

Powerlink Queensland

July 2026

Theodore Wind Farm Connection Project

Ministerial Infrastructure Designation Proposal Report

wsp



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Theodore Wind Farm Connection Project Ministerial Infrastructure Designation Proposal Report

Powerlink Queensland

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Rev	Date	Details
A	08/08/2025	Initial draft
B	03/09/2025	Draft
C	17/10/2025	Final draft
D	18/11/2025	Revised Final Draft
E	03/12/2025	Final
F	23/07/2026	Updated following Minster's consultation

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WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Table of contents

Abbreviations	xv
Executive summary	xxi
1 Introduction	1
1.1 Project overview	1
1.2 Project proponent.....	1
1.3 Legislative framework.....	2
1.3.1 Electricity Act 1994 and Electrical Safety Act 2002.....	2
1.3.2 Ministerial Infrastructure Designation.....	2
1.4 Assessment approach	6
1.4.1 Information sources	7
1.5 Structure of the MID proposal report	7
1.6 Defined terms.....	9
2 Project justification and feasible alternatives	10
2.1 Project justification	10
2.2 Theodore Wind Farm.....	10
2.3 Theodore Wind Farm Connection Project (the Project)	11
2.3.1 Project benefits	11
2.4 Feasible alternatives	12
2.4.1 Corridor selection process	12
2.4.2 MID Proposal area and MID Disturbance footprint	14
3 Project description	16
3.1 Theodore Wind Farm Connection Project overview	16
3.2 Project program	16
3.3 Site description.....	16
3.3.1 Land tenure	17
3.4 Relationship to other infrastructure and land uses	19
3.5 Transmission line	19
3.5.1 Physical details of the transmission line	19
3.5.2 Easements and access.....	27
3.5.3 Construction methodology	27
3.5.4 Operation, maintenance, and decommissioning	34

3.6	Castle Creek Substation	37
3.6.1	Physical details of the substation.....	37
3.6.2	Construction	40
3.6.3	Operation and maintenance	42
3.6.4	Decommissioning	42
3.7	Temporary infrastructure requirements.....	43
3.8	Workforce	43
3.9	Materials	44
3.9.1	Concrete batching.....	44
4	Land resources.....	46
4.1	Existing environment	46
4.1.1	Topography	46
4.1.2	Geology	46
4.1.3	Water features	49
4.1.4	Soils.....	51
4.1.5	Acid sulfate soils.....	56
4.1.6	Resource interests.....	56
4.1.7	Contaminated land.....	57
4.1.8	Unexploded ordnance.....	57
4.2	Potential impacts and mitigation measures	59
4.2.1	Topography	59
4.2.2	Soils.....	59
4.2.3	Contaminated land.....	61
5	Climate and greenhouse gas emissions	63
5.1	Climate conditions	63
5.1.1	Temperature	63
5.1.2	Relative humidity	64
5.1.3	Rainfall.....	64
5.1.4	Wind speed and direction	65
5.1.5	Extreme climatic conditions	65
5.2	Climate influence of design and construction	67
5.2.1	Climate change.....	67
5.2.2	Proposed climate change mitigation measures	67
5.3	Greenhouse gas emissions	68
5.3.1	Greenhouse gases	68
5.3.2	Project greenhouse gas emission sources	69
5.3.3	Project greenhouse gas emissions	71
5.3.4	Mitigation and management measures.....	72

6	Air quality	74
6.1	Legislative context	74
6.1.1	Queensland Environment Protection (Air) Policy 2019	74
6.1.2	Other guidance and standards	75
6.2	Existing environment	75
6.2.1	Identification of sensitive receptors	75
6.2.2	Local emission sources	77
6.2.3	Ambient air quality monitoring	78
6.3	Impact assessment	81
6.3.1	Air pollutants of interest	81
6.3.2	Construction impact assessment	81
6.3.3	Operation impact assessment	82
6.4	Mitigation and management measures	82
7	Water resources and hydrology	83
7.1	Existing environment	83
7.1.1	Surface water	83
7.1.2	Queensland Waterway Barrier Works	90
7.1.3	Matters of State Environmental Significance wetland and waterway values	91
7.1.4	Flooding	91
7.1.5	Groundwater	91
7.2	Potential impacts and mitigation measures	92
7.2.1	Hydrology	92
7.2.2	Water quality	93
7.2.3	Fish passage	94
7.2.4	Wetlands	95
7.2.5	Groundwater	95
7.2.6	Water use and sourcing	95
8	Protected areas	96
8.1	Existing environment	96
8.2	Impact assessment and mitigation measures	96
9	Flora	97
9.1	Methodology	97
9.2	Desktop assessment results	98
9.2.1	Literature review	98
9.2.2	Online datasets and mapping tools	99
9.2.3	Field survey results	102
9.3	Potential impacts and mitigation measures	116

9.3.1	Project-related impacts	116
9.3.2	Construction phase impacts	116
9.3.3	Potential indirect impacts	118
9.3.4	Maintenance and operations	118
9.3.5	Matters of State Environmental Significance	118
10	Fauna.....	119
10.1	Methodology	119
10.2	Desktop assessment results	120
10.2.1	Literature review	120
10.2.2	Online datasets and mapping tools.....	120
10.3	Field survey results	121
10.3.1	Fauna species	121
10.3.2	Habitat assessment	123
10.3.3	Habitat modelling	125
10.4	Potential impacts	140
10.4.1	Project-related impacts	140
10.4.2	Construction phase impacts	140
10.4.3	Operational phase	146
11	Matters of National Environmental Significance	147
11.1	Matters of National Environmental Significance	148
11.1.1	Protected Matters Search Tool results.....	148
11.1.2	Likelihood of occurrence assessments	149
11.2	Field survey results	149
11.2.1	Habitat assessment	149
11.2.2	Threatened ecological communities	151
11.2.3	Threatened flora species	154
11.2.4	Threatened fauna species	154
11.3	Potential impacts and mitigation measures	155
11.3.1	Impact avoidance and minimisation.....	155
11.3.2	Description of Project-related impacts	156
12	Biosecurity	167
12.1	Relevant legislation and policies	167
12.1.1	Commonwealth.....	167
12.1.2	Queensland	168
12.1.3	Local government	168
12.2	Existing environment	168
12.2.1	Biosecurity zones.....	168
12.2.2	Invasive flora species	168

12.2.3	Introduced fauna species.....	169
12.3	Potential impacts and mitigation measures	170
13	Land use, existing infrastructure, and Native Title	172
13.1	Existing environment	172
13.1.1	Land tenure	172
13.1.2	Zoning, character, and amenity	172
13.1.3	Existing land use.....	173
13.1.4	Future land uses.....	173
13.1.5	Native title.....	173
13.1.6	Existing infrastructure	174
13.2	Potential impacts and mitigation measures	175
13.2.1	Agricultural land and operations	175
13.2.2	Rural character and amenity.....	176
13.2.3	Native title.....	176
14	Visual amenity	177
14.1	Existing environment	177
14.1.1	Methodology	177
14.1.2	Settlement and infrastructure.....	178
14.1.3	Landform, hydrology, and rural land use	179
14.1.4	Visual receptors.....	179
14.2	Potential impacts and mitigation measures	179
14.2.1	Landscape amenity.....	179
14.2.2	Visual amenity	180
14.2.3	Mitigation measures.....	181
15	Social and economic.....	182
15.1	Existing environment	182
15.1.1	Social environment	182
15.1.2	Economic environment	183
15.1.3	State suburb summary.....	184
15.2	Potential impacts and mitigation measures	185
15.2.1	Population and community profile.....	185
15.2.2	Impacted property owners	185
15.2.3	Social Impact Assessment and Management Plan.....	185
15.2.4	Land acquisition and compensation process	186
15.2.5	Economic effects	186
16	Indigenous cultural heritage	188
16.1	Existing environment.....	188

16.1.1	Desktop assessment	188
16.1.2	Risk assessment.....	189
16.1.3	Summary of key desktop findings.....	191
16.2	Potential impacts and mitigation measures	191
16.2.1	Duty of Care category.....	191
17	Non-indigenous heritage	195
17.1	Existing environment	195
17.1.1	European settlement.....	195
17.1.2	Database searches.....	196
17.2	Potential impacts and mitigation measures	196
18	Transport and traffic	197
18.1	Methodology	197
18.2	Existing environment	197
18.2.1	State-controlled road network.....	197
18.2.2	Key road links	199
18.2.3	Key intersections	201
18.2.4	Traffic demands.....	203
18.3	Potential impacts and management measures	208
18.3.1	Construction stage.....	208
18.3.2	Operation.....	215
19	Noise and vibration	216
19.1	Existing environment	216
19.1.1	Existing noise sources	216
19.1.2	Estimated background levels.....	216
19.1.3	Sensitive receptors	217
19.2	Potential impacts and mitigation measures	217
19.2.1	Noise criteria.....	217
19.2.2	Vibration criteria.....	218
19.2.3	Construction	218
19.2.4	Operation and maintenance	219
19.2.5	Decommissioning	220
20	Hazards, health, and safety	221
20.1	Risk identification.....	221
20.1.1	Methodology	221
20.1.2	Data sources	221
20.1.3	Preliminary risk identification	222
20.1.4	Dangerous goods and hazardous substances.....	227
20.1.5	Health and safety management.....	228

20.1.6	Natural hazards	229
21	Electric and magnetic fields	230
21.1	Background information regarding electrical and magnetic fields	230
21.2	Sources of power frequency electric and magnetic fields	230
21.2.1	Electric fields	230
21.2.2	Magnetic fields.....	231
21.3	Potential impacts and management measures	232
21.3.1	Exposure guidelines	232
21.3.2	Calculated electric and magnetic fields.....	233
22	Bushfire risk	235
22.1	Existing environment	235
22.1.1	Bushfire hazard mapping.....	235
22.1.2	Bushfire risk analysis	237
22.2	Potential impacts and mitigation measures	239
22.2.1	Assessment against the SPP assessment benchmarks for natural hazards, risk and resilience	239
23	Waste management.....	242
23.1	Relevant legislation and policy	242
23.1.1	Commonwealth.....	242
23.1.2	Queensland	243
23.1.3	Local Government	244
23.2	Waste management.....	244
23.2.1	Objectives	244
23.2.2	Construction	245
23.2.3	Operation and maintenance	246
23.2.4	Regulated waste management	246
24	Cumulative impacts.....	247
24.1	Methodology	247
24.2	Existing environment	247
24.2.1	Theodore Wind Farm.....	249
24.2.2	Banana Range Wind Farm	250
24.2.3	Dawson Wind Farm	250
24.2.4	Banana Range Wind Farm Connection Project	250
24.3	Potential cumulative impacts	251
24.3.1	Land resources	251

24.3.2	Air quality	251
24.3.3	Water resources and hydrology	252
24.3.4	Protected areas	252
24.3.5	Terrestrial ecology	252
24.3.6	Biosecurity	253
24.3.7	Land use	253
24.3.8	Visual amenity	253
24.3.9	Social and economic	253
24.3.10	Indigenous cultural heritage	254
24.3.11	Non-indigenous heritage	254
24.3.12	Traffic and transport	254
24.3.13	Noise and vibration	255
25	Environmental management	256
25.1	Powerlink's commitment to environmental management	256
25.2	Environmental management process	256
25.2.1	Overview of process	256
25.2.2	Environmental audits and inspections	257
25.2.3	Non-conformance and corrective actions	257
25.2.4	Emergency response	257
25.2.5	Training and competency – environmental	257
25.2.6	Review and improvement	258
25.3	Environmental management plan	258
25.3.1	EMP	258
25.3.2	Environmental Work Plans	258
25.3.3	Construction Environmental Management Plan (CEMP)	258
26	Planning and approval requirements	259
26.1	Commonwealth legislation	259
26.1.1	Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	259
26.1.2	Native Title Act 1993	260
26.2	State legislation	260
26.2.1	Electricity Act 1994	260
26.2.2	Electricity Safety Act 2002	261
26.2.3	Planning Act 2016	261
26.2.4	Land Act 1994	262
26.2.5	Acquisition of Land Act 1967	262
26.2.6	Environmental Protection Act 1994	262
26.2.7	Nature Conservation Act 1992	264
26.2.8	Vegetation Management Act 1999	265
26.2.9	Water Act 2000	265
26.2.10	Fisheries Act 1994	265
26.2.11	Aboriginal Cultural Heritage Act 2003	266

26.2.12	Forestry Act 1959	266
26.2.13	Transport Infrastructure Act 1994	267
26.3	State planning policy	267
26.3.1	Applicable State interests	267
26.3.2	Regional plans	268
26.4	Local government planning, ordinances, and by-laws	268
26.4.1	Planning scheme	268
26.4.2	Local laws	268
26.5	Summary of legislative triggers	269
27	Community and stakeholder engagement	271
27.1	Engagement framework	271
27.2	Project stakeholders	271
27.3	Engagement activities to date	273
27.3.1	Project engagement phases	273
27.3.2	Landholders and trustees/lessees	276
27.3.3	Traditional Owner groups	277
27.3.4	Other stakeholder engagement	278
27.3.5	Engagement as part of the Corridor Selection Report (CSR) process	279
27.3.6	Engagement during Project design	282
27.3.7	Social impact assessment and management plan engagement	283
27.4	Future engagement activities	283
28	Conclusions	284
29	Limitations	286
29.1	Permitted purpose	286
29.2	Qualifications and assumptions	286
29.3	Use and reliance	286
29.4	Disclaimer	287
	References	288

List of tables

Table 1.1	Ministerial Infrastructure Designation process	4
Table 1.2	Structure of the MID proposal.....	7
Table 2.1	Design considerations used to determine MID Disturbance footprint	14
Table 3.1	Details of properties within the Project area (south to north).....	17
Table 4.1	Surface geology units (1:100k) within the Project area.....	48
Table 4.2	Mapped soil units within the Project area	51
Table 4.3	Exploration permits within the Project area	56
Table 5.1	Monthly rainfall statistics for Thangool Airport weather station from 1929–2025.....	64
Table 5.2	Potential impacts of climate change and proposed mitigation measures	67
Table 5.3	GHG emission sources included in this assessment	70
Table 5.4	Estimated GHG emissions during Project construction	72
Table 6.1	EPP Air objectives relevant to this Project.....	74
Table 6.2	Local emissions sources according to the National Pollutant Inventory (NPI)	77
Table 6.3	Summary of particulate matter statistics measured at the Bluff and Clinton stations from 2021–2023	79
Table 6.4	Summary of NO ₂ statistics measured at the Clinton Station from 2021–2023	80
Table 7.1	Water features crossed by the transmission line (south to north).....	83
Table 7.2	Environmental values	89
Table 7.3	MSES: Wetland and waterways mapped within the Project area	91
Table 7.4	Groundwater well information.....	92
Table 9.1	Summary of MSES mapped within the Study area.....	99
Table 9.2	State mapped regional ecosystems present within Study area	100
Table 9.3	Desktop results for conservation significant flora – Study area	101
Table 9.4	Field-verified vegetation communities and regional ecosystems in the Study area	114
Table 9.5	Extent of disturbance (clearing) to field verified vegetation communities and regional ecosystems in the Project area, MID Proposal area and MID Disturbance footprint	117
Table 10.1	Field-verified likelihood of occurrence assessment for NC Act threatened fauna species within the Study area.....	121
Table 10.2	Field-verified habitat assessment and corresponding vegetation communities within the Study area	123

Table 10.3	Habitat modelling criteria for NC Act threatened fauna species within the Study area.....	125
Table 10.4	NC Act (that are also not EPBC Act listed) threatened fauna species habitat within the MID Disturbance footprint	140
Table 10.5	NC Act threatened fauna species, recorded or with a moderate or high likelihood of occurring in the Disturbance footprint, and risk of impact assessment	141
Table 11.1	Summary of MNES mapped within the Study area.....	148
Table 11.2	Desktop likelihood of occurrence assessment for TECs listed under the EPBC Act	149
Table 11.3	Field-verified habitat assessments and corresponding vegetation communities within Study area	150
Table 11.4	Assessment of Brigalow patches in the Study area against the Brigalow TEC diagnostic characteristics	152
Table 11.5	Field-verified likelihood of occurrence assessment for MNES threatened and/or migratory fauna species within the Study area	154
Table 11.6	MNES fauna species habitat within the MID Disturbance footprint	158
Table 11.7	Threatened fauna species listed under the EPBC Act, recorded or with a moderate or high likelihood of occurring in the EPBC referral footprint, and risk of impact assessment.....	160
Table 12.1	Invasive flora species recorded within the Project area.....	169
Table 13.1	Native title determinations relevant to the Project area	174
Table 13.2	Indigenous Land Use Agreements	174
Table 14.1	Severity / magnitude matrix	177
Table 14.2	Visual and landscape amenity impacts.....	178
Table 14.3	Significance of impacts to visual amenity	180
Table 15.1	State suburb population statistics	183
Table 16.1	Registered Aboriginal Parties for the Project area.....	188
Table 16.2	Cultural Heritage Body for the Project area	189
Table 16.3	Aboriginal cultural heritage risk profile for the Project area	190
Table 16.4	Summary of the activities categorised under the Duty of Care Guidelines.....	192
Table 16.5	Duty of Care category assessment for the Project area	192
Table 17.1	Statutory and non-statutory database search results for non-indigenous heritage values within or close to the Project area	196
Table 18.1	AADT Traffic volumes and HV percentages (2023).....	203
Table 18.2	Historic growth rates (2023)	207
Table 19.1	Background sound pressure levels.....	216

Table 19.2	Acoustic quality objectives (EPP (Noise)).....	217
Table 19.3	Standards/guidelines used for assessing construction vibration.....	218
Table 19.4	Predicted construction noise setback distances	218
Table 20.1	Data set and sources.....	221
Table 20.2	Preliminary hazard and risk identification	222
Table 20.3	Indicative list of dangerous goods and hazardous substance	227
Table 21.1	Typical magnetic field ranges	231
Table 21.2	Magnetic field Reference Levels at 50 HZ for IEEE (2002) and ICNIRP (2010).....	232
Table 21.3	Electric field Reference Levels at 50 HZ for IEEE (2002) and ICNIRP (2010).....	232
Table 21.4	Calculated electric and magnetic field results.....	233
Table 22.1	Vegetation hazard class of field verified regional ecosystems from within the Project area	237
Table 23.1	General waste generation and management during construction	245
Table 24.1	Proposed projects in vicinity of the Project area	247
Table 24.2	Potential cumulative impacts	251
Table 26.1	Summary of applicable SPP State interests	267
Table 26.2	Summary of legislative requirements.....	269
Table 27.1	Project stakeholders	271
Table 27.2	Engagement phases.....	274
Table 27.3	Project engagement with landholders.....	276
Table 27.4	Project engagement with Traditional Owners	277
Table 27.5	Other stakeholder engagement	278
Table 27.6	Powerlink responses to key themes from community feedback on the Draft CSR.....	280

List of figures

Figure 1.1	Ministerial Infrastructure Designation process	3
Figure 3.1	Property map and location of proposed renewable energy developments	20
Figure 3.2	Outline of typical self-supporting double circuit suspension and tension structures	25
Figure 3.3	Typical insulator string	26
Figure 3.4	Typical bored foundation types	30
Figure 3.5	Transmission conductor drums and mobile crane utilised in structure erection	31
Figure 3.6	Stringing sheaves and helicopter stringing	33
Figure 3.7	Substation general arrangement	38
Figure 3.8	Indicative construction workforce numbers on site	44
Figure 4.1	Topography	47
Figure 4.2	Surface geological units	50
Figure 4.3	Mapped soil units and Australian Soil Classification	55
Figure 4.4	Exploration permits within the Project area	58
Figure 5.1	Mean monthly maximum and minimum temperature for 2019–2024 (inclusive) at Thangool Airport station	63
Figure 5.2	Mean monthly relative humidity for 2019–2024 (inclusive) at the Thangool Airport station	64
Figure 5.3	Annual wind rose plot (left) and windspeed histogram (right) for 2019–2024 (inclusive) at the Thangool station	65
Figure 5.4	Seasonal wind rose plots for 2019–2024 (inclusive) at the Thangool station	65
Figure 5.5	Average annual days of thunder activity	66
Figure 6.1	Sensitive receptors in proximity to the Project	76
Figure 6.2	Local emissions sources according to the National Pollutant Inventory (NPI) (DCCEEW 2025a)	78
Figure 6.3	Time series of PM ₁₀ mass concentrations	79
Figure 6.4	Time series of PM _{2.5} mass concentrations	80
Figure 6.5	Time series of NO ₂ mixing ratios	81
Figure 7.1	Waterways and wetlands	84
Figure 9.1	Field-verified regional ecosystems and vegetation communities	103
Figure 10.1	Field-verified fauna habitats	129
Figure 18.1	Existing State-controlled road network in the vicinity of the Project	198
Figure 18.2	Streetview of Leichhardt Highway	199
Figure 18.3	Streetview of Dawson Highway	200
Figure 18.4	Streetview of Uncle Toms Road	200
Figure 18.5	Streetview of Defence Road	201

Figure 18.6	Leichhardt Highway/Dawson Highway intersection	202
Figure 18.7	Leichhardt Highway/Uncle Toms Road intersection	202
Figure 18.8	Leichhardt Highway/Defence Road intersection	203
Figure 18.9	Road segments	204
Figure 18.10	Dawson Highway/Leichhardt Highway AM and PM peak period intersection turn volumes (2023)	205
Figure 18.11	Leichhardt Highway/Uncle Toms Road AM and PM peak period intersection turn volumes (2023)	206
Figure 18.12	Leichhardt Highway/Defence Road AM and PM peak period intersection turn volumes (2023)	207
Figure 18.13	AM and PM construction peak Project turn volumes – Dawson Highway/Leichhardt Highway (100 percent of workers from Moura)	209
Figure 18.14	AM and PM construction peak Project turn volumes – Dawson Highway/Leichhardt Highway (100 percent of workers from Biloela)	210
Figure 18.15	AM and PM construction peak Project turn volumes – Leichhardt Highway/Uncle Toms Road (2026)	212
Figure 18.16	AM and PM construction peak Project turn volumes – Leichhardt Highway/Defence Road (2026)	213
Figure 21.1	Calculated electric and magnetic field results	234
Figure 22.1	Bushfire hazard mapping	236
Figure 22.2	Fire seasons	239
Figure 23.1	Waste and resource management hierarchy	243

List of appendices

Appendix A	Ministerial infrastructure designation: Pre-lodgement advice and MID checklist
Appendix B	Project area and MID Disturbance footprint
Appendix C	EMR/CLR search results
Appendix D	Environmental Management Plan
Appendix E	Ecological Assessment Report (MID)
Appendix F	Cultural heritage due diligence assessment
Appendix G	Traffic impact assessment
Appendix H	Project assessment against applicable State interests and local planning zone outcomes

Abbreviations

AADT	annual average daily traffic
ABS	Australian Bureau of Statistics
ACH Act	<i>Aboriginal Cultural Heritage Act 2003</i> (Queensland)
Acquisition of Land Act	<i>Acquisition of Land Act 1967</i> (Queensland)
ACT	<i>Australian Capital Territory</i>
ADG Code	Australian Code for the Transport of Dangerous Goods by Road & Rail
AEP	annual exceedance probability
AHD	Australian Height Datum
ALA	Atlas of Living Australia
ALC	agricultural land classification
ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
APE	annual probability of exceedance
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
ASRIS	Australian Soil Resource Information System
AUL	auxiliary left turn
AUR	auxiliary right turn
BAL	basic left
BESS	battery and energy storage system
BGL	below ground level
Biosecurity Act	<i>Biosecurity Act 2014</i> (Queensland)
Biosecurity Regulation	<i>Biosecurity Regulation 2016</i>
BoM	Bureau of Meteorology
CASANZ	Clean Air Society of Australia and New Zealand
CEMP	Construction Environmental Management Plan
CH ₄	methane
CHMA	Cultural Heritage Management Agreement
CHMP	Cultural Heritage Management Plan
CLR	Contaminated Land Register
CO ₂	carbon dioxide
CSIRO	Commonwealth Scientific and Industrial Research Organisation

CSR	Corridor Selection Report
DAMS	Development Assessment Mapping System
DETSI	Department of Environment, Tourism, Science and Innovation
DLA	designated landscape areas
DLGWV	Department of Local Government, Water and Volunteers
DNRMMRRD	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development
DOS	degree of saturation
DPI	Department of Primary Industries
DSDSATSIP	Department of Seniors, Disability Services and Aboriginal and Torres Strait Islander Partnerships
DWATSIPM	Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism
DSDILGP	former Queensland Department of State Development, Infrastructure, Local Government and Planning (now DSDIP)
DSDIP	Queensland Department of State Development, Infrastructure and Planning
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
Electricity Act	<i>Electricity Act 1994</i> (Queensland)
Electricity Safety Act	<i>Electricity Safety Act 2002</i> (Queensland)
Electricity Safety Regulation	<i>Electricity Safety Regulation 2013</i> (Queensland)
E	endangered
EMF	electric and magnetic field
EMP	Environmental Management Plan
EMR	Environmental Management Register
Energy Act	<i>Energy (Renewable Transformation and Jobs) Act 2024</i> (Queensland)
EP Act	<i>Environmental Protection Act 1994</i> (Queensland)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
EPP (Air)	Environmental Protection (Air) Policy 2019
EPP (Noise)	Environmental Protection (Noise) Policy 2019
EPP (Water and Wetland Biodiversity)	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
EP Regulation	Environmental Protection Regulation 2019

ERA	environmentally relevant activities
ERM	Environmental Resources Management Australia Pty Ltd
ESCP	Erosion and Sediment Control Plan
EWP	Environmental Work Plans
FTE	full time equivalent
Fisheries Act	<i>Fisheries Act 1994</i> (Queensland)
GBR	Great Barrier Reef
GCHCC	Gangulu Cultural Heritage Coordinating Committee
GED	general environmental duty
GHG	greenhouse gas
GIS	Geographic Information System
GNP	Gaangalu Nation People
GTIA	Guide to Traffic Impact Assessment
GW	gigawatts
GW/hr	gigawatt per hour
GWP	global warming potential
ha	hectare
HES	high ecological significance
HEV	high ecological value
H ₂ S	hydrogen sulfide
HSE	Health, Safety and Environment
HSEMS	Health, Safety, and Environmental Management System
HV	heavy vehicles
HVR	high value regrowth
Hz	hertz
IAA	important agricultural areas
IAQM	Institute of Air Quality Management
IAR	Initial Advice Request
ICNIRP	International Commission on Non-Ionising Radiation Protection
IECA	International Erosion Control Association
IEEE	Institute of Electrical and Electronics Engineers
IPCC	Intergovernmental Panel on Climate Change

ILUA	Indigenous Land Use Agreements
JSA	job safety analysis
km	kilometre
Koala Plan	Nature Conservation (Koala) Conservation Plan 2017
km/h	kilometre per hour
kt	kilotonnes
kV	kilovolt
LAC	Local Ambulance Committee
LGA	local government area
LG Act	<i>Local Government Act 2009</i> (Queensland)
LOS	level of service
LRRS	local road of regional significance
m	metre
m ³	cubic metre
M	migratory
Ma	marine
mm	millimetre
MGR	Minsters Guidelines and Rules
MID	Ministerial Infrastructure Designation
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
MSP	Management service providers
MW	megawatt
NT Act	<i>Native Title Act 1993</i>
NC Act	<i>Nature Conservation Act 1992</i>
NCAS	National Carbon Accounting System
NEPM	National Environment Protection Measures
NGA	National Greenhouse Accounts
NGER	<i>National Greenhouse and Energy Reporting Act</i> (2007)
NH ₃	ammonia
NNTT	National Native Title Tribunal
NOx	nitrogen oxide

NPI	National Pollutant Inventory
NSW	New South Wales
NT	near threatened
NT Act	<i>Native Title Act 1993</i>
OPGW	optical ground wire: optical fibre composite overhead ground wire, is a type of cable that is used in transmission line
PEA	Project Environmental Advisor
PEP	Project Engagement Plan
PIA	Pavement Impact Assessment
Planning Act	<i>Planning Act 2016</i> (Queensland)
PM	particulate matter
PMAV	property maps of assessable vegetation
PMST	protected matters search tool
Powerlink	Powerlink Queensland, are trading names of Queensland Electricity Transmission Corporation
PPAA	Project Participation and Access Allowance
QFES	Queensland Fire and Emergency Services
QLD	Queensland
RE	regional ecosystem
RFCS	Rural Financial Counselling Services
RWE	RWE Renewables Australia
SAR4	Standard Axle Repetition with a load damage exponent of 4
SARA	State Assessment and Referral Agency
SCL	strategic cropping land
SCR	state-controlled road
SDS	safety data sheets
SEA	strategic environmental areas
SEIFA	socio-economic indexes for areas
SEQ	Southeast Queensland
SES	State Emergency Services
SF ₆	sulfur hexafluoride
SIA	Social impact assessment

SIDRA	Signalised and Unsignalised Intersection Design and Research Aid
SL	simple left
SLC	special least concern
SMP	species management program
SO ₂	sulfur dioxide
SPP IMS	State Planning Policy Interactive Mapping System
SSC	state suburb
SWMS	safe work method statement
TEC	threatened ecological community
The Project	Theodore Wind Farm Connection Project
TIA	Traffic Impact Assessment
TI Act	<i>Transport Infrastructure Act 1994</i> (Queensland)
TJ	terajoules
TSP	total suspended particulates
UXO	unexploded ordnance
V	vulnerable
VHC	vegetation hazard class
VM Act	<i>Vegetation Management Act 1999</i> (Queensland)
VOC	volatile organic compounds
WBCSD	World Business Council for Sustainable Development
WHO	World Health Organization
WoNS	weeds of national significance
WHS	work health and safety
WHS Act	<i>Work Health and Safety Act 2011</i> (Queensland)
WQO	water quality objectives
WRI	World Resources Institute
WRR Act	<i>Waste Reduction and Recycling Act 2011</i> (Queensland)
WSP	WSP Australia Pty Ltd
WUC	Work under contract
WWBW	waterway barrier works
WWNAC	Wulli Wulli Nation Aboriginal Corporation
WWP	Wulli Wulli People

Executive summary

Project overview

RWE Renewables Australia (RWE) are seeking to establish the Theodore Wind Farm, an 1,100 megawatt (MW) renewable energy facility located approximately 22 kilometres (km) east of Theodore, 50 km south-west of Biloela and 150 km south-west of Gladstone.

Powerlink Queensland (Powerlink), a transmission entity under the *Electricity Act 1994* (Electricity Act), owns, operates and maintains Queensland's high voltage electricity transmission network. Powerlink has been engaged by RWE to provide a connection for the Theodore Wind Farm to the transmission network.

The Theodore Wind Farm Connection Project (the Project) includes:

- a proposed 275 kilovolt (kV) substation, to be known as the Castle Creek Substation, located within the proposed Theodore Wind Farm. The substation footprint encompassing an area of 445 m x 270 m (12 hectares (ha))
- construction of a new double circuit 275 kV transmission line extending approximately 55.4 km north of the Theodore Wind Farm to a new substation to be constructed at Mt Benn. The Mt Benn Substation is part of the Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and does not form part of Theodore Wind Farm Connection Project. The proposed transmission line will be positioned within a new 60 m wide easement.

In addition to the transmission line and Castle Creek Substation, other ancillary infrastructure required to construct and maintain the Project includes:

- access tracks with an average clearing width of 14 m
- a 300 m by 250 m laydown area (including batch plant site)
- brake and winch sites (60 m by 50 m).

Since lodgement of the MID Proposal, the Project disturbance footprint has been refined through ongoing design development, environmental review and constructability assessments. Key refinements include infrastructure micro-siting, additional turn-in areas to facilitate safe access, and minor alignment adjustments resulting from updated cadastral information. These changes were undertaken to improve constructability and operational access while, where practicable, avoiding and minimising impacts on environmental values such as watercourses, native vegetation and other sensitive features.

Environmental and planning approval for the Project is being sought via the Ministerial Infrastructure Designation (MID) process under the *Planning Act 2016* (Queensland) (Planning Act). Approvals are expected to be completed in 2026. Subject to obtaining the necessary approvals, construction is expected to commence thereafter with an approximate 2 year duration.

WSP Australia Pty Ltd (WSP) have prepared this MID proposal on behalf of Powerlink, considering the potential environmental, social and economic impacts associated with the construction, operation and maintenance of the Project.

Project justification

Powerlink needs to reinforce its transmission network in the Gladstone area over the next 10 years. This is important to ensure an ongoing reliable and secure electricity supply to the region, as the largest load centre outside of south-east Queensland.

The Gladstone area's role in the wider power system is changing significantly. The eventual retirement of the Gladstone Power Station and the potential for electrification of local industry, means more generation from other parts of the State is needed to power the local economy. Powerlink is currently planning for a critical program of transmission upgrades, to ensure the safety and reliability of the electricity network as the region prepares for changes in how and where electricity is generated and increasing demand on the network.

In addition to Powerlink's role in developing and operating the high voltage network and associated infrastructure, Powerlink also provides electricity transmission services. This can include connecting large industry and also electricity generation projects (such as wind, solar farms, battery storage and others) to the transmission network.

As the Transmission Network Service Provider (TNSP) in Queensland, Powerlink operates under the National Electricity Rules (NER) which define its obligation to connect generation projects to Queensland's electricity network. This means that Powerlink is obligated to connect any proponent (such as a generator) to the transmission network, provided they meet the relevant technical and regulatory requirements.

The Theodore Wind Farm project has now met these requirements, and RWE has engaged Powerlink to connect the Theodore Wind Farm to the transmission network. Once built, it will provide an important connection into the Calvale Substation, supplying renewable energy into the Gladstone region. This transmission connection also provides opportunity for other renewable energy projects, to link with the new infrastructure (subject to planning and environmental approvals).

Throughout the course of this impact assessment a MID Disturbance footprint (i.e. the area where permanent and temporary ground disturbance associated with construction and operation of the Project will occur) has been developed to minimise impacts to remnant vegetation to the greatest extent possible.

Environmental assessment

Land resources

The Project area varies in elevation from approximately 230 m Australian Height Datum (AHD) on the alluvial plains to approximately 450 m AHD on the volcanic ridgetops. The landforms are predominantly flat to undulating, with some steeper slopes rising to the east of the Project associated with the Banana Range. Areas of undulating topography contains waterways which are generally bordered by areas of remnant and regrowth vegetation.

Broadly speaking, the dominant geology in the flatter regions of the Project area is a mix of mudstone, sandstone, siltstone and andesite. Waterways are associated with alluvial soils (clay, silt, sand and gravel), and steeper terrain areas are associated with conglomerate, sandstone, volcaniclastic rocks (ignimbrite) and hard rocky features (granite). Alluvial materials are typically unconsolidated and can be picked up and transported when disturbed, through activities such as vegetation clearing or earthworks, and may potentially result in soil erosion or other soil issues if not appropriately managed. Risks are likely to be greatest during construction activities and minimal during operations.

There is a low to extremely low probability of the Project area containing acid sulfate soils as the general topography of the area is above 100 m AHD.

No sites listed on the Environmental Management Register or Contaminated Land Register are within the Project area.

Greenhouse gas emissions

An assessment of the Scope 1, 2 and 3 greenhouse gas emissions (GHG) from the Project found that during construction the estimated total Scope 1 GHG emissions are larger than that estimated for Scope 2 emissions, with land clearing the largest source, accounting for 52 percent of the estimated total emissions. The estimated Scope 3 emissions from the Project predominantly relate to energy embodied in construction materials.

GHG emission will be managed in accordance with the Environmental Management Plan (EMP).

Air quality

Background levels of particulate matter in the region are influenced by a range of anthropogenic and natural sources. According to the 2023 Air Quality Monitoring Report for Queensland, the air quality in the Gladstone region was generally good, with no exceedances of the Air National Environmental Protection Measures (NEPM) standards for key pollutants such as CO, NO₂, SO₂, O₃, and lead. There were, however, occasional exceedances of particulate matter (PM₁₀ and PM_{2.5}) criteria, which were attributed to agricultural activities, bushfires, and dust storms. Overall, the air quality in these rural areas was within acceptable limits for most of the year.

The construction phase of the Project is expected to involve activities that may affect local air quality, primarily through dust generation. The operation/maintenance phase is anticipated to be localised and have a negligible effect on air quality. No sensitive receptors have been identified within 250 m of the MID Disturbance footprint. The overall risk to human and ecological receptors is deemed negligible, with any potential impacts unlikely to be significant.

Water resources

Surface water

The Project area is located in the Dawson River drainage sub-basin of the Fitzroy River Basin. The easement alignment crosses approximately 46 water features, 4 of which are third order (or higher) streams. Off-easement access tracks cross an additional 7 water features. Most streams flow west towards the Dawson River (approximately 32 km west from the nearest point along the MID Proposal Area), with two water features flowing in a northeastern direction towards the Don River (approximately 48 km north of the Mt Benn Substation).

Vegetation clearing and earthworks for the Project have the potential to influence bank stability and erosion, which can increase turbidity, sedimentation, and nutrients in downstream water features. An Erosion and Sediment Control Plan (ESCP) will be developed by construction contractors in line with IECA Best Practice Erosion and Sediment Control Guidelines (IECA 2008) and the EMP.

Stream flow in the Project area is highly variable and seasonal, with many water features being intermittent. The Dawson-Fitzroy catchment has experienced severe flooding on average once every 10 years. The transmission alignment intersects one floodplain area as it traverses across Castle Creek.

Powerlink transmission line structures are designed to span water features and withstand inundation of the foundations by water and excessive wind conditions. When the transmission line is unable to span water features, towers are designed to be outside of overflow channels, and to withstand expected peak flow velocities. These structures will not impede peak flows during storm events or reduce floodplain storage capacity.

There is a potential risk of fuels, oils, herbicides and other chemicals needed for construction and maintenance activities to spill and enter water features, impacting water quality, aquatic ecology and other environmental values. The EMP outlines procedures for the storage of chemicals and hydrocarbons, and appropriate containment and spill response procedures.

Groundwater

The excavation and construction of foundations for the transmission line towers could result in a short-term localised interference with groundwater, if present. Where groundwater is encountered active dewatering may be required within the excavated area until the works are completed. Dewatering will occur in line with a dewatering method, prepared specifically for the Project.

Protected areas

The Project does not traverse any protected areas as defined by the *Nature Conservation Act 1992* (NC Act). Though, protected areas can also include areas managed for production of forest resources, such as State forests. The Belmont State Forest, protected under the *Forestry Act 1959*, is located to the east of the Project area and is mostly comprised of remnant vegetation.

The Project does not directly impact Belmont State Forest and indirect impacts (e.g. noise and dust) are anticipated to be negligible. Mitigation measures are outlined in the EMP.

Flora

Most of the Study area (5, 275 ha (89.2 percent)) has been previously cleared for agriculture and grazing leaving a landscape dominated by pasture grasslands with scattered native trees and regrowth present as small, isolated pockets of vegetation. Field verification surveys confirmed the presence of 10 remnant regional ecosystems and four high value regrowth regional ecosystems across the Study area. Six of these are subject to vegetation clearing activities. A total of 192 flora species were identified. No threatened flora species listed under the NC Act or EPBC Act were recorded.

Where feasible, the Project has followed the general principles for impact mitigation of avoidance, minimisation, mitigation and compensation. Determination of the MID Disturbance footprint has avoided impacting remnant vegetation and habitats to the greatest extent possible by incorporating design measures such as scalloping or spanning over sensitive vegetation. Approximately 7.7 ha of field verified regulated vegetation (remnant and regrowth regional ecosystems) would be removed as a result of the Project. Where vegetation clearing is unavoidable, clearing activities will be managed in accordance with the measures outlined in the EMP.

Fauna

Field verification surveys confirmed nine different habitat types across the Study area. A total of 81 fauna species were recorded in the Study area, including eight amphibians, 42 birds, 22 mammals (including 13 species of microbat identified from microbat call analysis), one fish and eight reptiles. The Squatter Pigeon (*Geophaps scripta scripta*) (Vulnerable under the NC Act and EPBC Act) was recorded adjacent to the Study area and personal communications with local landholders indicates they are a common occurrence in the Locality. The Short-beaked Echidna (*Tachyglossus aculeatus*) (Special least concern under the NC Act) was also recorded during the field surveys. An additional nine threatened and/or migratory fauna species listed under the NC Act (and/or EPBC Act) have been assessed as having a moderate to high likelihood of occurrence within the Study area, despite not having yet been recorded.

To avoid unnecessary impacts to species' habitats throughout the construction phase of the project, low-risk species management programs (SMP) will be implemented along with high-risk SMPs for Squatter Pigeon, Corben's Long-eared Bat, Greater Glider and Yellow-bellied Glider.

Matters of National Environmental Significance

Threatened ecological communities

The Brigalow (*Acacia harpophylla* dominant or co-dominant) threatened ecological community (TEC), listed as Endangered under the EPBC Act, was field-verified within five separate patches within the Study area, comprising regional ecosystems RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains) and RE 11.12.21 (*Acacia harpophylla* open forest on igneous rocks. Colluvial lower slopes).

A total of 43.3 ha of Brigalow (*Acacia harpophylla* dominant or co-dominant) TEC is present within the Study area, of which 1.4 ha (associated with Patch 4 – RE 11.3.1) is within the Project area. The Project has been designed to avoid this patch (i.e. vegetation can be spanned without clearing) and as such the Brigalow (*Acacia harpophylla* dominant or co-dominant) TEC will not be directly impacted by the Project.

Threatened species

The MNES threatened species assessed as being at risk of Project-related impacts and requiring significant impact assessments in accordance with the Matters of National Environmental Significance, Significant Impact Guidelines 1.1 (Significant Impact Guidelines) were:

- Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable)
- Greater Glider (southern and central) (*Petauroides volans*) (Endangered)
- Koala (combined Queensland, NSW, ACT) (*Phascolarctos cinereus*) (Endangered)
- Squatter Pigeon (southern) (*Geophaps scripta scripta*) (Vulnerable)
- Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) (Vulnerable).

The significant impact assessments determined that the Project will not result in a significant residual impact on MNES threatened species within the meaning of the Significant Impact Guidelines.

Biosecurity

Field survey identified seven invasive flora species and five introduced fauna species within the Project area. Potential biosecurity impacts from the Project include the introduction of weeds, edge effects, and habitat degradation.

With the implementation of management strategies, the overall risk of habitat modification due to weed invasion is expected to remain low. Similarly, the likelihood of the Project contributing to the establishment of pest animal species in previously unaffected areas is also considered low.

Land use, existing infrastructure, and Native Title

The Project (including proposed access tracks) traverses 18 freehold land parcels, one lands lease land parcel and eight road parcels.

The Project area is zoned 'rural' within the Banana Shire Planning Scheme 2021, with a land use intent of maintenance of rural character and amenity. The proposed transmission line and substation will change the current land use from agricultural to infrastructure.

Most of the Project area is located across land classified as Class C agricultural land under the agricultural land classification scheme (DSITI & DNRM 2018), which is not suitable for crop production. As such, it is unlikely the Project will significantly impact agricultural land and operations. Grazing can still occur under the transmission line, and modifications, such as increasing the height of transmission wires, can be made to minimise impacts to farming practices. Powerlink is committed to reducing and mitigating impacts to the surrounding land use and will continue to collaborate with all landholders and stakeholders throughout the construction and operation of the Project.

The Project area traverses the Wulli Wulli People's and the Wulli Wulli People #3's Native Title claim. Wulli Wulli People #3 have an active non-exclusive title registered in the north-west portion of the Project area. Wulli Wulli People have a non-exclusive title registered in the southern portion of the Project area. In the northern portion of the Project area, there is a dismissed native title claim belonging to the Gaangalu Nation People.

Powerlink will comply with the requirements of the Native Title Act to secure an easement for the transmission line.

Visual amenity

The Project lies in a rural area comprising isolated farmsteads, rural rangelands used predominantly for cattle grazing, and areas of forested and natural landscapes. The area surrounding the Project area is sparsely settled. Landform across the Project area and wider landscape is varied. In the east lies the elevated Banana Range (550 m AHD) on which the Belmont State Forest is located. The foothills of the Banana Range and western side of the Project area is relatively flat, with several knolls scattered throughout the landscape.

The likely visual impact of the Project area is anticipated to be from the introduction of transmission towers and conductors to nearby residential properties, the Dawson Highway, between Moura and Biloela, and within Belmont State Forest. There are ten residences within 2.5 km of the transmission line, with the closest being approximately 650 m away. The transmission line has been designed to minimise its visual impact and, in most instances, the surrounding vegetation and topography of the landscape will screen the proposed transmission line from visual receptors.

Social and economic

Given the sparse population within the Project area, the Project is not anticipated to have a significant impact on the socio-economic profile of the area during the construction or maintenance/operational phases of the Project. At the peak of construction, it is estimated that a workforce of 145 people will be required for which local short-term accommodation will be sourced. Workers will travel to the Project area during the operational phase to undertake maintenance activities but it is short-term and temporary in nature.

Powerlink will continue to work closely with landholders prior to and during the construction period to address any concerns and ensure they are informed of upcoming Project activities. Acquisition of the transmission line easements and substation site for the Project will be undertaken in accordance with the *Acquisition of Land Act 1967*. Compensation will be paid to landowners directly affected by the Project.

The construction of this electricity transmission infrastructure will assist and support the region's economic development into the future.

Indigenous cultural heritage

No registered historical or Aboriginal heritage sites were identified by Niche in the desktop cultural heritage assessment. However, the absence of recorded sites may reflect a lack of previous archaeological investigations rather than a lack of cultural significance. The Project area contains remnant vegetation and varied land use types indicating a landscape that has undergone substantial transformation since colonial settlement in the 1850s, primarily for agricultural purposes.

To minimise potential impacts to unidentified cultural heritage items, care should be taken to avoid works within waterways and remnant vegetation, which are classified as Category 5 under the Duty of Care Guidelines and require cultural heritage assessment and engagement with relevant Aboriginal parties. For areas assessed as Category 4, while formal engagement is not mandatory, it is recommended that discussions with the relevant Aboriginal party occur to ensure cultural considerations are addressed.

All site personnel should receive a cultural heritage induction prior to commencing work, including procedures for managing unexpected finds or the discovery of human remains.

Non-indigenous cultural heritage

No places of non-indigenous cultural heritage were identified from statutory or non-statutory databases, within or adjacent to the Project area. Though, the absence of evidence may be a result of a lack of previous assessments within the Project area. The Project should proceed with caution ensuring an unanticipated finds procedure is in place for the unexpected discovery of historical heritage items.

Transport and traffic

A traffic impact assessment was conducted for the Project.

During the construction phase, the Project is expected to generate a peak daily traffic volume of approximately two heavy vehicle and 121 light vehicle trips (in and out), with the same maximum peak hour flow. In the operational phase, traffic generation is minimal, averaging three light vehicle trips per day. This level of activity is considered negligible in terms of impact on the state-controlled road network.

Although increases in daily traffic volumes on the Dawson and Leichhardt Highways may exceed 5 percent due to low existing background volumes, the impact on link capacity is negligible, with no change to the operational Level of Service (LoS). Similarly, increases in Standard Axle Repetition with a load damage exponent of 4 (SAR4s) during the construction year remain below 5 percent of annual SARs. While turn movements at key intersections, Dawson Highway/Leichhardt Highway, Leichhardt Highway/Uncle Toms Road, and Leichhardt Highway/Defence Road, may increase by more than 5 percent, the low baseline volumes mean that intersection performance remains unaffected, with no change in operational LoS.

No dedicated public or active transport infrastructure is located near the Project site, and the minor increase in traffic volumes is not expected to impact transport services in regional centres along the Dawson and Leichhardt highways.

Although the construction phase introduces a potential increase in road safety risks due to elevated traffic volumes, these risks can be effectively mitigated through measures outlined in the EMP and development of a Traffic Management Plan.

Noise and vibration

Existing background sources of noise within the surrounding area include domestic and farm, road traffic noise particularly from the Leichhardt Highway and Dawson Highway and natural sources such as birds and insects, and wind and weather events.

Noise impacts during construction of the Project are likely to be associated with site preparation activities, assembly of transmission line structures, concrete trucks for structure footings, vehicle movements and activities at laydown areas (loading/unloading of material). During the construction phase, elevated noise levels can be expected at locations close to the work areas and/or in vicinity of the roads used for access. All sensitive receptors are located beyond the setback distances for noise generating construction equipment, and therefore compliance with noise criteria during construction is expected to be achieved. Impacts from construction activities will be managed in accordance with the general requirements of the EMP.

During construction, the only vibration-intensive works expected to take place would be pile boring and the use of vibratory rollers for construction of structure footings. As there are no residential properties within the safe working distances, there will likely be no vibration impacts to sensitive receptors.

Operation and maintenance of the transmission line should have minimal impacts on ambient noise levels. During the operational phase, ariel (via drones) and/or vehicular maintenance inspections of the proposed transmission line will be conducted. Audible noise from operation of the transmission line (wind on the line and transmission structures and corona discharge) and the substation are unlikely to be noticeable at the closest sensitive receptors. The substation may emit a humming noise, which results from vibrations caused by expansion and contraction of the transformer core. Transformers installed in the substation must meet noise limits under various loading conditions and be tested in accordance with Australian Standard AS 2374 – Power Transformers. Noise reduction measures may be implemented such as noise barriers, enclosures and land buffers if noise becomes a problem to surrounding sensitive receptors.

Hazards, health, and safety

The Project will comply with all relevant legislation, including the *Electrical Safety Act 2002*, the *Work Health and Safety Act 2011*, and the *Work Health and Safety Regulation 2011*. A preliminary risk assessment has been undertaken to identify potential health, safety, and environmental risks associated with the construction, operation, and decommissioning phases. A comprehensive construction risk assessment will be conducted to identify critical controls and ensure residual risks are maintained at acceptable levels. This assessment forms part of an ongoing risk management process that will be implemented throughout the Project lifecycle. Proposed mitigation measures will be incorporated into the detailed design and construction planning to ensure safe and compliant Project delivery.

Electric and magnetic fields

Electric and magnetic field (EMF) levels expected from the Project were assessed against the reference levels for public exposure. The assessment found that both electric and magnetic field strengths associated with the proposed 275 kV transmission line are well below the ICNIRP limits at the edge of the easement.

Bushfire risk

While the majority of the Project area is not classified as bushfire-prone, the northern sections of the Project area intersect areas mapped as having very high, high, and medium bushfire risk. Vegetation clearing is expected to reduce bushfire hazards and contribute to lowering the overall risk in these areas.

Following a detailed assessment, Powerlink's standard fire prevention and mitigation measures, outlined in the On-site Fire Prevention Procedure and Bushfire Mitigation Procedure (ASM-PLN-A3285085), have been deemed appropriate for the Project. These measures will be implemented alongside those specified in the EMP throughout both construction and operational phases.

Waste management

The Project aims to align with the objectives of the Queensland Waste Management Strategy (Queensland Government undated), developed under the *Waste Reduction and Recycling Act 2011*. This Strategy outlines a long-term vision for sustainable waste management across the state.

During construction, anticipated waste types include green waste, general waste, regulated waste, and wastewater. These will be managed in accordance with the waste and resource management hierarchy and Powerlink's standard environmental controls, with a focus on avoidance and minimisation. A comprehensive Waste Management Plan will be developed by the construction contractors prior to the commencement of construction. Waste management during operation and maintenance is undertaken in accordance with Powerlink's standard environmental controls, detailed in the EMP in Chapter 23 (Waste management).

Cumulative impacts

There are several major energy and resource projects proposed within the vicinity of the Project area. Depending on the timing of each project, these are likely to result in a range of incremental impacts. These include dust impacts from the use of local unsealed roads for the transport of machinery, materials and personnel and short-term noise impacts resulting from construction and vegetation clearing. Other impacts include the increased cumulative traffic volumes from construction of these projects which can result in increased loads and wear on the region's existing State-controlled road network, as well as local roads providing access to project sites.

Depending on the timing of construction of the proposed projects, there is the potential for short-term shortage of labour and accommodation in the region. These accommodation shortages have potential to inflate accommodation costs and reduce affordability for locals or tourists, and affect accommodation availability for social and/or community events.

Environmental management

Powerlink is committed to the protection of the environment, which includes avoiding, minimising, mitigating, and managing adverse environmental impacts from its activities.

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

Community and stakeholder consultation

Powerlink is committed to fostering meaningful and effective engagement with stakeholders and landholders. This commitment is guided by Powerlink's Stakeholder Engagement Framework.

Throughout the consultation process to date, Powerlink has actively considered and addressed key issues raised by stakeholders. Where appropriate, formal agreements have been established with stakeholders and landholders to support collaborative outcomes. As part of the public consultation process for this report, Powerlink continues to engage directly with landholders, Traditional Owner groups, the broader community, and other stakeholders.

1 Introduction

Chapter 1 provides a broad overview of the Theodore Wind Farm Connection Project, identifies the Project proponent, and outlines the assessment approach used to prepare this Ministerial Infrastructure Designation (MID) proposal. The structure of the MID proposal is also presented.

1.1 Project overview

RWE Renewables Australia (RWE) are seeking to establish the Theodore Wind Farm, an 1,100-megawatt (MW) renewable energy facility, and 200-MW battery energy storage system (BESS) located approximately 22 kilometres (km) east of the township of Theodore, 50 km south-west of Biloela and 150 km south-west of Gladstone.

Powerlink Queensland (Powerlink), a transmission entity under the *Electricity Act 1994* (Electricity Act), owns, operates and maintains Queensland's high voltage electricity transmission network. Powerlink has been engaged by RWE to provide a connection for the Theodore Wind Farm to the transmission network.

The Theodore Wind Farm Connection Project (the Project) includes:

- a proposed 275 kilovolt (kV) substation, to be known as the Castle Creek Substation, located within the proposed Theodore Wind Farm
- construction of a new double circuit 275 kV transmission line extending approximately 55.4 km north of the Theodore Wind Farm to a new substation to be constructed at Mt Benn. The Mt Benn Substation is part of the Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and does not form part of Theodore Wind Farm Connection Project. The proposed transmission line will be positioned within a new 60 m wide easement.

1.2 Project proponent

The Project owner, developer, operator and maintainer 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 1993* and is a transmission entity under the 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 Queensland's primary role is to provide a secure and reliable network to transport high voltage electricity from generators to electricity distribution networks owned by Energex, Ergon Energy (Ergon) and Country Energy, which supply 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 NSW/QLD Interconnector.

1.3 Legislative framework

1.3.1 *Electricity Act 1994 and Electrical Safety Act 2002*

Powerlink's operations are guided by the Electricity Act and the *Electrical Safety Act 2002* (Electricity Safety Act). The Electricity Act sets out the requirements that all electricity industry participants must follow to ensure a safe, efficient and reliable supply of electricity. It also requires the supply of electricity 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 Electricity Safety Act seeks to prevent through regulation, the death, injury and destruction that can be caused by electricity. Accordingly, the purpose of the Electricity 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 Electricity Safety Act.

1.3.2 *Ministerial Infrastructure Designation*

State approval for the Project is being sought via the MID process under the *Planning Act 2016* (Planning Act).

1.3.2.1 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 a type of infrastructure. The process provides infrastructure entities a streamlined, considered whole-of government response on a request for infrastructure.

Three statutory instruments support the infrastructure designation function, namely:

- Planning Act, which includes provisions for making, amending, extending or repealing infrastructure designations
- Planning Regulation 2017 (Planning Regulation), which identifies the types of infrastructure that may be designated
- Ministers Guidelines and Rules (MGR), which includes processes for making or amending ministerial designations (Chapter 7 of the MGR).

Section 35 of the Planning Act identifies that the Planning Regulation describes the types of infrastructure that may be designated by the Minister. Schedule 5, part 2, item 7 of the Planning Regulation identifies 'electrical operating works', being operating works under the Electricity Act, as infrastructure which may be designated.

Section 36 of the Planning Act provides criteria for making infrastructure designations, stating:

- 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 for the efficient and timely supply of infrastructure as it will enable:

- the delivery of the recently released Queensland Government's Energy Roadmap
- the continued provision of electricity to meet the anticipated population and economic growth and enhance and service the liveability of the Banana Shire region, Gladstone region and Central Queensland.

To make a designation under section 36 of the Planning Act the Minister must also be satisfied that adequate environmental assessment, including adequate consultation has been carried out in relation to the Project. This MID proposal has been developed to address the MGR requirements prescribed under the Planning Regulation to satisfy the requirements of the Minister.

1.3.2.2 Intent of designation

The infrastructure designation will affirm the Project as a site for electricity operating works and will provide a streamlined, considered whole-of-government response, which avoids the need for later approvals under the Planning Act. Delivery of the Project via the MID process will support the fulfillment of Powerlink’s legislative obligations as a transmission authority under section 31 of the Electricity Act including that ‘the transmission entity must properly take into account the environmental effects of its activities under the authority’.

1.3.2.3 MID proposal process

The MGR specifies the need for an infrastructure entity to prepare a MID proposal in support of an application for a MID. For the purpose of this MID proposal, ‘environment’ is defined in section 8 of the *Environmental Protection Act 1994* (EP Act) and includes:

- 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 proposal considers the potential environmental effects relating to the construction, operation, maintenance and eventual decommissioning of the Project. In particular, this MID proposal:

- identifies the environmental values within the Project area
- assesses the potential impact of the Project, during construction, operation and decommissioning, on those environmental values
- identifies management and mitigation measures to avoid or minimise potential impacts.

Chapter 7, part 1 of the MGR outlines the process for making a MID in accordance with section 36(3) of the Planning Act. This process is illustrated in Figure 1.1 and outlined further in the Queensland Government’s Making or Amending a Ministerial Infrastructure Designation (MID) Operational Guidance (Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) 2021).

Process for making a Ministerial Infrastructure Designation (MID), and making an amendment to a MID (not a minor amendment)



Source (Queensland Treasury 2020)

Figure 1.1 Ministerial Infrastructure Designation process

Table 1.1 provides an overview of the MID process along with the status of the Project.

Table 1.1 Ministerial Infrastructure Designation process

Step	Description	Project status
1 Initial advice	An Initial Advice Request (IAR) was submitted to the Department of State Development, Infrastructure and Planning (DSDIP) in March 2025 to confirm the Project detail and seek pre-lodgement advice. A pre-lodgement meeting was held with representatives from DSDIP on 14 April 2025. DSDIP provided pre-lodgement advice for the Project on 5 June 2025 which included a summary of relevant matters based on the supporting information provided in the IAR. The pre-lodgement advice is included as Appendix A.	Complete
2 Preliminary stakeholder engagement	Powerlink commenced engagement with directly affected landowners and key Project stakeholders with their input being critical to Powerlink's understanding of the key issues for the Project. Feedback from stakeholders has helped guide the location of the recommended corridor and MID Proposal Area. A Draft Corridor Selection Report (CSR) was released for public review and comment on 28 October 2024, with the period for feedback closing on 29 November 2024 (refer further to Chapter 27 (Community and stakeholder engagement)). Feedback was reviewed and considered, and outcomes were provided in the Final CSR. The Final CSR was released in February 2025. A copy of the Draft and Final CSRs can be found at: Theodore Wind Farm Connection Project Powerlink Preliminary stakeholder engagement, along with results of field studies, has also informed the location of the 60 m wide MID Proposal Area within the recommended corridor.	Complete
3 Endorsement to lodge a MID proposal	Following preliminary stakeholder engagement and prior to seeking a MID, Powerlink must write to the Minister seeking their endorsement to lodge a MID proposal (endorsement request). The purpose of the endorsement step is to ensure entities only progress to preparing a MID proposal where it is considered that a MID is the appropriate planning assessment pathway for the proposed infrastructure. The endorsement request was submitted by Powerlink to the Minister on 11 September 2025 and the endorsement receipt received on 21 November 2025.	Complete
4 Lodgement of MID proposal	Following the receipt of endorsement to lodge a MID proposal, Powerlink is required to prepare the material identified in schedule 3 of the MGR, and any additional material outlined in the initial advice received in step 1. This information is provided within this MID proposal, which has been drafted in accordance with chapter 7 of the MGR. The MID proposal was submitted to DSDIP late November/early December 2025.	This document
5 Consultation by Minister	Following receipt of the MID proposal, the Minister will commence consultation by writing to the local government and the landowner/s, inviting submissions on the MID proposal.	Future step

Step	Description	Project status
6 Consultation by Entity	Powerlink has developed a consultation strategy for the Project and has undertaken extensive preliminary consultation with stakeholders and the community. Engagement activities and outcomes from the preliminary stakeholder engagement are outlined in Chapter 27 (Community and stakeholder engagement). In line with the pre-lodgement written advice provided by the Minister (refer Appendix A), further consultation is not required, where engagement with stakeholders has already been undertaken. Powerlink will be responsible for undertaking formal consultation on the Project. This formal consultation will include a 20 business day public consultation period and include as a minimum: sign(s) on the land, a notice in the paper and letters to surrounding landowners, elected representatives and Native Title and/or Aboriginal or Torres Strait Islander party/parties for the area. Requirements for the formal consultation stage will be determined following endorsement to lodge a MID proposal. Submissions regarding the proposed MID must be made to the Minister.	Commenced and future step
7 Consideration of submissions	Following Powerlink advising the Minister of the completion of consultation, the Minister must give Powerlink a copy of any submissions received, or a notice that no submissions were received. After considering any submissions, Powerlink must provide to the Minister evidence of consultation undertaken, a summary of the matters raised in the submissions and how these matters have been addressed.	Future step
8 State agency comments	While consultation is being undertaken in step 6, DSDIP will seek comments on the entity's proposal from state agencies as relevant. The Minister will provide Powerlink with any state agency comments the Minister determines should be responded to by Powerlink at the same time as the Minister provides the entity with a copy of any submissions received during consultation on the MID. Powerlink must provide the Minister with a summary of how any state agency comments provided have been addressed as part of the summary of matters raised in submissions.	Future step
9 Change to the entity's proposal	If a change is made to the proposed infrastructure (that is considered to warrant further consultation), either as a consequence of a submission made during consultation or another circumstance, or where the Minister determines that consultation wasn't adequately completed, further consultation may apply to the proposal. Following the completion of any subsequent consultation by Powerlink, Powerlink will again be provided with a copy of any submissions for their consideration, and the entity must again give the Minister a summary of the matters raised in the subsequent consultation, and how these matters have been addressed.	Future step
10 Decision by the Minister	The Minister makes a decision whether to grant designation under section 37 of the Planning Act. The decision notice and gazette notice is to be provided by the Minister to relevant stakeholders and made publicly available.	Future step

1.4 Assessment approach

The assessment approach taken to support the proposed MID for the Project and to inform preparation of this MID proposal is as follows:

- **Desktop GIS analysis:** Characteristics of the study area were initially identified via a desktop review of available electronic mapping and database resources. This included Commonwealth, State and local government sources that provide information in relation to the physical, natural and social/human environment. A variety of web-based sources was used to conduct reviews of various constraints.
- **Corridor selection:** A recommended corridor for the Project was determined, based on the process described in Section 2.4 of this MID proposal. Building upon the earlier corridor analysis undertaken by RWE, Powerlink carried out technical assessments on the corridor alternatives and preferred corridor to ensure suitability for accommodating the proposed transmission line. Powerlink's assessment of RWE's preferred corridor ensured that social, environmental and economic objectives of the Project achieved a balanced overall outcome. Feedback on the preferred corridor was sought via release of the Draft and Final CSRs for public review and comment (refer to Chapter 27 (Community and stakeholder engagement)).
- **Ecological field assessment:** Ecological field surveys of the recommended corridor were undertaken from 3 to 6 February 2025; 18 to 21 February 2025; and 26 to 29 May 2025 (refer Chapters 9 (Flora) and 10 (Fauna) for details). The objective of the field surveys was to confirm the nature and extent of ecological constraints and verify the outcomes of the desktop assessment.
- **Stakeholder consultation and notification of adjacent landholders:** Powerlink has undertaken tailored engagement activities with identified stakeholders and landholders (i.e. letters to directly affected landholders, adjacent landholders, and state and local government authorities; emails to renewable energy proponents; local advertisements; social media; and drop-in sessions and engagement on the Draft and Final CSRs) to comply with MID requirements. Engagement activities will be ongoing throughout the Project delivery (refer Chapter 27 (Community stakeholder engagement)).
- **Easement alignment:** Results of the field survey and stakeholder consultation were used to inform development of the 60 m wide easement alignment for the Project. This area corresponds with the MID Proposal Area.
- **Initial Advice Request report:** An Initial Advice Request (IAR) was submitted to DSDIP in March 2025 which triggered the commencement of the MID process for the Project. Following the submission of the IAR, Powerlink received pre-lodgement advice (refer to Appendix A) from DSDIP. The pre-lodgement advice provides a summary of relevant matters for Powerlink to consider in preparing this MID proposal.
- **MID proposal preparation:** This MID proposal has been prepared to support a MID for the Project. It has been prepared in accordance with the MGR and the pre-lodgement advice received from DSDIP. It includes details of the Project; an assessment of environmental, social and economic impacts; and outlines the measures to be implemented to avoid, mitigate and compensate for negative impacts.
- **MID proposal consultation and submission response:** Following public consultation on the MID Proposal Report, Powerlink prepared a report to document responses to community, agency and Council submissions. Feedback informed updates to environmental assessments, approval pathways, mitigation measures and Project design. The report demonstrates how consultation outcomes have been taken into account in the ongoing assessment and development of the Project. Based on this response report, this MID proposal has been updated to reflect the latest information and Project refinements following the submissions.

1.4.1 Information sources

Applicable environmental and planning legislation, previous assessments for the Project area and information held on government databases have been considered in this MID proposal. The following sources have been consulted in preparing this MID proposal:

- Previous reports:
 - Banana Range Wind Farm Planning Report (AECOM Australia Pty Ltd 2019)
 - Banana Range Wind Farm Ecological Assessment (NGH Environmental 2019)
 - Theodore Wind Farm Connection Project – Draft and Final Corridor Selection Reports ([Theodore Wind Farm Connection Project | Powerlink](#))
 - Theodore Wind Farm Ecological Assessment Report (Environmental Resources Management (ERM) Australia Pty Ltd 2024a)
 - Theodore Wind Farm Planning Report (ERM 2024b)
 - Dawson Wind Farm Significant Impact Assessment Report (GreenTape Solutions 2025).
- Applicable mapping layers in:
 - Protected Matters Search Tool (PMST)
 - Queensland Globe
 - GeoResGlobe
 - Queensland Government Development Assessment Mapping System (DAMS)
 - Queensland Government State Planning Policy interactive mapping system (SPP IMS)
 - Banana Regional Council Planning Scheme 2021
- Geoscience Australia Portal
- Unexploded Ordnance (UXO) Mapping Application, Department of Defence
- Bureau of Meteorology (BoM) data
- Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism (DWATSIPM) Cultural Heritage Register and Database
- Heritage register searches that include World, National and Commonwealth Heritage Registers, Queensland Heritage Register and Local Heritage Registers
- Contaminated Land Register and Environmental Management Register.

1.5 Structure of the MID proposal report

Table 1.2 provides a detailed overview of the information addressed as part of each chapter of the MID proposal.

Table 1.2 Structure of the MID proposal

Report section	Description
Executive summary	Provides a summary of the Project and overall findings from the environmental assessment.
Chapter 1 – Introduction	Provides a brief summary of the Project, identifies the proponent and their role providing electricity within Queensland, outlines the legislative context of the designation process and the structure of the MID proposal.
Chapter 2 – Project justification and feasible alternatives	Provides a justification for the Project, with particular reference to the economic and social benefits, as well as an assessment of feasible alternatives for the location of the transmission line connection with respect to social, environmental and economic considerations.

Report section	Description
Chapter 3 – Project description	Describes the Project including background, program and relationship to other projects, details the land proposed to be subject to the designation and describes the infrastructure which is to be constructed and the method by which this would occur.
Chapters 4 to 25 – Assessment of matters	Assesses the potential environmental impacts of the Project to various environmental values and discusses likely management and mitigation measures to be employed to avoid and/or minimise these impacts. The matters included in the assessment are as follows: Chapter 4 – Land resources Chapter 5 – Climate and greenhouse gas emissions Chapter 6 – Air quality Chapter 7 – Water resources and hydrology Chapter 8 – Protected areas Chapter 9 – Flora Chapter 10 – Fauna Chapter 11 – Matters of National Environmental Significance Chapter 12 – Biosecurity Chapter 13 – Land use, existing infrastructure, and Native Title Chapter 14 – Visual amenity Chapter 15 – Social and economic Chapter 16 – Indigenous cultural heritage Chapter 17 – Non-indigenous heritage Chapter 18 – Transport and traffic Chapter 19 – Noise and vibration Chapter 20 – Hazards, health and safety Chapter 21 – Electric and magnetic fields Chapter 22 – Bushfire risk Chapter 23 – Waste management Chapter 24 – Cumulative impacts.
Chapter 25 – Environmental management	Provides an outline of Powerlink’s commitment to the achievement of environmental best practice and a summary of the Environmental Management Plan (EMP) prepared for the Project (refer to Appendix D).
Chapter 26 – Planning and approvals requirements	Provides an assessment of the Project against relevant state and local planning instruments and policies. Summarises the associated Commonwealth, state and local legislation and approval requirements which may apply to the Project.
Chapter 27 – Community and stakeholder engagement	Describes Powerlink’s Stakeholder Engagement Framework and the engagement activities undertake for the Project along with proposed future engagement activities.
Reference list	Provides a list of references used to compile the MID proposal.

Report section	Description
Appendices to the MID proposal	Appendix A: Pre-lodgement advice and MID checklist Appendix B: Project area and MID Disturbance footprint Appendix C: Environmental Management Register (EMR)/Contaminated Land Register (CLR) search results Appendix D: Environmental Management Plan Appendix E: Ecological Assessment Report (MID) Appendix F: Cultural Heritage Due Diligence Assessment Appendix G: Traffic Impact Assessment, including supporting assessment Memo Appendix H: Project assessment against applicable state interests and local planning zone outcomes.

1.6 Defined terms

The following are the defined terms used throughout the MID proposal:

- **Project:** The Theodore Wind Farm Connection Project comprising:
 - a proposed 275 kV substation, to be known as the Castle Creek Substation located within the proposed Theodore Wind Farm
 - the construction of a new double circuit 275 kV transmission line extending approximately 55.4 km north of the Theodore Wind Farm to a new substation to be constructed at Mt Benn. The Mt Benn Substation forms part of the Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and does not form part of the Theodore Wind Farm Connection Project.
- **Recommended corridor:** 1 km wide corridor in which the 60 m wide easement alignment is determined.
- **MID Proposal area:** The MID Proposal area is the area subject to assessment and approval under the MID process. It represents the designated planning footprint within which Project infrastructure and associated activities may occur and provides flexibility for detailed design refinement during subsequent Project phases.
- **Study area:** As defined by individual technical studies or by default the 1 km wide recommended corridor.
- **Project area:** The Project area is the broader area associated with the Theodore Wind Farm Connection Project and encompasses all land potentially required for the development, construction, operation and maintenance of the Project, including the transmission line corridor, substation site, access tracks and associated temporary and permanent infrastructure. It consists of:
 - the 60 m wide easement alignment between the proposed Castle Creek Substation and proposed Mt Benn Substation (55.4 km long by 60 m wide)
 - the Castle Creek Substation site (approximately 12 ha (445 m x 270 m))
 - off-easement ancillary infrastructure (including access tracks, laydown area and brake and winch sites).
- **MID Disturbance footprint:** The MID Disturbance footprint is the specific area of land anticipated to be physically disturbed by Project activities within the area subject to ministerial designation. This includes permanent infrastructure such as transmission towers, substations and access tracks (located within easement), as well as temporary disturbance areas required during construction, including laydown areas, construction compounds, brake and winch sites and temporary workspaces. The MID Disturbance footprint represents a subset of the MID Proposal area and forms the basis of the environmental impact assessments presented in the Project documentation. The Project area and MID Disturbance footprint are shown in Appendix B.

2 Project justification and feasible alternatives

Chapter 2 provides an assessment of the need and benefits of the proposed development. It outlines the options considered in the selection of the transmission line corridor and the process for determining the MID Proposal area and MID Disturbance footprint.

2.1 Project justification

Powerlink needs to reinforce its transmission network in the Gladstone area over the next 10 years. This is important to ensure an ongoing reliable and secure electricity supply to the region, as the largest load centre outside of south-east Queensland.

The Gladstone area's role in the wider power system is changing significantly. The eventual retirement of the Gladstone Power Station and the potential for electrification of local industry, means more generation from other parts of the state is needed to power the local economy. Powerlink is currently planning for a critical program of transmission upgrades, to ensure the safety and reliability of the electricity network as the region prepares for changes in how and where electricity is generated and increasing demand on the network.

In addition to Powerlink's role in developing and operating the high voltage network and associated infrastructure, Powerlink also provides electricity transmission services. This can include connecting large industry and also electricity generation projects (such as wind, solar farms, battery storage, and others) to the transmission network.

As the Transmission Network Service Provider (TNSP) in Queensland, Powerlink operates under the National Electricity Rules (NER) which define its obligation to connect generation projects to Queensland's electricity network. This means that Powerlink is obligated to connect any proponent (such as a generator) to the transmission network, provided they meet the relevant technical and regulatory requirements.

The Theodore Wind Farm project has now met these requirements, and RWE has engaged Powerlink to connect the Theodore Wind Farm to the transmission network. Once built, it will provide an important connection into the Calvale Substation, supplying renewable energy into the Gladstone region. This transmission connection also provides opportunity for other energy projects, to link with the new infrastructure (subject to planning and environmental approvals).

2.2 Theodore Wind Farm

RWE are seeking to establish the Theodore Wind Farm, a renewable energy facility located approximately 22 km east of Theodore, 50 km south-west of Biloela and 150 km south-west of Gladstone. Theodore Wind Farm is intended to generate approximately 1,100 MW of electricity and will comprise 170 turbines, a 240 MW BESS facility, ancillary buildings, and infrastructure. The Project would generate enough electricity to power about 500,000 Queensland homes.

A Development Application for Theodore Wind Farm was submitted in September 2024 to the State Assessment and Referral Agency (SARA) (2409-41961 SDA) for Material Change of Use and Operational Work – Renewable Energy Facility (Wind Farm and Ancillary Infrastructure) and Native Vegetation Clearing. In March 2025, the Theodore Wind Farm was included in the Commonwealth Governments inaugural Renewable Energy Priority List. The priority list aims to provide coordinated support through Commonwealth, state and territory regulatory and environmental approval processes on a case-by-case basis and provide a faster approach to regulatory approvals.

The Development Application for the Theodore Wind Farm was approved, subject to conditions, on 20 June 2025. The Theodore Wind Farm Project is currently being assessed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) via a Public Environmental Report, the guidelines for which were published on 16 August 2024.

RWE has requested Powerlink to provide a connection from the Theodore Wind Farm to the electricity grid. The proposed transmission line and Castle Creek Substation (Theodore Wind Farm Connection Project) will facilitate a grid connection for the Theodore Wind Farm.

2.3 Theodore Wind Farm Connection Project (the Project)

The Theodore Wind Farm Connection Project includes:

- a proposed 275 kV substation, to be known as the Castle Creek Substation located within the proposed Theodore Wind Farm
- construction of a new double circuit 275 kV transmission line extending approximately 55.4 km north of the Theodore Wind Farm to a new substation to be constructed at Mt Benn. The proposed transmission line will be positioned within a new 60 m wide easement.

In late October 2024, Powerlink released a Draft Corridor Selection Report (CSR) that identified a 1 km wide corridor for the transmission line. Landholders, Traditional Owner groups, the community and other stakeholders were invited to provide feedback on the Draft CSR over a five-week consultation period. This feedback has helped guide the Final CSR and determination of the final corridor for the Project.

Since determination of the final corridor, detailed discussions have continued with directly affected landholders and other stakeholders, as well as further analysis and studies. This has included targeted investigations and the development of planning, design and construction considerations, to enable the refinement of the final 1 km wide corridor to a 60 m wide easement alignment for detailed assessment and consultation.

2.3.1 Project benefits

By connecting the Theodore Wind Farm to the electricity network, the Project will result in the following environmental and community benefits:

- the generation of clean energy from wind to create a strong generation profile complementing solar
- improve the reliability of electricity generation by inclusion of storage infrastructure to the fringe of the grid
- support agricultural land use through collaborative design iterations with landholder to minimise impacts on existing practices
- create employment opportunities (both direct and indirect) – the Project will require a workforce up to 145 jobs during construction at peak periods and support employment and economic growth during operations
- utilise local materials and skills where practical
- increase the potential for training and business opportunities in the region.

2.4 Feasible alternatives

Powerlink has undertaken studies to identify feasible network solutions to address the connection requirements between the Theodore Wind Farm and the proposed Mt Benn Substation.

2.4.1 Corridor selection process

As part of their initial project planning activities, RWE undertook preliminary desktop analysis and investigations into transmission corridor alternatives from a landholder, environment and constructability perspective, leading to the identification of a preferred corridor.

In 2024, RWE engaged Powerlink to progress work to connect the proposed Theodore Wind Farm to the electricity grid, which included consolidating work previously completed by RWE on the Project and progressing this work to the next stage. Building upon the earlier corridor analysis undertaken by RWE, Powerlink carried out technical assessments on the corridor alternatives and preferred corridor to ensure suitability for accommodating the proposed transmission line. To achieve this, the following main objectives considered when determining the transmission line connection were to:

- limit the number of land titles affected by the proposed infrastructure
- align with property boundaries where possible
- minimise impact to agricultural land and position transmission structures to cause minimal interference to farming operations
- maintain a safe distance from local and private airstrips
- utilise existing road network where feasible
- cross major roads at perpendicular angles
- minimise impact on sensitive ecological areas (remnant vegetation, threatened ecological communities (TECs), protected areas and state forests) and Aboriginal cultural and heritage sites and areas
- position the transmission structures and wires to cause minimal interference to farming operations
- minimise the risk of bushfire induced multi-circuit outages of the infrastructure by avoiding insofar as possible high bushfire severity areas or taking other precautionary measures
- minimise interaction with difficult topographical conditions
- minimise the number of waterways and floodplain crossings, and intersect at perpendicular angles where practicable
- maintain a relatively direct route and minimise the number of major bends required
- minimise areas of rocky and dispersive soils which may pose constructability risks.

The preferred transmission line connection is one which balances these objectives to achieve the best compromise between the constraints of the existing social, natural, and physical environment as well as the economic considerations relevant to the Project. Through this process, a recommended corridor was identified, which reflected the preferred corridor identified by RWE.

In October 2024, the Draft CSR was released for public feedback. Landholders, Traditional Owner groups, the wider community and other stakeholders were invited to provide feedback on the Draft CSR over a five-week consultation period. This feedback was reviewed and considered in developing the final recommended corridor for the proposed transmission line.

Following feedback received during the Draft CSR's consultation period in October and November 2024, two realignments were investigated by Powerlink:

- Northern section: This realignment occurs in the northern area and relates to the corridor alignment from the proposed Mt Benn Substation for an approximate distance of 1.3 km to the south where it rejoins the original recommended corridor. This area is constrained by existing land uses including grazing operations and associated farming infrastructure in the recommended corridor. Taking these identified constraints into consideration, relocating this corridor section to the west significantly reduces impacts in this area.

- Central section: This realignment occurs in the central area of the corridor surrounding Sawpit Creek. This area is constrained by existing land uses including various grazing operations. Following engagement with landholders, an alternative alignment was explored. This also reduces environmental impacts related to crossing Sawpit Creek. These considerations have resulted in this corridor section being relocated to the west.

The Final CSR that identifies a 1 km wide corridor was publicly released in February 2025.

The final 1 km wide corridor maintains the ability to:

- achieve a relatively direct route between the proposed Theodore Wind Farm and the proposed Mt Benn Substation
- involve a minimal number of properties
- minimise impacts on agriculture, cropping, and grazing lands
- be located a considerable distance from existing townships and major highways
- enhance opportunities for co-existence with other proposed renewable energy projects in the area.

The Draft and Final CSR's are available to view on Powerlink's website at [Theodore Wind Farm Connection Project | Powerlink](#).

2.4.1.1 Alternatives considered

Broader region

The area for the proposed transmission connection is naturally bounded by the Banana Range, Belmont State Forest, and surrounding forested areas to the east which present significant topographical constraints, in addition to collectively forming part of a broader area of protected vegetation. While corridor alternatives were considered on the eastern side of the Banana Range, they were deemed impractical due to the additional distance required for the transmission line, together with the increased complexities of construction and access, to avoid impacts to these naturally significant areas. Specifically, these locations were seen to create further substantial constraints, significant environmental impacts and increased economic impacts due to the cost associated with increased transmission line lengths and the terrain/constructability difficulties associated with undulating topography. As such, investigations into viable corridor alternatives were limited to the west of the Banana Range.

Alternatives to the west brought the Project closer to the Leichhardt Highway, a prominent tourist route throughout the region, as well to the existing township of Banana in the north-west. Smaller land sizes and residential land uses comprise much of the township and outskirts of Banana and collectively present a high social and visual constraint to the Project when compared with more open, larger land parcels used for farming or rural purposes. Given this, ensuring a considerable separation distance from Banana was also a key consideration in determining potential corridor options. In addition to the above, freehold land parcels vary in size throughout the locality with larger rural land holdings characterising much of the area adjacent to the Banana Range. These larger land holdings diminish to the west towards the Leichhardt Highway and north-west towards Banana and thus were an important consideration in the identification of corridors. A critical consideration was to limit the impact of the Project to as few residents and properties as possible. Bordering the locality to the north are a range of physical features including Powerlink's existing 132 kV transmission line, together with the Moura rail line and Dawson Highway. Further, given the physical location of the proposed Mt Benn Substation being south of the rail line and highway, the exploration of corridor alternatives further to the north and north-west were not considered practical, particularly given the location of the existing 132 kV transmission line and the potential to co-locate additional transmission infrastructure as a means of further reducing the social and economic footprint of the Project.

The conclusions of the desktop analysis of the broader region identified a more refined area of focus for the proposed corridor. In particular, several of the natural and physical constraints identified throughout the locality, including but not limited to the Banana Range, Belmont State Forest, highways and rail line, created distinct boundaries to the investigation area and thus the corridor selection process that was adopted for this Project. Subsequently, considerations for identifying a corridor were focused on areas west of the Banana Range, south of the Moura rail line and east of the Leichhardt Highway, with careful consideration given to the number, type and current land uses of any impacted properties. Further, emphasis was also placed on those parcels already earmarked for renewable energy projects as a means of co-locating such infrastructure.

Alternatives considered by RWE

As part of their initial project planning activities, RWE investigated the following corridor alternatives:

- A central corridor to the west of Mt Benn: Investigations concluded that whilst this option contained many outcomes as favourable as the identified recommended corridor, particularly in relation to environmental and economic outcomes, this option would have still resulted in impacts to additional properties and landholders. In addition, given the proximity of proposed renewable energy projects within the area, it was preferred to maximise the co-location opportunities with other large-scale infrastructure, afforded by the identified recommended corridor.
- A corridor to the west of Flat Top Mountain: Investigations identified that whilst the environmental outcomes were found to be better with this option (when taking into account opportunities to avoid impacts during the detailed design phase), there were greater impacts upon existing agricultural land uses (including mapped areas of strategic cropping land (SCL)) and wetlands, along with the most waterway crossings. Critically, this option was the longest and impacted the largest number of properties and landholders and thus had the potential to result in the most social impacts and disruption to existing land uses.

2.4.2 MID Proposal area and MID Disturbance footprint

The outcomes of the stakeholder consultation along with the results of the ecological field surveys were used to inform development of the 60 m wide MID Proposal area for the Project. Key factors considered when determining the easement alignment were proximity to residences, land use impacts, and impact on ecological values.

Throughout the course of this impact assessment a MID Disturbance footprint has been developed to minimise impacts to remnant vegetation to the greatest extent possible. Design factor considerations used to determine the MID Disturbance footprint are summarised in Table 2.1.

Table 2.1 Design considerations used to determine MID Disturbance footprint

Project component	MID Disturbance (clearing) footprint	Considerations
Transmission line (high risk spans)	60 m wide clearing in mid span where vegetation violations exist	Determined from Power Line Systems – Computer Aided Design and Drafting (PLS-CADD) and violation vegetation. LIDAR data is used to create plan and profile showing the height of vegetation in relation to height of conductor. PLS-CADD models the areas where vegetation intersects the clearance zone (i.e. 8 m vertical 7 m horizontal from maximum sag of conductor at maximum load on the hottest day of the year).
	30 m wide clearing in areas between tower pad and mid-span clearing	—
	No clearing (where vegetation can be spanned)	Maintaining safe electrical clearances
Transmission line (low risk spans)	50 m wide clearing in mid-span	Determined from PLS-CADD and violation vegetation
	24 m wide clearing in areas between tower pad and mid-span clearing	—
	No clearing (where vegetation can be spanned)	Maintaining safe electrical clearances

Project component	MID Disturbance (clearing) footprint	Considerations
Tower pad (high bushfire clearing risk or towers > 50 m)	50 m x 50 m	–
Tower pad (low bushfire clearing risk or towers < 50 m)	40 m x 40 m	–
Access tracks	Maximum clearing width 14 m	–
Laydown area	300 m x 250 m	One larger laydown area is proposed to service the entire alignment as opposed to multiple laydown areas with a nominal size of 60 m x 60 m.
Batch plants	60 m x 200 m	Incorporated in the laydown area
Conductor brake and winch sites	60 m x 50 m	–

The MID Disturbance footprint is shown in Appendix B.

2.4.2.1 Project Refinements and Updated Disturbance Footprint

Since lodgement of the MID Proposal, ongoing design development, environmental reviews and constructability assessments have resulted in refinements to the Project footprint. The primary changes to the disturbance footprint are associated with infrastructure micro-siting undertaken during preliminary design development and the inclusion of additional turn-in areas required to facilitate safe access to and from access tracks. These refinements were undertaken to optimise the Project layout, improve constructability and operational access, and, where practicable, avoid and minimise impacts on environmental values. This included refining the location of infrastructure and temporary work areas to reduce impacts on watercourses, native vegetation and other environmentally sensitive features, while maintaining the Project's technical and operational requirements.

The footprint updates to cadastral information following a Digital Cadastral Database (DCDB) correction resulted in minor alignment adjustments across several land parcels, including Lots 47 SP232217, 9 FN319, 12 FN321, 1 RL6869 and 11 FN293. These adjustments reflect updates to property boundary locations and resulted in localised shifts to the Project alignment of up to approximately 15 metres. The alignment refinements do not alter the overall Project intent or function and have been incorporated into the updated disturbance footprint presented in the revised mapping and assessment figures presented in this report.

The updated disturbance footprint serves as the basis for the revised environmental assessments in this addendum and reflects the most current design available at the time of assessment.

3 Project description

Chapter 3 describes the Project, which is subject to the proposed infrastructure designation and sets out the relationship of the Project to other infrastructure and development projects. It identifies the land proposed to be subject to the infrastructure designation, the infrastructure to be constructed, and the method by which construction is likely to occur. Operation, maintenance, and decommissioning requirements are also outlined.

3.1 Theodore Wind Farm Connection Project overview

The Theodore Wind Farm Connection Project (the Project) which forms this MID request includes development of a new Castle Creek Substation at the Theodore Wind Farm along with a double circuit 275 kV transmission line extending approximately 55.4 km north of the wind farm to a new substation to be constructed at Mt Benn. The Mt Benn Substation forms part of the Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and does not form part of the Theodore Wind Farm Connection Project.

In summary, the Project comprises the following components:

- a 275 kV substation proposed in the locality of Castle Creek, Queensland (the Castle Creek Substation). The substation footprint encompassing an area of 445 m x 270 m (12 hectares (ha))
- a 55.4 km 275 kV transmission line between Castle Creek Substation and Mt Benn Substation (the transmission line). The transmission line will be a double circuit configuration on self-supporting structures (steel lattice towers and/or poles) and located within a 60 m wide easement.

Since lodgement of the MID Proposal, the Project disturbance footprint has been refined through ongoing design development, environmental review and constructability assessments. Key refinements include infrastructure micro-siting, additional turn-in areas to facilitate safe access, and minor alignment adjustments resulting from updated cadastral information. These changes were undertaken to improve constructability and operational access while, where practicable, avoiding and minimising impacts on environmental values such as watercourses, native vegetation and other sensitive features.

Detailed descriptions, including construction, operation and maintenance, and decommissioning requirements, of the transmission line and substation are provided in Sections 3.5 and 3.6 respectively.

3.2 Project program

Approvals for the Project are expected to be completed in 2026. Subject to obtaining the necessary approvals, construction is anticipated to commence thereafter with an approximate 2 year duration. Transmission lines are designed for a 50-year in-service life and substation equipment for a service life in excess of 40 years with refurbishment scheduled every 15 years. The service life of both transmission lines and substation is very reliable under most conditions.

3.3 Site description

The Theodore Wind Farm Connection Project is located in the Banana Shire Council local government area, approximately 32 km east of Theodore and 23 km west/south-west of Biloela. The proposed easement alignment (MID Proposal area) for the transmission line is 60 m wide and 55.4 km long approximately, travelling in a northerly direction from the Theodore Wind Farm connecting to the proposed Mt Benn Substation, approximately 17 km north-east of Banana township. The easement alignment traverses the western foothills of the Banana Range crossing a number of

water features including Castle Creek, Lonesome Creek, Sawpit Creek, and Banana Creek. The Belmont State Forest is located immediately to the east of the easement alignment.

Under the Banana Shire Council Planning Scheme 2021 (Banana Shire Council 2021a), the broader area is identified within the Rural Zone, the intent of which is to preserve land for agricultural purposes and protect the rural character and amenity of the region. It also recognises the need to provide opportunities for compatible non-rural uses and for areas to be managed for their contribution to the economy, landscape character, and ecological values.

Land uses predominately comprise grazing with broadacre cropping found further to the west reflecting the large area of strategic cropping land (SCL) also present. The SCL areas identified, broadly correspond to land identified as Class A under the agricultural land classification scheme (Guidelines for Agricultural Land Evaluation in Queensland (DSITI & DNRM 2018)) and are defined as land that is suitable for a wide range of current and potential crops and worthy of protection from development due to their suitability for crop production.

There are no strategic environmental areas in proximity to the Project area. Residential properties are sparsely dispersed throughout the landscape.

3.3.1 Land tenure

Details of the property within the Project area are presented in Table 3.1 and shown on Figure 3.1. The proposed Castle Creek Substation is situated across Lot 18 DW550 and Lot 8 DW2.

Table 3.1 Details of properties within the Project area (south to north)

Lot/Plan	Tenure	Rights/interests	Property name	Project component
Lot 18 DW550	Freehold	N/a	Brindabella	Castle Creek Substation, access tracks
Lot 8 DW2	Freehold	N/	Glenleigh	Transmission line, Castle Creek Substation, access tracks, brake and winch site
Road parcel	Road	N/a	Unnamed	Transmission line, access tracks
Lot 1 RP617748	Freehold	N/a	Glenleigh	Transmission line, access tracks
Lot 2 RP617749	Freehold	N/a	Glenleigh	Transmission line, access tracks
Lot 4 SP131475	Freehold	N/a	Glenleigh	Transmission line, access tracks, brake and winch site
Road parcel	Road	N/a	Coates Road	Access tracks
Road parcel	Road	Local Government	Shawlands Road	Transmission line, access tracks
Lot 3 SP131475	Freehold	N/a	Brindabella	Transmission line, access tracks
Road parcel	Road	N/a	Sewells Walloon Road	Access track
Lot 11 SP322234	Freehold	N/a	Tarramba	Access track
Lot 2 SP131475	Freehold	N/a	Walloon	Access track
Lot 20 DW286	Freehold	N/a	Orana	Transmission line, access tracks
Road parcel	Road	N/a	L Anderson Road	Access track

Lot/Plan	Tenure	Rights/interests	Property name	Project component
Lot 6 DW447	Freehold	N/a	Glenhalvern	Transmission line, access tracks, brake and winch site, laydown area
Lot 16 DW284	Freehold	N/a	Barfield	Transmission line, access tracks
Road parcel	Road	N/a	Unnamed	Transmission line, access tracks
Lot 12 FN294	Freehold	Stock Route Strata Parcel (012 FN294) – Profit à Prendre (State of Queensland)	Brookleigh	Transmission line, access tracks
Lot 11 FN293	Freehold	N/a	Monkey Springs	Transmission line, access tracks
Lot 1 RL3869	Lands Lease	Strata / Temporarily Closed Road	Coupes Road	Transmission line, access tracks
Lot 12 FN321	Freehold	Strata Parcel (1 RL3869) – Lands Lease	Banana	Transmission line, access tracks, brake and winch site
Road parcel	Road	N/A	Coupes Road	Transmission line
Lot 9 FN319	Freehold	N/a	Lorella	Transmission line, access tracks
Lot 10 FN802236	Freehold	Banana Range Wind Farm	McGoverns	Access track
Lot 47 SP232217	Freehold	Easement APM346 (Powerlink) Easement BSP232217	Mountain View	Transmission line, access tracks
Lot 43 PM375	Freehold	Easement APM346 Easement CCP848651 Easement DCP848652 Easement BPM434	Mountain View	Access track
Road parcel	Road	N/A	Dawson Highway	Access track

All land parcels traversed by the Project are freehold tenure, apart from:

- Lot 1 RL3869, which is lands lease and subject to a Road Licence
- Lot 12 FN294, in the vicinity of Banana Creek, which is freehold but also profit à prendre tenure belonging to The State of Queensland (Represented by Department of Agriculture and Fisheries)
- Lot 12 FN321, which is freehold but also lands lease tenure associated with Strata Parcel 1 RL3869.

Named roads traversed by the Project are Banana Range Holdings/Coupes Road to the west of the Banana Range Wind Farm, Coates Road to the north of Castle Creek and Shawlands Road south of Lonesome Creek. Two unnamed roads are also traversed by the Project, as well as a public track to the south of Castle Creek. Numerous property access tracks are also present throughout the Project area.

3.4 Relationship to other infrastructure and land uses

Existing Powerlink infrastructure within the Project area is limited to the 132 kV transmission line between Moura and the Callide Power Station. The proposed easement alignment corridor for the Project crosses this Powerlink easement prior to connecting into the Mt Benn Substation.

The north-eastern portion of the easement alignment traverses the proposed Banana Range Wind Farm (EDF Renewables). The Mt Benn Substation proposed as part of Powerlink's Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and has become a common connection to both projects. The Dawson Wind Farm (EDF Renewables) and Sawpit Solar Farm (European Energy) are other proposed renewable energy projects, traversed by the MID Proposal area. The uniqueness of these potential renewable energy projects being located within close proximity, warranted further consideration during the corridor selection process to ensure a coordinated and integrated approach to corridor selection. In this regard, emphasis was placed on the potential to co-locate the corridor with proposed renewable energy projects to reduce the physical, environmental and social impacts of the transmission corridor.

The location of the proposed Banana Range Wind Farm, Dawson Wind Farm, and Sawpit Solar Farm in relation to the Theodore Wind Farm Connection Project is illustrated on Figure 3.1.

3.5 Transmission line

A 275 kV double circuit above ground transmission line is required to connect the Theodore Wind Farm to the Powerlink transmission network. Physical details of the transmission line are described in the following subsections along with details of the methods by which construction of the transmission is likely to occur. Operation, maintenance, and decommissioning requirements are also outlined.

3.5.1 *Physical details of the transmission line*

3.5.1.1 Aerial structures

Support structures are used to keep the high voltage conductors separate from each other and provide appropriate clearances from the ground and other obstacles. The requirements for minimum clearance between energised conductors and various types of obstacles are specified in the Electricity Safety Regulation 2013, which is subordinate legislation to the *Electrical Safety Act 2002*.

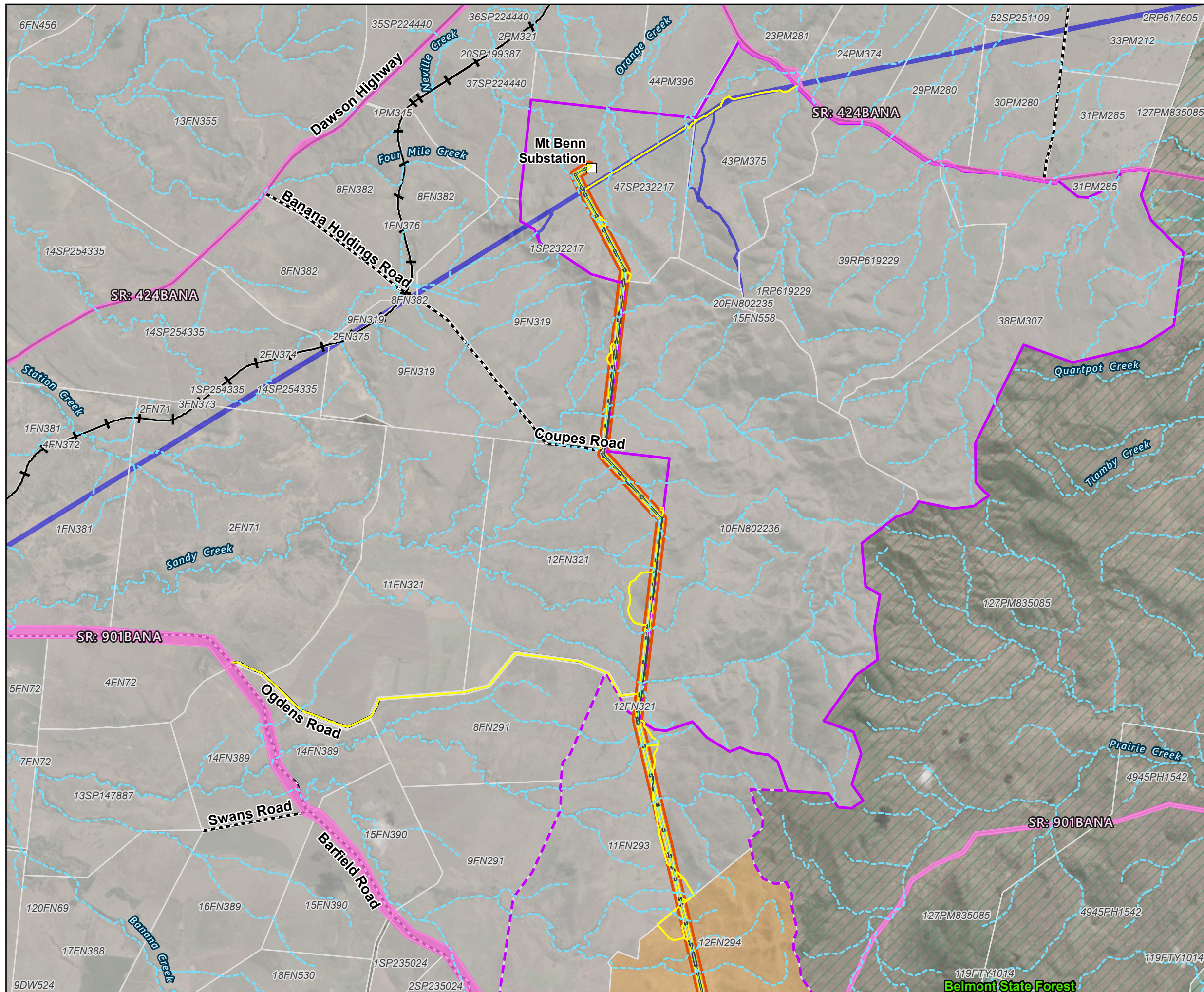
Structures are fabricated in a range of heights to allow optimum height to be provided at each site. The distance or span between structures and their height is determined by multiple factors including topography, average temperatures, sensitive environmental areas, clearance requirements, and structure loading limits. Typically, shorter structures are found on elevated areas such as hills, with taller structures in gullies, or where additional clearance is required over a mid-span obstacle such as a road. Transmission line structures for the Theodore Wind Farm Connection Project range from 42 m to 81 m in height with the average structure height being 56 m. The average span length between structures is 460 m.

Various designs of conventional self-supporting towers have been used in Queensland for over 50 years and are the standard form of support structure for high voltage construction observed throughout the state. For self-supporting towers, individual components are fabricated from galvanised steel angle sections (members) and steel plate and are assembled onsite. Individual foundations support the four legs of the tower. Either structure type can be raised or lowered in height (in 1 m increments) to ensure appropriate ground clearance.



PS218956
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Project

Figure 3.1
Property map and location of proposed
renewable energy developments



Legend

- Rail line
- Proposed Transmission Centreline
- Cadastre
- Project area
- MID Proposal area
- ▨ MID Disturbance footprint
- Mt Benn Substation
- Proposed Banana Range Wind Farm - Stage 1
- Dawson Wind Farm
- Water features

Roads

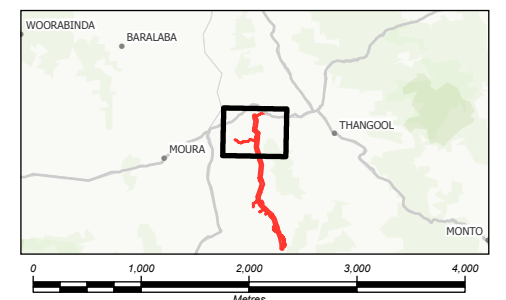
- Highway
- Local

Tenure

- Easement
- Freehold
- ▨ Lands Lease
- Profit à Prendre
- State Forest

Stock routes

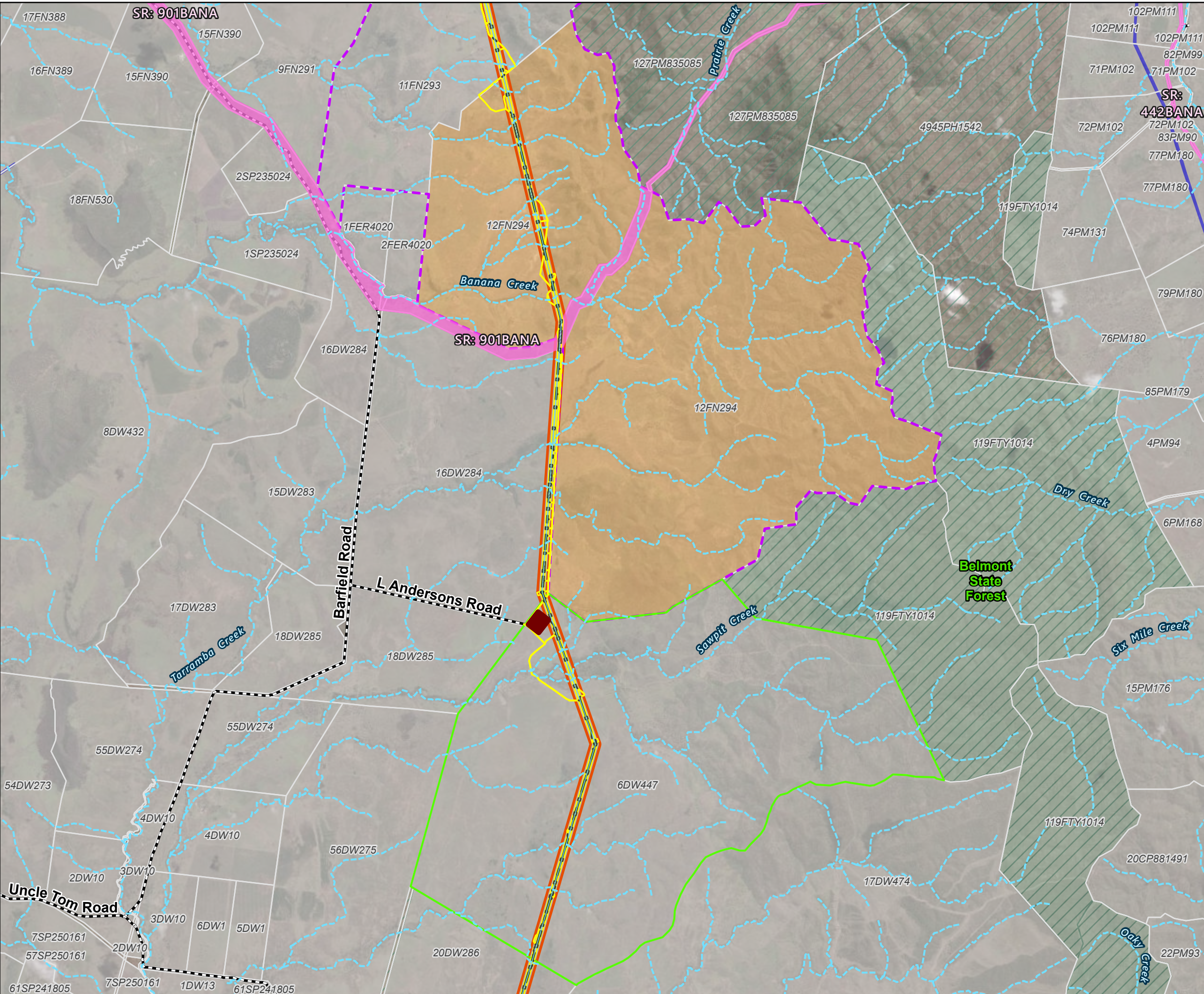
- Tertiary



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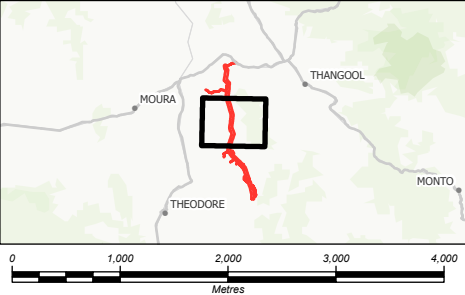
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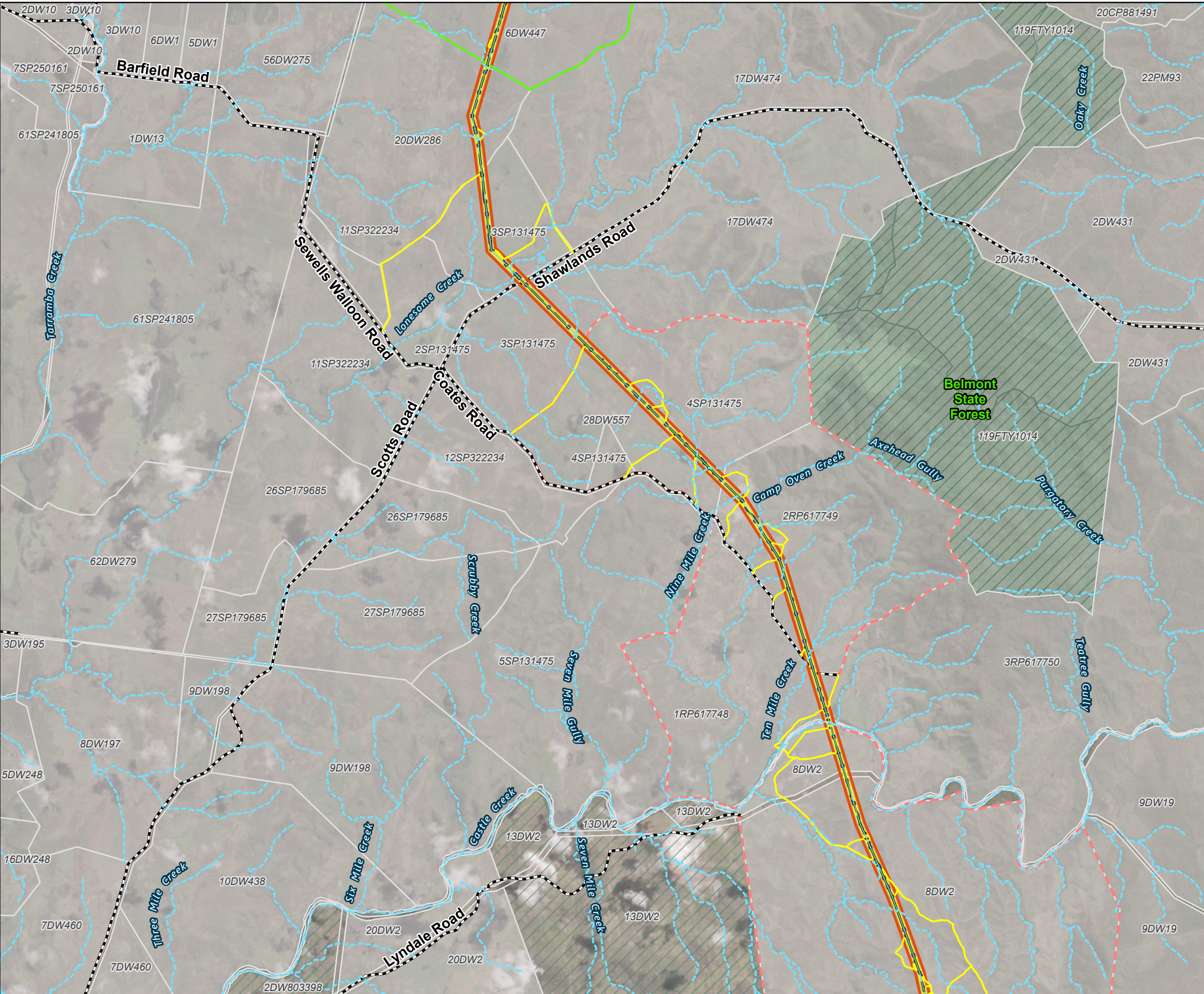
PS218956
Theodore Wind Farm Connection
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Figure 3.1
Property map and location of proposed
renewable energy developments

- Legend**
- Proposed Transmission Centreline
 - Cadastre
 - Laydown area
 - Project area
 - MID Proposal area
 - MID Disturbance footprint
 - Renewable energy projects**
 - Proposed Sawpit Solar Farm
 - Dawson Wind Farm
 - Water features
 - Roads**
 - Local
 - Tenure**
 - Easement
 - Freehold
 - Lands Lease
 - Profit à Prendre
 - State Forest
 - Stock routes**
 - Tertiary



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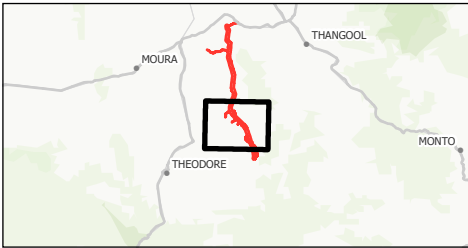


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Figure 3.1
Property map and location of proposed
renewable energy developments

Legend

- Proposed Transmission Centreline
- Cadastre
- Project area
- MID Proposal area
- Proposed Theodore Wind Farm
- MID Disturbance footprint
- Renewable energy projects**
- Proposed Sawpit Solar Farm
- Water features
- Roads**
- Local
- Tenure**
- Freehold
- Lands Lease
- State Forest

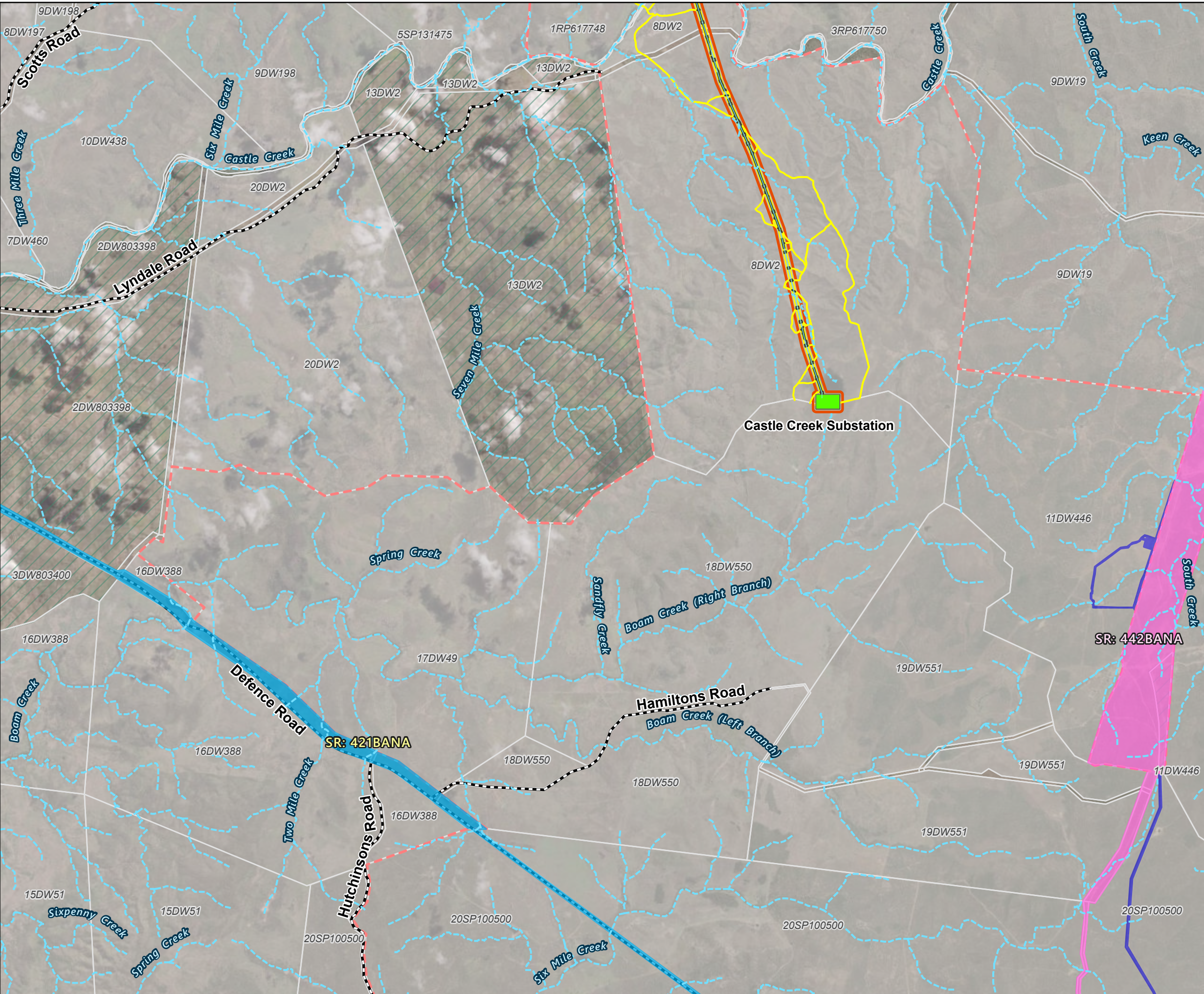


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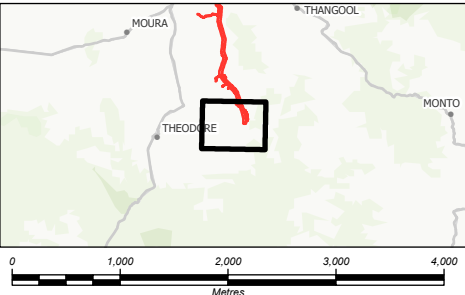
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Project

Figure 3.1
Property map and location of proposed
renewable energy developments

- Legend**
- Proposed Transmission Centreline
 - Cadastre
 - Castle Creek Substation
 - Project area
 - MID Proposal area
 - Proposed Theodore Wind Farm
 - MID Disturbance footprint
 - Water features
- Roads**
- Local
- Tenure**
- Easement
 - Freehold
 - Lands Lease
- Stock routes**
- Secondary
 - Tertiary



Coordinate system: GDA2020 MGA Zone 56
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Treatments can be applied to the galvanised surfaces of the towers to reduce visual impact where necessary.

Structure duties

There are two specific duties of structures – suspension and tension.

Suspension structures

Suspension structures are used where the transmission line follows a straight line or has a very small deviation angle (up to 2 degrees). They are designed to carry the weight (vertical load) of the conductors and transverse (horizontal) load from wind on the conductors. Features of the suspension structures are relatively light construction, with cross-arms on each side of the upper part of the structure (superstructure) and insulator strings supporting the conductors.

Tension structures

Tension structures are characterised by a ‘heavier’ appearance due to the larger steel section sizes and conductors ‘terminated’ onto the cross-arms using insulators in a near-horizontal orientation. Tension structures are designed to carry the weight (vertical load) of the conductors, and transverse (horizontal) load from wind on the conductors and conductor and earth wire tension loads. These structures are required at all changes in direction of the line greater than two degrees or where termination sites have been predetermined to facilitate line construction and operation. These structures are designed to withstand high longitudinal loading on the structure, which cannot be accommodated by the lighter suspension structures. Tension structures are also used in conductor ‘uplift’ positions. Conductor uplift is a term used to describe the loading condition where in the absence of sufficient vertical loading, the suspension insulator string will swing unacceptably close to the body of the tower under certain loading conditions, thus reducing electrical clearance. This situation can occur on a structure located at the base of a hill or steep terrain and is resolved by using a tension structure with its different insulation configuration even though the loading conditions would not normally require one at this location. Another use is for terminations at the end of the line.

A suite of structures may be designed for a particular project to cover a range of angle duties. For example, an intermediate type may be designed for angles up to 40 degrees and a ‘heavy duty’ type provided for angles up to 90 degrees and termination positions. An outline of a typical self-supporting double circuit suspension and tension tower is shown in Figure 3.2.

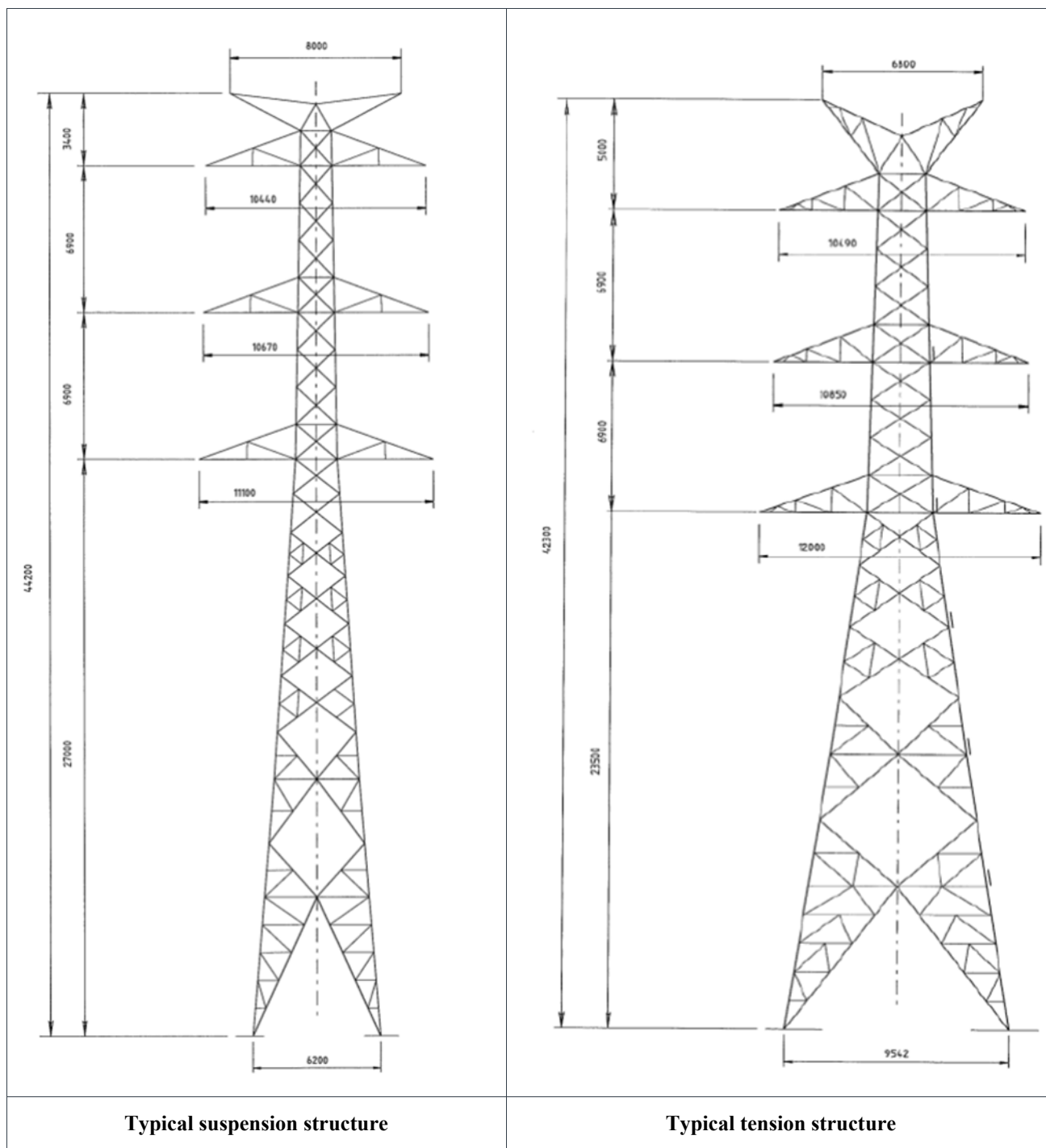


Figure 3.2 Outline of typical self-supporting double circuit suspension and tension structures

3.5.1.2 Conductors, earth wires, insulators, and fittings

Conductors

For double circuit configuration, each structure will support 12 individual conductors, configured in three pairs of twin conductors and two smaller diameter earth wires.

Earth wires

Overhead earth wires provide protection to the conductors from direct lightning strikes to safely dissipate earth fault currents and are also used as a support for optical fibre cables for communication purposes.

Insulators and fittings

Insulators are used to provide a connection between conductors and structures and to provide electrical insulation between the high voltage electricity and the (earthed) structure. The length of insulators in a string is determined by line voltage, clearance requirements and environmental (e.g. pollution) considerations. For this Project, insulators will be ceramic disc type. Special galvanised steel or aluminium fittings connect both the line end of the insulator to the conductors and the tower end to the structure. A typical insulator string is shown in Figure 3.3.

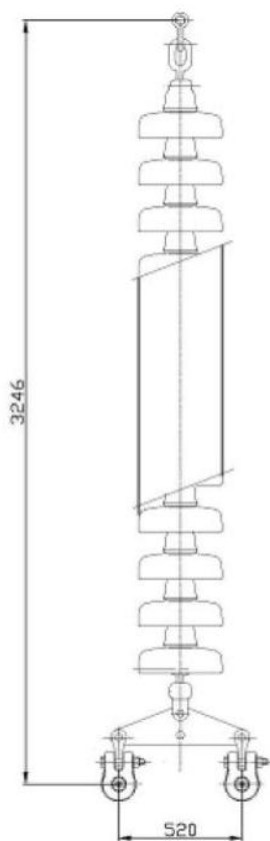


Figure 3.3 Typical insulator string

Telecommunications

Other than optical fibre cables for communication purposes, no telecommunication infrastructure will be incorporated into the design of the Project.

3.5.2 Easements and access

3.5.2.1 Easement

In most cases, Powerlink transmission lines are constructed on easements. An easement is a registered interest in a parcel of land providing Powerlink with a right of way allowing the transmission line to be built, operated, and maintained on part of a property with ownership of the land remaining with the landholder. Restrictions are placed on activities permitted on an easement to maintain public safety and ensure the line can operate reliably. Compensation is paid to directly affected landholders in accordance with the heads of compensation in the *Acquisition of Land Act 1967*.

Easement width is determined by the size and type of line, and the need to maintain safe electrical clearance between the high voltage conductors and any object or structure adjacent to the line under all conditions. This includes safe electrical clearance to vegetation in and adjacent to the easement. For a 275 kV transmission line, a 60 m wide easement will be acquired.

3.5.2.2 Access tracks

Heavy vehicle access to the transmission line is required during construction and for ongoing operation and maintenance. In steeper terrain or where creeks or gullies intersect the easement, tracks may need to detour off the easement. Where access is generally available from adjacent public roads, limited access track construction to the structure site is normally all that is required for both construction and maintenance activities. In all cases, maximum use is made of existing public and privately owned roads and tracks. Proposed access tracks for the Project are shown on Figure 3.1.

3.5.3 Construction methodology

Construction of a transmission line involves a series of field activities which are broadly grouped as follows:

- geotechnical investigations
- site survey and set out
- flora and fauna surveys
- mobilisation, including establishment of accommodation camps, laydowns, and offices
- installation of gates, grids, clean-down bays, and access tracks
- vegetation clearing
- tower site benching
- foundation installation
- structure assembly and erection
- conductor and earth wire stringing
- road crossings
- watercourse crossings
- laydown areas
- site rehabilitation
- demobilisation.

3.5.3.1 Site survey and set out

Following cadastral survey of the easement, the location of the transmission line (within the easement) is then set out. Structure sites are marked and orientated using design information. Structure locations are based on the technical characteristics of the structures and conductors, topographical constraints, landholder requirements and environmental considerations.

Easement boundaries will be identified and marked prior to vegetation clearing.

3.5.3.2 Flora and fauna surveys

To inform the planning of the transmission line and assessment of Project impacts ecological field surveys identifying vegetation communities, flora species and habitat have been undertaken. The results of these field surveys are presented in Chapters 9 (Flora), 10 (Fauna), and 11 (Matters of National Environmental Significance), and in Appendix E of this MID proposal.

A baseline weed survey will be undertaken prior to construction activities commencing and a post-construction weed survey will be undertaken after the first wet season once construction is finalised. The surveys will occur along the entire 55.4 km long, 60 m wide easement and access tracks and will identify Weeds of National Significance (WoNS), restricted and invasive matters, and regionally declared weed species

3.5.3.3 Vegetation clearing

The amount of vegetation clearing required is dependent on terrain, vegetation type and significance, and landholder requirements (where feasible). The aim is to clear vegetation sufficient to meet Powerlink's safety, reliability and operational requirements for the transmission line.

In non-sensitive areas, the most effective and efficient clearing method for large scale clearing is by bulldozer, often fitted with a 'stick rake' or 'tree spear' to push over larger trees or use of a mega-mulcher. Timber of commercial value may be recovered prior to clearing. Depending on land use, landholder requirements, environmental constraints and maintenance requirements, cleared vegetation may be dealt with in the following ways:

- chipped or mulched on site and used for easement revegetation
- stacked and windrowed – any stacked and windrowed vegetation must be placed in a manner which does not concentrate overland flow or create erosion
- stacked and burnt – any burning of cleared vegetation may only occur in accordance with a permit from the Queensland Fire and Emergency Services, and so as not to create any additional hazard to the surrounding environment or transmission line.

In sensitive areas, such as steep or erosion prone terrain, near watercourses or other environmentally sensitive areas, alternative methods of clearing such as hand clearing (chainsaw) or the use of a fella-buncher (or excavator with cutting attachment) may be appropriate. These techniques are more labour intensive and time consuming than other mechanical means but achieve the desired clearing outcome. In steep terrain or environmentally sensitive areas, trees may be cut above ground level, felled along the contour, and allowed to decompose naturally or mulched. In areas where hand clearing is required, stump heights will be discussed and agreed with the landholder. Where visual impacts are identified, lower vegetation is typically retained along road corridors to provide a visual screen. In these areas, supplementary planting of suitable species may be used to improve screening.

Chemical treatment may also be used for selective treatment of incompatible vegetation while minimising ground disturbance. The method is mostly suitable for regrowth vegetation and may be through stump injection, cut stump, or overall spray technique.

Appropriate clearing methods for various areas are selected with input from property owners and advisory bodies and carried out in accordance with the requirements specified in the EMP (refer Appendix D).

Specific clearing considerations for the Project are detailed in Chapters 9 (Flora) and 10 (Fauna).

3.5.3.4 Access track development

Where access tracks do not exist, but where access is critical for construction purposes, Powerlink will typically get the landowners permission to create access tracks. Vegetation and soil disturbance is kept to an absolute minimum and any disturbed areas are progressively stabilised and reinstated so that minimum area of ground is exposed at any one time. In planning access, Powerlink will consider the terrain and ensure that access is gained along contours to prevent any likely impacts associated with soil erosion. Where fences need to be opened, these will be opened with the relevant owners' consent and the fences reinstated upon completion of construction.

3.5.3.5 Laydown areas

Laydown areas have been determined for the Project and are located within the broader Project Area. A number of these laydown areas are located within the MID Disturbance Footprint, while others are situated outside the footprint to support construction and project delivery activities.

3.5.3.6 Foundation installation

Geotechnical assessments are undertaken prior to construction to determine the appropriate foundation type for each structure. Bored foundations are often used and are shown on Figure 3.4. Alternative foundation types (i.e. mass concrete, micro-piles, mini-piles) are used in situations where ground conditions are not suitable for bored foundations.

The choice of foundation type is dependent on the specific nature of the soil and rock and takes into account soil/concrete friction strength, water levels, soil bearing capacity, construction constraints, rock levels, and soil properties.

Construction of tower foundations usually consists of the following steps:

- setting out
- excavation/boring
- leg stub/base set-up
- placement of reinforcing steel/concreting
- concreting of excavated foundations
- installation of earthing.

Setting out involves the placement of temporary pegs on site to mark the location of the excavation. Dimensions of foundations are determined by structure type and height and soil conditions at the site.

Excavation of bored foundations may be by truck mounted auger, backhoe, or track mounted excavator. The excavation is bored at the same inclination as the structure leg. In unstable ground conditions, the excavation may be stabilised by the insertion of a steel ‘liner’ in a bored foundation and shoring or timbering for a mass concrete foundation. Although dependent upon the geology of the surrounding soil, foundations are typically excavated to approximately 8–12 m.

Micro or mini piles involve small diameter 50–300 mm diameter drilled holes which are designed to have a centrally placed steel reinforcing member. Subject to ground conditions, the foundation design and the size of the drilling equipment being used, a range of piles, from 3–12 are drilled per leg. These small and grouped piles are then bonded and tied back into a pile cap and/or column forming a tower leg foundation. Micro or mini pile foundations are the preferred foundation for difficult drilling conditions including hard rock, saturated and collapsing soils.

Leg stub setup is the process of placing an extension of the tower leg (the ‘stub’) in the correct position and inclination within the excavation, in preparation for concreting in place. A temporary jig or template is used to hold the stub firmly in place in the correct horizontal and vertical alignment and is removed after concreting. Reinforcing steel is required in tower foundations, with the amount varying with tower and foundation type. Temporary formwork is also used for the foundation column above ground (bored foundations) and above the base (mass concrete foundations). Concrete is placed in accordance with normal construction procedures and formwork removed after an appropriate curing time.

Backfilling of mass concrete foundations is completed using the excavated material, if suitable, or imported fill. Excess soil is appropriately treated (where determined by soil testing) and covered with topsoil and/or another suitable cover (e.g. mulch).

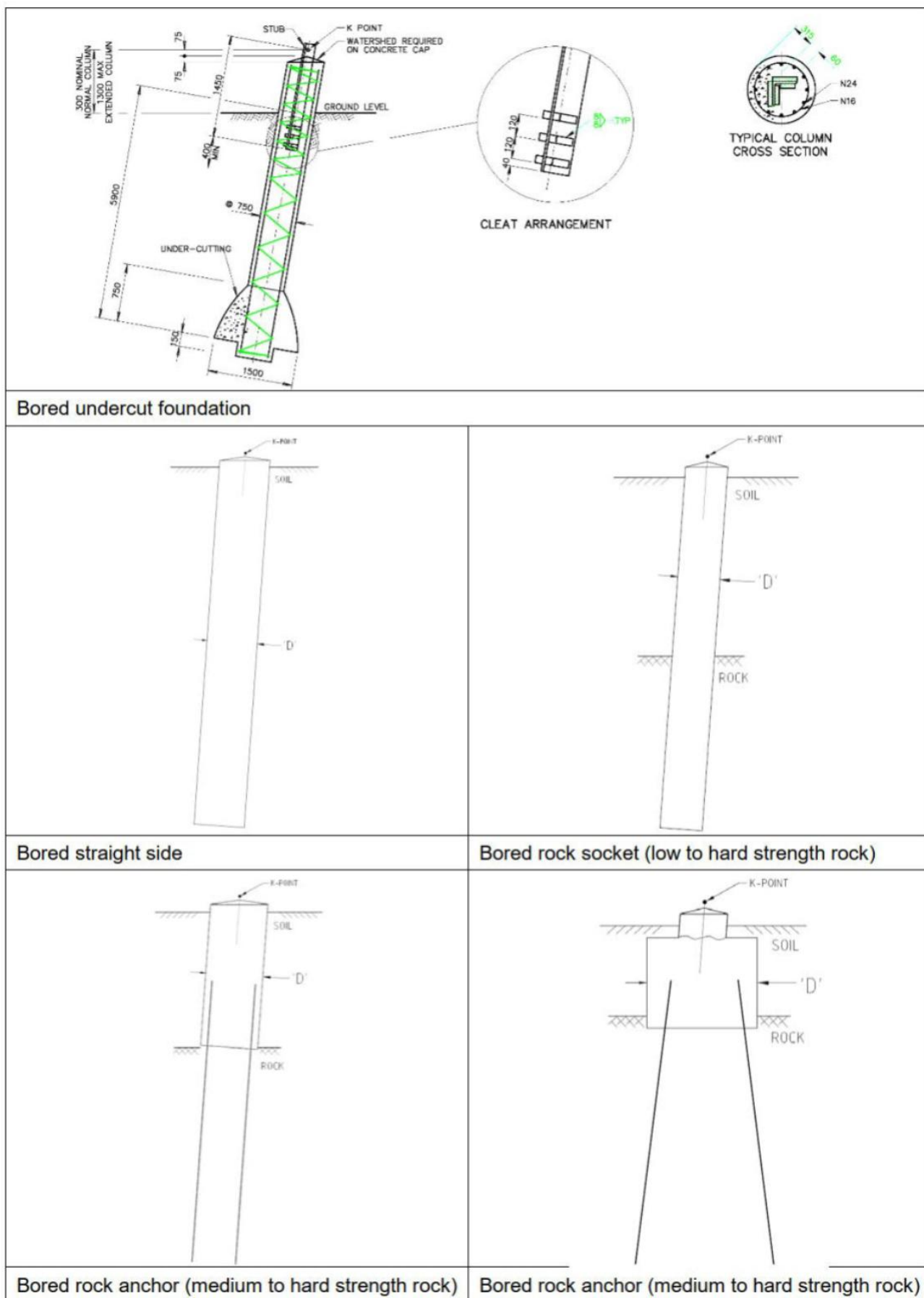


Figure 3.4 Typical bored foundation types

3.5.3.7 Structure assembly and erection

The term ‘structure assembly and erection’ refers to a sequence of activities from delivery to site, preassembly, erection, tightening, and inspection tower components of each structure.

Steel for lattice towers is fabricated, galvanised, sorted and bundled ready for delivery at a contractor’s facility off site and transported to the final location in two or more pieces, typically by semi-trailer. Preassembly of the tower is usually carried out adjacent to its final site and involves assembly of several sections, which will allow convenient erection in the following stage.

Where practical, bolts holding the members together are tightened at this stage. Larger or heavy towers may require the use of a small mobile crane at this stage to move members and sections about the site. A large mobile crane (Figure 3.5) is used to erect the tower in sections with a work crew installing and tightening all bolts and checking that the structure is complete.



Figure 3.5 Transmission conductor drums and mobile crane utilised in structure erection

3.5.3.8 Conductor and earth wire stringing

Depending on constraints, terrain, and access, conductor and earth wire stringing is usually carried out in sections of varying lengths of up to 10 km between termination structures. Existing infrastructure such as buildings, roads and fences may require hurdling which is a method that adopts a protective barrier to prevent contact and potential damage. Additionally, existing distribution and transmission feeders which intersect the transmission line may require other electrical entity works to facilitate stringing. This may include but is not limited to:

- undergrounding existing distribution feeders
- supply of additional generation to impacted feeders
- network outages
- live line hurdling which involves the installation of a portable undercrossing protective barrier.

The conductor and earth wire stringing process requires the use of specialised equipment and is briefly described as follows:

- A powerful winch (puller) is set up at one end of the stringing section, and a braking device (tensioner) at the other. These designated ‘brake and winch’ sites are for this Project 60 m x 50 m are located both on and off easement. Typically, off easement brake and winch sites are located at bend points along the alignment. These brake and winch sites are generally cleared and stripped of the topsoil layer, which is stockpiled separately and used for rehabilitation of the site at completion of stringing.
- Specially designed pulleys (stringing sheaves) are fixed at each conductor and earth wire attachment point on each structure in the section.
- Multiple high strength, non-rotating steel winch ropes are threaded continuously through the corresponding sheave on each structure between the winch and the tensioner. This is often facilitated by threading light polypropylene ropes through the sheaves as they are installed. These ropes are used to pull the winch rope through the sheaves at each structure without the requirement for a worker to climb the structure.
- For each stringing section for each conductor and earth wire, individual winch ropes will be runout.
- The conductors (electrical cables) are then pulled out under tension through the stringing sheaves on each structure and through to the winch. The tension in the winch ropes is continuously monitored to avoid over tensioning. Workers carry out visual checks through the stringing section to ensure that the conductor run out proceeds smoothly and wires remain clear of all obstructions.
- At the completion of the run out of all conductors and earth wires, they are attached to structures or temporary anchorages.
- Conductor and earth wire tensions are adjusted to give the design sag (i.e. the correct ground clearance).
- Conductors are clamped in final positions at the end of insulator strings at each suspension structure and are terminated on insulator strings at each tension structure.
- Conductor spacers are installed between sub-conductors (sometimes from a helicopter).
- Earth wires are clamped or terminated as required at each structure earth wire peak.
- Equipment is repositioned and the above process is repeated for subsequent stringing sections.

A variation of the above process uses a helicopter to undertake the direct run-out of conductor and/or earth wire (refer to Figure 3.6). It is similar to the above process but differs in that no steel winch rope is used. The use of a helicopter is not proposed for this Project.



Figure 3.6 Stringing sheaves and helicopter stringing

3.5.3.9 Road crossings

Where transmission lines cross road reserves, approval will be sought from the relevant road authority under section 102 of the *Electricity Act 1994*.

3.5.3.10 Watercourse crossings

Where possible, structures will be located at least 50 m from watercourses. Where the transmission line crosses watercourses, previously cleared tracks for existing crossings will be preferentially used to minimise new watercourse crossings. Where new crossings are required, the construction methodology will be dependent upon the size of the watercourse. Excavation, filling, and vegetation clearing within a watercourse under the *Water Act 2000* (Water Act) will be undertaken in accordance with the Riverine Protection Permit Exemption Requirements (WSS/2013/726). If works are unable to meet the exemption requirements, a riverine protection permit will be obtained.

It is important to note that some watercourses may also be mapped as waterways for the purposes of the *Fisheries Act 1994* (Fisheries Act). Where proposed crossing works constitute waterway barrier works, these works will be designed and constructed in accordance with the Accepted Development Requirements (ADR, 2025) for Operational Work that is Constructing or Raising Waterway Barrier Works. If compliance with the ADR cannot be achieved, the relevant approvals for waterway barrier works will be obtained following detailed design and prior to construction.

The construction of bed-level crossings typically involves the excavation of the crossing bed to an appropriate depth to provide a stable base. The excavation is then lined with a heavy-duty geo-fabric and filled with aggregate using a combination of rock sizes up to 150 mm to lock the rock into place. In some instances where it is not practical to undertake excavation works due to unfavourable soil properties, alternative solutions may be required. This may include, but may not be limited to:

- installation of bog mats
- installation of geomaterials.

3.5.3.11 Site rehabilitation

Rehabilitation will be undertaken progressively during construction, where practicable, and Powerlink will ensure that all disturbed areas impacted from construction are reinstated at the end of the Project. The short-term goal of rehabilitation is the stabilisation of soils to provide a suitable matrix for vegetation establishment to aid in preventing erosion.

Rehabilitation also includes the replacement of topography, topsoil, and fences where disturbed.

3.5.4 Operation, maintenance, and decommissioning

3.5.4.1 Operation

After completion of construction and commissioning of the transmission line, the amount of activity on site decreases substantially. During operation, normal practice is for maintenance staff to carry out scheduled inspections of the line, easement, and access tracks on average twice per year.

These inspections (patrols) are either by vehicle, drones or helicopter. It is likely that vehicles or drones will be used for this Project. Additional inspections may be required to perform such activities as emergency repairs. Powerlink maintains access tracks suitable for dry weather 4WD vehicles use.

3.5.4.2 Maintenance

Structures, conductors and fittings

Structures, conductors and fittings are inspected for any signs of unusual wear, corrosion or damage. Transmission lines are designed for a 50-year in-service life and are very reliable under most conditions. Maintenance staff normally conduct a detailed visual inspection about once every two to three years.

Provision may be made for some structure and conductor maintenance tasks to be carried out from a helicopter, with the line either energised or de-energised. Typically, insulators are replaced every 25 years with the majority of the remaining equipment designed to last the life of the line.

Easements

Inspection of the easements is carried out on each scheduled line patrol, with the main aim to record the type, density and height of vegetation regrowth. Additional matters of interest include new under-crossings (e.g. distribution powerlines), or other activity or construction within the easement which may affect operation or maintenance of the line.

Powerlink's policy is for the landholder to be contacted prior to any vegetation control work on a property and the landholder's agreement obtained regarding the treatment method to be employed. This is particularly important if herbicides are involved for withholding periods for meat production.

Easement vegetation management is important to ensure the safe operation of the transmission line. Vegetation management is undertaken in accordance with Powerlink's standards and procedures.

Three techniques for vegetation management are employed:

- mechanical
- hand clearing
- chemical (herbicides).

The technique adopted for each area takes into account a number of issues such as landholder requirements, type of regrowth, terrain and the local environmental conditions. Mechanical clearing is usually by a tractor driven slasher, or similar vehicle, and is suitable for shrubs and smaller trees. It is limited to relatively flat and accessible terrain due to the type of vehicle used.

Hand clearing is labour intensive but allows the vegetation clearing to be quite selective and ensures that disturbance to non-target species is minimised. Hand clearing can be employed in areas where vehicle access is not available. Lopping of larger trees is also an option near urban or in visually sensitive areas.

Chemical treatment may be used for selective treatment of incompatible vegetation while minimising ground disturbance. The method may be through stump injection, cut stump or overall spray technique and is mostly suitable for regrowth vegetation.

Access tracks

Maintenance of access tracks is required to ensure that vehicle access to structure sites is available for inspections and structure maintenance. Techniques employed should be appropriate for the area. For example, a grader may be required in hilly terrain where some reshaping of drainage is necessary, but a slasher could be preferred in open grasslands.

The work should minimise disturbance to natural groundcover, thus reducing erosion potential and subsequent maintenance requirements. Maintenance of access provided by others is undertaken in consultation with the appropriate authority.

3.5.4.3 Decommissioning

Typically, a transmission line has a 50-year operational life. After this time it may:

- be replaced with a transmission line designed for the revised environmental constraints and electrical system requirements at the time
- if the line were no longer required, be dismantled and the easements may be surrendered to the property owner.

At the time when the transmission line is decommissioned, it will be de-energised, dismantled and removed.

Dismantling and removal of the transmission line

The process of dismantling and removal of the transmission line is staged and includes the following:

- Lowering the overhead conductors and earth wires to the ground and cutting them into manageable lengths to roll onto drums or reels. These are removed from the site and sold as scrap metal. Some minor damage to vegetation results, but other clearing is not normally required for this operation.
- Removing insulators and line hardware from structures at the site and disposal at a waste facility that is authorised to accept the waste.
- Dismantling towers in manageable sections and removing from site. The steel is usually sold as scrap metal. Steel poles are cut into pieces small enough to be handled and transported, then removed from site.
- Demolition of foundations is normally carried out as follows:
 - the ground surrounding each foundation (tower leg/holding down bolts and encasing concrete) is excavated to a depth of approximately 600 mm below the natural surface level
 - the concrete is broken away and the tower leg or holding down bolts and reinforcing steel is cut off about 500/600 mm below ground
 - demolished concrete and steel are removed from site for disposal or recycling at a waste facility that is authorised to accept the waste
 - the excavation is backfilled and compacted with suitable (imported, if necessary) material.

In specific situations such as cultivation, some variation would be necessary. For example, foundations may be cut off deeper (to avoid any potential interference with ploughing machinery) and backfilled with better quality soil.

Environmental management, easement restoration and rehabilitation

Given the typical operational life span of a transmission line is 50 years, it is considered unnecessary at this stage to identify specific environmental management, easement restoration and rehabilitation measures which will be undertaken at the time of decommissioning, however broad environmental strategies are identified below.

It is expected that legislative frameworks, regulatory provisions and best practice strategies with regard to environmental management will continually improve. Therefore, identifying and committing to current environmental management standards for decommissioning works would not be contemporary at the time of decommissioning.

Powerlink is committed to employing environmental management strategies during the decommissioning phase which meet or exceed legislative, regulatory and best practice requirements current at the time. All necessary permits and/or approvals which are required to undertake decommissioning works will be sought and received prior to decommissioning works commencing. Broad environmental management strategies that will be employed during decommissioning are discussed below:

- Soils – both temporary and permanent erosion and sediment control strategies and/or devices will be implemented during decommissioning works to ensure that transmission line structure sites are left as stable landforms. Surface stabilisation (e.g. mulching or grass seeding) may be undertaken where necessary to ensure that large scale erosion does not occur and sites are returned to the equivalent surrounding landscape. All excavations made to remove structure footings to a depth of 1m below ground level will be filled and covered over.
- Water quality – as for construction phase works, water quality protection measures will be implemented during decommissioning works. For access tracks across drainage lines and/or watercourses, the access tracks will be removed if not required by the landholder after decommissioning. Associated water structures will also be removed, and the bed and bank profiles will be returned to the surrounding waterway profile.
- Air quality – decommissioning works will involve land surface disturbance, excavation, use of machinery and possibly clearing of vegetation regrowth. These activities have the potential to cause impacts to local air environments and nuisance to sensitive receptors. Therefore, as for construction phase works, management measures to reduce the occurrence, duration and intensity of potential air quality impacts will be implemented.
- Noise – as with air quality considerations, decommissioning works will involve activities which have the potential to impact on local acoustic quality and sensitive receptors. Therefore, management measures will be implemented to reduce actual or potential acoustic impacts. All decommissioning works will comply with operational hours specified by relevant authorities and legislation.
- Infrastructure – during decommissioning, assets will be dismantled and/or cut on site into manageable sections which can be loaded and removed from the easement. The decommissioning process will generate traffic on local roads comprising standard vehicles utilised for staff movement; trucks and heavy vehicles for collection of dismantled assets; and heavy vehicle movements to deliver and remove machinery required to undertake decommissioning works. Whilst traffic movements associated with decommissioning are not expected to exceed those associated with construction works, traffic management on local roads will be employed where required.
- Vegetation – clearing of vegetation regrowth along sections of easements and access tracks may be required to gain appropriate access to transmission line assets.
- Easement rehabilitation – should the easements no longer be required, passive rehabilitation such as natural regrowth of vegetation over the easements would be allowed and encouraged. Active rehabilitation including planting of native, endemic species, including control of significant weed infestations may be undertaken. Monitoring of rehabilitation will be undertaken to ensure success.
- Access track rehabilitation – access tracks not required by landholders would be allowed to passively rehabilitate. In some circumstances, light scarifying and seeding may be undertaken to promote vegetative regeneration.
- Waste – decommissioning of the transmission line will result in waste material including cleared vegetation, steel, concrete, cable, insulators, conductors etc. Where recycling facilities for these waste materials exist at the time of decommissioning, these waste materials will either be re-used or recycled. If no recycling facilities exist, waste materials will be disposed of in accordance with regulatory requirements.

Decommissioning Management Plan

Prior to decommissioning of the transmission line, a Decommissioning Management Plan will be prepared. This will provide detail regarding the proposed decommissioning works, environmental risks associated with decommissioning, and management and mitigation measures. This plan will utilise environmental management strategies, practices and technologies current at the time of decommissioning to comply with regulatory provisions and to appropriately manage environmental issues.

3.6 Castle Creek Substation

A new substation at Castle Creek is proposed as part of the Project. The substation is required to perform switching, transform voltage, control stability through reactive and system strength support and to connect to the customer system (Theodore Wind Farm).

The proposed substation will be located across Lot 8 DW2 and Lot 18 DW550 and will have a total surface area of approximately 12 ha (445 m x 270 m). The proposed substation layout is shown in Figure 3.7.

3.6.1 *Physical details of the substation*

3.6.1.1 Fencing

Security fences with locked gates will be installed around the substation site to restrict unauthorised access in accordance with regulatory standards. This will be in the form of a 2.4 m high chain wire security fence, topped with several strands of barbed wire. The site will be unattended unless maintenance of the substation is being carried out. A security fence will define the overall boundary of the site and the balance of the land acquired will provide a buffer zone. In the case of the Castle Creek Substation a 50 m wide buffer zone, clear of vegetation, will be provided outside of the security fence.

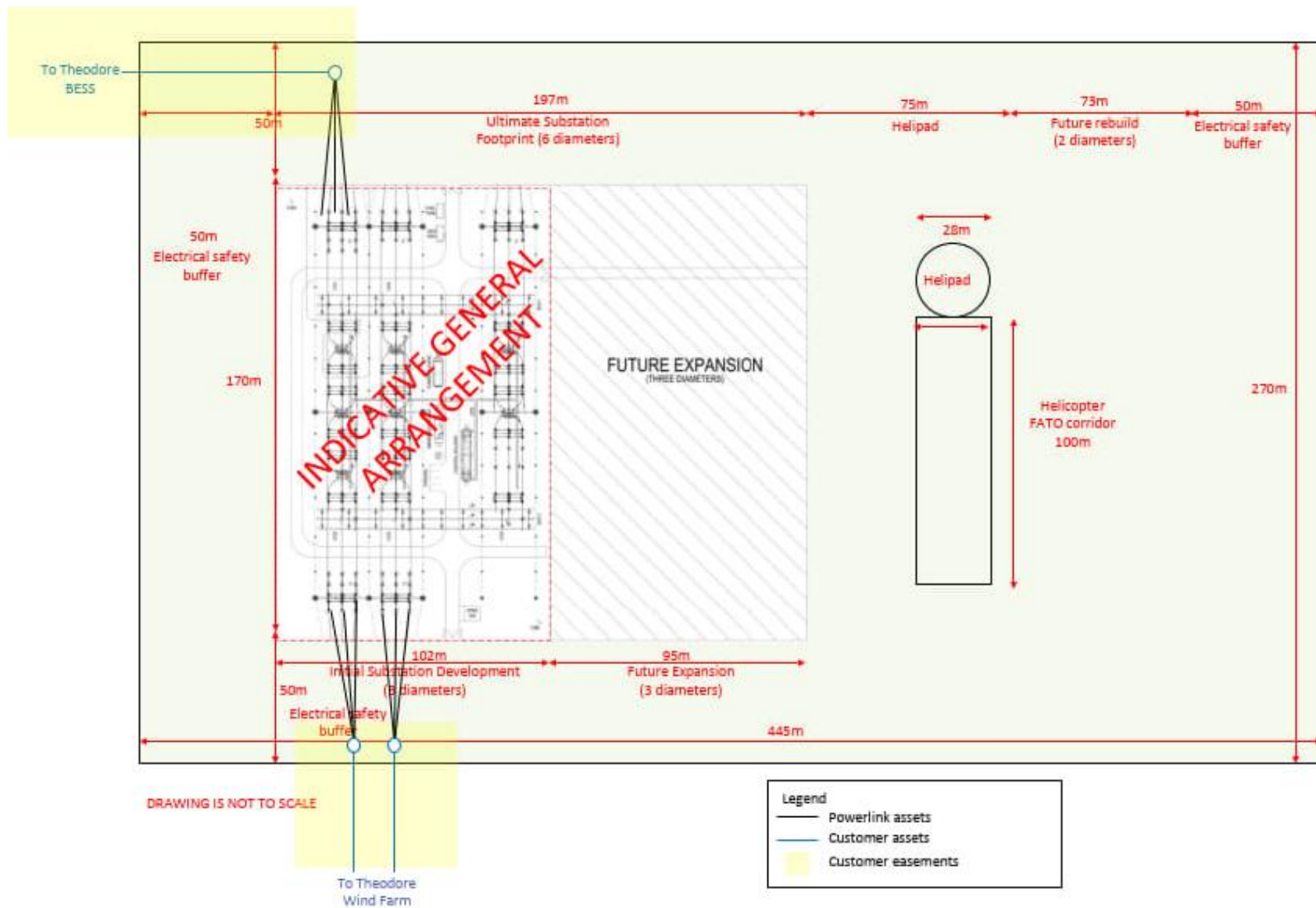


Figure 3.7 Substation general arrangement

3.6.1.2 Civil works

Site access

A gravel access road and space for parking will be provided at the substation site to allow maintenance staff access under all weather conditions. Access to the substation will utilise an internal road to be constructed by RWE as part of the Theodore Wind Farm and connect to Defence Road. The access road will be within a 12 m wide easement and the substation site will provide enough space for maintenance and emergency vehicles that may need to access the site. Planning approval for the access road has already been secured as part of the Theodore Wind Farm Project and therefore it does not form part of the Theodore Wind Farm Connection Project.

Roads into and around the substation site and hard standing and pavement areas will be constructed, suitable for anticipated weight of plant, vehicles and equipment and amount of traffic anticipated over the life of the substation. The internal roads within the substation will be bitumen finished, and external access roads gravel finished. All other areas of the substation yard will be covered with crushed rock.

Cable ducts

Underground cable trenching within the substation includes cable trenches, cable pits and conduits as required for multicore cables.

3.6.1.3 Drainage

Substation platform surface runoff will filter through the crushed rock surface layer and be collected by open drains around the platform perimeter to suitably sized secondary containment ponds. The collected surface water will run into drainage pits, piped to the edges of the platform and discharged through headwalls with aprons to dissipate the energy of the water. Oil and water separators will be installed as part of drainage. A first flush diversion system will be installed to mitigate the risk of releasing sediments and contaminants from the area. Automated oil detection and separation systems may be utilised. The need for drainage works shall be kept to the minimum and care taken also to minimise damage to natural drainage channels and soil erosion. The drainage system will be largely influenced by the final substation platform level relative to the surrounding natural ground surfaces and associated grades.

3.6.1.4 Aerial structures

Aerial structures comprise of galvanised tubular steel acting as:

- strain beams for terminating the transmission line conductors
- poles for supporting aerial earth wires over the substation.

Gantry structures

Gantry structures are of steel construction and are used to support high voltage conductors throughout the substation that interconnect sections of electrical equipment. Requirements for minimum clearance between energised conductors and various types of obstacles are specified by the Electricity Safety Regulation 2013. The distance between structures and their height is determined by the equipment layout and these clearance requirements.

Support structures

Support structures are used to maintain ground clearance to the various items of electrical equipment. Support structures at the substation will be of conventional fabricated steel and tubular steel construction.

Busbars

Busbars act as high-capacity connectors between pieces of equipment. They are made of tubular aluminium.

3.6.1.5 Major electrical equipment and switchgear

Electrical equipment is grouped into:

- primary plant involved in the transformation, switching, and isolation of high voltage electricity
- secondary systems associated with the protection, metering, and control of the primary plant
- communication systems linking the automated control and signalling equipment in the substation to remote control facilities as well as voice and data communications facilities.

3.6.1.6 Fire protection system

Fire protection in equipment rooms will be principally through passive protection, such as fire-retardant cabling, dispersal of equipment, and fireproof cabinets. The installation of transformers and other equipment will be designed where possible to eliminate the requirement for fire water deluge systems. Where technically feasible, fire-resistant transformer oil will be used to prevent the escalation of transformer faults into fire. Gaseous fire suppression will be considered during the safety in design risk assessment processes and only installed if warranted.

3.6.1.7 Other facilities

The substation site will have an allowance for a small maintenance facility that will consist of a dust-free building with an internal cubicle that includes amenities, an office and a hardstand for the loading and unloading of storage. It will also incorporate an unsealed helicopter landing area. Additional areas may be required for hazardous substance enclosures or fuel storage areas or tanks. Any storage shed will typically be a 'slab on ground' portal frame design with Colorbond® type walls.

3.6.1.8 Buildings

The proposed substation will contain the following buildings:

- an air-conditioned combined demountable control/communications building
- an air-conditioned demountable amenities building
- a storage shed on a concrete slab.

The proposed substation will include a site office building which is likely to include office space, a kitchenette and ablutions facilities. Reticulated water supply is not available at the proposed substation location and is not proposed to be extended to the site. Rainwater tank(s) will be provided at the substation site for general use excluding drinking water. Water tanks will be enclosed and provided with first flush devices in order to improve quality of rainwater caught and stored on site for use.

3.6.2 Construction

Construction of the proposed substation will involve a series of field activities including:

- a detailed site survey (including geotechnical investigation) to allow detailed structure and substation design
- vegetation clearing
- earthworks and levelling for the substation platform and access road
- site fencing
- installation of a site drainage system
- installation of a substation cable trench and conduit system
- installation of the substation earthing mat
- installation of the substation structure and building foundations
- buildings, structure and electrical equipment erection
- conductor and earth wire stringing
- site rehabilitation.

3.6.2.1 Geotechnical investigation

Geotechnical assessments are undertaken prior to construction to allow for the detailed design of the substation. This typically involves the use of a large truck-mounted drilling rig.

3.6.2.2 Vegetation clearing

The area affected by the construction of the built elements of the substation must be fully cleared.

3.6.2.3 Earthworks

A level surface is required for the construction of the substation therefore the initial stage of construction is earthworks, usually by a cut and fill process to bench the pad, the extent of which will depend on the site profile. Earthworks for the site comprises compacted fill approximately 1 m above surrounding ground level. Fill may be required to be imported to meet specification requirements.

3.6.2.4 Platform surfacing

A 100 mm thick platform road base surface will be laid as part of initial earthworks. This will extend up to 3 m outside the future compound fence alignment all around the site, excluding the future roads. A final 100 mm thick platform of additional road base surfacing finish covering the same area will be laid after completion of civil works. A further 100 mm thick gravel surface will be placed within the compound after completion of civil works.

3.6.2.5 Civil works

This phase of the work involves the installation of the substation security fencing, drainage, roads, cable trenches, substation earthing and installation of structure foundations. The substation copper electrical earthing mat will be installed across the site at a depth of approximately 600 mm. The disturbed soil will then be compacted and covered to prevent erosion.

Drainage work consists of the installation of all drains, pits and culverts necessary to control the flow of stormwater from the site.

It is expected that structure foundations will be one of two main types, broadly described as bored and excavated. Bored concrete foundations are used in most situations whilst excavated foundations are used where pad type footings are required.

Isolated concrete plinths and foundations will then be constructed to support the site infrastructure. Concrete for foundations will be supplied from the nearest commercial batching plant and poured in accordance with normal construction procedures. Formwork will be removed after an appropriate curing time. Other foundation requirements such as those for the control and communications buildings are normally completed at this time.

3.6.2.6 Structure and building erection

The steel for the lattice and tubular structures will be fabricated, galvanised, sorted and bundled ready for delivery at a factory or workshop off site. Pre-assembly of the structures will be carried out on site and will involve assembly of the individual members into a number of sections, which will allow convenient erection by a mobile crane.

The demountable control building and amenities building will both be of a transportable prefabricated building design with 'colorbond' walls and roofing. They will be delivered complete to site and installed on their foundations using a mobile crane. The storage shed will typically be galvanised metal walls and roofing.

3.6.2.7 Erection of landing beams, gantry structures, conductors, and busbars

Once all strain beams, gantry and support structures have been erected, the busbars and high-voltage electrical equipment will be placed in position and all electrical connections made. Cables that carry the control and protection signals to the control equipment located in the bay buildings will be laid and all connections made. Conductors are strung between the high-level gantries and connections made to the high voltage equipment. The final connection to be made is that of the incoming transmission lines.

3.6.3 Operation and maintenance

After the completion of construction and commissioning of the substation, the amount of activity on site will decrease substantially as the substation is designed to be monitored and controlled remotely. For safety and security reasons, only authorised personnel are permitted access to substation compound. Regular security checks will also be carried out. Remotely controlled operational cameras will be installed as remote video monitoring of the substation enables a quick response to issues.

Facilities exist for manual and emergency site control, should this be necessary. Maintenance staff will carry out routine inspections of the substation and detailed maintenance of all plant and equipment at regular intervals. Additional inspections may be required as a result of equipment failure, damage, modifications, and upgrades.

During the routine inspections, the substation and items of plant will be inspected for signs of unusual wear, corrosion or damage. Faults and defects will be reported to maintenance staff who will rectify any problems identified.

Substation equipment is designed with a service life in excess of 40 years with refurbishment scheduled every 15 years and is very reliable under most conditions. Apart from the detailed visual inspections that maintenance staff undertake, routine maintenance will be carried out periodically depending on the type and make of the item of plant concerned.

Vegetation regrowth control within the substation compound and under the incoming power supply transmission lines will be undertaken to maintain electrical safety clearances between the conductors and vegetation.

3.6.4 Decommissioning

The design life of the substation is typically around 40 years. However, after that time it would be reasonable to expect that replacement or refurbishment work would occur to bring the equipment to the required level of performance and reliability. If the substation were ever considered no longer necessary, it would be removed and rehabilitation works undertaken.

3.6.4.1 Dismantling and removal of the substation

Decommissioning the substation would involve removal of all substation structures, equipment and associated infrastructure. The process of dismantling and removal of the substation would include:

- removal of transformers and static containments units
- dismantling of all above ground structures (aerial structures, gantry structures, busbars etc.)
- removal of footings to typically 1 m below ground level (with the lower end of the footing remaining in place).

3.6.4.2 Environmental management, site restoration, and rehabilitation

Any decommissioning works would be undertaken in accordance with legislative, regulatory and best practice requirements current at the time that decommissioning is undertaken. General decommissioning environmental management principles employed by Powerlink are discussed in Section 3.5.4.3.

3.6.4.3 Decommissioning Management Plan

Prior to decommissioning of the substation, a Decommissioning Management Plan which provides detail regarding the proposed decommissioning works, environmental risks associated with decommissioning and management and mitigation measures will be prepared. This plan will utilise environmental management strategies, practices, and technologies current at the time of decommissioning to comply with regulatory provisions and to appropriately manage environmental issues which may be associated with decommissioning of the substation.

3.7 Temporary infrastructure requirements

The following temporary infrastructure is anticipated to be required for the Project:

- Staging laydown for each structure (included within the clearance footprint for each structure).
 - Site office and laydown area – A temporary construction laydown area has been proposed within Lot 6 DW447 with proposed dimensions of 300 m x 250 m. Access to the laydown area is available from the Leichhardt Highway via Uncle Tom Road, Barfield Road, and L Anderson Road. The exact location of the site office and laydown area will be defined during detailed design and will be subject to assessment and approval by the relevant local council, if required. Approvals for these facilities will not form part of the Infrastructure Designation process.
 - Conductor brake and winch sites – Brake and winch sites are required for tensioning of the transmission line at tower locations. For this Project they will consist of a cleared area of 60 m x 50 m. Brake and winch sites can be contained within the easement where the transmission line is straight, or out of the easement where the line bends.
 - Concrete batch plant sites – Concrete batch plants require an area of 60 m x 200 m. The concrete batch plant for this Project will be located within the temporary construction laydown area. Establishment of the site will require that topsoil is stripped and stored. The area will be topped with a gravel layer of approximately 150 mm thickness. Following construction, these areas will be returned to their previous land uses as agreed with landholders.
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3.8 Workforce

Construction of the Project is anticipated to require a peak construction workforce of approximately 145 persons, over a 2-year period. Indicative workforce numbers across the 2-year construction period are shown in Figure 3.8. A workforce accommodation strategy is currently under development. At present accommodation camps for the Project workforce are not proposed and accommodation requirements are likely to include sourcing of local short-term accommodation in regional towns (i.e. Theodore, Banana, or Biloela).

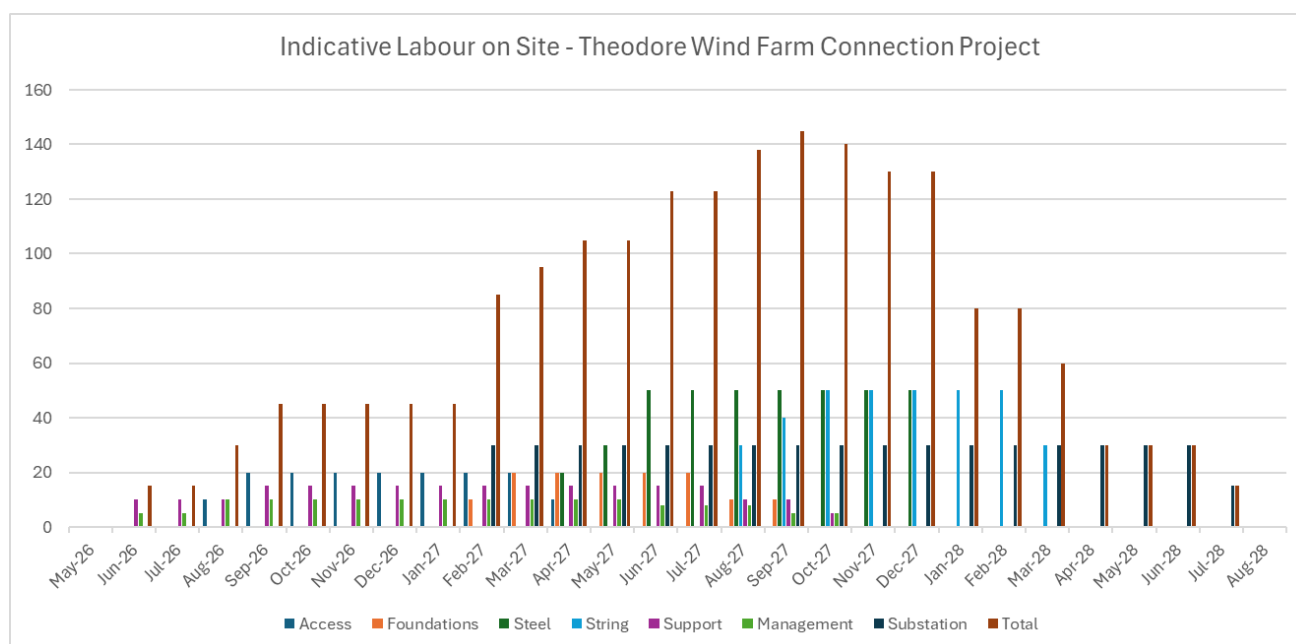


Figure 3.8 Indicative construction workforce numbers on site

3.9 Materials

3.9.1 Concrete batching

A mobile concrete batch plant is anticipated to be required for the Project. The site for the batch plant will be 60 m x 200 m and located within the temporary construction laydown area. It will comprise the following key components:

- raw materials receivable and storage areas for sand, aggregate, cement powder, setting retardants and additives
- plant and equipment for the processing, production, and delivery of wet concrete
- cleaning and waste collection facilities
- administration and management offices
- small workshop.

3.9.1.1 Quarry material

The Project will require access to quarry materials during construction for access tracks, waterway crossing, erosion and sediment controls, and foundations, and also further access to material for ongoing maintenance. These materials include, but are not limited to, rock, gravel, sand, and soils.

The Project will require access to quarry materials during construction for access tracks, waterway crossings, erosion and sediment controls, foundations, and ongoing maintenance activities. These materials include, but are not limited to, rock, gravel, sand, and soils.

Where available, materials will be sourced from local registered quarries. If suitable registered quarries are unavailable, the required approvals, permits and authorities will be obtained prior to material extraction from alternative sources.

The Project is not anticipated to require the extraction or use of riverine quarry material. However, should the removal of riverine quarry material be required for any purpose other than disposal as waste, a quarry material allocation notice and any associated development approvals will be obtained prior to extraction.

3.9.1.2 Water supply

General construction water required for activities such as dust suppression, access track construction, erosion and sediment control implementation, equipment washdown, and other construction activities, will be sourced from local dams and bores in consultation with landholders.

Where water is proposed to be extracted from local creeks, extraction will be undertaken in accordance with requirements under the Water Act. As Powerlink Queensland is a Constructing Authority under the Water Act, water may be taken in accordance with the '*Exemption requirements for the take of water without a water entitlement*', where applicable. Where these exemption requirements cannot be met, the necessary water authorisations will be obtained from the Department of Local Government, Water and Volunteers (DLGWV) prior to extraction.

Water used for the batching of concrete requires specific parameters (e.g. salinity and pH). Potable water for human consumptions will be sourced from tested and treated water sources.

The Project does not propose to use reticulated water supplies. Detailed construction water demand estimates will be determined during detailed design and construction planning once construction methodologies and water requirements have been finalised.

3.9.1.3 Power generation

Generators are required to power the site offices and substation.

3.9.1.4 Project fuel requirements

Vehicles, machinery and equipment required for the Project are anticipated to be fuelled by either diesel or unleaded petrol. Refuelling of vehicles, machinery, and equipment will be in accordance with the requirements of the EMP (refer to Appendix D).

4 Land resources

Chapter 4 provides a description of the land features within the Project area (topography, geology, soils, resource interests and contaminated land) and an assessment of the potential impacts from the Project to these land-based environmental values. Project activities that involve disturbance to soil, such as vegetation clearing, excavation, and civil works have the potential to impact land resources through soil erosion, compaction and acidification. While significant earthworks are not proposed for the Project, the Project will require excavation work over steep terrain in proximity to water features, which will require management measures to be implemented to reduce the risk of erosion in the area. The Project area is not known to be positioned over areas of contaminated land, UXOs, mining leases or acid sulfate soils. Practical measures for protecting or enhancing land-based environmental values are identified. Within implementation of these measures the risk of the Project adversely impacting land-based environmental values is considered low.

4.1 Existing environment

A desktop assessment was undertaken to identify land features along the MID Proposal area, including topography, geology, soil types, acid sulfate soils, resource interests and contaminated land. Data sources included:

- Queensland Globe and GeoResGlobe
- Geoscience Australia Portal – Australian Soil Resource Information System
- Environmental Management Register/Contaminated Land Register
- Department of State Development, Infrastructure and Planning (DSDIP) Development Assessment Mapping System.

4.1.1 Topography

The Project area varies in elevation from approximately 230 m Australian Height Datum (AHD) on the alluvial plains to approximately 450 m AHD on the volcanic ridgetops. The landforms are predominantly flat to undulating, with some steeper slopes rising to the east of the Project associated with the Banana Range. Areas of undulating topography contains waterways which are generally bordered by areas of remnant and regrowth vegetation.

The proposed Castle Creek Substation at the Theodore Wind Farm is at an elevation of approximately 415 m AHD. The transmission line from the substation travels north/northwest, decreasing to an elevation of 230 m AHD as it navigates through the foothills of Banana Range. It then crosses over the Banana Range, to the east of Mt Benn, at an elevation of approximately 450 m AHD. The elevation declines on the eastern side of the Banana Range to approximately 300 m AHD, where the transmission line connects into the proposed Mt Benn Substation.

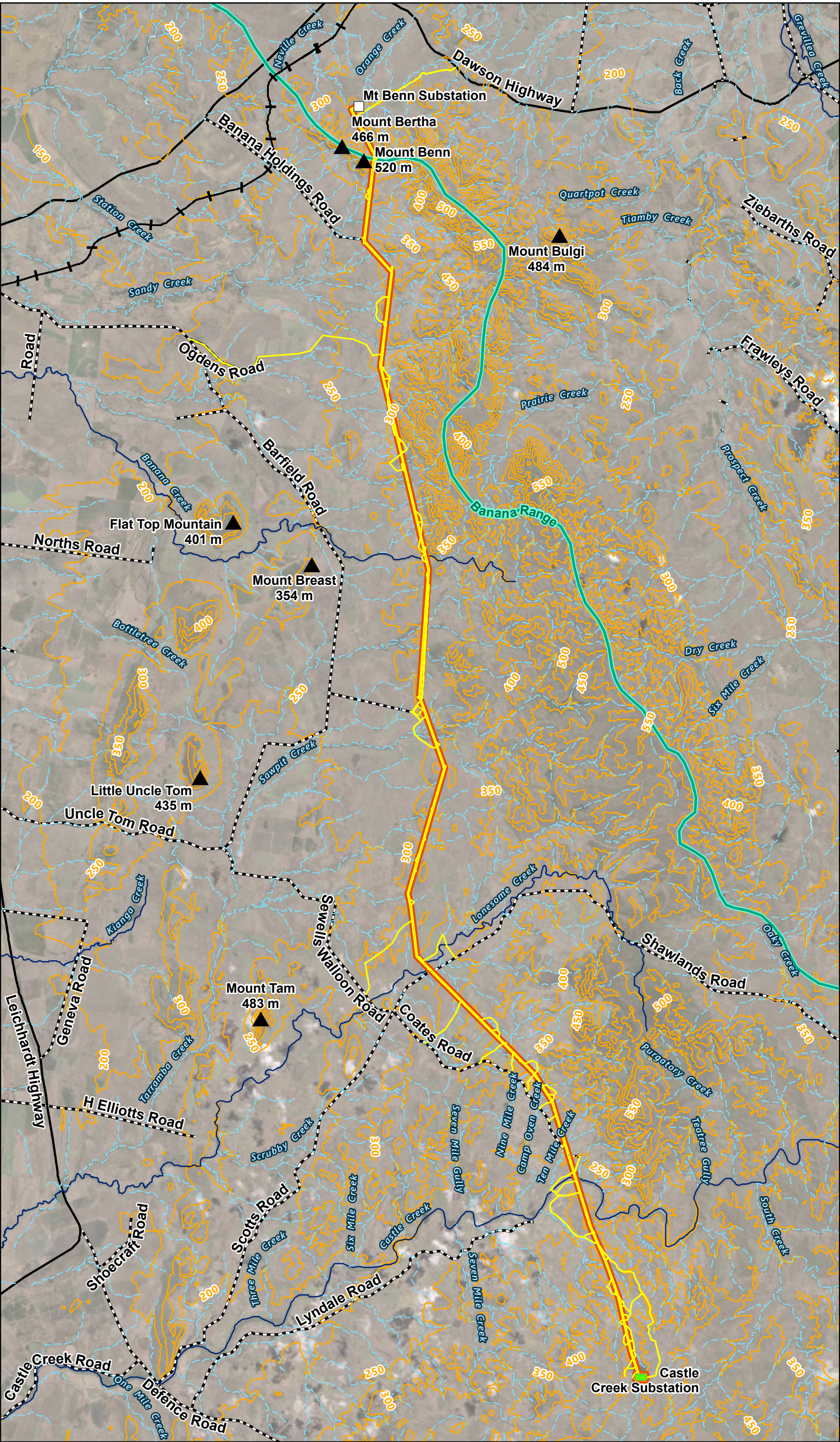
No landslide areas have been identified within the Project area.

The topography of the Project area is shown on Figure 4.1.

4.1.2 Geology

Regional geology units (1:100k) present within the Project area are described in Table 4.1 and illustrated on Figure 4.2.

Broadly speaking, the dominant geology in the flatter regions of the Project area is a mix of mudstone, sandstone, siltstone, and andesite. Waterways are associated with alluvial soils (clay, silt, sand, and gravel), and steeper terrain areas are associated with conglomerate, sandstone, volcaniclastic rocks (ignimbrite), and hard rocky features (granite). Alluvial materials are typically unconsolidated and can be picked up and transported when disturbed, meaning they 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.



PS218956
Theodore Wind Farm Connection
Project

Figure 4.1
Topography

Legend

- Rail line
- Mt Benn Substation
- Mountain peak
- Mountain range
- Castle Creek Substation
- Project area
- MID Proposal Area

Roads

- Highway
- Local

Contour

- Index Contour

Water features

- Major - perennial
- Major - non perennial
- Minor - non perennial
- Minor - perennial



0 1,500 3,000 4,500 6,000 7,500
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
1:150,000 Date: 8/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government,
Mountain peak: © State of Queensland (Department of Resources) 2023
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Table 4.1 Surface geology units (1:100k) within the Project area

Geology unit	Lithological summary	Dominant rock	Location
Glenleigh Granite (CPggl)	Pink and white, medium to coarse-grained, biotite granite	Granitoid	South – location of Theodore Wind Farm and Castle Creek Substation
Td?	Duricrusted palaeosols at the top of deep weathering profiles, including ferricrete and silcrete; duricrusted old land surfaces	Ferricrete	South – location of Theodore Wind Farm and Castle Creek Substation
Torsdale Volcanics (CPvt?)	Grey, brown or purple, crystal-poor to crystal-rich, mainly lithics-poor, dacitic to rhyolitic ignimbrite and other volcanoclastic rocks; minor porphyritic rhyodacitic to rhyolitic lava; rare andesitic rocks; minor volcanolithic conglomerate and sandstone	Felsites (lavas, clastics & high-level intrusives)	Scattered areas within the Project area, with larger areas in the north and south
Qa-QLD (Qa)	Clay, silt, sand and gravel; flood-plain alluvium	Alluvium	Underlies watercourses (Banana Creek, Sawpit Creek, Lonesome Creek and Castle Creek)
Qf-QLD (Qf)	Clay, silt, sand and clayey to sandy gravel; alluvial fans, sheetwash and floodout sheets	Alluvium	Area in the north
Woolton Granite Complex (Cpgwo)	Grey to pink, medium-grained hornblende-biotite granite; greenish grey, medium-grained hornblende-biotite granodiorite	Woolton granite complex	Small area in the south
Woolton Granite Complex/a (GPgwo/a)	Greyish pink, fine to medium-grained leucogranite	Woolton granite complex/a	Small area in the south – off-easement access tracks only.
Camboon Volcanics/a2 (CPvc/a2)	Dark grey, greenish to brownish grey or purple, fine to medium-grained, porphyritic andesite (locally amygdaloidal); minor polymictic granule to cobble conglomerate, andesitic tuff and rhyodacitic(?) ignimbrite	Mafites (lavas, clastics & high-level intrusives)	Central and northern aspect of the Project area
Qf?-QLD (Qf?)	Clay, silt, sand and clayey to sandy gravel; alluvial fans, sheetwash and floodout sheets	Alluvium	Two small areas in the north of the Project area
Torsdale Volcanics (CPvt)	Grey, brown or purple, crystal-poor to crystal-rich, mainly lithics-poor, dacitic to rhyolitic ignimbrite and other volcanoclastic rocks; minor porphyritic rhyodacitic to rhyolitic lava; rare andesitic rocks; minor volcanolithic conglomerate and sandstone	Felsites (lavas, clastics & high-level intrusives)	Areas in the centre and north of the Project area
Mount Bulgi Conglomerate Member (CPvcb)	Polymictic conglomerate and subordinate sandstone containing mainly felsic volcanic clasts and local granite clasts	Rudite	One area in the north of the Project area

Geology unit	Lithological summary	Dominant rock	Location
Camboon Volcanics (CPvc)	Basaltic to andesitic lava and equivalent volcanoclastic rocks; subordinate felsic ignimbrite, other felsic volcanoclastic rocks and minor lava; commonly deformed to schistose equivalents in the Gogango Deformed Zone	Mafites (lavas, clastics & high-level intrusives)	One area in the north of the Project area
Cg/g- Auburn Subprovince (Cg/g)	Cream to pink or grey, fine to medium-grained leucocratic biotite granite	Granitoid	One area in the north of the Project area
TQR?-QLD (TQr?)	Clay, silt, sand, gravel, soil; colluvial and residual deposits	Colluvium	Western side of the Project area – off easement access tracks only
Duaringa Formation, Td-QLD (Tu, Td)	Mudstone, sandstone, conglomerate, siltstone, oil shale, lignite, basalt	Sedimentary rock	Western side of the Project area – off easement access tracks only
Flat Top Formation (Pbf)	Siltstone, lithic sandstone, mudstone, conglomerate and minor coquinitic sandy limestone and tuff	Sedimentary rock	Western side of the Project area – off easement access tracks only

4.1.3 Water features

The Project is within the Fitzroy Drainage Basin and the Dawson River sub-basin. The MID Proposal area crosses seven named water features and their tributaries, namely (from south to north):

- Castle Creek – intermittent, stream order 5, mapped as watercourse under the Water Act
- Ten Mile Creek – intermittent, stream order 2
- Camp Oven Creek -intermittent, stream order 2
- Nine Mile Creek – intermittent, stream order 2
- Lonesome Creek – intermittent, stream order 4
- Sawpit Creek – intermittent, stream order 2
- Banana Creek – intermittent, stream order 3.

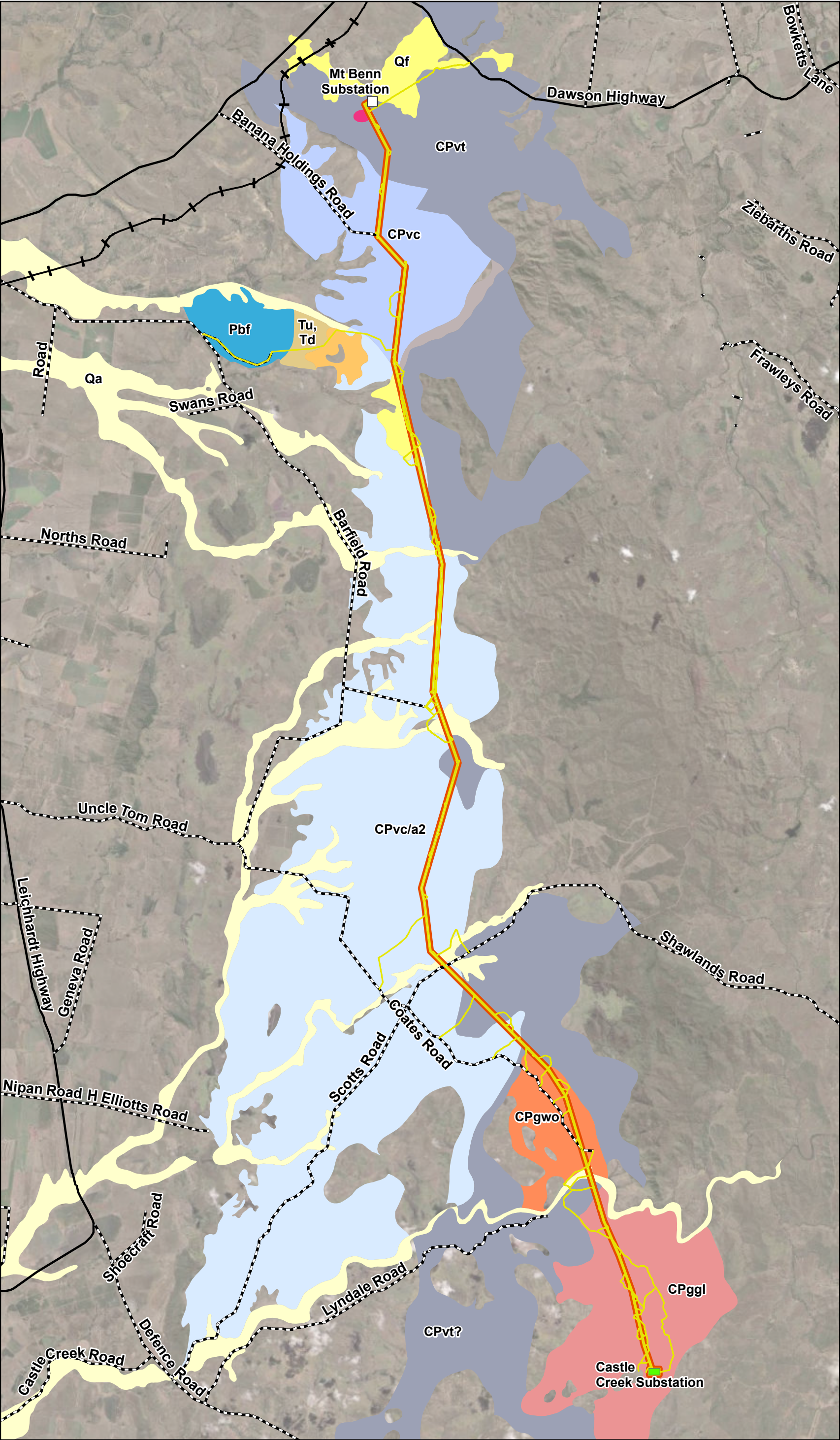
Tributaries of Tarramba, Sandy, and Neville Creeks are also crossed by the MID Proposal area or easement alignment.

In addition to the water features above, one off-easement access track intersects Orange Creek in the north, connecting the transmission line, in the vicinity of the Mt Benn Substation, to the Dawson Highway.

There are no water features on the site of the proposed substation.

All water features crossed by the easement alignment are intermittent and as such only flow continuously at certain times of the year. The Project area also includes many water features which are mapped as Queensland waterways for waterway barrier works (WWBW) under the Fisheries Act. Where bed level crossings for new access tracks are required, design and construction will be required to comply with the 'Accepted Development Requirements for Operational Work that is Constructing or Raising Waterway Barrier Works. Where crossings are located within watercourses regulated under the Water Act, construction activities will also comply with the Riverine Protection Permit Exemption Requirements. Where works are unable to meet the exemption requirements, a riverine protection permit will be required.

Further information on the existing environment and potential impacts on water resources and hydrology is provided in Chapter 7 (Water resources and hydrology).





PS218956
Theodore Wind Farm Connection
Project

Figure 4.2
Surface geological units

Legend

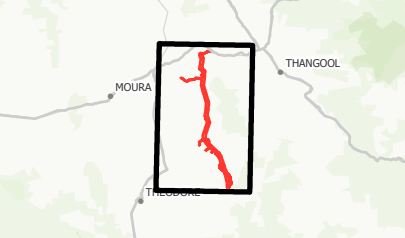
- Rail line
- Mt Benn Substation
- Castle Creek Substation
- Project area
- MID Proposal area

Roads

- Highway
- Local

Detailed surface geology

- Camboon Volcanics (CPvc)
- Camboon Volcanics/a2 (CPvc/a2)
- Cg/g-Auburn Subprovince (Cg/g)
- Duaringa Formation, Td-QLD (Tu, Td)
- Flat Top Formation (Pbf)
- Glenleigh Granite (CPggl)
- Mount Bulgi Conglomerate Member (CPvcb)
- Qa-QLD (Qa)
- Qf?-QLD (Qf?)
- Qf-QLD (Qf)
- Torsdale Volcanics (CPvt)
- Torsdale Volcanics? (CPvt?)
- TQR?-QLD (TQR?)
- Woolton Granite Complex (CPgwo)



0 1,500 3,000 4,500 6,000 7,500
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
1:150,000 Date: 5/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government,
Rail line: © State of Queensland (Department of Natural Resources and Mines,
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4.1.4 Soils

The Australian Soil Classification is the classification system currently used to describe and classify soils in Australia. It is a general-purpose, hierarchical classification system, and consists of five categorical levels from the most general to the most specific: order, suborder, great group, subgroup, and family. Additionally, more detailed surveys of specific areas are available for use in soil determinations.

The following soil survey sources were utilised to identify potential soil classifications within the Project area:

- Soils of the Banana Area, Central Queensland developed by Natural Resources and Water, Queensland 2008 (BAN 1). The BAN covers the northern section of the Project area.
- Lands of the Dawson-Fitzroy Area, Queensland, Land Research Series No.21 for Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia 1968 (ZDD3). The ZDD3 covers the centre and southern portion of the Project area.
- The Australian Soil Classification, which is the classification system currently used to describe and classify soils in Australia. It is a general-purpose, hierarchical classification system, and consists of five categorical levels from the most general to the most specific: order, suborder, great group, subgroup, and family.
- Principal Profile Forms, after Northcote, K.H. (1979). A Factual Key for the Recognition of Australian Soils.
- Australian Soil Classification after Isbell, R.F. (1993). A Classification System for Australian Soils, 4th Edition.

Mapped soil units found within the Project area are summarised in Table 4.2 and illustrated on Figure 4.3.

Table 4.2 Mapped soil units within the Project area

Map code ¹	Description	Dominant soil/general description ²	Australian soil classification ³	Locality
Gc (BAN)	Greycliffe Very deep (>1.5m), grey or brown cracking clay soil with a pedal to coarse self-mulching topsoil and an acid soil reaction trend. The upper subsoil is strongly sodic (ESP >15) and has high to very levels of soluble salts (0.8-2.5 dS/m). Widely spaced, melonhole gilgai separated by inter-gilgai flats up to 50m in width.	Cracking clay soils – Vertosols Ug5.24 Ug5.34 Ug5.16	Grey Vertosols	North
Fg (BAN)	Ferguson Stony, hard setting, shallow to deep (0.3-1.2m), black, brown or grey-brown, sodic duplex soil with moderately thick (0.1-	Sand or loam over sodic clay -Sodosols, Kurosols Db1.33	Brown or Black Sodosols	North

¹ Mapping units are named after the dominant (>70%) soil profile class. Where two soils appear as a complex, two symbols are used. The first symbol represents the dominant soil with a portion of 50 to 70%, with the second soil having a portion of 30% to 50%.

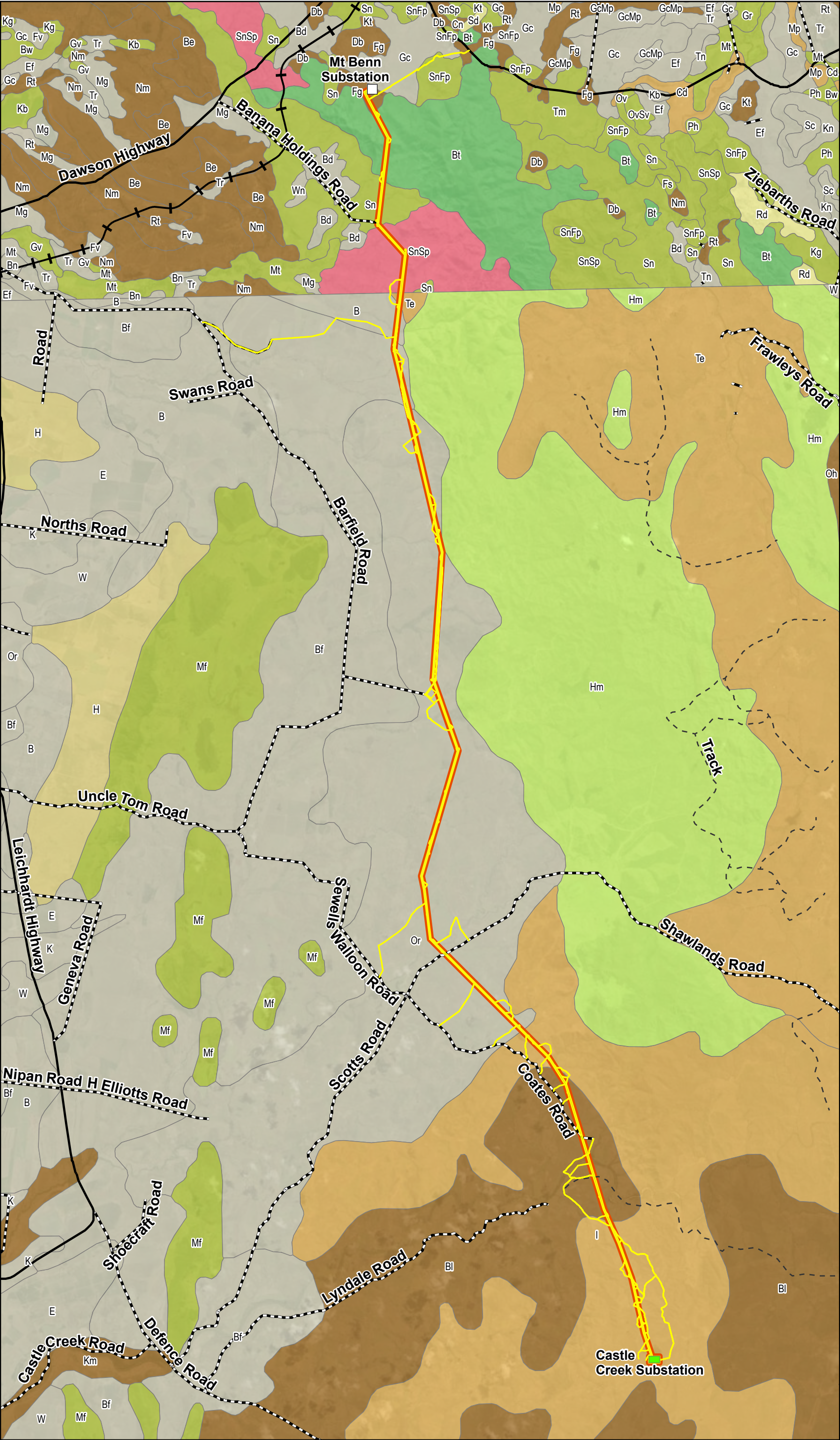
² Principal Profile Forms, provided in Northcote, K.H. (CSIRO, 1979). A Factual Key for the Recognition of Australian Soils, 4th Edition.

³ Australian Soil Classification, Isbell, R.F. et al (1996). A Classification System for Australian Soils, 3rd Edition.

Map code ¹	Description	Dominant soil/general description ²	Australian soil classification ³	Locality
	0.3m), clay loamy topsoil that has a sporadically bleached A2 horizon. The topsoil overlies a light medium to medium clay subsoil that has a coarse prismatic structure. Ferguson has an alkaline soil reaction trend and is formed on acid volcanic rocks.			
Bt (BAN)	Bertha Shallow to moderately deep (0.3-0.7m), stony, uniform sand to clay loamy soil with an acid to neutral soil reaction trend, that is formed on acid volcanic rocks. The surface soil either directly overlies weathered rock or has a pale, sporadic or conspicuously bleached subsurface horizon and/or a dark brown or yellow-brown, B2 horizon that overlies weathered rock.	Deep sandy soils – Tenosols, Rudosols Uc5.11 Um5.51 Um2.12 Um1.44	Bleached-Leptic Tenosol, Leptic Rudosol or Brown Kandosol	North
Sn (BAN)	Santo Shallow to moderately deep (0.3-0.9m), structured, red or brown, gradational or non-cracking clay soil with a thin or moderately thick (0.1-0.3m) clay loam or light clay topsoil that overlies a blocky structured, light medium or medium clay subsoil. Neutral to alkaline soil reaction trend, formed on intermediate to basic volcanic rocks.	Friable non-cracking clay or clay loam soils - Dermosols, Ferrosols Uf6.31 GN3.12 GN3.22	Red or Brown Dermosol	North
SnSp (BAN)	Santo Stony Phase Shallow to moderately deep (0.2-0.8m), stony, red or brown, uniform or gradational soil with a 0.05-0.25m thick, clay loam fine sandy to light medium clay topsoil that overlies a blocky structured light clay to medium clay subsoil. Neutral to alkaline	Friable non-cracking clay or clay loam soils - Dermosols, Ferrosols Ut6.31 Dr2.12 Gn3.22	Red or Brown Dermosols or Chromosol	North

Map code ¹	Description	Dominant soil/general description ²	Australian soil classification ³	Locality
	soil reaction trend, formed on Permian, intermediate, volcanic rocks.			
SnFp (BAN)	Santos Fertile Phase Shallow or moderately deep (0.3-0.9m), structured, red or brown, non-cracking clay with a moderately thick (0.1-0.2m), light clay or light medium clay topsoil that overlies a blocky structured, light clay to medium clay subsoil. Neutral or alkaline soil reaction trend, formed on Permian, intermediate, volcanic rocks.	Friable non-cracking clay or clay loam soils - Dermosols, Ferrosols	Dermosol	North
Te (ZDD3)	Torsdale Strongly undulating volcanic plains with low hills and moderately extensive lower slopes, shallow texture contrast soils and cracking clays and eucalypt grassy woodland, in the central east.	Shallow texture contrast soils and cracking clays Dr2.12 Dy2.43 Dd1.43 Ug5.13, Ug5.15, Ug5.16 Uf6.11, Uf6.21, Uf6.32	Chromosol	Centre
B (ZDD3)	Banana Undulating plains mainly on Upper Palaeozoic argillaceous rocks, cracking clays, with softwood scrub, brigalow, and eucalypt grassy woodland, mainly in the north-eastern quarter.	Deep cracking clays Ug5.12, Ug5.15, Ug5.18, Ug5.34 Dy2.13 Dd1.43 Uf6.22 Um1.43 Gn3.43	Vertosol	Centre
Bf (ZDD3)	Barfield Undulating plains on Upper Palaeozoic volcanic rocks, with moderately extensive depositional lower slopes with fine-textured soils, shallow to deep cracking clays, and eucalypt grassy woodland, between Theodore and Banana.	Shallow to deep cracking clays Ug5.4, Ug5.12, Ug5.15, Ug5.22 Uf6.33	Vertosol	Centre

Map code ¹	Description	Dominant soil/general description ²	Australian soil classification ³	Locality
Or (ZZD3)	Orana Undulating plains on dipping Upper Palaeozoic volcanic rocks with shallow fine-textured soils, and eucalypt grassy woodland with minor brigalow, between Theodore and Banana.	Shallow cracking clays, shallow undifferentiated soils, and texture contrast soils Ug5.4, Ug5.12, Ug5.22 Dy2.12, Dy3.12 Uf6.33 Dd3.33	Vertosol	Centre
Hm (ZZD3)	Hillmore Hills on dipping Upper Palaeozoic volcanics, very shallow undifferentiated soils, shrub with eucalypt woodlands in the north-eastern quarter.	Firm shallow siliceous loams Um1.41 Uf6.31 Ug5.34 Dr2.12, Dy2.23, Dy2.43 Gn3.94	Rudosol	Centre
I (ZZD3)	Irving Hills on granitic and volcanic rocks, texture contrast soils and outcrops and very shallow undifferentiated soils, with eucalypt grassy woodlands in the north and east.	Shallow undifferentiated soils Dy2.12, Dy2.43, Dy3.12, Dy3.43, Dy3.62, Dy4.51 Dr2.12 Un1.41 Uf6.31 Ug5.15	Chromosol	South
Bl (ZDD3)	Bouldercombe Strongly undulating granite plains with low hills and moderately extensive colluvial lower slopes, texture contrast and very shallow undifferentiated soils, with eucalypt grassy woodland, mainly near Camboon but small areas near Rockhampton.	Texture contrast and very shallow undifferentiated soils Uc1.21, Uc2.21, Uc6.12 Gn3.11 Dr2.12, Dy2.43, Dy3.12, Dy3.41, Dy3.43, Dy3.62, Dy4.51 Db3.12 Ug5.15	Sodosol	South



Legend

- Rail line
- Mt Benn Substation
- Castle Creek Substation
- Project area
- MID Proposal area

Australian soil classification [ASC]

- Chromosol
- Dermosol
- Ferrosol
- Kandosol
- Kurosol
- Rudosol
- Sodosol
- Tenosol
- Vertosol

Roads

- Highway
- - Local
- - Track

0 1,500 3,000 4,500 6,000 7,500
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
1:150,000
Date: 6/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government, Australian soil classification [ASC]; © State of Queensland (Department of Natural Resources and Environment)

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Based on the available mapping the following broad soil types and associated characteristics are located within the Project area:

- Dermosols – well-structured clay to clay loam soils, generally suitable for earthworks, non-dispersive, prone to compaction
- Rudosols – associated with current and previous watercourses, layered alluvium, vulnerable to erosion
- Sodosols – texture contrast soils with impenetrable subsoils, low agricultural potential commonly used for grazing, vulnerable to erosion and dryland salinity when vegetation removed
- Vertosols – clay-rich soils, high soil fertility, large water holding capacity, potential for strong cracking and salinity
- Chromosol – moderate agricultural potential, susceptible to soil acidification and soil structure decline
- Kandosol - sandy to loamy-surface soil, grading to porous sandy-clay subsoils with low fertility and poor water-holding capacity
- Tenosol – poorly developed but widespread and can be shallow and stony. These soils generally have a low fertility and low water-holding capacity

4.1.5 Acid sulfate soils

Acid sulfate soils are commonly found in low-lying coastal areas where the natural ground level is less than 5 m AHD. According to the ASRIS mapping resource, there is a low to extremely low probability of the Project area containing ASS as the general topography of the area is above 100 m AHD.

4.1.6 Resource interests

No resource production permits (e.g. petroleum, mining leases, mining claims) are traversed by the MID Proposal area or located across the site of the proposed Castle Creek Substation.

The Project area is located across five exploration permits for minerals other than coal (EPM 28294, EPM 26852, EPM 28717, EPM 28839, and EPM 28836). The proposed substation site is within EPM 28836. Off-easement access tracks supporting the Project are also located within a coal exploration permit (EPC 1620). The section of the MID Proposal area or easement alignment north of Banana Creek is also within a geothermal exploration permit that is currently in the application process (EPG 2044). Table 4.3 provides details of these exploration permits, which are shown on Figure 4.4. While there have been some active prospects for copper and gold in the area surrounding the Project, none of these prospects are within the Project area.

Table 4.3 Exploration permits within the Project area

Permit number	Mineral type	Status	Holder	Relevance to the Project
EPM 28294	Minerals other than coal	Granted	AngloGold Ashanti Australia Limited	Northern extent of the easement alignment
EPM 26852	Minerals other than coal	Granted	True North Copper Limited	Central/northern extent of the easement alignment
EPM 28717	Minerals other than coal	Granted	Terrain Mineral Ltd	Central/southern extent of the easement alignment
EPM 28839	Minerals other than coal	Granted	Terrain Mineral Ltd	Southern extent of the easement alignment

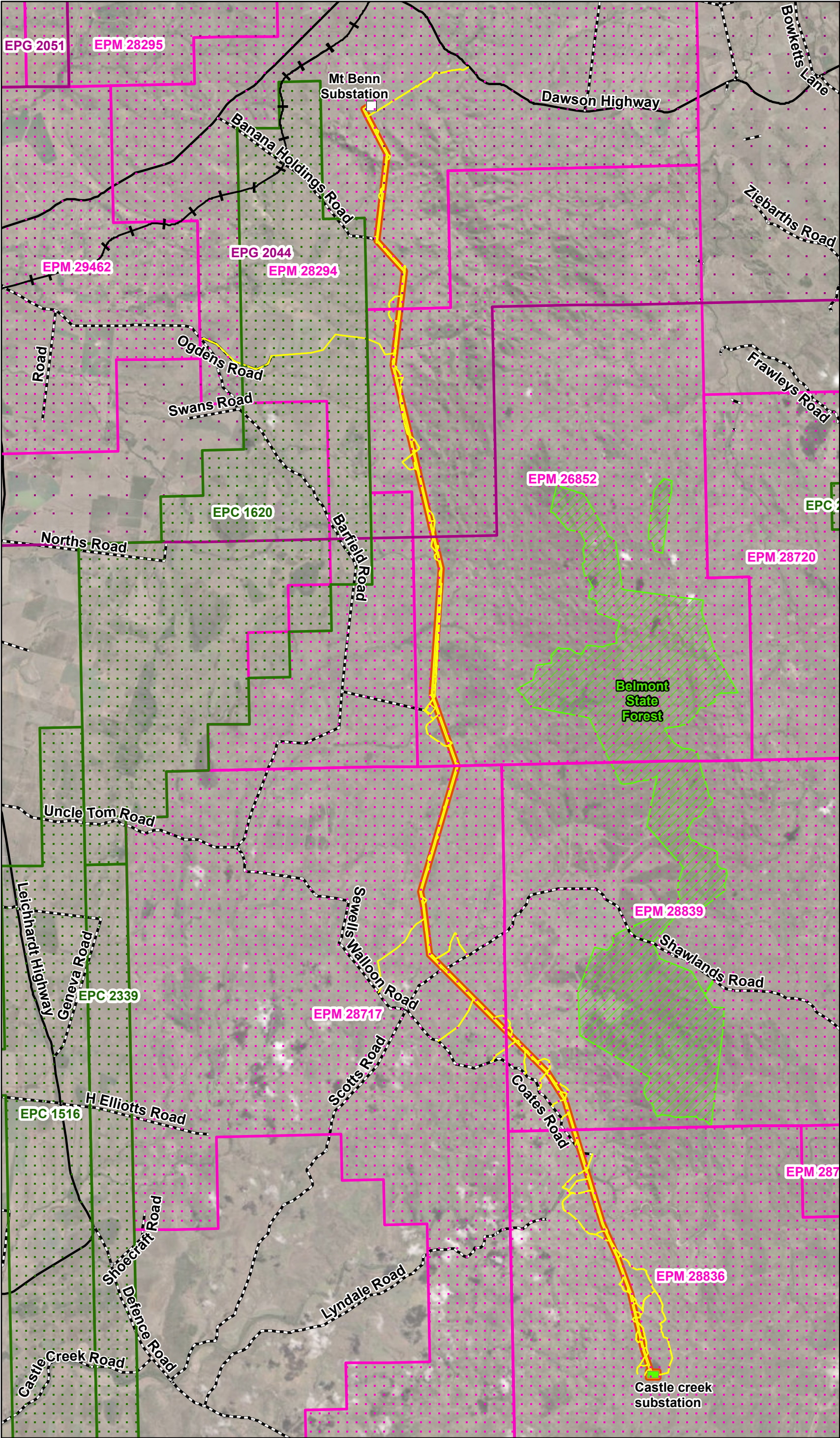
Permit number	Mineral type	Status	Holder	Relevance to the Project
EPM 28836	Minerals other than coal	Granted	Terrain Mineral Ltd	Southern extent of the easement alignment and the entire site of the proposed substation
EPG 2044	Geothermal	Application	Australis Energy Pty Ltd	Northern extent of the easement alignment (north of Banana Creek).
EPC 1620	Coal	Granted	Endocoal Pty Ltd	West of the easement alignment. Traversed by off-easement access tracks.

4.1.7 *Contaminated land*

A search of the Environmental Management Register (EMR) and Contaminated Land Register (CLR) was undertaken in May and June 2025 for the lots associated with the Project (Appendix C). None of the lots were listed on the EMR or CLR. Contaminating land uses which have the potential to be within the Project area include cattle dips, waste areas fuel storage tanks and old machinery.

4.1.8 *Unexploded ordnance*

The Australian Government, Department of Defence identified no areas with substantial potential for unexploded ordnance as being mapped within or adjacent to the Project.



PS218956
Theodore Wind Farm Connection
Project

Figure 4.4
Exploration permits within the
Project area

Legend

- Mt Benn Substation
- Castle Creek Substation
- ┌ Rail line
- Project area
- MID Proposal area
- ▨ State Forest
- Exploration permits
- Coal
- EPC granted
- Geothermal
- EPG application
- Mineral
- EPM granted



0 1,500 3,000 4,500 6,000 7,500
Metres

Coordinate system: GDA2020 MGA Zone 56
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Data sources: WSP, RWE, Powerlink, QLD Government,
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4.2 Potential impacts and mitigation measures

Project activities that involve the disturbance of soil, such as vegetation clearing, excavation, and civil works have the potential to impact land resources. Potential impacts relating to topography, soil, ASS, resource interests, and contaminated land are discussed in the following subsections.

4.2.1 Topography

Construction of the Project may involve cut and fill earthworks for the establishment of:

- transmission line structures
- substation platform
- access tracks in undulating terrain
- laydown areas.

Cut and fill earthworks are likely to be required at some transmission line structure locations where topography is steep or undulating to establish safe work areas for assembly and erection of structures. Earthworks associated with pad and footing construction for support structures will generally be restricted to an area of approximately 50 m by 50 m for structures greater than 50 m in height and 40 m by 40 m for structures less than 50 m in height.

Construction of the substation will require cut and fill earthworks to provide a flat pad. Detailed earthwork profiles will be developed during substation detailed design and will involve the balance of cut and fill quantities to minimise disturbance to the surrounding existing topographic profile.

Access tracks will be required to service each transmission line structure site and for access to the substation. Access will be established to accommodate a range of construction equipment including delivery trucks, concrete trucks and cranes. Access tracks will generally only be constructed using a grader to push a thin layer of soil and will not include any earthworks; however, in more undulating terrain, a small proportion of earthworks may be required.

Where possible, already cleared areas will be used for laydown and brake and winch sites to minimise the need for earthworks. Limited levelling and clearing of these sites are proposed.

The earthworks described above will occur at relatively small, discrete locations and no other changes to the geomorphic landscape are anticipated. Therefore, the impact on the existing topography is anticipated to be negligible from construction of the Project. No operational impacts to topography are anticipated.

4.2.2 Soils

Any activity which exposes the ground surface, such as vegetation clearing or earthworks, may potentially result in soil erosion or other soil management issues if not appropriately managed. Risks are likely to be greatest during construction activities and minimal during operations.

Prior to construction, geotechnical assessments will be undertaken to determine the appropriate foundation type for each structure and the substation. The choice of foundation type is dependent on the specific nature of the soil and rock and takes into account soil/concrete friction strength, water levels, acidity, soil bearing capacity, construction constraints, rock levels, and soil properties.

Rehabilitation will be undertaken progressively during construction, where practicable, and Powerlink will ensure that all disturbed areas impacted from construction are reinstated at the end of the Project. The short-term goal of rehabilitation is the stabilisation of soils to provide a suitable matrix for vegetation establishment, to aid in preventing erosion. Rehabilitation also includes the replacement of topography, topsoil, and fences.

4.2.2.1 Soil erosion

The erosion of topsoil, considered to be the most productive part of the soil profile, has the potential to impact on the surrounding land use (which is predominantly grazing) 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.

Project areas containing vertosol, sodosol, rudosol, and ferrosol soils are considered susceptible to erosion due to the dispersive nature of these soils. The soil orders chromosols, tenosols, and dermosols are considered generally not to be dispersive and present a lower erosion risk during construction and operation.

Alluvial soils on the banks and approaches to water features are generally of a loamy sand nature and are considered prone to erosion when disturbed.

While significant earthworks are not proposed for the Project the careful management and handling of soil resources can reduce erosion, protect water resources from sediment-laden runoff, and improve the chances of rehabilitation success, reducing the environmental impact of the Project.

Measures to minimise impacts from soil disturbing activities will be in accordance with the general requirements outlined in the EMP (Soil and Water) (Appendix D) and include:

- conducting soil sampling and testing to inform both erosion and sediment control and rehabilitation requirements
- minimising ground disturbance and removal of native or pastoral ground cover
- restricting vehicles to approved and mapped access tracks
- minimising soil disturbance in erosion prone and steeply sloping areas during clearing activities
- water movement through the site is controlled – in particular, clean water is diverted around the site
- monitoring continued effectiveness of erosion and sediment control structures and measures
- removal of temporary erosion and sediment controls when permanent measures are in place and/or site stabilisation has occurred
- developing a Rehabilitation Management Plan
- undertaking ground preparation works prior to commencement of any rehabilitation treatments in accordance with the Rehabilitation Management Plan
- monitoring rehabilitation works until site stabilised criteria is achieved.

Specific control measures may be required for areas identified as highly erodible and include:

- using erosion control measures, such as the use of erosion matting (e.g. Jute Mesh) or sediment socks (e.g. sand-filled UV-resistant fabric tubes) for earthwork activities
- avoiding large scale clearing on sodic and dispersive soils where possible, especially if reworking is necessary (e.g. for earthworks and backfill)
- considering the application of soil ameliorants such as gypsum for sodic soils as these can reduce dispersity, waterlogging and crusting (IECA 2008).

A Project specific Erosion and Sediment Control Plan (ESCP) will also be developed by construction contractors in accordance with the IECA Best Practice Erosion and Sediment Control Guidelines (2008), as outlined in the EMP. The ESCP will include onsite drainage, stormwater runoff and treatment (if required), vegetation works (clearing and rehabilitation), site exit and egress points, and stockpile management.

4.2.2.2 Soil compaction

Soil compaction may occur during construction of the Project through increased frequency of light vehicles on access tracks, the introduction of heavy machinery during construction and the storage of materials. Potential impacts associated with soil compaction include a decline in soil structural stability, a decrease in water entering the soil either as rain or irrigation, and subsequent issues with poor root growth, soil cultivation, and seedbed preparation.

Project areas containing dermosols, ferrosols, and vertosols soils are considered to be susceptible to compaction due to their high clay content.

In addition, areas mapped as having rudosol, sodosol, chromosol, and tenosol soils are subject to a loss in shear strength with increases in their moisture content. After prolonged or intense rainfall and especially under traffic loads the soil is likely to become weak and possibly slippery for tyred vehicles.

The following measures will also be considered to protect the structural properties of soils:

- scheduling peak construction activities outside of the wet season
- excluding traffic from soils that are sensitive to structural degradation, where appropriate
- implementing appropriate site vehicle weight and speed restrictions, to minimise the adverse impacts that speeding traffic can have on subgrade (soil) performance under vehicle load
- addressing wet weather aspects associated with the use of unsealed access tracks through a Traffic Management Plan.

4.2.2.3 Soil acidification

Mapped areas of chromosol soils are present and at risk of soil acidification, which are typically accelerated by agricultural production and removal of plants. This may lead to decline in crop and pasture production due to loss of soil fertility.

As outlined in the EMP (Acid Sulfate Soils) (Appendix D) soil disturbing activities will be assessed to determine the level of risk and controls will be implemented commensurate with the level of risk assigned. This could include the application of ameliorants during soil stripping activities where determined by a suitably qualified person.

4.2.2.4 Acid sulfate soils

When disturbed, acid sulfate soils can generate large amounts of sulfuric acid, iron, aluminium and sometimes heavy metals, which has the potential to impact on the environment and infrastructure. Available mapping information and site conditions indicate that the potential for acid sulfate soils to impact on the environment or infrastructure is considered low to very low for the Project (refer to Section 4.1.5).

If acid sulfate soils are encountered during construction activities, the general requirements as outlined in the EMP (Acid Sulfate Soils) (refer Appendix D) will be implemented.

4.2.3 Contaminated land

4.2.3.1 Existing land contamination

While no site listed on the EMR/CLR are within the Project area, the potential exists for contaminating land uses such as cattle dips, waste storage areas, fuel storage tanks or old machinery to be present. Where land is either known or suspected of being contaminated, Powerlink has a general environmental duty under the EP Act to ensure that any risk to human health or the environment are mitigated.

Contaminated land will be managed and mitigated in accordance with the general requirements outlined in the EMP (Contaminated Land) (refer Appendix D). These include testing for the presence of contamination known or suspected contamination exists, prior to excavations or other earthworks occurring, and on-site remediation of contaminated soil where contamination is confirmed. If on-site remediation is not practicable, contaminated soil is to be removed off-site for treatment or disposal in accordance with legislative requirements (i.e. soil disposal permits, disposal to an appropriate licenced facility).

4.2.3.2 Prevention of land contamination

The chemicals used during the construction, operation and decommissioning phases of the Project will include fuel (predominantly diesel), unleaded petrol, 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.

To prevent Project activities from contaminating land, management of contaminating materials along with waste will be in accordance with the general requirements listed in the EMP (Contaminated Land and Hazardous Materials) (refer to Appendix D). Management of wastes and hazardous materials is discussed further in Chapter 20 (Hazards, health and safety) and Chapter 23 (Waste management).

5 Climate and greenhouse gas emissions

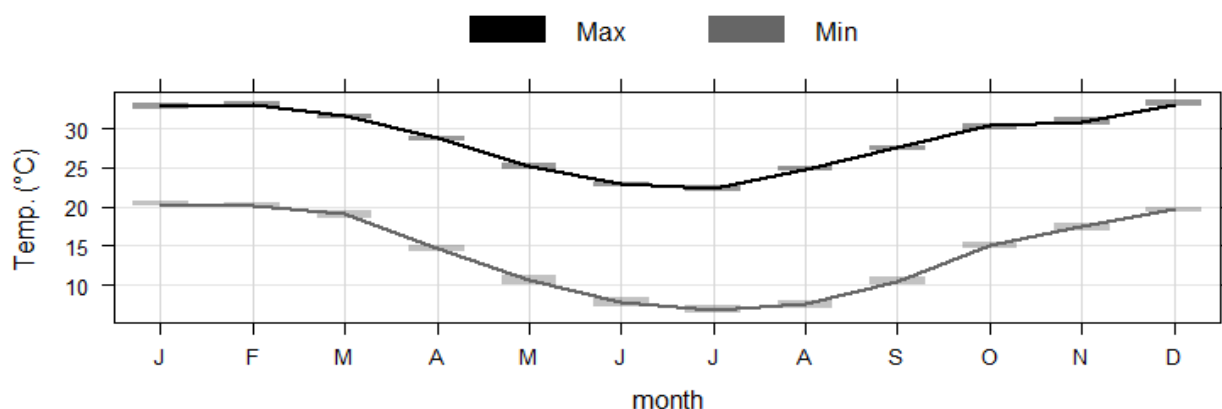
Chapter 5 presents climate statistics for the Project area including temperature, humidity, rainfall, and wind, along with atypical meteorological conditions and their likely frequency of occurrence (i.e. thunderstorms, cyclones, drought, flooding). Climate change projections as well as an assessment of greenhouse gas emission types and sources have also been provided for the Project.

5.1 Climate conditions

The Project is within the subtropical climate zone, as classified by the Commonwealth Bureau of Meteorology (BoM 2005). The Australian subtropical climate is seasonal with the highest temperature, rainfall and evaporation occurring during summer months of November to February. Climate data has been obtained from the closest BoM weather station to the Project area, the Thangool Airport (039089), approximately 28 km east of the MID Proposal area (Latitude: 24.49°S | Longitude: 150.57°E). The Thangool Airport weather station records both rainfall and temperature statistics.

5.1.1 Temperature

Temperature statistics from the Thangool Airport weather station are available from 1929 to now. The annual average maximum temperature for the region is 29.2°C (BoM 2025a). January is the hottest month of the year with a mean maximum temperature of 33.8°C and a mean minimum temperature of 19.8°C (BoM 2025a). The annual average minimum temperature for the region is 13.3°C (BoM 2025a). July is the coolest month of the year with a mean minimum temperature of 5.8°C and a mean maximum temperature of 23.2°C (BoM 2025a). Mean monthly maximum and minimum temperature for 2019–2024 at the Thangool Airport station is presented in Figure 5.1.

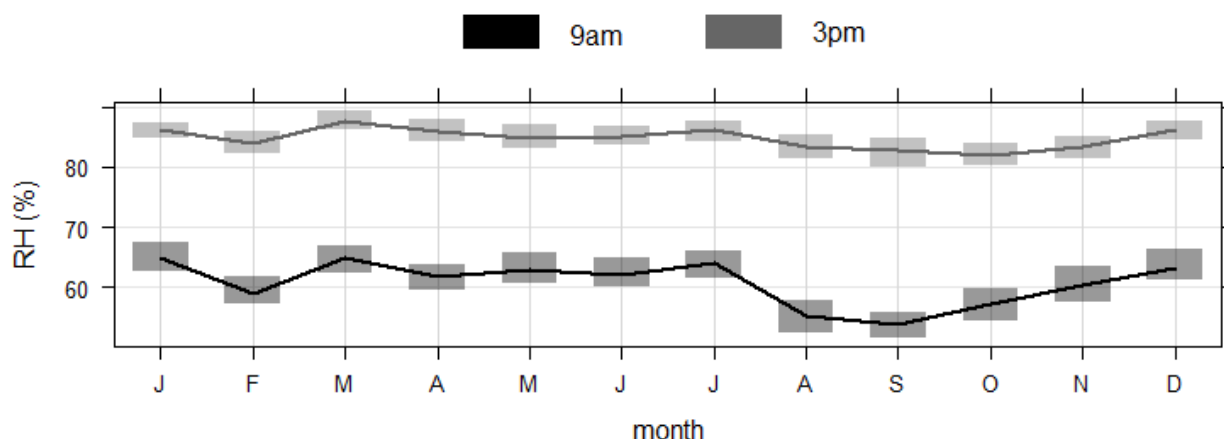


The shaded bars indicate 95 percent confidence intervals.

Figure 5.1 Mean monthly maximum and minimum temperature for 2019–2024 (inclusive) at Thangool Airport station

5.1.2 Relative humidity

Figure 5.2 presents the mean monthly relative humidity (RH) at 9:00 am and 3:00 pm for 2019–2024 (inclusive) at Thangool Airport station and demonstrates a humid climate throughout the year.



The shaded bars indicate 95 percent confidence intervals.

Figure 5.2 Mean monthly relative humidity for 2019–2024 (inclusive) at the Thangool Airport station

5.1.3 Rainfall

Rainfall in the region is seasonal and highly variable. The average annual rainfall at the Thangool Airport weather station is 654.9 mm. The majority of rainfall generally falls between October and March (i.e. the wet season) when on average 470 mm of rainfall is typically recorded at Thangool Airport weather station (Table 5.1). The wet season is characterised by short-lived intense rainfall events (i.e. high daily totals) while drier conditions are experienced throughout the rest of the year (when average monthly rainfall is less than 50 mm). Recharge and stream run-off potential is highest during the wet season months when most rainfall occurs. Similarly, daily evaporation is higher between October and March (i.e. in the warmer months).

Table 5.1 Monthly rainfall statistics for Thangool Airport weather station from 1929–2025

Statistics	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)												
Mean	94.4	92.3	63.8	33.0	37.3	30.9	28.6	23.5	24.6	57.9	74.6	93.8
Median	87.4	74.0	48.7	22.8	22.6	21.2	16.4	18.9	15.4	50.6	71.0	74.6
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	310.0	206.5	278.6	198.5	209.1	127.6	140.2	108.7	155.4	240.9	214.0	374.4
Decile 1	22.2	12.2	10.9	3.1	3.2	2.4	1.2	0.3	0.0	9.0	17.3	34.0
Decile 9	171.2	206.0	135.7	73.4	77.2	78.6	78.0	65.7	61.0	120.7	136.6	163.5
Highest daily	199.6	07.4	107.4	91.2	83.8	97.0	68.6	87.6	86.6	79.6	67.0	127.8
Pan Evaporation (mm)												
Daily average	7.4	6.6	6.4	5.1	4.0	2.9	3.1	4.0	5.5	6.7	6.8	7.4

Source: (BoM 2025)

5.1.4 Wind speed and direction

Figure 5.3 shows the annual wind rose plot (left) and windspeed histogram (right) for 2019–2024 (inclusive) at the Thangool station. East to south-easterly winds dominate with a relatively high frequency of calms (14.5 percent). Seasonal wind roses (Figure 5.4) show that winds in spring are relatively evenly distributed across the north-westerly to south-easterly sectors. In summer, autumn, and winter, easterly and south-easterly winds prevail. Average windspeeds in autumn and winter tend to be lower compared to spring and summer.

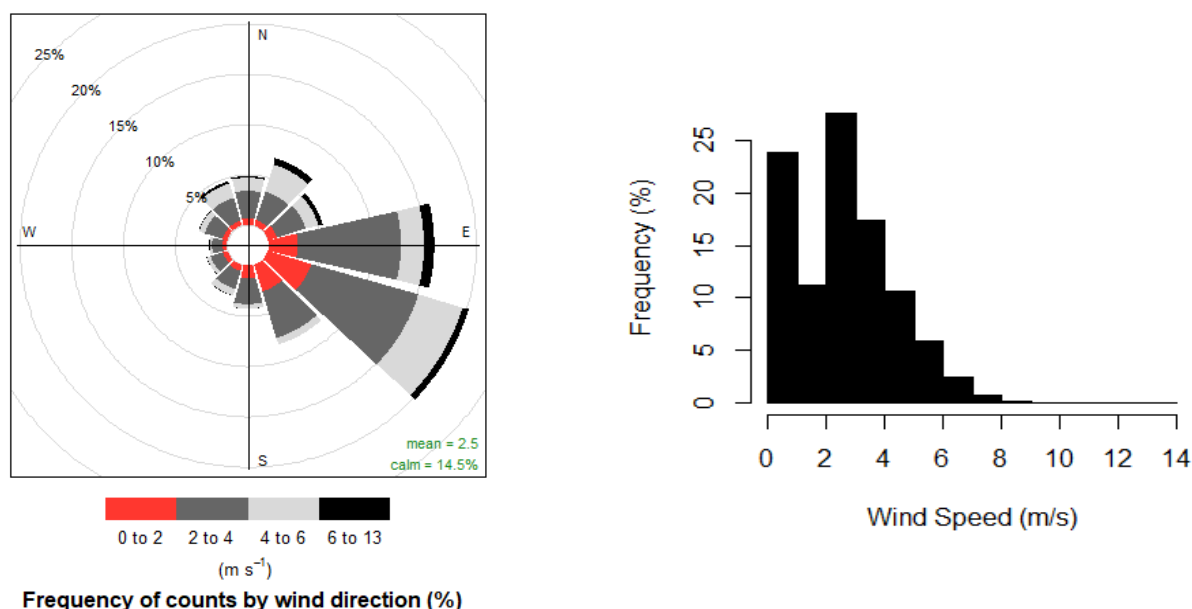


Figure 5.3 Annual wind rose plot (left) and windspeed histogram (right) for 2019–2024 (inclusive) at the Thangool station

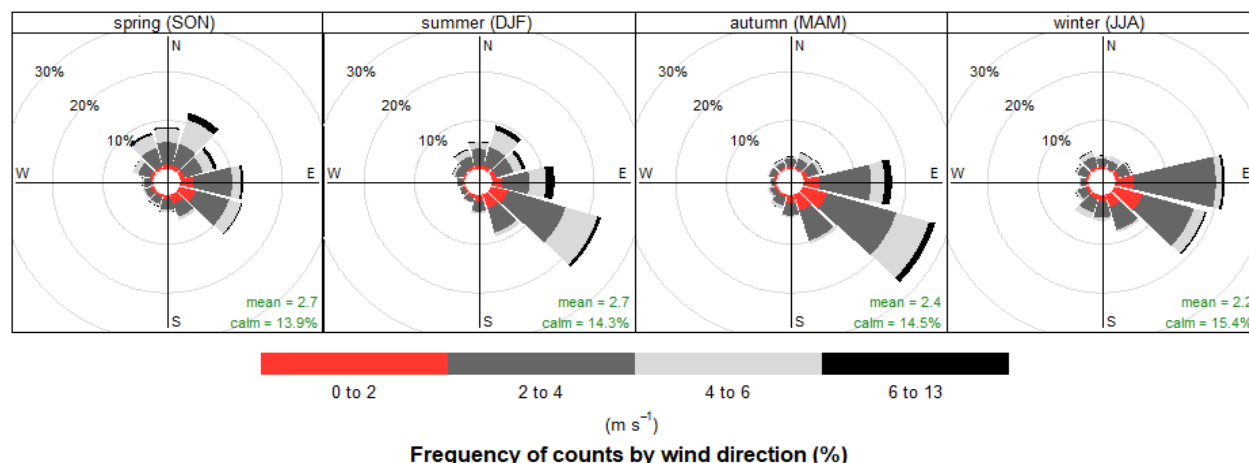


Figure 5.4 Seasonal wind rose plots for 2019–2024 (inclusive) at the Thangool station

5.1.5 Extreme climatic conditions

Extreme weather or atypical meteorological conditions have the potential to adversely affect the Project during any phase of its lifecycle. Their occurrence may result in construction and operation ceasing, damage to structures or the environment and subsequent maintenance. The history of extreme weather for the Project area is an important consideration and will allow for any risks to be identified and assessed.

5.1.5.1 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 effects on vegetation growth, erosion, and overall land quality. Information about climate risk, including droughts, for rural Queensland is provided by the Queensland Government's 'The Long Paddock' initiative (Stone et al. 2019).

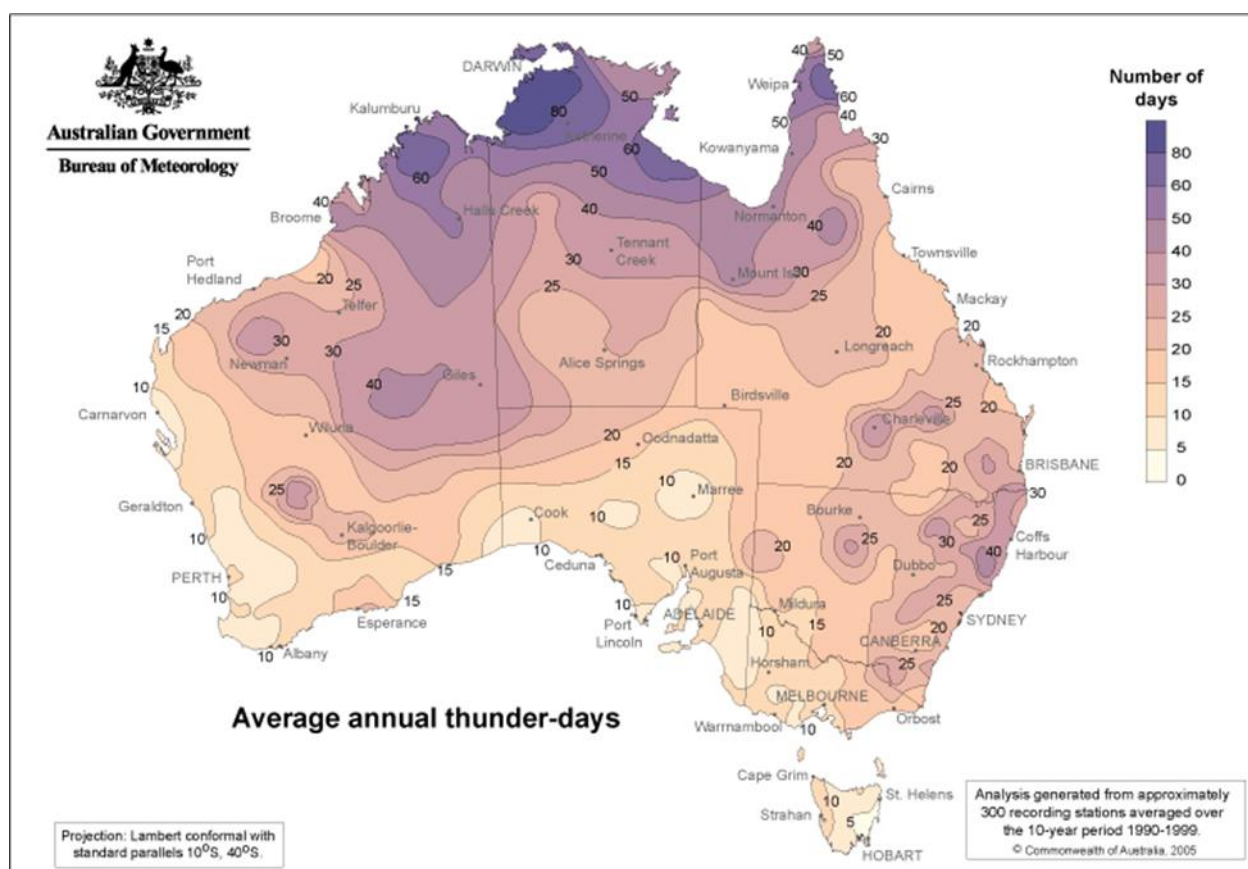
A review of recent Queensland Drought Situation maps indicates that, as of 1 April 2025, the Project area (Banana Shire local government area) is not drought-declared. It is likely that during the Project's life-cycle, drought conditions of various severity will be experienced, and the associated risks should therefore be considered.

5.1.5.2 Cyclones

Tropical cyclones generally develop from tropical lows between November and April, and can cause damaging winds, flood-producing rainfall, and coastal storm surges. The Project is located close to regions where tropical cyclones have occurred (BoM 2025c). The most recent cyclone to affect the Banana Shire Council occurred on 20 February 2015 when Tropical Cyclone Marcia passed to the East of Biloela as a category 1 cyclone with wind gusts to 85 km/h recorded. Theodore has experienced flooding and strong winds as a result of several cyclones passing the south-east Queensland coast including Tropical Cyclone: Alfred (2025), Debbie (2017), Oswald (2013), Gertie (1995), and Cliff (1981).

5.1.5.3 Thunderstorms

Thunderstorm activity is a common meteorological occurrence in south-east 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 (2025d) indicates that the Project area and surrounds can expect an annual average of 20 days of thunder activity (refer Figure 5.5).



Source: (BoM 2025d)

Figure 5.5 Average annual days of thunder activity

5.1.5.4 Flooding

Rainfall across Queensland varies considerably both spatially and over time, and increasing rainfall is known to occur in south-east Queensland from strengthened monsoonal influence that can lead to flooding. Impacts from flooding events can include damage to infrastructure foundations, increased erosion and general land degradation. Elevated water levels can result in major road closures and restrict access especially in rural areas.

In accordance with both the Queensland Floodplain Assessment Overlay data (DNMMRRD 2024) and the local government mapping (Banana Shire Council 2021b), the MID Proposal area is only located within the Dawson River flood hazard area. Consequently, the flooding risks associated with the Project is considered low (refer further to Chapter 7 (Water resources and hydrology)).

5.2 Climate influence of design and construction

The Project is located within a subtropical climate zone characterised by warm humid summers and mild winters. The region experiences a low to moderate frequency of meteorological conditions such as flooding and thunderstorm activity. These conditions have the potential to affect the operation of the transmission line through power outages, physical damage to the infrastructure, soil erosion of unsealed access tracks or vegetation, and other materials being blown into conductors. Localised flooding could limit access for critical maintenance and repairs following such events.

The electricity transmission infrastructure will be designed and constructed to reasonably withstand severe weather events. Consideration will also be given to other impacts associated with flooding such as soil erosion and land degradation, which can lead to reduced or limited access to areas for construction and maintenance.

5.2.1 Climate change

Increasingly reliable regional climate change projections are now available for many regions of the world due to advances in modelling and understanding of the physical processes of the climate system. Based on the Queensland Future Climate Dashboard (Queensland Government 2025), the projected median warming, to the year 2070 for the Project area range from 1.8°C to 2.9°C. Changes in rainfall in this region are variable with a decrease in precipitation (-3 mm) predicted for the northern end of the Project and an increase in precipitation (0.43 mm) predicted in the south. The duration of wet events (i.e. heavy rainfall, floods) is predicted to decrease with a change value of between -0.56 and -2.3 across the Project area (Queensland Government 2025).

5.2.2 Proposed climate change mitigation measures

Table 5.2 identifies the proposed mitigation measures for potential climate change impacts on the Project.

Table 5.2 Potential impacts of climate change and proposed mitigation measures

Potential Climate Change Impacts	Risk Scenario	Risk to the Project	Mitigation Measures (if required)
Increase in annual average temperature	High temperatures lead to increased demand for electricity while also negatively affecting reliability and efficiency of infrastructure and/or equipment.	Low	Not applicable
Change in seasonal average rainfall	Decrease in rainfall especially during winter and spring may lead to drier conditions therefore increasing the potential for wind erosion.	Medium	Monitoring of erosion during routine service maintenance.

Potential Climate Change Impacts	Risk Scenario	Risk to the Project	Mitigation Measures (if required)
	Decrease in rainfall in conjunction with increased temperatures will also increase bushfire risk.	Medium	Emergency response procedures for bushfire (refer to Chapter 22 (Bushfire risks) and Appendix D).
Increase in annual average potential evaporation	Increased dust emissions due to drier surface conditions, resulting in increased water demand for dust suppression during construction. Increased dry foliage and vegetation will increase amount of fuel available for bushfires.	Low	Dust control measures including watering of access tracks/roads, work sites and stockpiles during construction. Regular routine service maintenance of vegetation for transmission line access rights area buffers.
Increased risk of tropical cyclone impact	Increased impacts from gale force winds and flooding	Low	Emergency response procedures for natural disasters.
	Increased risk of erosion especially from exposed areas due to increase in rainfall intensity.	Low	Adaptive management as soon as practical to minimise risk.

5.3 Greenhouse gas emissions

5.3.1 Greenhouse gases

Powerlink annually reports greenhouse gases (GHG) (Scope 1, 2 and 3 emissions) under the *National Greenhouse and Energy Reporting Act* (2007) (Commonwealth) (NGER) and to Governments as required. Powerlink uses the NGER's method to calculate emissions. The thresholds from this legislation and guidance are as follows:

- individual facilities:
 - 25 kilotonnes (kt) or more of GHGs
 - production or consumptions of 100 terajoules (TJ) or more of energy
- company across all facilities:
 - 50 kt or more of GHGs
 - production or consumptions of 200 TJ or more of energy.

GHG emissions quantification in Australia is completed in accordance with the (Commonwealth) Department of Climate Change, Energy, the Environment and Water (2024): *National Greenhouse and Energy Reporting (Measurement) Determination 2008*.

Australia's NGER and international GHG quantification guidance (ISO14064) recognise that GHG emissions can include:

- **Scope 1 emissions** – direct GHG emissions from project activities. These are emissions produced by sources that are owned or controlled by the proponent.
- **Scope 2 emissions** – indirect emissions from the purchase of electricity or steam.
- **Scope 3 emissions** – other indirect emissions embodied in other energy or materials. These emissions are produced by sources that are not owned or controlled by the proponent but are the result of the proponent's activities. This includes emissions associated with the extraction, production and transport of purchased construction materials.

The Department of Environment, Tourism, Science and Innovation (DETSI) Guideline: Greenhouse Gas Emission (2024) provides information about how to meet requirements in relation to GHG emissions to be provided with applications for new environmental authorities (EAs) and applications to amend existing EAs. This guideline is intended to operate alongside Commonwealth guidance and requirements.

This guideline indicates the requirements differ between low and medium-high emitters, defined as:

- Low emitters are applications with expected GHG emissions (Scope 1 and Scope 2) of less than 25,000 tonnes CO₂-e
- Medium-high emitters are applications with expected GHG emissions (Scope 1 and Scope 2) 25,000 tonnes CO₂-e or more per year (at any time during the life of the project).

Applications for medium to high emitters require:

- GHG emissions inventory (Scope 1, 2, and 3)
- GHG emission mitigation and management practices (including Scope 3 where possible)
- GHG abatement plan
- A risk assessment that outlines the scale of expected GHG emissions from the activity and how they are expected to contribute to climate change impacts on Queensland's environmental values.

Key GHG guidance considered as part of this assessment included:

- National Greenhouse and Energy Reporting Act 2007 (Commonwealth of Australia 2007)
- National Greenhouse and Energy Reporting (Measurement) Determination 2008
- Australian National Greenhouse Accounts Factors: For individuals and organisations estimating greenhouse gas emissions
- Australia's emissions projections 2024, Department of Climate Change, Energy, the Environment and Water, Canberra, December (DCCEE 2024)
- Intergovernmental panel on Climate Change (IPCC) guidelines for National Greenhouse Gas Inventories 2006, and the 2019 refinement to the IPCC guidelines
- ISO 14064-1:2018, Greenhouse gases – Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
- ISO 14064-2:2019, Greenhouse gases – Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

To identify and calculate Scope 3 emissions across the Project, this assessment used the guidance from the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD), Greenhouse Gas (GHG) Protocol: A Corporate Accounting and Reporting Standard (Revised Edition) (2015), GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard (2013) and the Technical Guidance for Calculating Scope 3 Emissions (version 1.0), referred to as Scope 3 standard.

5.3.2 *Project greenhouse gas emission sources*

The boundaries adapted for the GHG emission inventory calculations are defined in this section. A GHG inventory is a list of emission sources, and the associated emissions quantified using standardised methods. This assessment considered Scope 1, 2, and 3 emissions associated with construction and operation of the Project.

The geographical study area for this assessment covers the Project area, including the Castle Creek Substation and transmission line. For this assessment, only Scope 1, 2, and 3 emissions associated with the construction and operation within the Project area were considered and this is considered the systems boundary for this assessment. Table 5.3 provides a summary of the emission sources identified during construction and operation.

GHG emissions would also occur during decommissioning of Project infrastructure at the end of its design life, however these were not considered as part of this assessment due to the uncertainty regarding the Project end-of-life phase.

Table 5.3 GHG emission sources included in this assessment

Project activity	Scope 1	Scope 2	Scope 3
Construction			
Construction of project infrastructure	Emissions from diesel combustion from mobile and stationary plant.	N/A	Emissions associated with production of fuels consumed. Embodied emissions associated with construction materials utilised.
Vehicle movements transporting staff and equipment	Emissions from all fuel combustion from light vehicles within the Project area.	N/A	Emissions associated with production of fuels consumed. Emissions from diesel/petrol combustion associated with worker transport.
Electricity consumption	N/A	Electricity generated offsite to power construction plant, equipment, site offices and accommodation camps.	Electricity generated offsite to power construction plant, equipment, site offices and accommodation camps.
Operation			
Vehicle movements transporting staff and equipment	Emissions from diesel combustion from light vehicles within Project area.	N/A	Emissions associated with production of fuels consumed.
Use of SF ₆	Leakage of SF ₆	N/A	N/A
Electricity consumption	N/A	Transmission loss	N/A

5.3.2.1 Assumption and activity data

To compile the GHG emission inventory for the Project, a number of assumptions were required, including the identification of key sources and the estimated level of activity for these sources (referred to as activity data), such as projected fuel usage or volume of construction materials used. The activity data and assumption used are indicative, conservative and adapted from recent similar projects. The total GHG emission calculated during the two-year construction phase are amortised over the Project lifetime as construction activity to give an indication of the impact over the Project lifetime.

Key assumptions made for this assessment for the Project construction include:

- The total MID Disturbance footprint for the Project is 113.5 ha, and this area was used for calculating the GHG emissions due to land clearing.
- A temporary construction compound is likely to be required, and this will be powered by a 60 kVa diesel generator. The generator is estimated to consume 68 kL of diesel over the two-year construction period.
- While both gasoline and diesel-powered vehicles are likely to be used, this assessment has assumed only diesel-powered vehicles will be used.
- There will be no helicopters used during the Project construction.

- The mobile plant required for the construction of the transmission line and substation (e.g. excavators, cranes, skid steers, etc) are estimated to consume 870 kL of diesel over the two-year construction period.
- The total amount of construction materials required is estimated to be 4,000 tonnes of steel, 2750 m³ of concrete, and 720 km of conductor cables.
- The total construction workforce will vary over the construction period, with a maximum of 145 personnel, and mean of 70 personnel per month. This assessment conservatively assumed the mean workforce over the 2-year construction period, and each worker is assumed to drive-in/drive-out from Brisbane (500 km, twice a month) when calculating the worker commuter emissions.

5.3.2.2 Emission factors

The GHG emissions for each source were determined using emission factors from the following sources:

- GHG emissions associated with vegetation clearing were estimated using the National Carbon Accounting System (NCAS) FullCAM model (DCCEEW 2020). The total loss of carbon per hectare due to clearing was estimated using the FullCAM model and converted to CO₂-equivalent emissions by multiplying by the molecular mass ratio of CO₂ to carbon (44/12).
- Specific diesel fuel energy content factor and emission factors in Australian National Greenhouse Accounts Factors 2024 (NGA) (DCCEEW 2024a).
- The CO₂-e emissions from gas insulated electrical components were determined by multiplying the quantity of SF₆ by the default leakage rate from the NGA (DISER 2021) and the GWP for SF₆.
- Estimates of Scope 2 emissions from consumption of purchased electricity were calculated based on the current Scope 2 emission factor for electricity consumption in Queensland from the NGA (2024) and based on future predictions in Australia's emission projections 2024 (DCCEEW 2024b)). Annual transmission losses from the infrastructure during operation of the Project were estimated using average transmission line flow and impedance. The Scope 2 emissions associated with these transmission losses were calculated by multiplying the estimated losses in kilowatt-hours per year (kWh/year) by the Queensland Scope 2 emission factor. Scope 2 emission factors are projected to decrease over time (DCCEEW 2024b). Therefore, as the Project is expected to be operational in 2028, the projected Queensland Scope 2 EF for 2028 were applied as an upper estimate of emissions due to transmission loss.
- Scope 3 embodied emissions in materials were calculated using material emission factors were drawn from the Transport for NSW Carbon Estimate and Reporting Tool (v2.1).
- Scope 3 emissions associated with the combustion of transport fuel reflect the emissions associated with producing the fuel and were calculated using Scope 3 liquid fuel emission factors from the NGA (2024).

5.3.3 Project greenhouse gas emissions

5.3.3.1 Construction

The estimated GHG emissions associated with the two-year project construction are summarised in Table 5.4 and amortised over the Project design lifecycle (50 years) to give an indication of the impact over the Project lifetime.

As shown in Table 5.4, the estimated total Scope 1 emissions are larger than that estimated for Scope 2 emissions. The estimated Scope 3 emissions from the Project predominantly relate to energy embodied in construction materials. The largest source of emissions for the Project is Scope 1, with land clearing the largest source, accounting for 52 percent of the estimated total emissions.

Table 5.4 Estimated GHG emissions during Project construction

Scope	Activity/source	Whole construction period (t CO ₂ -e)	Annual over the Project life ¹ (t CO ₂ -e/yr)
1	Diesel consumption from mobile or stationary plant	1,227	25
1	Land use change due to clearing	25,217	504
Total Scope 1		26,444	529
2	Purchased electricity consumption	0	0
Total Scope 2		0	0
3	Extraction and production of diesel consumed	301	6
3	Worker commuting	1,412	28
3	Extraction and production of purchased materials – steel	11,600	232
3	Extraction and production of purchased materials – concrete	3,754	75
3	Extraction and production of purchased materials – aluminium conductors	7,085	142
3	Upstream emissions of purchased electricity consumption	0	0
Total Scope 3		24,153	483
Total Scope 1, 2 and 3		50,597	1,012

(1) Amortised over the whole Project lifecycle (50 years).

5.3.3.2 Operation

During the operation of this transmission line Scope 1 and 2 emissions will be reported annually to the clean energy regulator as the Project progresses.

5.3.4 Mitigation and management measures

Greenhouse gas impacts will be managed in accordance with the requirements of the EMP (Air Quality) (refer to Appendix D). Measures include:

- handling sulfur hexafluoride gas (SF₆) to minimise potential for loss to the atmosphere
- reporting any losses of SF₆ to Powerlink's PQ Switch incident management system and against the SAP measuring point
- ensuring personnel handling SF₆ have appropriate experience in correct handling and loss prevention.

In addition to these measures, the following will also be implemented to minimise or manage greenhouse gas emissions where practicable:

- Consider use of energy efficient and passive design features for substation buildings including air conditioning, LED lighting, photo-electric sunset switches, low flow fittings and solar power, where reasonable and feasible.

- Approaches to reduce GHG emissions during construction will be explored and implemented where practicable. This will include (but will not be limited to):
 - employing the most efficient construction methods and reuse of materials, where possible
 - using low-emission materials, such as low-carbon concrete and steel, where possible during construction
 - using renewable sources to power equipment such as construction compounds and accommodation facilities, as much as possible
 - using local suppliers as much as possible to reduce transport emissions
 - using high-efficiency diesel, where possible
 - minimising vegetation clearance
 - facilitating worker ride sharing to reduce transport emission.

6 Air quality

Chapter 6 describes the potential air quality risks associated with the Project. Sensitive receptors have been identified for the Project as well as local emission sources influencing ambient air quality. An impact assessment has been completed to understand the Project's influence on air quality during both the construction and operation phase. Although no sensitive receptors were identified within 250 m of the MID Disturbance footprint, gaseous and dust emissions were identified for the construction phase of the Project. These emissions were considered to be negligible for the operation phase. Mitigation and management measures for air quality are identified in the EMP.

6.1 Legislative context

6.1.1 Queensland Environment Protection (Air) Policy 2019

The Environmental Protection (Air) Policy 2019 (EPP (Air)) outlines the environmental values to be protected or enhanced and sets air quality objectives for specific contaminants to protect these values. These objectives are based on national and international standards, including the National Environment Protection (Ambient Air Quality) Measure (*Air NEPM*), the National Environment Protection (Air Toxics) Measure (*Air Toxics NEPM*), the World Health Organization (WHO) Guidelines for Europe (2000), and the United States Environmental Protection Agency (USEPA) standards.

The EPP Air objectives relevant to this Project are presented in Table 6.1, and include the Environmental Protection (Air) Amendment Policy 2024, updated on 30 August 2024. This assessment adopts the particulate matter < 2.5 microns (PM_{2.5}) criteria which commenced on 1 January 2025.

In the absence of criteria for total volatile organic compounds (VOCs), the assessment criterion for benzene is typically adopted. Given that the benzene criterion is significantly lower than those for other VOCs, such as toluene and xylene, this approach is considered highly conservative.

Table 6.1 EPP Air objectives relevant to this Project

Indicator	Air quality objective	Averaging period
PM _{2.5} (pre-1 January 2025)	25 µg/m ³	24 hours
	8 µg/m ³	1 year
PM _{2.5} (post-1 January 2025)	20 µg/m ³	24 hours
	7 µg/m ³	1 year
Particulate matter < 10 microns in diameter (PM ₁₀)	50 µg/m ³	24 hours
	25 µg/m ³	1 year
Total suspended particles (TSP)	90 µg/m ³	1 year
Carbon monoxide (CO)	11,000 µg/m ³	8 hours
Nitrogen dioxide (NO ₂)	164 µg/m ³	1 hour
	31 µg/m ³	1 year
Benzene (adopted as a criterion for total VOCs)	5.4 µg/m ³	1 year

6.1.2 Other guidance and standards

6.1.2.1 Guidance on the assessment of dust from demolition and construction 2024

The Institute of Air Quality Management's (IAQM) Guidance on the assessment of dust from construction Version 2.2, 2024 (IAQM guidance) provides guidance for defining the significance of air quality impacts due to construction of a new development based on the magnitude of change, that is, the predicted increase or decrease in particle concentrations from a project, and the sensitivity of the receivers.

This guidance is widely used for the semi-quantitative assessment of the risk of air quality (primarily particulate matter) impacts from construction works and was applied in this assessment.

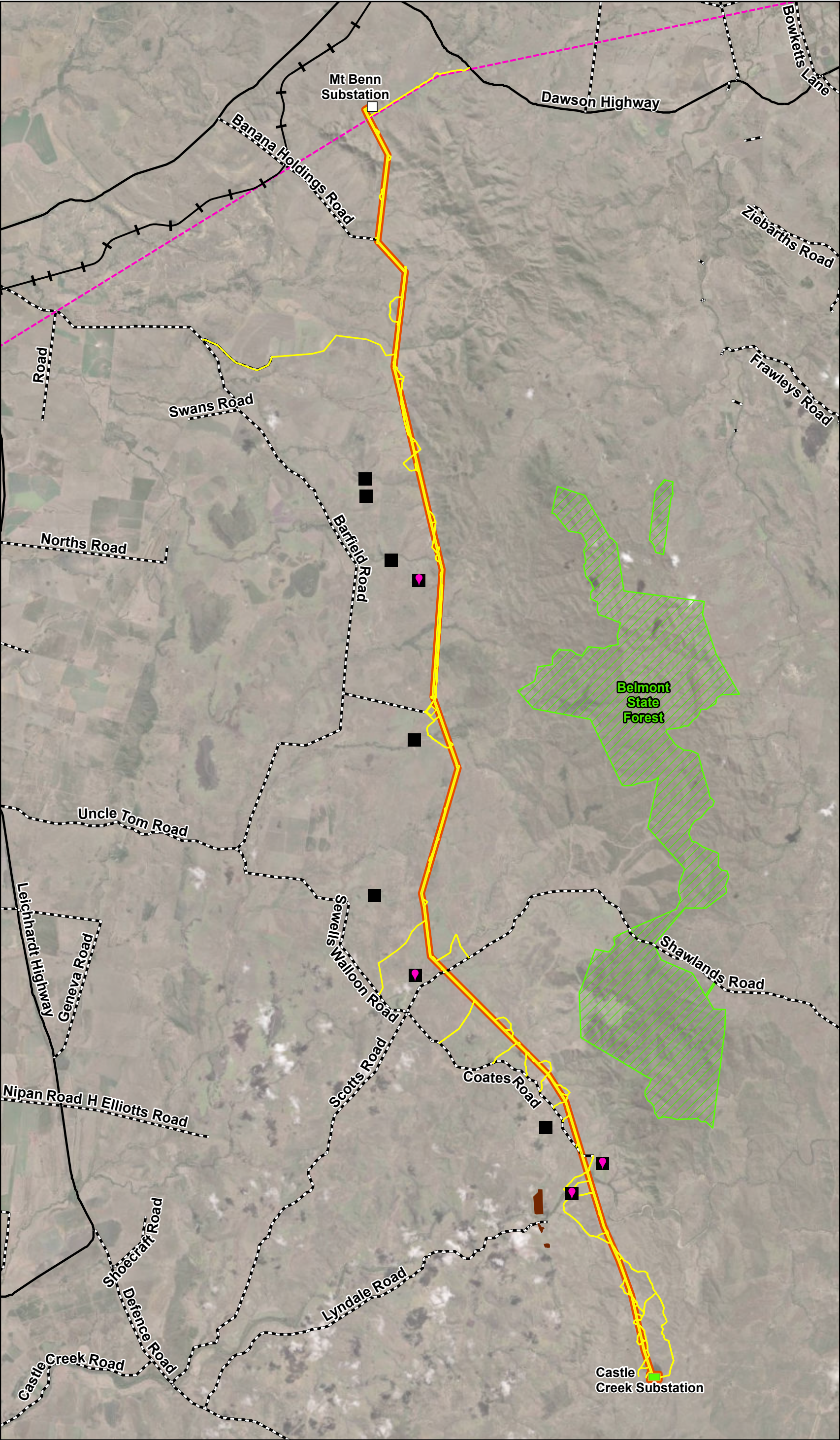
6.1.2.2 Good practice guide for the assessment and management of air pollution from road transport projects, 2023

The *Good Practice Guide for the assessment and management of air pollution from road transport projects*, published by the Clean Air Society of Australia and New Zealand (CASANZ) (the CASANZ guidance), provides guidance for defining the significance of air quality impacts due to construction of a new road project. For this assessment, the CASANZ guidance was used to adapt the IAQM guidance to Australian conditions.

6.2 Existing environment

6.2.1 Identification of sensitive receptors

Sensitive receptors (residential and ecological) surrounding the Project area are shown in Figure 6.1. There are four residential receptors located within 1 km of the proposed transmission line. The closest is approximately 650 m from the centreline of the transmission line. The closest ecological receptors, Belmont State Forest and cropping land, are located approximately 1.95 km from the transmission line. There are no sensitive receptors within 2.5 km of the proposed Castle Creek Substation.



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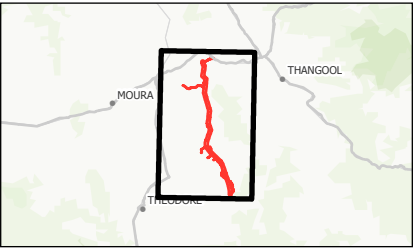
Figure 6.1
Sensitive receptors in proximity to
the Project

Legend

- Rail line
- Mt Benn Substation
- Residential receptors within 1 km of Project area
- Residential receptors within 2.5 km of Project area
- - - Existing transmission line
- Castle Creek Substation
- Project area
- MID Proposal area
- ▨ State Forest
- Cropping land within 2.5 km of Project area

Roads

- Highway
- - - Local



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Date: 6/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government,
Roads and tracks: © State of Queensland (Department of Resources) 2023
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6.2.2 Local emission sources

According to the National Pollutant Inventory (NPI) 2023/24 reporting year, significant local emission sources influencing ambient air quality in the Project area are listed in Table 6.2 and Figure 6.2. Additional sources of particulate emissions in the greater Gladstone region, cited in the 2023 air quality monitoring report for Queensland (Queensland Government 2024a), included bushfires and dust storms.

Table 6.2 Local emissions sources according to the National Pollutant Inventory (NPI)

Source type	Source location	Emissions typically associated with these sources
Oil and gas extraction and supply	Facilities in the region include: Apt Allgas Energy QNP 4 & 5 Gas Gatestation in Moura Westside Corporation Meridian Seam Gas Facility in Kianga Origin Energy CSG Limited Moura Facility in Theodore.	Leaks, venting, and flaring from equipment release VOCs NO _x emission from combustion in engines and flaring processes Dust from site activities and combustion processes emitting PM ₁₀ and PM _{2.5} Hydrogen sulfide (H ₂ S) emissions from natural gas processing, which has a strong odour and can be harmful at high concentrations.
Coal mining	The Anglo Coal Dawson Mine is a significant feature in the local landscape, running almost 30 km north-south approximately 15 km west of the Project.	Coal dust generated by mining activities, which can cause respiratory issues and nuisance due to soiling. PM _{2.5} from combustion and mechanical (excavation and processing) activities. NO _x and SO ₂ emissions from diesel engines and blasting activities.
Beef cattle feedlots	Located in and around Theodore. Feedlots include: — Kulcaway — Warnoah — Charvel — Hurdle Gully — Terencevale — Oxview	Dust from manure, feed, and soil (i.e. windblown dust). Ammonia (NH ₃) released from manure decomposition. Methane (CH ₄) emissions from enteric fermentation in cattle and manure management processes.

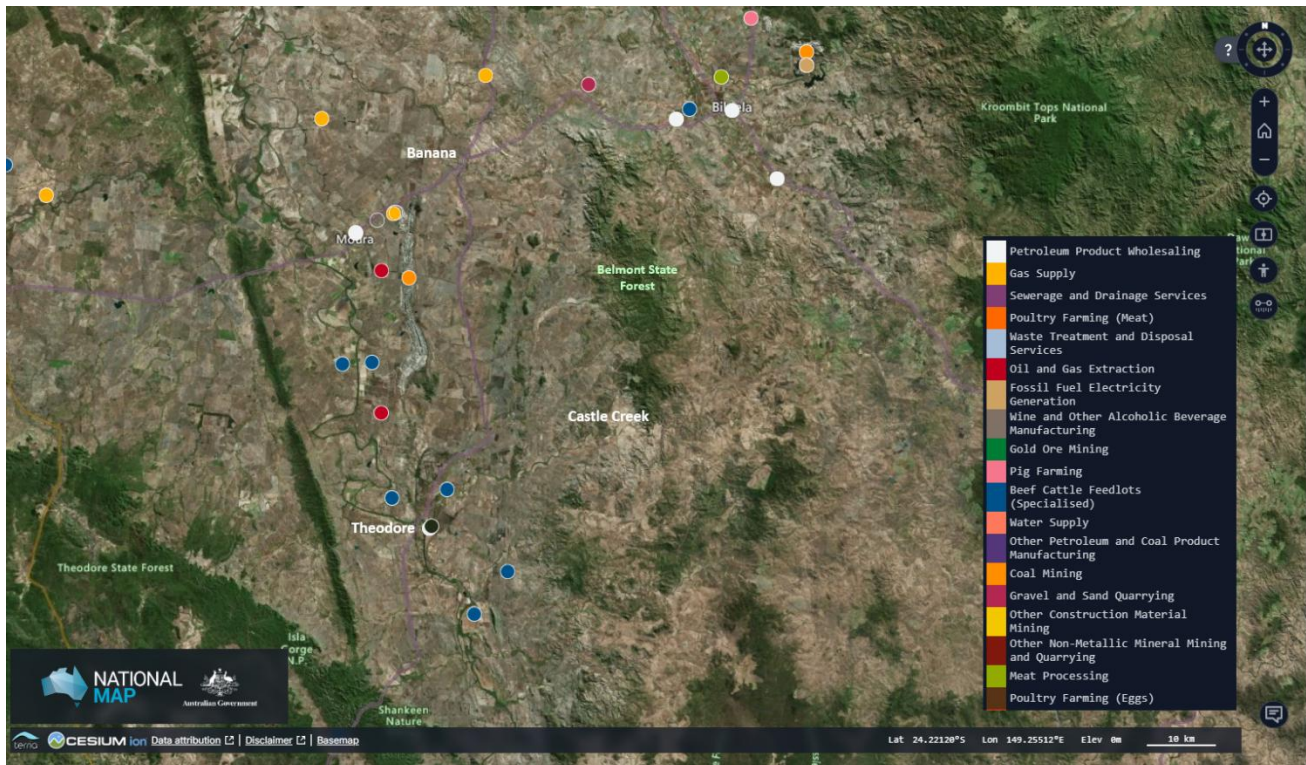


Figure 6.2 Local emissions sources according to the National Pollutant Inventory (NPI) (DCCEEW 2025a)

6.2.3 Ambient air quality monitoring

According to the 2023 Air Quality Monitoring Report for Queensland, the air quality in the Gladstone region was generally good. The report indicates that there were no exceedances of the Air NEPM standards for key pollutants such as CO, NO₂, SO₂, O₃, and lead. There were, however, occasional exceedances of particulate matter (PM₁₀ and PM_{2.5}) criteria, which were attributed to agricultural activities, bushfires, and dust storms. Overall, the air quality in these rural areas was within acceptable limits for most of the year.

Ambient air quality monitoring data was sourced from the two closest DETSI stations:

- Clinton Station, located at the Gladstone Airport (approximately 120 km east-north-east of the Project) measuring PM₁₀, PM_{2.5}, NO, NO_x, NO₂, and SO₂
- Bluff Station, located approximately 140 km north-west of the Project, measuring PM₁₀.

The Bluff Station, while further from the Project area, is located inland, is surrounded by farmland, and is within 2 km of a coal mine. Given the similar land uses within the study area, the Bluff Station is likely to be more representative of conditions within the region surrounding the Project area than the Clinton Station which may be influenced by the coastal meteorology and more “urban” combustion sources. Both stations are presented for completeness.

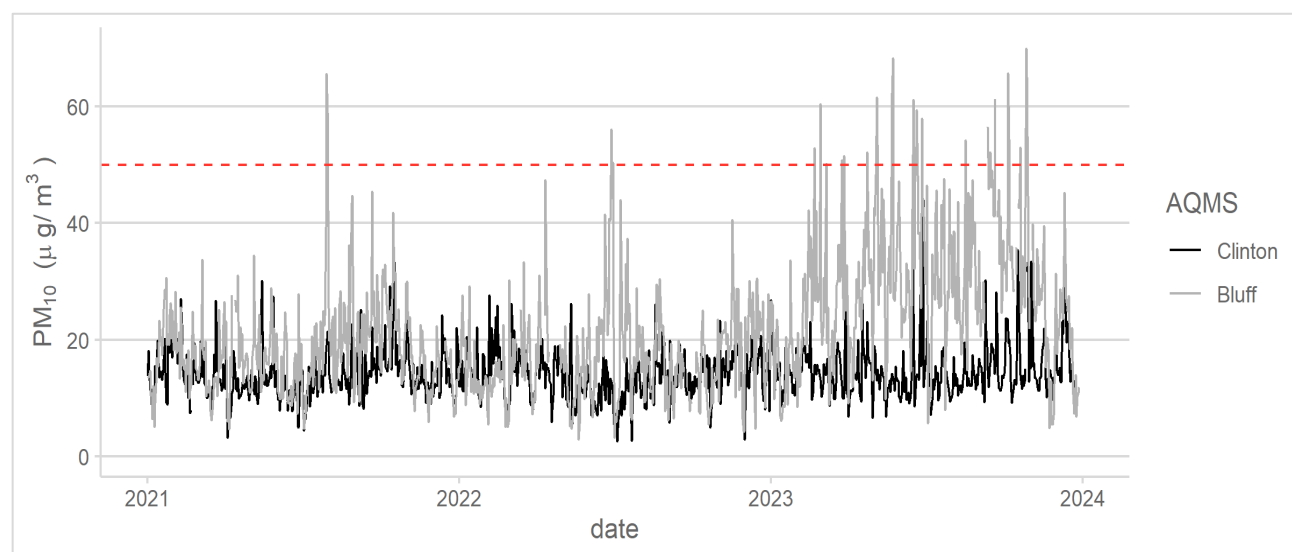
6.2.3.1 Particulate matter

Table 6.3 provides a summary of particulate matter (PM₁₀ and PM_{2.5}) statistics measured at the Bluff and Clinton stations from 2021–2023. As seen in Figure 6.3, PM₁₀ concentrations tended to be higher at the Bluff Station compared to the Clinton Station. There were 34 exceedances of the 50 µg/m³ 24-hour PM₁₀ criteria at the Bluff Station recorded in the 3-year period, compared to just 1 exceedance recorded during the same period at the Clinton Station. This is likely due to the greater exposure of the Bluff Station to agricultural activities, bushfires, and coal mining operations (< 2 km away) discussed in the previous section.

PM_{2.5} is not measured at the Bluff Station. PM_{2.5} measurements made at the Clinton Station show 3 exceedances of the 24-hour criteria (which was 25 µg/m³ prior to 1 January 2025), all of which were recorded in 2023 (refer to Figure 6.4).

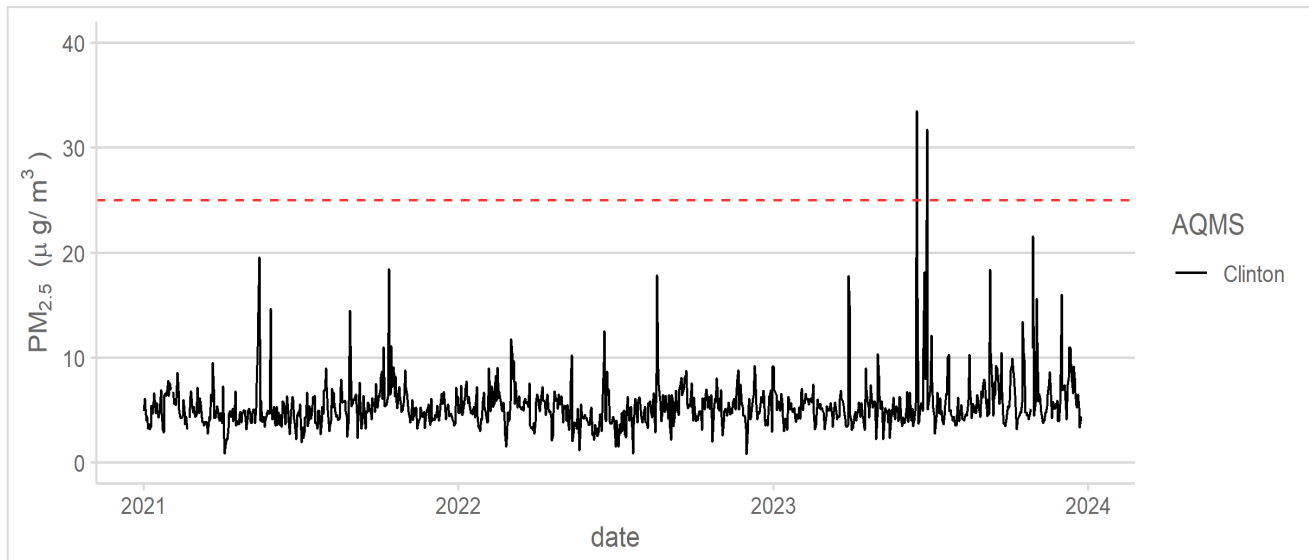
Table 6.3 Summary of particulate matter statistics measured at the Bluff and Clinton stations from 2021–2023

Statistic	Bluff Station	Clinton Station	
	PM ₁₀	PM ₁₀	PM _{2.5}
Data Coverage (%)	96.1	99.2	99.2
24-hour average			
Max. Conc. ($\mu\text{g}/\text{m}^3$)	97.6	113.8	85.7
90 th percentile ($\mu\text{g}/\text{m}^3$)	37.3	19.5	7.4
Criteria ($\mu\text{g}/\text{m}^3$)	50	50	25
No. exceedance days	34	1	3
Annual average			
2021 ($\mu\text{g}/\text{m}^3$)	18.2	13.9	5.2
2022 ($\mu\text{g}/\text{m}^3$)	17.0	13.6	5.2
2023 ($\mu\text{g}/\text{m}^3$)	30.1	15.1	6.2
Criteria ($\mu\text{g}/\text{m}^3$)	25	25	8



Note: The dashed line indicates the 24-hr average standard ($50 \mu\text{g}/\text{m}^3$).

Figure 6.3 Time series of PM₁₀ mass concentrations



Note: The dashed line indicates the 24-hr average standard at the time ($25 \mu\text{g}/\text{m}^3$).

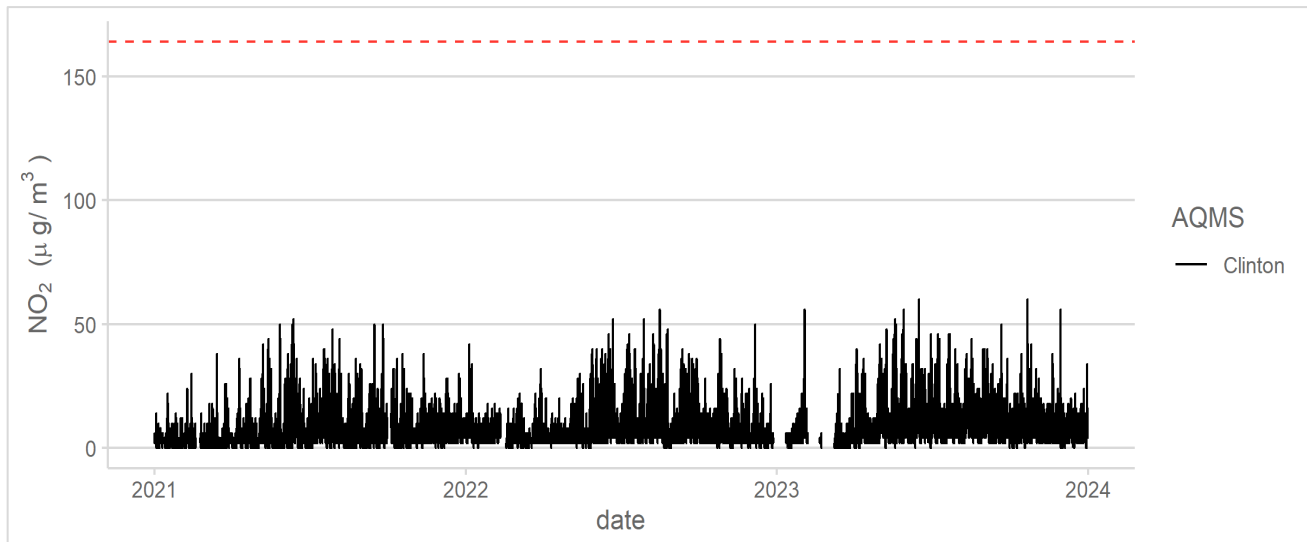
Figure 6.4 Time series of $\text{PM}_{2.5}$ mass concentrations

6.2.3.2 Gases

Table 6.4 provides a summary of the NO_2 statistics measured at the Clinton Station from 2021–2023. Associated time series are shown in Figure 6.5. All measured concentrations remained well below the respective criteria.

Table 6.4 Summary of NO_2 statistics measured at the Clinton Station from 2021–2023

Statistic	NO_2
Data Coverage (%)	93.9
<i>1-hour average</i>	
Max. Conc. ($\mu\text{g}/\text{m}^3$)	60.0
90 th percentile ($\mu\text{g}/\text{m}^3$)	14.0
Criteria ($\mu\text{g}/\text{m}^3$)	164.0
No. exceedance days	0
<i>Annual average</i>	
2021 ($\mu\text{g}/\text{m}^3$)	5.8
2022 ($\mu\text{g}/\text{m}^3$)	6.7
2023 ($\mu\text{g}/\text{m}^3$)	8.4
Criteria ($\mu\text{g}/\text{m}^3$)	31.0



Note: The dashed line indicates the current 1-hour average standard ($164 \mu\text{g}/\text{m}^3$).

Figure 6.5 Time series of NO_2 mixing ratios

6.3 Impact assessment

6.3.1 Air pollutants of interest

During both the construction and operational phases of the project, the movement of vehicles on unsealed surfaces, along with fuel combustion from vehicle traffic, diesel generators, and the operation of on-site plant and machinery, have the potential to generate air pollutants. Dust emissions may also arise from earth-moving activities on these surfaces during construction. As such, the following key air pollutants were identified:

- Dust associated pollutants including:
 - total suspended particulates (TSP)
 - fine particulates (PM_{10} and $\text{PM}_{2.5}$)
 - deposited dust
- CO
- NO_x
- VOCs (e.g. benzene).

6.3.2 Construction impact assessment

The IAQM guidance recommends that a risk assessment of potential dust impacts from construction activities is undertaken when sensitive human receivers are located within:

- 250 m of the MID Disturbance footprint
- 50 m of the routes used by construction vehicles on a public highway, up to 250 m from the site entrances.

And for ecological receivers within:

- 50 m of the MID Disturbance footprint
- 50 m of the routes used by construction vehicles on a public highway, up to 250 m from the site entrances.

No sensitive receptors were identified within 250 m of the MID Disturbance footprint. One sensitive receiver is within 250 m of a proposed off-easement access track. This sensitive receiver is not a permanent residence and only used periodically by farm contractors when called in for mustering. In addition, the access is associated with an existing property access track and is only proposed for use for works in the vicinity of Castle Creek.

Therefore, the need for a more detailed assessment is ‘screened out’. It can be concluded that the level of risk for human and ecological receivers is negligible, and any impacts would not be of significance.

6.3.3 *Operation impact assessment*

Regular maintenance activities are required for the Castle Creek Substation and transmission lines during its operation, including regular inspection along with other operational activities and in the event of an emergency (as required).

Inspection of the transmission line and each tower is carried out on each scheduled line patrol, with the main aim being to record the type, density and height of vegetation regrowth. The frequency of inspections of the transmission lines during the operation phase are anticipated to be low and the number of vehicles required during these events would be minimal. Therefore, the gaseous and dust emissions during operation phase is anticipated to be localised and negligible, and the impacts on surrounding areas would be negligible.

The future Castle Creek Substation expansion would not accommodate full-time staff or contractors. Maintenance at the substation site would typically include ad-hoc attendance (up to around three times a month) to undertake both planned and unplanned equipment inspection and/or maintenance. It is expected that these activities would only require light vehicles and/or small to medium plant (depending on the works required). Therefore, the gaseous and dust emissions during operation phase is anticipated to be negligible, and the impacts on surrounding areas would be negligible.

6.4 Mitigation and management measures

According to the EP Act, individuals and businesses have a General Environmental Duty (GED), to take all reasonable and practicable measures to prevent or minimise environmental harm. This duty is fundamental to the EPP (Air) and applies to any activity that might impact the environment, regardless of the significance of the impact.

Potential air quality impacts will be managed in accordance with the requirements of the EMP (Air Quality) (refer Appendix D). These measures include:

- restricting vehicle travelling speed to <40 km/hr, unless specified, on unsealed and off-road access tracks
- ensuring all vehicles and machinery are fitted with appropriate exhaust systems and devices and that devices are maintained in good working order
- turning off vehicles and equipment when not in use
- applying dust suppressants or watering to work areas, stockpiles and access tracks as required to prevent dust nuisance
- restricting vehicles to approved and mapped access tracks
- covering all loose loads for transport to and from the work site
- scheduling dust generating activities in proximity to dust sensitive locations (e.g. residences or schools etc.), when possible, to minimise dust nuisance at the sensitive receptors
- constructing access tracks from materials which are more stable and less likely to turn to dust in dust sensitive locations
- orientating material stockpiles in a direction that reduces exposed surfaces to prevailing winds
- ensuring chipping/ mulching equipment has dust collection devices attached where possible
- carrying out regular visual surveillance of vehicles, plant and equipment working or moving within proximity to residences or other dust sensitive locations
- limiting dust inducing activities on days with high levels of bushfire smoke in the air and if wind is blowing towards receptors
- avoiding or minimising queuing in roadways approaching the worksites or adjacent to other sensitive activities.

These measures are considered sufficient to manage and mitigate dust impacts from the Project and no additional mitigation measures are warranted.

7 Water resources and hydrology

Chapter 7 describes the surface and locally important subsurface hydrology traversed by the Project including water quality, catchment health, wetlands, and the frequency and extent of flooding. Due to the nature and location of the Project, the likelihood of occurrence and consequence of water impacts is considered to be low. Based on the assessment, the most likely water quality impacts during the construction and operation phases of the Project are water quality impacts from erosion and contamination. Management and mitigation measures have been identified to manage risks associated with the interference of surface water and groundwater and water quality impacts from erosion and contamination. With the implementation of these measures the risk of the Project adversely impacting water resources or hydrology is considered low.

7.1 Existing environment

7.1.1 Surface water

The Project area is located in the Dawson River drainage sub-basin of the Fitzroy River Basin. The Fitzroy Basin is over 142 600 km², making it the second largest seaward draining basin in Australia and the largest draining to the Great Barrier Reef (River Health 2024). The Fitzroy River Catchment accounts for large loads of sediment being deposited in the Great Barrier Reef each year. This is mainly due to a legacy of historic land clearing and poor grazing management practice combined with highly erosive soils.

The Fitzroy River Catchment has a sub-tropical, semi-arid climate characterised by prolonged dry periods often followed by floods (Queensland Government 2009). Rainfall is highly seasonal and variable across the catchment, with higher rainfall towards the coast (Queensland Government 2009).

The MID Proposal area or easement alignment crosses approximately 49 water features, 4 of which are third order (or higher) streams. Off-easement access tracks cross an additional 7 water features, which are all first or second order streams except for one tributary of Banana Creek which has a stream order of 3. Although the easement alignment also intersects this tributary, it intersects the water feature further downstream when it has a stream order of 1.

Most streams flow west towards the Dawson River (approximately 32 km west from the nearest point along the MID Proposal area) which leads into Fitzroy River (located approximately 92 km north of the Mt Benn Substation) and discharges into the Great Barrier Reef (approximately 115 km northeast of Mt Benn Substation). Two water features located in proximity to the Mt Benn Substation flow in a northeastern direction towards the Don River (approximately 48 km north of the Mt Benn Substation) before flowing into the Dawson River and following the same pathway as described above.

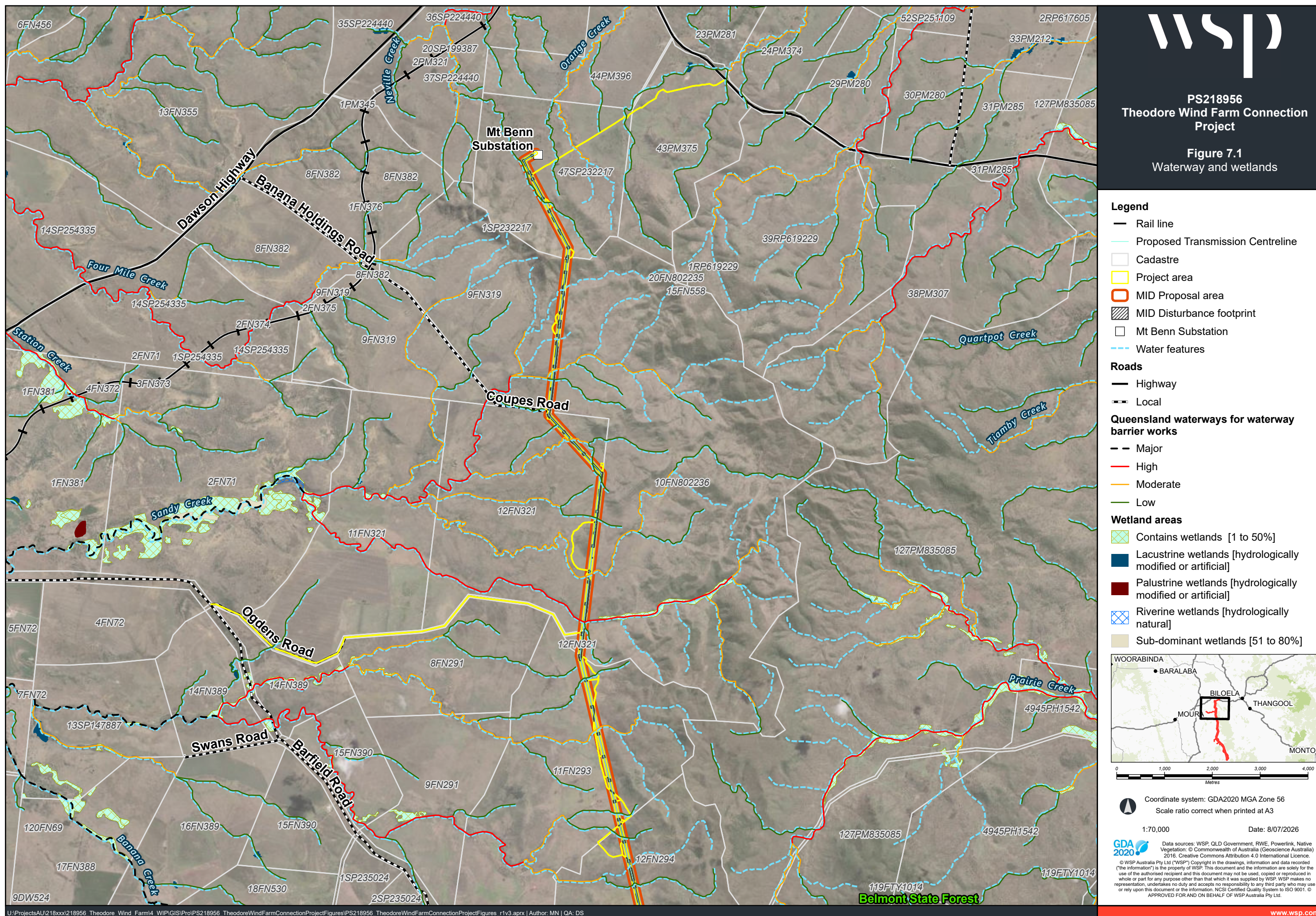
The major water features (third order or higher) crossed by the easement alignment (from south to north) is provided in Table 7.1 and shown on Figure 7.1.

Table 7.1 Water features crossed by the transmission line (south to north)

Water feature Name	Sub-Basin	Perenniality	Stream order	Easting	Northing
Castle Creek	Fitzroy	Intermittent	5	-24.815	150.366
Lonesome Creek	Fitzroy	Intermittent	4	-24.737	150.308
Banana Creek	Fitzroy	Intermittent	3	-24.590	150.311
Unnamed (crossed by access track)	Fitzroy	Intermittent	3	-24.587	150.294
Unnamed	Fitzroy	Intermittent	3	-24.513	150.300
Unnamed (crossed by access track)	Fitzroy	Intermittent	3	-24.470	150.277



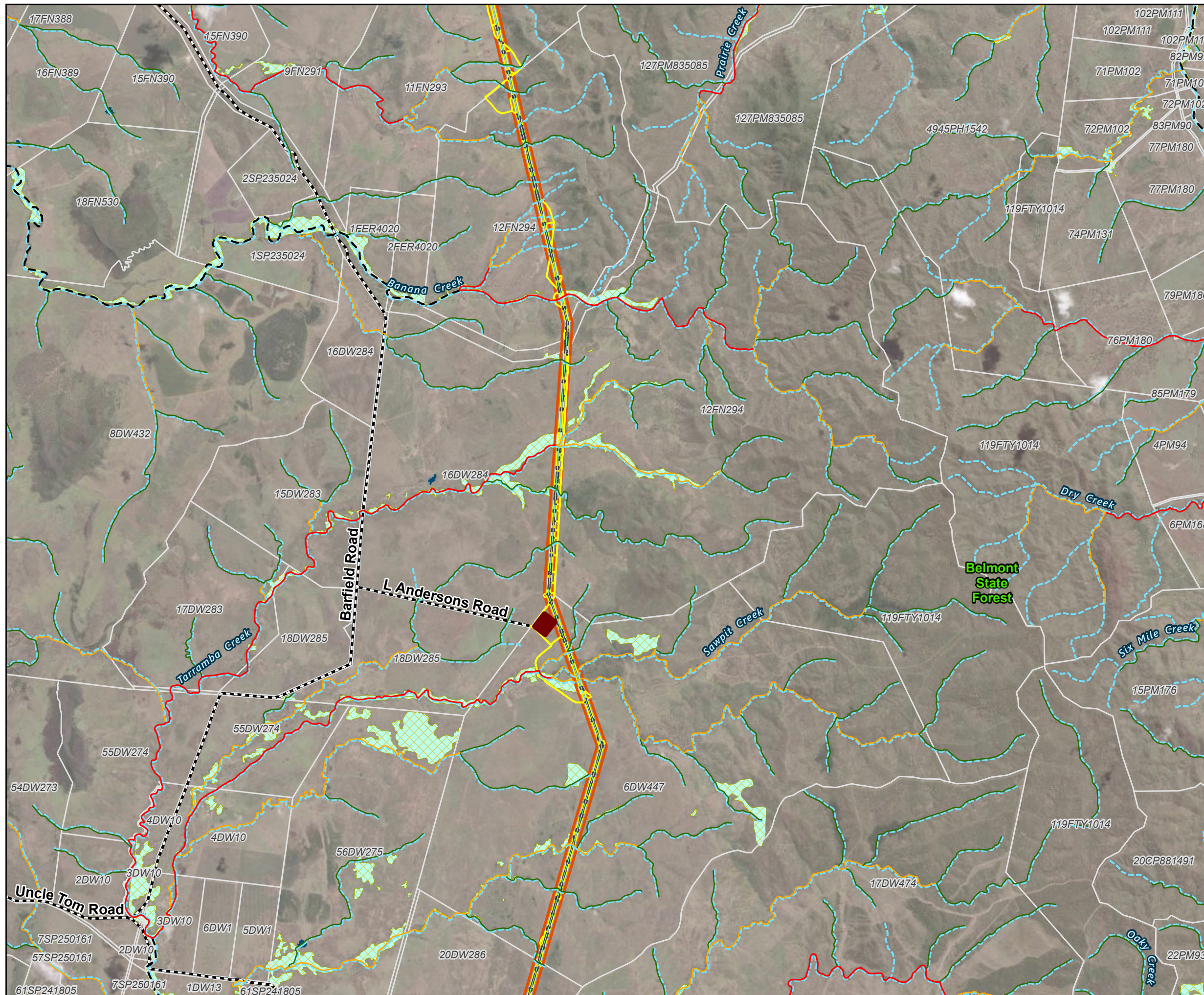
Figure 7.1
Waterway and wetlands





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Figure 7.1
Waterway and wetlands



Legend

- Proposed Transmission Centreline
- Cadastre
- Laydown area
- Project area
- MID Proposal area
- MID Disturbance footprint
- Water features

Roads

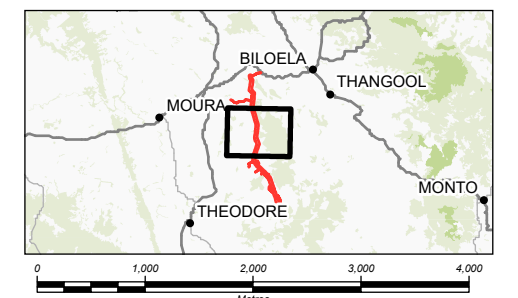
- Local

Queensland waterways for waterway barrier works

- Major
- High
- Moderate
- Low

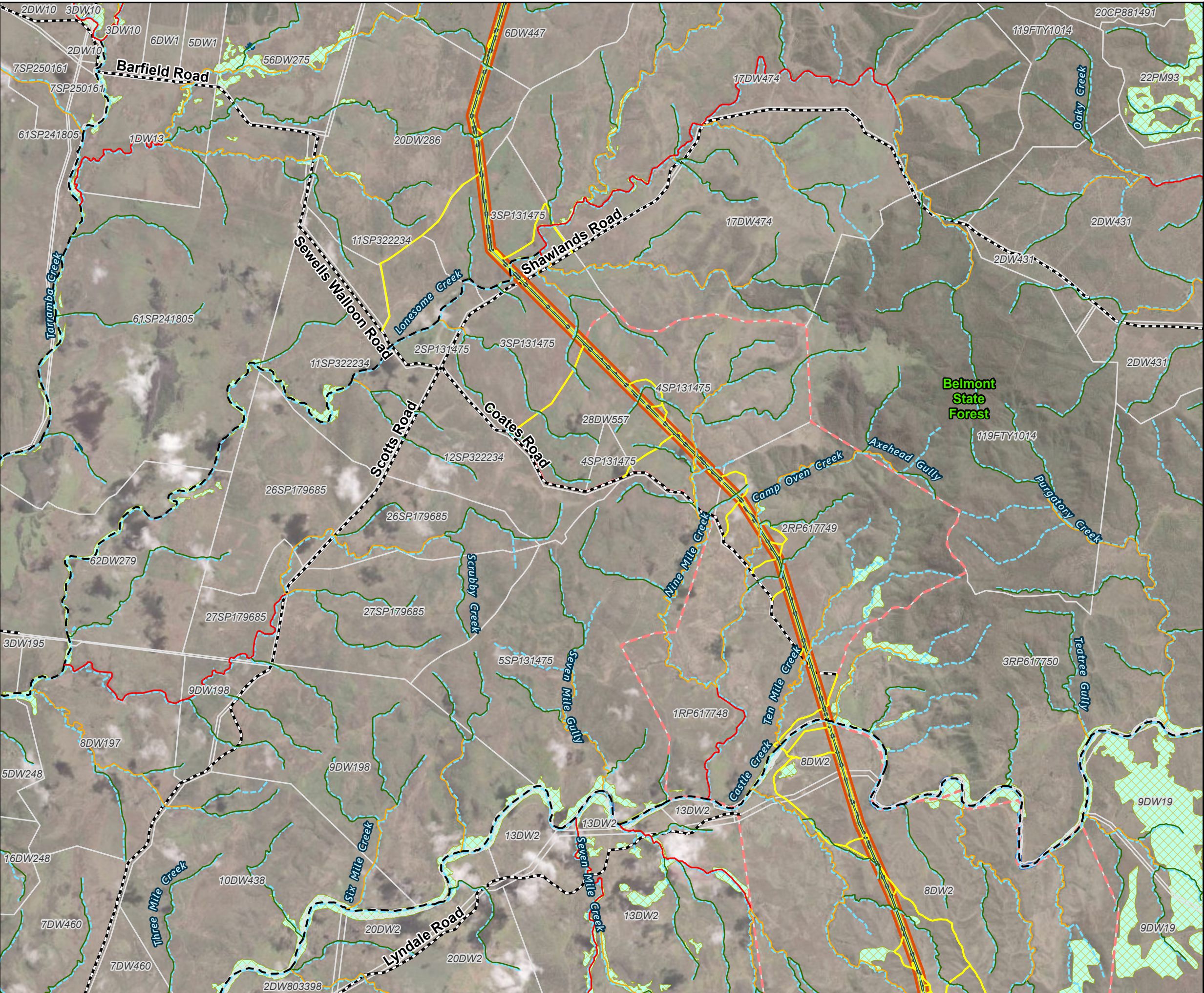
Wetland areas

- Contains wetlands [1 to 50%]
- Lacustrine wetlands [hydrologically modified or artificial]



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Figure 7.1
Waterway and wetlands

Legend

- Proposed Transmission Centreline
- Cadastre
- Project area
- MID Proposal area
- Proposed Theodore Wind Farm
- MID Disturbance footprint
- Water features

Roads

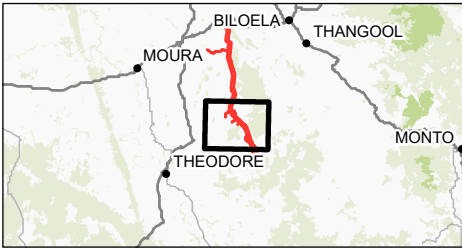
- Local

Queensland waterways for waterway barrier works

- Major
- High
- Moderate
- Low

Wetland areas

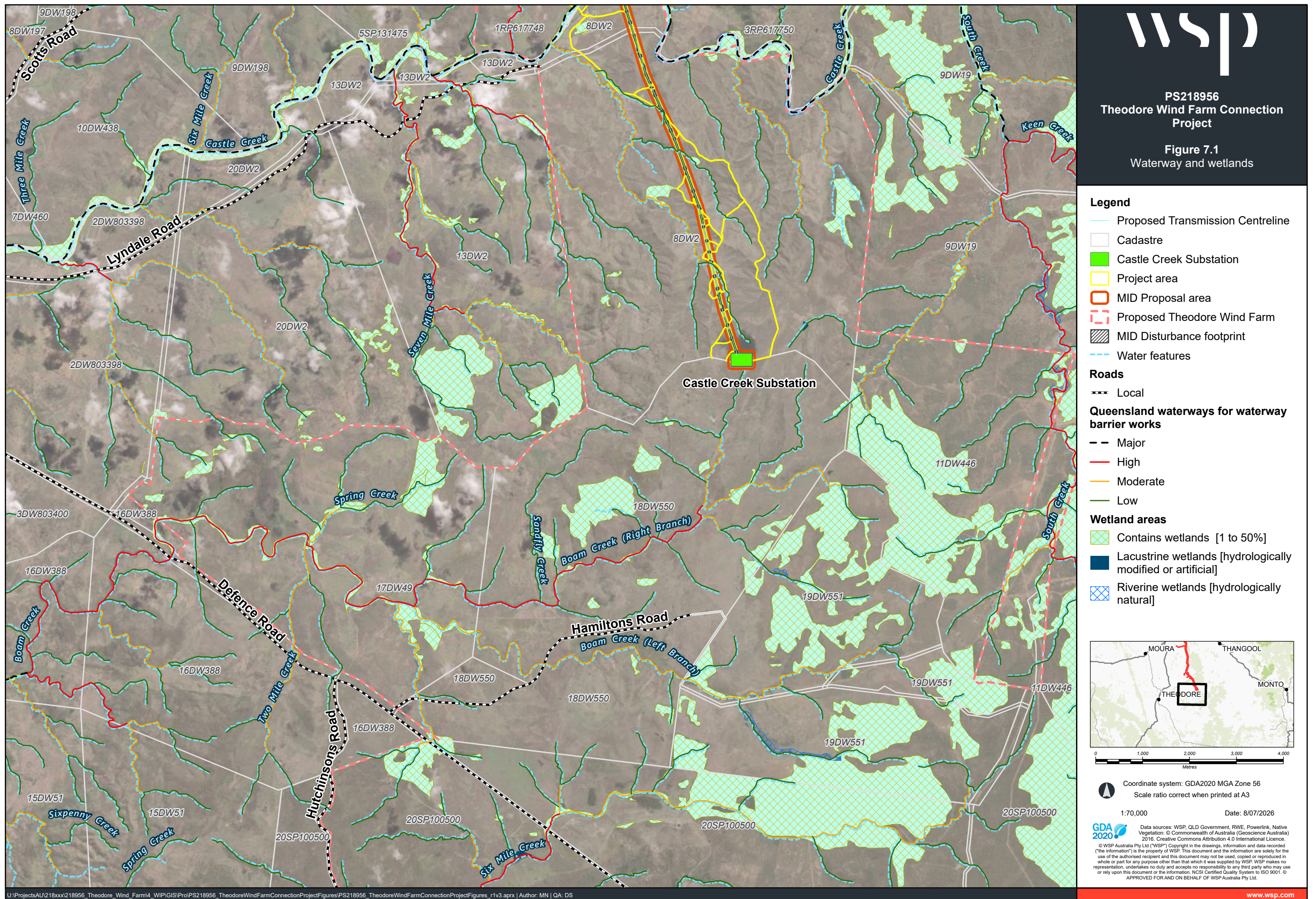
- Contains wetlands [1 to 50%]
- Lacustrine wetlands [hydrologically modified or artificial]
- Riverine wetlands [hydrologically natural]



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Several mapped areas of palustrine and riverine wetlands occur in the vicinity of the Project, located mainly adjacent to Banana Creek, Castle Creek, Sawpit Creek, and associated tributaries. These are also shown on Figure 7.1.

7.1.1.1 Environmental values of Dawson River Sub-basin

The Dawson River Sub-basin is located in southeast Queensland and is part of the Brigalow Belt Bioregion. The Project is largely located within the Lower Dawson River Catchment in the southern portion of the Fitzroy Basin while the northern portion of the alignment is located within the Callide Creek Catchment.

Lower Dawson River Catchment

The southern 53 km of the MID Proposal area as well as the Castle Creek Substation are located within the Lower Dawson River Catchment within the Dawson River Sub-basin. The main water feature within this catchment of relevance to the Project are Castle Creek, Lonesome Creek and Banana Creek. These three water feature flow west and discharge into Dawson River approximately 60 km (Banana Creek), 30 km (Lonesome Creek), and 32 km (Castle Creek) downstream of the Project. Castle Creek is the only watercourse gazetted as a watercourse under the Water Act.

These three water features are intermittent, typically flowing during the wet season between November and April and return to base flow or, in most cases, stop flowing completely over winter (River Health 2024). Surface waters of the Lower Dawson River Catchment in proximity to the Project area are typical of moderately disturbed ecosystems and influenced primarily by surrounding land uses associated mainly with grazing.

Banana Creek, Lonesome Creek and Castle Creek and their tributaries are mapped as stream order 1, 2, 3, 4, and 5.

Callide Creek Catchment

The northern 2.4 km of the MID Proposal area is located within the Callide Creek Catchment within the Dawson River Sub-basin. Orange Creek flows in a northeastern direction into Kroombit Creek (West Branch), approximately 15.2 km downstream. Kroombit Creek then flows into Callide Creek followed by Don River and Dawson River, just downstream of Baralaba. The Dawson River eventually discharges into the Great Barrier Reef. The Project also intersects an unnamed tributary of Neville Creek, which follows a similar route to Orange Creek. Surface waters of the Callide Creek Catchment in proximity to the Project are typically intermittent and of moderately disturbed ecosystems.

Orange Creek and Callide Creek and their tributaries are mapped as stream order 1, 2, 3, and 4.

Environmental values and water quality objectives

The quality of natural waters in Queensland is protected under the Environmental Protection (Water and Wetland Biodiversity) Policy EPP 2019 (Queensland) (EPP (Water and Wetland Biodiversity)). Section 6 of the EPP (Water and Wetland Biodiversity) lists the categories into which waters can be classified and their associated environmental values (EVs). The EVs and water quality objectives (WQOs) assigned to maintain the identified EVs, are progressively being determined for each water basin in Queensland. Queensland waters with defined EVs and WQOs are listed in Schedule 1 of the EPP (Water and Wetland Biodiversity).

The EPP (Water and Wetland Biodiversity) has described the relevant water features within the Lower Dawson River catchment (which comprises Cracow and Theodore areas) as being moderately disturbed freshwaters of the Lower Dawson River eastern tributaries. Waters in the vicinity of the Project within the Callide Creek catchment are described as being moderately disturbed freshwaters of the Callide Creek and tributaries.

The environmental values assigned in the EPP (Water and Wetland Biodiversity) to waterways surrounding the Project are outlined in Table 7.2.

Table 7.2 Environmental values

Water feature description			Environmental values											
Basin, Sub-basin	Catchment	Water Type	Aquatic ecosystems	Irrigation	Farm supply use	Stock water	Aquaculture	Human consumer	Primary recreation	Secondary recreation	Visual recreation	Drinking water	Industrial use	Cultural and spiritual values
Dawson River Sub-basin of the Fitzroy River Basin	Dawson River Catchment	Lower Dawson – Eastern Tributaries	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Callide Creek Catchment	Callide Creek and tributaries	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y

Y – Indicates applicable environmental value.

N – Not relevant to the waters within vicinity of the Project.

7.1.1.2 Water quality

No in situ surface water sampling has been undertaken for the Project.

Water quality within the Fitzroy River Catchment is monitored by the Fitzroy Partnership. To describe the health of the freshwater and estuaries within the Catchment, the Fitzroy Partnership have adopted a grading system:

- Grade A – excellent, all water quality and biological health indicators meet desired levels
- Grade B – good, most water quality and biological health indicators meet desired levels
- Grade C – fair, there is a mix of good and poor levels of water quality and biological health indicators
- Grade D – poor, some or few water quality and biological health indicators meet desired levels
- Grade E – fail, very few or no water quality and biological health indicators meet desired levels.

The results from the 2023-24 monitoring period are provided below.

Callide Catchment

The Fitzroy River Basin Report Card for June 2023 – June 2024 found the overall condition of the Callide Catchment health to be good (Grade B) (Fitzroy Partnership 2024). The following key observations of the catchment were described in the assessment:

- Physical chemical properties (conductivity, pH, sulfate and turbidity) received a grading of B, meaning that these parameters met desired levels of most water quality and biological health indicators.
- Nutrients (nitrogen and phosphorus) received an overall grading of B. However, total nitrogen received a grade of C, oxidised nitrogen received a grade of A while both total phosphorus and filterable reactive phosphorus received a grade of B.
- Toxicants (metals) received an overall grading of B. All analysed metals received a grade of A except for copper which received a grade of B.
- Ecology (macroinvertebrates, habitat, and fish) received an overall grading of C. However, macroinvertebrates received a grade of D, habitat received a grade of C and fish received a grade of B.

It was noted that for the past 14 years, the Callide Catchment has experienced consistently high electrical conductivity, indicating elevated dissolved salt levels. A noticeable decline has been observed, with the grade for electrical conductivity going from grade C in 2010–2011 to grade B in 2023–2024.

Lower Dawson Catchment

The Fitzroy River Basin Report Card for June 2023–June 2024 found the overall condition of the catchment health to be fair (Grade C) (Fitzroy Partnership 2024). The following results were provided for the Lower Dawson Catchment:

- Physical chemical properties (conductivity, pH, sulfate and turbidity) received an overall grading of B. However, sulfate received a grade of A, turbidity received a grade of C while electrical conductivity and pH received grades of B.
- Nutrients (nitrogen and phosphorus) received a grading of C for all chemical parameters assessed.
- Toxicants (metals) received an overall grading of C. All analysed metals received a grade of A except for aluminium (Grade B), iron (Grade B) and copper (Grade C).
- Ecology (macroinvertebrates, habitat, and fish) received an overall grading of D. However, macroinvertebrates and freshwater fish received a grade of C while habitat condition received a grade of B.

Over the past 14 years of reporting in the Lower Dawson Catchment, aluminium, copper, and iron have exceeded guideline values. During the 2023–2024 reporting period, aluminium improved from a grade of C in 2010–2011 to a grade of B in 2023–2024, while copper declined from Grade B in 2010–2011 to a Grade C in 2023–2024.

7.1.1.3 Water plans

Water plans developed under the Water Act) establish the framework for water availability, entitlements (including take), priorities and mechanisms for future water requirements. The Project area is located within the Water Plan (Fitzroy Basin) 2011.

The northern section of the Project area is within the Callide Groundwater Management Area, where groundwater take is restricted to the purposes listed in section 116 of the Water Plan (Fitzroy Basin) 2011. Outside of a groundwater management area, groundwater may be taken for any purpose in accordance with section 101(1)(c) of the Water Act.

7.1.1.4 Wetlands

A total of eight mapped wetland areas are within the Project area, mostly associated with Castle Creek, Lonesome Creek, Sawpit Creek, Tarramba Creek, and Banana Creek (refer Figure 7.1). Three additional areas of wetlands are intersected by the off-easement access tracks. Types of wetlands include palustrine and riverine wetlands.

7.1.2 Queensland Waterway Barrier Works

The Queensland waterways for waterway barrier works (WWBW) spatial layer is intended to assist in determining whether works in proximity to waterways pose a threat to fish passage. It prescribes the likely level of risk which will apply (from low to major) and assists to determine whether the works can occur in accordance with an accepted development requirement or will require further assessment as part of a development approval. Various mapped waterways are present within the Project area including:

- Moderate (amber): Sawpit Creek, Ten Mile Creek, Camp Oven Creek, Nine Mile Creek
- High (red): Banana Creek, Lonesome Creek
- Major (purple): Castle Creek (refer Figure 7.1).

Off-easement access tracks intersect Orange Creek in the north, which is a low (green) waterway for waterway barrier works.

A significant number of additional unnamed tributaries are also present within the Project area including low (green), moderate (amber) and high (red) risk streams.

7.1.3 Matters of State Environmental Significance wetland and waterway values

Matters of State Environmental Significance (MSES) wetland and waterway values mapped within the Project area are summarised in Table 7.3.

Table 7.3 MSES: Wetland and waterways mapped within the Project area

MSES	Presence/absence in Project area
Strategic Environmental Area (SEA)	Value not mapped within the Project area
High Ecological Significance (HES) wetlands	Value not mapped within the Project area
Wetlands in High Ecological Value (HEV) waters	Value not mapped within the Project area
Waterways in High Ecological Value (HEV) waters	Value not mapped within the Project area
Queensland waterways for waterway barrier works (fish passage)	Five major, seven high, 32 moderate, and 53 low impact waterways for waterway barrier works occur within the Project area

7.1.4 Flooding

Stream flow in the Project area is highly variable and seasonal, with many water features being intermittent. Intermittent episodes of high flow are interspersed with long periods of no flow. Average rainfall in the Lower Dawson Catchment and Callide Creek Catchment is 600–800 mm and 600 mm, respectively.

Reliable and consistent data relating to flood extent within the sub-catchments of the Dawson and Callide Creek catchments is limited.

The Callide Creek Catchment experienced severe flooding in 1928, 1942, 2013, and 2015. Flood events are largely associated with cyclones.

The Dawson-Fitzroy catchment in proximity to Theodore experienced severe flooding following heavy rainfall events on average once every 10 years up to 1991 (1954, 1978, 1983, 1991), with flooding occurring annually from 2010 to 2013 (Bureau of Meteorology 2025b). The highest flood level recorded near the Project area was in December 2010/ January 2011, being approximately 14.70 m AHD. Theodore township is vulnerable to flooding in large events as high flows struggle to pass a natural constriction point in the terrain, approximately 1.5 km downstream of Theodore Weir. This constriction point causes upstream areas to act as a flood basin and as flow increases, water levels upstream risk, flooding farmland and eventual properties in the main town (Banana Shire Council 2025b).

The potential for significant flooding in the Fitzroy River Catchment requires average catchment rainfalls to be in excess of 300 mm within 48 hours.

The Banana Shire Planning Scheme 2021 provides a Queensland Flood Plain Assessment Overlay which represents floodplain areas within drainage sub-basins in Queensland. The transmission alignment intersects a floodplain area as it traverses across Castle Creek. No other floodplain areas are mapped within the Project area.

7.1.5 Groundwater

The Queensland Groundwater Database does not contain any groundwater monitoring bores information for the Project area. There is limited data available on local groundwater within the Project area.

There are two groundwater monitoring wells within 10 km of the Project, as summarised in Table 7.4.

Table 7.4 Groundwater well information

Groundwater well number	Status	Location	Main formation intercepted
RN 13030826	abandoned but still useable	6.70 km east of proposed Castle Creek Substation at Theodore Wind Farm	— 0 to 1.5 m BGL clay soil — 1.5 to 22 m BGL grey, grey-green shale — 22 to 31 m BGL grey, grey-green arenite — 31 to 32 m BGL grey-green shale — 32 to 57 m BGL grey-green conglomerate
RN 13030868	abandoned and destroyed	4.90 km north/northwest of Mt Benn Substation	— 0 to 1.0 m BGL clay soil — 1 to 3.0 m BGL andesitic volcanics — 3 to 14 m BGL pale grey, grey tuff — 14 to 54 m BGL andesitic volcanics — 54 to 62 m BGL grey tuff — 62 to 71 m BGL basaltic volcanics — 71 to 86 m BGL andesitic volcanics — 86 to 97 m BGL basaltic volcanics — 97 to 100 m BGL andesitic volcanics.

The bore report for RN 13030868 does not provide any recorded groundwater levels. However, field measurements have recorded the water as being saline (5000 $\mu\text{S}/\text{cm}$) and having a yield of 0.4 L/s. The bore report for RN 13030826 has recorded the groundwater level to range from 5.55 to 16.69 m BGL. The salinity of the water in this groundwater well is brackish (2,580 to 2,810 $\mu\text{S}/\text{cm}$).

7.2 Potential impacts and mitigation measures

Infrastructure associated with the Project has the potential to impact on the hydrology of the area as well as cause impacts to water quality. However, the nature and location of the proposed transmission line and substation means that the consequence of impacts occurring is low.

7.2.1 Hydrology

7.2.1.1 Transmission line

Powerlink transmission line structures are designed to span water features and in the event of peak flow events, accommodate both the inundation of the foundations by water and excessive wind conditions in accordance with the relevant Australian Standards. When the transmission line is unable to span water features, towers are designed to be outside of overflow channels, and to withstand expected peak flow velocities. These structures will not impede peak flows during storm events or reduce floodplain storage capacity.

The Project design has towers set back from the bank of watercourses and drainage lines crossed by the transmission line. Due to the transmission line traversing predominantly upper catchment creeks with relatively small catchments, out of bank flows are infrequent.

7.2.1.2 Substation

Powerlink substation sites are selected to ensure that substations are functional in a flood event with an Annual Probability of Exceedance (APE) of 1/200. The proposed site of the Castle Creek Substation is at an elevation of 415 m AHD and not within a mapped floodplain area.

7.2.1.3 Access tracks

Indicative locations of access tracks to service the construction and maintenance of the proposed transmission lines have been identified (refer Appendix B). Where water feature crossings are required, access tracks will be designed and constructed to appropriate standards and to avoid impeding surface water flow velocities or volumes. The location and alignment of access tracks will be designed in accordance with the Powerlink's Guidelines for Transmission Line Access Tracks to ensure that adverse impacts to drainage, water quality, and flood levels through lower-lying areas are minimised.

During the detailed design of water feature crossings, Powerlink will consult with, and obtain approval from, all relevant authorities having jurisdiction over works within and adjacent to water features.

7.2.2 Water quality

7.2.2.1 Construction phase

Water quality impacts during the construction phase of the Project relate primarily to erosion and sediment issues. Activities with the potential to create water quality impacts include:

- vegetation clearing
- excavation of foundations
- stormwater runoff and flooding of disturbed areas, including access tracks, cleared tower footprint areas and foundation excavations, which could be high in suspended solids or contain contaminants.

Water quality impacts related to erosion and sedimentation will be managed and mitigated through implementation of the general requirements as outlined in the EMP (Soil and Water) (Appendix D), and include the preparation of a Water Quality Monitoring Plan and implementation of an ESCP, discussed previously in Section 4.2.2.1. Where dewatering activities are required, a Dewatering Management Plan must also be developed.

In addition, the detailed design of the Project has yet to be finalised. Finalisation of the design will incorporate the following elements to minimise water quality impacts:

- set back transmission towers and access tracks at least 50 m from riparian vegetation and the high-bank of a watercourse or drainage line, where possible
- minimise runoff and stormwater concentration
- utilise existing water feature crossings and access tracks, wherever possible
- minimise clearing of vegetation in riparian areas
- schedule construction works within drier part of the year (i.e. winter season if possible) to limit exposure of disturbed ground surfaces to the erosive impacts of rainfall
- undertake necessary vegetation clearing along the transmission alignment in a staged manner to minimise soil disturbance
- implement clean water diversions around local stockpiles and exposed areas.

Potential water quality impacts may also occur from accidental spills of fuel or oil from construction equipment.

Hazardous materials used during construction will be managed in accordance with the general requirements of the EMP (Hazardous Materials) (Appendix D) which includes:

- developing an Emergency Response Plan for the Project to ensure the correct storage, handling and transport of hazardous materials
- ensuring all vehicles carrying additional fuel/oil/diesel over 20 L are equipped with a spill kit at all times
- ensuring that refuelling of vehicles and machinery does not occur within 50 m of a watercourse, drainage line or open drain and giving preference to refuelling off-site at an approved refuelling station
- keeping spill kits at each work area and ensuring that all personnel are trained in the emergency management of spills.

Herbicides may be used in certain locations to control vegetation regrowth, with potential for water quality impacts to occur as a result of their application. The use of any agricultural chemicals will be undertaken in accordance with the procedures outlined in the EMP (Herbicide distribution) (refer Appendix D), including:

- only ground distribution of herbicide is permitted, no aerial distribution of herbicides
- ground distribution of herbicides is to be undertaken by or under the direct supervision of a licensed commercial operation
- distribution of herbicides is also only to be undertaken using equipment approved for weed spraying operations
- records must be kept for each and every ground distribution of chemicals
- Powerlink is to liaise and notify landholders prior to the use of chemicals on properties.

It is expected that the potential risks for impacts to surface water quality will decrease once disturbed areas have stabilised and ground surface cover, through rehabilitation, has been established. Monitoring of rehabilitation, and any corrective actions necessary undertaken in a timely manner. Details on rehabilitation are outlined in the EMP (refer to Appendix D).

7.2.2.2 Operation and maintenance

During the operational phase of the Project, water quality impacts may occur as a result of erosion and sedimentation from vegetation clearing for maintenance purposes, litter, and accidental fuel or chemical spillages of small quantities. Maintenance equipment and vehicles will be well maintained to avoid the risk of accidental fuel spillage. Any spillage will be cleaned up immediately and in accordance with the measures outlined in the EMP (Appendix D). Maintenance and refuelling of vehicles will not be undertaken along the access rights areas during the operation phase. A containment system will also be installed at the substation to prevent accidental discharge of oil to the environment.

7.2.3 Fish passage

Any waterway crossings required for the Project are located high in the catchments and fish habitat and passage are limited in these locations due to the ephemeral nature of the waterways. As such, potential impacts to fish passage are considered minor.

While the risk of impact to fish habitat is considered minor, the following mitigation measures will be adopted to avoid and/or minimise impacts:

- structures will be located at least 50 m from waterways, where possible
- previously cleared tracks for existing crossings will be preferentially used to minimise new waterways crossings
- excavation or placing fill in a waterway that are also a watercourse will be carried out in accordance with the Riverine Protection Permit Exemption Requirement (WSS/2013/726) or as otherwise authorised under relevant legislation.
- Waterway crossing works will be constructed or upgraded in accordance with the Accepted Development Requirements for Constructing or Raising Waterway Barrier Work (ADR for WWBW), and where they cannot be met, a development application will be lodged for approval.

If construction and remedial works are to occur within the bed and banks of waterways, the construction contractor must liaise with relevant administrative authorities regarding licences and permits required to conduct works in waterways and any management strategies which are required to be implemented. Where access tracks are not required by the landholder after decommissioning, these will be removed. The waterway bed and bank profiles will then be returned to be consistent with the surrounding waterway profile. Where possible, Powerlink will endeavour to ensure compliance with the Accepted Development Waterway Barrier Works.

7.2.4 *Wetlands*

Minor areas of wetlands are present in the Project area, mainly associated with creeks and drainage lines. By spanning watercourses, the initial design of the Project has minimised the impact on these mapped wetland areas. Further adjustment of the transmission line design may occur during detailed design to ensure that direct disturbance to these areas is minimal. Construction activities and access tracks will be designed to avoid these areas (if encountered) to ensure minimal disturbance occurs as a result of the Project. Erosion and sediment control measures will be implemented to assure that there are no impacts to areas downstream of the transmission alignment or access tracks.

7.2.5 *Groundwater*

The excavation and construction of foundations for the transmission line towers could result in a short-term localised interference with groundwater, if present. Minimal impact or interference with groundwater resources is expected to occur as a result of the Project. While foundations may be bored or constructed of mass concrete, a mass concrete foundation would be the most extensive, with excavations potentially down to 8 m deep. Some footing excavation may intersect with shallow groundwater aquifers and where this occurs, active dewatering may be required within the excavated area until the footings are completed.

Soils and geotechnical information at target areas along the transmission line and at the substation site will be gathered as part of the tower foundation design process. This would include identification of the presence of water and the likelihood of encountering groundwater.

Groundwater entering excavation voids during construction activities may become contaminated with a number of pollutants associated with construction activities and construction materials including sediment and/or concrete slurry, fines or possibly hydrocarbons from excavation equipment. In this case, discharge waters will not be of a suitable quality to be released untreated into surface waters or land and a specific dewatering method will be prepared and implemented (refer item SW22 in the EMP (Appendix D)). The objective of the dewatering method is to ensure that any dewatering activities do not impact on the quality of receiving land (soils) and surface waters by establishing and implementing appropriate discharge water treatment procedures prior to release from the work areas. Once operational, the tower foundations will not disrupt any aquifers (if present).

7.2.6 *Water use and sourcing*

The volumes of water required for the Project and their locations will be determined at the detailed design phase. Consultation with landholders for the location of access tracks and land access will also include negotiations for access to water. It is not expected that water would need to be sourced from local water features. If water is to be sourced from a water feature, Powerlink will extract water in accordance with the 'Exemption requirements for constructing activities for the take of water without a water entitlement (OSW/2020/5467 Version 4.01, updated on 5 February 2021)' or any later revision. If Powerlink cannot meet the exemption requirements of the above document, a water licence application will be submitted with DLGWV.

8 Protected areas

Chapter 8 identifies the relevant protected areas in proximity to the Project area. Whilst the Project area does not traverse any areas protected under the *Nature Conservation Act 1992*, it is located adjacent to the Belmont State Forest, which is protected under the *Forestry Act 1959* and contains extensive areas of remnant vegetation. The Project will not have a direct impact on any protected areas and indirect impacts are considered to be negligible. Standard mitigation measures for air quality and noise and vibration will be adopted to minimise impacts to Belmont State Forest.

8.1 Existing environment

Protected areas refer to areas set aside for the conservation of natural and cultural values and are defined under section 14 of the *Nature Conservation Act 1992* (NC Act). Protected areas include national parks, conservation parks, resources reserves, special wildlife reserves, nature refuges, and coordinated conservation areas. This section does not discuss Indigenous and non-Indigenous cultural heritage places. Discussion on these matters is provided in Chapter 16 (Indigenous cultural heritage) and Chapter 17 (Non-indigenous heritage) respectively.

The Project area does not traverse any protected areas as defined by the NC Act. The closest protected area is the Oxtrack Nature Refuge, approximately 25 km south-west of the proposed Castle Creek Substation.

Although not protected under the NC Act, protected areas can also include areas managed for production of forest resources, including timber and quarry material such as State forests. The Belmont State Forest, protected under the *Forestry Act 1959*, is located to the east of the Project area. The Belmont State Forest has a gazetted area of 8,550 ha, most of which comprises remnant vegetation, and is approximately 2 km from the Project at its closest point. The location of the Belmont State Forest in relation to the Project is shown on Figure 3.1.

8.2 Impact assessment and mitigation measures

The Project will not directly impact on a protected area, and indirect impacts on Belmont State Forest, such as dust deposition and noise, are anticipated to be negligible. Standard mitigation measures, as provided in the EMP (Appendix D), and discussed further in Chapter 6 (Air quality) and Chapter 19 (Noise and vibration), will be implemented to ensure potential dust and noise impacts do not impact the environmental values associated with the Belmont State Forest.

9 Flora

Chapter 9 describes the presence, extent, and integrity of vegetation communities and flora species within the Study area. Project-related impacts on vegetation communities and flora species are identified along with proposed avoidance and/or mitigation measures. The focus of this chapter is on Matters of State Environmental Significance (MSES) with Matters of National Environmental Significance (MNES) addressed in Chapter 11 (Matters of National Environmental Significance). Most of the Study area (5, 275 ha (89.2 percent)) has been previously cleared for agriculture and grazing leaving a landscape dominated by pasture grasslands with scattered native trees and regrowth present as small, isolated pockets of vegetation. Field verification surveys confirmed the presence of 10 remnant regional ecosystems and four high value regrowth regional ecosystems across the Study area. Six of these would be subject to vegetation clearing activities as a result of the Project. A total of 192 flora species were identified, including 6 special least concern, 150 least concern, and 36 introduced species. No threatened flora species listed under the NC Act or EPBC Act were recorded.

Where feasible, the Project has followed the general principles for impact mitigation of avoidance, minimisation, mitigation and compensation. Determination of the MID Disturbance footprint has avoided impacting remnant vegetation and habitats to the greatest extent possible by incorporating design measures such as scalloping or spanning over sensitive vegetation. Approximately 7.7 ha of field verified regulated vegetation (remnant and regrowth regional ecosystems) would be removed as a result of the Project. Where vegetation clearing is unavoidable, clearing activities will be managed in accordance with the measures outlined in the EMP.

9.1 Methodology

The methodology used to assess floristic and vegetative values associated within the Study area included:

- Desktop assessment to characterise and identify potential flora species that may be present within the Study area. The desktop assessment included a review of literature including previous ecological assessment reports conducted within the Study area and wider Locality. Searches of publicly available datasets and online mapping were used and where relevant a 10 km search area of the Project area was applied.
- Field surveys for the Project were completed between 3 February and 29 May 2025, across three field events:
 - 3–6 February 2025 (4 days/3 nights) (summer/wet season)
 - 18–21 February 2025 (4 days/3 nights) (summer/wet season)
 - 26–29 May 2025 (3 days/4 nights) (autumn/early dry season).

There was a short break in the summer/wet season survey due to inclement weather. The main purpose of the field surveys was to field verify the vegetation communities and habitats within the Study area which may be at risk of impact from the Project, and to identify threatened species that may be present. The survey methods and efforts were developed in reference to State and Commonwealth survey guidelines to determine the level of adequate surveys for the target threatened flora species.

- Field verification of vegetation communities and regulated vegetation:
 - The initial field verification of vegetation communities and regulated vegetation (regional ecosystems) were undertaken during the February 2025 surveys, with these data further refined during the May 2025 survey. Across both survey's this involved 55 quaternary surveys in accordance with the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et. al 2023).

- The field verified vegetation communities and regulated vegetation (regional ecosystems) were mapped, using ArcGIS Pro Version 3.6 software, at a scale of 1:5,000. The combination of these products was used to trace polygons derived from geological mapping and vegetation extents in accordance with the Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner et. al 2023).
- Threatened flora species:
 - Opportunistic searches for threatened flora species were undertaken while conducting Quaternary surveys. The searches focused on species identified as having a moderate or higher likelihood of occurrence within habitats potentially suitable for relevant threatened flora species.
 - The Study area is not mapped as a high-risk area for protected plants under the NC Act. Thus, a protected plants flora survey in accordance with the Flora Survey Guidelines – Protected Plants (DES 2020) was not triggered.
- Likelihood of occurrence assessment:
 - A likelihood of occurrence assessment was undertaken for all conservation significant species identified in the desktop assessment. This assessment considered information relating to species habitat preferences, known or suspected distribution, database records from the region, the occurrence of suitable habitat based on desktop information, or confirmed presence of species within the Study area (i.e. known records).

Further detail on the methodology is provided within the Ecological Assessment Report (MID) (Appendix E). The following sections present the results of these assessments.

9.2 Desktop assessment results

9.2.1 Literature review

9.2.1.1 Theodore Wind Farm

In August and September 2024, Environmental Resources Management Australia Pty Ltd (ERM) prepared an Ecological Assessment Report (EAR) and a Planning Report for the proposed Theodore Wind Farm (ERM 2024a; ERM 2024b). The field data from these reports were reviewed to understand previous ecological findings of the Study area. Only the findings from the northern extent of the proposed wind farm are deemed relevant to the desktop assessment, as the southern extent is beyond the defined Locality for the Project. Potential habitat corresponding to the Brigalow (*Acacia harpophylla* dominant and co-dominant) Threatened Ecological Community, listed as Endangered under the EPBC Act was identified within the northern extent of the Theodore Wind Farm and considered relevant to the Theodore Wind Farm Connection Project.

9.2.1.2 Dawson Wind Farm

An EPBC Act Significant Impact Assessment (SIA) Report was prepared in July 2025 by GreenTape Solutions (GreenTape) for EDF Renewables to support the Dawson Wind Farm EPBC Act Referral. The Dawson Wind Farm study area intersects the Study area for the Theodore Wind Farm Connection Project, between Ogdens Road and L Anderson Road, Tarramba. Field surveys were undertaken over seven survey events between 2021–2025.

The Semi-evergreen Vine Thickets of the Brigalow Belt (North and South) and Nandewar Bioregions TEC (Endangered under the EPBC Act) was identified within the Dawson Wind Farm study area. Patches of Brigalow, Poplar Box and Weeping Myall TECs were also identified within the Project footprint. Although not detected during targeted field surveys, four threatened flora species (Ooline (*Cadellia pentastylis*), Cossinia (*Cossinia australiana*), *Solanum dissectum*, and *Solanum johnsonianum*) were considered likely to occur based on historical records from the region and the presence of patches of suitable habitat.

9.2.1.3 Banana Range Wind Farm

In 2019, NGH Environmental Pty Ltd (NGH) prepared an Ecological Assessment Report for the proposed Banana Range Wind Farm (NGH 2019), with post-wet and dry season surveys conducted in May and November 2018, respectively. The Banana Range Wind Farm study area is located directly adjacent to the northern extent of the Study area for the Theodore Wind Farm Connection Project. Although the Banana Range Wind Farm surveys were completed over six years ago, the results of the Ecological Assessment Report are highly relevant to the Theodore Wind Farm Connection Project due to the proximity of the two projects to each other.

Ecological assessments confirmed the presence of the Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions TEC, outside the project impact area, in the south-west. Although not detected during targeted field surveys, five threatened flora species (Ooline (*Cadellia pentastylis*), King Blue-grass (*Dichanthium queenslandicum*), Bluegrass (*Dichanthium setosum*), *Solanum dissectum*, and *Solanum johnsonianum*) were considered likely to occur based on historical records within 10 km.

9.2.2 Online datasets and mapping tools

9.2.2.1 Matters of State Environmental Significance

The MSES mapped as occurring within the Study area are presented in Table 9.1. In terms of flora values, the following are relevant to flora values and the focus of the assessment presented in this chapter:

- regulated vegetation
- threatened flora species records.

The remaining mapped MSES for the Study area are discussed in Chapter 10 (Fauna).

Table 9.1 Summary of MSES mapped within the Study area

MSES	Presence/absence in Study area
State conservation areas	
Estates	Value not mapped within the Study area
Nature refuges	Value not mapped within the Study area
Special wildlife reserves	Value not mapped within the Study area
State Marine Parks (highly protected zone)	Value not mapped within the Study area
Fish habitat areas (A and B areas)	Value not mapped within the Study area
Wetlands and waterways	
Strategic Environmental Area (SEA)	Value not mapped within the Study area
High Ecological Significance (HES) wetlands	Value not mapped within the Study area
Wetlands in High Ecological Value (HEV) waters	Value not mapped within the Study area
Waterways in High Ecological Value (HEV) waters	Value not mapped within the Study area
Queensland waterways for waterway barrier works (fish passage)	Intersects 10 major, 17 high, 66 moderate, and 126 low impact waterways for waterway barrier works occur within the Study area
Protected wildlife habitat	
Endangered or vulnerable wildlife habitat	Value not mapped within the Study area
Special least concern wildlife habitat	Value not mapped within the Study area

MSES	Presence/absence in Study area
Koala Habitat Area – SEQ	Value not mapped within the Study area
Protected plants flora survey trigger map	Value not mapped within the Study area
Threatened species records	Refer to field-verified likelihood of occurrence assessment (Attachment C of Appendix E)
Regulated vegetation and habitat	
Category B – Endangered or of concern remnant regional ecosystems	Value mapped within the Study area
Category C – Endangered or of concern regrowth regional ecosystems	Value mapped within the Study area
Category R – Great Barrier Reef (GBR) riverine regrowth	Value mapped within the Study area
Regulated vegetation (defined watercourse)	Value mapped within the Study area
Essential habitat	Value not mapped within the Study area
Regulated vegetation 100 m from wetland	Value not mapped within the Study area
Legally secured offset areas	Value not mapped within the Study area

No other MSES (including essential habitat or protected plants) are mapped as occurring within the Study area.

9.2.2.2 State mapped regulated vegetation (regional ecosystems)

Regulated vegetation (regional ecosystems) mapped by the State as occurring within the Study area listed in Table 9.2. Of these regional ecosystems RE 11.3.2 and 11.12.21 are analogous with threatened ecological communities listed under the EPBC Act. Threatened ecological communities are discussed further in Chapter 11 (Matters of National Environmental Significance).

Table 9.2 State mapped regional ecosystems present within Study area

Regional ecosystem	Description	VM Act status	Potentially corresponding TEC
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of concern	— Poplar Box Grassy Woodland on Alluvial Plains — Weeping Myall Woodlands
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus spp.</i> woodland on alluvial plains	Of concern	None
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least concern	None
11.9.9	<i>Eucalyptus crebra</i> woodland on fine-grained sedimentary rocks	Least concern	None
11.12.1	<i>Eucalyptus crebra</i> woodland on igneous rocks	Least concern	None

Regional ecosystem	Description	VM Act status	Potentially corresponding TEC
11.12.2	<i>Eucalyptus melanophloia</i> woodland on igneous rocks	Least concern	None
11.12.4	Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	Least concern	None
11.12.6	<i>Corymbia citriodora</i> open forest on igneous rocks (granite)	Least concern	None
11.12.17	<i>Eucalyptus populnea</i> woodland on igneous rocks. Colluvial lower slopes	Endangered	None
11.12.21	<i>Acacia harpophylla</i> open forest on igneous rocks. Colluvial lower slopes	Endangered	— Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)
Non-remnant	Non-remnant	N/A	None

Category R – GBR riverine regrowth regulated vegetation as well as regulated vegetation (defined watercourse) are also mapped within the Study area.

9.2.2.3 Conservation significant flora species

The desktop assessment identified 10 conservation significant flora species with the potential to occur within the Study area. These species and their respective conservation status under the EPBC Act and NC Act are detailed in Table 9.3.

Table 9.3 Desktop results for conservation significant flora – Study area

Scientific name	Common name	Conservation status	
		EPBC Act	NC Act
<i>Arthraxon hispidus</i>	Hairy jointgrass	V	V
<i>Cadellia pentastylis</i>	Ooline	V	V
<i>Cossinia australiana</i>	Cossinia	E	E
<i>Dichanthium queenslandicum</i>	King blue-grass	E	V
<i>Dischanthium setosum</i>	Bluegrass	V	LC
<i>Leuzea australis</i>	Austral cornflower	V	V
<i>Polianthion minutiflorum</i>	-	V	V
<i>Solanum dissectum</i>	-	E	E
<i>Solanum johnsonianum</i>	-	E	E
<i>Xerothamnella herbacea</i>	-	E	E

9.2.3 Field survey results

9.2.3.1 Vegetation communities and regulated vegetation

Field verification surveys confirmed two distinct land zones mapped by the Queensland Herbarium as present within the Study area:

- Land zone 3: Recent Quaternary alluvial systems, including closed depressions, paleo-estuarine deposits currently under freshwater influence, inland lakes, and associated wave-built lunettes.
- Land zone 12: Mesozoic to Proterozoic igneous rocks, forming ranges, hills, and lowlands.

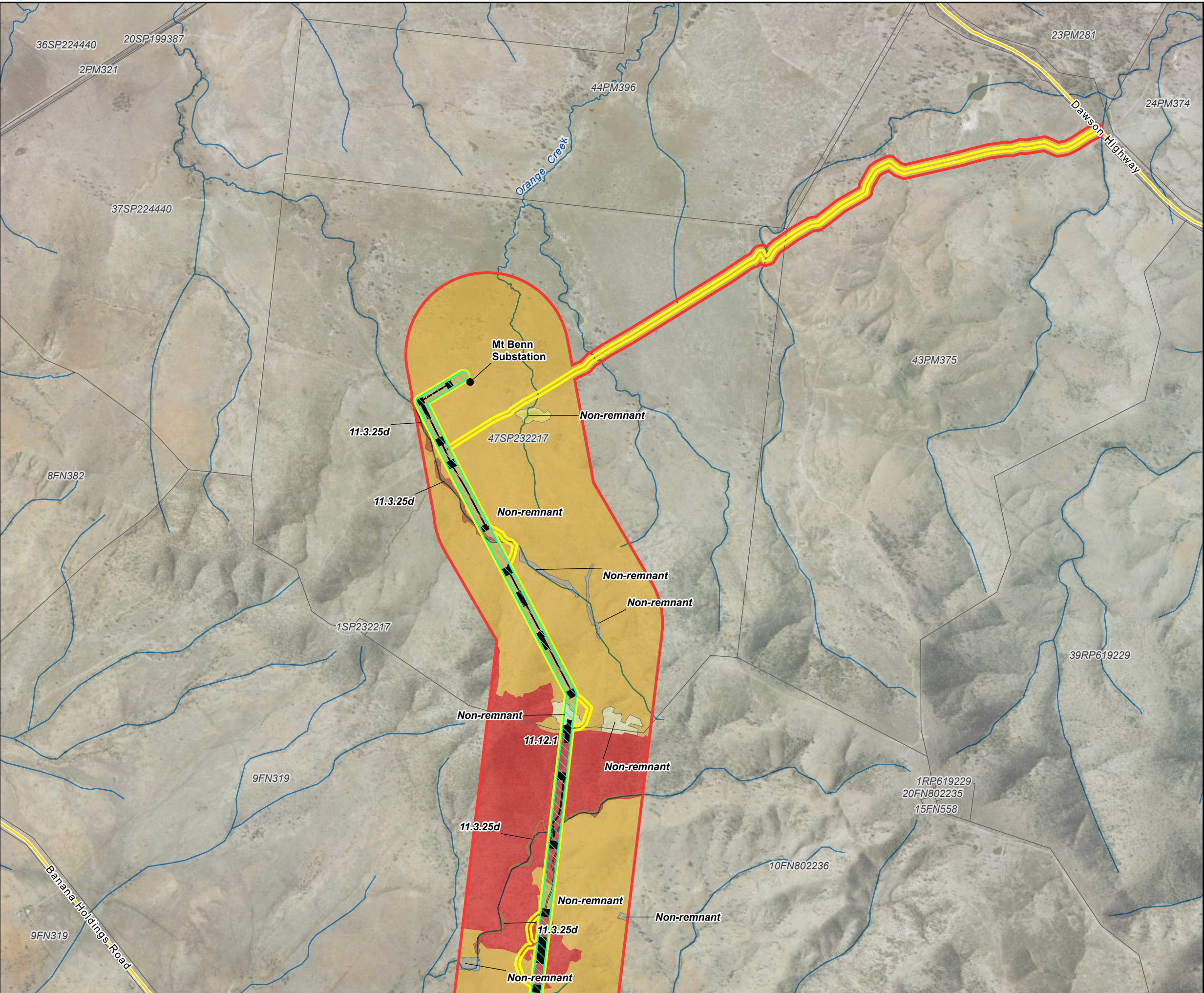
Within these two land zones, there were 10 remnant regional ecosystems represented across the Study area, four of which also occurred as younger high value regrowth ecosystems (refer Table 9.4). Detailed descriptions of each vegetation community or regional ecosystem are presented in Appendix E, with supporting data from Quaternary surveys provided in Appendix E. The distribution of field-verified regional ecosystems across the Study area is presented in Figure 9.1. None of the field-verified regional ecosystems were present on the proposed Cattle Creek Substation site.

Key notes on the dominant field verified vegetation communities within the Study area include:

- Most of the Study area has been cleared for agriculture and grazing leaving a landscape dominated by exotic and native grasslands, with occasional *Acacia* and *Eucalyptus* regrowth and small, isolated pockets of remnant revegetation.
- Within the regrowth and remnant vegetation communities, woodlands dominated by Narrow-leaved ironbark (*Eucalyptus crebra*) and Silver-leaved ironbark (*E. melanophloia*) (RE 11.12.1 and RE 11.12.2), were common on the hillslopes.
- Forest red gum (*Eucalyptus tereticornis*), River red gum (*E. camaldulensis*), and Black tea-tree (*Melaleuca bracteata*) woodlands were associated with the alluvial terraces and ephemeral watercourses.
- Small, isolated patches of Brigalow open forest (*Acacia harpophylla*) and Semi-evergreen vine thicket (SEVT) were also scattered throughout the Study area.

Field-verified vegetation communities varied significantly to Queensland Herbarium-mapped ecosystems, partially due to the finer scale of the field verified mapping (1:5,000), with a resulting 10 m minimum polygon width. The variation also came from a more thorough assessment of the age, canopy height and cover of vegetation communities within the Study area.

The Queensland Herbarium mapping and property maps of assessable vegetation (PMAV) presented much of the pastureland as non-remnant (Category X), but field verified mapping found that some areas within this land met the required age to be considered high-value regrowth (Category C) vegetation (over 15 years of age). These areas were mapped as remnant where they had reached more than 50 percent of the undisturbed predominant canopy and more than 70 percent of the regional ecosystem's undisturbed height.



PS218956 Theodore Wind Farm Connection Project

Figure 9.1
Field Verified Vegetation Communities

Page 1 of 11

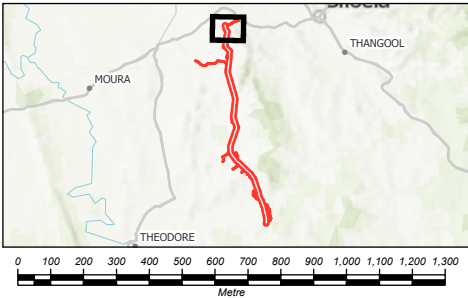
Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

Field Verified Regional Ecosystems

- Regional ecosystems
- Eucalyptus crebra* woodland with *Corymbia erythrophloia* on igneous hills [11.12.1]
 - Melaleuca bracteata* open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]

- Non-remnant
- Degraded alluvial woodland [Non-remnant]
 - Farm dam [Non-remnant]
 - Low *Eucalyptus crebra* regrowth [Non-remnant]
 - Mixed woody grassland [Non-remnant]

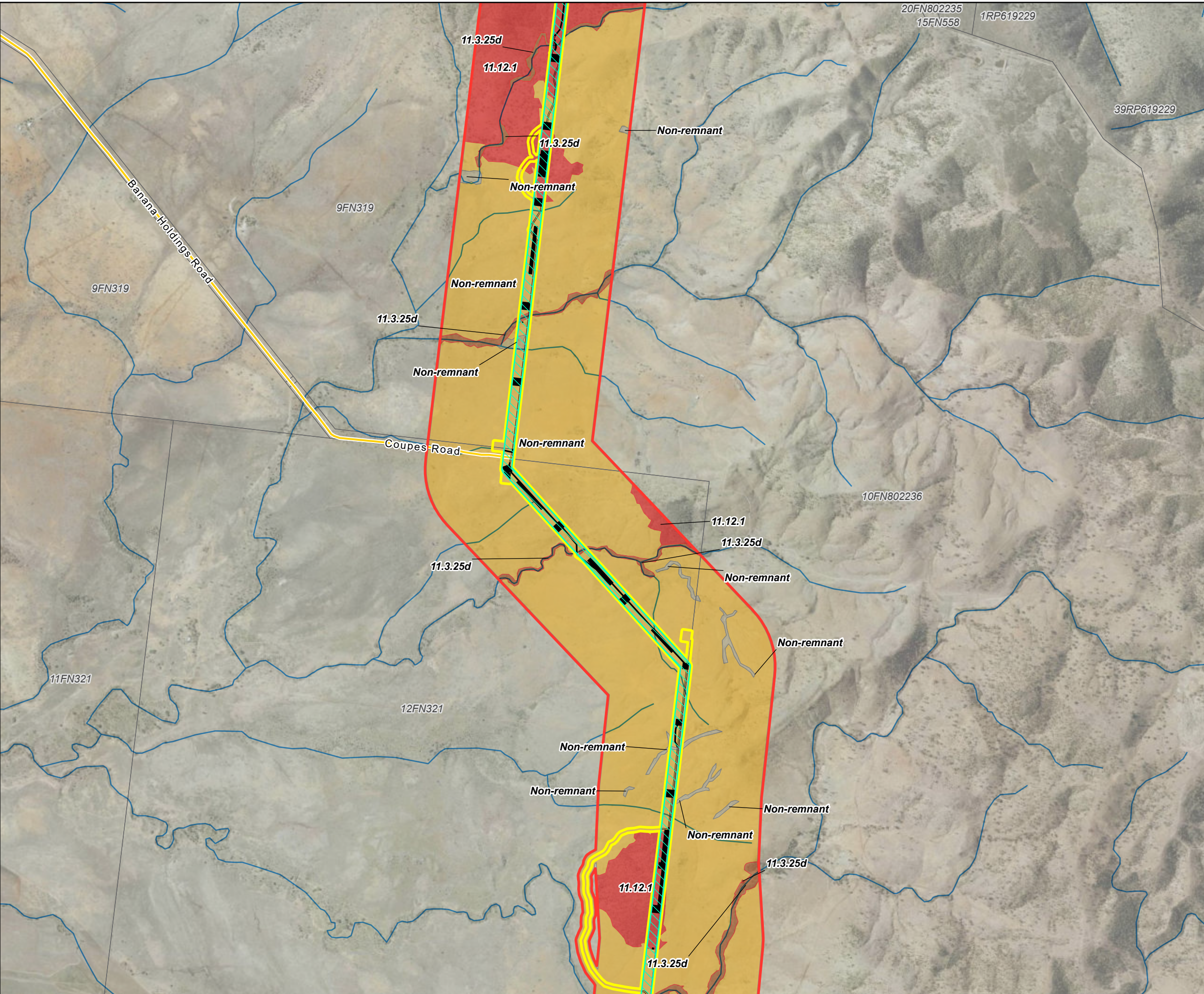


Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

1:23,000 Date: 8/07/2026

Data sources: DELWP, Geoscience Australia, Queensland Government, WSP

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Connection Project

Figure 9.1
Field Verified Vegetation Communities

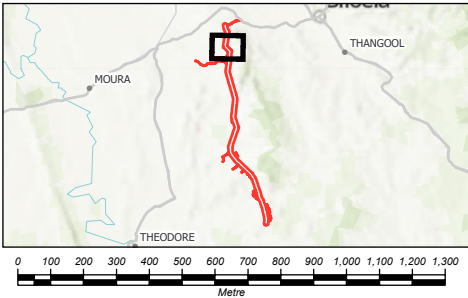
Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

Field Verified Regional Ecosystems

- Regional ecosystems
- Eucalyptus crebra* woodland with *Corymbia erythrophloia* on igneous hills [11.12.1]
 - Melaleuca bracteata* open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]

- Non-remnant
- Degraded alluvial woodland [Non-remnant]
 - Mixed woody grassland [Non-remnant]
 - Regrowth Brigalow woodland species on depressions [Non-remnant]

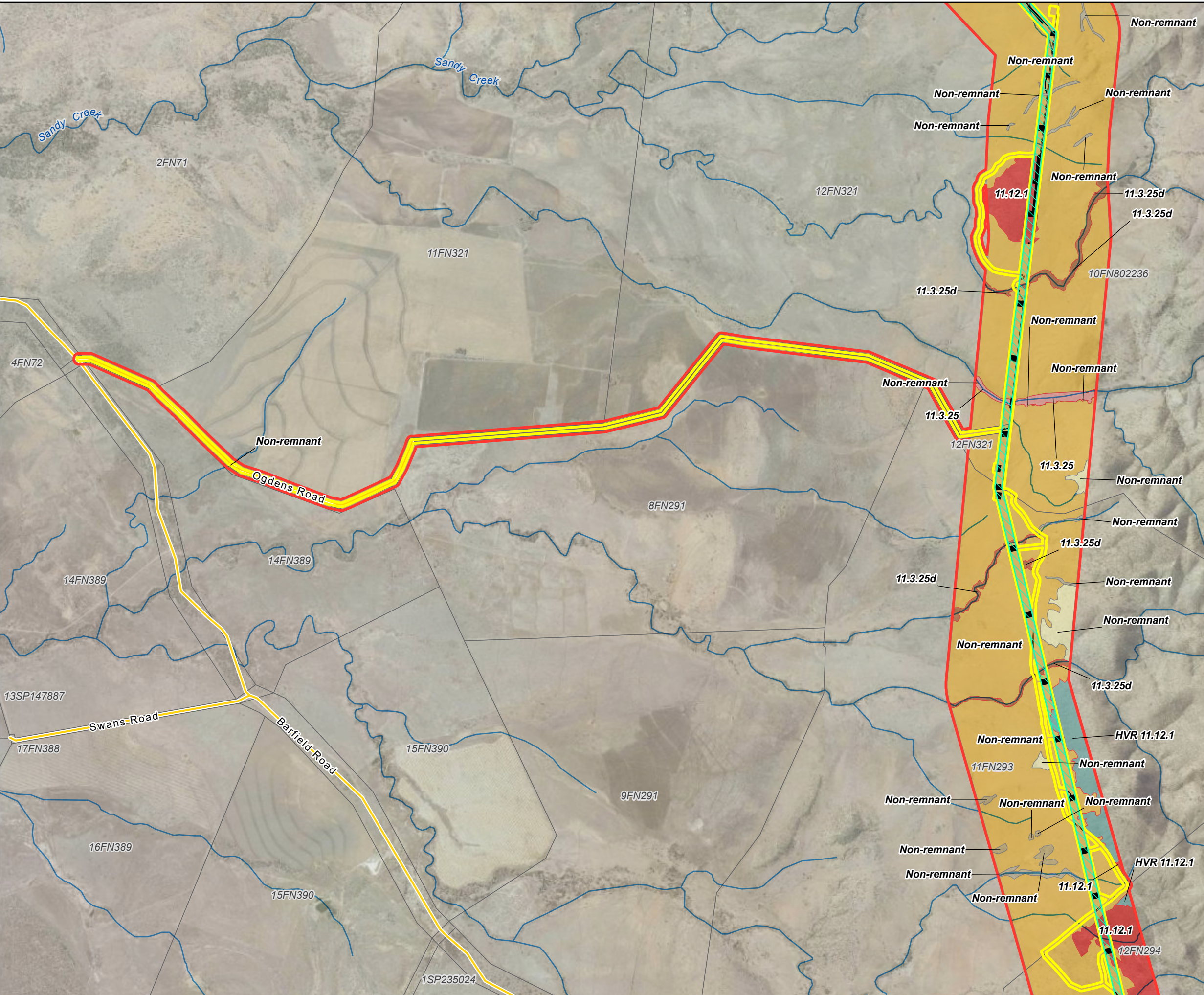


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Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

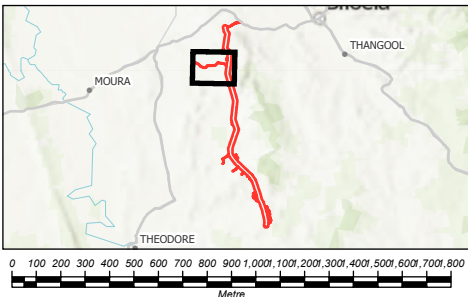
Field Verified Regional Ecosystems

Regional ecosystems

- Eucalyptus camaldulensis* woodland with *Melaleuca* spp. on fringing banks [11.3.25]
- Eucalyptus crebra* woodland with *Corymbia erythrophloia* on igneous hills [11.12.1]
- Melaleuca bracteata* open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]
- Sparse open *Eucalyptus crebra* woodland on volcanic hills [HVR 11.12.1]

Non-remnant

- Degraded alluvial woodland [Non-remnant]
- Low *Eucalyptus crebra* regrowth [Non-remnant]
- Mixed woody grassland [Non-remnant]
- Regrowth Brigalow woodland species on depressions [Non-remnant]



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Figure 9.1
Field Verified Vegetation Communities

Page 4 of 11

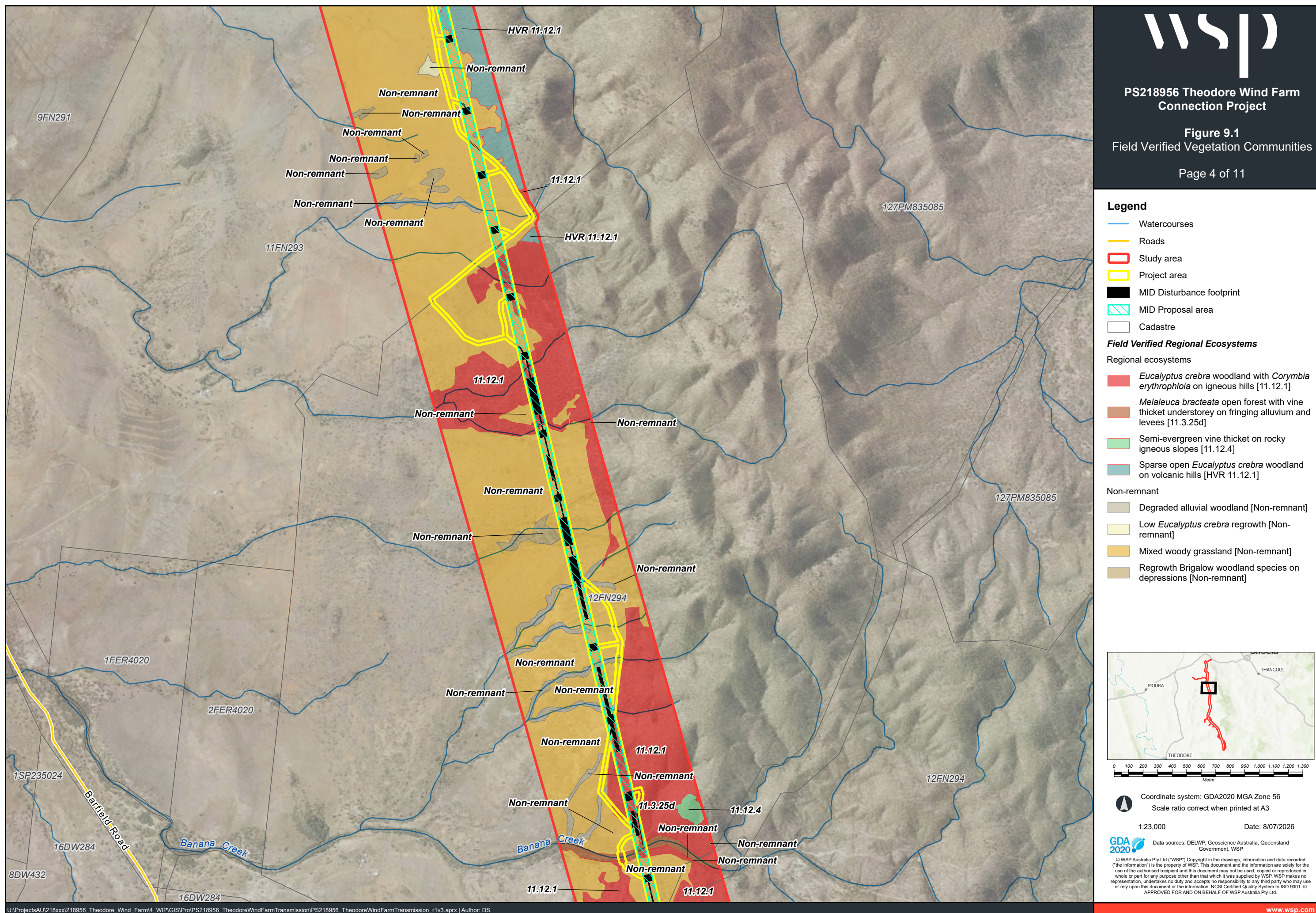




Figure 9.1
Field Verified Vegetation Communities

Page 5 of 11

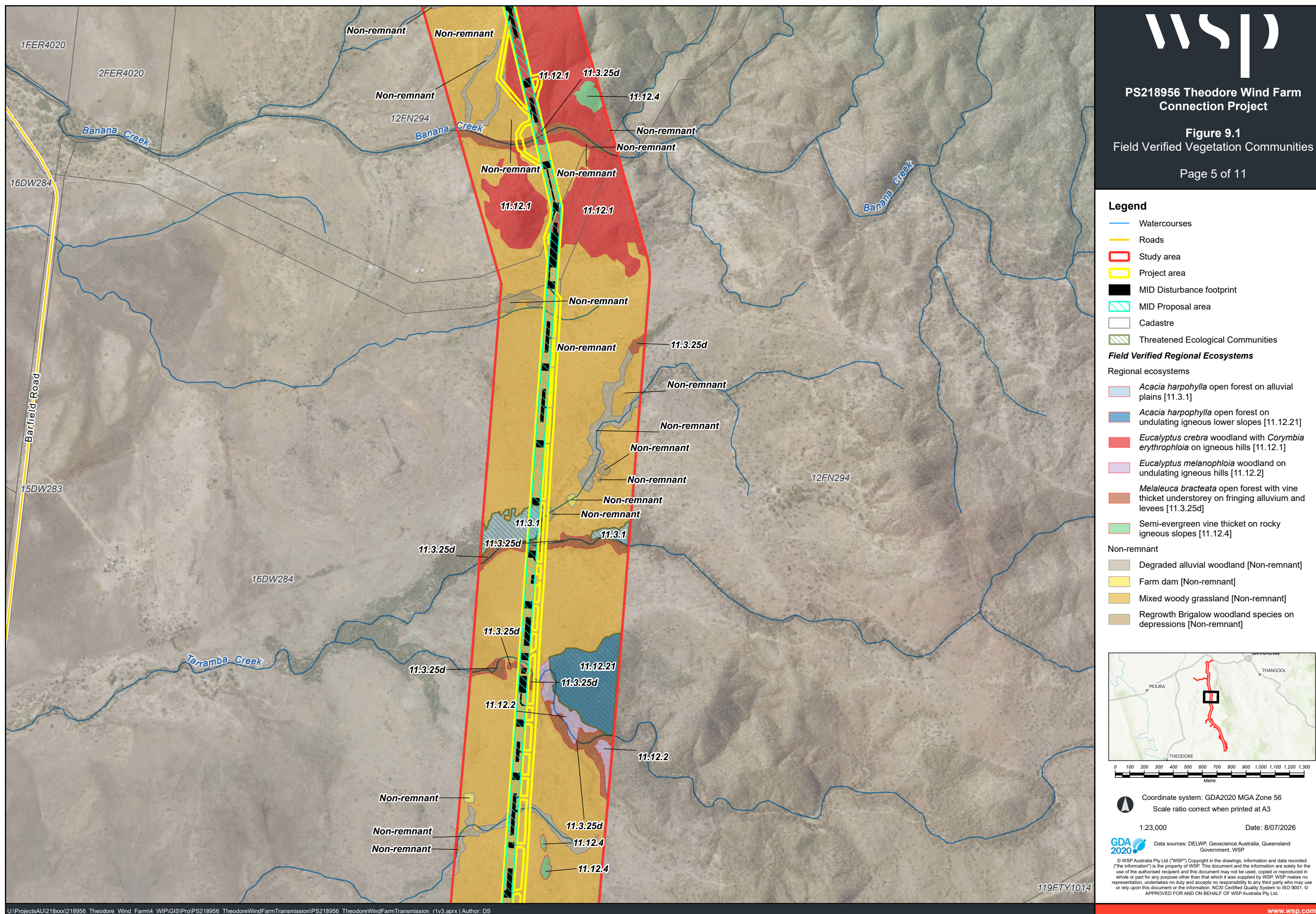
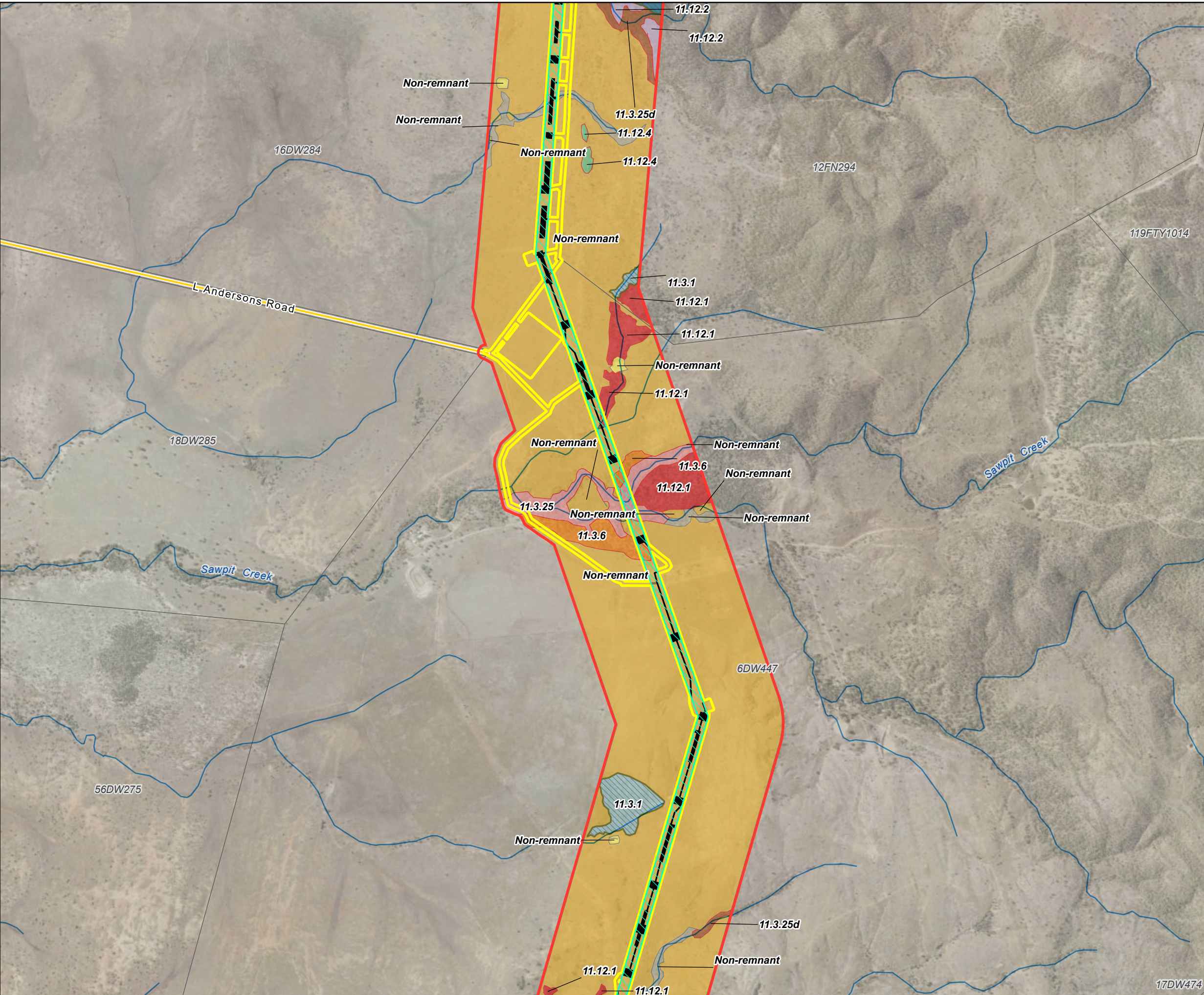
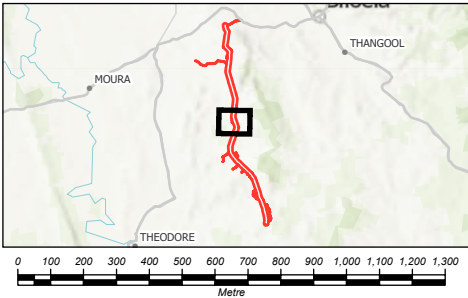


Figure 9.1
Field Verified Vegetation Communities



Legend

- Watercourses
 - Roads
 - Study area
 - Project area
 - MID Disturbance footprint
 - MID Proposal area
 - Cadastre
 - Threatened Ecological Communities
- Field Verified Regional Ecosystems**
- Regional ecosystems
- Acacia harpophylla open forest on alluvial plains [11.3.1]
 - Acacia harpophylla open forest on undulating igneous lower slopes [11.12.21]
 - Eucalyptus camaldulensis woodland with Melaleuca spp. on fringing banks [11.3.25]
 - Eucalyptus crebra woodland with Corymbia erythrophloia on igneous hills [11.12.1]
 - Eucalyptus melanophloia woodland on alluvial plains [11.3.6]
 - Eucalyptus melanophloia woodland on undulating igneous hills [11.12.2]
 - Melaleuca bracteata open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]
 - Semi-evergreen vine thicket on rocky igneous slopes [11.12.4]
- Non-remnant
- Degraded alluvial woodland [Non-remnant]
 - Farm dam [Non-remnant]
 - Mixed woody grassland [Non-remnant]



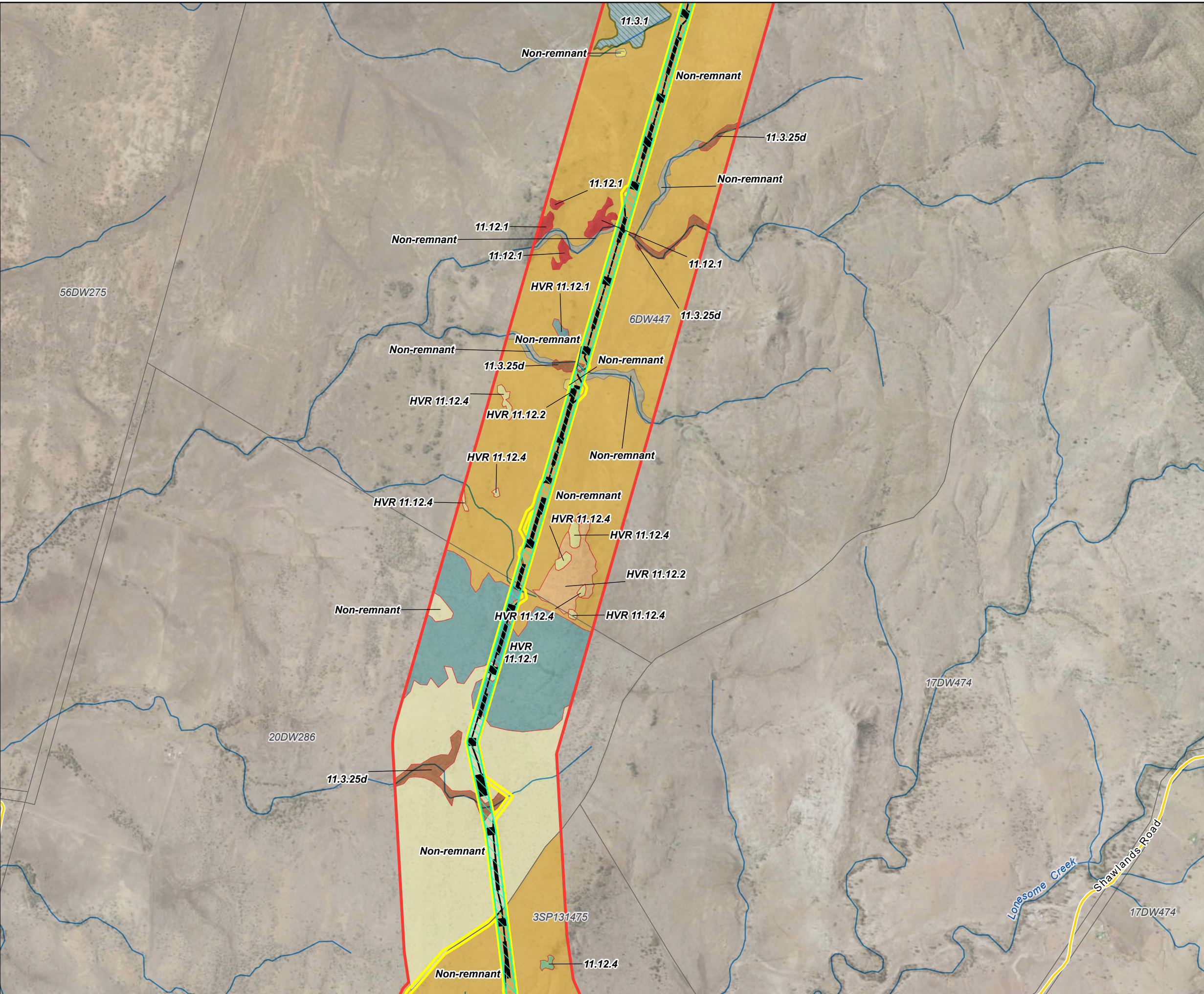
Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

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Figure 9.1
Field Verified Vegetation Communities



Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre
- Threatened Ecological Communities

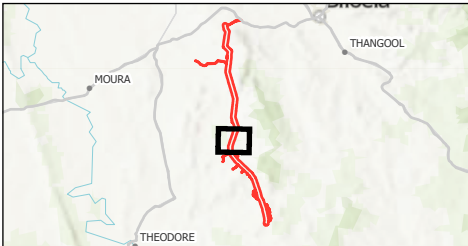
Field Verified Regional Ecosystems

Regional ecosystems

- Acacia harpophylla open forest on alluvial plains [11.3.1]
- Eucalyptus crebra woodland with Corymbia erythrophloia on igneous hills [11.12.1]
- Eucalyptus melanophloia low open woodland on undulating igneous hills [HVR 11.12.2]
- Low semi-evergreen vine thicket on rocky igneous hill crests [HVR 11.12.4]
- Melaleuca bracteata open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]
- Semi-evergreen vine thicket on rocky igneous slopes [11.12.4]
- Sparse open Eucalyptus crebra woodland on volcanic hills [HVR 11.12.1]

Non-remnant

- Degraded alluvial woodland [Non-remnant]
- Farm dam [Non-remnant]
- Low Eucalyptus crebra regrowth [Non-remnant]
- Mixed woody grassland [Non-remnant]

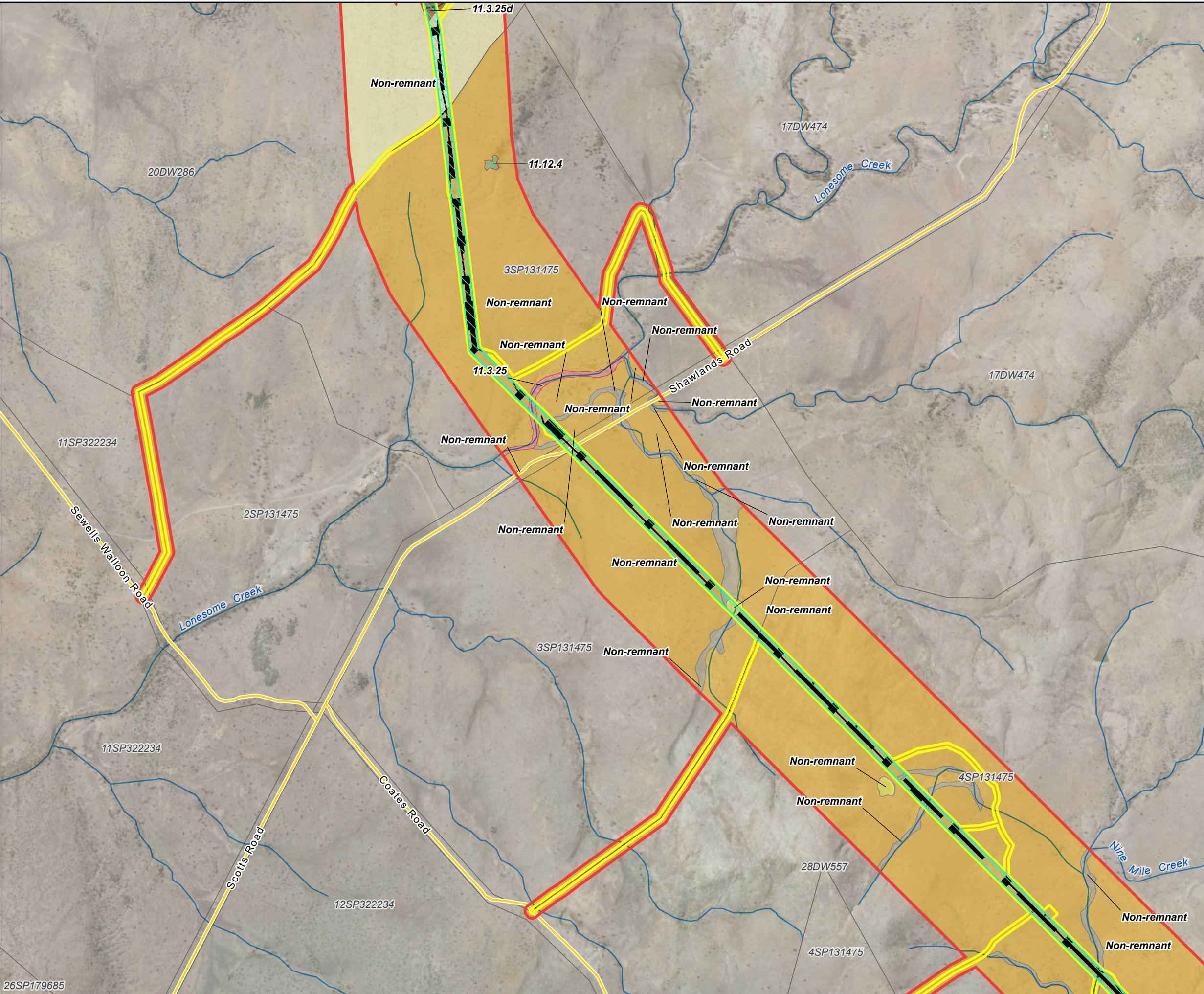


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Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

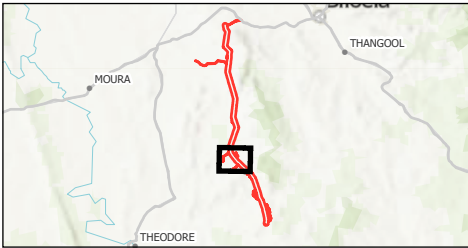
Field Verified Regional Ecosystems

Regional ecosystems

- Eucalyptus camaldulensis* woodland with *Melaleuca* spp. on fringing banks [11.3.25]
- Melaleuca bracteata* open forest with vine thicket understorey on fringing alluvium and levees [11.3.25d]
- Semi-evergreen vine thicket on rocky igneous slopes [11.12.4]

Non-remnant

- Cleared hardstand and roads [Non-remnant]
- Degraded alluvial woodland [Non-remnant]
- Farm dam [Non-remnant]
- Low *Eucalyptus crebra* regrowth [Non-remnant]
- Mixed woody grassland [Non-remnant]

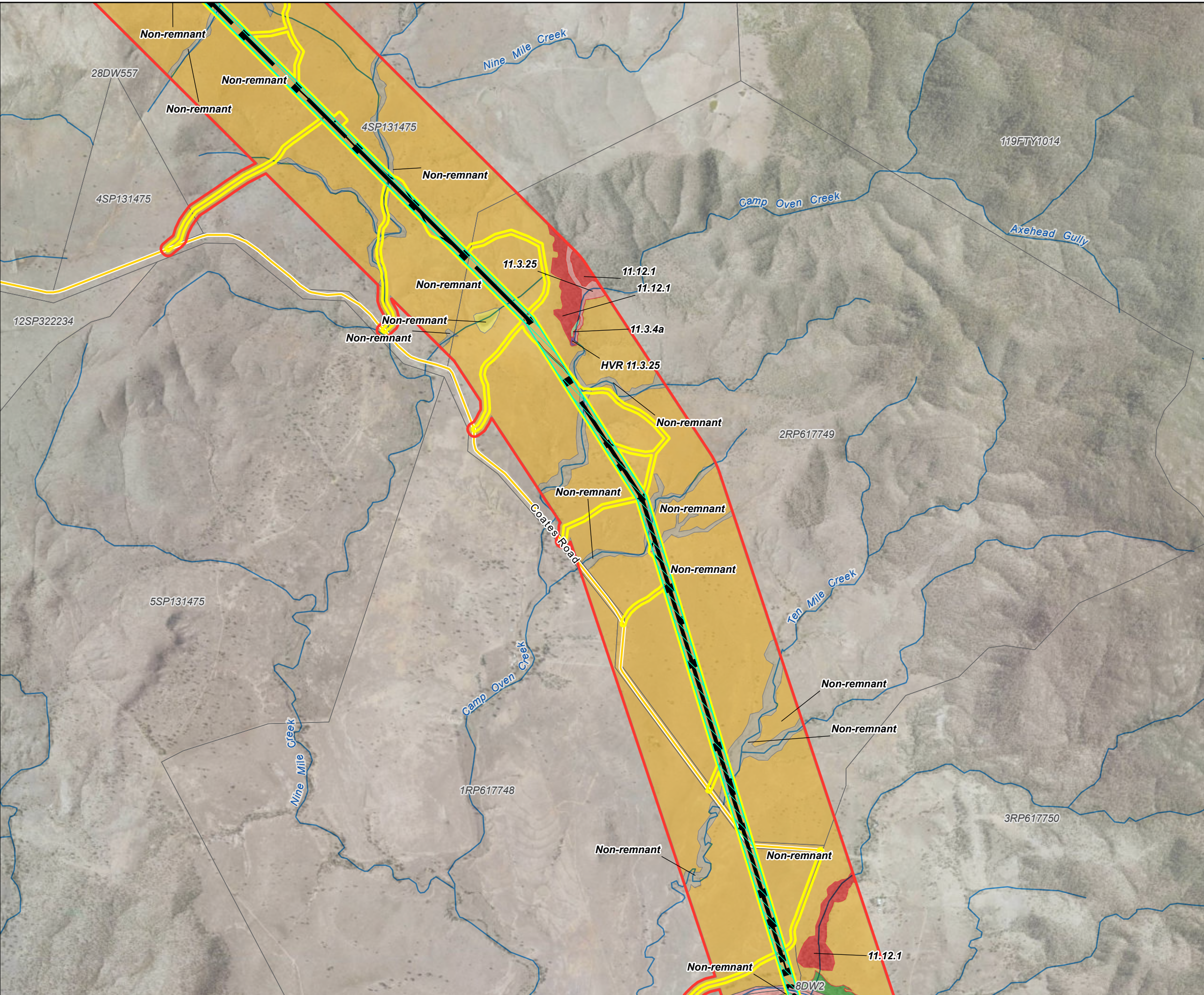


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Legend

- Watercourses
- Roads
- Study area
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- MID Proposal area
- Cadastre

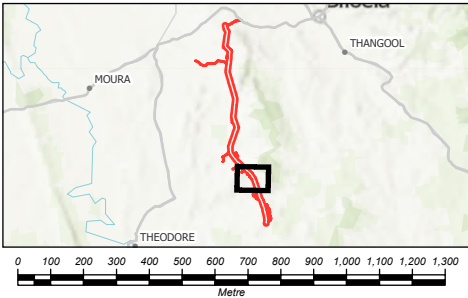
Field Verified Regional Ecosystems

Regional ecosystems

- Corymbia tessellaris* (now *Blakella tessellaris*) woodland on alluvial terraces [11.3.4a]
- Eucalyptus camaldulensis* open woodland on alluvial plains [11.3.4]
- Eucalyptus camaldulensis* woodland with *Melaleuca* spp. on fringing banks [11.3.25]
- Eucalyptus crebra* woodland with *Corymbia erythrophloia* on igneous hills [11.12.1]
- High value regrowth *Eucalyptus camaldulensis* open woodland on alluvial plains [HVR 11.3.25]

Non-remnant

- Degraded alluvial woodland [Non-remnant]
- Farm dam [Non-remnant]
- Mixed woody grassland [Non-remnant]



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Figure 9.1
Field Verified Vegetation Communities

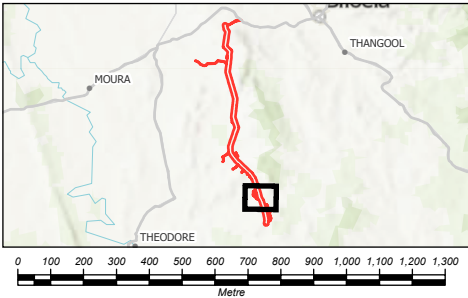
Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

Field Verified Regional Ecosystems

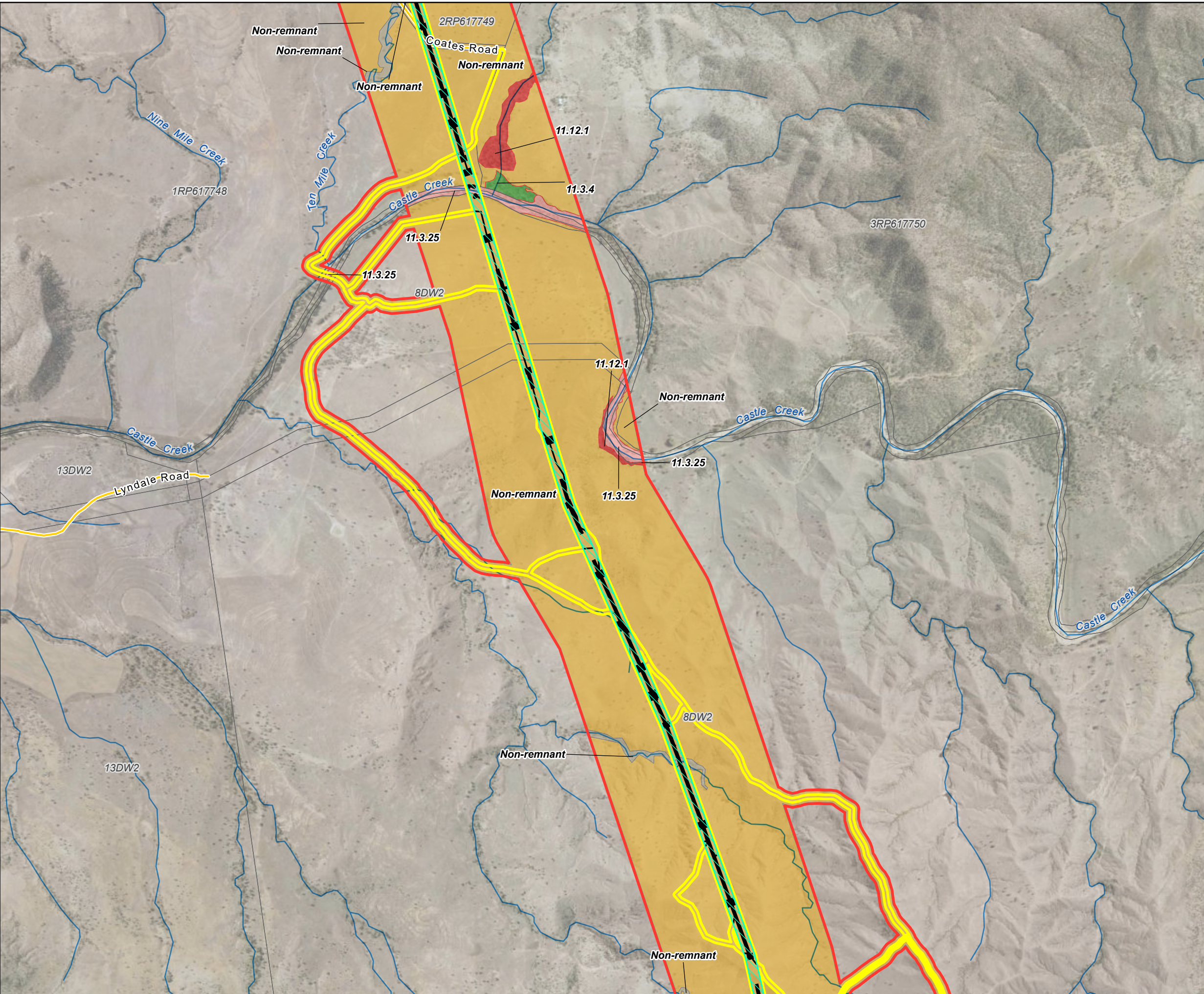
- Regional ecosystems
- Eucalyptus camaldulensis* open woodland on alluvial plains [11.3.4]
 - Eucalyptus camaldulensis* woodland with *Melaleuca* spp. on fringing banks [11.3.25]
 - Eucalyptus crebra* woodland with *Corymbia erythrophloia* on igneous hills [11.12.1]

- Non-remnant
- Degraded alluvial woodland [Non-remnant]
 - Mixed woody grassland [Non-remnant]



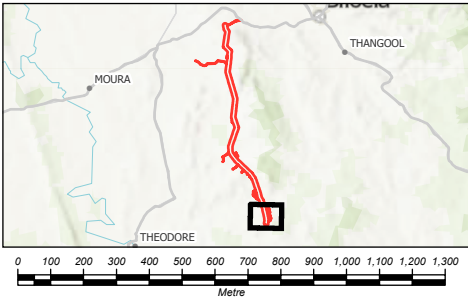
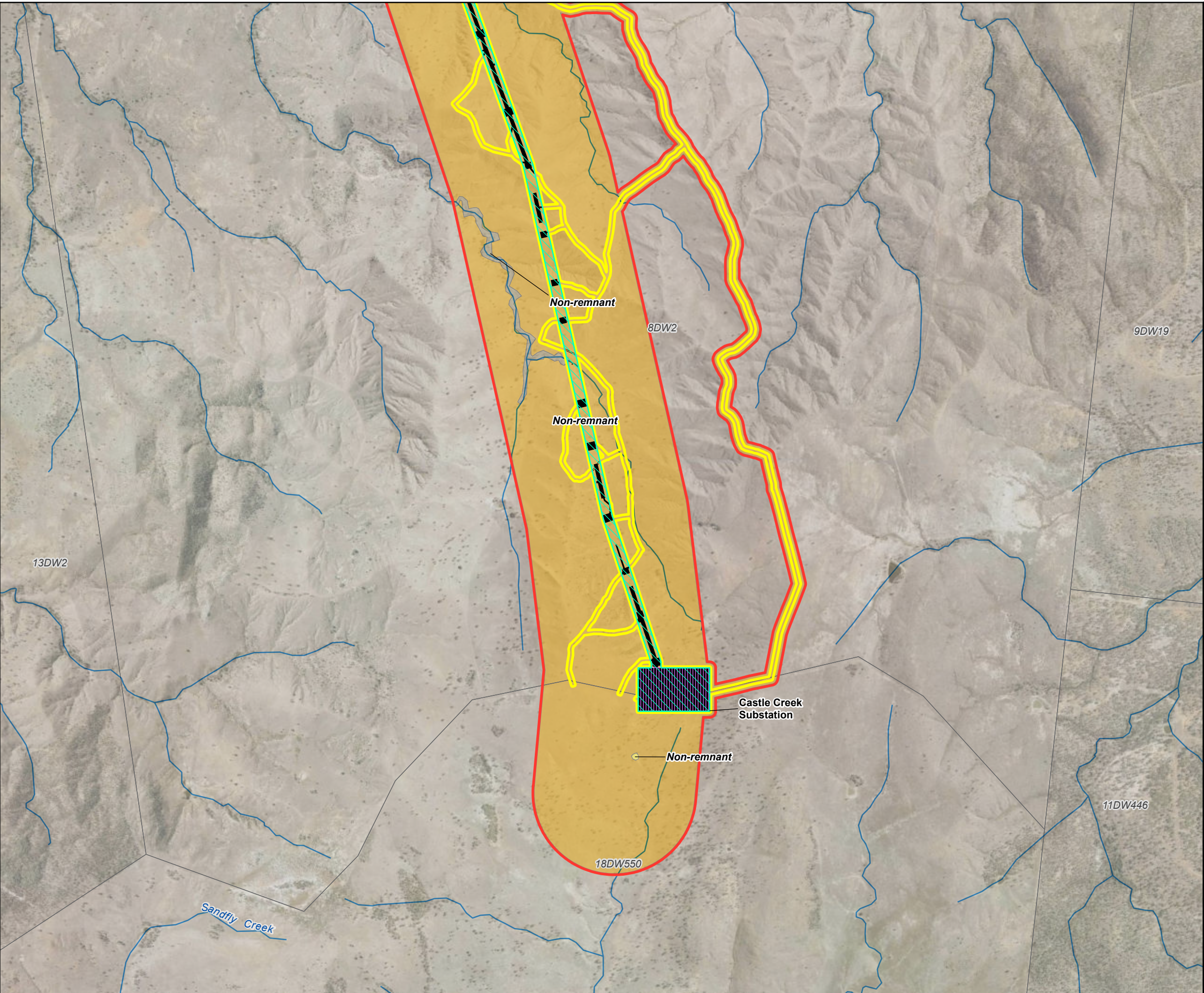
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Legend

- Watercourses
 - Study area
 - Project area
 - MID Disturbance footprint
 - MID Proposal area
 - Castle Creek Substation
 - Cadastre
- Field Verified Regional Ecosystems**
- Non-remnant
- Degraded alluvial woodland [Non-remnant]
 - Farm dam [Non-remnant]
 - Mixed woody grassland [Non-remnant]



Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
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Table 9.4 Field-verified vegetation communities and regional ecosystems in the Study area

Vegetation community	Regional ecosystem	Regional ecosystem short description	Regulated vegetation category	VM Act status	Potentially corresponding TEC	Study area (ha)
<i>Acacia harpophylla</i> open forest on alluvial plains	11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	B	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	21.5
<i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains	B	Of Concern	-	2.6
<i>Blakella tessellaris</i> (prev. <i>Corymbia tessellaris</i>) woodland on alluvial terraces	11.3.4a	<i>Corymbia tessellaris</i> woodland on alluvial terraces and sand ridges. adjacent to larger stream channels which are irregularly flooded or possibly relict.	B	Of Concern	-	0.2
<i>Eucalyptus melanophloia</i> woodland on alluvial plains	11.3.6	<i>Eucalyptus melanophloia</i> woodland on alluvial plains	B	Least Concern	-	10.5
<i>Eucalyptus camaldulensis</i> woodland with <i>Melaleuca</i> spp. on fringing banks	11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	B	Least Concern	-	43.0
High value regrowth <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	HVR 11.3.25	HVR <i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	C	Least Concern	-	0.1
<i>Melaleuca bracteata</i> open forest with vine thicket understorey on fringing alluvium and levees	11.3.25d	<i>Melaleuca bracteata</i> woodland to open forest on fringing alluvial soils or near-channel levees on heavy wet clays.	B	Least Concern	-	62.0
<i>Eucalyptus crebra</i> woodland with <i>Corymbia erythrophloia</i> on igneous hills	11.12.1	<i>Eucalyptus crebra</i> woodland on igneous rocks	B	Least Concern	-	357.1

Vegetation community	Regional ecosystem	Regional ecosystem short description	Regulated vegetation category	VM Act status	Potentially corresponding TEC	Study area (ha)
Sparse open <i>Eucalyptus crebra</i> woodland on volcanic hills	HVR 11.12.1	HVR <i>Eucalyptus crebra</i> woodland on igneous rocks	C	Least Concern	-	91.7
<i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	11.12.2	<i>Eucalyptus melanophloia</i> woodland on igneous rocks	B	Least Concern	-	7.6
<i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	HVR 11.12.2	HVR <i>Eucalyptus melanophloia</i> woodland on igneous rocks	C	Least Concern	-	10.6
Semi-evergreen vine thicket on rocky igneous slopes	11.12.4	Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	B	Least Concern	-	4.4
Low semi-evergreen vine thicket on rocky igneous hill crests	HVR 11.12.4	HVR Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	C	Least Concern	-	3.5
<i>Acacia harpophylla</i> open forest on undulating igneous lower slopes	11.12.21	<i>Acacia harpophylla</i> open forest on igneous rocks. Colluvial lower slopes	B	Endangered	Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	21.8
Degraded alluvial woodland	Non-remnant	-	X	-	-	122.0
Regrowth Brigalow woodland species on depressions	Non-remnant	-	X	-	-	11.0
Low <i>Eucalyptus crebra</i> regrowth	Non-remnant	-	X	-	-	147.2
Mixed woody grassland	Non-remnant	-	X	-	-	4,986.1
Cleared hardstand and roads	Non-remnant	-	X	-	-	1.7
Farm dams	Non-remnant	-	X	-	-	7.3
Total (rounded)						5,911.9

9.2.3.2 Flora species

A total of 192 flora species were recorded within the Study area during the wet season field surveys, including six special least concern, 150 least concern, and 36 introduced species. A complete list of flora species recorded during the survey is presented in Appendix E.

Threatened flora species

No threatened flora species listed under the NC Act were recorded during the flora surveys within the Study area.

The initial desktop-based likelihood of occurrence assessment was revised following the field surveys to identify the threatened flora species with field-verified potential to occur within the Study area. The assessment did not identify any threatened flora species listed under the NC Act as having a moderate or higher likelihood of occurring in the Study area, as the potential remnant habitats were degraded and fragmented, with an understorey that was significantly modified by grazing pressure. The revised likelihood of occurrence assessment presented in Appendix E. Note that plant species listed under the NC Act as Special least concern have been omitted as there are no legislative requirements relevant to the Project, regardless of them being present.

Invasive plants

Seven restricted invasive plants listed under the *Biosecurity Act 2014* were recorded within the Study area, including five species that are also listed Weeds of National Significance (WoNS). These are discussed further in Chapter 12 (Biosecurity).

9.3 Potential impacts and mitigation measures

9.3.1 *Project-related impacts*

The following sections describe the potential Project-related impacts to flora values. Both direct and indirect Project-related impacts from construction and operational and maintenance activities have been identified. Measures to avoid, minimise, or manage impacts are also discussed.

9.3.2 *Construction phase impacts*

The most significant impacts on flora values will occur during the construction phase of the Project, when vegetation clearing will occur.

9.3.2.1 Clearing of regulated vegetation (regional ecosystems)

The Project requires vegetation clearing within field-verified vegetation communities and regulated vegetation (regional ecosystems). The 60 m wide Project area (including associated infrastructure and the substation) covers a total area of 406.0 ha of which approximately 35.3 ha is associated with regulated vegetation (remnant and high-value regrowth regional ecosystems). Design of the Project, and development of the MID Disturbance footprint, has considered measures to avoid or minimise impacts to regulated vegetation including scalloping or spanning over sensitive vegetation. The result of these measures has reduced the impact on regulated vegetation. The extent of disturbance (clearing) to regulated vegetation (regional ecosystems) and non-remnant vegetation within the MID Disturbance footprint is presented in Table 9.5. The Project area, and MID Proposal Area, representing full clearance of the 60 m wide easement is also included for comparison purposes.

The MID Disturbance footprint comprises approximately 113.5 ha of which approximately 7.7 ha consists of field verified regulated vegetation (remnant and high value regrowth regional ecosystems).

Table 9.5 Extent of disturbance (clearing) to field verified vegetation communities and regional ecosystems in the Project area, MID Proposal area and MID Disturbance footprint

Regional ecosystem and vegetation community	VM Act status	Project area (ha)	MID Proposal area (ha)	MID Disturbance footprint (ha)
11.3.1 – <i>Acacia harpophylla</i> open forest on alluvial plains	Endangered	1.4	1.4	0.0
11.3.6 – <i>Eucalyptus melanophloia</i> woodland on alluvial plains	Least Concern	1.1	1.1	0.03
11.3.25 – <i>Eucalyptus camaldulensis</i> woodland with <i>Melaleuca spp.</i> on fringing banks	Least Concern	2.5	2.4	0.2
11.3.25d – <i>Melaleuca bracteata</i> open forest with vine thicket understorey on fringing alluvium and levees	Least Concern	2.9	2.7	0.1
11.12.1 – <i>Eucalyptus crebra</i> woodland with <i>Corymbia erythrophloia</i> on igneous hills	Least Concern	22.4	21.9	6.2
HVR 11.12.1 – Sparse open <i>Eucalyptus crebra</i> woodland on volcanic hills	Least Concern	4.8	4.8	1.0
HVR 11.12.2 – <i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	Least Concern	0.2	0.2	0.2
Subtotal – regulated vegetation (remnant and high-value regrowth)		35.3	34.5	7.7
Non-remnant Degraded alluvial woodland	-	5.3	4.9	1.9
Non-remnant Regrowth Brigalow woodland species on depressions	-	0.4	0.4	0.01
Non-remnant Low <i>Eucalyptus crebra</i> regrowth	-	9.2	8.3	2.9
Non-remnant Mixed woody grassland	-	355.0	295.2	101.0
Cleared hardstand, roads, and farm dams	-	0.8	0.8	0.04
Subtotal – non-remnant vegetation		370.7	309.6	105.8
TOTAL		406.0	344.1	113.5

To minimise the disturbance of native vegetation, consistent with the safe and reliable operation of the asset, the following measures, as outlined in the EMP (Appendix D), will be applied:

- The extent of vegetation clearing areas will be nominated on the EWPs and made available for the vegetation clearing activity.
- The EWPs will nominate any areas that have specific management requirements (e.g. no-go zones, vegetation to be retained).
- Prior to commencing initial vegetation clearing, the extent of clearing (work area) will be delineated on site, both geospatially, as well as using high visibility barriers or taping to ensure that clearing will not occur in areas to be preserved. The delineated limits of clearing must be maintained for at least the duration of clearing and earthworks.
- An unexpected finds protocol will be implemented if a previously unidentified threatened plant individual or population is observed during future surveys for the Project (e.g. targeted surveys of any new areas established during detailed design, pre-clearance surveys).

9.3.3 *Potential indirect impacts*

Indirect impacts occur when Project-related activities affect vegetation in a manner other than a direct loss or clearing. Examples of indirect impacts to flora values during construction include:

- Dust deposition: Excessive dust generation from construction activities could potentially disrupt the pollination cycle and ability of native plants to reproduce (i.e. fertilisation, germination, revegetation and recolonisation of existing plants).
- Edge effects: Edge effects are zones of changed environmental conditions (e.g. altered light levels, wind speed, temperature) occurring along the edge of habitat fragments. Edge effects can result in weed invasion and altered community assemblage. Significant increases to edge effects are not anticipated as most of the Study area has been previously cleared for agriculture and grazing leaving a landscape dominated by pasture grasslands with scattered native trees and regrowth present as small, isolated pockets of vegetation.
- Weed invasion and colonisation: Ground disturbance activities have the potential to create favourable conditions for invasive plant (weed) species and/or facilitate their spread into immediately adjacent areas.

Indirect impacts to vegetation will be managed in accordance with the measures for vegetation management, dust and weed management outlined in the EMP (Appendix D).

9.3.4 *Maintenance and operations*

As a distribution entity, Powerlink is obligated to manage electricity infrastructure to ensure the safe and reliable provision of electricity. Periodic vegetation management is therefore required to satisfy electrical safety requirements. Potential impacts associated with maintenance and operational activities will be at a much lesser scale to those identified for the construction phase of the Project, and will be discrete and temporary in nature.

9.3.5 *Matters of State Environmental Significance*

No flora MSES have been recorded within the MID Disturbance footprint.

Reef regrowth watercourse vegetation (Category R) as well as remnant vegetation (Category B) (defined watercourse) are mapped within the Study area. The MID Disturbance footprint impacts 0.1 ha of mapped Category R – Reef regrowth watercourse vegetation adjacent to Castle Creek, and 0.2 ha of field verified Category B remnant vegetation (defined watercourse). Clearing of regulated vegetation will be undertaken in accordance with relevant legislative requirements.

No other areas (Category A, B, C, or R) within a defined distance from the defining banks of a relevant watercourse identified on the vegetation management and drainage feature map are located within the MID Disturbance footprint.

10 Fauna

Chapter 10 describes the presence, extent and integrity of fauna values in the Study area. The assessment considers the biological diversity of the Study area including listed fauna species and their habitats. As with Chapter 9 (Flora), the focus of this assessment is on Matters of State Environmental Significance (MSES), with MNES discussed in detail in Chapter 11 (Matters of National Environmental Significance).

Field verification surveys confirmed nine different habitat types across the Study area. Field surveys also recorded a total of 81 fauna species from the Study area, including eight amphibians, 42 birds, 22 mammals (including 13 species of microbat identified from microbat call analysis), one fish and eight reptiles. The Squatter Pigeon (*Geophaps scripta scripta*) (Vulnerable under the NC Act and EPBC Act) was recorded adjacent to the Study area and personal communications with local landholders indicates they are a common occurrence in the Locality. The Short-beaked Echidna (*Tachyglossus aculeatus*) (Special least concern under the NC Act) was also recorded during the field surveys. An additional eight NC Act threatened fauna species listed under the NC Act have been assessed as having a moderate to high likelihood of occurrence within the Study area, despite not having yet been recorded.

Where feasible, the Project has followed the general principles for impact mitigation of avoidance, minimisation, mitigation and compensation. Development of the MID Disturbance footprint has avoided impacts to remnant vegetation and habitats to the greatest extent possible by incorporating design measures such as scalloping or spanning over sensitive vegetation. Where habitat clearing is unavoidable, clearing activities will be managed in accordance with the measures outlined in the EMP including the preparation and implementation of high- and low-risk Species Management Programs.

10.1 Methodology

The methodology used to assess fauna values associated with the Study area included:

- Desktop assessment to characterise and identify potential fauna species that may be present within the Study area. The desktop assessment included a review of literature including previous ecological assessment reports conducted within the Study area and wider Locality. Searches of publicly available datasets and online mapping were used and where relevant a 10 km search area of the Project area was applied.
- Field surveys for the Project were completed between 3 February and 29 May 2025, across three field events:
 - 3–6 February 2025 (4 days/3 nights) (summer/wet season)
 - 18–21 February 2025 (4 days/3 nights) (summer/wet season)
 - 26–29 May 2025 (3 days/4 nights) (autumn/early dry season).

There was a short break in the summer/wet season survey due to inclement weather. The main purpose of the field surveys was to field verify the fauna habitats within the Study area which may be at risk of impact from the Project, and to identify threatened fauna species that may be present. The survey methods and efforts were developed in reference to State and Commonwealth survey guidelines to determine the level of adequate surveys for the target threatened fauna and/or migratory species. The fauna survey methods applied included spotlighting, diurnal searches, bird surveys, incidental fauna search and survey, camera traps, an anabat echolocation recorder, and thermal drone surveys.

- A likelihood of occurrence assessment was undertaken for all conservation significant fauna species identified in the desktop assessment. This assessment considered information relating to species habitat preferences, known or suspected distribution, database records from the region, the occurrence of suitable habitat based on desktop information, or confirmed presence of species within the Study area (i.e. known records). The likelihood of occurrence assessment was revised following the field survey and confirmation of fauna habitats.

Further detail on the methodology is provided within the Ecological Assessment Report (MID) (Appendix E). The following sections present the results of this assessment.

10.2 Desktop assessment results

10.2.1 Literature review

The literature review from previous ecological investigations undertaken for the Theodore Wind Farm, Banana Range Wind Farm, and Dawson Wind Farm noted that the following NC Act listed fauna species as either recorded or considered likely to occur:

- Theodore Wind Farm (refer Section 9.2.1) confirmed the presence of the following NC Act listed fauna species within the northern extent of the study area:
 - Squatter Pigeon (southern subspecies) (*Geophaps scripta scripta*), listed as Vulnerable under the NC Act
 - Greater Glider (southern and central) (*Petauroides volans*), listed as Endangered under the NC Act
 - Koala (*Phascolarctos cinereus*), listed as Endangered under the NC Act
 - Short-beaked Echidna (*Tachyglossus aculeatus*), listed as Special Least Concern under the NC Act.
- Banana Range Wind Farm:
 - Greater Glider (southern and central) (*Petauroides volans*)
 - White-throated Needletail (*Hirundapus caudacutus*) – listed as Vulnerable under the NC Act
 - Short-beaked Echidna (*Tachyglossus aculeatus*).
- Dawson Wind Farm Project:
 - Squatter Pigeon
 - Greater Glider.

10.2.2 Online datasets and mapping tools

10.2.2.1 Matters of National Environmental Significance (MNES)

The EPBC Act Protected Matters Search Tool (PMST) identified fauna species classified as MNES known or predicted to be present within a 10 km search area of the Project area. The PMST database results identified 26 listed threatened fauna species and ten listed migratory fauna species as potentially occurring within the Study area. The PMST report is included in Attachment A of Appendix E. EPBC Act listed threatened and migratory species are discussed further in Chapter 11 (Matters of National Environmental Significance).

10.2.2.2 Matters of State Environmental Significance

Matters of State Environmental Significance (MSES) mapped as occurring within the Study area that are relevant to fauna values are:

- threatened fauna species records
- Queensland waterways for waterway barrier works (fish passage).

The complete list of mapped MSES mapped as occurring within the Study area is provided in Table 9.1.

10.3 Field survey results

10.3.1 Fauna species

A total of 81 fauna species were recorded within the Project area, including eight amphibians, 42 bird species, 22 mammal species (including 13 species of microbat identified from microbat call analysis), one fish species and eight reptile species.

Of the species recorded, five were introduced species including Cane Toad (*Rhinella marina*), Indian Myna (*Acridotheres tristis*), European Hare (*Lepus europaeus*), House Mouse (*Mus musculus*), and Rabbit (*Oryctolagus cuniculus*). Dingos (*Canis familiaris*) were also recorded but their status as an introduced species is still being debated. A complete fauna species list is presented in Appendix E.

10.3.1.1 Threatened fauna species

Squatter Pigeons (*Geophaps scripta scripta*) (Vulnerable under the NC Act and EPBC Act) were observed adjacent to the Study area and personal communications with local landholders indicate that they are a common occurrence in the Locality (refer to Appendix E). The Short-beaked Echidna (*Tachyglossus aculeatus*) (Special Least Concern under the NC Act) was also recorded during the field surveys. An additional eight threatened fauna species listed under the NC Act have been assessed as having a moderate to high likelihood of occurrence and as such, have the potential to occur within the Study area despite not having been recorded. These species are outlined in Table 10.1 with the full likelihood of occurrence assessment presented in Appendix E.

Table 10.1 Field-verified likelihood of occurrence assessment for NC Act threatened fauna species within the Study area

Scientific name	Common name	NC Act	EPBC Act	Likelihood of occurrence within the Study area
Birds				
<i>Apus pacificus</i>	Fork-tailed Swift	SLC	M, Ma	Moderate: The species may fly over the Study area. It is almost exclusively aerial, therefore unlikely to utilise terrestrial habitat. As the species breeds outside of Australia, breeding habitat does not occur within the Study area. Species records on ALA in the Locality.
<i>Geophaps scripta scripta</i>	Squatter Pigeon (Southern Subspecies)	V	V	Recorded: Potential breeding, foraging, and roosting habitat is present within the Study area. The species is routinely observed within the Study area by landholders and was also recorded during the field surveys adjacent to the Study area. Previous records exist within 5 km of the Study area.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	V, M, Ma	Moderate: The species does not breed in Australia and as such, no breeding habitat is present. The species is almost exclusively aerial and forages midair at higher altitudes. Species records on ALA in the Locality. A flock of 35 birds and two lone individuals were recorded during surveys for the adjacent Banana Range Wind Farm (NGH 2019). The species was not recorded during ecological surveys for other adjacent projects Theodore Wind Farm (ERM 2024) or Dawson Wind Farm (GreenTape 2025).

Scientific name	Common name	NC Act	EPBC Act	Likelihood of occurrence within the Study area
Mammals				
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Moderate: Potential habitat is present within the Study area, within Ironbark woodland and adjacent creek lines directly adjacent to Belmont State Forest. Species requires large areas of contiguous vegetation, preferring a shrubby understorey, therefore the amount of preferred habitat within the Study area is limited for this species. Species records in the Locality, with three recent (2022) records near Upper Dawson approx. 180 km south-west, and three records (2014 and 2002) within Expedition National Park approximately 150 km south-west. Suitable habitat recorded within the proposed Dawson Wind Farm, located within the Study area adjacent to Belmont State Forest (GreenTape 2025).
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	E	Moderate: Potential habitat is present within the Study area. Recent records within approximately 10 km of Study area, with 14 individuals recorded during the Theodore Wind Farm surveys (ERM 2024a). Hollow-bearing trees were encountered infrequently within the Study area and are typically not at densities required by the species, however, presence and use as part of a larger home range cannot be discounted.
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	V	Moderate: Potential habitat is present within the Study area. Species records far afield (60–80 km from Study area) at Kroombit Tops National Park, Theodore State Forest, and Presho Forest Reserve. Theodore Wind Farm located directly to the south of the Study area contains field verified suitable habitat for the species (ERM 2024a).
<i>Phascolarctos cinereus</i>	Koala (combined Qld, NSW, ACT)	E	E	Moderate: Potential habitat mapped within the Study area, but there are limited recent records in the Locality (10 km search area from Study area), suggesting the habitats are not preferred and/or threatening process are substantial. Scat was recorded in 2021 by GreenTape (2025) during Dawson Wind Farm surveys approximately 5 km from the Study area. Scat also recorded by ERM (2024a) during Theodore Wind Farm surveys approximately 30 km from the southernmost point (Castle Creek Substation) of the Study area. Recent records at Hefferson State Forest (40 km southeast of Study area), and Thangool (35 km east of Study area) (ALA 2025). Older species record (2011) 4 km west of the Study area just south of Castle Creek (ALA 2025).
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	SLC	-	Recorded: Suitable habitat is present within the Study area. Recorded during field surveys.
Reptiles				
<i>Acanthophis antarcticus</i>	Common Death Adder	V	-	Moderate: Potentially suitable habitat recorded within the Study area. Species records in the Locality.
<i>Strophurus taenicauda</i>	Golden-Tailed Gecko	NT	-	High: Suitable habitat is present within the Study area. Species records on ALA in the Locality at Theodore, Isla George National Park, and Castle Creek.

Table key: E = Endangered, V = Vulnerable, NT = Near Threatened, M = Migratory, Ma = Marine, SLC = Special Least Concern

10.3.2 Habitat assessment

The Study area is comprised of nine different habitat types. A summary of the field-verified fauna habitats within the Study area, corresponding vegetation communities, and relevant threatened species supported by these habitats, are presented in Table 10.2. Full descriptions of these habitat types are provided in Section 6 of the Ecological Assessment Report (MID) (Appendix E). It should be noted that aerial species such as the Fork-tailed Swift (*Apus pacificus*) and the White-throated Needletail (*Hirundapus caudacutus*) were not assigned a habitat type as they are unlikely to utilise habitat that may be potentially impacted by the Project. While species were broadly assigned to a habitat in Table 10.2, the species may only occur in parts of the listed habitat type, depending on the presence of required microhabitat throughout the habitat area.

The field-verified fauna habitats within the Study area are illustrated on Figure 10.1.

Table 10.2 Field-verified habitat assessment and corresponding vegetation communities within the Study area

Fauna habitat	Regional ecosystem and vegetation community description	Relevant NC Act threatened species	Total in Study area (ha)
Brigalow open forest	11.3.1 – <i>Acacia harpophylla</i> open forest on alluvial plains 11.12.21 – <i>Acacia harpophylla</i> open forest on undulating igneous lower slopes	— Common Death Adder — Corben's Long-eared Bat — Golden-tailed Gecko — Koala — Short-beaked Echidna — Squatter Pigeon	43.3
Eucalypt riparian and floodplain woodlands	11.3.4 – <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains 11.3.4a – <i>Blakella tessellaris</i> (prev. <i>Corymbia tessellaris</i>) woodland on alluvial terraces 11.3.25 – <i>Eucalyptus camaldulensis</i> woodland with <i>Melaleuca</i> spp. on fringing banks HVR 11.3.25 – HVR <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	— Corben's Long-eared Bat — Common Death Adder — Greater Glider — Koala — Short-beaked Echidna — Squatter Pigeon — Yellow-bellied Glider	45.9
Melaleuca riparian open forest with vine thicket understorey	11.3.25d – <i>Melaleuca bracteata</i> open forest with vine thicket understorey on fringing alluvium and levees	— Common Death Adder — Corben's long-eared Bat — Greater Glider — Koala — Short-beaked Echidna	62.0
Ironbark woodland on floodplains and rocky hills	11.3.6 – <i>Eucalyptus melanophloia</i> woodland on alluvial plains 11.12.1 – <i>Eucalyptus crebra</i> woodland with <i>Corymbia erythrophloia</i> on igneous hills HVR 11.12.1 – Sparse open <i>Eucalyptus crebra</i> woodland on volcanic hills 11.12.2 – <i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills HVR 11.12.2 – HVR <i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	— Corben's Long-eared Bat — Golden-tailed Gecko — Greater Glider — Koala — Short-beaked Echidna — Squatter Pigeon — Yellow-bellied Glider	477.5

Fauna habitat	Regional ecosystem and vegetation community description	Relevant NC Act threatened species	Total in Study area (ha)
Semi-evergreen vine thicket	11.12.4 – Semi-evergreen vine thicket on rocky igneous slopes HVR 11.12.4 – HVR Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	— Common Death Adder — Corben's Long-eared Bat — Short-beaked Echidna	7.9
Regrowth Wilga woodland	Non-remnant – Regrowth Brigalow woodland species on depressions	— Koala — Short-beaked Echidna — Squatter Pigeon	11.0
Regrowth ironbark woodland	Non-remnant – Low <i>Eucalyptus crebra</i> regrowth	— Koala — Short-beaked Echidna — Squatter Pigeon	147.2
Non-remnant regrowth on alluvium	Non-remnant – Degraded alluvial woodland	— Koala — Squatter Pigeon	122.0
Pasture grassland with scattered eucalypts	Non-remnant – Mixed woody grassland	— Koala — Squatter Pigeon	4986.1
Water	Non-remnant – water	Nil	7.3
Cleared areas	Non remnant – cleared hardstand	Nil	1.7
Total (rounded)			5,911.9

10.3.3 Habitat modelling

Habitat modelling criteria for listed fauna species with a moderate or higher likelihood of occurrence within the Study area is presented in Table 10.3.

Table 10.3 Habitat modelling criteria for NC Act threatened fauna species within the Study area

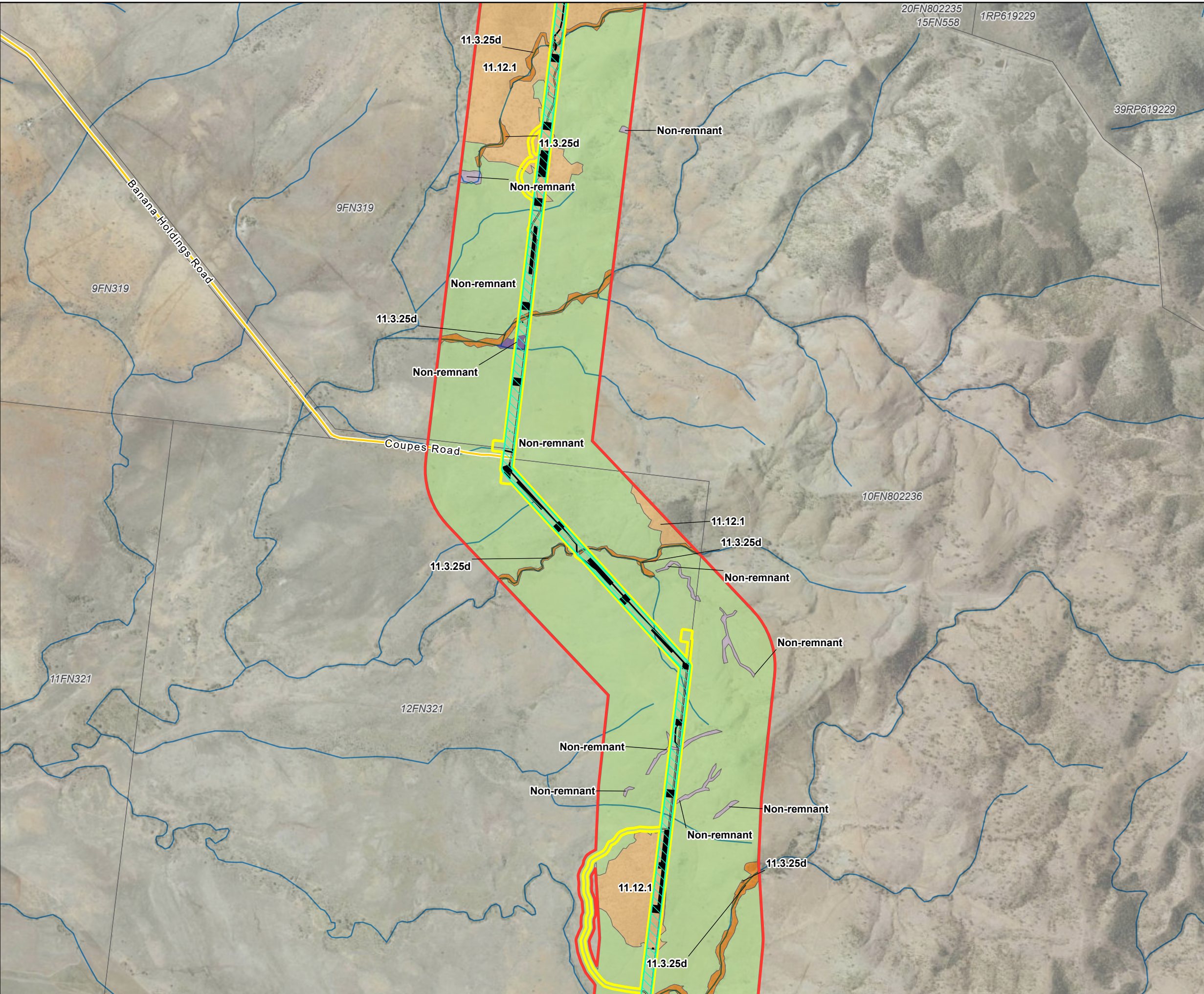
Species	Habitat type	Vegetation community, habitat description, and criteria	Study area (ha)
Birds			
Squatter Pigeon (southern) <i>Geophaps scripta scripta</i>	Breeding	Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Acacia</i> or <i>Callitris</i> species, on sandy or gravelly soils with patchy perennial tussock grasses or a mix of perennial tussock grasses and low shrubs and forbs within 1 km of a suitable waterbody with gently sloping banks (including but not limited to areas mapped as Queensland land zones 3, 5 or 7). Breeding habitat is also suitable for foraging and roosting. Regional ecosystems within Study area include 11.3.1, 11.3.4, 11.3.4a, 11.3.6, 11.3.25, HVR 11.3.25 and 11.3.25d	61.5
	Foraging and roosting	Any remnant or regrowth open-forest to sparse, open-woodland or scrub dominated by <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Acacia</i> or <i>Callitris</i> species, on sandy or gravelly soils with patchy perennial tussock grasses or a mix of perennial tussock grasses and low shrubs and forbs within 1–3 km from permanent and seasonal water (including but not limited to areas mapped as Queensland land zones 3, 5 or 7). Regional ecosystems within Study area include 11.3.6 and 11.3.25	15.2
	Dispersal	Any remnant, regrowth, or non-remnant forest or woodland occurring between patches of foraging or breeding habitat that facilitates movement between patches of foraging habitat, breeding habitat and/or waterbodies, and areas of cleared land. Regional ecosystems within Study area include degraded alluvial woodland, regrowth Brigalow woodland species on depressions, and mixed woody grassland. Regional ecosystems within Study area include 11.12.1, 11.12.2, 11.12.21, 11.3.25d, HVR 11.12.1 and HVR 11.12.2.	5,818.4
	Total		5,895.1
Mammals			
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	Roosting and foraging	Extensive stands of inland vegetation including <i>Eucalypt</i> and <i>Brigalow</i> woodlands; and hollow bearing trees and/or loose bark abundant. Mapping rules: Contiguous vegetation with a patch size >500 ha. Regional ecosystems within Study area include 11.12.1, 11.12.4, 11.3.25, and 11.3.25d	146.8
	Total		146.8

Species	Habitat type	Vegetation community, habitat description, and criteria	Study area (ha)
Short-beaked Echidna <i>Tachyglossus aculeatus</i>	Breeding, foraging, and dispersal	Vegetation communities supporting ground shelter, suitable denning habitat, and an abundance of microhabitat for prey species groups ants and termites. Regional ecosystems within the Study area include 11.3.1, 11.3.4, 11.3.4a, 11.3.6, 11.3.25, 11.3.25d, 11.12.1, 11.12.2, 11.12.4, 11.12.21, HVR 11.12.1, HVR 11.12.2, HVR 11.12.4, Regrowth Brigalow woodland species on depressions, and Low <i>Eucalyptus crebra</i> regrowth	794.7
Total			794.7
Greater Glider (southern and central) <i>Petauroides volans</i>	Denning and foraging	<i>Remnant vegetation:</i> <i>Eucalypt forests and woodlands in Queensland REs considered habitat or potential habitat as per the Species Specific Guidance – Greater Glider habitats in Queensland containing trees with a DBH greater than 30 cm (used as a proxy for hollow-bearing trees).</i> <i>(Note literature states >30cm DBH preferentially selected for foraging (Eyre et al 2022) and >50cm DBH for denning, as more likely to contain suitable hollows for sheltering).</i> <i>Mapping Rules: Habitat patch is large (>50ha) and connected with a low level of fragmentation (<100m distance, including connected adjacent habitats outside Study area).</i> Denning habitat is also suitable for foraging. Regional ecosystems within Study area includes 11.3.4, 11.3.4a, and 11.3.25	33.8
	Potential future denning, foraging, and dispersal	<i>Regrowth vegetation:</i> <i>Eucalypt forest and woodland where known important tree species for foraging are dominant/co-dominant</i> <i>AND</i> <i>in Queensland REs considered habitat or potential habitat as per the Species Specific Guidance – Greater Glider habitats in Queensland</i> <i>AND</i> <i>where the trees present do not have a DBH greater than 30 cm.</i> Regional ecosystems within Study area include 11.3.6 and HVR 11.3.25	9.6
Total			43.4

Species	Habitat type	Vegetation community, habitat description, and criteria	Study area (ha)
Yellow-bellied Glider <i>Petaurus australis australis</i>	Denning and foraging	<i>As the species is typically associated with remnant/mature woodlands of the genera Eucalyptus and Corymbia due to these habitats containing large, hollow-bearing, sap trees (Eyre et al. 2022; Kavanagh & Lambert, 1990), all remnant REs which contain known sap trees utilised by yellow-bellied gliders, including E. tereticornis, E. moluccana and C. citriodora (Eyre & Goldingay 2005), as well as REs which contain live hollow-bearing trees (additional E. crebra), comprising intact and connected patches</i> Regional ecosystems within Study area include 11.3.4, 11.3.4a, 11.3.25, and HVR 11.3.25	34.0
	Dispersal	Connected and non-fragmented remnant Eucalypt woodland to forest that is connected to denning and/or foraging habitat. Regional ecosystems within Study area include 11.3.6, 11.12.1 and non-remnant vegetation.	37.8
	Total		71.8
Koala <i>Phascolarctos cinereus</i>	Climate refugia (dry season habitat)	<i>Remnant or regrowth: Eucalypt forests or woodlands on drainage lines or riparian zones that are resilient to drying conditions, likely to provide a cooler refuge during periods of bushfire and heatwaves, including but not limited to regional ecosystems on land zone 3.</i> All areas of climate refugia within the Study area are also suitable for breeding and foraging. The climate refugia (dry season habitat) is represented within Study area by REs 11.3.1, 11.3.4, 11.3.4a, 11.3.6, 11.3.25, 11.3.25d, and HVR 11.3.25.	138.1
	Breeding and foraging	<i>All remnant and high-value regrowth forest or woodland containing species that are locally important koala food and habitat trees (trees of the genus Eucalyptus, Corymbia and Angophora).</i> Regional ecosystems within Study area include 11.12.1, HVR 11.12.1, 11.12.2, HVR 11.12.2 and 11.12.21	489.1
	Dispersal	<i>Shrublands or grasslands with emergent koala food trees, shelter or paddock trees located in areas that provide corridors for movement and connectivity to areas that support koala lifecycle requirements.</i> Regional ecosystems and vegetation communities within the Study area include non-remnant degraded alluvial woodland, low regrowth <i>E. crebra</i> woodland, mixed woody grassland, and regrowth Wilga woodland.	5,267.9
	Total		5895.1

Species	Habitat type	Vegetation community, habitat description, and criteria	Study area (ha)
Reptiles			
Common Death Adder <i>Acanthophis antarcticus</i>	Breeding, foraging, and dispersal	Vegetation communities containing a dense leaf litter layer and other sheltering microhabitat such as low dense shrubs and coarse woody debris is abundant. Regional ecosystems within the Study area include 11.3.1, 11.3.25d, 11.12.4, HVR 11.12.4, and 11.12.21.	113.2
Total			113.2
Golden-tailed Gecko <i>Strophurus taenicauda</i>	Breeding, foraging, and dispersal	Brigalow and ironbark dominated communities containing loose/decorticating bark microhabitat. Regional ecosystems within the Study area include 11.3.1 11.3.6, 11.12.1, 11.12.2, 11.12.21, HVR 11.12.1, HVR 11.12.2, and HVR 11.12.21.	520.8
Total			520.8

Within the above habitat descriptions, ‘Eucalypt’ as a broad definition refers to Myrtaceous trees within the genera *Angophora*, *Blakella*, *Corymbia*, *Eucalyptus*, *Lophostemon*, and *Melaleuca*.



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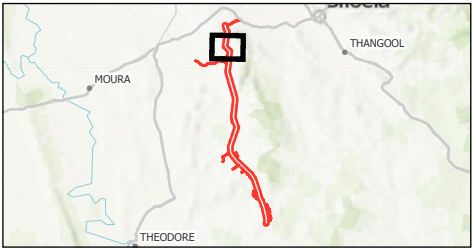
Figure 10.1
Field Verified Fauna Habitat

Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre

Field Verified Fauna Habitat

- Pasture grassland with scattered eucalypts
- Ironbark woodland on floodplains and rocky hills
- Melaleuca riparian open forest with vine ticket understorey
- Non-remnant regrowth on alluvium
- Regrowth brigalow woodland



0 100 200 300 400 500 600 700 800 900 1,000 1,100 1,200 1,300
Metre

Coordinate system: GDA2020 MGA Zone 56
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Figure 10.1
Field Verified Fauna Habitat

Page 3 of 11

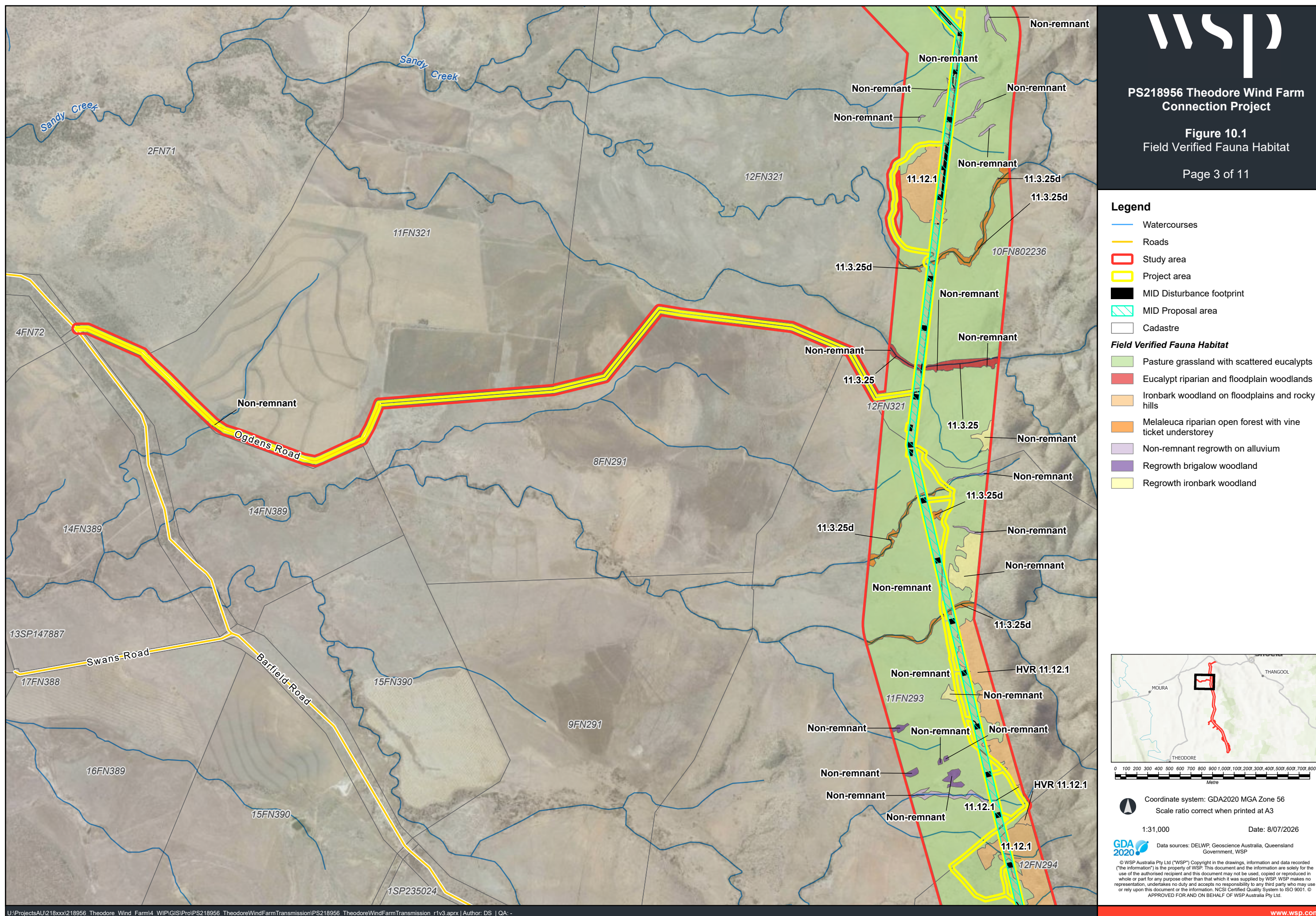
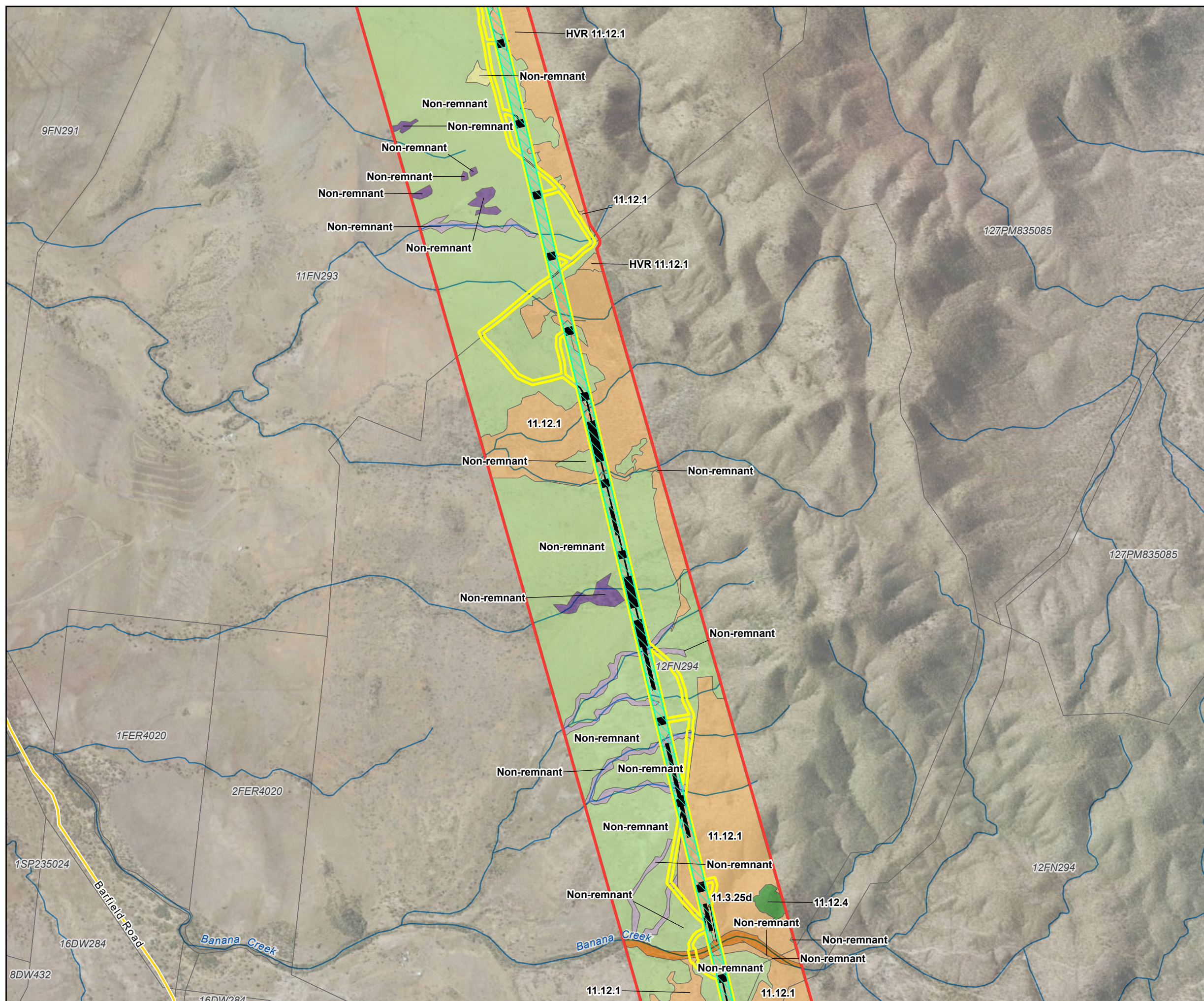




Figure 10.1
Field Verified Fauna Habitat

Page 4 of 11

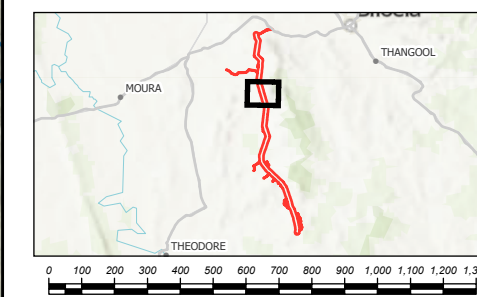


Legend

-  Watercourses
-  Roads
-  Study area
-  Project area
-  MID Disturbance footprint
-  MID Proposal area
-  Cadastre

Field Verified Fauna Habitat

-  Pasture grassland with scattered eucalypts
-  Semi-evergreen vine thicket
-  Ironbark woodland on floodplains and rocky hills
-  Melaleuca riparian open forest with vine ticket understorey
-  Non-remnant regrowth on alluvium
-  Regrowth brigalow woodland
-  Regrowth ironbark woodland



Coordinate system: GDA2020 MGA Zone 56
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1:23,000 Date: 8/07/2026



Data sources: DELWP, Geoscience Australia, Queensland Government, WSP

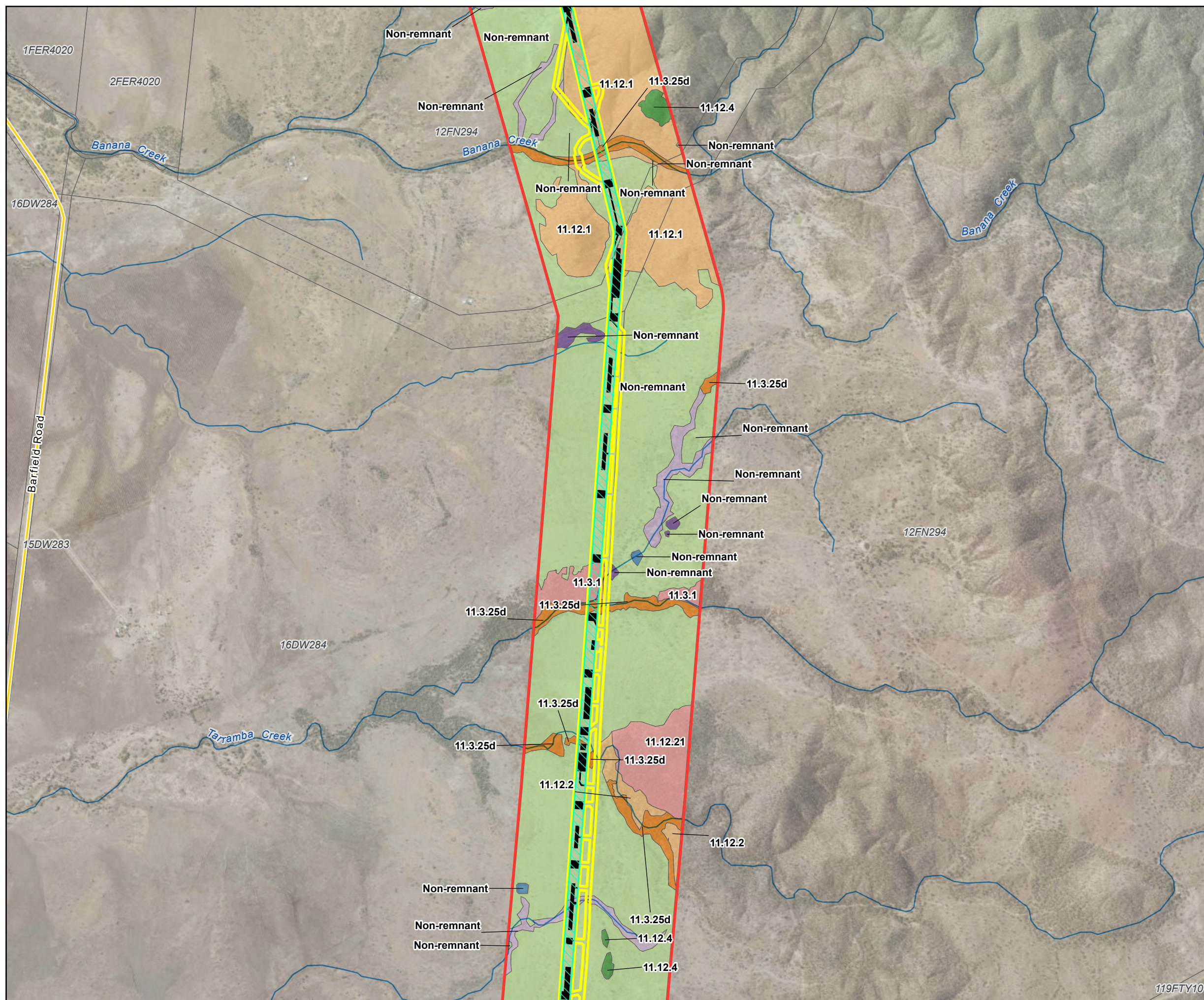
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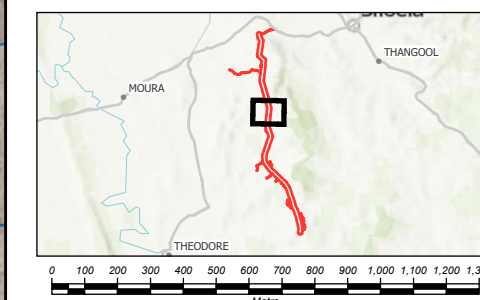
Figure 10.1
Field Verified Fauna Habitat

Page 5 of 11



Legend

-
- Watercourses
 — Roads
 Study area
 Project area
 MID Disturbance footprint
 MID Proposal area
 Cadastre
- Field Verified Fauna Habitat**
- Farm dam
 - Pasture grassland with scattered eucalypts
 - Semi-evergreen vine thicket
 - Brigalow open forest
 - Ironbark woodland on floodplains and rocky hills
 - Melaleuca riparian open forest with vine ticket understorey
 - Non-remnant regrowth on alluvium
 - Regrowth brigalow woodland



Coordinate system: GDA2020 MGA Zone 56
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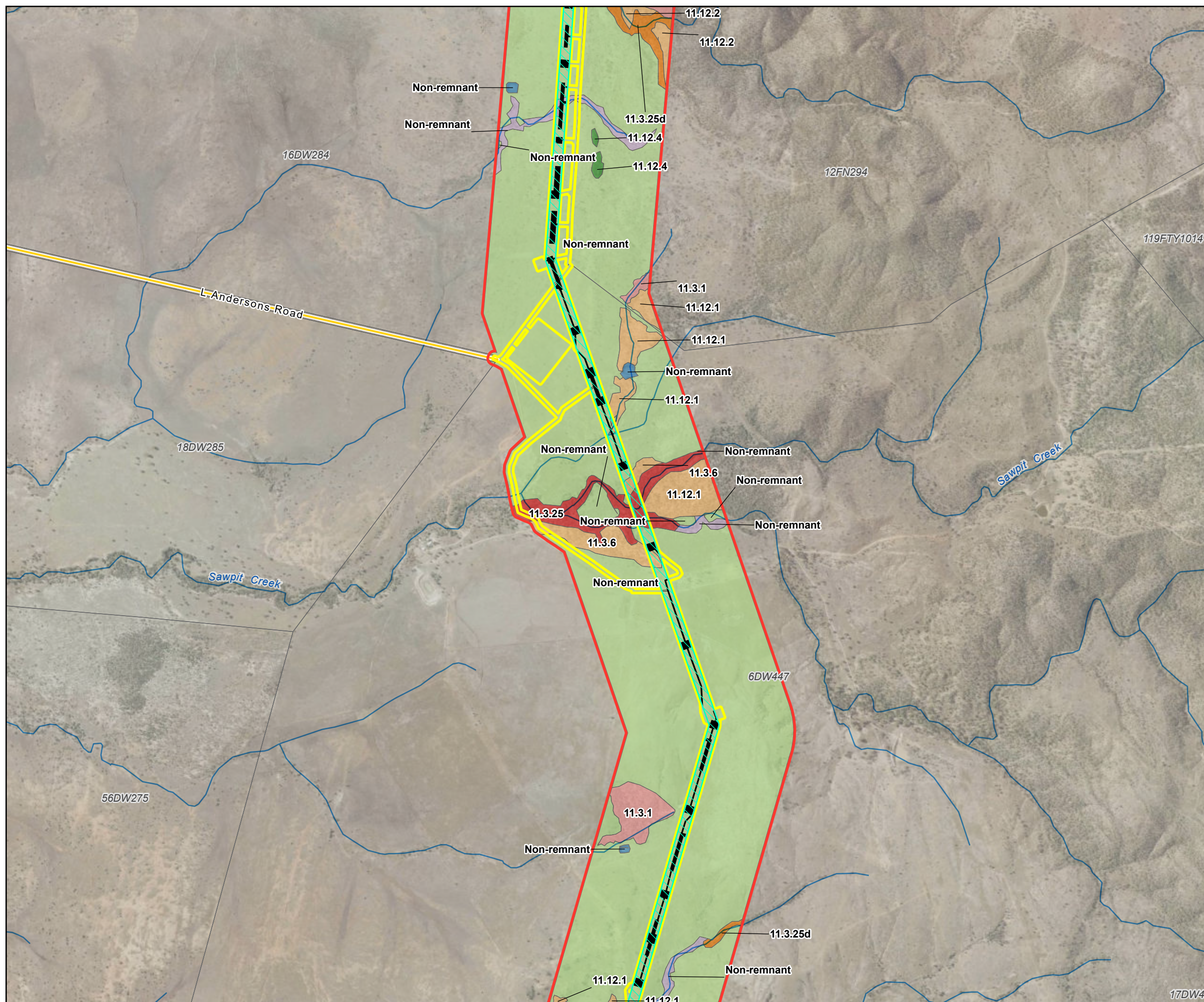
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Figure 10.1
Field Verified Fauna Habitat

Page 6 of 11

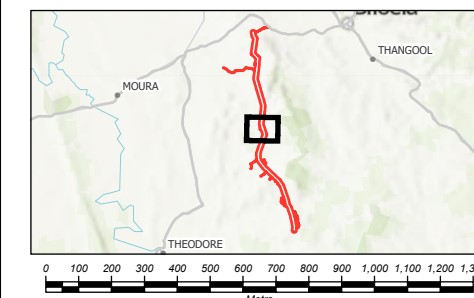


Legend

-  Watercourses
-  Roads
-  Study area
-  Project area
-  MID Disturbance footprint
-  MID Proposal area
-  Cadastre

Field Verified Fauna Habitat

-  Farm dam
-  Pasture grassland with scattered eucalypts
-  Semi-evergreen vine thicket
-  Brigalow open forest
-  Eucalypt riparian and floodplain woodlands
-  Ironbark woodland on floodplains and rocky hills
-  Melaleuca riparian open forest with vine ticket understorey
-  Non-remnant regrowth on alluvium



Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

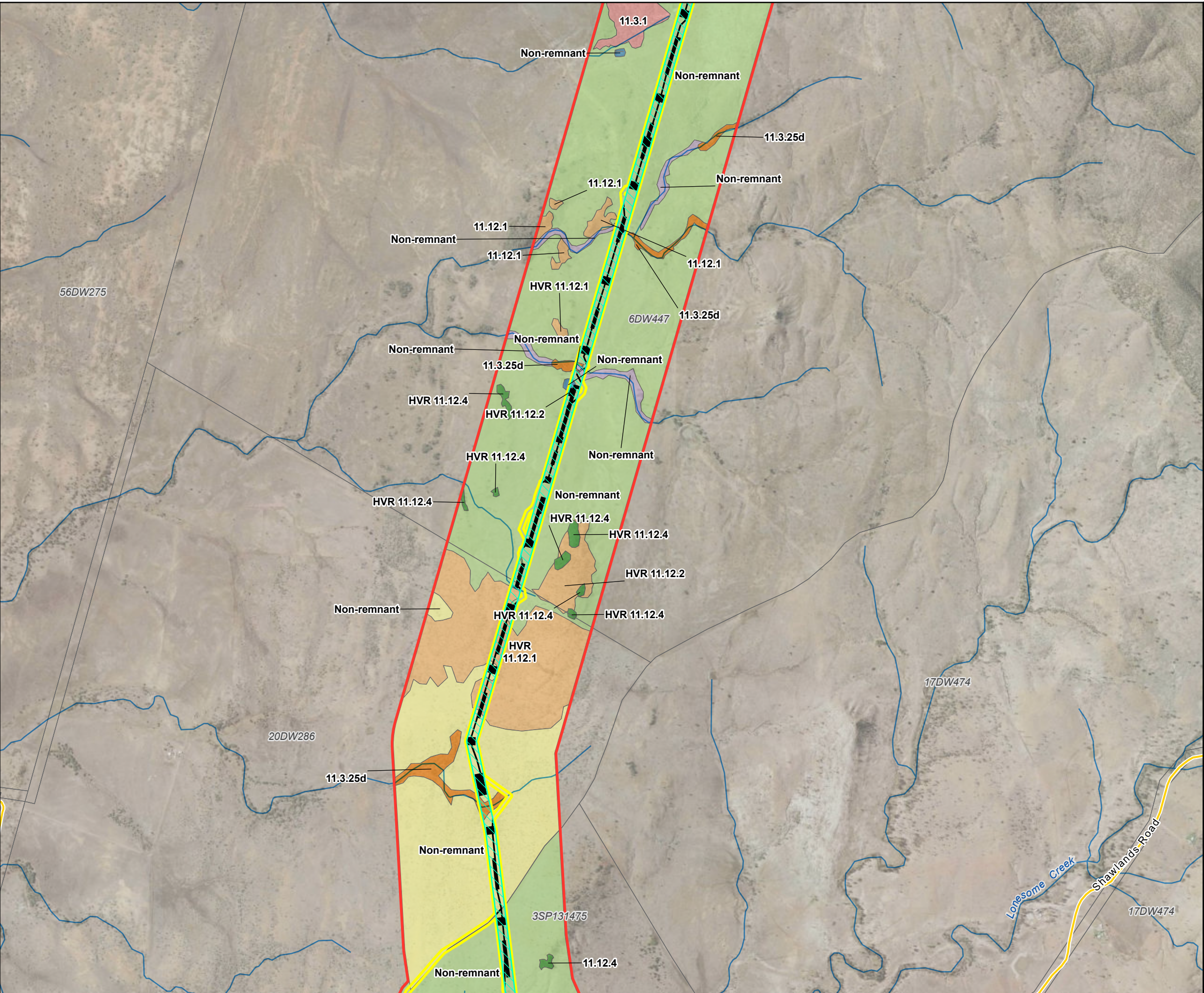
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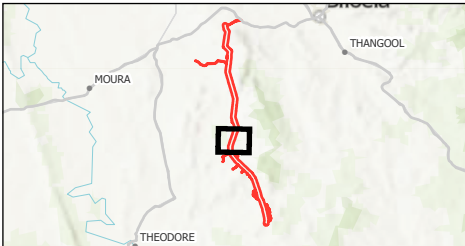
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Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre
- Field Verified Fauna Habitat**
 - Farm dam
 - Pasture grassland with scattered eucalypts
 - Semi-evergreen vine thicket
 - Brigalow open forest
 - Ironbark woodland on floodplains and rocky hills
 - Melaleuca riparian open forest with vine ticket understorey
 - Non-remnant regrowth on alluvium
 - Regrowth ironbark woodland



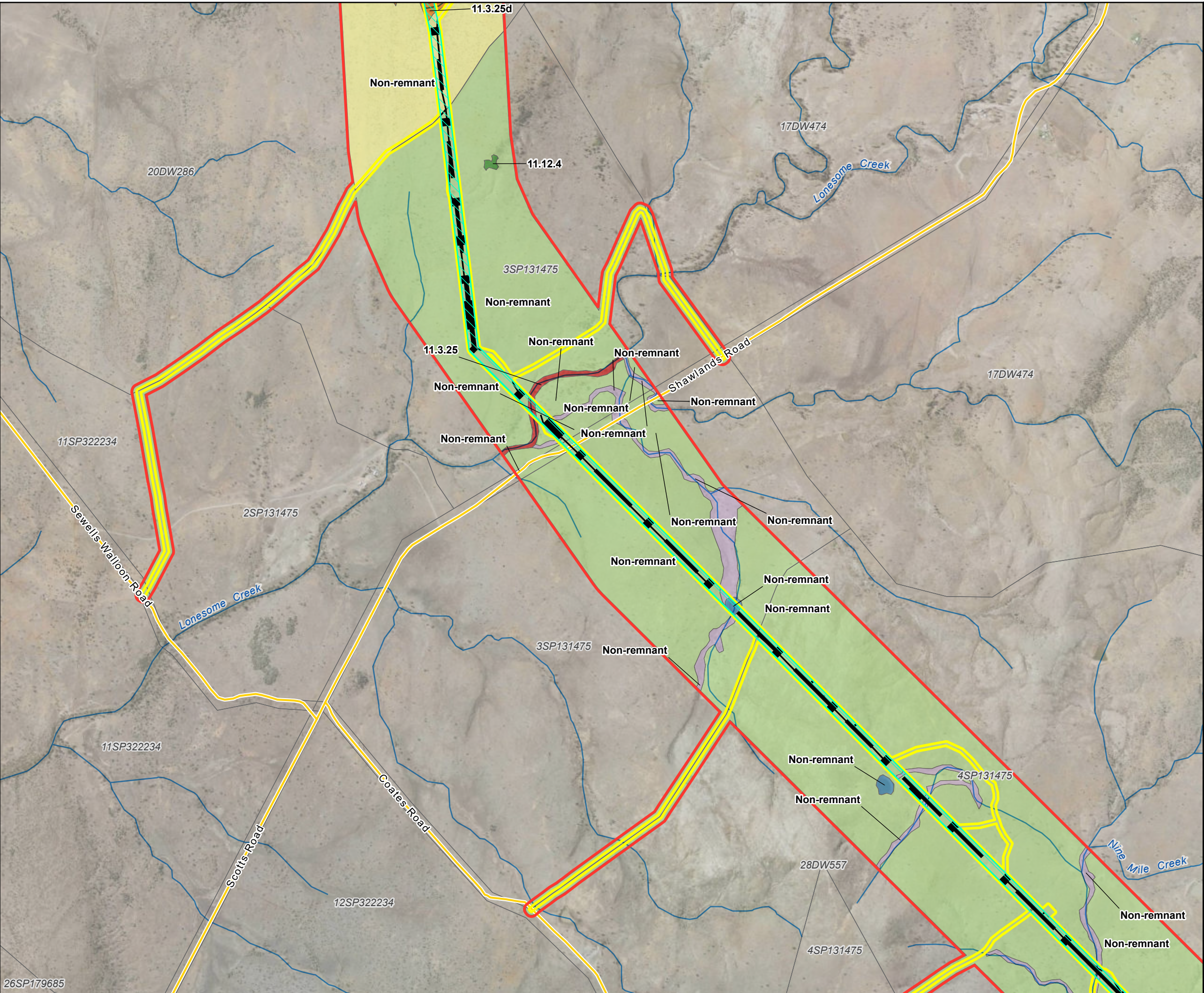
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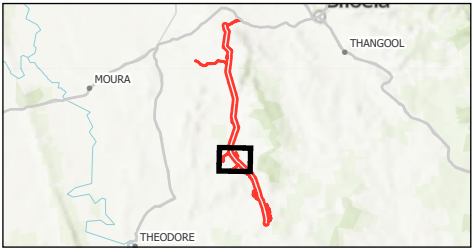
PS218956 Theodore Wind Farm
Connection Project

Figure 10.1
Field Verified Fauna Habitat



Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre
- Field Verified Fauna Habitat**
 - Cleared hardstand
 - Farm dam
 - Pasture grassland with scattered eucalypts
 - Semi-evergreen vine thicket
 - Eucalypt riparian and floodplain woodlands
 - Melaleuca riparian open forest with vine ticket understorey
 - Non-remnant regrowth on alluvium
 - Regrowth ironbark woodland



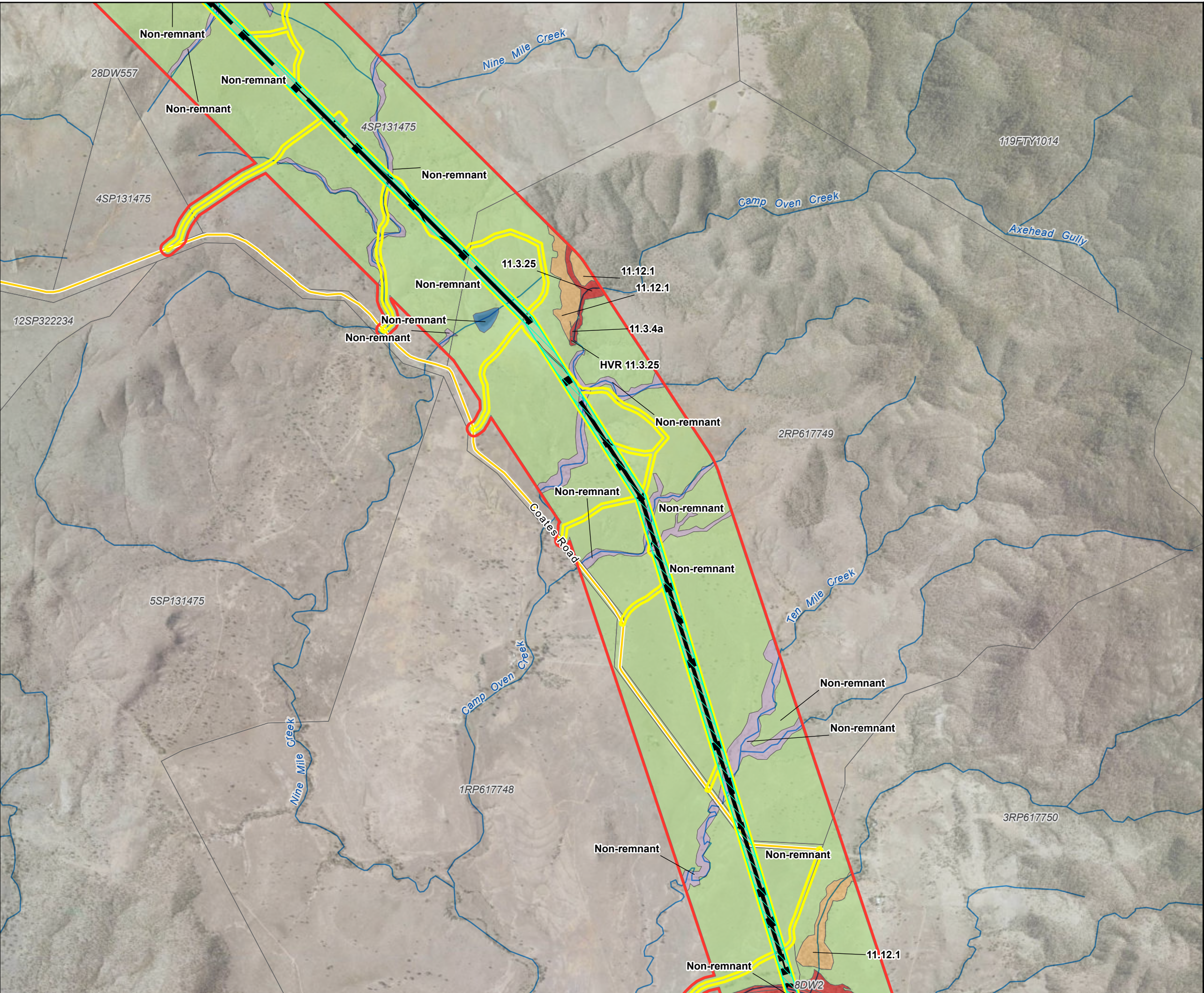
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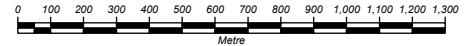
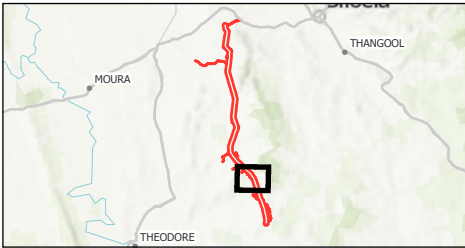
PS218956 Theodore Wind Farm
Connection Project

Figure 10.1
Field Verified Fauna Habitat



Legend

- Watercourses
- Roads
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Cadastre
- Field Verified Fauna Habitat**
 - Farm dam
 - Pasture grassland with scattered eucalypts
 - Eucalypt riparian and floodplain woodlands
 - Ironbark woodland on floodplains and rocky hills
 - Non-remnant regrowth on alluvium



Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3

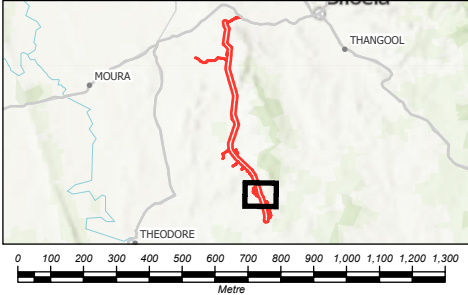
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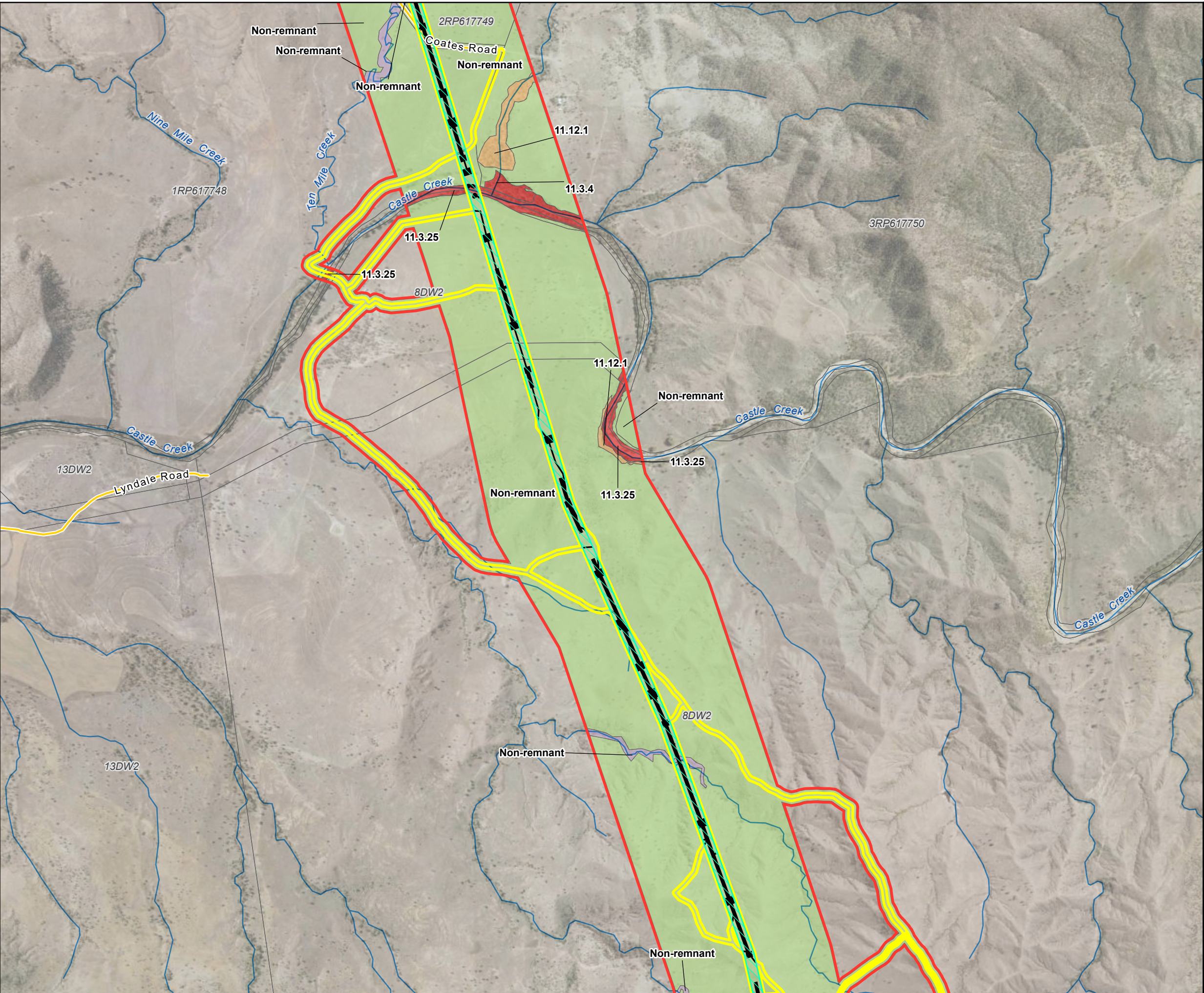
Legend

- Watercourses
 - Roads
 - Study area
 - Project area
 - MID Disturbance footprint
 - MID Proposal area
 - Cadastre
- Field Verified Fauna Habitat**
- Pasture grassland with scattered eucalypts
 - Eucalypt riparian and floodplain woodlands
 - Ironbark woodland on floodplains and rocky hills
 - Non-remnant regrowth on alluvium



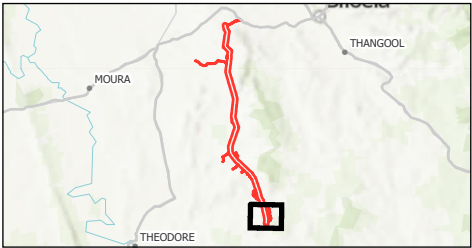
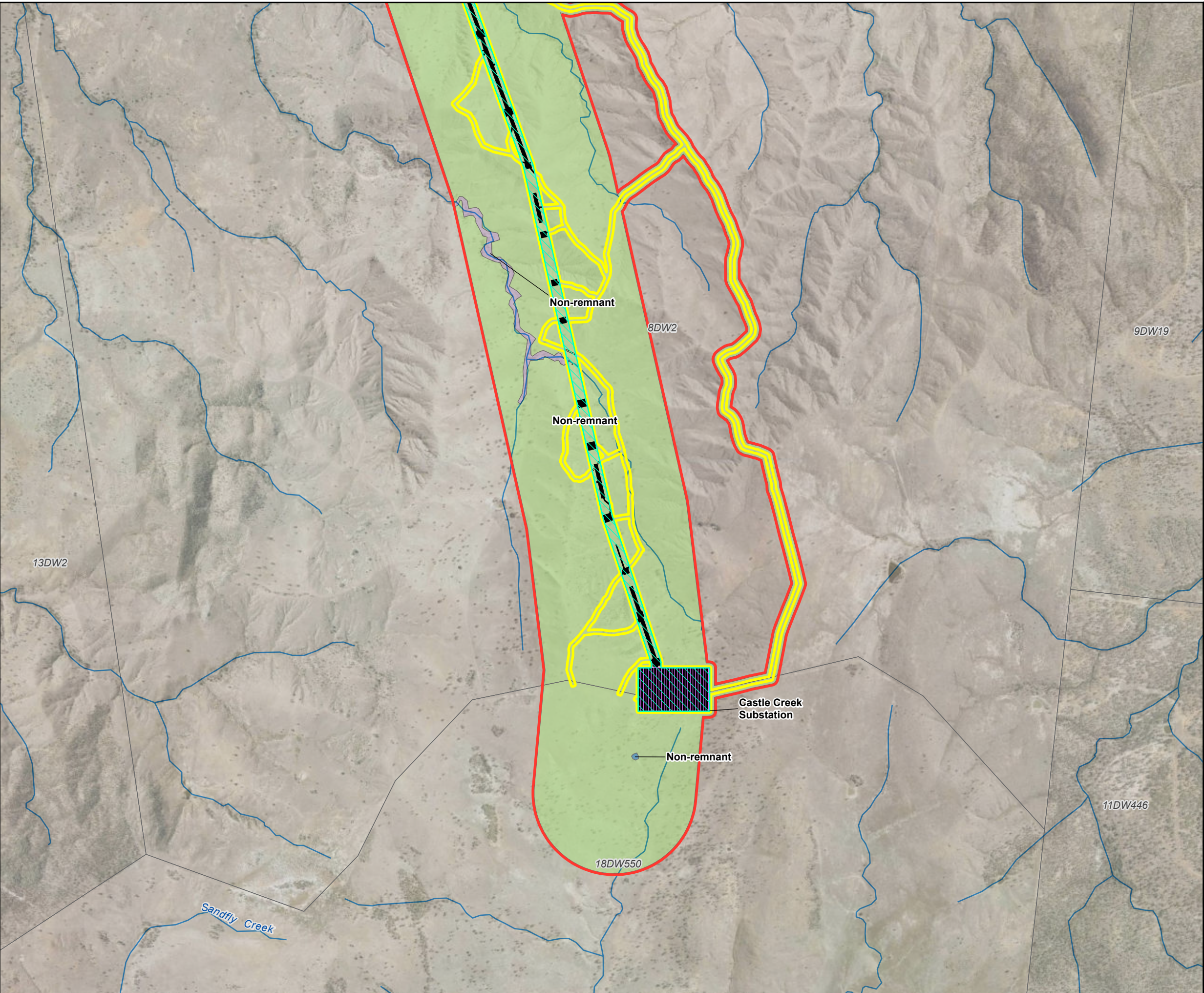
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Legend

- Watercourses
- Study area
- Project area
- MID Disturbance footprint
- MID Proposal area
- Castle Creek Substation
- Cadastre
- Field Verified Fauna Habitat**
 - Farm dam
 - Pasture grassland with scattered eucalypts
 - Non-remnant regrowth on alluvium



Coordinate system: GDA2020 MGA Zone 56
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10.4 Potential impacts

10.4.1 Project-related impacts

The following sections describe the potential Project-related impacts to fauna species and habitats. Both direct and indirect Project-related impacts from construction and operational and maintenance activities have been identified. Measures to avoid, minimise, or manage impacts are also discussed.

10.4.2 Construction phase impacts

The most significant impacts on fauna species and habitats values will occur during the construction phase of the Project, when vegetation clearing will occur.

10.4.2.1 Habitat loss

The MID Disturbance footprint covers approximately 113.5 ha which includes a variety of habitats for a range of species including some listed under the NC Act (and/or EPBC Act) as well as a diverse assemblage of common flora and fauna species. The removal of habitat may displace native fauna into adjacent habitats and place some species at risk of direct Project-related impacts and potential mortality. Important microhabitat features removed because of vegetation clearing include:

- groundcover containing coarse woody debris, dense vegetation and leaf litter suitable for foraging and sheltering by reptiles, amphibians, and terrestrial mammals
- canopy trees and dense shrub layers suitable for woodland bird nesting
- large trees suitable for nesting habitat for arboreal mammals and birds
- native trees containing fruits, flowers, nectar, and sap providing food for native fauna species
- vegetation around ephemeral waterways and habitat suitable for semi-aquatic species, bird species, and some mammals.

The extent of habitats for threatened fauna species within the MID Disturbance footprint is presented in Figure 10.1. The extent of habitats for threatened fauna species listed under the NC Act (that are not also listed under the EPBC Act), with a moderate or higher likelihood of occurring within the MID Disturbance footprint is summarised in Table 10.4. EPBC Act listed species are addressed in Chapter 11 (Matters of National Environmental Significance).

Table 10.4 NC Act (that are also not EPBC Act listed) threatened fauna species habitat within the MID Disturbance footprint

Species	NC Act Status	Habitat type	Species habitat description	Project area (ha)	MID Proposal area (ha)	MID Disturbance footprint (ha)
Mammals						
Short-beaked Echidna <i>Tachyglossus aculeatus</i>	SL	Breeding, foraging and dispersal	— Eucalypt riparian and floodplain woodlands — Melaleuca riparian open forest with vine ticket understorey — Ironbark woodland on floodplains and rocky hills — Regrowth Wilga woodland — Regrowth ironbark woodland	44.9	43.1	10.5
		Total		44.9	43.1	10.5

Species	NC Act Status	Habitat type	Species habitat description	Project area (ha)	MID Proposal area (ha)	MID Disturbance footprint (ha)
Reptiles						
Common Death Adder <i>Acanthophs antarcticus</i>	V	Breeding, foraging and dispersal habitat	— Melaleuca riparian open forest with vine ticket understorey — Semi-evergreen vine thicket	4.2	4.1	0.1
Total				4.2	4.1	0.1
Golden-tailed Gecko <i>Strophurus taenicauda</i>	NT	Breeding, foraging and dispersal	— Ironbark woodland on floodplains and rocky hills	29.9	29.3	7.4
Total				29.9	29.3	7.4

Table key: V = Vulnerable, SLC = Special Least Concern, NT = Near Threatened

The risk of impact assessment for NC Act listed species is provided in Table 10.5.

The table also presents the result of any significant residual impact assessment undertaken in accordance with the Significant Residual Impact Guidelines (Queensland Government 2014) for NC Act species that are also MNES. The full significant residual impact assessments are provided in Appendix E.

Table 10.5 NC Act threatened fauna species, recorded or with a moderate or high likelihood of occurring in the Disturbance footprint, and risk of impact assessment

Scientific name	Common name	NC Act	Likelihood of occurrence	Risk of impact
Birds				
<i>Apus pacificus</i>	Fork-tailed Swift	SLC	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance). The species may fly over the EPBC referral footprint. It is almost exclusively aerial and unlikely to utilise terrestrial habitat within the EPBC referral Disturbance footprint. The species is at low risk of potential Project-related impacts. An EPBC Act significant impact assessment is not required.
<i>Geophaps scripta scripta</i>	Squatter Pigeon (Southern)	V	Recorded	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance). An EPBC Act significant impact assessment has been undertaken. Based on the availability of suitable habitat within and surrounding the Study area and the high mobility of the species, the assessment determined that the Project will not result in a significant impact on the Squatter Pigeon within the meaning of the EPBC Act Significant Impact Guidelines.

Scientific name	Common name	NC Act	Likelihood of occurrence	Risk of impact
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance)). The species may fly over the EPBC referral footprint. It is almost exclusively aerial and unlikely to utilise terrestrial habitat within the EPBC referral footprint. The species is at low risk of potential Project-related impacts. An EPBC Act significant impact assessment is not required.
Mammals				
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance)). An EPBC Act significant impact assessment has been undertaken. Based on the availability of suitable habitat surrounding the EPBC referral footprint and the mobility of the species, the assessment determined that the Project will not result in a significant impact on Corben's Long-eared Bat within the meaning of the EPBC Act Significant Impact Guidelines.
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance)). An EPBC Act significant impact assessment has been undertaken. Given the relatively low quality of Greater Glider microhabitat, lack of evidence of the species within the EPBC referral footprint, and high availability of suitable habitat surrounding the EPBC referral footprint, the assessment determined that the Project will not result in a significant impact on the Greater Glider within the meaning of the EPBC Act Significant Impact Guidelines.
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance)). An EPBC Act significant impact assessment has been undertaken. Given the relatively low quality of Yellow-bellied Glider microhabitat, lack of evidence of the species within the EPBC referral footprint, and high availability of suitable habitat surrounding the EPBC referral footprint, the assessment determined that the Project will not result in a significant impact on the Yellow-bellied Glider within the meaning of the EPBC Act Significant Impact Guidelines.

Scientific name	Common name	NC Act	Likelihood of occurrence	Risk of impact
<i>Phascolarctos cinereus</i>	Koala (combined Qld, NSW, ACT)	E	Moderate	Assessed as a MNES (refer Chapter 11 (Matters of National Environmental Significance). An EPBC Act significant impact assessment has been undertaken. The Project will impact upon viable foraging and breeding habitat (7.2 ha) and climate refugia habitat (0.5 ha), which will lead to an overall reduction of habitat for the species in the Locality. As such, the assessment determined that the Project <u>will not</u> result in a significant impact to the Koala, within the meaning of the EPBC Act Significant Impact Guidelines.
<i>Tachyglossus aculeatus</i>	Short-beaked Echidna	SLC	Recorded	11.2 ha of potentially suitable foraging, breeding, and dispersal habitat will be removed. Whilst this is a relatively large area, this common species is widespread throughout Australia and is a generalist, inhabiting a wide range of habitats. Additionally, the species would likely continue to use the area post-construction. It is unlikely the Project would lead to a significant impact. Furthermore, the Project falls under the MID approval process and is therefore not a prescribed activity listed under Schedule 1 of the EO Regulation. Therefore, Significant Residual Impact Assessments under the EO Act are not required for this species.
Reptiles				
<i>Acanthophis antarcticus</i>	Common Death Adder	V	Moderate	The Project will impact 0.1 ha of foraging, breeding and dispersal habitat that is potentially suitable for the Common Death Adder. At a landscape scale there are large areas of potentially suitable habitat retained within the Study area and a reduction of 0.1 ha is unlikely to significantly impact the species.
<i>Strphurus taenicauda</i>	Golden-tailed Gecko	NT	High	The Project will impact 7.2 ha of foraging, breeding and dispersal habitat that is potentially suitable for the Golden-tailed Gecko. Suitable habitat for the species is abundant in the Study area with 520.3 ha being retained in the Study area. The Golden-tailed Gecko is listed as near threatened under the NC Act and therefore no Significant Residual Impact Assessments are required for this species.

Table key: E = Endangered, V = Vulnerable, SLC = Special Least Concern, NT = Near Threatened

Finalisation of the Project design will consider additional measures which will enable habitat clearing in sensitive environments, particularly riparian areas around creek lines, to be avoided or minimised. Where habitat clearing is unavoidable, clearing activities will be managed in accordance with the measures outlined in the EMP (Appendix D). These include delineating clearing boundaries (work areas) on the ground to prevent unauthorised clearing and vehicle and/or pedestrian traffic access. Environmental Work Plans are to be clearly labelled with the intent and exclusion conditions of the 'no-go' zones and clearing zones. Workers will be made aware of management requirements in induction training and through work instructions.

10.4.2.2 Wildlife interactions

It is possible native fauna could be injured or killed by vegetation clearing, construction activities or vehicle/machinery interactions. There is also the risk that an increase in construction vehicle traffic may potentially impact native species that are diurnal or crepuscular (active at twilight) such as reptiles and macropods. Additionally, during the wet season when the ephemeral drainage lines are periodically inundated with surface water, amphibians, and reptiles are at risk of impact from construction vehicles.

The EMP (Appendix D) measures to reduce the risk of direct mortality to native fauna during construction. These include:

- tampering within an animal breeding place may only be carried out in accordance with a Damage Mitigation Permit or an approved Species Management Program
- prior to commencement of site activities where interactions with native fauna is expected (e.g. vegetation clearing), measures to recover and rehabilitate injured or orphaned native animals unavoidably impacted will be implemented
- a fauna spotter-catcher, who holds a valid Rehabilitation Permit (fauna spotter-catcher), will be engaged to undertake pre-clearing habitat searches and be present during vegetation clearing activities and during any disturbance to habitat features (i.e. trees containing hollows, trees containing nests, hollow logs) to minimise fauna harm
- an authorised carer (holding a valid Rehabilitation Permit (rehabilitation and release a protected animal)) will be engaged to care for and rehabilitate injured or orphaned native animals
- vegetation clearing will be undertaken in a staged and sequential manner, moving away from environments, such as roads, which may potentially cause injury to fleeing fauna
- excavations will be secured to prevent access from native fauna
- vehicles will be restricted to approved and mapped access tracks and only those vehicles required for the safe, efficient and essential construction activities will be allowed in the work area
- construction work hours will be limited to between 6.30 am and 6.30 pm Monday to Sunday (excluding public holidays) unless authorised through an approval or in response to exceptional circumstances including an emergency. Night activities are not expected, and in the event are needed relevant notifications will be provided.
- any unplanned interactions with native fauna or fauna habitat will be immediately reported to Powerlink

Species Management Programs

Specific fauna management measures will include implementing approved Species Management Programs (SMPs) during the construction phase to reduce the risk of direct mortality from the Project.

Low- and High-risk SMPs will be required under the *Nature Conservation (Animals) Regulation 2020* (Animal Regulation) for the Project pre-construction, construction, and post-construction phases. A suitably qualified (holding a DETSI approved Rehabilitation Permit) and experienced fauna spotter-catcher or ecologist will need to be employed for the construction phase of the Project to implement a protocol of best management practices. This should include pre-clearance surveys and the presence of fauna spotter-catchers to minimise the risk of fauna mortality during vegetation clearing.

Species requiring a High-risk SMP include wildlife prescribed as Extinct in the wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Special Least Concern or Least Concern (colonial breeder) under the Animals Regulation. Species recorded or those having a moderate or higher likelihood of having breeding places within the MID Disturbance footprint, and therefore require a high-risk SMP, include:

- Corben's Long-eared Bat
- Golden-tailed Gecko
- Greater Glider
- Least concern (colonial breeder) microbats
- Short beaked Echidna
- Squatter Pigeon
- Yellow-bellied Glider.

It should be noted that although the Project contains Koala habitat, a High-risk SMP is not required for this species, as they do not have a 'habitual breeding place' (e.g. hollow or nest). As such, Koalas are managed under the *Nature Conservation (Koala) Conservation Plan, 2017* (Koala Plan). A fauna spotter-catcher experienced in Koala surveys and management and/or Koala spotting will be required in areas containing Koala habitat, in accordance with the *Nature Conservation (Koala) Conservation Plan 2017*.

10.4.2.3 Impacts to wildlife corridors and connectivity

At present the connectivity identified within the overall landscape provides an availability of fauna movement opportunities. Due to the linear nature of the proposed transmission line, the Project has the potential to increase the fragmentation of remaining wildlife corridors. Clearing of woody vegetation up to 60 m wide in some areas is likely to expose fauna to predators and reduce connectivity for some species (e.g. gliders).

Development of the Project has considered siting the infrastructure within already cleared areas and minimising vegetation clearing wherever possible. Clearing of areas of greatest wildlife connectivity within the Project area, such as riparian corridors along waterways are likely to be largely minimised or avoided. The current design includes, where possible, longer spans over gullies and low-lying areas such as waterways and floodplains. Where the transmission line spans such gullies steep enough that tree clearing within these areas of the easement is not required, the remaining vegetation retains some level of wildlife connectivity. In areas where woody vegetation requires clearing, opportunities for vegetation scalloping have been considered, whereby clearing within the 60 m easement is reduced to 10–30 m.

10.4.2.4 Displacement of native fauna from noise and light generation

Noise and light pollution generated by vehicles, machinery, excavation, and lighting during the construction phase may deter native fauna from utilising areas immediate surrounding the MID Disturbance footprint. Although fauna may be temporarily displaced by noise and/or light generated from clearing during the construction phase, minimal impacts are anticipated post-construction. Similarly, the fauna regularly utilising the roadsides will be somewhat adapted to vehicle noise. The EMP includes appropriate mitigation measures to minimise the risk of excessive noise and light generation and potential displacement of native fauna. These include:

- limiting construction work hours to between 6.30 am and 6.30 pm Monday to Sunday, unless permitted through an approval or in response to exceptional circumstances including an emergency
- selecting appropriate plant and equipment for each task to minimise noise contributions
- ensuring machinery is fitted with appropriate noise attenuation devices and is maintained in accordance with the manufacturer's recommendations
- shutting down equipment generating loud, extraneous (unusual) noise until the source of the noise can be identified and rectified
- scheduling loud noise activities to occur at times to minimise noise nuisance.

10.4.2.5 Waterways

Proposed infrastructure crossing locations may be subject to both the Water Act and Fisheries Act as a regulated watercourse can also constitute a mapped waterway for waterway barrier works.

One major watercourse, Castle Creek (mapped under the Water Act), as well as an additional seven named water features and their tributaries intersect the MID Disturbance footprint.

Waterways provide habitat and fish passage for aquatic and semi aquatic species, including amphibians, fish, and turtles. Several of these water features are mapped as waterways for waterway barrier works (fish passage). Existing waterways are in the upper reaches of the catchment. As such, fish habitat and passages are limited due to the ephemeral nature of the waterways.

While the risk of impact to fish habitat is considered minor, the following mitigation measures will be adopted to avoid and/or minimise impacts:

- structures will be located at least 50 m from waterways, where possible
- previously cleared tracks for existing crossings will be preferentially used to minimise new waterways crossings
- excavation or placing fill in a waterway will be carried out in accordance with the EMP.
- Waterways crossing works will be constructed or upgraded in accordance with the Accepted Development Requirements for Constructing or Raising Waterway Barrier Work (DPI, 2025), and where they cannot be met, a development application will be lodged for approval.

Waterway barrier works are discussed further in Section 7.2.3.

10.4.3 Operational phase

10.4.3.1 Wildlife interactions

Risks to fauna from the operational phase of the Project, include animals climbing and/or nesting in transmission structures and strikes from flying species of fauna connecting with the transmission lines. Transmission lines represent a collision risk to birds, as they occur in open areas where obstacles are not expected and easily blend in with the landscape due to relatively narrow linear profile making them less visible during flight.

Species most at risk during the operational stage include flying-foxes, raptors such as falcons, kites, ospreys, goshawks, and eagles due to their large size and resulting wingspan, as well as large wetland and migratory birds that fly higher and/or for longer distances including a broad range of those in the *Scolopacidae* (i.e. sandpiper) family and the *Pelecaniformes* (i.e. pelicans and egrets) family.

In areas where fauna interactions are likely, fauna-friendly anti-climb barriers are installed on towers. The need for additional mitigation measures (e.g. wire marking, line configuration (number, spacing of wire levels, wire height, and diameter) or habitat modification) will be assessed and determined once the specific Project design layout has been finalised.

11 Matters of National Environmental Significance

Chapter 11 discusses the Matters of National Environmental Significance (MNES) of relevance to the Project. It describes the presence and extent of MNES in relation to the Project, assesses the relevant impacts that the Project will or is likely to have on MNES and the potential significance of impact on each relevant MNES, in accordance with the Matters of National Environmental Significance: Significant impact guidelines 1.1 (Significant Impact Guidelines).

Relevant MNES within the Study area were found to include:

- listed threatened species and communities
- listed migratory species, protected under international agreements.

MNES assessed as being at risk of Project-related impacts were:

- Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable)
- Greater Glider (southern and central) (*Petauroides volans*) (Endangered)
- Koala (combined Queensland, NSW, ACT) (*Phascolarctos cinereus*) (Endangered)
- Squatter Pigeon (southern) (*Geophaps scripta scripta*) (Vulnerable)
- Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) (Vulnerable).

Significant impact assessments determined that the Project would not result in a significant impact to the Squatter Pigeon, Corben's Long-eared Bat, Greater Glider, Yellow-bellied Glider or Koala, within the meaning of the Significant Impact Guidelines. As such, there are no significant Project-related impacts to MNES.

Statutory responsibility for administering and regulating MNES under the EPBC Act now resides with the National Environmental Protection Agency (NEPA). An EPBC Referral was submitted for the Theodore Wind Farm Connection Project (EPBC Ref. No. 2025/10328) and was determined to be a *Not Controlled Action* by the then DCCEEW on 3 December 2025.

The assessment methodology, impact assessment process and reporting requirements applied under the EPBC Act are distinct from those used to assess MSES in Queensland, which support State approval processes, including MIDs. Accordingly, where impacts to MNES are reported in this document, the impact areas are based on the EPBC referral footprint assessed under the Commonwealth referral process. These areas may differ slightly from the impact footprints presented elsewhere in this report for MSES and other State-based assessment purposes.

Reporting impacts using the EPBC referral footprint ensures consistency with the existing EPBC referral and the Commonwealth assessment undertaken by the relevant MNES regulator, while recognising that separate assessment frameworks and reporting requirements apply to State environmental matters associated with the Queensland approval process.

11.1 Matters of National Environmental Significance

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

- World heritage properties
- National heritage places
- wetlands of international importance
- nationally threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mines)
- a water resource, in relation to coal seam gas development and large coal mining development.

Other matters protected under the EPBC Act, include:

- the environment, where actions proposed are on, or will affect Commonwealth land and the environment
- the environment, where Commonwealth agencies are proposing to take an action.

11.1.1 Protected Matters Search Tool results

A search of the EPBC Act Protected Matters Search Tool (PMST) identified the MNES known or predicted to be present within a 10 km search area of the Study area. The PMST database results are summarised in Table 11.1.

Table 11.1 Summary of MNES mapped within the Study area

MNES in PMST search area (10 km radius)	Presence/absence
World Heritage Properties	None
National Heritage Properties	None
Wetlands of International Importance	None
Great Barrier Reef Marine Park	Not present in search area
Commonwealth Marine Area	Not present in search area
Threatened Ecological Communities	
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	Community known to occur within Study area
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Community may occur within Study area
Poplar Box Grassy Woodland on Alluvial Plains	Community likely to occur within Study area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Community likely to occur within Buffer area
Weeping Myall Woodlands	Community likely to occur within Study area
Threatened flora and fauna species	
36 species	Refer Attachment A of Appendix E
Migratory fauna species	
10 species	Refer to Attachment A of Appendix E

11.1.2 Likelihood of occurrence assessments

11.1.2.1 Threatened ecological communities

The PMST returned the following five TECs, listed under the EPBC Act, as having potential to occur within 10 km of the Project area (refer to Table 11.2). An assessment of the likelihood of occurrence for each of these TECs within the Study area has also been provided in Table 11.2.

Table 11.2 Desktop likelihood of occurrence assessment for TECs listed under the EPBC Act

Name	Status	Likelihood of occurring in Study area
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	Endangered	High: State mapped regional ecosystems that potentially correspond to this TEC are mapped within the Study area (RE 11.12.21).
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Low: No state mapped regional ecosystems within the Study area with potential to correspond with the listing advice for this TEC.
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	High: State mapped regional ecosystems that potentially correspond to this TEC are mapped within the Study area (RE 11.3.2).
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Low: No state mapped regional ecosystems within the Study area that could potentially correspond with the listing advice for this TEC.
Weeping Myall Woodlands	Endangered	High: State mapped regional ecosystems that potentially correspond to this TEC are mapped within the Study area (RE 11.3.2).

11.2 Field survey results

11.2.1 Habitat assessment

The Study area is comprised of nine different habitat types. A summary of the field verified fauna habitats within the Study area, corresponding vegetation communities, and relevant MNES threatened species supported by these habitats, are presented in Table 11.3 and discussed in Appendix E.

It should be noted that aerial species such as the Fork-tailed Swift (*Apus pacificus*) and the White-throated Needletail (*Hirundapus caudacutus*) were not assigned a habitat type as they are unlikely to utilise terrestrial habitat that may be potentially impacted by the Project. While species have been broadly assigned to a habitat in Table 11.3, the species may only occur in parts of the listed habitat type, depending on the presence of required microhabitat throughout the habitat area.

The field-verified fauna habitats within the Study area are illustrated on Figure 10.1. Habitat requirements of each MNES threatened species with a moderate or higher likelihood of occurrence within the Study area, are detailed in Table 6.25 of Appendix E, with corresponding habitat mapping presented in Figure 6.2 of Appendix E.

A summary of the threatened fauna likelihood of occurrence assessment is presented in Table 11.5, with the full likelihood of occurrence assessment in Appendix E.

Table 11.3 Field-verified habitat assessments and corresponding vegetation communities within Study area

Fauna habitat	Regional ecosystem and vegetation community description	Relevant MNES threatened species	Total in Study area (ha)
Brigalow open forest	11.3.1 – <i>Acacia harpophylla</i> open forest on alluvial plains 11.12.21 – <i>Acacia harpophylla</i> open forest on undulating igneous lower slopes	— Corben's Long-eared Bat — Koala — Squatter Pigeon	43.3
Eucalypt riparian and floodplain woodlands	11.3.4 – <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains 11.3.4a – <i>Blakella tessellaris</i> (prev. <i>Corymbia tessellaris</i>) woodland on alluvial terraces 11.3.25 – <i>Eucalyptus camaldulensis</i> woodland with <i>Melaleuca</i> spp. on fringing banks HVR 11.3.25 – HVR <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	— Corben's Long-eared Bat — Greater Glider — Koala — Squatter Pigeon — Yellow-bellied Glider	45.9
Melaleuca riparian open forest with vine thicket understorey	11.3.25d – <i>Melaleuca bracteata</i> open forest with vine thicket understorey on fringing alluvium and levees	— Corben's long-eared Bat — Greater Glider — Koala	62.0
Ironbark woodland on floodplains and rocky hills	11.3.6 – <i>Eucalyptus melanophloia</i> woodland on alluvial plains 11.12.1 – <i>Eucalyptus crebra</i> woodland with <i>Corymbia erythrophloia</i> on igneous hills HVR 11.12.1 – Sparse open <i>Eucalyptus crebra</i> woodland on volcanic hills 11.12.2 – <i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills HVR 11.12.2 – HVR <i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	— Corben's Long-eared Bat — Greater Glider — Koala — Squatter Pigeon — Yellow-bellied Glider	477.5
Semi-evergreen vine thicket	11.12.4 – Semi-evergreen vine thicket on rocky igneous slopes HVR 11.12.4 – HVR Semi-evergreen vine thicket and microphyll vine forest on igneous rocks	— Corben's Long-eared Bat	7.9
Regrowth Wilga woodland	Non-remnant – Regrowth Brigalow woodland species on depressions	— Koala — Squatter Pigeon	11.0
Regrowth ironbark woodland	Non-remnant – Low <i>Eucalyptus crebra</i> regrowth	— Koala — Squatter Pigeon	147.2
Non-remnant regrowth on alluvium	Non-remnant – Degraded alluvial woodland	— Koala — Squatter Pigeon	122.0
Pasture grassland with scattered eucalypts	Non-remnant – Mixed woody grassland	— Koala — Squatter Pigeon	4,986.1
Water	Non-remnant – water	Nil	7.3
Cleared areas	Non remnant – cleared hardstand	Nil	1.7
Total (rounded)			5,911.9

11.2.2 Threatened ecological communities

The field survey identified that only one of the TECs reported in desktop searches corresponds to field-verified regional ecosystems within the Study area, namely RE11.3.1 and RE 11.12.21, which are associated with the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC listed as Endangered under the EPBC Act. This TEC was confirmed as being present within five patches of vegetation in the Study area (refer Figure 9.1), and is represented by the following field-verified regional ecosystems:

- RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains) (Endangered)
- RE 11.12.21 (*Acacia harpophylla* open forest on igneous rocks. Colluvial lower slopes) (Endangered).

The distribution of this TEC across the Study area is shown in Figure 9.1.

The other four TECs revealed by the PMST are not present within the Study area, as no field verified regional ecosystems corresponding to these TECs, as listed by their Conservation Advice, were recorded within the Study area.

11.2.2.1 Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC

An assessment of each patch against the key diagnostics and condition thresholds for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC (DCCEEW 2013) is presented in Table 11.4. The patches were assessed using field survey data collected during the wet season and dry season surveys. All patches were assessed as meeting the key diagnostic and condition thresholds for the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC. A total of 43.3 ha of the Brigalow (*Acacia harpophylla* dominant and co-dominant) TEC has been identified within the Study area, none of which is within the MID Disturbance footprint. The TEC will therefore not be impacted by direct removal (clearing).

Table 11.4 Assessment of Brigalow patches in the Study area against the Brigalow TEC diagnostic characteristics

Criteria	Diagnostic characteristic	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5
1 – dominant species AND:	The presence of <i>Acacia harpophylla</i> as one of the most abundant tree species in the patch. <i>A. harpophylla</i> is either dominant in the tree layer, or co-dominant with other species (notably <i>Casuarina cristata</i> , other species of <i>Acacia</i> , or species of <i>Eucalyptus</i>).	<i>Acacia harpophylla</i> dominant	<i>Acacia harpophylla</i> dominant	<i>Acacia harpophylla</i> dominant	<i>Acacia harpophylla</i> dominant	<i>Acacia harpophylla</i> dominant
2a – corresponding Queensland regional ecosystem OR:	In Queensland, the patch lies in one of the following REs: Brigalow Belt Bioregion – REs 11.3.1, 11.4.3, 11.4.7, 11.4.8, 11.4.9, 11.4.10, 11.5.16, 11.9.1, 11.9.5, 11.9.6, 11.11.14, and 11.12.21	RE 11.12.21	RE 11.3.1	RE 11.3.1	RE 11.3.1	RE 11.3.1
2b – corresponding NSW community AND/OR:	In NSW: Patch meets one of the following NSW Vegetation Classification and Assessment (VCA) community descriptions: VCA IDs 29, 31 and 35	n/a	n/a	n/a	n/a	n/a
2c – regrowth	Vegetation is Brigalow regrowth with species composition and structural elements broadly typical of one of the identified Queensland REs or NSW vegetation communities (i.e. at least 15 years since it was last comprehensively cleared)	n/a	n/a	n/a	n/a	n/a
3 – size	The patch is >0.5 ha in size	≥21.8 ha (adjacent State-mapped RE is not Brigalow)	9.8 ha isolated patch	≥2.2 ha (adjacent State-mapped RE is not Brigalow)	≥ 8.3 ha (adjacent State-mapped RE is not Brigalow)	≥ 1.2 ha (adjacent State-mapped RE is not Brigalow)
4 – exotic perennial plants	Exotic perennial plants comprise < 50% of the total vegetation cover of the patch, as assessed over a minimum representative area of 0.5 ha (100 x 50 m)	Yes	Yes	Yes	Yes	Yes
TEC Assessment		TEC	TEC	TEC	TEC	TEC

Criteria	Diagnostic characteristic	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5
Flora survey point		Q24	Q53	T101	T100	Q18
Area within Study area		21.8 ha	9.8 ha	2.2 ha	8.3 ha	1.2 ha
Area within Project area		0 ha	0 ha	0 ha	1.4 ha	0 ha
Area within EPBC Referral footprint		0 ha	0 ha	0 ha	0 ha	0 ha

11.2.3 Threatened flora species

No threatened flora species listed under the EPBC Act and/or NC Act were recorded during the flora surveys within the Study area. The field-verified likelihood of occurrence assessment did not identify any threatened flora species listed under the EPBC Act as having a moderate or higher likelihood of occurring in the Study area, as the potential remnant habitats were degraded and fragmented, with an understorey that was significantly modified by grazing pressure. The revised likelihood of occurrence assessment is presented in Appendix E.

11.2.4 Threatened fauna species

The Squatter Pigeon (*Geophaps scripta scripta*) (Vulnerable under the EPBC Act and NC Act) was recorded adjacent to the Study area and personal communications with local landholders indicates they are a common occurrence in the Locality. An additional seven threatened and/or migratory fauna species listed under the EPBC Act have been assessed as having a moderate to high likelihood of occurrence within the Study area, despite not having yet been recorded (refer Table 11.5).

Table 11.5 Field-verified likelihood of occurrence assessment for MNES threatened and/or migratory fauna species within the Study area

Scientific name	Common name	EPBC Act	Likelihood of occurrence within the Study area
Birds			
<i>Apus pacificus</i>	Fork-tailed Swift	M	Moderate: The species may fly over the Study area. It is almost exclusively aerial, therefore unlikely to utilise terrestrial habitat. As the species breeds outside of Australia, breeding habitat does not occur within the Study area. Species records on Atlas of Living Australia (ALA) in the Locality.
<i>Geophaps scripta scripta</i>	Squatter Pigeon (Southern Subspecies)	V	Recorded: Potential breeding, foraging and roosting habitat is mapped within the Study area and the species has previously been recorded within 5 km of the Study area. The species is routinely observed within the Study area by landholders and was recorded during field surveys adjacent to the Study area.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, M	Moderate: The species does not breed in Australia and as such, no breeding habitat is present. The species is almost exclusively aerial and forages midair at higher altitudes. Species records on ALA in the Locality. A flock of 35 birds and two lone individuals were recorded during surveys for the adjacent Banana Range Wind Farm (NGH 2019). The species was not recorded during ecological surveys for other adjacent projects Theodore Wind Farm (ERM 2024) or Dawson Wind Farm (GreenTape 2025).

Scientific name	Common name	EPBC Act	Likelihood of occurrence within the Study area
Mammals			
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	Moderate: Potential habitat is present within the Study area, within Ironbark woodland and adjacent creek lines directly adjacent to Belmont State Forest. The species requires large areas of contiguous vegetation, preferring a shrubby understorey, therefore the amount of preferred habitat within the Study area is limited for this species. There are species records in the region, with three recent (2022) records near Upper Dawson approximately 180 km south-west, and three records (2014 and 2002) within Expedition National Park approximately 150 km south-west. This species can be cryptic with a low trap rate and therefore a lack of records exist for this species. Suitable habitat recorded within the proposed Dawson Wind Farm, located within the Study area adjacent to Belmont State Forest (GreenTape 2025).
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	Moderate: Suitable habitat is present within the Study area. There is a recent record within approximately 10 km of the Study area and 14 individuals were recorded during the Theodore Wind Farm surveys (ERM 2024) Hollow-bearing trees were encountered infrequently within the Study area and are typically not at densities required by the species, however, presence and utilisation of habitat cannot be discounted.
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	Moderate: Suitable habitat is present within the Study area. There are species records within nearby (60–80 km) Kroombit Tops National Park, Theodore State Forest, and Presho Forest Reserve.
<i>Phascolarctos cinereus</i>	Koala (combined Qld, NSW, ACT)	E	Moderate: Potential habitat is mapped within the Study area, but there are no previous recent records in the Locality (10 km search area from Study area), suggesting the habitats are not preferred and/or threatening process are substantial. There are recent records from Hefferson State Forest (40 km southeast of Study area), and Thangool (35km east of the Study area). There is an older species record (2011) from 4 km west of the Study area just south of Castle Creek (ALA, 2025). Scat was recorded in 2021 by GreenTape (2025) during Dawson Wind Farm surveys approximately 5 km from the Study area. ERM (2024) also recorded scat during Theodore Wind Farm surveys approximately 30 km from the southernmost point (Castle Creek Substation) of the Study area.

Table key: E = Endangered, V = Vulnerable, M = Migratory

11.3 Potential impacts and mitigation measures

11.3.1 Impact avoidance and minimisation

The design and planning phase of the Project has prioritised avoidance and minimisation of impacts to MNES, as well as other areas of native vegetation and habitats. A detailed corridor selection process, in addition to the findings of the desktop assessment and field verified data, have been used to avoid and minimise Project impacts, particularly to known significant ecological values (MNES and MSES), and inform design refinements (where possible).

The assessments undertaken have seen development of the Project progress from the recommended 1 km wide corridor (Study area) through to an initial assessment of impacts based on total clearing of the Project area (full 60 m wide easement, substation site and off-easement infrastructure). Design refinements have resulted in the development of a smaller EPBC referral footprint to avoid and minimise impacts to field verified ecological values. Development of the EPBC referral footprint has involved considerable design measures (e.g. locating structures outside of remnant vegetation, raising structure heights and reducing the extent of vegetation clearing within the easement) to avoid and minimise impacts to native vegetation/habitats and watercourses. In particular, development of the EPBC referral footprint has:

- located structures such as transmission towers and access tracks outside of remnant vegetation, and within areas of lowest biodiversity (such as non-remnant pasture grasslands) to the greatest extent possible
- prioritised the avoidance and minimisation of impacts to the following areas:
 - Brigalow TEC
 - vegetation communities that comprise habitat for threatened species
 - waterways and waterway vegetation, including the Eucalypt riparian and floodplain woodlands and Melaleuca riparian open forest with vine thicket understorey, and particularly around Castle Creek
- utilised existing access tracks such as landholder tracks and local roads, in preference to clearing for new access tracks
- reduced easement clearing width where assessment has determined there will be adequate electrical safety clearances to the conductor.

11.3.2 Description of Project-related impacts

11.3.2.1 Threatened ecological communities

Brigalow (*Acacia harpophylla* dominant or co-dominant) TEC (Endangered under the EPBC Act) was field-verified within five separate patches within the Study area. They were comprised of regional ecosystems RE 11.3.1 (*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains) and RE 11.12.21 (*Acacia harpophylla* open forest on igneous rocks. Colluvial lower slopes).

A total of 43.3 ha of Brigalow (*Acacia harpophylla* dominant or co-dominant) TEC is present within the Study area, of which 1.4 ha (associated with Patch 4 – RE 11.3.1) is within the Project area. The Project has been designed to avoid this patch (i.e. vegetation can be spanned without clearing) and as such the Brigalow (*Acacia harpophylla* dominant or co-dominant) TEC will not be directly impacted by the Project.

Where remnant and high value regrowth vegetation is located under the transmission lines and requires clearing due to encroachment into the transmission line exclusion zone (i.e. tall trees), consideration has also been given to adopting selective clearing techniques. This includes removal of only large trees and species with an expected maximum height reaching the exclusion zone, and smaller tree species, shrubs, and groundcovers are left.

General measures to protect TECs from direct and indirect impacts during construction are outlined in the EMP. A project-specific environmental annexure to the EMP will be developed and will include the following measures:

- clearing will be restricted to the EPBC referral footprint. Any TEC patches in proximity to the MID Disturbance footprint will be marked during pre-clearing surveys and protected by exclusion fencing or flagging.
- Dust suppression measures will be implemented as required (i.e. on high windy days during extended dry periods) to minimise the impact of dust generation on flora
- The condition of the TEC areas will be maintained through the implementation of weed and pest management strategies to control the spread of weeds and pests
- Information on avoidance and management of the TEC will be included on Environmental Work Plans (EWPs) and communicated at site inductions.

11.3.2.2 Threatened species habitat loss

The MID Disturbance footprint is approximately 113.5 ha and includes a variety of habitats for a range of species including some listed under the EPBC Act as well as a diverse assemblage of common flora and fauna species. The removal of habitat may displace native fauna into adjacent habitats and place some species at risk of direct Project-related impacts and potential mortality. Important microhabitat features removed because of vegetation clearing include:

- groundcover containing coarse woody debris, dense vegetation and leaf litter suitable for foraging and sheltering by reptiles, amphibians, and terrestrial mammals
- canopy trees and dense shrub layers suitable for woodland bird nesting
- large trees suitable for nesting habitat for arboreal mammals and birds
- native trees containing fruits, flowers, nectar and sap providing food for native fauna species
- vegetation around ephemeral waterways and habitat suitable for semi-aquatic species, bird species, and some mammals.

The extent of impact to habitats for threatened fauna species listed under the EPBC Act, with a moderate or higher likelihood of occurring within the EPBC referral footprint is outlined in Table 11.6 and presented in a series of figures in Appendix E.

Table 11.6 MNES fauna species habitat within the MID Disturbance footprint

Species	Habitat type	Species habitat description	Project area (ha)	MID Proposal area (ha)	EPBC disturbance footprint (ha)	MID Disturbance Footprint (ha)
Squatter Pigeon (southern) <i>Geophaps scripta scripta</i>	Breeding	— Eucalypt riparian and floodplain woodlands	4.0	4.0	0.3	0.1
	Foraging and roosting	— Brigalow open forest — Eucalypt riparian and floodplain woodlands	0.9	0.9	0.1	0.1
	Dispersal	— Ironbark woodland on floodplains and rocky hills — Melaleuca riparian open forest with vine ticket understorey — Regrowth ironbark woodland — Non-remnant regrowth on alluvium — Pasture grassland with scattered eucalypts — Regrowth Wilga woodland	378.6	337.4	167.1	113.2
	Total		383.5	342.3	167.4	113.4
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	Roosting and foraging	— Ironbark woodland on floodplains and rocky hills	8.8	8.6	2.3	2.0
	Total		8.8	8.6	2.3	2.0
Greater Glider (southern and central) <i>Petauroides volans</i>	Denning and foraging	— Eucalypt riparian and floodplain woodlands — Melaleuca riparian open forest with vine thicket understorey	1.7	1.7	0.3	0.1
	Potential future denning, foraging and dispersal	— Eucalypt riparian and floodplain woodlands	1.1	1.1	0.03	0.03
	Total		2.8	2.8	0.33	0.13

Species	Habitat type	Species habitat description	Project area (ha)	MID Proposal area (ha)	EPBC disturbance footprint (ha)	MID Disturbance Footprint (ha)
Yellow-bellied Glider	Denning and foraging	— Eucalypt riparian and floodplain woodlands — Melaleuca riparian open forest with vine thicket understorey	1.7	1.7	0.3	0.1
<i>Petaurus australis australis</i>	Dispersal	— Ironbark woodland on floodplains and rocky hills	1.1	1.1	0.03	0.03
Total			2.8	2.8	0.33	0.13
Koala	Climate refugia (dry season habitat)	— Eucalypt riparian and floodplain woodlands — Melaleuca riparian open forest with vine thicket understorey — Ironbark woodland on floodplains and rocky hills	7.7	7.5	0.5	0.3
<i>Phascolarctos cinereus</i>	Breeding and foraging	— Ironbark woodland on floodplains and rocky hills	27.4	26.9	7.2	7.4
	Dispersal	— Non-remnant regrowth on alluvium — Regrowth Wilga woodland — Pasture grassland with scattered eucalypts	348.4	307.9	159.8	105.7
Total			383.5	342.3	167.5	113.4

(1) Calculations may not add up exactly due to rounding

The risk of impact assessment for each species is provided in Table 11.7. Where required significant impact assessment in accordance with the Significant Impact Guidelines were undertaken, the results of which are also presented in Table 11.7. The full significant impact assessments are provided in Appendix E.

Table 11.7 Threatened fauna species listed under the EPBC Act, recorded or with a moderate or high likelihood of occurring in the EPBC referral footprint, and risk of impact assessment

Scientific name	Common name	EPBC Act	Likelihood of occurrence	Risk of impact
Birds				
<i>Apus pacificus</i>	Fork-tailed Swift	M	Moderate	The species may fly over the EPBC referral footprint. It is almost exclusively aerial and unlikely to regularly utilise terrestrial habitat within the EPBC referral footprint, which would primarily be used for aerial foraging while moving through the Study area. The species primarily flies over dry or open habitats and are also found over treeless grassland and open farmland (DCCEEW 2025b), which occur within the Study area. The Project will result in the removal of up to 7.7 ha of remnant and high value regrowth woodland vegetation, which will not significantly alter suitable foraging and dispersal habitat for the species. Therefore, the species is at low risk of Project-related impacts from the construction phase of the Project. There are no significant threats listed for this species in Australia, with potential threats including habitat destruction and predation by feral animals (DCCEEW 2025b). However, risk of collision with overhead transmission lines should be considered for the operational phase as mortality due to collision is a general risk for all birds and bats. The Draft referral guideline for migratory birds (DoE 2015) states that an ecologically significant portion (1%) of the population is 1,000 individuals for this species. The Project is unlikely to cause injury or mortality from transmission line collision to this amount of individuals, given the likelihood of occurrence is only moderate, and they have not been recorded within the Study area for this Project and during the ecological surveys undertaken for other surrounding projects (ERM 2024, Greentape 2025, NGH 2019). There are also no listed significant migration routes for the species within inland Australia (DCCEEW 2025b). Additionally, controls within the EMP include identifying areas of the transmission line that are potentially of higher risk for bird collision, to determine where installation of diverters may be required, further reducing the risk of collision impact to bird species. Therefore, the species is at low risk of potential Project-related impacts during the operational phase.

Scientific name	Common name	EPBC Act	Likelihood of occurrence	Risk of impact
				Given the species is a non-breeding migrant to Australia, the widespread distribution of the species, the generalist nature of their habitat preferences, and the low-risk of transmission line collision impact, the species is at low risk of potential Project-related impacts. An EPBC Act significant impact assessment is not required.
<i>Geophaps scripta scripta</i>	Squatter Pigeon (Southern)	V	Recorded	The Project will clear up to 0.4 ha of potential breeding, roosting and foraging habitat for the Squatter Pigeon, including 0.3 ha of habitat suitable for breeding habitat and 0.1 ha of habitat suitable for foraging and roosting (not breeding). Additionally, 167.1 ha of habitat suitable for dispersal only will be impacted. This species was recorded during field surveys adjacent to the Study area and is at risk of Project-related impacts. An EPBC Act significant impact assessment has been undertaken and is presented in Attachment G of Appendix E. The assessment determined that the Project <u>will not</u> result in a significant impact on the Squatter Pigeon within the meaning of the EPBC Act Significant Impact Guidelines.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V, M	Moderate	The species may fly over the EPBC referral footprint. It is almost exclusively aerial and unlikely to regularly utilise terrestrial habitat within the EPBC referral footprint, which would be primarily used for aerial foraging while moving through the Study area. The species most often flies over wooded areas, as well as pastures and farmland. A flock of 35 birds and two lone individuals were recorded during surveys for the adjacent Banana Range Wind Farm (NGH 2019). The species was not recorded during ecological surveys for this Project or for other adjacent projects (ERM 2024, Greentape 2025). The Project will result in the removal of up to 7.7 ha of remnant and high value regrowth woodland vegetation, which will not significantly alter suitable foraging and dispersal habitat. No suitable roosting habitat is present within the Study area. Additionally, controls within the EMP include identifying areas of the transmission line that are potentially of higher risk for bird collision, to determine where installation of diverters may be required, further reducing the risk of collision impact to bird species. Therefore, the species is at low risk of Project-related impacts from the construction phase of the Project. The Conservation Advice for the species (TSSC 2019) states that the risk direct mortality from collision with overhead

Scientific name	Common name	EPBC Act	Likelihood of occurrence	Risk of impact
				transmission lines is of low severity and affects a small number of birds. The Draft referral guideline for migratory birds (DoE 2015) states that an ecologically significant portion (1%) of the population is 100 individuals for this species. The Project is unlikely to cause injury or mortality from transmission line collision to this amount of individuals either in a single event or cumulatively. There are also no listed significant migration routes for the species within inland Australia (DCCEEW 2025b). Therefore, the species is at low risk of potential Project-related impacts during the operational phase. Given the species is a non-breeding migrant to Australia, the widespread distribution of the species, the generalist nature of their habitat preferences, and the low-risk of transmission line collision impact, the species is at low risk of potential Project-related impacts. An EPBC Act significant impact assessment is not required.
Mammals				
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	Moderate	The Project will clear up to 2.3 ha of potential roosting and foraging habitat for Corben's Long-eared Bat. The species is cryptic and difficult to detect without targeted trapping efforts. As <i>Nyctophilus</i> species were recorded on Anabat detectors within the Study area and the surrounding Dawson Wind Farm project (GreenTape 2025) (refer Section 9.2.1), this species has a moderate likelihood of occurrence. Due to the loss of potential habitat, and the moderate likelihood of occurrence within the EPBC referral footprint, this species may be at risk of Project-related impacts. An EPBC Act significant impact assessment has been undertaken and presented in Attachment G of Appendix E. The assessment determined that the Project <u>will not</u> result in a significant impact on Corben's Long-eared Bat within the meaning of the EPBC Act Significant Impact Guidelines.

Scientific name	Common name	EPBC Act	Likelihood of occurrence	Risk of impact
<i>Petauroides volans</i>	Greater Glider (southern and central)	E	Moderate	The Project will clear up to 0.33 ha of potential denning and foraging habitat for the Greater Glider. Due to the loss of potential habitat, and the moderate likelihood of occurrence within the EPBC referral footprint, this species may be at risk of Project-related impacts. An EPBC Act significant impact assessment has been undertaken, presented in Attachment G of Appendix E. The assessment determined that the Project <u>will not</u> result in a significant impact on the Greater Glider within the meaning of the EPBC Act Significant Impact Guidelines.
<i>Petaurus australis australis</i>	Yellow-bellied Glider (south-eastern)	V	Moderate	The Project will clear up to 0.3 ha of potential denning and foraging habitat for the Yellow-bellied Glider. Additionally, 0.03 ha of habitat suitable for dispersal only will be impacted. Due to the loss of potential habitat, and the moderate likelihood of occurrence within the EPBC referral footprint, this species may be at risk of Project-related impacts. An EPBC Act significant impact assessment has been undertaken, presented in Attachment G of Appendix E. The assessment determined that the Project <u>will not</u> result in a significant impact on the Yellow-bellied Glider within the meaning of the EPBC Act Significant Impact Guidelines.

Scientific name	Common name	EPBC Act	Likelihood of occurrence	Risk of impact
<i>Phascolarctos cinereus</i>	Koala (combined Qld, NSW, ACT)	E	Moderate	Approximately 7.6 ha¹ of breeding, foraging, and dry season refugia habitat for the Koala will be impacted by the Project. Despite fauna survey efforts including nocturnal spotlighting over two seasonal survey events, and 6.6 hours of thermal drone coverage over 216 ha, the species was not recorded. Although the Project will result in the permanent impact to 7.6 ha of potential Koala habitat suitable for breeding, foraging and climate refugia (dry season habitat), habitat of similar or better quality is widely available in the local area, such as in the Belmont State Forest. The Project will impact 159.8 ha of dispersal habitat for the Koala, comprising shrublands or grasslands with emergent koala food trees, shelter or paddock trees located in areas that provide corridors for movement and connectivity to areas that support koala lifecycle requirements. Disturbance to dispersal habitat is not considered significant as the linear design of the proposed action will still allow for Koala habitat across the landscape (thus retaining its dispersal functionality). The proposed transmission structures, overhead lines and access tracks will not reduce the ability of Koalas to disperse through the landscape. Therefore, the species is at risk of Project-related impacts to 0.5 ha of primary habitat (inc. climate refugia – dry season habitat) and 7.2 ha of secondary habitat that is utilised by the species for breeding and foraging, total of 7.6 ha of impact An EPBC Act significant impact assessment has been undertaken and presented in Attachment G of Appendix E. The assessment determined that the Project <u>will not</u> result in a significant impact to the Koala, within the meaning of the EPBC Act Significant Impact Guidelines.

Table key: E = Endangered, V = Vulnerable, M = Migratory

Table notes: 1: The non-rounded EPBC referral footprint area is 7.17 ha breeding and foraging, and 0.47 ha climate refugia, totalling 7.6 ha for these two habitat types. However once both numbers are rounded up, a rounding error occurs. This report assesses the impact to the more accurate non-rounded numbers, being a total of 7.6 ha for these two combined habitat types.

With consideration of the Project avoidance, minimisation and mitigation measures, the significant impact assessments undertaken for known or potentially occurring MNES, determined that the Project will not result in a significant residual impact on MNES threatened species within the meaning of the Significant Impact Guidelines (refer to Attachment G of Appendix E).

While the Project would result in the removal of 7.6 ha of Koala habitat suitable for breeding, foraging and climate refugia (dry season habitat), that meets the criteria of habitat critical to the survival of the Koala, it was determined that this will not result in a significant impact to the Koala on the basis that:

- The vegetation removal is not significant when considering the small scale (7.6 ha) and low impact nature (linear transmission line) of the proposed action. The Project will not result broad scale clearing of entire habitat patches but rather removes small sections of vegetation from the edges of habitat that is highly disturbed with a patchy distribution.
- No Koalas or evidence of Koalas were recorded within the Study area during targeted surveys, and the EPBC referral footprint is likely to only occasionally support individuals at low densities and not a local population of the species. This habitat utilisation level is consistent with the finding from three other local Koala assessments prepared for the Theodore Wind Farm (ERM 2024), Dawson Wind Farm (GreenTape 2025), and Banana Range Wind Farm (NGH 2019).
- The nature of the proposed action is linear, associated with overhead transmission lines. As such, it does not create movement barriers for the Koala or fragmentation of habitat and will not prevent species dispersal through the landscape. No additional impacts are likely to result from the operational phase of the Project once the construction phase is complete.
- The scale and circumstantial nature of the impact is minor (7.6 ha) within the context of the wider regional habitat availability, with the EPBC referral footprint connected to >800 square kilometres (km²) of higher quality habitat within the region.

11.3.2.3 Impact mitigation

The risk of direct mortality to threatened species during construction will be managed in accordance with the measures outlined in the EMP. These include:

- tampering within an animal breeding place may only be carried out in accordance with a Damage Mitigation Permit or an approved Species Management Program (refer to Section 11.3.2.4)
- prior to commencement of site activities where interactions with native fauna is expected (e.g. vegetation clearing), measures to recover and rehabilitate injured or orphaned native animals unavoidably impacted will be implemented
- a fauna spotter-catcher, who holds a valid Rehabilitation Permit (fauna spotter-catcher), will be engaged to undertake pre-clearing habitat searches and be present during vegetation clearing activities and during any disturbance to habitat features (i.e. trees containing hollows, trees containing nests, hollow logs) to minimise fauna harm
- an authorised carer (holding a valid Rehabilitation Permit (rehabilitation and release a protected animal)) will be engaged to care for and rehabilitate injured or orphaned native animals
- vegetation clearing will be undertaken in a staged and sequential manner, moving away from environments, such as roads, which may potentially cause injury to fleeing fauna
- excavations will be secured to prevent access from native fauna
- vehicles will be restricted to approved and mapped access tracks and only those vehicles required for the safe, efficient and essential construction activities will be allowed in the work area
- construction work hours will be limited to between 6.30 am to 6.30 pm Monday to Sunday (excluding public holidays) unless authorised through an approval or in response to exceptional circumstances including an emergency
- any unplanned interactions with native fauna or fauna habitat will be immediately reported to Powerlink.

Measures in the EMP to minimise fauna interactions during operations include:

- In areas where fauna interactions have been identified or are likely, fauna friendly anti-climbing barriers will be installed on towers. The need for additional mitigation measures (e.g. wire marking, diverters on spans to minimise bird strike, line configuration (number, spacing of wire levels, wire height, and diameter) or habitat modification) will be assessed and installed as required.

11.3.2.4 Species management programs

As the Project has potential to impact the breeding places of fauna species listed under the NC Act, a specific *Species Management Program – high-risk of impacts* (High-risk SMP) will be required to be approved by DETSI prior to construction commencing. Species requiring a High-risk SMP include wildlife listed as threatened species or recognised as Least Concern (colonial breeder) species under the *Nature Conservation (Animals) Regulation 2020* (Animals Regulation).

Species listed under the Animals Regulation, that are also listed as Endangered or Vulnerable under the EPBC Act, and recorded have a moderate or higher likelihood of having breeding places within the MID Disturbance footprint include:

- Corben's Long-eared Bat
- Greater Glider
- Squatter Pigeon
- Yellow-bellied Glider.

It should be noted that although the MID Disturbance footprint contains Koala habitat, a High-risk SMP is not required for this species, as they do not have a 'habitual breeding place' (e.g. hollow or nest). As such, Koalas are managed under the *Nature Conservation (Koala) Conservation Plan, 2017* (Koala Plan).

As with any project that involves the removal of native vegetation and habitats, there is an inherent risk of also impacting animal breeding places of Least Concern (non-colonial) fauna species (e.g. bird nests). Several fauna breeding habitat features were recorded within the MID Disturbance footprint, including bird nests, hollow bearing trees, arboreal termitaria with nest excavations, and hollow logs.

To mitigate this risk, implementation of an approved *Species Management Program – low risk of impacts* (Low-risk SMP) is required under the Animals Regulation. Tampering with animal breeding places for Least Concern (non-colonial) fauna species may be undertaken in accordance with an approved Low-risk SMP.

The requirements outlined in the High-risk and Low-risk SMPs will be implemented during the Project pre-construction, construction, and post-construction phases. In line with the EMP, these requirements will include that a suitably qualified (holding a DETSI approved Rehabilitation Permit) and experienced fauna spotter-catcher or ecologist be employed for the construction phase of the Project to implement a protocol of best management practices. A fauna spotter-catcher experienced in Koala surveys and management and/or Koala spotting will be required in areas containing Koala habitat, in accordance with the Koala Plan.

12 Biosecurity

Chapter 12 identifies the non-native fauna and flora species in proximity to the Project as well as the relevant biosecurity zones. The likely impacts to result from the Project include introduction of weeds, edge effect, and habitat degradation. Mitigation measures have been outlined to help mitigate these impacts, which includes a biosecurity matters survey which will be undertaken before and after construction and property specific Biosecurity Management Plans (where required) which will be developed in consultation with landholder requirements. With implementation of the proposed management and mitigation measures the overall extent of habitat modification from weed invasion is not likely to increase extensively because of the Project. The risk of the Project resulting in the establishment of pest animal species in areas where they are currently absent is assessed as low.

12.1 Relevant legislation and policies

12.1.1 *Commonwealth*

12.1.1.1 Australian Pest Animal Strategy 2017-2027

Under the EPBC Act, a number of introduced animals are recognised as threats to native animals and plants. The impacts of some introduced animals have been listed as ‘key threatening processes’ for the survival of threatened species under the EPBC Act.

The Australian Pest Animal Strategy 2017-2027 translates higher level policies and strategies into nationally agreed principles, goals and priorities to guide pest animal management. The strategy is achieved through the implementation of State and Territory legislation, nationally significant species action plans, and threat abatement plans. Nationally significant species action plans provide detailed assessments of risks and impacts of pest animals. They specify priorities, targets, preferred strategies and indicators, and also identify key stakeholder partners. Threat abatement plans describe the research, management, and any other actions necessary to reduce the impact of a listed key threatening process under the EPBC Act on native species and ecological communities.

12.1.1.2 Australia Weeds Strategy 2017-2027

The Australian Weeds Strategy 2017–2027 provides a national framework for addressing weed issues whilst maintaining the sustainability of Australia’s primary industries and reducing the impact of weeds on the environment.

Thirty-two (32) Weeds of National Significance (WoNS) have been agreed by Australian governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread and environmental, social and economic impacts. Consideration was also given to their ability to be successfully managed. A list of 20 WoNS was endorsed in 1999 and a further 12 were added in 2012. WoNS have individual national strategic management plans. These plans define responsibilities and identify strategies and actions to control the weed species. They facilitate coordinated action from all stakeholders at a national level and improve linkages between research and ongoing control.

12.1.2 Queensland

12.1.2.1 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) is administered by DPI and provides management measures to protect agricultural and tourism industries and the environment from pests, diseases and contaminants.

Under the Biosecurity Act, invasive plants and animals may be classed as:

- Prohibited matter: a biosecurity matter not found in Queensland that has a significant impact on human health, social amenity, the economy or the environment.
- Restricted matter: a biosecurity matter found in Queensland that has a significant impact on human health, social amenity, the economy or the environment. Suitable mitigation measures should be undertaken to prevent the proliferation of prohibited or restricted matters.

The Biosecurity Act is underpinned by the Biosecurity Regulation 2016 (Biosecurity Regulation) which outlines measures to prevent and minimise biosecurity risks.

12.1.3 Local government

The Biosecurity Act requires every local government in Queensland to develop a biosecurity plan for invasive biosecurity matter for their area. The local government plan relevant to the Project is the Banana Shire Council Biosecurity Plan 2019–2024 (Banana Shire Council 2019).

This plan prioritises pest management within the LGA based on existing priorities (national and state status), impacts and threats (conservation, water resources, agriculture and community), and capacity to manage the species.

12.2 Existing environment

12.2.1 Biosecurity zones

A biosecurity zone is a part of Queensland that has legal movement restrictions placed on it to limit the spread of pests and diseases within the state. The Biosecurity Manual (Queensland Government 2023b) describes the risk minimisation requirements for movement of biosecurity carriers to be followed in compliance with the Biosecurity Regulation.

The Project area overlays several biosecurity zones including:

- Sugar cane pest biosecurity zone 4
- Papaya ringspot biosecurity zone 1
- Grape phylloxera exclusion zone
- Cattle tick infested area.

12.2.2 Invasive flora species

The PMST search results (included in Attachment A of Appendix E) identified WoNS; other plants that are considered to pose a significant threat to biodiversity; and feral animals which are considered likely to be present within the Project area. The Wildlife Online searches also identified additional introduced taxon known to be present in proximity to the Project area that have naturalised and that may be constitute a biosecurity matter. Invasive flora recorded during the field surveys within the Project area are outlined in Table 12.1.

Table 12.1 Invasive flora species recorded within the Project area

Scientific name	Common name	WoNS	Biosecurity Act status	Biosecurity Act category
<i>Bryophyllum delagoense</i>	Mother-of Millions	No	Restricted invasive	3
<i>Cryptostegia grandiflora</i>	Rubber vine	Yes	Restricted invasive	3
<i>Dolichandra unguis-cati</i>	Cats claw creeper	Yes	Restricted invasive	3
<i>Lantana montevidensis</i>	Creeping Lantana	No	Restricted invasive	3
<i>Opuntia streptacantha</i>	Cardona pear	Yes	Restricted invasive	2, 3, 4, 5
<i>Opuntia tomentosa</i>	Velvety tree pear	Yes	Restricted invasive	2, 3, 4, 5
<i>Parthenium hysterophorus</i>	Parthenium weed	Yes	Restricted invasive	3

Biosecurity Act category:

- (1) Must report the presence of category 1 matter to a DPI inspector with 24 hours
- (2) Must report the presence/sightings of category 2 matter to Biosecurity Queensland within 24 hours
- (3) Must not distribute or dispose of unless under a regulation, restricted matter permit or by an authorised officer
- (4) Must not move or cause or allow to be moved
- (5) Must not keep in the person's possession or under the person's control.

The distributions of *Bryophyllum delagoense* (Mother-of Millions), *Cryptostegia grandiflora* (Rubber vine), and *Dolichandra unguis-cati* (Cats claw creeper) were localised and largely restricted to waterways within the Project area. *Parthenium hysterophorus* (Parthenium weed) was restricted to one small patch on the western bank of Castle Creek in the southern portion of the Project area, and became more prevalent in the north, where it was a common ground cover. *Lantana montevidensis* (Creeping Lantana) was found as an understorey plant in localised patches in open Eucalypt woodlands on land zone 12. *Opuntia* spp. were very sparsely scattered throughout the Project area at densities of less than 1 percent.

12.2.3 Introduced fauna species

Five introduced fauna species were recorded from the Project area during field surveys namely:

- Cane Toad (*Rhinella marina*)
- Indian Myna (*Acridotheres tristis*)
- European Hare (*Lepus europaeus*)
- House Mouse (*Mus musculus*)
- Rabbit (*Oryctolagus cuniculus*).

Dingos (*Canis familiaris* breed Dingo) were also recorded but their status as an introduced species is still being debated.

12.3 Potential impacts and mitigation measures

Potential biosecurity impacts associated with the Project are likely to include:

- 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.
- Edge effects: Clearing needed for construction of the Project may exacerbate edge effects, changing population or community structures of the adjacent retained vegetation. These changing population or community structures can provide opportunities for weeds to establish, which may worsen the aforementioned impacts.
- Habitat degradation: The presence of species of biosecurity concern is often associated with ongoing degradation of habitat. This includes impacts associated with feral vertebrate activities, and loss of habitat values due to the introduction or exacerbation of weeds.

While the Project activities (particularly vegetation clearing) have the potential to disperse pest animal species out of the areas of disturbance and across the surrounding landscape, it is highly likely that pest animal species recorded in the Project area already occupy habitats in the locality. Therefore, the risk of the Project resulting in the establishment of these pest animal species in areas where they are currently absent is assessed as low.

Activities associated with the Project have the potential to disperse weeds into surrounding areas. While weed species are established throughout the Project area, the greatest density is contained within previously cleared areas and waterways. The most likely causes of weed dispersal associated with the Project include earthworks, movement of soil and attachment of seed (and other propagules) to vehicles and machinery. This is an indirect impact that may reduce habitat quality.

The biosecurity risks associated with construction, operation and maintenance and decommissioning of the Project will be managed in accordance with the measures outlined in the EMP (Biosecurity) (Appendix D). These include:

- vehicle and machinery clean down measures in accordance with the Queensland Government's biosecurity clean down requirements
- avoidance or minimisation of travel through areas heavily affected by biosecurity matters, wherever possible
- provision of 'biosecurity matter free' declaration forms for all high-risk material (i.e. sand, soil, mulch etc)
- obtaining a biosecurity instrument permit before moving materials (e.g. soils and related equipment) out of biosecurity zones or within different biosecurity zones
- appropriate disposal of material potentially contaminated with biosecurity matter in accordance with the Biosecurity Act.

Baseline biosecurity matters surveys (weed surveys) will be undertaken for the Project area prior to construction of the Project. The surveys will occur along the easement, established access tracks, and substation site and will, where present, identify WoNS, restricted and invasive matters and regionally declared weed species. A biosecurity matter survey will also be completed along the easement and established access tracks post construction following the first wet season.

Where required, property specific Biosecurity Management Plans will be developed by construction contractors in consultation with landholders. These property specific Biosecurity Management Plans will identify:

- property-specific biosecurity management plans
- any known biosecurity matters that should be considered prior to entry
- concerns in relation to biosecurity matters (currently on property, activity being managed, currently in the region but not on property)
- biosecurity control practices currently implemented on the property.

Relevant management measures for each Biosecurity Queensland Biosecurity Zones will also be included in the Biosecurity Management Plan and shown on the relevant EWP.

Where required, clean down facilities will be constructed in accordance with Powerlink drawings (A1-H-154843-001 to 004). They will be located as close as possible to the infested area, away from environmentally sensitive areas and clean properties. These facilities will be recorded for monitoring of biosecurity matters (for a minimum of two maintenance cycles from the last time the site was used). The clean down facilities will be decommissioned at the end of the Project with geofabric and rehabilitated to meet 70 percent groundcover or equivalent to pre-disturbance cover.

13 Land use, existing infrastructure, and Native Title

Chapter 13 provides a general description of the land use and activities within and around the Project area to assess and predict the likely consequences (both positive and negative) of the Project. While the Project will change the current land use from agricultural to infrastructure, this change is not expected to be incompatible with the future land uses for the area. The landscape is currently undergoing a transition to support renewable development with several renewable energy projects proposed for the area, two of which have received planning approval. Strategies are recommended to mitigate any adverse impacts and maximise the potential benefits during construction and operation.

13.1 Existing environment

13.1.1 *Land tenure*

The Project area (including off-easement access tracks and laydown areas) incorporates 18 freehold land parcels, one lands lease land parcel, and eight road parcels. Details of the lot on plan and tenure of the land parcels traversed by the Project are provided in Table 3.1 of Section 3.3.1. Of the freehold land parcels, two contain strata parcels with either a land lease tenure (Lot 12 FN321) or profit à prendre tenure/stock route strata parcel (Lot 12 FN294 – associated with the State of Queensland represented by the Department of Agriculture and Fisheries). Lot 47 SP232217 also contains an easement registered to Powerlink for a 132 kV transmission line between Moura and Biloela.

The site of the proposed Castle Creek Substation is across 2 freehold land parcels (Lot 18 DW550 and Lot 8 DW2, refer Table 3.1 of Section 3.3.1)..

13.1.2 *Zoning, character, and amenity*

The Project area is within the Banana Shire Council local government area. Each local government Authority is subject to individual Local Planning Instruments which identify the strategic intent and desired outcomes for land use planning within the respective local government area. The Project and how it relates to the Banana Shire Planning Scheme 2021 is further discussed in Section 26.4.

The Project area is located on land zoned as ‘rural’ within the Banana Shire Planning Scheme 2021. Land use intent for the ‘rural’ zoned areas include grazing and agricultural uses as well as the maintenance of rural character and amenity. Rural zones also recognise the need to provide opportunities for compatible non-rural uses and be managed for their contribution to the economy, landscape character and ecological values. Land uses within this ‘rural’ zone are primarily grazing, with broadacre cropping along the western boundary. Other land uses include reservoir/dams and residential properties scattered throughout the landscape.

The existing rural character of the area is generally characterised by rural properties, with large lot sizes and supporting agricultural operational buildings, sheds or structures.

The existing amenity of the area can be defined by considering elements such as noise, air quality and the visual environment which have been assessed individually in this MID proposal (refer to Chapter 6 (Air quality), Chapter 14 (Visual amenity), and Chapter 19 (Noise and vibration)). These elements are considered representative of a rural environment.

13.1.3 Existing land use

13.1.3.1 Agricultural land

The Project area is primarily located across land classified as Class C agricultural land under the agricultural land classification scheme (DSITI & DNRM 2018)) which is defined as land suitable for stock grazing. A northern section of the MID Proposal area (Lot 11 FN293) and one existing off-easement access track traverse over an area of Class A agricultural land defined as land highly suitable for cropping (DSITI & DNRM 2018). This area is a portion of the mapped strategic cropping land located west of the Project area and is also identified as an important agricultural area by the Queensland Agricultural Land Audit (Queensland Government 2013).

The Project area also intersects one tertiary stock route reserve (901BANA).

Areas of intensive agricultural industries, aquaculture or intensive horticulture are not located in proximity to the Project.

13.1.4 Future land uses

13.1.4.1 Proposed renewable energy developments

The proposed Castle Creek Substation and transmission line provide a connection for the Theodore Wind Farm to the national electricity network. A 200 MW Battery Energy Storage System (BESS) associated with the Theodore Wind Farm is planned to be located next to the proposed Castle Creek Substation.

Other proposed renewable energy projects in proximity to the Project include:

- Banana Range Wind Farm. The Banana Range Wind Farm Project, located approximately 20 km south-west of Biloela, has received all planning and approvals and is expected to be built in 2026. The transmission line crosses lots associated with the Banana Range Wind Farm (Stage 1) (Lot 47 SP232217 and Lot 10 FN802236).
- Dawson Wind Farm. Located to the south of the Banana Range Wind Farm 1, planning approvals are currently being sought for the Dawson Wind Farm. The transmission line traverses the Dawson Wind Farm (Lot 11 FN293 and Lot 12 FN294).
- Sawpit Solar Farm. The project is currently in its feasibility stage of development and is planned to be located approximately 30 km south-west of Biloela. Limited details are available for the Sawpit Solar Farm, but it is to be located on Lot 6 DW447, which is also traversed by the proposed transmission line.

Further information on these proposed renewable energy developments is provided in Chapter 24 (Cumulative impacts).

13.1.5 Native title

Native title is defined under the *Native Title Act 1993* (NT Act). Native title rights and interests relate to land or waters held by Aboriginal peoples or Torres Strait Islanders under their traditional laws and customs recognised by the common law of Australia.

Native title rights may exist regardless of whether there is a native title claim or determination in relation to the relevant land or waters. Native title may be exclusive or non-exclusive and non-exclusive rights may co-exist with the rights of others, such as a pastoral leaseholder.

The Project area traverses the Wulli Wulli People's and the Wulli Wulli People #3's Native Title claim as detailed in Table 13.1.

Table 13.1 Native title determinations relevant to the Project area

Name	NNTT Ref	Date determined	Outcome	Rights	Relevant lots
Wulli Wulli People #3	QC2017/011	23/02/2018	Active/Accepted for registration	Non-exclusive	North-west portion of the Project area
Wulli Wulli People	QCD2015/009	13/08/2015	In effect-Finalised Determined on 13 August 2015 Registered 29 January 2016	Non-exclusive	Southern portion of the Project area
Gaangalu Nation People	QCD2024/001	30/04/2024	Claim dismissed	Claim dismissed	Claim area in the northern portion of the Project area

The central/southern end of the Project area, including the site of the proposed substation is subject to two Indigenous Land Use Agreements (ILUA). These ILUAs are presented in Table 13.2.

Table 13.2 Indigenous Land Use Agreements

Name	Tribunal Number	Type	Outcome	Location
Ergon Energy and Wulli Wulli People ILUA	QCD2015/045	Area agreement	IULA registered on 29 January 2016	Central/southern extent of Project area including proposed substation site
Wulli Wulli People and Banana Shire Council ILUA	QC2015/044	Area agreement	IULA registered on 29 January 2016	Central/southern extent of Project area including proposed substation site

Not all land is subject to native title. Under the NT Act (Commonwealth), the valid grant of a freehold estate (other than certain types of Aboriginal and Torres Strait Islander land) on or before 23 December 1996 is known as a ‘previous exclusive possession act’, meaning that native title has been extinguished over the area. The dedication and declaration of roads on or before 23 December 1996 also has the effect of extinguishing native title (section 253 of the NT Act (Commonwealth)).

13.1.6 Existing infrastructure

13.1.6.1 Road and rail networks

The Project area intersects local roads managed by the Banana Shire Council, including Coupes Road, Coates Road, and Shawlands Road. Roads that lead to the Project area, but are not intersected, include Banana Holdings Road and L Anderson Road. While State road assets and the Moura Coal Rail System are present within the Locality, they are not within the Project area.

Further detail on the State and local road network is provided in Chapter 18 (Transport and traffic).

13.1.6.2 Airports and airstrips

No existing air transport infrastructure is present within the Project area. Two aerodromes are in proximity to the Project:

- Biloela (Thangool) Aerodrome – located approximately 28 km east of the MID Proposal area and approximately 50 km northeast of the proposed substation site.
- Moura Aerodrome – located approximately 32 km west of the MID Proposal area and approximately 50 km northwest from the proposed substation site.

13.1.6.3 Electricity infrastructure

The Project intersects several Ergon 12.7 kV high voltage distribution lines in proximity to Shawlands Road and Coates Road. The required statutory design requirements will be adhered to so that 275 kV lines will be much higher than the existing distribution lines. Powerlink will work closely with Ergon to determine a suitable methodology for the line crossing, including whether a brief supply interruption is required.

The transmission line travels in close proximity to a 132 kV Powerlink transmission line, which extends between Moura and Biloela. The proposed transmission line from the Theodore Wind Farm crosses the easement for this transmission line prior to its connection into the Mount Benn Substation. The transmission line will be designed and constructed in line with the *Electricity Safety Act 2000* such that it does not cross the existing Powerlink transmission line.

It is likely that other service systems, such as water, telephone and fibre-optic cables, exist within and close to the Final Alignment. Searches for the location of these services will be requested from the relevant asset owners and administering authorities during the detailed design stage. Additionally, prior to construction and any ground disturbance activities for transmission line structure footings, access tracks etc, ‘dial before you dig’ searches will be conducted to ensure that these existing services are avoided.

13.1.6.4 Water and sewer infrastructure

Registered groundwater bores are scattered throughout the landscape, used predominately for water supply. Several of these bores are used for water level monitoring maintained by Department of Local Government, Water and Volunteers. None of these bores are within the Project area.

13.1.6.5 Private infrastructure

The Project area is located across multiple privately owned freehold tenure. Residential properties are scattered throughout the area, and it is likely private infrastructure will be present including farm dams, sheds, fences, and cattle yards.

13.2 Potential impacts and mitigation measures

13.2.1 Agricultural land and operations

The proposed transmission line and substation will change the current land use from agricultural to infrastructure. A northern section of the MID Proposal area (Lot 11 FN293) and one existing off-easement access track traverse over an area of Class A agricultural land defined as land highly suitable for cropping (DSITI & DNRM 2018). However, as most of the Project area is located across Class C pastureland, which is not suitable for crop production, it is unlikely the Project will significantly impact agricultural land and operations. Grazing and cropping can still occur under the transmission line, and modifications, such as increasing the height of transmission wires, can be made to minimise any potential impact a new transmission line has on the farming practices.

Through the landholder and stakeholder engagement and infrastructure design processes, Powerlink is committed to reducing and mitigating impacts to the surrounding land use. Powerlink will continue to collaborate with all landholders and stakeholders throughout the construction and operation of the Project.

Construction and operation of the Project will be managed in accordance with Powerlink's standard environmental controls, particularly the EMP (Appendix D) and Land Access Protocol (a copy of which can be found on the Powerlink Website at [Land Access Protocol | Powerlink](#)).

Powerlink's Land Access Protocol states that while on landholder's property, Powerlink will take all reasonable measures to minimise interference, disturbance, injury, erosion, or damage to:

- any land or property of the landholder
- livestock or improvements on the relevant land or the surrounding area
- the landholder's use of the land
- the landholder and people authorised by the landholder to be on their land
- the natural environment, including any flora and fauna, and bed or banks of any water feature, or cultural heritage (unless authorised under an associated permit, approval, or licence).

13.2.2 *Rural character and amenity*

The proposed transmission line and substation are in an area that currently has no similar structures or infrastructure and will likely impact the current rural character and amenity of the landscape. However, the landscape is currently undergoing a transition to support renewable development. The area is expected to accommodate several renewable energy projects. Two wind farms – the Theodore Wind Farm and the Banana Range Wind Farm – have received planning approval. Not only does the Project support the Theodore Wind Farm but it will not be incompatible for the proposed land uses for the region. The undulating terrain within the landscape will also help to conceal sections of the transmission line from potential viewpoints. Visual amenity impacts associated with the Project are discussed further in Chapter 14 (Visual amenity).

13.2.3 *Native title*

Any acts or dealings in relation to land and water that affect native title must comply with the NT Act in order to be validly done. To the extent that native title exists or may exist in the area of the Project, Powerlink will comply with the requirements of the NT Act for securing an easement for the transmission line. Powerlink typically complies with section 24KA of the NT Act, which applies to facilities for services to the public, for its transmission line easements. Under section 24KA, native title is not extinguished but is 'suppressed' while the easement remains in place.

13.2.3.1 *Built infrastructure*

During the construction and operation of the transmission line and the substation, it is expected that no impacts or relocation should occur to water infrastructure. A temporary interruption of the electricity supply to adjacent residences may be necessary when stringing of the transmission line occurs in the vicinity of Ergon distribution lines. Powerlink will coordinate these works with Ergon to ensure that any disruptions are minimised. During the construction phase, it is likely that the intersected local roads will be temporarily impacted. Traffic impacts and proposed mitigation measures for potential impacts to the road network are addressed in Chapter 18 (Transport and traffic).

14 Visual amenity

Chapter 14 identifies the relevant visual receptors and describes the visual impacts from construction and operation of the Project. It provides an assessment of impacts to view sheds, outlooks and features contributing to the amenity of the area, including assessment from private residences as well as taking into account the existing infrastructure within the landscape. The Dawson Highway is the main viewshed for visual receptors likely to be impacted by the Project, with other receptors including residences and Belmont State Forest. Siting of the proposed transmission line and substation has considered the location of surrounding residences and aimed to maximise the distance between these receptors and the proposed infrastructure. Further mitigation measures have been developed to aid in providing a more harmonious appearance to the Project overall.

14.1 Existing environment

14.1.1 Methodology

There are no established, measurable thresholds of significance that exist for landscape or visual impacts. The significance of impact is therefore determined by considering the sensitivity of the landscape or visual receptor and the magnitude of change expected because of the proposed development. In accordance with the Guidance Note for Landscape and Visual Assessment (Australian Institute of Landscape Architects 2018) the following is defined:

- Sensitivity is defined as the capacity of a landscape or receptor to change without losing valued attributes.
- Magnitude is defined as the extent of change that will be experienced by receptors. This change can be adverse or beneficial. Factors that could be considered in assessing magnitude are:
 - the proportion of the view/landscape affected
 - extent of the area over which the change occurs
 - the size and scale of the change
 - the rate and duration of the change
 - the level of contrast and compatibility.

To assess the impacts to visual amenity from the Project the existing character of the location has been assessed to develop an understanding of visual receptors and the landscape. The determination of potential viewpoints and visual receptors has been via a desktop study only. No field verification has been undertaken. Table 14.1 and Table 14.2 describe the criteria used for the assessment of visual and landscape amenity impacts.

Table 14.1 Severity / magnitude matrix

		Magnitude				
		Minor	Moderate	High	Major	Critical
Sensitivity	Critical	Medium	High	High	Severe	Severe
	Major	Low	Medium	High	High	Severe
	High	Low	Medium	Medium	High	Severe
	Moderate	Low	Low	Medium	High	High
	Minor	Low	Low	Low	Medium	High

Table 14.2 Visual and landscape amenity impacts

Factor	Sensitivity		Magnitude	
	Landscape	Visual amenity	Landscape	Visual amenity
Critical	A highly protected landscape known for its National value or significant features or value at a large scale.	Significant impacts to a large number of viewers in a well-used or popular location.	Significant change in the landscape affecting a large area fundamentally changing its character.	Severe widespread change of environmental landscape features evident from long distances away (2 km or more) or obstructing significant amounts of the view from close by.
Major	A protected landscape with occasional significant landscape features present.	Medium density of viewers impacted with some interest in their environment.	Major loss of environmental amenity restricted to a certain area.	Major loss of environmental landscape features evident from moderate distances away (500 m or more) or obstructing large amounts of the view from close by.
High	A valued landscape with regional importance or protections under State designations with few or occasional disturbance present.	Low density of viewers impacted with some interest in their environment.	Substantial instances of loss of landscape features that could be reversed with intensive efforts.	Substantial instances of environmental landscape change only evident from moderate distances away (100 m or more) or obstructing moderate amounts of the view from close by.
Moderate	A landscape with limited values and presence of similar / other disturbance.	Isolated impacts to a small number of viewers with a low interest in the environment.	Isolated but substantial instances of landscape character impact that could be reversed with intensive efforts.	Isolated but substantial instances of environmental landscape change only evident immediately within the local environment.
Minor	A landscape with limited value or lacking scenic quality with other disturbance present.	Minor impacts to a few individual viewers over a small duration.	Minor incident of impacts to landscape character that can be reversed.	Minor incident of environmental landscape that is proposed to be reversed.

14.1.2 Settlement and infrastructure

The Project lies in a rural area comprising isolated farmsteads, rural rangelands used predominantly for cattle grazing, and areas of forested and natural landscapes. The area surrounding the Project area is sparsely settled.

An existing Powerlink 132 kV transmission line between Moura and Biloela merges with the Project at its connection to the Mt Benn Substation. The off-easement access tracks continue to follow this easement for approximately 4.5 km northeast, as it heads towards the Dawson Highway.

The Moura Coal Rail System originates in the rural town of Moura, and runs to Gladstone, connecting to several mines, including Dawson and Callide mines. It runs in a north-eastern direction and is approximately 2.7 km north and 3.4 km west from the connection of the proposed transmission line into the Mt Benn Substation.

The Leichhardt Highway and Dawson Highway are popular tourist routes located in proximity to the Project.

The Banana Range Wind Farm is a proposed project located across Banana Range and adjacent to Belmont State Forest. It will be comprised of 41 turbines and is currently in the development phase, having received all necessary planning approvals. The Project intersects land parcels belonging to the Banana Range Wind Farm as it travels within the foothills of Banana Range prior to its connection into the Mt Benn Substation.

There are no known scenic lookouts in proximity to the Project.

14.1.3 *Landform, hydrology, and rural land use*

Landform across the Project area and wider landscape is varied. In the east lies the elevated Banana Range (550 m AHD) on which the Belmont State Forest is located. The foothills of the Banana Range and western side of the Project area is relatively flat, with several knolls scattered throughout the landscape, including Mount Tam (483 m AHD), Little Uncle Tom (435 m AHD), Mount Breast (354 m AHD), and Flat Top Mountain (401 m AHD). As the transmission line connects into the Mt Benn Substation, it passes to the east of Mount Benn (520 m AHD).

The main watercourse to the west of the Project area is the Dawson River. Several significant tributaries to the Dawson River are crossed by the transmission line, including Castle Creek in the south, followed by Lonesome Creek and Banana Creek in the north.

Under the Banana Shire Planning Scheme 2021, most of the Project area is zoned as 'rural' and land use is predominantly grazing for livestock production (predominantly beef cattle).

14.1.4 *Visual receptors*

There are currently very few residents living in this rural area. Viewers (visual receptors) who may experience views of the Project are likely to include:

- residents living on rural properties surrounding the Project area
- workers on surrounding rural properties
- travellers on the state (particularly the Dawson Highway) and local roads within the Project area.

Intermittent views of the transmission line may also be visible to:

- recreational users walking in the landscape including those visiting Belmont State Forest, noting that there is limited information on the use of the Belmont State Forest for recreation purposes.
- recreational users using the local river systems for kayaking/canoeing, noting that some water features are only navigable during the wet season.

Due to the distance and topography, the Project is unlikely to be visible from the surrounding towns of Banana, Theodore, or Biloela.

Based on these visual receptors, viewpoints were assessed to provide an indication of the potential visual impact of the Project.

14.2 Potential impacts and mitigation measures

14.2.1 *Landscape amenity*

An evaluation of the overall potential impacts on landscape amenity was based on the sensitivity of the existing landscape to change and the magnitude of change resulting from the Project's development. Based on the criteria in Table 14.2, the area was assessed as having a moderate landscape sensitivity and moderate magnitude of impact:

- Sensitivity: a landscape with limited values and presence of similar/other disturbance.
- Magnitude: isolated but substantial instances of landscape character impact that could be reversed with intensive efforts.

Based on this assessment the overall impact on the visual and landscape character of the area has been assessed as low (refer Table 14.1).

14.2.2 Visual amenity

The likely visual impact of the Project area is anticipated to be from nearby residential properties, the Dawson Highway, between Moura and Biloela, and within Belmont State Forest. The visual sensitivity most of the area surrounding the transmission line and substation site is considered minor due to the separation distance between visual receptors and the Project area (refer Table 14.3). In the central and southern section of the Project area, where it passes through areas of open grazing land with residences present within 2.5 km of the alignment, visual sensitivity is considered high.

The visual impact created by the construction of the transmission lines will vary along the Project area, based on the viewing opportunities and distances from the transmission line. The main visual impact will result from towers spaced generally between 400 and 500 m apart, and approximately 50 m high. Overall, the magnitude of visual impacts of the Project are considered moderate on a regional scale, with some localised visual impacts to residences in the central and southern end of the Project area where it passes through open cleared areas.

Table 14.3 Significance of impacts to visual amenity

Viewpoint	Sensitivity	Magnitude	Significance
Surrounding residences	High	Moderate	Medium
Dawson Highway	Minor	Moderate	Low
Belmont State Forest	Minor	Moderate	Low

14.2.2.1 Surrounding residences

There are ten residences within 2.5 km of the transmission line, with the closest being approximately 340 m away. Residences in the greater landscape benefit from views of Banana Range, farmland, undulating topography, and areas of mature vegetation. Some of these features can aid in concealing the infrastructure.

The primary visual effect will be the introduction of transmission towers and conductors that will traverse in proximity to residences. In most instances the vegetation within and topography of the landscape will screen the proposed transmission line from the closest residential receptors to an extent. In particular, vegetation along a tributary of Castle Creek is likely to provide a degree of screening of the transmission line from the closest residence.

While vegetated areas in the landscape can provide a significant degree of visual screening to residences, vegetation clearing will be required to construct the Project and associated off-easement access tracks. In the central and southern sections of the Project area where it passes through areas of open grazing land, with residences present within 1 km of the alignment, the overall significance of the visual impact has been assessed as medium.

14.2.2.2 Dawson Highway

The Dawson Highway is the main viewshed for visual receptors likely to be impacted by the Project. The road has a bend which wraps around the connection point of the transmission line into Mt Benn Substation. This connection point is offset from the road by approximately 4 km. The landscape on either side of the highway is mostly comprised of grass fields and sparse mature vegetation. Prior to the transmission line connecting in the substation, it passes atop Mt Benn which has an elevation of 520 m AHD. The key impact to this location will be the transmission towers which will be visible to road users. The length of the Dawson Highway that wraps around the portion of the transmission line that connects into the Mt Benn Substation is approximately 15 km.

The Moura Coal Rail System and existing Powerlink 132 kV transmission line between Moura and Biloela are currently present within the landscape and are in closer proximity to the Dawson Highway, reducing the impact of the Project on this viewpoint. The Banana Range Wind Farm, when developed, will also be visible in the landscape from the Dawson Highway as it extends atop the Banana Range.

Furthermore, the Project crosses the existing Powerlink transmission line upon its connection into the Mt Benn Substation which reduces the sensitivity of the landscape to disturbance. The surrounding landscape is also undulating and may be able to shield the transmission line at certain points.

14.2.2.3 Belmont State Forest

The transmission line passes in the foothills of Banana Range, with Banana Range supporting Belmont State Forest. While limited details are known about the use and purpose of Belmont State Forest, State forests are protected for their significant ecological/resource value. While the state forest may be accessed and used by tourists and the community, use is considered to be minor as defined tracks within the area are limited. There are no known viewpoints within Belmont State Forest.

The co-location with infrastructure reduces the sensitivity of the landscape to disturbance. This is relevant along the northern portion of the transmission line, where it is positioned within land owned by the Banana Range Wind Farm.

The transmission towers will form a visible element of the viewshed within the local environment. However, this will not be a defining part of the landscape.

14.2.3 Mitigation measures

The visual impact on the surrounding visual receptors has been considered throughout the design of the Project. During the corridor selection process, the recommended corridor was positioned as far as practicable away from visual receptors and took advantage of screening by existing vegetation and topography where possible. Design of the transmission line and overall MID Disturbance footprint has considered visual impacts by incorporating the following measures, where practicable and to the greatest extent possible:

- locating transmission towers to minimise tree and other vegetation removal where practicable
- avoiding tower placement in locations that are potentially visually prominent from residences
- siting structures carefully and considering increases to tower heights to minimise disturbance of existing visually-sensitive vegetation and/or to span watercourses
- using the natural line of the landscape to reduce visibility and assist integration of the Project infrastructure.

However, due to the size of typical structures, which, at around 50 m, are taller than mature trees, it is not possible to fully 'screen' or 'hide' the transmission structures or associated infrastructure within the landscape. In these instances, landscape elements (landform, vegetation, hard elements as appropriate) that will interrupt sightlines from sensitive vantage points may be considered where a significant visual impact is identified; and particularly where nearby residences are likely to be affected (following consultation with landowners).

The EMP (Visual Amenity) (Appendix D) will also be followed during the construction phase of the Project to minimise visual amenity impacts, including:

- maintaining a neat and tidy worksite
- minimising Powerlink asset light spill over to neighbouring sensitive receptors (without compromising asset security requirements e.g. security lighting)

Measures to manage vegetation, dust, waste and other elements that have the potential to impact landscape and/or visual amenity are outlined in the EMP (Appendix D).

15 Social and economic

Chapter 15 provides an overview of the existing socio-economic environment and assesses the potential impacts to affected property owners and the local community during the construction and operation/maintenance phases. An analysis of the economic impacts of the Project on regional and local economies and business activity is provided, including existing businesses, general tourism, recreation, and agricultural activities. Given the sparse population within the Project area, the Project is not anticipated to have a significant impact on the socio-economic profile of the area during the construction or maintenance/operational phases of the Project. There are approximately 16 land parcels affected by the transmission line, with the process for land acquisition and compensation detailed below. Powerlink will continue to work closely with landholders prior to and during the construction period to address any concerns and ensure they are informed of upcoming Project activities and property specific access requirements are incorporated into the construction phase. Maintenance checks will be conducted regularly on the transmission infrastructure.

15.1 Existing environment

The transmission line commences at Theodore Wind Farm, approximately 22 km north-east of Theodore, and travels to the north for 55.4 km before connecting into the Mt Benn Substation. The Project area is located within the Banana Shire LGA, intersecting rural land holdings predominantly characterised by cattle grazing land. The closest population centres to the Project area are Banana (17 km south-west of Mt Benn Substation), Biloela (approximately 23 km east/north-east of Mt Benn Substation) and Theodore (approximately 32 km west of the Castle Creek Substation).

The Banana Shire LGA represents the regional community of interest, with the Project area within three State Suburbs namely Camboon, Castle Creek, and Tarramba. According to the Australian Bureau of Statistics (ABS) (ABS 2021a), these three state suburbs are inhabited by a total of 171 individuals. Since the area surrounding the Project is sparsely populated, the LGA and three state suburbs have been used to determine the socio-economic status of the landscape.

Relevant stakeholders (local and regional) and consultation activities are detailed in Chapter 27 (Community and stakeholder engagement).

15.1.1 Social environment

15.1.1.1 Regional social characteristics

The Banana Shire LGA is within a rural environment with a population density of just 0.5 people/km². In 2024, the residential population was estimated at 15,053 people which is 0.3 percent of the Queensland population. This is an increase of 0.6 percent since 2019. For comparison, Queensland's population increased by an estimated 1.9 percent over the same period.

In 2046, the population for Banana Shire Council LGA is projected to be 14,150 persons (or 0.2 percent of the Queensland population in 2046). The average annual growth rate between 2021 and 2046 for the LGA is expected to decline by 0.1 percent while Queensland is expected to increase by 1.4 percent.

The Banana Shire Council describes the area as containing a 'rich history and a strong future built on the back of grazing and cropping agricultural enterprises and the continuing expansion and development of mining, gas, manufacturing industries, and niche businesses'.

Based on the region's Socio-Economic Indexes for Areas (SEIFA), the region has a small area of the most disadvantaged quintile, with majority of the area comprised of quintile 3 and 4 implying the area has some to moderate advantage (ABS 2021a). This rating measures social and economic conditions in geographic areas across Australia and ranks the regions to reflect the level of disadvantage of social and economic conditions. This may include assessments of the proportion of low-income earners, low education attainment in the region and whether the area has high unemployment and reduced access to transport.

15.1.1.2 State suburb summary

State suburb level figures have been provided for high level indicators across the Project area as per Table 15.1. The area surrounding the Project is characterised by a sparsely populated, relatively young population. While Castle Creek increased in population size between 2016 and 2021 (from 27 to 57, respectively), in line with Queensland, both Camboon and Tarramba had decreases in population.

Table 15.1 State suburb population statistics

State Suburb (SSC) area	2016 Population	2021 Population	Male (%)	Female (%)	Median Age
Camboon	93	76	52	48	37
Castle Creek	27	57	52.5	47.5	38
Tarramba	57	38	57.1	42.9	36
Queensland	4,703,193	5,156,138	49.3	50.7	38

Source: ABS 2021b Census of Population and Housing

15.1.2 Economic environment

15.1.2.1 Regional economic characteristics

The Banana Shire LGA is a significant agricultural production area comprised largely of beef cattle production but also dry land and irrigated cropping, horticulture and forestry. Following the 2021 Census (ABS 2021b), the main industry identified in the Banana Shire LGA was agriculture, forestry and fishing, followed by mining and, health care and social assistance. The agricultural industry is well supported by 'favourable climatic and soil conditions, proximity to major markets, established service centres and labour force and existing freight, water and electricity infrastructure' (Banana Shire Council 2025a).

At the time of the 2021 Census, Beef Cattle Farming was the largest industry of employment for the Banana Shire LGA, employing 12.7 percent of the region's labour force. While the region was previously known for sheep stations, sheep have been replaced by a wide variety of cattle breeds and open country has been cultivated to produce wheat, sorghum, legume crops and cotton. The gross value of livestock production from the Banana Shire LGA in 2010–2011 was \$151.8 million (Banana Shire Council 2025a). The next largest industry was coal mining (12.2 percent). The Banana Shire LGA contains significant mineral, coal, gas and extractive resources including established underground and open-cut thermal and coking coal mining, minerals and coal seam gas (CSG) extraction. This resource sector is anticipated to expand as a result of new mining operation, CSG extraction, presence of existing infrastructure, and proximity to Gladstone Port.

Managers were the largest occupation group of employment within the LGA, with 19.5 percent of the region's labour force identified. Technicians and trades workers (15.5 percent), machinery operators and drivers (14.6 percent) and labourers (13.3 percent) were also fields where large numbers of individuals were employed. Construction activity in the Banana Shire LGA has resulted from consistent population growth and activity stemming from the mining and resource and agricultural sectors. Biloela accommodates most of the growth with Moura being the second most populous town.

The 2021 Census determined that the median weekly personal income was \$856 in Banana Shire LGA, which is higher than the median weekly income for Queensland (\$787). The proportion of households with a weekly income greater than \$3000 is 21.9 percent, which is equal to the proportion of households in Queensland.

Much of the LGA is experiencing very low unemployment figures recording unemployment rates under 2 percent at the time of the 2021 Census.

15.1.3 *State suburb summary*

A summary of the economical characteristics of the state suburb areas, as reported by the Australian Bureau of Statistics (ABS, 2021b), are summarised below. This includes information about the number of dwellings, people per household, employment in the labour force and the median income and mortgage repayments.

15.1.3.1 *Camboon*

In Camboon, there is a total of 29 private dwellings, with an average of 3.1 people per household. The median weekly household income is \$1,875 and the median monthly mortgage repayment is \$1,300. Salaries in Camboon are above the median weekly income in Queensland (\$1,675) and monthly mortgage repayments are lower than the median monthly mortgage repayments for Queensland (\$1,733). A total of 40 individuals (53 percent of the population) are employed in the labour force, of which 28 individuals (70 percent) work full-time and 3 individuals (7.5 percent) are employed part time.

The three greatest occupational roles in Camboon include managers (24 individuals), labourers (11 individuals) and technicians and trades workers (five individuals). Agriculture, forestry, and fishing employ the majority of people (29 individuals) with a smaller proportion of the population working in mining (six individuals), health care and social assistance (four individuals), and construction (three individuals).

15.1.3.2 *Castle Creek*

Castle Creek is comprised of a total of 25 dwellings, with an average of 2.9 people per household. The median weekly household income is \$3,124 while the median monthly mortgage repayment is \$2,708. Salaries in Castle Creek are above the median weekly income in Queensland (\$1,675), while monthly mortgage repayments are higher than the median monthly mortgage repayments for Queensland (\$1,733). A total of 31 individuals (54 percent) of the population are employed in the labour force, with 28 individuals (90.3 percent) employed full time and three individuals (9.7 percent) working part time.

The three greatest occupational roles include managers (18 individuals), clerical and administrative workers (five individuals) and labourers (four individuals). Majority of employed individuals work in agriculture, forestry and fishing (24 individuals) with a smaller proportion working in mining (three people) and health care and social assistance (three people).

15.1.3.3 *Tarramba*

Tarramba contains a total of 22 dwellings, with an average of 2.8 people per household. The median weekly household income is \$2,124 while the median monthly mortgage repayments being \$2,383. Salaries in Tarramba are above the median weekly income in Queensland (\$1,675), while monthly mortgage repayments are higher than the median monthly mortgage repayments for Queensland (\$1,733). A total of 22 individuals (57.9 percent) of the population are employed in the labour force, with 18 individuals (81.8 percent) working full time and four individuals (18.2 percent) working part time.

According to the Australian Bureau of Statistics (ABS, 2021b), the greatest occupational role is a manager (19 individuals). The main industry of employment is agriculture, forestry and fishing (10 individuals), with fewer individuals working in health care and social assistance (four individuals).

15.2 Potential impacts and mitigation measures

15.2.1 *Population and community profile*

Given the sparse population within the Project area, the Project is not anticipated to have a significant impact on the socio-economic profile of the area during the construction or maintenance/operational phases of the Project. As the construction phase is temporary, and workers are not proposed to be permanently relocated to the region, elements of the community are not anticipated to be impacted to a noticeable level.

During construction, there will be a temporary influx of workers into the region. At the peak of construction, it is estimated that a workforce of 145 people will be required (refer Section 3.8). Local short-term accommodation will be sourced for this workforce (refer Section 3.8).

The operational phase of the Project is not anticipated to have any material impact upon the demographic profile of local and regional populations. Workers will travel to the Project area during the operational phase to undertake maintenance activities, however, it is short term and temporary in nature.

15.2.2 *Impacted property owners*

There are approximately 13 land parcels affected by the transmission line, with an additional 6 land parcels containing access tracks and/or the Castle Creek Substation.

Many of the affected property owners have a historical connection to their properties and the community. It should be recognised that owners operate and manage agricultural activities as businesses on their properties and grazing is the predominant land use in the affected area.

There is no residential development near or within the Project area and, as such, impacts to residences are in relation to rural homesteads. Most of the properties surrounding the Project area are large blocks. Subdivision of properties into small residential lots is not present near the Project area, as seen closer to more urbanised areas.

There is evidence that considerable investment in relevant infrastructure (e.g. swimming pools, stables, horse riding arena) has been made on these properties to accommodate the various industries and lifestyles enjoyed by property owners.

Powerlink will continue working closely with affected landholders to ensure they are informed of upcoming Project activities and property specific access requirements are incorporated into the construction phase.

15.2.3 *Social Impact Assessment and Management Plan*

Powerlink is undertaking a Social Impact Assessment (SIA) and developing a Social Impact Management Plan (SIMP) due for completion mid-2026.

The SIMP will outline management measures aligned with the following five key matters: workforce management, housing and accommodation, local business and industry procurement, health and community wellbeing, and community and stakeholder engagement.

As a part of the SIA process, engagement was undertaken, and included engagement with stakeholders to:

- understand stakeholder and community insights, interests and concerns regarding the proposed Project
- identify and understand potential social impacts and opportunities as well as ways in which these can be avoided, managed, mitigated or for opportunities, enhanced.

The first of two rounds of engagement was completed with relevant stakeholders in July 2025. The second round of engagement is expected to be undertaken in November 2025.

During round one engagement, stakeholders shared insights across all five key matters. For example, delivering local and Indigenous business and workforce opportunities, enabling good workforce management such as reducing the use of local medical services, managing demand on housing and short-term accommodation providers, and delivering lasting benefits for communities.

15.2.4 *Land acquisition and compensation process*

Acquisition of the transmission line easements and substation site for the Project will be undertaken in accordance with the *Acquisition of Land Act 1967*. Compensation will be paid to landowners directly affected by the Project.

Powerlink is committed to treating property owners fairly and to not financially disadvantage them by the corporation's activities. Compensation is assessed to reflect the difference between the market value of the property before and after the easement is acquired.

The following items are considered in assessing the amount of easement compensation:

- restrictions to the landowner on the use of the easement area
- loss of land for structure sites
- effect of Powerlink access tracks on the property
- loss of any commercial or useable timber
- visual impact of the transmission line and or substation site on the property
- impact on residential improvements and any effect on the balance of the property
- allowance for disturbance during the construction period
- legal, valuation, and any associated costs.

Market value is determined according to recent sales of similar properties in the area, but an allowance is made if such sales have occurred under abnormally depressed conditions resulting from factors such as drought. Market value is an indication of the present value of future potential of the property.

Under the Acquisition of Land Act, a registered property valuer (under the Queensland Valuers Registration Board) assesses compensation. An independent valuer engaged by Powerlink will be appointed to assess compensation. The landowner can seek independent valuation and legal advice. Powerlink will meet reasonable cost for the landowner to seek independent advice, provided that an agreement on compensation can be subsequently reached with Powerlink.

If agreement on compensation cannot be reached, either party can refer the matter to the independent Land Court for a decision. That decision is binding on the parties, and the Court will also determine who pays the associated professional costs.

Appropriate compensation is a key issue for many property owners as noted during consultation. While Powerlink will compensate property owners for the easement, efforts will be made to reduce property impacts by locating structures and access tracks in areas with least impact, where feasible, and incorporating appropriate construction timing to accommodate property activities.

15.2.5 *Economic effects*

15.2.5.1 *Local benefits*

It is unlikely the Project will directly impact the economic profile of the area. However, the construction of this electricity transmission infrastructure will assist and support the region's economic development into the future.

The construction phase will take approximately 2 years and see a small influx (up to approximately 145 workers) in the temporary population as construction workers move to the area. Specialist contractors will be engaged by Powerlink Queensland to construct the transmission line and substations. These workforces will require food, accommodation, and fuel and will likely indirectly contribute to the economic environment. Local contractors and labour will be engaged for components of the construction phase where possible.

During operation, Powerlink employees will be required to travel to the Project for regular maintenance activities. Powerlink employees are likely to stay with the region at existing accommodation facilities, as well as spend money for food, fuel, and a range of other potential services. During both construction and operation there is a potential for a direct benefit to the local community, in employment and provision of local services.

The Project is required to connect Theodore Wind Farm to the national electricity market. This will play a key role in driving economic growth and diversifying the service offering in the region. Other benefits associated with the Project include supporting the diversification of Queensland's electricity generation mix and supporting both the Commonwealth Renewable Energy Target and State planning intent.

15.2.5.2 Property impacts

Powerlink recognises that a new transmission line and a substation in an area can have perceived adverse effects on overall amenity for the area and has introduced several measures in an attempt to alleviate this effect. These include consideration of tower locations, minimising vegetation clearing, landscaping, and a community benefits program to assist with community projects.

It is Powerlink's experience that property devaluation can occur as a result of impacts from transmission line or substation development, including:

- management of stock in proximity of the transmission line
- noise emissions from the operation of machinery
- dust emissions associated with earthworks
- traffic disruptions.

These impacts are discussed further in Chapter 13 (Land use, existing infrastructure, and Native Title) and Chapter 18 (Transport and traffic). Powerlink will continue to work closely with landholders prior to and during the construction period to ensure they are aware of the type, location, and timing of construction activities on their properties and to minimise construction impacts where possible.

The transmission line and substations will introduce a new permanent item into the visual landscape. Visual impacts and potential mitigation measures are addressed in detail within Chapter 14 (Visual amenity). It was concluded that the overall impact on visual amenity would be low to moderate.

Transmission line noise is not expected to be audible at any residence, nor will any property owners be affected by any noise or vibration generated by the substation. Noise and vibration impacts and mitigation measures will be considered by Powerlink and are addressed in Chapter 19 (Noise and vibration). Maintenance checks will be conducted regularly on the transmission infrastructure.

16 Indigenous cultural heritage

Chapter 16 summarises the Due Diligence Assessment prepared by Niche and identifies the relevant Aboriginal Parties and cultural heritage values within the Project area. The Gaangalu Nation People, Wulli Wulli People, and Wulli Wulli People #3 are listed as the Aboriginal Parties for the Project area. A search of the Project area boundary in the Aboriginal and Torres Strait Islander Cultural Heritage Database and Register revealed that there are no previously recorded Aboriginal sites either in or within 100 m from the Project area. A cultural heritage risk assessment was undertaken to understand the risk profile for the Project. It was determined that the likelihood of Aboriginal use, finding Aboriginal cultural heritage, archaeological potential, and potential to damage cultural heritage items is high in parts of the Project area where remnant vegetation is present, and disturbance has not occurred. Due to the significant ground disturbance expected from the Project, mitigation measures will be implemented to protect any known and unknown cultural heritage values within the Project area.

16.1 Existing environment

16.1.1 Desktop assessment

An indigenous cultural heritage due diligence assessment was conducted by Niche to assess and manage risks related to the Project (Appendix F). A search of the Aboriginal and Torres Strait Islander Cultural Heritage Database and Register conducted on 10 April 2025 found that:

- no Aboriginal cultural heritage site points were recorded in the Project area or within 100 m of the Project area boundaries
- no Aboriginal or Torres Strait Islander cultural heritage site polygons were recorded in the Project area boundaries
- no Designated Landscape Areas (DLAs) were recorded in the Project area
- no Registered Cultural Heritage Study Areas were recorded in the Project area
- no National Heritage Areas (Indigenous values) were recorded in the Project area
- Gaangalu Nation People, Wulli Wulli People, and Wulli Wulli People #3 are listed as the Aboriginal Parties for the Project area (Table 16.1)
- Wulli Wulli Nation Aboriginal Corporation RNTBC Cultural Heritage Body is listed as the cultural heritage body for the Project area (Table 16.2)
- one Cultural Heritage Management Plan (CHMP) recorded in the Project area (Approved CHMP – Dawson Wind Farm with Wulli Wulli People).

Table 16.1 Registered Aboriginal Parties for the Project area

Aboriginal Party	Federal Court no.	Contact
Gaangalu Nation People	QUD33/2019	Gaangalu Nation People Saylor Legal AMP Building PO Box 4017 VINCENT QLD 4814 Phone: (07) 4431 0074 Mobile: 0474 244 447 Email: david@saylorlegal.com.au

Aboriginal Party	Federal Court no.	Contact
Wulli Wulli People	QUD6006/2000	c/- Ted Besley Legal Practice Director Lithic Legal Pty Ltd Level 17, 110 Mary Street, Brisbane Qld 4000 Ph: (07) 3211 4478 Email: t.besley@lithiclegal.net.au
Wulli Wulli People #3	QUD619/2017	c/- Ted Besley Legal Practice Director Lithic Legal Pty Ltd Level 17, 110 Mary Street, Brisbane Qld 4000 Ph: (07) 3211 4478 Email: t.besley@lithiclegal.net.au

Table 16.2 Cultural Heritage Body for the Project area

Cultural heritage body	Departmental ref. no.	Registration date	Contact
Wulli Wulli Nation Aboriginal Corporation RNTBC	CHB015527	11/02/2016	c/- Ted Besley Legal Practice Director Lithic Legal Pty Ltd Level 17, 110 Mary Street, Brisbane Qld 4000 Ph: (07) 3211 4478 Email: t.besley@lithiclegal.net.au

16.1.2 Risk assessment

The Aboriginal cultural heritage risk profile for the Project area is based on:

- the likelihood that Aboriginal people used the area in the past
- the nature of the local environment and previous level of disturbance
- whether any archaeological remains of that occupation are still present (archaeological potential)
- the nature of the proposed Project activities.

The Project area has experienced significant environmental change due to colonial expansion into the area by the 1850s. Heavy agricultural and mining land use means the landscape has experienced significant clearing and ground disturbance, especially on the surface. A summary of the Aboriginal cultural heritage risk profile for the Project area is provided in Table 16.3.

Table 16.3 Aboriginal cultural heritage risk profile for the Project area

Criteria	Assessment	Risk profile
The likelihood that Aboriginal people used the area in the past.	It is highly likely that Aboriginal people used this area in the past, as its waterway network would have supported important food resources. Furthermore, the wider area contains numerous cave sites which contained various cultural artefacts including art, indicating long-term occupation within the area. The location of these site types on the surrounding mountain ranges, in conjunction with water accessibility within the region, may have also resulted in the Project area having been used as a transport corridor.	High The likelihood of Aboriginal use of the Project area in the past is high.
The nature of the local environment and previous level of disturbance.	Most of the Project area has been subjected to varied significant ground disturbance and surface disturbances. Aerial imagery shows evidence of significant ground disturbance and surface disturbance in the form of vegetation clearance along the western extent of the Banana Range at least by 1960. This is consistent with the agricultural history of the area. Between 1960 and 2000, there were no significant changes to the Project area in terms of vegetation or waterways. Most of the Project area was seen to have been cleared, and experienced significant ground disturbance, with some remaining areas of vegetation persisting mostly in the northern half.	Low – high The likelihood of finding Aboriginal cultural heritage in the disturbed areas is low. The likelihood of finding Aboriginal cultural heritage in parts of the Project area where remnant vegetation is present, and disturbance has not occurred is high.
Whether any archaeological remains of that occupation are still present (archaeological potential).	Significant ground surface disturbance has occurred across most of the Project area. However, a few areas comprising of remnant vegetation remain. These areas are mostly situated in the northern extent of the Project area close to creeks. Ground disturbance is limited to vegetation clearing and agricultural activities with no high-intensity subsurface earthworks or development. DWATSIPM results identified no Aboriginal cultural heritage sites either in or within 100 m of the Project area. Many cultural artefacts and sites have however been previously identified from the surrounding area. The lack of previous archaeological assessments within the Project area may affect this lack of recorded sites.	Low – high The archaeological potential is low in the previously disturbed areas. The archaeological potential is high in areas containing uncleared vegetation, and where disturbance has not occurred.
The nature of the proposed Project activities.	Project activities within previously disturbed areas will be consistent with previous disturbance as significant ground surface disturbance has occurred in these areas (i.e. where vegetation clearing and erosion has occurred in the past). Project activities outside previously disturbed areas will be inconsistent with previous disturbance, e.g. uncleared vegetation.	Low – high The risk for harming cultural heritage is low in the previously disturbed areas. The risk for harming cultural heritage is high in areas containing uncleared vegetation, and areas where disturbance has not occurred.

16.1.3 Summary of key desktop findings

The desktop assessment completed by Niche reviewed all statutory and relevant non-statutory cultural heritage matters relevant to the Project area (refer Appendix F). The key findings include:

- Within the Commonwealth, State, or Local Government heritage databases there are no registered historical heritage sites located in or within 100 m from the Project area. A search of the Project area boundary in the Aboriginal and Torres Strait Islander Cultural Heritage Database and Register revealed that there are no previously recorded Aboriginal sites in or within 100 m from the Project area.
- No registered Aboriginal or historical heritage sites were identified in any of the non-statutory databases utilised.
- Despite a lack of results in both statutory and non-statutory databases, there is clear evidence that both sites of historic and Aboriginal significance are within the wider area. Additionally, the absence of evidence may be a result of a lack of previous archaeological assessments within the Project area.
- There are traces of remnant vegetation spread throughout the Project area, especially in the corridor section where the powerlines will be. As a result, the area contains a variety of land use and disturbance types.
- Since colonial settlement of the area around the 1850s, a transformation of the landscape has occurred, predominantly towards agriculture use. As such, the region enveloping the Banana Shire Council has been significantly disturbed, especially in terms of the ground surface. The area also has an extensive mining history, with Dawson Mine being the closest to the Project area. The town of Theodore was set up in the 1920s to further support agriculture and involved the establishment of an irrigation scheme. The area contains a vast network of waterways and has been previously identified as an area of interest regarding damming.
- The wider region is culturally significant to various Aboriginal groups, which is evident in the number and types of cultural sites. Rock shelters containing art are recorded within the wider region east and south of the Project area and have been associated with a range of cultural artefacts and hearths. The oldest dated site is in Carnarvon Gorge, west of the Project area and suggests an occupation date of at least ~19,000 years before the present day.
- The desktop assessment suggests that the land may have been used previously by Aboriginal people as a connection route for Aboriginal people to traverse the landscape and likely as an area with abundant food availability and resources.

16.2 Potential impacts and mitigation measures

16.2.1 Duty of Care category

The *Aboriginal Cultural Heritage Act 2003* (Queensland) (ACH Act), administered by the DWATSIPM, 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 acting under a native title agreement or other agreement with an Aboriginal Party.

The Duty of Care Guidelines set out a framework that assists land users ensure they take reasonable and practical measures with regards to the key protection provision of the ACH Act. The Duty of Care Guidelines set out a system to categorise the nature of an activity to understand the potential for any activity to impact upon significant Aboriginal cultural heritage values. The criteria that determine this categorisation consider the likelihood of any activity to cause surface disturbance and the appropriate procedure to commence the activity. Table 16.4 provides a summary of the five categories of recognised under the Duty of Care Guidelines.

Table 16.4 Summary of the activities categorised under the Duty of Care Guidelines

Category	Description
Category 1	Where an activity involves no surface disturbance of an area it is generally unlikely that the activity will harm Aboriginal cultural heritage, and the activity will comply with the DoC guidelines. These activities may include walking, driving along existing roads and tracks, aerial surveys, navigating through water, and GPS survey that does not include surface disturbance. These activities are unlikely to alter the formation or destroy Aboriginal cultural heritage values. It is reasonable and practicable for the activity to proceed without further cultural heritage assessment.
Category 2	Where an activity causes no additional surface disturbance of an area it is generally unlikely that the activity will harm Aboriginal cultural heritage or could cause additional harm to Aboriginal cultural heritage to that which has already occurred, and the activity will comply with the Duty of Care guidelines. These activities may include cultivation of an area that is currently used for cultivation, cattle grazing overgrazed land, use and maintenance of existing roads, tracks and powerlines within the existing infrastructure alignment etc. It is reasonable and practicable for these activities to proceed without further cultural heritage assessment.
Category 3	Where an activity is proposed in a developed area it is generally unlikely that the activity will harm Aboriginal cultural heritage, and the activity will comply with these Duty of Care guidelines. In these circumstances, it is reasonable and practicable that the activity proceeds without further cultural heritage assessment. Examples of the types of activities that may generally proceed within a developed area include the use and maintenance of existing roads, tracks and power lines within the existing alignment, or other infrastructure footprint or the use and maintenance of services and utilities (such as electricity infrastructure; water or sewerage disposal) on an area where such services and utilities are currently being provided.
Category 4	Where an activity is proposed in an area that has previously been subject to significant ground disturbance it is generally unlikely that the activity will harm Aboriginal cultural heritage and the activity will comply with these Duty of Care guidelines
Category 5	Activities causing additional surface disturbance . Where an activity is proposed under Category 5 there is generally a high risk that it could harm Aboriginal cultural heritage. In these circumstances, the activity should not proceed without a cultural heritage assessment. The DoC guidelines also note that particular care must be taken where it is proposed to undertake activities causing additional surface disturbance to 'features' considered likely to have cultural heritage significance and that if such features are present then it is necessary to notify the Aboriginal Party.

The assignment of a Duty of Care Category relies on two sources of information, being the degree of disturbance caused by the proposed Project activities and the extent of previous land disturbances. Table 16.5 outlines these criteria and the Duty of Care category assessment for the Project.

Table 16.5 Duty of Care category assessment for the Project area

Project activity	Known cultural heritage sites	Previous disturbance	Consistent with previous land use?	Duty of Care category
Castle Creek Substation construction	No known cultural heritage sites within this Project activity area.	Significant land clearance for the purpose of agriculture has affected this Project activity area.	Yes, the Project activity is consistent with previous land use.	The Project activity is identified as having a Duty of Care category of 4 due to the high degree of surface ground disturbance.

Project activity	Known cultural heritage sites	Previous disturbance	Consistent with previous land use?	Duty of Care category
Transmission line construction	No known cultural heritage sites within this Project activity area.	Significant land clearance for the purpose of agriculture has affected most of this Project activity area.	The Project activity is mostly consistent with previous land use. Cleared sections of the Project activity area are consistent with the previous land use. Areas containing remnant vegetation and areas in proximity to known waterways have not been subject to significant ground disturbance in the past. Therefore, the proposed activity would not be consistent with previous land use.	The Project activity is identified as having a Duty of Care category of 4 for cleared areas due to the high degree of surface ground disturbance. Areas containing remnant vegetation will be classified as having a Duty of Care category of 5.

While the Project area has significant ground disturbance and there is a low number of recorded Indigenous cultural heritage sites within the area, there is potential that works associated with the Project may disturb unknown items of cultural heritage. The risks of disturbance to items of Indigenous cultural heritage are greatest within the previously undisturbed areas of the Project area. The following measures are recommended to minimise impacts to Indigenous cultural heritage:

- Care should be taken to avoid impact to waterways and remnant vegetation. Activities within these areas are identified as category 5 Duty of Care, requiring a cultural heritage assessment and engagement with relevant aboriginal parties
- Where an activity is assessed as Category 4, although not required under the Duty of Care Guidelines, it is recommended that the relevant aboriginal party is engaged to discuss the Project in relation to areas assessed as Category 4.
- All site personnel should be provided with a cultural heritage induction prior to the commencement of the development. This induction should include a procedure to be followed if unexpected cultural heritage finds are identified during the activity or if human remains are identified.
- All activities for the Project should be undertaken with an appropriate unexpected finds procedure in place.

Powerlink 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 each of the Aboriginal Parties, in accordance with the ACH Act.

Powerlink has established processes and has significant experience working closely with Traditional Owners for the management of cultural heritage risks in transmission line development. Powerlink has established cultural heritage management arrangements with all identified traditional owner groups for the Project. This includes an existing Whole-of-Claim CHMA with the Gaangalu Nation People, executed in 2015, and project-specific CHMAs executed with the Wulli Wulli People and Wulli Wulli People #3 in June 2026. The CHMAs are considered ‘another agreement’ in accordance with Part 3, Section 23(3)(a)(iii) of the Aboriginal Cultural Heritage Act 2003.

Since November 2024, Powerlink has been engaging with the Gaangalu Nation People, Wulli Wulli People and Wulli Wulli People #3 regarding cultural heritage management and compliance for the Project. Engagement with the

Traditional Owners is ongoing and will continue throughout the duration of the Project in accordance with the relevant CHMAs.

In accordance with the CHMAs, Powerlink will undertake cultural heritage surveys and prepare associated reports with each Traditional Owner group and their technical advisors prior to construction activities. These surveys will inform the identification, assessment and management of Aboriginal cultural heritage values within the Project area and surrounding vicinity.

Based on the outcomes of these surveys, Powerlink will implement cultural heritage management measures in consultation with the relevant Traditional Owners, including avoiding or mitigating impacts to identified cultural heritage constraints where reasonable and practicable, and implementing clear procedures for the management of unexpected finds and human remains.

Powerlink will also prepare a Cultural Heritage Implementation Document (CHID) to capture the cultural heritage management measures required for the Project and to ensure these measures are appropriately communicated and implemented by relevant Powerlink personnel and contractors.

All Powerlink staff and contractors involved in the Project will be required to complete cultural heritage inductions prior to the commencement of works.

The locations and significance of the sites identified from database searches will be confirmed through surveys conducted under the CHMAs.

17 Non-indigenous heritage

Chapter 17 identifies any known and/or potential historical and landscape heritage values of the area potentially affected by the Project. Within the Commonwealth, State, or Local Government heritage databases there are no registered historical heritage sites located in or within 100 m from the Project area. The predominant land use in the area is agriculture which has resulted in the region being significantly disturbed, especially in terms of the ground surface. The area also has extensive history of mining. An unanticipated finds procedure will be developed for the unexpected discovery of historical heritage items.

17.1 Existing environment

A non-indigenous cultural heritage assessment was conducted by Niche to identify non-indigenous historical and landscape heritage values within the Project area (Appendix F). Still, Powerlink will include the consideration of non-Indigenous cultural heritage within the CHID, which will contain clear procedures for the management of unexpected finds and human remains.

The findings from this assessment are summarised in this chapter.

17.1.1 *European settlement*

Some of the earliest records for colonial exploration into Central Queensland were of Ludwig Leichhardt in 1844, who travelled north from Jimbour into the Dawson Valley, and Major Mitchell in 1846, who travelled north-east from the western extent of Central Queensland through Tambo (Towner 1962).

The literature review undertaken found that since colonial settlement in the late 1880's, Central Queensland has been transformed into a landscape predominantly used for agriculture. Sugar cane plantations were one major aspect of agriculture in the region, especially between Mackay and Bundaberg. Another aspect of agriculture that thrived was sheep and cattle farming. The Laurel Bank Works of Rockhampton, which made tallow, was a significant business in the initial period of sheep and cattle agriculture (Bird 1904). Mining was another important aspect of economic and colonial population growth within Central Queensland, especially due to multiple gold mine sites supporting 'gold rushes' (Bird 1904; Mate 2014).

Banana Station, approximately 20 km west of the Project area, was in operation since at least 1855. Banana was established as a township in 1881, aided to some degree by the development created by the introduction of telegraph lines to Banana in 1865, and some rail infrastructure in the wider surrounding region. The township of Theodore, previously a part of Castle Creek, was established as a farming region with irrigation systems during the 1920s as a result of the acknowledgment of great soil quality (Elder 2023; Madsen & O'Mullen 2013). In the same time period, the first mine in the Banana Shire area opened up at Baralaba (Banana Shire 2025b).

The area also has various mining and quarry sites, with Dawson Mine, being the closest to the Project area (approximately 25 km west), established in the 1960s (AngloAmerican 2013).

17.1.2 Database searches

Desktop searches of relevant statutory and non-statutory registers/databases were undertaken on 11 April 2025 for the Project area with a 100 m buffer. The results of these searches are summarised in Table 17.1.

Table 17.1 Statutory and non-statutory database search results for non-indigenous heritage values within or close to the Project area

Register/database	Within the Project area	Within 100 m of the Project area
Statutory registers/databases:		
World Heritage List	None	None
National Heritage List	None	None
Commonwealth Heritage List	None	None
Queensland Heritage Register	None	None
Banana Shire Planning Scheme 2021 – Heritage overlay map	None	None
Banana Shire Local Heritage Register	None	None
Non-statutory registers/databases:		
National Trust of Australia (Queensland) Heritage Register	None	None
National Trusts of Australia Register of Significant Trees	None	None
Register of the National Estate	None	None
Queensland WWII Historic Places	None	None
Queensland Native Mounted Police Research Database	None	None

17.2 Potential impacts and mitigation measures

No places of non-indigenous cultural heritage were identified from statutory or non-statutory databases, within or adjacent to the Project area. As such, it is unlikely the Project will impact non-indigenous heritage values. The absence of evidence may be a result of a lack of previous assessments within the Project area (refer Appendix F). The Project should proceed with caution ensuring an unanticipated finds procedure is in place for the unexpected discovery of historical heritage items.

18 Transport and traffic

Chapter 18 presents a summary of the Traffic Impact Assessment (TIA) prepared by WSP in collaboration with Powerlink Queensland, in accordance with the Guide to Traffic Impact Assessment (GTIA) published by the Queensland Department of Transport and Main Roads (2018). The assessment covers both the construction and operational phases of the Project. The report found that the Project will generate minimal traffic during both construction and operation, with no significant impacts expected on the State-controlled road network, intersections, pavement conditions, or public and active transport infrastructure. Although some increases in traffic volumes and turning movements are anticipated, particularly during construction, these are considered negligible due to low existing traffic levels and will not affect operational performance. No sensitive transport infrastructure is located near the site, and road safety risks can be effectively mitigated through temporary signage during construction.

Following submission of this MID Proposal Report, a supplementary traffic assessment was undertaken in response to an information request from the DTMR. The assessment includes updated SIDRA modelling, turn warrant assessments for key State-controlled road intersections, and conceptual intersection layouts. The supplementary assessment confirmed that Project construction traffic would result in only minor changes to intersection performance, would not materially affect the operation of the surrounding road network, and that the existing intersection treatments are appropriate for the forecast construction traffic volumes.

All findings are documented in the TIA report (refer Appendix G, including the supplementary assessment prepared), in alignment with the GTIA and the supplementary Pavement Impact Assessment Guidelines (PIA).

18.1 Methodology

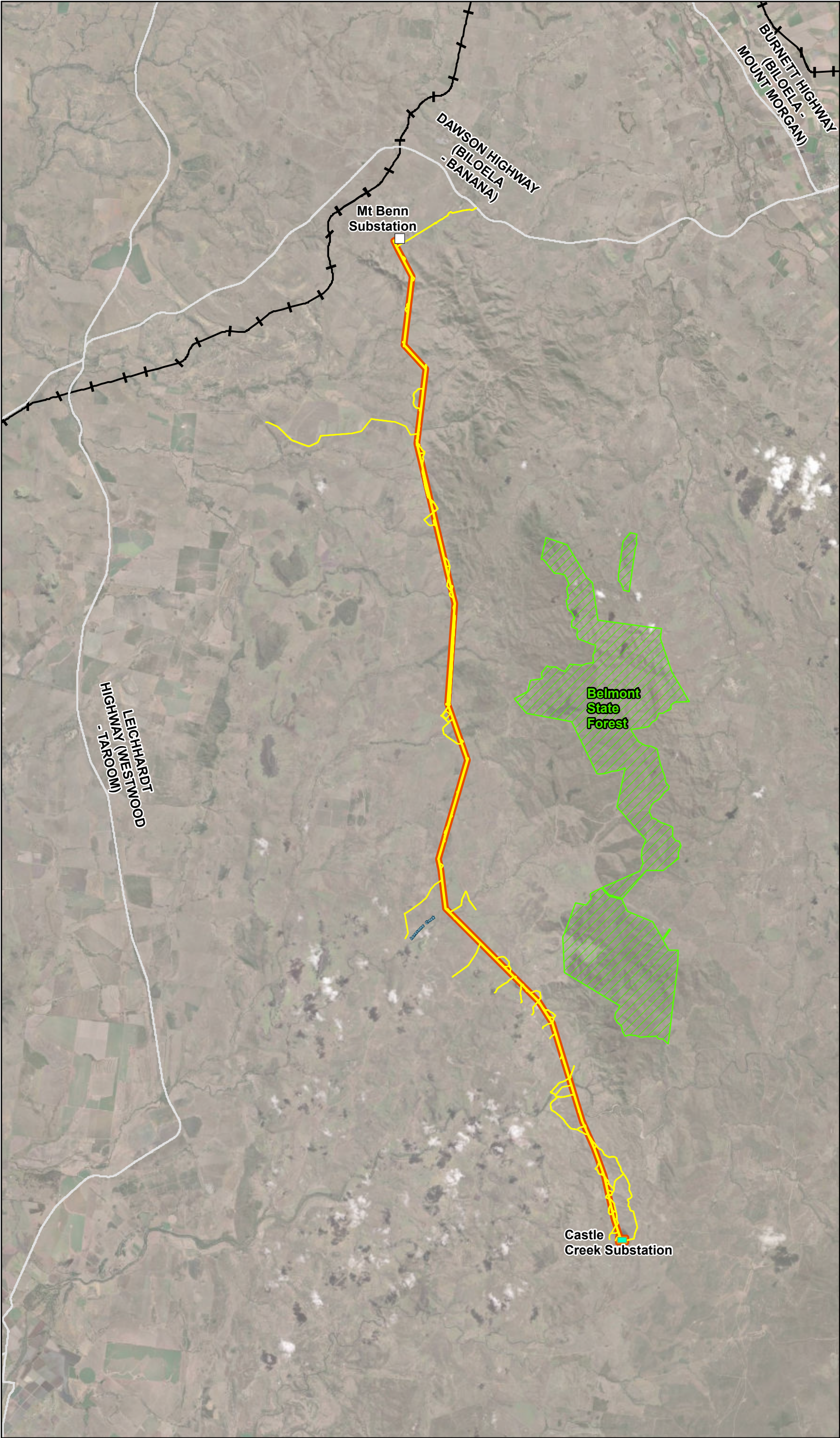
The TIA follows the methodology detailed in the GTIA which provides information about the processes to assess traffic-related impacts created by a proposed development, such as the construction and operation of the Project in this case. In line with the GTIA, the following methodology has been adopted:

- identification of access routes to the Project site
- estimation of the traffic generation for the construction and operational phases of the Project and assignment of this traffic to the identified access routes
- review of transport networks to establish existing conditions (i.e. no project)
- assessment of impacts resulting from the Project-generated traffic to the State-controlled road network in relation to:
 - road link capacity Level of Service (LOS)
 - pavement damage
 - intersection operation utilising Signalised and Unsignalised Intersection Design and Research Aid (SIDRA) Intersection Software
 - other transport facilities
 - road safety assessment
- identification of mitigations measures.

18.2 Existing environment

18.2.1 State-controlled road network

The existing State-controlled road network surrounding the Project site, which are expected to accommodate construction and operational vehicle movements associated with the Project, is illustrated in Figure 18.1. Access to the Project site will primarily be via the State-controlled road network, with key transport routes including the Leichhardt Highway (Route 26A – Westwood to Taroom) and the Dawson Highway (Route 46A – Gladstone to Biloela, Biloela to Banana, and Banana to Rolleston).

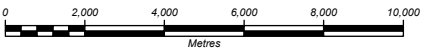
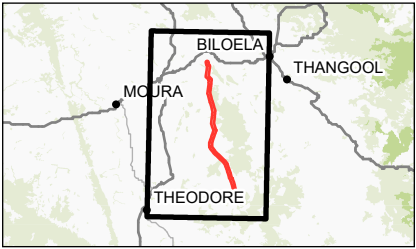


PS218956
Theodore Wind Farm Connection
Project

Figure 18.1
Existing state-controlled road
network in the vicinity of the Project

Legend

- Mt Benn Substation
- Castle Creek Substation
- ┌ Rail line
- Project area
- ▭ MID Proposal area
- ▨ State Forest
- State controlled road



Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
1:190,000
Date: 6/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government,
Native Vegetation: © Commonwealth of Australia (Geoscience Australia) 2016.
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18.2.2 Key road links

The key road links relevant to the Project are as follows.

18.2.2.1 Leichhardt Highway

This State-controlled road connects the towns of Banana in the north and Theodore in the south. It typically features a two-lane, two-way configuration with sealed shoulders and edge line markings. The highway traverses predominantly rural areas, with occasional urban sections. The posted speed limit is generally 100 km/h, with reductions in certain areas due to road geometry and proximity to urban centres. The Leichhardt Highway (facing south) in the vicinity of the Project is shown in Figure 18.2.



Source: Google Maps

Figure 18.2 Streetview of Leichhardt Highway

18.2.2.2 Dawson Highway

Also a State-controlled road, the Dawson Highway provides an east–west connection between Gladstone and Moura. Its typical cross-section includes two lanes, sealed shoulders, and edge line markings. The standard posted speed limit is 100 km/h, with localised reductions where road geometry or urban environments necessitate. The Dawson Highway (facing east) in the vicinity of the Project is shown in Figure 18.3.



Source: Google Maps

Figure 18.3 Streetview of Dawson Highway

18.2.2.3 Uncle Toms Road

Uncle Toms Road is a non-State-controlled, unsealed rural access road with a non-paved surface. It links the Leichhardt Highway to access tracks leading to the Project site. As it is not part of the State-controlled road network, potential impacts from Project-related construction and operational activities have not been assessed within the TIA. However, the intersection with the Leichhardt Highway has been evaluated to identify any potential impacts on the highway itself. Uncle Toms Road (facing east) in the vicinity of the Project is shown in Figure 18.4.



Source: Google Maps

Figure 18.4 Streetview of Uncle Toms Road

18.2.2.4 Defence Road

Classified as a Local Road of Regional Significance (LRRS) under local government jurisdiction, Defence Road connects the Leichhardt Highway in the north to Eidsvold Theodore Road in the south. It has a posted speed limit of 80 km/h and experiences very low traffic volumes. This road will serve as the primary access route for workforce commuting from Theodore and for heavy vehicle movements during the construction phase of the Project. Access to the Castle Creek Substation will also be via Defence Road. Defence Road (facing north) in the vicinity of the Project is shown in Figure 18.5.



Source: Google Maps

Figure 18.5 Streetview of Defence Road

18.2.3 Key intersections

Access to the Project site access routes by construction heavy vehicles and workforce and staff vehicles during the construction stage is supposed to be undertaken from the Dawson Highway and Leichhardt Highway via three existing intersections in proximity to the Project site.

18.2.3.1 Dawson Highway/Leichhardt Highway

This intersection is located approximately 17 km west of the Project site. The current configuration of the intersection is a priority-controlled T-intersection, consisting of a 100 m Auxiliary Left Turn (AUL) lane on the eastern approach and a 70 m Auxiliary Right Turn (AUR) on the western approach of the Dawson Highway. The intersection is shown in Figure 18.6.



Figure 18.6 Leichhardt Highway/Dawson Highway intersection

18.2.3.2 Leichhardt Highway/Uncle Toms Road

This intersection is located approximately 18 km west of the Project site. The current configuration of the intersection is a priority-controlled T-intersection, consisting of Basic Left (BAL) Turn Treatment on the northern approach and Simple Left (SL) Turn Treatment on the southern approach. The intersection is shown in Figure 18.7.



Figure 18.7 Leichhardt Highway/Uncle Toms Road intersection

18.2.3.3 Leichhardt Highway/Defence Road

This intersection is located approximately 20 km west of the Project site. The current configuration of the intersection is a priority-controlled T-intersection, consisting of Basic Left (BAL) Turn Treatment on the northern approach and Simple Left (SL) Turn Treatment on the southern approach. The intersection is shown in Figure 18.8.

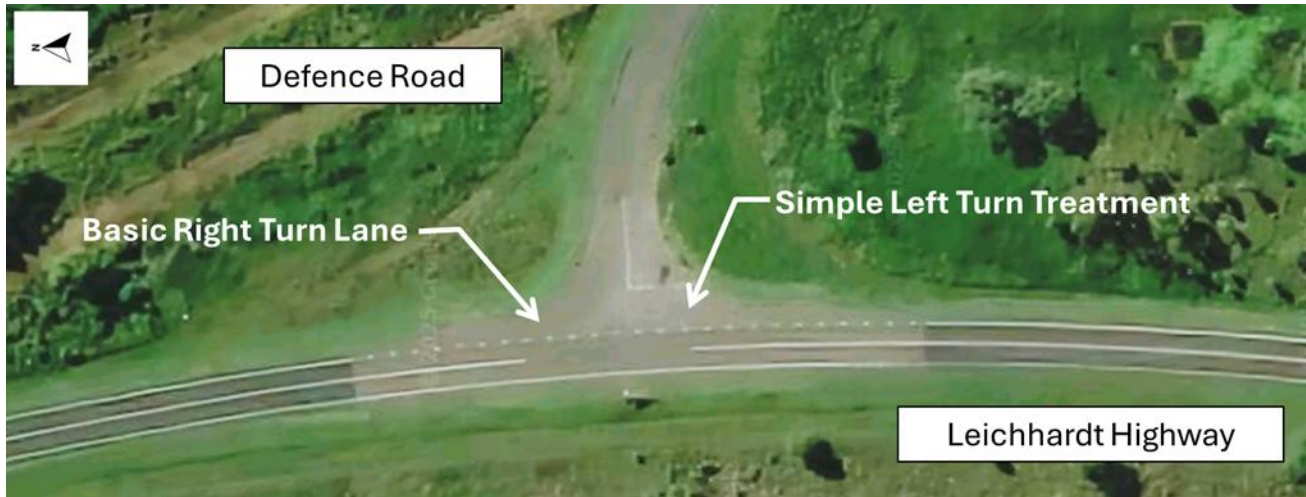


Figure 18.8 Leichhardt Highway/Defence Road intersection

18.2.4 Traffic demands

18.2.4.1 Link

Key road segments near the Project site assessed as part of the TIA are shown in Figure 18.9.

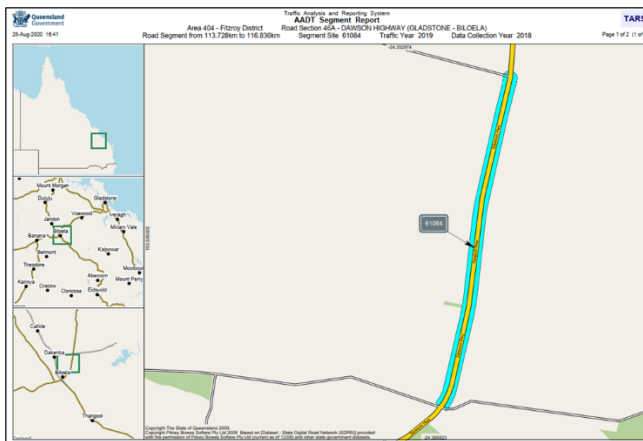
Table 18.1 shows the existing daily background traffic of each road segment (Site 61084, Site 60012, Site 61020, Site 61526, Site 61617, and Site 60050) analysed. Key information includes Annual Average Daily Traffic (AADT) and Heavy Vehicle (HV) percentages for the Gazettal (G), Against-Gazettal (A), and Both (B) directions, sourced from the 2023 Traffic Census, which is the most recent census year containing AADT segment reports for the four sites assessed in this report that have been identified as potentially impacted by construction and operational activities associated with the Project. The AM and PM peak hour traffic volumes for each segment and direction were derived from the Queensland Traffic Data Average by Hour by Day 2023 dataset.

The peak hour traffic volumes for a representative section of the Dawson Highway (Site 60012) show that the background AM and PM peak periods occur between 8:00 and 9:00 AM and 3:00 and 4:00 PM respectively and are typically 7% of daily flows.

Table 18.1 AADT Traffic volumes and HV percentages (2023)

Site	Road (section)	Chainage (km)	Volumes (AADT)			HV %			AM Peak Volume			PM Peak Volume		
			G	A	B	G	A	B	G	A	B	G	A	B
61084	46A – Dawson Highway (Gladston – Biloela)	113.728km to 116.836km	834	848	1682	22%	13%	17%	65	56	121	64	59	123
60012	46B – Dawson Highway (Biloela – Banana)	1.366km to 26.802km	975	991	1966	15%	25%	20%	65	95	160	91	89	180
61020	46B – Dawson Highway (Biloela – Banana)	26.802km to 45.652km	626	642	1268	24%	22%	23%	51	49	100	57	55	112

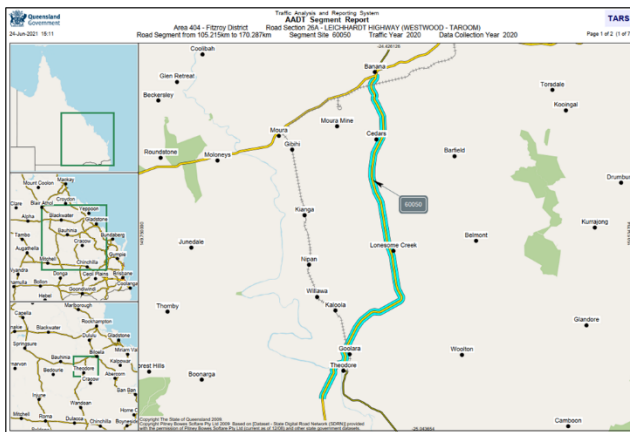
Site	Road (section)	Chainage (km)	Volumes (AADT)			HV %			AM Peak Volume			PM Peak Volume		
			G	A	B	G	A	B	G	A	B	G	A	B
60050	26A – Leichhardt Highway (Westwood – Taroom)	105.215km to 170.287km	426	440	866	31%	40%	35%	37	33	70	31	37	68
61617	46C – Dawson Highway (Banana – Rolleston)	0.000km to 7.750km	659	642	1301	35%	22%	28%	46	57	103	57	56	113
61526	26A – Leichhardt Highway (Westwood – Taroom)	104.655km to 105.215km	1189	1226	2415	28%	24%	26%	81	87	168	89	98	187



Road Section 46A: Dawson Highway (Gladstone to Biloela)



Road Section 46B: Dawson Highway (Biloela to Banana)



Road Segment 26A: Leichhardt Highway (Westwood to Taroom)

DTMR AADT Segment Report

Figure 18.9 Road segments

18.2.4.2 Intersection turn volumes

Dawson Highway/Leichhardt Highway intersection

2023 peak hour intersection turn volumes (8:00-9:00 AM and 3:00-4:00 PM) for the intersection of Dawson Highway / Leichhardt Highway have been estimated based on:

- observed peak hour volumes on Dawson Highway (Site 61617) and Leichhardt Highway (Site 61526 and Site 60050)
- application of the directional distribution observed on Dawson Highway and the eastern approach of Leichhardt Highway during the AM and Peak periods to the observed peak hour traffic volumes on the southern approach of Leichhardt Highway
- application of daily HV proportions to the peak hour traffic volumes.

The estimated 2023 AM and PM peak hour intersection turn volumes are shown in Figure 18.10.

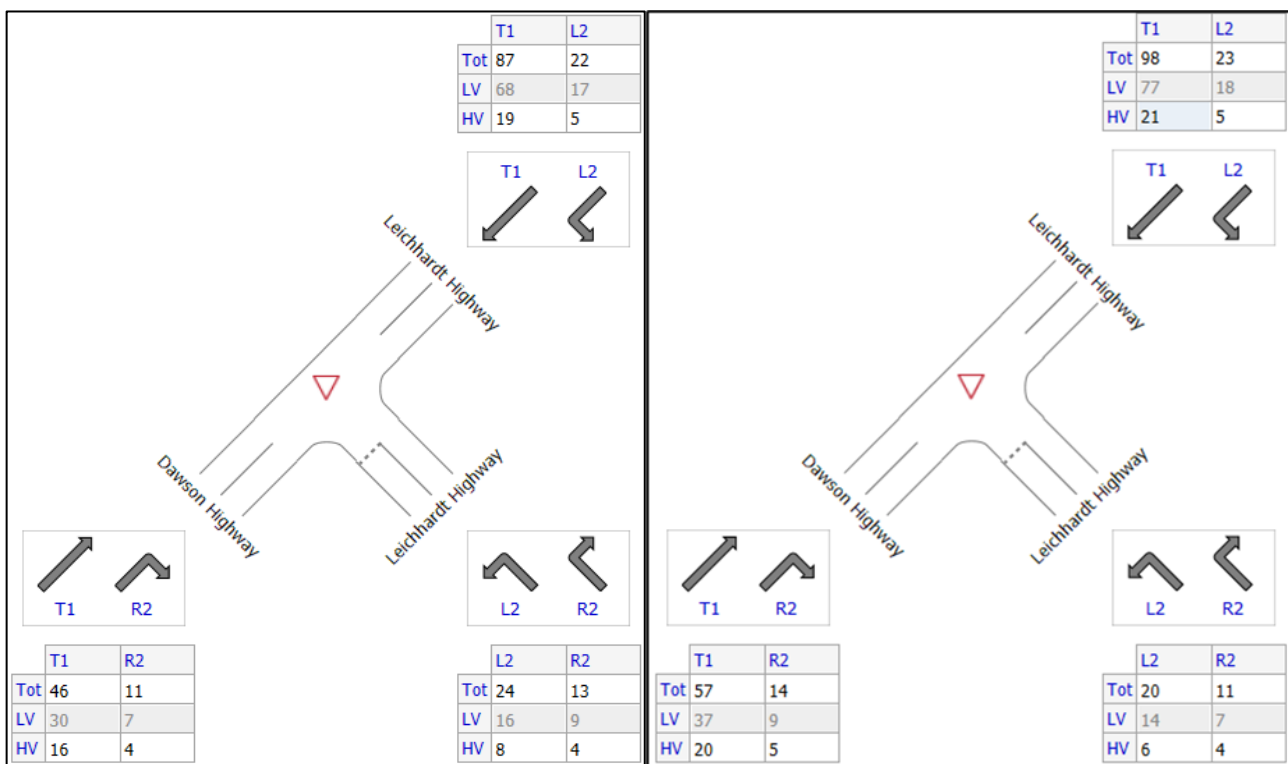


Figure 18.10 Dawson Highway/Leichhardt Highway AM and PM peak period intersection turn volumes (2023)

Leichhardt Highway/Uncle Toms Road intersection

2023 peak hour intersection turn volumes (8:00–9:00 AM and 3:00–4:00 PM) for the intersection of Leichhardt Highway / Uncle Toms Road intersection have been estimated based on:

- observed peak hour volumes on and Leichhardt Highway (Site 60050)
- application of a directional distribution of 10 percent (turning into/exiting Uncle Toms Road) to the calculated peak hour volumes on Leichhardt Highway
- application of daily HV proportions to the peak hour traffic volumes

The estimated 2023 AM and PM peak hour intersection turn volumes are shown in Figure 18.11.

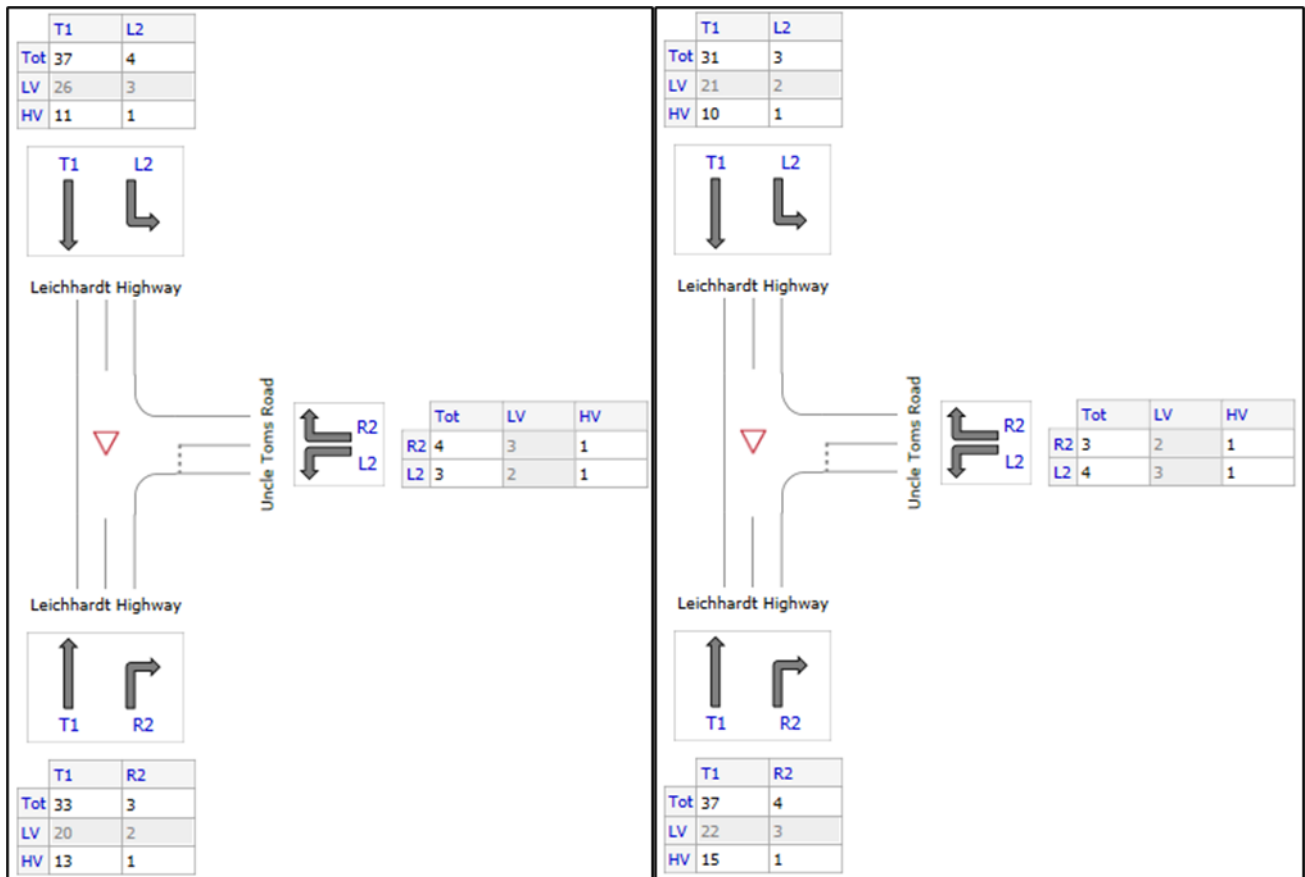


Figure 18.11 Leichhardt Highway/Uncle Toms Road AM and PM peak period intersection turn volumes (2023)

Leichhardt Highway/Defence Road intersection

2023 peak hour intersection turn volumes (8:00-9:00 AM and 3:00-4:00 PM) for the intersection of Leichhardt Highway / Defence Road intersection have been estimated based on:

- observed peak hour volumes on and Leichhardt Highway (Site 60050)
- application of a directional distribution of 10 percent (turning into / exiting Defence Road) to the calculated peak hour volumes on Leichhardt Highway
- application of daily HV proportions to the peak hour traffic volumes.

The estimated 2023 AM and PM peak hour intersection turn volumes are shown in Figure 18.12.

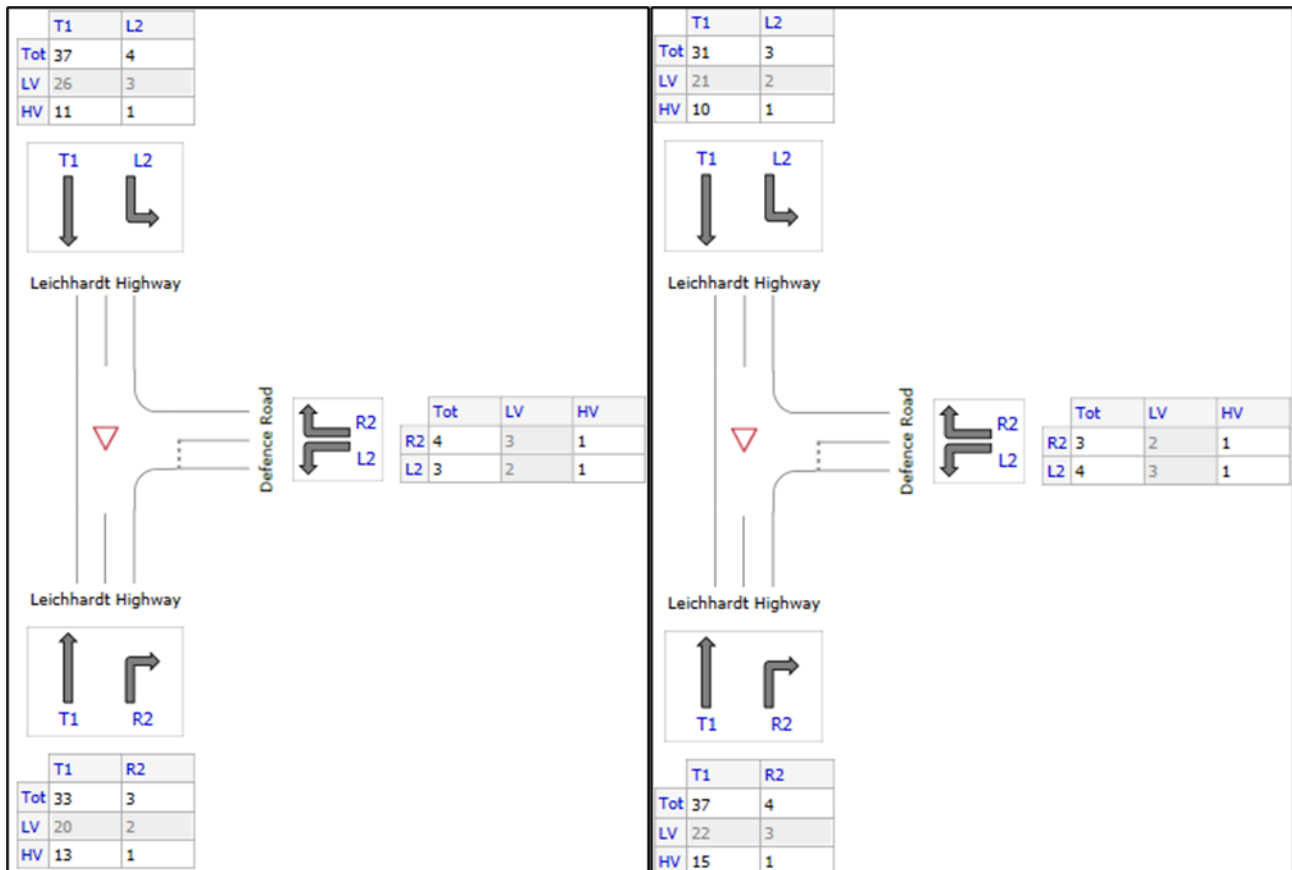


Figure 18.12 Leichhardt Highway/Defence Road AM and PM peak period intersection turn volumes (2023)

18.2.4.3 Growth rates

Historic AADT ten-year growth rates on each road segment (taken from the 2023 Traffic Census) are shown in Table 18.2.

Table 18.2 Historic growth rates (2023)

Site	Road (section)	Chainage (km)	Ten-year growth rate %		
			G	A	B
61084	46A – Dawson Highway (Gladston – Biloela)	113.728km to 116.836km	-1.57%	-1.99%	-1.81%
60012	46B – Dawson Highway (Biloela – Banana)	1.366km to 26.802km	0.04%	0.35%	0.18%
61020	46B – Dawson Highway (Biloela – Banana)	26.802km to 45.652km	0.32%	0.50%	0.40%
61526	26A – Leichhardt Highway (Westwood – Taroona)	104.655km to 105.215km	1.35%	1.50%	1.42%
61617	46C – Dawson Highway (Banana – Rolleston)	0.000km to 7.750km	-0.65%	-1.19%	-0.93%
60050	26A – Leichhardt Highway (Westwood – Taroona)	105.215km to 170.287km	0.31%	0.81%	0.56%

Based on the above, AADT traffic volumes and peak period traffic volumes for the construction year of 2026, opening year of 2028 and the design horizon year of 2038 have been extrapolated using the ten-year growth rates specific to each road segment and direction. To ensure a conservative assessment, locations (Site 61084 and Site 61617) that exhibited a negative growth trend has been assigned a zero-growth rate for future year extrapolation to avoid underestimation.

18.2.4.4 Crash statistics

A review of the available five-year crash data between 2020 and 2024 revealed that there were no crashes within the vicinity of the Project (up to 500 m). Notwithstanding, there are 17 records of crash incidents along the Leichhardt Highway and Dawson Highway in the vicinity of the Project site. Most were single vehicle incidents. The incident closest to the Project occurred on Shawlands Road in 2022 and involved a single vehicle losing control and leaving the road corridor.

18.2.4.5 Freight routes

A review of the State-controlled road network for Heavy Vehicle Routes Restrictions was undertaken in the vicinity to the Project site to understand the potential limitations of the Project site access. Both the Leichhardt Highway and Dawson Highway are approved for the B-double vehicles up to 26 m and 4.6 m in height between Gladstone and the Project site.

18.2.4.6 Public transport

The Project is not currently serviced by any public transport services. Private intercity coach services (Service GX461 and GX462) operated by Greyhound Australia travel along Leichhardt Highway and Dawson Highway between Miles and Rockhampton at a frequency of three services per week (Monday, Wednesday and Friday).

18.2.4.7 Active transport

Due to the rural nature of the area, there is no dedicated active transport infrastructure in the immediate vicinity of the Project site.

18.3 Potential impacts and management measures

18.3.1 Construction stage

18.3.1.1 Link capacity assessment

An assessment of the increases to AADT traffic volumes on the Dawson Highway and Leichhardt Highway as a result of the Project's construction traffic generation has been undertaken for the construction year of 2026. This analysis represents a worst-case assessment for link capacity increases, investigating a day of peak construction workers (121 trips in and out) and peak heavy vehicles (2 trips in and out). The ten-year growth rates have been applied to the observed 2023 AADT traffic volumes to extrapolate to the 2026 construction year. The results of this show that during the day of the Project's highest generated traffic volumes, development flows exceed 5 percent of the background AADT volumes in either direction on both the Dawson Highway and Leichhardt Highway, with the greatest increase of 28.5 percent (Leichhardt Highway (Westwood – Taroom)).

A more detailed peak hour link LOS assessment has been undertaken for Dawson Highway and Leichhardt Highway where construction traffic results in a greater than 5 percent increase to base AADT traffic volumes. Road link LOS has been calculated based on Table 5.5 of the Guide to Traffic Management Part 3, (Austroads 2020) for a road of 100 km/h. It is noted that the LOS criterion for Highways is based on Passenger Car Units (PCU), which has been accounted for by factoring background and proposed vehicle volumes for heavy vehicles by a PCU factor of 2. The results of the link assessment show no change in link LOS for the road section where the Project generated traffic exceeds 5 percent of the base AADT traffic volumes. As such, the Project construction is not considered to have a significant impact on link capacity and no mitigation of link capacity impacts is required.

18.3.1.2 Pavement assessment

An assessment to determine potential pavement impacts to State-controlled roads resulting from the Project's construction generated HV traffic has been undertaken. The initial assessment identifies any road links where the total yearly development SARs are expected to exceed 5 percent of the yearly background traffic SARs in either direction on the link's during the construction period.

For the purpose of the assessment a SAR4 load damage exponent has been adopted for the Dawson Highway and Leichhardt Highway with an average SAR4 value of 4 applied to background HV traffic volumes. This analysis shows that the total SAR4s generated by the Project do not exceed 5 percent of the construction year background SAR4s in either direction on the Dawson Highway and Leichhardt Highway. As such, the Project is not considered to have a significant impact on pavements, and no further analysis of pavement impacts is required.

18.3.1.3 Intersection assessment

Intersection analysis was undertaken using SIDRA intersection software, reporting on the average delay, Degree of Saturation (DOS), delay-based Level of Service (LOS), and 95th percentile queues by approach. The GTIA (DTMR 2017) states that for priority-controlled intersections, when average peak hour delays for any turn movement exceeds 42 seconds (the LOS C/D threshold), then the intersection should be upgraded for safety reasons where practical.

Dawson Highway/Leichhardt Highway

Combined background and development traffic generated by the Project in the AM and PM peak during the construction period are shown for the following two scenarios for the Dawson Highway/Leichhardt Highway intersection:

- Dawson Highway/Leichhardt Highway – 100 percent workers from Moura (Figure 18.13)
- Dawson Highway/Leichhardt Highway – 100 percent workers from Biloela (Figure 18.14).

These volumes represent the combined highest peak hour of traffic generation for both light and heavy vehicles during the construction period.

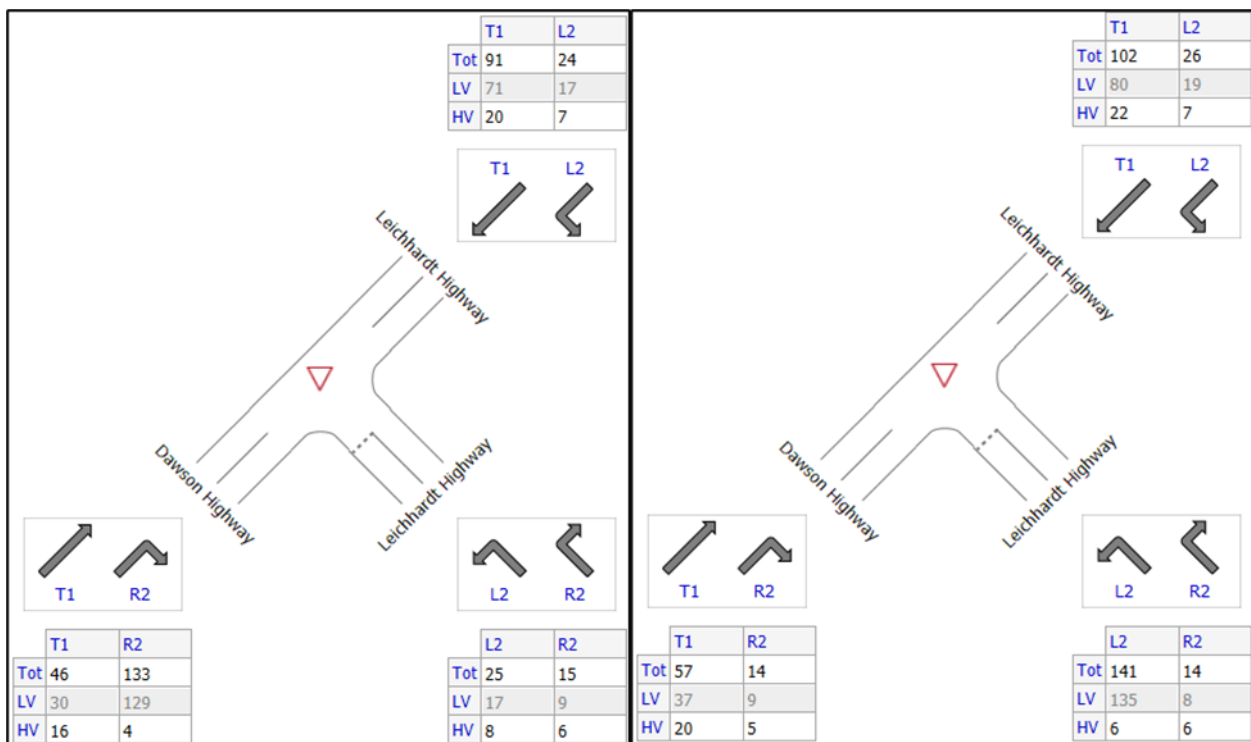


Figure 18.13 AM and PM construction peak Project turn volumes – Dawson Highway/Leichhardt Highway (100 percent of workers from Moura)

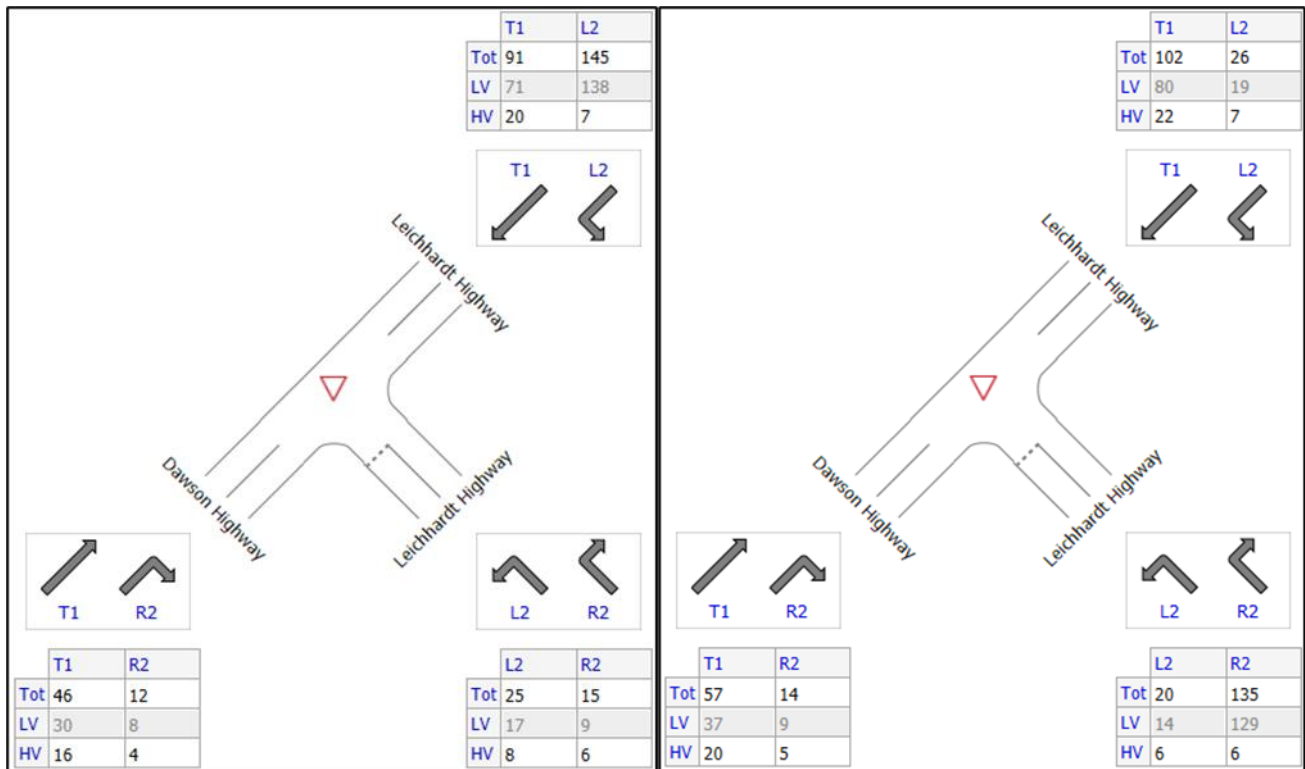


Figure 18.14 AM and PM construction peak Project turn volumes – Dawson Highway/Leichhardt Highway (100 percent of workers from Biloela)

Although the Project construction activities generate relatively low traffic volumes, it is expected to generate an increase of more than 5 percent of the base traffic for turn movements at the intersection of Dawson Highway/Leichhardt Highway in the AM and PM peak periods due to the very low background volumes.

To assess the resulting impacts, the intersection of Dawson Highway/Leichhardt Highway has been investigated in the 2026 AM and PM peak periods for without and with construction scenarios. The ten-year growth rates of each direction of each road segment have been applied to the estimated 2023 peak hour turn volumes to extrapolate to the 2026 construction year.

100 percent workers from Moura

The assessment results for both the without construction and with construction traffic scenarios indicate that the Dawson Highway/Leichhardt Highway intersection (100 percent workers from Moura) continues to operate acceptably during the AM peak period, even with the inclusion of the highest anticipated construction traffic volumes, including:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.01)
- minimal changes to delays (largest increase of 2s)
- minimal changes to queue lengths (largest increase of 2.5m).

The assessment of the operation of Dawson Highway/Leichhardt Highway intersection (100 percent workers from Moura) in the PM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.11)
- minimal changes to delays (largest increase of 0.8 s)
- minimal changes to queue lengths (largest increase of 3.1 m).

The results demonstrate the Project is not considered to have a significant impact on intersection operation and no mitigations are required.

100 percent workers from Biloela

The assessment of the operation of Dawson Highway/Leichhardt Highway intersection (100 percent workers from Biloela) in the AM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.07)
- minimal changes to delays (largest increase of 1 s)
- minimal changes to queue lengths (largest increase of 0.2 m).

The assessment of the operation of Dawson Highway/Leichhardt Highway intersection (100 percent workers from Biloela) in the PM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.16)
- minimal changes to delays (largest increase of 0.1 s)
- minimal changes to queue lengths (largest increase of 5.0 m).

The results demonstrate the Project is not considered to have a significant impact on intersection operation and no mitigations are required.

Leichhardt Highway/Uncle Toms Road (100 percent workers from Moura or Biloela)

The combined background and development traffic generated by the Project in the AM and PM peak during the construction period at the intersection of Leichhardt Highway/Uncle Toms Road are shown in Figure 18.15. These volumes represent the combined highest peak hour of traffic generation for both light and heavy vehicles during the construction period.

Although the Project construction activities generate relatively low traffic volumes, it is expected to generate an increase of more than 5 percent of the base traffic for turn movements at the intersection of Leichhardt Highway/Uncle Toms Road in the AM and PM peak periods due to the very low background volumes.

To assess the resulting impacts, the intersection of Leichhardt Highway/Uncle Toms Road has been investigated in the 2026 AM and PM peak periods for without and with construction scenarios. The ten-year growth rates of each direction of each road segment have been applied to the estimated 2023 peak hour turn volumes to extrapolate to the 2026 construction year.

The assessment results for both the without construction and with construction traffic scenarios indicate that the Leichhardt Highway/Uncle Toms Road intersection continues to operate within acceptable limits during the AM peak period, even with the inclusion of the highest anticipated construction traffic volumes, including:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.07)
- minimal changes to delays (largest increase of 0.8s)
- minimal changes to queue lengths (largest increase of 0.1 m).

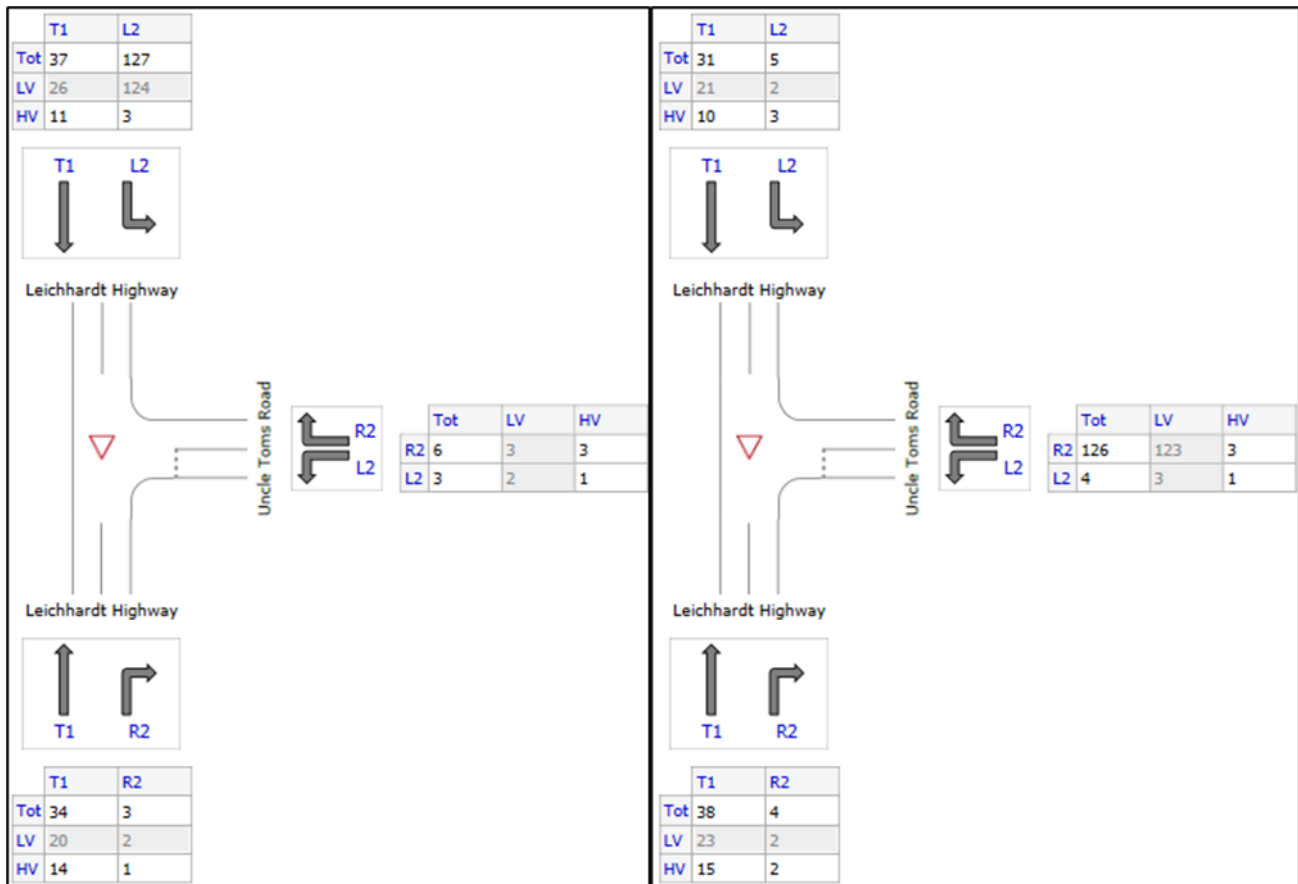


Figure 18.15 AM and PM construction peak Project turn volumes – Leichhardt Highway/Uncle Toms Road (2026)

The assessment of the operation of Leichhardt Highway/Uncle Toms Road intersection in the PM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.11)
- minimal changes to delays (largest increase of 0.3 s)
- minimal changes to queue lengths (largest increase of 2.7 m).

The results demonstrate the Project is not considered to have a significant impact on intersection operation and no mitigation measures are required.

Leichhardt Highway/Defence Road (100 percent workers from Theodore)

The combined background and development traffic generated by the Project in the AM and PM peak during the construction period at the intersection of Leichhardt Highway/Defence Road are shown in Figure 18.16. These volumes represent the combined highest peak hour of traffic generation for both light and heavy vehicles during the construction period.

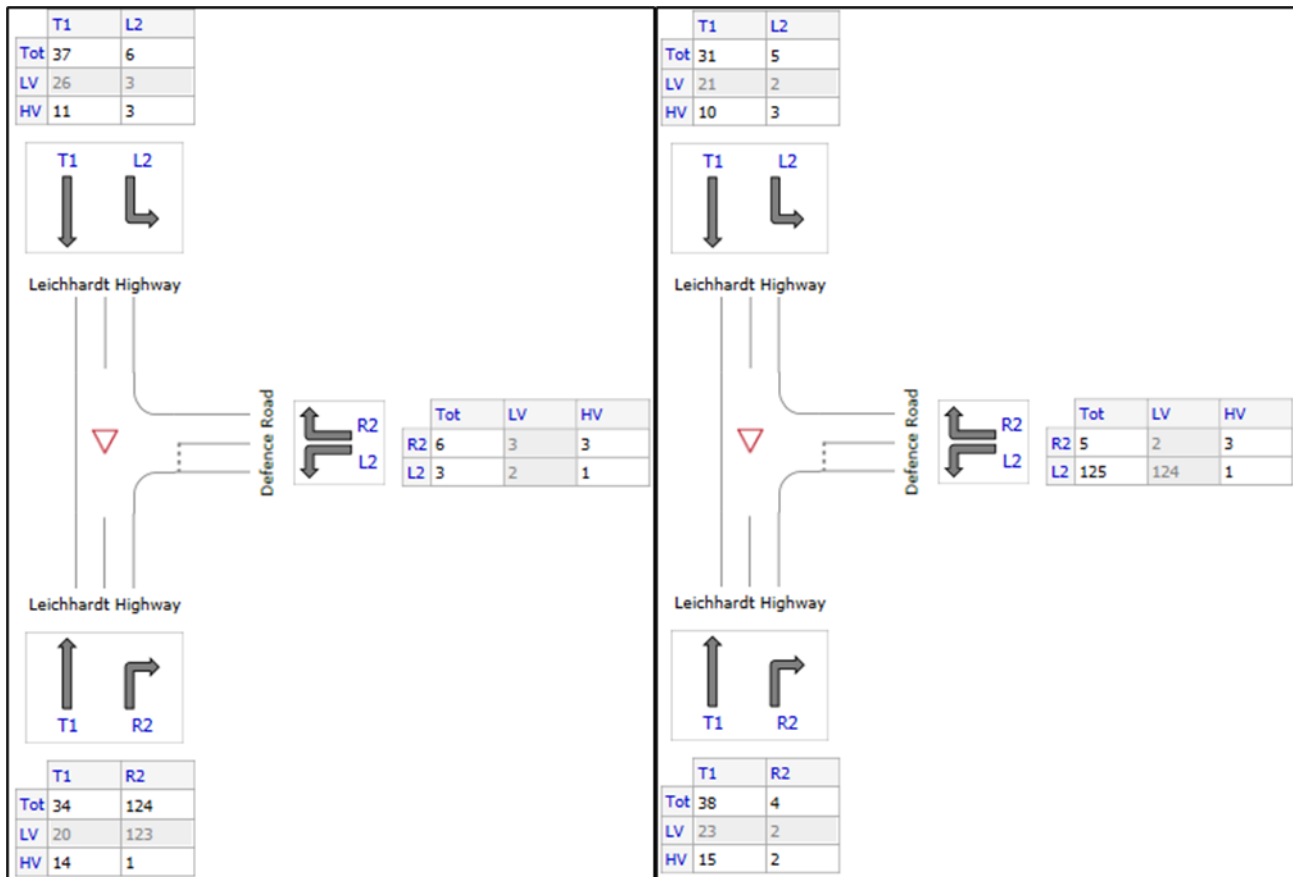


Figure 18.16 AM and PM construction peak Project turn volumes – Leichhardt Highway/Defence Road (2026)

Although the Project construction activities generate relatively low traffic volumes, it is expected to generate an increase of more than 5 percent of the base traffic for turn movements at the intersection of Leichhardt Highway/Defence Road in the AM and PM peak periods due to the very low background volumes.

To assess the resulting impacts, the intersection of Leichhardt Highway/Defence Road has been investigated in the 2026 AM and PM peak periods for without and with construction scenarios. The ten-year growth rates of each direction of each road segment have been applied to the estimated 2023 peak hour turn volumes to extrapolate to the 2026 construction year.

The assessment results for both the without construction and with construction traffic scenarios indicate that the Leichhardt Highway/Defence Road intersection continues to operate within acceptable limits during the AM peak period, even with the inclusion of the highest anticipated construction traffic volumes, including:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.07)
- minimal changes to delays (largest increase of 1.2 s)
- minimal changes to queue lengths (largest increase of 3.3 m).

The assessment of the operation of Leichhardt Highway/Defence Road intersection in the PM peak period shows that with the addition of the heaviest expected peak period construction traffic the intersection continues to operate in an acceptable manner with:

- no change in intersection LOS
- minimal changes to approach DOS (largest increase of 0.08)
- minimal changes to delays (largest increase of 0.5 s)
- minimal changes to queue lengths (largest increase of 2.5 m).

The results demonstrate the Project is not considered to have a significant impact on intersection operation and no mitigation measures are required.

18.3.1.4 Other transport network impacts

Heavy vehicle routes

As a relatively low increase (general <5 percent) in AADT traffic volumes is noted on the Dawson Highway and Leichhardt Highway during the peak period of construction activities, it is not expected that construction heavy vehicle and workforce movements generated by the Project would impact the operation of existing heavy vehicles movements on the Dawson Highway and Leichhardt Highway 26 m B Double HV route.

Public transport

No public transport in the vicinity of the site apart from occasional coach services in operation along the Dawson Highway and Leichhardt Highway. Due to the low traffic volumes generated by the Project construction activities (primarily workers' movements from Biloela, Banana and Theodore) it is expected to have a minimal impact on these services. In addition, it is noted that the heaviest time for construction movements is expected at the start and end of construction hours (6:30AM to 6:30PM) which is outside coach bus service periods in surrounding town centres.

Active transport

Given the surrounding land uses in the vicinity of the Project, the demand for cycling and pedestrian travel in the area is likely to be low. Although there would be increased traffic from construction vehicles in surrounding town centres along the access routes, the increase is minor and no impact to existing active transport movements are expected. It is noted that the largest hourly construction movements (workforce) would occur outside peak traffic periods and would have minimal impact to pedestrians and cyclists.

18.3.1.5 Safety review

The Dawson Highway and Leichhardt Highway, in the vicinity of the Project site, have an AADT of fewer than 8,000 vehicles per day and a posted speed limit of 100 km/h. This classifies the road environment as medium risk. Given this classification, and the fact that the development is expected to be assessed under the *Planning Act 2016*, the Project does not qualify as a "Major Project" and a road safety assessment for the construction period has been undertaken in accordance with the requirements outlined in the GTIA. In line with the GTIA, the assessment includes identification of existing safety risks, potential new risks arising from the development, and recommendations for mitigation measures to ensure the safety risk rating is not exacerbated. A key risk identified during this assessment is the anticipated increase in heavy vehicle volumes along both the Dawson Highway and Leichhardt Highway during the construction phase.

The safety review found that, based on current crash data, the existing intersection configurations at the assessed locations do not present a significant safety risk under current traffic conditions. As there are no proposed changes to the vertical or horizontal geometry of the intersections, no impact on existing sight lines is expected. To mitigate the potential increase in safety risk during construction, temporary warning signage will be installed on approaches to the intersections on the access routes to provide advance notice to road users of construction activities. This is a temporary measure, aligned with the anticipated construction duration of approximately two months.

18.3.1.6 Mitigation measures

Traffic impacts during construction will be managed in accordance with the measures outlined in the EMP (Transport and Traffic) (Appendix D). These include preparation of a Traffic Management Plan for the construction phase of the Project. In addition to these measures, the following mitigations are recommended to be implemented to reduce and manage potential traffic impacts from the Project construction activities:

- temporary warning signs to be introduced on the Dawson Highway in the vicinity of the intersection with Leichhardt Highway to provide road users advanced warning of turning construction vehicles
- where possible, minimise traffic impacts during harvest seasons for cotton (February/March) and sorghum (March).

18.3.2 Operation

18.3.2.1 Design horizon

The analysis horizon year has been determined based on an assumed year of opening for the Project in 2028. The operational analysis has been undertaken for the year of opening and a 10-year design horizon (2038). The assessment assumes that the number of trips generated by the Project operational activities remains constant over the assessment period.

18.3.2.2 Traffic generation

Due to the nature of the Project, minimal traffic is expected to be generated as a result of the operation and maintenance of the Project. The expected traffic generated by the operation of the Project results from periodic inspection and maintenance activities and is estimated in the region of three vehicle trips on average per year.

18.3.2.3 Impacts

As the construction activities were not found to have any significant impact on the transport network, and operational traffic is significantly less than that generated by construction activities, the operation of the Project is expected to have negligible impact on:

- link capacity and pavement
- intersection operation
- heavy vehicle routes
- active or public transport networks
- general road safety.

Due to the low generated traffic volumes associated with the Project operational activities, no mitigation measures are required during the operational phase.

19 Noise and vibration

Chapter 19 describes the potential for the Project to impact the noise character of the surrounding area. The closest residential receptor to the Project is located approximately 340 m to the west of the proposed transmission line. An additional three residences are located between 700 m and 1 km to the west of the proposed transmission line. Prevailing winds are east to south-easterly, and the proposed activities will be localised and of a short duration. Accordingly, the construction and operation/maintenance of the Project is unlikely to impact on the acoustic amenity of the surrounding area to any significant extent. Audible noise from operation of the transmission line (wind on the line and transmission structures and corona discharge) and substation are unlikely to be noticeable at the closest sensitive receptors.

Mitigation and management measures proposed for the construction and operation/maintenance phases are in accordance with Powerlink's standard environmental controls as outlined in the EMP (Appendix D).

19.1 Existing environment

19.1.1 Existing noise sources

The Project is located within a rural environment with minimal development and generally low existing background noise. The main sources of noise are from:

- domestic and farm activities: including movement of heavy vehicles and machinery use (e.g. tractors, ploughers and excavators) and livestock vocalisations
- road traffic noise particularly from the Leichhardt Highway and Dawson Highway, and to a lesser extent local roads
- natural sources such as birds and insects, and wind and weather events.

19.1.2 Estimated background levels

Estimates have been used to establish background noise levels for nearby residential sensitive receptors. These estimates are based on Australian Standard 1055.2-1997 Acoustics – 'Description and measurement of environmental noise – Part 2: Application to specific situations', which provides estimated background sound pressure level values for different areas in Australia. As the sensitive receptors are rural, they are expected to align within Noise Area Category R1: 'Areas with negligible transportation'. The relevant background noise levels are presented in Table 19.1.

Table 19.1 Background sound pressure levels

Noise area category	Description of neighbourhood	Average background A-weighted sound pressure level L_{A90}		
		Day 0700 – 1800	Evening 1800 – 2200	Night 2200 – 0700
Noise Area Category R1	Areas with negligible transportation	40	35	30

19.1.3 Sensitive receptors

Relevant noise sensitive receptors defined by the EPP (Noise) include:

- residences
- libraries and education institutions (including schools (including playgrounds), colleges, and universities)
- childcare centres or kindergartens
- hospital, surgery or other medical institution
- commercial and retail activity
- protected areas, or areas identified under a conservation plan as critical habitat or areas of major interest under the NC Act
- marine park under the *Marine Parks Act 2004*
- parks or gardens that are open to the public for use other than for sport or organised entertainment.

Based on the definition within the EPP (Noise), relevant noise sensitive receptors surrounding the Project area are limited to residences. These sensitive receptors are shown on Figure 6.1. Residential properties are sparsely scattered throughout the Project area, with the closest being approximately 650 m to the east of the proposed transmission line. An additional three residential receptors are located between 700 m and 1 km of the proposed transmission line, one of which is used only on a periodic basis by farm contactors.

Whilst not a protected area under the NC Act, the Belmont State Forest is a gazetted area under the *Forestry Act 1959* and is comprised predominantly of remnant vegetation. At its closest point the Belmont State Forest is located approximately 2 km to the east of the proposed transmission line.

19.2 Potential impacts and mitigation measures

19.2.1 Noise criteria

The noise criteria for the construction and operation of the Project have been adopted from:

- EP Act
- Queensland Environmental Protection Regulation 2008 (EP Regulation)
- EPP (Noise).

Table 19.2 outlines the applicable noise emission limits for the construction and operation of the Project in accordance with the acoustic quality objectives within the EPP (Noise).

Table 19.2 Acoustic quality objectives (EPP (Noise))

Sensitive receptor	Time of day	Acoustic quality objectives (measured at the receptor) (dB(A))		
		LA _{eq,adj,1hr}	LA _{10,adj,1hr}	LA _{1,adj,1hr}
Residence (outdoors)	Daytime and evening	50	55	65
Residence (indoors)	Daytime and evening	35	40	45
	Night-time	30	35	40

19.2.2 Vibration criteria

The relevant standards and guidelines for the assessment of construction vibration are outlined in Table 19.3.

Table 19.3 Standards/guidelines used for assessing construction vibration

Item	Standard/guideline
Structural damage	German Standard DIN 4150 – Part 3 – <i>Structural Vibration in Buildings – Effects on Structures</i> (DIN 4150)
Human comfort (tactile vibration)	Transport Noise Management Code of Practice: Volume 2 – <i>Construction Noise and Vibration, Department of Transport and Main Roads</i>

19.2.3 Construction

19.2.3.1 Noise

Noise impacts during construction are likely to be associated with the following activities and equipment:

- site preparation (including vegetation clearing, access/maintenance track construction, cut and fill and foundation excavation activities) involving heavy machinery (e.g. bulldozers), chainsaws, woodchippers/mulchers
- assemblage of transmission line structure components using manual and power tools
- concrete trucks for transmission line structure and substation equipment footings
- vehicle movement associated with delivery or removal of construction materials from the work areas
- activities at laydown and construction material stockpile areas (e.g. loading/unloading of materials etc).

As discussed in Sections 3.5.3.8 and 5.3.2.1, helicopter stringing of the transmission line is not proposed for this Project and as such noise from helicopters has not been considered as part of this assessment.

During the construction phase, elevated noise levels can be expected at locations close to the work areas and/or in vicinity of the roads used for access. Sensitive receptors in proximity to these work areas and/or access roads may experience some elevated noise levels during construction. Predicted setback distances for noise-generating construction equipment are provided in Table 19.4.

Table 19.4 Predicted construction noise setback distances

Scenario	Representative worst-case equipment	Noise limit, $L_{Aeq,adj,1hr}$ dB(A)	Setback distance (m)	Number of residential properties affected
Installation of gates, grids, washdowns, and access tracks	Vibratory roller	50	250	0
Access track construction	Excavator	50	110	0
Benching of substation pads				
Excavation for foundations				
Rehabilitation of disturbed areas (tower pads, batters including substation batters)				
Benching of tower pad sites, cut/fill	Tipper truck	50	210	0
Vegetation clearing	Mulcher	50	500	0
Foundations, substation electrical equipment, and transmission line	Bored piling rig	50	220	0

Scenario	Representative worst-case equipment	Noise limit, $L_{Aeq,adj,1hr}$ dB(A)	Setback distance (m)	Number of residential properties affected
Steel assembly and erection	Crane	50	120	0
Electrical plant erection				
Lines assembly				

All sensitive receptors are located beyond the setback distances for noise generating construction equipment.

Potential noise impacts from construction activities will be managed in accordance with the general requirements of the EMP (Noise and Vibration) (Appendix D). These include measures such as:

- limiting works hours to between 6.30 am and 6.30 pm (Monday to Sunday) unless permitted by a Development Approval
- applying noise limits to the use of regulated devices (only to be used between 7:00 am and 7:00 pm Monday to Sunday) unless permitted through a MID process or a Development Approval
- ensuring machinery is fitted with appropriate noise attenuation devices and maintained in accordance with manufacturer's specifications
- scheduling loud noise activities to occur at times to minimise noise nuisance to surrounding sensitive receptors
- delivering material and equipment to and from site within approved construction hours
- turning plant off when not in use.

These environmental controls are considered sufficient to management potential noise impacts from the Project activities and no additional measures are proposed.

19.2.3.2 Vibration

During construction, the only vibration-intensive works expected to take place would be pile boring and the use of vibratory rollers for construction of structure footings. Safe working distances to minimise disturbance to sensitive receptors have been recommended and are based on the British Standards BS 6472 'Evaluation of human exposure to vibration in buildings' and BS 7385 'Evaluation and measurement for vibration in buildings'. These distances are up to 2 m for pile boring (structural damage) and up to 100 m for the vibratory roller (human comfort). As there are no residential properties within these safe working distances, there will likely be no vibration impacts to sensitive receptors.

19.2.4 Operation and maintenance

19.2.4.1 Noise

Operation and maintenance of the transmission line and substation should have minimal impacts on ambient noise levels. During the operational phase, ariel (via drones) and/or vehicular maintenance inspections of the proposed transmission line will be conducted. Ariel inspection is expected to occur approximately every 12 months on average.

Audible noise may also result from transmission line operation including the following:

- wind on the lines and transmission line structures (whistling)
- corona discharge (buzzing, crackling, or humming).

Typically, the proposed access rights area provides an adequate noise buffer under normal operating conditions. Noise from wind effects is expected to be incidental and should only occur during periods of higher wind speeds, with the impacts reduced by surrounding vegetation and topography. 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 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 unlikely to be noticeable at the closest sensitive receptors.

The substation may also emit a humming noise, which results from vibrations caused by expansion and contraction of the transformer core. Transformers installed in the substation must meet noise limits under various loading conditions and be tested in accordance with Australian Standard AS 2374 – Power Transformers. Noise reduction measures may be implemented such as noise barriers, enclosures and land buffers if noise become a problem to surrounding sensitive receptors. Considering the distance from the closest potential sensitive receptors (in excess of 7 km) the substation will be inaudible by the sensitive receptors during operation.

19.2.4.2 Vibration

During the operation of the transmission line and substation, no significant vibrations are expected.

19.2.5 Decommissioning

Decommissioning, dismantling and removing the proposed transmission line at the end of its design life has potential to generate noise impacts from the following activities:

- vehicle and machinery movement over access roads and existing easement
- exhaust emissions associated with vehicle and machinery operation during decommissioning works
- dismantling of transmission line structures involving cranes
- disassembly of transmission line structure components using manual and power tools
- ground surface levelling or grading to better facilitate passive rehabilitation of the easements and transmission line structure locations.

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 construction phase activities. Following construction and commissioning of the Project, the existing transmission line will be decommissioned, and the impacts outlined above are also applicable those decommissioning activities.

20 Hazards, health, and safety

Chapter 20 identifies potential hazard and risks associated with the construction and operation of the transmission line and substation as well as the potential consequences of exposure to the hazards for sensitive receptors identified from within and in proximity to the Project area. Mitigation measures and safeguards will be established to minimise the risk to the community, property, and environment.

20.1 Risk identification

20.1.1 Methodology

Hazards and risks are defined as:

- Hazards: 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. A risk is often specified in terms of an event or circumstance and the consequences that may flow from it. A risk is measured in terms of a combination of the consequence of an event and its likelihood.

This chapter outlines the identification of potential hazard associated with the construction and operation of the transmission line and associated substation as well as the potential consequences of exposure to the hazard for sensitive receptors identified in the Project area. Sensitive receptors are not restricted to individuals or communities, and include sensitive environments such as land, water, flora, and fauna. Mitigation measures and safeguards will be established to minimise the risk to the community, property, and environment. All risks will be managed through measures outlined in the EMP (Appendix D) as well as Powerlink' risk management framework and procedures.

The assessment has been carried out using the information available at the time of preparation of this MID proposal. Further investigation and development of design may lead to the identification of additional hazards and associated risks, or changes to the identified risks. Identified risks will be continuously monitored and risk assessments conducted to identify and assess emergent risks throughout the Project lifecycle. Additional mitigation measures will be developed and documented as required.

20.1.2 Data sources

Relevant datasets and sources for this assessment are outlined in Table 20.1. This includes several relevant risk assessments and disaster management plans that have been prepared by the Banana Shire Council.

Table 20.1 Data set and sources

Relevant Data	Sources
Local Disaster Management Plan	Banana Shire Council – Local Disaster Management Plan v5.4 (2018)
Planning Scheme	Banana Shire Planning Scheme (2021)
EAR sections (this report)	Land resources (Chapter 4), Climate and greenhouse gas emissions (Chapter 5), Flora (Chapter 9), Fauna (Chapter 10), Transport and traffic (Chapter 18), Electric and magnetic fields (Chapter 21), Bushfire risk (Chapter 22), Waste management (Chapter 23).

Relevant Data	Sources
Powerlink Policies	Environmental Management Plan (Appendix D) Electrical Safety Rules (Powerlink Queensland: Electrical Safety Rules – November 2024) Queensland Electrical Entity Standard for Safe Access to High Voltage Electrical Apparatus (QLD Electricity Entity Standard for Safe Access to HV Electrical Apparatus) Powerlink Webpage (Transmission Line Safety Safety Powerlink)
Climate Data	Bureau of Meteorology

20.1.3 Preliminary risk identification

The risk identification presented in this section is a desktop study evaluating the key Project risks. Technical studies undertaken as part of this MID proposal have been incorporated into this assessment where applicable. The key hazards and risk identified for the Project are presented in Table 20.2. The preliminary risk assessment forms part of the larger risk management process which will continue throughout the lifecycle of the Project and has sought to identify hazards which may presently exist prior to construction. The Project will continuously monitor identified risks and conduct future risk assessments to identify and assess emergent risks throughout the Project lifecycle.

Table 20.2 Preliminary hazard and risk identification

Hazards	Potential health, safety, and environmental impacts	Mitigation measures	Risk
Natural hazard and environmental risks			
Bushfire	Transmission line and substation structural failure and loss of service delivery Potential for flammable goods to escalate risk of encroaching bushfire Injuries or fatality Damage to neighbouring infrastructure and properties.	Design of the transmission line and substation has considered the potential bushfire hazards and risks and will manage these to minimise impact to the health, safety and environment to so far as is reasonably practicable. General requirements of the EMP (Bushfire) (Appendix D).	Refer further to Chapter 22 (Bushfire risk) of this MID proposal.
Landslide	Instability of transmission tower Transmission line or substation damage resulting in failure of infrastructure and loss of service delivery Injuries or fatality, e.g. struck by moving rocks Change of construction plan	Design of the transmission line and substation has considered the potential hazards and risks from landslides and will manage these to minimise impact to the health, safety and environment to so far as is reasonably practicable. Powerlink's standard environmental controls for erosion and sediment control (refer to the EMP (Appendix D)).	No landslide areas have been identified within the Project area. The likelihood of landslide impacting the Project area is considered low. Refer to Chapter 4 (Land resources) of this MID proposal.

Hazards	Potential health, safety, and environmental impacts	Mitigation measures	Risk
Flooding	Transmission line or substation damage and loss of service delivery Damage to electrical assets Loss of access to infrastructure Inundation of construction laydown areas Injuries or fatality.	Design of the Project has considered the potential flood risks and will manage these to minimise impact to the health, safety and environment to so far as is reasonably practicable. Transmission structures are designed to be outside of overflow channels, and to withstand expected peak flow velocities. These structures will not impede peak flows during storm events or reduce floodplain storage capacity. Powerlink substation sites are selected to ensure that substations are functional in a flood event with an AEP of 1/200.	The Project area is outside the Planning Scheme's flood mapping for 5%, 2% and 1% AEP and there will be no impact on flood levels as a result of the Project. The likelihood of flooding impacting the Project area is considered to be low. Refer to Chapter 7 (Water resources and hydrology).
Acid sulfate soils	Damage to infrastructure Impacts to water quality and aquatic ecology.	Powerlink's standard environmental controls for acid sulfate soils (refer to the EMP (Appendix D)).	Risk of the Project encountering acid sulfate soils has been assessed as low. Refer to Sections 4.1.5 and 4.2.2.4.
Contaminated land	Excavation of contaminated material from sites listed on EMR/CLR or unregistered sites exposed to previous contamination (e.g. cattle dips, petroleum oils storage) resulting in exposure to contaminated materials and/or further contamination of soil or water. Contamination of soils and watercourses through spills and leaks.	Powerlink's standard environmental controls for contaminated land (refer to the EMP (Appendix D)). Appropriate handling and disposal of waste and hazardous material (refer to the EMP (Appendix D)).	Based on current and past land uses, the risk of the Project encountering contaminated land has been assessed as low. Refer to Sections 4.2.3, 20.1.4 and 23.2.

Hazards	Potential health, safety, and environmental impacts	Mitigation measures	Risk
Introduction or spread of invasive animals, plant or disease (e.g. via vehicles and mobile plant and equipment)	Loss of biodiversity Broader impacts could include potential health hazards to stock, quarantine impacts or changes to irrigation requirements if transported in the wider area.	General biosecurity requirements as outlined in the EMP (Appendix D) including development and implementation of property-specific Biosecurity Management Plans if required.	The risk of the Project resulting in the establishment of new pest animal and plant species in areas where they are currently absent is assessed as low. There is a moderate risk that activities associated with the Project will disperse weeds into surrounding areas. Management measures are included in the EMP (Appendix D) to minimise this risk. Refer to Chapter 12 (Biosecurity).
Waste (e.g. waste concrete, timber, plastic packaging)	Offensive odour Vermin Impact on visual amenity (e.g. temporary stockpiles of waste materials) Contamination of soils or waterways.	General requirements for waste management as outlined in the EMP (Appendix D).	The risk of the Project encountering issues associated with waste has been assessed as low Refer to Chapter 23 (Waste management).
Storage and handling of dangerous goods and hazardous substances	Loss of containment Pollution to stormwater and soil Potential fire from flammable goods and escalation of bushfire risk Health impacts.	General requirements for hazardous materials as outlined in the EMP (Appendix D).	The risk of the Project resulting in contamination of land or water as a result of spills or release of hazardous materials is low. Refer further to Section 20.1.4.
Dangerous Goods and Hazardous Substance Transportation	Loss of containment Pollution to stormwater and soil Potential fire from flammable goods and escalation of bushfire risks.	The transportation of dangerous goods will only be undertaken by license transporters in accordance with Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code), including the requirements to display Hazchem signage, placard and carry spill containment equipment to be used by emergency services personnel in the event of an emergency.	Low. Managed in accordance with regulatory requirements and Powerlink's standard practices. Refer further to Section 20.1.4.

Hazards	Potential health, safety, and environmental impacts	Mitigation measures	Risk
Dust e.g. from roadworks, clearing of land, installation	Poor visibility Residential complaints Respiratory irritation	Powerlink's standard environmental controls for Air Quality (refer to the EMP (Appendix D)).	The likelihood of the Project causing air quality impacts at residents or to other sensitive land uses has been assessed as low. Refer further to Chapter 6 (Air quality) of this MID proposal.
Noise and vibration	Nuisance and disturbance to residential or other sensitive land uses.	Powerlink's standard environmental controls for noise and vibration (refer to the EMP (Appendix D)).	The likelihood of the Project creating noise disturbance to residents or other sensitive land uses has been assessed as low. Refer further to Chapter 19 (Noise and vibration) of this MID proposal.
Increased volume of traffic (including heavy vehicle) on local road network	Public road traffic accidents causing severe or fatal injuries Increase in road wear.	Powerlink's standard environmental controls for transport and traffic (refer to the EMP (Appendix D)) including development and implementation of a Traffic Management Plan.	The likelihood of the Project increasing the volume of traffic has been assessed as low. Refer further to Chapter 18 (Transport and traffic) of this MID proposal.
Electric and Magnetic Field (EMF)	Health impacts from prolonged exposure to EMFs Interference with television or radio reception.	Although there is no scientifically proven causal link between EMFs from transmission lines and human health, the Project nevertheless will follow 'prudent avoidance' approach in the design and siting of transmission lines and towers. Advice and, if required, signal amplification equipment to assist with television or radio reception problems.	Calculated electric and magnetic fields for the transmission line are all below the Reference Levels for general public anywhere on easement. The risk from prolonged exposure to EMFs is assessed as low. Refer Chapter 21 (Electric and magnetic fields)

Hazards	Potential health, safety, and environmental impacts	Mitigation measures	Risk
Health and safety risks			
Contact with high voltage electricity	Injuries, e.g. cardiac arrest, electrical shock Fatality	High voltage electrical work will be managed to satisfy the requirements of the <i>Electrical Safety Act 2002</i> and subordinate legislation, including adherence to Powerlink's Electrical Safety Rules and Safe Access to High Voltage Electrical Apparatus.	Low: Managed in accordance with Powerlink's standard procedures practices. Refer further to Section 20.1.5.1.
Overhead equipment and transmission line collision	Dropped loads Contact with live electricity Severe or fatal injury	Risk assessments, SWMSs/JSAs, Take 5, training of personnel and operation of machinery by competent authorised persons. Exclusion zones	Low: Managed in accordance with Powerlink's standard procedures practices. Helicopter stringing is not proposed for this Project.
Hot work and machinery use	Risk of fire or explosion from ignition of flammable contaminants and escalation of bushfire risk	Project will ensure that a risk assessment process is in place in accordance with Powerlink's fire management principles to prevent outbreak of fire	Low: Managed in accordance with Powerlink's standard procedures practices. Refer to Section 20.1.5.3.
Fatigue	Severe or fatal injury Damage to equipment, infrastructure or property.	Powerlink Fatigue Management Guidelines are used to ensure conditions of work of personnel align with <i>Work Health and Safety Act 2011</i> (WHS Act).	Low: Managed in accordance with Powerlink's standard procedures practices. Refer to Section 20.1.5.2.
Underground services	Damage to infrastructure security Contact with live electricity Severe or fatal injury	Dial Before You Dig Excavation works comply with Safe Work Australia Model Code of Practice.	Low: Managed in accordance with Powerlink's standard procedures practices. Refer to Section 20.1.5.4.
Vandalisms, e.g. security breach	Compromising infrastructure security Contact with live electricity Severe or fatal injury	Public awareness The security of the transmission line and substation will be maintained at all times. The proposed substation will be accessible only to authorised and competent personnel and escorted visitors. The substation will be fully fenced and monitored to prevent and detect unauthorised access to high voltage and control equipment.	Low: Managed in accordance with Powerlink's standard procedures and practices. Refer further to Section 20.1.5.1.

Proposed controls will be considered through the construction risk assessment process. The controls will be based on existing Powerlink safety management systems. The management strategies practiced by Powerlink will be in place for the duration of the Project and are not limited to the control measures discussed in the MID proposal.

20.1.4 Dangerous goods and hazardous substances

The chemicals during the construction, operation and decommissioning phases will include fuel (predominantly diesel), lubricants, oils, minor quantities of solvents and acids, degreasers, and domestic cleaning agents.

The anticipated list of chemicals used throughout the lifecycle of the Project along with their purpose and dangerous good details are presented Table 20.3.

Table 20.3 Indicative list of dangerous goods and hazardous substance

Chemical name	Design life cycle stage	Purpose/use	DG Class	UN no.	pg
Concrete Curing Compound	Construction	Concreting for slab construction	N/A	N/A	N/A
Concrete retardant	Construction	Concreting for slab construction	N/A	N/A	N/A
Concrete residue	Construction	Concreting for slab construction	N/A	N/A	N/A
Kerosene	Construction	Fuel for mobile equipment	3	1223	III
Primer (solvent/glue)	Construction	Cleaning and degreaser	3	1206	II
Expanda Foam (fomofill)	Construction	Sealing of joints and gaps	2.1	1950	N/A
Silicon	Construction	Sealing of joints and gaps	4.1	1346	III
Aerosols paints	Construction	Line marking	2.1	1950	N/A
Alminox	Construction	Improve joint conductivity and prevent corrosion	N/A	N/A	N/A
Electrical contact cleaner	Construction Operation	Cleaning of grease from electric components	2.1	1950	N/A
Diesel Fuel	Construction Operation Decommissioning	Fuel for mobile equipment	3 (Class C1)	1202	III
Lubrication oil (including grease and transformer oil)	Construction Operation Decommissioning	Lubricate equipment	Class C2	N/A	N/A
Sulphur Hexafluoride (SF 6) gas	Construction Operation	Transformer insulation	2.2, 6	1080	N/A
Herbicides	Construction Operation Decommissioning	Weed removal	N/A	N/A	N/A

20.1.4.1 Transportation of dangerous goods

The transportation of dangerous goods will only be undertaken by licenced transporters in accordance with the Australian Code for the Transport of Dangerous Goods by Road & Rail (ADG Code), including the requirements to display Hazchem signage, placard and carry spill containment equipment to be used by emergency services personnel in the event of an emergency.

Dangerous goods and hazardous substance storage (permanent and temporary)

The EMP (Appendix D) requires that there is no contamination of land or water as a result of a spill or release of hazardous material. In line with the general requirements for hazardous materials management, all chemicals will be stored, handled and used according to provisions in their Safety Data Sheet (SDS). SDS shall be made available for each chemical used and stored in an easily accessible location. 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 3780:2008 Storage and Handling of Corrosive Substance. 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
- restock spill kit(s).

20.1.5 Health and safety management

20.1.5.1 High voltage safety

High voltage electrical work will be managed to satisfy the requirements of the Electrical Safety Act and subordinate legislation, including adherence to Powerlink's Electrical Safety Rules and Safe Access to High Voltage Electrical Apparatus.

Where community members wish to undertake work on or near a Powerlink transmission line easement, Powerlink provides guidance in their publication titled Powerlink Management of Easement Co-use Requests Guideline ([\(Management of Easement Co-Use Requests Guideline.pdf\)](#)). This publication provides guidelines on activities which are generally permitted, require written approval, or are not permitted on or near a Powerlink transmission line easement.

Trespassing on or vandalisms of transmission towers or substations can result in severe or fatal injury. Powerlink is committed to continued delivery of powerline safety messages to the community through the 'Look up and Live' campaign, electrical safety awareness activities, and community engagement activities to increase public awareness of the powerline safety.

Collision with machinery or equipment

Heavy machinery used during construction includes excavators, graders, rollers, cranes, generators, and drill rigs. The movement of heavy equipment has the potential to cause serious injuries due to factors such as ground instability, equipment integrity failure, or human error. As such, the operation and maintenance of machinery will be in accordance with the manufacturer's specification, machinery maintenance procedures, and testing of braking systems. Administrative controls include risk assessments, SWMSs/JSAs, Take 5, training of personnel, and operation of machinery by competent authorised persons. Engineering controls will also be implemented, including exclusion zones where there is the potential to encroach high voltage exclusion zones, or for tasks such as working at heights. Helicopter activities are not proposed for this Project.

20.1.5.2 Fatigue management

Powerlink Fatigue Management Guidelines are used to ensure conditions of work of personnel align with WHS Act. Random breath testing and drug and alcohol test will be carried out to identify fitness for work to reduce the likelihood of related incidents.

20.1.5.3 Hot work

Activities which involve hot work have the potential to generate fires. The Project will ensure that a risk assessment process is in place in accordance with Powerlink's fire management principles to prevent outbreak of fire, including:

- limit hot work during extreme weather conditions
- availability of first response fire-fighting equipment and trained personnel
- adopt low fire risk infrastructure design
- develop strategies in the planning, investigation, and acquisition phases
- timely delivery of operational and maintenance strategies including regular inspections and vegetation maintenance.

20.1.5.4 Underground services

Facility records and visual inspections will be conducted to gather site information to identify hazards, soil conditions, trenches, pits, bores, standing water, and potentially dangerous obstruction which may impact on safe execution of work. The Project will lodge a Dial Before You Dig enquiry prior to excavation or drilling work, which provides information about underground services on the worksite. Excavation work will be carried out according to Project work plans and any excavations, including exposed underground assets, will be backfilled. Procedural control for the Project will also ensure that excavation work will comply with Safe Work Australia Model Code of Practice.

20.1.6 *Natural hazards*

With ongoing shifts in climate and weather patterns due to climate change, more intense and frequent natural hazards are expected across Australia, particularly in tropical regions. Natural hazards that will potentially affect the Project are cyclones and bushfires. Given the Project's proximity to the shore, strong winds and heavy rainfall from intensifying cyclone events may affect the construction and/or operation of the transmission line and the surrounding environment. As the Project is situated in proximity to a State Forest, bushfires may also affect the Project (refer to Chapter 22 (Bushfire risk)). The development associated with the Project including the vegetation clearing may influence how natural hazards impact the landscape. Clearing vegetation may change flooding characteristics, altering how water moves throughout the landscape and shift bushfire risk by reducing fuel loads in the area.

While damage to the transmission line and surrounding environment may occur, construction activities will be suspended following any natural hazard or severe weather warnings, ensuring the safety of all personnel working on the Project.

21 Electric and magnetic fields

Chapter 21 describes the levels of extra low frequency electric and magnetic fields (EMFs) associated with the Project. Expected EMFs were calculated for the 275 kV transmission line under three operating scenarios: steady state, 30 minutes emergency, and 2 minutes emergency. These values were then compared to the International Commission on Non-Ionizing Radiation Protection Reference Levels (ICNIRP), showing that the calculated electric and magnetic fields for the transmission line are all below the Reference Levels for general public anywhere on MID Proposal area.

21.1 Background information regarding electrical and magnetic fields

Electric and magnetic fields (EMFs) 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 EMFs, those relevant to transmission lines alternate at the frequency of the alternating current power transmission system. These fields alternate in magnitude and direction 50 times per second (50 Hz). Although they may occur simultaneously at the same place, the EMFs exist independently of one another. These power-frequency fields are commonly referred to as extra low frequency electric and magnetic fields (ELF EMFs).

Household electrical wiring and common appliances (electric blankets, televisions, hair-dryers, 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 2016).

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 (Health New Zealand 2025). 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 contrasts with 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 (Health New Zealand 2025).

21.2 Sources of power frequency electric and magnetic fields

21.2.1 Electric fields

EMFs are produced by all transmission lines, distribution systems, wiring and equipment that use alternating current electricity. An electric field will exist around any conductor that is energised from the power supply, whether or not there is any load connected to it. The strength of power frequency electric fields depends primarily on the voltage of the system; 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.

21.2.2 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 hertz (Hz). Transmission line magnetic fields are affected by variables such as line loading, line design, and wire height above ground (Energy Networks Association 2016). 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).

Depending on their configuration relative to each other, the magnetic fields generated by individual conductors in an alternating current power system can partly cancel each other. This cancelling effect is greater when the conductors are closer together. For example, this is why the magnetic field directly above an underground cable buried 1 to 1.5 m deep can be as high as (or higher than) the field directly below an equivalently loaded line some 10 m 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 microtesla (μT) or milligauss (mG). One μT equals 10 mG.

Typical magnetic fields measured at normal user distance from common household appliances, some overhead lines, and associated infrastructure are outlined in Table 21.1. The data in Table 21.1, 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.

Table 21.1 Typical magnetic field ranges

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
Personal computer	0.2–2
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
10 m away	0.05–1
Transmission line	-
Under line	1–20
Edge of easement	0.2–5

Source: (Energy Networks Association 2016)

21.3 Potential impacts and management measures

21.3.1 Exposure guidelines

The two internationally recognised guidelines for exposure to ELF EMF are:

- International Commission on Non-Ionizing Radiation Protection (ICNIRP) (2010)
- International Committee on Electromagnetic Safety, Institute of Electrical and Electronics Engineers (IEEE) in the USA (2002).

Under these guidelines Basic Restrictions are identified. The Basic Restrictions are the fundamental limits on exposure, which are based on the internal electric currents or fields that cause established biological effects. If Basic Restrictions are not exceeded, there will be protection against the established biological effects. The Basic Restrictions include safety factors to ensure that, even in extreme circumstances, the thresholds for these health effects are not reached. These safety factors also allow for uncertainties as to where these thresholds actually lie.

The Basic Restrictions identified in the ICNIRP and IEEE Guidelines are specified through quantities that are often difficult and, in many cases, impractical to measure. As such, Reference Levels of exposure to the external fields, which are simpler to measure, are provided as an alternative means of showing compliance with the Basic Restrictions. The Reference Levels have been conservatively formulated such that compliance with the Reference Levels will ensure compliance with the Basic Restrictions. If measured exposures are higher than Reference Levels, then a more detailed analysis would be necessary to demonstrate compliance with the Basic Restrictions.

The ICNIRP and IEEE Reference Levels are summarised in Table 21.2 and Table 21.3.

Table 21.2 Magnetic field Reference Levels at 50 HZ for IEEE (2002) and ICNIRP (2010)

	IEEE (2002)	ICNIRP (2010)
General public		
Exposure general	Not specified	200 μ T
Exposure to head and torso	904 μ T	Not specified
Exposure to arms and legs	75,800 μ T	Not specified
Occupational		
Exposure general	Not specified	1000 μ T
Exposure to head and torso	2710 μ T	Not specified
Exposure to arms and legs	75,800 μ T	Not specified

Table 21.3 Electric field Reference Levels at 50 HZ for IEEE (2002) and ICNIRP (2010)

	IEEE (2002)	ICNIRP (2010)
General public		
Exposure	5 kV/m 10 kV/m (within right of way)	5 kV/m
Occupational		
Exposure	10 kV/m 20 kV/m (within right of way)	10 kV/m

ARPANSA directly references ICNIRP 2010 as the guideline for exposure. As such, the relevant values relating to general public exposure for the proposed 275 kV transmission line are:

- magnetic field – 200 μT
- electrical field – 5 kV/m.

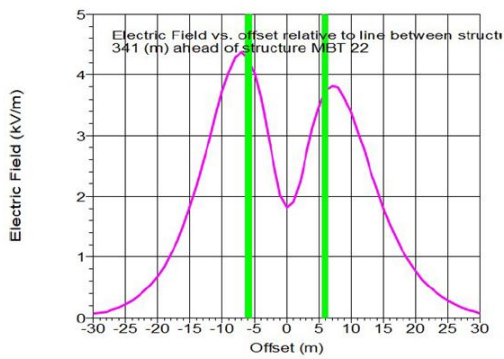
21.3.2 *Calculated electric and magnetic fields*

Expected EMFs were calculated for the 275 kV transmission line under three operating scenarios: steady state, 30 minutes emergency, and 2 minutes emergency are shown in Table 21.4 and illustrated in Figure 21.1. The calculated field strength was then compared to the ICNIRP (2010) Reference Levels for general public to time varying electric and magnetic fields (Table 21.4 and Figure 21.1).

These values indicated the calculated electric and magnetic fields for the transmission line are all below the ICNIRP (2010)/ARPANSA Reference Levels for general public anywhere on easement.

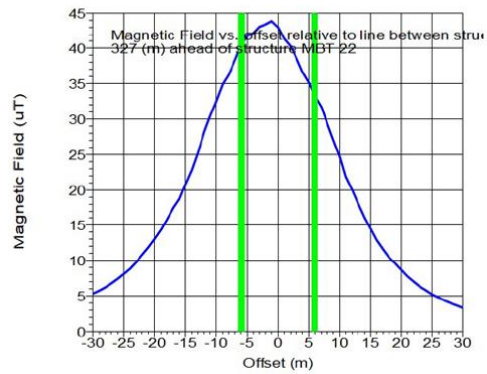
Table 21.4 Calculated electric and magnetic field results

Scenario	Electric field		Magnetic field	
	E-field reference level (kV/m)	Calculated electric field (kV/m)	Magnetic (B-field) reference levels (μT)	Calculated magnetic field (μT)
Steady state	5	4.4	200	44
30-minute emergency	5	4.1	200	43
2-minute emergency	5	4.1	200	63



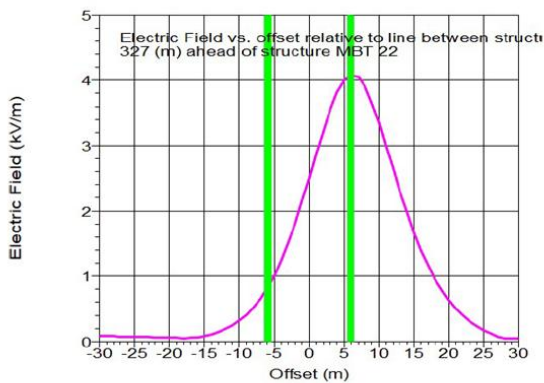
3D EMF Point Results Span from MBT 22 to MBT 23:

Cross section results at max BF along centerline between structures MBT 22 and MBT 23



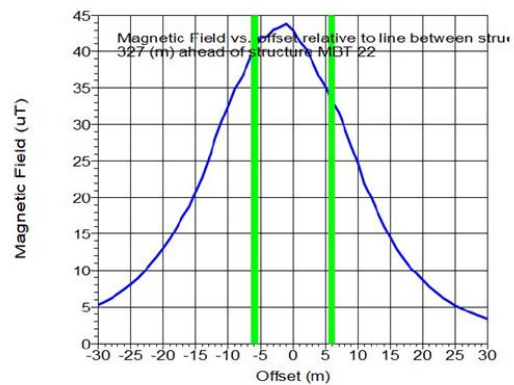
Electric field – steady state normal operations

Magnetic field – steady state normal operations



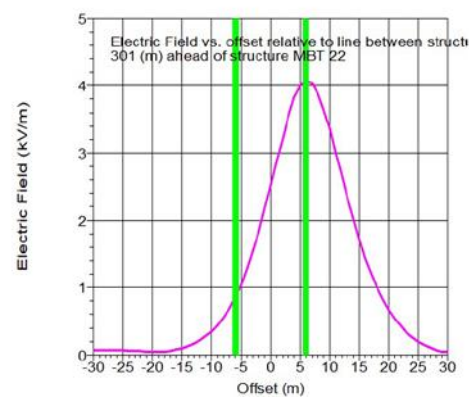
3D EMF Point Results Span from MBT 22 to MBT 23:

Cross section results at max BF along centerline between structures MBT 22 and MBT 23



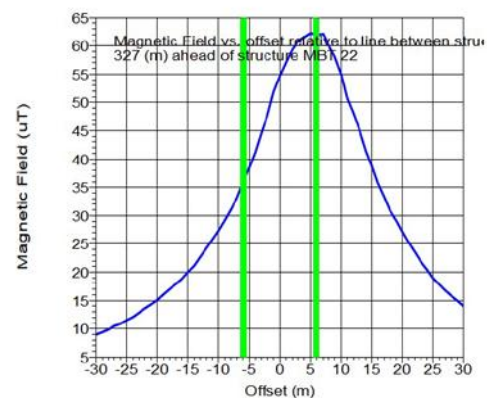
Electric field – Emergency 30 minutes

Magnetic field – Emergency 30 minutes



3D EMF Point Results Span from MBT 22 to MBT 23:

Cross section results at max BF along centerline between structures MBT 22 and MBT 23



Electric field – Emergency 2 minutes

Magnetic field – Emergency 2 minutes

Figure 21.1 Calculated electric and magnetic field results

22 Bushfire risk

Chapter 22 assesses the potential bushfire risks associated with the Project. Whilst most of the Project area is not identified as having bushfire risk, the northern sections of the MID Proposal area or easement alignment traverse areas mapped as very high, high and medium bushfire prone areas. Vegetation clearing associated with the development of the transmission line and substation will reduce the bushfire hazard in the area and overall bushfire risk. Based on the assessment undertaken, Powerlink's standard measures as outlined in the On-site Fire Prevention Procedure and Bushfire Mitigation – Procedure (ASM-PLN-A3285085) are deemed appropriate for the Project.

22.1 Existing environment

22.1.1 *Bushfire hazard mapping*

22.1.1.1 State Planning Policy

The State Planning Policy (SPP) expresses the State interests in land-use planning and development, including hazards, risk, and resilience. The SPP includes state-wide mapping for bushfire prone areas (mapped as potential fire intensity), which considers potential fuel load, maximum landscape slope, and fire weather severity.

A bushfire prone area is defined by the SPP as land that is potentially affected by significant bushfires, including vegetation likely to support a significant bushfire; adjacent land they could be subject to impacts from a significant bushfire; and land that is identified by the SPP and/or a local planning instrument as a bushfire prone area. While the proposed substation site and most of the MID Proposal area are not located within identified bushfire risk areas, due to the length of the transmission line there are some locations towards the northern extent have been mapped as having potential bushfire risk. Large areas at risk of high to very high intensity bushfires occur to the east of the Project associated with the Banana Range.

A small portion of the northern section (between Lot 10 FN802236 and Lot 47 SP232217) as well as the central-northern section (Lot 12 FN294) of the easement alignment is mapped as 'Medium Potential Bushfire Intensity', 'High Potential Bushfire Intensity', 'Very High Potential Bushfire Intensity' and 'Potential Impact Buffer' area under the SPP mapping (Queensland Government 2017).

Other areas that may be affected include sections within Lot 6 DW447, Lot 20 DW286, Lot 2 RP617749, and Lot 8 DW2, which are mostly mapped as 'Medium Potential Bushfire Intensity'.

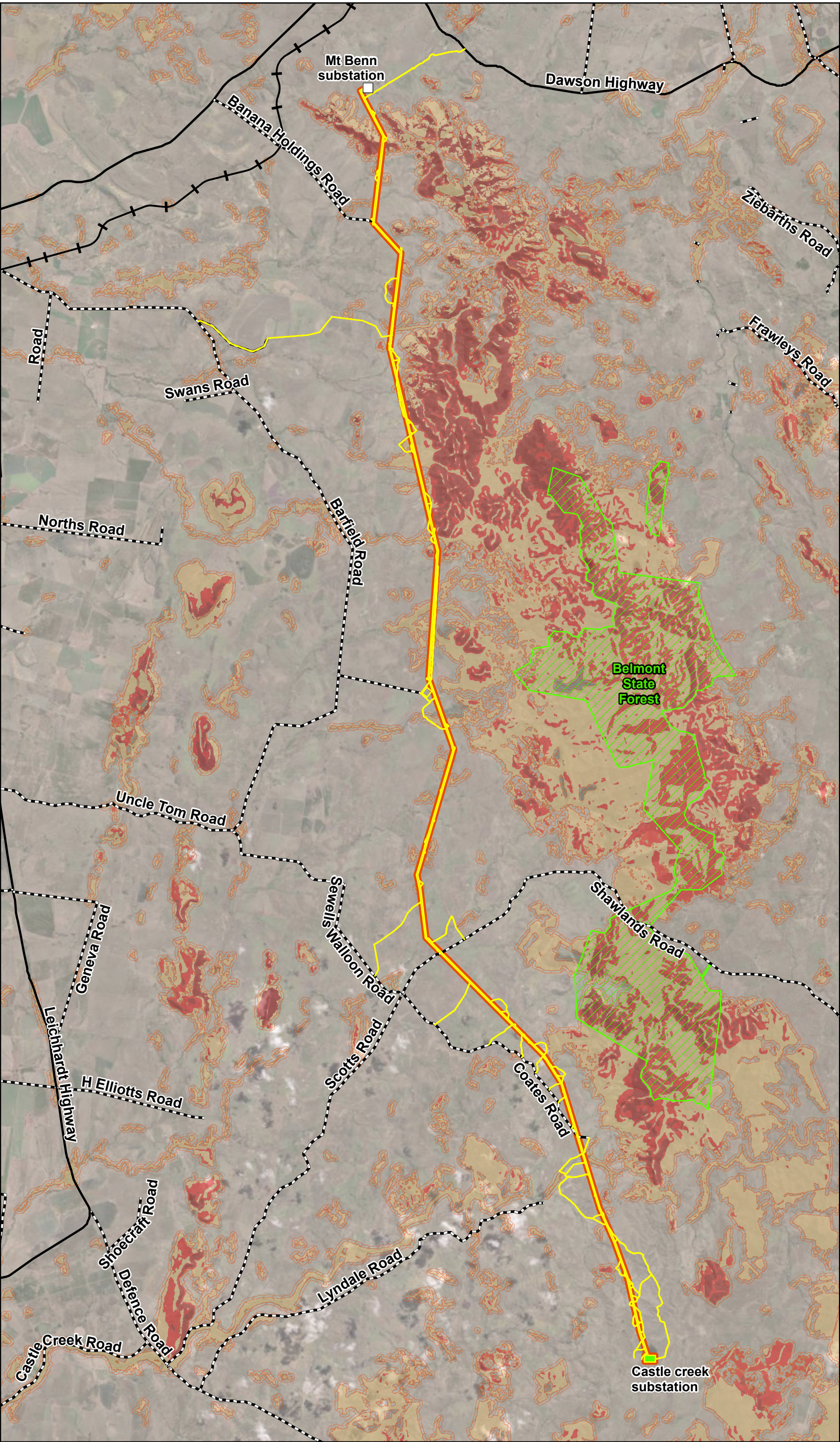
Bushfire-prone areas are shown on Figure 22.1.

22.1.1.2 Local planning instruments

The local planning instrument applicable to the Project is the Banana Shire Council Planning Scheme (2021).

The Minister has identified that the natural hazards, risk, and resilience State interest is not reflected within local planning instruments. However, all schemes include bushfire overlay mapping and assessment benchmarks.

Similar to the bushfire overlay mapping in the SPP, the Banana Shire Council Planning Scheme (2021) indicates that while the majority of the Project area has no fire risk, a small portion of the northern section as well as an area in the central portion of the MID Proposal area is mapped as 'Very High Potential Bushfire Intensity', 'High Potential Bushfire Intensity', 'Medium Potential Bushfire Intensity', and 'Potential Impact Buffer'.

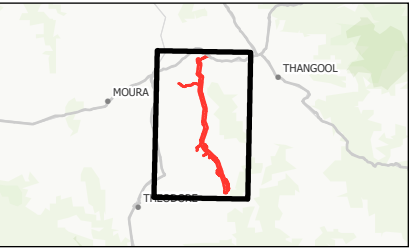


PS218956
Theodore Wind Farm Connection
Project

Figure 22.1
Bushfire hazard mapping

Legend

- Rail line
- Mt Benn Substation
- Castle Creek Substation
- Project area
- MID Proposa area
- ▨ State Forest
- Roads**
 - Highway
 - - - Local
- Bushfire prone land**
 - Very High Potential Bushfire Intensity
 - High Potential Bushfire Intensity
 - Medium Potential Bushfire Intensity
 - Potential Impact Buffer



0 1,500 3,000 4,500 6,000 7,500
Metres

Coordinate system: GDA2020 MGA Zone 56
Scale ratio correct when printed at A3
1:150,000
Date: 6/07/2026

Data sources: WSP, RWE, Powerlink, QLD Government,
Rail line: © State of Queensland (Department of Natural Resources and Mines,
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22.1.2 Bushfire risk analysis

As noted above, bushfire hazard mapping takes into consideration fuel loads (vegetation type), landscape slope, and weather conditions. A summary of these considerations for the Project area is provided in the following subsections.

22.1.2.1 Site conditions

Topography and slope

As described in Section 4.1.1, the topography across the Project area varies from relatively low, flat plains to the foothills of the Banana Range and associated ridges. Majority of the Project area has a slope ranging from 0 to 10 percent but some areas exceed a 20 percent slope.

22.1.2.2 Vegetation

The methodology for state-wide mapping of bushfire prone areas in Queensland assigns regional ecosystems to twenty vegetation hazard classes, which are then grouped as either bushfire prone, grassfire prone or low fuel load classes (Leonard, Newnham, Opie & Blanche 2014). The vegetation hazard classes for the regional ecosystems and vegetation communities identified from the Project area are summarised in Table 22.1. The *Eucalyptus camaldulensis* (RE 11.3.4 – Open forests/woodlands – shrubby), *Melaleuca bracteata* (RE11.3.25d – Melaleuca communities), *Eucalyptus crebra* (RE.11.12.1 – Open forests/woodlands – shrubby) and *Acacia* spp. have high potential fuel load and therefore identified as Bushfire Prone vegetation classes (Class 1, Class 2 and Class 3). Grassland communities (Class 12 and 11) are recognised as Grassfire Prone. Non-remnant communities (Class 19 and 20) are recognised as Low fuel load classes.

Table 22.1 Vegetation hazard class of field verified regional ecosystems from within the Project area

RE ID	Vegetation community	Vegetation hazard class (VHC)	Potential fuel load (tonnes/ha)
RE 11.3.1	<i>Acacia harpophylla</i> open forest on alluvial plains	VHC 3 – Tall open forests	28
RE 11.3.4	<i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	VHC 2 – Open forests/woodlands – shrubby	30
RE 11.3.4a	<i>Blakella tessellaris</i> (prev. <i>Corymbia tessellaris</i>) woodland on alluvial terraces	VHC 7 – Open forests/woodlands – grassy	19
RE 11.3.6	<i>Eucalyptus melanophloia</i> woodland on alluvial plains	VHC 7 – Open forests/woodlands – grassy	19
RE 11.3.25	<i>Eucalyptus camaldulensis</i> woodland with <i>Melaleuca</i> spp. on fringing banks	VHC 7 – Open forests/woodlands – grassy	19
RE 11.3.25 (HVR)	High value regrowth <i>Eucalyptus camaldulensis</i> open woodland on alluvial plains	VHC 7 – Open forests/woodlands – grassy	19
RE11.3.25d	<i>Melaleuca bracteata</i> open forest with vine thicket understorey on fringing alluvium and levees	VHC 1 – Melaleuca communities	33
RE.11.12.1	<i>Eucalyptus crebra</i> woodland with <i>Corymbia erythrophloia</i> on igneous hills	VHC 2 – Open forests/woodlands – shrubby	30
RE 11.12.1 (HVR)	Sparse open <i>Eucalyptus crebra</i> woodland on volcanic hills	VHC 7 – Open forests/woodlands – grassy	19

RE ID	Vegetation community	Vegetation hazard class (VHC)	Potential fuel load (tonnes/ha)
RE 11.12.2	<i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	VHC 7 – Open forests/woodlands – grassy	19
RE 11.12.2 (HVR)	<i>Eucalyptus melanophloia</i> low open woodland on undulating igneous hills	VHC 7 – Open forests/woodlands – grassy	19
RE 11.12.4	Semi-evergreen vine thicket on rocky igneous slopes	VHC 14 – Dry vine forest and vine thickets	5
RE 11.12.4 (HVR)	Low semi-evergreen vine thicket on rocky igneous hill crests	VHC 14 – Dry vine forest and vine thickets	5
RE 11.12.21	<i>Acacia harpophylla</i> open forest on undulating igneous lower slopes	VHC 3 – Tall open forests	28
Non-remnant	Degraded alluvial woodland	VHC 7 – Open forests/woodlands – grassy	19
Non-remnant	Regrowth Brigalow woodland species on depressions	VHC 7 – Open forests/woodlands – grassy	19
Non-remnant	Low <i>Eucalyptus crebra</i> regrowth	VHC 11 – Native grasslands, sedgelands, and balds	5
Non-remnant	Mixed woody grassland	VHC 12 – Mixture of rural classes – mainly grassland	5
Non-remnant	Cleared hardstand and roads	VHC 19 – Sparse ground cover	1
Non-remnant	Farm dams	VHC 20 – Water bodies	0

22.1.2.3 Climate

As described in Chapter 5 (Climate and greenhouse gas emissions), the Project area is considered to experience a sub-tropical climate with warm wet summers and mild winters.

Bushfire ‘season’, as described by Queensland Fire and Emergency Services, normally commences in this region around July, with the peak fire season during September to November (refer to Figure 22.2). The threat of bushfires increases with periods of reduced rainfall and increased temperatures, which can increase the amount of dry grass available to burn.

Climate modelling from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and BoM predicts a temperature rise of 0.4°C to 1.5°C by 2030 with reduced rainfall and increased intensity of heavy rainfall events projected in the Banana Shire LGA (full range of emission scenario). The extreme heat and dry conditions experienced in the Project area, now and in the foreseeable future can be conducive for a bushfire event.

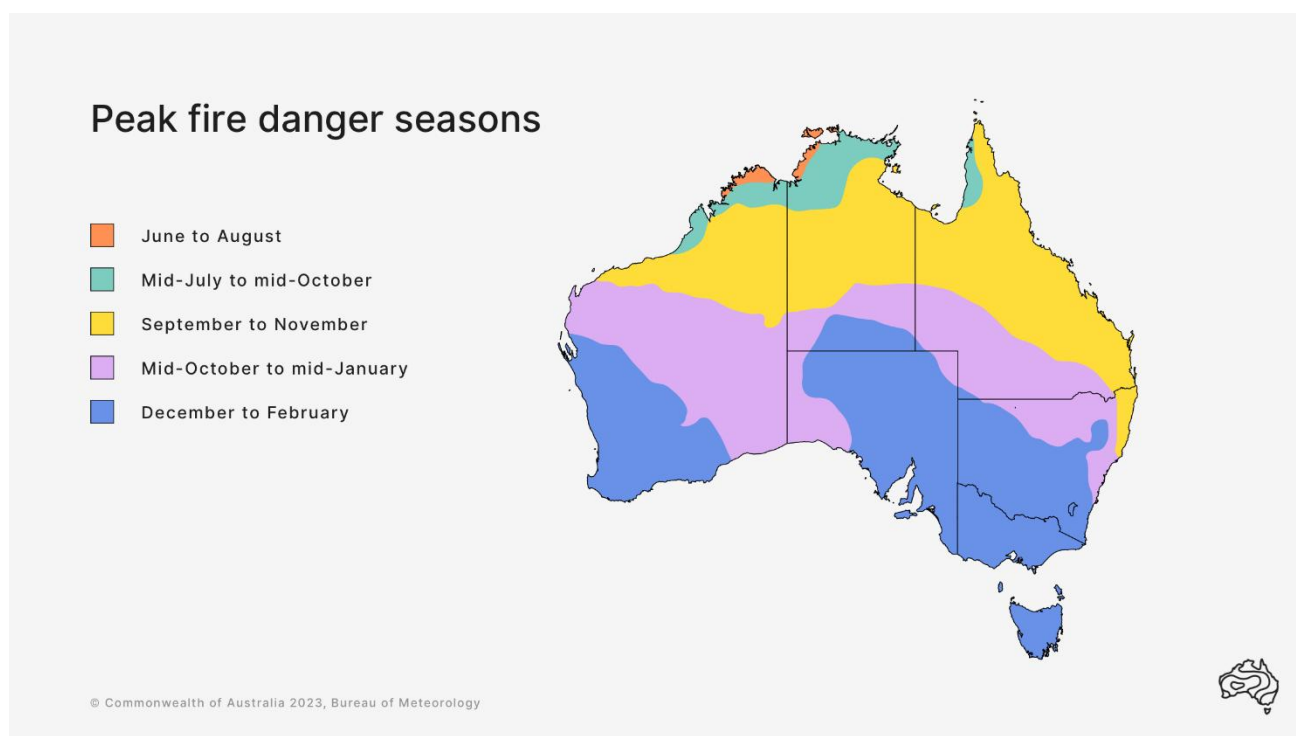


Figure 22.2 Fire seasons

22.2 Potential impacts and mitigation measures

Bushfires are potentially harmful to people and property. Potential impacts are addressed below as either fire hazard from the Project or fire hazard to the Project.

Based on the above assessment, Powerlink's standard measures as outlined in the Bushfire Mitigation – Procedure (ASM-PLN-A3285085) (Appendix D) are deemed appropriate for the Project. In addition, the measures outlined in the EMP (Bushfire) will also be applied during construction and operational activities (refer Appendix D).

22.2.1 *Assessment against the SPP assessment benchmarks for natural hazards, risk and resilience*

The overall intent of the natural hazards, risk, and resilience of the State interest in the SPP is that 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.

The State interest includes the following assessment benchmarks in relation to bushfire prone areas:

- development avoids bushfire prone areas, and where avoidance is not possible, development mitigates the risk to people and property to an acceptable or tolerable level
- development supports and does not hinder disaster management response or recovery capacity and capabilities.
- development avoids increasing the severity of bushfires and the potential resulting impacts
- risks to public safety from the storage and use of hazardous materials are avoided.

While most of the Project area is not located within bushfire prone areas, it does cross a few Very High, High, and Medium bushfire-prone areas.

22.2.1.1 Fire hazard from the Project

Construction

Construction equipment and vehicles have the potential to create a fire risk through the generation of sparks, heat, and machinery faults which may ignite dry combustible materials. Other potential sources of ignition may arise from accidental fires from human related activities.

Construction activities will generate combustible material in the form of cardboard, and paper packing material and mulched/chipped vegetation. Potential spills of fuel, oil, and flammable liquid may also increase the risk of bushfire, particularly in proximity to dry combustible materials.

Bushfire risks during construction will be managed in accordance with the general requirements outlined in the EMP (Appendix D). These include measures such as:

- monitoring fire hazard warnings associated with weather patterns and fire risk are issued by the BoM and the Queensland Rural Fire Service
- storing flammable and combustible liquids (i.e. fuel) within facilities designed to AS1940–2004 The Storage and Handling of Flammable and Combustible Liquids
- documenting and communicating procedures guiding the response to emergency and fire situations, and requests from emergency management authorities
- keeping firefighting equipment on site when hot works are being undertaken
- prohibiting the burning of vegetation, unless a permit is obtained by a local fire authority and Powerlink is obtained prior to burning.
- identifying designated smoking areas with cigarette butt bins for safe disposal.

Operation and maintenance

Operational fire risk is generally related to external influences, such as climate, surrounding land use, and the proximity and density of surrounding vegetation. Operational faults are rare and do not necessarily result in electrical arc flashover to vegetation. During periods of reduced rainfall and increased temperatures, dry vegetation has the potential to come into contact with the transmission line conductor. This may result in a fire event through power arcing but has been assessed as unlikely for the Project. Due to the height of the transmission line structures, these events are very rare.

Operational waste, particularly dry combustible waste, is anticipated to be limited (refer to Chapter 23 (Waste management)). Therefore, operational waste will have a negligible contribution to bushfire risk from the Project.

During maintenance of the infrastructure, it is anticipated that vegetation waste will be generated which may present a potential fire risk. Sprayed vegetation is usually left to die back and decompose naturally. Cleared regrowth may be mulched or chipped. Burning of vegetative waste will only be undertaken with required permits in place.

Maintenance is also likely to present similar fire risks to construction, on a smaller and more localised scale. These risks include the generation of sparks or heat, machinery faults which may ignite dry combustible materials. Other potential sources of ignition may arise from accidental fire from human related activities.

Powerlink adopts an asset risk management approach that considers potential fire starts from network components (e.g. insulator and instrument failures). High consequence areas and the likelihood of failures are assessed to determine the optimal investment in the network.

In addition to the bushfire risk measures applied during construction, the following measures will be applied during operation and maintenance of the Project:

- maintaining easement through routine vegetation maintenance to ensure vegetation remains outside of untrained exclusion zones and incompatible species do not interfere with the safe operation of the transmission line.
- ensuring that cleared vegetation is not placed in a location which may increase any fire hazard and impact on the Project in the event of a fire.

22.2.1.2 Fire hazard to the Project

Bushfire risk is an important consideration for Project as damage from bushfires can result in multi-circuit outages of the infrastructure. Fires burning adjacent to or under high voltage transmission lines have the potential to:

- create electrical arcs (known as ‘flashovers’) that can endanger people, animals, and objects
- damage or destroy the wires, insulators and supports of the transmission line
- interrupt electricity supply to households and industry.

Further information on safety risks associated with fires burning near transmission lines are provided in Powerlink’s Fire and transmission line safety brochure, which can be accessed from the Powerlink website at Fires and transmission line safety.

Fire events within the vicinity of transmission lines would most likely be the result of environmental conditions, such as climatic conditions, or land use activities. Powerlink actively reduces vegetation within the easement during maintenance programs. Therefore, the easement and Project access tracks often act as a firebreak if a fire occurs. Transmission line access tracks may also be used by fire crews in the event of fire. The Project design is unlikely to impose restrictions upon existing bushfire management techniques.

Transmission lines are designed to be compatible with the impacts of potential natural hazards that may occur within the proposed easement and potential fire impacts to the transmission lines are limited.

23 Waste management

Chapter 23 outlines the waste products generated from the construction and operation and maintenance of the transmission line and substation. Waste streams identified from decommissioning and dismantling the infrastructure are also identified. Management of waste stream from the Project will be undertaken in accordance with the measures outlined in the EMP (Appendix D), which includes the development and implementation of a Waste Management Plan.

23.1 Relevant legislation and policy

This section outlines the primary relevant Commonwealth, state and local government legislation, policy, standards and guidelines which are relevant for the management of waste.

23.1.1 *Commonwealth*

23.1.1.1 National Waste Policy 2018

The 2018 National Waste Policy has replaced the 2009 policy, focusing on five key principles for waste and resource recovery to assist Australia with the transition towards a circular economy:

- avoid waste
- improve resource recovery
- increase use of recycled material and build demand and markets for recycled products
- better manage material flows to benefit human health, the environment and the economy
- improve information to support innovation, guide investment, and enable informed consumer decisions.

The Policy is comprised of 14 strategies and is implemented through the 2024 National Waste Policy Action Plans which will guide investment and efforts until 2030.

23.1.1.2 National Pollutant Inventory

The National Pollutant Inventory (NPI) tracks pollution across Australia through the reporting of emissions and transfers of 93 substances that have the potential to impact on human health and the environment. The NPI framework establishes a ‘trigger’ threshold usage for these substances and, if threshold is exceeded during a reporting year for an NPI substance, all emissions of that substance must be reported in accordance with the most current relevant Emission Estimation Technique Manuals.

The desired environmental outcomes of the NPI program are to:

- maintain and improve air and water quality
- minimise environmental impacts associated with hazardous waste
- improve the sustainable use of resources.

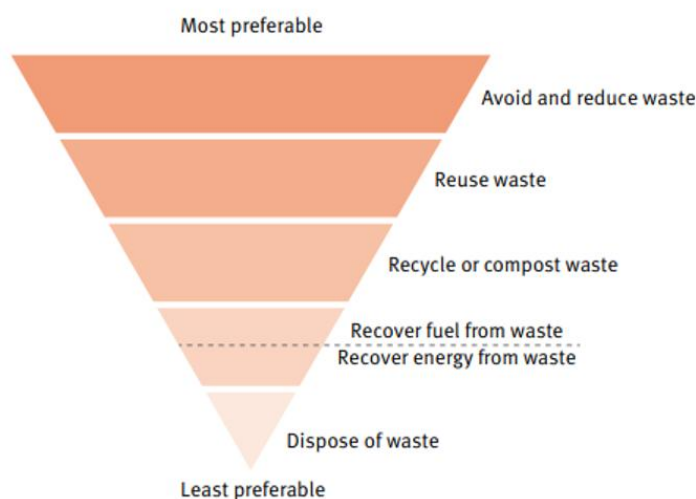
23.1.2 Queensland

23.1.2.1 Waste Reduction and Recycling Act 2011

The *Waste Reduction and Recycling Act 2011* (WRR Act) contains measures to reduce waste generation and landfill disposal and encourage recycling. The legislation establishes a framework to modernise waste management and resource recovery practices in Queensland, in order to promote waste avoidance and reduction and encourage resource recovery and efficiency.

The WRR Act establishes the following concepts and definitions which are relevant to waste avoidance and management for the Project:

- waste includes anything other than a resource approved under Chapter 8 of the WRR Act, that is:
 - left over, or is an unwanted by-product, from an industrial, commercial, domestic or other activity; or
 - surplus to the industrial, commercial, domestic or other activity generating the waste
- waste resource and management hierarchy: consider waste and resource management options in the order depicted in Figure 23.1
- circular economy principle: promote waste avoidance and minimise the impact of waste on the environment and human health, all products and materials should be kept in the economy for as long as they have value or remain useful
- circular economy: is an economy in which all products and materials are kept for as long as they have value or remain useful
- polluter pays principle: all costs associated with the management of waste should be borne by the persons who generated the waste
- proximity principle: waste and recovered resources should be managed as close to the source of generation as possible
- product stewardship principle: there is a shared responsibility between all persons who are involved in the life cycle of a product for managing the environmental, social, and economic impact of the product.



Source: (Queensland Government, undated)

Figure 23.1 Waste and resource management hierarchy

These waste management concepts have been actively considered for the Project and will be implemented throughout all stages of the Project.

23.1.2.2 Environmental Protection Act 1994

The EP Act includes provisions regarding general environmental duty, and the requirement to take all reasonable and practicable measures to prevent environmental harm. This includes requirements for waste management, such as waste prevention and minimisation.

The EP Regulation is subordinate to the Act and establishes requirements for the transportation of regulated waste, defines trackable waste, describes obligations for generators/transporters/waste receivers, receiving/disposing of waste at approved facilities, and defines regulated waste.

23.1.2.3 Queensland Waste Strategy

A new resource recovery and waste strategy is currently being developed, with public consultation and input into the development of the new strategy and waste disposal levy having closed on 26 June 2025. The new strategy is underpinned by the waste disposal levy and will outline the Queensland Government's vision for waste reduction and recycling and formulate a plan for building partnerships with industry and local and federal governments.

The Queensland Waste Management Resource Recovery Strategy was first released in 2019 and provided the resource recovery and waste sector with policy certainty and prioritised waste types for action and identified key re-investment opportunities.

23.1.3 Local Government

23.1.3.1 Banana Shire Planning Scheme 2021

The Banana Shire Planning Scheme includes development codes that relate to waste management. In particular, the performance outcome 40 (PO40) for the Development Design Code requires:

- Performance outcome: The development utilises waste management systems that promote recycling, reuse and reduction of waste being disposed of to landfill.

23.2 Waste management

23.2.1 Objectives

The Project seeks to achieve the objectives of the Queensland Waste Management Strategy (Queensland Government, undated), which has been made under the WRR Act. The Queensland Waste Management Strategy sets a long-term strategy for:

- achieving waste avoidance, sustainable consumption, industry investment in innovation and new infrastructure, strategic regional infrastructure planning, and product stewardship
- securing continuous improvement in waste management and resource recovery practices, services and technologies, benchmarked against best available technology
- reducing the climate change impacts of waste management and disposal.

The Queensland Waste Management Strategy establishes the following vision:

Queensland will become a zero-waste society, where waste is avoided, reused and recycled to the greatest extent possible. Strategic investment in diverse and innovative resource recovery technologies and markets will produce high-value products and generate economic benefits for the state (Queensland Government undated).

Where possible, the Project will be designed, operated, and decommissioned to ensure that the following outcomes are achieved, which will provide benefits for the environment, economy, and community:

- reduce the amount of waste to be disposed to landfill
- reduce waste-related greenhouse gas emissions by diverting organic materials away from landfill
- manage waste so that it can be used as a resource.

These matters are discussed in further detail in Sections 23.2.2, 23.2.3, and 23.2.4.

23.2.2 Construction

The construction of the proposed transmission line and substation will generate various waste types. Potential waste streams are outlined in Table 23.1, along with the disposal and recycling options available. Quantities of waste have yet to be determined. Estimates will be generated during the detailed design phase and a Waste Management Plan will be prepared for the Project. General management measures to inform this Waste Management Plan are described in the EMP (refer Appendix D). The Waste Management Plan will provide details of the estimated quantities of waste from each waste stream and will include all actions needed to effectively implement the waste management hierarchy. It will also establish a waste monitoring program for the construction stage.

Table 23.1 General waste generation and management during construction

Waste type	Recycling options	Management/disposal method
Cleared vegetation	Vegetation mulch to be retained on site for use in mitigation and site management works (e.g. erosion control).	Due to the relatively small amount of vegetative waste likely to be generated from this Project, disposal will be either via chipping or mulching. Burning of vegetative waste will not be undertaken.
Excess spoil	Reuse as fill around site or to construct ancillary infrastructure (e.g. access tracks, where applicable) or reinstatement of eroded areas.	Uncontaminated spoil is usually stockpiled and spread around the transmission line structure after construction is complete. Contaminated material will be disposed of by an appropriately licensed waste contractor to a licensed waste facility.
Waste concrete	Return to concrete plant for reuse of sand and gravel.	Collected and disposed of by construction contractor or concrete supplier.
Excess nuts, bolts, etc.	Recycled via scrap metal recyclers.	Collected during and after construction.
Wooden boxes and pallets	Generally, not accepted back by suppliers.	Disposed of at landfill if not accepted back by suppliers.
Plastic bags and packaging	Nil	Collected and disposed of at landfill.
Cardboard packaging and boxes	Collected and recycled	Not required
Conductor drums	Returned to supplier for reuse	Not required
Scrap conductors	Recycled via scrap metal merchants	Not required
Excess steel	Recycled via scrap metal merchants	Not required
Sewerage	Nil	Wastes to be transported by a licensed regulated waste transport contractor and must only be disposed of at licensed disposal facilities.

Transmission line support structures are designed, fabricated, and supplied to sites, ready for installation. This practice ensures that minimal excess material is transported to site; on-site waste generation is minimised; and waste generation is limited to faulty fittings (e.g. nuts and bolts) or incorrect/damaged steel members.

Waste excavated material will be reused where possible. Where excavated waste material cannot be reused (e.g. due to contamination), is to 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 on the site away from drainage channels and slopes. All stockpiles of waste excavated material will be covered or watered down when weather conditions dictate.

Waste produced during construction activities will be disposed of as required by relevant legislation (e.g. EP Act, WRR Act). 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. Putrescible waste will be sorted in closed waste containers to prevent the attraction and breeding of pest and disease vectors (such as flies and rodents) and will be removed from site at the end of each day. Waste that cannot be reused on site will be transported to a facility that is authorised to accept that type of waste.

23.2.3 *Operation and maintenance*

The types of waste generated by transmission line maintenance are similar to those generated during construction but in much smaller quantities.

Operation of the transmission line does not generate waste, except during infrequent refurbishment programs. Some waste is generated from line maintenance activities (i.e. conductor offcuts, damaged insulators). Generated waste materials would be removed from the site and either recycled or disposed of at facilities that are authorised to accept the waste.

Easement maintenance schedules depend on the type and growth rates of the easement vegetation; the maintenance requirements of landholders; and 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, with the waste being sold or distributed by the contractor. Additional maintenance could be required in the event of a transmission line failure or natural disaster that may compromise the operational safety of the line or state of the easement.

23.2.4 *Regulated waste management*

It is not expected that the Project will generate any Category 1 or Category 2 regulated waste under the *Environmental Protection Regulation 2019*. If the Project encounters Biosecurity waste, polluted spoil (acid sulfate soils) or other types of regulated waste, it will be tracked, transported and disposed of in accordance with legislative requirements.

24 Cumulative impacts

Chapter 24 summarises the cumulative impacts associated with the Theodore Wind Farm Transmission Connection Project and other past, present, and reasonably foreseeable projects within and surrounding the study area. Measures to avoid, minimise and/or mitigate potential adverse impacts from combined projects or activities during the design, construction, and operation phases of the Project are also identified.

24.1 Methodology

Cumulative impact assessment is the consideration of the combined effects of activities or development on environmental, social, economic, and cultural values. A project-initiated cumulative impact assessment considers potential project impacts in addition to adverse impacts arising from the combined effects of current and reasonably foreseeable projects.

The methodology adopted to assess potential cumulative impacts from the Project includes the identification of:

- relevant current and reasonably foreseeable projects with the potential to contribute to the Project’s cumulative impacts
- environmental values that may be impacted by the design, construction and operational phases of the Project
- measures that will be implemented for the Project to avoid, minimise, or mitigate any identified cumulative impacts (if applicable).

The identification of relevant current and reasonably foreseeable projects is based on publicly accessible information available at the time of preparation of this MID proposal.

24.2 Existing environment

The existing environmental, social and economic values of the Project area, and wider region, are identified and discussed throughout this MID proposal. Existing and reasonably foreseeable projects within the vicinity of the Project area are summarised in Table 24.1 and shown on Figure 3.1.

Table 24.1 Proposed projects in vicinity of the Project area

Project Name (Proponent)	Location	Status
Theodore Wind Farm (RWE Renewables Australia)	The Theodore Wind Farm is at the southern end of the transmission line. The proposed Castle Creek Substation is within the Theodore Wind Farm.	A Development Application for Theodore Wind Farm was submitted in September 2024 to the State Assessment and Referral Agency (SARA) (2409-41961 SDA) for Material Change of Use and Operational Work – Renewable Energy Facility (Wind Farm and Ancillary Infrastructure) and Native Vegetation Clearing. The Development Application for the Theodore Wind Farm was approved, subject to conditions on 20 June 2025. The project has been assessed as a controlled action under the EPBC Act with assessment via public environment report. Further information is provided in Section 24.2.1.

Project Name (Proponent)	Location	Status
Banana Range Wind Farm (EDF Renewables Australia Pty Ltd)	The Theodore Wind Farm Connection Project intersects the Banana Range Wind Farm in the north	The project has received Commonwealth approvals. Development Approval was granted by the former Department of State Development, Infrastructure and Planning on 9 December 2019 (re: 1907-12349 SDA). However, a minor amendment was submitted to SARA in 2025 and is awaiting assessment (reference # 2509-47979 SPD). Further information is provided in Section 24.2.2.
Dawson Wind Farm (Highland Energy Australia Pty Ltd)	The Theodore Wind Farm Connection Project intersects the Dawson Wind Farm in the centre/north	An EPBC Act referral for the Dawson Wind Farm has been submitted (EPBC number: 2025/10257) and the public comment period has ended as of 25 September 2025.
Sawpit Solar Farm (European Energy)	The Theodore Wind Farm Connection Project traverses the proposed Sawpit Solar Farm.	The project is currently in the feasibility phase and estimated to provide approximately 1 GW of solar power. A development application has yet to be submitted to the Banana Shire Council.
Banana Range Wind Farm Connection Project (Powerlink)	EDF Renewables has engaged Powerlink to consider options to connect their proposed wind farm to the transmission network. A new substation (the Mt Benn substation) will also be constructed at the Banana Range Wind Farm site. The Theodore Wind Farm Connection Project connects into the proposed Mt Benn Substation.	Since the release of the final transmission corridor in April 2023, Powerlink has been meeting with landholders to identify individual site constraints and determine a final easement alignment. Final field surveys and initial construction feasibility assessments are underway. The findings of these studies will be summarised in the MID proposal report which is scheduled to be released for public comment in 2025. Further information is provided in Section 24.2.3.
Calvale to Calliope River Transmission Line Reinforcement Project	Powerlink is planning for a new transmission line between Calvale Substation (near Callide Power Station) and Calliope River Substation (near Gladstone). The line will be around 87 km long and mostly co-located beside existing 275 kV transmission lines in spare existing easements. Connecting the new transmission line to the electricity network will also involve upgrade works at both the Calvale and Calliope River substations. The project is approximately 30 km northeast from the northern end of the Project area.	In November 2024, Powerlink referred the Calvale to Calliope River Transmission Line Reinforcement Project to the Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment under the EPBC Act. Initial consultations were held in January 2025, and the project was classified as a 'Controlled Action'. Powerlink will prepare a Public Environment Report, which will be made available for public consultation. If approved and funded, this project will become Stage 1 of the Gladstone Project. Construction of the Project is due to commence mid-2026 and be completed in 2028.

Project Name (Proponent)	Location	Status
Bouldercombe to Larcom Creek Transmission Line Reinforcement Project	Powerlink is planning for a new transmission line between the Bouldercombe and Larcom Creek substations. The line will be approximately 95 km long and mostly co-located beside existing 275 kV transmission lines in spare existing easements. Whilst not in the immediate vicinity of the Theodore Wind Farm Connection Project there is the potential for workforce requirements to overlap.	Powerlink has been engaging with directly impacted landholders, Traditional Owner groups, and the wider community. If approved and funded, this project will become Stage 2 of the Gladstone Project. Construction of the Project is due to commence in 2027 and be completed in 2029.

Additional information on following projects is provided in the following sections:

- Theodore Wind Farm: the Project provides the connection of this project to the transmission line network
- Banana Range Wind Farm and Dawson Wind Farm: the Project traverses these proposed developments
- Banana Range Wind Farm Connection Project: The Project has the same termination point (Mt Benn Substation)

While the Sawpit Solar Farm is also traversed by the Project, limited information on this proposed development is available in the public domain. Additional information on the Calvale to Calliope River and Bouldercombe to Larcom transmission line reinforcement projects is not provided below as they are further removed from the Project. Further details on these projects are available on the Powerlink website.

24.2.1 Theodore Wind Farm

The Theodore Wind Farm is intended to generate about 1,100 MW of electricity The project comprises:

- up to 170 wind turbine generators
- wind turbine generator foundations and hardstand areas
- temporary infrastructure such as concrete batching plants, laydown areas, temporary construction offices, parking and accommodation camp, temporary fencing, and other standard construction site ancillary works including local road upgrades to facilitate component delivery
- access tracks and electrical reticulation, including underground and overhead electrical works where necessary
- switching stations and substations
- battery energy storage system (BESS)
- temporary and permanent meteorological masts
- permanent operations and maintenance facilities, with a variety of associated site facilities and storage laydowns around the proposed site.

The Theodore Wind Farm Connection Project provides the transmission connection for the Theodore Wind Farm from Castle Creek Substation to Powerlink transmission network at the Mt Benn Substation in the north.

Construction of the Theodore Wind Arm is expected to take up to four years and require a workforce up to 500 people at peak periods. Construction is expected to commence 2026, with the wind farm being operational by 2029. The project will have an operating life of 30 to 35 years. A 50-bed on-site accommodation camp is proposed as part of the project. Access to the site is via the Leichhardt Highway and Defence Road.

24.2.2 *Banana Range Wind Farm*

The Banana Range Wind Farm received a Development Permit for Material Change of Use on 9 December 2019 (Reference # 1907-12349 SDA). The approved layout included construction of:

- 51 wind turbines with a total capacity of 230 MW. The turbines will have a maximum total (tip) height of 250 m including a rotor diameter of up to 180 m and hub height of up to 170 m. Each turbine will have a footprint of approximately 90 m x 120 m. Turbines will be positioned on a concrete hardstand (1 ha on average)
- 2 substations including energy storage.

A minor change application was made to SARA in 2025, involving a reduction in the scale and associated impact of the wind farm development. The revised design for the Banana Range Wind Farm includes:

- reduction in the number of wind turbine generators from 51 to 41
- change of the location of the wind turbine generators, including some beyond the 100 m micro-siting area provided for under the existing Decision Notice
- a reduction of the height of each wind turbine generator, from ground level to the highest tip to 235 m
- relocation of the transmission line from the ridgeline to the lower elevations in the western portion of the site as well as relocation of the proposed Mt Benn Substation site.

Construction is anticipated to take up to two years (starting in Q1 2026 and be completed by Q4 2028) and require a workforce up to 200 people at peak periods. Once operational, the Banana Range Wind Farm will require 10 to 15 full-time jobs. The project will have an operating life of 30 to 35 years. Access to the project site will be via the Dawson Highway.

The project is proposed to be connected to the transmission network via the Banana Range Wind Farm Connection Project 275 kV transmission line.

24.2.3 *Dawson Wind Farm*

The Dawson Wind Farm is intended to generate up to 600 MW of electricity. It includes:

- up to 75 wind turbine generators
- wind turbine generator foundations and hardstand areas
- temporary infrastructure such as construction compounds, laydown areas, concrete batching plants, power curve verification masts, bores and water dams
- two potential 33 kV / 275 kV collector substation locations
- BESS with 500 MW power and 1000 MWh storage capacity
- operations and maintenance facility
- electrical reticulation, including underground and overhead electrical works where necessary
- temporary and permanent meteorological (met) masts
- access tracks and waterway crossings.

Construction is anticipated to start in November 2027.

24.2.4 *Banana Range Wind Farm Connection Project*

Powerlink is planning for a new 44 km-long transmission line to connect the Banana Range Wind Farm to the transmission network. The Banana Range Wind Farm Connection Project involves constructing a new, 275 kV transmission line from the Banana Range Wind Farm site at the northern foothills of the Banana Range (about 20 km west of Biloela), to Powerlink's existing Calvale Substation, near Callide Power Station. A new substation (the Mt Benn substation) will also be constructed at the Banana Range Wind Farm site. The Theodore Wind Farm Connection Project connects into the proposed Mt Benn Substation.

Construction is expected to commence in 2026 pending project approvals.

24.3 Potential cumulative impacts

Cumulative impacts of the Project and other known major projects in the area are difficult to quantify due to a lack of available information. The following sections however aim to provide a qualitative assessment of the potential activities that may result in cumulative impacts on the receiving environment.

Table 24.2 provides an overview of the natural and built environmental values which are likely to contribute to cumulative impacts as a result of the Project. An assessment of each value is discussed below in relation to the contribution of the Project to cumulative impacts.

Table 24.2 Potential cumulative impacts

Natural environmental and built environmental values	Potential for cumulative impact?	
	Construction	Operation
Land resources	×	×
Air quality	×	×
Water resources and hydrology	×	×
Terrestrial ecology	✓	×
Biosecurity	✓	×
Land use	×	×
Visual amenity	×	✓
Social and economic	✓	×
Indigenous and non-indigenous heritage	✓	×
Non-indigenous heritage	×	×
Traffic and transport	✓	×
Noise and vibration	×	×
Waste management	✓	✓

24.3.1 Land resources

Earthworks required for the Project will occur at relatively small, discrete locations and no other changes to the geomorphic landscape are anticipated. The risk of soil and contamination impacts resulting from the Project were also identified as being readily managed through standard practices. As impacts from the Project on soil quality and soil contamination are localised, cumulative impacts are not expected.

24.3.2 Air quality

The Project is not anticipated to create a dust impact to sensitive receptors. The Project, the Theodore Wind Farm Project, the Banana Range Wind Farm Project, and the Dawson Wind Farm Project may all require the use of local unsealed roads for the transport of machinery, materials, and personnel, and potentially may result in cumulative dust impacts should development of the projects occur in a similar timeframe. Given the distance between the four projects, and that fact that the Theodore Wind Farm Connection Project is mainly linear with construction occurring in discrete locations, any overlap of the use of local roads should only be short-term. Coordination of construction activities between the projects should ensure that potential cumulative impacts are minimised.

24.3.3 *Water resources and hydrology*

The likelihood of measurable impacts of the proposed Project and the other proposed developments on water resources is low. Identified impacts from all projects are most likely to occur during construction, and primarily as a result of access tracks construction across waterways. With implementation of mitigation measures including erosion and sediment controls and stormwater management, significant impacts on water resources and hydrology are not expected. The risk of cumulative impacts is therefore considered to be low.

24.3.4 *Protected areas*

The Project will not impact on protected areas and as such no cumulative impacts have been identified.

24.3.5 *Terrestrial ecology*

Cumulatively, the Project and other proposed developments in the region are likely to result in the continued loss of biodiversity in the region. All the projects identified in Table 24.1 are likely to result in habitat loss and degradation from vegetation clearing/removal. Vegetation clearing associated with these projects has the potential to impact on habitat for terrestrial flora and fauna (including MNES and MSES), potentially increasing the extent of impact.

The design and planning phase of the Project has prioritised avoidance and minimisation of impacts to MNES/MSES, as well as other areas of native vegetation and habitats. A detailed corridor selection process, in addition to the findings of the desktop assessment and field verified data, have been used to avoid and minimise Project impacts, particularly to known significant ecological values (MNES and MSES), and inform design refinements (where possible).

Development of the MID Disturbance footprint has involved considerable design measures (e.g. locating structures outside of remnant vegetation, raising structure heights and reducing the extent of vegetation clearing within the MID Proposal Area) to avoid and minimise impacts to native vegetation/habitats and water features. In particular, development of the MID Disturbance footprint has:

- located structures such as transmission towers and access tracks outside of remnant vegetation, and within areas of lowest biodiversity (such as non-remnant pasture grasslands) to the greatest extent possible
- prioritised the avoidance and minimisation of impacts to the following areas:
 - Brigalow TEC
 - vegetation communities that comprise habitat for threatened species
 - waterways and waterway vegetation, including the Eucalypt riparian and floodplain woodlands and Melaleuca riparian open forest with vine thicket understorey, and particularly around Castle Creek
- utilised existing access tracks such as landholder tracks and local roads, in preference to clearing for new access tracks
- reduced easement clearing width where assessment has determined there will be adequate electrical safety clearances to the conductor.

Implementation of these avoidance and minimisation measures has reduced the direct impact (vegetation clearing) to remnant and high value regrowth vegetation by 27.7 ha to 7.7 ha and non-remnant areas by 206.6 ha to 159.7 ha.

Based on this reduced MID Disturbance footprint, the Project is not expected to result in a significant residual impact to MNES and/or MSES and have a minor contribution to biodiversity loss in the region.

24.3.6 *Biosecurity*

Of the projects identified in Table 24.2, the projects considered most likely to result in cumulative biosecurity impacts are the Theodore Wind Farm, Sawpit Solar Farm, Banana Range Wind Farm, and Dawson Wind Farm. Ground disturbance activities associated with these projects have the potential to create favourable conditions for invasive plant species (weeds) to invade and/or spread into areas immediately adjacent to disturbed areas. Provided potential impacts are managed in accordance with legislative requirements, then the risk of cumulative impacts to biodiversity from biosecurity impacts (i.e. the displacement of native flora and fauna species due to invasion of weed and pest species) is considered low.

24.3.7 *Land use*

Impacts to agricultural land uses underlies the proposed developments reviewed in this study. As with the Theodore Wind Farm Connection Project, the Theodore Wind Farm, Banana Range Wind Farm, and Dawson Wind Farm are located across Rural zoned land under the Banana Shire Planning Scheme, with the predominant land use being cattle grazing. Neither of these proposed developments will sterilise the land for agricultural purposes following completion of construction, with grazing/agricultural activities still able to be undertaken during operations. The evolving landscape and shift towards renewable energy development is also acknowledged. As such minimal cumulative impacts to land use are expected.

Construction activities have the greatest potential for impact, although these impacts can be minimised by liaising/negotiating with the relevant stakeholders.

24.3.8 *Visual amenity*

The proposed wind farm developments in the vicinity of the Project are expected to have some degree of visual impact on the surrounding rural character. The visual impact assessment for the Theodore Wind Farm determined that opportunities to view the development varied, but that visual impact ratings were generally low. Due to surrounding topography and vegetation there were limited opportunities to view the development in its entirety. The visual impact assessment for the Banana Range Wind Farm found that the proposed development would have some local significant impacts on the character parts of the Banana Range and views.

Development of the proposed Theodore Wind Farm Connection Project would contribute to the overall impact on visual amenity of the area. Greatest area of impact is likely to be at the northern end of the Project area, where both the proposed transmission line and Banana Range Wind Farm are likely to be visible from the Dawson Highway. Due to the height differences the transmission towers, when viewed against the proposed transmission towers, will be less prominent in the landscape.

The visual impact on the surrounding visual receptors has been considered throughout the design of the Project. During the corridor selection process, the recommended corridor was positioned as far as practicable away from visual receptors. Design of the Project has also considered screening by existing vegetation and topography, where possible.

24.3.9 *Social and economic*

24.3.9.1 *Impact on labour market*

Where the Project's construction would overlap with the construction of other proposed major projects, the cumulative impact on labour demand (and subsequent increased competition for labour resources) has the potential to intensify existing labour shortages in the construction industry, reduce the availability of labour for other projects and sectors, increase real wages and labour costs for businesses across the region, increase reliance on non-local labour forces to support delivery of projects, and potentially delay projects.

Given the relatively low labour requirements during the Project's operation, potential cumulative impacts on labour demand during operation are expected to be minimal.

24.3.9.2 Impact on short-term accommodation availability and affordability

The need to provide accommodation to a non-local workforce across multiple cumulative projects may increase the demand for short term accommodation (e.g. motels, hotels and camp sites) and housing, which may result in increased prices for short term accommodation and housing across the region, considering the already tight housing market. An accommodation strategy will be developed for the construction phase of the Project to ensure that the construction workforce can be appropriately accommodated. A 50-bed on-site accommodation camp is proposed for the Theodore Wind Farm project, which will assist in minimising accommodation cumulative impacts.

The operation of the Project is expected to have minimal labour requirements and as such there would be minimal long-term impacts on the local housing market from the Project.

24.3.10 Indigenous cultural heritage

Despite the Project area having already been exposed to significant ground disturbance, there is a low number of recorded Indigenous cultural heritage sites within the area, there is potential that works associated with the Project may disturb unknown items of cultural heritage. The risks of disturbance to items of Indigenous cultural heritage are greatest within the previously undisturbed areas of the Project area. The risk of impact to unknown items of Indigenous cultural heritage will be managed and mitigated through the development and implementation of Cultural Heritage Management Agreements (CHMAs) with each of the Aboriginal Parties, in accordance with the ACH Act.

Ground disturbance works associated with the other developments also have the potential to disturb items of Indigenous cultural heritage. Management of this risk will be undertaken in accordance with the processes outlined in any CHMAs or Cultural Heritage Management Plans (CHMPs) developed between the proponents and the relevant Aboriginal Parties. Undertaking works in accordance with these agreements should ensure cumulative impacts are minimised.

24.3.11 Non-indigenous heritage

No historic heritage values have been identified within the Project area and as such the Project is not anticipated to result in any cumulative impacts.

24.3.12 Traffic and transport

In accordance with DTMR's Guide to Traffic Impact Assessment, State-controlled road links where development traffic exceeds 5 percent of the base traffic (background traffic) is deemed to have an impact on the road network. Chapter 18 (Transport and traffic) identified that the Project's estimated construction traffic volumes will most likely exceed 5 percent of the background traffic on the Dawson Highway and Leichhardt Highway during the construction period due to low background volumes. The Traffic Impact Assessment found negligible impact to link capacity and no change to the operational level of service on these State-controlled roads.

Both the Banana Range Wind Farm and Theodore Wind Farm are anticipated to use the Dawson Highway and Leichhardt Highway for the delivery of construction materials, machinery and personnel. Therefore, there is the potential for cumulative road network impacts should the construction periods of the three projects overlap.

Coordination of construction activities will be crucial to mitigating cumulative traffic and transport impacts. Powerlink will continue to engage and work collaboratively with the proponents of these projects to ensure impacts are minimised to the greatest extent possible.

24.3.13 Noise and vibration

Chapter 19 (Noise and vibration) identified the setback distances from the Project at which compliance with noise criteria during construction would be achieved. All residential sensitive receptors are located beyond these identified setback distance and therefore are expected to achieve compliance with noise criteria during construction.

As vegetation in this area is limited to scattered trees within a predominantly cleared landscape, vegetation clearing activities will not be extensive and unlikely to create a significant source of noise. As this sensitive receptor is within the footprint of the Theodore Wind Farm, there is the potential for cumulative noise impacts. As construction works in the vicinity of this receptor from the two projects will be localised (i.e. occur in discrete locations such as transmission line structures and wind turbine locations), noise impacts will be short-term and localised.

It is recommended that Powerlink will coordinate construction activities with RWE in this location to ensure noise impacts are minimised.

24.3.13.1 Waste management

Waste generated by the Project has the potential to adversely impact environmental values. Impacts from generated construction waste will be temporary and limited to the construction phase. Impacts from waste generated during the operational phase will be minor due to the nature of operational activities.

The potential impacts to environmental values from waste activities are anticipated to be negligible due to the nature of the Project and the proposed management and mitigation measures.

The proposed waste minimisation controls to be applied in the Project reduce total volume of waste requiring disposal to landfill as far as practicable. Disposal of wastes to landfill would only occur where no secondary reuse or recycling pathway can be identified for a material. Projects identified in Table 24.1 have the potential adversely impact the ability of waste management facilities to accept and handle these waste stream. Further determination of the volumes of wastes to be generated by the Project and other project is required to assess the potential for this to occur. Discussions will be held with waste management facilities to determine their ability to accept the proposed waste volumes and stream.

25 Environmental management

Chapter 25 outlines Powerlink's commitment to the protection of the environment and management of adverse environmental impacts. It identifies how potential impacts of the Project will be managed and mitigated through the EMP.

25.1 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 Powerlink activities. Every Powerlink individual is responsible and accountable for environmental management, and Powerlink's leaders are active role models of this commitment.

Powerlink through its Health, Safety and Environment Policy systemically monitors its compliance obligations and business requirements. It has systems in place to develop, resource, monitor and make continuous improvement to progress its health, safety and environmental commitments and objectives. This includes planning, design, construction, operation, and maintenance of an electrically safe network.

25.2 Environmental management process

25.2.1 Overview of process

Powerlink's Environmental Management Process involves the following steps:

- Step 1 – Acquisition of Approvals: Powerlink's EMP (Appendix D) for the Project is included as a supporting document for acquisitions of Commonwealth and State approvals. The environmental controls contained within this EMP specify Powerlink's minimum requirements for the management of environmental aspects relevant to activities undertaken by Powerlink and its Contractors.
- Step 2 – Contract Document Development: Powerlink's Environment and Sustainability Specification is issued as part of Contract engagement documentation. The Specification defines Powerlink's environmental management requirements relating to Work Under Contract (WUC) for a project. An Environmental Annexure is also developed and issued as part of Contractor engagement. The Environmental Annexure details Project-specific environmental management requirements related to WUC. Environmental Work Plans (EWPs) provide a geospatial representation of key land and water- based data sets which are of relevance to Powerlink's assets. EWPs are used by Powerlink staff, Contractors, relevant sub-Contractors and relevant management service providers (MSPs) for the identification of key environmental features and/or constraints which have been highlighted to enable works to be undertaken on, or in association with, a Powerlink asset.
- Step 3 – Project Delivery: The Contractor is required to develop, and implement through Project delivery, a Construction Environmental Management Plan (CEMP). The CEMP must, at a minimum, meet the requirements as outlined within the Environment and Sustainability Specification and Environmental Annexure and all relevant legislative requirements. Roles and responsibilities must be nominated in the Contractor's CEMP including timing/frequency for undertaking environmental management activities where applicable.
- Step 4 – Operation and Maintenance: Activities undertaken by Powerlink and Contractors during the operation and maintenance phase are managed in accordance with Powerlink's Environmental Management System documentation, including the EMP. EWPs are also used by Powerlink staff, Contractors, relevant sub-Contractors, and relevant MSPs for the identification of key environmental features and/or constraints which have been highlighted to enable works to be undertaken on, or in association with, a Powerlink asset.

- Step 5 – Decommissioning: Activities undertaken by Powerlink and Contractors during the decommissioning phase are managed in accordance with Steps 2 and 3 above. As the operational life of a transmission line and substation is typically 50 years, specific measures relating to decommissioning (removal and replacement of an asset) have not been included in the EMP. Environmental regulations, understanding of environmental impacts and community expectations will have changed over this length of time and will need to be considered as part of the environmental assessment process current at the time of decommissioning. Any agreements, requirements or conditions relating to an asset removal or replacement (e.g. conditions of a development approval) will be retained within the relevant Objective site folder, to ensure that such measures are not overlooked at the end of the asset's life.

25.2.2 *Environmental audits and inspections*

Environmental audits may be conducted by a Powerlink Environmental Representative at any given time throughout the Project against the EMP or other requirements (e.g. Project Environmental Annexure requirements, permits, approval conditions). The frequency of environmental inspections is dependent on the environmental risk determined for the work.

External audits may be required as a condition of Project approvals or at the request of the Regulator. The frequency of external audits will be undertaken in accordance with relevant Project approval conditions, or as directed by the Regulator.

25.2.3 *Non-conformance and corrective actions*

The identification of non-conformances may be a result of an environmental incident, inspections/audits/monitoring against the EMP, or other requirements (e.g. Project Environmental Annexure requirements, permits, approval conditions).

Powerlink's Corporate Health, Safety and Environment (HSE) Management System (HSEMS), includes processes and procedures for responding to environmental incidents or non-conformances, including notification requirements and implementation of corrective actions.

25.2.4 *Emergency response*

Powerlink's processes and procedures for emergency response are maintained within the Corporate HSEMS. Powerlink's Emergency Management Procedure has been developed to prevent, plan for, respond to and recover from HSE emergencies at Powerlink sites, in order to minimise the consequences, prevent further harm and enable a safe and efficient resumption of normal operations.

Contractors must develop and implement an Emergency Preparation and Response Plan that describes the requirements and associated responsibilities to effectively prevent, prepare for, respond to, and recover from any emergency situation associated with the scope of work, including environmental incidents and natural disasters (e.g. floods events, bushfire, cyclone).

25.2.5 *Training and competency – environmental*

Powerlink staff or Contractors undertaking activities that have an environmental impact will have an appropriate competency matrix which includes specific environment related competencies.

Training records will need to be maintained by Powerlink for its staff and management. Contractors working on behalf of Powerlink will have the obligation to maintain training records for their staff and sub-contractors. Training records will be reviewed, including inductions, as part of routine environmental audits and inspections.

25.2.6 *Review and improvement*

The EMP will be reviewed and updated as required to ensure the document addresses any site related environmental issues or changes in guidelines, policies, procedures or legislation. The review and update of the EMP is to allow for a process of continuous improvement. Any identified changes or deficiencies in the EMP should be promptly addressed and new revisions of the EMP issued as necessary. Any changes or updates to the EMP will be discussed with the Powerlink Environmental Managers (refer to Section – Roles and Responsibilities) to determine if such changes will trigger any broader organisational improvements or issues.

25.3 Environmental management plan

25.3.1 *EMP*

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. These will be captured in an Environmental Annexure to the EMP.

All construction, operation, maintenance and decommissioning measures proposed for the Project are documented in the EMP (Appendix D).

25.3.2 *Environmental Work Plans*

Environmental Work Plans (EWPs) provide a geospatial representation of key land- and water-based datasets that are of relevance to Powerlink's assets. EWPs shall be used by Powerlink staff, Contractors, relevant sub-contractors and relevant MSPs for the identification of key environmental features and/or constraints that have been highlighted to enable works to be undertaken on or in association with a Powerlink asset. Information presented on the EWPs may include and not necessarily be limited to:

- vegetation communities and habitat areas
- clearing extents and methods
- access tracks
- areas of cultural significance
- significant environmental management measures
- land status (e.g. weed status, contaminated land status)
- special access requirements and controls.

The EMP and EWPs will be reviewed and updated as required to ensure that they address any site related environmental issues or changes in guidelines, policies, procedures or legislation.

25.3.3 *Construction Environmental Management Plan (CEMP)*

The EMP and EWPs will be used by the third-party construction contractor to prepare a Construction Environmental Management Plan (CEMP) for the Project. The CEMP will outline the specific measures that the construction contractor will employ to ensure that the works are undertaken in accordance with the measures outlined in the EMP and EWPs. The CEMP will be supported by detailed plans including:

- Erosion and Sediment Control Plan
- Waste Management Plan
- Traffic Management Plan.

26 Planning and approval requirements

Chapter 26 provides an overview of the relevant legislation, policy, and approval requirements for the Project. In addition, it identifies the applicable State interests and local government planning schemes applicable and provides a statement about how they relate to the Project.

26.1 Commonwealth legislation

26.1.1 *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's primary legislation for environmental protection. Administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW), it provides a framework for the protection of significant flora, fauna, habitats, ecological communities, and places such as heritage sites, marine areas, and select wetlands. The EPBC Act defines these protected matters as Matters of National Environmental Significance (MNES).

A project requires assessment if it is likely to have a significant residual impact to MNES. Self-assessment is required to determine whether impacts will occur, following which a referral will need to be submitted to DCCEEW if significant residual impacts are likely. The Commonwealth Minister may decide that a referred project has, or will have, a significant impact on protected matters, and will declare it a controlled action. Controlled actions require assessment and approval by the Commonwealth Minister for the Environment.

26.1.1.1 Project relevance

Based on database search results and field verification surveys the following MNES were identified as being present or having a moderate or high likelihood of occurring within the Project area:

- listed threatened species:
 - Corben's Long-eared Bat (*Nyctophilus corbeni*) (Vulnerable)
 - Greater Glider (southern and central) (*Petauroides volans*) (Endangered)
 - Koala (*Phascolarctos cinereus*) (Endangered)
 - Squatter Pigeon (southern) (*Geophaps scripta scripta*) (Vulnerable)
 - White-throated Needletail (*Hirundapus caudacutus*) (Vulnerable, Migratory)
 - Yellow-bellied Glider (south-eastern) (*Petaurus australis australis*) (Vulnerable)
- listed threatened ecological communities:
 - Brigalow (*Acacia harpophylla*) dominant or co-dominant (Endangered)
- listed migratory species:
 - Fork-tailed Swift (*Apus pacificus*).

Significant impact assessments (SIA) undertaken in accordance with the Significant Impact Guidelines 1.1 – Matters of National Environmental Significance (refer Attachment G of Appendix E) determined that the Project will not result in a significant residual impact on MNES threatened species within the meaning of the Significant Impact Guidelines. The Project was referred to the DCCEEW in October 2025. If deemed to be a controlled action by the Department, the Project will require further assessment and approval under the EPBC Act.

26.1.2 *Native Title Act 1993*

The *Native Title Act 1993* (Commonwealth) (NT Act (Commonwealth)) recognises the rights and interests of Indigenous people in land and waters in accordance with traditional laws and customs. This includes regulation of acts that may affect Native Title, Native Title determinations, and compensations for acts affecting Native Title. Specifically, the NT Act (Commonwealth) includes provisions for the:

- recognition and protection of Native Title
- establishment of methods for regulating future dealings which may affect Native Title
- establishment of methods for determining Native Title claims
- validation of past acts and intermediate period acts, invalidated because of the existence of Native Title.

Under the NT Act (Commonwealth), the valid grant of a freehold estate (other than certain types of Aboriginal and Torres Strait Islander land) on or before 23 December 1996 is known as a ‘previous exclusive possession act’, meaning that Native Title has been extinguished over the area. The dedication and declaration of roads on or before 23 December 1996 also has the effect of extinguishing Native Title (section 253 of the NT Act (Commonwealth)). Where a proposed development impacts on a parcel of land which is subject to a Native Title claim, the Project will suppress the existing rights and interests of Indigenous people in respect of that land, until such time as the infrastructure is decommissioned.

26.1.2.1 Project relevance

The Project area is located within one registered Native Title claim (Wulli Wulli people) and one active Native Title claim (Wulli Wulli People #3) (refer Table 13.1). In the northern portion of the Project area, there is a dismissed Native Title claim belonging to the Gaangalu Nation People. These claims are not relevant to land over which Native Title has been expressly extinguished including freehold tenure and most land tenures dedicated as roads on or before 23 December 1996 and specific State lease land (i.e. perpetual lease for use for a particular purpose (transport: rail corridor)). Apart from roads all land traversed by the MID Proposal area, and the site of the proposed Castle Creek Substation, is of freehold tenure where Native Title has been expressly extinguished.

Within land over which Native Title has not been expressly extinguished (i.e. potentially roads), construction of the transmission line and substation is covered under section 24K which concerns ‘facilities for services to the public’ including ‘an electricity transmissions or distribution facility’. Under section 24KA:

- future acts, proposals to do something that might affect Native Title, are valid but the non-extinguishment principle applies
- Native Title is not extinguished, but is suspended for the duration of the act (until the easement for the transmission infrastructure is withdrawn)
- Native Title holders, and any registered Native Title claimants, have the same relevant procedural rights as an ordinary title holder.

26.2 State legislation

26.2.1 *Electricity Act 1994*

The *Electricity Act 1994* (Electricity Act) is the principal legislation governing Queensland’s electricity industry (including the use, licensing, and supply of electricity) and is administered by the Queensland Treasury. It provides a framework for all electricity industry participants to follow to ensure the efficient, economically and environmentally sound supply and use of electricity.

Requirements for construction and operation of the electricity network are set out under the Electricity Act and subordinate legislation including the Electricity Regulation 2006. A number of activities related to the construction and operation of electricity infrastructure are exempt from approval. In particular, the clearing of native vegetation on freehold land is exempt development if the clearing is for operating works for a transmission entity on land subject of a designation for operating works under the *Planning Act 2016*.

26.2.1.1 Project relevance

Under section 22 of the Electricity Act, electricity entities include entities that participate in the electricity industry including transmission entities such as Powerlink. Powerlink must comply with the conditions set for transmission authorities under section 31 of the Electricity Act.

Under section 31(b) of the Act, a transmission entity is required to properly take into account the environmental effects of its activities under the transmission authority. Powerlink will meet this requirement through the development of this MID proposal and implementation of a Project-specific EMP. The measures outlined in the EMP are relevant to the construction, operation and maintenance stages of the Project.

26.2.2 Electricity Safety Act 2002

The *Electricity Safety Act 2002* (Electricity Safety Act) seeks to prevent the potential death, injury or destruction caused by electricity. The Electricity Safety Act regulates electricity works to prevent persons from being killed or injured by electricity, and to prevent property from being destroyed by electricity.

26.2.2.1 Project relevance

The transmission line and substation must be designed in compliance with the requirements outlined under the Electricity Safety Act.

26.2.3 Planning Act 2016

The *Planning Act 2016* (Planning Act) is administered by the Department of State Development, Infrastructure and Planning (DSDIP) and is Queensland's primary legislation for the provision of, and framework for, the state's planning system. The Planning Act enables the Queensland planning Minister to designate premises for the development of infrastructure prescribed within the Planning Regulation 2017 (Planning Regulation) (refer Section 1.3.2 for details on the process for infrastructure designations).

26.2.3.1 Project relevance

'Electricity operating works' are considered 'infrastructure' which is prescribed development under the Planning Regulation. The Planning Minister is the only State Minister with authority to designate land for infrastructure. The Minister's Guideline and Rules (MGR) outlines the process for making infrastructure designations. The assessment process involves submission of a MID proposal, minimum 20 business day consultation period, and a State interest review.

A designation 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 under the *Building Act 1975*). However, this does not exempt any approvals required under other legislation. A MID under the Planning Act is being sought for the Project.

26.2.4 *Land Act 1994*

The *Land Act 1994* (Land Act) is administered by the Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development (DNRMMRRD) and governs the allocation and management of land for development including non-freehold, freehold, leasehold and other tenures. Although this Act generally applies to non-freehold land, most freehold land contains a reservation to the State for minerals.

26.2.4.1 Project relevance

The Project traverses freehold tenure and roads.

The Electricity Act provides some exemptions to the Land Act for works by transmission entities such as Powerlink. 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 roads through written agreement from the road authority under section 102. Written agreements will be in place prior to any works commencing.

26.2.5 *Acquisition of Land Act 1967*

The *Acquisition of Land Act 1967* is administered by DNRMMRRD and sets out the processes for compulsory and voluntary acquisition of land for a public purpose by a constructing authority.

26.2.5.1 Project relevance

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

26.2.6 *Environmental Protection Act 1994*

The EP Act is administered by the Department of Environment, Tourism, Science and Innovation (DETSI) and operates as the key legislative framework for environment protection and management in Queensland through mechanisms to monitor and enforce environmental compliance.

The EP Act utilises a number of mechanisms to achieve its objective of:

“To protect Queensland’s environment while allowing for development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends (ecologically sustainable development).”

These include creating a general environmental duty, licencing of Environmentally Relevant Activities (ERAs) and issuing the Environmental Protection Policies (EPPs) and Regulations under the Act.

Activities with the potential to cause land contamination are listed as ‘notifiable activities’ under schedule 3 of the EP Act. Land on which a notifiable activity has taken place is recorded in the Environmental Management Register (EMR). Furthermore, land is recorded in the Contaminated Land Register (CLR) when scientific investigation proves it is contaminated, and action must be taken to remediate or manage the land.

The EP Regulation also prescribes requirements for the management of regulated waste. Any regulated waste generated by the Project will be tracked, transported and disposed of in accordance with legislative requirements.

26.2.6.1 Project relevance

General environmental duty

Section 319 of the EP Act establishes a general environmental duty of care, which Powerlink are obliged to meet when undertaking works and operations of their electrical infrastructure. The duty states that an organisation undertaking an activity must not cause, or be likely to cause, environmental harm unless all reasonable and practicable measures to prevent or minimise the harm are taken.

Powerlink will comply with the general environmental duty as a result of the design and mitigation measures informed by preliminary studies; this MID proposal; standard Powerlink management procedures; and a Project-Specific Environmental Management Plan (EMP) (refer Appendix D). Management procedures and the EMP will be implemented throughout the construction and operational stages of the Project.

ERAs

The EP Regulation is subordinate legislation to the EP Act and prescribes Environmentally Relevant Activities (ERAs) which have the potential to release contaminants into the environment or cause environmental harm. It is not expected that the development of the transmission line or substation would trigger an ERA requiring an Environmental Authority.

Environmental Protection Policies

Under the EP Act, environmental protection policies (EPPs) are developed to cover specific aspects of the environment. The following EPPs are approved under the EP Act.

- **Environmental Protection (Air) Policy 2019 (EPP (Air)):** The purpose of the EPP (Air) is to achieve the objectives of the EP Act in relation to air quality. Section 7 of the EPP (Air) lists the following environmental values to be protected:
 - 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
 - the qualities of the air environment that are conducive to protecting agricultural use of the environment.

The air quality objectives for protecting these environmental values are detailed in Schedule 1 of the EPP (Air)). An assessment of the Project against the EPP (Air) and air quality objectives is provided in Chapter 6 (Air quality).

- **Environmental Protection (Noise) Policy 2019 (EPP (Noise)):** The purpose of EPP (Noise) is to ensure the objective of the EP Act is upheld in relation to the acoustic environment. Section 6 of the EPP (Noise) lists the following environmental values to be protected:
 - the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems
 - 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
 - the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

The acoustic quality objectives for sensitive receptors are detailed in Schedule 1 of the EPP (Noise). An assessment of the Project against the EPP (Noise) and acoustic quality objectives is provided in Chapter 19 (Noise and vibration).

- **Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP (Water and Wetland Biodiversity)):** The purpose of the EPP (Water and Wetland Biodiversity) is to ensure the objective of the EP Act is upheld in relation to all Queensland waters and wetlands. Environmental values and water quality guidelines are determined according to a process detailed in the National Water Quality Management Strategy, Implementation Guidelines and Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC). Environmental values and water quality objectives are categorised by region and sub-basin and documented under

Schedule 1 of the EPP (Water and Wetland Biodiversity). An assessment of the Project against the EPP (Water and Wetland Biodiversity) and water quality objectives is provided in Chapter 7 (Water resources and hydrology).

26.2.7 Nature Conservation Act 1992

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

Protected plants

Where clearing is required in an area containing threatened flora species and supporting habitats, a clearing permit must be obtained from DETSI. The protected plants flora survey trigger map identifies 'high-risk' areas (where threatened flora is known or likely to exist) 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 threatened flora species are known or likely to exist.

Species management program

Section 332 of the Nature Conservation (Animals) Regulation 2020 (Animals Regulation) requires that “*a person must not, without a reasonable excuse, tamper with an animal breeding place that is being used by a protected animal to incubate or rear the animal's offspring*”, unless the removal or tampering is part of an approved species management program (SMP) for animals of the same species; or the person holds a damage mitigation permit for the animal and the permit authorises the removal or tampering.

Two SMP templates are available under the NC Act, depending on the conservation listing of the identified protected animals. The SMP “low risk of impacts” (low-risk SMP) relate to protected animals classed as least concern where the impacts are unlikely to affect a broader population. The SMP “high risk of impacts” (high-risk SMP) relate to protected animals identified by the Animal Regulation or breeding type, where the broader population is at a greater risk from impacts and include least concern wildlife that are colonial breeders and wildlife prescribed as extinct in the wild, critically endangered, endangered, vulnerable, near threatened, special least concern or least concern (colonial breeder) under the Animals Regulation.

26.2.7.1 Project relevance

The Project area is not mapped as a high-risk area for protected plants under the NC Act. In addition, no species of protected plants were identified from the flora survey as occurring in the Project area. A protected plants flora survey in accordance with the *Flora Survey Guidelines – Protected Plants* is therefore not required for the Project.

As with any removal of native vegetation and habitats, there also is inherent risk of impacting animal breeding places of least concern (non-colonial) fauna species. Several fauna breeding habitat features were recorded within the Project area, including bird nests, hollow bearing trees, arboreal termitaria with next excavations, burrows and hollow logs. To mitigate this risk, it is a requirement under the NC Act to implement a Species Management Program (SMP) “low risk of impacts” (low-risk SMP).

As the Project has potential to impact the breeding places of fauna species listed under the NC Act, a specific Species Management Program – high-risk of impacts (high-risk SMP) will be required to be approved by DETSI prior to construction commencing. Species requiring a high-risk SMP include wildlife prescribed as Extinct in the wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Special Least Concern or Least Concern (colonial breeder) under the Nature Conservation (Animals) Regulation 2020 (Animals Regulation). It should be noted that a high-risk SMP is not required for the Koala, as they do not have a ‘habitual breeding place’ (e.g. hollow or nest). As such, Koalas are managed under the Nature Conservation (Koala) Conservation Plan, 2017 (Koala Plan).

26.2.8 *Vegetation Management Act 1999*

The DNRMRD administers the *Vegetation Management Act 1999* (VM Act) which seeks to manage native vegetation in Queensland, with the exception of non-woody vegetation regulated under the NC Act. 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.

26.2.8.1 Project relevance

The Project traverses areas of native vegetation that may need to be cleared. Under schedule 10 of the Planning Regulation, operational work that is the clearing of native vegetation is assessable development unless the clearing is exempt clearing work or accepted development. However, under section 44 of the Planning Act, where an infrastructure designation is granted, the work would automatically be considered accepted development. As highlighted in Section 26.2.1, a similar exemption is also provided under section 112A of the Electricity Act.

26.2.9 *Water Act 2000*

The Water Act provides the legislative framework for the sustainable use, allocation and management of water resources in Queensland. It is jointly administered by the DLGWV and DETSI 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.

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 (RPP). Powerlink, as an approved entity, is exempt from requiring a permit where the self-assessment guidelines 'Riverine Protection Permit Exemption Requirements' are met. Where possible, any excavation or placement of fill within a waterway will be undertaken in accordance with the Riverine Protection Permit Exemption Requirements (WSS/2013/726).

26.2.9.1 Project relevance

The Project traverses a designated watercourse (Castle Creek), an unmade drainage feature and numerous 'unmapped' water features. While construction of the transmission line will not require works disturbing a waterway, construction of new maintenance tracks over designated watercourses will need to comply with the exemption requirements. Compliance with the exemption requirements may be achieved through the implementation of the EMP. Where compliance cannot be met, a riverine protection permit would be required from DETSI for any works within affected watercourses.

26.2.10 *Fisheries Act 1994*

The Fisheries Act governs the management of fisheries, declared fish habitat areas and marine plants and is administered by the Department of Primary Industries (DPI). 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' (Accepted development requirements (WWBW)) (DPI 2025).

26.2.10.1 Project relevance

The Development Assessment Mapping System (DAMS) is used to determine the presence of waterways in an area and their risk level. The MID Proposal area or easement alignment crosses a number of waterways of various risk levels. Although construction of the transmission line will not require works within the bed and banks of a waterway, establishment of access tracks within these areas may be necessary and may constitute waterway barrier works (WWBW).

Under schedule 10 of the Planning Regulation, works that are constructing or raising WWBW assessable development unless carried out in accordance with the Accepted development requirements (WWBW). Powerlink will not require development approval for WWBW for establishment of access tracks if compliance is achieved with the Accepted development requirements (WWBW). However, under section 44 of the Planning Act, where the infrastructure designation for the Project is successful the work would automatically be considered accepted development.

26.2.11 *Aboriginal Cultural Heritage Act 2003*

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) seeks 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 administered by The Department of Women, Aboriginal and Torres Strait Islander Partnerships and Multiculturalism (DWATSIPM).

26.2.11.1 Project relevance

A search of the DWATSIPM cultural heritage database and register has identified a number of records of Aboriginal cultural heritage values within the Project area. Powerlink will be responsible for carrying out works in accordance with the Duty of Care Guidelines under the ACH Act by taking all reasonable and practicable measures to ensure the activities do not harm Aboriginal cultural heritage values. The Guidelines categorise activities depending on the nature of the works and likelihood of causing harm. These categories determine the certain obligations that are required to meet the cultural heritage duty of care.

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 also may 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 within areas with little or no previous ground disturbance (i.e. clearing of remnant vegetation, escarpments)
- works in proximity to water features, such as riparian areas.

26.2.12 *Forestry Act 1959*

The *Forestry Act 1959* (Forestry Act) provides for the management, use, and protection of State forests and associated resources in Queensland, including State-owned quarry material and timber. The Act is administered by the DPI and DETSI. Under the Forestry Act, an authority is required to interfere with, remove, or use State-owned forest products, including quarry materials and timber resources located on affected land parcels. The Act also provides for compensation where activities sterilise resources or restrict access to State-owned materials.

26.2.12.1 Project relevance

The Project footprint contains a number of land parcels where quarry and timber material is owned by the State under the provisions of the Forestry Act. The Project anticipates sourcing all construction material from approved and licensed quarries.

Should suitable materials not be available from these sources, and extraction of State-owned quarry material be required, the necessary authority under the Forestry Act will be obtained prior to any disturbance of State-owned quarry or timber resources.

While significant impacts on State-owned timber resources are not currently anticipated, consultation with relevant agencies and stakeholders is ongoing. Any requirements relating to State-owned timber interests will be addressed through the detailed design, approvals and construction planning processes.

26.2.13 Transport Infrastructure Act 1994

The *Transport Infrastructure Act 1994* (TI Act) regulates the management of the State-controlled road network and is administered by the Department of Transport and Main Roads (DTMR). Under section 50 of the TI Act, construction, maintenance and operation of ancillary works and encroachments within State-controlled roads (i.e. placement of a transmission line over the road) can only be undertaken where a written approval has been granted from DTMR. Interruption to traffic flow on a State-controlled road, will also require a traffic permit. Prior to apply for a traffic control permit, the applicant will be required to obtain a permit which grants the user permission to access the state-controlled road to undertake relevant activities.

26.2.13.1 Project relevance

The Project does not traverse any State-controlled roads. The Project will however require the transport of over-sized, over-mass, and heavy lift plant equipment on the state-controlled road network. Transporting this equipment to the Project area may require some temporary amendments to road infrastructure to allow clearance for this plant and equipment, triggering Road Corridor Permits and Traffic Control Permits under the TI Act.

26.3 State planning policy

26.3.1 Applicable State interests

The State Planning Policy (SPP) sets out the framework of 17 State interests that are relevant to the assessment of development in Queensland. The SPP applies, to the extent relevant, to development applications and designated infrastructure under the Planning Act and prevails over all other regional and local planning instruments. The relevant State interests applicable to the Project are identified in Table 26.1. A full assessment of the Project against the applicable State interests is provided in Appendix H.

Table 26.1 Summary of applicable SPP State interests

Relevant State interest	Application	Response to State interest
Liveable communities and housing	Housing supply and diversity	Not applicable.
	Liveable communities	Not applicable.
Economic growth	Agriculture	Applicable
	Development and construction	Not applicable
	Mining and extractive resources	Not applicable.
	Tourism	Not applicable
Environment and heritage	Biodiversity	Applicable
	Coastal environment	Not applicable
	Cultural heritage	Applicable
	Water quality	Applicable
Safety and resilience to hazards	Emissions and hazardous activities	Applicable
	Natural hazards, risks and resilience	Applicable

Relevant State interest	Application	Response to State interest
Infrastructure	Energy and water supply	Applicable
	Infrastructure integration	Applicable
	Transport infrastructure	Applicable
	Strategic airports and aviation facilities	Not applicable
	Strategic ports	Not applicable

26.3.2 Regional plans

The Project is subject to the Central Queensland Regional Plan (DSDIP 2013). The Central Queensland Regional Plan was implemented in 2013 as a statutory instrument providing strategies aiming to address economic, social and environmental issues in the region, including identifying strategic infrastructure and service needs and support economic prosperity.

The Project would be consistent with Central Queensland Regional Plan's priority outcomes to protect Priority Agricultural Land Uses while supporting co-existence opportunities for the resources sector. Design of the Project has aimed to minimise impacts to land uses including avoiding nearby Class A agricultural land wherever possible. Other priorities include infrastructure that supports economic growth in the region by expanding energy generation capabilities. This involves public and private sector investment focusing on reinforcing electricity generation and transmission/distribution systems.

26.4 Local government planning, ordinances, and by-laws

26.4.1 Planning scheme

Once the land has been designated, development relevant to the designation becomes accepted development under the local planning schemes and as such further planning approval is not required. It is worth noting however, that the Minister may have regard to the local government assessment framework and decisions may be influenced by zoning, land-use intent, and local ordinances and by-laws. As the local government assessment framework may be relevant in the designation of the land, it is worth noting that the Project is zoned as "rural" under the Banana Shire Planning Scheme (2021). An assessment of the Project compliance with the overall outcomes for the rural zone is provided in Table H.10.

The Project would be consistent with the strategic outcome of the Banana Shire Planning Scheme (2021) to develop renewable energy and allied industries to provide a secure green energy future (such as wind, solar or other alternative power).

26.4.2 Local laws

Local laws are administered by the *Local Government Act 2009* (LG Act) and are used to regulate matters specific to LGAs. While the approvals framework for this Project gives rise to a number of legislative and regulatory exemptions, the local laws imposed by the relevant local governments will still apply and may trigger permits required to be obtained for development. The local laws of the Banana Shire Council that may apply to the Project are:

- Local Law No. 3 (Community and Environmental Management) 2011:
 - control of local pests
 - fire hazards
 - community safety hazards
 - noise standards.

- Local Law No. 4 (Local Government Controlled Areas, Facilities and Roads) 2011:
 - use of local government-controlled areas, facilities and roads
 - matters affecting roads.

26.5 Summary of legislative triggers

Table 26.2 provides an overview of the relevant planning and approval requirements potentially triggered by the Project. Note that not all approvals may be required and will depend upon subsequent detailed assessments of site-specific impacts and design solutions. Standard Powerlink requirements detailed under the Electricity Act have not been listed below.

Table 26.2 Summary of legislative requirements

Legislation	Responsible authority	Activity	Licence/permit/approval
Commonwealth			
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	Department of Climate Change, Energy, the Environment and Water	Potential for significant impact on MNES	EPBC Referral. Assessments undertaken to support development to indicate that the Project will not result in a significant impact to MNES. The Project was however referred to DCCEEW in October 2025.
State			
<i>Planning Act 2016</i>	Department of State Development, Infrastructure, and Planning	Electricity operating works	Ministerial Infrastructure Designation
<i>Acquisition of Land Act 1967</i>	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development	Easement acquisition across freehold land	Voluntary agreement preferred Compulsory acquisition can be undertaken
<i>Nature Conservation Act 1992</i>	Department of Environment, Tourism, Science and Innovation	Potential for clearing protected plants	Protected Plant Clearing Permit (if protected plants are identified in subsequent field surveys)
		Clearing habitat of least concern (non-colonial) fauna species	Low-risk Species Management Program
		Clearing habitat of endangered, vulnerable, near threatened, special least concern or least concern (colonial breeder) fauna species	High-risk Species Management Program

Legislation	Responsible authority	Activity	Licence/permit/approval
<i>Vegetation Management Act 1999</i>	Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development	Clearing native vegetation	Land subject to Infrastructure Designation is accepted development (not requiring a development permit for operational works)
<i>Water Act 2000</i>	Department of Local Government, Water and Volunteers	Undertaking works within a watercourse which involves excavation, fill or removal of vegetation (Constructure of maintenance tracks)	Riverine protection permit (if exemption requirements cannot be met)
<i>Fisheries Act 1994</i>	Department of Primary Industries	Waterway barrier works within a waterway (Construction of maintenance tracks)	Land subject to Infrastructure Designation is accepted development (not requiring a development permit for operational works)
<i>Forestry Act 1959</i>	Department of Primary Industries	Interference with or use of State-owned quarry and timber material	Sales permit.

27 Community and stakeholder engagement

Chapter 27 details the activities and outcomes preliminary community and stakeholder consultation undertaken between the Project introduction in October 2024 and release of the Final Corridor Selection Report (CSR) in February 2025. The key concerns raised by stakeholders were identified and included biosecurity, land use impacts and compensation process. Powerlink’s responses to the feedback received are highlighted along with the future community and stakeholder engagement activities proposed for the Project.

27.1 Engagement framework

Powerlink is committed to effective and genuine engagement practices with landholders, Traditional Owner groups, the wider community, and other stakeholders.

Powerlink’s activities are guided by a Stakeholder Engagement Framework, which is underpinned by the key principles of integrity, openness, responsiveness, accountability and inclusiveness. A Community Engagement Strategy also underpins Powerlink’s engagement planning approach and commitments to ensure Powerlink remains focused on undertaking respectful and transparent engagement across all stages of our infrastructure lifecycle. These framework documents are available online at: [Stakeholder Engagement Framework | Powerlink](#) and [Community Engagement Strategy | Powerlink](#).

The aim of Powerlink’s engagement for the Theodore Wind Farm Connection Project is to:

- provide timely, relevant and meaningful information about the Project, reflective of the scale and complexity of the Project activities
- ensure landholders, Traditional Owner groups, the wider community, and other stakeholders are aware of key Project activities and how they can provide input within the scope of consultation processes
- utilise a range of engagement activities to facilitate two-way information sharing with identified target stakeholder groups.

27.2 Project stakeholders

The identified key stakeholder groups for the Project are outlined in Table 27.1.

Table 27.1 Project stakeholders

Stakeholder Group	Stakeholders
Elected Representatives	State: — Mr Bryson Head, Member for Callide (re-elected October 2024)
	Federal: — Mr Colin Boyce, Member for Flynn
Local Council	Banana Shire Council: — Nev Ferrier, Mayor — Tom Upton, CEO

Stakeholder Group	Stakeholders
Directly affected landholders	Residential/ agricultural: — 14 landholders
	Renewable Energy Developers: — EDF (Banana Wind Farm) — RWE (Theodore Wind Farm) — European Energy (Sawpit Solar Farm)
	Local Government: — Banana Shire Council.
Adjacent landholders to recommended corridor	Adjacent to recommended corridor (27 properties)
	Near neighbours 10 km from the recommended corridor (43 properties)
Traditional Owner Groups	Gangulu Cultural Heritage Coordinating Committee (GCHCC), of the Gaangalu Nation People (GNP)
	Wulli Wulli Nation Aboriginal Corporation (WWNAC), of the Wulli Wulli People (WWP)
	Wulli Wulli People#3
Wider community / general public	Local business, industry groups, and government: — AgForce – Central Queensland Region — Federal Department of Employment and Workplace Relations — Department of Primary Industries (local office in Biloela) — Department of Trade, Employment and Training (Indigenous Officer – Economic Participation) — Department of Local Government, Water and Volunteers — Department of State Development, Infrastructure and Planning — Queensland Farmers' Federation — Stanwell Corporation Limited — Theodore Water (Previously Sunwater) — Clean Energy Council — Coexistence Queensland — CS Energy – Biloela Office — Callide Valley Agricultural and Pastoral Society Inc. — Callide Valley Chamber of Commerce — Fitzroy Basin Association — Moura Chamber of Commerce — Rural Financial Counselling Service (RFCS) Southern Queensland — Theodore Chamber of Commerce — Elders Rural Services Local emergency services: — Queensland Fire and Emergency Services (QFES) — Biloela Fire Brigade — Local Ambulance Committee (LAC) — Mount Murchison Fire Brigade — State Emergency Service (SES)

Stakeholder Group	Stakeholders
	Environmental: — Barfield Producers Group — Dawson Catchment Coordinating Association — Wildlife Preservation Society of Queensland: Upper Dawson Branch Volunteering and school-based communities: — Biloela Post Office — Biloela Scouts Group — Holmes Enterprises — Camboon Cattle Station — Hotel Theodore — IGA Cornetts Groceries (Theodore) — Museum / Historical Society — Theodore Community Bowls Club — Theodore Council of the Ageing — Theodore Kindergarten — Theodore Lions Club — Theodore Medical Centre — Theodore Post Office — Theodore Rotary Club — Theodore Show Society — Theodore Sport and Recreation Centre — Theodore State School P&C — Theodore Tennis Club — Theodore Community Link
	People living in Banana Shire LGA
	Subscribers to Project updates

27.3 Engagement activities to date

This section details the engagement activities undertaken to date for the Project. It describes the engagement phases outlined in the Project Engagement Plan (PEP) which align with Project milestones. It also details Project-specific engagement activities that have been undertaken with key stakeholder groups, including landholders and Traditional Owner groups.

27.3.1 Project engagement phases

A PEP was prepared in 2024, to guide community and stakeholder engagement throughout the planning phase of the Project. The PEP incorporates five phases of engagement, outlining open and transparent processes to capture feedback at key stages (refer Table 27.2). A new PEP will be prepared to support the construction phase, pending the outcome of planning and environmental approvals.

Table 27.2 Engagement phases

#	Engagement phase	Timing	Purpose of engagement	Status
0	Project introduction with key stakeholders and landholders	October 2024	— Targeted consultation to introduce the Project and gain early understanding of key issues and interests. — Advise landholder of the proposed recommended corridor.	Complete
1	Release of Draft Corridor Selection Report (CSR)	28 October 2024	— Consultation with landholders, Traditional Owner groups, the community and other stakeholders, to support the release of the Draft CSR. — Project web page established on Powerlink website.	Complete
2	Release of the Final CSR	February 2025	— Communication with Project stakeholders, to generate awareness of the Final CSR, which confirms the final corridor to be progressed to planning and environmental approvals. — The Final CSR includes a summary of feedback received during Draft CSR consultation, and Powerlink's response. This is to demonstrate transparency and close the feedback loop before progressing to the next phase.	Complete
3	Consultation with landholders and other stakeholders to inform the planning and approvals process	Late 2024 – Current	— Targeted consultation with landholders along the final corridor and other key stakeholders (including Traditional Owners). — Engage with directly impacted landholders about: — Land Access Protocol and Project Participation and Access Allowance (PPAA), and facilitating access for field studies — understanding their concerns and priorities — understanding land use in-detail, including any property-specific or commercial land activities that may be impacted or will co-exist with the Project — infrastructure placement, including transmission towers and supporting infrastructure such as access tracks.	Complete

#	Engagement phase	Timing	Purpose of engagement	Status
4	Consultation with landholders and other stakeholders to inform announcement of Castle Creek Substation	25 August – September 2025.	- Targeted communication with directly impacted and adjacent landholders to announce the substation at the Theodore Wind Farm end, referred to as Castle Creek Substation. - A Project newsletter was distributed to landholders and other key stakeholders (including Traditional Owner groups) to announce Castle Creek Substation and information regarding upcoming Ministerial Infrastructure Designation lodgement and Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) referral.	Complete
5	Formal Consultation on MID application	2025/2026	- Formal 20-business-day public consultation period on the MID application. Powerlink has: - Undertaken communication and engagement activities to generate awareness of the MID Proposal and the consultation period. - Received comments from community members, government agencies and Banana Shire Council. - Updated this document and prepared a response document, including additional assessments, to provide more information about the process and address the comments received.	Complete
6	EPBC Act referral	2025/2026	- Formal public consultation period(s) during the EPBC Act referral process. Powerlink has: - Undertaken communication and engagement activities to generate awareness of the EPBC Act referral and associated consultation period(s). - Received a 'Not a Controlled Action' determination for the Project under the EPBC Act, confirming that Commonwealth assessment and approval is not required.	Complete
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7	Post planning and environmental approval	2026, pending approvals	To communicate the approvals process being complete and to advise next steps and timeframes leading into the construction phase.	Pending approvals

27.3.2 Landholders and trustees/lessees

Powerlink has maintained regular communication with directly affected and adjacent landholders, since October 2024. The Project has a dedicated Landholder Relations Advisor, who is responsible for leading engagement with landholders along the Project corridor, including providing Project updates, facilitating property access, and managing enquiries. Landholders have direct contact details for the Landholder Relations Advisor, providing convenient, personalised service for their Project-related matters.

A summary of Project engagement with landholders to-date is provided in Table 27.3.

Table 27.3 Project engagement with landholders

Phase	Timing	Activity
Project introduction	October 2024	— Proactive calls to directly impacted landholders. — Face-to-face landholder meetings.
Release of Draft CSR	28 October 2024	— Proactive calls to directly impacted landholders, about release of the Draft CSR and consultation period. — Letters and Project newsletter sent to directly impacted landholders, summarising Draft CSR and how to provide feedback. The correspondence contained details about upcoming community information drop-in sessions and offered one-on-one meetings. — In-person meetings held upon request.
Detailed consultation to inform planning and approvals process	November 2024 – January 2025	— Proactive calls to directly impacted landholders about the proposed recommended corridor. — Proactive calls to directly impacted landholders, before issuing PPAA letter. The PPAA is a payment for landholders in recognition of providing property access and input for field studies. — In person meetings held upon request
Release of Final CSR	February 2025	— Proactive calls to directly impacted landholders, about release of the Final CSR. — The Final CSR and accompanying project newsletter included a summary of feedback received during Draft CSR consultation, and Powerlink's response to key issues raised. — Letters and newsletter issued to directly impacted and adjacent landholders.
Announcement of Castle Creek Substation	25 August 2025	— Letters and newsletter issued to directly impacted and adjacent landholders – around the Castle Creek Substation — Project newsletter distributed to directly affected landholders along the final transmission alignment.
Ongoing	Since October 2024	— Frequent incoming and outgoing interactions between Landholder Relations Advisor and individual landholders, about property access for field studies, construction drive through, and general project enquiries.

27.3.3 Traditional Owner groups

Powerlink has dedicated team members for engaging with Traditional Owner groups about legislative cultural heritage requirements, as well as engagement on Project milestones and other partnering opportunities. Table 27.4 summarises Project engagement to-date with the Traditional Owner groups:

- Gangulu Cultural Heritage Coordinating Committee (GCHCC) of the Gaangalu Nation People (GNP)
- Wulli Wulli Nation Aboriginal Corporation (WWNAC), of the Wulli Wulli People (WWP)
- Wulli Wulli People #3 (Native Title Applicants).

Table 27.4 Project engagement with Traditional Owners

Phase	Timing	Activity
Project introduction	From September 2024	— Commenced high level Project introduction with Traditional Owner Groups during Renewable Energy Zone community information sessions run by the Queensland Government.
	October 2024	— Continued engagement with Traditional Owner Groups along the Project corridor, coinciding with public introduction of the Project.
Detailed consultation to inform planning and approvals process	Late 2024 – Current	— Ongoing, regular engagement with GCHCC WWNAC, and Wulli Wulli People #3 through Powerlink’s Indigenous Partnerships team to: — scope, schedule, and undertake cultural heritage surveying works — discuss Project design as well as cultural heritage assessment and management strategies over the Project area. GCHCC: — November 2024: Meeting with GNP representatives to provide a Project update, discuss the Renewable Energy Zone and provide an update on other projects in the area. — December 2024: Meeting with GCHCC representatives about project, Draft CSR timeframes and milestones. — February 2025: A second meeting with the GCHCC representatives to receive feedback on the Draft CSR and discuss the upcoming release of the Final CSR, as well as discuss the Renewable Energy Zone and provide updates on other projects in the area. Wulli Wulli People #3 — August 2025: Meeting with the Wulli Wulli People #3 about the Project, Draft CSR, release of the Final CSR, timeframes and milestones. WWNAC: — November 2024: Meeting with WWNAC representatives about project Draft CSR, timeframes and milestones. — November 2024: Feedback on the Project Draft CSR was received by the WWNAC representatives. — February 2025: An email was sent to WWNAC regarding the release of the Final CSR.

Phase	Timing	Activity
Release of Final CSR	February 2025	WWNAC and GCHCC: - February 2025: Update provided to WWNAC and GCHCC that a final corridor has been confirmed. Wulli Wulli People #3: - August 2025: Update provided to Wulli Wulli People #3 in a meeting that a final corridor has been confirmed.
Announcement of Castle Creek Substation	August 2025	August 2025: Update provided to GHCC, WWNAC, and Wulli Wulli People #3 by email.

27.3.4 Other stakeholder engagement

Table 27.5 summarises Project engagement activities undertaken to-date, with other key stakeholders.

Table 27.5 Other stakeholder engagement

Stakeholder	Activity
Elected representatives	Queensland Minister for Energy (prior to State Government election in October 2024): - October 2024: During caretaker period an email was sent to Minister's Office with a copy of the Draft CSR and Project newsletter. Queensland Treasurer, Minister for Energy and Minister for Home Ownership (post-election): - February 2025: Email the Treasurer's Office a copy of the Final CSR and Project newsletter. - August 2025: Email the Treasurer's Office a copy of the Project newsletter – Castle Creek Substation. State Member for Callide: - October 2024: Email to State Member (Callide) to inform the upcoming release of the Draft CSR and offer briefing. - November 2024: Meeting with State Member (Callide) to provide update about projects in the region, including the release of the Draft CSR for Theodore Wind Farm Connection Project and consultation period. Emails informing about key Project milestones, and offering briefing: - February 2025: Final CSR, consultation findings and Powerlink's response - August 2025: Email informing about updated Project newsletter – Castle Creek Substation. Banana Shire Council: - October 2024: Email to Council informing of upcoming release of the Draft CSR for project and offering briefing. - November 2024: Meeting with Council CEO about Powerlink activity in the region including release of Draft CSR for Theodore Wind Farm Connection Project and consultation period. - February 2025: Email informing about Final CSR, consultation findings and Powerlink's response. - August 2025: Email informing about updated Project newsletter – Castle Creek Substation.

Stakeholder	Activity
	Federal Member for Flynn — February 2025: Email informing about Final CSR, consultation findings and Powerlink's response. — August 2025: Email informing about updated Project newsletter – Castle Creek Substation.
Community groups	Proactive emails about: — October 2024: release of Draft CSR and upcoming community information sessions. — February 2025: release of Final CSR, consultation findings and Powerlink's response. — August 2025: release of updated Project newsletter – Castle Creek Substation.
Wider community	— Project web page live on Powerlink website, in October 2024 (Draft CSR), updated in December 2024, February 2025 (Final CSR) and August 2025 (Castle Creek Substation). — Powerlink stall at Mt Larcom Show in June 2023, including Project information. — Advertising in Queensland Country Life (online and hard copy) to promote Draft CSR community drop-in information sessions. — November 2024: Community drop-in information sessions held in Biloela, Theodore and Banana. — November 2024: Information session regarding the release of the Draft CSR were promoted by Theodore Community Link and Dawson Catchment Coordinating Association. — Draft CSR and Final CSR Project newsletters uploaded to Project web page and letterbox dropped to properties within a 10km radius of the corridor. — Project newsletter included at Powerlink Transmission Network forum, issued November 2024. — Project newsletter featured at Powerlink's Central Queensland pop-up information sessions – Biloela, Gladstone, Rockhampton, and Bouldercombe – July and August 2025. — Project newsletter included at Powerlink's Central Queensland Transmission Network Forum in August 2025.

27.3.5 Engagement as part of the Corridor Selection Report (CSR) process

27.3.5.1 Preliminary stakeholder engagement

On Monday 28 October 2024, Powerlink released a Draft CSR for the Project which included a 1 km wide recommended corridor. Landholders, Traditional Owner groups, the wider community, and other stakeholders were invited to provide feedback. Information on the Draft CSR release was shared via:

- phone calls to landholders
- letters and emails to landholders and other stakeholders
- briefings with Traditional Owner representatives, Local Government agencies and the State Member
- distribution of a Project newsletter
- Powerlink website
- media release and advertisements within the local newspaper.

The Draft CSR was open for public comment between 28 October 2024 and 29 November 2024. During this time, feedback was received via various methods including emails, face-to-face meetings (including community drop-in sessions), website and feedback forms providing the opportunity for interested stakeholders to comment directly on the

1 km wide recommended corridor, highlighting their areas of interest and feedback. Three community information drop-in sessions were held in November 2024 at Biloela, Theodore and Banana to enable another avenue for feedback. These sessions were promoted via Powerlink’s website and social media channels, newspaper advertisements, various community Facebook groups, Local Government channels, and in the Project newsletter that was distributed. Throughout this consultation period, Powerlink had 58 interactions with landholders, providing copies of mapping and discussing on-ground insights as to how properties are used, helping to identify constraints and verify desktop data.

27.3.5.2 Feedback received

Feedback received during the corridor selection phase was critical for Powerlink to better understand on-ground conditions, constraints and land uses including various farming and agriculture operations, to fully inform the final corridor and alignment of the transmission line.

Key themes have been identified that covered a wide range of topics including biosecurity, economic impacts and compensation, and land use impacts to properties including design considerations (e.g. tower heights and locations). The key themes raised during stakeholder interactions during consultation on the draft Corridor Selection Report are summarised in Table 27.6, along with Powerlink’s responses to these themes.

Table 27.6 Powerlink responses to key themes from community feedback on the Draft CSR

Key issues/themes	Response
Biosecurity: - Concerns about potential spread of weeds from Powerlink use of access tracks and activity within the easement - Landholder requirements to use vehicle washdowns prior to entering properties - Ensuring fire management and risk assessments are undertaken to minimise fire risk from Powerlink activities	Powerlink understands biosecurity is a priority for landholders. Powerlink takes biosecurity seriously and have processes in place to avoid spreading weeds between properties or introducing new weeds from outside the local area. For example, Powerlink take preventative measures to minimise exposure to weeds, such as: - conducting regular vehicle wash downs - avoiding travel through areas heavily affected by biosecurity matter - visiting clean areas first, before travelling to affected areas - staying on roads and designated access tracks in work areas - obtaining weed and seed declarations on any fill material brought onto a property. Powerlink will work with landholders to identify biosecurity risks on each property and develop appropriate management measures, including those referred to in existing biosecurity management plans
Design features (e.g. tower height and location): - Concerns that tower locations will impact farming operations and a preference for positioning towers away from homes. - Ensure a co-design approach is used between EDF’s Banana Range Wind Farm and Powerlink’s infrastructure.	Powerlink in identifying the most suitable location for a transmission line, considers a range of factors including the current and future use of a property. Powerlink works with landholders throughout the full Project lifecycle, from route selection to construction, to help ensure our actions minimise impacts to farmland and farming operations where possible, to ensure positive co-existence exists between Powerlink, affected landholders, the community and other stakeholders. Powerlink works with landholders to understand how land is used, including timing of key activities such as farming operations, mustering, future development plans and any potential incompatibility these activities may have when accessing and placing electricity infrastructure. Powerlink has taken these factors into consideration when determining the final alignment for the Project.

Key issues/themes	Response
	Further, the co-location of infrastructure is considered as part of the corridor selection process. Powerlink understands there may be benefits in co-locating and likewise there may be challenges. With this Project in particular, the challenge is the competing project timeframes coupled with the uncertainty around the location of the Banana Range Wind Farm alignment and timing of complex design details. Powerlink however does not have the jurisdiction to compel proponents to co-locate infrastructure when they are developing private transmission infrastructure. Powerlink will continue to work closely with landholders and relevant stakeholders to determine the location of any transmission line infrastructure, taking into account both current and future infrastructure on landholder property.
Property values, compensation and negotiations: — The value of the Project Participation Access Allowance (PPAA) – not seen as favourable by landholder's given the time away from their day-to-day operations	Powerlink is committed to being fair, transparent and equitable when negotiating payments with hosting landholders. Additionally, the Project Participation and Access Allowance (PPAA) is a payment offered by Powerlink to recognise cooperation from landholders in providing input and facilitating access to their property for technical studies. The PPAA is separate from, and in addition to, any compensation to be paid if an easement or substation is to be progressed on that land.
Land use impacts: — Property-specific feedback provided to Powerlink referencing topography, waterways, mustering laneways and farming practices. — Potential impacts on farming operations (e.g. aerial mustering and location of cattle yards).	Powerlink is committed to working with landholders to understand how their land is used, including timing of key activities such as farming operations, future development plans and any potential incompatibility these may have when locating transmission towers and accessing properties. Management strategies will be developed to minimise impacts, such as adjusting construction schedules to coincide with agricultural calendars and working closely with landholders to ensure their long-term property development plans are considered during the life of the Project. Changes to the final corridor are reflective of consideration to farming practices. Feedback regarding design considerations will continue to be investigated into the MID Proposal area phase of this Project.

After the engagement period was complete, Powerlink:

- reviewed and considered feedback
- responded individually to stakeholders
- incorporated the key issues/themes and Powerlink's response, into the Final CSR.

All feedback received during the engagement period has been collated and considered by Powerlink.

27.3.5.3 Engagement outcomes

As a result of the feedback received, Powerlink investigated two areas for realignment of the recommended corridor as follows:

- Northern section:
 - This realignment occurs in the northern area of the corridor and entails the alignment of the corridor from proposed Mt Benn substation for an approximate distance of 1.3 km to the south where it rejoins the original recommended corridor.
 - This area is constrained by existing land uses including grazing operations for which associated farming infrastructure was found to exist within the corridor. With the identified constraints taken into consideration, relocating the corridor to the west, found greater ability to significantly reduce impacts in this area.
- Central section:
 - This realignment occurs in the central area of the corridor, surrounding Sawpit Creek.
 - This area is constrained by existing land uses including various grazing operations and, following engagement with landholders, an alternative alignment was explored. In consideration of this alternative corridor alignment, reduced environmental impacts were also identified, particularly regarding the crossing of Sawpit Creek. These considerations have resulted in the corridor being relocated to the west.

Realignment of these two corridor sections offers greater ability to reduce impacts in these areas, in particular environmental impacts in the central corridor. Further information on these realignments is provided in Section 2.4.

With adoption of these two realignments, the final 1 km wide corridor length has increased by 0.9 km (1 percent) overall, resulting from landholder consultation to improve co-existence opportunities in this area.

The final corridor continues to achieve the least overall impact across social, environmental and economic considerations. Through the corridor selection and refinement process, the final corridor:

- maintains a relatively direct route
- includes the least number of properties, which minimises property-specific impacts
- minimises significant impacts on agriculture, cropping and grazing lands
- is located a considerable distance from existing townships (mainly Banana) and major highways, reducing broad visual amenity impacts
- enhances opportunities for co-existence with existing distribution powerlines and other proposed renewable energy projects in the area, creating less impacts and maximising efficiencies.

The Final CSR and a project newsletter were published on 17 February 2025. The Draft and Final CSRs, and all Project newsletters, are available on the project web page, [Theodore Wind Farm Connection Project | Powerlink](#).

27.3.6 Engagement during Project design

Powerlink has continued to work closely with landholders, Traditional Owner groups, the wider community, and other stakeholders during the progression of planning activities to reduce the 1 km wide final corridor to the 60 m wide MID Proposal area. This work has included undertaking detailed technical studies and ongoing engagement with landholders and Traditional Owner groups to help determine the final transmission line design. This phase of the Project has focused heavily on identifying specific areas to avoid and impacts to mitigate and further manage through the design process.

Following completion of the cadastral survey of the MID Proposal area, the MID Disturbance footprint was updated to reflect ongoing design development, environmental reviews and constructability assessments. The key changes were associated with infrastructure micro-siting undertaken during preliminary design development and the inclusion of additional turn-in areas required to facilitate safe access to and from access tracks. These updates were undertaken to optimise the Project layout, improve constructability and operational access, and, where practicable, avoid and minimise impacts on environmental values.

27.3.7 *Social impact assessment and management plan engagement*

As a part of the SIA and SIMP development process, engagement was undertaken, and included engagement with stakeholders to:

- understand stakeholder and community insights, interests and concerns regarding the proposed Project
- identify and understand potential social impacts and opportunities as well as ways in which these can be avoided, managed, mitigated or for opportunities, enhanced.

The first of two rounds of engagement was completed with relevant stakeholders July 2025. The second round of engagement is expected to be undertaken November 2025.

During round one engagement, stakeholders shared insights around:

- delivering local and Indigenous business and workforce opportunities
- enabling good workforce management such as reducing the use of local medical services
- managing demand on housing and short-term accommodation providers
- delivering lasting benefits for communities.

These insights fall within five key themes, including workforce management, housing and accommodation, local business and industry procurement, health and community wellbeing, and community and stakeholder engagement. These themes will be addressed in the Social Impact Management Plan.

27.4 Future engagement activities

The MID application will involve a formal 20-business-day public consultation period. As a minimum consultation is to include:

- sign/s on the land
- a notice in the paper and
- letters to surrounding landowners, elected representatives, and Native Title and/or Aboriginal or Torres Strait Islander party/parties for the area.

In addition, Powerlink is expecting to undertake a second round of engagement on the SIA and SIMP development in November 2025 which will be comprised of focus groups, meetings, targeted landholder and Traditional Owner engagement.

28 Conclusions

This Environmental Assessment Report has been prepared by WSP on behalf of Powerlink who are seeking a MID under Part 5 of the Planning Act for a proposed transmission line and substation.

Powerlink has been engaged by the proponents of the Theodore RWE to provide a connection for the Theodore Wind Farm to the transmission network. The Theodore Wind Farm Connection Project will comprise:

- a proposed 275 kV substation, to be known as the Castle Creek Substation, located within the proposed Theodore Wind Farm. The substation footprint encompasses an area of 445 m x 270 m (12 ha)
- construction of a new double circuit 275 kV transmission line extending approximately 55.4 km north of the Theodore Wind Farm to a new substation to be constructed at Mt Benn. The Mt Benn Substation is part of the Banana Range Wind Farm Connection Project (currently in the planning and approvals phase) and does not form part of Theodore Wind Farm Connection Project. The proposed transmission line will be positioned within a new 60 m wide easement.
- The Project is located in a rural area, with no sensitive receptors identified within 250 m of the Project's Disturbance footprint. As such, the likelihood of there being air quality, noise and visual impacts to sensitive receptors is considered low. Given the sparse population within the Project area, the Project is not anticipated to have a significant impact on the socio-economic profile of the area during the construction or maintenance/operational phases of the Project

The proposed transmission line and substation will change the current land use from predominantly agricultural purposes to supporting energy creation and transmission infrastructure. However, as most of the Project area is located across Class C pastureland, which is not suitable for crop production, it is unlikely the Project will significantly impact agricultural land and operations. Grazing can still occur under the transmission line, and modifications, such as increasing the height of transmission wires, can be made to minimise any potential impact a new transmission line has on the farming practices.

Through the landholder and stakeholder engagement and infrastructure design processes, Powerlink is committed to reducing and mitigating impacts to the surrounding land use. Powerlink has continued to work closely with landholders, Traditional Owner groups, the wider community, and other stakeholders during the progression of planning activities to design a 1 km wide corridor and refine it to a 60 m wide MID Proposal area or easement alignment. The input of Project stakeholders is critical to Powerlink's understanding of the key issues for the Project, which included biosecurity, land use impacts and compensation process. This feedback has helped guide the location of the transmission easement. The following design and construction considerations have been adopted to help address the concerns of the community and stakeholders:

- locating the transmission line in the foothills of the Banana Range, to the east of the mapped areas containing strategic cropping land, to reduce impacts to farming operations
- increasing tower heights along the alignment to span vegetation and watercourses
- siting transmission structures outside of vegetated areas
- scalloping and/or selective clearing of vegetation to minimise clearing impacts
- maximising distance from sensitive receptors, ecological receptors, townships and other visual receptors to reduce visual amenity impacts
- setting back towers from the bank of watercourses and drainage lines
- following property boundaries where possible to intersect the least number of properties and minimise property-specific impacts
- co-locating the transmission line with the existing 132 kV Powerlink transmission line upon its connection into the Mt Benn Substation to further reduce the social and economic footprint of the Project.

The first round of engagement for the SIA and SIMP was completed with relevant stakeholders July 2025. The second round of engagement is expected to be undertaken November 2025.

Powerlink will continue to collaborate with all landholders and stakeholders throughout the construction and operation of the Project.

The design and planning phase of the Project has prioritised avoidance and minimisation of impacts to MNES/MSES, as well as other areas of native vegetation and habitats. Development of the Project Disturbance footprint has involved considerable design measures (e.g. locating structures outside of remnant vegetation, raising structure heights and reducing the extent of vegetation clearing within the MID Proposal area) to avoid and minimise impacts to native vegetation/habitats and watercourses. In particular, development of the MID Disturbance footprint has:

- located structures such as transmission towers and access tracks outside of remnant vegetation, and within areas of lowest biodiversity (such as non-remnant pasture grasslands) to the greatest extent possible
- prioritised the avoidance and minimisation of impacts to the following areas:
 - Brigalow TEC
 - vegetation communities that comprise habitat for threatened species
 - waterways and waterway vegetation, including the Eucalypt riparian and floodplain woodlands and Melaleuca riparian open forest with vine thicket understorey, and particularly around Castle Creek
- utilised existing access tracks such as landholder tracks and local roads, in preference to clearing for new access tracks
- reduced easement clearing width where assessment has determined there will be adequate electrical safety clearances to the conductor.

Implementation of these avoidance and minimisation measures has reduced the direct impact (vegetation clearing) to remnant and high value regrowth vegetation by 27.7 ha to 7.7 ha and to non-remnant areas by 206.6 ha to 159.7 ha. Based on this reduced MID Disturbance footprint, the Project is not expected to result in a significant residual impact to MNES and/or MSES.

As demonstrated throughout this report and in the relevant supporting technical studies, impacts of the Project have been thoroughly assessed and any relevant mitigation methods will be implemented through the future construction and implementation phases.

29 Limitations

This Report is provided by WSP Australia Pty Limited (*WSP*) for Powerlink Queensland (*Client*) in response to specific instructions from the Client and in accordance with WSP's proposal dated 11 October 2024 and agreement with the Client dated 24 November 2024 (*Agreement*).

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