undertaken for the existing 132kV transmission line, the noise generated is likely to be similar to that already experienced.

Operation and maintenance phase mitigation measures

For the proposed new substation in Barron, it is recommended that a minimum separation distance of 140m be maintained between transformers at the substation and any residential land use that is occupied. It is noted that this risk would only apply to the residential use on Stewarts Road that is owned by Powerlink Queensland and currently tenanted. The property will be vacated prior to operation and therefore minimum separation distance will be maintained.

Decommissioning phase impacts and mitigation measures

Decommissioning, dismantling, and removing transmission lines, structures, and the substation as the end of their design life have the potential to generate noise impacts, including from the following activities:

- vehicle and machinery movement over access roads and existing easement;
- dismantling of transmission line structures with cranes, manual tools and power tools;
- dismantling of substation infrastructure using manual and power tools; and
- ground surface levelling or grading for rehabilitation of the easement.

Potential noise impacts associated with decommissioning activities are expected to be localised and short-term, and similar in occurrence and magnitude to potential impacts associated with the construction phase activities.

6.17 Hazards, health and safety

This section describes, and summarises, the potential environmental hazards associated with the construction, operation, maintenance and decommissioning phases of the Project.

6.17.1 Methodology

A desktop risk assessment has been carried out using information available at the time of preparing the MID Assessment Report and has included a review of a number of datasets, including:

- CRC Local Disaster Management Plan and Adverse Events Plan;
- CairnsPlan;
- Powerlink Policies (EMPs, Emergency Response Plans and Asset Management Strategy);
- climate Data from BoM; and
- the risk assessment includes an evaluation of key hazard impacts relevant to the Project and proposed mitigation measures.

For the purposes of this assessment, hazards and risks can be defined as:

- Hazard: A source of potential harm or an existing situation with a potential to cause loss, harm to people or damage to property and environment.
- Risks: The chance of something happening that will have an impact on objectives and is often specified in terms of an event or circumstance and the consequences that may flow from it.

Effective environmental management requires activities with potential to cause environmental impacts to be identified and managed to an acceptable level based on 'As Low as Reasonably Practicable' (ALARP) principles. An environmental risk assessment has been conducted for the Project to inform planning for the proposed activities, support this MID Assessment Report, and enable the Proponent to meet the objectives for environmental regulation.

The risk assessment has been prepared in accordance with the following risk matrix, adopted from the Victorian EPA guideline *Assessing and controlling risk: A guide for business*[5]*:*

- Inherent risk and residual risk are assessed using the risk matrix identified in Table 6-31.
- Likelihood for the purpose of risk assessment is outlined in Table 6-32.
- Consequence for the purpose of risk assessment is outlined in Table 6-33.
- Risk ratings are compared against

Table 6-34 to determine if the level of risk is acceptable, or whether additional controls need to be implemented to manage and lower the risk.

[5] Victorian EPA Publication *1695.1: Assessing and controlling risk: A guide for business,* available at: https://www.epa.vic.gov.au/about-epa/publications/1695-1

Table 6-31 Risk matrix

	Consequence				
Likelihood	**Low**	**Minor**	**Moderate**	**Major**	**Severe**
Certain	Medium	High	High	Extreme	Extreme
Likely	Medium	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	High
Rare	Low	Low	Low	Medium	Medium

Table 6-32 Likelihood rating of impact occurring

Likelihood	Description
Certain	Expected to happen regularly under normal circumstances
Likely	Expected to happen at some time
Possible	May happen at some time
Unlikely	Not likely to happen in normal circumstances
Rare	Could happen but probably never will

Table 6-33 Consequence rating of the harm impact could cause

Consequence	Description
Low	No or minimal environmental impact, or no health and wellbeing impacts.
Minor	Low environmental impact / low potential for health and wellbeing impacts.
Moderate	Medium level of harm to health and wellbeing or the environment over an extended period of time.
Major	Serious environment harm / high-level harm to health and wellbeing.
Severe	Permanent or long-term serious environmental harm / life threatening or long-term harm to health and wellbeing.

Table 6-34 Description of risk ratings

Risk Level	Description
Extreme	Totally unacceptable level of risk. Stop work and/or take action immediately.
High	Unacceptable level of risk. Controls must be put in place to reduce to lower levels.
Medium	Can be acceptable if controls are in place. Attempt to reduce to low.
Low	Acceptable level or risk. Attempt to eliminate risk but higher risk levels take priority.

6.17.2 Hazard risk assessment

The risk identification presented within this section is based on a desktop study only. Technical studies undertaken as part of the MID Assessment Report have been incorporated where applicable.

The key hazards associated with the Project, including their impact and proposed mitigation measures, have been included in Table 6-35.

Table 6-35 Preliminary hazard and risk identification

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Erosion & Sedimentation Construction activities resulting in exposed earth	• Instability to transmission line structures and substation foundations • Loss of service delivery • Damage to neighbouring properties/infrastructure	Likely	Moderate	High	Refer to mitigation measures in Section 6.4.	Possible	Minor	Medium
Compaction Construction activities resulting in a compaction of soil	• Poor root growth, which may result in reduced crop yield through poor water and nutrient uptake • Difficulties with soil cultivation • Decrease in water entering the soils • Decline in soil structure stability • Decline in fertiliser efficiency	Likely	Moderate	High	Refer to mitigation measures in Section 6.1 and Section 6.4.	Possible	Minor	Medium
Resource interests Construction activities, and siting of poles impacting on resource operations	• Impacts to the operation of the resource activities • Reduced operational area for resource activities as a result of pole siting	Likely	Moderate	High	Refer to mitigation measures in Section 6.1.	Possible	Minor	Medium

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Contaminated land Excavation of contaminated land from sites listed on the EMR/CLR	• Excavation of contaminated land from sites listed on the EMR/CLR and further potential contamination, including landfill and petroleum and oil storage • Contact with acid sulphate soils • Contamination of watercourses • Disposal of contaminated material and/or on site remediation of contaminated soil	Likely	Major	High	Refer to mitigation measures in Section 6.1.	Unlikely	Minor	Low
Acid Sulphate Soils Excavation and exposure of material that has the potential to contain potential or actual acid sulfate soils	• Contact with acid sulphate soils • Contamination to watercourses • Disposal of contaminated material and/ or on-site remediation of contaminated soil	Likely	Major	High	Refer to mitigation measures in Section 6.1	Unlikely	Minor	Low
Weather Natural weather events, including	• Transmission line structural failure and loss of service delivery	Likely	Moderate	High	Refer to mitigation measures in Section 6.2 and 6.5.	Unlikely	Moderate	Medium

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
storms, droughts, flooding, high winds	• Loss of access to infrastructure and inundation of construction areas • Damage to neighbouring properties/infrastructure							
Dust Construction activities, such as earthworks activities, vegetation clearing and stockpiling, resulting in dust generation	• Poor visibility • Respiratory irritation • Residential complaints • Impacts on crops and surrounding vegetation/habitat health	Possible	Moderate	Medium	Refer to mitigation measures in Section 6.3.	Unlikely	Minor	Low
Noise and vibration Construction activities, such as ground disturbance activities or installation of infrastructure, resulting in noise and vibration	• Nuisance and disturbance to surrounding sensitive land uses	Possible	Moderate	Medium	Refer to mitigation measures in Section 6.16.	Unlikely	Minor	Low

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Water quality Construction activities, such as ground disturbance activities, may result in an increase in suspended sediments	• Impacts to water quality and health of aquatic species	Likely	Moderate	High	Refer to mitigation measures in Section 6.4.	Unlikely	Moderate	Medium
Flooding Loss of infrastructure during operation and delays in construction	• Transmission line and/or substation damage and loss of service delivery • Damage to electrical assets • Loss of access to infrastructure • Inundation of construction laydown areas • Downstream flood impacts from substation construction	Likely	Moderate	High	Refer to mitigation measures in Section 6.4.	Unlikely	Moderate	Medium
Groundwater Construction activities, such as excavation of footings for	• Impacts to groundwater table • Impacts to groundwater quality	Unlikely	Moderate	Medium	Refer to mitigation measures in Section 6.4.	Unlikely	Low	Low

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
transmission line structures and trenching works for the underground cable, may post a risk to groundwater resources.								
Coastal Processes Siting of poles and construction activities may result in impacts to coastal processes	• Erosion of bed and banks of the Barron River • Impacts to water flow and movement	Possible	Major	High	Refer to mitigation measures in Section 6.4.	Unlikely	Low	Low
Vegetation clearing Construction activities, including ground disturbance.	• Loss of vegetation communities and fauna habitat • Increased edge effects • Modification of watercourses from changes in water quality • Increased sedimentation from cleared areas • Potential for impacts to unknown heritage artefacts	Likely	Moderate	High	Refer to mitigation measures in Section 4.7 and 4.8.	Unlikely	Moderate	Medium

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Introduction of weeds Movement of construction vehicles through the Project area	• Spread of WoNs and other weeds, resulting in impacts to neighbouring properties	Likely	Major	High	Refer to mitigation measures in Section 6.10.	Unlikely	Minor	Low
Spread of pest species Movement of soil during construction may introduce or exacerbate known electric fire ant nests	• Spread of pest species, resulting in impacts to native species	Likely	Major	High	Refer to mitigation measures in Section 6.10.	Unlikely	Minor	Low
Agricultural operations Construction activities and placement of the poles may impact on existing land uses	• Loss or fragmentation of agricultural land • Disturbance to agricultural operations • Disturbance of rural amenity values	Possible	Moderate	Medium	Refer to mitigation measures in Section 6.10	Unlikely	Minor	Low

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Traffic Increased traffic volume resulting from construction activities	• Increased number of larger vehicles on roads, increasing potential for traffic accidents • Potential for public vehicle interaction resulting in injuries, increased road wear and increased traffic volume through local roads, resulting in traffic congestion	Possible	Moderate	Medium	Refer to mitigation measures in Section 6.15.	Unlikely	Minor	Low
Bushfire Fire outbreak from construction / bushfire in surrounding areas	• Transmission line structural failure and loss of service delivery • Potential for flammable goods to escalate risk of encroaching bushfire • Injuries /fatality • Damage to neighbouring properties/infrastructure	Likely	Moderate	High	Refer to mitigation measures in Section 6.19.	Unlikely	Minor	Low
Dangerous goods and hazardous Substances	• Loss of containment • Pollution of stormwater and soils • Health impacts	Possible	Moderate	Medium	Undertake works in accordance with Powerlink's standard	Unlikely	Minor	Low

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Transportation, handling and storage					environmental controls within Appendix K.			
Waste Creation of waste during construction	• Inappropriate waste handling resulting in contamination of soils and waterways and impacts to neighbouring properties • Potential impact to cause offensive odour. • Potential impact to visual amenity due to waste material such as temporary stockpile from construction.	Possible	Moderate	Medium	Refer to mitigation measures in Section 6.20.	Unlikely	Minor	Low
EMF Increased EMF from construction of the transmission line	• Health impacts from prolonged exposure to EMF • Interference with television or radio reception.	Possible	Moderate	Medium	Refer to mitigation measures in Section 4.17.	Unlikely	Minor	Low
Contact with existing underground services	• Damage to existing underground infrastructure during the construction of UG cable if appropriate measures aren't taken to identify existing infrastructure.	Possible	Moderate	Medium	Undertake works in accordance with Powerlink's standard environmental controls within Appendix K	Unlikely	Minor	Low

Hazard	Risk	Inherent risk			Mitigation	Residual risk		
		Likelihood	Consequence	Risk		Likelihood	Consequence	Risk
Contact with existing OH transmission lines	• Contact with overhead services during construction, operation and decommissioning. • Inadvertent contact with overhead lines during construction of the replacement line, resulting in potential fatality.	Possible	Major	High	Undertake works in accordance with Powerlink's standard environmental controls within Appendix K.	Unlikely	Minor	Low

6.17.3 Dangerous goods and hazardous substance management

Chemicals used during construction, operation and decommissioning phases are likely to include fuels, lubricants, oils, degreasers and domestic cleaning agents.

All dangerous goods will be transported by licensed transporters in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG Code).

Standard procedures for the storage, containment, disposal and spill response for potentially hazardous materials will be managed in accordance with *AS 1940:2017 Storage and Handling of Flammable and Combustible Liquids* and *AS 3780:2023 Storage and Handling of Corrosive Substances*. The storage and handling, including first aid and clean up response of these chemicals will be incorporated into the Emergency Response Plan for the Project. Spill management requirements include:

- assess spill (extent and potential to migrate offsite, fire hazard potential, type and volume);
- isolate the spill (prevent further spillage, blocked drains and prevent access to the area);
- notification of the spill;
- clean up and remediation; and
- restock spill kit(s).

6.18 Electric and magnetic fields

A desktop assessment was undertaken for the overhead transmission line and substation components of the MID Corridor to identify potential impacts associated with Electric and magnetic fields (EMF) from the Project. This desktop assessment was informed by EMF calculations for Kamerunga to Redlynch 132kV Transmission line.

A separate EMF study was conducted for the underground cable component of recommended corridor to demonstrate that the new line will be designed and constructed in compliance with existing standards and guidelines for safe health exposure to general public and for interference free operation of electronic devices in proximity of the cable line.

These assessments are provided in Appendix I.

6.18.1 Background information regarding electric and magnetic fields

Electric and magnetic fields occur almost everywhere, can exist independently of each other, and can result from both natural sources and human activity. Naturally occurring electric fields result from charged particles in the atmosphere and storm activity, and the electric field strength can vary quite quickly as a result of lightning discharges. The earth's natural magnetic field varies with latitude, and some rocks and minerals are also naturally magnetic.

Unlike most natural electric and magnetic fields, those relevant to transmission lines alternate at the frequency of the alternating current (AC) power transmission system. These fields alternate in magnitude and direction 50 times per second (50hertz [Hz]). Although they may occur simultaneously at the same place, the electric and magnetic fields exist independently of one another. These power–frequency fields are commonly referred to as extra low frequency (ELF) EMFs).

Household electrical wiring and common appliances (electric blankets, televisions, hairdryers, computers, etc.) all produce ELF EMF. Background magnetic fields in the home are usually around 0.1 microtesla (µT) and background electric fields in the home can be up to 20 volts per metre (V/m) (ARPANSA, 2018). The electric field produced by any source outside the home will be attenuated considerably by the structure of the home, as all common building materials are sufficiently conducting to screen fields (World Health Organization, 2007).

EMFs should not be confused with electromagnetic radiation. EMFs are fundamentally different in their physical nature and in the way they interact with the body (NZ Ministry of Health, 2013). Electromagnetic radiation is a term used to describe the movement of electromagnetic energy through the propagation of a wave (e.g. radio waves, microwaves). This wave is composed of electric and magnetic waves which oscillate (vibrate) in phase with, and perpendicular to, each other (Energy Networks Association, 2016). This is in contrast to EMF, where the electric and magnetic components are essentially independent of one another. EMFs around power lines and electrical appliances are not a form of radiation (NZ Ministry of Health, 2013).

6.18.2 Sources of power frequency electric and magnetic fields

Electric fields

EMFs are produced by all transmission lines, distribution systems, wiring and equipment that use AC electricity. An electric field will exist around any conductor that is energised from the power supply, whether there is any load connected to it. The strength of power frequency electric fields depends

primarily on the voltage of the system and also on the distances of the point of measurement from the energised conductor and from nearby earthed objects.

High voltage transmission lines may generate fields of several thousand V/m, whereas fields from lower voltage distribution lines will be in the order of hundreds of V/m, and home appliances several tens of V/m or less.

It is important to note that the electric field strength falls quickly with increasing distance from the voltage source. It is also relatively easy to shield electric fields. Trees, shrubs, buildings, human skin and even clothes will shield electric fields.

Magnetic fields

Magnetic fields are produced by, and proportional to, the flow of alternating electric current through conductors. The strength and direction of the field will change with the alternating current at 50 Hz.

Transmission line magnetic fields are affected by variables such as line loading, line design, and wire height above ground (Energy Networks Association, 2006). The strength of the magnetic field also decreases rapidly with distance from the source, but it is not practical to provide shielding for magnetic fields (unlike the simple shielding that is possible for electric fields).

However, the magnetic fields generated by the individual conductors in an AC power system can partly cancel each other, depending on their configuration relative to each other. This cancelling effect is greater when the conductors are closer together. It is for this reason that the magnetic field directly above an underground cable buried 1 to 1.5m deep can be as high as or higher than the field directly below an equivalently loaded line some 10m overhead. However, the field strength from the underground cable will usually fall off faster with increasing distance because of the closer proximity of the conductors to one another.

Magnetic fields are measured using a gaussmeter, in a unit of µT or milligauss (mG). 1µT is equivalent to 10mG. Typical magnetic fields, measured at normal user distance from common household appliances, some overhead lines and associated infrastructure are outlined in Table 6-36. The data in Table 6-36, from the Energy Networks Association, shows that power frequency magnetic fields are not just associated with high voltage transmission lines but are found everywhere in modern society with its almost universal reliance on electricity (Department of Energy and Water Supply, 2017).

Table 6-36 Typical magnetic field ranges (Energy Networks Association, 2016)

Item	Range of measurements in µT
Electric stove	0.2 – 3
Refrigerator	0.2 – 0.5
Electric kettle	0.2 – 1
Toaster	0.2 – 1
Television	0.02 – 0.2
Computer	0.2 – 2

Item	Range of measurements in µT
Electric blanket	0.5 – 3
Hair dryer	1 – 7
Pedestal fan	0.02 – 0.2
Substation (at fence)	0.1 – 0.8
Distribution line (under line)	0.2 – 3
Distribution line (10 m away)	0.05 – 1
Transmission line (Under line)	1 -20
Transmission line (edge of easement)	0.2 - 5

6.18.3 EMF guidelines

There are a handful of international guidelines for EMF that are used to confirm whether EMF measurements are safe for the surrounding environment, these include the International Radiation Protection Association (IRPA) Guidelines which have been adopted within the National Health and Medical Research Council of Australia (NHMRC) Guidelines.

6.18.4 Existing environment

Potential sources of EMF currently present within the area includes Powerlink's existing 132kV transmission line from Kamerunga to Woree, Kamerunga Substation, Woree Substation as well as the number of other low voltage transmission lines in the region.

Proposed new sources of EMF will include the proposed transmission line and the new substation in Barron. The existing 132kV transmission line from Kamerunga to Woree will, however, be decommissioned following completion of the Project and as such, the construction of the new transmission line will not increase the source of EMF in the region, but rather change the location of where the EMF source is located.

6.18.5 Potential impacts and mitigation measures

Estimated EMF associated with the Project

Underground cable component

An EMF study was conducted for the underground cable component of the MID Corridor to demonstrate that the new line will be designed and constructed in compliance with existing standards and guidelines for safe health exposure to general public and for interference free operation of electronic devices in proximity of the cable line. This assessment is provided in Appendix I. The EMF assessment for UG component considered a new arrangement of the 132kV underground cables connected from Redlynch UGOH transition structure to existing Woree Substation.

Overhead transmission line component

Powerlink have undertaken an EMF calculation for the for Kamerunga to Redlynch 132kV Transmission line (Appendix I). These calculations investigate the EMF levels for both the existing line and proposed line at the following two locations:

- Section 1 – Kamerunga Villas between structures 1252-STR-T053 and 1252-STR-1525; and
- Section 2 – Sugar Cane Fields between structures 1252-STR-1531 and 1252-STR-1532.

The proposed new line will have similar structure locations and span lengths meaning that the same sections were investigated for both proposed and new lines.

Substation

The EMF will include appropriate buffer and comply with the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) requirements.

Electric and magnetic field

Overhead transmission line component

Where the proposed transmission line is co-located with the 132kV line, it was calculated that the maximum expected combined electric field would be approximately 2,230V/m at Section 1 and 970V/m at Section 2.

Given this Project is associated with the replacement of an existing 132kV overhead transmission line then electric field and magnetic field impacts would be significantly below internationally recognised EMF guidelines for established health effects, which is 5,000V/m.

The electric field values at easement Sections 1 and 2 are shown in Table 6-37.

Table 6-37 Electric field values at easement Sections 1 and 2[6]

Overhead Line Statue	Easement Section	Maximum Level (V/m)	At Edge of Easement (V/m)	ICNIRP Guideline Reference Limit (V/m)
Existing	Section 1	1030	630	5000
New	Section 1	1200	700	5000
Existing	Section 2	470	380	5000
New	Section 2	500	10	5000

Where the proposed transmission line is co-located with the 132kV line, it was calculated that the maximum expected combined magnetic field would be approximately 93.1mG for Section 1 and 7.9mG for Section 2. The magnetic field at the edge of the 60 m wide transmission line easement was estimated to be approximately 42.2mG for Section 1 and 7.9mG for Section 2.

Given is this Project is associated with the replacement of an existing 132kV overhead transmission line then electric field and magnetic field impacts would be lower and have been used for the purposes of this

[6] Source: Powerlink 2025

assessment and therefore significantly below internationally recognised EMF guidelines for established health effects, which is 2000mG.

The electric field values at easement Sections 1 and 2 are shown in Table 6-38.

Table 6-38 Magnetic field values at easement Sections 1 and 2

Overhead Line Status	Easement Section	Maximum Level (mG)	At Edge of Easement (mG)	ICNIRP Guideline Reference Limit (mG)
Existing	Section 1	31.0	14.3	2000
New	Section 1	62.1	27.5	2000
Existing	Section 2	12.4	7.5	2000
New	Section 2	22.6	0.4	2000

Note that in easement Section 2, the significant decrease of the values at the edge of easement between the existing and new lines is due to the width of the easement increasing from 20m to 40m.

Underground cable component

An EMF Assessment, comparing multiple cable layout scenarios, has been undertaken for the project to confirm whether the underground cable component will comply with the relevant EMF health exposure guidelines.

Due to metallic sheath of cables and also by the effect of soil, the electric field from underground cables is effectively shielded and is immeasurable in the space above buried cables. Therefore, the assessment only related to the extremely low frequency magnetic field emitted by buried cables. The magnetic field from any electrical equipment is directly proportional to the electrical current passing through the equipment which may substantially vary in time. In addition, the electrical load current can vary seasonally reaching its maximum either during a hot summer period or during the cold winter days.

EMF modelling and calculations were carried out on the basis of a worst-case continuous power rating of 150MVA or the current of 656 A per phase or 328 A per set of 3 cables to supply two 75MVA transformers as well as for installation of cables in a shallow trench with deuced soil cover of 500mm (representative of where cables may cross other services). The EMF exposure within the Assessment was calculated at 1m above ground level.

The EMF Assessment included assessment of EMF profiles for four different scenarios, being:

- Cable joint bay with two circuits in service;
- Two normal trefoils;
- One normal and one inverted trefoil; and
- Shallow trench.

EMF profiles for these different formations of two sets of 132kV cables where both sets are electrically loaded equally to half of their rated capacity is shown in Figure 6-28.

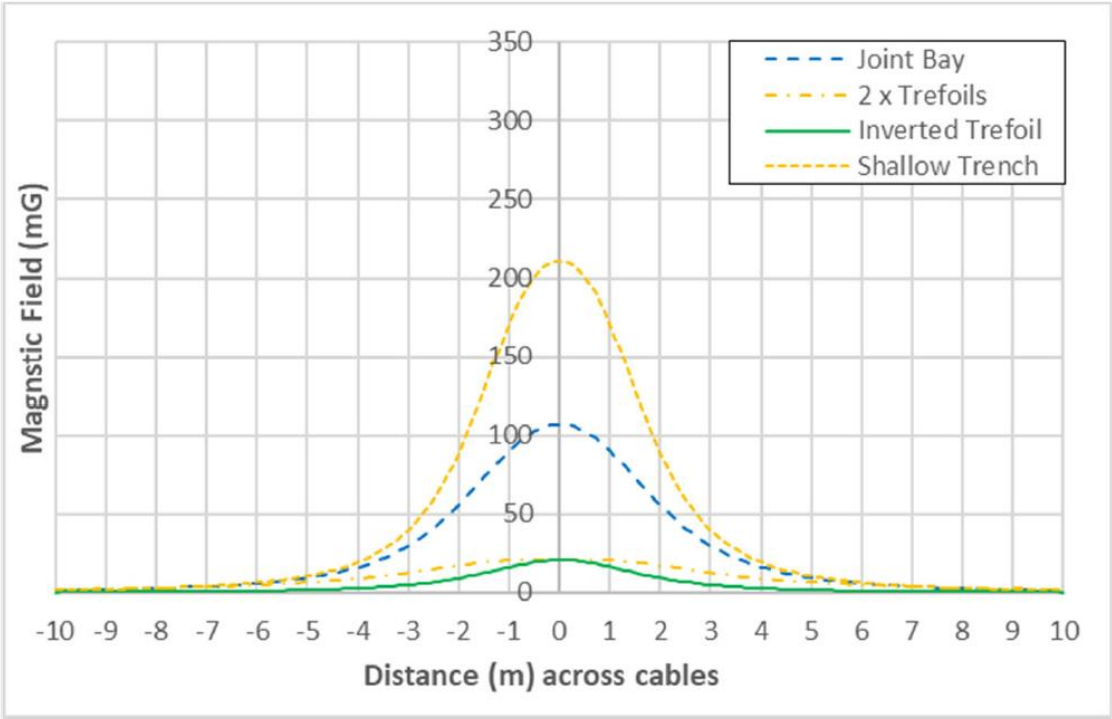


Figure 6-28 EMF Profiles

This figure details that the most effective cable arrangement with respect to the lowest EMF profile in the space directly above the cable trench, and at lateral distances away from the trench, is the inverted trefoil scenario, which is the proposed cable construction for the Project (as shown in Figure 3-1). As expected, the worst-case cable arrangement with respect to EMF profile, is that placed within a shallow trench. All scenarios, however, are well below the health exposure limits provided within the International Commission on Non-Ionising Radiation Protection (ICNIRP) Guidelines (as detailed in Appendix I).

Health

Research

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) is a Commonwealth Government agency charged with the responsibility for protecting the health and safety of people and the environment from EMF.

Research into EMF and health is a complex area involving many disciplines, from biology, physics and chemistry to medicine, biophysics and epidemiology. Research on EMFs and health has been conducted for over 40 years, including over 2,900 studies at a cost of more than $490 million internationally (Energy Networks Association, 2016).

The research has generally focused on the magnetic fields with two main areas of research, epidemiology and laboratory studies. Both areas would need to provide links between EMFs and adverse health effects for causality to be accepted by health authorities.

- Epidemiology (population): This research looks at statistics to see if there are patterns of disease in large groups of people. The difficulty with large statistical studies is that they take several years to produce meaningful results and even then, there are different opinions about how the results should

be interpreted. There may be other factors in the study which could complicate the interpretation of the results. Scientists generally agree that epidemiological studies aren't strong enough by themselves to establish that adverse health effects exist.

- Laboratory: In the laboratory researchers have studied animal cells, as well as human volunteers under controlled circumstances to see if EMFs have any effects. There have been many hundreds of these studies, and scientists look for results which can be successfully repeated in different laboratories. In over 40 years of research there have been no such consistently reproducible results for exposures below the guidelines.

It is well accepted by scientists that no one study considered in isolation will provide a meaningful answer to the question of whether or not EMF can contribute to adverse health effects. In order to make an informed conclusion from all of the research, it is necessary to consider the science in its totality. All of the research is reviewed periodically by expert panels which are established by national or international bodies with the purpose of trying to determine whether or not human exposure to EMF is related to adverse health effects.

General research findings

There is no established evidence that exposure to magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of the proximity, causes any health effects (ARPANSA, 2015). Generally, homes that are more than 50 m from a high voltage powerline are not expected to have higher than typical magnetic fields. For substations and transformers, the magnetic fields at distances of 5-10m away are generally indistinguishable from typical background levels in the home (ARPANSA, 2015).

The following provides advice from credible public health authorities regarding the potential health impacts from EMF.

- ARPANSA: There is no established evidence that ELF EMF is associated with long term health effects. There is some epidemiological research indicating an association between prolonged exposure to higher-than-normal ELF magnetic fields (which can be associated with residential proximity to transmission lines or other electrical supply infrastructure, or by unusual domestic electrical wiring), and increased rates of childhood leukaemia. However, the epidemiological evidence is weakened by various methodological problems such as potential selection bias and confounding. Furthermore, this association is not supported by laboratory or animal studies and no credible theoretical mechanism has been proposed (ARPANSA, 2018).
- World Health Organisation: Despite the feeling of some people that more research needs to be done, scientific knowledge in this area is now more extensive than for most chemicals. Based on a recent in-depth review of the scientific literature, the World Health Organisation concluded that current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields (World Health Organization, 2018).
- US National Cancer Institute: Studies have examined associations of these cancers with living near power lines, with magnetic fields in the home, and with exposure of parents to high levels of magnetic fields in the workplace. No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found. There was no evidence that electrical utility workers who were exposed to pulsed electromagnetic fields produced by power lines were more likely to develop brain tumours or leukaemia than the general population (National Cancer Institute, 2016).

- Health Canada: There have been many studies on the possible health effects from exposure to EMFs at ELFs. While it is known that EMFs can cause weak electric currents to flow through the human body, the intensity of these currents is too low to cause any known health effects. Some studies have suggested a possible link between exposure to ELF magnetic fields and certain types of childhood cancer, but at present this association is not established (Government of Canada, 2016).

EMF Guidelines for established health effects

The two internationally recognised exposure guidelines are:

- ICNIRP 2010; and
- International Committee on Electromagnetic Safety, Institute of Electrical and Electronics Engineers (IEEE) 2002.

ARPANSA aligns with the ICNIRP guidelines for the protection of people from exposure to ELF EMF, which recommends a magnetic field public exposure limit is 200µT (2,000mG). The IEEE Standard recommends a magnetic field public exposure limit is 904µT (9,004mG).

Magnetic field exposure limits are intended to prevent the occurrence of synaptic effects perceived as magneto-phosphenes in the sensitive retinal tissue. While this phenomenon is not itself considered an adverse health effect, it is related to synaptic effects in specialised neural tissue, and since similar effects could possibly occur elsewhere in the central nervous system, particularly the brain, expert groups have advised that exposure involving the head should be below this level (Energy Networks Association, 2016).

Electric field exposure limits are intended to protect against synaptic effects (ICNIRP, 2010) and micro-shocks (IEEE, 2002), with both organisations reporting a public exposure limit of 5000V/m. Micro-shocks may involve a spark discharge that occurs either immediately before making contact with a grounded conductor, or when a grounded person touches a charged isolated conductor. The public exposure level is similar to that experienced from spark discharges when touching, for example, a door handle after acquiring static from crossing a carpet or getting out of a car seat (Energy Networks Association, 2016).

The Powerlink Queensland calculations have estimated that both the electric field and magnetic field strength for the co-located lines would be well below the relevant internationally recognised guidelines administered by the ICNIRP. Therefore, the replacement of the existing line for this Project would also fall below these guidelines.

Interference with implanted medical devices

There are no known instances of adverse effects on pacemaker users around power lines, or in other areas where exposure limits comply with the ICNIRP reference levels for the public (NZ Ministry of Health, 2013). A very small proportion of cardiac pacemakers have been found to be sensitive to 50/60Hz electric and magnetic fields close to the ICNIRP limits for public exposure and it is most likely that they will revert to a fixed pacing mode, which poses no immediate threat to the wearer (NZ Ministry of Health, 2013).

Users of implanted medical devices such as pacemakers and defibrillators are typically issued with warnings regarding the effects of electric and magnetic fields including those from electric arc welders and magnetic resonance imaging (MRI) devices. The United Kingdom's Department of Health's Medicines and Healthcare Products Regulatory Agency does not consider that transmission line EMFs constitute a significant hazard to the operation of pacemakers (Department of Energy and Climate Change, 2011)

Corona ion discharge

In addition to the 50 Hz electric fields themselves, there is a related phenomenon known as corona. Corona is a localised electrical discharge which can occur due to very high localised electric fields in the vicinity of sharp edges on energised conductors and fittings. Corona leads to the generation of ions in the air, as well as audible and radio frequency noise. Transmission lines are designed as far as possible to prevent corona but some level of corona generally remains. In Australia most transmission and distribution lines are designed to have surface voltage gradients under normal operating conditions which are much less than the levels where corona ions are formed (Energy Networks Association, 2009).

These ions attach to pollutants in the air and drift away from the power line for distances possibly up to few kilometres. It has been postulated by physicist Denis Henshaw that these ions may be inhaled or deposited on the skin of a person nearby and could lead to enhanced pollutant absorption to people living near powerlines with possible health impacts.

Henshaw's theoretical mechanisms involving corona ions and pollutant particles have not been proven by health studies on real populations near transmission lines. The following provides a summary of the findings of relevant studies:

- National Radiological Protection Board UK (and subsequently confirmed by the World Health Organization): It seems unlikely that corona ions would have more than a small effect on the long-term health risks associated with particulate air pollutants, even in the individuals who are most affected (NPRB, 2004) (World Health Organization, 2007).
- Bracken Study: Based on this study, AC transmission lines appear to have a minor impact on potential long-term exposure to space charge (ions and/or charged aerosols) beyond the ROW (right of way) (Bracken, 2005).
- Queensland University of Technology: The research has shown that large sections of overhead high voltage transmission lines in South-East Queensland are essentially corona-free. The resulting ion concentrations are rarely high enough to be of any concern with regards to health effects. Both air ion and charged particle concentrations decrease rapidly with distance from the lines and merge with background values within a distance of about 200 m from the lines (Fatokun, 2008) (Jayaratne, 2008).

Potential exposure to Project EMF

The advice of recognised health authorities is that whilst a causal link has not been established between human health and exposure to power frequency electric and magnetic fields, prudent avoidance should be exercised in relation to EMF exposure because of as yet unanswered questions, especially in some childhood epidemiological studies. Powerlink has adopted the policy of prudent avoidance in response to this issue and this is consistent with the above advice. For the current Project, it has been possible to select a Proposed MID Corridor which is remote from frequented locations, and this is entirely consistent with the application of prudent avoidance.

It is not expected that any persons other than Powerlink employees or contractors would spend any significant periods of time adjacent to or close to the transmission infrastructure. As the OH component of the Project traverses rural properties, it is likely that landholders engaged in land management or agricultural activities will spend time in or occasionally cross under the Powerlink Queensland transmission

line. Such persons may be subjected temporarily to a higher ELF magnetic field than they might experience in their home, but such exposure will be well within the limits in current international health guidelines.

Other potential impacts

Induction in adjacent metal objects

The electric field generated by a transmission line can induce a charge in a sufficiently large metal object that is insulated from the earth. A person touching it could discharge the object to earth and experience 'microshock'. Powerlink will assess the potential for such situations and propose mitigation measures for any objects near the transmission line that may be affected.

There is also the possibility that a transmission line could cause interference with the operation of an electric fence running parallel to the line for a sufficient distance. The inductive coupling between the transmission line and the fence wire could induce currents and voltages in the fence wire that could interfere with the equipment generating the pulses on the fence. Powerlink will provide mitigation measures to assist the owner of any electric fence installation that might be adversely affected.

Coupling between the transmission lines and other conductive infrastructure running parallel to them could result in induced voltages and currents, especially in the event of fault conditions. Conductive infrastructure, such as pipelines and rail, are present along the Proposed Alignment. As such, Powerlink provide mitigation measures to assist the owner of any conductive infrastructure that might be adversely affected.

Potential impacts on crops and livestock

In more than 50 years of operating high voltage transmission lines across Queensland, Powerlink and its predecessor have no known instance of detrimental effects on crops or livestock from exposure to EMF.

The United Kingdom's National Policy Statement for Electricity Networks Infrastructure states that there is little evidence that exposure of crops, farm animals or natural ecosystems to transmission line EMFs has any agriculturally significant consequences (Department of Energy and Climate Change, 2011).

The Australian Government National Standard for Organic and Bio-Dynamic Produce (Edition 3.7, 2016) does not mention powerlines, electric or magnetic fields (Department of Agriculture and Water Resources, 2016). Section 1.25.2 of the Standard states that "Bio-dynamic Preparations are to be stored in a suitable container away from fumes, electricity, contamination sources." The Project is not located within close proximity of any known storage areas and is therefore not considered to impact on organic or bio-dynamic certification.

Radio and television interference

The corona discharges from points of high local electric field strength on transmission lines, can generate high–frequency fields in a broad band in the radio spectrum from a few hundred kilohertz (kHz) up to several megahertz (MHz). These radio frequency fields may cause interference with radio broadcast reception at locations near the transmission line. There should not be any significant problem if the correct line hardware design is used.

This form of interference is also subject to statutory limits imposed in accordance with Australian Standards. The proposed transmission line will be designed to meet these standards. In the event that

corona–induced interference becomes a problem, Powerlink will arrange to undertake any necessary remedial work.

OH transmission lines may also cause some degree of shielding of radio and television signals for receivers near the line, which may cause reception difficulties in areas of weak signal strength. Powerlink will assist people experiencing reception problems caused by the transmission line by providing advice and, if necessary, signal amplification equipment.

Mitigation measures

Powerlink has adopted the policy of prudent avoidance with regards to EMF, and the following design and construction/operation mitigation measures are proposed to reflect this.

Mitigation measures undertaken during the design phase include:

- Taking a prudent avoidance approach by locating proposed transmission infrastructure away from houses and habitable buildings so they do not materially add to EMF levels that already exist in a typical household environment.
- Providing information to the public regarding the latest findings from independent and credible scientific research into potential health impacts.
- Designing transmission lines to reduce EMFs in accordance with best practice guidelines.
- Providing the maximum EMF generated by proposed transmission lines as part of public consultation for planned projects.

Mitigation measures undertaken during the construction and operation phases include:

- Where radio or television interference has been identified, Powerlink can assist people experiencing reception problems caused by transmission line by providing advice and, if required, signal amplification equipment.
- Assessment of the potential for induced charge in proximal metal objects and propose mitigation measures for any objects in or near the easement that may be affected.
- Assisting owners of electric fenced running parallel to the line that are experiencing interferences.
- If corona–induced interference becomes a problem, Powerlink will arrange to undertake any necessary remedial work.

6.19 Bushfire risk

6.19.1 Existing environment

A desktop assessment was undertaken to identify the potential impacts associated with bushfires on the Project and included a review of the SPP IMS and CairnsPlan mapping.

The SPP expresses the State's interest in land use planning and development, including natural hazards and risk and includes State-wide mapping for bushfire prone areas. The SPP IMS takes into consideration potential fuel load, maximum landscape slope, and the severity of adverse weather conditions conducive to fire risk (e.g., rainfall and temperature). Additionally, CairnsPlan includes bushfire overlay mapping.

A review of SPP IMS and CairnsPlan overlay mapping indicated that the majority of the MID Corridor is not within a bushfire prone area, with the exception of pockets along Brinsmead Road, Ramsey Drive and Mulgrave Road. Areas along Brinsmead Road, Ramsey Drive and Mulgrave Road are mapped as either Medium Potential Bushfire Intensity and potential impact buffer which traversed by UG Cable component of MID Corridor (refer to Table 5-1).

These areas are restricted to the vegetated areas along the MID Corridor, particularly near Brinsmead Terrace, vegetation around the reservoirs off Ramsey Drive, Moody Creek, Ramsay Park and Cairns Jockey Club (Figure 6-29).

BUSHFIRE POTENTIAL RISK AREA WITHIN THE PROPOSED MID CORRIDOR

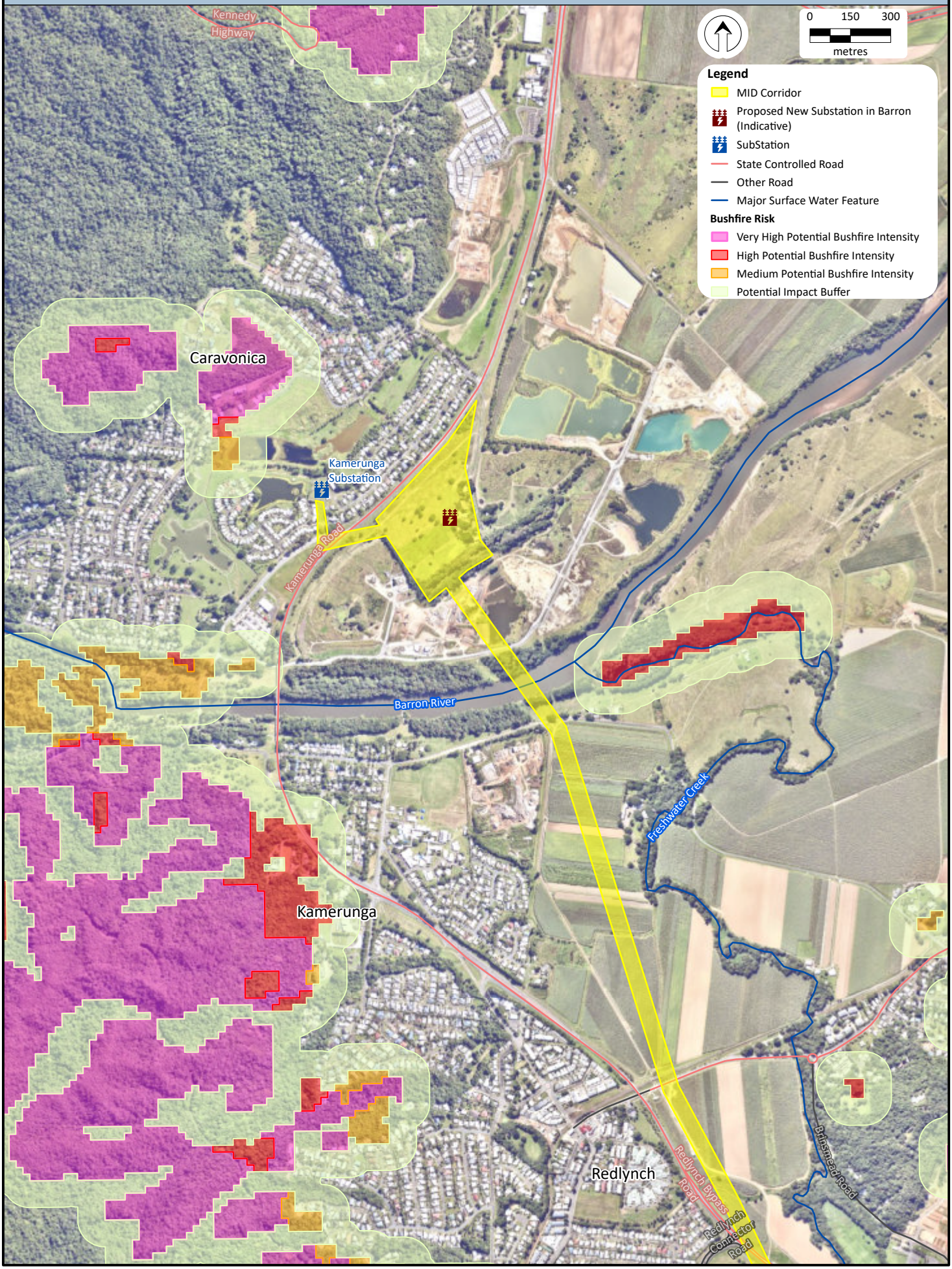


Figure 6-29-1

BUSHFIRE POTENTIAL RISK AREA WITHIN THE PROPOSED MID CORRIDOR

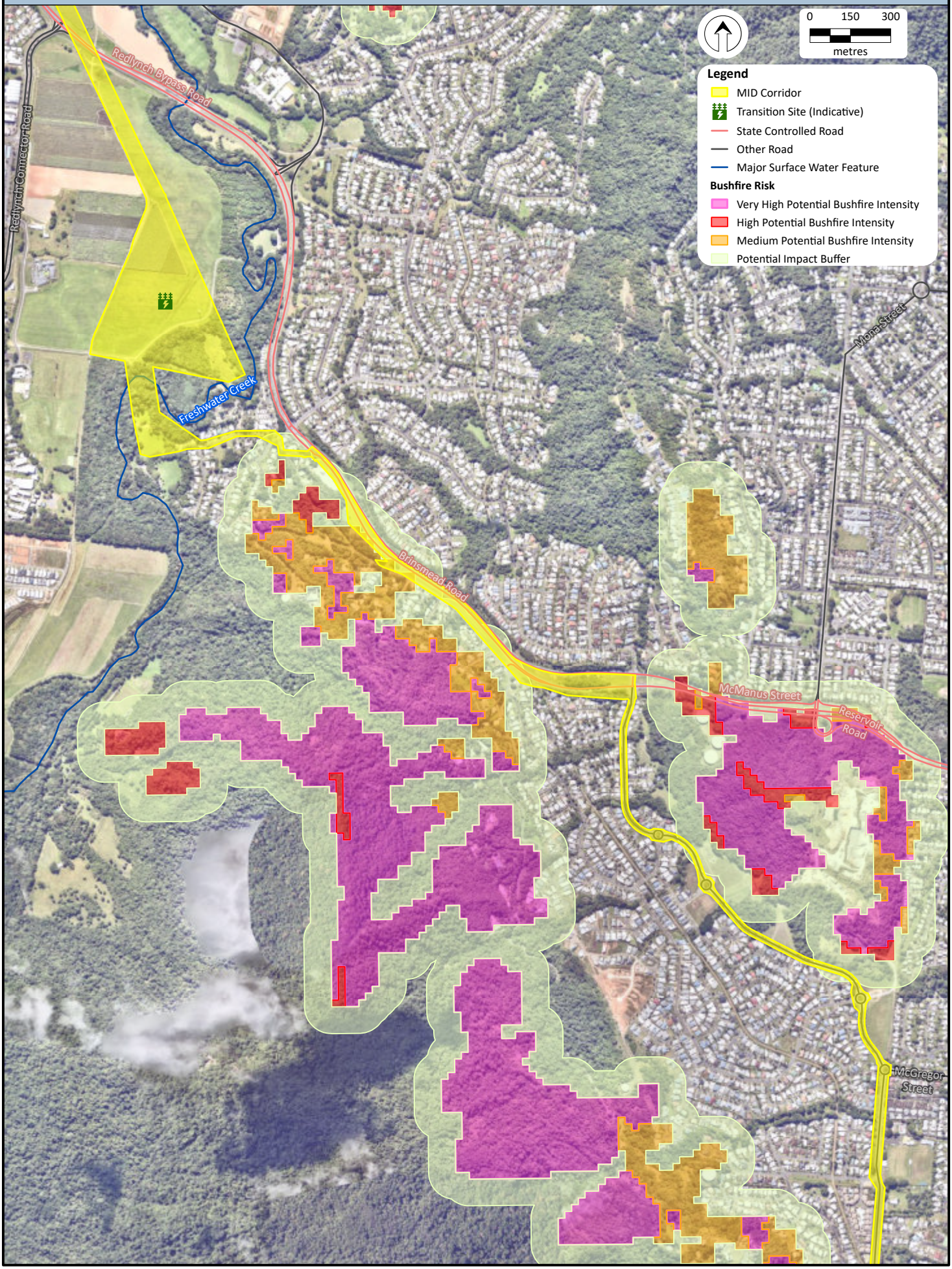


Figure 6-29-2

BUSHFIRE POTENTIAL RISK AREA WITHIN THE PROPOSED MID CORRIDOR

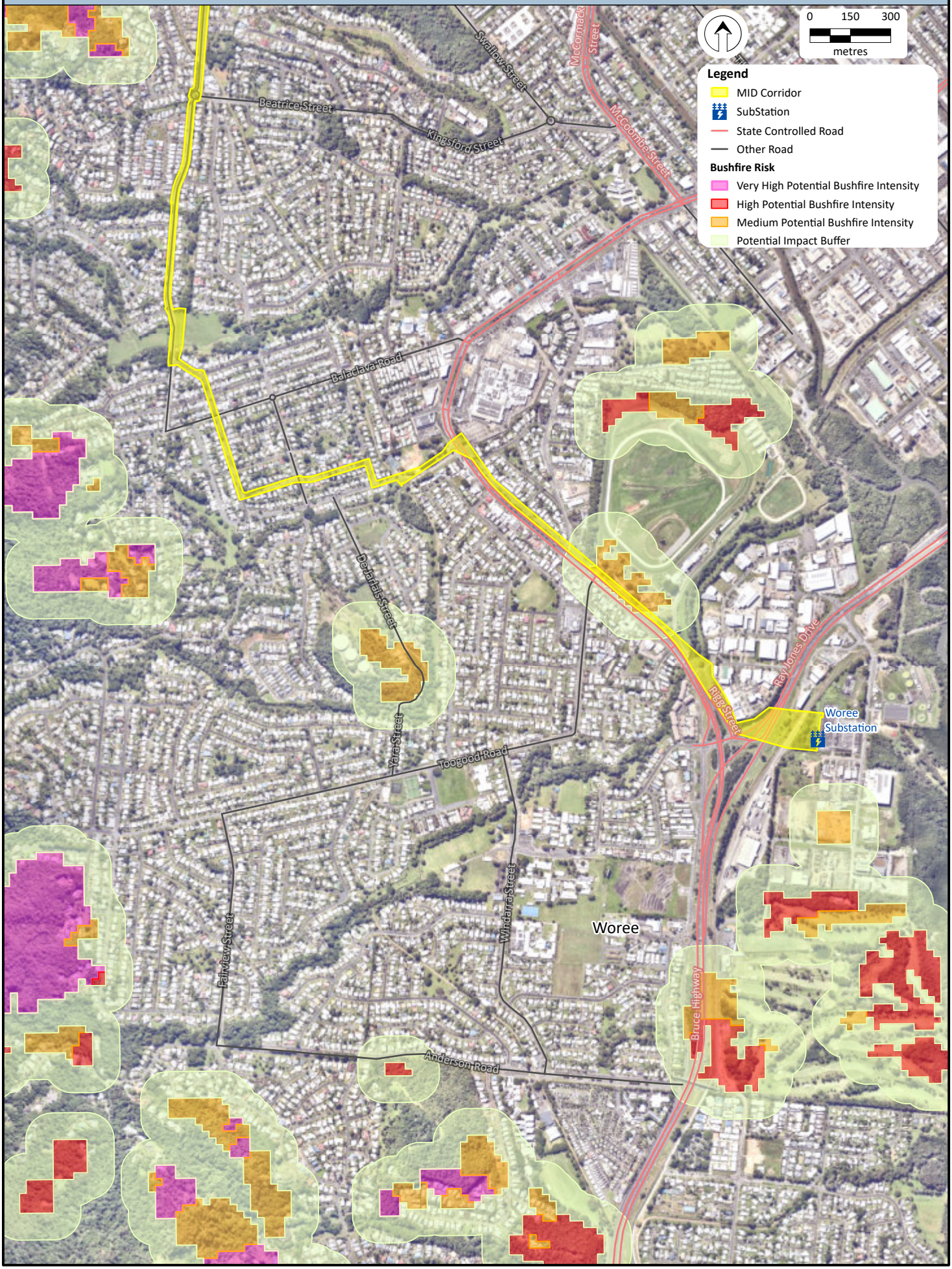


Figure 6-29-3

6.19.2 Potential impacts and mitigation measures

Construction phase

Equipment and vehicles utilised throughout the construction phase of the Project may increase the potential for a bushfire through the generation of sparks, heat and machinery faults which may ignite dry combustible materials. Potential spills of fuel, oil and flammable liquid may also increase the potential for bushfire, particularly in proximity to dry combustible materials (e.g. vegetation).

The potential for bushfire to occur during the operational and maintenance phases of the Project are generally associated with external influences, such as climate, surrounding land use/management and proximity to surrounding vegetation and other fuel loads. Operational faults along transmission lines are rare and vegetation is kept well away from the conductors.

Mitigation measures will be applied during the construction, operation and maintenance phases to manage the potential risk associated with fires through undertaking all activities in accordance with relevant Powerlink policies and Australian and Industry standards, including:

- Guideline for the Design of Transmission Lines for Bushfires (A544415); and
- AS1940–2004 The Storage and Handling of Flammable and Combustible Liquids.

In addition to the above, standard measures provided for within Powerlink's EMP will assist to effectively manage any potential risk associated with bushfire hazards. These measures include:

- Reviewing fire hazard warnings associated with weather patterns and fire risk issued by the BoM and the Queensland Rural Fire Service by undertaking daily checks of fire hazard warnings;
- Implementing procedures guiding the response to emergency and fire situations, and requests from emergency management authorities;
- Holding firefighting equipment at each work site when hot works are being undertaken. Personnel must be trained in the use of the equipment;
- Ensuring all mobile plant holds a fire extinguisher that has been tested and tagged;
- Ensuring that no burning of vegetation is undertaken, unless a permit is obtained by a local fire authority and Powerlink prior to any burning;
- Identifying designated smoking areas and ensuring all have a cigarette butt bin for safe disposal; and
- Ensuring all work are undertaken in accordance with the mitigation measures documented in the Powerlink documents 'On-Site Fire Prevention Procedure' and 'ASM-PLN-A3285085 - Bushfire Mitigation Procedure'.

Operation and maintenance phase

During operation, Powerlink undertake regular vegetation maintenance and inspections within the easement to ensure the risk of fire affecting the powerline, or being caused by the transmission line is negligible.

Figure 6-30 and Figure 6-31 outlines Powerlink's standard construction and maintenance requirements for transmission lines with respect to vegetation management in non-fire prone, and fire prone areas.

During bushfire events, OH transmission networks manage heat and smoke from fires by reducing the transfer capacity of interconnectors (i.e. derating), reducing the risk of damage, but reducing the flow of electricity, which can result in power outages or weakening of the overall power grid. UG transmission lines are able to continue to function during such events and do not require derating, allowing for continued

supply of power[7].The underground transmission lines traverse the SPP and the CairnsPlan bushfire risk mapping and therefore locating the underground component in these areas is a mitigation measure.

Additionally, OH transmission lines that are damaged or have foreign object interference can result in arcing and generation of sparks that can ignite vegetation. While the number of bushfires ignited by electricity is very low, there is still the possibility of occurrence[2] UG transmission lines do not have this risk due to their presence below ground within protective conduits.

Further information on safety risks associated with fires burning near transmission lines are provided on Powerlink's website.

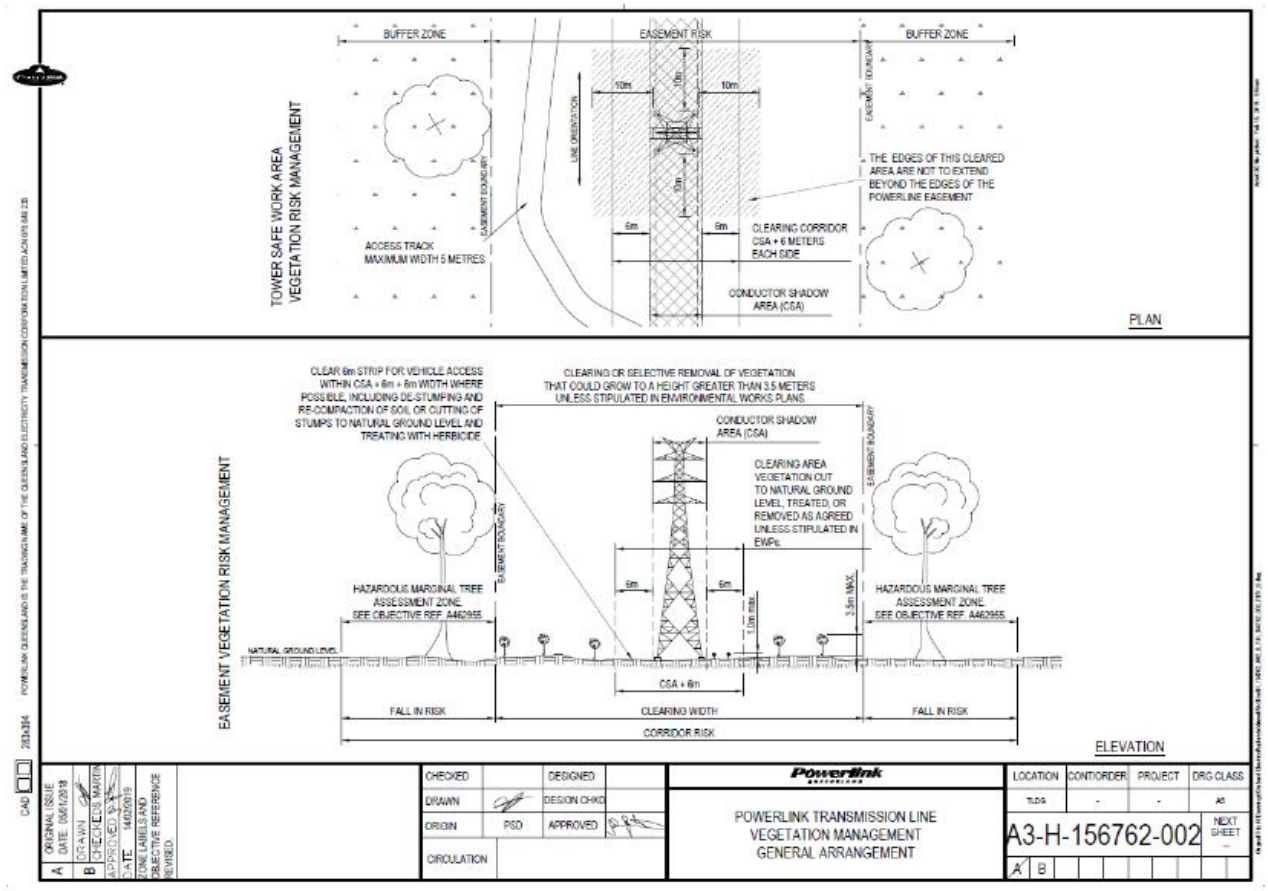


Figure 6-30 Powerlink vegetation management general arrangement

[7] Energy Networks Australia (2020) Bushfire Factsheet, January 2020. energynetworks.com.au/resources/fact-sheets/bushfire-factsheet-2020/

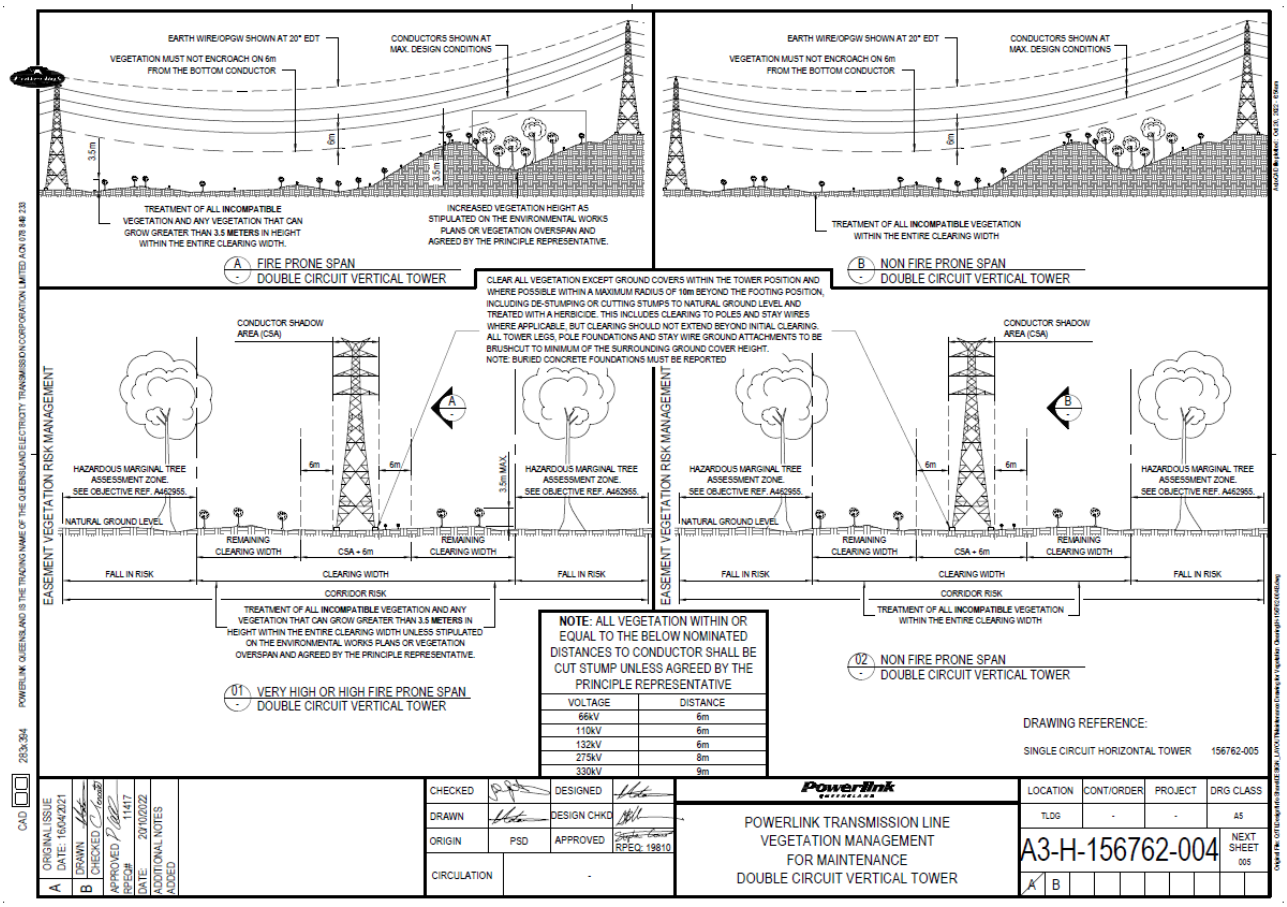


Figure 6-31 Powerlink vegetation management for maintenance activities in non-fire prone, and fire prone areas

6.20 Waste management

This section outlines the waste products generated from the construction and maintenance phase pf the Project. Management of waste will be undertaken in accordance with Powerlink Specification - Health, Safety and Environment Specification - HSE-SPE-A3011646 and Powerlink's standard environmental controls as outlined in the Project EMP (Appendix K).

6.20.1 Construction impacts and mitigation measures

Construction activities will generate various waste types, including, but not limited to, cleared vegetation, excess spoil, pallets, plastic, steel, and cardboard packaging.

Quantities of waste to be generated are yet to be determined, however, prior to construction a Waste Management Plan will be prepared. The plan will provide details of the estimated quantities from each waste stream and include all actions needed to effectively implement the waste management hierarchy. It will also establish a waste monitoring program for the construction stage.

Transmission line support structures are designed, fabricated, and supplied to sites ready for assembly and erection. This practice ensures that minimal excess material is transported to site.

Waste excavated material will be reused where possible. Where this is not possible, it will be disposed of by a licensed waste contractor (if required) to a facility that is authorised to accept that type of waste. Stockpiles and waste that must be stored temporarily on site will be located on existing cleared areas at the site, and away from drainage channels and slopes. All stockpiles of waste excavated material will be covered or have dust suppressants applied to them when weather conditions dictate.

Waste produced during construction activities will be disposed of as required by relevant legislation. Waste kept on site will be stored in a manner that does not pose health and safety risks. Segregation of waste will allow for efficient reuse, recycling, or disposal. Waste that cannot be reused onsite will be transported to a facility that is authorised to accept that type of waste.

6.20.2 Operation impacts and mitigation measures

Operation of the transmission line and substation does not generate waste, except during infrequent refurbishment programs. Some waste is generated from line maintenance activities (i.e. conductor offcuts, damaged insulators). Waste materials will be removed from the site and either recycled or disposed of at facilities that are authorised to accept the waste.

Easement and transmission line maintenance schedules depend on the type and growth rates of the easement vegetation and forecast transmission line equipment failures. Maintenance inspections are expected to occur approximately once every 12 months. Maintenance of vegetation regrowth will be maintained less frequently, and on an as-needs basis. Typical vegetation regrowth maintenance works include mechanical trimming, mechanical removal and selective use of herbicides, predominantly used for stump spraying. Powerlink uses contractors for routine maintenance of easements. Cleared regrowth will be mulched or chipped and re-used on site.

6.21 Infrastructure

6.21.1 Existing environment

Road networks

The MID Corridor crosses a number of SCRs (managed by DTMR) and Local government roads (managed by CRC) as detailed in Section 6.15. Powerlink Queensland will seek approval under the Electricity Act from the relevant road authority prior to constructing the transmission line over and within the road.

The proposed new substation in Barron and UGOH transition site in Redlynch on a Powerlink-owned greenfield site do not intersect with any State-controlled or Local government roads.

A review of SPP IMS indicated that the road intersected by MID Corridor listed in Table L- with the exception of Stewarts Road, unnamed Road Reserve (off Portelli Road), Watson Street, Cavendish Street, Downing Street and Henley Street are mapped as active transport corridor. In addition, future busway corridor is mapped along the Mulgrave Road to Bruce highway which is intersected by MID Corridor (refer to Table 5-1).

Rail network

The MID Corridor crosses a number of rail corridor, including:

- MSF Sugar Mulgrave Sugar Mill Rail Corridor;
- Queensland Rail Tablelands Systems (Cairns to Forsayth) Rail Corridor; and
- Queensland Rail North Coast Line (Woree Siding).

A review of SPP IMS indicated that the railway corridor is mapped within OH Transmission line component along the Kamerunga Road and UG Cable component of MID Corridor along the Bruce Highway.

The recommended proposed new substation in Barron and UGOH transition site in Redlynch on a Powerlink-owned greenfield site do not intersect with any rail networks.

Powerlink Queensland will seek approval under the Electricity Act from the relevant rail authority prior to constructing the transmission line across the rail corridor.

Airports and air strips

The MID Corridor does not intersect with existing air transport infrastructure. The nearest airport is Cairns Airport, situated approximately 4.7km east of the project.

A review of SPP IMS indicated that MID Corridor and surrounding area are all mapped under obstacle limitation surface[8] area as follows:

- The OH Transmission line component, proposed new substation in Barron and portion of UG Cable component of MID Corridor (until Irene Street) are mapped under obstacle limitation surface contour range of 60 to 145m. Specifically, the OH Transmission line component of MID Corridor is mapped

[88] Obstacle limitation surface is the surface that defines the height limit for obstacles located on land surrounding an airport is to manage development that is in close proximity to airports to achieve the overall outcome of the safety of aircraft operating within the operational airspace.

within contour range of 100m to 130m and the proposed new substation in Barron is located within the range of 95m to 130m.

- No SPP IMS height restriction zones are mapped within and in the vicinity of MID Corridor.
- The MID Corridor is entirely located under Building restricted area - Area of interest under the SPP IMS.
- Part of proposed new substation in Barron area (5SP181502), majority of OH Transmission line, UGOH transition site in Redlynch and part of UG Cable component of MID Corridor are located within the SPP IMS lighting area 6km buffer. In addition, the entire MID Corridor is mapped under the 8km wildlife hazard buffer zone (refer to Table 5-1).
- CairnsPlan has an airport environs overlay, and the map provides the consistent layers with SPP IMS with the exception of the height restriction zone. The MID Corridor is mapped under the Airport environs overlay maps therefore airport environs overlay code would be applied to the Project if the project did not proceed with the MID process under the Planning Act.

Cairns Port limits.

- Where the OH Transmission line component crosses the Barron Rover it is mapped within the high risk maritime development zone (DAMS) and is within Cairns Port Limits. The OH Transmission line is a duplication of the existing line and therefore will not compromise the operation of aids to navigation or the safe operation of vessels in navigable waterways.

Electricity infrastructure

The MID Corridor crosses a number of existing high voltage electricity infrastructure, including:

- 132KV Powerlink OH transmission line connected from existing Powerlink Kamerunga Substation to Lake Placid Road.
- 22kV Ergon Energy OH transmission line traverses the new substation in Barron area along Stewarts Road.
- 22kV Ergon Energy OH transmission line intersects along Mulgrave Sugar Mill Rail.
- 132KV Powerlink OH transmission line intersects along Mulgrave Sugar Mill Rail.
- 22kV Ergon Energy OH transmission line traverses UGOH) transition structure located at a transition site in Redlynch.
- 132KV Powerlink OH transmission line intersect at Shale Street.
- 22kV Ergon Energy OH transmission line intersect along CWAR.
- 22kV Ergon Energy OH transmission line intersect along Irene Street and Hemley Street.
- 22kV Ergon Energy OH transmission line intersect along Mulgrave Road.
- 132KV Powerlink OH transmission line connected from existing Powerlink Woree Substation.
- Exiting Kamerunga Substation (T053) and Woree Substation.

The MID Corridor is mostly situated in urbanised areas and as such, will be co-located with low voltage electricity infrastructure.

A review of SPP IMS indicated that along the MID Corridor, the existing overhead transmission line, existing Kamerunga Substation and Woree Substation owned by Powerlink are identified. These major electricity facilities are part of this Project.

Water and sewer infrastructure

The OH transmission line component of the MID Corridor is mostly situated in a rural environment where no water and sewer infrastructure is present (DSDIP, 2024). The underground cable component, however, will be situated within road reserves of an urban environment where existing water and sewer networks will be present.

The closest sewage treatment plant is Southern Waste Water Treatment Plant, located approximately 20m from existing Woree Substation, at 1 Maconachie Street, Woree QLD 4868 as described as 603NR835483 and 31C19830. The facility has been holding EA EPPR00887713 and ERA 63- Sewage Treatment is authorised to the CRC on 16 August 2021.

A review of SPP IMS did not identify the presence of this sewage treatment facility, pump station facilities, reservoir facilities, water treatment plants, water quality facilities, pipelines and channels, bulk water storage infrastructure, or facilities for extracting ground water are identified.

Powerlink Queensland will engage with the Cairns Regional Council to manage any potential infrastructure (potable water, sewer and stormwater) interactions.

The recommended site is proposed within a rural area where limited water and sewer infrastructure is present.

Private infrastructure

The MID Corridor is situated in a mostly urban and partially rural area of Cairns and as such, private infrastructure will likely be present. For the overhead transmission line component of the MID Corridor this is likely to include access tracks, fencing and farm infrastructure, while the underground cable component will be constructed within road reserve and as such, is unlikely to interfere with any private infrastructure on private land.

The recommended site is proposed on Powerlink-owned land and as such, will not interfere with any private infrastructure.

Defence land

The MID Corridor and site will not interfere with any Department of Defence land.

High pressure gas pipelines

A review of SPP IMS identified that no high-pressure gas pipeline are mapped within and adjacent to MID Corridor.

6.21.2 Potential impacts and mitigation measures

No relocation of existing public infrastructure is required to facilitate this Project. During construction, the road network (both State-controlled and Local government) may be impacted through an increase in traffic associated with light vehicle movements, equipment haulage and machinery movements, as well as from construction of the underground cable component within road reserve. Minimal access is anticipated during the operational phase and will be limited to maintenance activities. Potential impacts associated with the road network are discussed in Section 6.15.

Powerlink will manage construction impacts, e.g. helicopter stringing in this area under the Off-airport Work Activities requirements with Cairns Airport, Queensland Government and CRC. The OH transmission line will be of a similar height as existing transmission line to comply with Obstacle limitation surface contours.

Powerlink will operate in this area under existing arrangements with Maritime Safety Queensland and Port North.

The MID Corridor and site are distanced enough from Cairns Airport and as such, no impacts are anticipated.

No impacts will occur to Ergon Energy infrastructure from the construction and operation of the Project.

Construction and operation of the Project will be managed in accordance with Powerlink's Standard Environmental Controls provided within Appendix K. Additional mitigation measures for traffic management are detailed in Section 6.15.

6.22 Cumulative impacts

6.22.1 Existing environment

This MID Assessment Report presents the existing environmental, social and economic values of the Project area, and considers benefits and impacts in that context. Projects that have been developed or are under the process of development are considered part of the existing environment for this MID Assessment Report.

6.22.2 Cumulative impacts

With respect to cumulative impacts, consideration has been given to proposed developments and projects where there is publicly available information available, and the potential exists for cumulative impact of that development concurrent with this Project. Local community projects and investments as described in the Social and Economic Impact Assessment have not been included in this broader assessment. The Social Impact Assessment found that issues of potential concern for nearby residents included visual amenity and flooding. Due to the localised nature of these two issues, they have not been considered further in this cumulative impact assessment.

Relevant projects have been identified from the following sources:

- Coordinated projects being assessed under the *State Development and Public Works Organisation Act 1971* – there are no adjacent or upstream/downstream projects;
- Powerlink Queensland projects portal (Transmission Line and Connection Projects | Projects | Powerlink) – whilst there are a number of active maintenance and upgrade projects underway there are no adjacent or upstream/downstream projects;
- Northern Australia infrastructure fund (NAIF Projects);
- Infrastructure Australia projects (Projects | Infrastructure Australia);
- Far north Queensland projects pipeline (Far North Queensland Major Projects Pipeline | State Development, Infrastructure and Planning);
- Queensland Government procurement portal (Queensland Government - future procurement opportunities for suppliers) – there are no adjacent or upstream/downstream projects;
- Commonwealth EPBC Act Portal (All referrals · EPBC Act Public Portal);
- State Assessment and Referral agency portal (SARA application material | Planning); and
- Local Government websites including:
    - Mareeba Shire Council (Development Applications - Mareeba Shire Council);
    - Tablelands Regional Council (Search Development Applications - TRC - Tablelands Regional Council);
    - Cook Shire Council (Development Applications - Cook Shire Council);
    - Mackay Regional Council (MRC Find an Application); and
    - Cairns Regional Council (Cairns Regional Council).

Relevant proposed projects adjacent and within the vicinity of the MID Corridor are provided in Table 6-39. This list is based on publicly accessible information, available at the time of writing.

Table 6-39 Existing and proposed developments

#	Project Name (Proponent)	Location	Status
1	Chalumbin/Wooroora Station Wind Farm (Ark Energy)	Ravenshoe	QLD planning approval in June 2022. Project withdrawn from EPBC Act process in April 2024.
2	Mount Garnet Iron ore operations expansion (Fomento Group)	Ravenshoe	No status or information available.
3	Chewko Solar Farm (Tilt Renewables)	Mareeba	Planning approval received in 2017.
4	Mareeba Solar PV Park (ACE Power/Clean Gen)	Mareeba	No project approval information available.
5	Cape York Solar Storage (Lyon Group)	Lakeland	No status or information available.
6	Lakeland Wind Farm (Windlab Ltd)	Lakeland	QLD Approval in 2018. EPBC Approval April 2017. Currently under development.
7	High Road Wind Farm (Ratch Australia)	Evelyn	Under approval process. No information available.
8	North Queensland Airports Upgrade Project (North Queensland Airports)	Cairns, (Mackay)	Under development through 2024 and 2025.
9	Cairns Seniors Community Housing Project (QLD Government)	Cairns	Under development through 2024 and 2025.
10	Desailly Renewable Energy Park	Port Douglas	Proposal withdrawn.
11	Mt Fox Energy Park Wind Farm	Mt Fox	In planning and approvals stage.

6.22.3 Potential cumulative impacts

Cumulative impacts of the Project, and other known major projects in the area are difficult to quantify based on the lack of available information, however the following section aims to provide a qualitative assessment of the potential and assumed activities which may lead to a cumulative impact on environmental, social and economic values.

Those projects where information is available are described below and potential cumulative impacts presented in Section 6.22.3.

Chewko Solar Farm

The Chewko Solar Farm is a proposed 60MW project being developed by Tilt Renewables, publicly available information shows the Planning Approval was received from Mareeba Shire Council in 2017. The development status of the project however is unknown.

Lakeland Wind Farm

The Lakeland Wind Farm project is a large-scale renewable energy project being developed by Windlab Ltd north of Port Douglas. The project is currently under development and information on impacts has been sourced from publicly available information.

North Queensland Airports Upgrade Project

The North Queensland Airports Upgrade Project is an upgrade to the Cairns and Mackay Airports being undertaken by the North Queensland Airports Corporation. As of June 2024, the project was awaiting a financial investment decision.

Cairns Seniors Community Housing Project

The Cairns Seniors Community Housing Project is being developed by the Queensland Government and Housing Australia and will deliver 490 dwellings including 245 social, 223 affordable and 22 specialist disability accommodation apartments, providing housing to around 690 people. The project is expected to commence in late 2024/early 2025 and be completed by late 2026.

Table 6-40 Potential cumulative impacts

Impact	This Project	Project 3	Project 6	Project 8	Project 9	Potential Cumulative Impact
Environmental						
Climate		GG emissions reduction of 100kt over project life	NA	NA	NA	No anticipated significant cumulative impact
Impacts to MSES	<1 ha of regulated vegetation and habitat impacted.	NA	10 ha of prescribed vegetation impacted.	NA	NA	No direct connectivity between projects, neither is a significant impact.
Impacts to MNES	No significant residual impacts	NA	39 ha of MNES habitat	NA	NA	No direct connectivity between projects. No cumulative impact noted.
Social						
Traffic & Transport	Minor localised impacts during construction only.	Impacts not considered significant	NA	NA	NA	No anticipated significant cumulative impact
Housing / Accommodation	Not available at this time. Existing Cairns LGA labour force aligns with project needs, some requirement for additional resourcing expected.	NA	NA	NA	490 new homes	Net positive impact anticipated.
Economic						
Construction Jobs	144 direct FTE 527 direct and indirect FTE	250 FTE	200 FTE	505 FTE	290 FTE	No anticipated significant cumulative impact due to the specialised skills and experience
Operational Jobs	Not available at this time	NA	<5 FTE	1,497 FTE	32 FTE	

Impact	This Project	Project 3	Project 6	Project 8	Project 9	Potential Cumulative Impact
						needed for the project and existing labour profile.
Economic benefit ($)	$200M investment each year of construction into local economy	NA	NA	$1.4BN	$140M	No anticipated significant cumulative impact.

NA – Information not available

6.23 Offsets

6.23.1 Matters of National Environmental Significance

Under the EPBC Act Environmental Offsets Policy, offsets for a project may be required to compensate for adverse or significant impacts to MNES. When offsets to MNES are considered possible and appropriate, the principles within this Policy will apply when determining what constitutes a suitable offset.

Based on the results of the significant impact assessment, it is unlikely that offsets will be required to compensate for impacts to MNES. The effective implementation of the hierarchy of management principles of avoid, minimise, mitigate, remediate then offset will ensure that impacts from the project will remain low and will not be considered 'significant' which would trigger the need for offsets.

6.23.2 Matters of State Environmental Significance

For MSES, the Project is unlikely to have a significant residual impact on MSES regulated vegetation or wildlife habitat, however for MSES protected areas and marine plants, significant residual impacts are likely, based on the MSES Significant Residual Impact Guidelines. While this is the case, an offset under the EO Act would not be required for impacts to marine plants, with the Infrastructure Designation process under the Planning Act not considered a prescribed activity for the purpose of providing an offset for significant residual impacts to prescribed environmental matters (recognised as MSES). However, an offset will be required for impacts to protected areas as this will be conducted under an authority granted, made, issued or given under the NC Act, Section 34 in a protected area, which is listed as a prescribed activity under Schedule 1 of the EO Act.

The General guide for the Queensland Environmental Offsets Framework (DESI 2024) outlines that an offset is required for significant residual impacts on a protected area to compensate for the loss of unique values for which the land was set aside as a protected area including natural and cultural values, public enjoyment and appreciation, iconic geological and landscape values, tourism and recreational values, and significance to Traditional Owners. When an offset is required as a result of significant residual impacts on a protected area, the offset should be delivered by financial settlement, or with agreement of the Chief Executive of the Department, as a proponent-driven offset. Proponent-driven offsets are considered on a case-by case basis. In the case of a financial settlement offset for a protected area, the financial settlement will be determined in accordance with Chapter 2 of the Offsets Policy. Once the financial settlement has been agreed between the proponent and the DETSI, the proponent will be required to transfer the agreed amount to DETSI's offset account for receipting. The DETSI will then transfer the funds to Queensland Parks and Wildlife Service and Partnerships for delivery of an activity that provides a social, cultural, economic or environmental benefit to any protected area.

An offset calculation was completed for impacts to 0.31ha of Kamerunga Conservation Park (located in the Cairns Regional Council LGA, Wet Tropics bioregion, and Innisfail Subregion). The notional offset area for a proponent-driven offset was 5 ha, while financial offset was $63,620.

6.24 Environmental management

6.24.1 Powerlink's commitment to environmental management

Powerlink is committed to the protection of the environment and management of adverse environmental impacts as a result of all Powerlink activities and as such, every Powerlink individual is responsible and accountable for environmental management, and Powerlink's leaders are active role models of this commitment.

Powerlink's Health, Safety and Environment Policy outlines the commitment to delivering environmental outcomes for everyone, everywhere and everyday by the following:

- setting targets and objectives to monitor performance aimed at the elimination or minimisation of environmental harm;
- consulting and communicating with employees and other stakeholders on relevant environmental matters;
- applying a continuous improvement framework to the development, implementation and review of standards, procedures and supporting documentation which complies with environmental statutory obligations; is fit for purpose; and drives protection of the environment and prevention of pollution;
- systematically identifying, assessing, and managing as far as reasonably practicable the environmental impacts which may arise from Powerlink's activities;
- ensuring environmental responsibilities are clearly defined and individuals are accountable for performance within their scope of responsibility; and
- providing the necessary resources to meet these commitments.

6.24.2 Environmental Management Plan

The mitigation and management measures for this Project have been proposed in line with Powerlink's standard environmental controls, in addition to other Project specific measures. Additional measures have been proposed where required to provide further mitigation and management measures specifically for the Project. All proposed measures are detailed within Section 5.7 and within Appendix K.

All construction measures will be documented within a CEMP and EMP which will be prepared by the construction contractor, in consultation with Powerlink and will include:

- roles and responsibilities;
- performance criteria; and
- monitoring and compliance, including audits, training, and competency.

7 Consultation

The Project involves the construction of electricity transmission infrastructure along a linear alignment. Construction of this Project will be via large, steel structures, as well as underground cables, and as a result, the Project may impact on the existing social and environmental characteristics of the surrounding community. Powerlink recognises its proposed infrastructure may cause uncertainty for members of the community and is committed to engaging early and transparently with landholders, the broader community, and other stakeholders in its development process to ensure they are aware of the Project (a 'no surprises' approach), have multiple opportunities to provide valuable local knowledge and insights, and can comment on the suitability of Powerlink's project moving forward.

Powerlink are committed to:

- engaging early with stakeholders in the decision-making process;
- working with stakeholders to identify engagement preferences;
- presenting information in a clear and accessible manner;
- providing a clear scope of engagement opportunities;
- genuinely considering feedback;
- demonstrating how engagement has improved decision making; and
- educating staff to improve their engagement skills, identifying future opportunities and building a strong internal culture that values engagement.

7.1 Engagement process

Powerlink seek to connect with relevant stakeholders to ensure a comprehensive, transparent, responsive, and sensitive approach. The Project's proximity to residential, cultural, and commercial interests makes the need for an effective engagement plan imperative to the Project's success.

Powerlink are managing the stakeholder engagement and public consultation activities required for the MID process. The engagement approach outlined in the Project Engagement Plan is based on principles of respect, transparency, and responsiveness to those potentially impacted by the proposal to build a new substation in Barron to replace the existing Kamerunga Substation and the proposed Kamerunga to Woree overhead and underground transmission line corridor.

A separate construction engagement strategy will be developed post-approval.

7.2 Engagement approach

A Project Engagement Plan was developed to ensure best practice was utilised throughout the Project life cycle. Engagement for the Project will largely be at the 'inform' level of the International Association for Public Participation (IAPP) Spectrum of Public Participation.

Stakeholders were categorised per impact level, ranging from directly affected at the primary level to interested parties at the tertiary level and consultation requirements were outlined accordingly.

Key messaging was outlined and included in Powerlink' communication tools:

- Stakeholder Engagement Framework;
- Community Engagement Framework;

- Reflect Reconciliation Action Plan (RAP); and
- Landholder and Community Better Practice Engagement Guide.

Each engagement tool was designed to adapt to various milestones for the Project, with respect to how these may change the level of influence stakeholders may have on a project.

7.3 Engagement tools

A range of engagement tools have been included in the Project Engagement Plan to ensure accessible and therefore effective communication with stakeholders, including contact channels, information tools, direct engagement, and stakeholder tracking.

7.4 Engagement phases

Engagement for the Project began with engagement with stakeholders along the overhead line in 2019, followed by preliminary engagement with landholders and stakeholders along the entire corridor between July and September 2024. Future engagement for the Project will include:

- Targeted MID Lodgement Engagement: August 2025
- Post MID approval engagement: Timing TBC

A summary of the engagement undertaken for the Project is provided below.

7.5 Engagement undertaken

Powerlink commenced early engagement in 2019 with landholders, Traditional Owner groups and other key stakeholders to inform development of a new transmission line corridor for the overhead line replacement component of the project. Planning for this overhead section was paused in early 2020, due to additional investigations into associated projects in the Cairns region.

The additional project investigations focused on a potential new substation to replace the existing Kamerunga Substation and line replacement projects (overhead and underground), and the interrelationship between these projects and potential staging arrangements. Initial discussions commenced regarding the new transmission corridor between Redlynch and Woree Substation at the end of 2019 with Cairns Regional Council, DTMR and MSF Sugar. Engagement with Queensland Rail commenced in late 2023.

A summary of the engagement undertaken to date is provided below:

- Establishing a project specific webpage (www.powerlink.com.au/projects/kamerunga-woree-replacement-project) to host information about the project, MID process, consultation opportunities and a map showing the proposed new transmission line and substation location.
- Interactive map highlighting the proposed substation site and transmission corridor Kamerunga to Woree Replacement Project - Draft Corridor and Site Selection | Social Pinpoint.
- Correspondence with all project stakeholders including providing project information such as a community notice and project newsletter.
- Correspondence with the wider community of Cairns providing project information such as a community notice and project newsletter.
- Hosting a series of community information drop-in sessions across the project area.
- Project briefings with Cairns Regional Council Mayor and relevant Divisional Councillors.

- Project briefings with:
  - Michael Healy – Member for Cairns
  - Curtis Pitt – Member for Mulgrave (sitting MP prior to 2024 State election)
  - Terry James – Member for Mulgrave (current)
  - Craig Crawford – Member for Barron River (sitting MP prior to 2024 State election)
  - Bree James – Member for Barron River (current)
- Correspondence with project area Traditional Owner groups:
  - Gimuy Walubara Yidinji (GWY) Elders Aboriginal Corporation
  - Djabugay Aboriginal Corporation.
- Project briefings with Cairns and Far North Environment Centre (CAFNEC)
- Correspondence and meetings with directly impacted landholders to discuss the project and property considerations.

Key topics raised during the above preliminary stakeholder engagement included:

- Social:
  - Works methodology for decommissioning and removal of the existing overhead transmission line and impacts to properties during this phase
  - Project construction timings and general construction impacts
  - Whether Powerlink will retain the easement along the existing overhead line from Redlynch to Woree once is it removed
  - Property value impacts along underground cable route
  - Flood impact concerns and how this would affect residential areas
  - Increased cyclone resilience with undergrounding a significant section of the transmission line
  - Visual amenity impacts regarding the new substation
  - Extending underground beyond current proposed section.
- Environmental:
  - Potential impacts construction of the new substation in Barron would have on flood levels/flow
  - Loss of green areas where the new substation is proposed
  - Impact to trees along the underground cable corridor.
- Economic:
  - Potential positive impact the removal of the overhead line from Redlynch to Woree would have on property values
  - Potential negative impact to properties near the new substation location
  - Consideration of undergrounding in some sections where the replacement overhead line is proposed.

Feedback from these stakeholders, together with technical assessments, informed the identification and comparative assessment of a number of transmission line corridor options between the Kamerunga Substation and Woree Substation. This informed a recommended corridor selection. The early engagement process and comparative assessment are documented in the in the final published Corridor and Site Selection Report.

7.6 Future engagement

Engagement will continue with impacted landholders, Traditional Owner groups, the wider community and other stakeholders as the Project progresses to finalise the project's corridor and reach a final transmission alignment.

8 References

ARPANSA (2015). ARPANSA Fact Sheet – Electricity and Health. Yallambie, VIC: Australian Radiation Protection and Nuclear Safety Agency.

ARPANSA (2018). Extremely low frequency electric and magnetic fields. Retrieved 07 09, 2018, from https://www.arpansa.gov.au/understanding-radiation/what-is-radiation/non-ionisingradiation/low-frequency-electric-magnetic-fields.

Australian Government Department of Environment (DoE). (2013) *Matters of national environmental significance Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999*: https://www.dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf (Accessed: 03 December 2024).

Bracken, T. S. (2005). DC Electric Fields from Corona—Generated Space Charge near AC Transmission Lines. IEEE Trans. Power Delivery, 1692-1702.

Bureau of Meteorology (BoM). (2016) *Average Annual Thunder-day and lightning flash density Australian Climate Averages - Thunder and lightning*: http://www.bom.gov.au/jsp/ncc/climate_averages/thunder-lightning/index.jsp.

Bureau of Meteorology (BoM) (2024) Climate Data Online - Map search: http://www.bom.gov.au/climate/data/index.shtml?bookmark=200&view=map.

Business Queensland (Queensland Government). (2023). Electric ant. Retrieved from https://www.business.qld.gov.au/industries/farms-fishing-forestry/agriculture/biosecurity/animals/invasive/restricted/electric-ant

Cairns Regional Council. (2016) Cairns Plan 2016. https://www.cairns.qld.gov.au/building-planning-business/planning-schemes/current

Cairns Regional Council (2023) Local Disaster Management Plan Cairns Region : https://www.cairns.qld.gov.au/__data/assets/pdf_file/0005/109670/Local-Disaster-Management-Plan_Separate-Attach_Clause-2.pdf.

Cairns Regional Council. (2024) Development assessment application: https://eservices.cairns.qld.gov.au/eservice/councilLink.do?resource=development-application-terms.html&nodeNum=7179.

Cook Shire Council. (2024) Development applications - cook shire council: https://www.cook.qld.gov.au/development-applications/.

DCCEEW. (2023). Australia's Commonwealth Heritage List. Retrieved from Australian Government Department of Climate Change, Energy, the Environment and Water: https://www.dcceew.gov.au/parks-heritage/heritage/places/commonwealth-heritage-list

DCCEEW. (2023). Protected Matters Search Tool. Retrieved from Australian Government Department of Climate Change, Energy, the Environment and Water: https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool

DCCEEW. (2024) EPBC Act Public Portal All referrals: https://epbcpublicportal.environment.gov.au/all-referrals/.

Department of Agriculture and Fisheries (DAF) (2023) Queensland Biosecurity Manual: https://www.daf.qld.gov.au/__data/assets/pdf_file/0004/379138/qld-biosecurity-manual.pdf

Department of Agriculture and Water Resources (2016). National Standard for Organic and Bio-Dynamic Produce. Australian Government.

Department of Defence. (2024). Where is Unexploded Ordnance UXO Mapping Application | Unexploded Ordnance: https://uxo.defence.gov.au/where-unexploded-ordnance.

Department of Energy and Climate Change (2011). National Policy Statement for Electricity Networks Infrastructure (EN-5). London.

Department of Energy and Water Supply (2017). Powering Queensland plan: an integrated energy strategy for the state. Brisbane: Queensland Government.

DES. (2020). Protected Plants – Flora Survey Guidelines. Nature Conservation Act 1992(Queensland).

DES Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (2020) Barron River basin environmental values and water quality objectives Basin 110 and adjacent coastal waters: https://environment.des.qld.gov.au/__data/assets/pdf_file/0031/86908/barron-evs-wqos.pdf.

DES Environmental Protection (Water and Wetland Biodiversity) Policy 2019. (2020) Mulgrave-Russell River Basin Environmental Values and Water Quality Objectives basins 111 and adjacent coastal waters.: https://environment.des.qld.gov.au/__data/assets/pdf_file/0025/88054/mulgrave-russell-evs-wqos.pdf.

DSDIP. (2024) *Coordinated projects map*: https://www.statedevelopment.qld.gov.au/coordinator-general/assessments-and-approvals/coordinated-projects/coordinated-projects-map.

DSDIP. (2024) *Far North Queensland major projects pipeline*, *State Development, Infrastructure and Planning*: https://www.statedevelopment.qld.gov.au/regions/queenslands-regions/far-north-qld/far-north-queensland-major-projects-pipeline#:~:text=Far%20North%20Queensland%20Major%20Projects%20Pipeline.

DSDIP. (2014). Significant Residual Impact Guidelines. For matters of state environmental significance and prescribed activities under the Sustainable Planning Act 2009. Queensland Environmental Offsets Policy. December 2014.

DSDIP. (2024). State Planning Policy interactive mapping system: https://sppims-dams.dsdilgp.qld.gov.au/spp/?tab=layers.

DETSI. (2024) Search the Queensland Heritage Register: Environment, land and water, Search the Queensland Heritage Register | Environment, land and water | Queensland Government: https://apps.des.qld.gov.au/heritage-register.

DHLGPPW. (2024) Planning SARA application material: https://www.planning.qld.gov.au/planning-framework/state-assessment-and-referral-agency/sara-application-material.

DTATSIPCA. (2023). Aboriginal and Torres Strait Islander Cultural Heritage Database and Register. Retrieved from Queensland Government, Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships: https://culturalheritage.datsip.qld.gov.au/achris/public/home

Energy Networks Association (2006). Standard Basis for Quoting Transmission Line Magnetic Fields.

Energy Networks Association. (2009). Comments on the Coronoa-Ion Hypothesis.

Energy Networks Association. (2016). EMF Management Handbook.

Energy networks Australia. (2020) Bushfire factsheet: https://www.energynetworks.com.au/resources/fact-sheets/bushfire-factsheet-2020.

Ethos Urban. (2024) Social and Economic Impact Assessment.

Fatokun, F. J. (2008). Characterizing the Atmospheric Electrical Environment near a Corona Ion Emitting Source. Atmospheric Environment, 1607-1616.

Government of Canada. (2016, 07 06). Electric and magnetic fields from power lines and electrical appliances. Retrieved 07 09, 2018, from https://www.canada.ca/en/healthcanada/services/home-garden-safety/electric-magnetic-fields-power-lines-electricalappliances.html

ICNIRP (2010). ICNIRP Guidelines For Limiting Exposure To Time-Varying Electric and Magnetic Fields (1 Hz – 100 kHz). Health Physics, 818-836.

IEEE (2002). C95.6-2002 - IEEE Standard for Safety Levels With Respect to Human Exposure to Electromagnetic Fields. Institution of Electrical and Electronic Engineers.

Infrastructure Australia, (2024) Projects | Infrastructure Australia: https://www.infrastructureaustralia.gov.au/projects.

IPCC (2022) IPCC Sixth Assessment Report. https://www.ipcc.ch/report/ar6/wg2/

Jayaratne, E. F. (2008). Air Ion Concentrations under Overhead High Voltage Transmission Lines in an Urban Environment. Atmos Environ, 1846-1856.

Lawrence, J., B. Mackey, F. Chiew, M.J. Costello, K. Hennessy, N. Lansbury, U.B. Nidumolu, G. Pecl, L. Rickards, N. Tapper, A. Woodward, and A. Wreford. (2022) Australasia. In: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 1581–1688, doi:10.1017/9781009325844.013.

Mackay Regional Council. (2024) eApplication tracker; https://planning.mackay.qld.gov.au/Pages/XC.Track/SearchApplication.aspx.

Mareeba Shire Council. (2019) Mareeba Shire Council Development applications: https://msc.qld.gov.au/council/building-planning/development-applications/.

Northern Australia infrastructure fund (NAIF). (no date) NAIF Projects: https://www.naif.gov.au/our-projects/?Term=&LocationTagIds=1263&page=2.

National Cancer Institute. (2016, May). Electromagnetic Fields and Cancer. Retrieved 07 09, 2018, from https://www.cancer.gov/about-cancer/causesprevention/risk/radiation/electromagnetic-fields-fact-sheet.

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F., Richter, D., Addicott, E.P. and Appelman, C.N. (2022). Methodology for surveying and mapping regional ecosystems and vegetation communities in Queensland. Version 6.0. Updated April 2022. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

NZ Ministry of Health. (2013). Electric and magnetic fields and your health. Wellington.

NPRB. (2004). Particle Deposition in the Vicinity of Power Lines and Possible Effects on Health.

Powerlink Queensland. (2024) Powerlink Queensland Projects Portal: https://www.powerlink.com.au/projects.

Queensland Government. (2013) *Soil Compaction*, *Queensland Government*: https://www.qld.gov.au/environment/land/management/soil/soil-health/compaction.

Queensland Government. (2023). Queensland Heritage Register. Retrieved from Queensland Government: https://www.qld.gov.au/environment/land/heritage/register

Queensland Government's Statistician's Office. (2023) Population projections: 2023 edition update | Queensland Government Statistician's Office: https://www.qgso.qld.gov.au/statistics/theme/population/population-projections/2023-edition-update

Queensland Government. (2024) *GeoResGlobe*: https://georesglobe.information.qld.gov.au.

Queensland Government. (2024) *Queensland Government - future procurement opportunities for suppliers*: https://qtenders.epw.qld.gov.au//fpp/.

Queensland Government. (no date) Drought duration report LongPaddock: https://longpaddock.qld.gov.au/drought/drought-declarations/droughthistory.

State of Queensland (Department of Environment and Science). (2023). Queensland Spatial Catalogue - QSpatial. Retrieved from http://qldspatial.information.qld.gov.au/catalogue

Tablelands Regional Council. (2021) Search development applications: https://www.trc.qld.gov.au/business-and-development/planning-services/search-development-applications/.

Trend Environmental. (2024). Desktop Protected Matters Assessment Report – CP.02731 Redlynch to Woree Transmission Line Upgrade Project.

Trend Environmental. (2023). Desktop Protected Matters Assessment Report – CP.02731 Redlynch to Woree Transmission Line Upgrade Project.

World Health Organization. (2007). Extremely Low Frequency (ELF) Fields. Environmental Health Criteria, No 238. Geneva.

World Health Organization. (2018). Electromagnetic fields (EMF). Retrieved 07 09, 2018, from http://www.who.int/peh-emf/about/WhatisEMF/en/index1.html

Appendix A Properties intersected by the MID Corridor

Table L-1 All land parcels intersected with MID Corridor

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
11	SP119574	Freehold	Lot 11 Kamerunga Road, Caravonica, Qld	Queensland electricity transmission corporation limited	Powerlink Kamerunga Substation	No change
0	GPT70286	Freehold	2-6 Lake Placid Rd, Caravonica QLD 4878	Private Ownership	Existing line easement. Open space for Kamerunga villas	132kV OH transmission line easement
321	SP142702	Freehold	1-3 Lake Placid Road, Caravonica, Qld	Private ownership Gunjal Property Pty Ltd Hladini Property Pty Ltd	Vacant space with existing line easement.	132kV OH transmission line easement
34	RP851525	Freehold	Kamerunga Road, Barron, Qld	The State Of Queensland (Represented By Department Of Transport And Main Roads)	Vacant land	132kV OH transmission line easement
99	RP851525	Freehold	Lot 99 Kamerunga Road, Barron, Qld	The State Of Queensland (Represented By Department Of Transport And Main Roads)	Vacant land	132kV OH transmission line easement
98	RP851526	Freehold	Lot 98 Kamerunga	Cairns Regional Council	Vacant land	132kV OH transmission line easement

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
			Road, Barron, Qld			
1	SP173007	Freehold	1 Kamerunga Road, Barron, QLD	The state of Queensland (represented by Department of Transport and Main Roads)	Vacant land	132kV OH transmission line easement
1	RP716266	Freehold	14 Stewarts Rd Barron, Qld	Queensland Electricity Transmission Corporation Limited	Vacant land	New substation located in Barron / no change in tenure
3	SP173007	Freehold	3 Stewarts Rd Barron, Qld	Queensland Electricity Transmission Corporation Limited	Vacant land	New substation located in Barron / no change in tenure
4	SP119694	Freehold	48 Stewarts Rd Barron, Qld	Queensland Electricity Transmission Corporation Limited	Residential dwelling	New substation located in Barron / no change in tenure
2	RP716266	Freehold	40 Stewarts Rd Barron, Qld	Queensland Electricity Transmission Corporation Limited	Residential dwelling	New substation located in Barron / No change in tenure
1	RP720215	Freehold	54 Stewarts Rd Barron, Qld	Queensland Electricity Transmission Corporation Limited	Residential dwelling	New substation located in Barron / No change in tenure

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
2	SP173007	Freehold	2 Kamerunga Road, Barron, Qld	Barron Sand No.1 Pty Ltd	Existing line easement.	132kV OH transmission line easement
201	SP341804	National Park	Lot 201 Lake Placid Road, Kamerunga, Qld	Kamerunga Conservation Park	Kamerunga Conservation Park Existing line easement.	132kV OH transmission line easement
7	RP808206	Reserve	Lower Freshwater Road, Kamerunga, Qld	Reserve For Park & Recreation	Existing line easement.	132kV OH transmission line easement
3	RP703107	Freehold	Lower Freshwater Road, Kamerunga, Qld	Private ownership	Sugar cane farm	132kV OH transmission line easement
35	RP857723	Freehold	Lower Freshwater Road, Kamerunga, Qld	Cairns Regional Council	Existing line easement.	132kV OH transmission line easement
4	RP703109	Freehold	Fairweather Road, Kamerunga, Qld	Private ownership	Sugar cane farm and residential (the residential area is not traversed by MID Corridor)	132kV OH transmission line easement

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
1	RP703109	Freehold	Fairweather Road, Kamerunga, Qld	Private ownership	Sugar cane farm	132kV OH transmission line easement
116	SP149839	Freehold	Kamerunga Road, Kamerunga, Qld	Private ownership	Sugar cane farm	132kV OH transmission line easement
52	SP109372	Lands Lease	Kamerunga Road, Redlynch, Qld	Queensland Rail Limited	QR sublease Existing line easement and rail corridor	132kV OH transmission line easement
9	SP100467	Freehold	Lot 9 Kamerunga Rd, Redlynch Qld	FGF Developments No. 2 Pty Ltd	Sugar cane farm	132kV OH transmission line easement
10	SP100467	Freehold	Redlynch Connector Road, Redlynch, Qld	The State Of Queensland (Represented By Department Of Transport And Main Roads)	DTMR owned land, existing line easement, vacant area and farm dam	132kV OH transmission line easement
11	SP100467	Freehold	Redlynch Connector Road, Redlynch, Qld	The State Of Queensland (Represented By Department Of Transport And Main Roads)	DTMR owned land, existing line easement, heavily vegetated undeveloped land	132kV OH transmission line easement

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
1	SP279529	Freehold	1-5 Redlynch Connector Road, Redlynch, Qld	Queensland Electricity Transmission Corporation Limited	Existing line easement. Sugar cane farm, residential dwelling and railway corridor	UGOH Transition structure / no change in tenure
2	SP279529	Freehold	2 Larsen Road, Redlynch, Qld	AFL Cape York Limited	Existing line easement. Access track, heavily vegetated area, Freshwater Creek and AFL Cape York House for Girls	UGOH Transition structure / no change in tenure
3	RP726839	Freehold	Brinsmead Road, Brinsmead, Qld	Cairns Mulgrave Water Supply Board	Goomboora Park	132kV UG transmission line easement
2	RP729485	Freehold	Shale Street, Brinsmead, Qld	No ownership information available	Goomboora Park	132kV UG transmission line easement
99	RP729484	Freehold	Shale Street, Brinsmead, Qld	No ownership information available	Goomboora Park	132kV UG transmission line easement
4	RP837733	Freehold	Lot 4 Redlynch Intake Rd, Redlynch, Qld	Cairns Regional Council	Goomboora Park	132kV UG transmission line easement

Lot	Registered Plan	Tenure	Address	Landowner	Existing Land Use	Proposed Land Use / Tenure
113	SP332596	Reserve	40 Irene Street, Mooroobool, Qld	Reserve For Park & Recreation	Open space adjacent to Sunflower Drive Park / existing line easement	132kV UG transmission line easement
36	RP903336	Freehold	36-38 Irene Street, Mooroobool, Qld	Cairns Regional Council	Open space adjacent to Sunflower Drive Park / existing line easement	132kV UG transmission line easement
724	NR7504	Reserve	58 Langan Street, Earlville, Qld	Reserve For Park & Recreation	Open space adjacent to Sunflower Drive Park / culvert / existing line easement	132kV UG transmission line easement
52	SP237150	Lands Lease	Marsh Street, Woree, QLD	Queensland Rail Limited	Queensland Rail Lease / Rail corridor	132kV UG transmission line easement
3	RP749188	Freehold	16-26 Marsh Street, Woree, QLD	Queensland Electricity Transmission Corporation Limited	Powerlink Woree Substation	Powerlink Woree Substation / No change in tenure or land use
22	C19830	Freehold	2-14 Marsh Street, Woree, QLD	Queensland Electricity Transmission Corporation Limited	Powerlink Woree Substation	Powerlink Woree Substation / No change in tenure or land use

Table L-2 All roads (road parcels) and rail corridor intersected with MID Corridor

Road/ Rail Corridor Name	Ownership
132kV OH Transmission line	
Lake Placid Road	State Controlled road
Kamerunga Road	State Controlled road
Stewarts Road	Cairns Regional Council road
Lake Placid Road	Cairns Regional Council road
Mulgrave Sugar Mill Rail Corridor	Mulgrave Sugar Mill
Lower Freshwater Road	Cairns Regional Council road
Queensland Rail Tablelands System Rail Corridor	Queensland Rail
Kamerunga Road (Stratford Connection Road)	State Controlled road
Cairns Western Arterial Road/ Redlynch Bypass Road	State Controlled road
Redlynch Connector Road / Cairns Western Arterial Road	State Controlled road
Unnamed Road Reserve (Redlynch Connector Road / Cairns Western Arterial Road)	Cairns Regional Council road
Unnamed Road Reserve (off Portelli Road)	Cairns Regional Council road
132kV UG transmission line	
Shale Street	Cairns Regional Council road
View Street	Cairns Regional Council road
Christie Drive	Cairns Regional Council road
Brinsmead Road/Cairns Western Arterial Road	State Controlled road
Brinsmead Terrace	Cairns Regional Council road

Road/ Rail Corridor Name	Ownership
Lake Morris Road	Cairns Regional Council road
Mulgrave Sugar Mill Rail Corridor (Brinsmead section)	Mulgrave Sugar Mill
Ramsay Drive	Cairns Regional Council road
Irene Street	Cairns Regional Council road
Mulgrave Sugar Mill Rail Corridor (Woree Siding section)	Mulgrave Sugar Mill
Mulgrave Sugar Mill Rail Corridor (Edmonton Mooroobool Line)	Mulgrave Sugar Mill
Langan Street	Cairns Regional Council road
Watson Street	Cairns Regional Council road
Cavendish Street	Cairns Regional Council road
Downing Street	Cairns Regional Council road
Henley Street	Cairns Regional Council road
Mulgrave Road	State controlled road
Mulgrave Road	Cairns Regional Council road
Ray Jones Drive	State controlled road
Bruce Highway	State controlled road
Rigg Street	State controlled road
North Coast Line	Queensland Rail
Unnamed Road Reserve	Cairns Regional Council Road

Table L-3 All easement parcels intersected with MID Corridor

Lot	Registered Plan	Tenure
A	RP729334	Barron
B	RP729335	Barron
D	SP265158	Barron
B	RP729335	Caravonica
B	SP139623	Kamerunga
A	RP729336	Kamerunga
D	SP142602	Redlynch
E	SP142602	Redlynch
I	SP249773	Redlynch
G	RP721123	Redlynch
F	RP721123	Kamerunga
E	RP721137	Kamerunga
D	RP721137	Kamerunga
C	RP721137	Kamerunga
E	RP721063	Redlynch
F	RP721063	Redlynch
K	SP249775	Redlynch
J	SP249774	Redlynch
O	SP295103	Redlynch

Appendix B Drawing, plans, drawings, elevations, images, and perspectives of the entity's proposal

Appendix C Traffic Impact Assessment

Appendix D Ecological Assessment Report (2025)

Appendix E Hydrology Flood Impact Assessment

Appendix F Air Quality Impact Assessment

Appendix G Social and Economic Impact Assessment

Appendix H Noise Impact Assessment

Appendix I Electromagnetic field (EMF) study

Appendix J Preliminary contamination assessment

Appendix K EMP for the project

Appendix L Search results