4.3 Conservation significant flora

4.3.1 Desktop assessment results

4.3.1.1 Protected plants flora survey trigger areas

Two high-risk flora trigger areas are intersected by the SGIC SDA pipeline alignment, both within the vicinity of Twelve Mile Road (Figure 4-3). Additional high-risk flora trigger areas are mapped within the broader desktop search extent, predominantly between Raglan and Bajool (Appendix A).

4.3.1.2 Essential habitat

According to the Vegetation Management Report, the SGIC SDA pipeline alignment intersects a polygon of regulated vegetation within the vicinity of Twelve Mile Creek which is mapped as containing essential habitat for the EVNT flora species *Macropteranthes leiocaulis.*

4.3.1.3 Previous field surveys

One suspected conservation significant flora species was identified during the Arup (2008) field survey, namely, *Cadellia pentastylis* (ooline). An extract from Chapter 6 of the EIS (Arup 2008) follows:

'*…one non-target species was observed, although it was a sterile specimen and absolute confirmation of identification was not possible. This was a Vulnerable species (listed under the EPBC Act), and was one individual of (probably) ooline (Cadellia pentastylis) found at Detailed Site 14 (Marble Creek)'.*

4.3.1.4 Database search results

The EPBC Act PMST database identified 14 conservation significant flora species that have the potential to occur within the SGIC SDA desktop search extent (Table 4-7). State based searches (i.e. WildNet and ALA) identified 15 conservation significant flora species that have been historically recorded within the SGIC SDA desktop search extent, seven of which were not listed in the PMST results (Table 4-7 and Figure 4-3).

The species identified in the current PMST search that were either not a listed species or not identified as potentially occurring within the PMST as part of the EIS (Arup 2008) include:

– *Decaspermum struckoilicum*
– *Dichanthium setosum*
– *Macadamia integrifolia.*

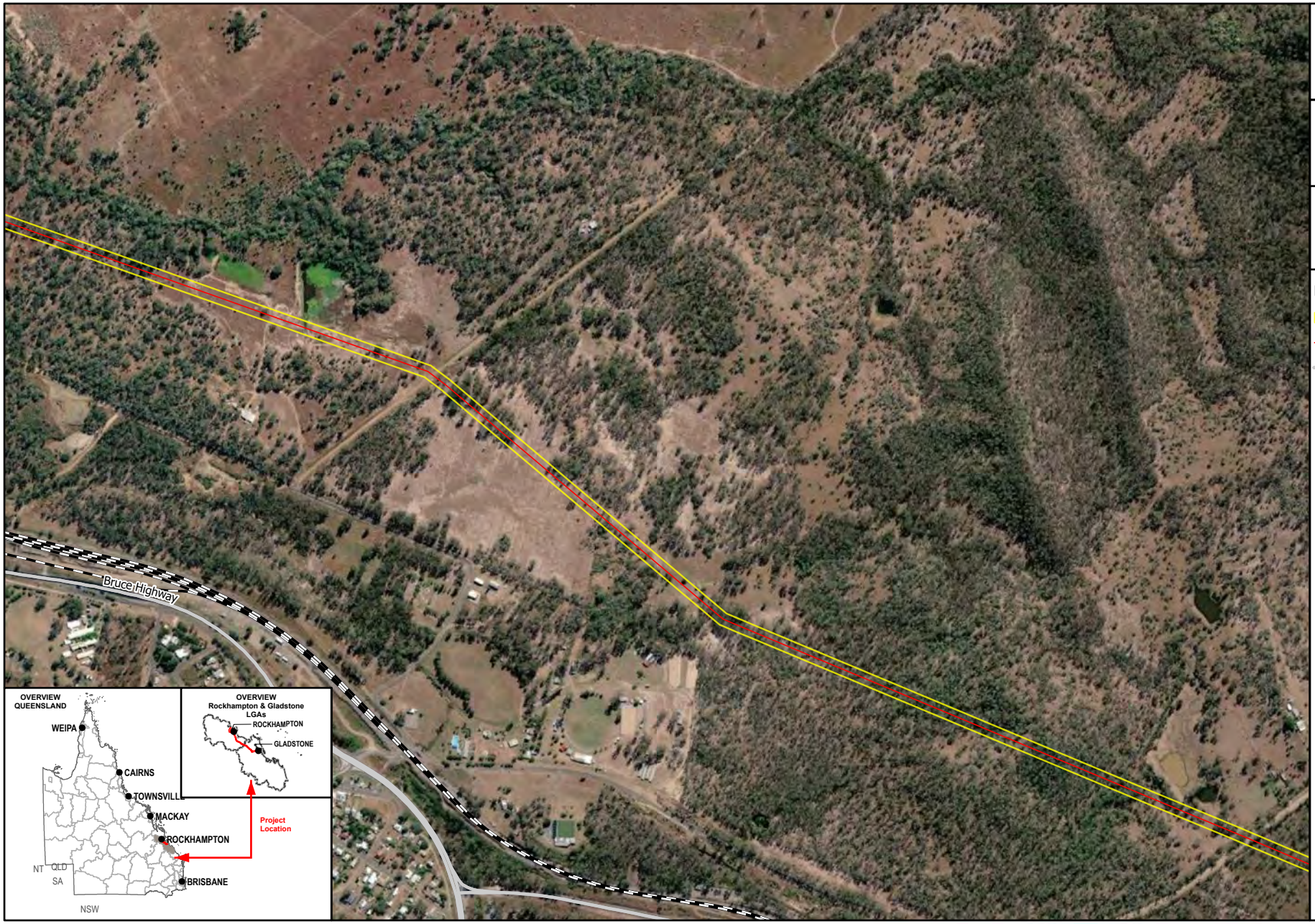
Table 4-7 Conservation significant flora species identified as present or having suitable habitat present in the desktop search extent

Scientific name	Status		Source	WN Records (post 1980)	Nearest Record to ROW	EPBC approval
	EPBC Act	NC Act				
Atalaya collina	E	E	PMST	-	11.47 km	✓
Bosistoa transversa	V	LC	WN; PMST	10	10.49 km	✓
Bulbophyllum globuliforme	V	NT	PMST	-	>60 km	✓
Callicarpa thozetii	NL	E	WN	3	8.82 km	
Capparis humistrata	E	E	WN	1	11.0 km	
Cossinia australiana	E	E	WN; PMST	1	11.7 km	✓
Cupaniopsis shirleyana	V	V	WN; PMST	2	7.19 km	✓
Cycas megacarpa	E	E	WN; PMST	13	2.1 km	✓
Cycas ophiolitica	E	E	WN; PMST	12	2.1 km	✓
Dansiea elliptica	NL	NT	WN	1	7.79 km	

Scientific name	Status		Source	WN Records (post 1980)	Nearest Record to ROW	EPBC approval
	EPBC Act	NC Act				
Decaspermum struckoilicum	E	CE	PMST	-	12.6 km	
Dichanthium setosum	V	LC	PMST	-	>200 km	
Eucalyptus raveretiana	V	LC	WN; PMST	4	5.59 km	✓
Graptophyllum excelsum	NL	NT	WN	14	4.7 km	
Hernandia bivalvis	NL	NT	WN	9	8.08 km	
Macadamia integrifolia	V	V	PMST	-	79 km	
Macropteranthes leiocaulis	NL	NT	WN	26	100 m	
Marsdenia brevifolia	V	V	PMST	-	4.5 km	✓
Parsonsia larcomensis	V	V	WN; PMST	7	7.71 km	✓
Samadera bidwillii	V	V	WN; PMST	4	8.63 km	✓
Zieria actites	NL	CE	WN	6	8.7 km	

Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; LC – least concern; NL – not listed;

WN – WildNet; PMST – Protected Matters Search Tool.



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Legend

- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-3a
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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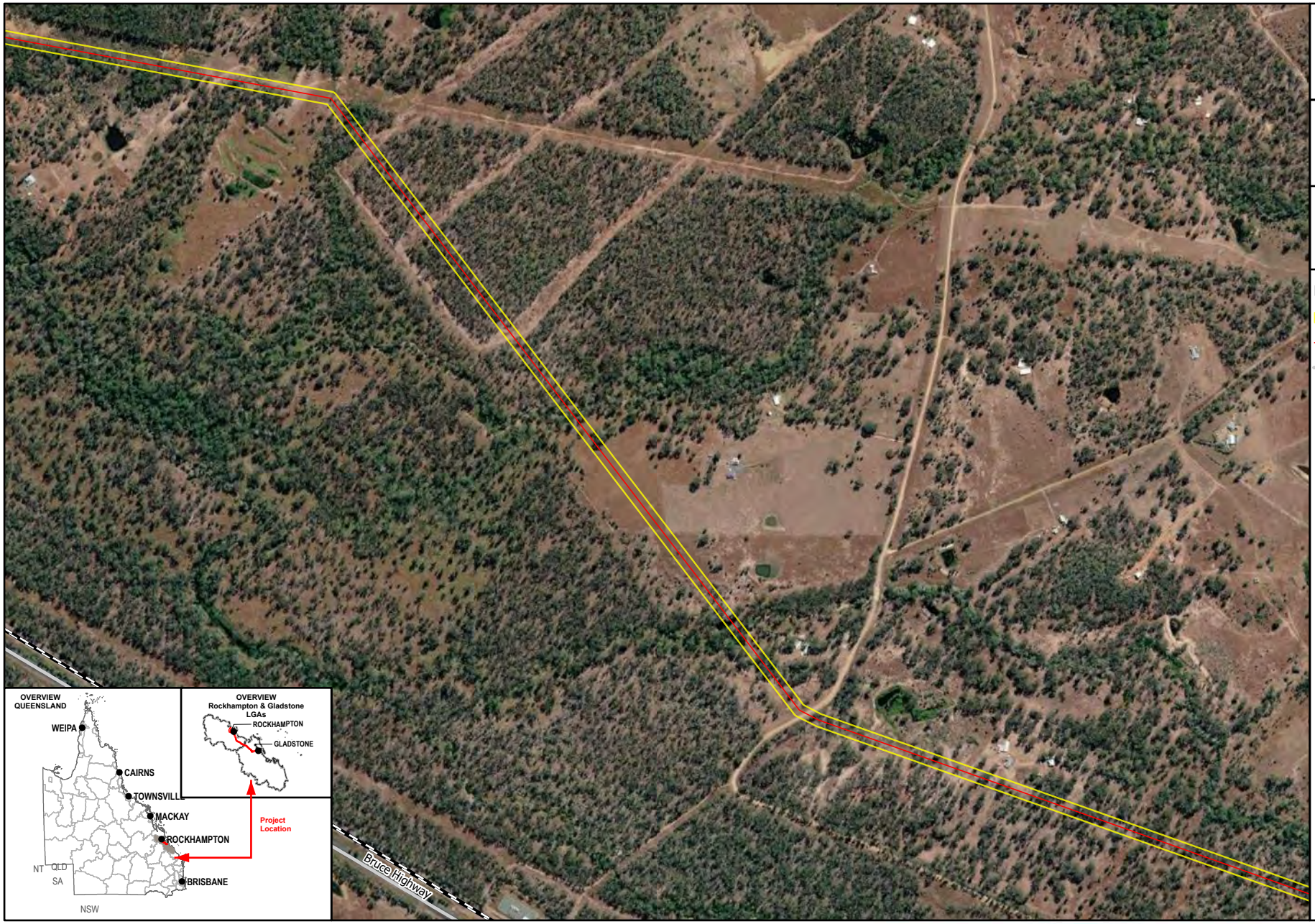

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Figure 4-3b

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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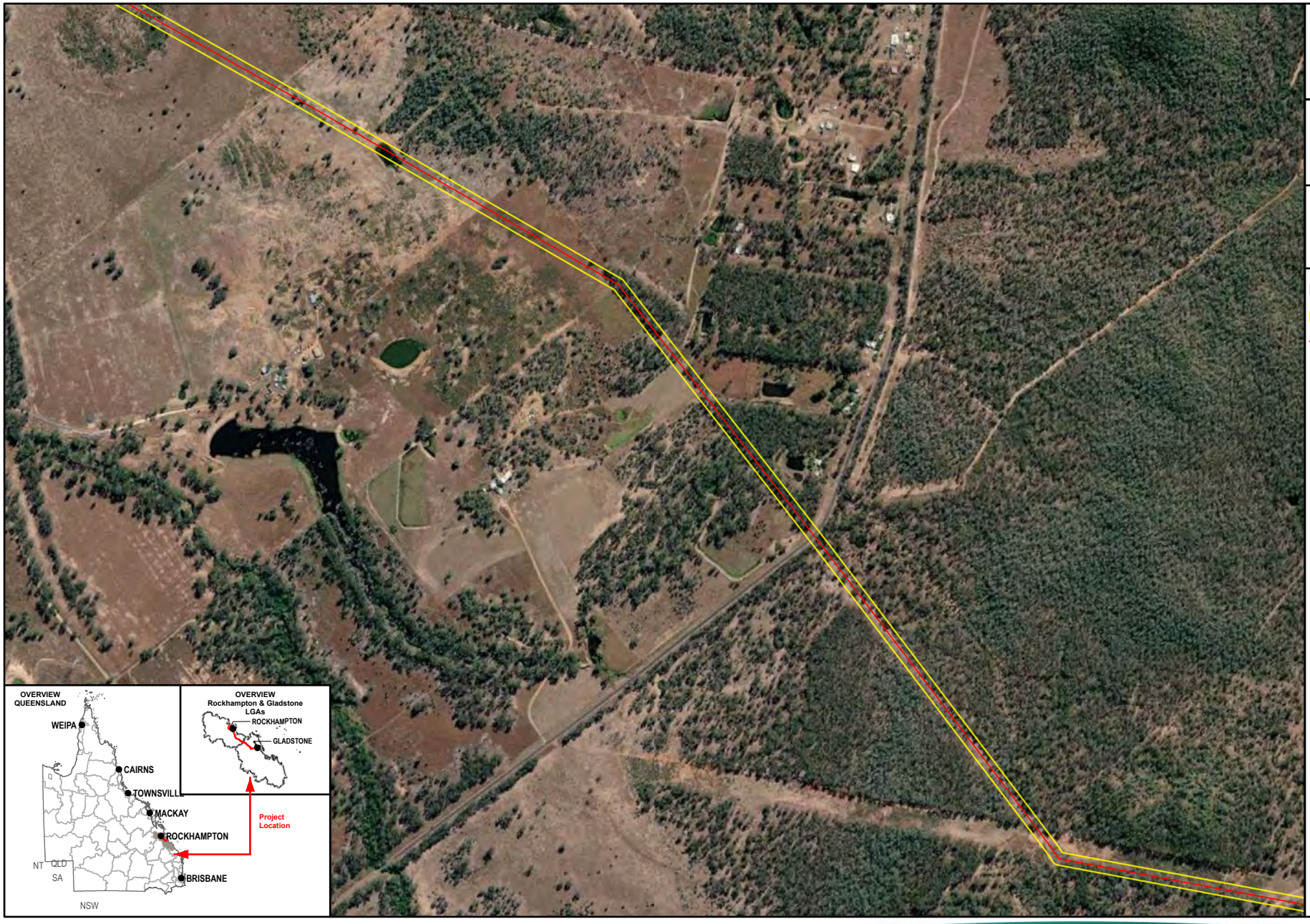

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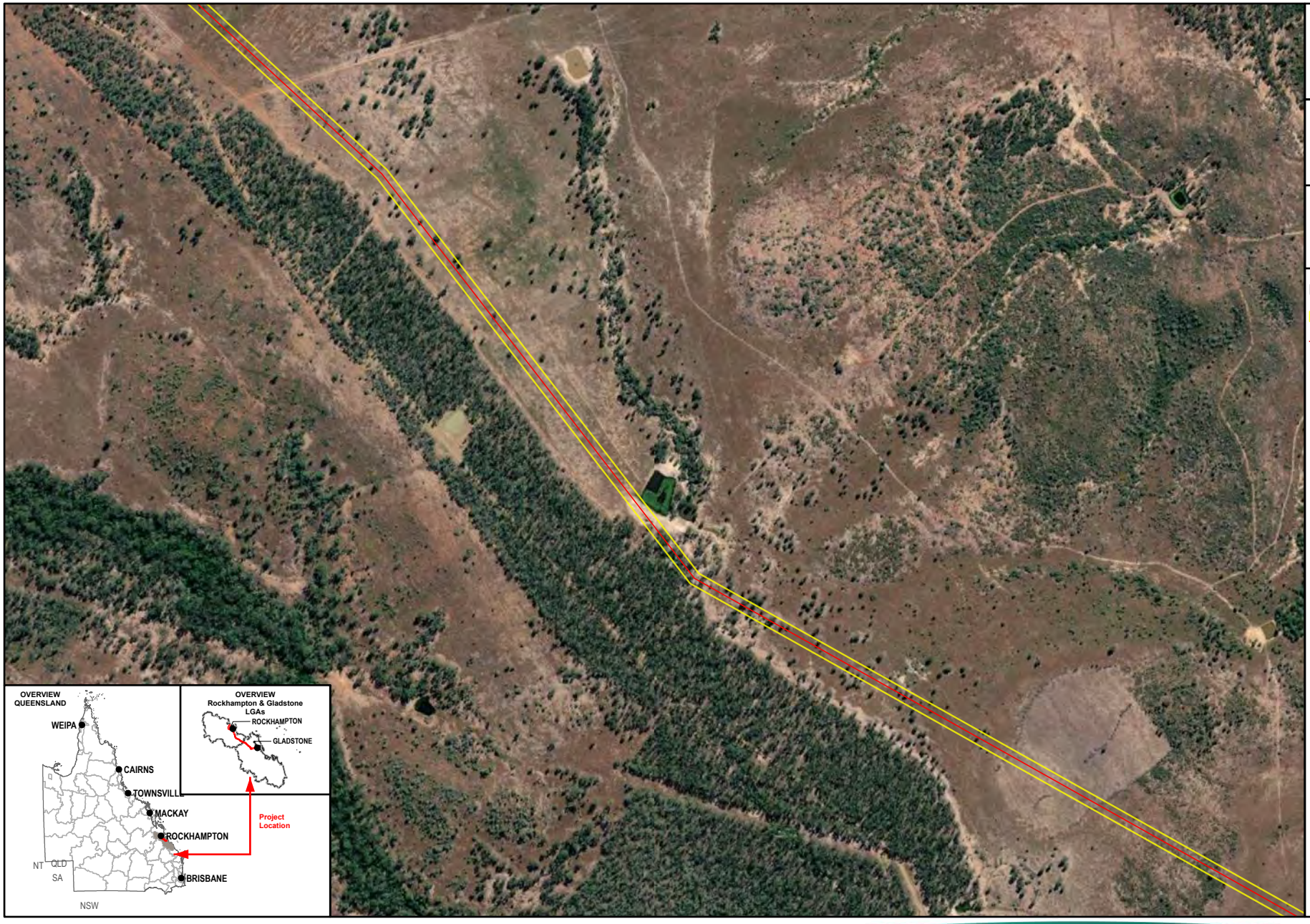

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Figure 4-3d
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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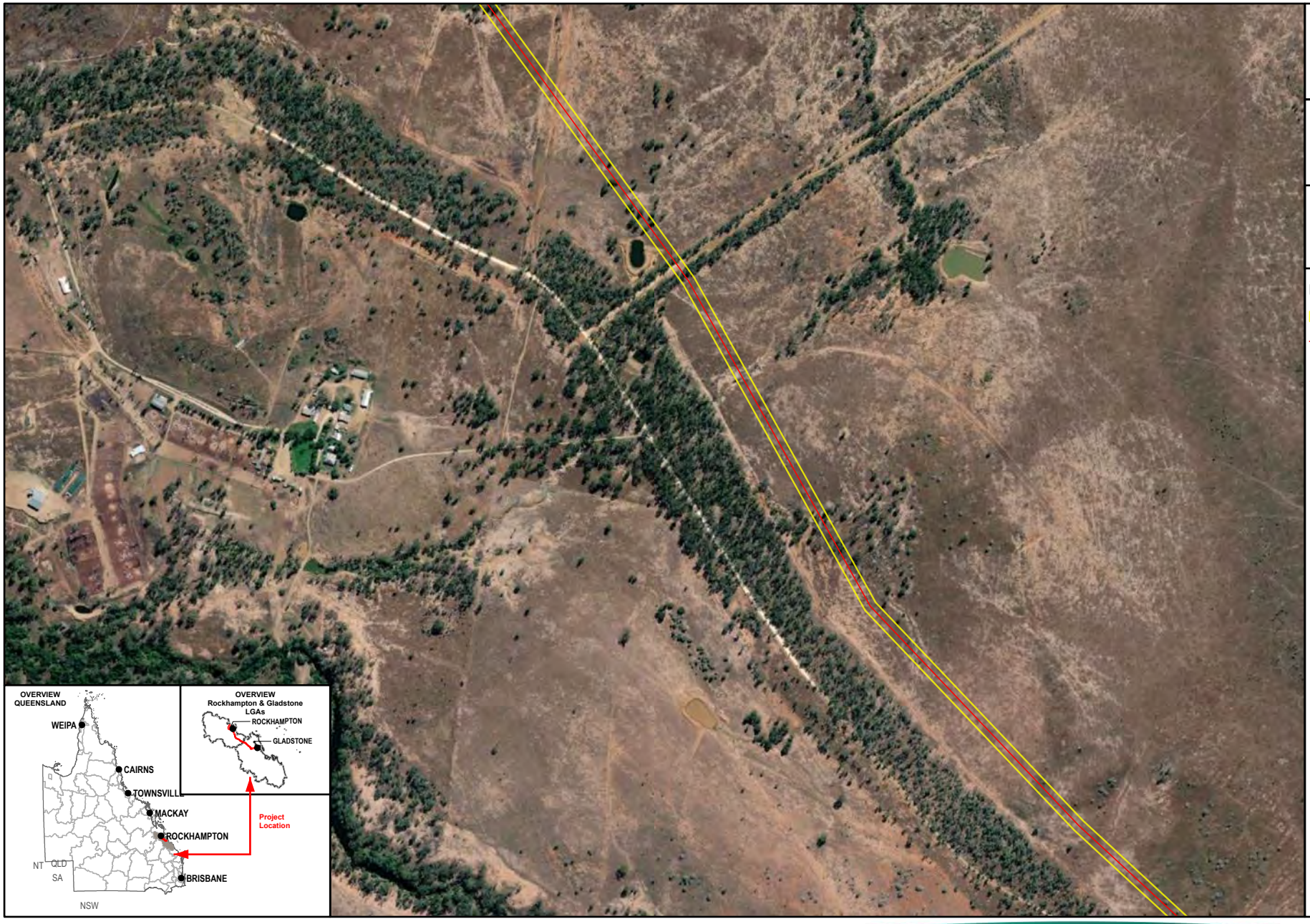

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-3e
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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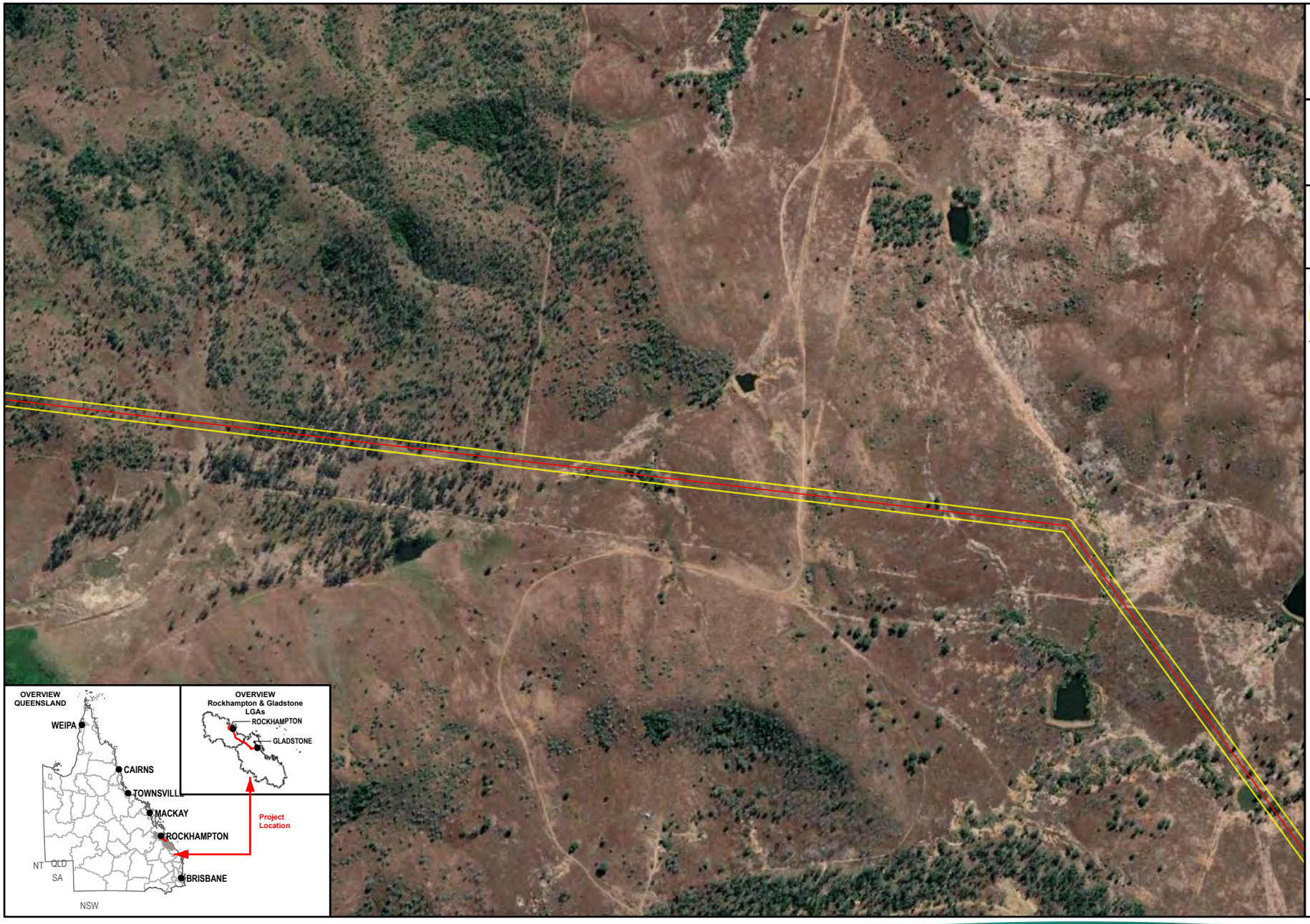

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- Study Area
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Figure 4-3f

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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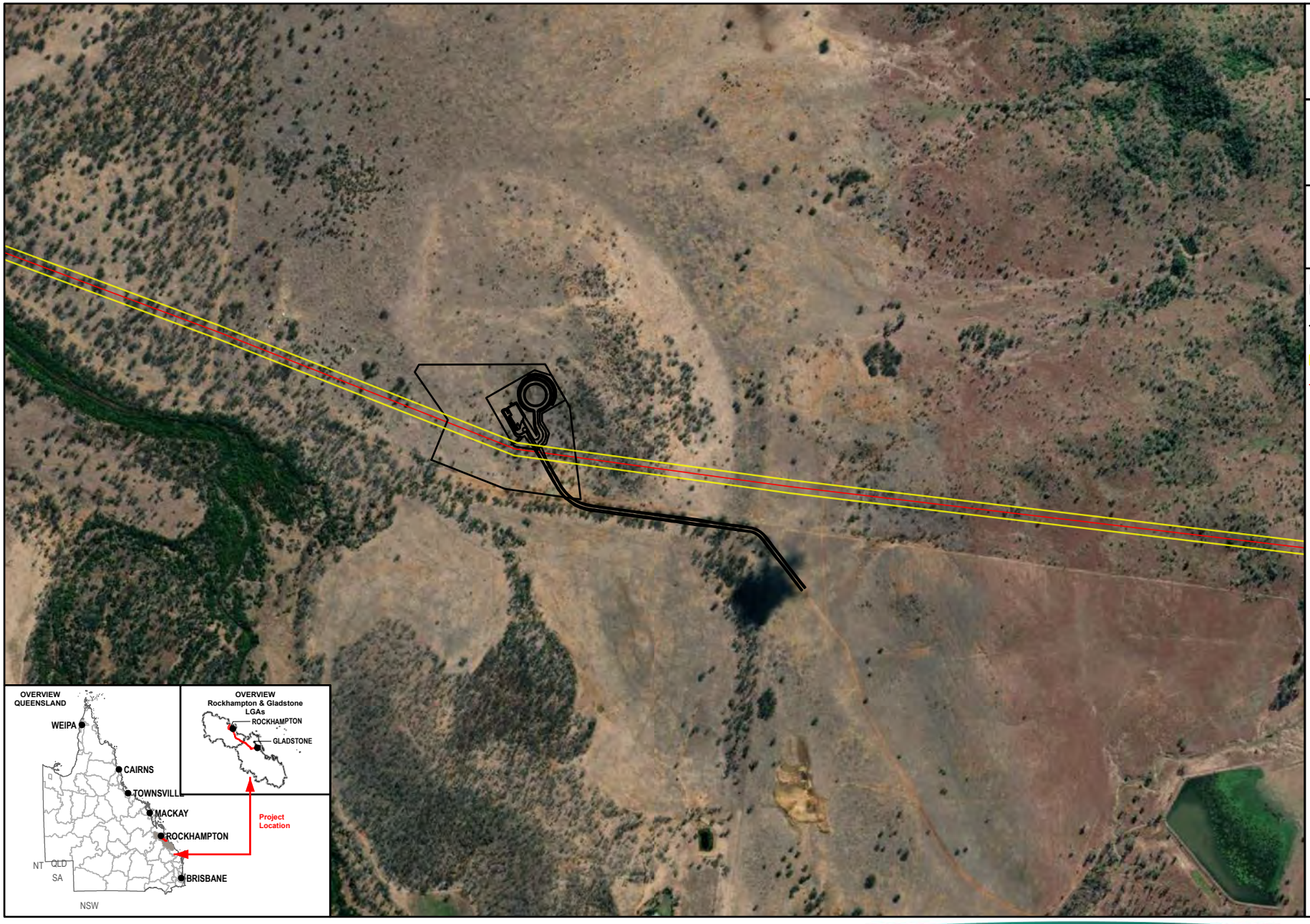

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- Raglan Pump Station and Reservoir Layout
- Study Area
- SGIC SDA Pipeline Alignment

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-3g
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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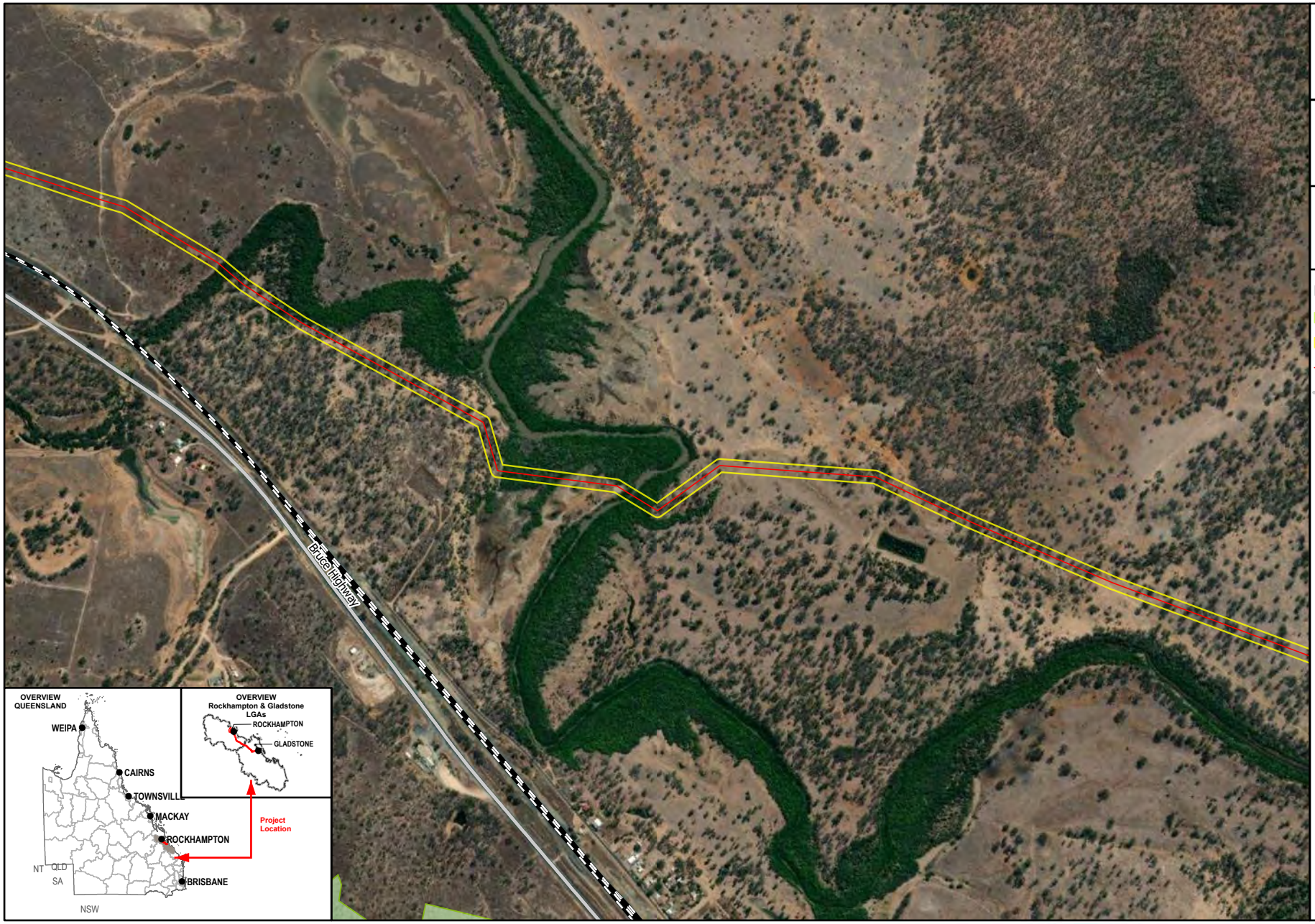

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- High-risk Flora Trigger Areas
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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Figure 4-3h

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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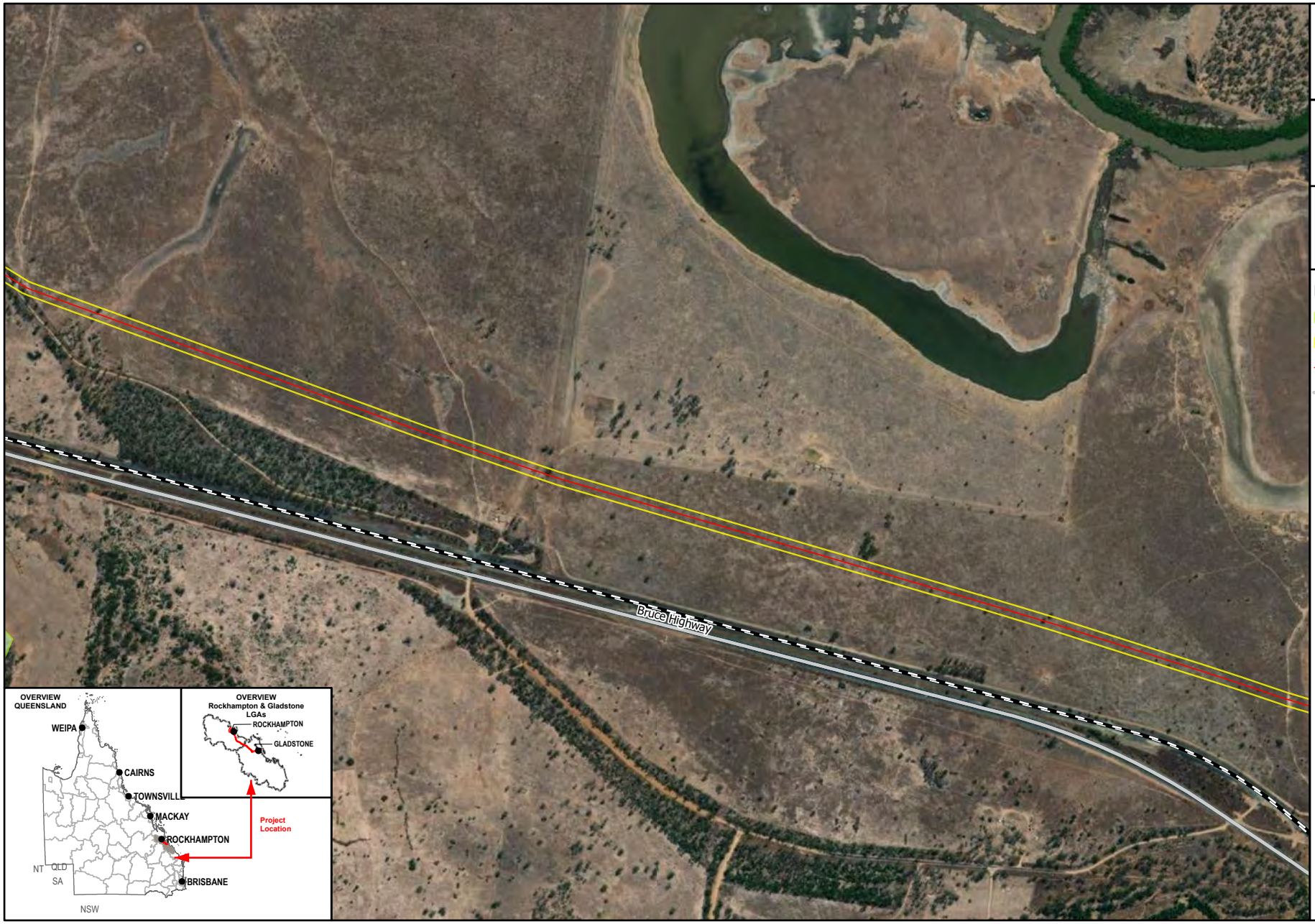

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- High-risk Flora Trigger Areas
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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Figure 4-3i
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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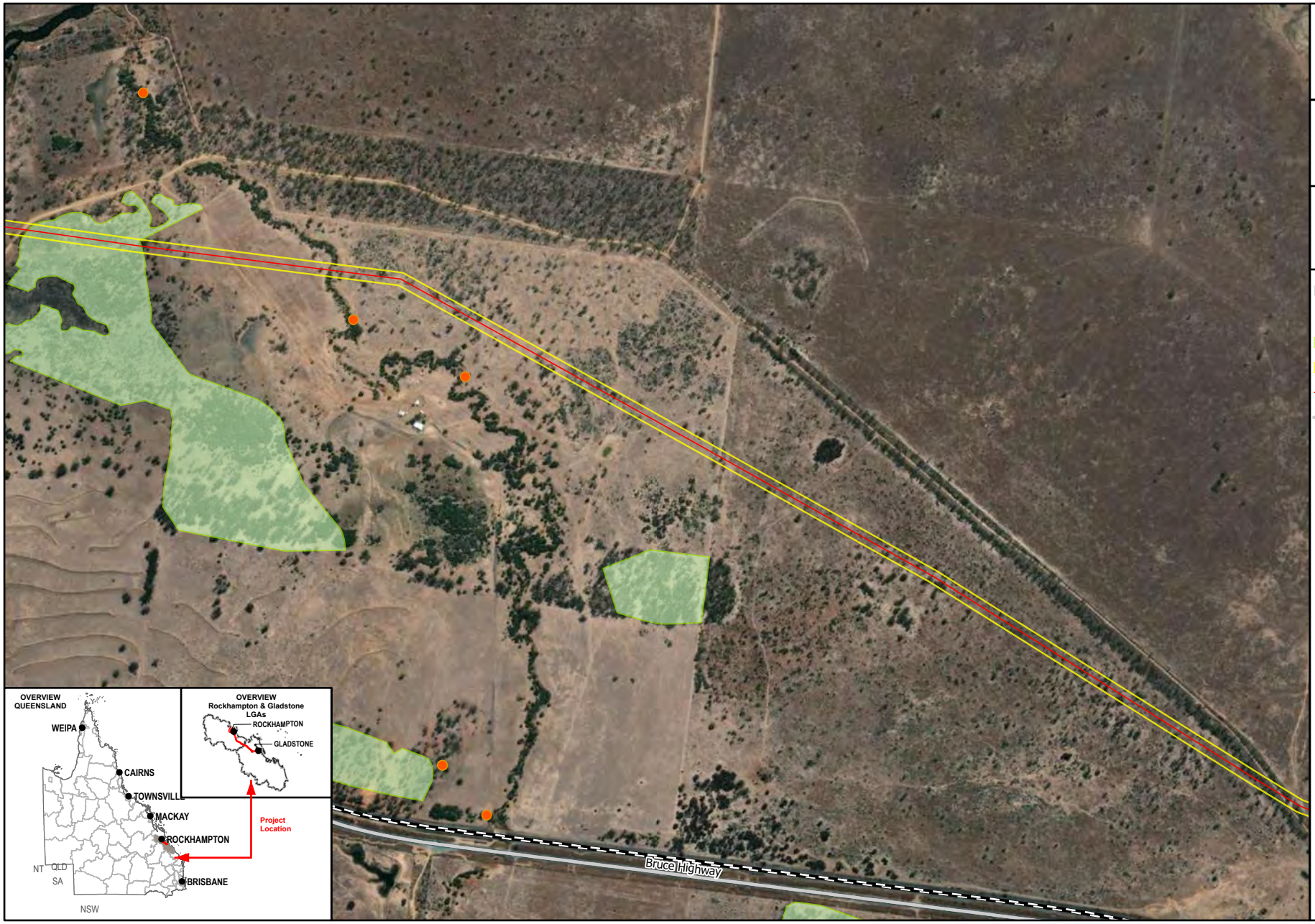

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- Threatened Flora Record
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- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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Figure 4-3j

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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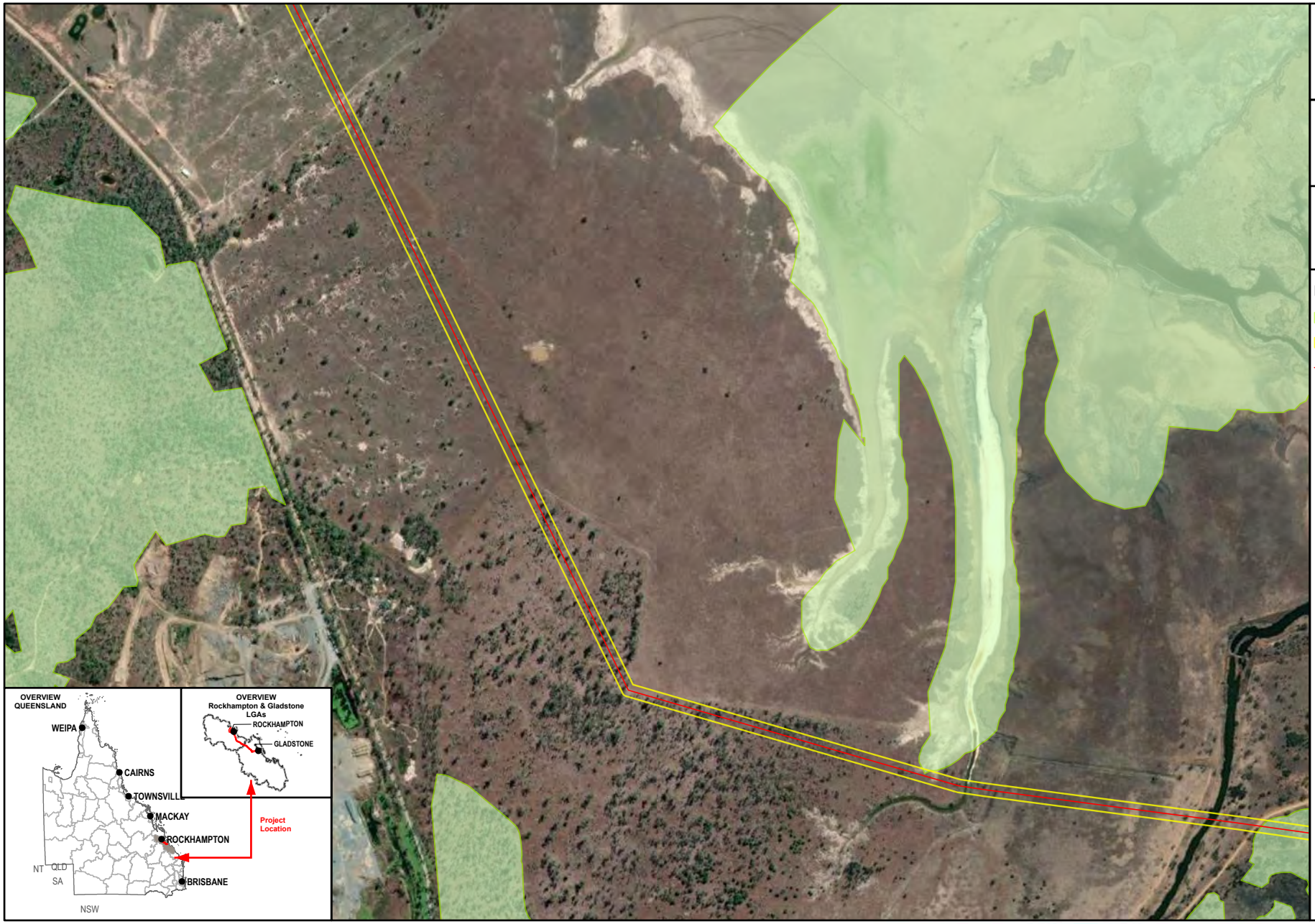

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- High-risk Flora Trigger Areas
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Figure 4-3k
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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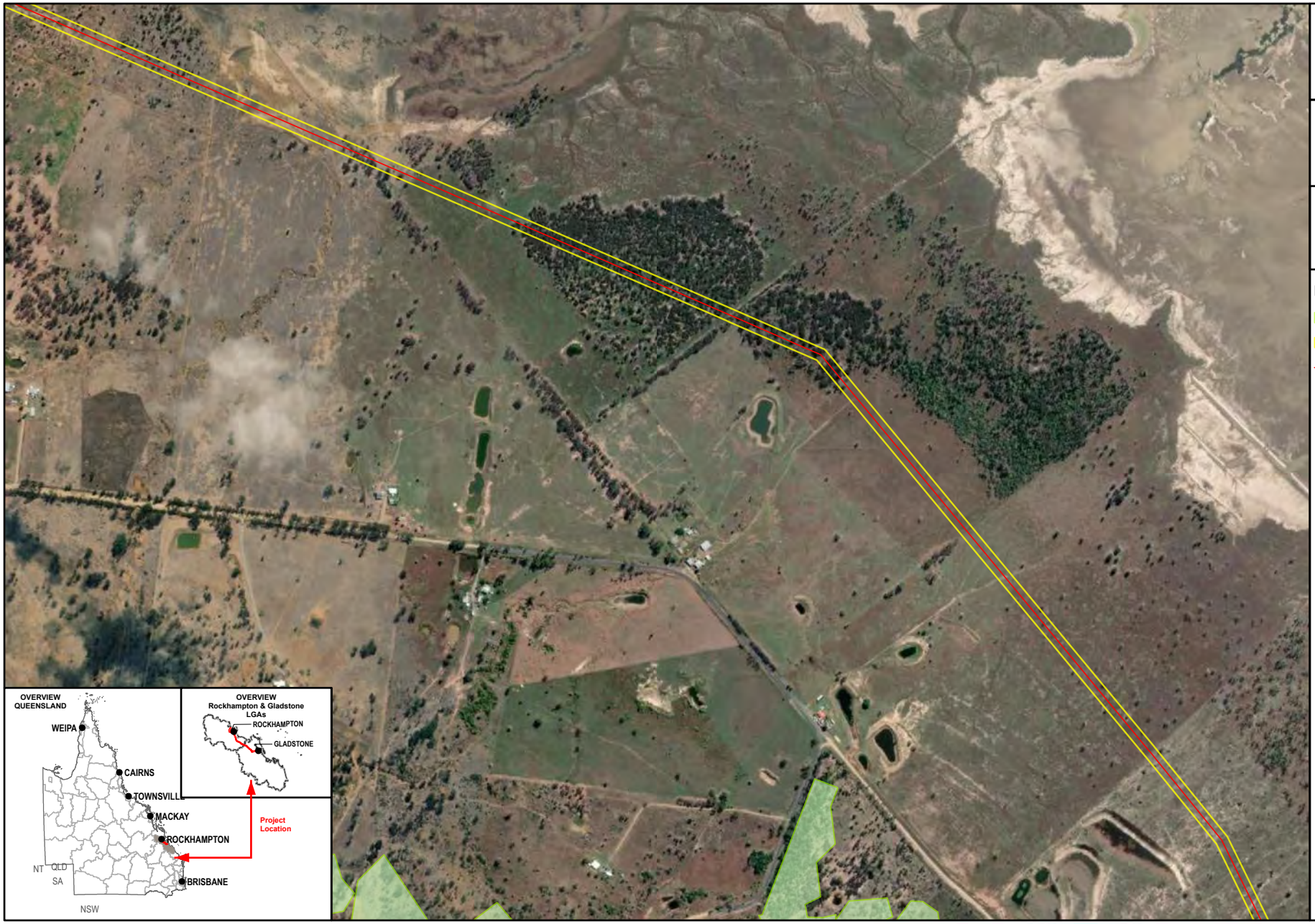

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- High-risk Flora Trigger Areas
- Study Area
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Figure 4-3l

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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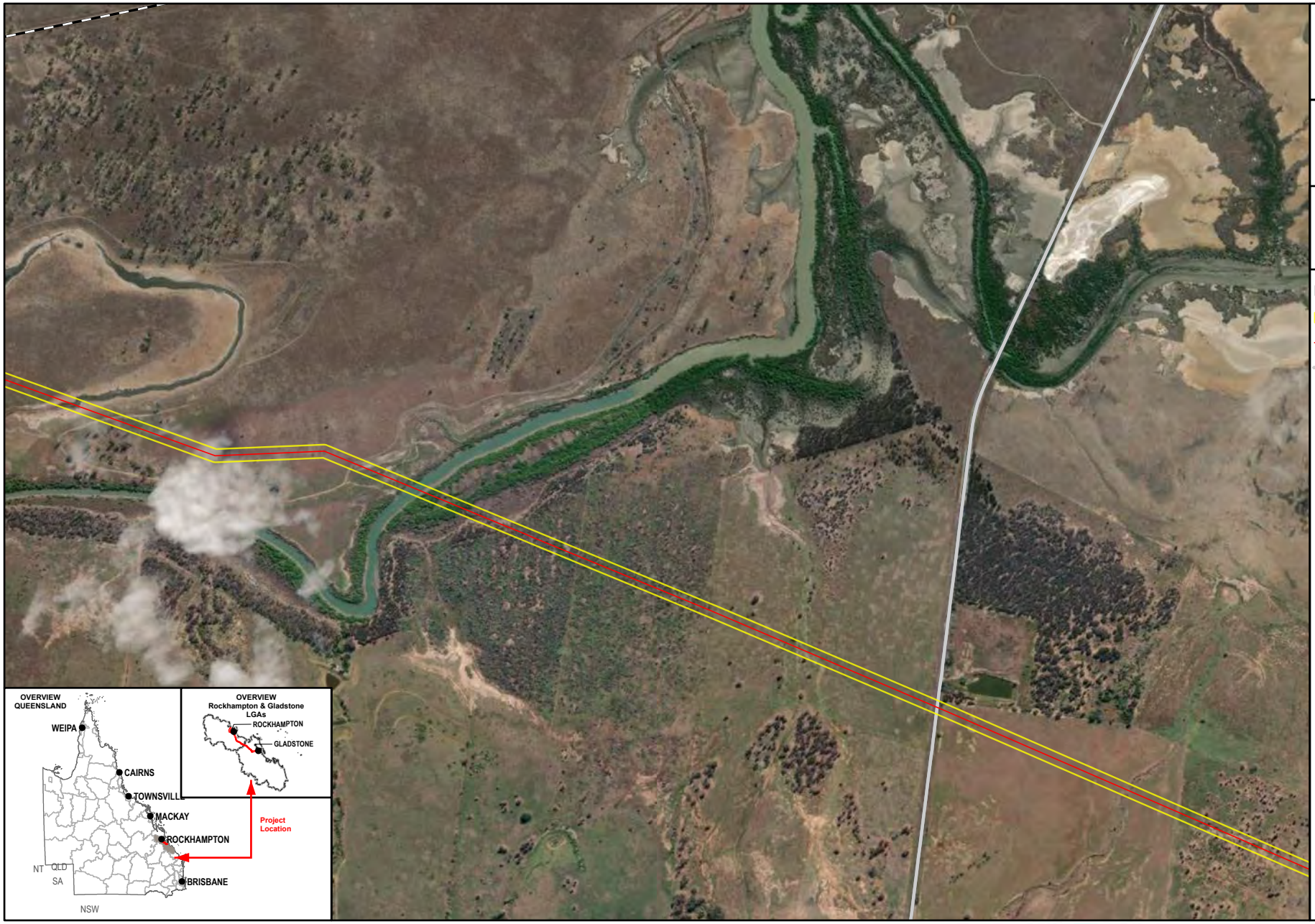

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- Study Area
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Figure 4-3m
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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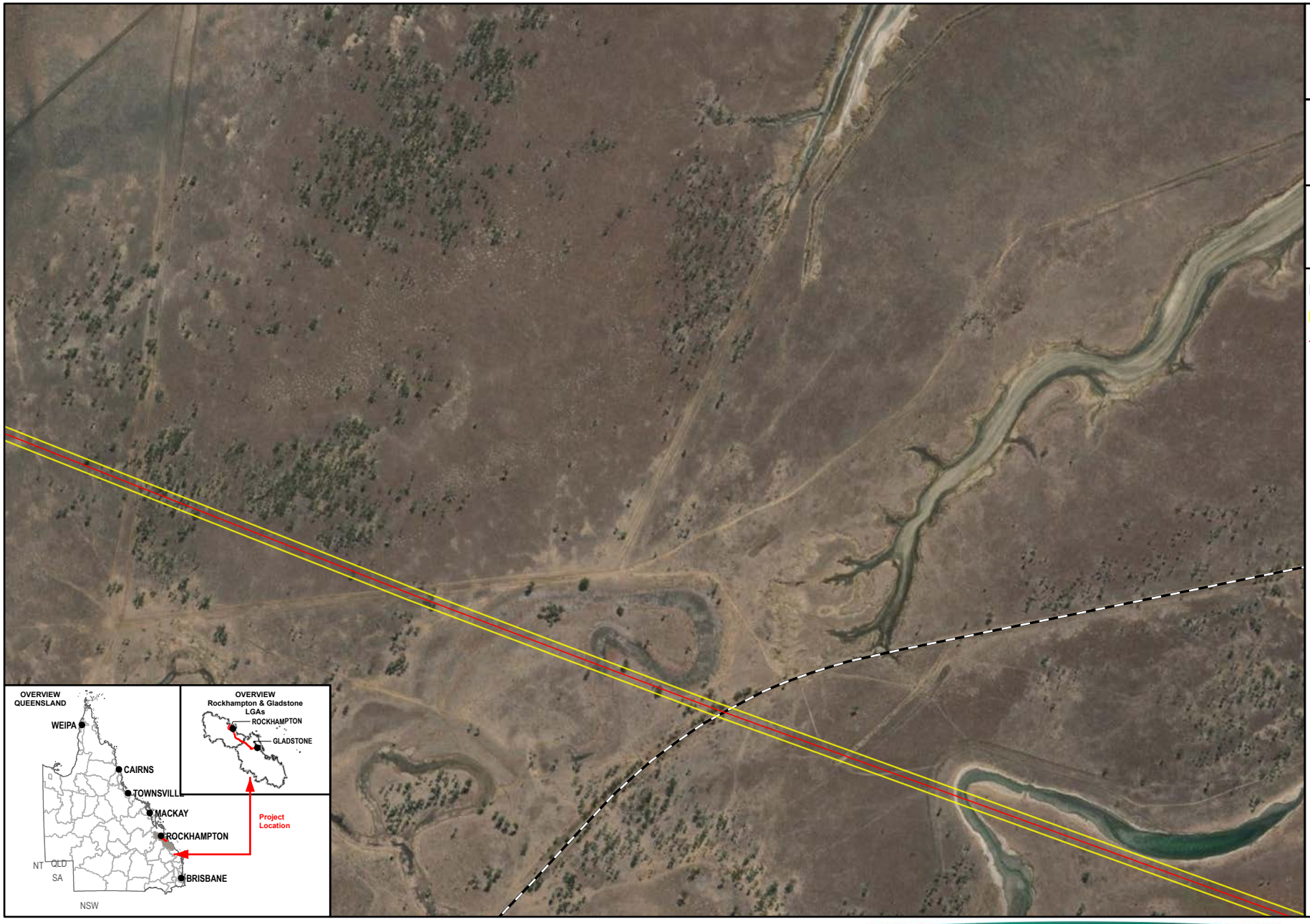

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Figure 4-3n
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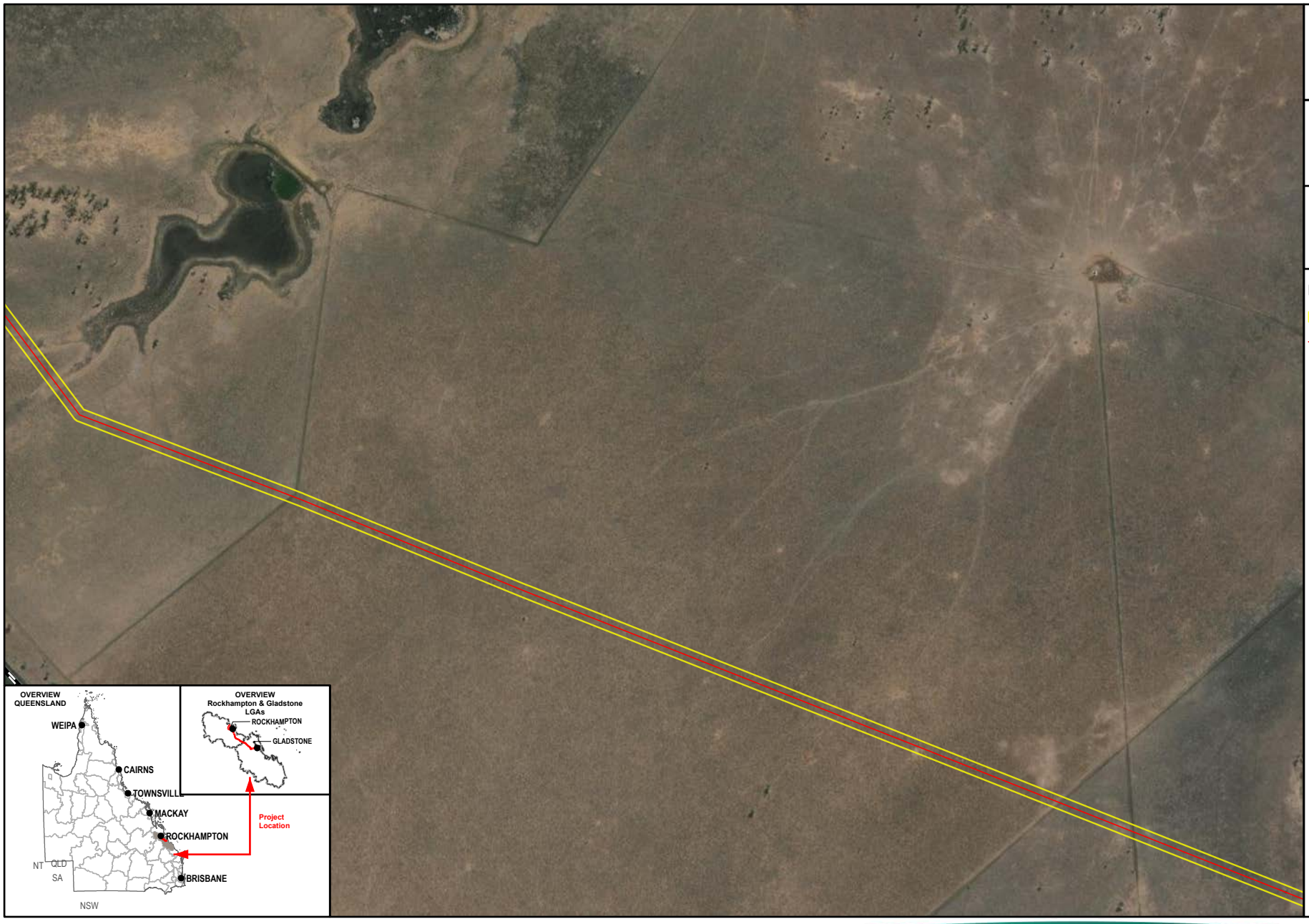

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Figure 4-3p

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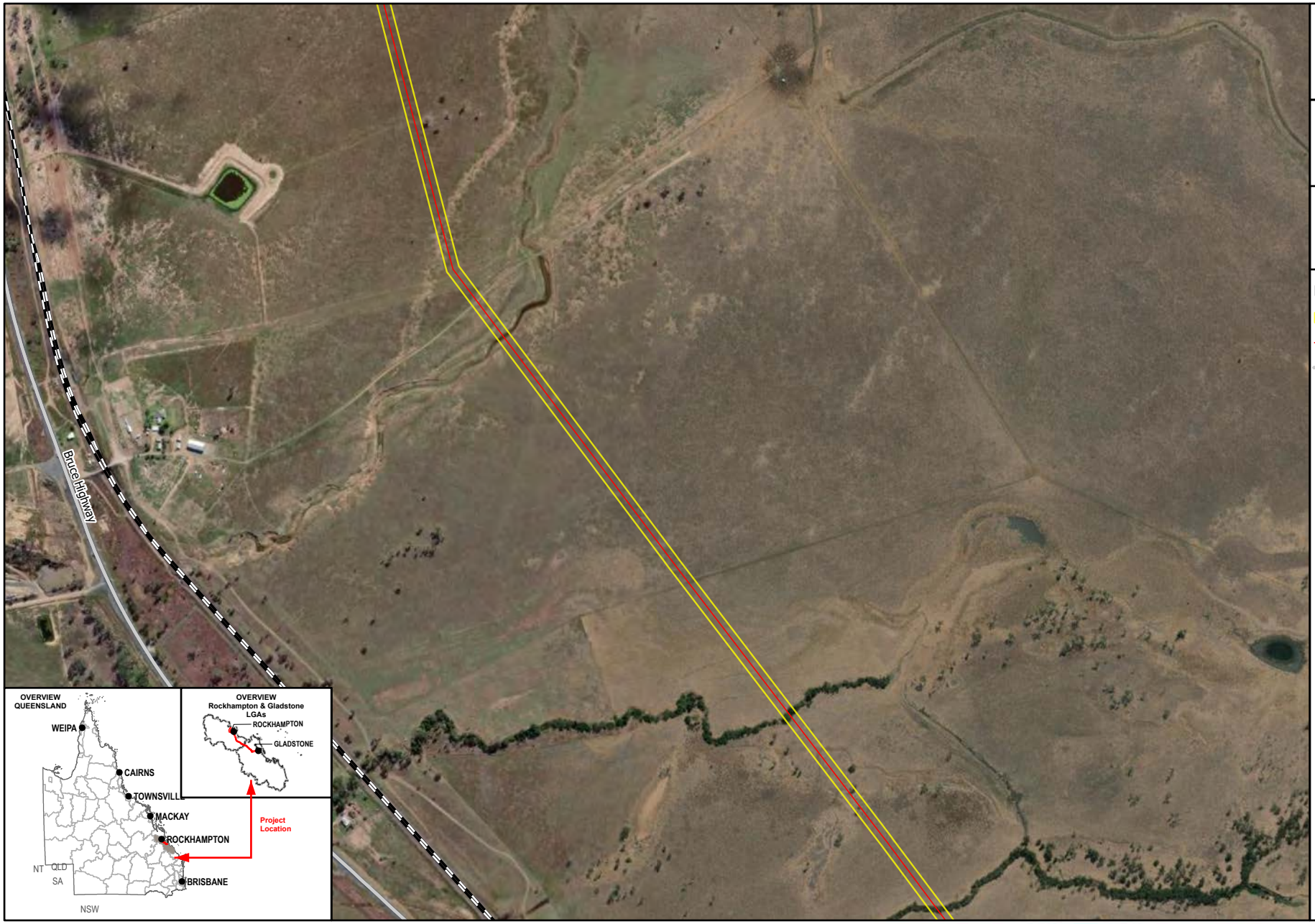

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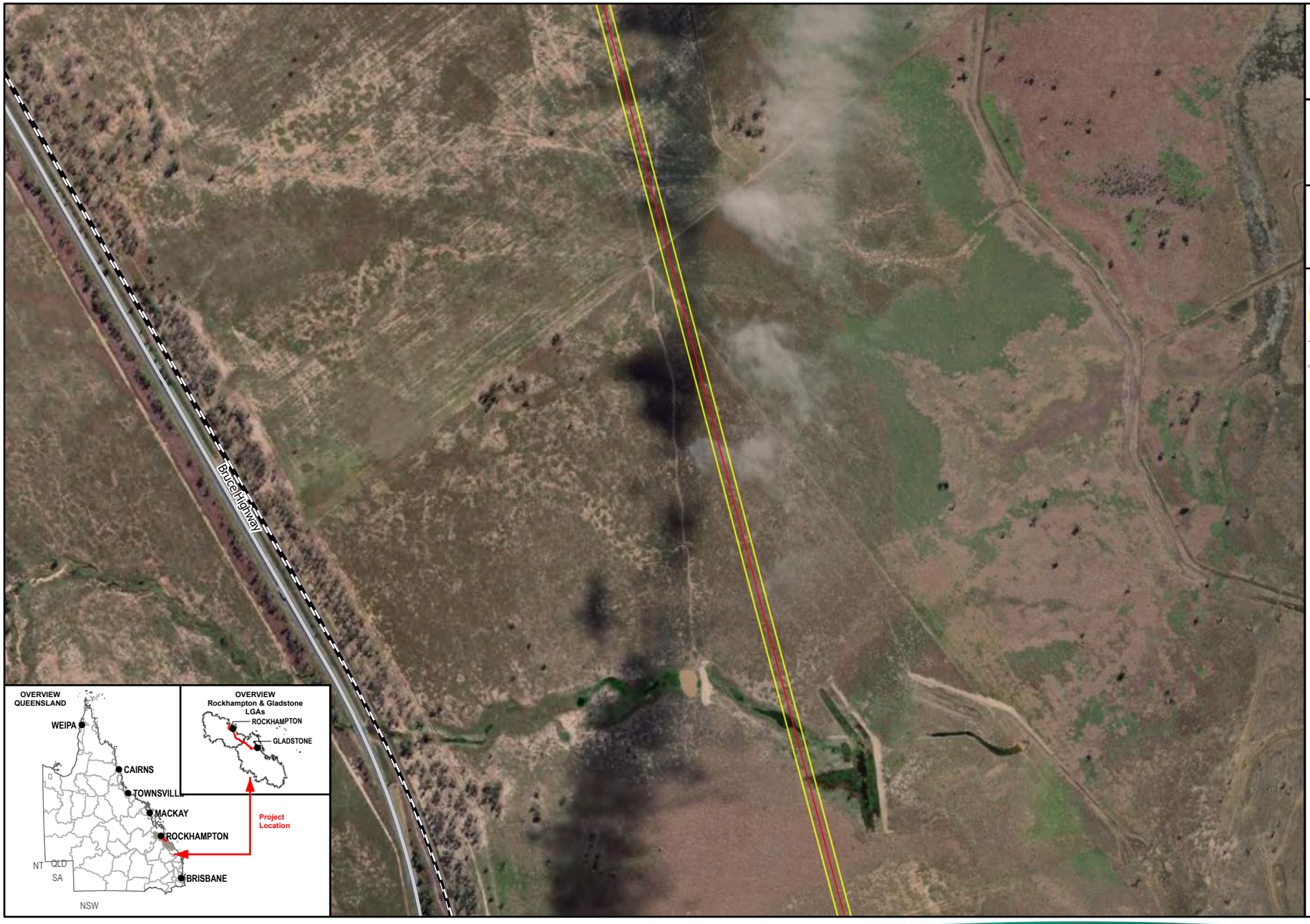

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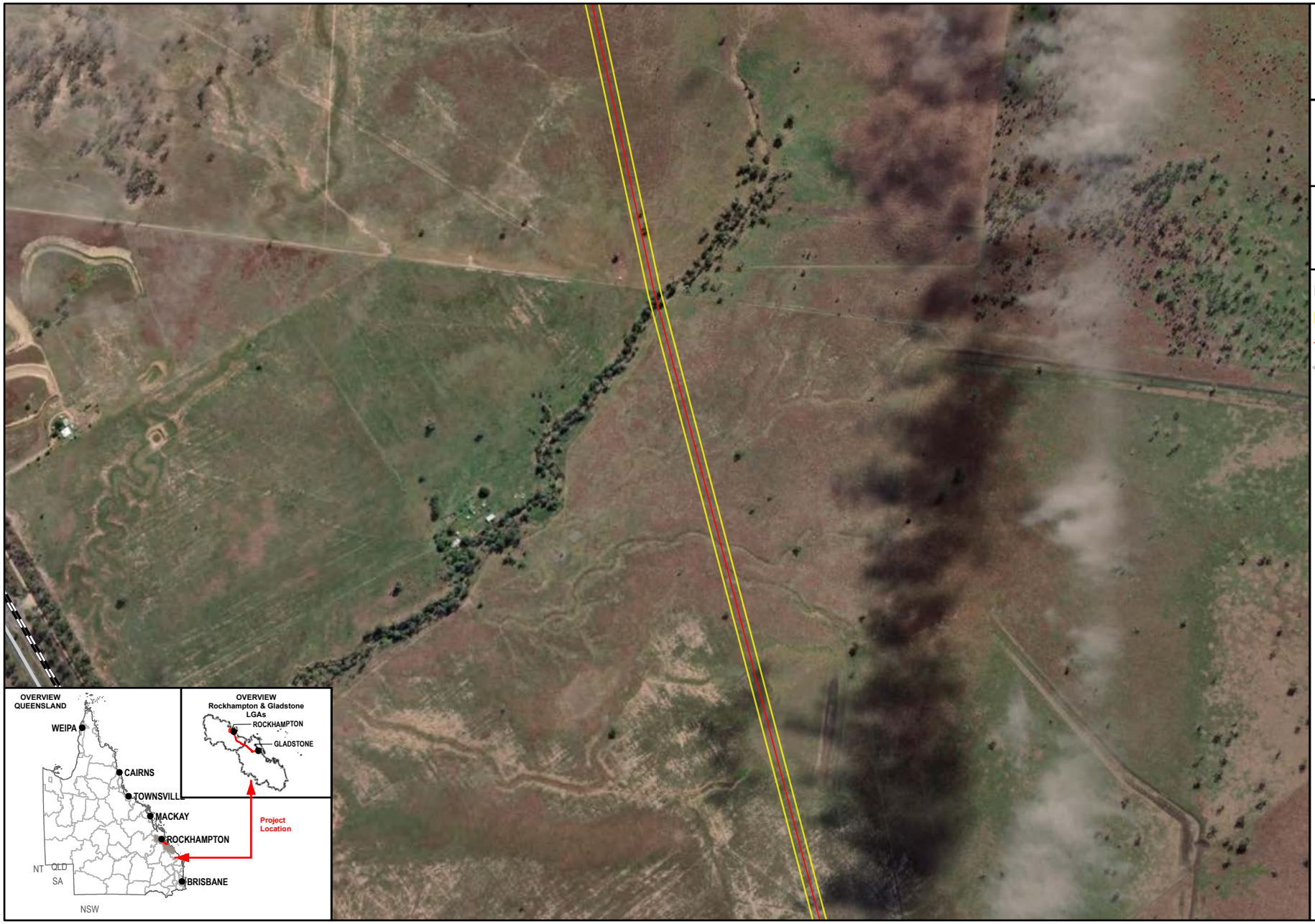

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Figure 4-3s
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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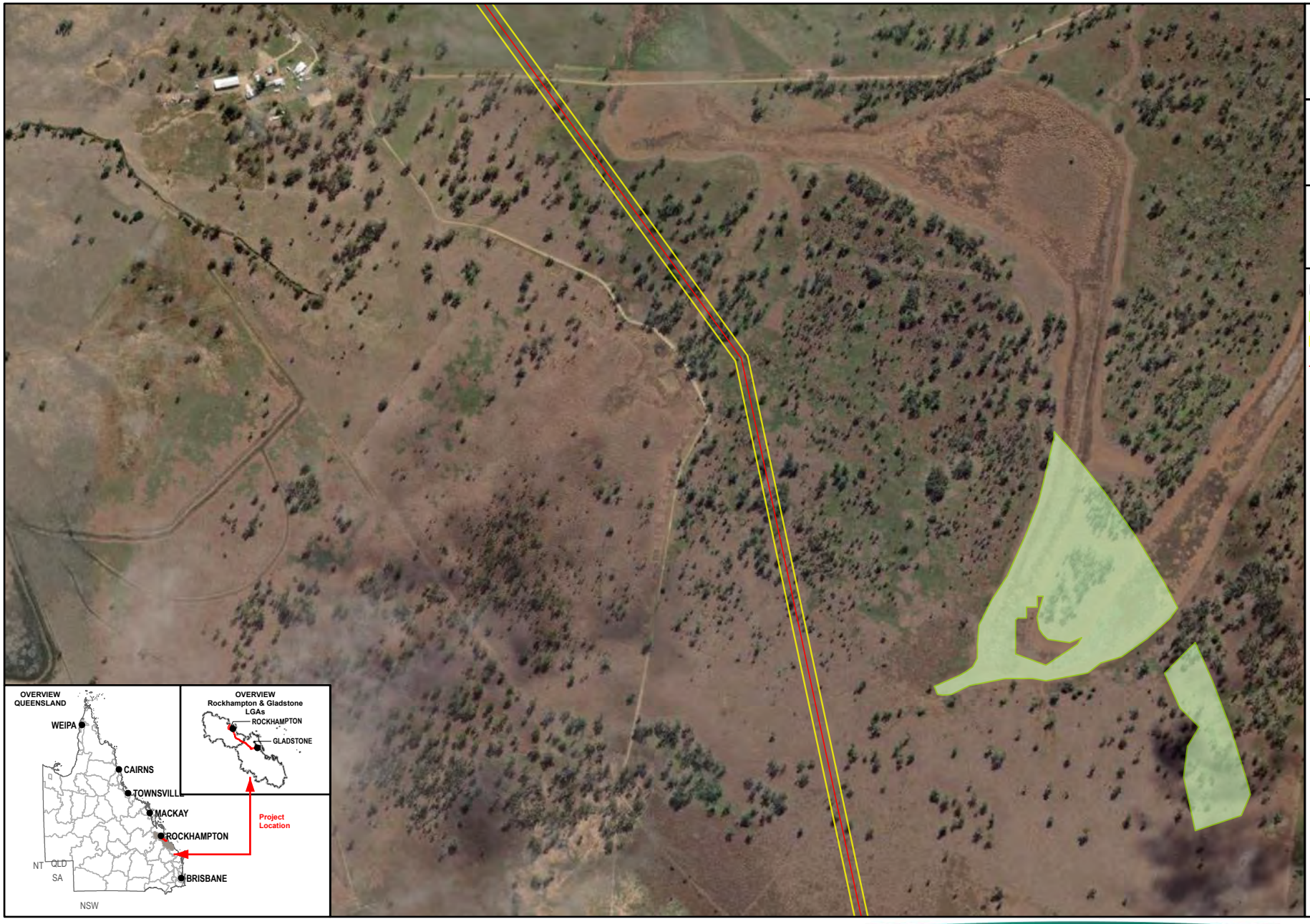

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Figure 4-3t
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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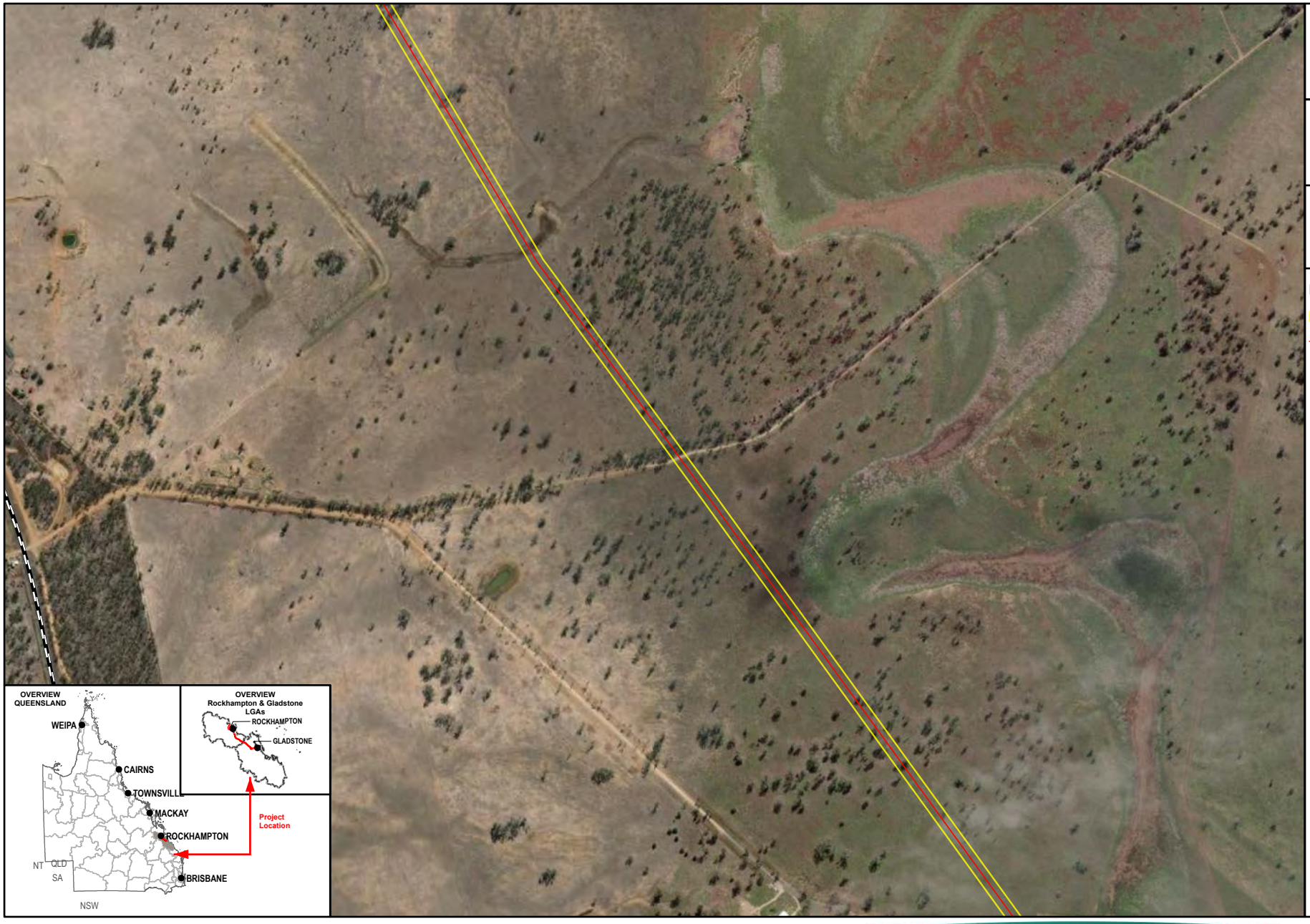

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Figure 4-3u
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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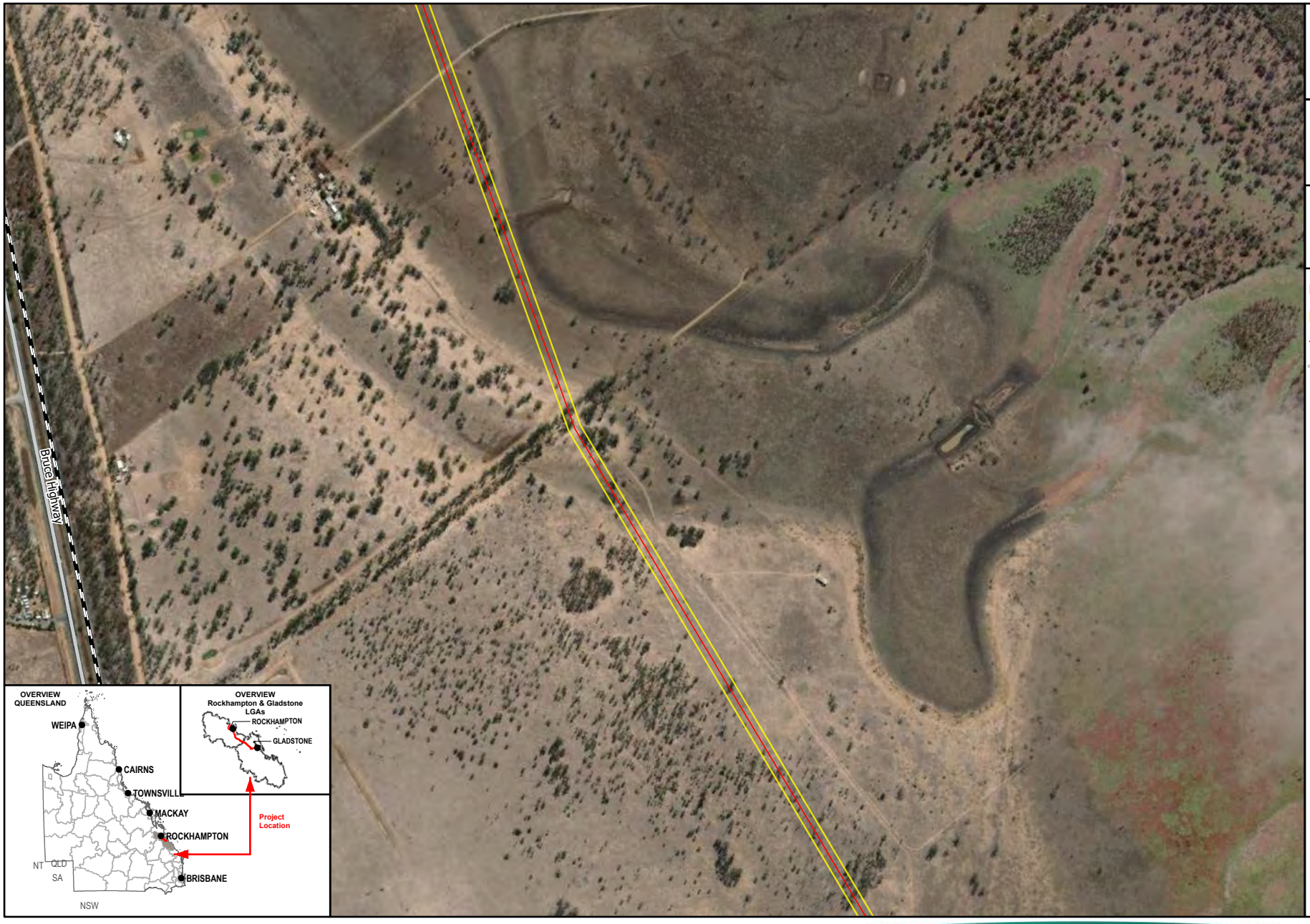

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Figure 4-3v
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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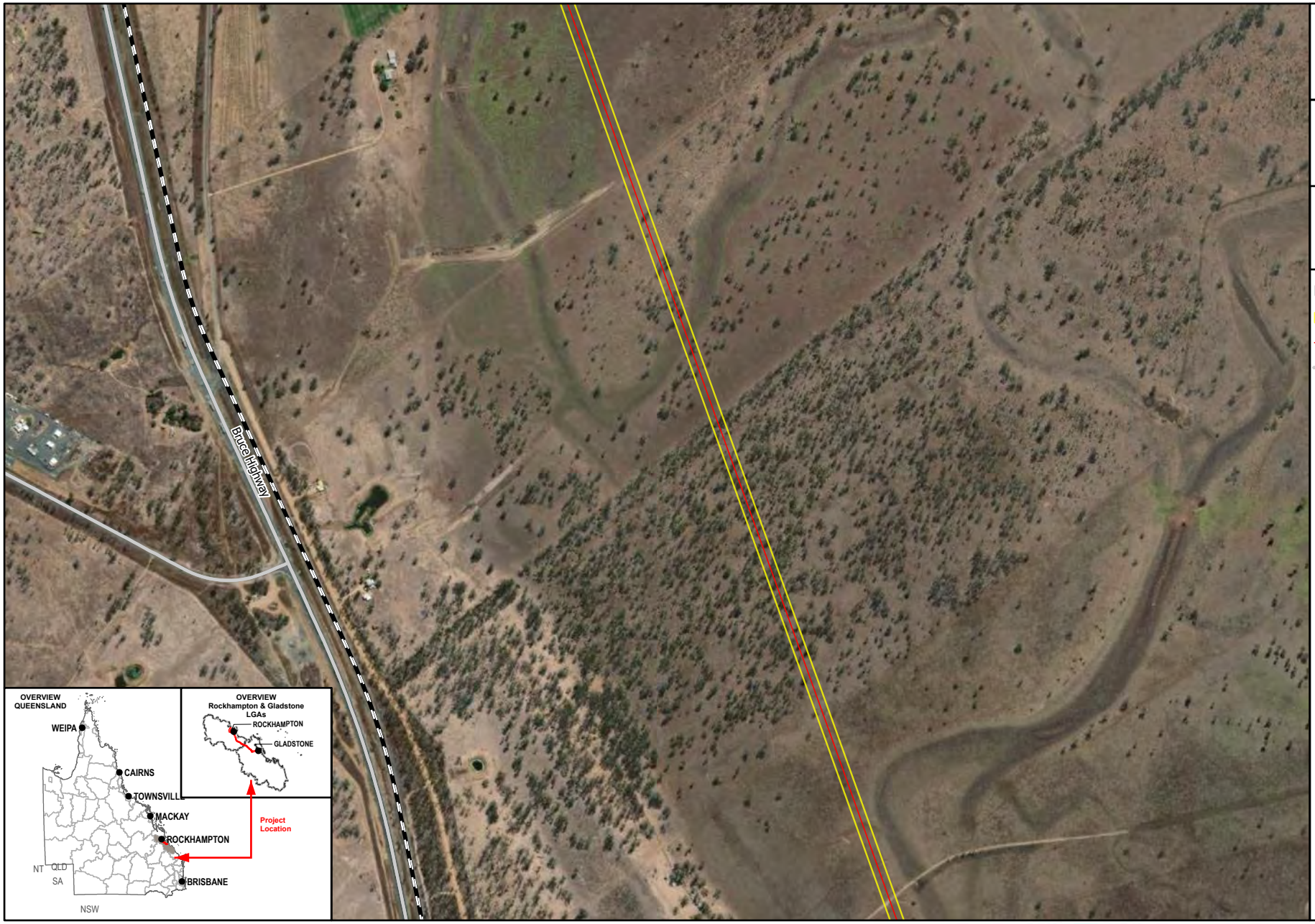

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Figure 4-3w

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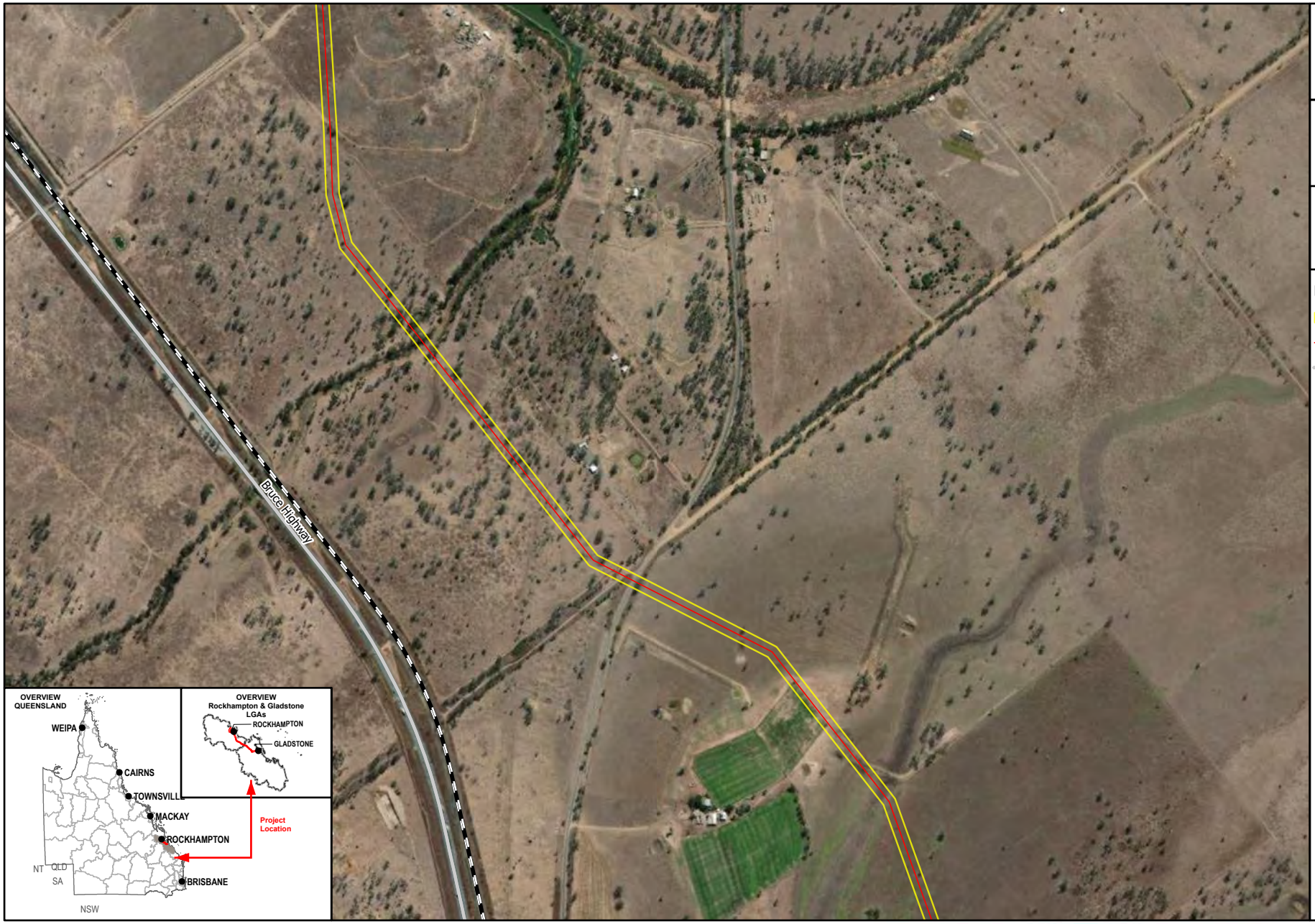

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Figure 4-3x
High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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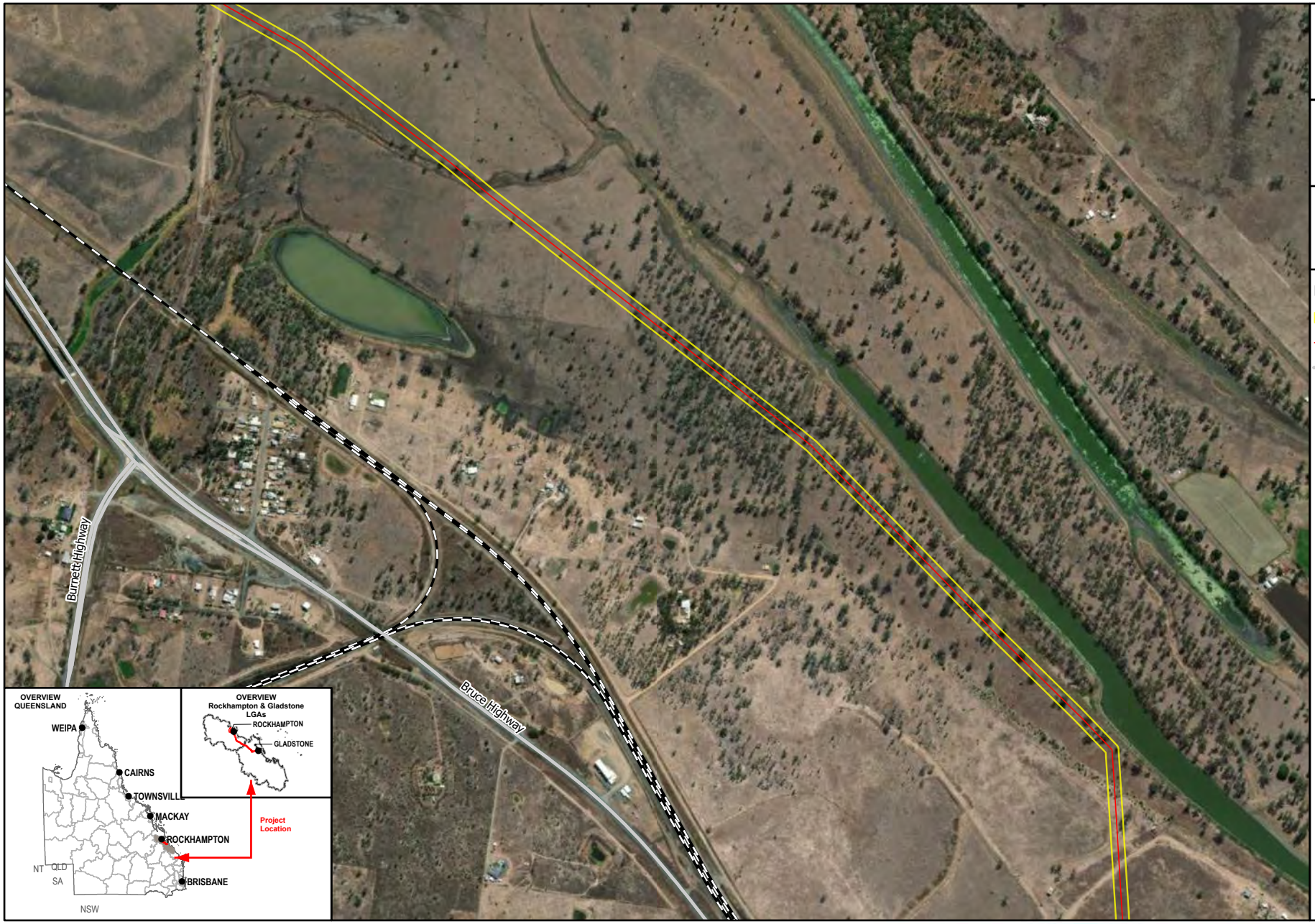

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Figure 4-3z

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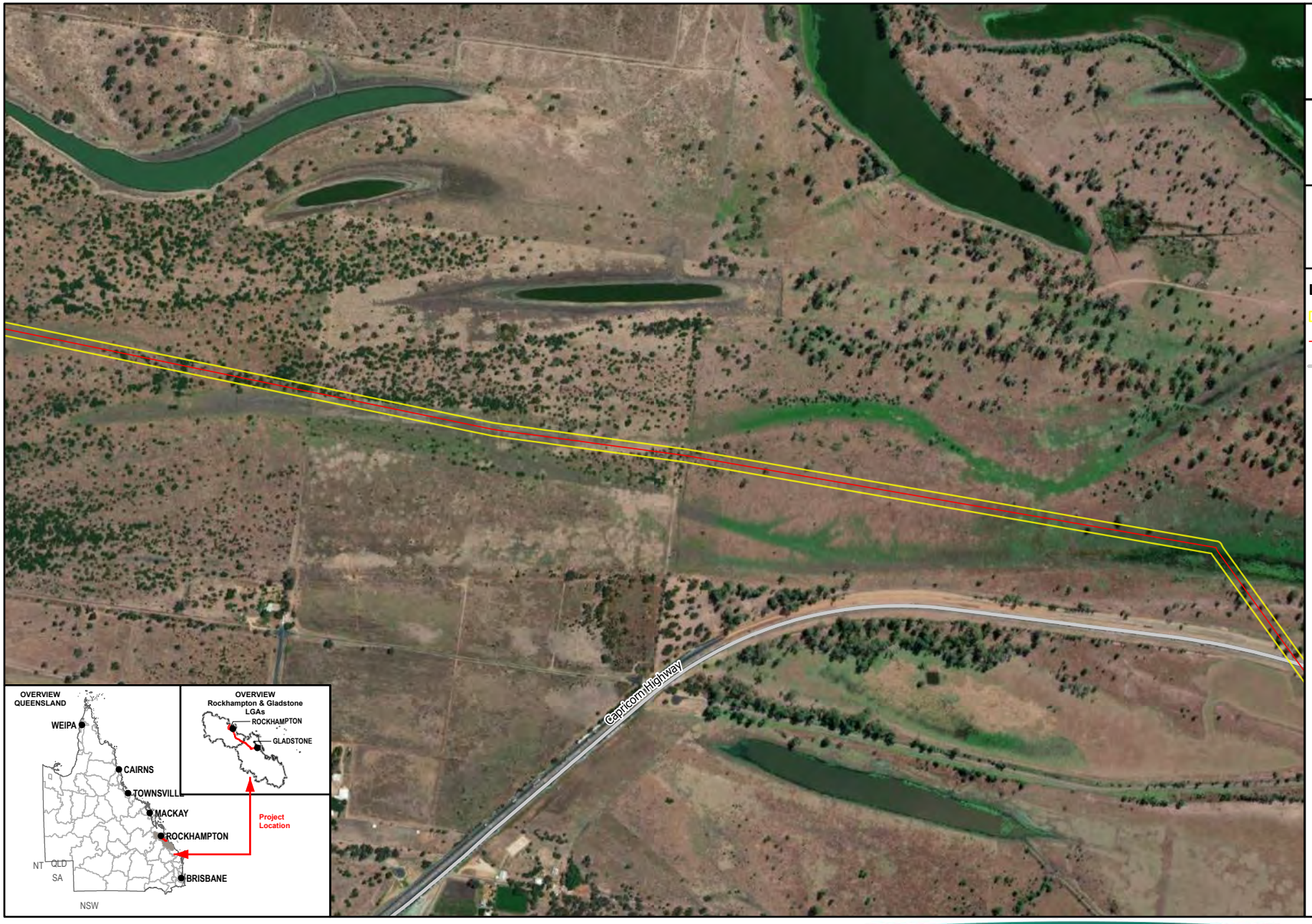

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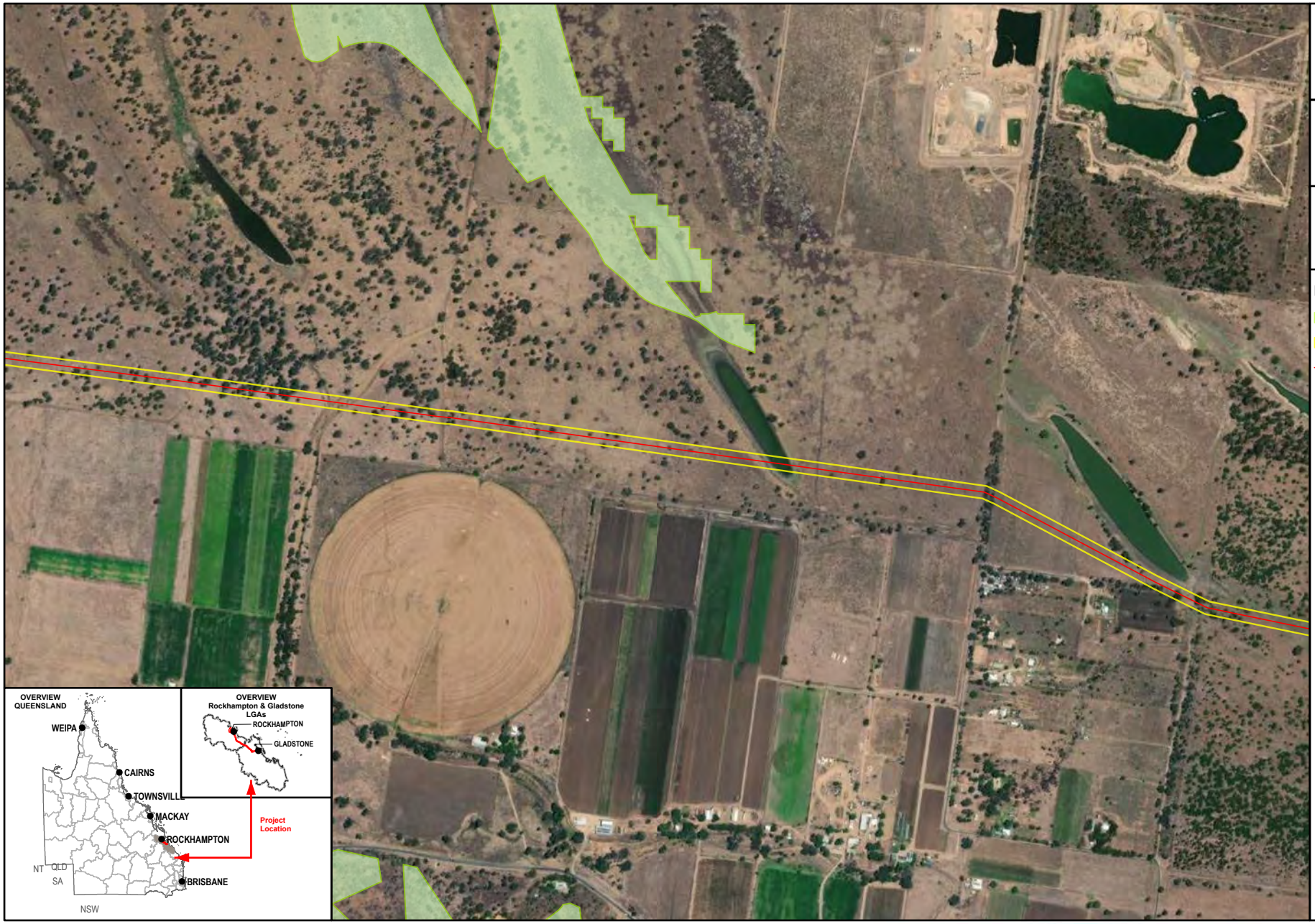

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Figure 4-3b1

High-risk Flora Survey Trigger Mapping and Historical Records Within the SGIC SDA Desktop Search Extent

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4.3.2 Field survey results

4.3.2.1 Conservation significant flora species

Comprehensive surveys for conservation significant flora species were undertaken within sections of the pipeline alignment intersected by high-risk flora trigger areas. Results of the protected plant surveys are presented in a standalone flora survey report, included as Appendix D. A protected plants Exemption Notification was submitted to DES via email on 3 August 2022. Opportunistic searches were also undertaken beyond the high-risk flora trigger areas. No EVNT flora species were recorded within the study area during the field assessment.

A voucher specimen of the plant previously identified as *Macropteranthes leiocaulis* at Marble Creek (-23.6833, 150.7581) was lodged with the Queensland Herbarium on 11 May 2022 as its morphological features and supporting habitat appeared more closely aligned to *Macropteranthes fitzalanii*. The Queensland Herbarium has since confirmed the specimen's identity as *M. fitzalanii* (least concern under the NC Act) (Herbarium reference: ME:PT 263/22). A high confidence is assigned to this identification as a fruiting specimen was supplied for identification purposes. Of note, the conservation status of *M. fitzalanii* under the NC Act was reclassified from near threatened to least concern in 2014.

Based on the location of the confirmed *M. fitzalanii* individual and some superficially similar appearances between it and *Cadellia pentastylis*, it is likely that the *'(probably)* ooline *(Cadellia pentastylis)*' identified by Arup in 2008 is actually *M. fitzalanii.*

Results of the protected plant surveys completed in high-risk flora trigger areas are presented in a standalone flora survey report, included as Appendix D. A protected plants Exemption Notification was submitted to DES via email on 3 August 2022.

4.3.2.2 Marine plants

Marine plant surveys were undertaken at six locations within the SGIC study area. Marine plant communities present at each location and their extents are listed in Table 4-8 and represented spatially in Figure 4-4.

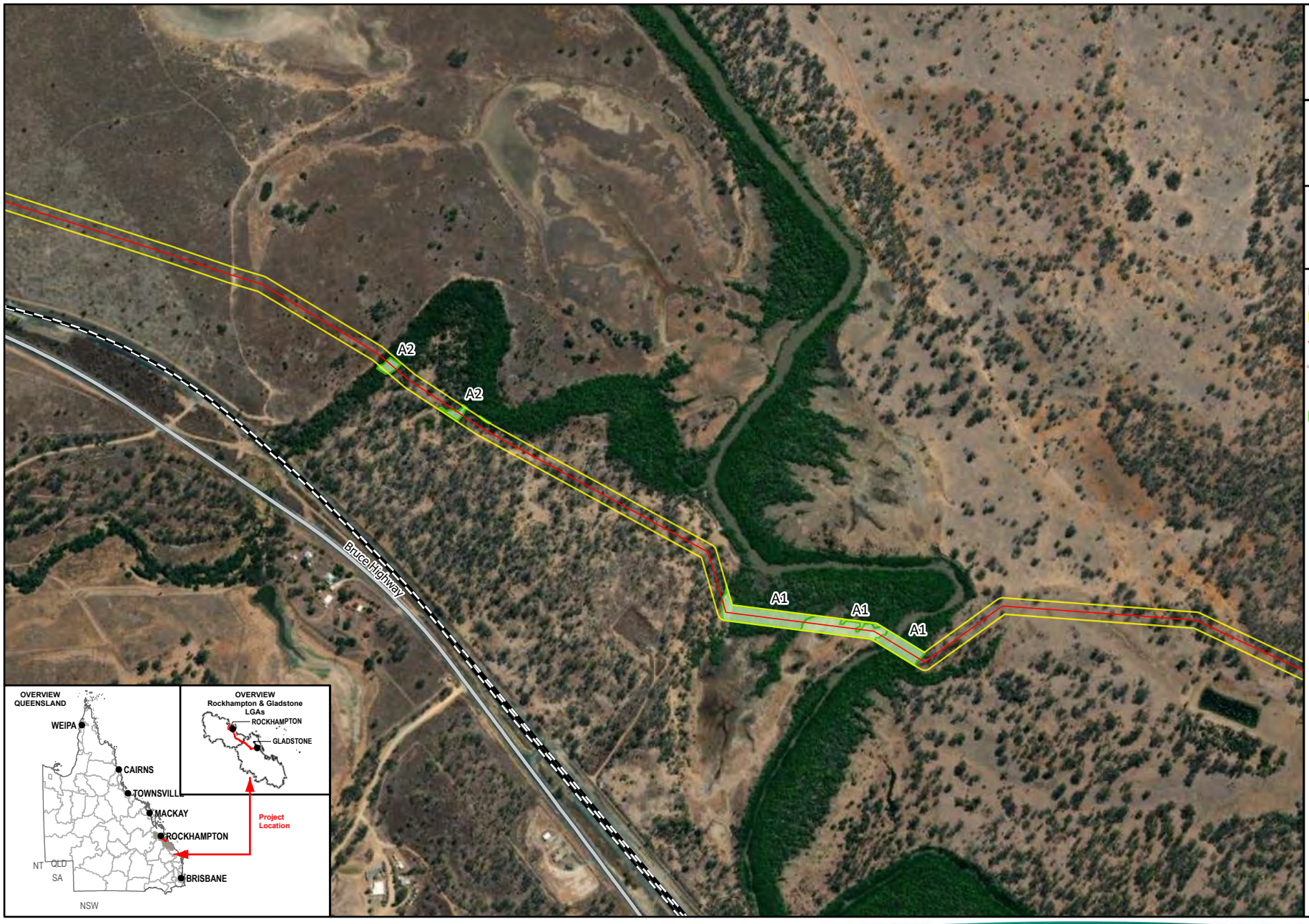
The project is expected to result in a total of 17,175 m^2 of temporary marine plant impacts and a total of 9,499 m^2 (0.95 ha) of permanent marine plant impacts. The aforementioned areas are based on a construction corridor width of 30 m. It is expected that the areas cited in Table 4-8 would be substantially reduced if a narrower construction footprint was adopted in areas occupied by marine plants or alternative construction methodologies are employed in such areas (e.g. underground boring). The temporary impact definition adopted is that cited in the *State Development Assessment Provisions Guideline State code 11: Removal, destruction or damage of marine plants* (February 2022), whereby an impact is considered to be of a temporary nature if the site is expected to return to its pre-disturbance condition within five years of clearing.

Table 4-8 Marine plant communities present

Site	Latitude	Longitude	Community type	Inherent marine plants present	Other marine plants present (located on or adjacent to tidal lands)	Area of temporary impacts (m^2)	Area of permanent impacts (m^2)
A1	-23.7086	150.81805	Mangrove	*Excoecaria agallocha* *Avicennia marina* *Aegiceras corniculatum* *Clerodendrum inerme* *Xylocarpus granatum* *Acanthus ilicifolius* *Enchylaena tomentosa* *Sporobolus virginicus*	*Cupaniopsis anacardioides* *Einadia nutans* subsp. *linifolia* Seawrack	2,142	5,869
			Saltmarsh – grassland	*Sporobolus virginicus* *Excoecaria agallocha* *Fimbristylis sp.* *Sesuvium portulacastrum* *Enchylaena tomentosa*	*Atriplex muelleri*	3,769	13
A2	-23.7043	150.8104	Mangrove	*Excoecaria agallocha* *Avicennia marina* *Acanthus ilicifolius* *Clerodendrum inerme* *Sporobolus virginicus* *Fimbristylis ferruginea* *Atriplex semibaccata*	*Trophis scandens* *Ludwigia octovalvis* *Dysphania* sp. *Cyperus difformis* *Passiflora foetida** *Ricinus communis** *Cupaniopsis anacardioides* *Ruellia simplex** *Melaleuca bracteata* *Senna pendula** *Solanum seaforthianum** *Eclipta prostrata** *Rivina humilis** *Sonchus oleraceus** *Atriplex muelleri* *Conyza* sp.* Seawrack	108	1,163

Site	Latitude	Longitude	Community type	Inherent marine plants present	Other marine plants present (located on or adjacent to tidal lands)	Area of temporary impacts (m^2)	Area of permanent impacts (m^2)
B	-23.6804	150.7442	Saltmarsh – samphire forbland	*Sporobolus virginicus* *Tecticornia pergranulata subsp. Queenslandica* *Tecticornia indica*	*Sclerolaena muricata* *Eriochloa* sp. *Sesbania cannabina* *Dichanthium sp.* *Chloris sp.* *Atriplex muelleri* *Acacia salicina* Seawrack	1,631	0
C1	-23.6388	150.6848	Mangrove	*Avicennia marina* *Ceriops australis* *Aegiceras corniculatum* *Aegialitis annulata* *Tecticornia indica* *Suaeda arbusculoides* *Tecticornia pergranulata subsp. Queenslandica* *Enchylaena tomentosa* *Sporobolus virginicus*	*Chloris inflata** *Mariana microphylla* *Sclerolaena muricata* *Bothriochloa decipiens* *Sporobolus caroli* *Alternanthera* sp.	3,318	2,454
C2	-23.6366	150.6761	Saltmarsh – grassland	*Sporobolus virginicus*	*Chloris inflata** *Sclerolaena calcarata* *Sporobolus caroli* *Alternanthera sp.* *Dinebra sp.*	602	0
C2			Saltmarsh – samphire forbland	*Tecticornia pergranulata subsp. Queenslandica* *Tecticornia indica* *Enchylaena tomentosa* *Suaeda arbusculoides* *Avicennia marina* *Sesuvium portulacastrum*	*Sclerolaena muricata*	3,058	0

Site	Latitude	Longitude	Community type	Inherent marine plants present	Other marine plants present (located on or adjacent to tidal lands)	Area of temporary impacts (m^2)	Area of permanent impacts (m^2)
C3	-23.6336	150.6680	Saltmarsh – samphire forbland	*Sporobolus virginicus* *Tecticornia pergranulata* subsp. *Queenslandica* *Enchylaena tomentosa* *Suaeda arbusculoides* *Atriplex semibaccata*	*Sclerolaena calcarata* *Atriplex muelleri* *Alternanthera* sp. Seawrack	2,547	0
Total						17,175	9,499
Key to table: (*) – introduced flora species							



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Legend

- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways
- Marine Plants Sites

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-4c Marine Plant Extents Within the SGIC SDA Study Area

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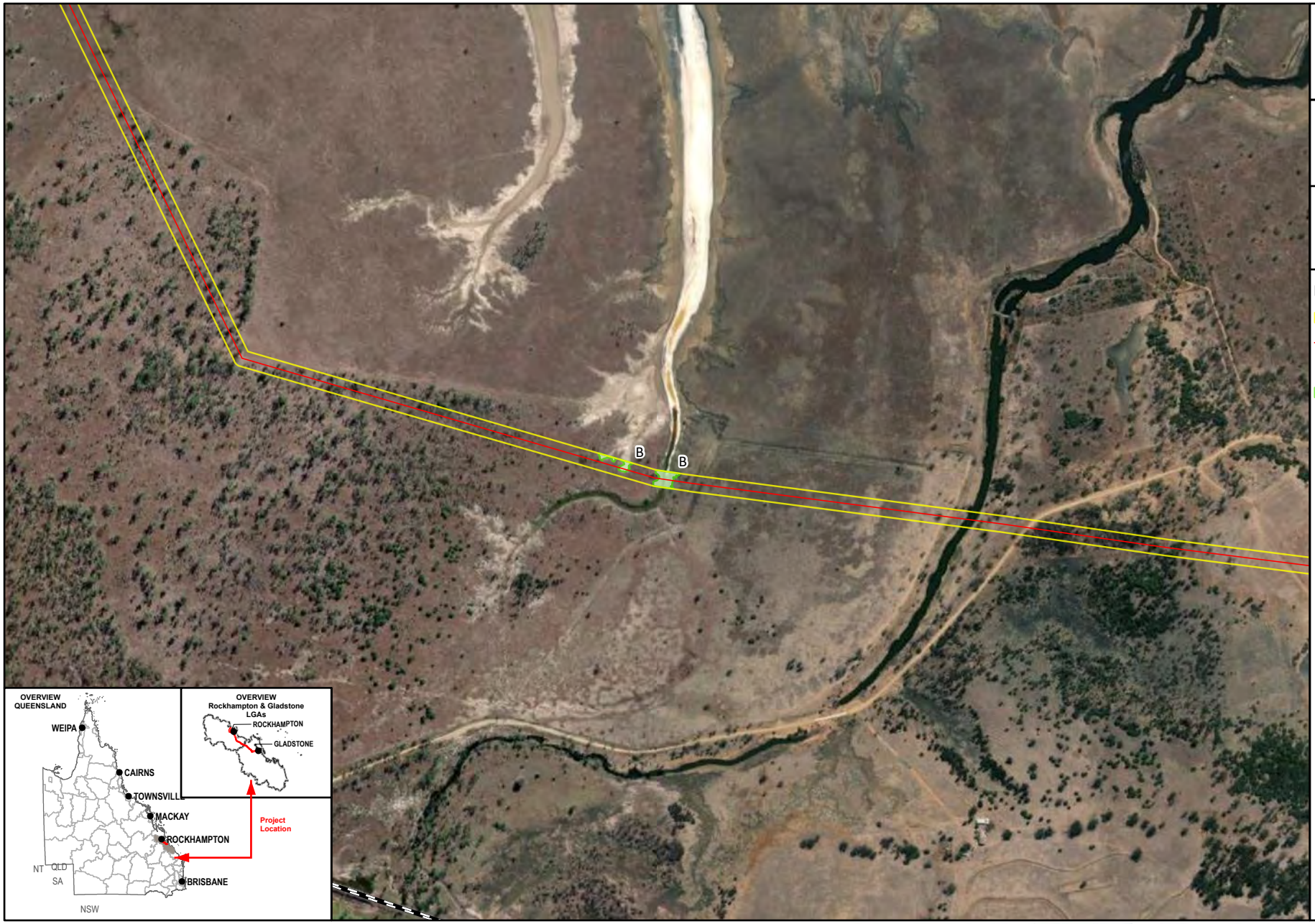

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Legend

- Study Area
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- Railways
- Marine Plants Sites

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Figure 4-4c Marine Plant Extents Within the SGIC SDA Study Area

000-G-MAP-2413 Version:3 Date:7/09/2022

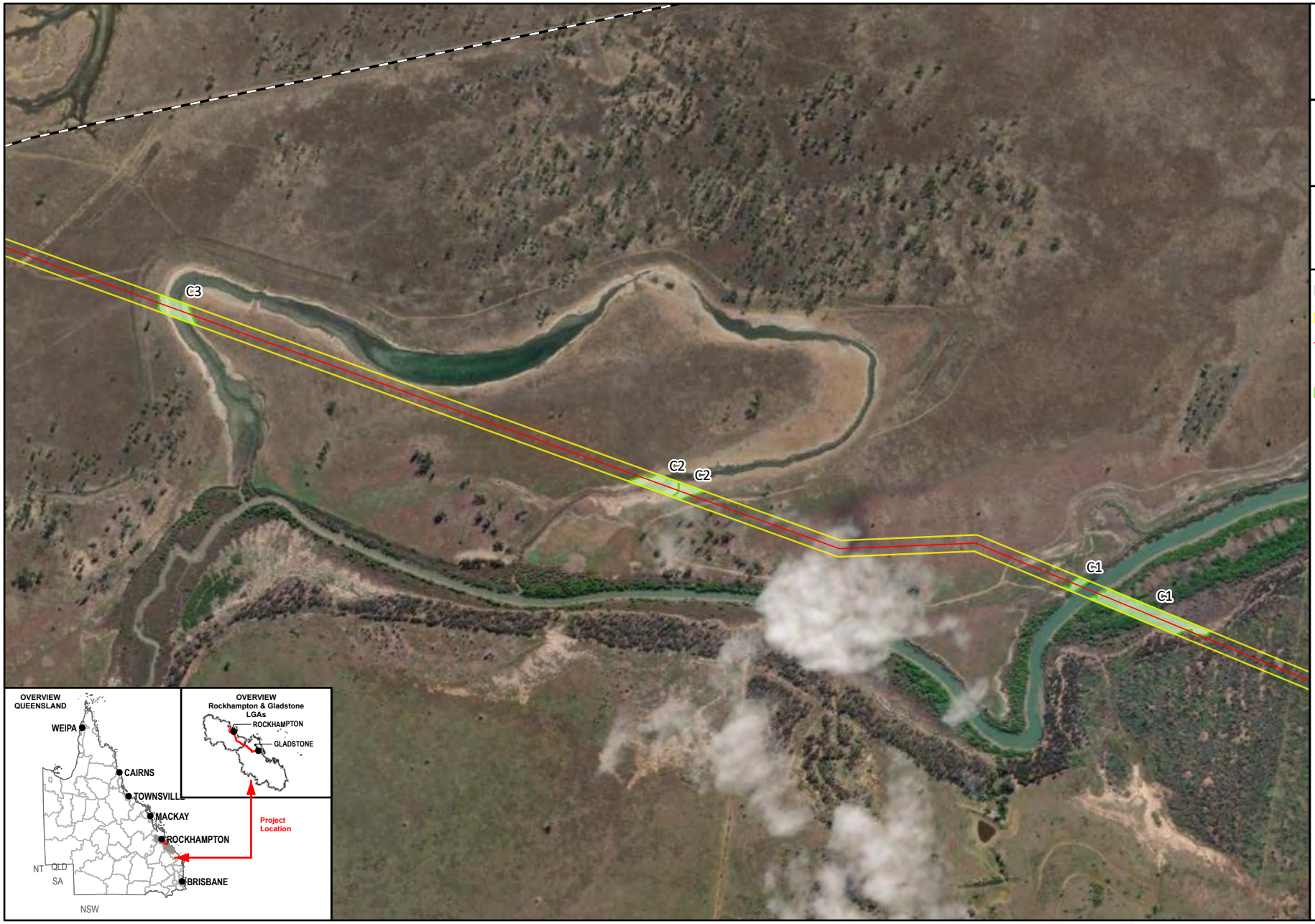

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Figure 4-4c Marine Plant Extents Within the SGIC SDA Study Area

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4.4 Terrestrial fauna

4.4.1 Desktop assessment results

4.4.1.1 Threatened fauna species

The EPBC Act PMST database identified 36 threatened fauna species that have the potential to occur within the desktop search extent (10 km buffer). State based searches (i.e. WildNet, Species Profile Search and Biomaps) identified 29 threatened fauna species that have been historically recorded within the desktop search extent. Note that marine species have been addressed in Section 4.6.

In aggregate, the searches identified 41 State and/or Federal threatened fauna species that are either predicted to occur or have been confirmed as occurring, within the desktop search extent. This comprised 24 birds, nine mammals, seven reptiles and one insect. Some historical records identified within the desktop search extent are classified and therefore the exact location of these records within the search extent are unknown. The PMST and WildNet desktop search results are provided in Appendix A and summarised in Table 4-9 .

Table 4-9 also identifies threatened fauna species that were identified as controlling provisions at the time of the EPBC approval.

Table 4-9 Threatened fauna species identified within the desktop search extent and/or predicted to occur (PMST)

Scientific name	Common name	Status		Source	WN Records	Nearest record to ROW	EPBC Approval
		EPBC Act	NC Act				
Birds							
Botaurus poiciloptilus	Australasian bittern	E	E	PMST	-	-	
Calidris canutus	Red knot	E, Mig	E	PMST	-	-	
Calidris ferruginea	Curlew sandpiper	CE, Mig	CE	WN; PMST	13	1.7 km	
Charadrius leschenaultii	Greater sand plover	V, Mig	V	PMST	-	-	
Charadrius mongolus	Lesser sand plover	E, Mig	E	WN	1	*	
Cyclopsitta diophthalma coxeni	Coxen's fig-parrot	E	E	PMST	-	-	
Epthianura crocea macgregori	Yellow chat (Dawson)	CE	E	WN; PMST	157	580 m	✓
Erythrotriorchis radiatus	Red goshawk	V	E	WN; PMST	2	5.0 km	✓
Falco hypoleucos	Grey falcon	V	V	WN; PMST	1	3.0 km	
Fregetta grallaria grallaria	White-bellied storm-petrel	V	LC	PMST	-	-	
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	WN; PMST	59	1.1 km	✓
Hirundapus caudacutus	White-throated needletail	V, Mig	V	WN; PMST	2	9.3 km	
Limosa lapponica baueri	Western Alaskan bar-tailed godwit	V	V	WN; PMST	6	1.6 km	
Lophochroa leadbeateri	Major Mitchell's cockatoo	NL	V	WN	1	*	
Macronectes giganteus	Southern giant petrel	E, Mig	E	PMST	-	-	

Scientific name	Common name	Status		Source	WN Records	Nearest record to ROW	EPBC Approval
		EPBC Act	NC Act				
Neochmia ruficauda ruficauda	Star finch (eastern, southern)	E	E	WN; PMST	1	5.4 km	
Ninox strenua	Powerful owl	NL	V	WN	7	6.7 km	
Numenius madagascariensis	Eastern curlew	CE	E	WN; PMST	9	1.7 km	
Pachyptila turtur subantarctica	Fairy prion (southern)	V	LC	PMST	-	-	
Poephila cincta cincta	Black-throated finch (southern)	E	E	WN; PMST	4	2.0 km	
Pterodroma neglecta neglecta	Kermadec petrel (western)	V	LC	PMST	-	-	
Rostratula australis	Australian painted snipe	E	E	WN; PMST	6	*	✓
Thalassarche impavida	Campbell albatross	V, Mig	SL	PMST	-	-	
Turnix melanogaster	Black-breasted button-quail	V	V	WN; PMST	2	1.9 km	
Mammals							
Chalinolobus dwyeri	Large-eared pied bat	V	V	PMST	-	-	
Dasyurus hallucatus	Northern quoll	E	LC	WN; PMST	7	795 m	
Macroderma gigas	Ghost bat	V	E	WN; PMST	1	*	
Nyctophilus corbeni	Corben's long-eared bat	V	V	PMST	-	-	
Petauroides volans	Greater glider (southern and central)	E	E	WN; PMST	14	4.9 km	
Petaurus australis australis	Yellow-bellied glider (south-eastern)	V	V	WN; PMST	10	10 km	
Phascolarctos cinereus	Koala	E	E	WN; PMST	14	930 m	
Pteropus poliocephalus	Grey-headed flying-fox	V	LC	WN; PMST	4	3.3 km	✓
Xeromys myoides	Water mouse	V	V	PMST	-	*	
Reptiles							
Acanthophis antarcticus	Common death adder	NL	V	WN	1	*	
Delma torquata	Collared delma	V	V	WN; PMST	1	4.8 km	✓
Denisonia maculata	Ornamental snake	V	V	WN; PMST	24	5.2 km	✓
Egernia rugosa	Yakka skink	V	V	WN; PMST	2	5.0 km	✓
Elseya albagula	White-throated snapping turtle	CE	CE	WN; PMST	3	860 m	
Furina dunmalli	Dunmall's snake	V	V	WN; PMST	1	*	

Scientific name	Common name	Status		Source	WN Records	Nearest record to ROW	EPBC Approval
		EPBC Act	NC Act				
Hemiaspis damelii	Grey snake	NL	E	WN	22	2.7 km	
Insects							
Jalmenus eubulus	Pale imperial hairstreak	NL	V	WN	2	*	
Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; LC – least concern; NL – not listed; WN – WildNet; PMST – Protected Matters Search Tool. * – location of historical record classified							

4.4.1.2 Migratory species

The desktop searches (i.e. PMST, WildNet, Species Profile Search and Biomaps) identified 45 migratory species that have the potential to occur within the desktop search extent. The PMST and WildNet desktop search results are provided in Appendix A and summarised in Table 4-10. Migratory species listed as threatened under the EPBC Act and NC Act have also been included in Table 4-10.

At the time of the EPBC Referral and EPBC approval, migratory species were not identified as controlling provisions.

Table 4-10 Migratory species identified within the desktop search extent

Scientific name	Common name	Status		Source	Records
		EPBC Act	NC Act		
Birds					
Actitis hypoleucos	Common sandpiper	Mig	SL	PMST	-
Anous stolidus	Common noddy	Mig	SL	PMST	-
Apus pacificus	Fork-tailed swift	Mig	SL	WN; PMST	2
Arenaria interpres	Ruddy turnstone	Mig	SL	WN	1
Calidris acuminata	Sharp-tailed sandpiper	Mig	SL	WN; PMST	43
Calidris canutus	Red knot	E, Mig	E	PMST	-
Calidris ferruginea	Curlew sandpiper	CE, Mig	CE	WN; PMST	13
Calidris melanotos	Pectoral sandpiper	Mig	SL	PMST	-
Calidris ruficollis	Red-necked stint	Mig	SL	WN	6
Calonectris leucomelas	Streaked shearwater	Mig	SL	PMST	-
Charadrius dubius	Little ringed plover	Mig	SL	WN	1
Charadrius mongolus	Lesser sand plover	E, Mig	E	WN	1
Charadrius leschenaultii	Greater sand plover	V, Mig	V	PMST	-
Chlidonias leucopterus	White-winged black tern	Mig	SL	WN	1
Cuculus optatus	Oriental cuckoo	Mig	SL	WN; PMST	1
Fregata ariel	Lesser frigatebird	Mig	SL	PMST	-
Fregata minor	Great frigatebird	Mig	SL	PMST	-
Gallinago hardwickii	Latham's snipe	Mig	SL	WN; PMST	45
Gelochelidon nilotica	Gull-billed tern	Mig	SL	WN	19
Hirundapus caudacutus	White-throated needletail	V, Mig	V	WN; PMST	2
Hydroprogne caspia	Caspian tern	Mig	SL	WN	41

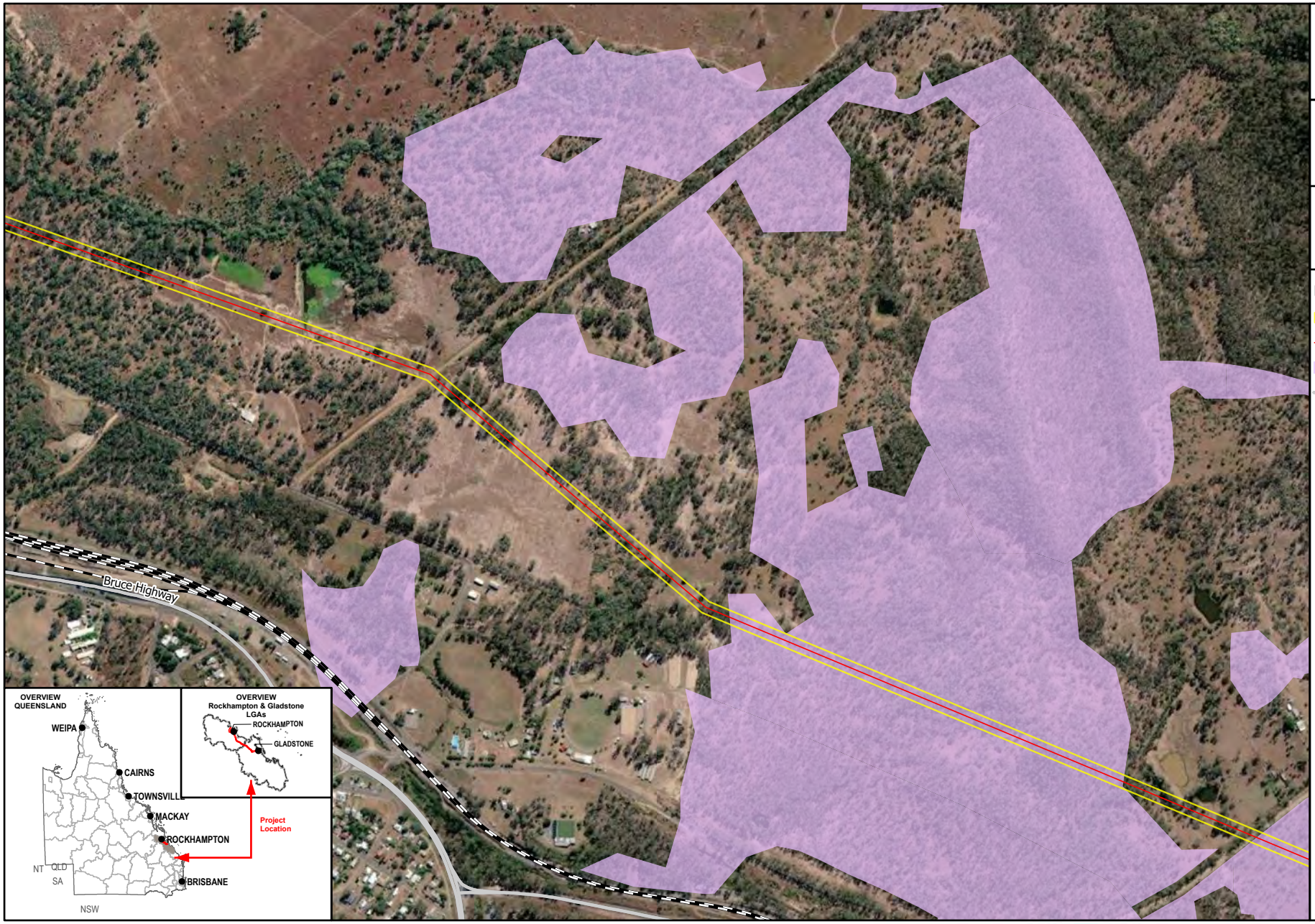
Scientific name	Common name	Status		Source	Records
		EPBC Act	NC Act		
Limnodromus semipalmatus	Asian dowitcher	Mig	SL	PMST	-
Limosa lapponica	Bar-tailed godwit	Mig	SL	PMST	-
Limosa lapponica baueri	Western Alaskan bar-tailed godwit	V, Mig	V	WN; PMST	6
Limosa limosa	Black-tailed godwit	Mig	SL	WN	23
Macronectes giganteus	Southern giant petrel	E, Mig	E	PMST	-
Monarcha melanopsis	Black-faced monarch	Mig	SL	WN; PMST	8
Monarcha trivirgatus	Spectacled monarch	Mig	SL	WN; PMST	11
Myiagra cyanoleuca	Satin flycatcher	Mig	SL	WN; PMST	6
Numenius madagascariensis	Eastern curlew	CE, Mig	E	WN; PMST	9
Numenius minutus	Little curlew	Mig	SL	WN	2
Numenius phaeopus	Whimbrel	Mig	SL	WN	4
Pandion haliaetus	Osprey	Mig	SL	WN; PMST	9
Phaethon lepturus	White-tailed tropicbird	Mig	SL	PMST	-
Plegadis falcinellus	Glossy ibis	Mig	SL	WN	69
Pluvialis fulva	Pacific golden plover	Mig	SL	WN	3
Rhipidura rufifrons	Rufous fantail	Mig	SL	WN; PMST	16
Sternula albifrons	Little tern	Mig	SL	WN; PMST	3
Thalasseus bergii	Crested tern	Mig	SL	WN	1
Thalassarche impavida	Campbell albatross	V, Mig	LC	PMST	-
Tringa incana	Wandering tattler	Mig	SL	WN	1
Tringa nebularia	Common greenshank	Mig	SL	WN; PMST	20
Tringa stagnatilis	Marsh sandpiper	Mig	SL	WN	60
Xenus cinereus	Terek sandpiper	Mig	SL	WN	1
Reptiles					
Crocodylus porosus	Estuarine crocodile	Mig	V	WN; PSMT	2
Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; LC – least concern; NL – not listed; WN – WildNet; PMST – Protected Matters Search Tool.					

4.4.1.3 Essential habitat

The SGIC SDA pipeline alignment intersects multiple areas of mapped essential habitat for conservation significant species listed under the NC Act as shown in Figure 4-5. These areas include essential habitat for the curlew sandpiper (*Calidris ferruginea*), lesser sand plover (*Charadrius mongolus*), ornamental snake (*Denisonia maculata*), yellow chat (Dawson) (*Epthianura crocea macgregori*), squatter pigeon (southern) (*Geophaps scripta scripta*), Australian painted snipe (*Rostratula australis*), powerful owl (*Ninox strenua*) and koala (*Phascolarctos cinereus*).

4.4.1.4 State and regional wildlife corridors

The SGIC SDA pipeline alignment crosses two state riparian corridors which follows Raglan Creek near Raglan and Scrubby Creek near Rockhampton (Figure 4-5). The SGIC SDA pipeline alignment also intersects nine regional terrestrial corridors which follow waterways, including Twelve Mile Creek, Inkerman Creek, Station Creek, Gavial Creek, and an unnamed waterway (Figure 4-5).



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Legend

- Study Area
- SGIC Pipeline Alignment
- Essential Habitat
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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Fitzroy to Gladstone Pipeline
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Figure 4-5a
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

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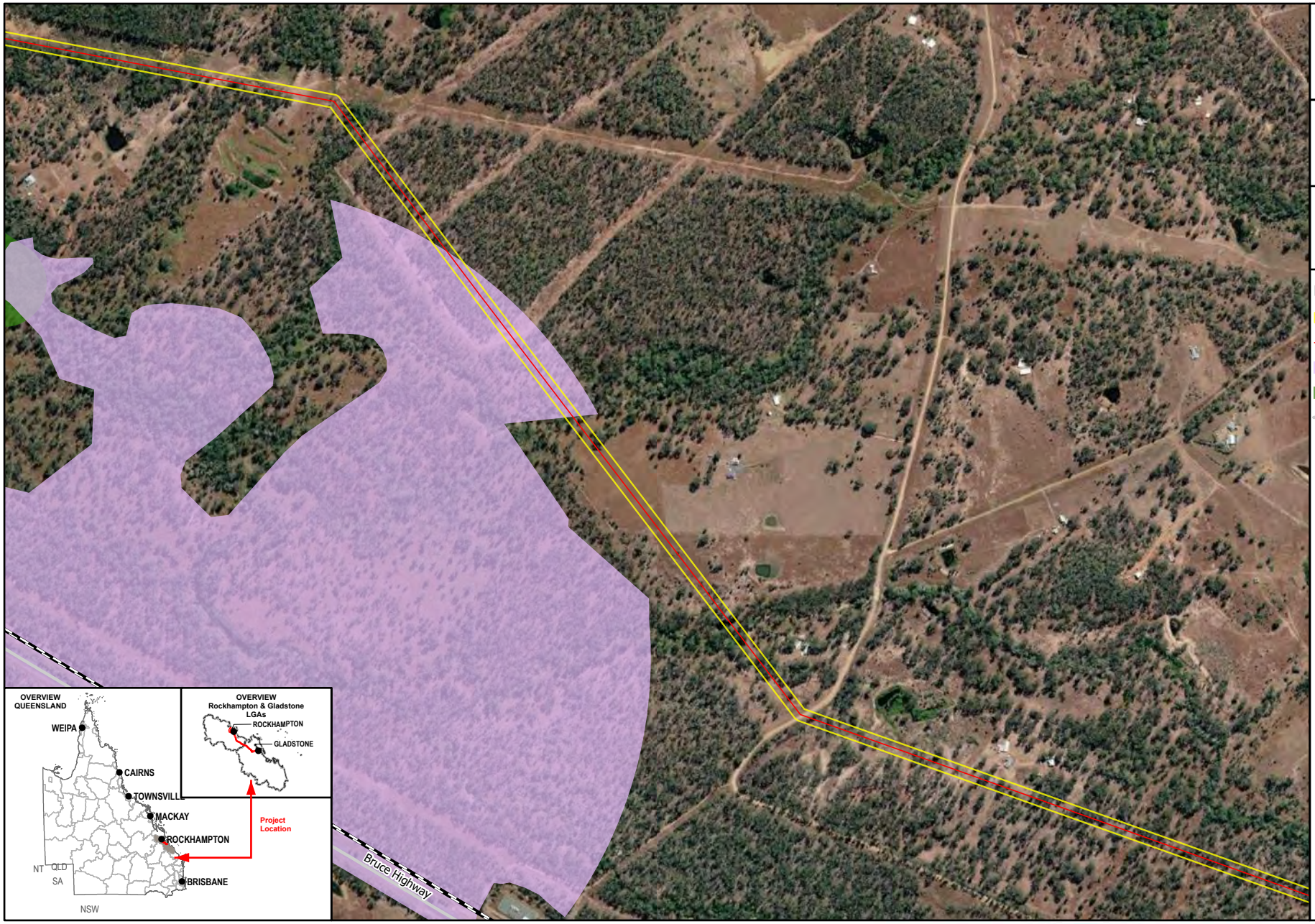

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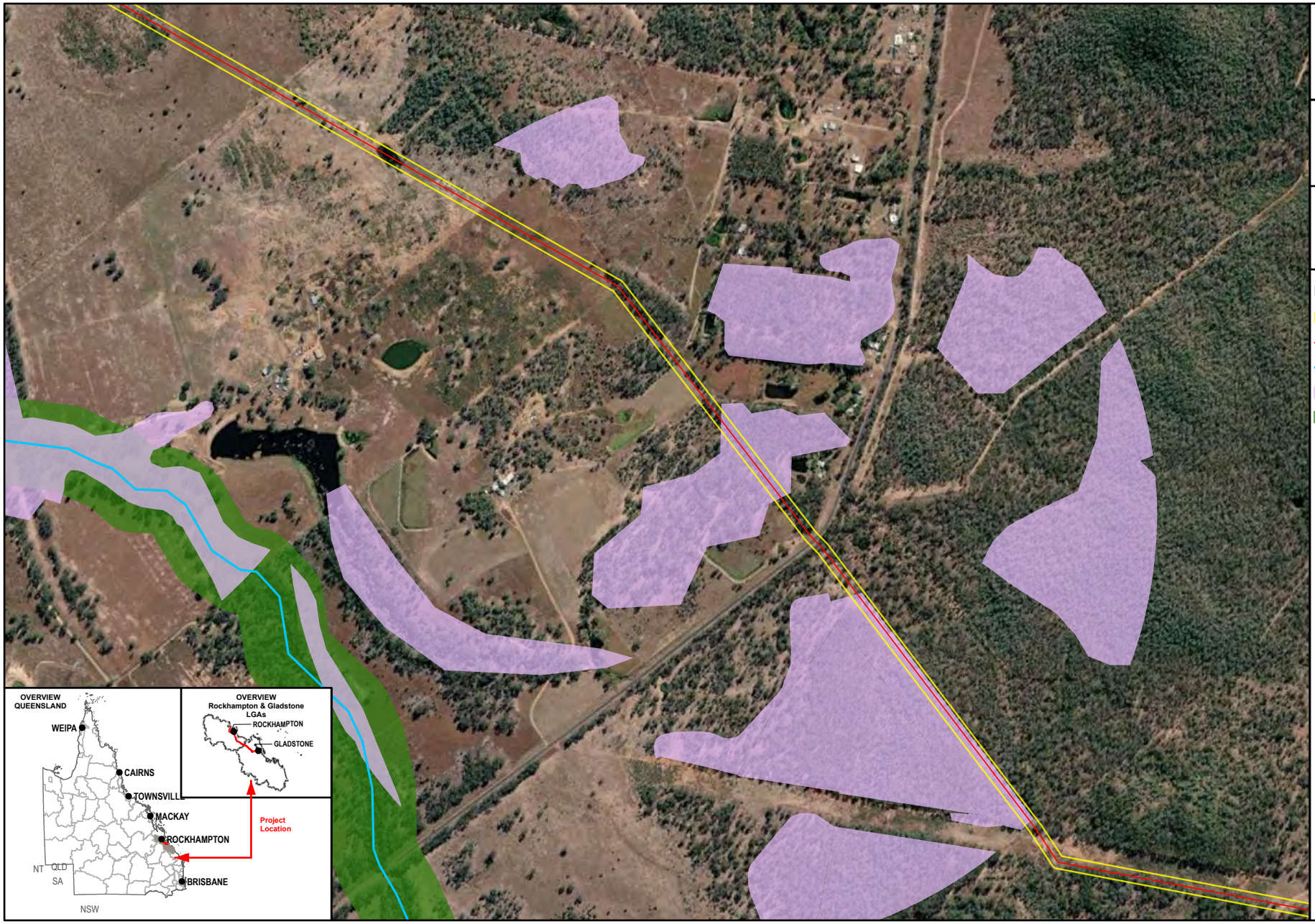
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5b
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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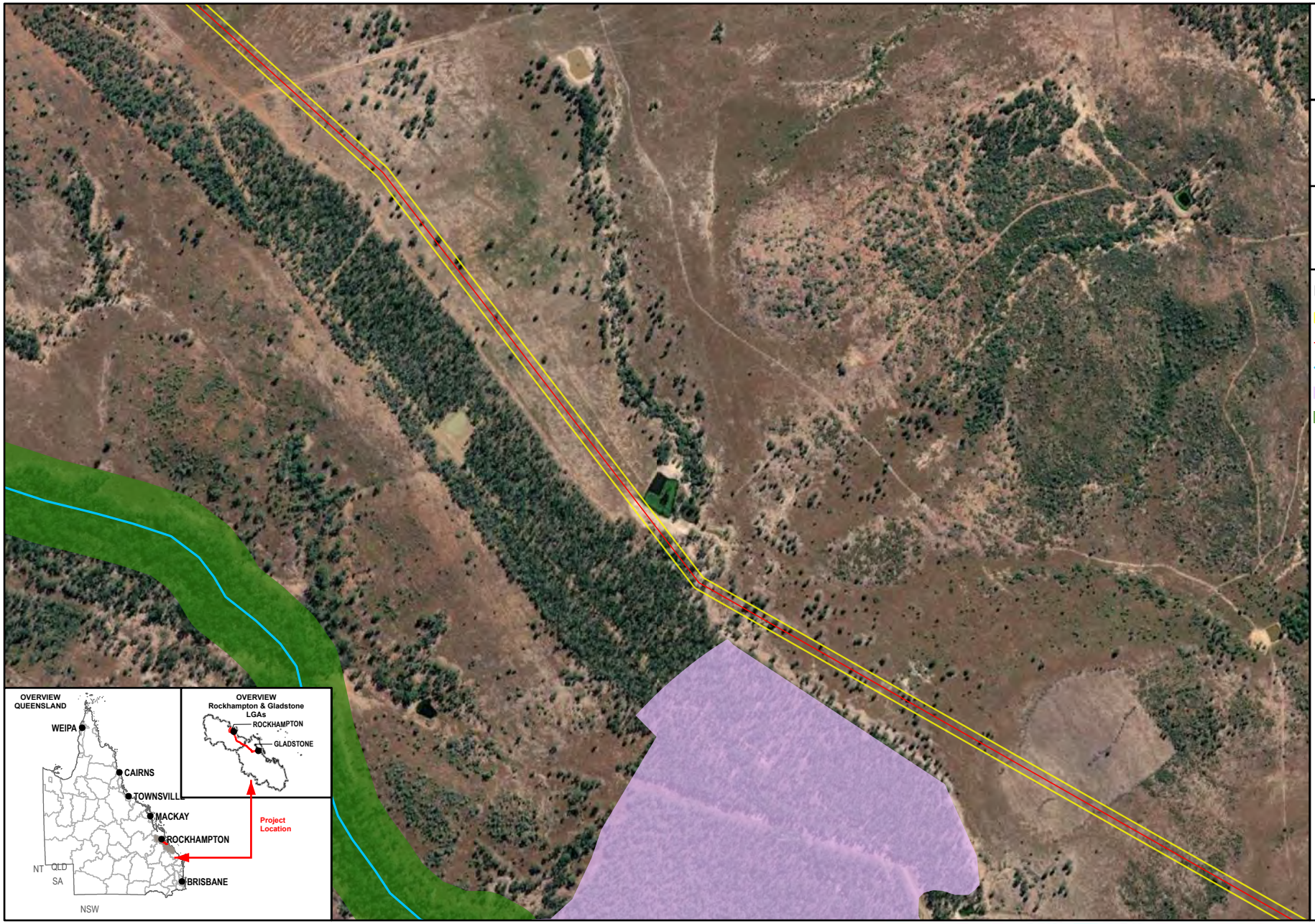
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5c
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

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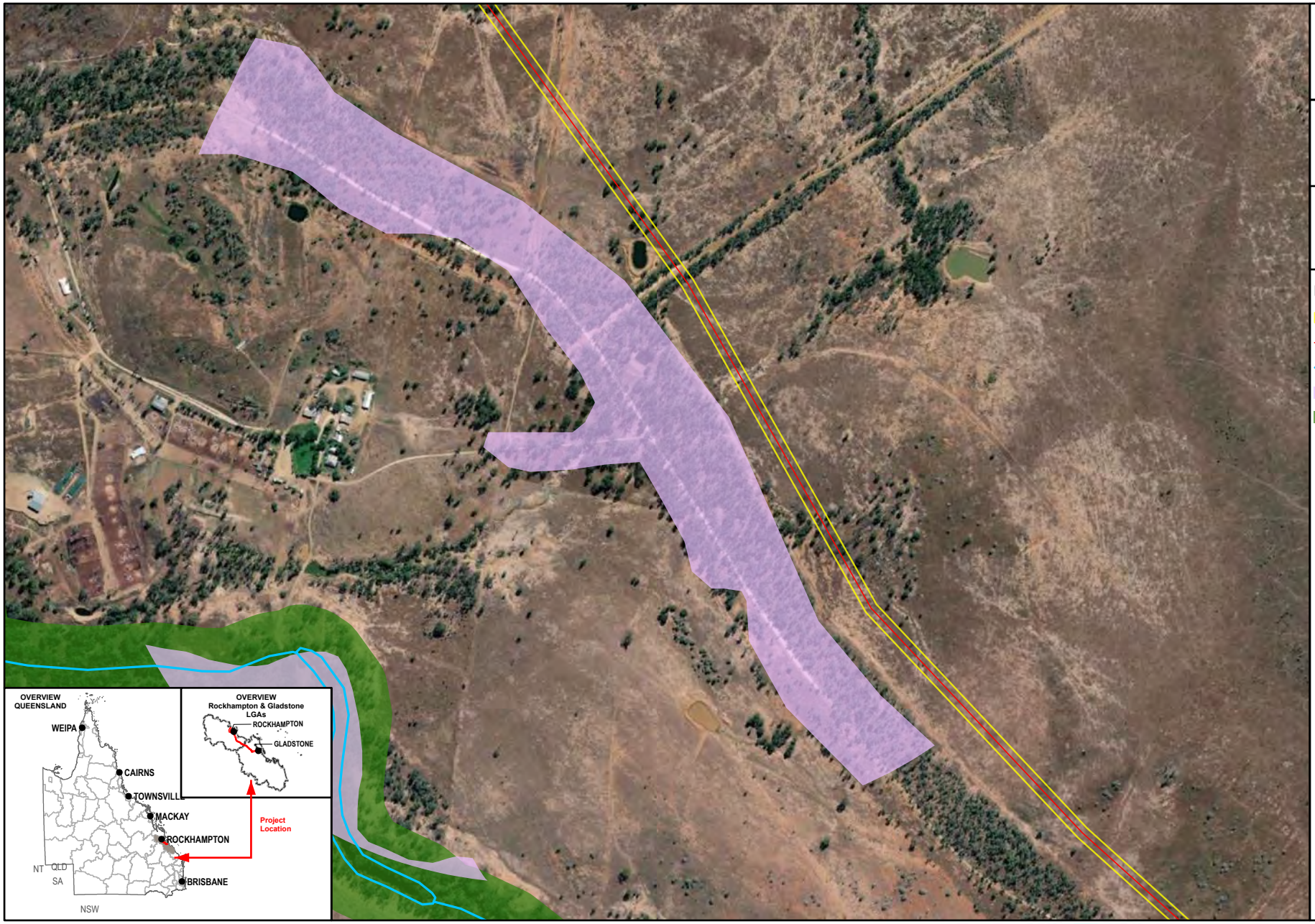
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report

Figure 4-5d

Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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PROJECTION UTM Zone 56
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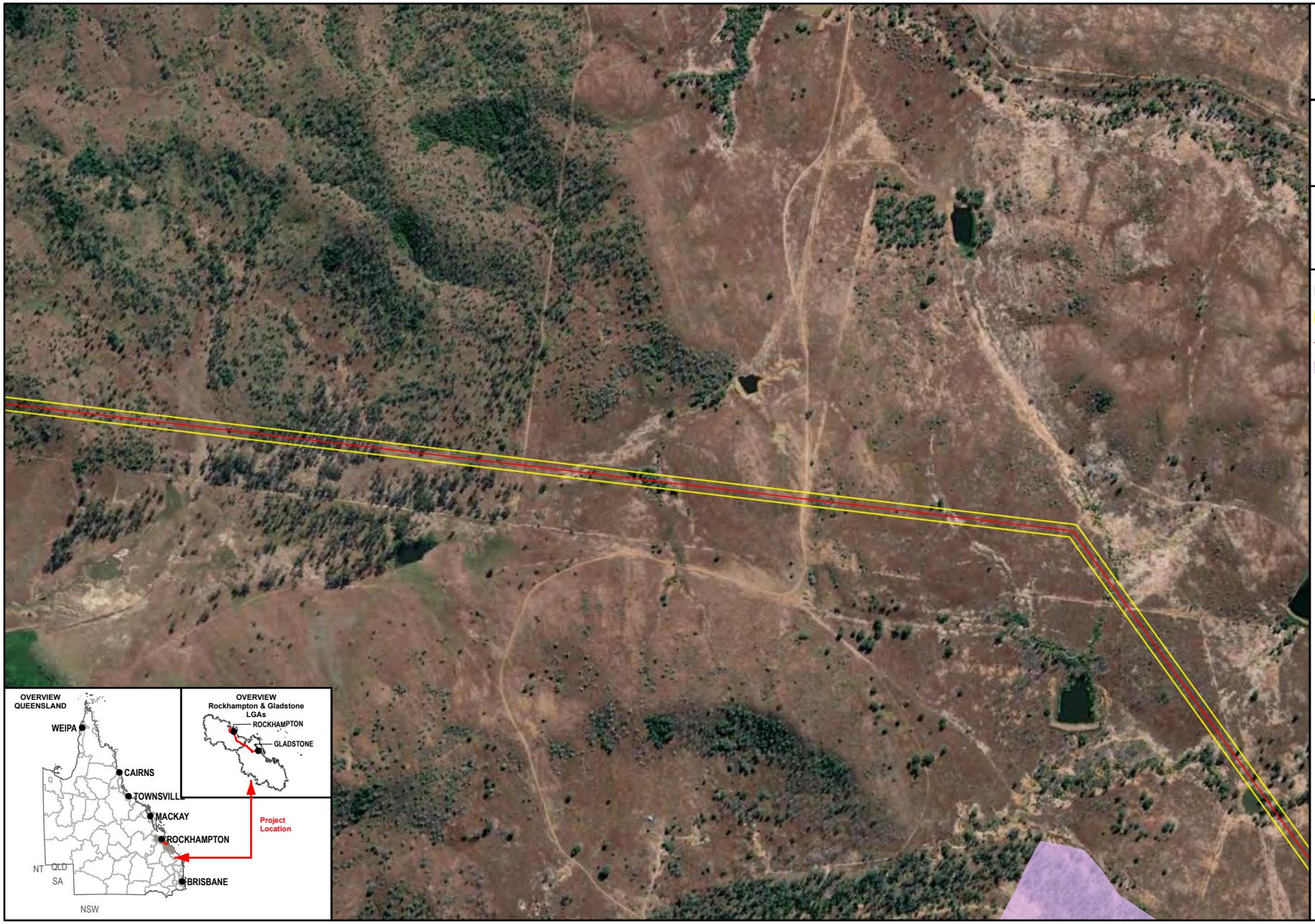
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5e
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Essential Habitat

Data Sources:
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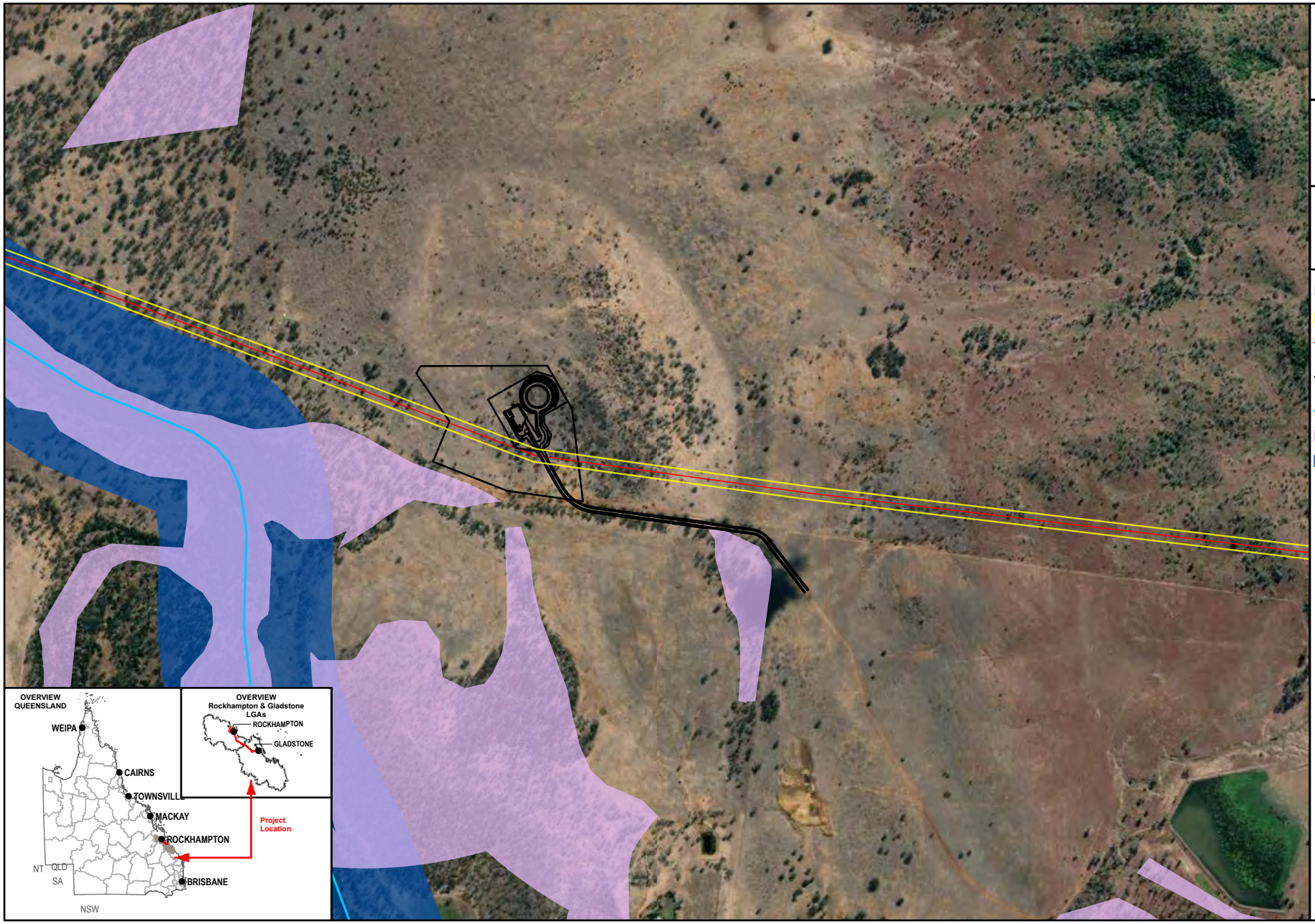
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5f
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Raglan Pump Station and Reservoir Layout
- Riparian Corridor Centrelines
- Essential Habitat
- State Wildlife Corriors

Data Sources:
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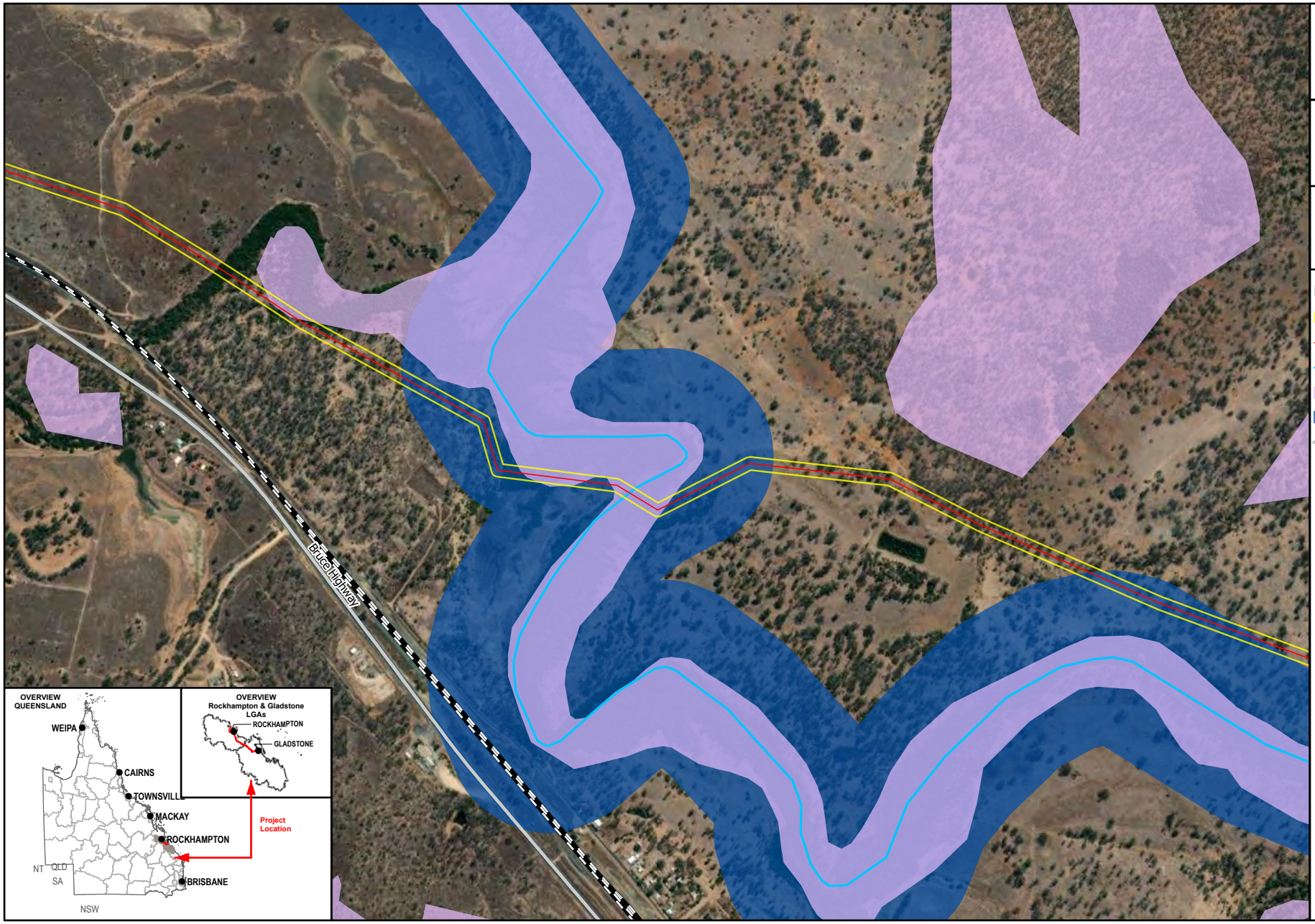
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5g
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- State Wildlife Corriors
- Main Roads
- Railways

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5h
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

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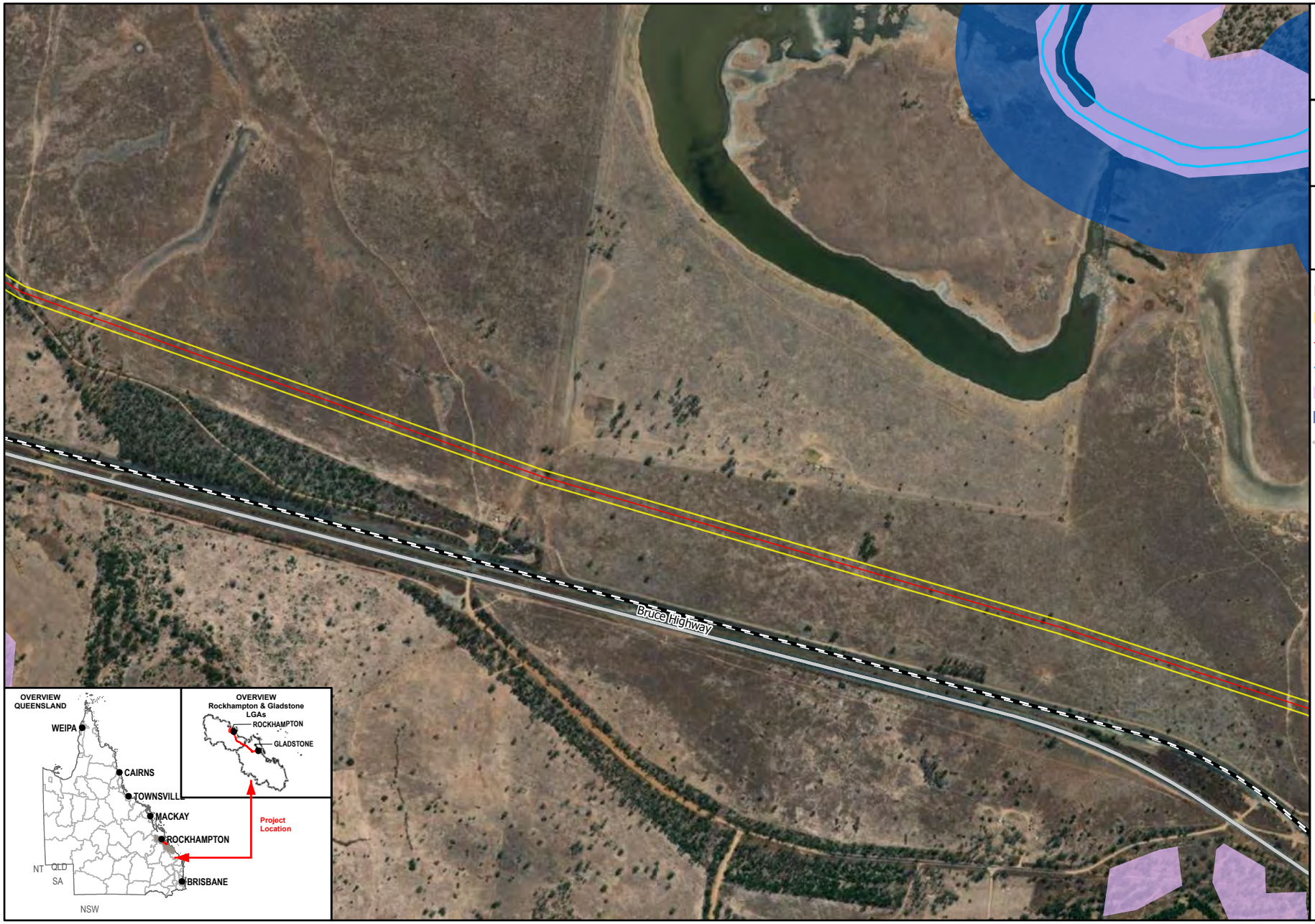

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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- State Wildlife Corriors
- Main Roads
- Railways

Data Sources:
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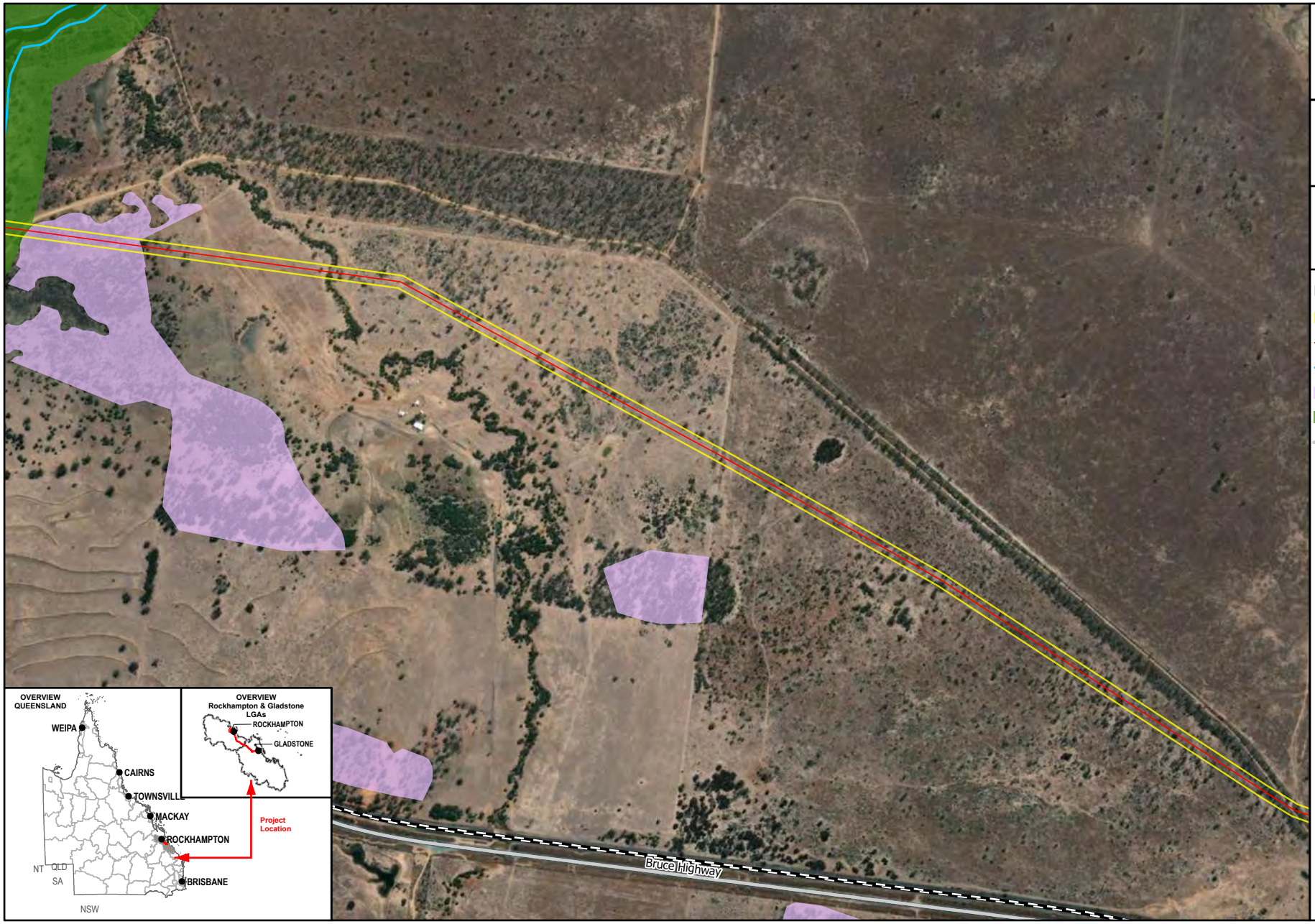
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5i
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors
- Main Roads
- Railways

Data Sources:
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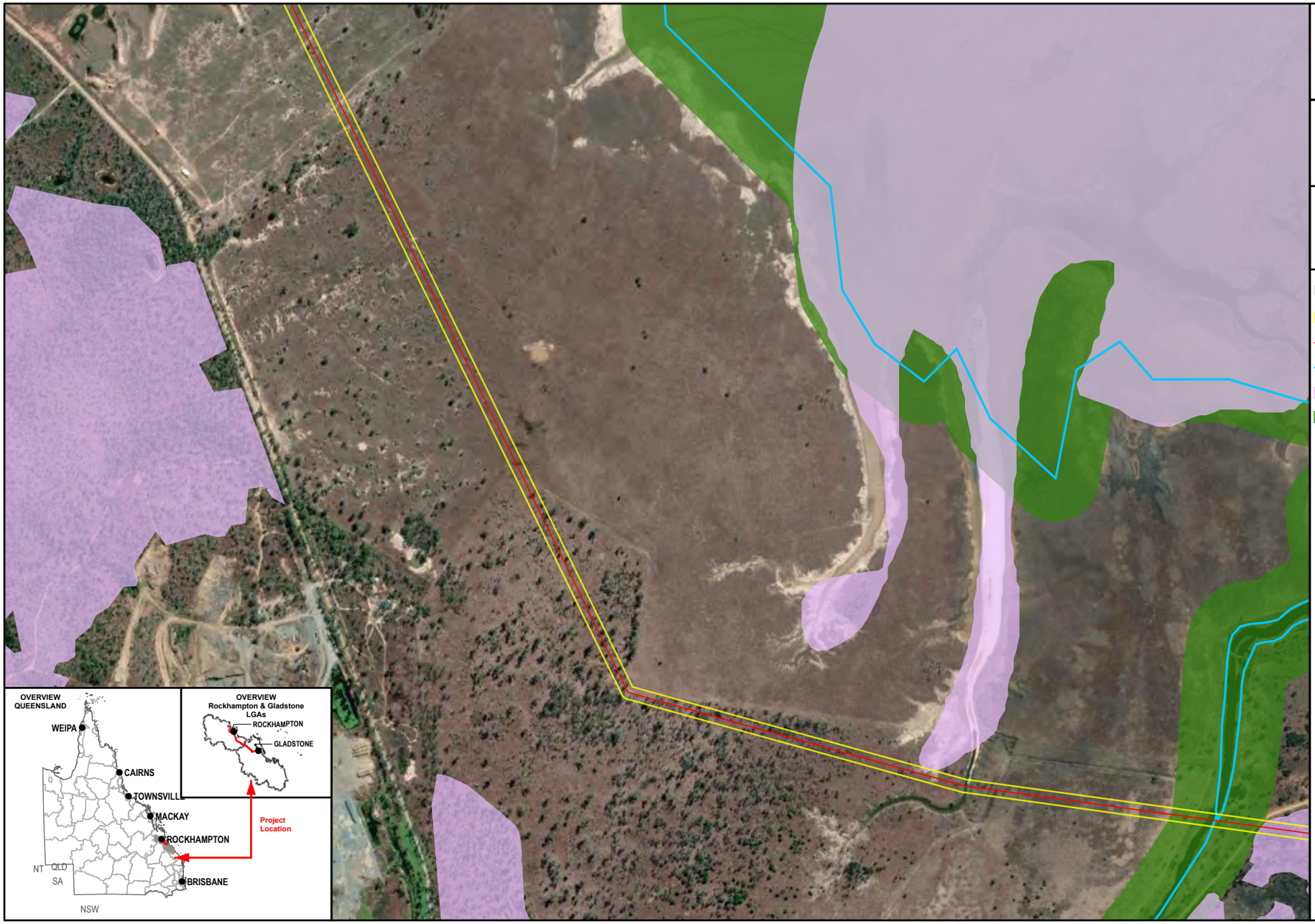
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5j
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors

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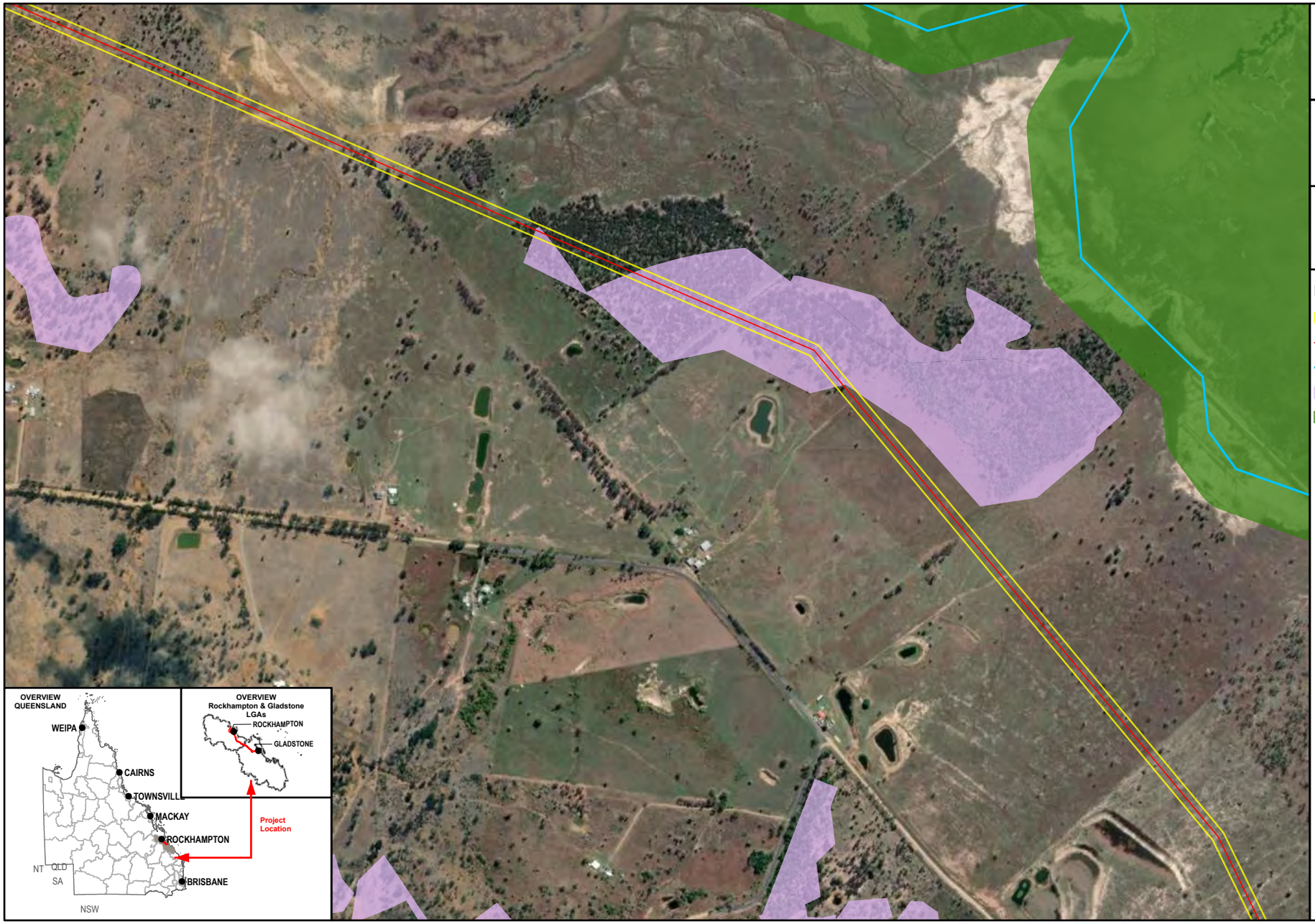
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5k
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors

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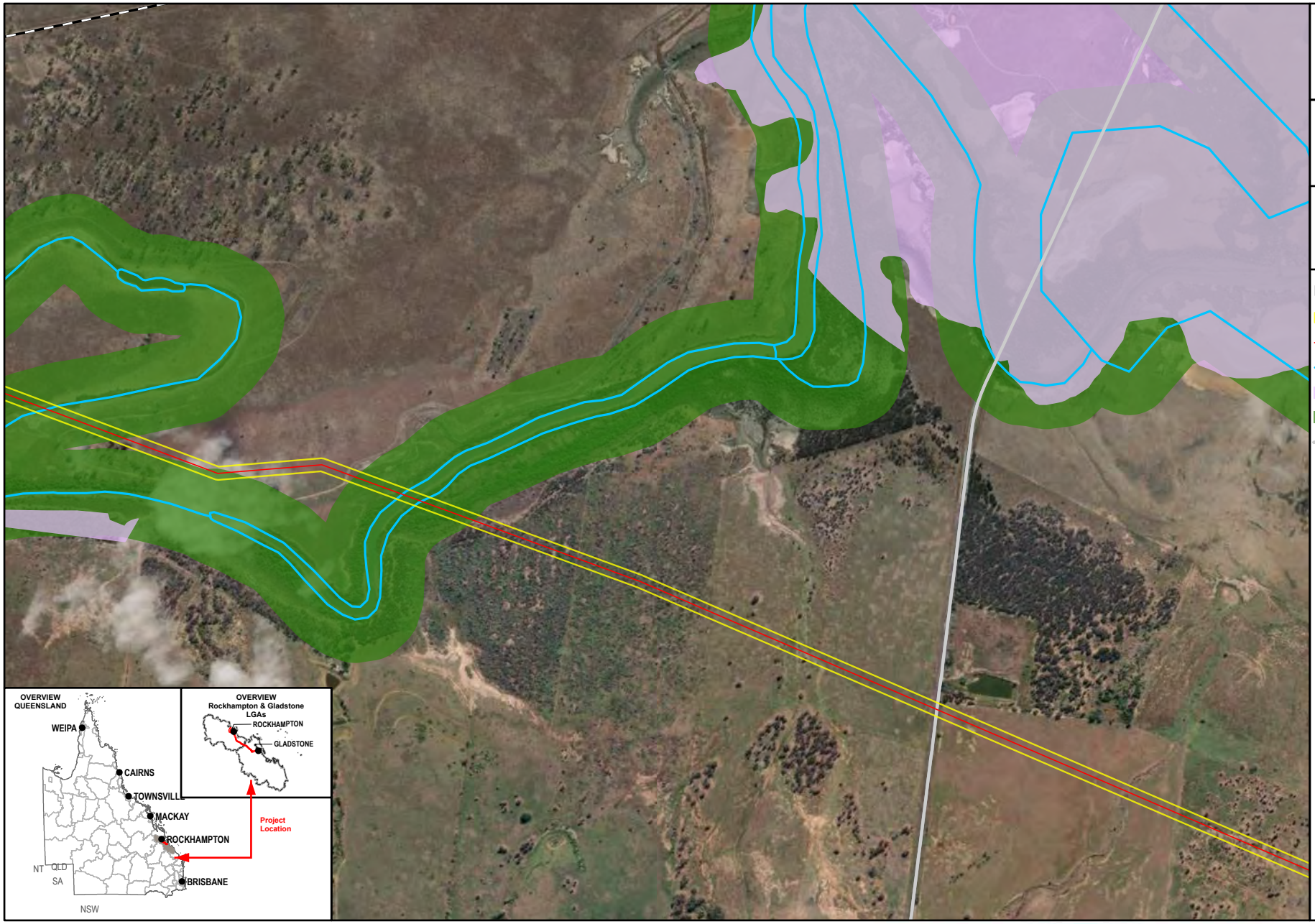
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5l
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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Legend

- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors
- Main Roads
- Railways

Data Sources:
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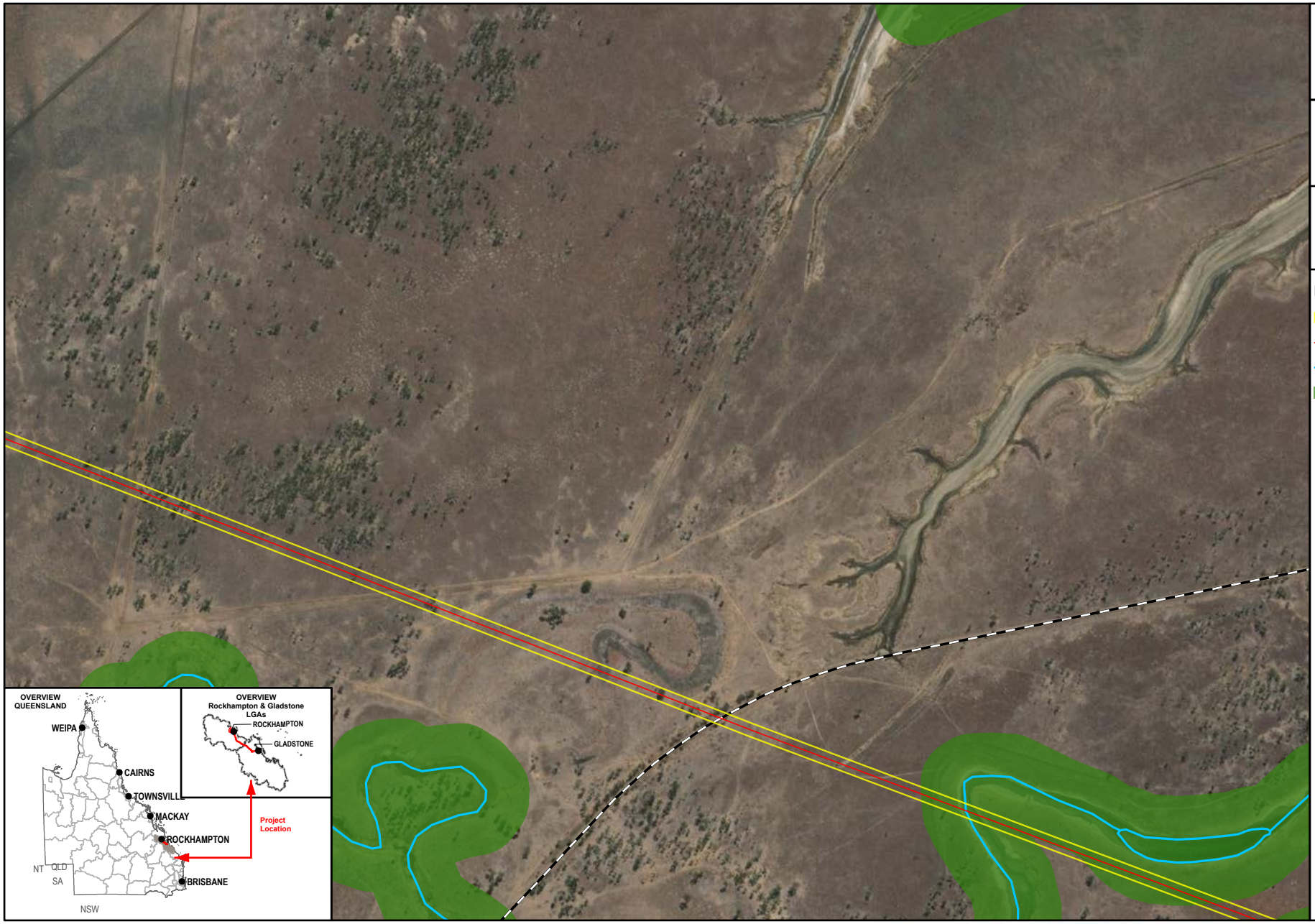
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5m
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Regional Wildlife Corriors
- Railways

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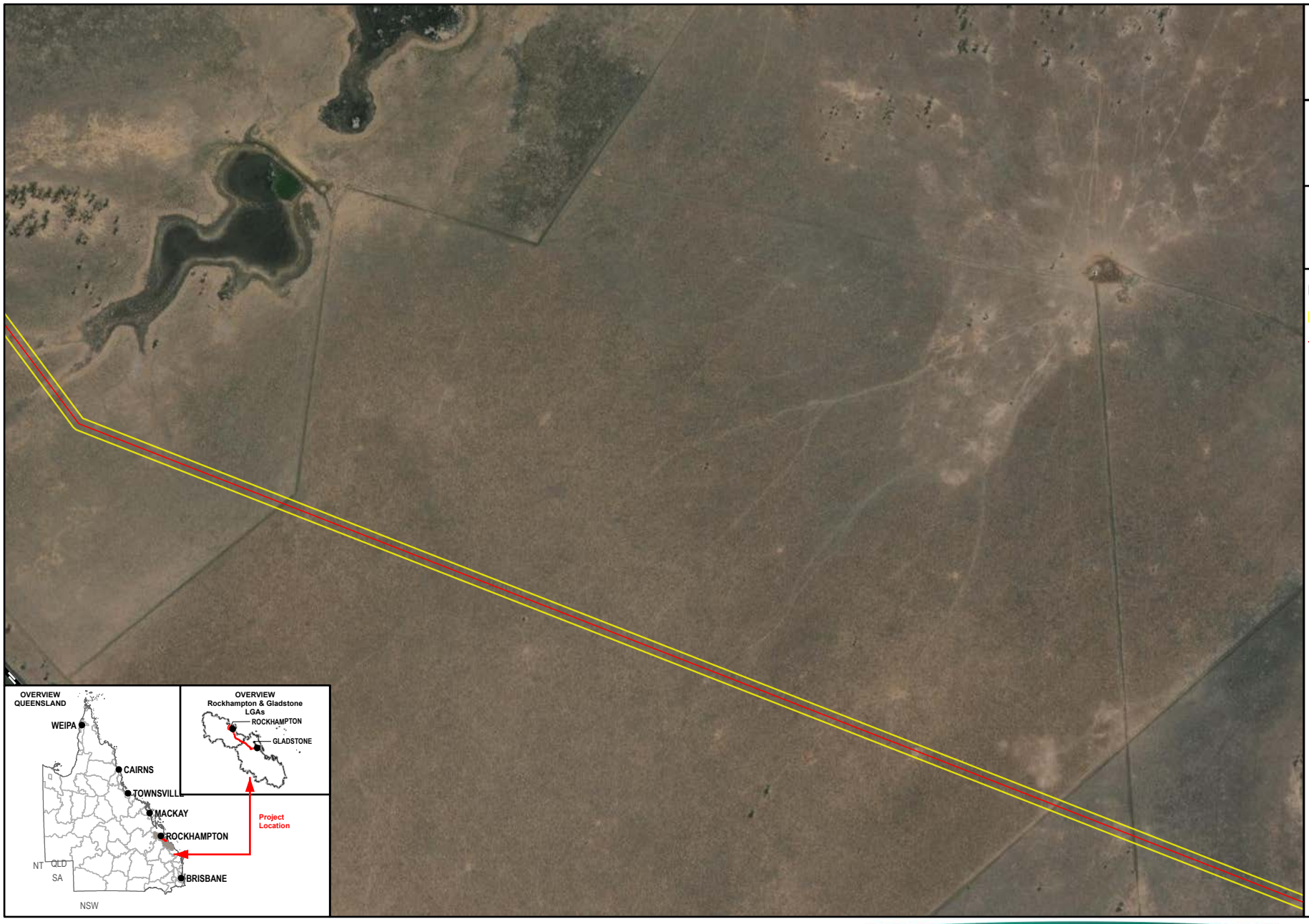
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5n
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Railways

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5o
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19

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Legend

- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors
- Main Roads
- Railways

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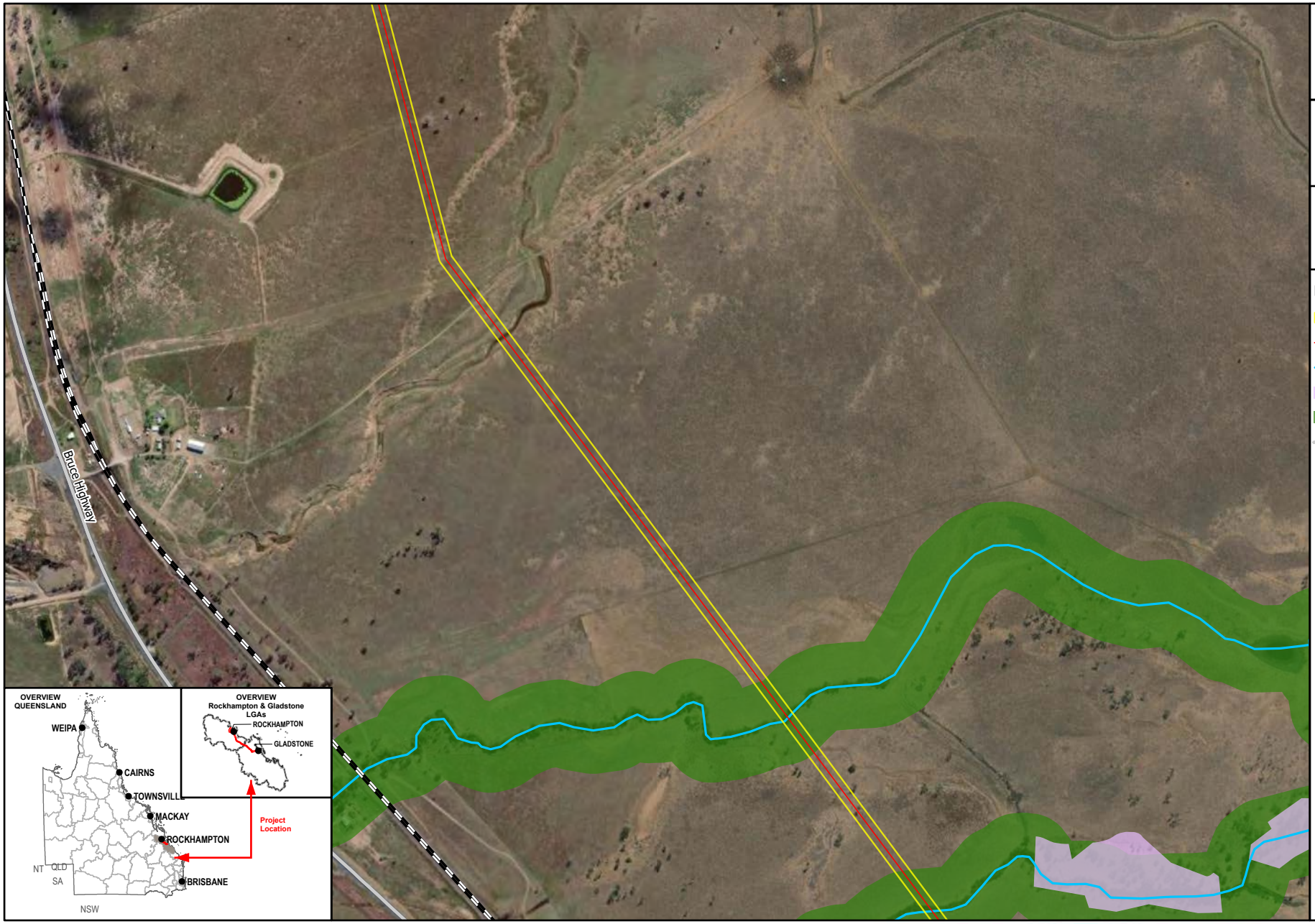
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5p
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
000-G-MAP-2414 Version:3 Date:2022/09/19



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- Study Area
- SGIC Pipeline Alignment
- Riparian Corridor Centrelines
- Essential Habitat
- Regional Wildlife Corriors
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Figure 4-5q
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent
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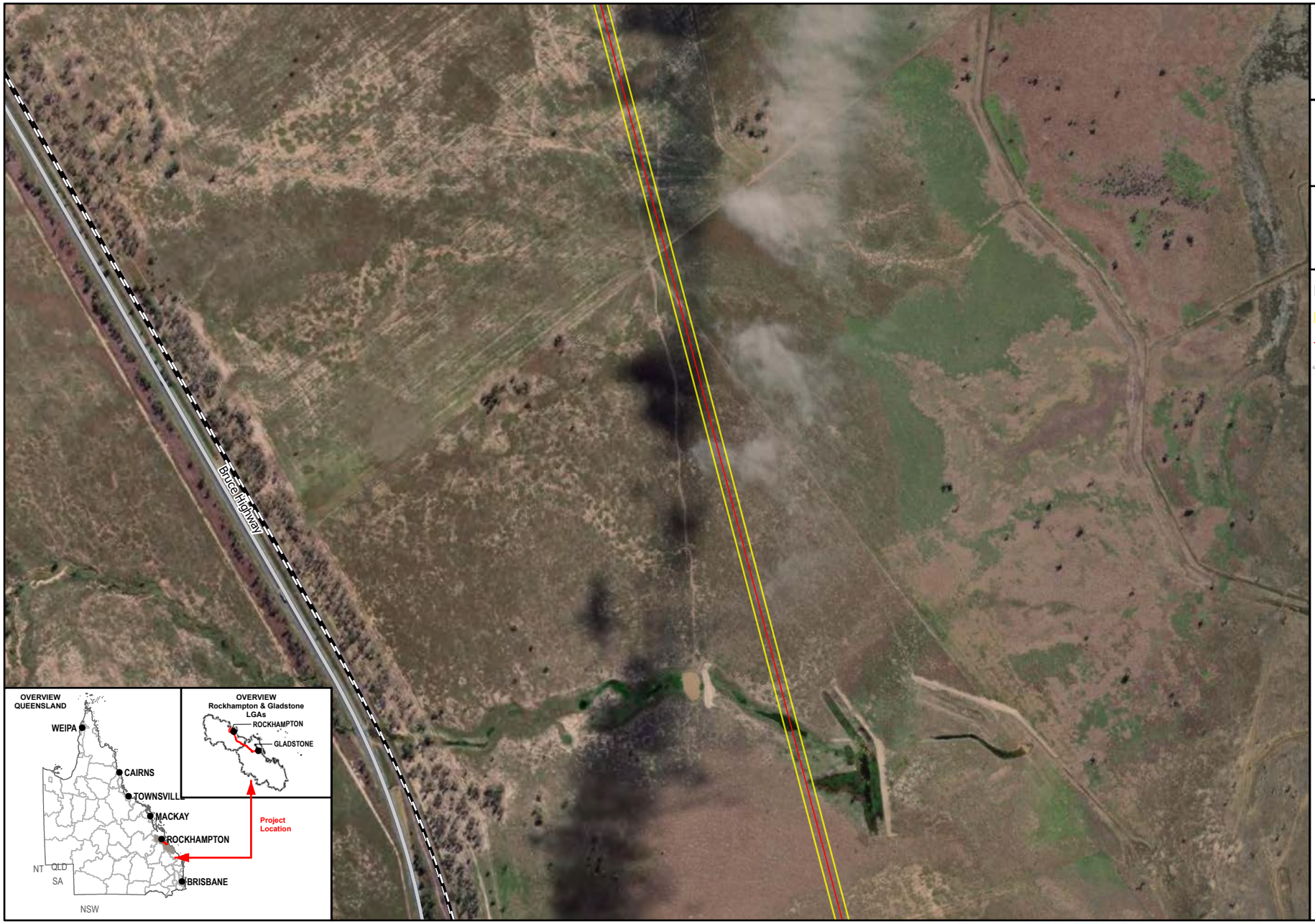

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Figure 4-5r
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

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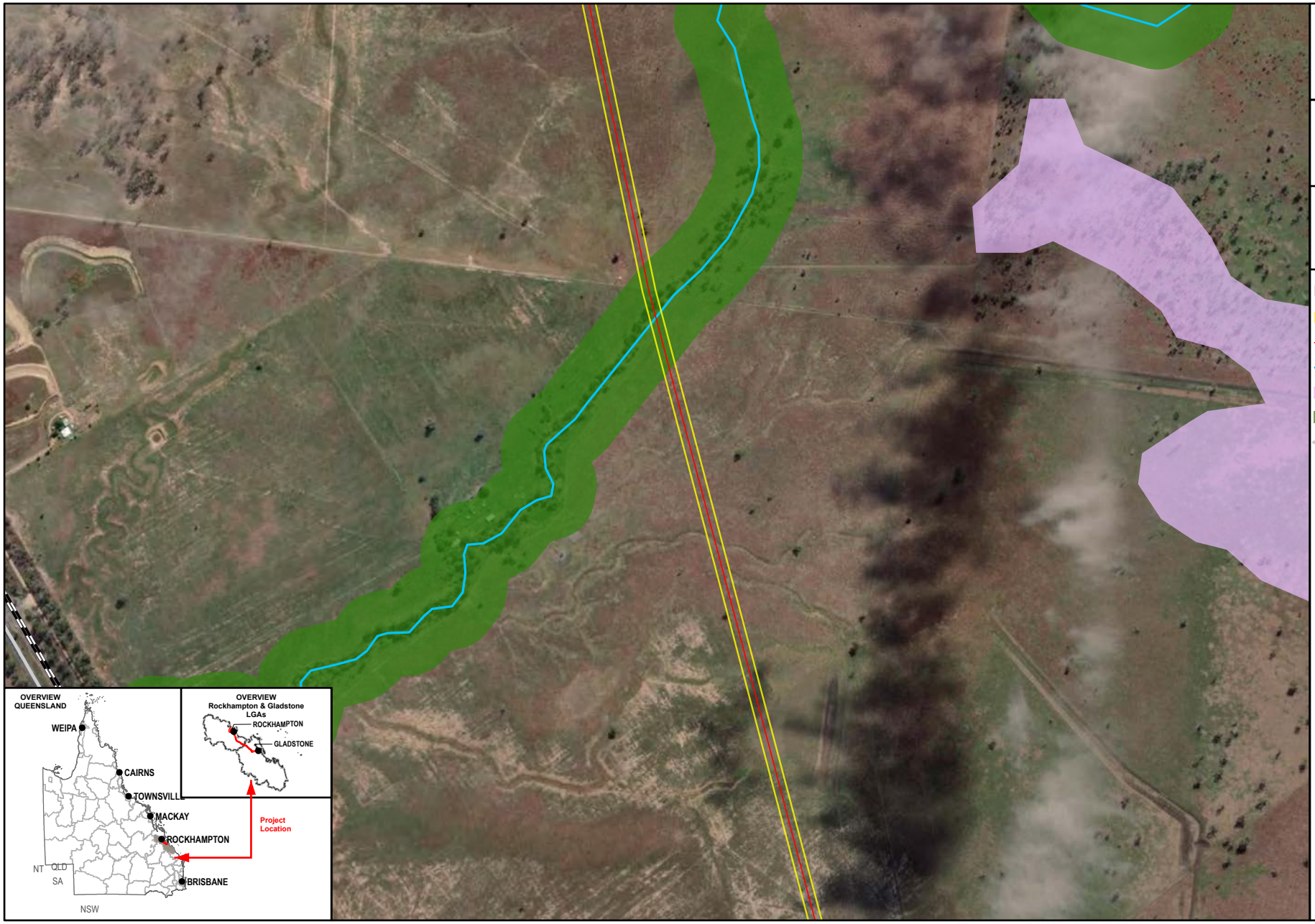

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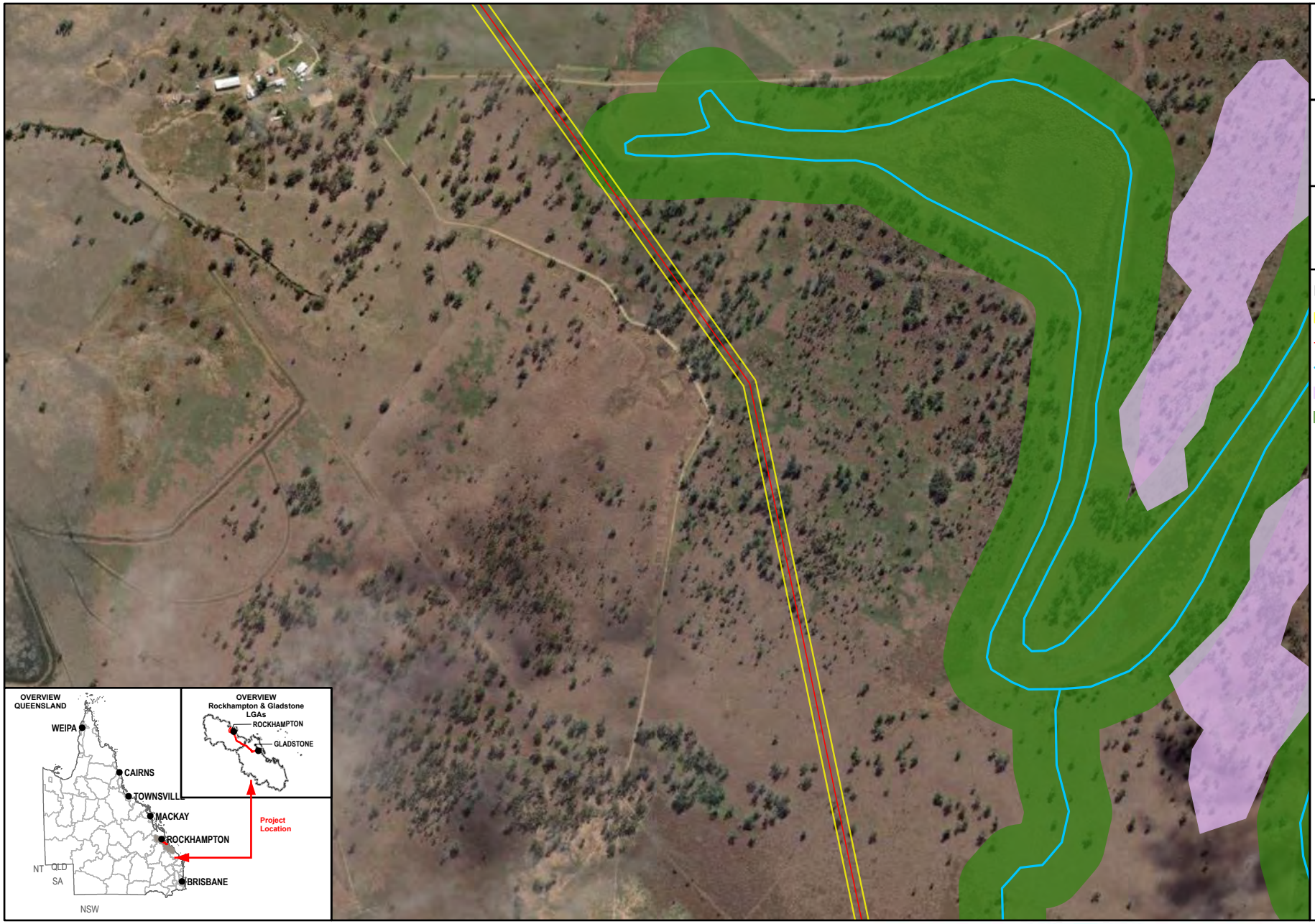

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-5t
Essential Habitat and Wildlife Corridors Within the SGIC SDA Desktop Search Extent

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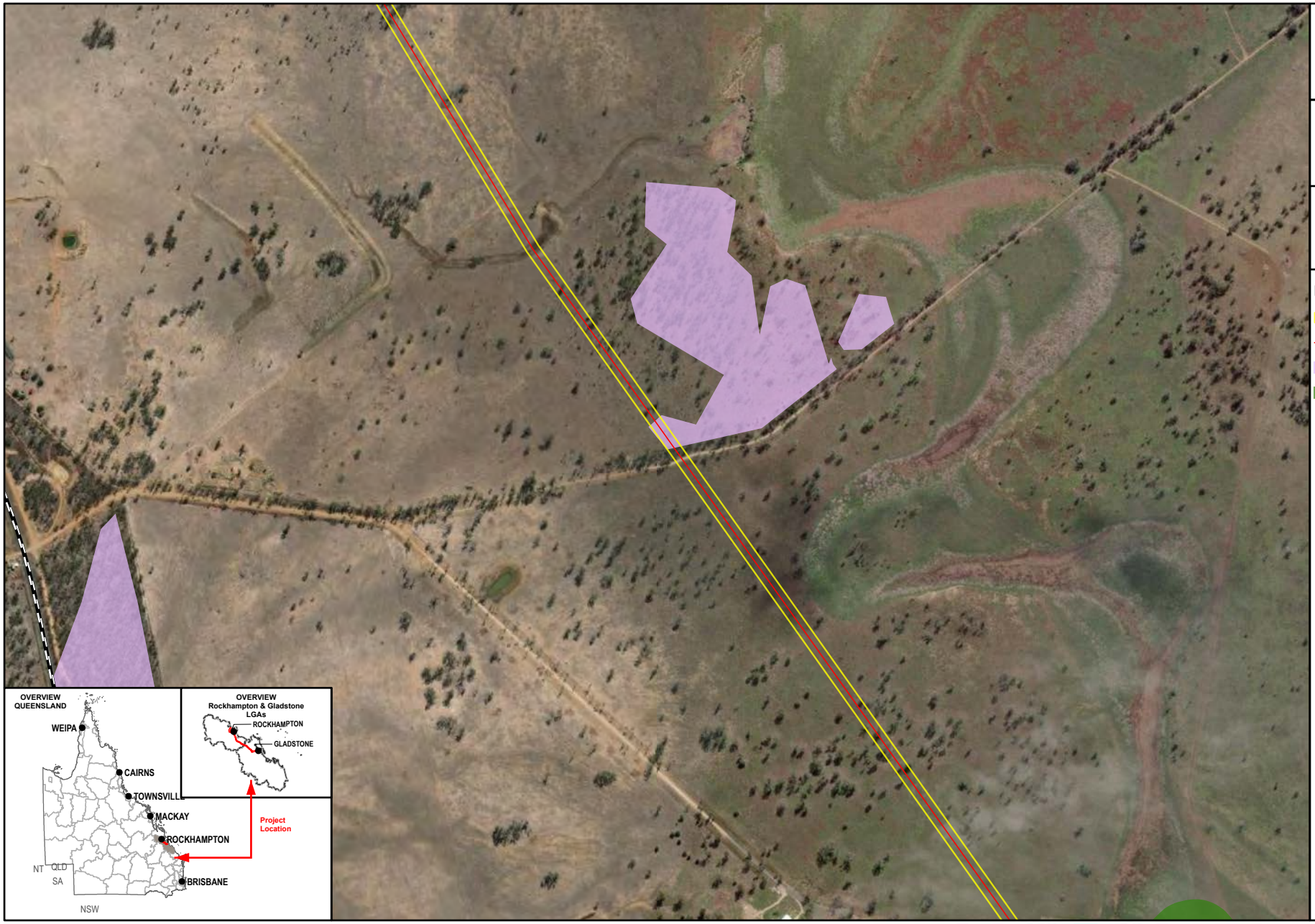

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Legend

- Study Area
- SGIC Pipeline Alignment
- Essential Habitat
- Regional Wildlife Corriors
- Railways

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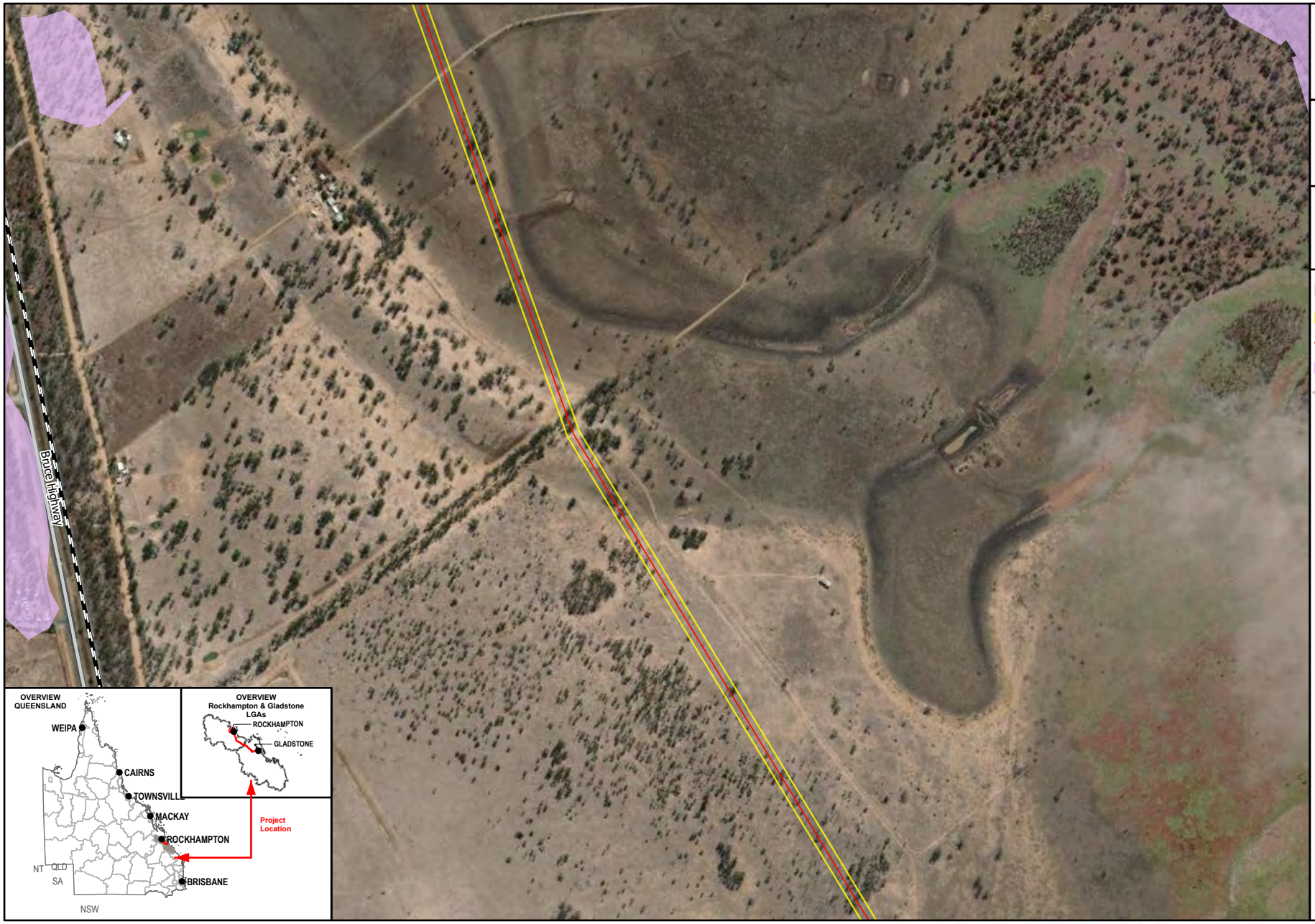

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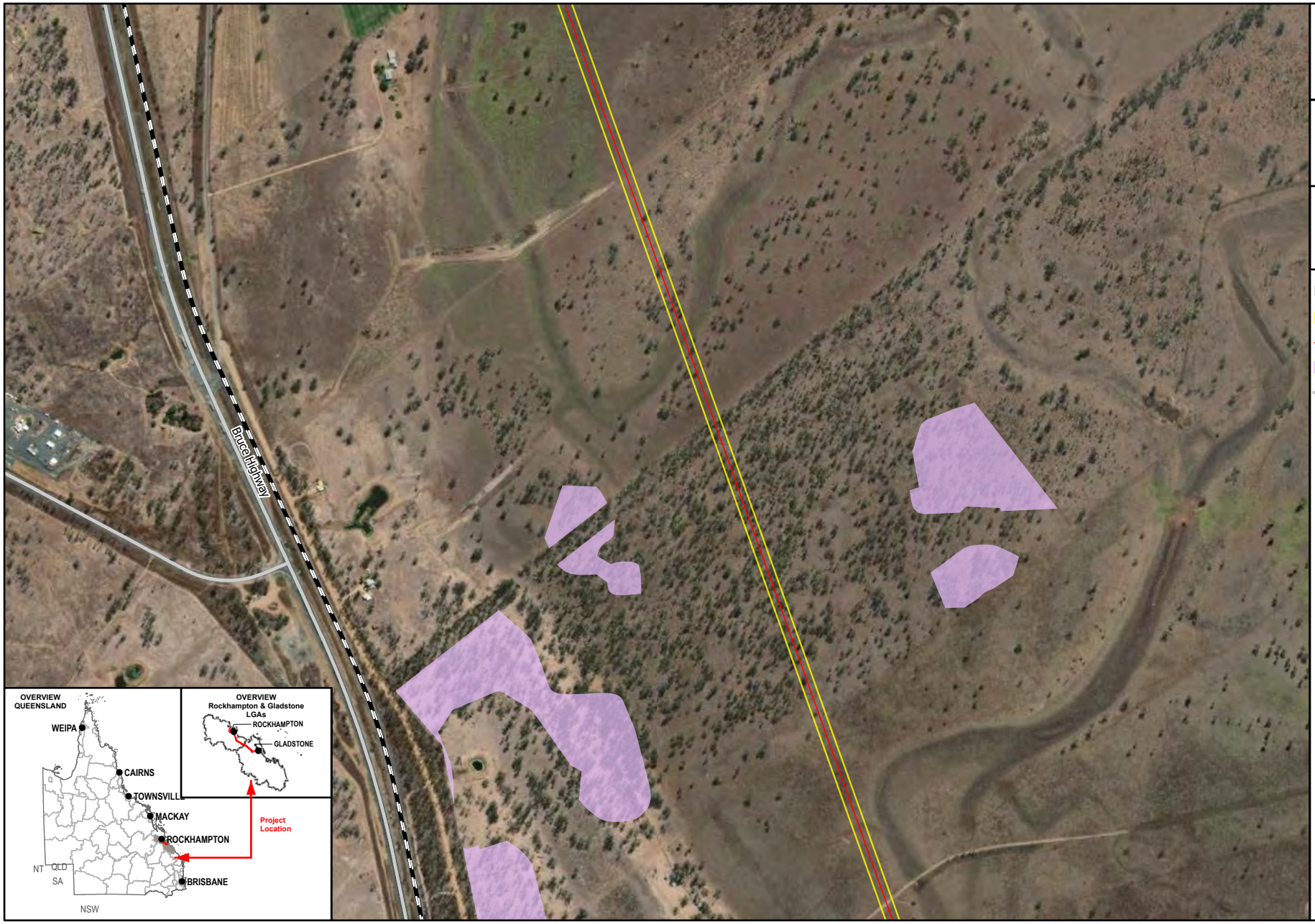

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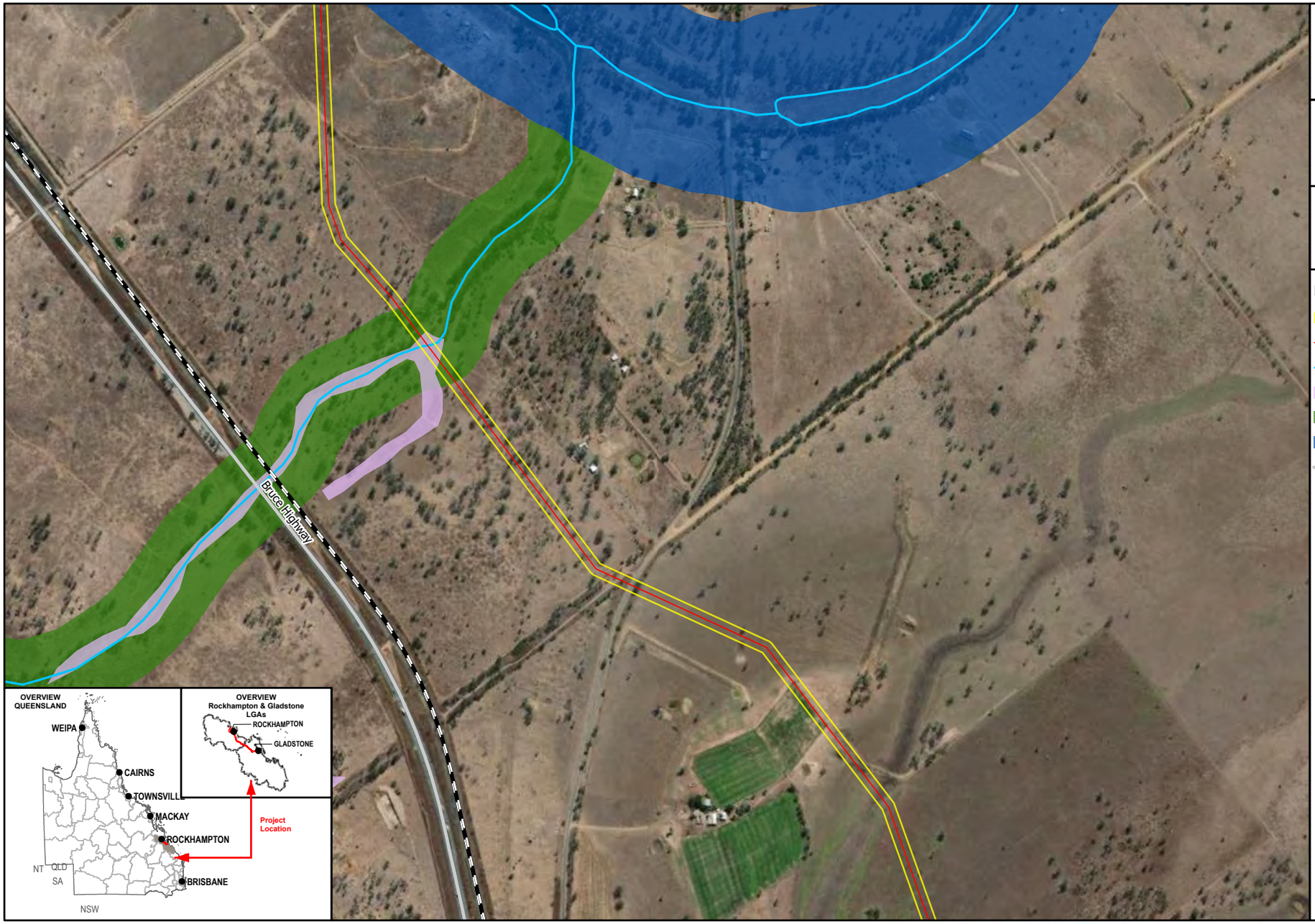

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- Riparian Corridor Centrelines
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- State Wildlife Corriors
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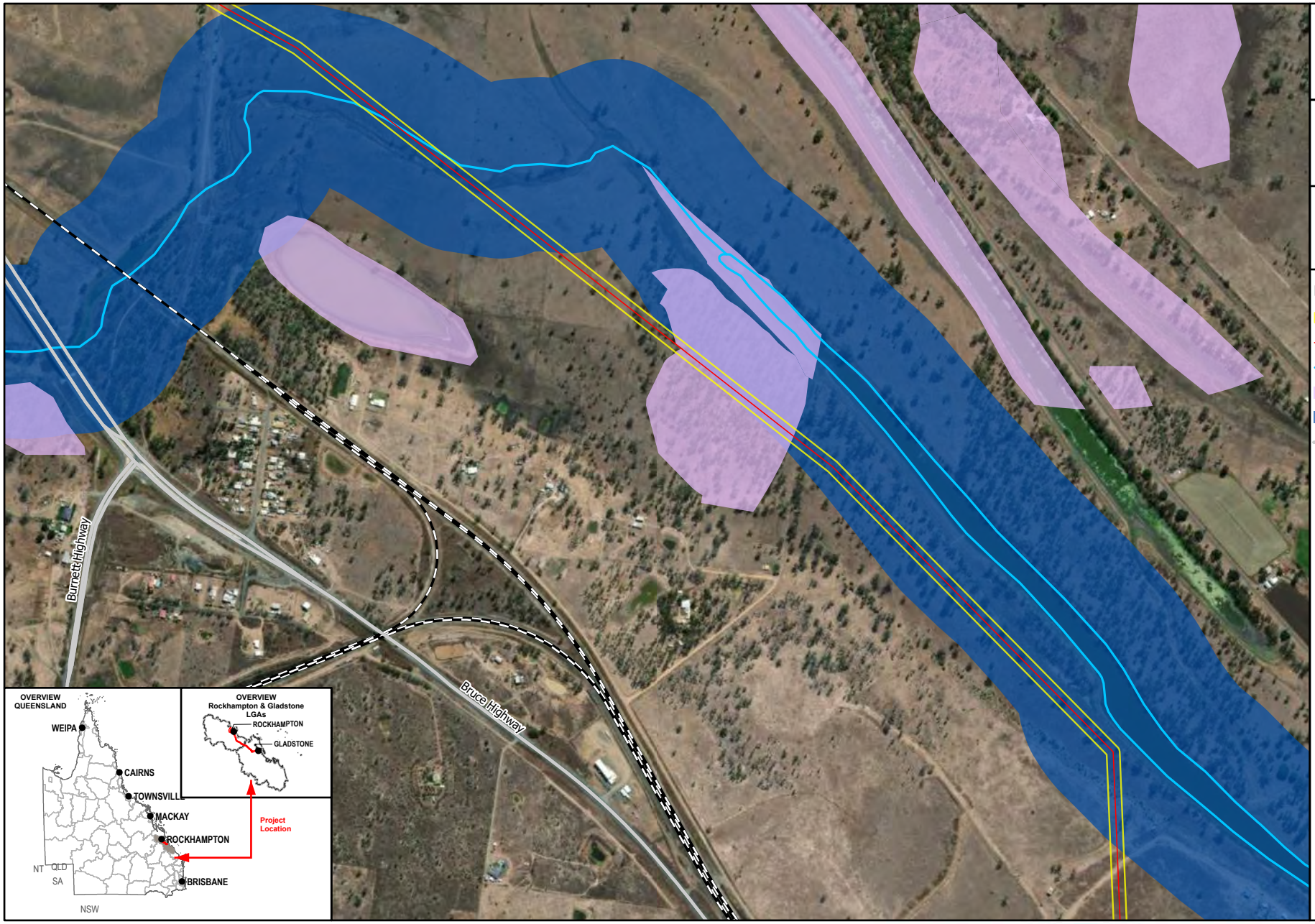

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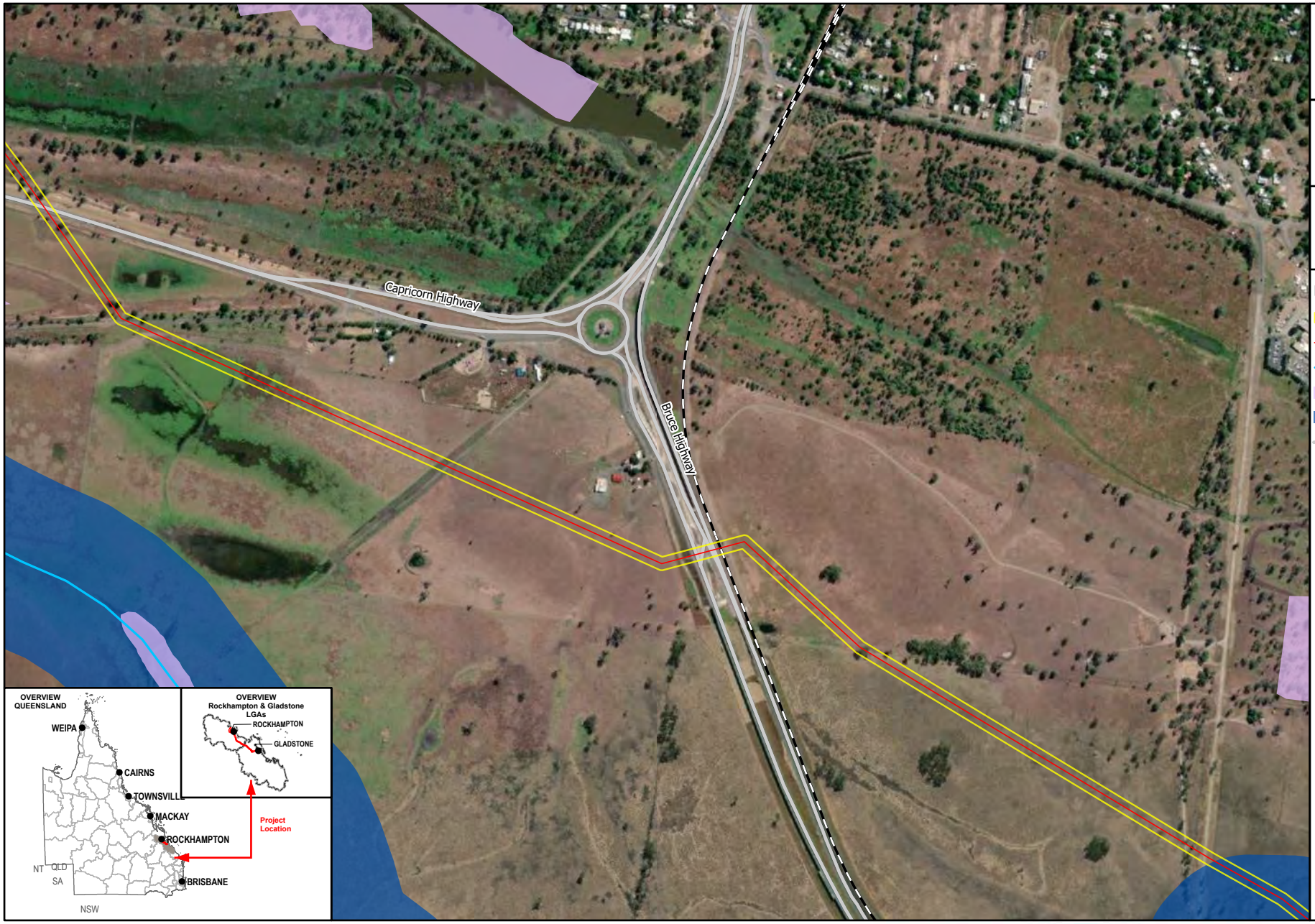

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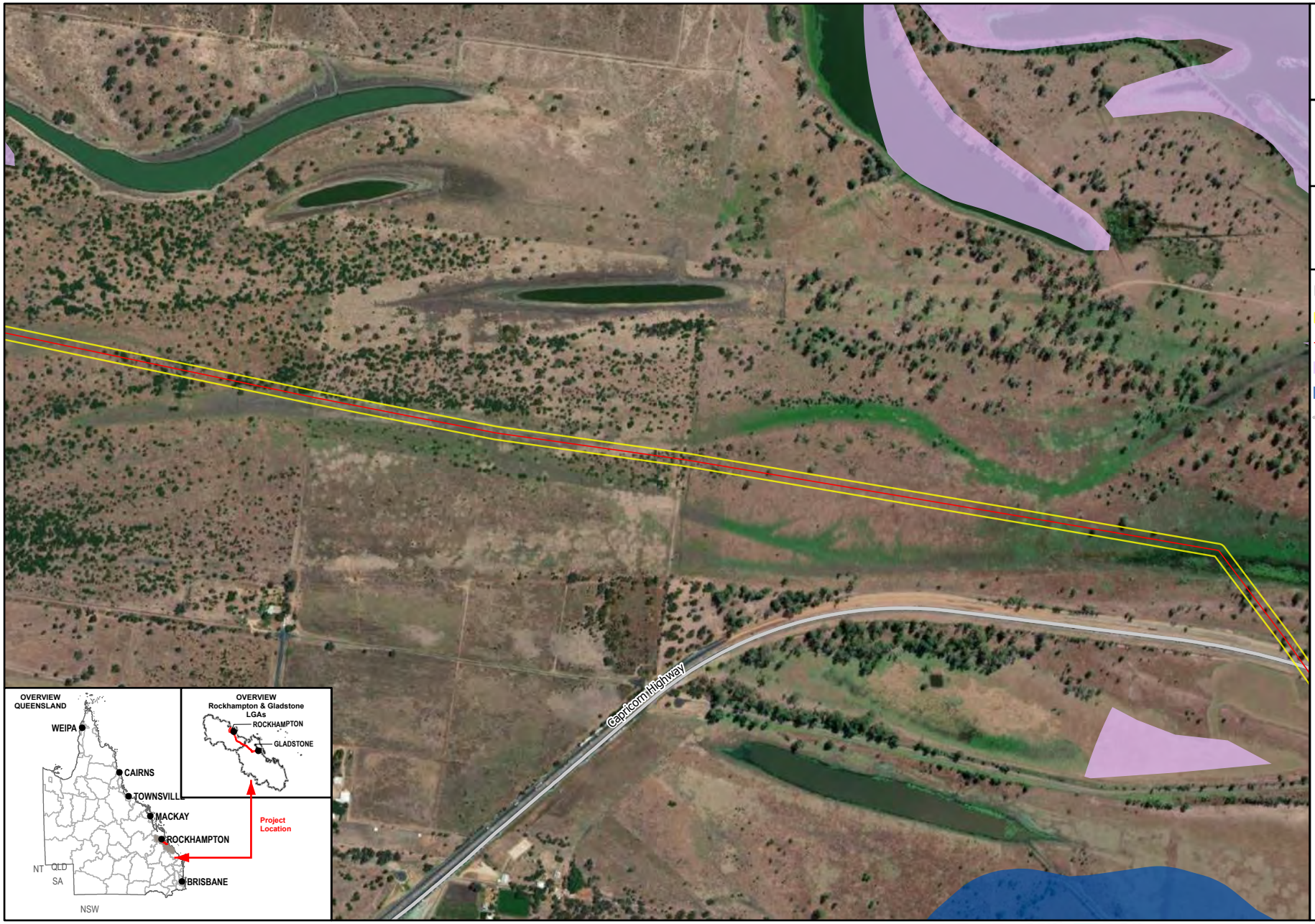

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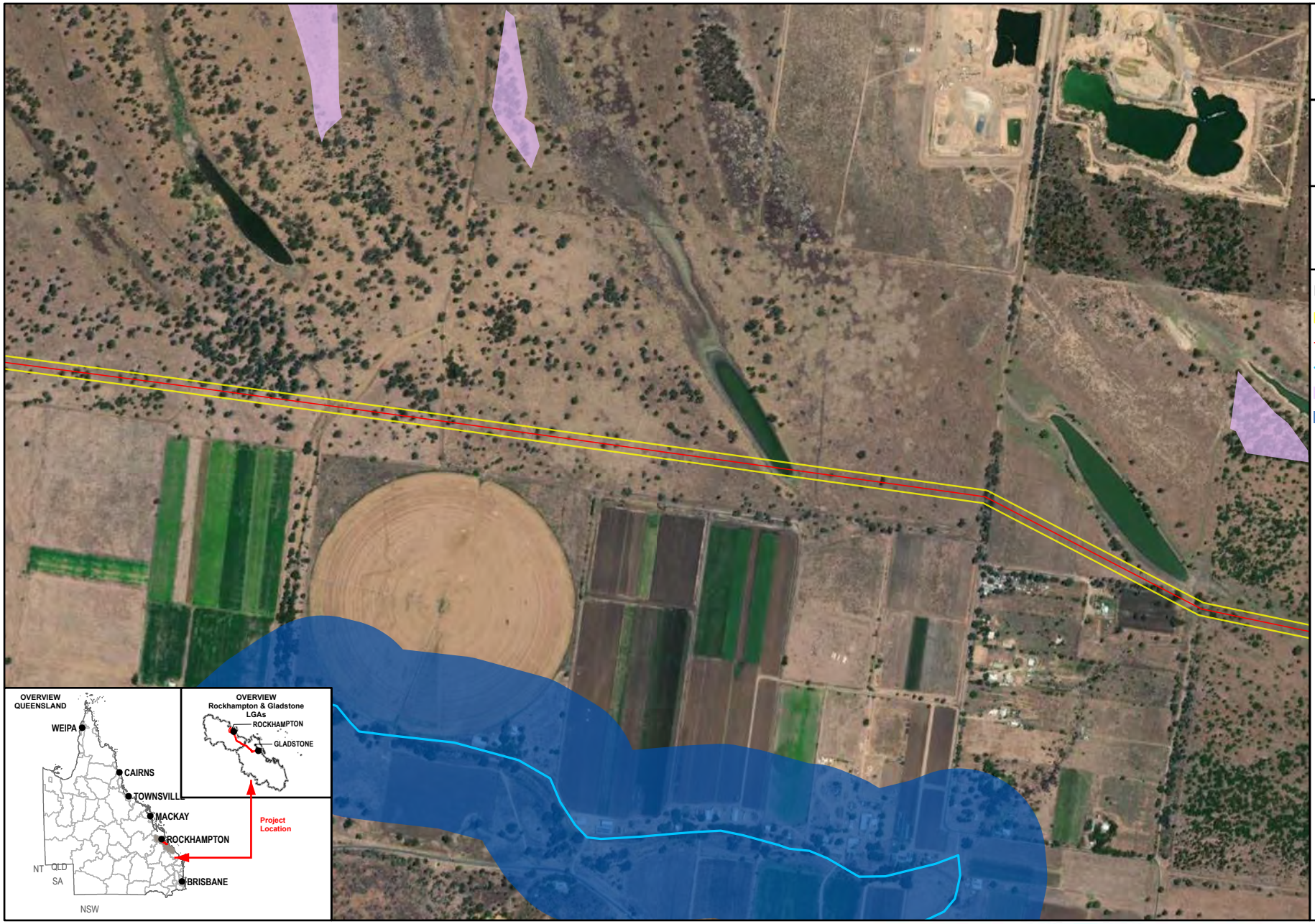

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Figure 4-5b1

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4.4.2 Field survey results

4.4.2.1 Terrestrial fauna survey results

Survey methods undertaken within the SGIC SDA study area are listed below. Details of each survey method is provided in Table 2-5.

– Habitat assessments
– Bird surveys
– Active searches
– Anabat detectors
– Remote cameras
– Large tree density assessments
– Hollow-bearing tree counts
– Nocturnal searches and spotlighting
– Opportunistic searches

4.4.2.2 Terrestrial fauna communities

A total of 98 terrestrial fauna species were recorded during the ecological surveys within the SGIC SDA study area. This comprised of 71 species of birds, 20 species of mammals, three species of reptiles and four species of amphibians. A description of each of the fauna groups is provided below. A list of fauna species encountered in the field survey is provided in Appendix H.

Birds

One conservation significant bird species, namely the squatter pigeon (southern), was confirmed present within the SGIC SDA study area during the 2022 field surveys. More information on this species is provided in Section 7.2.2.5. The yellow chat (Dawson) was confirmed present during the Arup (2008) field surveys and potentially suitable habitat was recorded within the SGIC SDA study area. More information on this species is provided in Section 7.2.2.4. The curlew sandpiper (Section 7.2.2.2), white-throated needletail (Section7.2.2.7), powerful owl (Section 7.2.2.8) and Australian painted sipe (7.2.2.13) are considered likely to occur.

At total of 71 bird species were recorded during the field surveys within the SGIC SDA study area. Riparian corridors and woodland ecosystems supported the greatest avian diversity. Woodland environments supported an array of honeyeaters, kookaburras, parrots, lorikeets and friarbirds. Riparian habitats supported rainbow bee-eater, striated pardalote (*Pardalotus striatus*), silvereye (*Zosterops lateralis*) and spangled drongo (*Dicrurus bracteatus*).

Freshwater waterbodies and wetlands provide drinking sites utilised by a range of woodland birds and habitat for wetland birds including the plumed whistling-duck (*Dendrocygna eytoni*), pacific black duck (*Anas superciliosa*), eastern great egret (*Ardea intermedia*), black swan (*Cygnus atratus*) and brolga (*Grus rubicunda*).

Open areas provide foraging habitat for raptors including the wedge-tailed eagle (*Aquila audax*), nankeen kestrel (*Falco cenchroides*), black kite (*Milvus migrans*) and whistling kite (*Haliastur sphenurus*), while the white-bellied sea eagle (*Haliaeetus leucogaster*) was recorded along the watercourses. While distinctly less frequent bird species associated with grasslands were also identified. These species included the Australasian pipit (*Anthus novaeseelandiae*), Australian bustard (*Ardeotis australis*) and golden-headed cisticola (*Cisticola exilis*).

Mammals

No conservation significant mammal species were recorded within the SGIC SDA study area during the 2022 field surveys. The koala was confirmed present during the Arup (2008) field surveys and potentially suitable habitat was recorded within the SGIC SDA study area during the 2022 field surveys. More information on this species is provide in Section 7.2.2.11. The greater glider (southern and central) (Section 7.2.2.9), yellow-bellied glider (south-eastern) (Section 7.2.2.10) and grey-headed flying-fox (Section 7.2.2.12) are considered likely to occur.

A total of 20 mammal species were identified during the field surveys within the SGIC SDA study area. Four introduced mammal species were recorded during the field surveys, two of which were captured on the remote cameras, including the wild dog (*Canis lupus familiaris*) and European fox (*Vulpes vulpes*). A total of 11 bat species were identified during microbat call analysis, including the yellow-bellied sheath-tailed bat (*Saccolaimus flaviventris*), little bent-wing bat (*Miniopterus australis*) and Northern freetail bat (*Chaerephon jobensis*).

Reptiles

No conservation significant terrestrial reptile species were recorded within the SGIC SDA study area during the 2022 field surveys. The ornamental snake was confirmed present during the Arup (2008) field surveys and potentially suitable habitat as recorded within the SGIC SDA study area. More information on this species is provided in Section 7.2.2.3. The grey snake (Section 7.2.2.6) is considered like to occur.

Only three reptile species were documented during field surveys within the SGIC SDA study area. Reptile species were predominantly recorded within the relatively more complex ground-level microhabitats of woodland habitat types. The species observed included the dubious dtella (*Gehyra dubia*), Bynoe's gecko (*Heteronotia beinoei*) and eastern bearded dragon (*Pogona barbata*). While not frequently observed, fringing riparian habitat would also host reptile species as these habitats provide essential vegetated corridors for species movements across the landscape.

Amphibians

No conservation significant frog species were recorded within the SGIC SDA study area during the2022 field surveys. No conservation significant frogs are considered likely to occur.

Three amphibian species were documented within the SGIC SDA study area. Amphibian species observed during field surveys included the green tree frog (*Litoria caerulea*), eastern sedge frog (*Litoria fallax*), desert tree frog (*Litoria rubella*) and cane toad (*Rhinella marina*). Amphibian species were generally observed in woodland habitats (mature eucalypt woodland and mixed *Eucalyptus/Corymbia* woodland), that supported dense ground-level microhabitats, including woody debris and leaf litter, but were also documented within fringing riparian habitats.

4.4.2.3 Conservation significant fauna species

One conservation significant fauna species, namely the squatter pigeon (southern), was confirmed present during the 2022 field surveys, and three conservation significant fauna species, namely the ornamental snake, yellow-chat (Dawson) and koala were confirmed present during the Arup (2008) field surveys (Table 4-11). Survey effort undertaken for threatened fauna species within the study area is outlined in Table 2-6.

Table 4-11 Conservation significant fauna species recorded within the SGIC SDA study area

Scientific name	Common name	Status		Details
		EPBC Act	NC Act	
Denisonia maculata	Ornamental snake	V	V	Two individuals were confirmed present on the southern extent of Casuarina Road during the Arup (2008) field surveys. The 2022 field surveys undertook nocturnal searches and spotlighting along Casuarina Road. No individuals were recorded; however, suitable habitat was identified within the SGIC SDA study area.
Epthianura crocea macgregori	Yellow chat (Dawson)	CE	E	Four individuals were confirmed present during the yellow chat (Dawson) field survey program (Arup 2008). Species were recorded from two locations along Twelve Mile Creek, just north of the SGIC SDA pipeline alignment. The 2022 field surveys were undertaken along Twelve Mile Creek and Inkerman Creek within the SGIC SDA study area. No individuals were recorded; however, suitable habitat was identified within the SGIC SDA study area along or in close proximity to both creeks.

Scientific name	Common name	Status		Details
		EPBC Act	NC Act	
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	14 individuals were confirmed present within the SGIC SDA study area during the 2022 field surveys. The species was also recorded during the Arup (2008) field surveys.
Phascolarctos cinereus	Koala	E	E	Tree trunk scratches and scats were identified at one location adjacent to Boat Landing Creek during the Arup (2008) field surveys. During the 2022 field surveys, a habitat assessment and SAT survey was undertaken approximately 450 m north of the location of confirmed koala traces. No individuals were recorded; however, suitable habitat was identified throughout vegetated areas retaining koala food and shelter trees within the SGIC SDA study area.
Key to table: CE – critically endangered; E – endangered; V – vulnerable.				

4.4.2.4 Essential habitat

Based on the field verified REs within the SGIC SDA study area, the mapped essential habitat for conservation significant species, identified in Section 4.4.1.3, did not change.

4.4.2.5 Habitat types

Historically, the landscape has been impacted by decades of disturbance from cattle grazing, vegetation clearing and intrusion by invasive weeds. These processes have altered local ecosystem composition and processes, reducing in places the density of native vegetation and habitat for conservation significant species. Despite this, sizeable remnants of natural habitat have been retained.

Eight broad habitat types were identified within the SGIC SDA study area during the field survey, including:

– Mature eucalypt woodland
– Mixed *Eucalyptus/Corymbia* woodland
– Regrowth and/or scattered *Eucalyptus/Corymbia/Acacia* trees
– Brigalow (*Acacia harpophylla*) woodland
– Estuarine environments
– Fringing riparian vegetation
– Freshwater waterbodies and seasonal wetlands
– Cleared and highly modified landscapes.

Broad habitat types were defined and broadly mapped throughout the study area based on habitat assessments, DoR and field verified RE mapping, and aerial imagery. These habitat types were validated, and mapping refined, through the ecological field surveys. A representative photograph and description of each of these habitat types is provided in Table 4-12, together with identification of which habitat types provide potential habitat for fauna that are MNES and MSES. Habitat types identified within the study area are mapped in Figure 4-6.

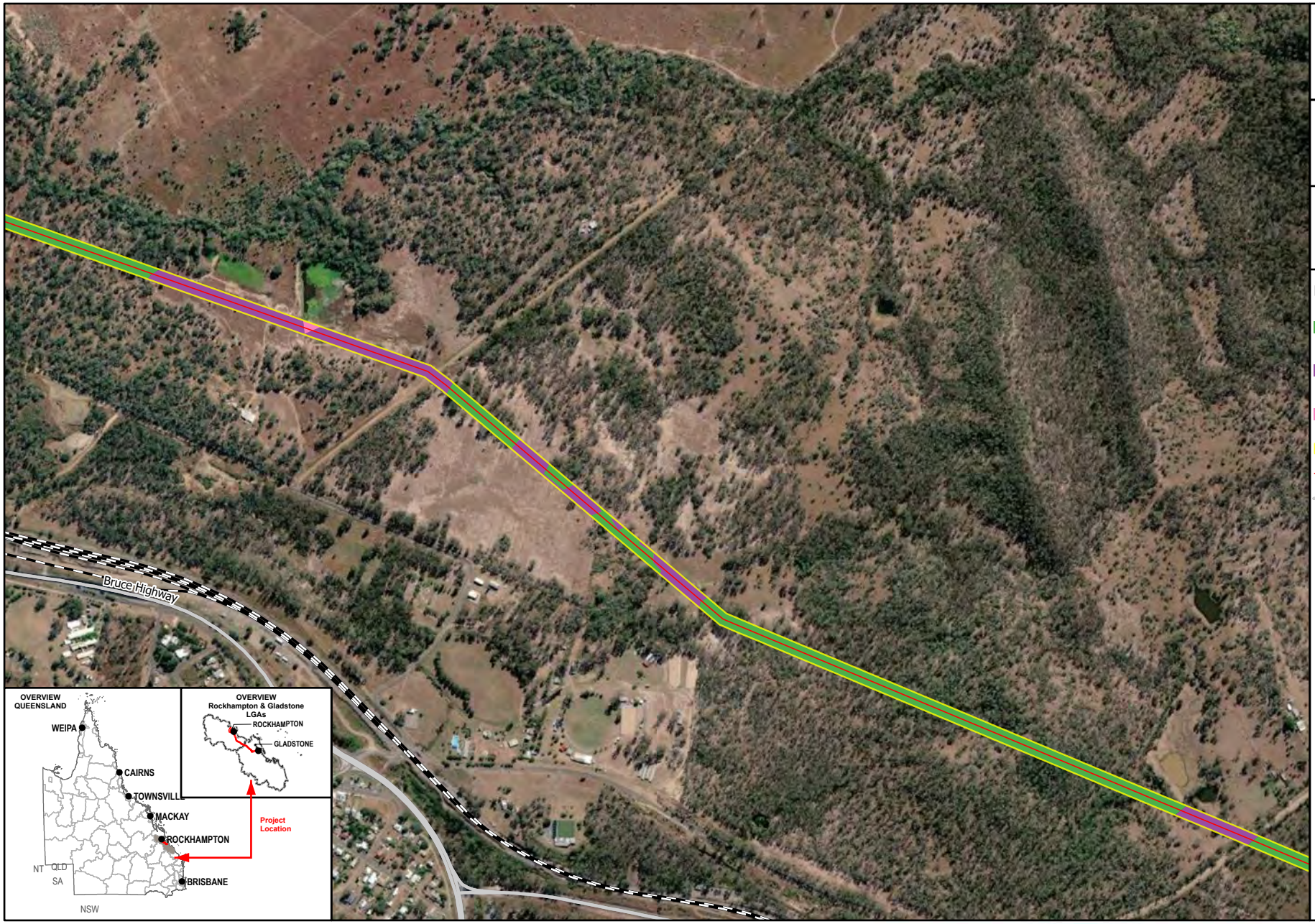
Table 4-12 Habitat types recorded within the SGIC SDA study area

Habitat type	General characteristics and ecological values
Mature eucalypt open woodland 	– Mature *Eucalyptus* species provides blossom and nesting opportunities for honeyeaters, flower peckers and parrots, and foraging habitat for flying-foxes. – Hollow-bearing trees are moderately dense, retaining small to medium sized hollows. Very few large hollows (> 30 cm) were observed. – Relatively complex ground-level microhabitats, with a high density of woody debris and leaf litter, and some ground logs. These microhabitats provide shelter and foraging microhabitat for ground-dwelling mammals, reptiles and amphibians. – Sparse, low ground cover, dominated by native grasses. Grasses provided food resources for some granivorous birds and herbivorous mammals.
	MNES and MSES species: – Potential foraging habitat for the squatter pigeon (southern) within 1 km (for breeding) and 3 km (for foraging) of a suitable, permanent or seasonal waterbody. – Potential foraging and denning habitat for the greater glider (southern and central) and yellow-bellied glider (south-eastern). – Potential foraging habitat for the powerful owl, koala and grey-headed flying-fox. – Potential foraging and breeding habitat for the ornamental snake (only woodland habitats retaining *Eucalyptus coolabah*).
Mixed *Eucalyptus/Corymbia* open woodland 	– Eucalypts provide blossoms and nesting opportunities for honeyeaters, and foraging habitat for flying-foxes. – Variety of koala food trees present, including *Eucalyptus tereticornis*¸ *E. crebra*, *E. coolabah, E. moluccana*, *E. exserta*, *Corymbia tessellaris*, *C. citriodora C. erythrophloia*, *C. intermedia* and *Lophostemon suaveolens.* – Low density of hollow-bearing trees present. Hollows are relatively small, providing suitable habitat for hollow-nesting birds (i.e. parrots and lorikeets), small mammals (i.e. gliders) and arboreal reptiles and amphibians. – Ground-level microhabitats varied throughout vegetated areas. Moderately dense to sparse ground logs, woody debris, rocks and leaf litter were present, providing shelter and foraging habitat for small to medium sized mammals, reptiles and amphibians. – Decorticating bark provide refuge for microbats, reptiles and amphibians. – Groundcover densities varied throughout vegetated areas. A mixture of native and introduced grasses were present.
	MNES and MSES species: – Potential foraging habitat for the squatter pigeon (southern) within 1 km (for breeding) and 3 km (for foraging) of a suitable, permanent or seasonal waterbody. – Potential foraging habitat for the greater glider (southern and central) and yellow-bellied glider (south-eastern). – Potential foraging habitat for the koala and grey-headed flying-fox.

Habitat type	General characteristics and ecological values
Regrowth and/or scattered *Eucalyptus/Corymbia/Acacia* trees 	– Characterised by the low density of mature and regrowth vegetation and is dominated by introduced pasture grasses. – Scattered koala food trees present, including *Eucalyptus tereticornis*, *E. crebra* and *Corymbia* species. – Low density of hollow-bearing tree resulting in limited roosting sites for microbat species, nesting sites for hollow-nesting bird species, and denning sites for arboreal mammals. Mature E. tereticornis trees retain large (>30 cm) hollows on alluvial plains adjacent to waterways. – Introduced grass species provide food resources for some grassland birds, and herbivorous mammals such as macropods. – The open landscape provides foraging habitat for raptors and snakes. – In most areas, the ground-layer has been heavily altered by cattle grazing and trampling, and intensive cultivation. These alterations have reduced the presence of suitable microhabitats for a range of fauna species.
	MNES and MSES species: – Potential foraging habitat for the squatter pigeon (southern) within 1 km (for breeding) and 3 km (for foraging) of a suitable, permanent or seasonal waterbody. – Potential foraging habitat for the koala (where paddock trees retained).
Brigalow (*Acacia harpophylla*) woodland 	– Regrowth areas contained moderately dense canopy cover of *Acacia harpophylla*. Structural complexity within this habitat was low. – Remnant areas contained moderately dense canopy cover layer of *A. harpophylla*. Dead stags retaining small hollows were generally sparse, providing refuge for microbats and arboreal reptile species. – The mid-storey was generally sparse containing various shrub species and juvenile *A. harpophylla*, providing shelter and nesting habitat for a variety of bird species. – Complex ground-level microhabitats, with a high density of woody debris, logs, root cavities and burrows and native and exotic grasses providing shelter and foraging habitat for small ground-dwelling mammals and reptiles. – Decorticating bark was sparse in remnant patches, providing some shelter for microbats and arboreal reptile species. – In some areas, gilgai depressions with deep soil cracks were present. Gilgais provide suitable habitat for a variety of reptile species, some of which are threatened including the ornamental snake, Dunmall's snake and yakka skink.
	MNES and MSES species: – Potential foraging and breeding habitat for the ornamental snake and grey snake.

Habitat type	General characteristics and ecological values
Estuarine environments 	– Mudflats provide important foraging habitat for migratory wading bird species, as they travel between northern and southern hemisphere. These birds forage on crabs, molluscs and other marine invertebrates in the intertidal mudflats. – Mangroves, saltmarshes and mudflats provide important foraging and breeding habitat for local bird species. – When inundated, mangroves and saltmarshes provide breeding and foraging habitat, and are an important nursery ground for juvenile fish and other marine organisms such as crabs and prawns. – Mudflats support a diverse benthic (bottom-dwelling) community, including worms, crabs and yabbies. This, in turn, provides food for fish species such as flathead and whiting.
	MNES and MSES species: – Potential foraging habitat for the curlew sandpiper and other migratory shorebird species. – Potential foraging and breeding habitat for the yellow chat (Dawson).
Fringing riparian vegetation 	– Fringing riparian vegetation along ephemeral waterways were dominated by *Melaleuca* spp., with *Eucalyptus* and *Corymbia* sp. – *Melaleuca*, *Eucalyptus* and *Corymbia* species provide foraging opportunities for honeyeaters and flying-foxes. – Ground-level microhabitats, including coarse woody debris and dense ground cover, provide shelter and foraging habitat for a variety of reptile and frog species. – Instream complexity with undercut banks, root balls, trailing vegetation and shallow water edges. – An important movement corridor for native mammals, birds, reptiles and amphibians, and are important foraging routes and flyways for microbats.
	MNES and MSES species: – Potential foraging and breeding habitat for the squatter pigeon (southern) (confirmed present). – Potential foraging and denning habitat for the greater glider (southern and central) and yellow-bellied glider (south-eastern). – Potential foraging and roosting habitat for the powerful owl. – Potential foraging habitat for the koala, grey-headed flying-fox and migratory bird species.

Habitat type	General characteristics and ecological values
Freshwater waterbodies and seasonal wetlands 	– Levees have been built on open floodplains to retain flood water. When these areas are inundated with water, these waterbodies may provide suitable foraging habitat for waterbirds. – Floodplains have largely been modified with pastural grasses. – Permanent to semi-permanent waterbodies (i.e. billabongs and dams) occur within the landscape. These waterbodies provide foraging, breeding and nesting habitat for a range of waterbirds. – Within the context of the local environment, permanent waterbodies provide an important reliable source of drinking water for birds, macropods, reptiles and amphibians. These features are particularly important during times of drought. – Waterbodies support local food webs. A local abundance of invertebrates provides prey items for microbats and amphibians. In turn, these attract predators including snakes, waterbirds, and raptors. – Canopy and/or shrub layer was either very sparse or absent. – Some waterbodies retained sedges, rushes and grasses, as well as dead stags within small (<10 cm) hollows, ground logs and woody debris. – Low density of deep cracking clays present.
	MNES and MSES species: – Potential foraging habitat for the curlew sandpiper, Australian painted snipe and other migratory bird species. – Potential foraging and breeding habitat for the squatter pigeon (southern).
Cleared and highly modified landscapes 	– Characterised by the absence or very low density of mature and regrowth vegetation and is dominated by introduced pasture grasses. – Very low density of koala food trees present (< 1 tree per ha), including *Eucalyptus, Corymbia* and *Acacia* species. – Introduced grass species provide food resources for some grassland birds, and herbivorous mammals such as macropods. – The open landscape provides foraging habitat for raptors and snakes. – Ground-level microhabitats have been historically cleared and lack structural complexity. – In most areas, the ground-layer has been heavily altered by cattle grazing and trampling, and intensive cultivation. These alterations have reduced the presence of suitable microhabitats for a range of fauna species.
	MNES and MSES species: No suitable habitat for conservation significant fauna species.



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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PROJECTION UTM Zone 56
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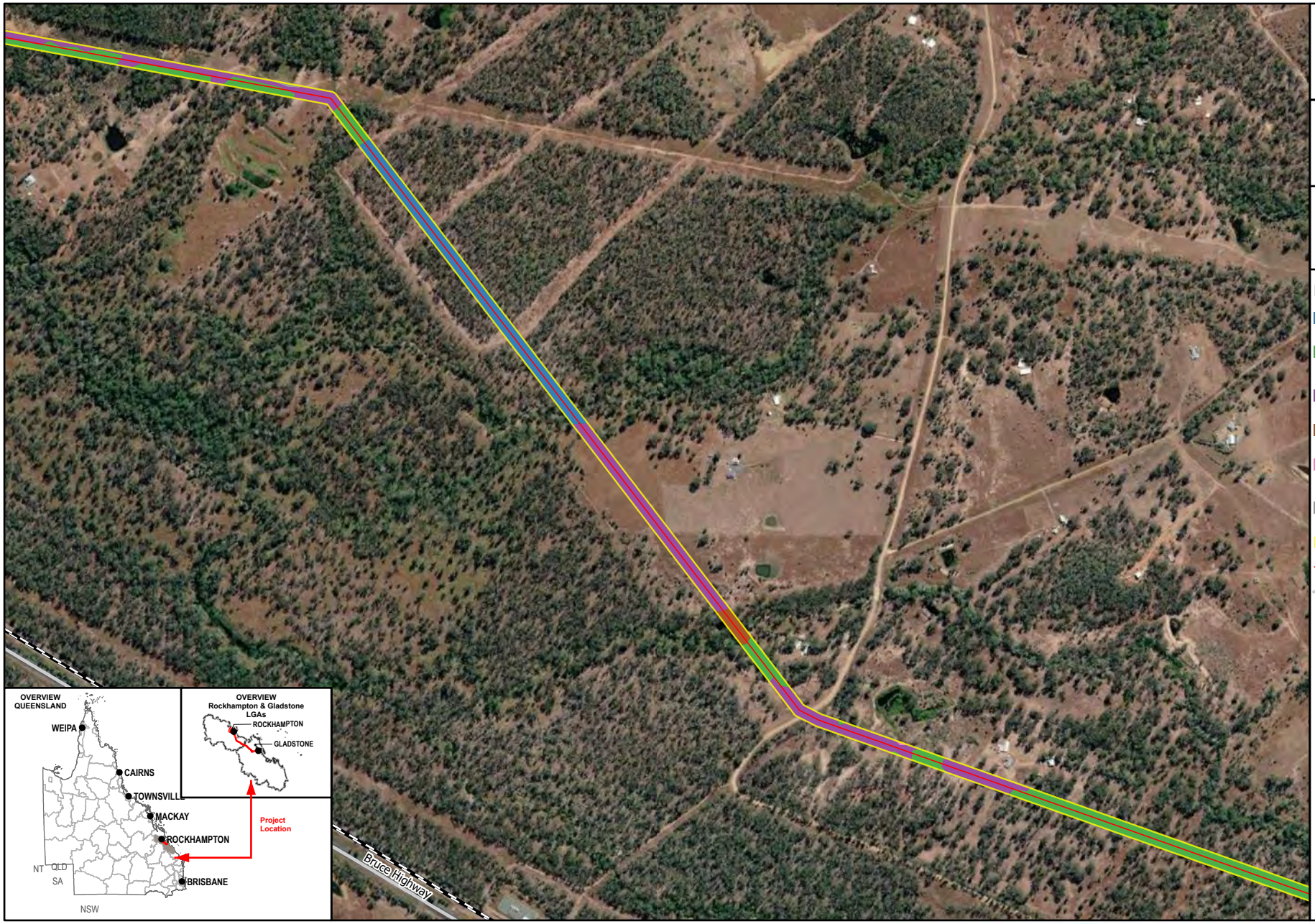
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6a
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mature Eucalypt Woodland
- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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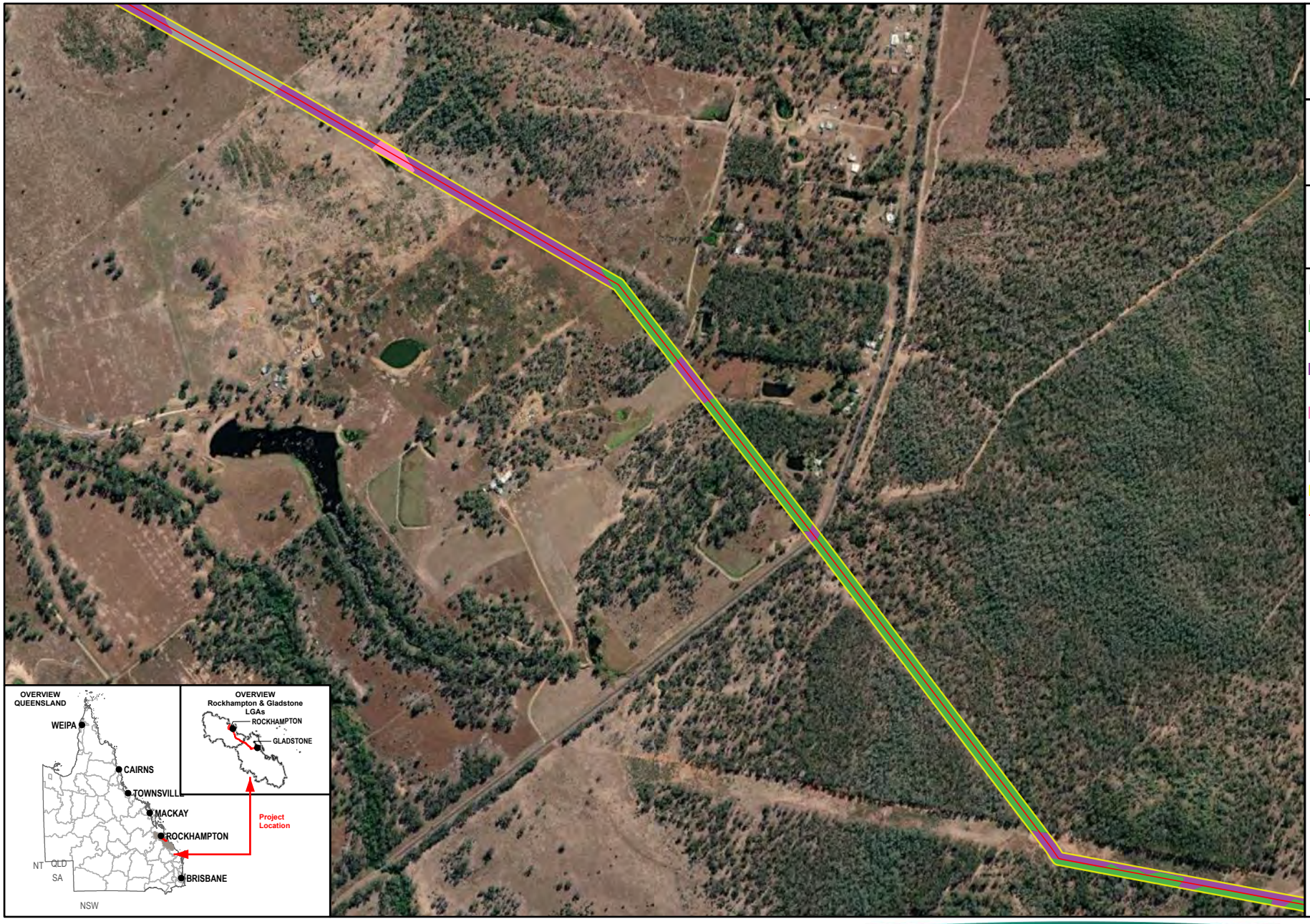
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6b
Habitat Types Identified Within the SGIC SDA Study Area

000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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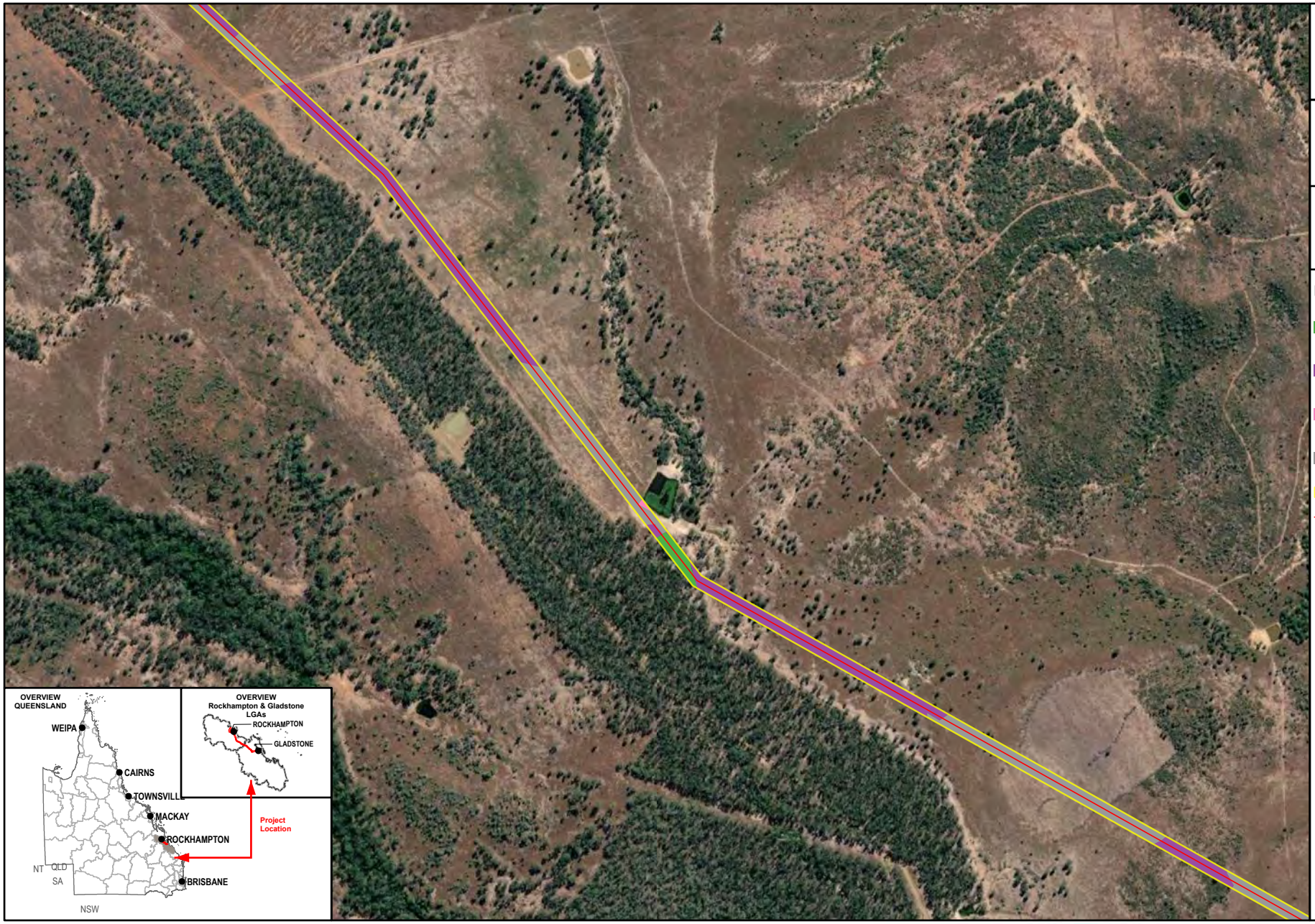
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report

Figure 4-6c
Habitat Types Identified Within the SGIC SDA Study Area

000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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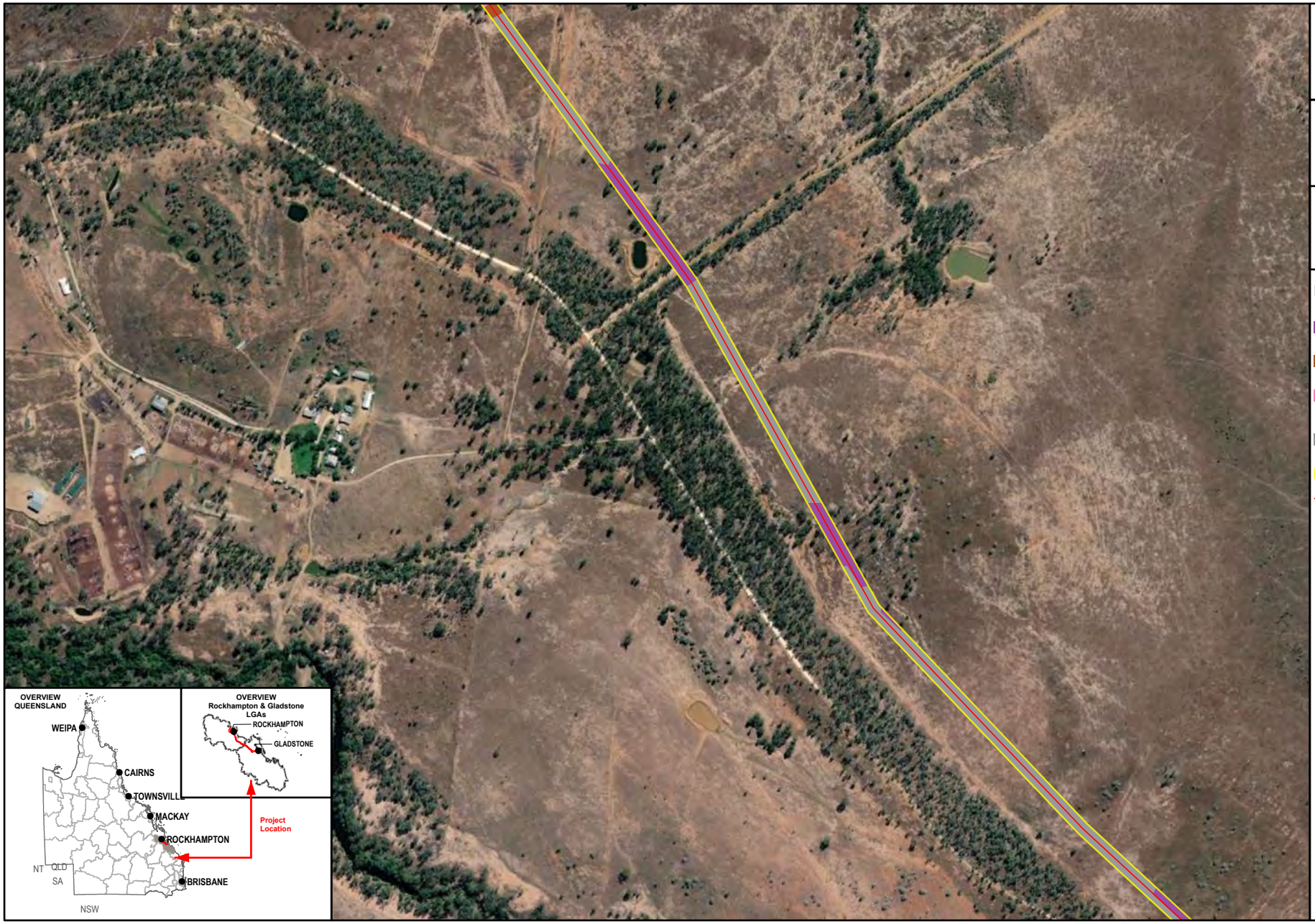
Figure 4-6d
Habitat Types Identified Within the SGIC SDA Study Area

000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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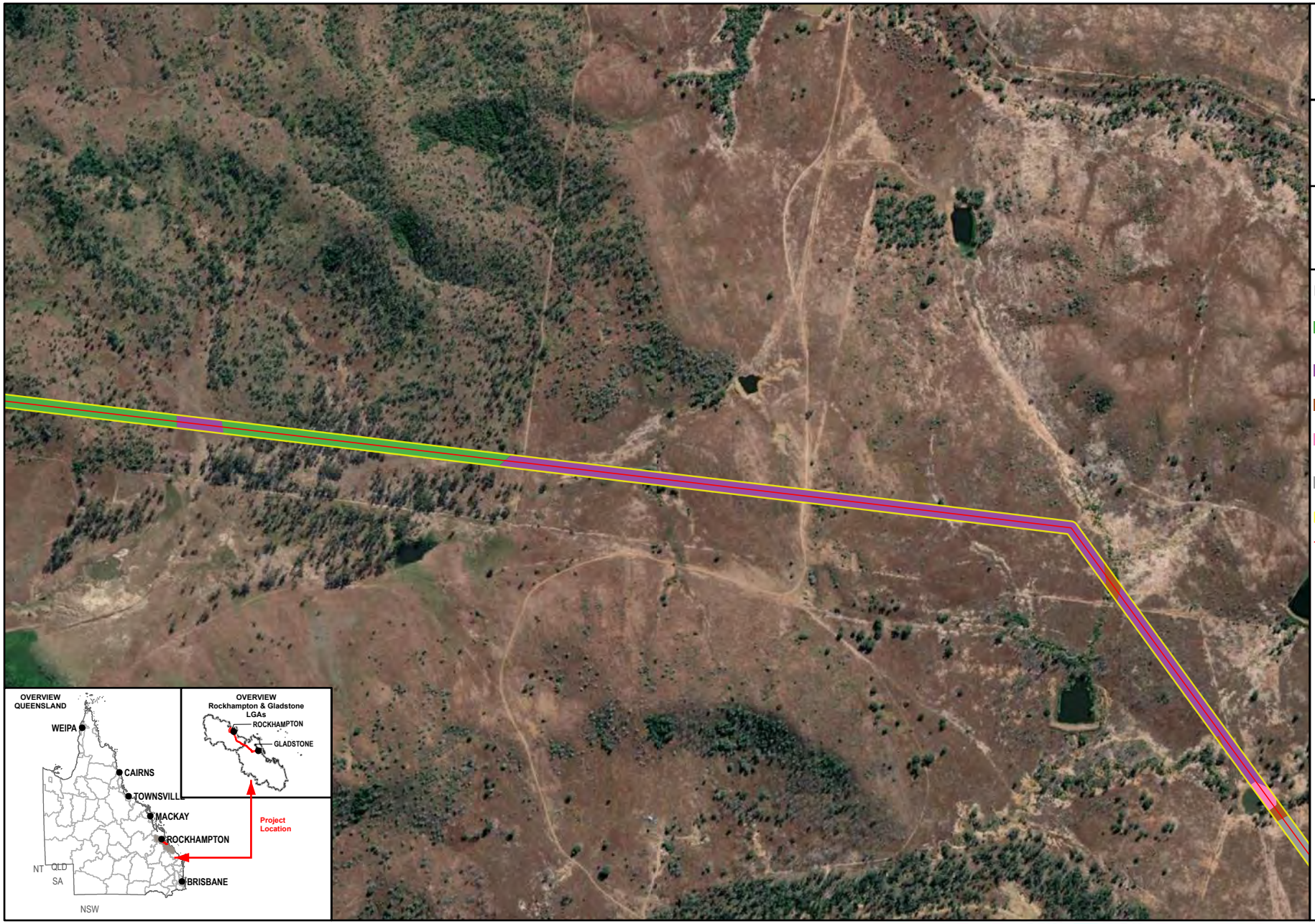
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6e
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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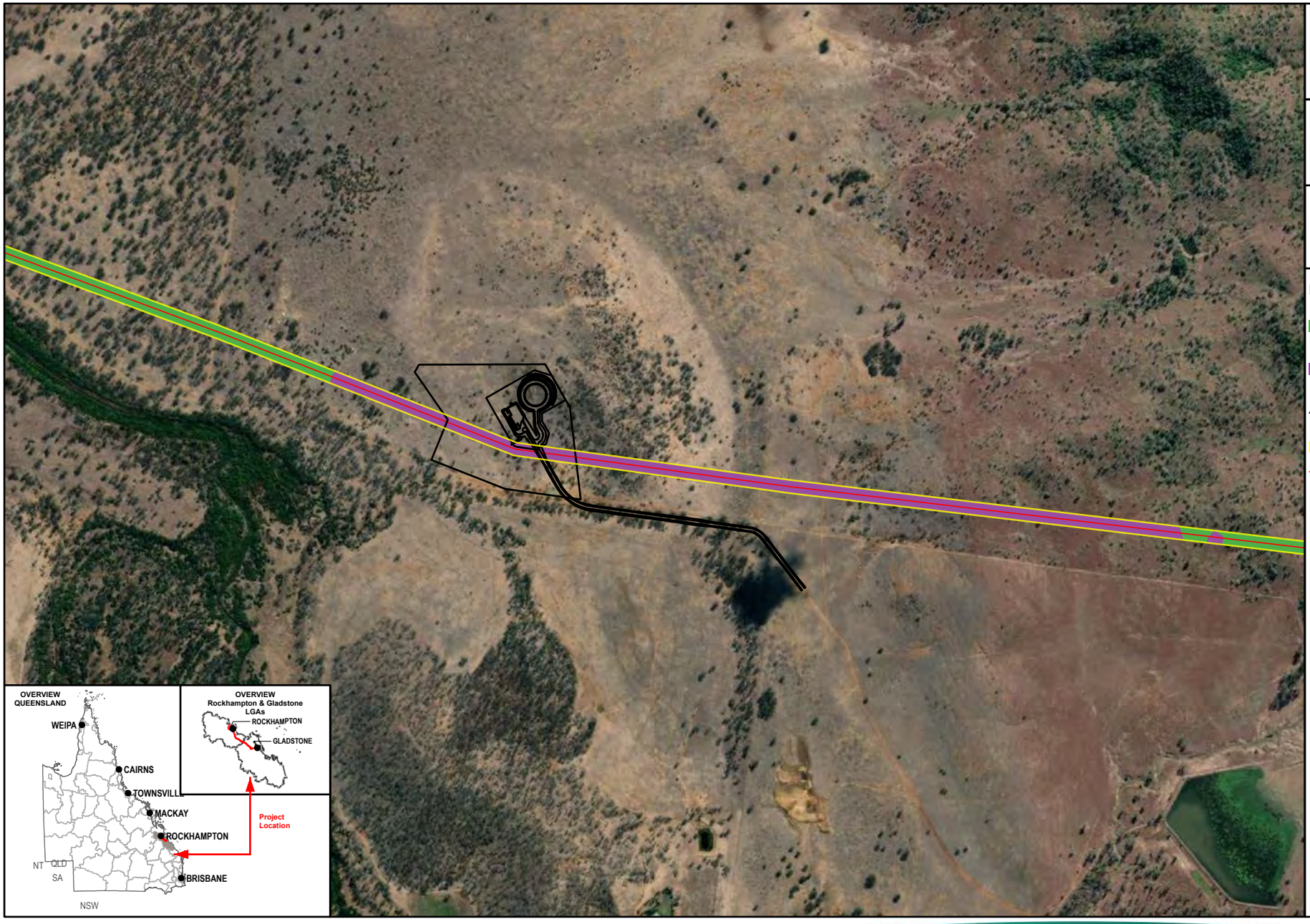
Figure 4-6f
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Raglan Pump Station and Reservoir Layout
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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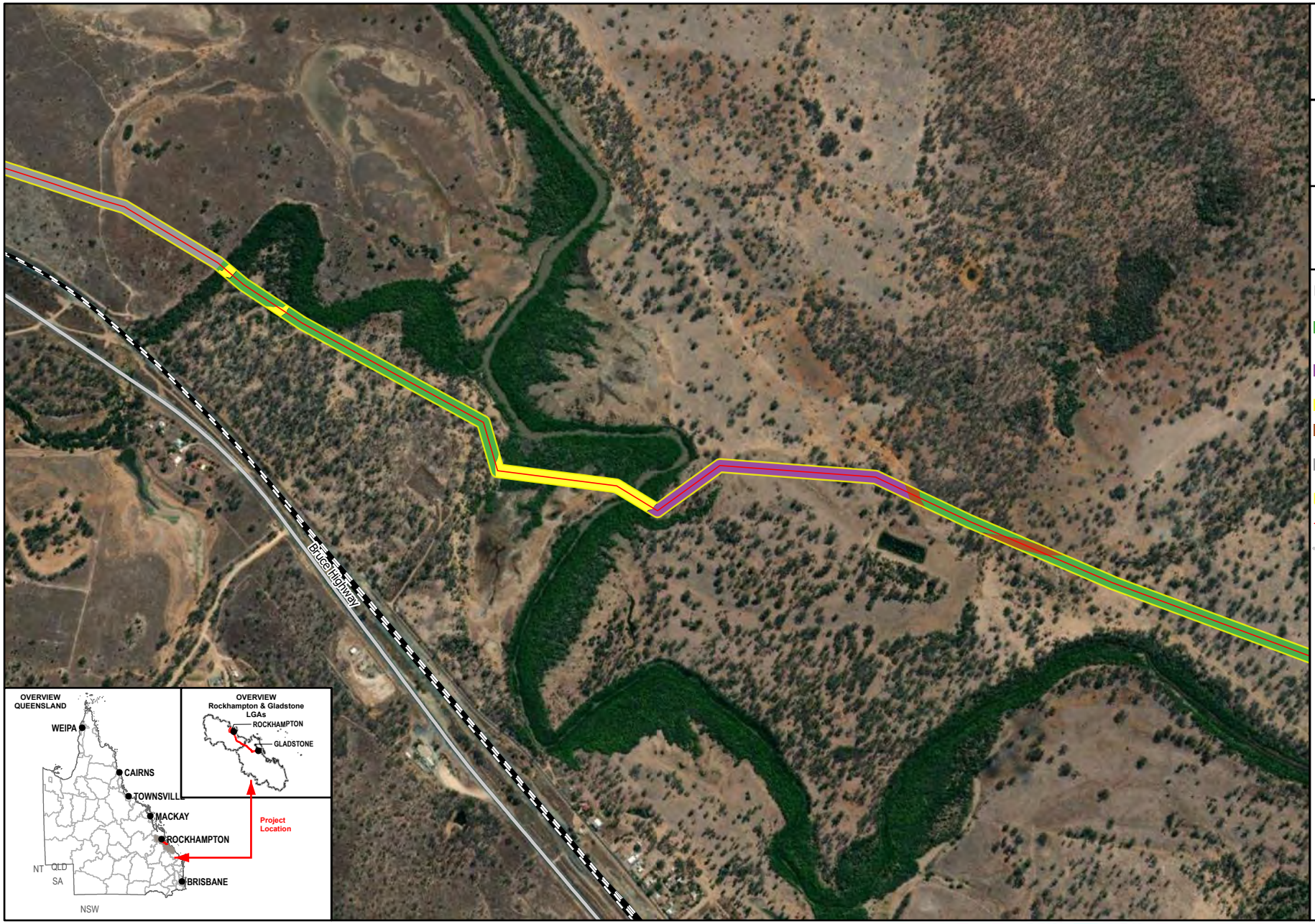
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6g
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Estuarine Environments
- Fringing Riparian Vegetation
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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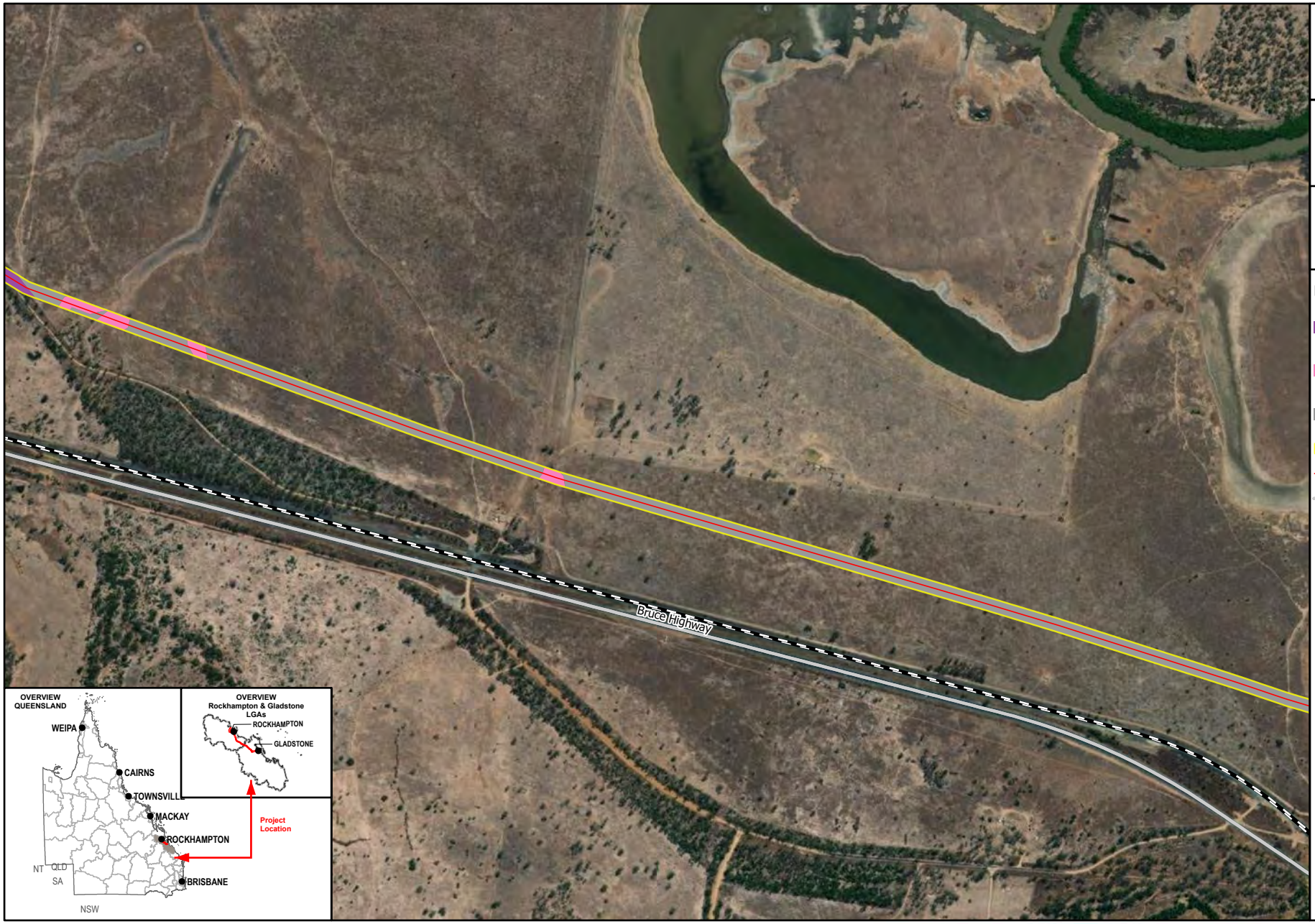
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6h
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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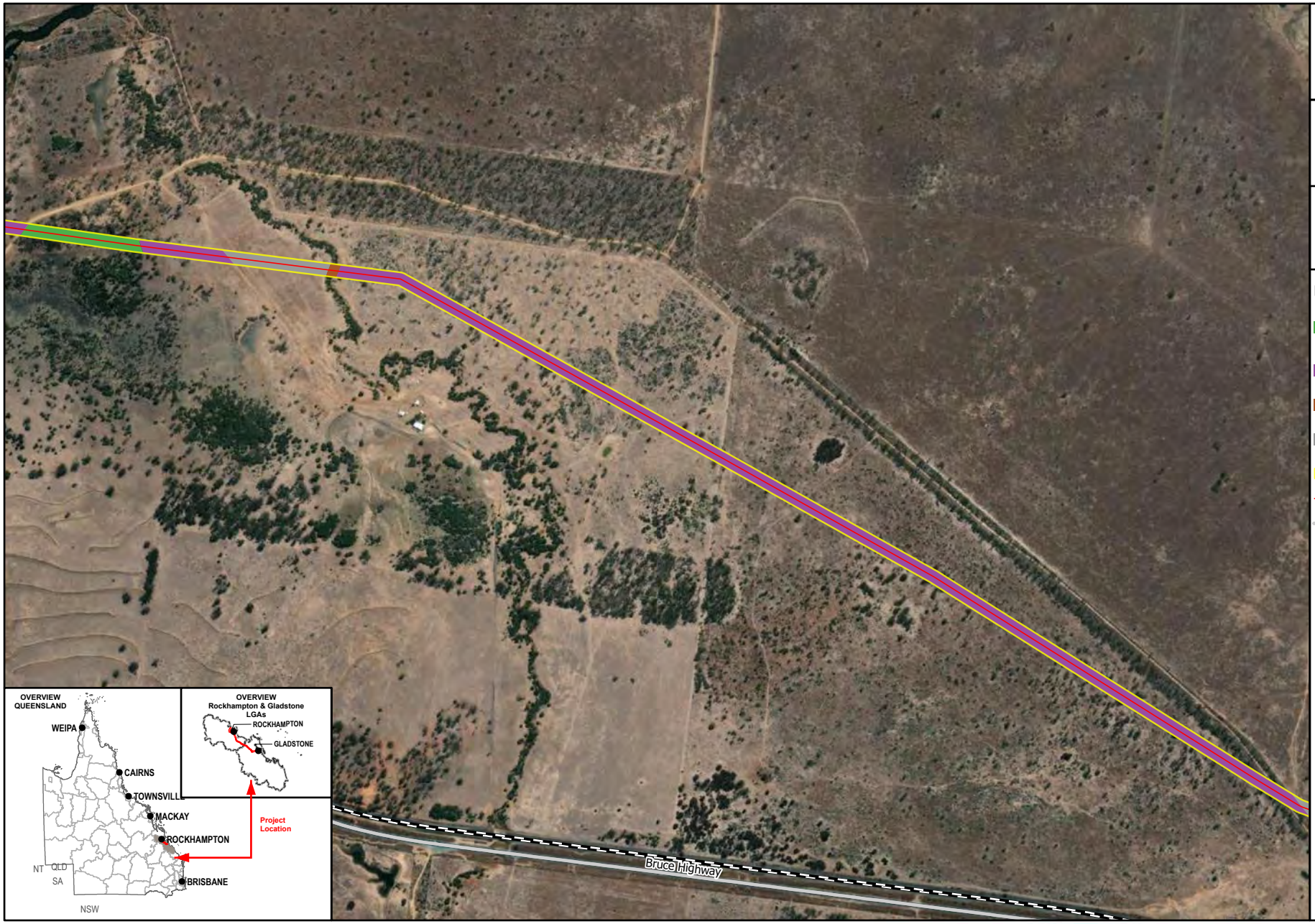
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6i
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Fringing Riparian Vegetation
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
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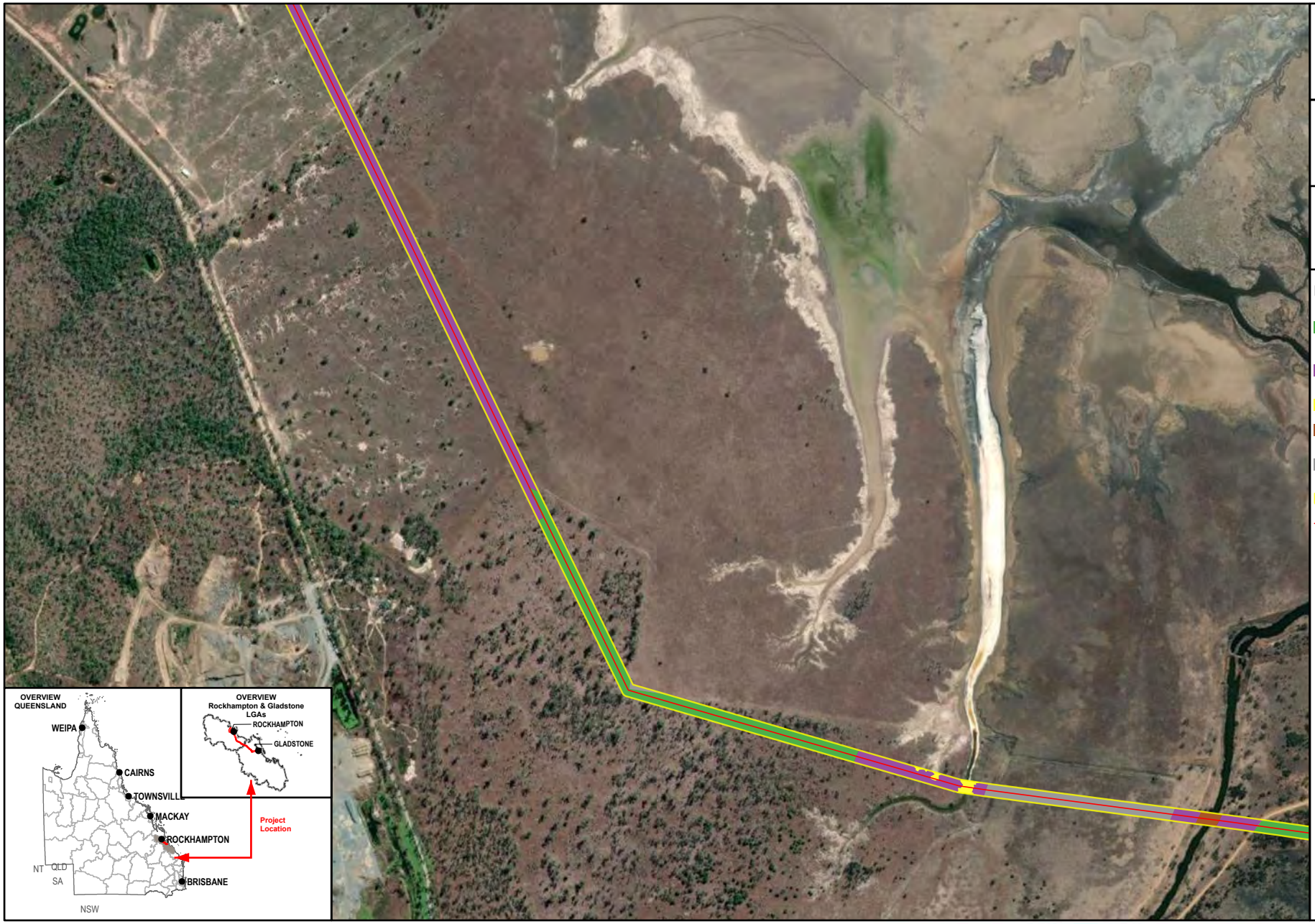
Figure 4-6j
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Estuarine Environments
- Fringing Riparian Vegetation
- Cleared and Highly Modified Landscapes
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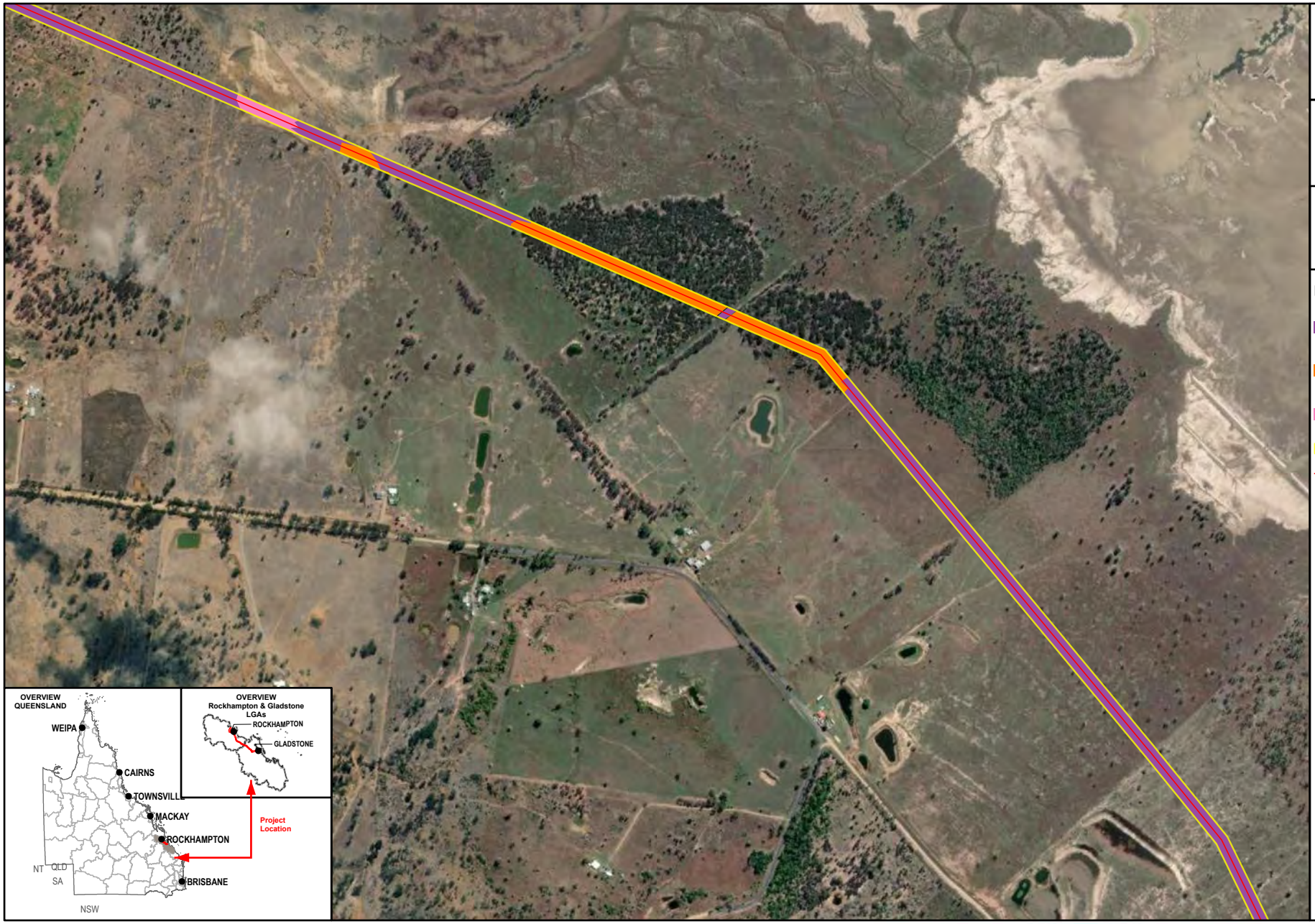
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6k
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Brigalow (Acacia harpophylla) Woodland
- Freshwater Waterbodies and Seasonal Wetlands
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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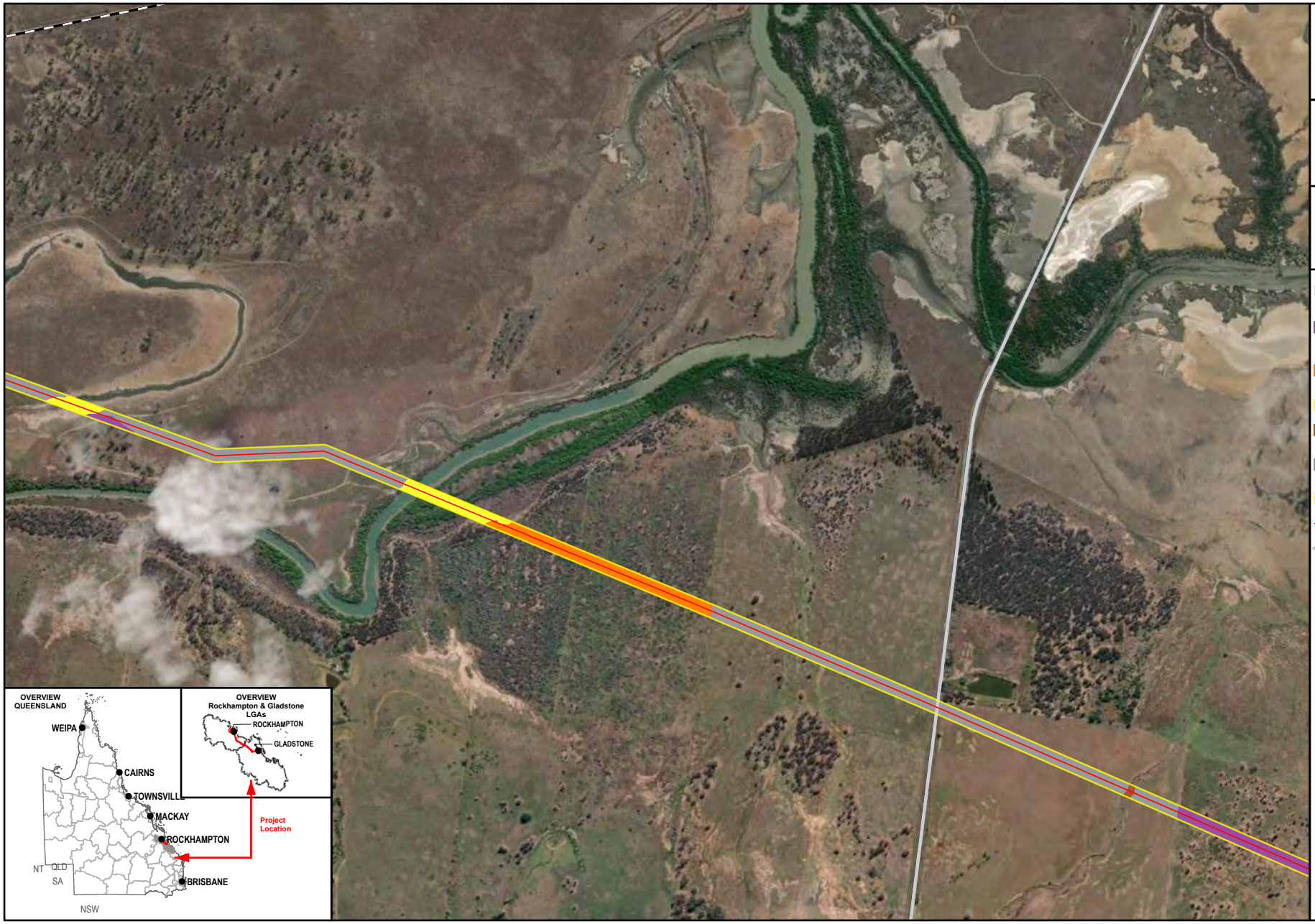
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6l
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Brigalow (Acacia harpophylla) Woodland
- Estuarine Environments
- Fringing Riparian Vegetation
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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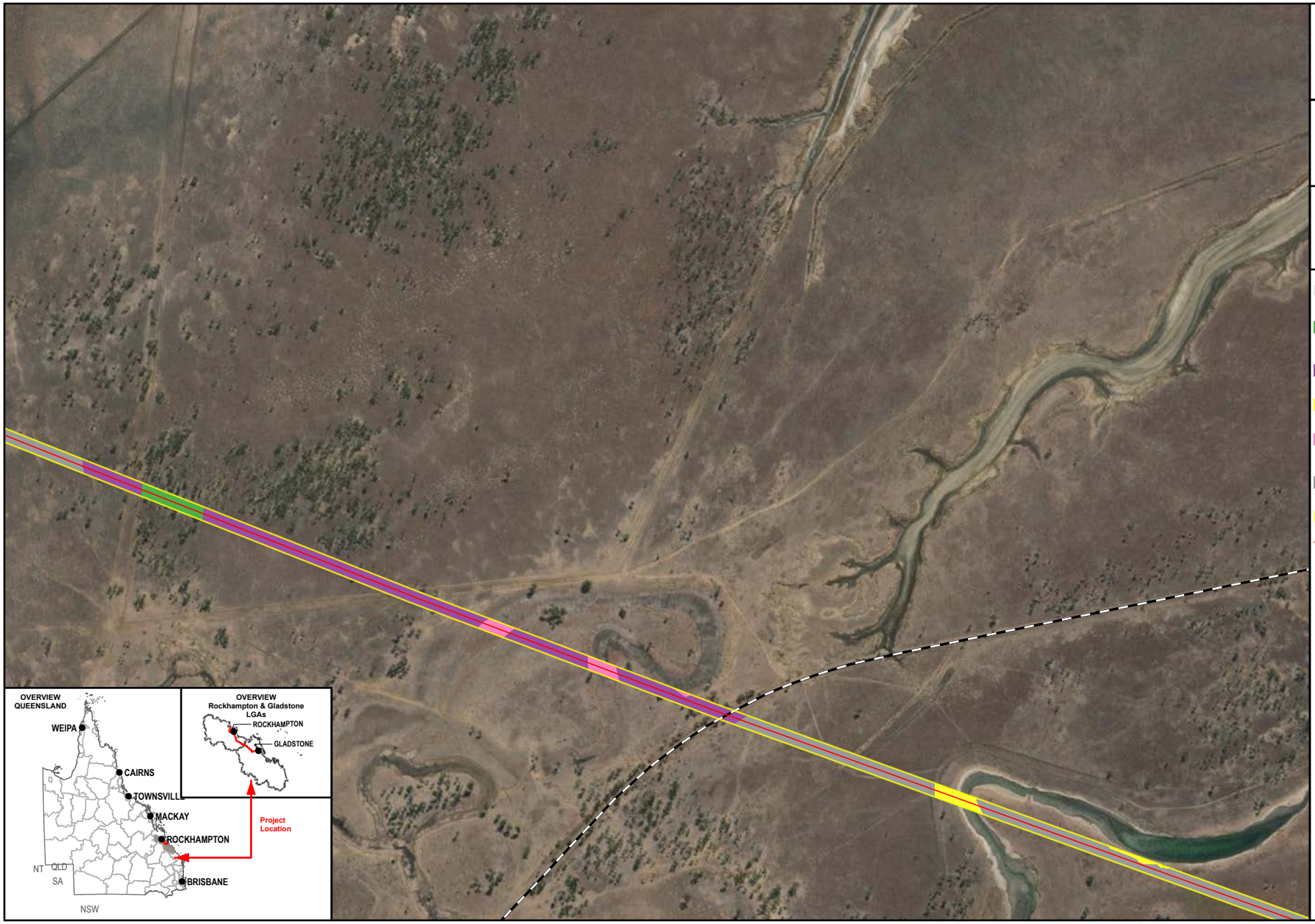
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6m
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Estuarine Environments
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
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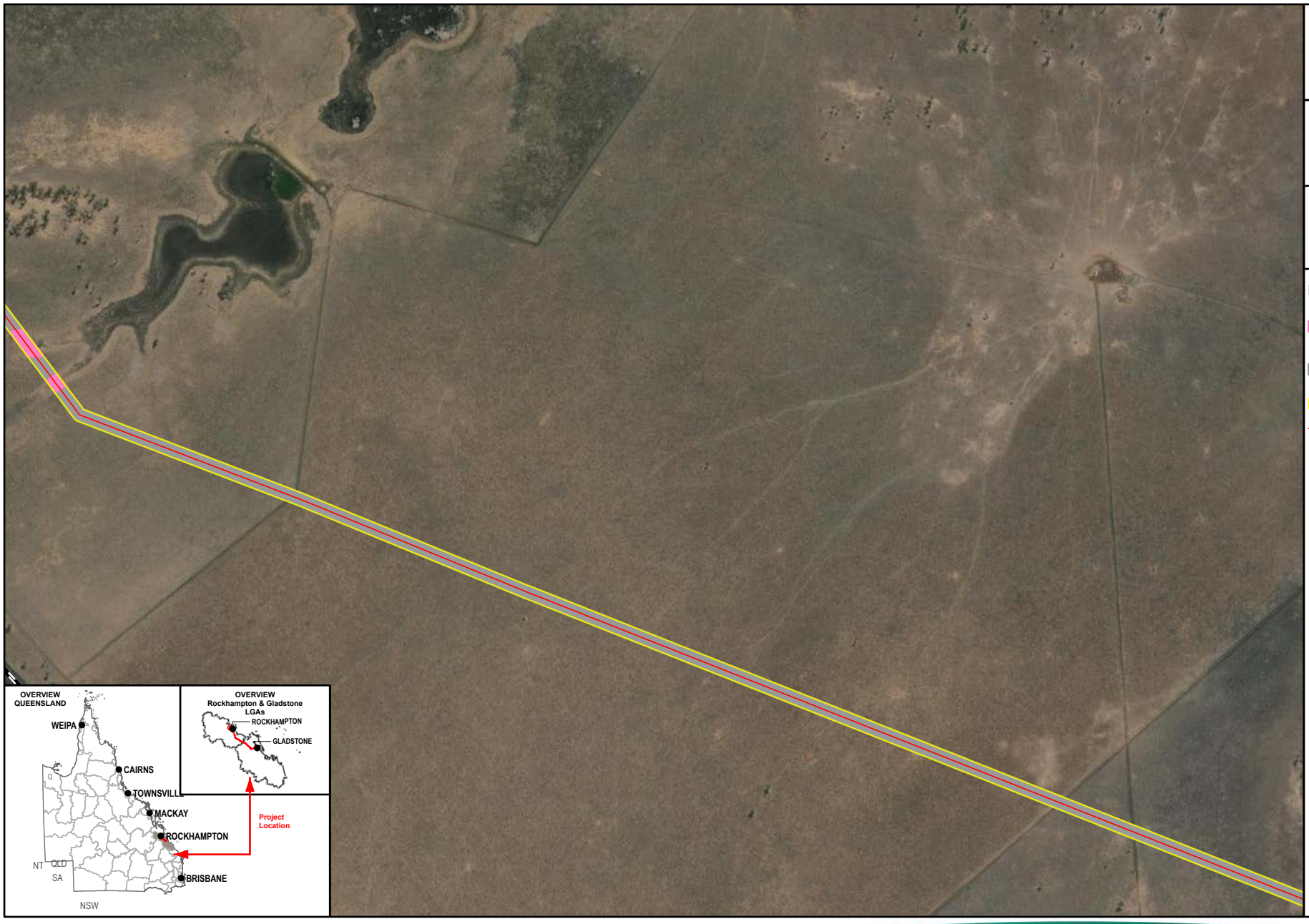
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6n
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Railways

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6o
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12

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Legend

- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
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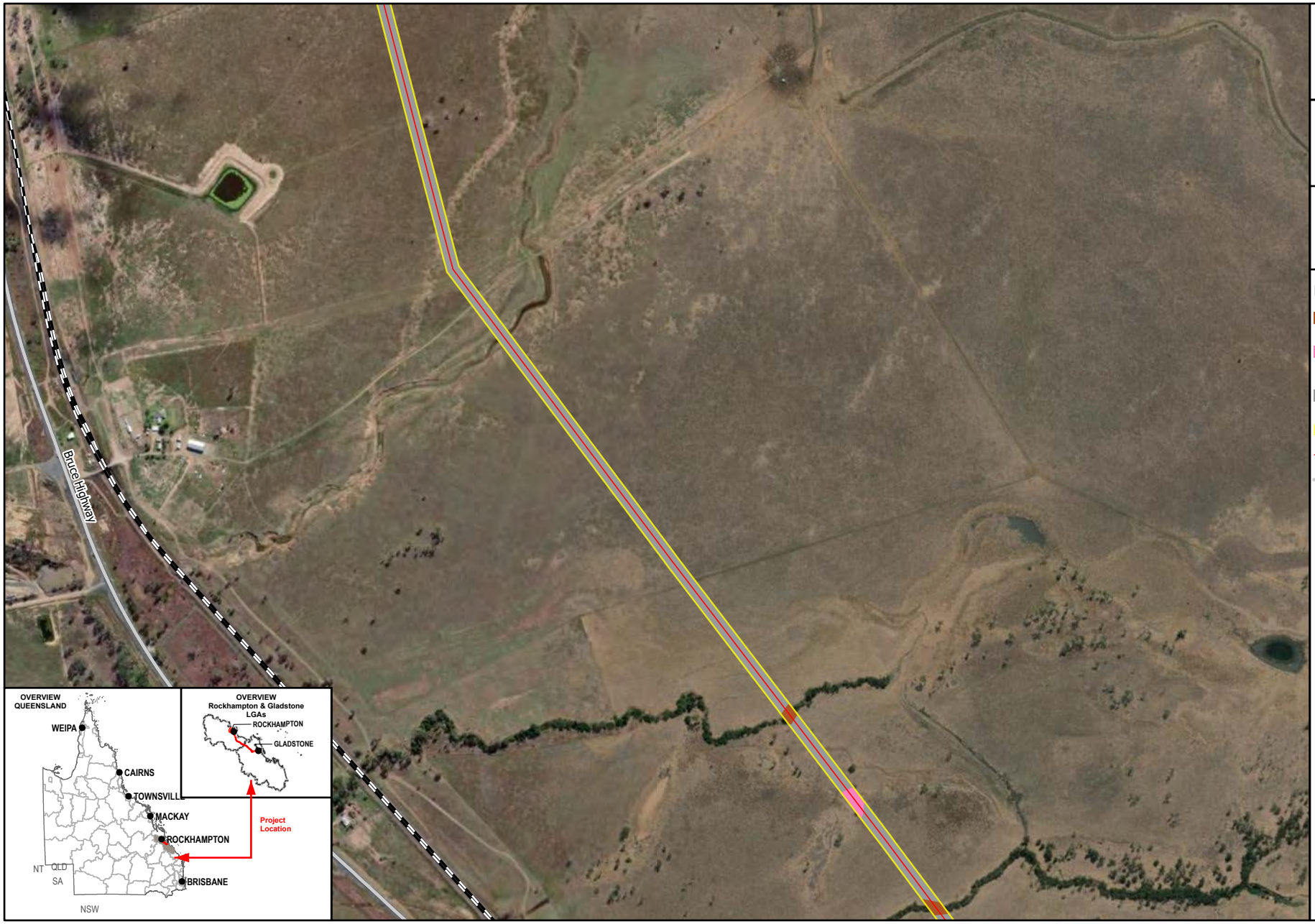
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6p
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
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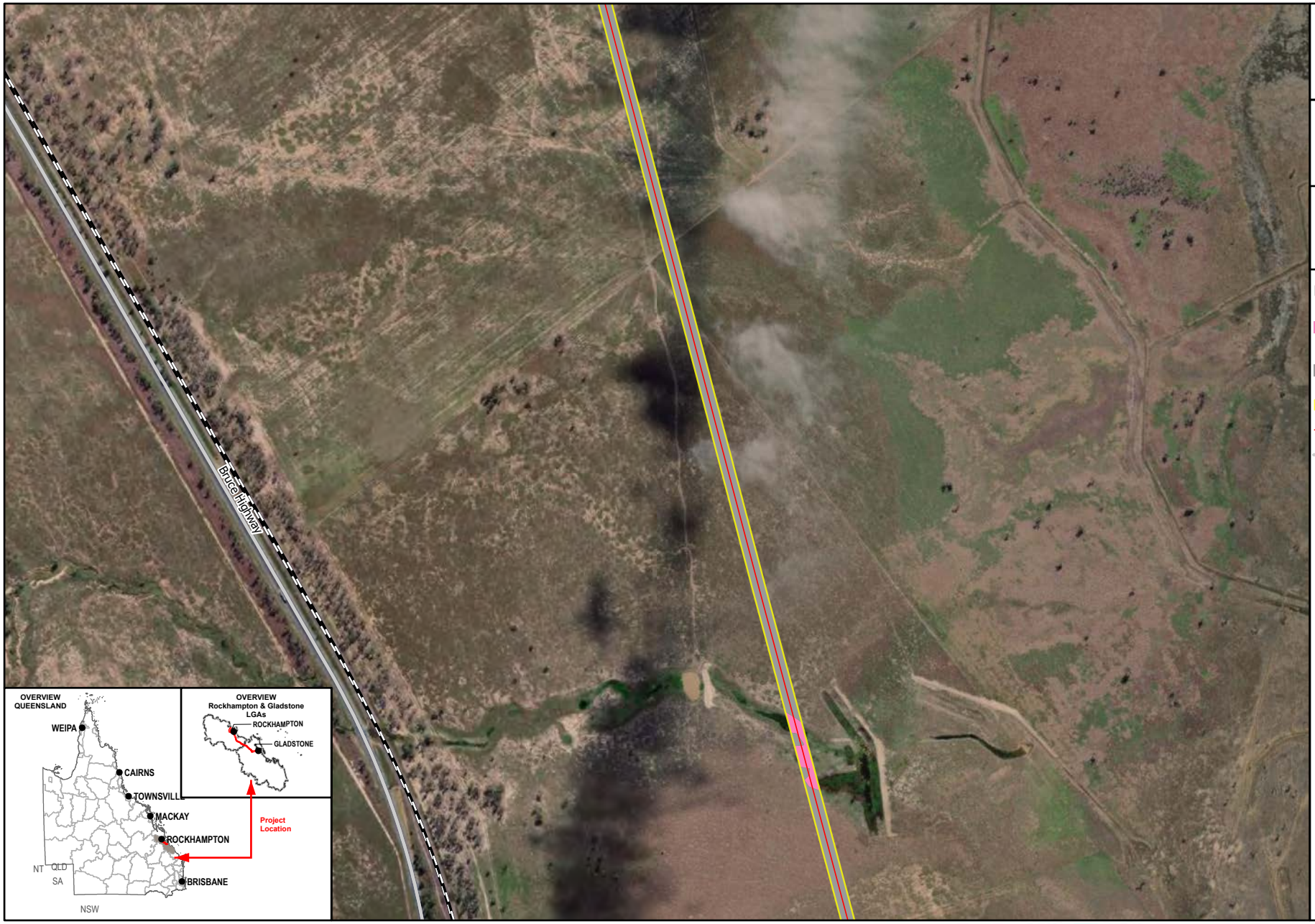
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6q
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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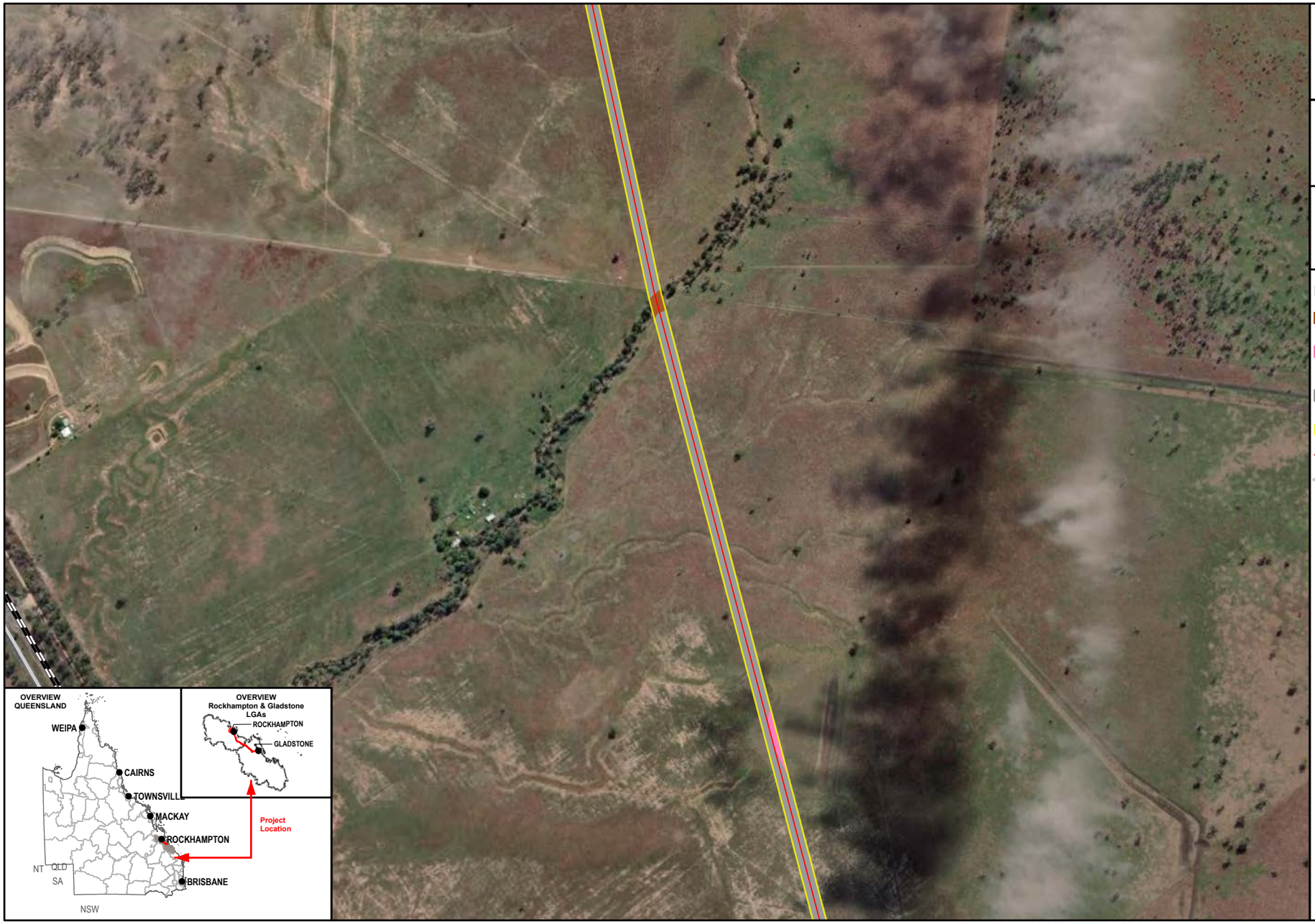
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6r
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Fringing Riparian Vegetation
- Freshwater Waterbodies and Seasonal Wetlands
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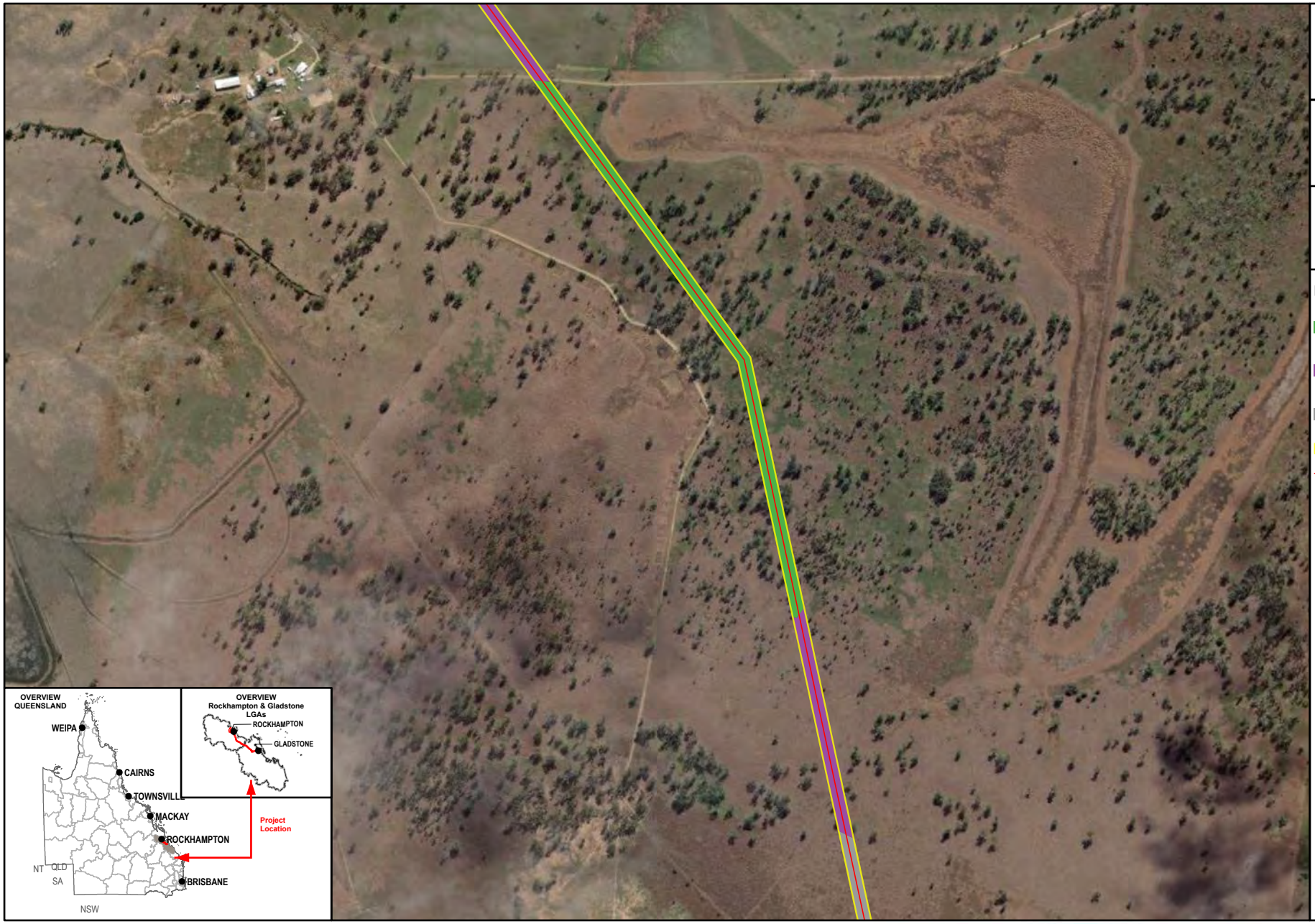
Figure 4-6s
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

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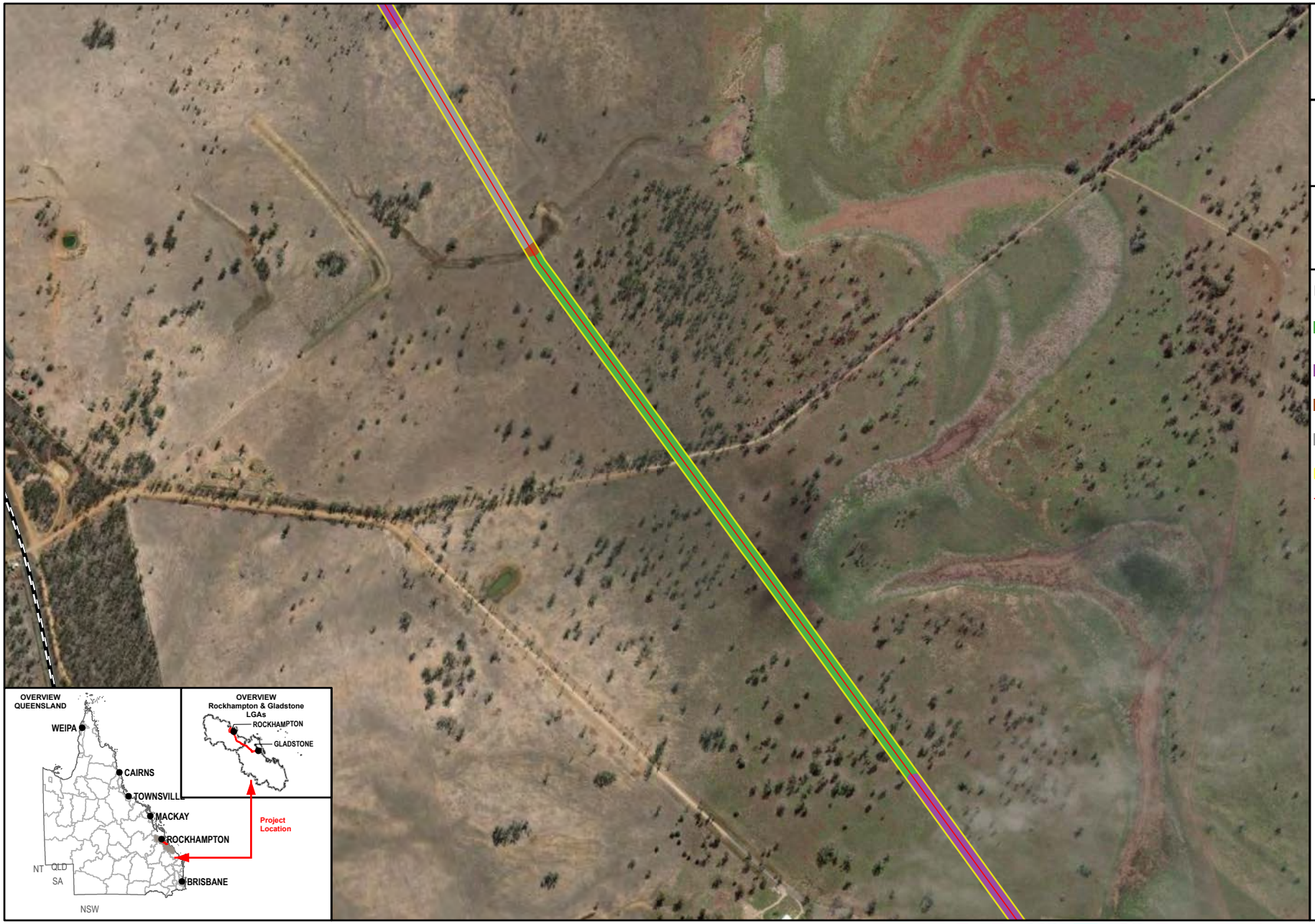
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6t
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

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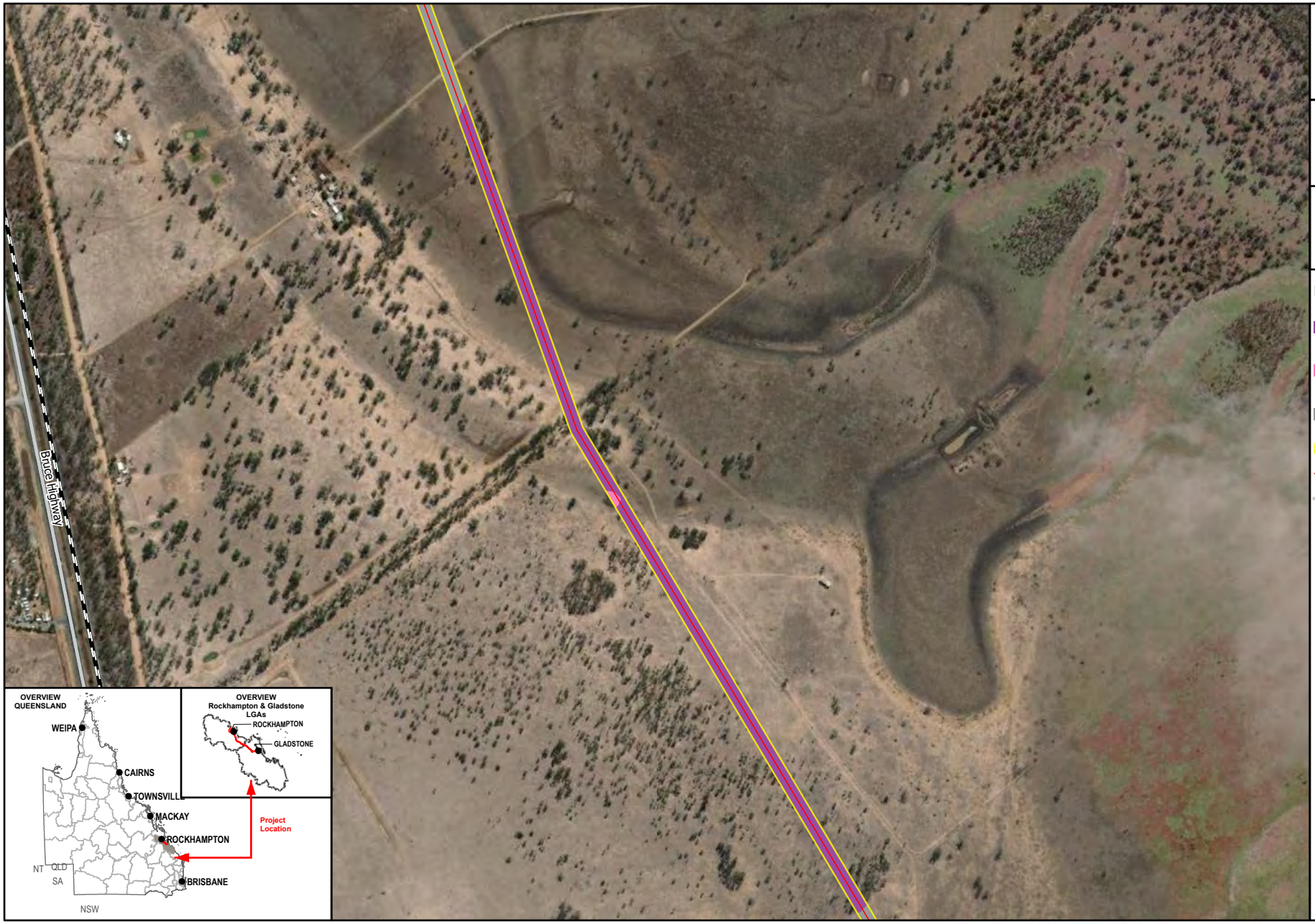
Figure 4-6u
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment
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- Railways

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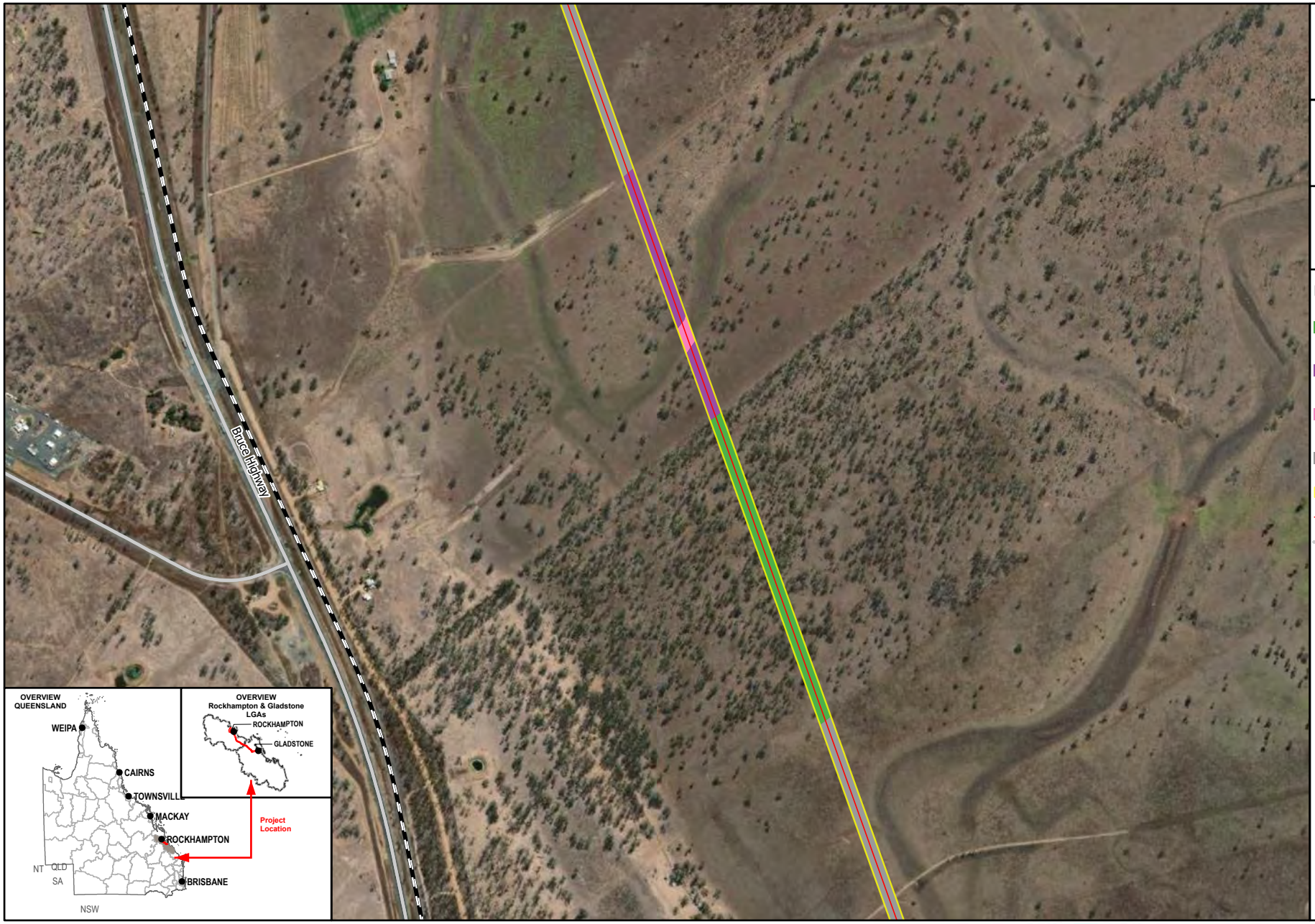
Figure 4-6v
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

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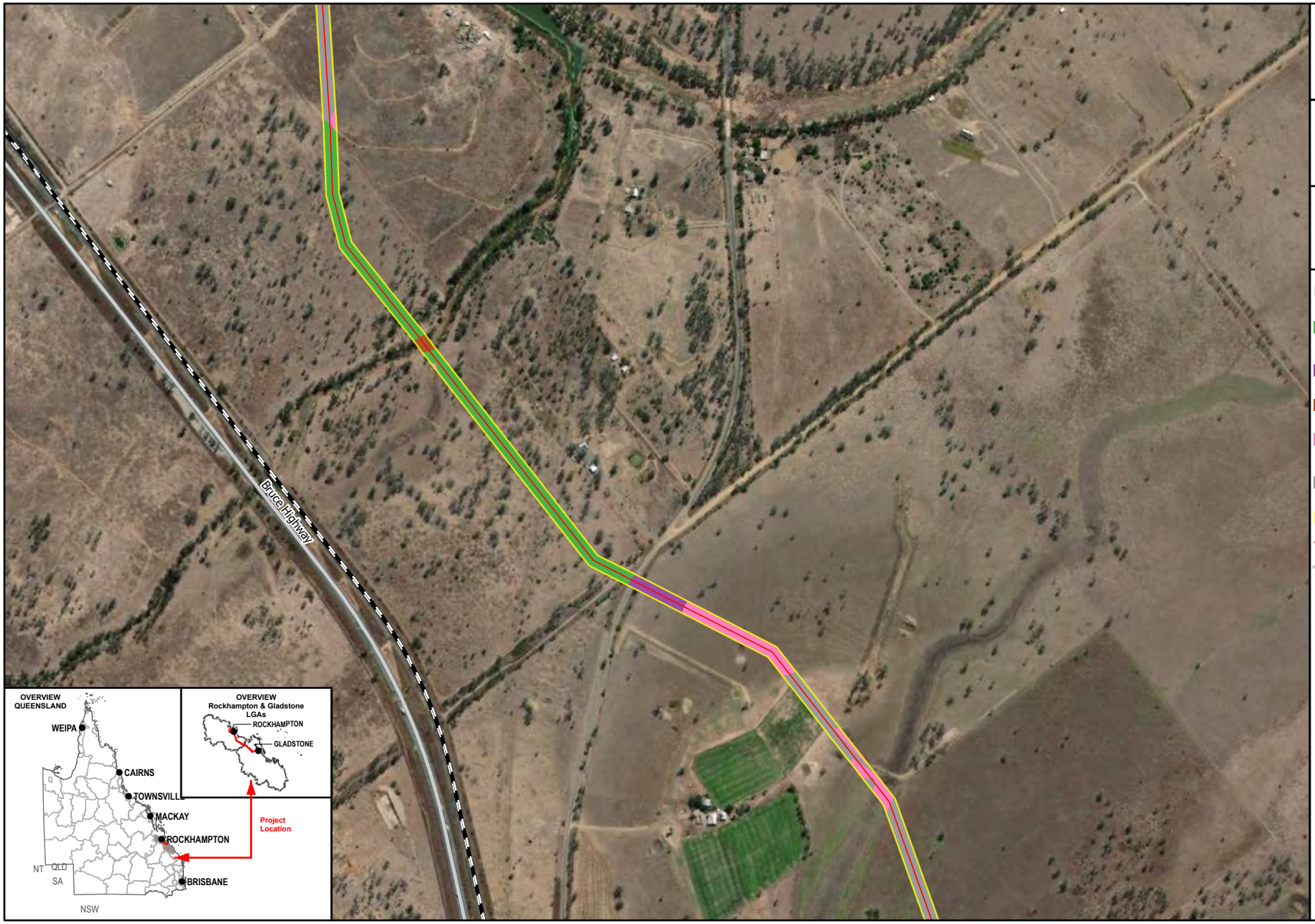
Figure 4-6w
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

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- Fringing Riparian Vegetation
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- Study Area
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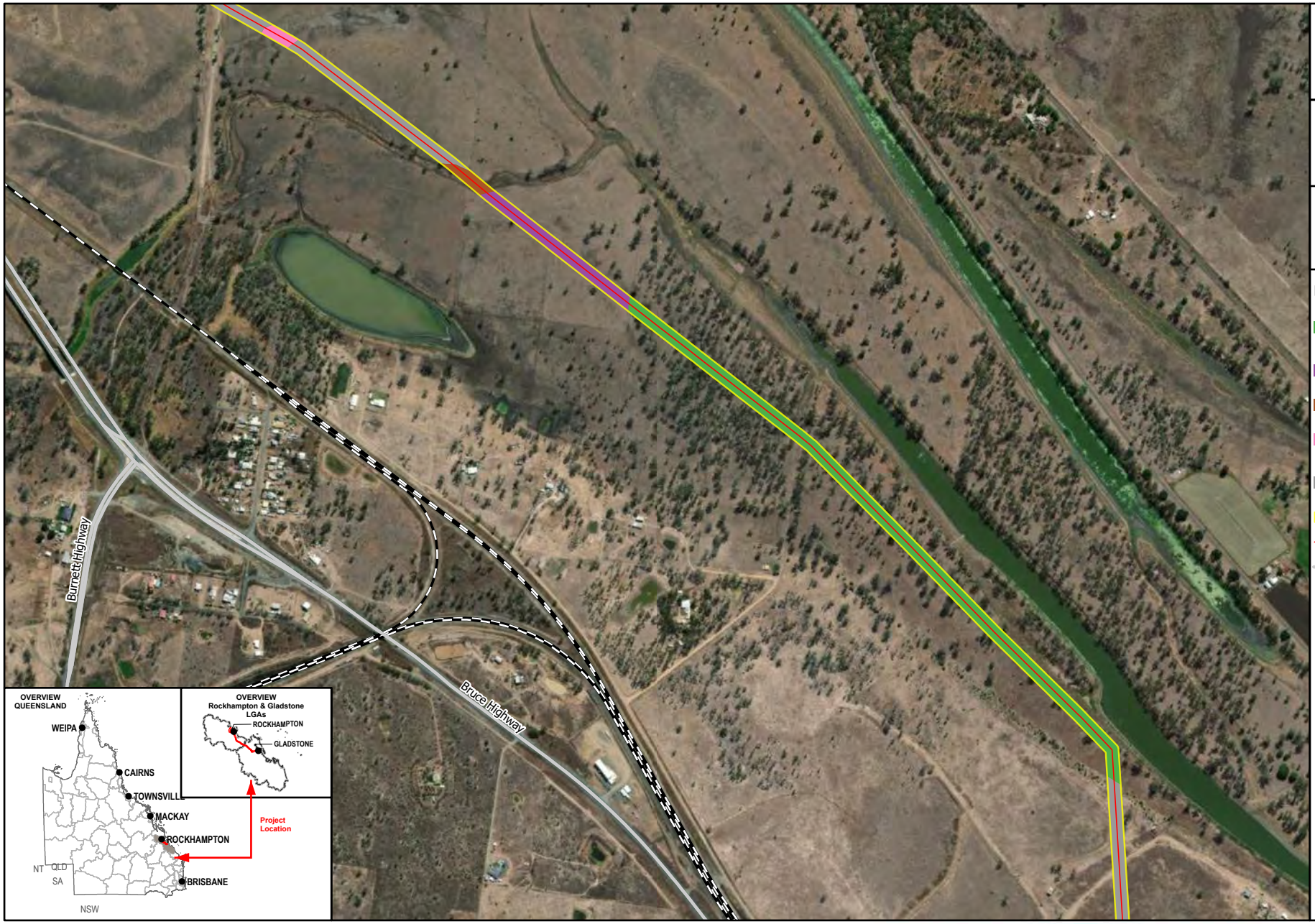
Figure 4-6x
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

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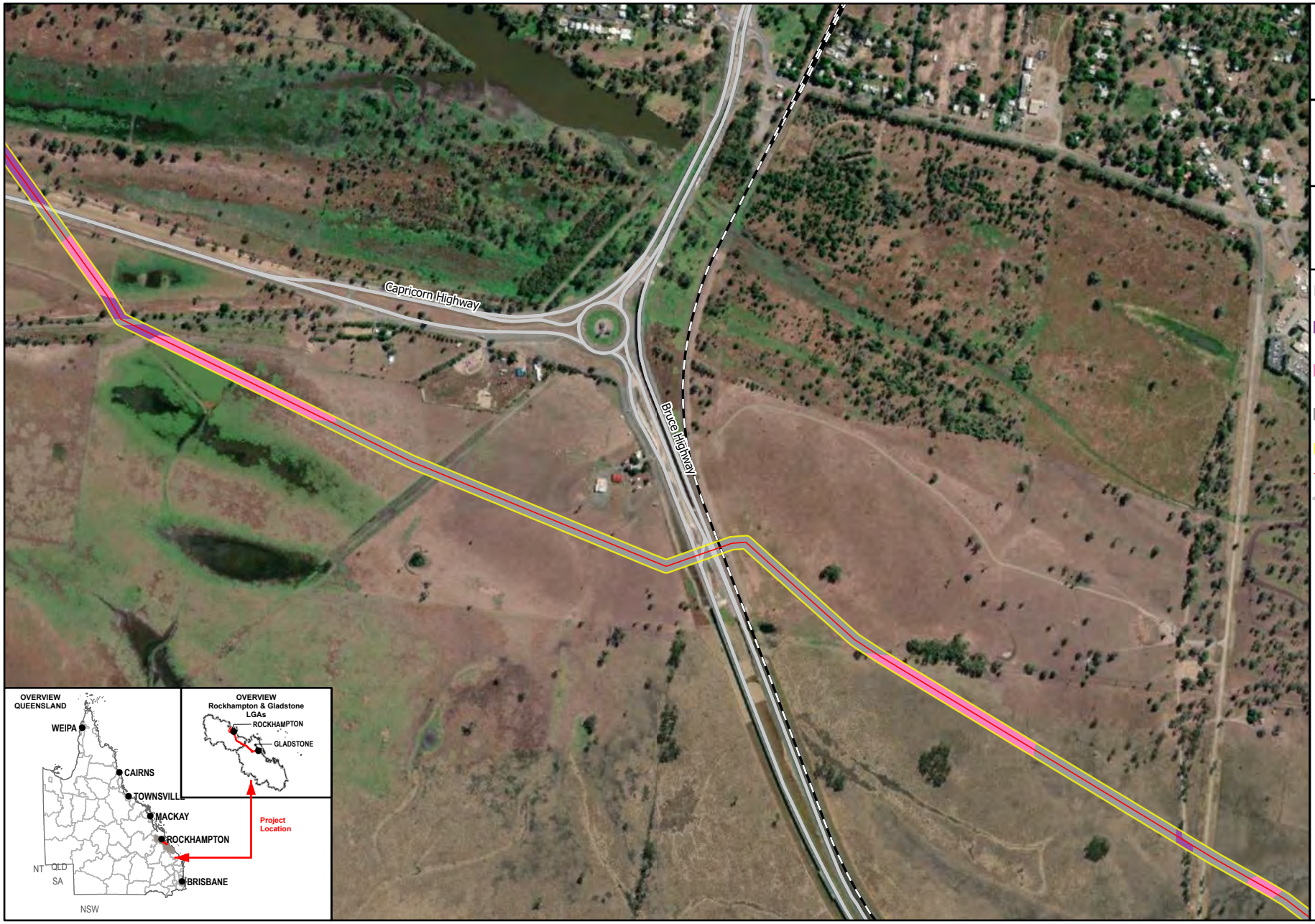
Figure 4-6y
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
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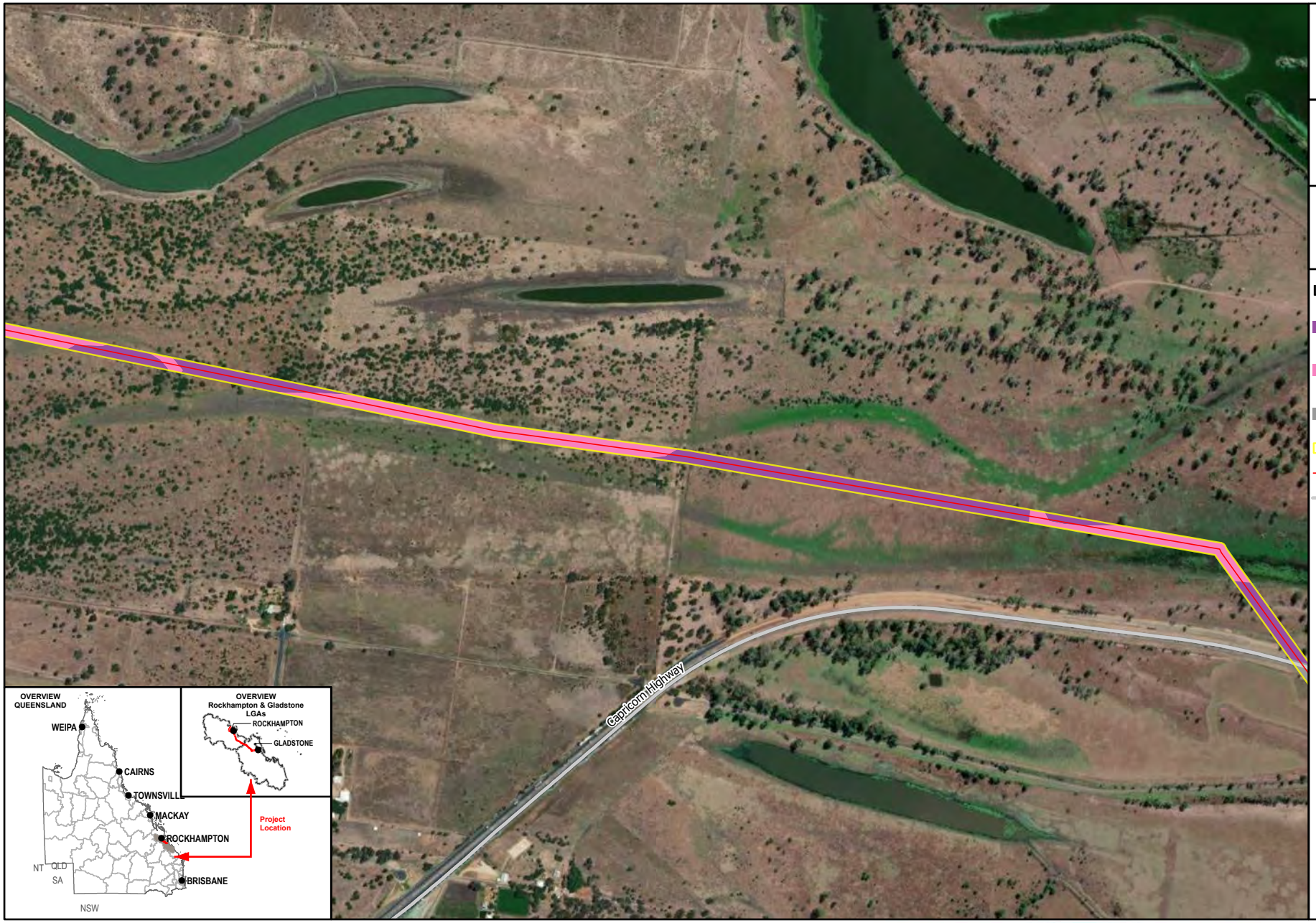

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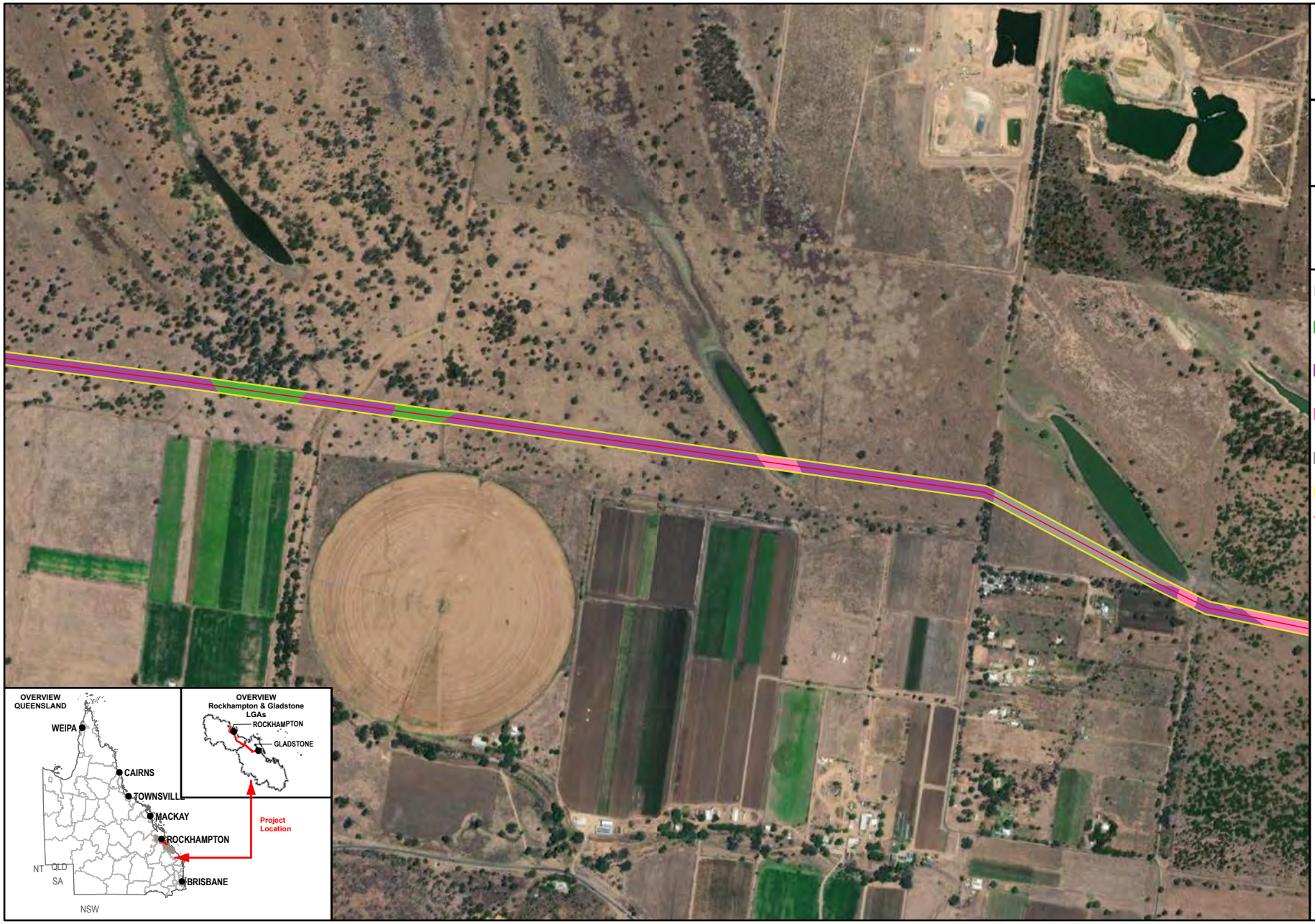
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-6a1
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12



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Legend

- Mixed Eucalyptus/Corymbia Woodland
- Regrowth and/or scattered Eucalyptus/Corymbia/Acacia Trees
- Freshwater Waterbodies and Seasonal Wetlands
- Cleared and Highly Modified Landscapes
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Figure 4-6b1
Habitat Types Identified Within the SGIC SDA Study Area
000-G-MAP-2415 Version:3 Date:2022/09/12

4.5 Biosecurity matters

4.5.1 Field survey results

4.5.1.1 Introduced flora species

Weed species were commonly observed throughout the SGIC SDA study area. WoNS and restricted invasive weeds (listed under the Biosecurity Act) recorded in the Northern Section study area are listed in Table 4-13. All restricted invasive plants recorded are Category 3 restricted matters.

Table 4-13 Weed species identified within the SGIC SDA study area

Species name	Common name	WoNS	State declaration Biosecurity Act
Parthenium hysterophorus	Parthenium	X	Category 3
Lantana camara	Lantana	X	Category 3
Opuntia stricta	Common pest pear	X	Category 3
Opuntia tomentosa	Velvety tree pear	X	Category 3
Sporobolus pyramidalis	Giant rat's tail grass		Category 3
Cryptostegia grandiflora	Rubber vine	X	Category 3
Cascabela thevetia syn. *Thevetia peruviana*	Yellow oleander		Category 3
Baccharis halimifolia	Groundsel bush		Category 3
Harrisia martinii	Harrisia cactus		Category 3

4.5.1.2 Introduced fauna species

Six introduced fauna species were identified within the SGIC SDA study area (Table 4-14), including four mammal species declared as restricted invasive animals under the Queensland's *Biosecurity Act 2014* (DAF 2017). Baited remote cameras detected the presence of the wild dog and European red fox during the field surveys within the SGIC SDA study area and are shown below in Plate 4-3.

Table 4-14 Introduced fauna species recorded within the SGIC SDA study area

Species name	Common name	State declaration Biosecurity Act
Canis lupus familiaris	Wild dog	Category 3, 4 and 6
Oryctolagus cuniculus	European rabbit	Category 3, 4 and 6
Rhinella marina	Cane toad	-
Sturnus tristis	Common Myna	-
Sus scrofa	Feral pig	Category 3, 4 and 6
Vulpes vulpes	European red fox	Category 3, 4 and 6

Plate 4-3 *Wild dog (left) and European red fox (right)*

4.6 Aquatic environment

4.6.1 Desktop assessment results

4.6.1.1 Threatened aquatic species

The EPBC Act PMST database identified 13 threatened aquatic species that have the potential to occur within the desktop search extent. State based searches (i.e. WildNet, Species Profile Search and Biomaps) identified seven threatened aquatic species that have been historically recorded within the desktop search extent.

The PMST and WildNet desktop search results are provided in Appendix A and summarised in Table 4-15. This table also identifies threatened aquatic species that were identified as controlling provisions under the EPBC approval.

Combined, all searches identified 15 threatened aquatic species within the desktop search extent. Six marine turtle species (*Caretta caretta, Chelonia mydas, Dermochelys coriacea, Eretmochelys imbricata, Lepidochelys olivacea, Natator depressus*), two freshwater turtle species (*Elseya albagula, Rheodytes leukops)*, dugong (*Dugong dugon)*, estuarine crocodile (*Crocodylus porosus)*, platypus (*Ornithorhynchus anatinus*), two sawfish species (*Pristis zijsron*, *Anoxypristis cuspidate)* and two riverine dolphin species (*Orcaella heinsohni, Sousa sahulensis),* listed in Table 4-15, have the potential to occur within the study area.

The green sawfish has no previous occurrences within study area. The species have been recorded in inshore coastal environments and estuarine creeks, but not into freshwaters (COA 2015). The species distribution occurs across northern Australia to the Whitsundays, its most current southern distribution (COA 2015). Although the species may occur further south, it is considered locally extinct throughout much of its former range. It is therefore unlikely that the green sawfish will occur within the SGIC SDA.

No previous occurrence records for the narrow sawfish occurs within the SGIC SDA (ALA 2022). The species is distributed across the Indo-Pacific, including across northern Australia and as far south in Queensland as off the coast of MacKay (Florida Museum 2022) and is therefore unlikely to occur within the waterways within the SGIC SDA.

Dugong are known to occur across northern Australia and as far south on the east coast as Moreton Bay and are known to congregate near accessible seagrass meadows within wide shallow bays, wide mangrove channels, and in the lee of large inshore islands (DCCEEW 2022f). Previous occurrence records of the species have occurred at the mouth of the Fitzroy River, but not in any of the tidal reaches within the SGIC SDA (ALA 2022). The turbidity of the water within the upper tidal reaches of Raglan Creek at site 2 and at Inkerman Creek at site 4 would not allow growth of large seagrass meadows within these reaches, there was also no evidence of seagrass at these sites. The habitat conditions within the tidal reaches of Raglan Creek and Inkerman Creek are not suitable for the species, and due to the sites occurring in the upper tidal reaches, the species is therefore unlikely to occur within the SGIC SDA.

The two dolphin species, dugong, and marine turtle species are discussed further in Section 4.6.2.5.

Table 4-15 Threatened aquatic species identified within the SGIC SDA desktop search extent

Scientific name	Common name	Status		Source	WN Records	Nearest Record to ROW	EPBC Approval
		EPBC Act	NC Act				
Reptiles							
Caretta caretta	Loggerhead turtle	E, Mig	E	WN, PMST	1	21.78 km	
Chelonia mydas	Green turtle	V, Mig	V	WN, PMST	14	21.75 km	
Crocodylus porosus	Estuarine crocodile	Mig	V	WN, PMST	1	7.5 km	
Dermochelys coriacea	Leatherback turtle	E, Mig	E	PMST	-	50.76 km	

Scientific name	Common name	Status		Source	WN Records	Nearest Record to ROW	EPBC Approval
		EPBC Act	NC Act				
Elseya albagula	White-throated snapping turtle	CE	CE	WN, PMST	3	904 m	
Eretmochelys imbricata	Hawksbill turtle	V, Mig	E	PMST	-	52.13 km	
Lepidochelys olivacea	Olive Ridley turtle	E, Mig	E	PMST	-	>180 km	
Natator depressus	Flatback turtle	V, Mig	V	PMST	-	30.67 km	
Rheodytes leukops	Fitzroy River turtle	V	V	PMST	-	9.63 km	✓
Sharks							
Anoxypristis cuspidata	Narrow sawfish	V, Mig	NL	PMST		30.72 km	
Pristis zijsron	Green sawfish	V, Mig	NL	PMST		>1,000 km	
Mammals							
Dugong dugon	Dugong	Mig	V	WN, PMST	2	17.40 km	
Orcaella heinsohni	Australian snubfin dolphin	NL	V	WN	1	26.0 km	
Ornithorhynchus anatinus	Platypus	-	SL	WN	4	3.15 km	
Sousa sahulensis	Australian humpback dolphin	Mig	V	PMST	-	25.52 km	

Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; LC – least concern; NL – not listed.

WN – WildNet; PMST – Protected Matters Search Tool.

4.6.1.2 Great Barrier Reef Marine Park

The SGIC section of the pipeline intersects several waterways within the Fitzroy River sub- catchment. The closest of these waterways to the GBR, Inkerman Creek, feeds into Casuarina Creek approximately 37 km upstream from GBR coastal zone. The GBR is listed as a World Heritage Area, National Heritage Property, Marine Park and nationally important wetland. The GBR supports a large number of conservation significant species including marine megafauna, shorebirds, sharks and marine fish species. It contains approximately ten per cent of the coral reef ecosystems in the world and supports an enormous amount of biodiversity. The SGIC SDA pipeline alignment will have no direct impacts upon the GBR, and mitigation measures (see Section 6) enacted to minimise potential indirect risks to the GBR.

4.6.1.3 Wetlands

One Nationally Important Wetland (Fitzroy River Floodplain) listed under the Australian Directory of Important Wetlands intersects the SGIC SDA, approximately 6 km south of Rockhampton. Two additional National Important Wetlands (Fitzroy River Delta, Great Barrier Reef Marine Park) are located downstream of the SGIC SDA pipeline alignment as outlined in Table 4-16 and shown in Figure 4-7. The SGIC SDA pipeline alignment with have no direct impacts upon these wetlands. The SGIC SDA pipeline alignment intersects with three MSES listed wetlands which are mapped as high ecological significance wetlands and wetland protection areas as shown in Figure 4-7. No Ramsar wetlands occur within or adjacent to the study area. The nearest Ramsar site is located at Shoalwater and Corio Bays approximately 48 km north-east of the study area.

Table 4-16 Nationally Important Wetlands within and in relation to the SGIC SDA pipeline alignment

Wetland ID	Wetland name	Location
QLD013	Fitzroy River Floodplain	SGIC SDA pipeline alignment

Wetland ID	Wetland name	Location
QLD012	Fitzroy River Delta	1.2 km downstream of the SGIC SDA pipeline alignment at Twelve Mile Creek
QLD100	Great Barrier Reef Marine Park	55 km downstream of the SGIC SDA pipeline alignment at Gavial Creek

4.6.1.4 Waterways and fish habitat

A total of 47 mapped waterways under the WWBW layer, including the tidal spatial layer, are intersected by the SGIC SDA pipeline alignment (Table 4-17; Figure 4-8).

The risk ratings assist with the determination of DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), based on the shape and location of the waterway in the catchment, as well as the characteristics of species that reside within them (DAF 2021). Waterways with a rating of major or high-risk to fish passage generally contain larger biomasses of fish populations and contain species that are more likely to have weaker swimming abilities (DAF 2021). Low or moderate risk waterways for fish passage are often in the upper reaches of a catchment and have steeper slopes and would generally have a lower biomass of fish populations than downstream reaches (DAF 2021).

Table 4-17 Summary of all waterway crossings in the SGIC SDA pipeline alignment

Waterway barrier works risk rating	Number of waterways intersected
Purple (major)	9
Red (high)	4
Amber (moderate)	15
Green (low)	16
Tidal	3

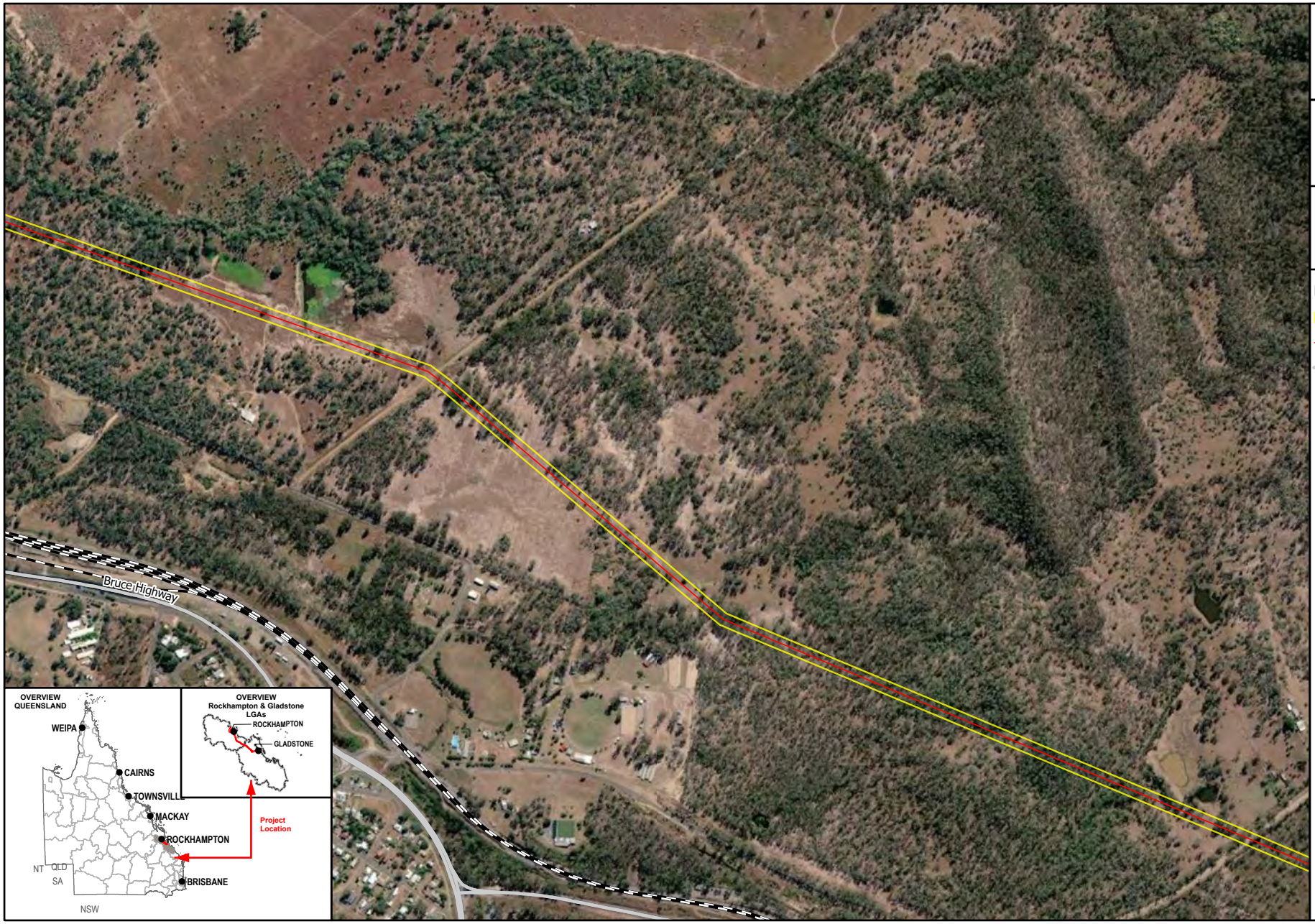
Majority of the waterways are mapped as moderate (15) and low (16). The nine major (purple) waterways in the WWBW layers within the SGIC SDA pipeline alignment include:

– Scrubby Creek
– Gavial Creek
– Bobs Creek
– Station Creek
– Oaky Creek
– Anabranch of Inkerman Creek (intersects SGIC SDA pipeline alignment twice)
– Twelve Mile Creek
– Horigan Creek.

The three tidal waterways in the WWBW layer within the SGIC SDA pipeline alignment include:

– Inkerman Creek
– Horigan Creek
– Raglan Creek.

No mapped fish habitat areas intersect the SGIC SDA pipeline alignment. Two kilometres downstream of the pipeline crossing at Raglan Creek is a mapped fish habitat area (management A) that extends beyond the mouth of the Fitzroy River and upstream towards Rockhampton (Figure 4-8).



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- Study Area
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- Main Roads
- Railways

Data Sources:
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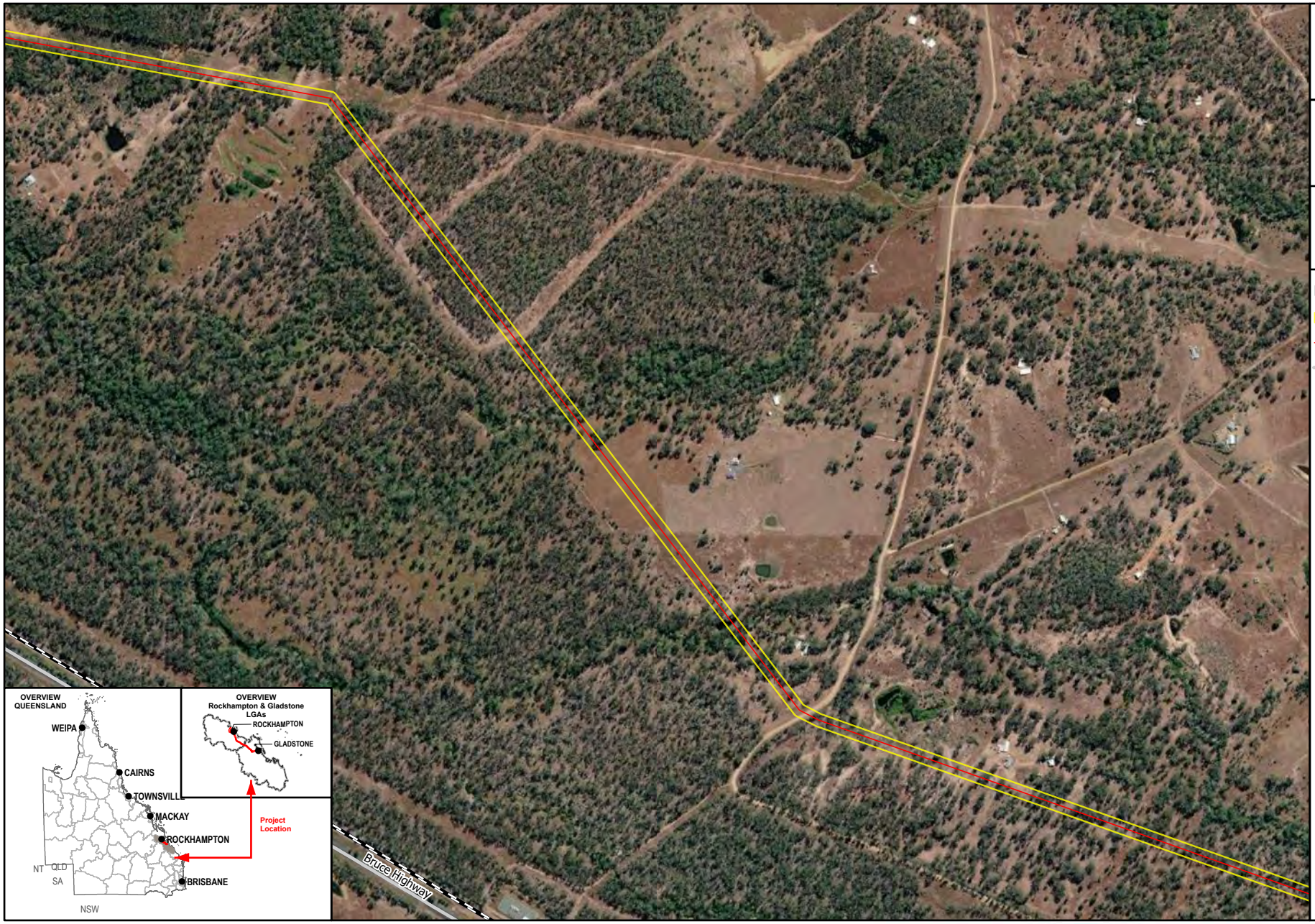
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7a
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7b
Mapped Wetlands Within the SGIC SDA Desktop Search Area
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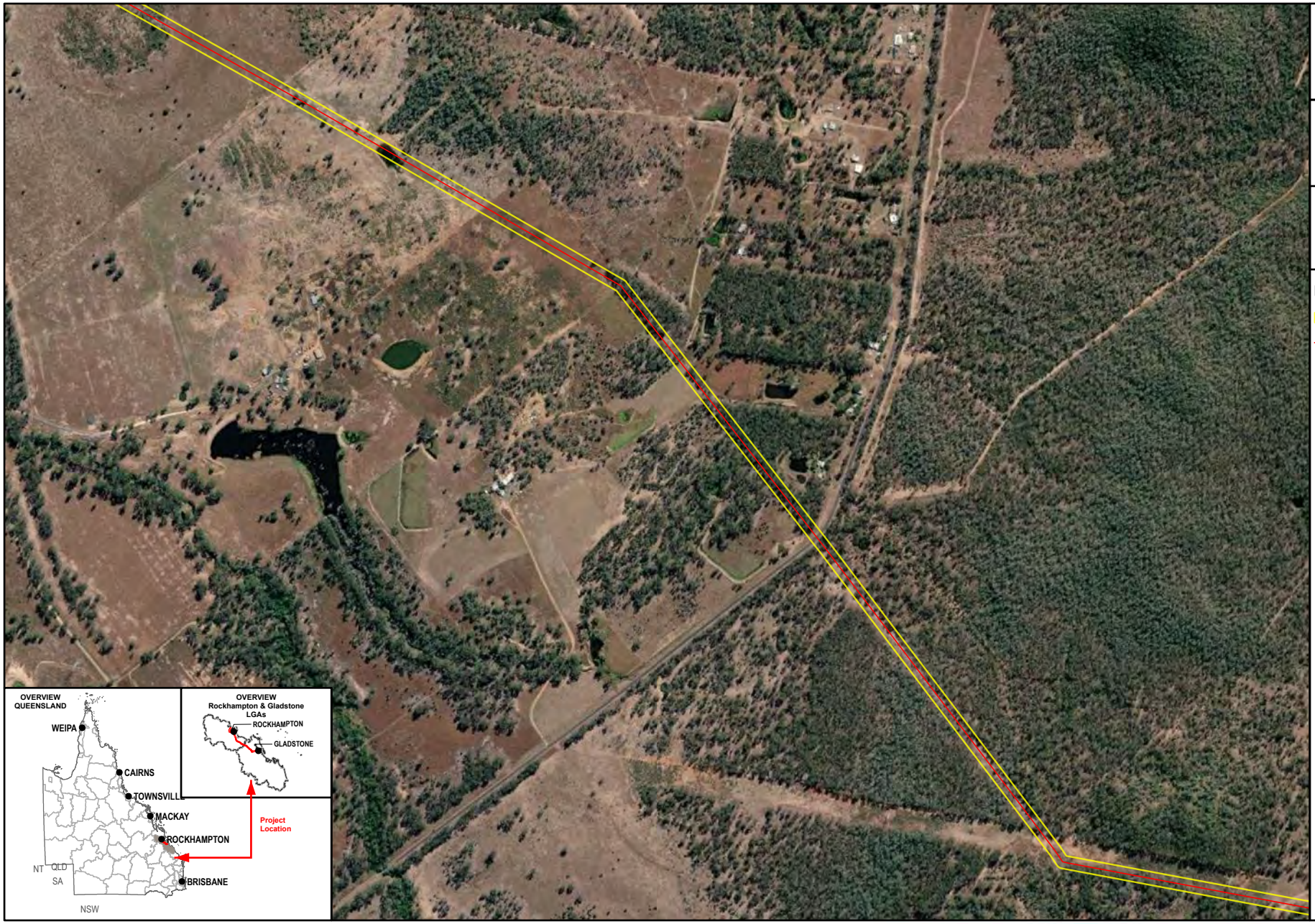

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7c
Mapped Wetlands Within the SGIC SDA Desktop Search Area

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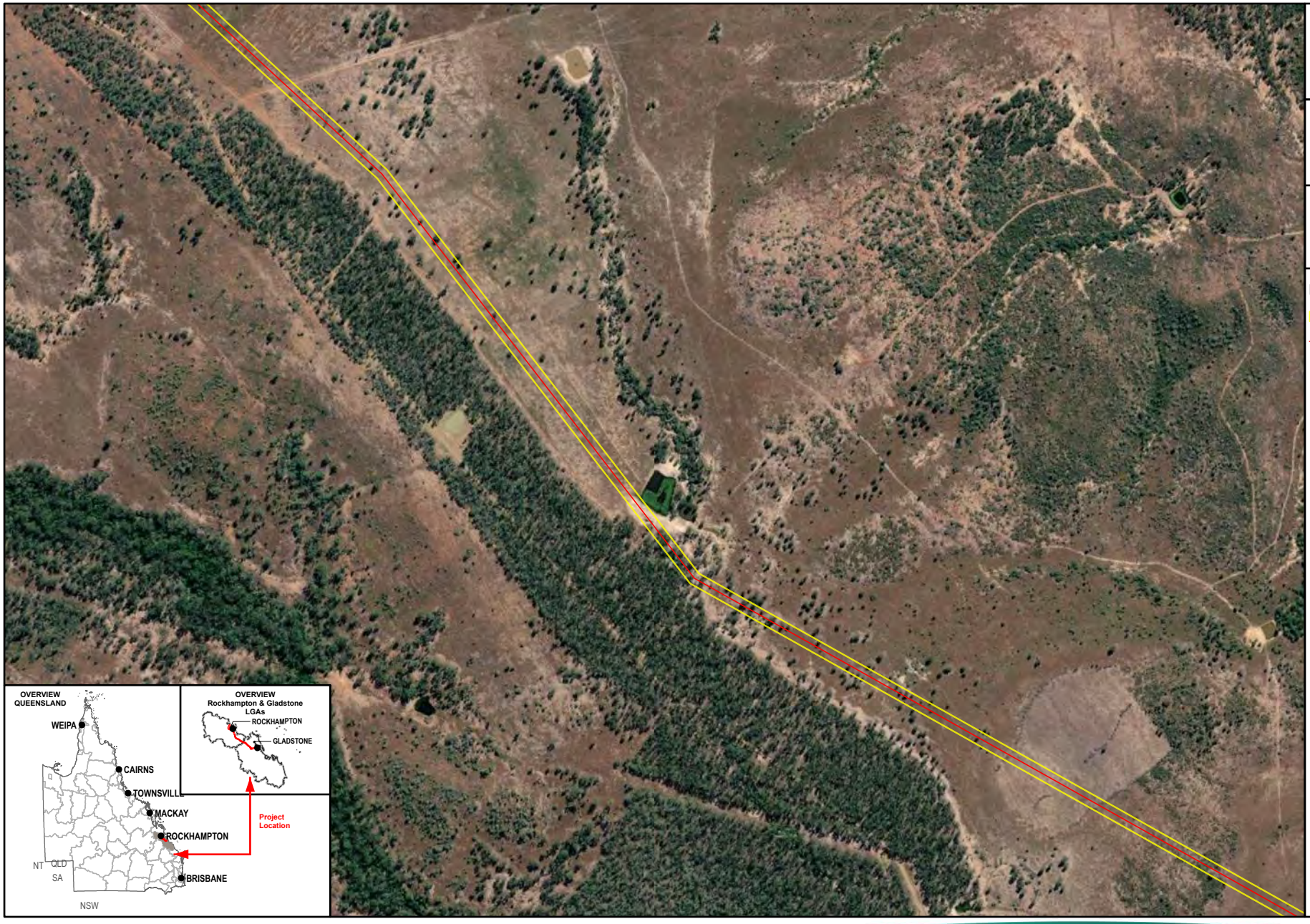

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Figure 4-7d
Mapped Wetlands Within the SGIC SDA Desktop Search Area

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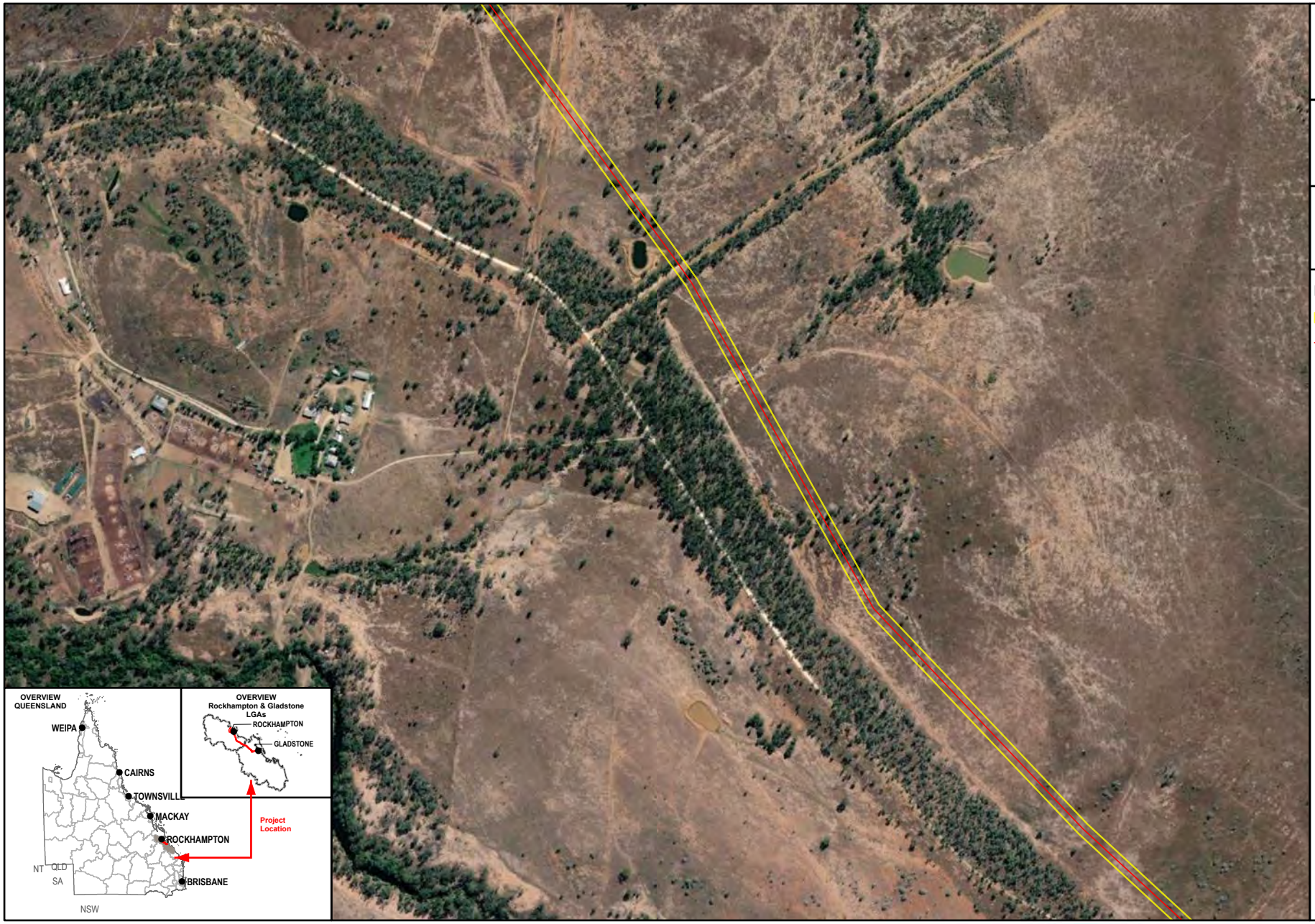

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Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7e
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12

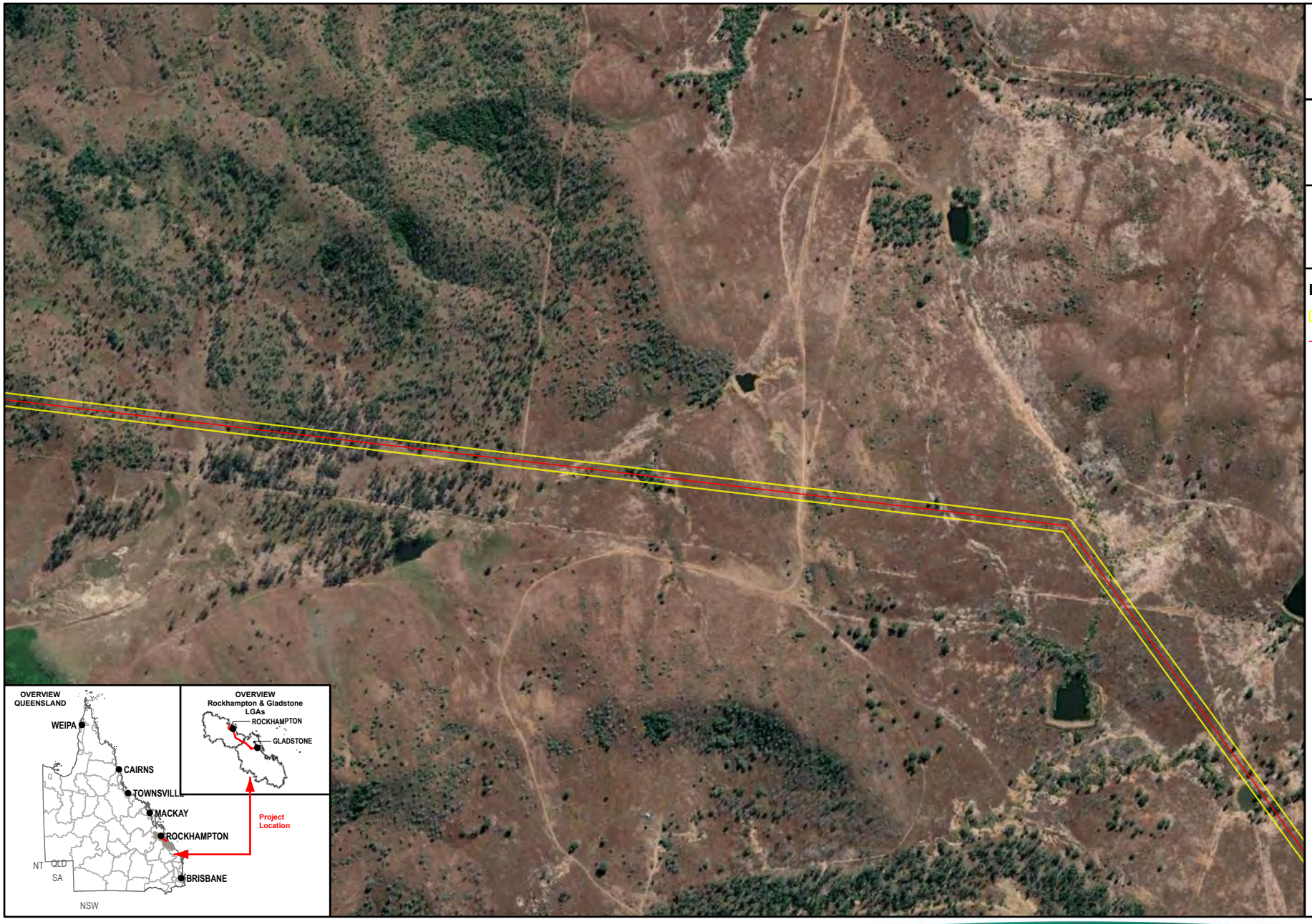

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Figure 4-7f
Mapped Wetlands Within the SGIC SDA Desktop Search Area

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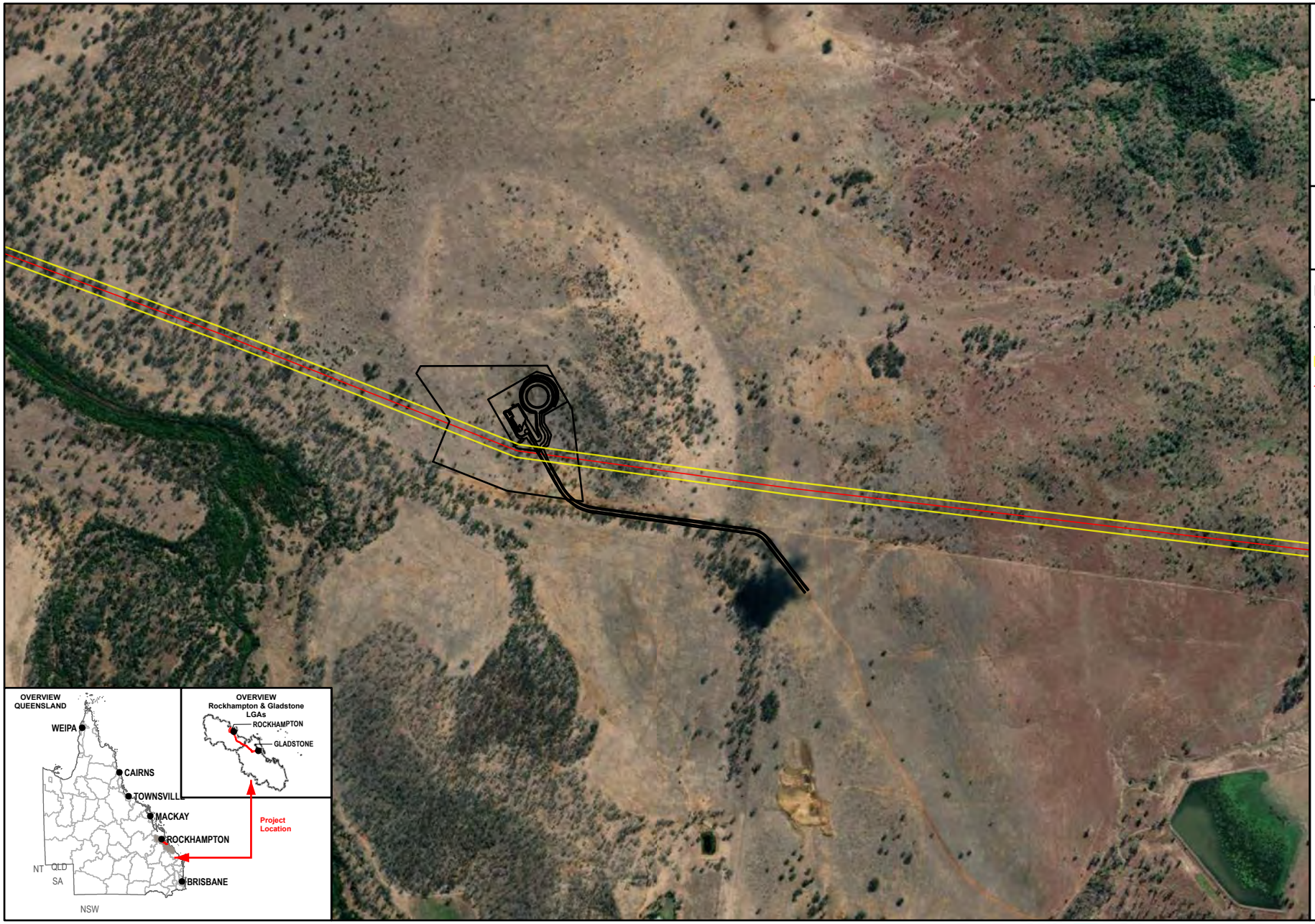

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- Raglan Pump Station and Reservoir Layout
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Figure 4-7g
Mapped Wetlands Within the SGIC SDA Desktop Search Area

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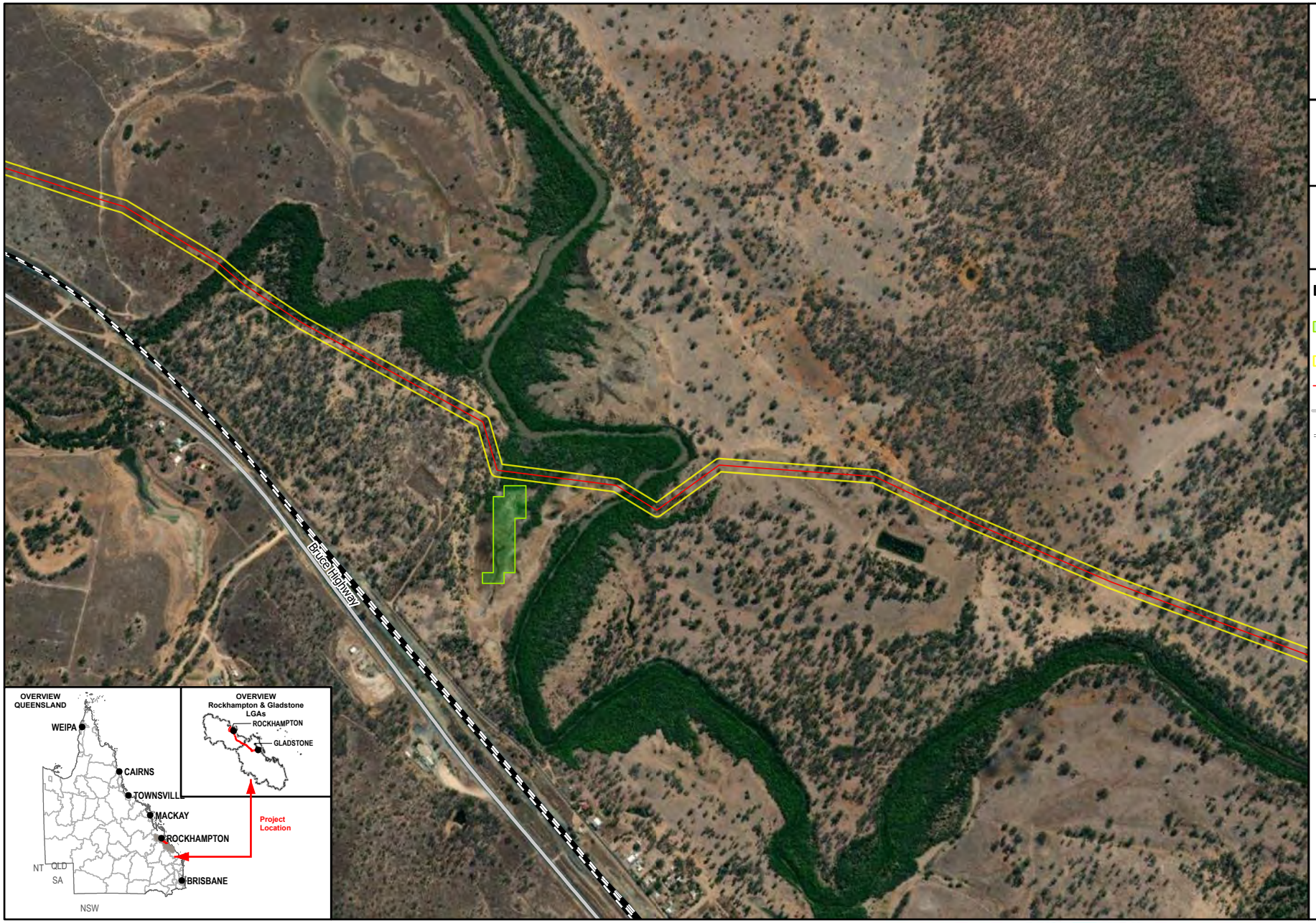

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- MSES High Ecological Significance Wetlands
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7h
Mapped Wetlands Within the SGIC SDA Desktop Search Area
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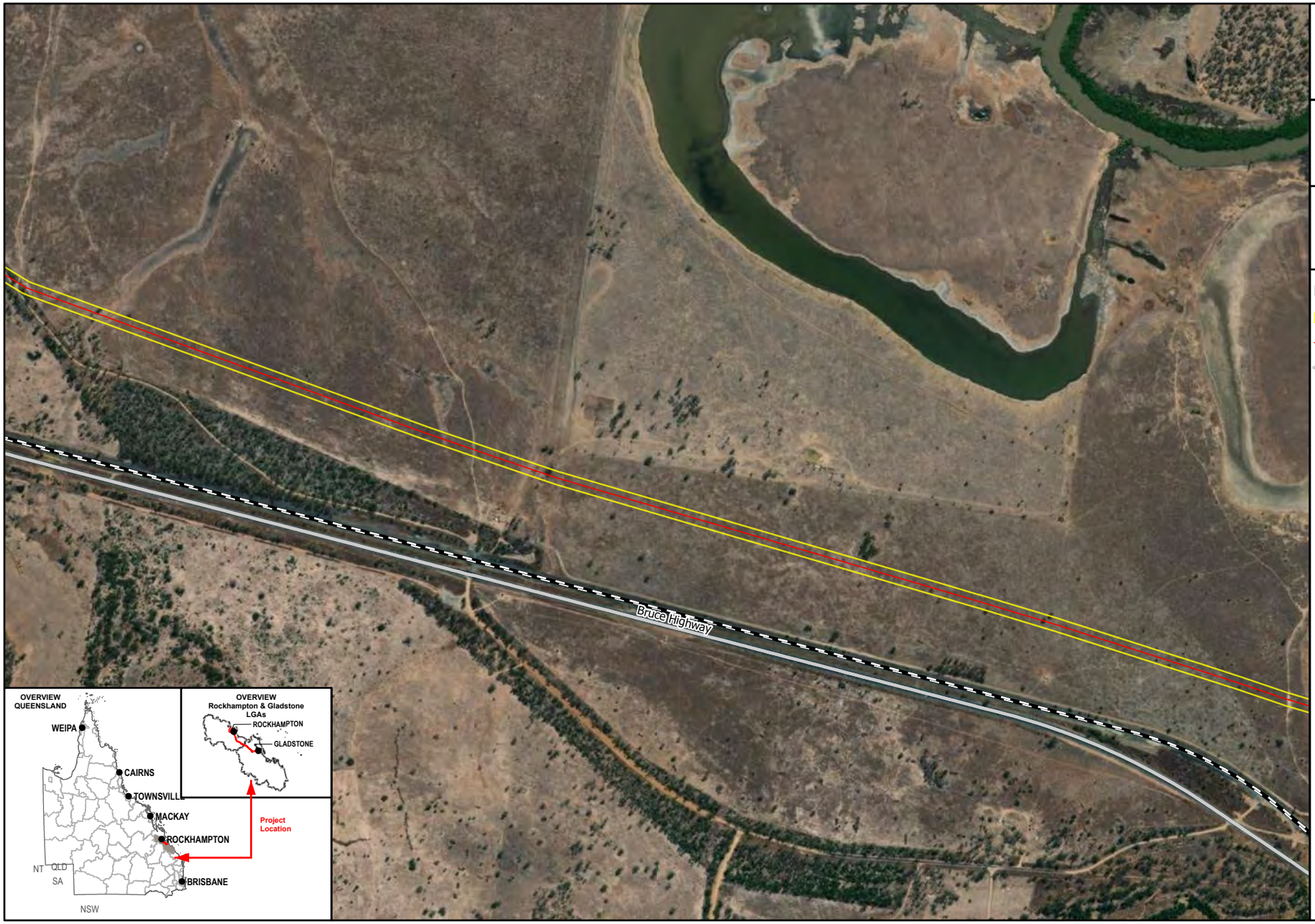

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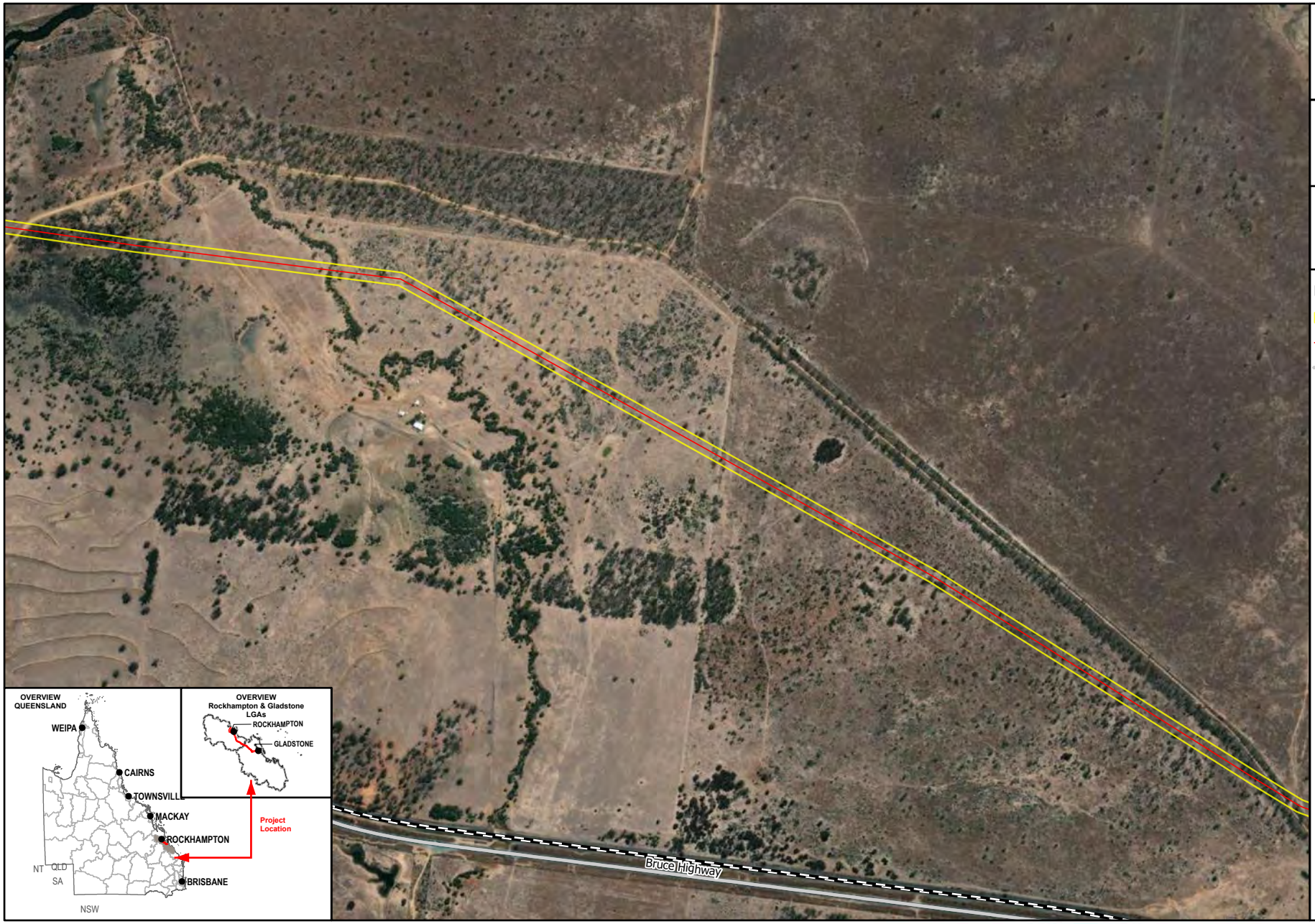
PROJECTION UTM Zone 56
(Datum GDA2020)

Compiled by:YS16239

Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7i
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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Legend

- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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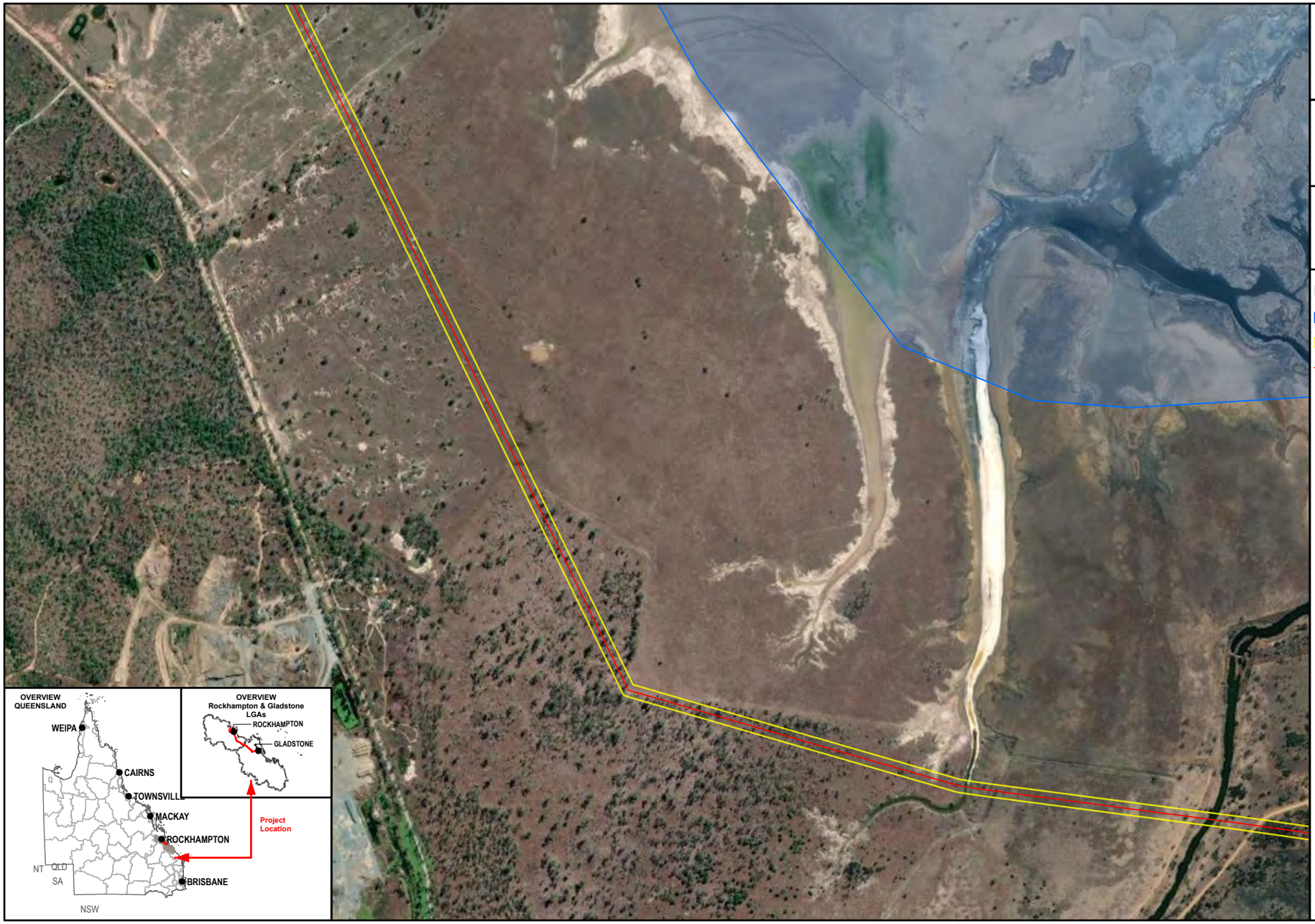
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7j
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- Fitzroy River Delta
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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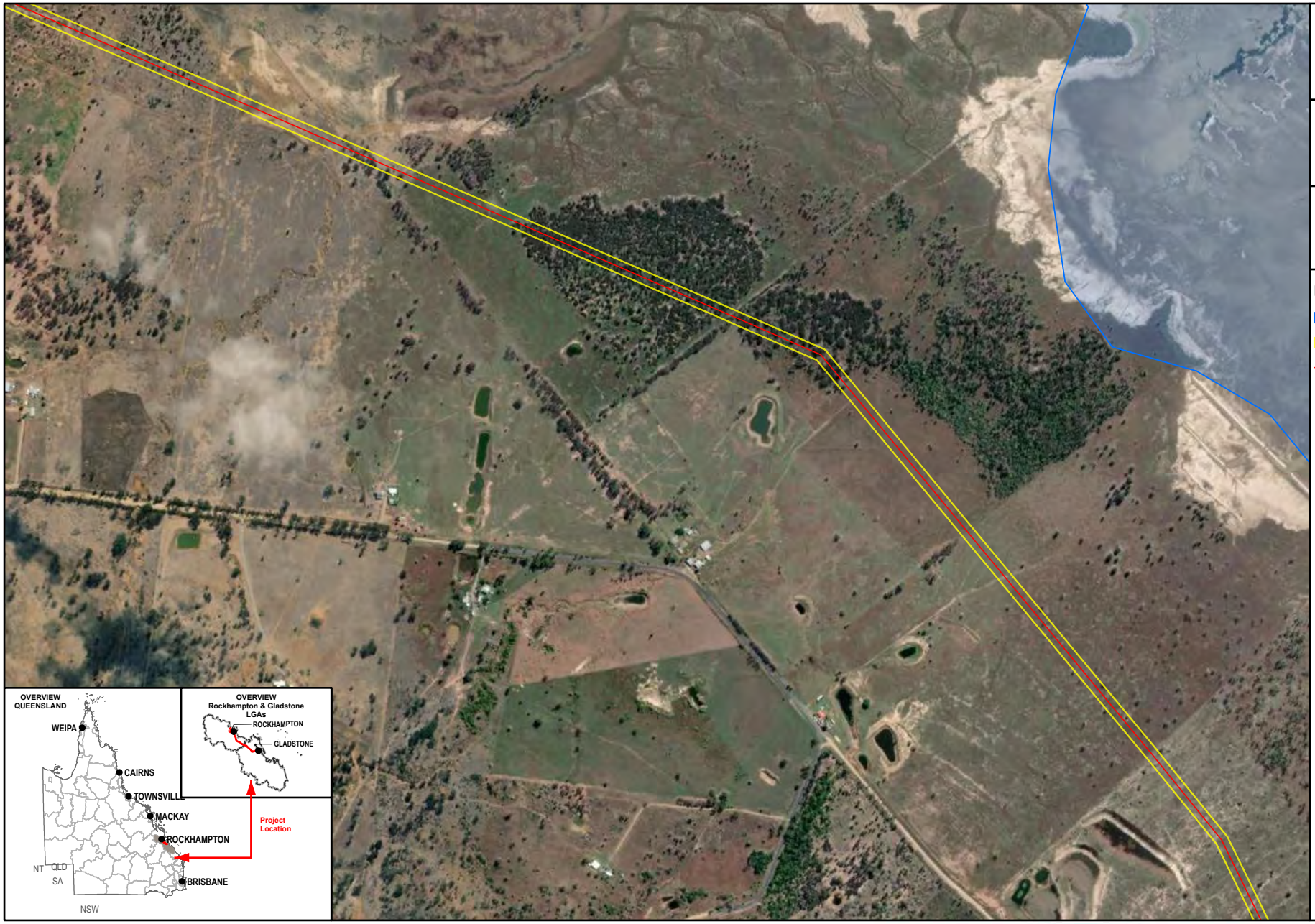
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7k
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- Fitzroy River Delta
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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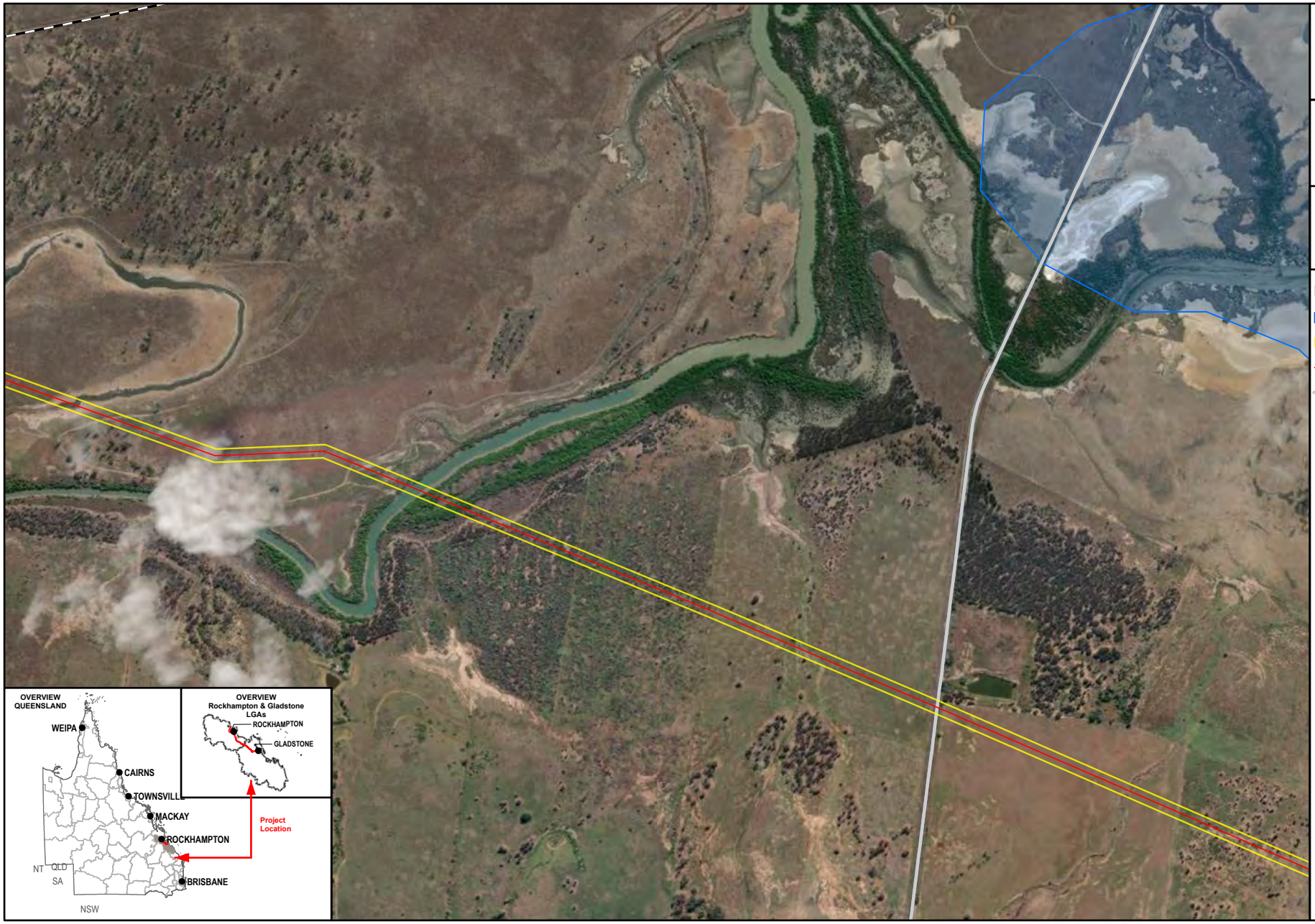
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report

Figure 4-7l

Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- Fitzroy River Delta
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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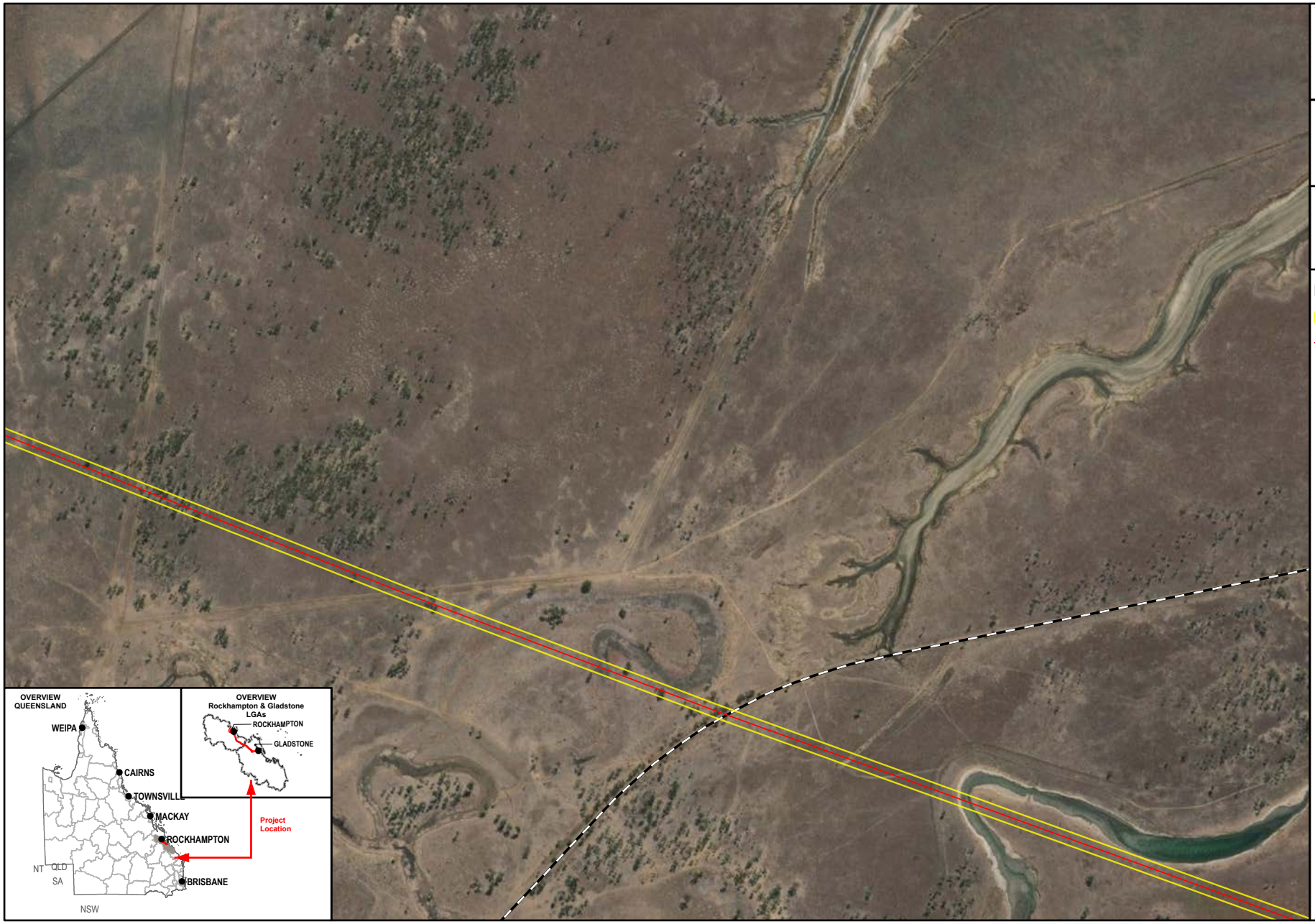
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7m
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- Study Area
- SGIC SDA Pipeline Alignment
- Railways

Data Sources:
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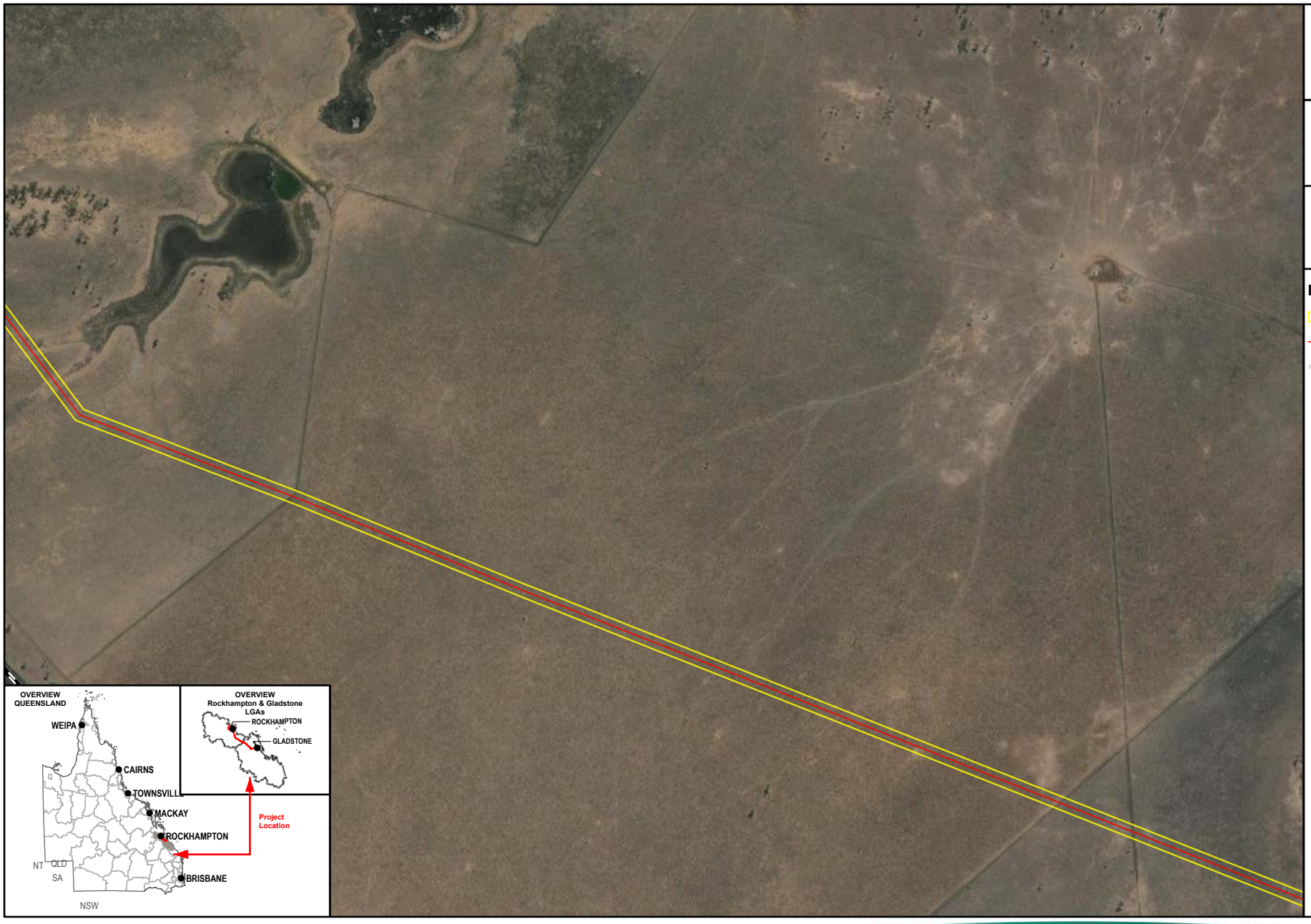
Figure 4-7n
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- Study Area
- SGIC SDA Pipeline Alignment
- Railways

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7o
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12

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- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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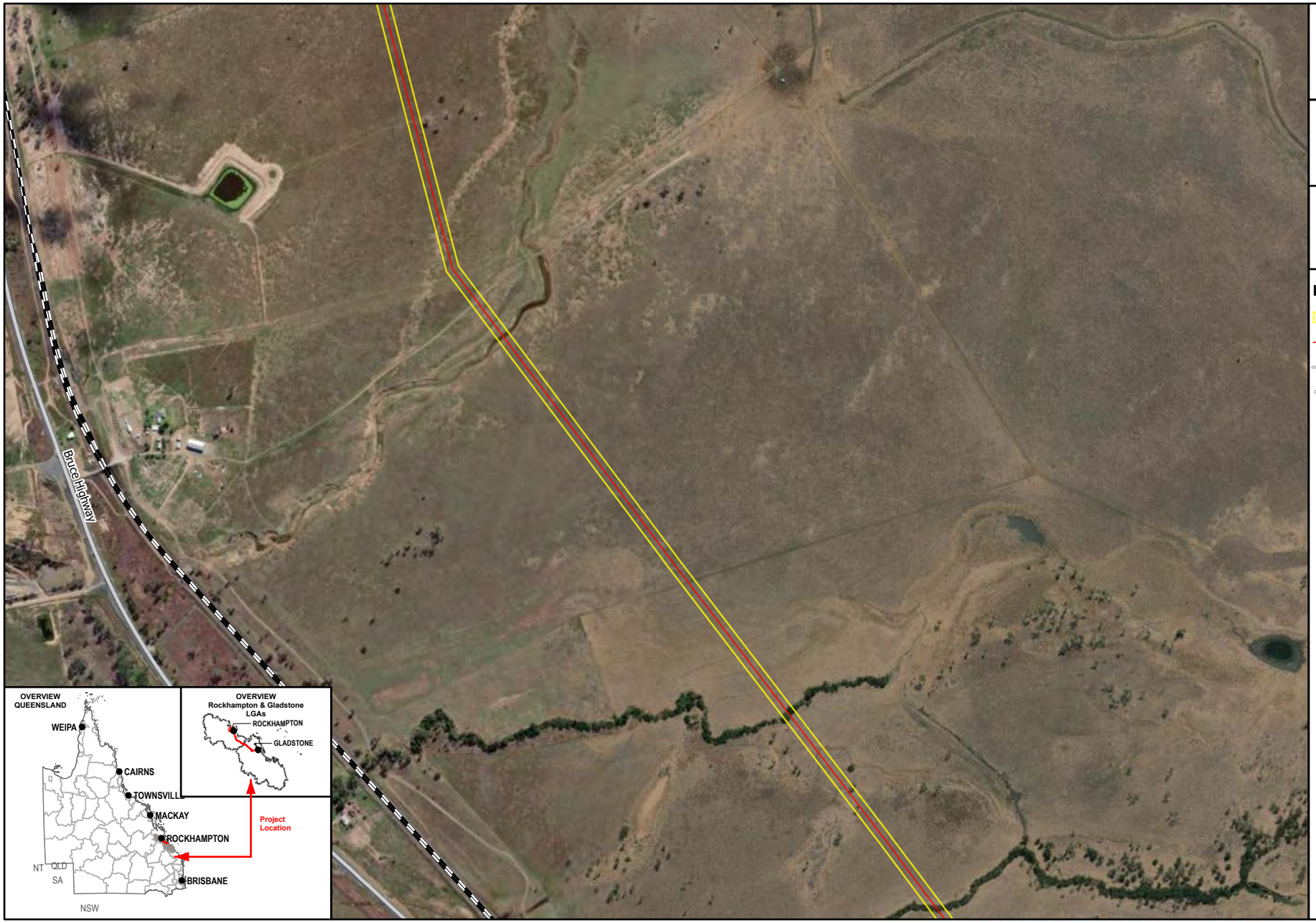
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7p
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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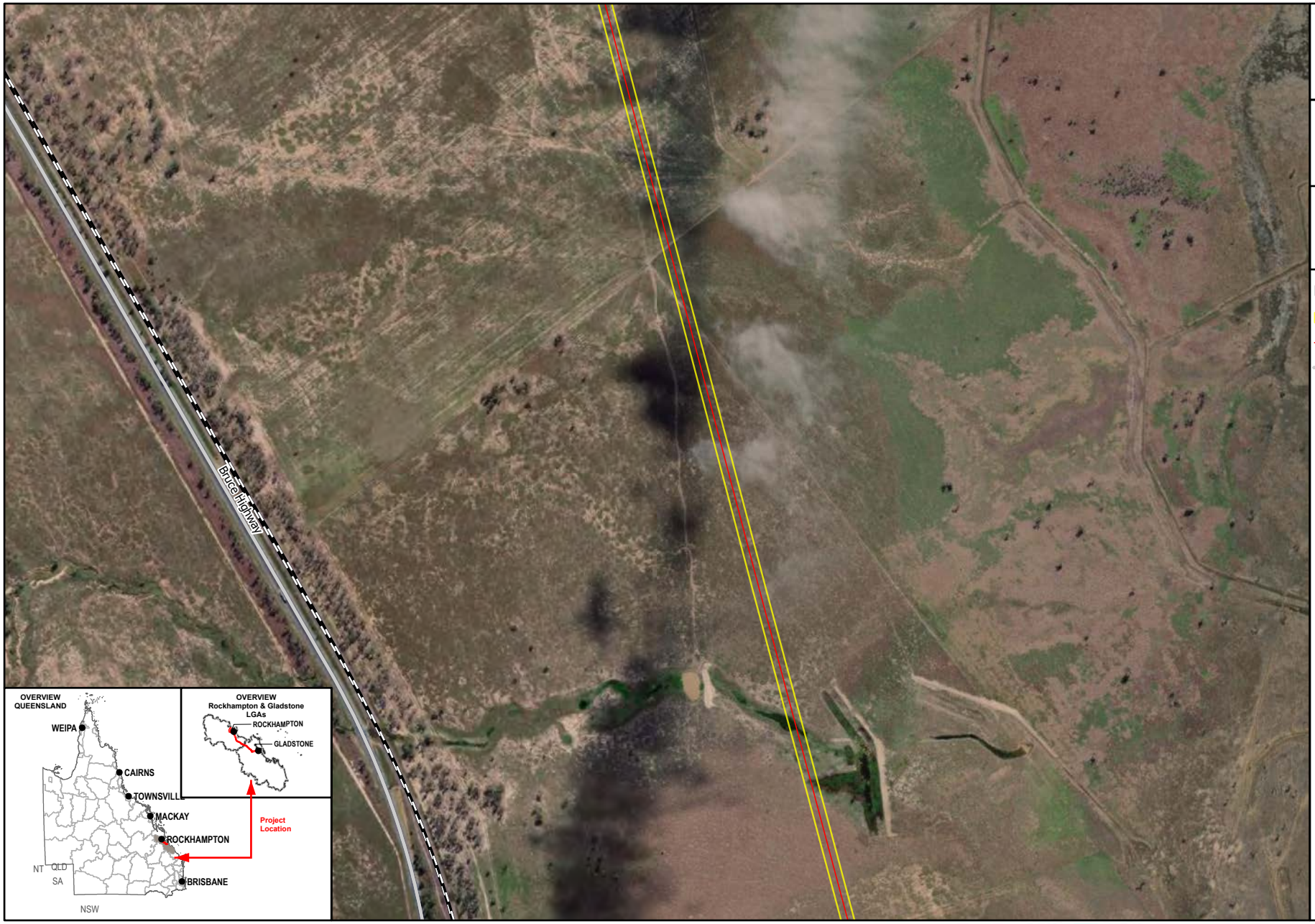
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7q
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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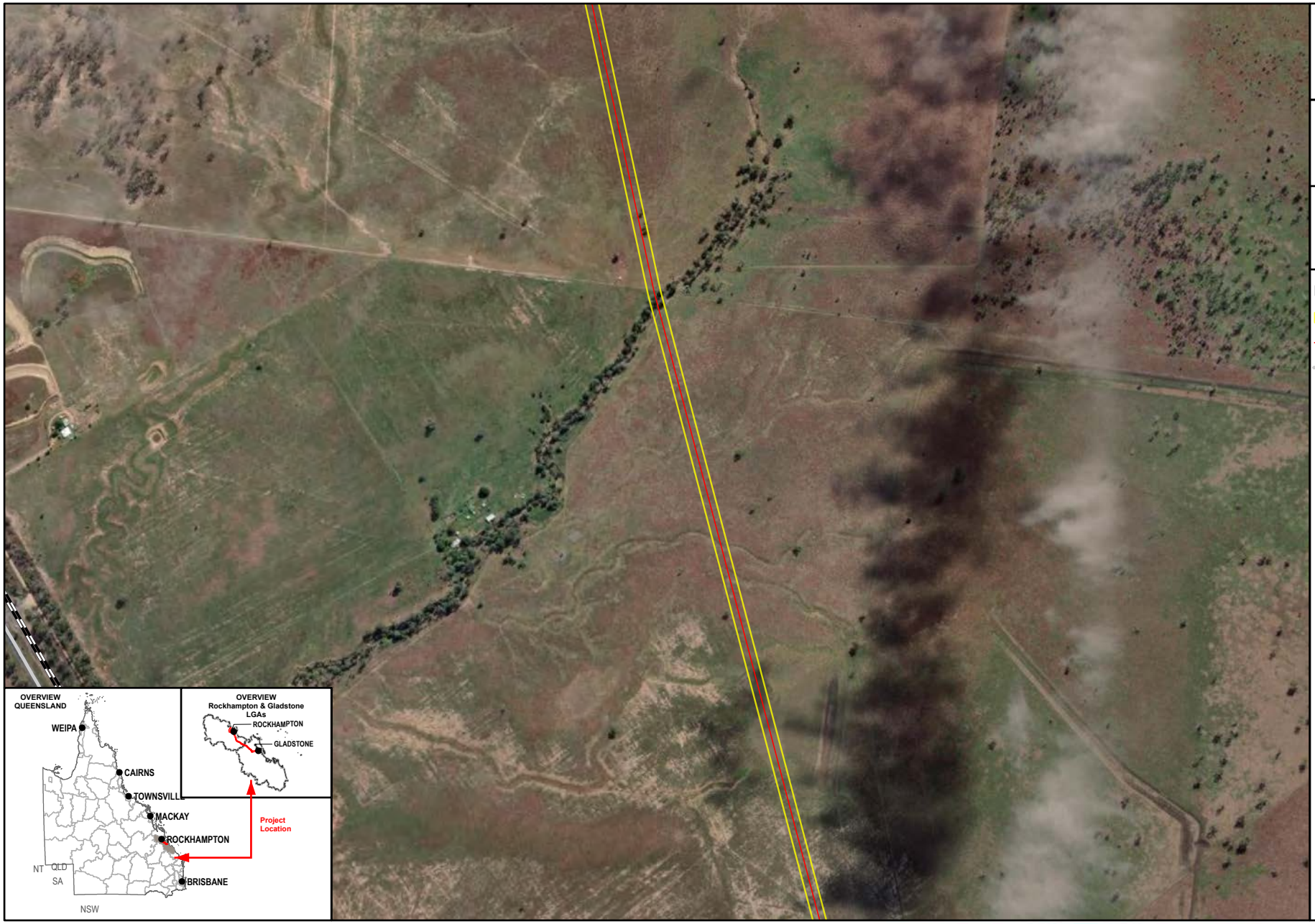
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7r
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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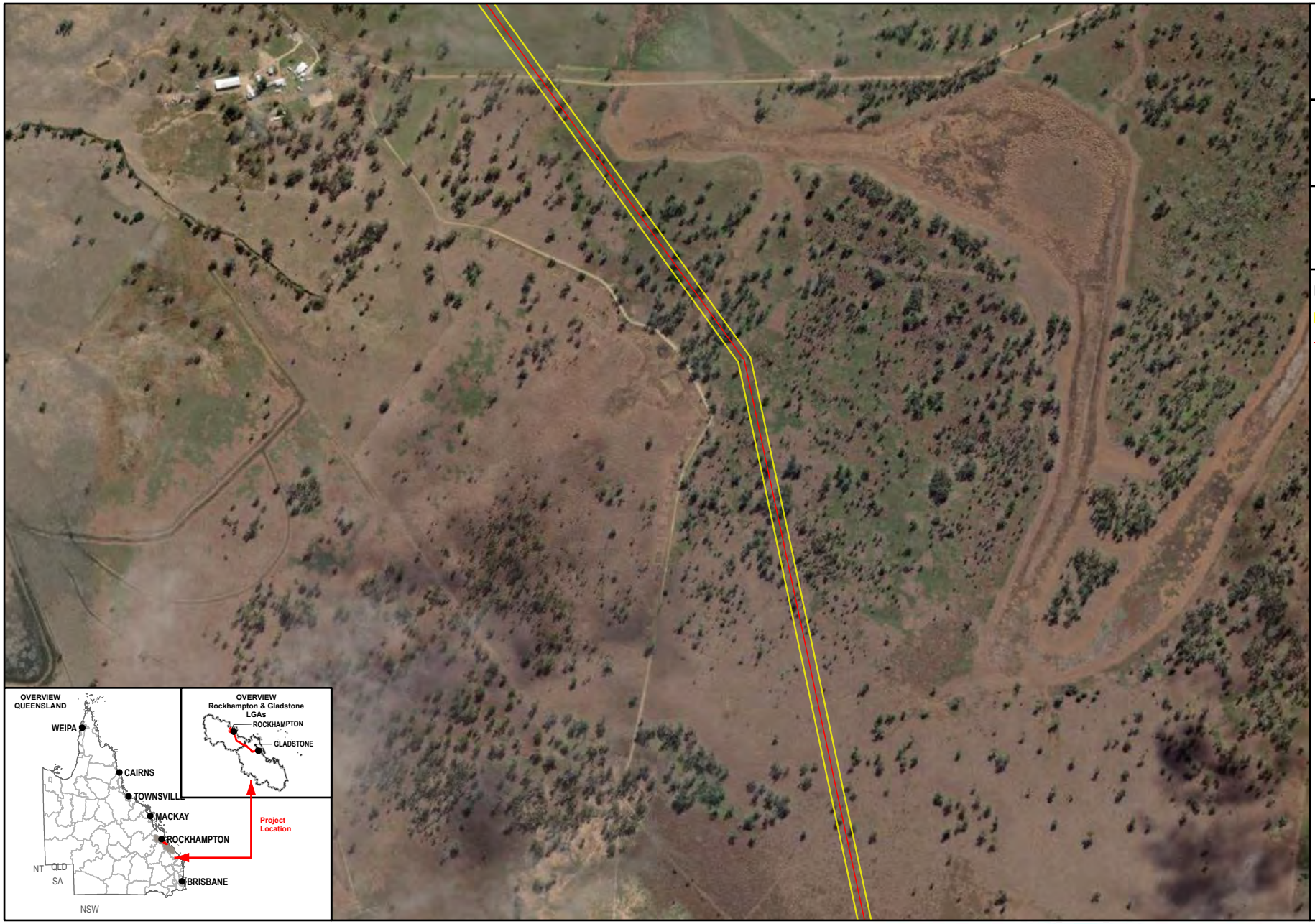
Figure 4-7s
Mapped Wetlands Within the SGIC SDA Desktop Search Area

000-G-MAP-2416 Version:3 Date:2022/09/12



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- SGIC SDA Pipeline Alignment

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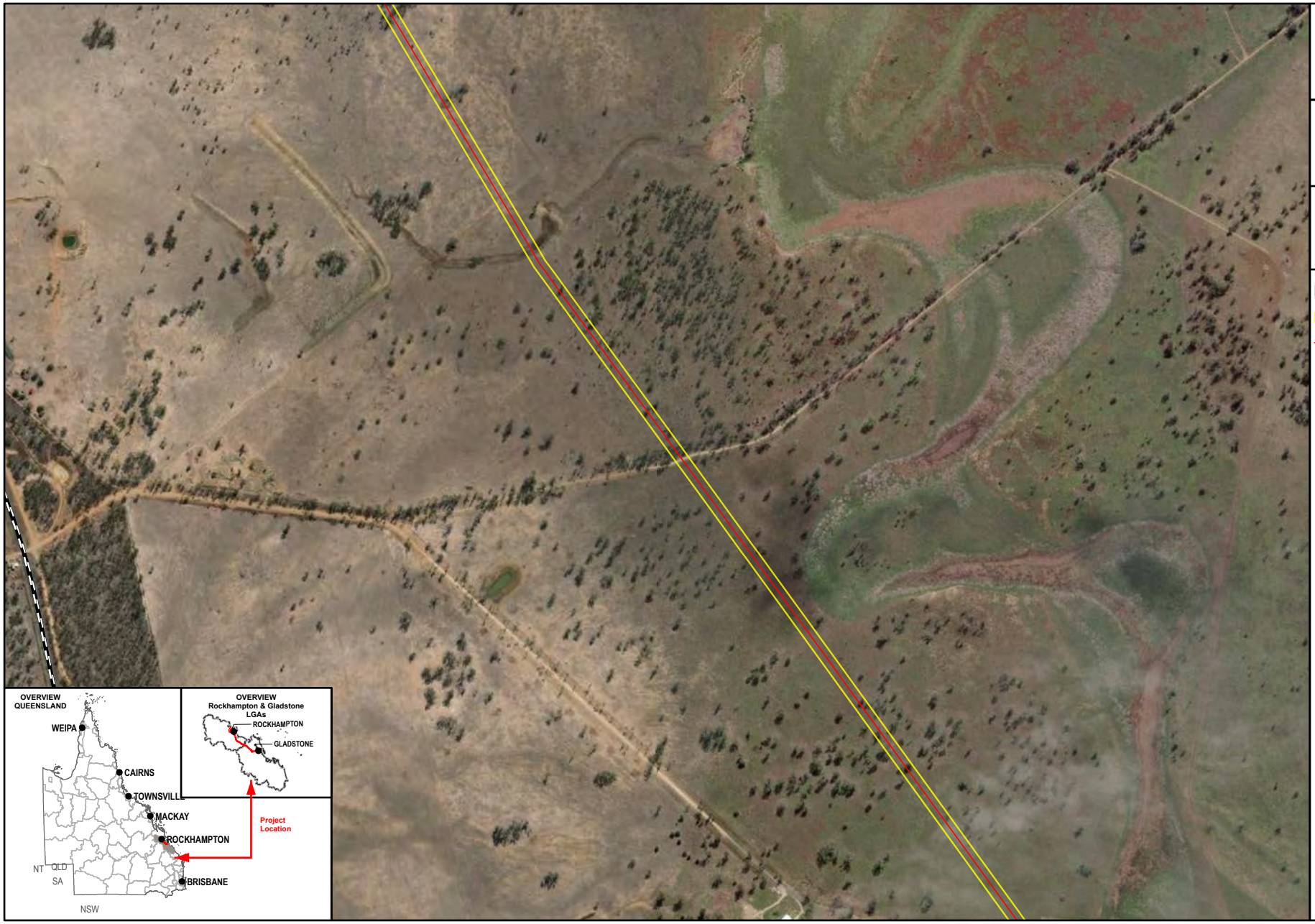
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7t
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- Study Area
- SGIC SDA Pipeline Alignment
- Railways

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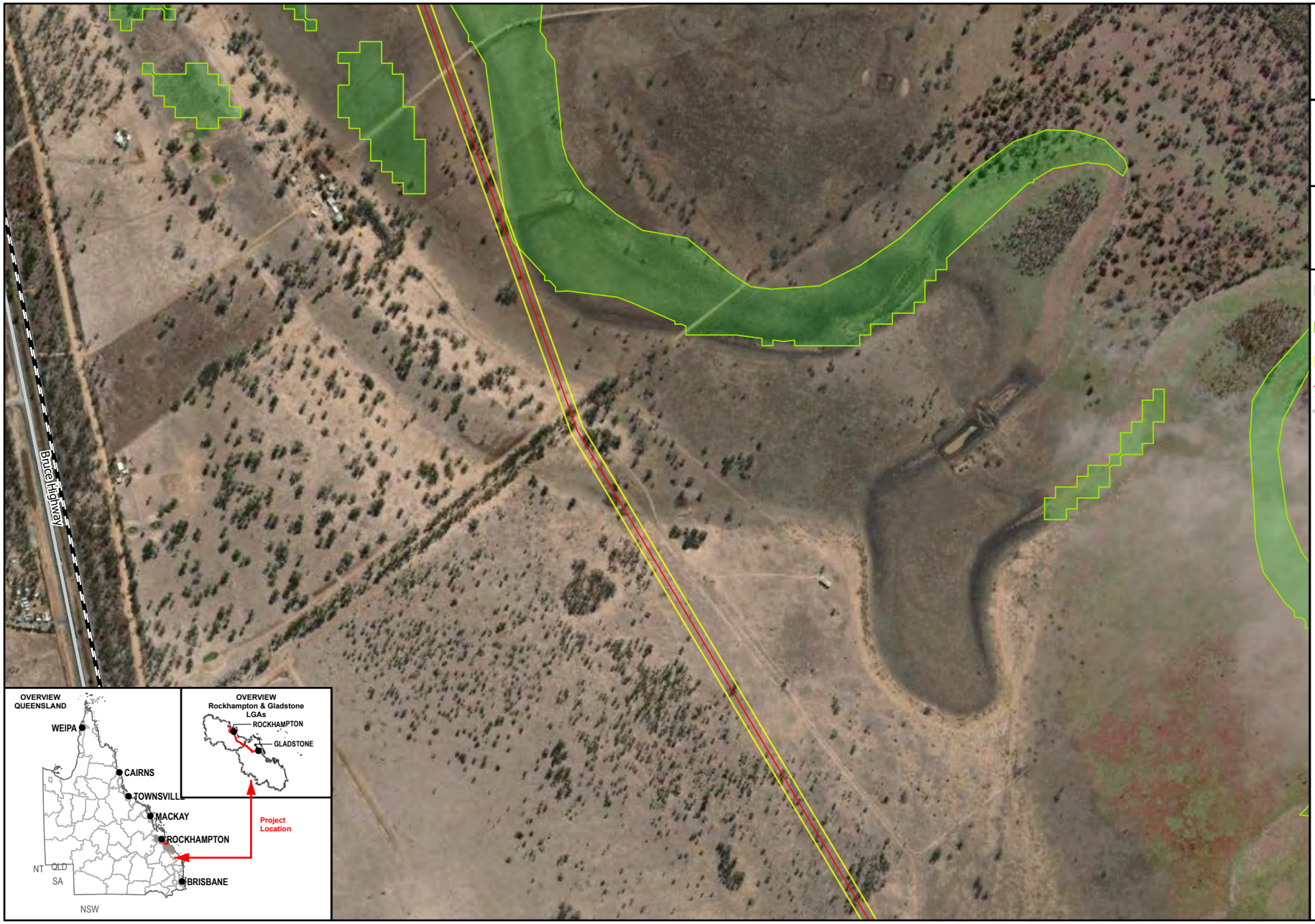
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7u
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- MSES High Ecological Significance Wetlands
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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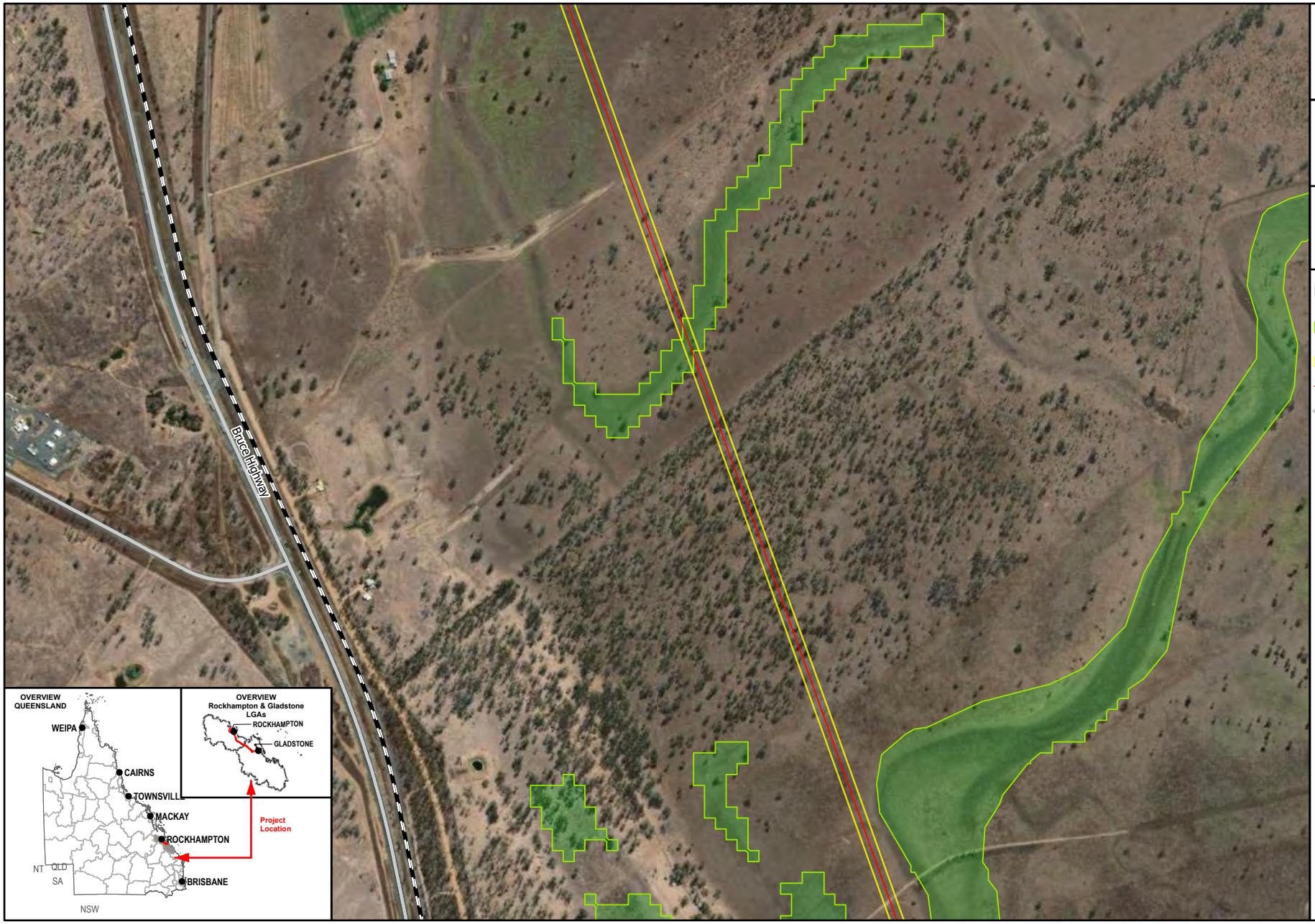
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7v
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- MSES High Ecological Significance Wetlands
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7w
Mapped Wetlands Within the SGIC SDA Desktop Search Area
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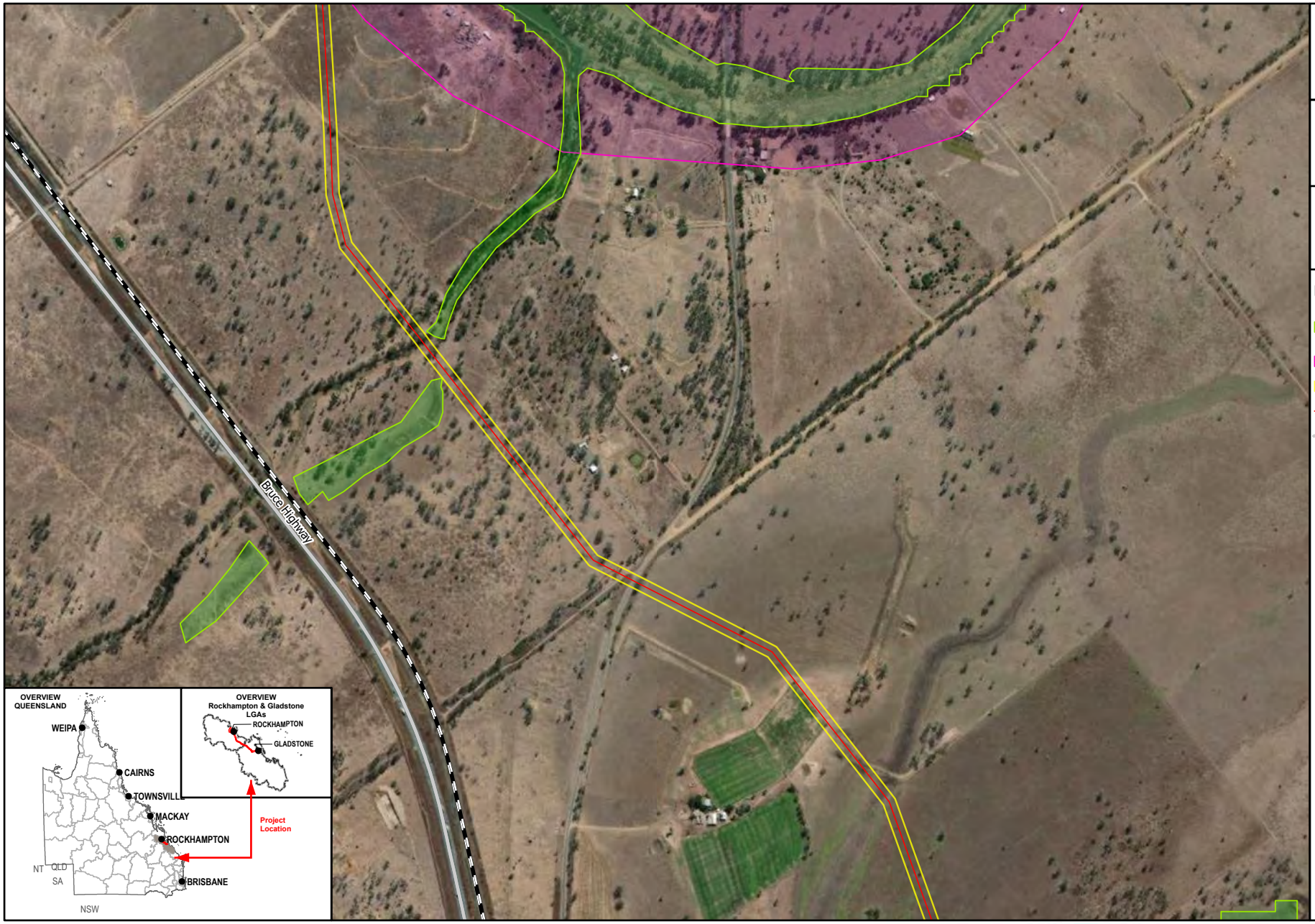

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- MSES High Ecological Significance Wetlands
- QLD013 Fitzroy River Floodplain
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
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Figure 4-7x
Mapped Wetlands Within the SGIC SDA Desktop Search Area

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- QLD013 Fitzroy River Floodplain
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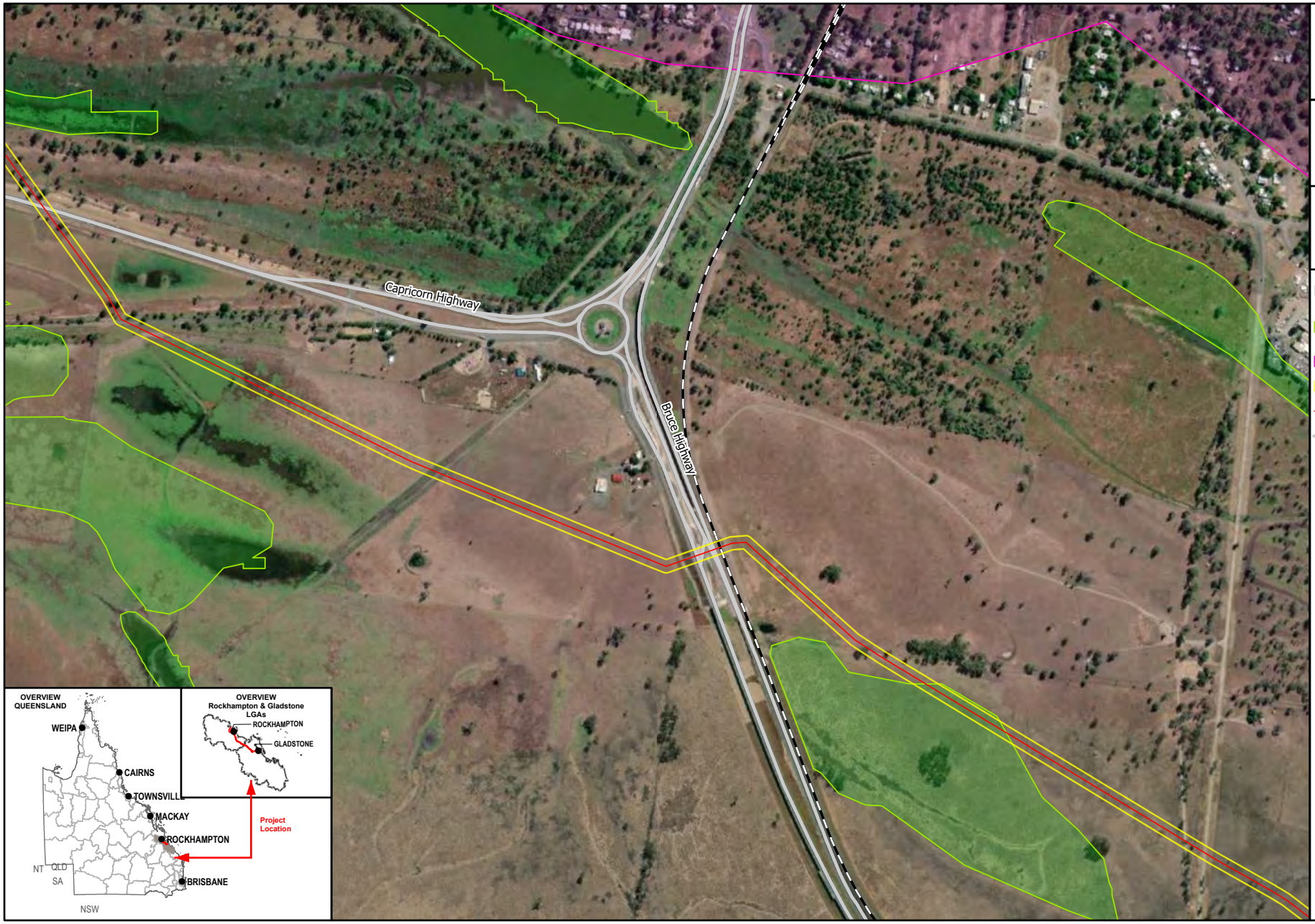
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7y
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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Legend

- MSES High Ecological Significance Wetlands
- QLD013 Fitzroy River Floodplain
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads
- Railways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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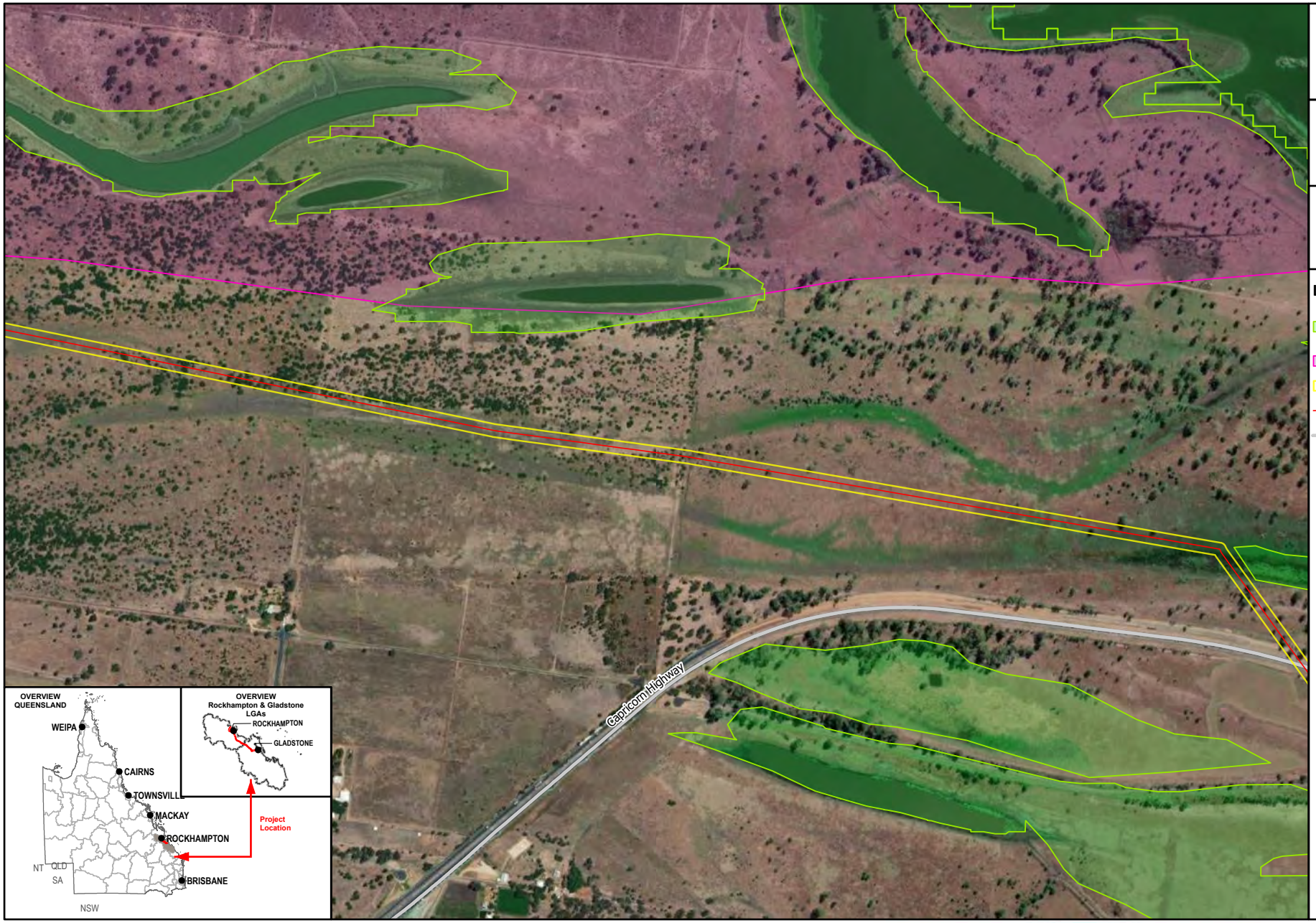
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7z
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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Legend

- MSES High Ecological Significance Wetlands
- QLD013 Fitzroy River Floodplain
- Study Area
- SGIC SDA Pipeline Alignment
- Main Roads

Data Sources:
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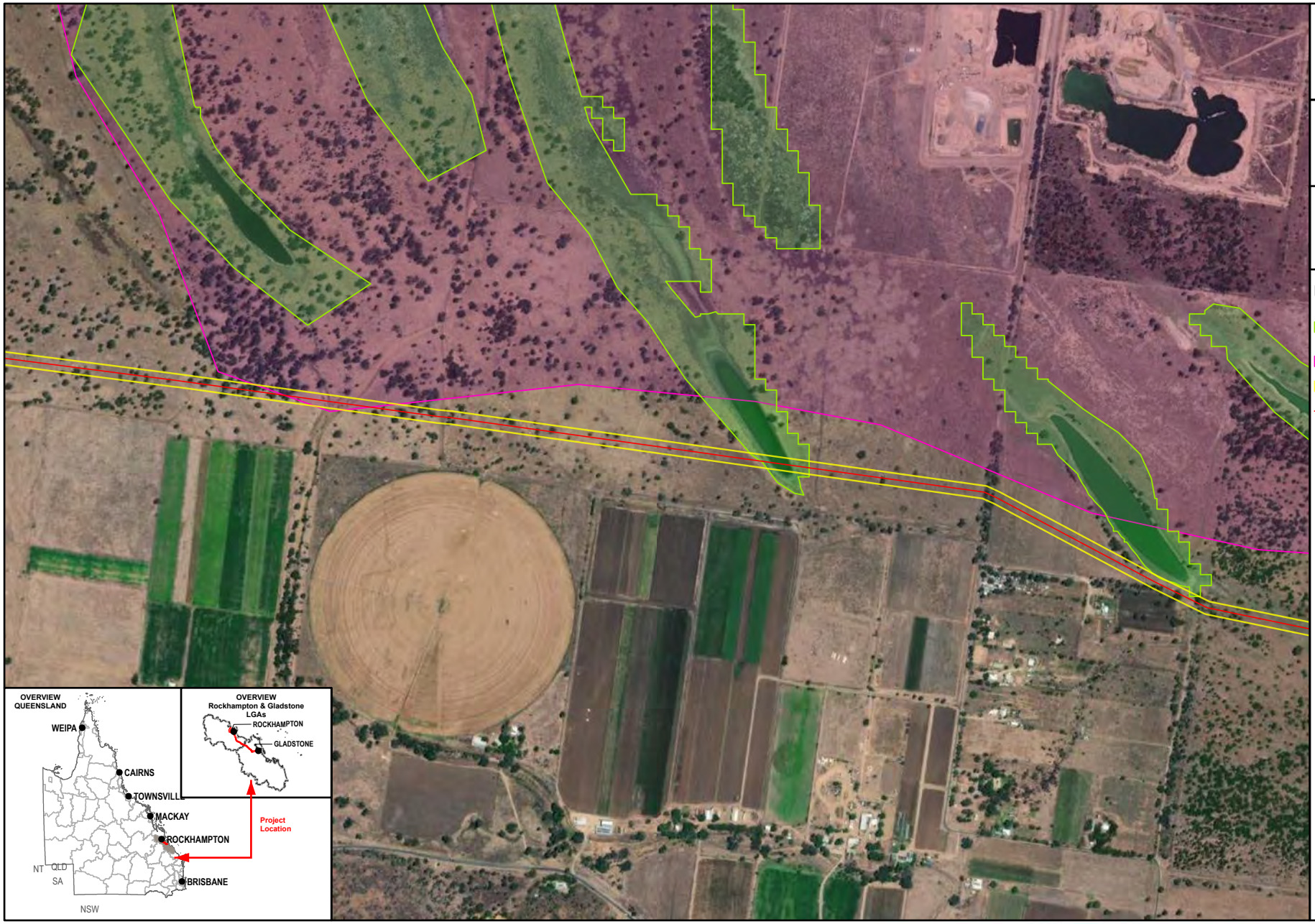
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7a1
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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- QLD013 Fitzroy River Floodplain
- Study Area
- SGIC SDA Pipeline Alignment

Data Sources:
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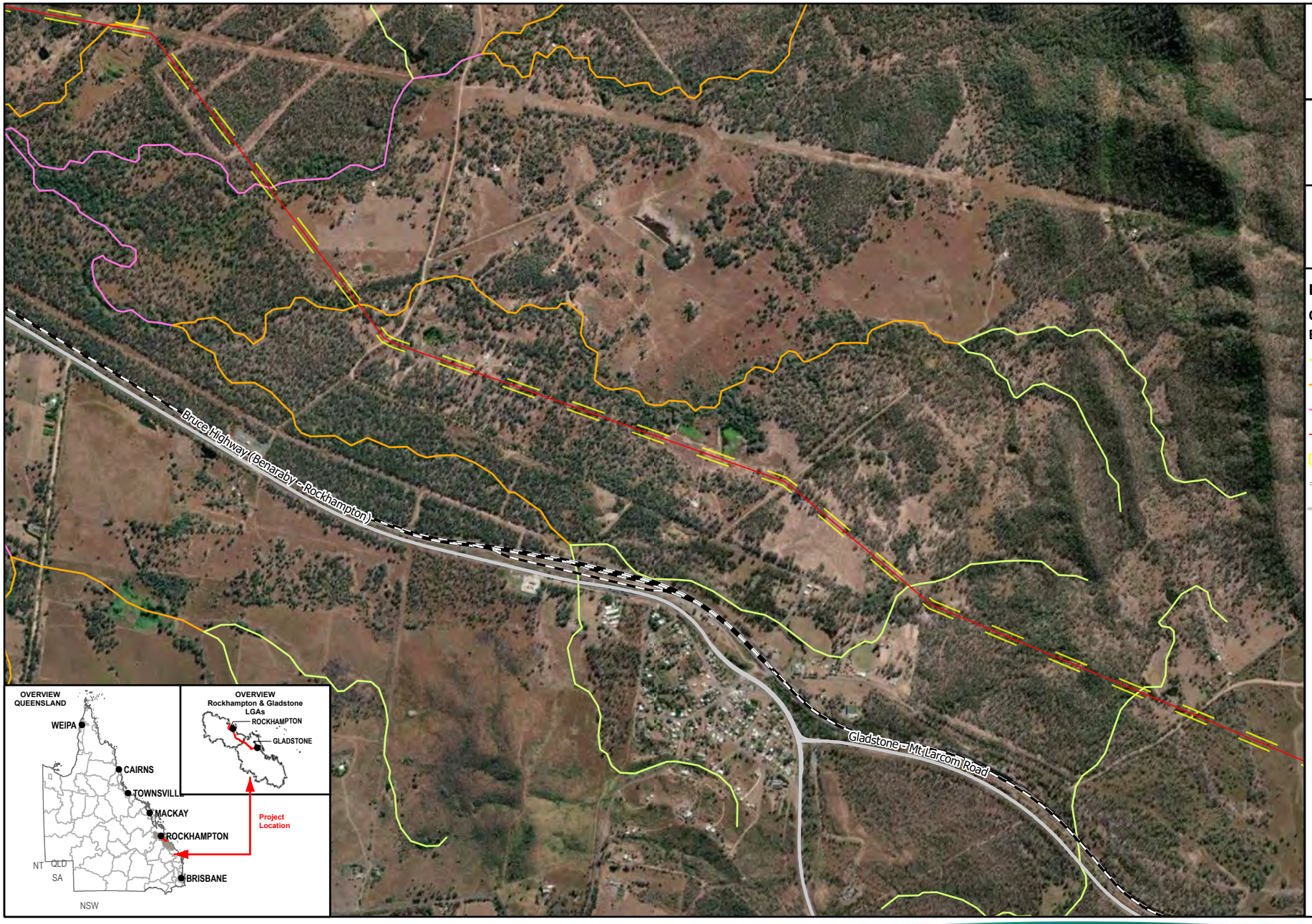
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-7b1
Mapped Wetlands Within the SGIC SDA Desktop Search Area
000-G-MAP-2416 Version:3 Date:2022/09/12



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Legend

Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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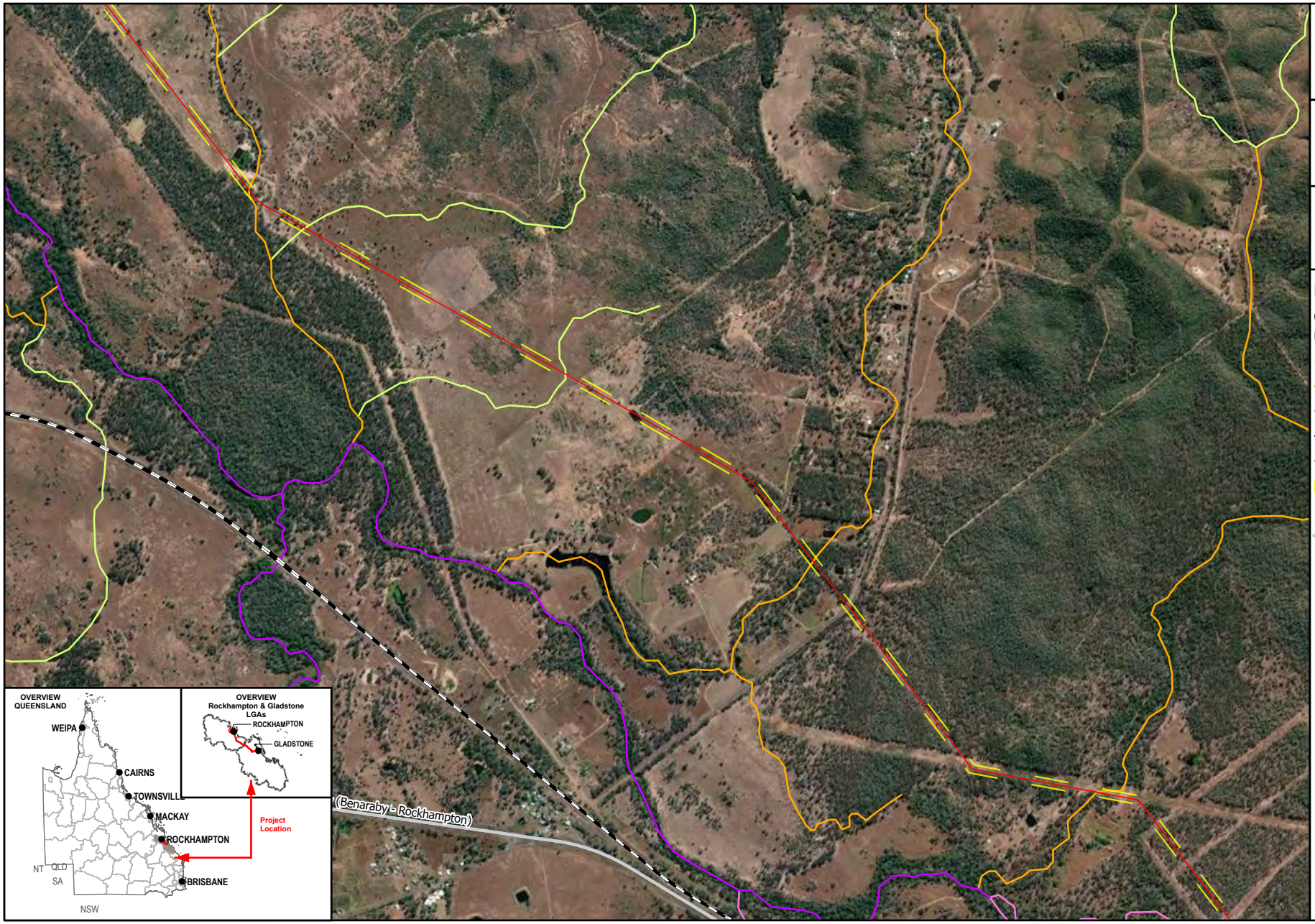
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8a Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
000-G-MAP-2417 Version:1 Date:7/07/2022



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Legend

Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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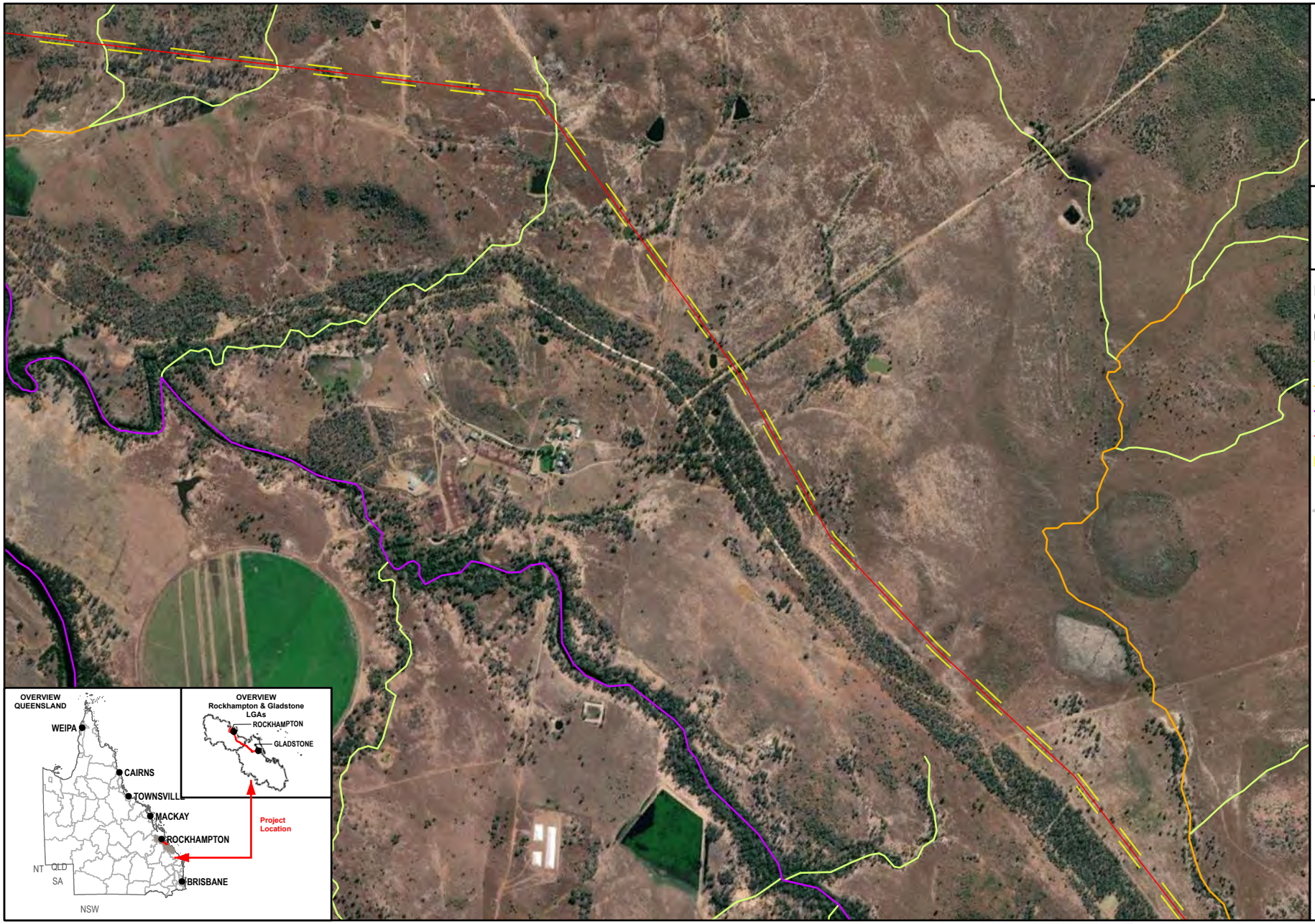
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8b Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Legend

Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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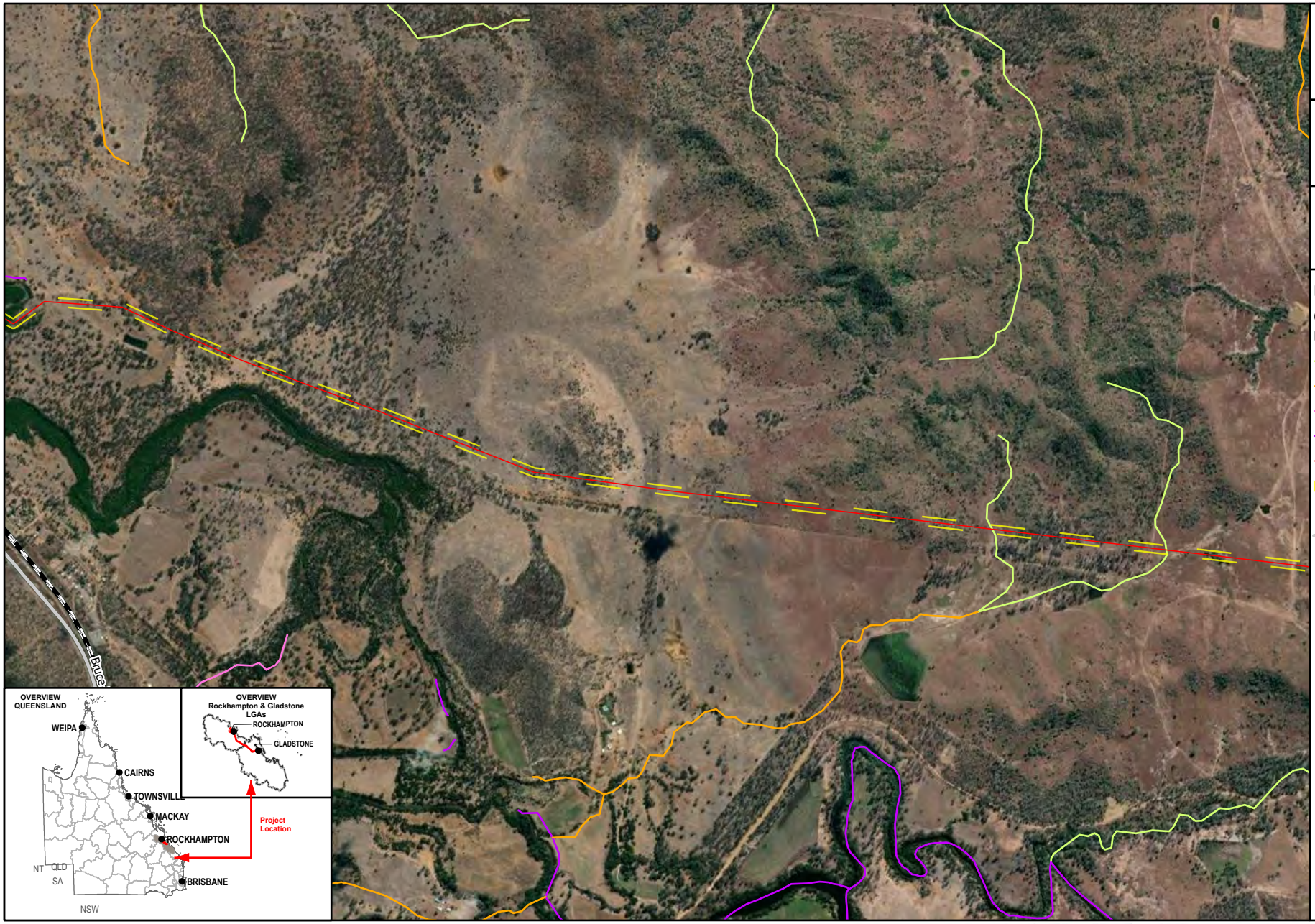
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8c Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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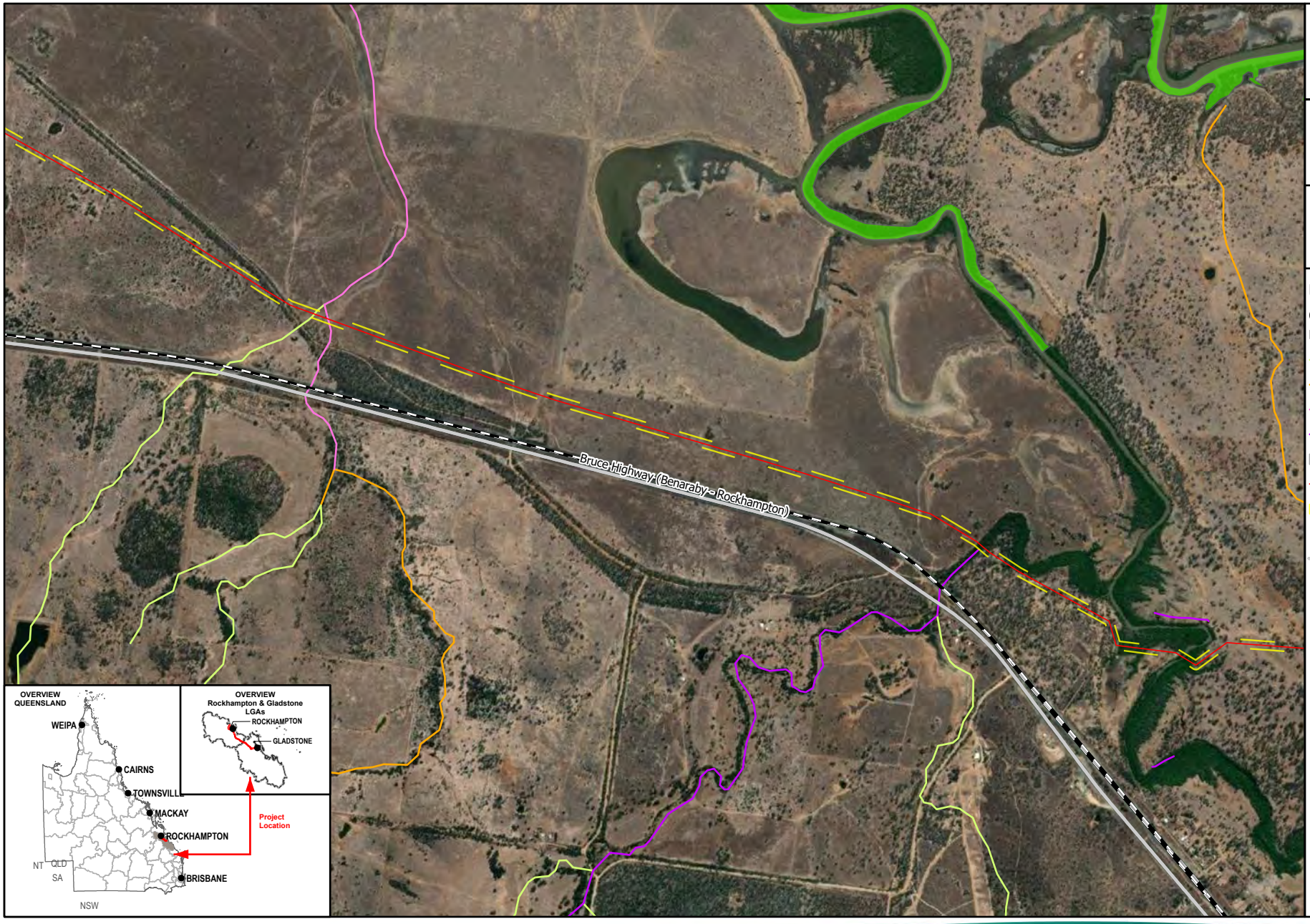
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8d Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- Fish Habitat Areas
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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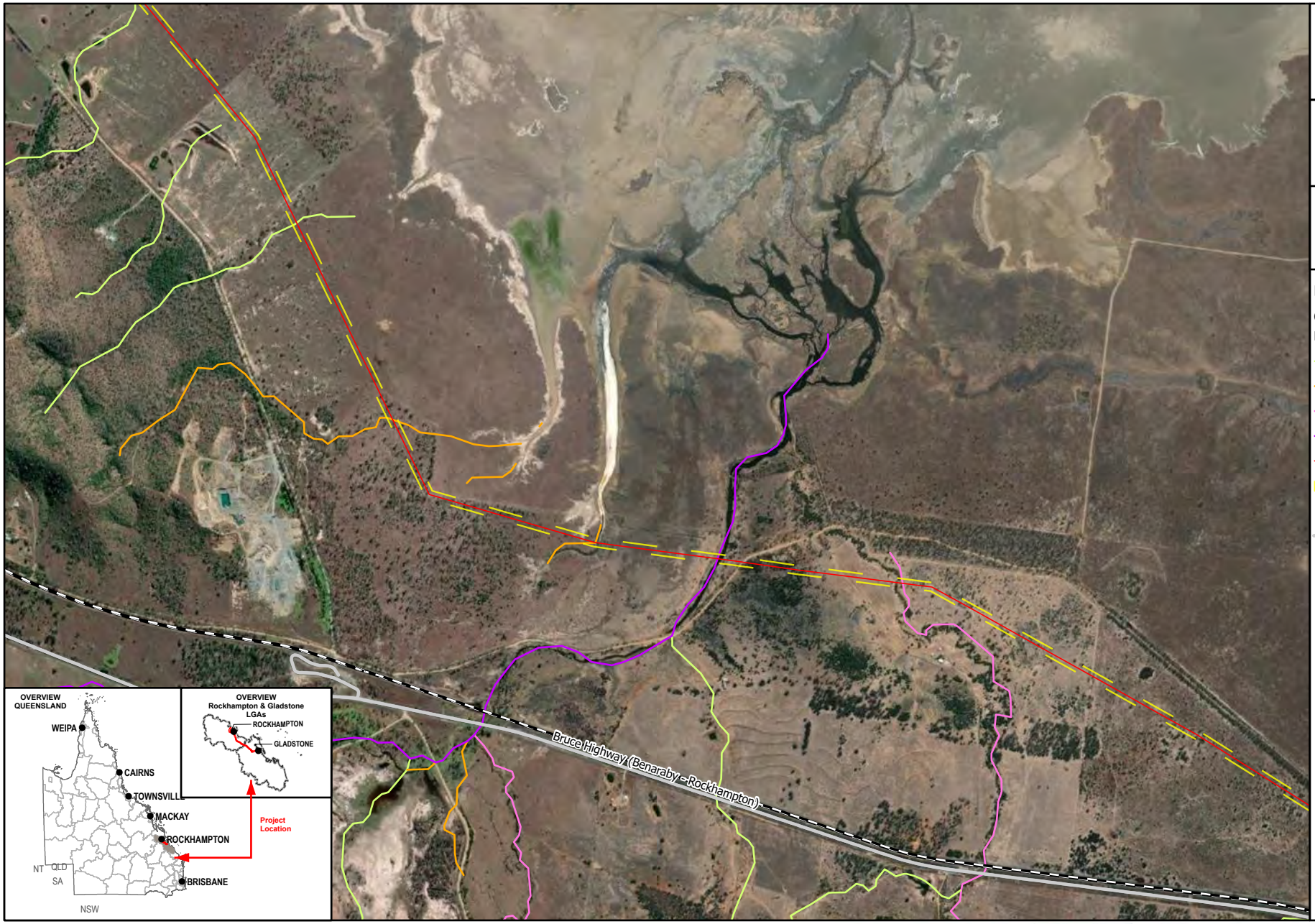
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8e Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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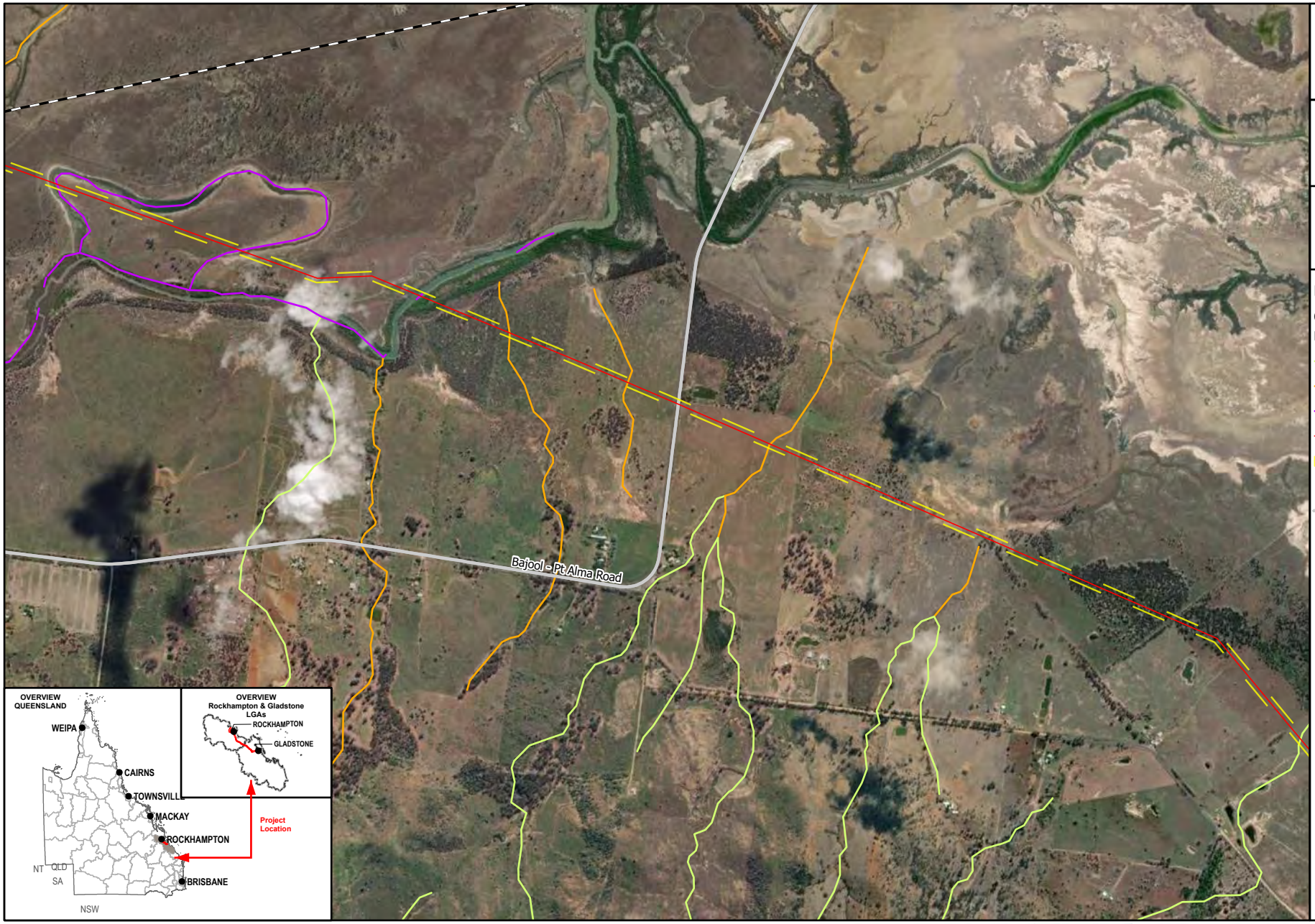
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8f Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8g Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

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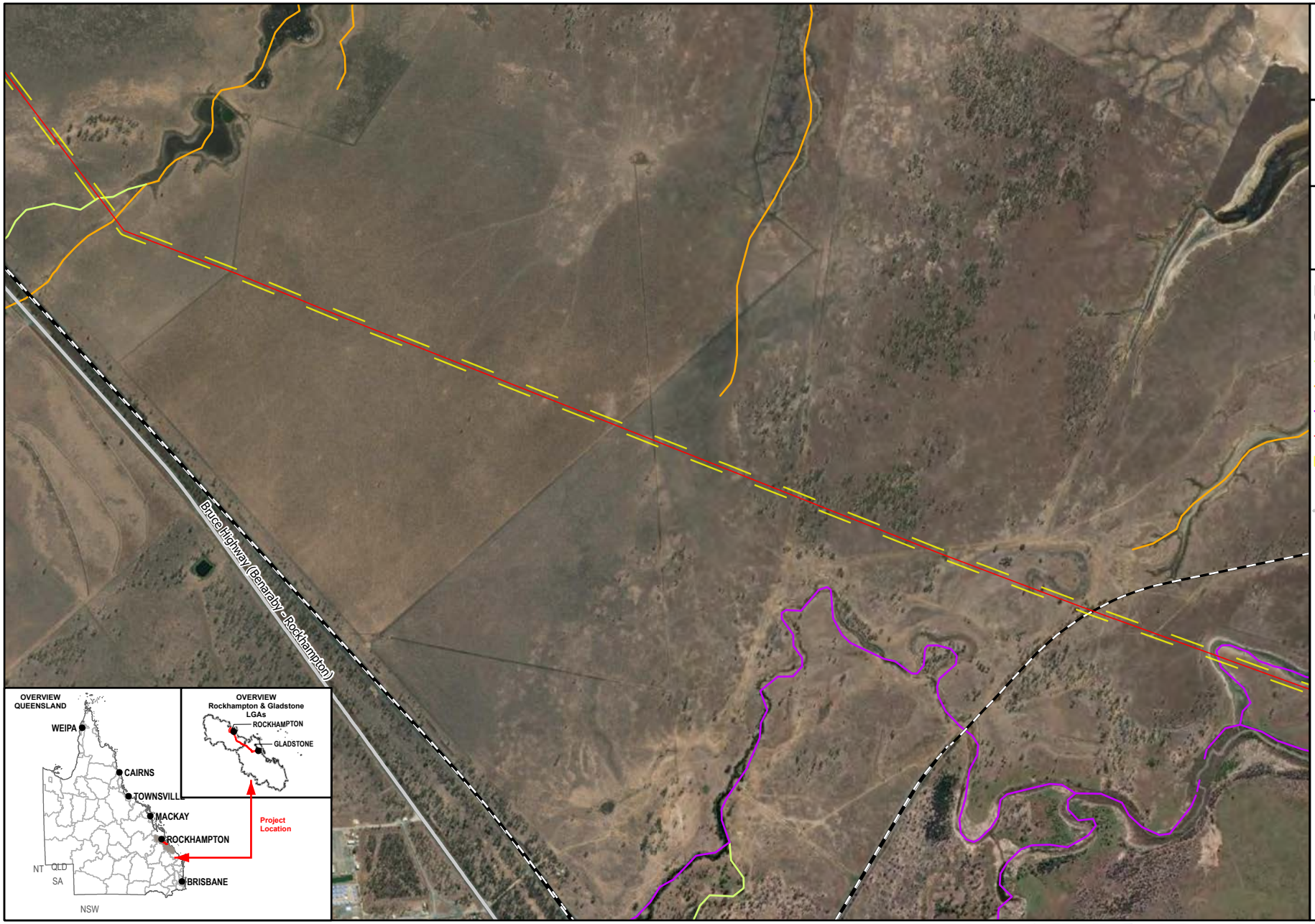

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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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Figure 4-8h Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
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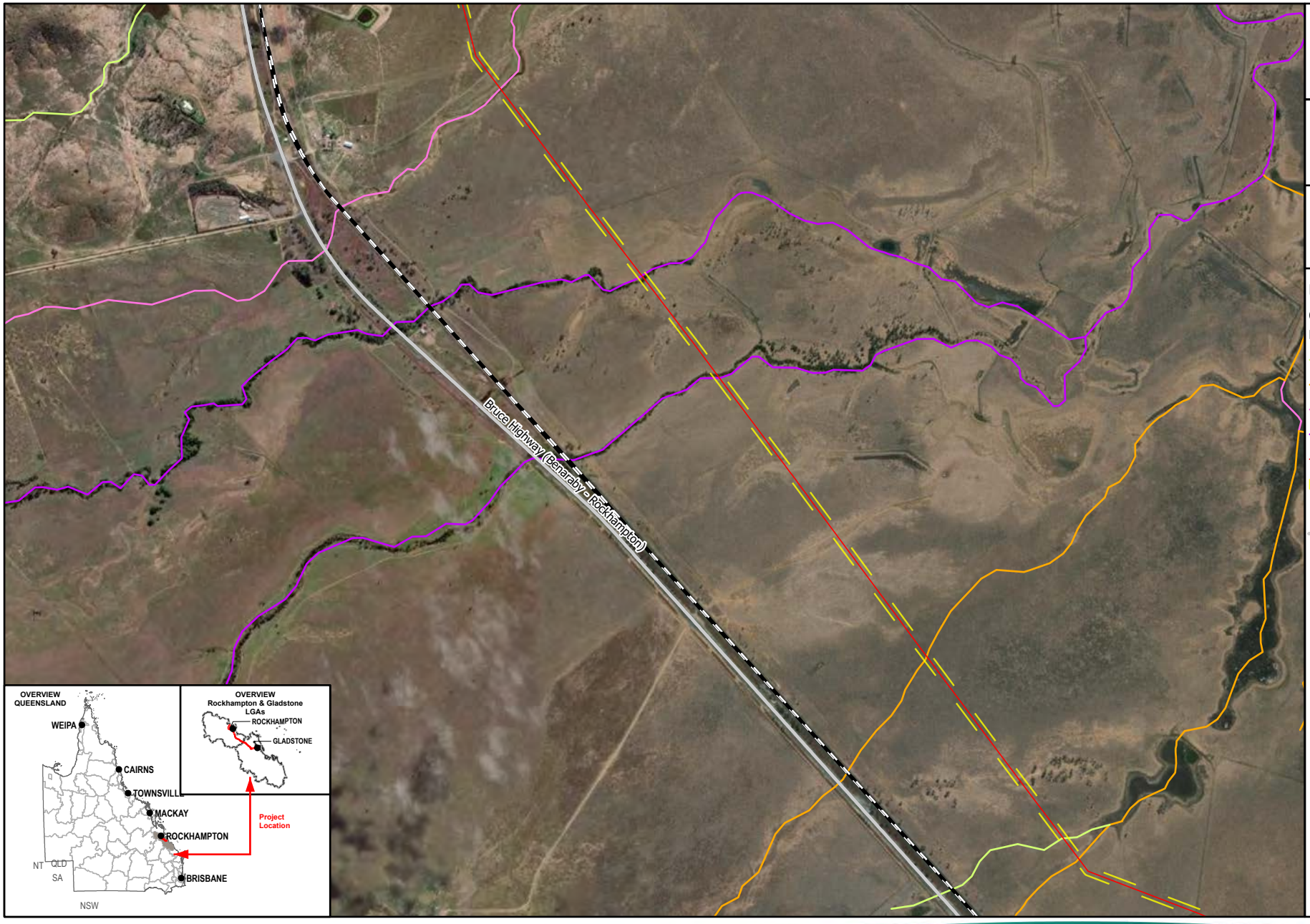

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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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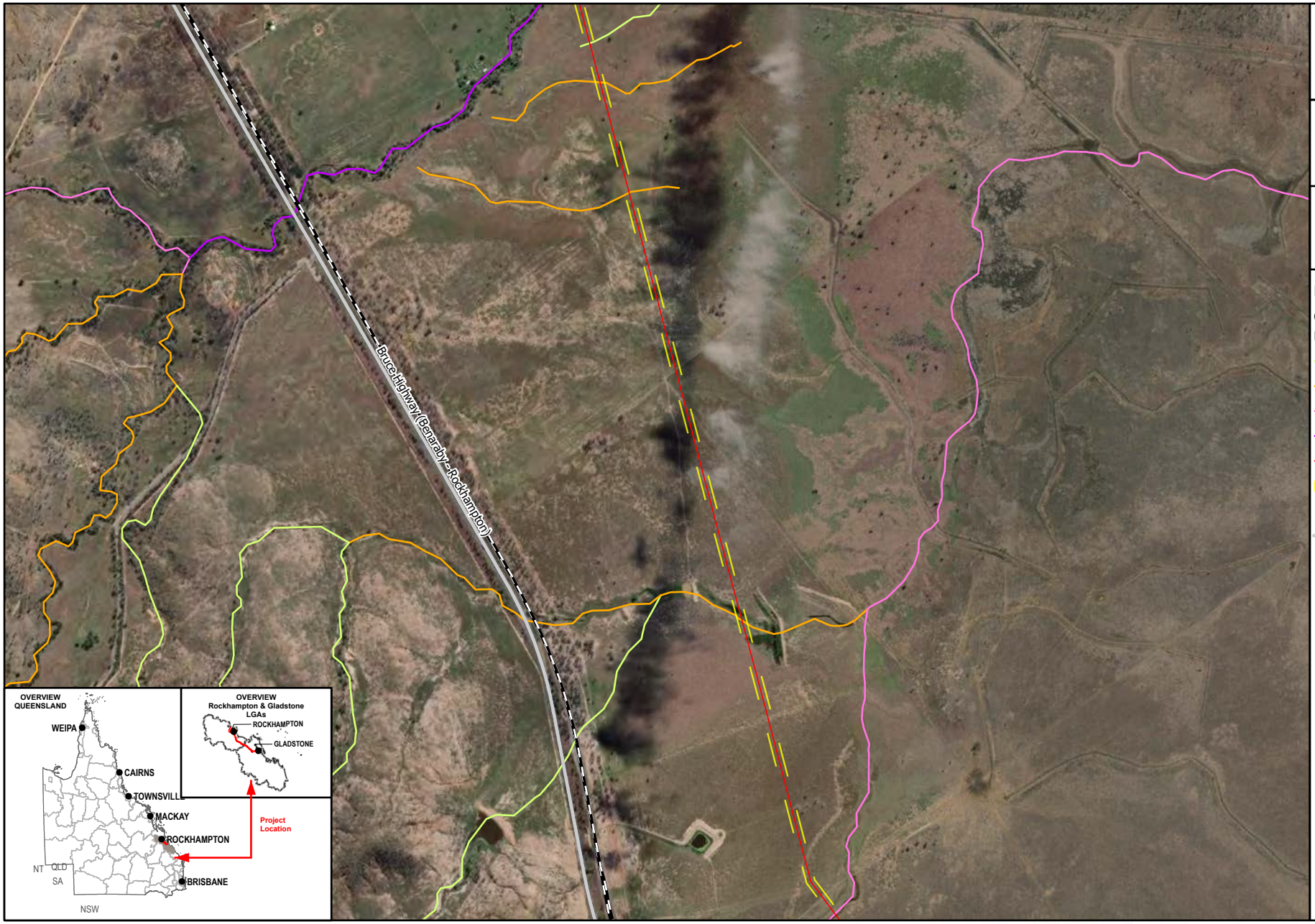
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8i Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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Figure 4-8j Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
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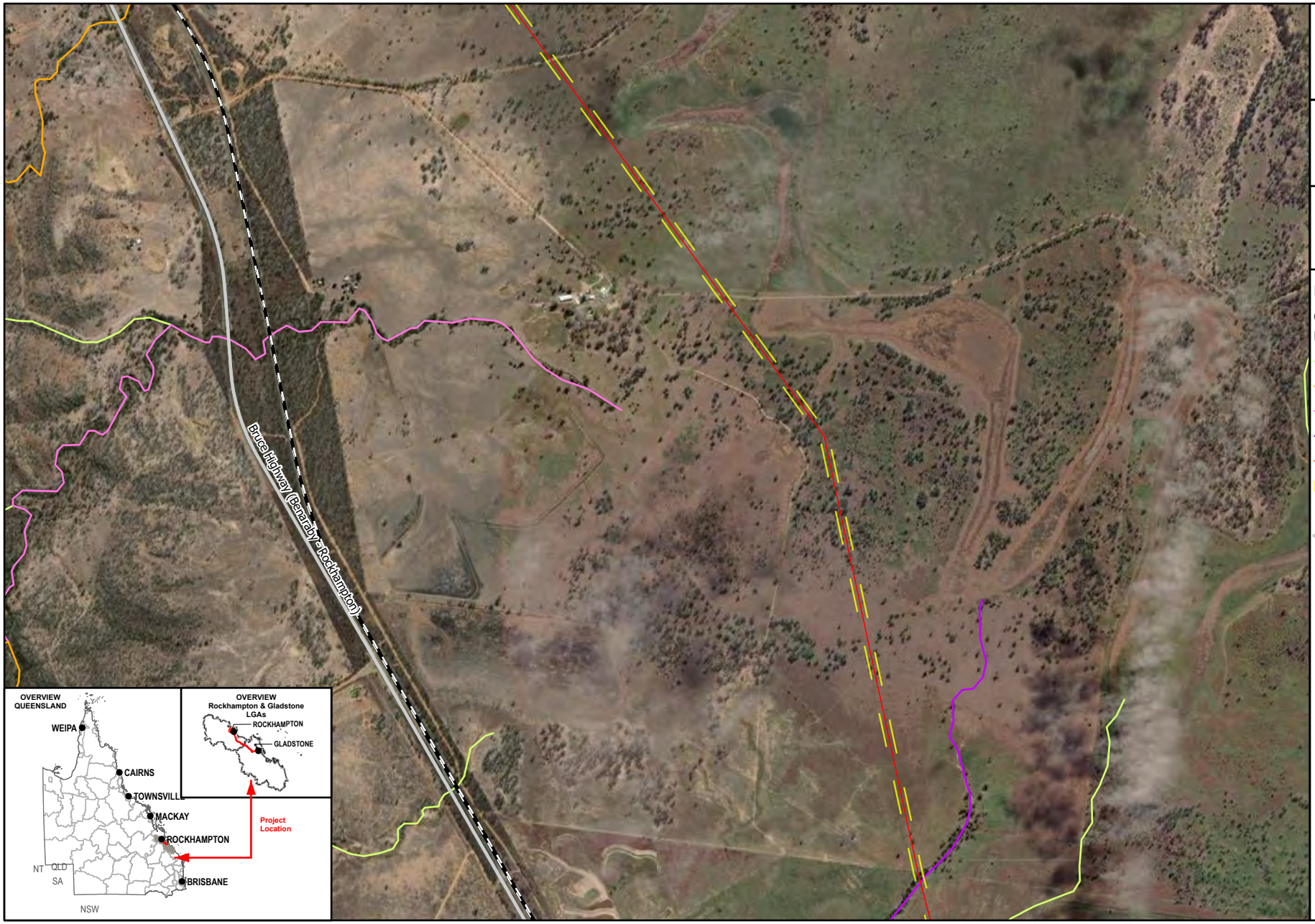

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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8k Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
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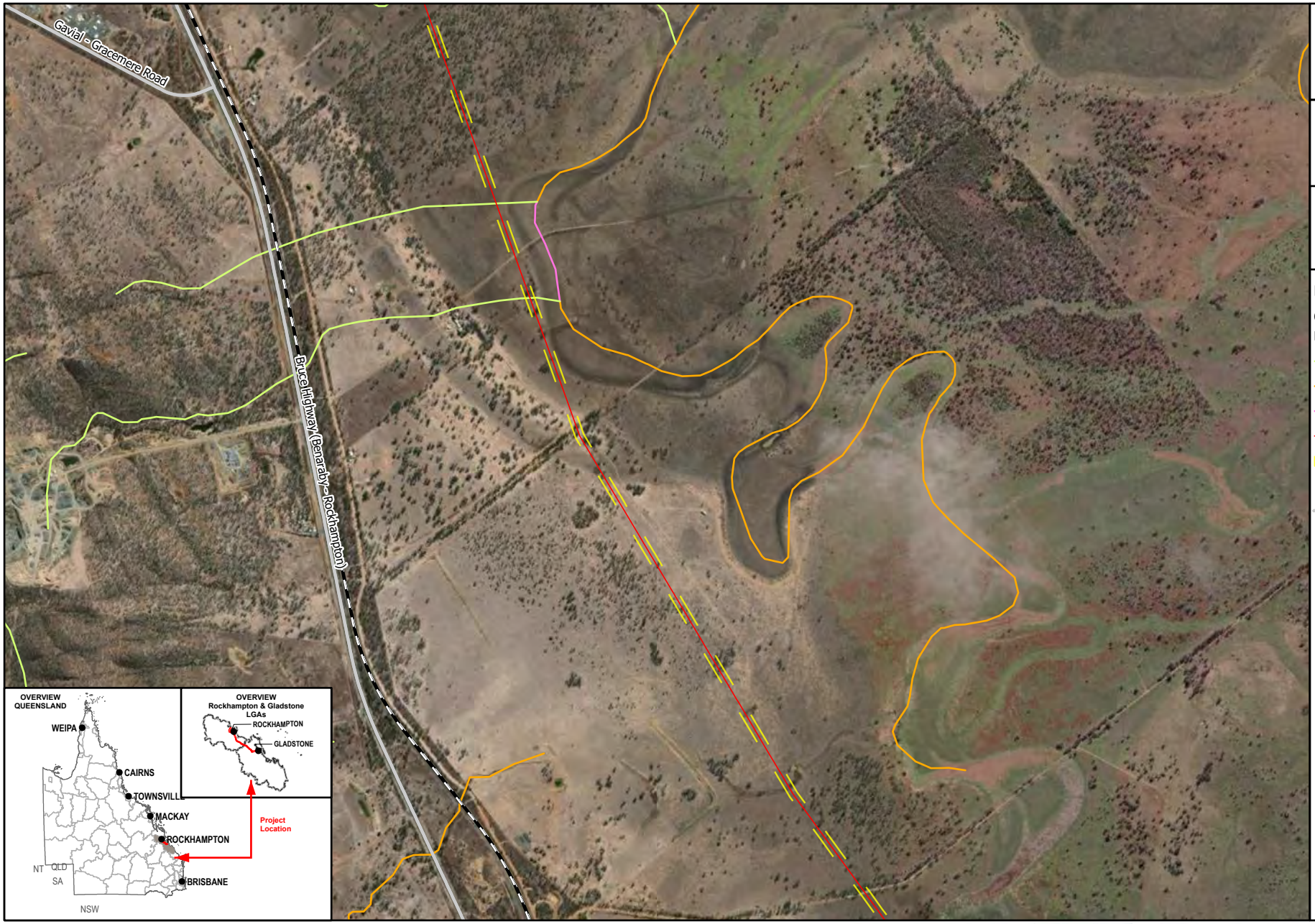

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Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 3 - High
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
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2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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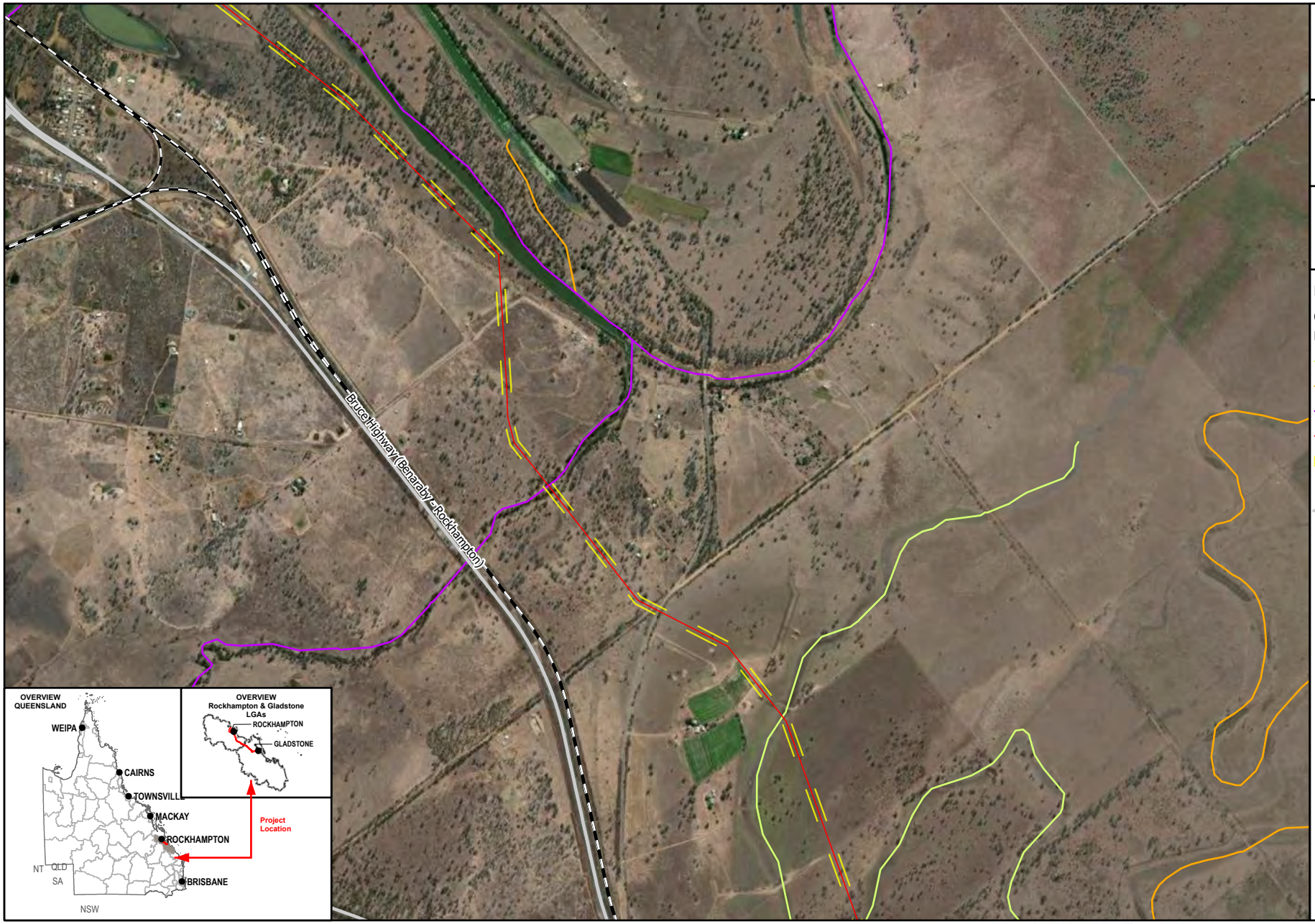
PROJECTION UTM Zone 56
(Datum GDA2020)

Compiled by:YS16239

Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8l Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Queensland Government

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Legend

Queensland Waterways for Waterway Barrier Works

- 1 - Low
- 2 - Moderate
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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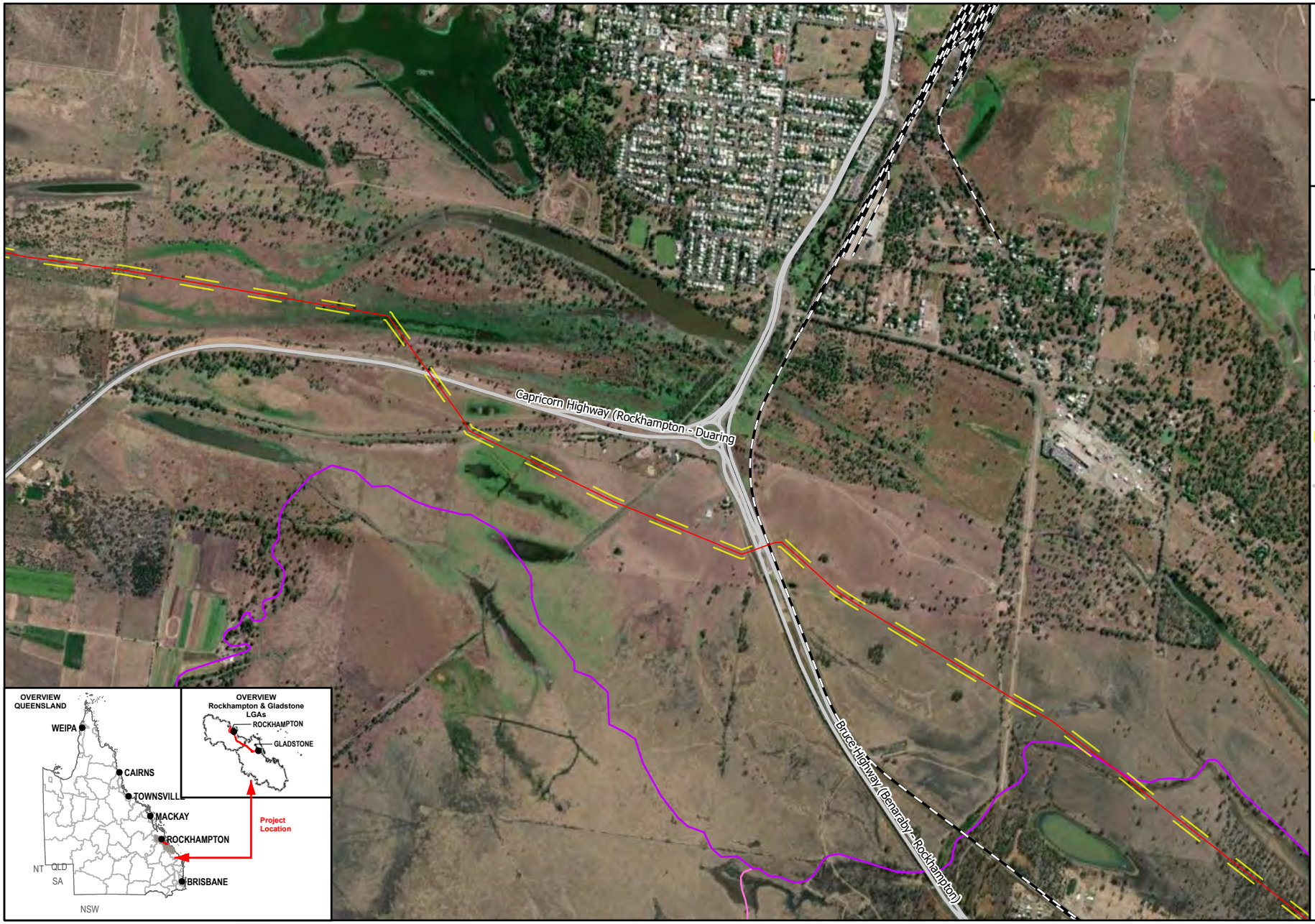
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8m Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

000-G-MAP-2417 Version:1 Date:7/07/2022



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Legend

Queensland Waterways for Waterway Barrier Works

- 3 - High
- 4 - Major
- SGIC SDA Pipeline Alignment
- Study Area
- Railways
- Main Roads

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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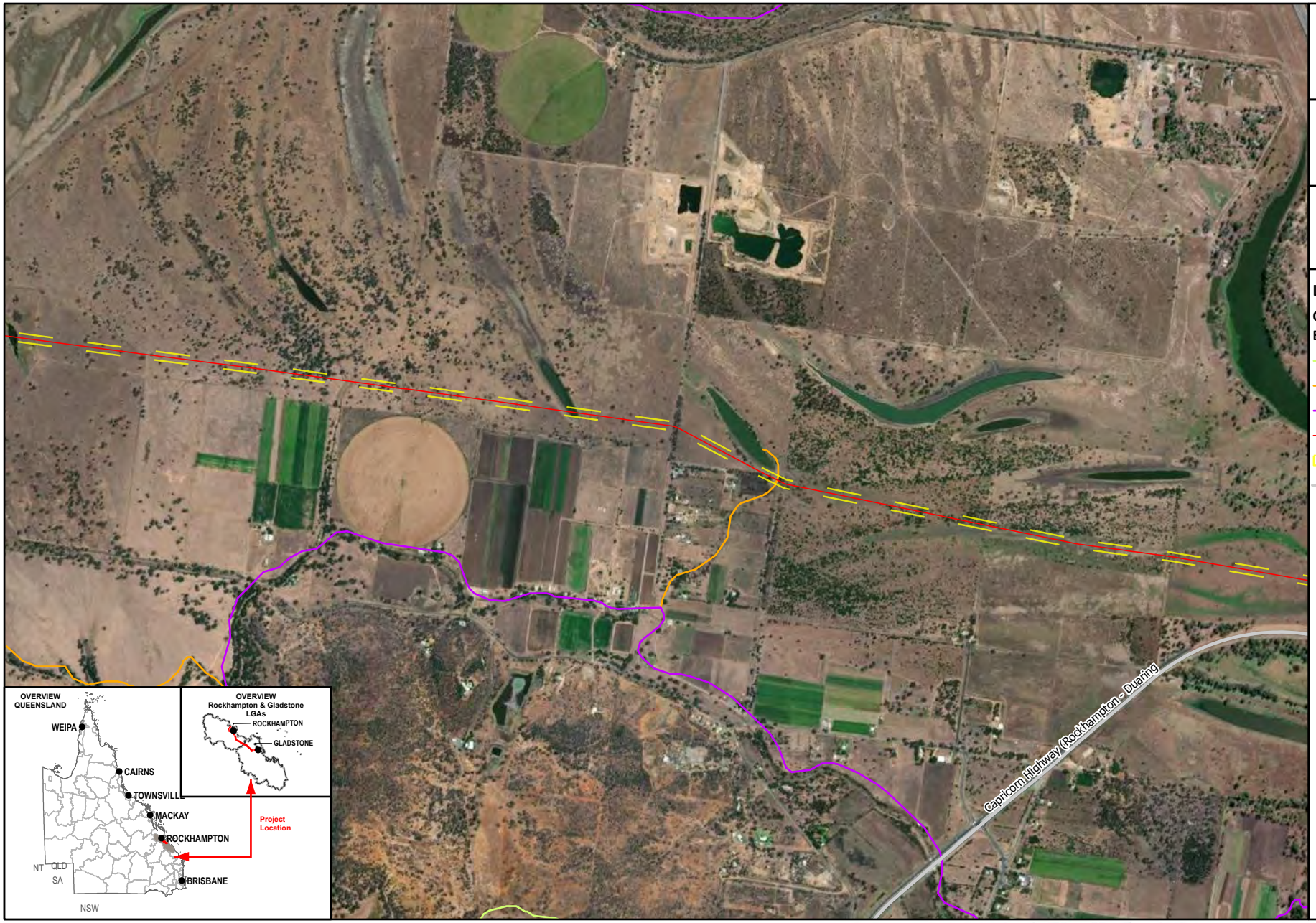
Fitzroy to Gladstone Pipeline Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 4-8n Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent
000-G-MAP-2417 Version:1 Date:7/07/2022



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Legend

Queensland Waterways for Waterway Barrier Works

- 1 - Low
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Figure 4-8o Mapped Waterways for Waterway Barrier Works and Fish Habitat Areas Within the SGIC SDA Desktop Search Extent

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4.6.2 Field survey results

4.6.2.1 Aquatic habitat

From the bioassessments of the nine waterways listed as major risk (purple) waterways in the WWBW spatial layer, seven sites were assessed as in fair condition, while the remaining two sites were in poor condition (Table 4-18). Three waterways, Twelve Mile Creek, Bob's Creek, and Gavial Creek have large permanent waterways providing refuge throughout the dry season. All other waterways assessed were ephemeral, some of which contained small, isolated pools during the time of survey. The majority of the major risk waterways displayed similar site characteristics including good or excellent condition bank stability and bank vegetation and stability, while the bottom substrate, embeddedness, and velocity and depth category were of poor condition. These results indicate that most sites are well vegetated but have low habitat complexities as a result of a silt/clay dominated substrate.

The bioassessments of four waterways listed as high-risk (red) waterways by the WWBW spatial layer resulted in two sites assessed to be in fair condition (sites 7 and 11) and two sites in poor condition (sites 10 and 18) as shown in Table 4-19. All of the high-risk waterways assessed were ephemeral, and either had no surface water present or were reduced to small isolation pools. The majority of sites whilst scoring well in bank vegetation and stability category, also scored poorly in the bottom substrate and embeddedness, indicating that these sites have limited habitat complexity due to some erosion and substrates dominated by silt/clay.

The bioassessments of five waterways listed as low and moderate risks (green and amber) waterways by the WWBW spatial layer (Table 4-20) resulted in one site as being assessed as in fair condition (site 8), while the remaining four sites were in poor condition. All sites whilst scoring well in bank vegetation and stability category, scored poorly in most categories, indicating that these sites have limited habitat complexity due to some erosion, channel alteration and substrates dominated by silt/clay.

Site characteristics and ecological values from the habitat assessments for all waterways and wetlands within the SGIC SDA are detailed below in Table 4-21. AusRivAS bioassessments are used as a standardised method to monitor and assess the ecological condition of Australian rivers. These bioassessments were only conducted upon riverine sites as they are not relevant to wetland sites.

Table 4-18 Bioassessment scores for major risk waterway (purple) sites within the SGIC SDA

Habitat variable	Scale	Site 3	Site 5	Site 6	Site 9	Site 14	Site 15	Site 17	Site 21	Site 24
Bottom substrate	0-20	2	7	0	2	0	0	2	0	14
Embeddedness	0-20	0	2	3	1	1	0	1	0	10
Velocity and depth category	0-20	1	6	5	1	2	1	1	1	2
Channel alteration	0-15	13	3	15	1	14	15	3	1	8
Bottom scouring and deposition	0-15	15	4	12	4	12	10	2	1	7
Pool/riffle, run/bend ratio	0-15	3	3	0	7	1	4	5	2	4
Bank stability	0-10	10	5	9	10	10	10	5	2	7
Bank vegetation and stability	0-10	10	6	10	10	10	5	6	5	10
Streamside cover	0-10	5	9	10	10	3	4	5	3	8
Totals	**0-135**	**59**	**45**	**64**	**46**	**53**	**49**	**30**	**15**	**70**

Habitat variable	Scale	Site 3	Site 5	Site 6	Site 9	Site 14	Site 15	Site 17	Site 21	Site 24
Habitat score category		**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**Fair**	**Poor**	**Poor**	**Good**

Table 4-19 Bioassessment scores for high-risk waterway (red) sites within the SGIC SDA

Habitat variable	Scale	Site 7	Site 10	Site 11	Site 18
Bottom substrate	0-20	10	1	2	1
Embeddedness	0-20	8	0	1	0
Velocity and depth category	0-20	0	0	2	0
Channel alteration	0-15	7	3	4	1
Bottom scouring and deposition	0-15	1	12	4	1
Pool/riffle, run/bend ratio	0-15	0	1	4	2
Bank stability	0-10	5	6	8	3
Bank vegetation and stability	0-10	8	10	8	4
Streamside cover	0-10	9	4	8	5
Totals	**0-135**	**57**	**37**	**41**	**17**
Habitat score category		**Fair**	**Poor**	**Fair**	**Poor**

Table 4-20 Bioassessment scores for low and moderate risk waterway (green and amber) sites within the SGIC SDA

Habitat variable	Scale	Site 8	Site 12	Site 13	Site 16	Site 19
Bottom substrate	0-20	5	2	0	0	4
Embeddedness	0-20	3	4	0	0	4
Velocity and depth category	0-20	0	3	0	0	0
Channel alteration	0-15	8	3	1	1	2
Bottom scouring and deposition	0-15	8	2	1	0	1
Pool/riffle, run/bend ratio	0-15	0	3	1	1	3
Bank stability	0-10	8	7	1	6	5
Bank vegetation and stability	0-10	10	7	6	9	6
Streamside cover	0-10	5	4	4	5	5
Totals	**0-135**		**35**	**14**	**22**	**30**
Habitat score category		**Fair**	**Poor**	**Poor**	**Poor**	**Poor**

Table 4-21 Site characteristics and ecological values of sites within the SGIC SDA

Site	Characteristics	Ecological values
Site 2 – Raglan Creek		
Upstream 	– Tidal – tidal waterway mapped under the WWBW spatial layer. – Water was higher than the watermark and was an incoming tide at time of survey. – Channel width was approximately 8 m, and a depth of approximately 2 m. – The left bank was steep and approximately 5 m high, while the right bank has a low slope and only 2 m high. – Land use adjacent to the survey area on the left bank was subject to grazing while the right bank was natural and dense mangroves. – There was no evidence of erosion along the banks. – Water within creek was highly turbid. – Bed and bank substrate was primarily silt/clays.	– Instream habitat consisted of a mangrove roots and some small woody debris. – The creek would support marine, estuarine and some freshwater fish species. – Mangrove and marine cooch species were recorded along the banks and in the riparian zone. – Site is marginal for sawfish and dugong and species are unlikely to occur. – White-throated snapping turtle habitat is unsuitable and the species is unlikely to occur. – Site optimal for estuarine crocodile foraging and refuge and the species is likely to occur at this site. – The site provides marginal foraging habitat for marine turtle species, green turtle is likely to occur.
Downstream 		

Site	Characteristics	Ecological values
Site 3 – Twelve Mile Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Twelve Mile Creek at site 3 is a mildly sinuous channel that was approximately 10 m wide, and an average depth >1.5 m. – Water flow was still at the time of the survey but was above the watermark. – Water clarity was clear. – Land use adjacent to the survey area on both banks was cattle grazing. – Bed substrate was stable, with deposition of silt upon the substrate. – The left bank had a low slope and was approximately 1 m high, while the right bank has a flat slope and was 0.5 m high, both banks were concave in shape. – Riparian vegetation was continuous on both banks with moderate amounts of grasses and sedges, and scatted *Eucalyptus* trees >10 m high, providing >5% shading.	– Overall habitat condition rating was fair (59). – A culvert was located approximately 1 km upstream of the study site. – Instream habitat consisted of deep pools, and some submerged aquatic macrophytes. – The creek would support small to large estuarine and freshwater fish species. – The site provides habitat for freshwater turtle species. – Site is sub-optimal for estuarine crocodile foraging, with sub-optimal breeding habitat and the species may occur at this site. – Optimal foraging and burrowing habitat present for platypus and species is likely to occur.

Site	Characteristics	Ecological values
Site 4 – Inkerman Creek		
Upstream  Downstream 	– Tidal – tidal waterway mapped under the WWBW spatial layer. – Inkerman Creek at site 4 consisted of a mildly sinuous channel that was approximately 18 m wide and approximately 5 m deep. – Water flow was slow and on the incoming tide at the time of the survey and was below the mangrove leaf line. – Water clarity was turbid. – Land use adjacent to the survey area on the left bank was dense native mangrove forest, while the land use adjacent to the right bank was grazing. – Bed substrate was stable, with deposition of silt upon the substrate. – The left bank had a low slope and was approximately 2 m high, while the right bank has a steep slope and was 8 m high. – Riparian vegetation was continuous on both banks with several species of mangroves.	– Instream habitat consisted of roots from various mangrove species. – The creek would support small to large estuarine and freshwater fish species. – A green turtle , was observed at the site at the time of survey. – The site provides sub-optimal habitat for other marine turtle species. – Site is marginal for sawfish and dugong species and the species is unlikely to occur. – Site is optimal foraging and marginal breeding habitat for the estuarine crocodile habitat and the species is likely to occur.

Site	Characteristics	Ecological values
Site 5 – Bobs Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Bobs Creek at Site 5 consisted of a mildly sinuous channel with a bank full width that was approximately 10 m wide. – The average depth was 1.4 m and a maximum depth of 2 m and a wetted width of 4 m. – There was no flow at the time of the survey, and the water level was below the watermark. – Water clarity was slightly turbid. – Land use adjacent to the survey area on both banks were subject to cattle grazing. – The was a moderate amount of erosion present and compacted bed substrate that consisted of 20% sand and 80% silt/clay. – The left bank had a steep slope, while the right bank had a vertical slope. Both banks were 4 m high and with a high level of erosion. – Riparian vegetation isolated/scattered on both banks with some *Eucalyptus* trees <10 m high, and a moderate amount of grasses, and some shrubs.	– Overall habitat condition rating was fair (45). – Instream habitat consisted of deep and shallow pools, with large woody debris and beds of water lily. – This location provides suitable habitat for many fish and turtle species. – Optimal foraging and burrowing habitat present for platypus and species is likely to occur. – Outside of any known range for any other threatened aquatic species.

Site	Characteristics	Ecological values
Site 6 – Gavial Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Gavial Creek at site 6 has a meandering channel with a wetted with of 10 m and a depth >2 m. – There was no Water flow at the time of the survey and was below the watermark. – Water clarity was turbid. – Land use adjacent to the survey area on both banks were subject to cattle grazing. – The was a moderate amount of erosion present and with a loosely compacted bed substrate that consisted of 100% silt/clay. – Both banks had a low slope and were 5 m high and with a moderate level of erosion. – Riparian vegetation was regularly spaced on both banks with a moderate amount of *Eucalyptus* trees <10 m and >10m high providing the site with 25% shading and 15% trailing bank vegetation – The riparian zone also contained a moderate amount of grasses, and some shrubs.	– Overall habitat condition rating was fair (64). – Instream habitat consisted of deep pools, with some submerged and some floating aquatic macrophytes. – There were some log jams and woody debris present within the waterbody. – Gavial Creek at this location provides suitable habitat for many fish and turtle species. – Provides optimal habitat and burrowing opportunities for the platypus, and the species is likely to occur at this site. – Site is sub-optimal foraging and marginal breeding habitat for the estuarine crocodile. The species may occur at this site

Site	Characteristics	Ecological values
Site 7 – Unnamed waterway		
Upstream  Downstream 	– Red – high-risk waterway mapped under the WWBW spatial layer. – Site 7 consisted of an irregularly meandering channel with a bank full width of 10 m. – Water was absent during the survey. – Land use adjacent to the survey area was grazing. – Bed substrate was moderately eroded, with some deposition upon the substrate. – Bed substrate comprised of 5% bedrock, 5% cobble, 20% pebble, 30% gravel, 30% sand, and 10% silt/clay. – The banks were moderately stable, with some evidence of local catchment erosion. – The banks on both sides of the river were steep, and concave in shape and were 4 m high. – Riparian vegetation was semi-continuous on both banks with moderate amounts of *Eucalyptus*, *Melaleuca*, and *Casuarina* trees >10 m high and <10 m high providing the site with 25% shading and 15% trailing bank vegetation. – The riparian zone also contained some bare ground, grasses, and shrubs.	– Overall habitat condition rating was fair (57). – Instream habitat consisted of pool, run, and riffle sections, as well as undercut banks. – This location would provide suitable habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 8 – Unnamed Creek		
Upstream  Downstream 	– Orange – moderate risk waterway mapped under the WWBW spatial layer. – The unnamed creek at Site 8 consisted of an irregular meandering channel with a bank full width of 3 m. – Water was absent during the survey. – Land use adjacent to the survey area was grazing. – Bed substrate was moderately aggregated, with some deposition upon the substrate. – Bed substrate comprised of 20% pebble, 30% gravel, 30% sand, and 20% silt/clay. – The left bank was moderately steep and 2 m high, while the right bank had a low slope and was 1 m high. – The was little local catchment erosion present. – The riparian zone was semi-continuous on both banks with some of *Eucalyptus*, *Melaleuca* and *Casuarina* trees >10 m and <10 m high providing the site with 25% shading and 25% trailing bank vegetation. – The riparian zone also contained a moderate proportion of grasses and shrubs.	– Overall habitat condition rating was fair (47). – Giant rat's tail grass (*Sporobolus pyramidalis*) present throughout site. – Instream habitat consisted of pool, run, and riffle sections. – There were no aquatic macrophyte species present. – This location would provide sub-optimal habitat for small bodied fish species for a short duration during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 9 – Horrigan Creek		
Upstream  Downstream 	– Purple / tidal – major/tidal risk waterway mapped under the WWBW spatial layer. – The site is located where the tidal mapped area connects with the major risk mapped waterway and is list as a major risk and tidal waterway. – Horrigan Creek at Site 9 consisted of a regular meandering channel with a bank full width of 8 m. – Water was absent during the survey. – Land use adjacent to the survey area on the left bank was cleared for cattle grazing and the right bank is vegetated floodplain and forest. – Bed substrate was moderately aggregated, with some compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – The left bank was moderately steep and 3 m high, while the right bank had a flat slope and was 0.5 m high. – The was no evidence of local catchment erosion present. – The riparian zone was continuous on both banks with a moderate amount of mangrove trees and exotic trees species >10 m and <10 m high providing the site with 50% shading and 25% trailing bank vegetation. – The riparian zone also contained a moderate proportion of grasses, some shrubs and bare ground.	– Overall habitat condition rating was fair (46). – A culvert was located approximately 1 km upstream of the study site. – Instream habitat consisted of mangroves and woody debris. – This location would provide suitable habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 10 – Pelican Creek		
Upstream 	– Red – high-risk waterway mapped under the WWBW spatial layer. – Pelican Creek at site 10 consisted of an irregularly meandering channel with a bank full width of 3 m. – Water was absent during the survey. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with heavy compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – The left bank had a low slope, while the right bank had a flat slope. Both banks were 1 m high. – The was some local catchment erosion present. – The riparian zone was continuous on both banks with grasses, and a moderate amount of exotic grass species present. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (37). – Instream habitat consisted of a shallow run and some emergent macrophytes. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.
Downstream 		

Site	Characteristics	Ecological values
Site 11 – Marble Creek		
Upstream  Downstream 	– Red – high-risk waterway mapped under the WWBW spatial layer. – Marble Creek at site 11 consisted of a irregularly meandering channel with a wetted width of 3 m. – Water was present in a small, isolated pool that was 0.3 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with heavy compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – The left bank had a steep slope, while the right bank had a moderate slope. Both banks were 3 m high. – The was a moderate level of local catchment erosion present. – The riparian zone was thick in clumps and sparse through most of the reach. There was a moderate amount of *Casuarina* trees <10 m high, providing the site with 25% shading and 15% trailing bank vegetation. – The riparian zone also contained a moderate proportion of grasses including exotic clover, some shrubs and bare ground.	– Overall habitat condition rating was fair (41). – Instream habitat consisted of a shallow run and some tree roots. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 12 – Unnamed waterway		
Upstream  Downstream 	– Green – minor risk waterway mapped under the WWBW spatial layer. – The unnamed creek at Site 12 consisted of a mildly sinuous creek with a bank full width of 2 m. – Water was absent during the survey. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately eroded, with a low level of compaction of the substrate. – Bed substrate comprised of 2% gravel, 5% sand, and 93% silt/clay. – Both banks had a steep slope, were benched and were 1 m high. – The was some local catchment erosion present and moderate bank stability. – The riparian zone was isolated/scattered on both banks, with extensive amounts of exotic species of grasses, with a little amount of bare ground and shrubs. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (35). – Instream habitat consisted of shallow runs, pools and undercut banks. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 13 – Unnamed waterway		
Upstream  Downstream 	– Orange – moderate risk waterway mapped under the WWBW spatial layer. – The unnamed creek at Site 13 consisted of a mildly sinuous creek with a wetted width of 2 m. – Water was present in a small, isolated pool with a green coloration containing scum and was 0.3 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with a low level of compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a steep slope, were benched and were 2 m high. – The was some local catchment erosion present and high bank stability. – The was no riparian zone, only with extensive amounts of exotic species of grasses along the banks. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (14). – Instream habitat consisted of shallow runs, and some emergent macrophytes. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 14 – Anabranch of Inkerman Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – The anabranch of Inkerman Creek at site 14 consisted of an irregularly meandering creek with a wetted width of 0.5 m. – Water was present in a small creek bed that was 0.2 m deep and below the watermark. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately eroded, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a low slope, were convex in shape and were 1 m high. – The was some local catchment erosion present and high bank stability. – The riparian zone contained occasional clumps of mangrove and marine grass species along both banks. – The riparian zone consisted of a moderate amount of bare ground, some grasses, and shrubs. There were no trees present within site and no shading present.	– Overall habitat condition rating was fair (53). – Juvenile mangroves present within the waterway. – Instream habitat consisted of shallow runs, and some emergent macrophytes. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 15 – Anabranch of Inkerman Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – The anabranch of Inkerman Creek at site 15 consisted of an irregular meandering creek with a wetted width of 1 m. – Water was slowly flowing in a small creek bed that was 0.3 m deep and below the watermark. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately eroded, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – The left bank had a steep slope and convex shape, the right bank had a moderate slope and a concave shape. Both banks were 2 m high. – The was some local catchment erosion present and high bank stability. – The riparian zone contained occasional clumps of marine grass species along both banks. – The riparian zone consisted of a moderate amount of bare ground, some grasses and shrubs. There were no trees present within site and no shading present.	– Overall habitat condition rating was fair (49). – Instream habitat consisted of shallow runs, and some emergent macrophytes. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 16 – Unnamed waterway		
Upstream 	– Orange – moderate risk waterway mapped under the WWBW spatial layer. – The unnamed creek at site 16 consisted of a straight channel with a bank full width of 30 m. – Water was absent during the survey. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with a moderate level of compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a low slope, were concave in shape. The left bank was 2 m high, and the right bank was 1 m high. – The was some local catchment erosion present and high bank stability. – The was no riparian zone, only with extensive amounts of exotic species of grasses along the banks. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (22). – Instream habitat consisted of shallow runs and emergent macrophytes (paragrass). – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.
Downstream 		

Site	Characteristics	Ecological values
Site 17 – Station Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Station Creek at site 17 consisted of a mildly sinuous channel with a wetted width of 4 m. – Water was present in a small, isolated pool that was 0.2 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with a moderate compaction of the substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a vertical slope and were benched. Both banks were 3 m high. – The was a moderate level of local catchment erosion present. – The riparian zone was thick in clumps and sparse through most of the reach. There were some *Eucalyptus* trees <10 m high, providing the site with 15% shading and 25% trailing bank vegetation. – The riparian zone also contained an extensive proportion of grasses and some shrubs including exotic species.	– Overall habitat condition rating was poor (30). – Instream habitat consisted of deep pools, runs, undercut banks, large woody debris, and emergent macrophytes (paragrass). – This location would provide optimal habitat for small bodied fish and sub-optimal habitat for large bodied fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 18 – Unnamed waterway		
Upstream  Downstream 	– Red – high-risk waterway mapped under the WWBW spatial layer. – The unnamed creek at site 18 consisted of a mildly sinuous channel with a bank full width of 5 m. – Water was absent during the survey. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was severely aggregated, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a low slope and a concave shape. The left bank was 2 m high, and the right bank was 1 m high. – The was some local catchment erosion present and moderate bank stability. – The was a continuous riparian zone comprised exclusively by grasses along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (17). – Instream habitat consisted of shallow runs, and emergent macrophytes (*Typha sp.*). – This location would provide some habitat for fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 19 – Unnamed waterway		
Upstream  Downstream 	– Amber – moderate risk waterway mapped under the WWBW spatial layer. – The unnamed creek at site 19 consisted of a regularly meandering channel with a minimum bank full width of 5 m and a maximum bank full width of 30 m. – Water was present in a small, isolated pool that was 0.1 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was severely aggregated, with a moderately compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a moderate slope and a concave shape. Both banks were 0.5 m in height. – The was some local catchment erosion present and high level of bank stability. – The was a continuous riparian zone comprised exclusively by grasses along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– Overall habitat condition rating was poor (30). – Instream habitat consisted of shallow pools, and emergent macrophytes including *Juncus sp.* and paragrass. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 21 – Scrubby Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Scrubby Creek at site 21 consisted of an irregularly meandering channel with wetted width of 4 m. – Water was present in an isolated pool that was 0.3 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was stable, with a loosely compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a low slope and a concave shape. Both banks were 0.5 m in height. – The was some local catchment erosion present and high level of bank stability. – The was a semi-continuous riparian zone along both banks that contained a moderate amount of grasses and shrubs, and some trees >10 m and <10 m in height. A moderate amount of the species present were exotic. – Shading was 5% and trailing bank vegetation 10%.	– Overall habitat condition rating was poor (15). – Instream habitat consisted of pool/run habitat containing some small woody debris, – This location would provide optimal habitat for many fish species during wet periods. – Site not suitable for platypus refuge or borrowing opportunities.

Site	Characteristics	Ecological values
Site 24 – Oaky Creek		
Upstream  Downstream 	– Purple – major risk waterway mapped under the WWBW spatial layer. – Oaky Creek at site 24 consisted of a mildly sinuous channel with wetted width of 3 m. – Water was present in an isolated pool that was 0.2 m deep. – Land adjacent to the survey area on both banks cleared for cattle grazing. – Bed substrate was moderately aggregated, with a moderately compacted substrate. – Bed substrate comprised of 5% cobble, 15% pebble, 20% gravel, 30% sand, and 30% silt/clay. – Both banks had a vertical slope and a benched shape. Both banks were 4 m in height. – The was a little evidence of local catchment erosion present and high level of bank stability. – The was a regularly spaced riparian zone along both banks that contained a moderate amount of grasses and shrubs, and some trees <10 m in height. Some of the species present were exotic. – Shading was 75% and trailing bank vegetation 50%.	– Overall habitat condition rating was fair (70). – Instream habitat consisted of shallow pools, and large woody debris – This location would provide optimal habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 26 – Unnamed wetland near Raglan Creek		
Photo 1  Photo 2 	– Mapped HSE wetland. – The wetland type is described as an upper mangrove wetland. – The site was dry during the survey with no evidence of recent inundation. – The site is located less than 100 m Raglan Creek and would be inundated during spring high tides and during floods. – Adjacent land use is natural, with evidence of horse grazing. – Mangrove species dominated the tree canopy level, while patches of marine couch dominated the understory. – The substrate was stable with little signs of erosion.	– The site was dominated entirely by grasses and mangroves. There was some large and small woody debris present that when inundated by water would provide the site with some habitat and refugia. Overall, with the absence of surface waters the site is marginal for aquatic species and only for a short period of time when inundated. – Site not suitable for foraging, refuge or breeding of any marine aquatic species. – Site not suitable for foraging, refuge or breeding of any freshwater aquatic species. – Site not suitable for estuarine crocodile refuge, foraging or nesting.

Site	Characteristics	Ecological values
Site 27 – Unnamed wetland		
Upstream  Downstream 	– Mapped HSE wetland. – The wetland type is described as an open wetland with grass understorey. – The site was dry during the survey with no evidence of recent inundation. – The wetland and land adjacent to the survey area was cleared for cattle grazing. – Bed substrate was severely aggregated, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a flat slope and a concave shape. – The was little local catchment erosion present and moderate bank stability. – The was a continuous riparian zone comprised exclusively by grasses in the bed and along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– A dam wall that was approximate 3 m high was located approximate 300 m downstream of the site and another of the same height located approximately 1 km upstream of the site. – Instream habitat was minimal and consisted of terrestrial grasses. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species. –

Site	Characteristics	Ecological values
Site 28 – Unnamed wetland		
Photo 1  Photo 2 	– Mapped HSE wetland. – The wetland type is described as an open wetland with grass understorey. – The site was dry during the survey with no evidence of recent inundation. – The wetland and land adjacent to the survey area was cleared for cattle grazing. – Bed substrate was severely aggregated, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a flat slope and a concave shape. – The was little local catchment erosion present and moderate bank stability. – The was a continuous riparian zone comprised exclusively by grasses in the bed and along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– Instream habitat was minimal and consisted of terrestrial grasses. – This location would provide limited habitat for many fish species during extremely wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 29 – Unnamed wetland		
Upstream  Downstream 	– Mapped HSE wetland. – The wetland type is described as an open floodplain watercourse with grass understorey. – The site was dry during the survey with no evidence of recent inundation. – The wetland and land adjacent to the survey area was cleared for cattle grazing. – Bed substrate was severely aggregated, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a flat slope and a concave shape. – The was little local catchment erosion present and moderate bank stability. – The was a continuous riparian zone comprised exclusively by grasses in the bed and along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– Instream habitat was minimal and consisted of terrestrial grasses. – This location would provide limited habitat for many fish species during wet periods. – Outside of any known range for threatened aquatic species.

Site	Characteristics	Ecological values
Site 30 – Unnamed wetland		
Photo 1  Photo 2 	– Mapped HSE wetland. – The wetland type is described as a floodplain billabong. – The site was wet during the survey, and water level below the watermark. – Water was turbid. – The wetland dimensions were approximately 1500 m long by 100 m wide and greater than 1.5 m deep. – Connection to other waterbodies only occurs during floods. – The wetland and land adjacent to the survey area was cleared for cattle grazing. – Bed substrate was severely aggregated, with a tightly compacted substrate. – Bed substrate comprised of 100% silt/clay. – Both banks had a flat slope and a concave shape. – The was little local catchment erosion present and moderate bank stability. – The was a continuous riparian zone comprised exclusively by grasses in the bed and along the banks, many of which were exotic species. – There were no trees present within site and no shading present.	– Habitat large shallow pool, with deep middle. – Small woody debris present – Site not suitable for white-throated snapping turtle refuge or nesting. – Site not suitable for platypus refuge or borrowing opportunities. – Site sub-optimal for estuarine crocodile refuge or nesting and may occur.

4.6.2.2 Physico-chemical water quality

The *in-situ* water quality data obtained from accessible sites indicated that only the Ph and turbidity were within the guidelines for the region at all sites. The conductivity was higher than the baseline guidelines for sites 3 and 11, while the dissolved oxygen was within the guidelines for all sites except for site 6, which was lower than the guidelines (Table 4-22).

Table 4-22 Water Quality Data at sites within the SGIC SDA

Parameter	Water quality objective*	Site 3	Site 5	Site 6	Site 11
Date	-	08/05/2022	05/05/2022	04/05/2022	08/05/2022
Time	-	9:25 am	1:25 pm	3:45 pm	10:50 am
Depth of location (m)	-	0.3	0.3	0.3	0.2
Temperature (°C)	-	23.8	22.8	25.7	22.2
Ph	6.5-8.5	-	6.79	6.76	7.74
Electrical conductivity (µS/cm)	< 445 (baseflow) < 250 (high flow)	1131	265.2	219.4	2179
Dissolved oxygen (mg/L)	-	7.57	7.52	4.07	7.90
Dissolved oxygen (% saturation)	85-110	89.0	87.4	49.9	91.1
Turbidity (NTU)	<50	13.9	16.3	22.2	18.4
Key to table: (*) – As per the moderately disturbed aquatic ecosystem objectives in the Fitzroy River sub-basin fresh waters (DEHP 2013)					

4.6.2.3 Aquatic flora

There were no threatened aquatic flora species confirmed present or predicted to occur within the study area. Details of the aquatic species present during the survey is in Table 4-21.

4.6.2.4 Freshwater fishes

A total of 34 native and three pest freshwater fish species are known to occur within the Fitzroy River catchments (Pusey *et al.* 2004). Of the native species to occur within the Fitzroy River catchment none are conservation significant.

A total of four fish species were captured throughout the surveys within the SGIC SDA. All species observed were common species. Agassiz's glassfish was the most abundant species recorded. The other species recorded were the fly-specked hardyhead, western carp gudgeon, and spangled perch (*Leiopotherapron unicolor*). Further details of the surveys are outlined in Appendix J.

All species recorded were native. No conservation significant species were recorded during the field survey, there were also no conservation significant species predicted to occur in the desktop search outlined in Section 4.6.1.1. No pest species were recorded during the field survey, biosecurity matters are further discussed in Sections 6.2.8 and 6.3.4.

4.6.2.5 Other aquatic fauna

Four known species of freshwater turtles are known to occur in the study area, two of which, the white-throated snapping turtle and Fitzroy River turtle, are conservation significant species. The white-throated snapping turtle has one occurrence in the estuarine waters of Raglan Creek downstream of site 2, as well as several records within the freshwaters of Raglan Creek upstream of Raglan (Thomson *et al.* 2006). However, the species is found in the upper-most freshwater reaches to the freshwater and brackish water interface but does not inhabit brackish waters (Thomson *et al.* 2006), or estuarine waters. The species prefers flowing waters with a complexity of subsurface structure including large woody debris, undercut banks and irregular rocky substrates (Thomson *et al.* 2006), none of which are present at site 2. It is based upon these criteria for habitat preference and distribution that the occurrence within the estuarine waters of Raglan Creek is an anomaly and that the species is unlikely to

occur at Raglan Creek at site 2. No previous records of this species occurring within any other waterway throughout the SGIC SDA exist and therefore the species is unlikely to occur throughout the SGIC SDA.

The Fitzroy River turtle is only known to occur within the main river system of the Fitzroy River and is unlikely to occur at any waterway crossings within the SGIC SDA. No observations of this species occurred throughout the surveys within the SGIC SDA and therefore the species is unlikely to occur. During the surveys within the SGIC, only one freshwater turtle was observed, an adult Krefft's river turtle, which was captured at Twelve Mile Creek (site 3).

Platypus are known to occur in the Fitzroy River and tributaries upstream of Rockhampton (ALA 2022) and the species has been identified within the desktop searches as known to occur within the SGIC SDA. Twelve Mile Creek (site 3), Bobs Creek (site 5) and Gavial Creek (site 6) contain permanent large pool sections with large woody debris, tree roots and aquatic macrophytes providing foraging and burrowing habitat for the species. The platypus is therefore considered likely to occur within the SGIC SDA.

Previous observations of estuarine crocodiles have been recorded in the Fitzroy River. The species is known for large migration and movements. Raglan Creek (site 2) and Inkerman Creek (site 4) are estuarine tidal creeks that lead into the Fitzroy River Delta. Both creeks contain optimal habitat for estuarine crocodiles and the species is therefore likely to occur at these locations. Twelve Mile Creek (site 3) and Gavial Creek (site 6) contain sub-optimal habitat for the species. Therefore, estuarine crocodile may occur within these waterways. Site 30 is an isolated floodplain billabong near the Fitzroy River, movement from estuarine crocodiles in and out of this billabong is able to occur during floods. The billabong contains sub-optimal habitat for the species and is able to support a small crocodile throughout the year, not just during flood times and therefore the species may still occur at this location.

Australian snubfin dolphin occurs throughout northern Australia and as far south on the east coast to Brisbane River and are known to occur within costal and estuarine waters (DCCEEW 2022d). Previous occurrence records of the species are recorded from the mouth of the Fitzroy River (ALA 2022). The pipeline alignment of the pipeline is located within the upper tidal reaches of Raglan Creek (site 2) and Inkerman Creek (site 4). Sub-optimal habitat for the species occurs within these two sites and therefore the species may occur.

Australian humpback dolphins are known to occur across northern Australia and as far south on the east coast as the Queensland and New South Wales border, and are known to inhabit inlets, estuaries, major tidal rivers, shallow bays, inshore reefs and coastal archipelagos (DCCEEW 2022g). Previous occurrence records of the species are recorded from the coastline of the SGIC SDA (ALA 2022) and with species able to cover considerable range therefore, the species may occur within the tidal reaches of Raglan Creek (site 2) and Inkerman Creek (site 4) which contain sub-optimal habitat for these species.

Of the marine species of turtles that are predicted to occur or habitat likely to occur within the SGIC SDA, the green turtle is the only species to have previous occurrences recorded in the estuarine waters within the region between Rockhampton and Gladstone (ALA 2022). A confirmed sighting of the green turtle at site 4 during the survey at Inkerman Creek indicates that the species is also likely occur within Raglan Creek at site 2. The other marine turtles are not known to occur within the upper tidal reaches of the waterways within the SGIC SDA and therefore those species are unlikely to occur.

4.7 Likelihood of occurrence

Based on the desktop searches and field survey results, the following conservation significant species have the potential to occur within the SGIC SDA study area (Table 4-23). The ornamental snake, yellow chat, squatter pigeon, Australian painted snipe and *Samadera bidwillii* were identified as controlling provisions at the time of EPBC approval. These species also listed under the NC Act were assessed against the Queensland Government's *Significant Residual Impact Guidelines* (DEHP 2014b) for MSES (Section 7.2). A detailed likelihood of occurrence assessment is provided in Appendix E.

Table 4-23 Likelihood of occurrence summary

Scientific name	Common name	Status		Likelihood of occurrence	EPBC approval
		EPBC Act	NC Act		
Threatened species					
Calidris ferruginea	Curlew sandpiper	CE, Mig	CE	**Likely to occur**	
Chelonia mydas	Green turtle	V, Mig	V	**Confirmed present**	
Crocodylus porosus	Estuarine crocodile	Mig	V	**Likely to occur**	
*Denisonia maculata**	Ornamental snake	V	V	**Confirmed present**	✓
*Epthianura crocea macgregori**	Yellow chat (Dawson)	CE	E	**Confirmed present**	✓
*Geophaps scripta scripta**	Squatter pigeon (southern)	V	V	**Confirmed present**	✓
Hemiaspis damelii	Grey snake	NL	V	**Likely to occur**	
Hirundapus caudacutus	White-throated needletail	V, Mig	V	**Likely to occur**	
Ninox strenua	Powerful owl	NL	V	**Likely to occur**	
Ornithorhynchus anatinus	Platypus	NL	SL	**Likely to occur**	
Petauroides volans	Greater glider (southern and central)	E	E	**Likely to occur**	
Petaurus australis australis	Yellow-bellied glider (south-eastern)	V	V	**Likely to occur**	
*Phascolarctos cinereus**	Koala	E	E	**Confirmed present**	
Pteropus poliocephalus	Grey-headed flying-fox	V	LC	**Likely to occur**	✓
Rostratula australis	Australian painted snipe	E	E	**Likely to occur**	✓
Samadera bidwillii	-	V	V	**Likely to occur**	✓
Migratory species					
Apus pacificus	Fork-tailed swift	Mig	SL	**Likely to occur**	
Calidris acuminata	Sharp-tailed sandpiper	Mig	SL	**Likely to occur**	
Calidris falcinellus	Broad-billed sandpiper	Mig	SL	**Likely to occur**	
Calidris ruficollis	Red-necked stint	Mig	SL	**Likely to occur**	
Chlidonias leucopterus	White-winged black tern	Mig	SL	**Likely to occur**	
Cuculus optatus	Oriental cuckoo	Mig	SL	**Likely to occur**	
Gallinago hardwickii	Latham's snipe	Mig	SL	**Likely to occur**	
Gelochelidon nilotica	Gull-billed tern	Mig	SL	**Likely to occur**	
Hydroprogne caspia	Caspian tern	Mig	SL	**Likely to occur**	

Scientific name	Common name	Status		Likelihood of occurrence	EPBC approval
		EPBC Act	NC Act		
Limosa limosa	Black-tailed godwit	Mig	SL	**Likely to occur**	
Monarcha trivirgatus	Spectacled monarch	Mig	SL	**Likely to occur**	
Myiagra cyanoleuca	Satin flycatcher	Mig	SL	**Likely to occur**	
Numenius minutus	Little curlew	Mig	SL	**Likely to occur**	
Pandion haliaetus	Osprey	Mig	SL	**Likely to occur**	
Plegadis falcinellus	Glossy ibis	Mig	SL	**Likely to occur**	
Pluvialis fulva	Pacific golden plover	Mig	SL	**Likely to occur**	
Tringa nebularia	Common greenshank	Mig	SL	**Likely to occur**	
Tringa stagnatilis	Marsh sandpiper	Mig	SL	**Likely to occur**	
Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; NL – not listed; (*) – confirmed present during the Arup (2008) field surveys.					

5. Northern Section ecological values

5.1 Threatened ecological communities

5.1.1 Desktop assessment results

The EPBC Act PMST search predicted four TECs have the potential to occur within the desktop search extent of the Northern Section (i.e. from the Fitzroy River to the SGIC SDA) (Appendix A). The predicted TECs and their associated REs are summarised in Table 5.1.

Although four TECs were shown as predicted to occur within the search area, only two were listed at the time of the EPBC approval, and as such, subject to the EPBC approval including:

– Brigalow (*Acacia harpophylla* dominant and co-dominant) (listed as endangered)
– Semi-evergreen vine thickets of the brigalow belt (listed as endangered).

Neither of the abovementioned communities was confirmed present within the Northern Section study area during the previous field survey (Arup 2008). It is also noted that the overwhelming majority of the Northern pipeline alignment occurs within the Interim Biogeographic Regionalisation for Australia (IBRA) Brigalow Belt North Bioregion which does not support the Coolibah – Black Box Woodlands TEC.

Table 5-1 TECs predicted to occur within the desktop search extent

TEC	EPBC Act status	Associated REs	RE(s) mapped in study area
Coolibah – Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	11.3.3, 11.3.16, 11.3.15, 11.3.37, 11.3.28	No
Poplar Box Grassy Woodland on Alluvial Plains	E	11.3.2, 11.3.17, 11.4.7, 11.4.12, 12.3.10	No
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	E	11.11.18, 11.2.3, 11.3.11, 11.4.1, 11.5.15, 11.8.13, 11.8.3, 11.8.6, 11.9.4, 11.9.8	No
Weeping Myall Woodlands	E	11.3.2, 11.3.28	No
Key to table: E – endangered			

5.1.2 Field survey results

No vegetation communities were observed that met the diagnostic or condition criteria of any EPBC Act listed TEC. In most instances, vegetation communities lacked the floristic composition to constitute a listed TEC or were not in a mandatory bioregion for the TEC.

5.2 Regional Ecosystems and regulated vegetation

5.2.1 Desktop assessment results

The Northern study area is largely located within the Marlborough Plains subregion of the Brigalow Belt bioregion. The exception being a small section of the Northern pipeline alignment (approximately 380 m) that encroaches into the Mount Morgan Ranges subregion of the Brigalow Belt bioregion. The study area is mapped by DoR as comprising a mixture of Category B, Category R, Category C and Category X vegetation. Descriptions of currently mapped REs and regrowth vegetation within the study area, together with their status under the VMA are provided in Table 5-2. PMAVs are also in place across substantial portions of the study area. The majority of the mapped polygons in the PMAVs are Category X. Essential habitat, defined watercourses and regulated vegetation within 100 m of a wetland are also intersected by the Northern Section pipeline alignment.

DoR vegetation mapping relative to the study area is provided in Appendix C.

Table 5-2 REs mapped within the Northern Section study area, either as components of heterogenous polygons or as homogenous polygons

Mapped RE	VM Act status	Short description	Broad Vegetation Group
11.3.1	E	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	25a
11.3.2	OC	*Eucalyptus populnea* woodland on alluvial plains	17a
11.3.3	OC	*Eucalyptus coolabah* woodland on alluvial plains	16c
11.3.4	OC	*Eucalyptus tereticornis* and/or *Eucalyptus* spp. Woodland on alluvial plains	16c
11.3.25	LC	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines	16a
11.3.25f	LC	Main river channels. Open water or exposed stream beds and bars	16a
11.3.27b	LC	Open water +/- aquatics and emergents. Often with fringing woodland	34d
11.3.27c	LC	Mixed sedges or grasses with areas of open water +/- aquatic species	34d
11.3.27x1b	LC	Sedgelands to grasslands on Quaternary deposits	34d

5.2.2 Field survey results

A number of discrepancies were identified between the mapped DoR RE layer and the field verified REs within the Northern Section study area. Most commonly, mapped heterogenous polygons comprising multiple REs were comprised of single RE or floristics observed within the extent of the pipeline alignment did not match the mapped RE. Often, the VMA status (endangered, of concern, least concern) and/or remnant status (remnant, regrowth, non-remnant) of verified polygons remained the same, despite the change in RE designation. Where a change was recorded, the VMA status was typically a lower conservation status (i.e. less threatened). The only exception was a patch of RE11.3.25/11.3.27 within Lot 102 LN176 which was remapped as RE11.3.4. This resulted in a change in VMA status of the patch from least concern to of concern.

Several areas containing PMAVs were mapped as Category X, despite vegetation appearing to have reached remnant status. These polygons were historically secured as Category X vegetation through the PMAV process and their assigned designation within the study area was retained.

Field verified RE mapping is provided in Figure 5-1. It is noted that DoR vegetation mapping was accepted for those polygons not ground-truthed during surveys (refer hatched polygons in Figure 5-1). Impact areas for respective REs within the GSDA, based on field verified mapping and a nominal 30 m wide corridor, are provided in Table 5-3.

A description of REs where field verification has resulted in a change to the VMA status or remnant status of the mapped polygon (version 12.1) is provided in Table 5.5-4.

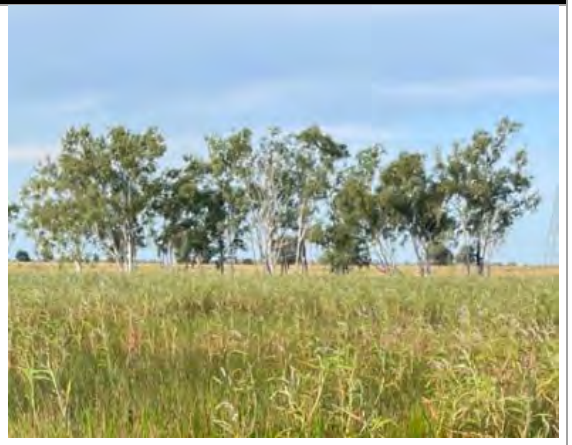
Table 5-3 Impact areas for REs mapped within the northern pipeline alignment

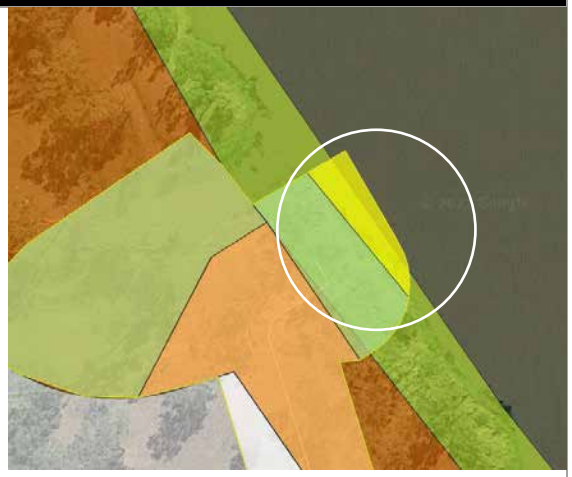
RE	VMA Class	VMA Status	Total area (m^2)
11.3.1/11.3.4	High value regrowth	E	5,216
11.3.2	High value regrowth	OC	1,205
11.3.3	High value regrowth	OC	2,095
11.3.3/11.3.27c	High value regrowth	OC	1,596
11.3.3/11.3.4	Remnant	OC	4,223
11.3.4	High value regrowth	OC	13,683
11.3.4	Remnant	OC	1,241
11.3.4/11.3.2/11.3.27x1b	High value regrowth	OC	1,851
11.3.4/11.3.25	High value regrowth	OC	3,585

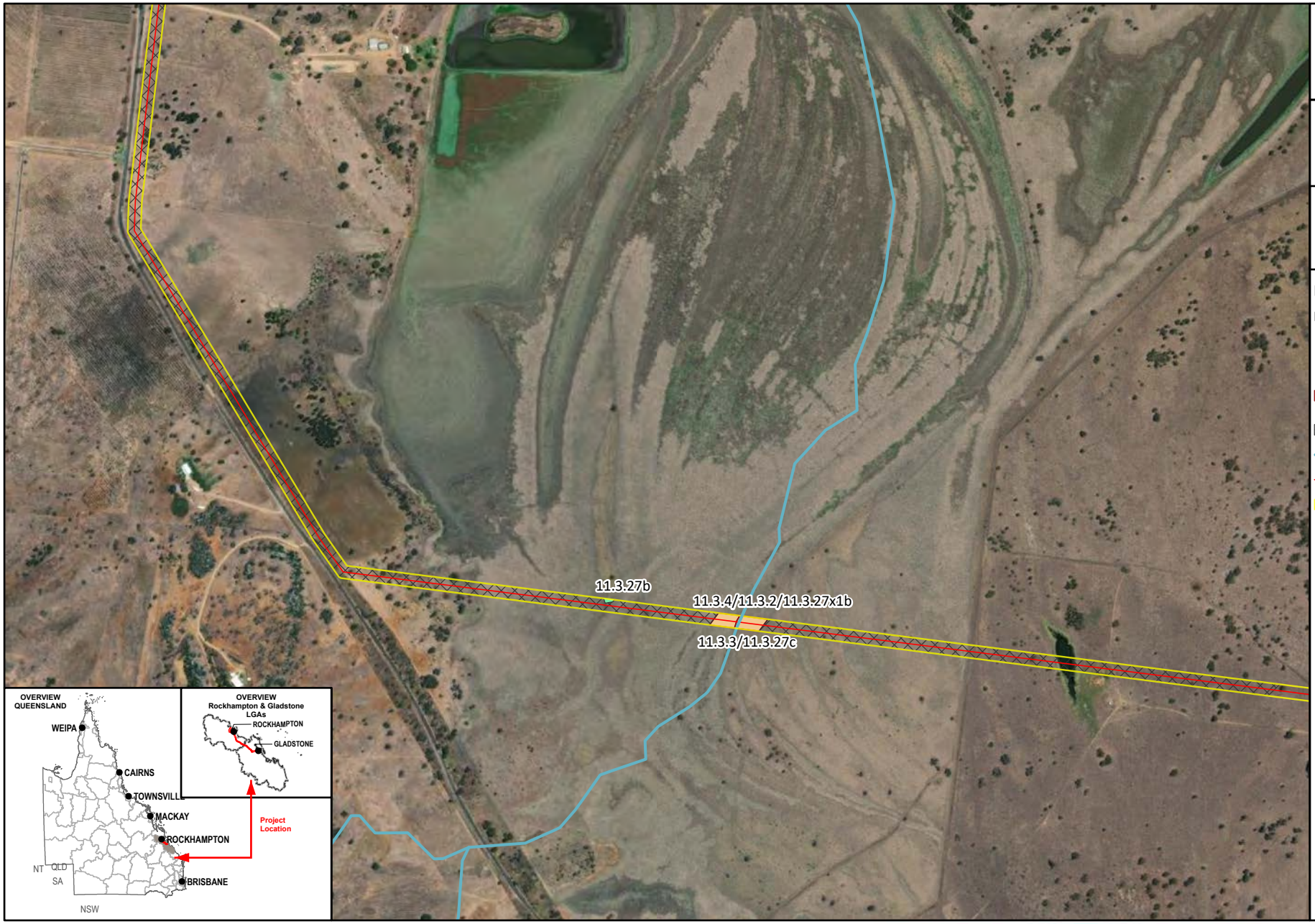
RE	VMA Class	VMA Status	Total area (m^2)
11.3.25e	High value regrowth	LC	3,356
11.3.27b	Remnant	LC	167
11.3.27c	Remnant	LC	5,765
Non-remnant	Non-remnant	NA	563,106
Water	Water	NA	283

Table 5.5-4 Field verified REs and regulated vegetation changes in the Northern Section study area

Location	Mapped RE	Field verified RE	Field description	Representative photograph
-23.369, 150.400	Category B 11.3.3/ 11.3.4	Category X	E – *Eucalyptus tereticornis, Lysiphyllum* sp., *E. coolabah, Corymbia tessellaris* (14-20 m tall, 4% cover) G – *Megathyrsus maximus*, Urochloa mutica*, Dichanthium aristatum*, Eriochloa pseudoacrotricha, Echinochloa colona*, Parthenium hysterophorus*, Aeschynomene indica*, Sesbania cannabina, Macroptilium lathyroides*, Sida* spp. (1 m tall, 95% cover). Landform: alluvial plain Note: A substantial portion of the mapped polygon within study corridor lacks sufficient tree cover to meet remnant or Category C status.	
		Category B 11.3.3/ 11.3.4	T1 — *Eucalyptus tereticornis, E. coolabah* (12 – 18 m tall, 20 % cover). T2 — *Eucalyptus tereticornis, Lysiphyllum hookeri, E. coolabah, Corymbia tessellaris* (6-10 m tall, 10 % cover). G — *Eriochloa pseudoacrotricha, Megathyrsus maximus*, Urochloa mutica*, Parthenium hysterophorus*, Aeschynomene indica*, Sesbania cannabina, Macroptilium lathyroides*, Sida* spp. (0.3-1 m tall, 85% cover).	

Location	Mapped RE	Field verified RE	Field description	Representative photograph
-23.3462, 150.4052	Category B 11.3.25/11.3.27c	Category B 11.3.4	Aerial and hillshade imagery indicate lack of defined drainage line. Rather, vegetation occupies an alluvial plain surrounding shallow depression and is representative of 11.3.4.	
-23.2949, 150.4361	Category R 11.3.3	Category R 11.3.25e	T1 – *Eucalyptus camaldulensis, Melaleuca leucandendra* (18-23 m tall, 10 % cover) T2 – *Casuarina cunninghamiana* (2% cover) S1 – *E. camaldulensis* (1-2 m tall) G – *Megathyrsus maximus*, 387oriacea387t amplexicaulis*, Passiflora foetida*, Alternanthera sp., Echinochloa sp.* (0.2-1 m tall, 90% cover) Landform: watercourse	

Location	Mapped RE	Field verified RE	Field description	Representative photograph
-23.2947, 150.4367	11.3.25f	Water	Adjustment made to polygon boundary to more accurately reflect site observations and aerial imagery	
Key to table: Pale orange shading: High value regrowth regulated vegetation containing of concern REs; Orange shading: Remnant regulated vegetation containing of concern REs; Pale green shading: High value regrowth regulated vegetation containing least concern REs; (*) – introduced flora species.				



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Legend

Field verified REs

- Category A or B area that is least concern
- Category C or R area containing of concern
- Unverified Fields
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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PROJECTION UTM Zone 56
(Datum GDA2020)

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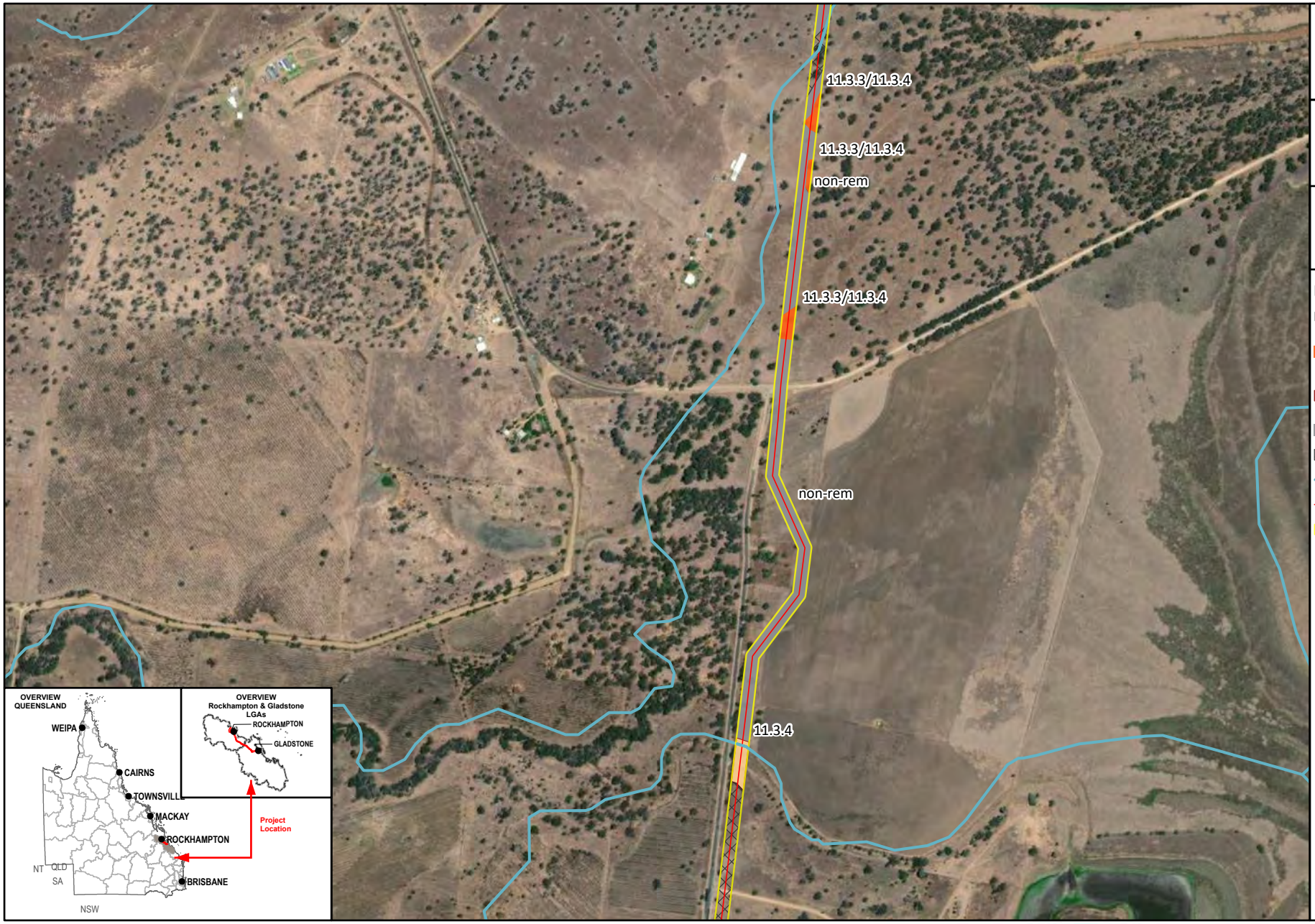
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1a
Field Verified REs
Within the Northern Section Study Area
000-G-MAP-2418 Version:3 Date:2022/09/19



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Field verified REs

- Category A or B area containing of concern
- Category C or R area containing of concern
- Non-remnant
- Unverified Fields
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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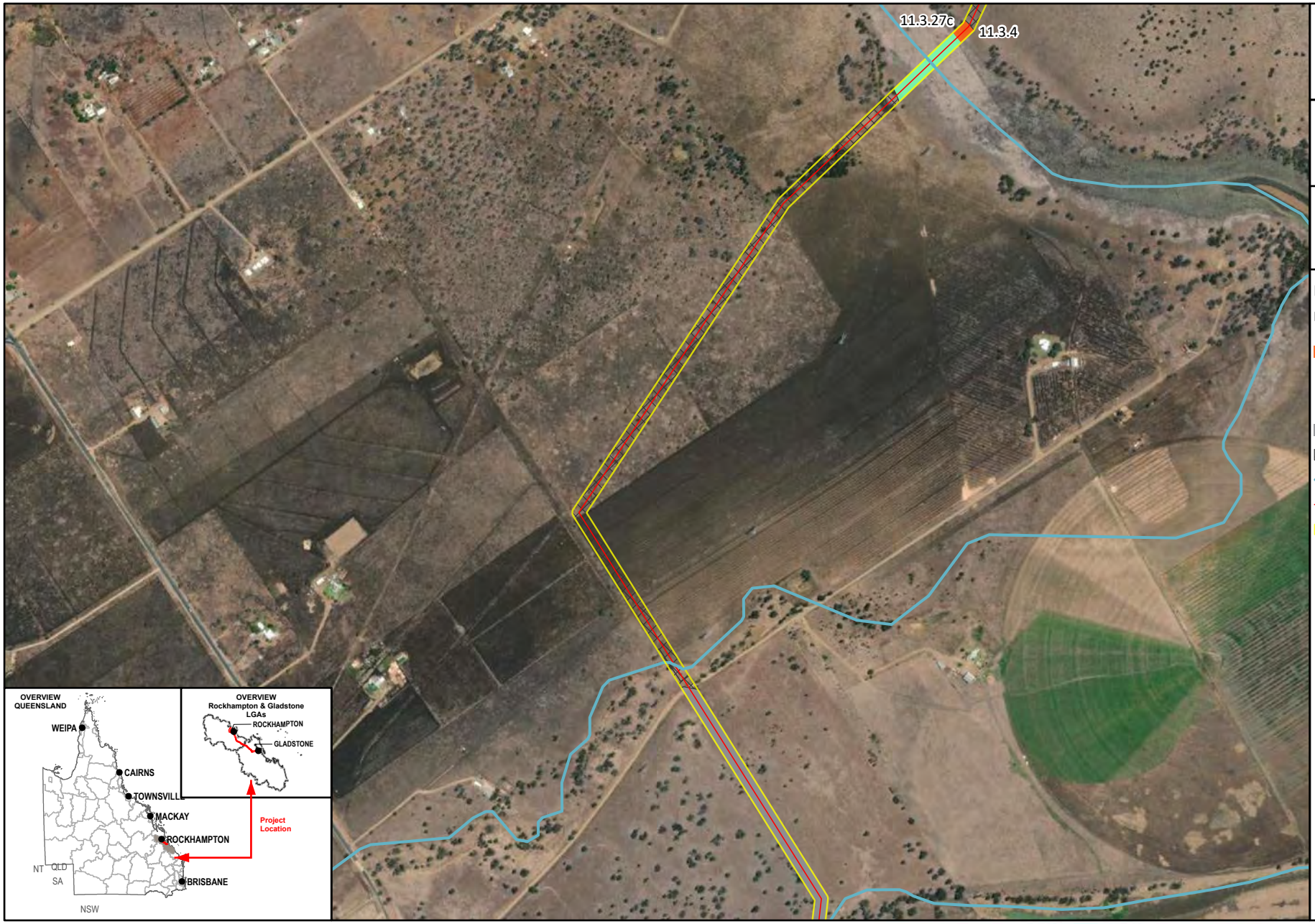
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1b
Field Verified REs
Within the Northern Section Study Area
000-G-MAP-2418 Version:3 Date:2022/09/19



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Field verified REs

- Category A or B area containing of concern
- Category A or B area that is least concern
- Non-remnant
- Unverified Fields
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
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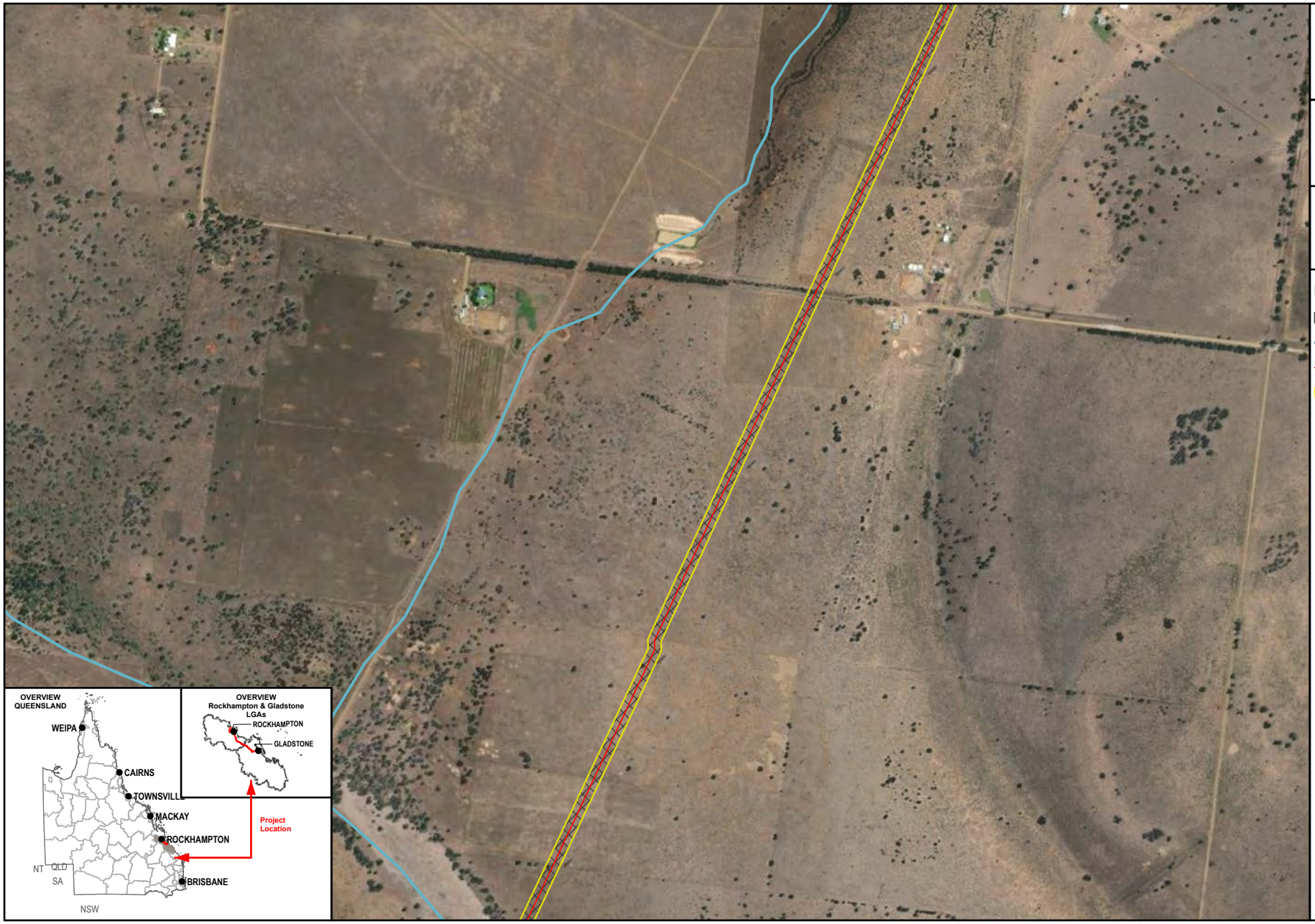
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1c
Field Verified REs
Within the Northern Section Study Area

000-G-MAP-2418 Version:3 Date:2022/09/19



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Legend

- Unverified Fields
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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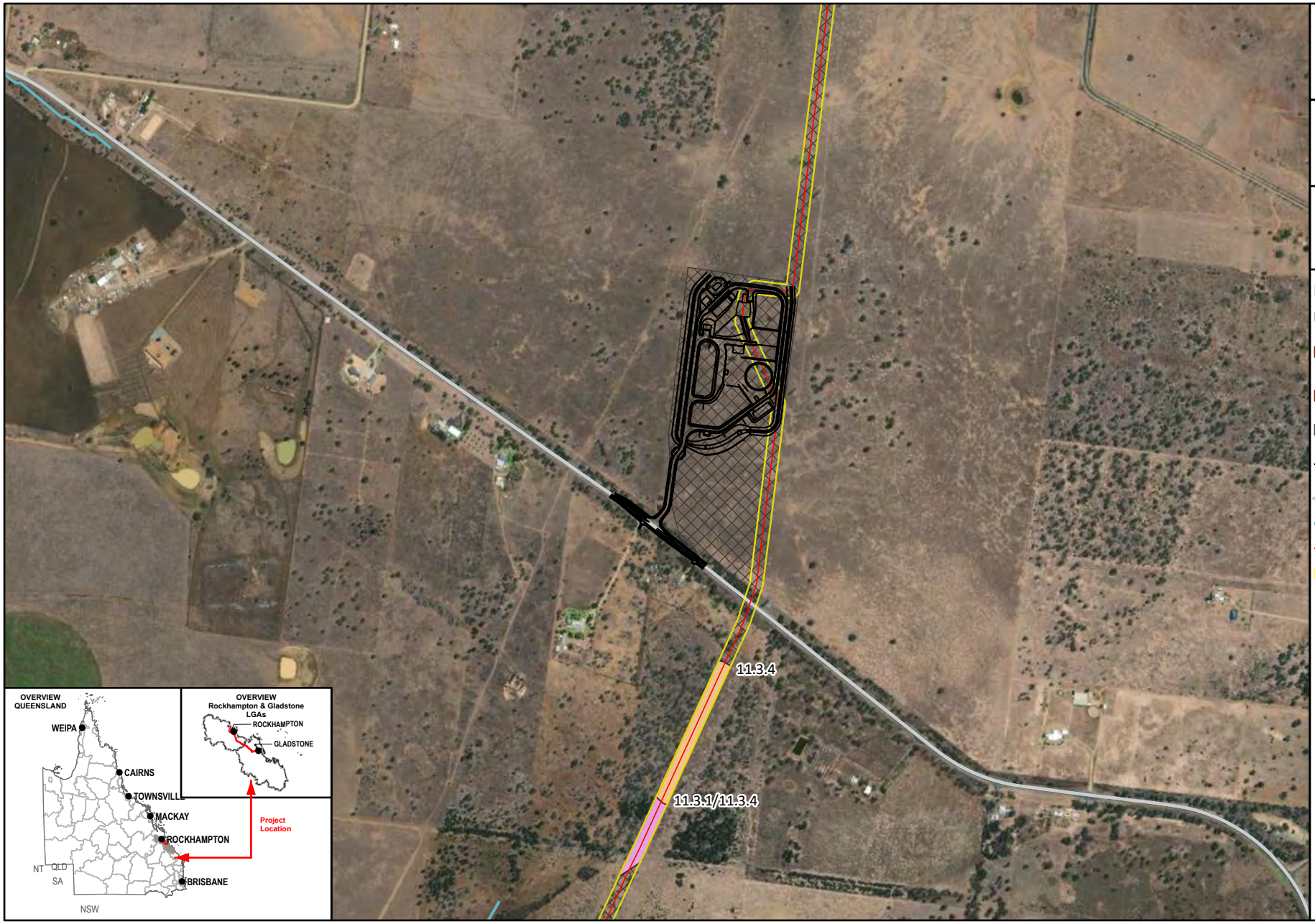
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1d
Field Verified REs
Within the Northern Section Study Area
000-G-MAP-2418 Version:3 Date:2022/09/19



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Legend

Field verified REs

- Category C or R area containing endangered
- Category C or R area containing of concern
- Unverified Fields
- Alton Down WTP, Pump Station and Reservoir Layout
- Main Roads
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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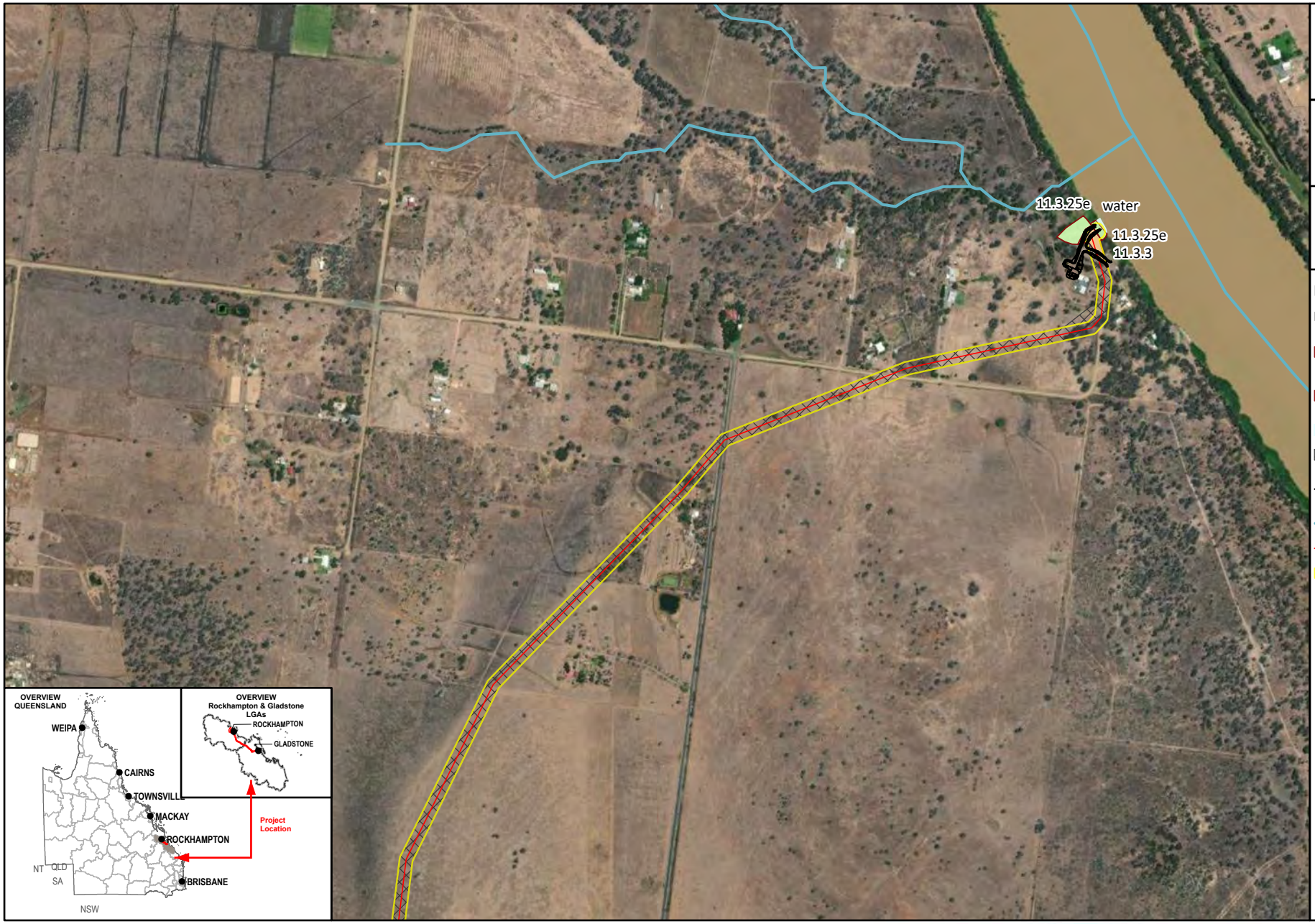
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1e
Field Verified REs
Within the Northern Section Study Area
000-G-MAP-2418 Version:3 Date:2022/09/19



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Legend

Field verified REs

- Category C or R area containing of concern
- Category C or R area that is least concern
- Water
- Unverified Fields
- Fitzroy River Intake and Pump Station Layout
- Waterways
- GSDA Pipeline Alignment
- Study Area

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-1f
Field Verified REs
Within the Northern Section Study Area
000-G-MAP-2418 Version:3 Date:2022/09/19

5.3 Conservation significant flora

5.3.1 Desktop assessment results

5.3.1.1 Protected plants trigger areas

Two high-risk areas under the protected plants flora survey trigger mapping intersect the Northern Section pipeline alignment within the locality of Nine Mile (Figure 5-2). Results of the protected plant surveys are presented in a standalone flora survey report, included as Appendix D. A protected plants Exemption Notification was submitted to DES via email on 3 August 2022. Numerous trigger areas are also mapped within the broader desktop search extent, predominantly within remnant vegetation (Appendix A).

5.3.1.2 Previous field surveys

No conservation significant flora species were recorded in the Northern Section study area during the previous field survey (Arup 2008).

5.3.1.3 Database searches

Ten conservation significant flora species have been predicted to occur from the PMST search within the Northern Section desktop search extent (Table 5-5). Four conservation significant flora species have historical records from the WildNet and Atlas of Living Australia (ALA) databases within the Northern Section desktop search extent (Table 5-5). Table 5-5 also identifies threatened flora species that were identified as controlling provisions under the EPBC approval.

Table 5-5 Conservation significant flora species historical records (post 1980)

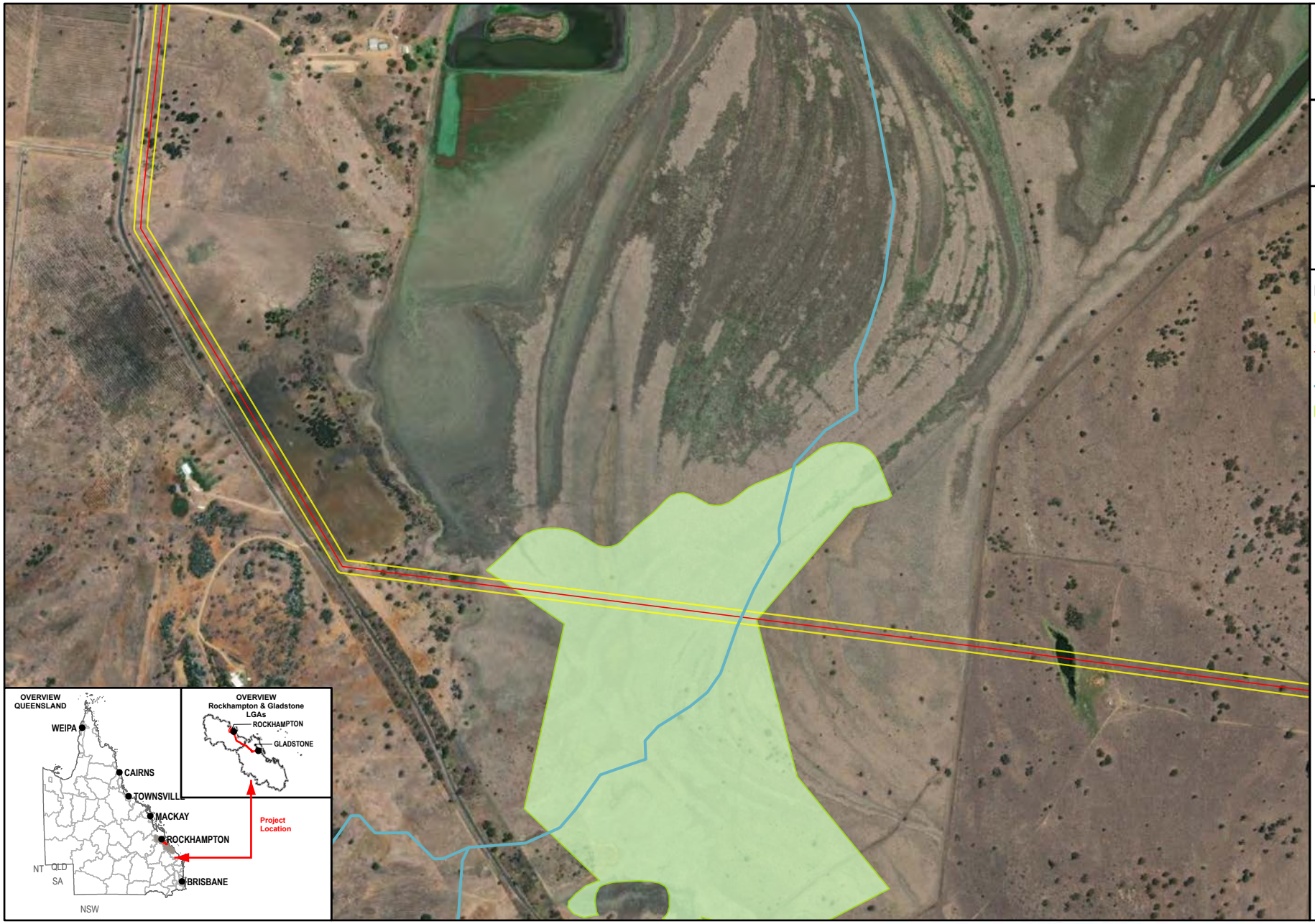
Scientific name	Status		Source	WN Records (post 1980)	Nearest Record to ROW	EPBC Approval
	EPBC Act	NC Act				
Bulbophyllum globuliforme	V	NT	PMST	-	>120 km	✓
Capparis humistrata	NL	E	WN	1	7.19 km	
Cossinia australiana	E	E	PMST	-	20.71 km	✓
Cupaniopsis shirleyana	V	V	PMST	-	79.49 km	✓
Cycas megacarpa	E	E	WN; PMST	1	7.54 km	✓
Cycas ophiolitica	E	E	WN; PMST	6	6.89 km	✓
Dichanthium setosum	V	LC	PMST	-	>230 km	
Eucalyptus raveretiana	V	LC	WN; PMST	20	8.44 km	✓
Marsdenia brevifolia	V	V	PMST	-	7.05 km	✓
Phaius australis	E	E	PMST	-	>200 km	
Samadera bidwillii	V	V	PMST	-	22.56 km	✓

Key to table: CE – critically endangered; E – endangered; V – vulnerable; NT – near threatened; Mig – migratory; SL – special least concern; LC – least concern; NL – not listed. WN – WildNet; PMST – Protected Matters Search Tool.

5.3.2 Field survey results

5.3.2.1 Conservation significant species

Comprehensive surveys for conservation significant flora species were undertaken within sections of the pipeline alignment intersected by high-risk flora trigger areas. Opportunistic searches were also undertaken beyond the high-risk flora trigger areas. No conservation significant flora species were identified within the Northern Section study area during the field surveys. Results of the protected plant surveys completed in high-risk flora trigger areas (Figure 5-2) are presented in a standalone flora survey report, included as Appendix D. A protected plants Exemption Notification was submitted to DES via email on 3 August 2022.



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- Study Area
- Northern Section Pipeline Alignment
- Waterways
- High-risk Flora Trigger Areas

Data Sources:
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2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-2a
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
000-G-MAP-2419 Version:3 Date:2022/09/12

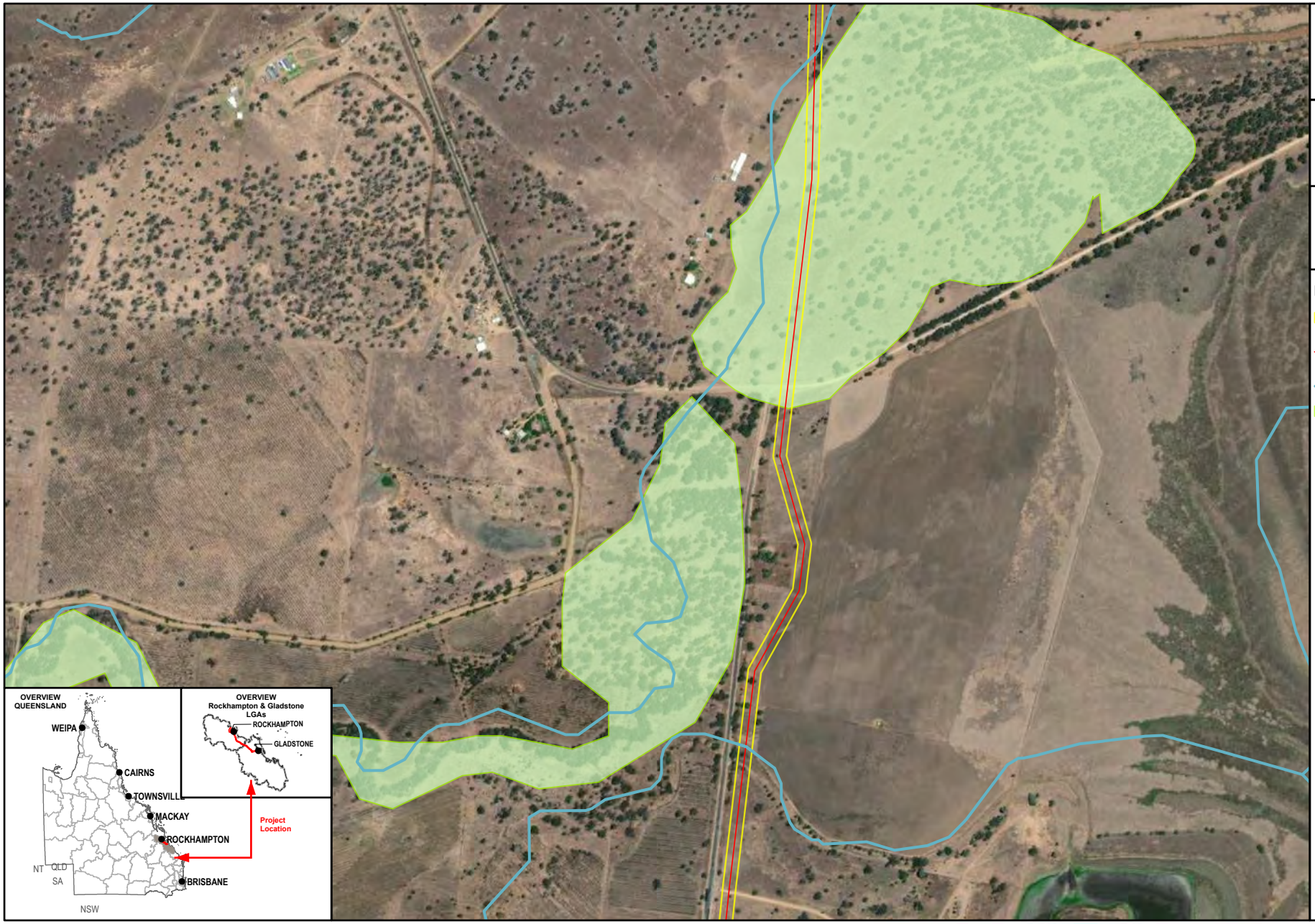

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Figure 5-2b
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
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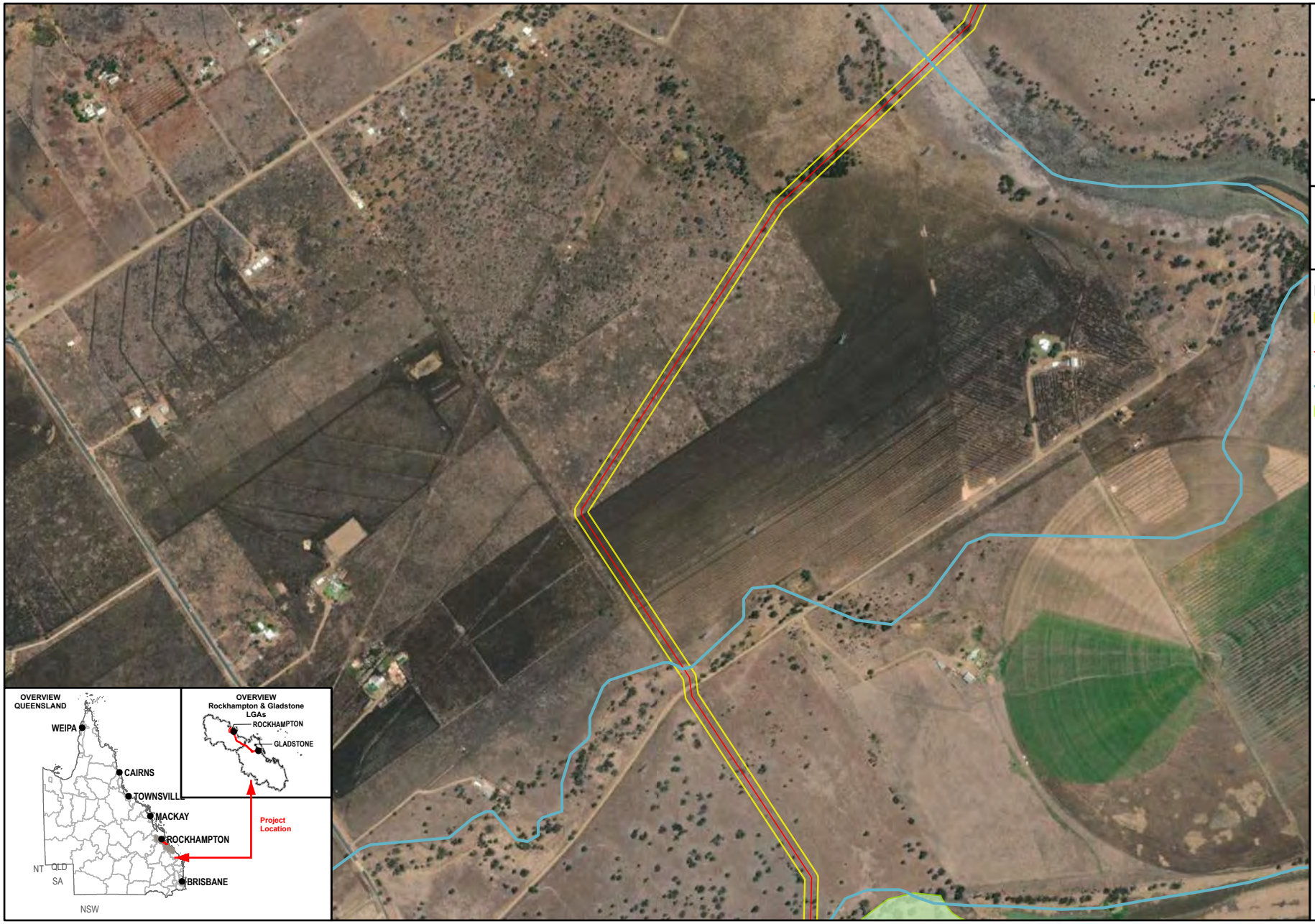

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- Northern Section Pipeline Alignment
- Waterways
- High-risk Flora Trigger Areas

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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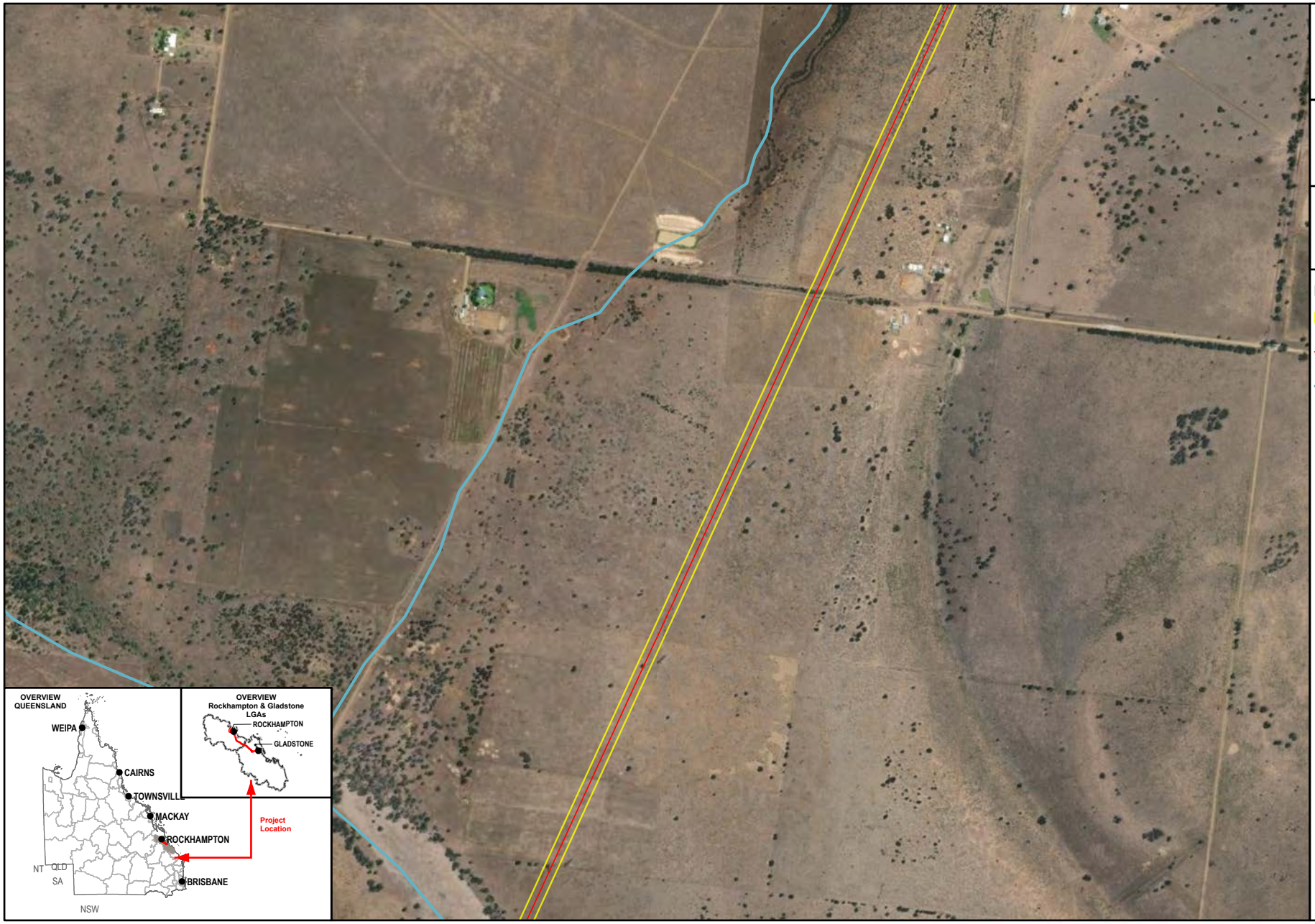
Figure 5-2c
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
000-G-MAP-2419 Version:3 Date:2022/09/12



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- Study Area
- Northern Section Pipeline Alignment
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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Figure 5-2d
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
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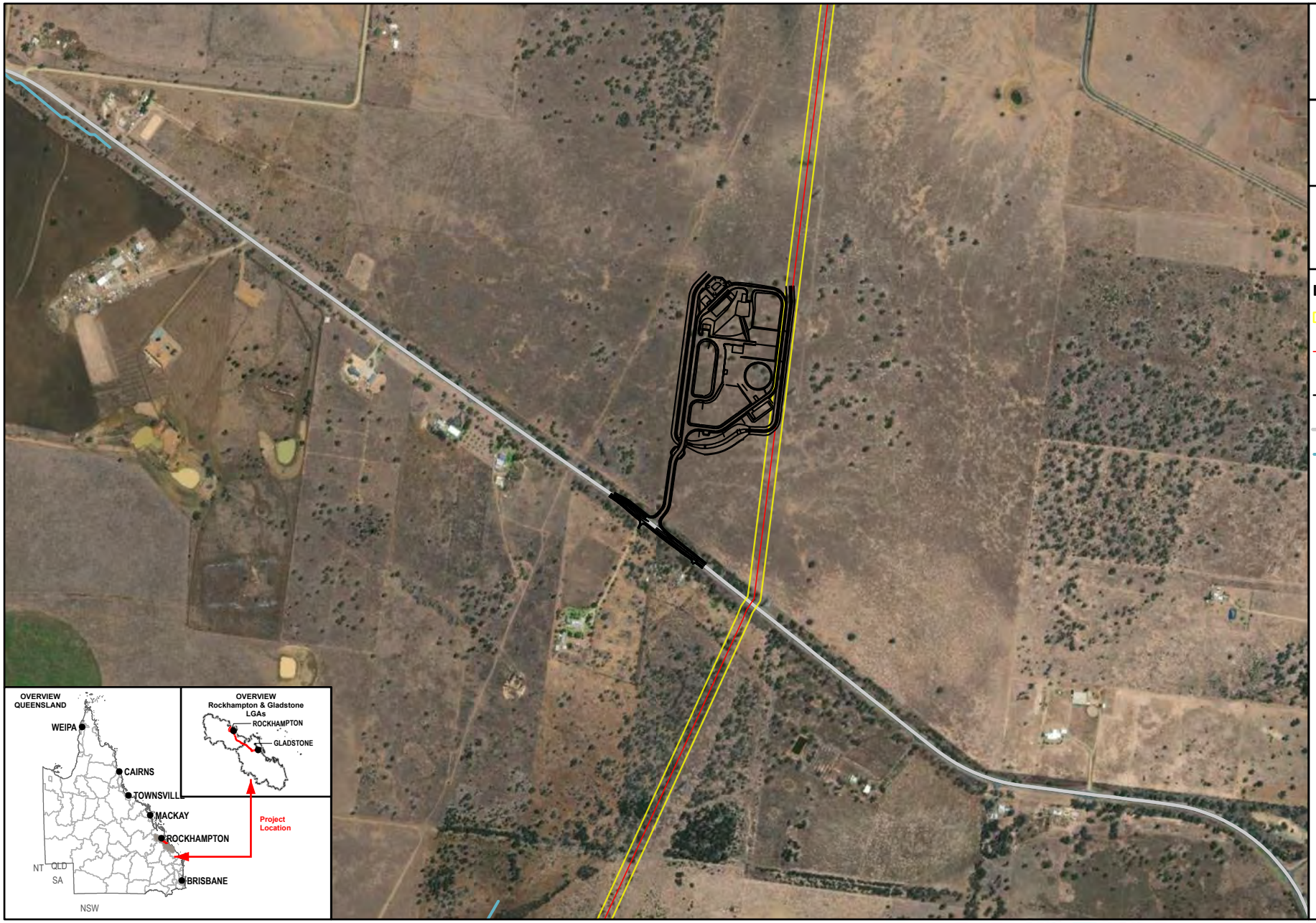

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Legend

- Study Area
- Northern Section Pipeline Alignment
- Alton Down WTP, Pump Station and Reservoir Layout
- Main Roads
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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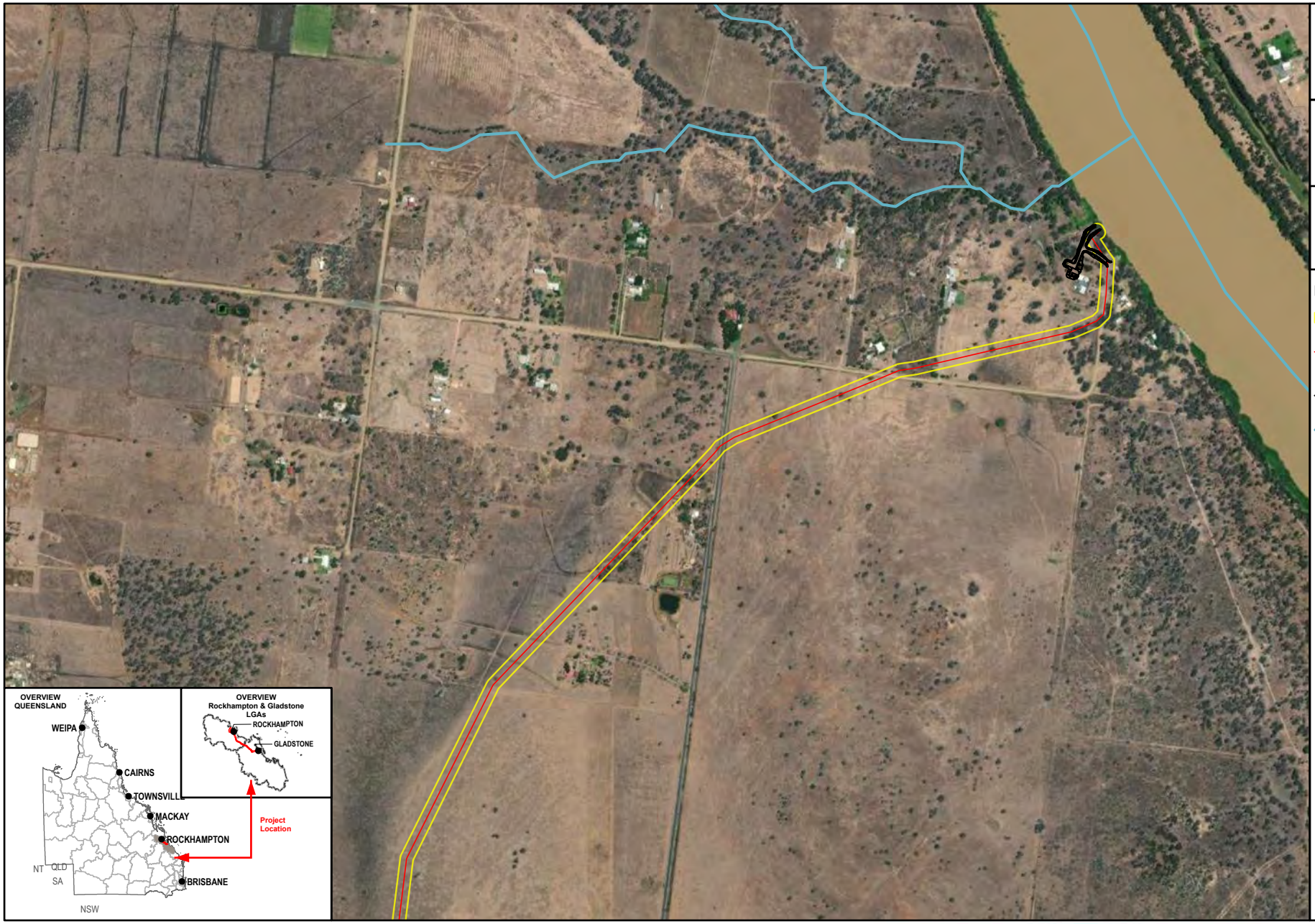
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-2e
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
000-G-MAP-2419 Version:3 Date:2022/09/12



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Legend

- Study Area
- Northern Section Pipeline Alignment
- Fitzroy River Intake and Pump Station Layout
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
2.Imagery @ Esri, Maxar, GeoEye, Earthstar Geographics, CNES-Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 5-2f
High-risk Flora Survey Trigger Mapping Within the Northern Section Desktop Search Area
000-G-MAP-2419 Version:3 Date:2022/09/12