7.2.2.14 Green turtle

Conservation status and species ecology

The green turtle is listed as vulnerable under both the EPBC Act and the NC Act and listed as an MNES at the time of the approval. The species can be found in waters in sub-tropical and temperate regions throughout the world and are capable of migration large distances of over thousands of kilometres between foraging and breeding grounds. The species can inhabit a range habitat types, including open ocean habitat, pelagic feeding grounds, nearshore waters, shallow coastal habitats and into estuarine waters. Green turtles feed mostly on seagrasses and algae, although immature animals are carnivorous. The southern Great Barrier Reef population has major rookeries on the Islands of the Capricorn Bunker Group and minor breeding aggregations on mainland beaches for Bustard Head to Bundaberg (DAWE 2021).

Field survey results and distribution of suitable habitat

The green turtle was recorded present in Inkerman Creek (site 4) and potential habitat for the species was noted to be present in Raglan Creek (site 2) during the 2022 surveys (Figure 7-19). No historical records for the green sea turtle were found within the desktop extent (10 km buffer). All other sites surveyed along the SGIC SDA were outside the known range and did not contain suitable habitat for the green turtle. No breeding habitat for the green turtle occurs within the SGIC SDA.

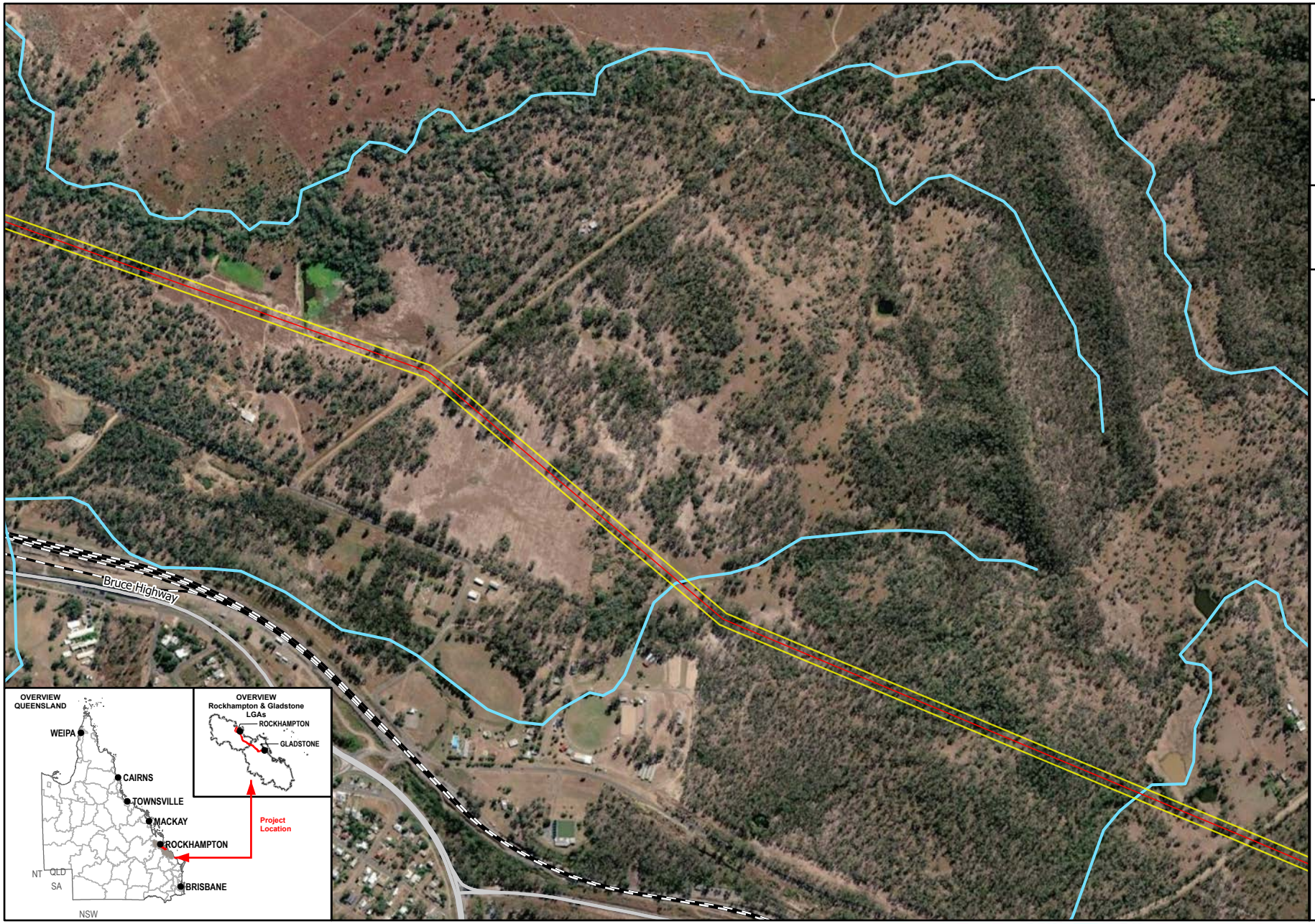
Significant Residual Impact Assessment

The project is unlikely to have a significant residual impact on the green turtle due to the temporary nature of the works and construction techniques that minimise disturbance of the creek bed and bank and avoid creating barriers for the creeks' connectivity. A significance of impact assessment of the project on the green turtle (vulnerable EPBC Act and NC Act) is provided in Table 7-32.

Table 7-32 Significance of impact for the green turtle

Significant residual impact criteria	Potential to occur
A long-term decrease in the size of a local population	**Unlikely** The green turtle is known to occur in Inkerman Creek and likely to occur in Raglan Creek. Individuals of this species are likely to forage and rest within these creeks, particularly during high tide. No suitable breeding habitat for the green turtle is present within the SGIC SDA pipeline alignment. Construction works at site 2 (Raglan Creek) and site 4 (Inkerman Creek) will consist of trenchless methods to minimise disturbance of the creek bed and bank, reducing the potential effects of the local population of the green turtle. Design and implementation of a CEMP will further minimise risk to individuals and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. Following construction, habitat will be restored and operation of the pipeline will have no direct or indirect impacts on the species or their habitat.
Reduce the extent of occurrence of the species	**Unlikely** Construction works at sites that green turtles are known or likely to occur (site 2 and 4) will consist of trenchless methods to minimise impacts to connectivity of Raglan and Inkerman Creeks. The works will be restricted temporally to a small, localised area, with measures in place to ensure no long-term impacts to habitat. Following construction, habitat will be restored, and operation of the pipeline will have no direct or indirect impacts on the species or their habitat. These measures ensure that it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragment an existing population	**Unlikely** All works will be conducted in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)to facilitate connectivity and flow. Temporary and localised disturbance to the creeks during construction is unlikely to fragment the existing population of the green turtle.

Significant residual impact criteria	Potential to occur
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The species breeding grounds do not occur within the SGIC SDA pipeline alignment. During the construction and operation phase there will be no permanent barriers to green turtle movement and therefore is unlikely to result in genetically distinct populations forming as a result of habitat isolation. The project is not considered to result in the fragmentation of the species and therefore genetically distinct populations forming due to habitat isolation is unlikely.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** Introduced fish species in the Fitzroy River Delta are not known to be a key threatening process to the green turtle. The implementation of the CEMP including a Weed Management Plan and Introduced Management Plan will reduce the risk of introducing new invasive species or spreading existing weeds within the river, which could cause degradation of habitat. The management actions proposed for the control of weed and pest species are considered sufficient such that no significant impact to the green turtle and/or the species' habitat is likely to occur.
Introduce disease that may cause the population to decline	**Unlikely** There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that construction works for the waterway crossings will have the potential to introduce disease to the extent that the green turtle population will decline.
Interfere with the recovery of the species	**Unlikely** The Recovery Plan for Marine Turtles in Australia which the Department of Climate Change, Energy, the Environment and Water (DCCEEW) is responsible for outlines of the recovery strategies for the species (DAWE, 2017). Relevant to the project, the recovery strategy aims at minimising chemical and terrestrial discharge with the implementation of best management of industrial, urban and agriculture runoff. Spill risk and spill response strategies are to be implemented. The species is known to occur in Inkerman Creek and may occur in Raglan Creek. A CEMP will be designed and implemented to avoid and minimise risk of water quality degradation from temporary construction activities. Following construction, habitat will be restored and operation of the pipeline will have no direct or indirect impact on green turtles or their habitat. No impact will occur to the downstream marine environment or any green turtle nesting habitat. These measures will ensure that the project is unlikely to contribute to key threating processes or interfere with recovery actions.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	**Unlikely** The duration of works conducted in Inkerman Creek and Raglan Creek will be less than 180 days. During construction, temporary and localised disturbance may occur to a small number of green turtles that may utilise these creeks for foraging and resting. Substantially suitable habitat will remain downstream such that this disturbance is unlikely to impact the availability of foraging resources. A CEMP will be designed and implemented to protect habitat quality within and downstream of the construction areas. All habitats will be restored following construction and the pipeline will have no direct or indirect impacts on green turtles or their habitat during operations. These measures result that the project is unlikely to cause disruption to ecologically significant locations of a species.
Conclusion	No direct loss of habitat or disturbance to bed and banks at Raglan Creek will occur during the construction or operational phases. The project is unlikely to have a significant residual impact on the green turtle.



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Legend

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

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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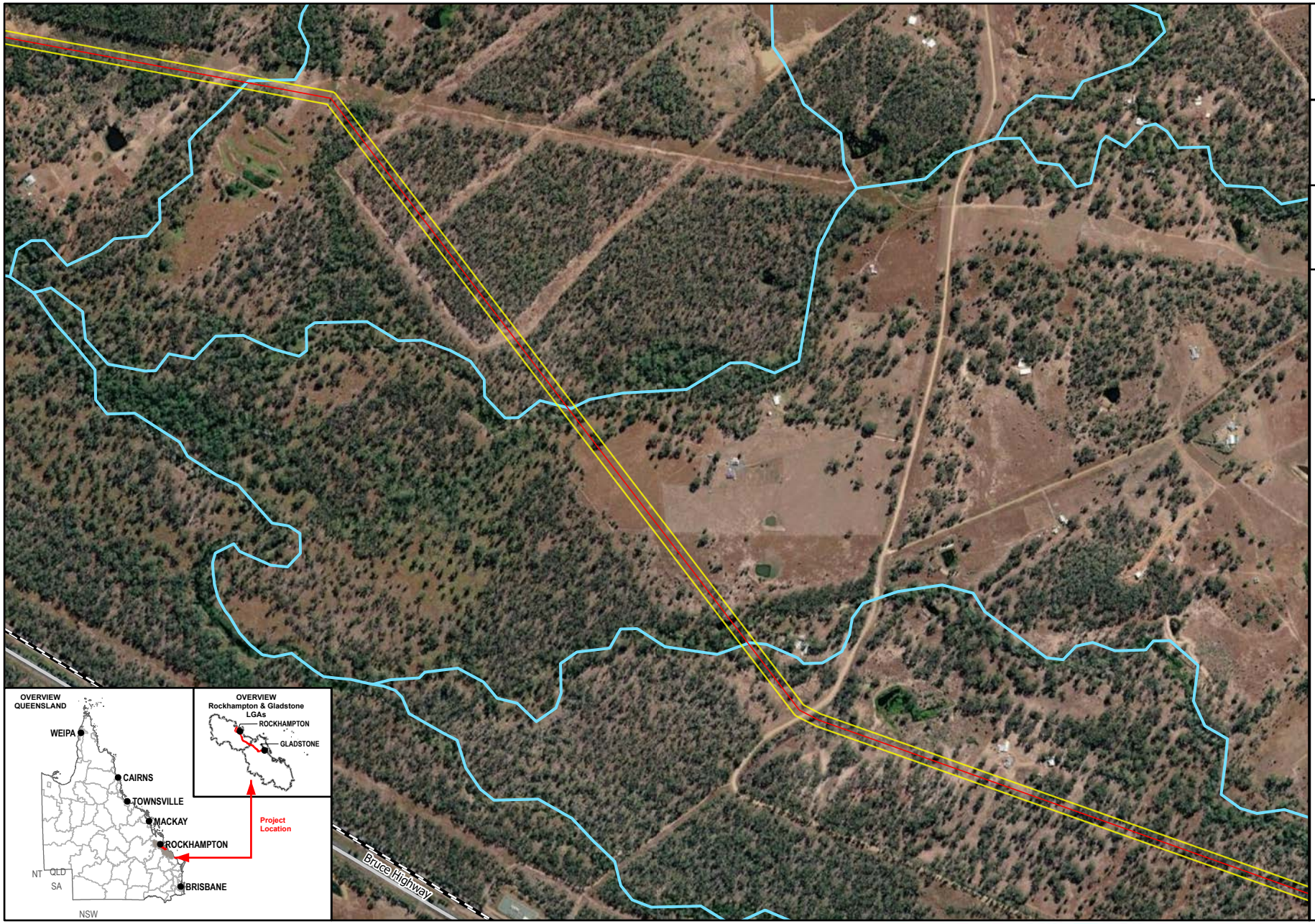
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19a
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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

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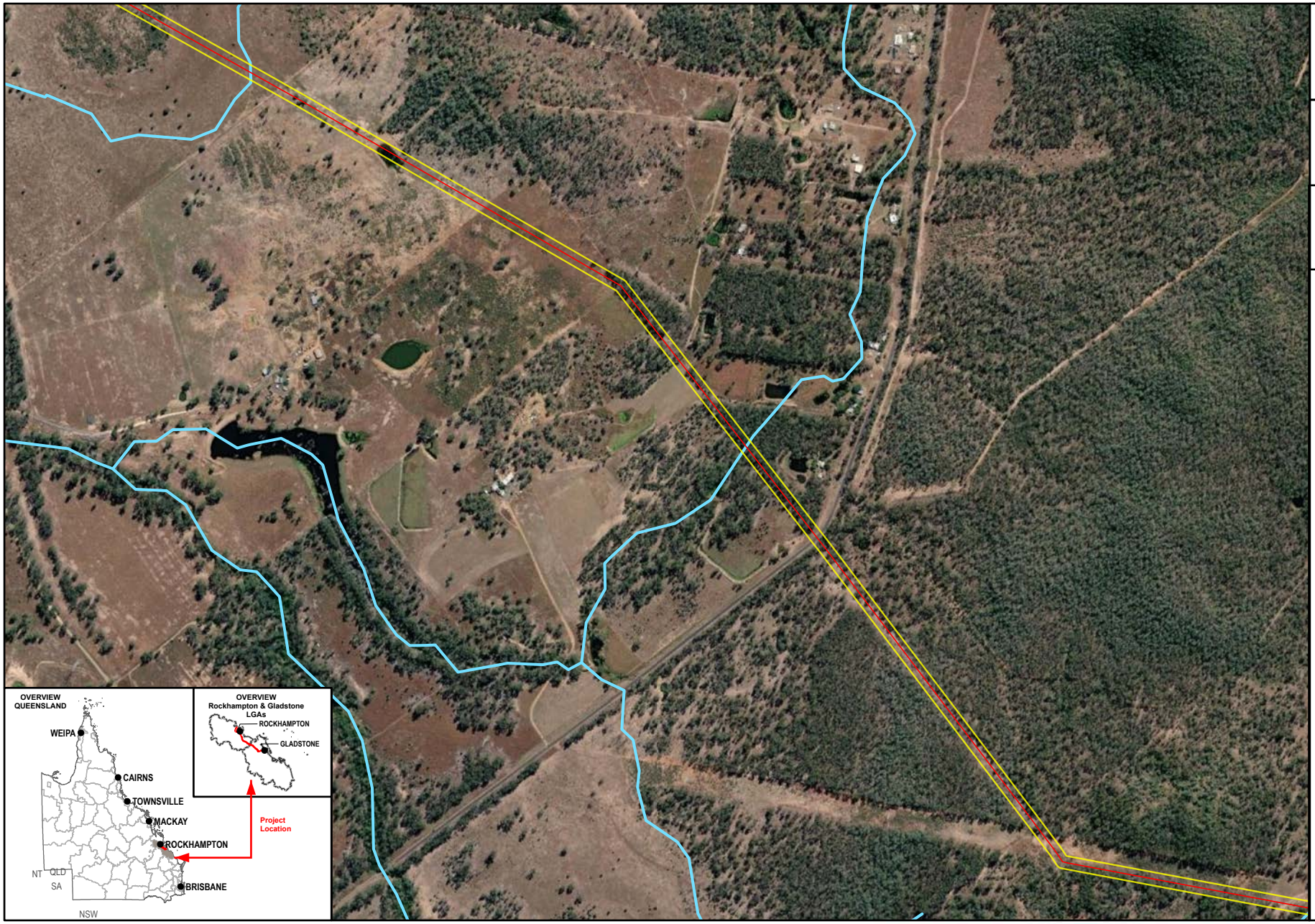
Figure 7-19b
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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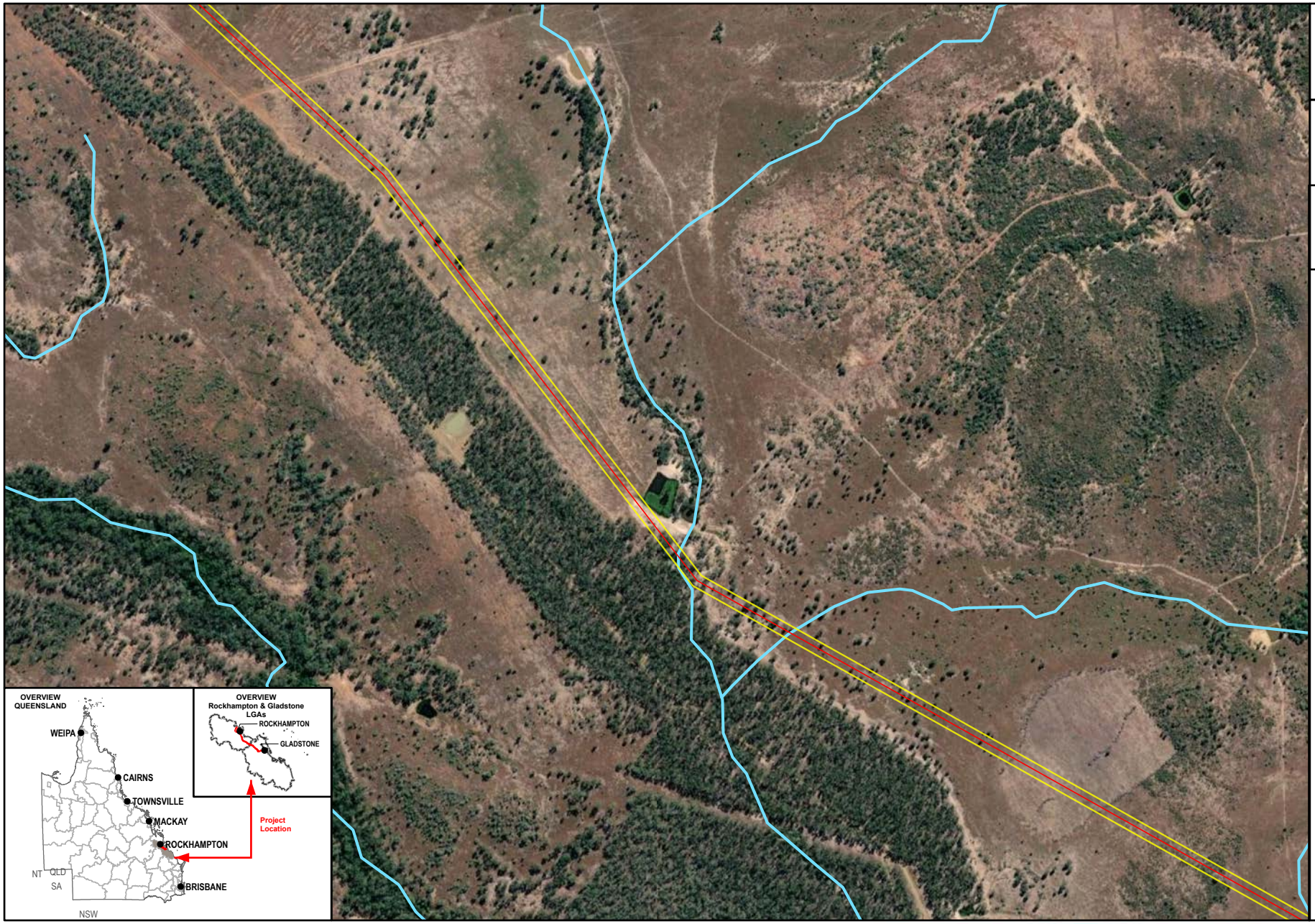
Figure 7-19c
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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Figure 7-19d
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
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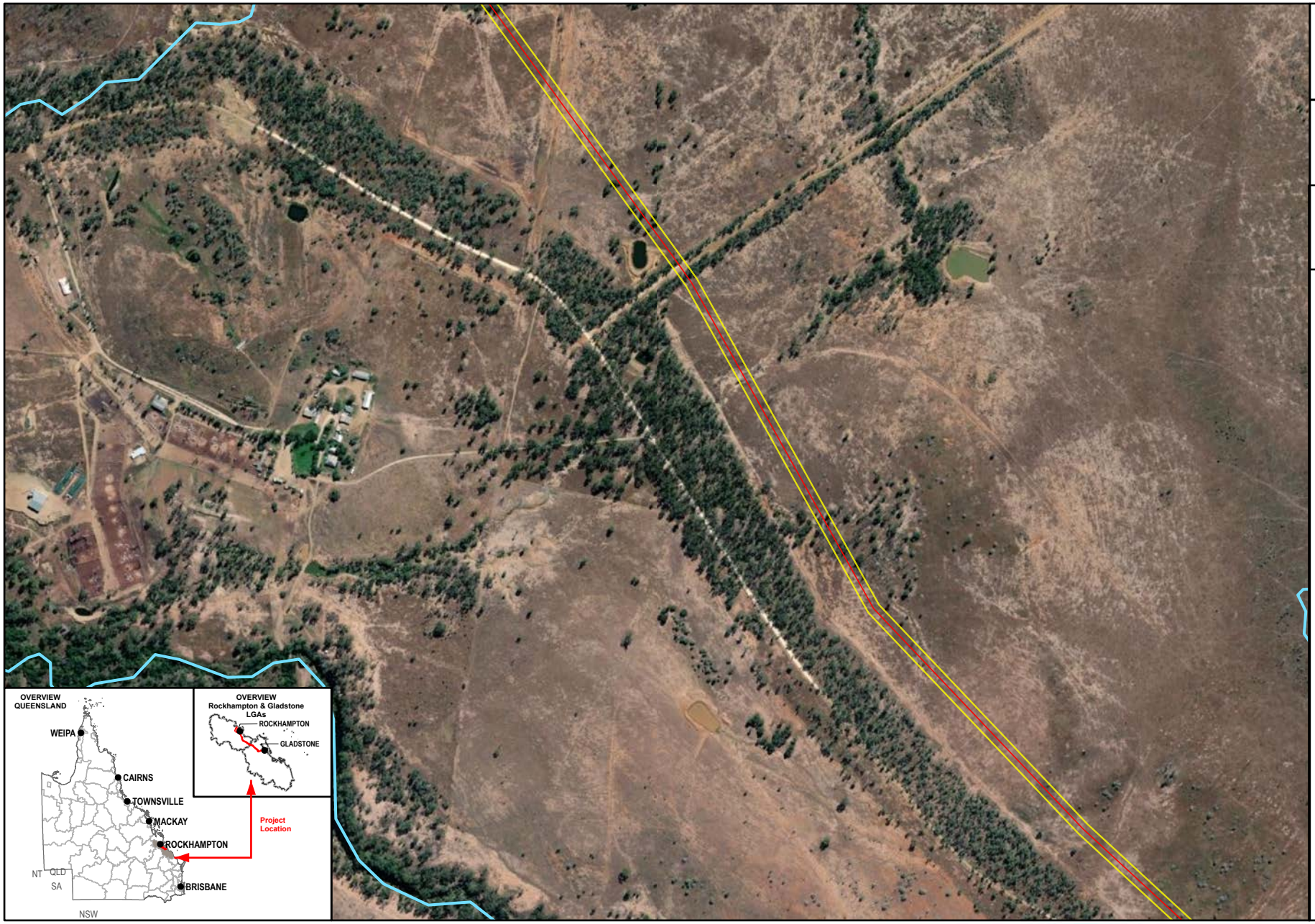

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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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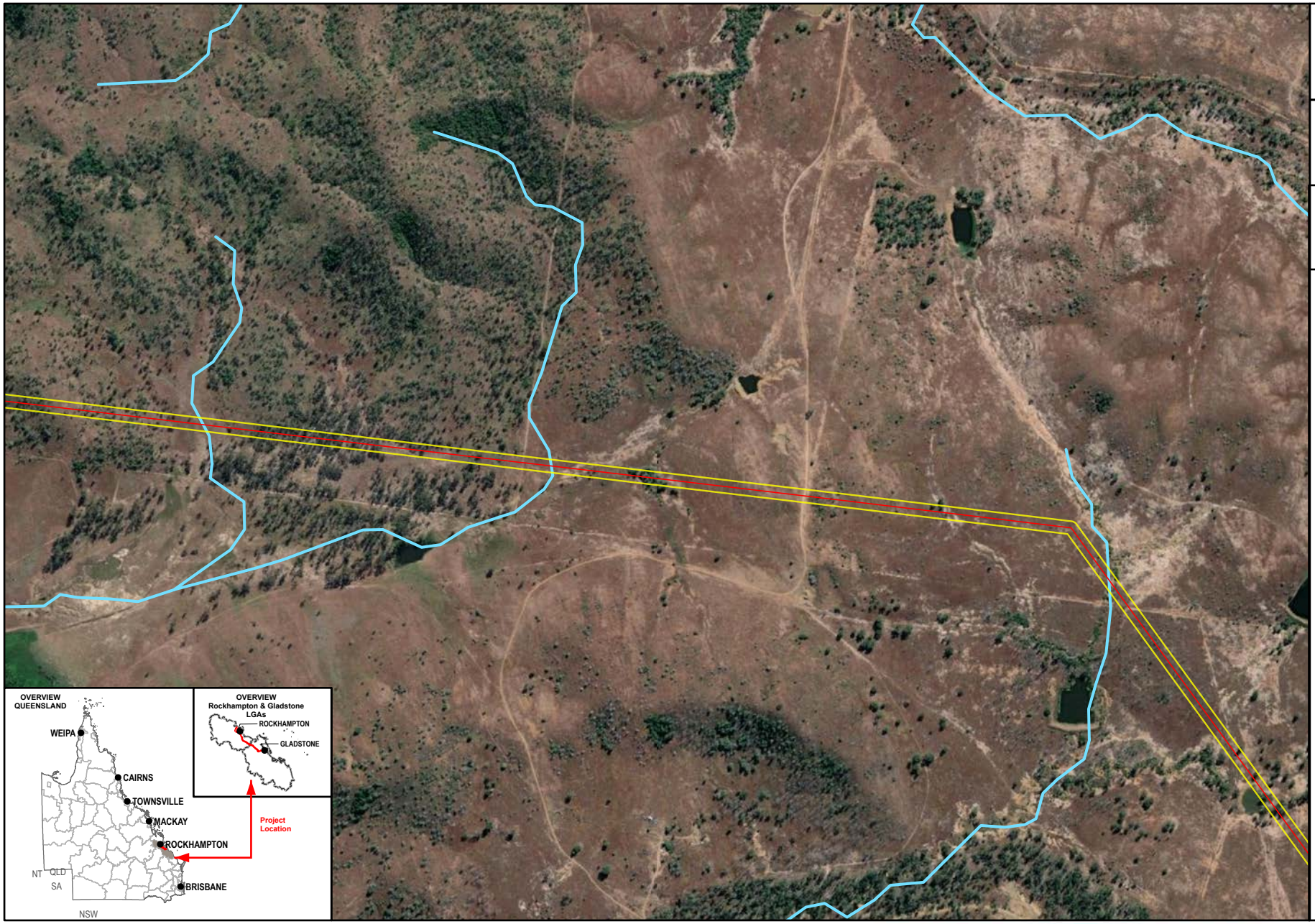
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19e
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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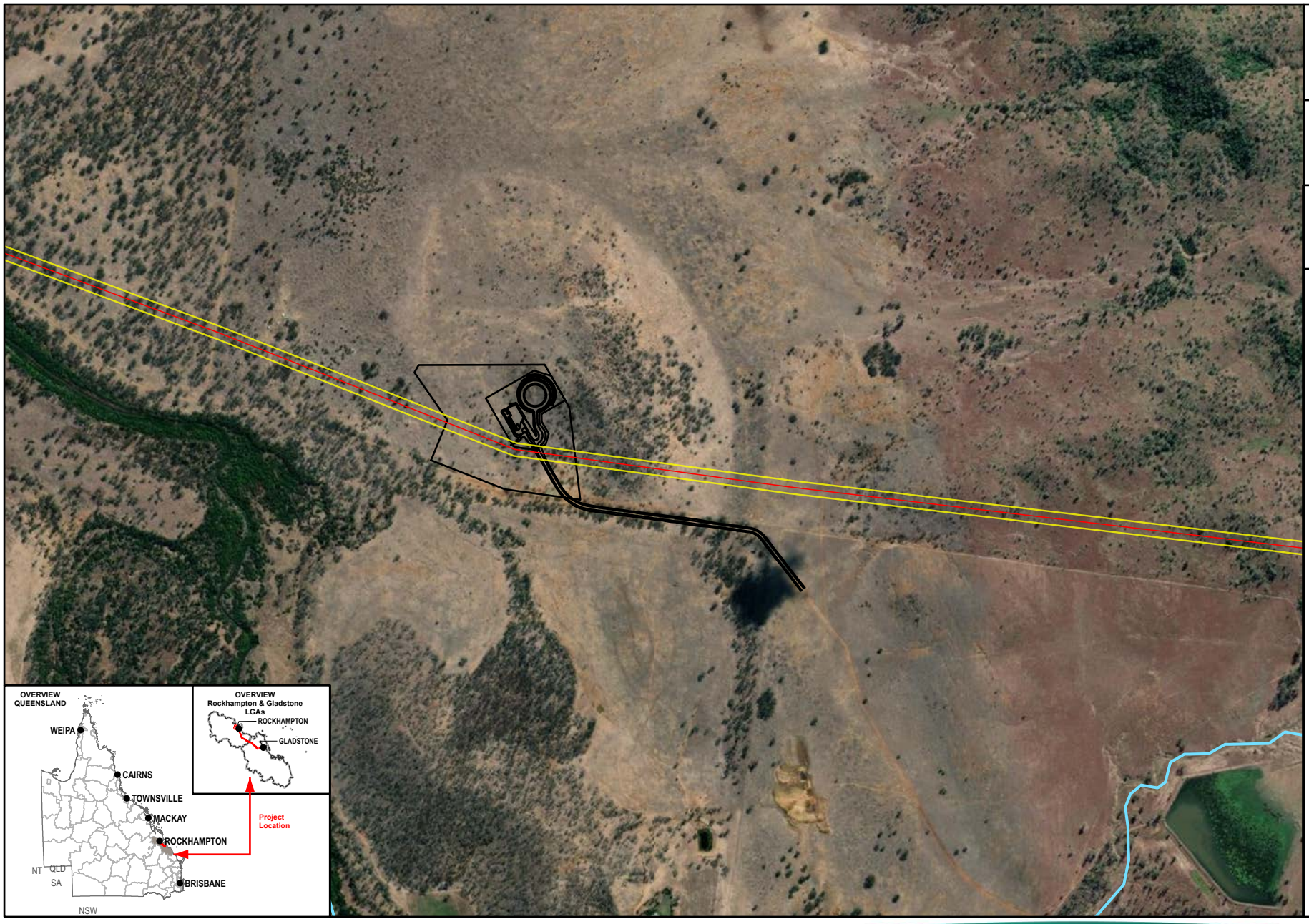
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19f
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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

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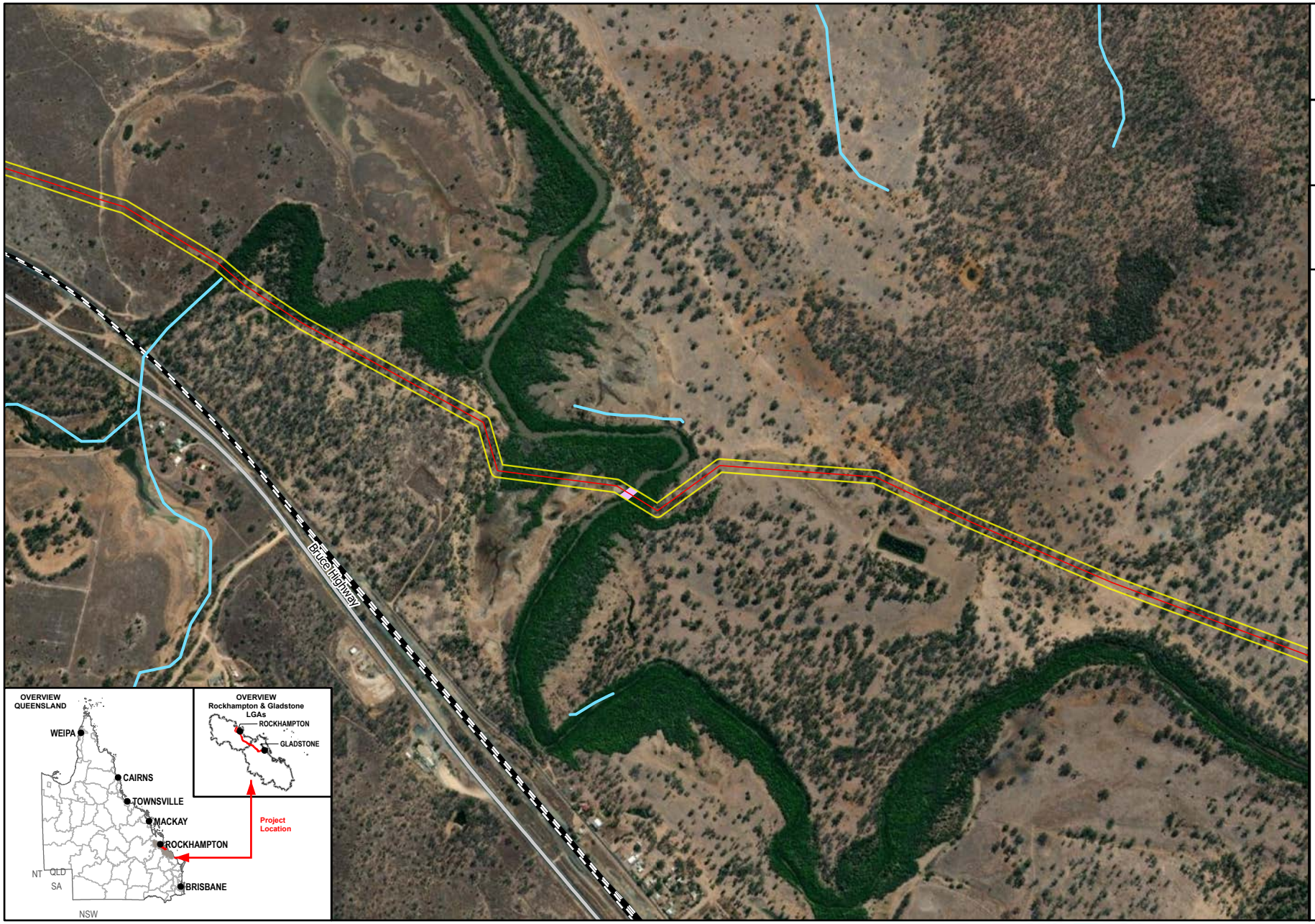
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19g
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Green Turtle Habitat
- Waterways
- Main Roads
- Railways

Data Sources:
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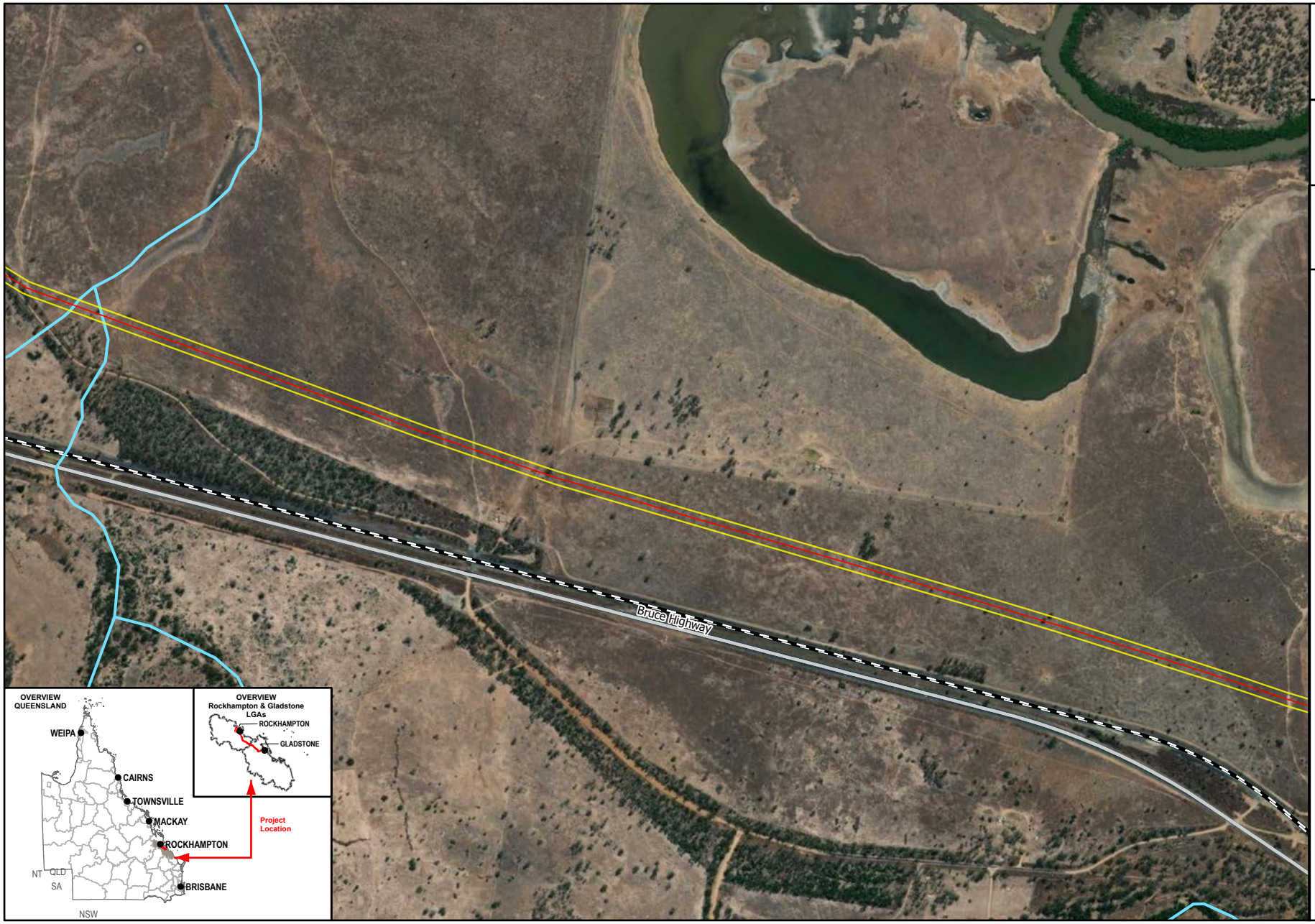
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19h
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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

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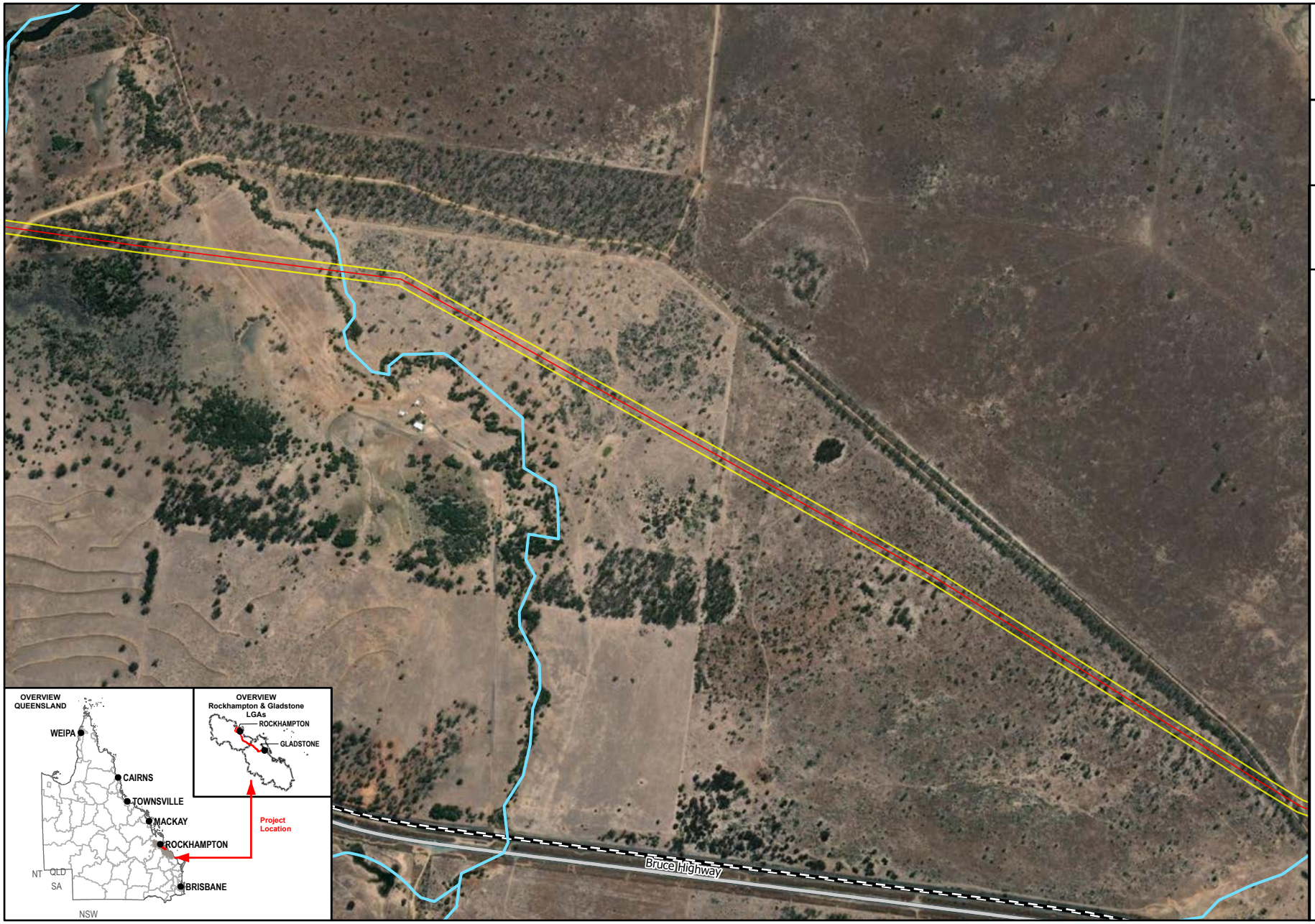
Figure 7-19i
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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

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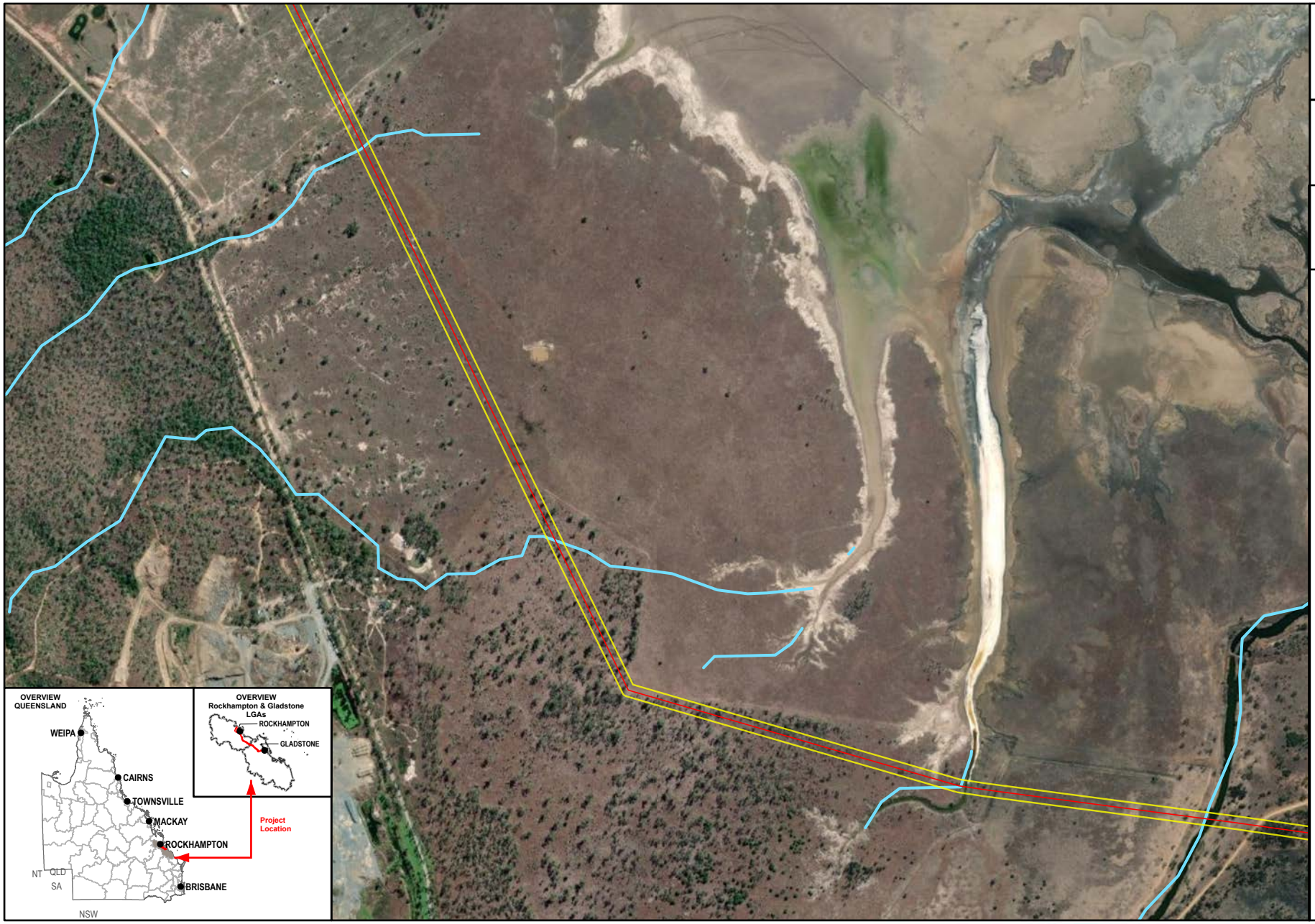
Figure 7-19j
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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Fitzroy to Gladstone Pipeline
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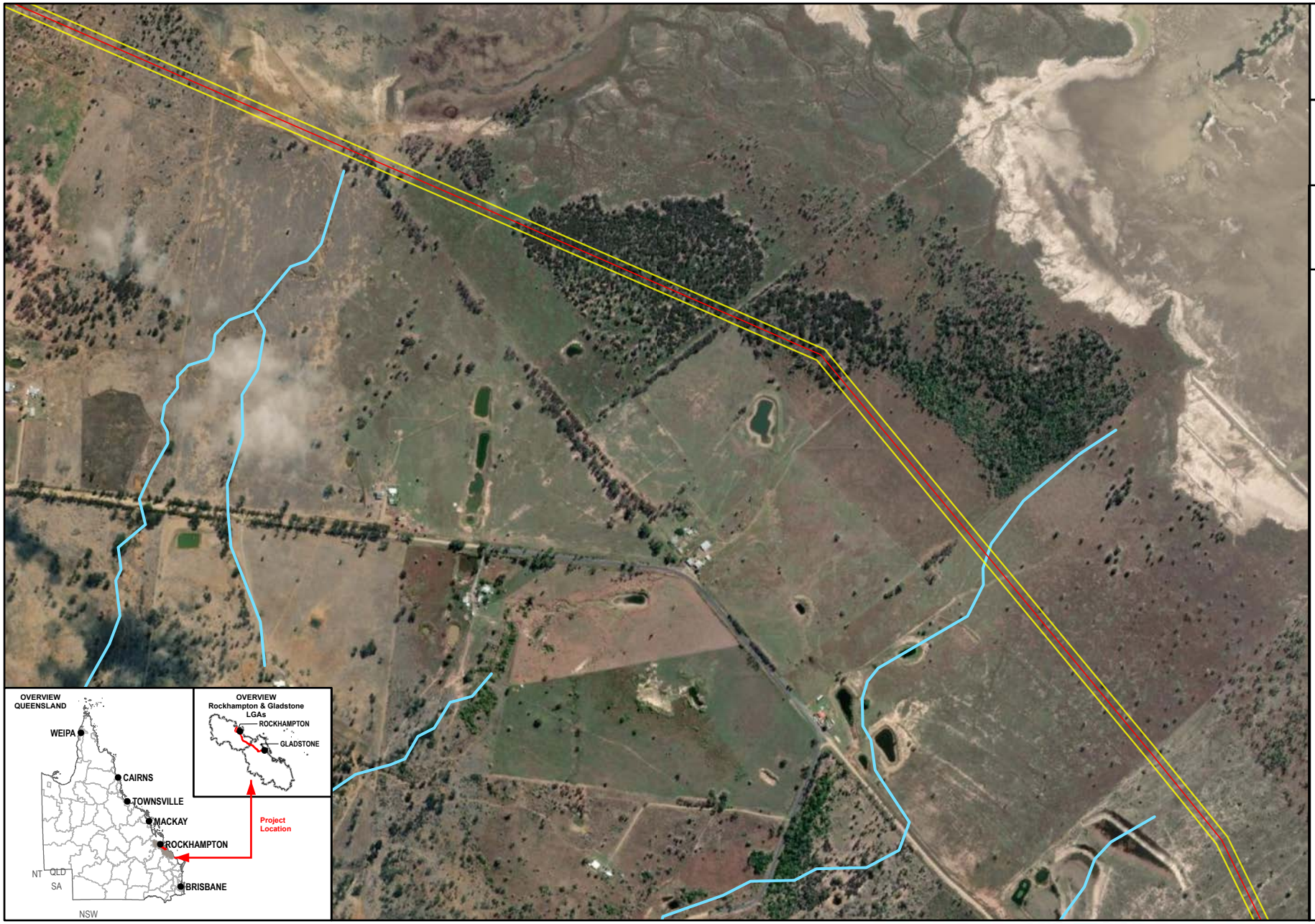
Figure 7-19k
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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Figure 7-19l
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
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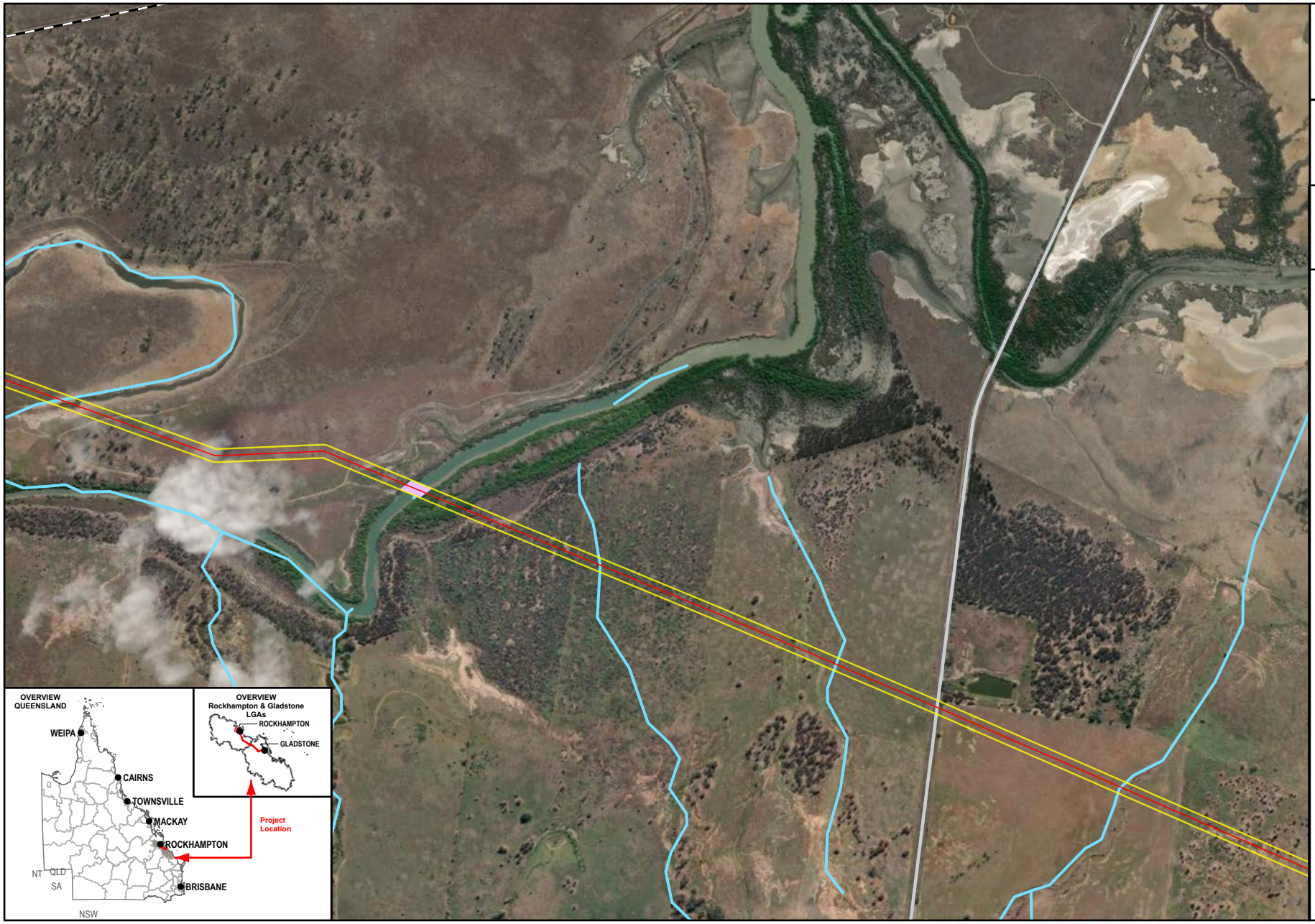

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- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Green Turtle Habitat
- Waterways
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- Railways

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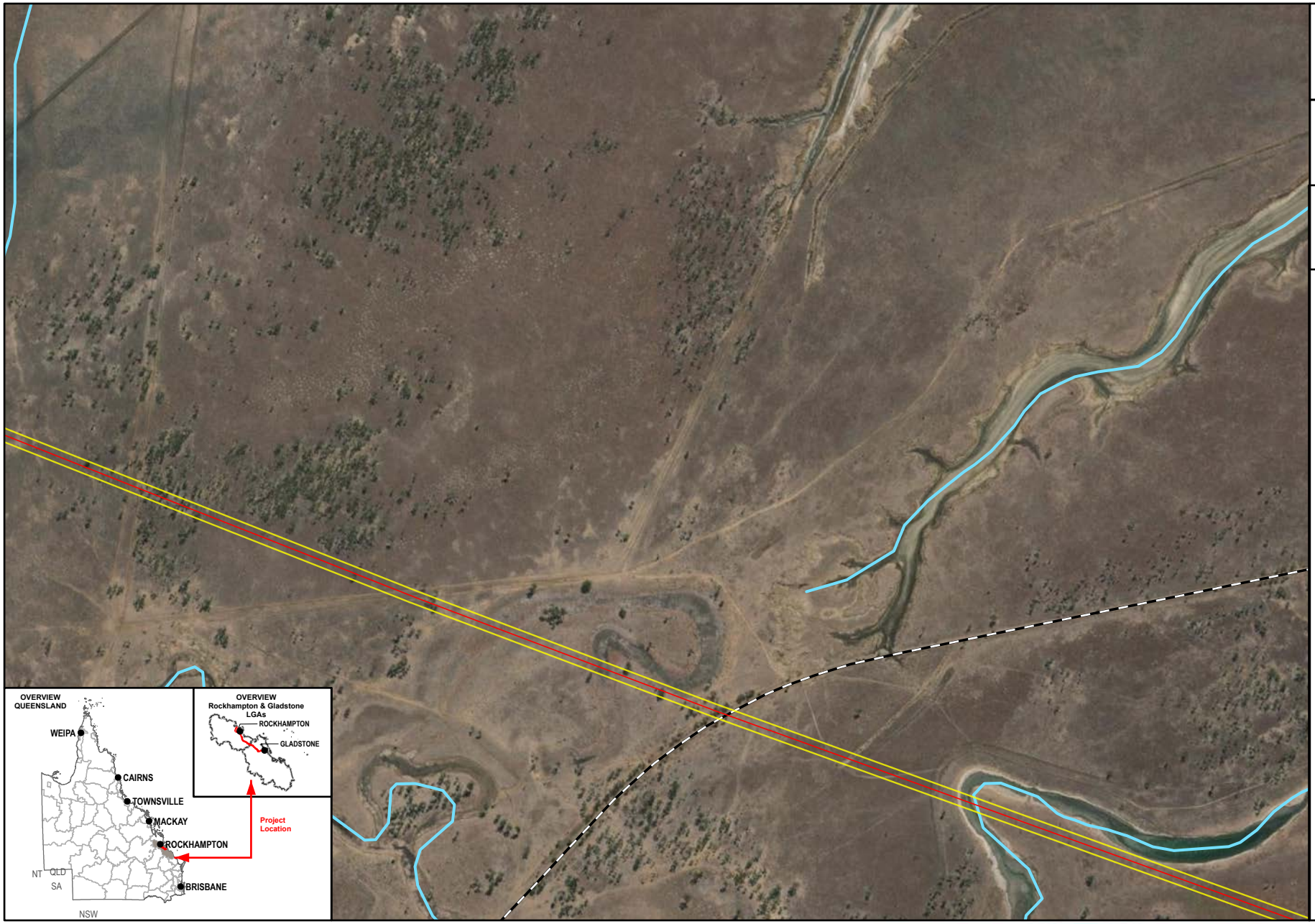
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-19m
Distribution of Green Turtle Habitat Within the SGIC SDA Study Area
000-G-MAP-2440 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- Railways

Data Sources:
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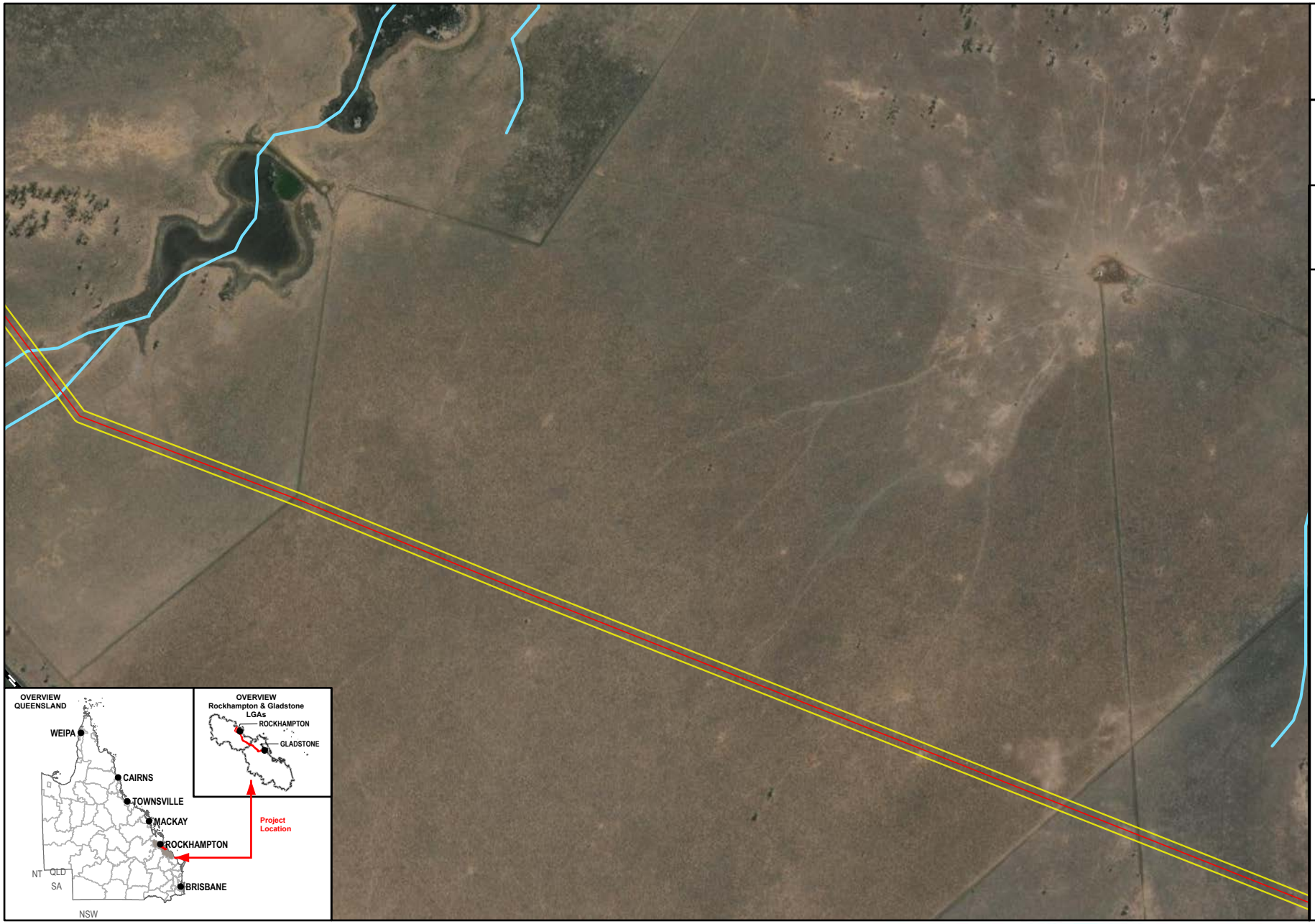

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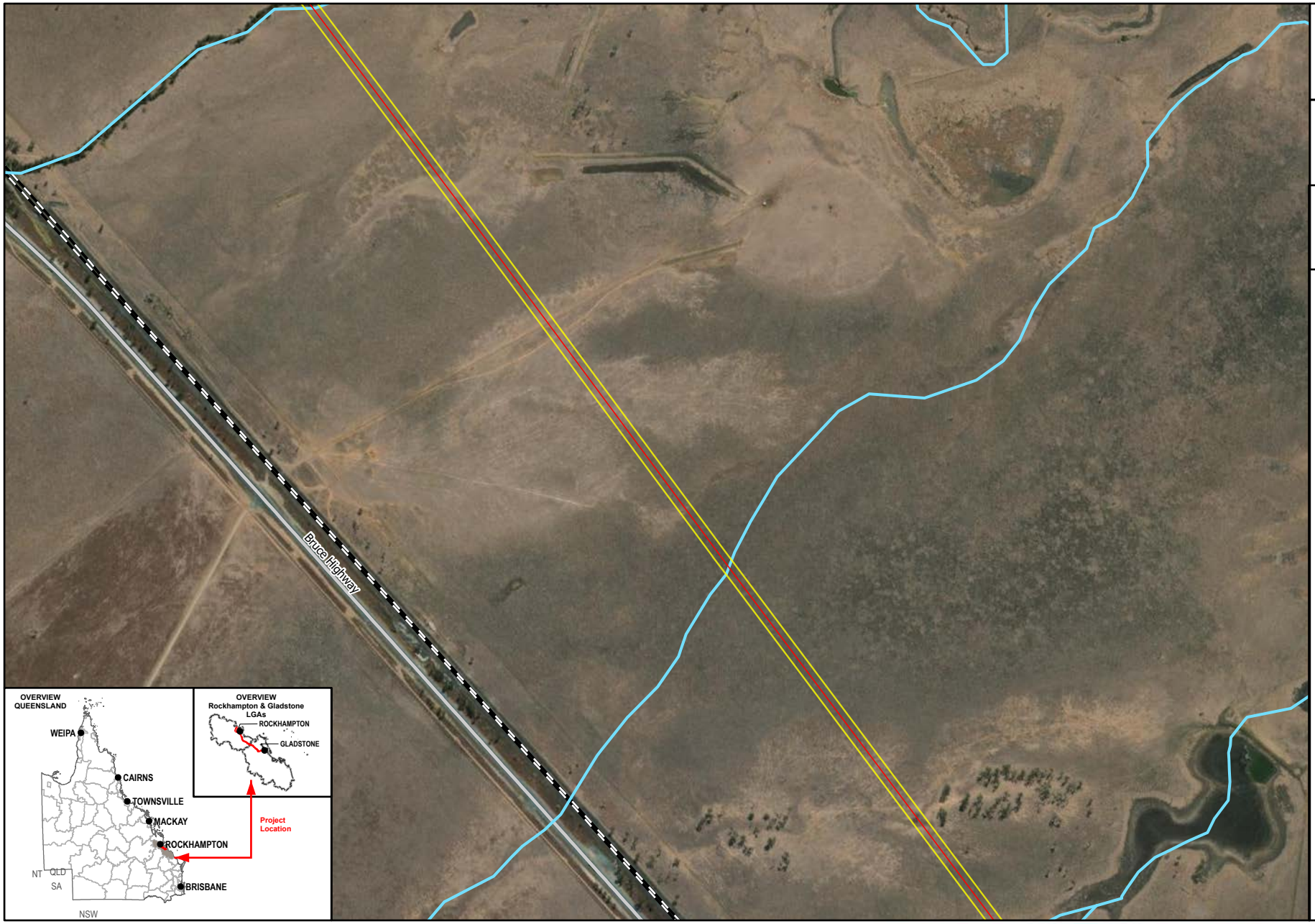

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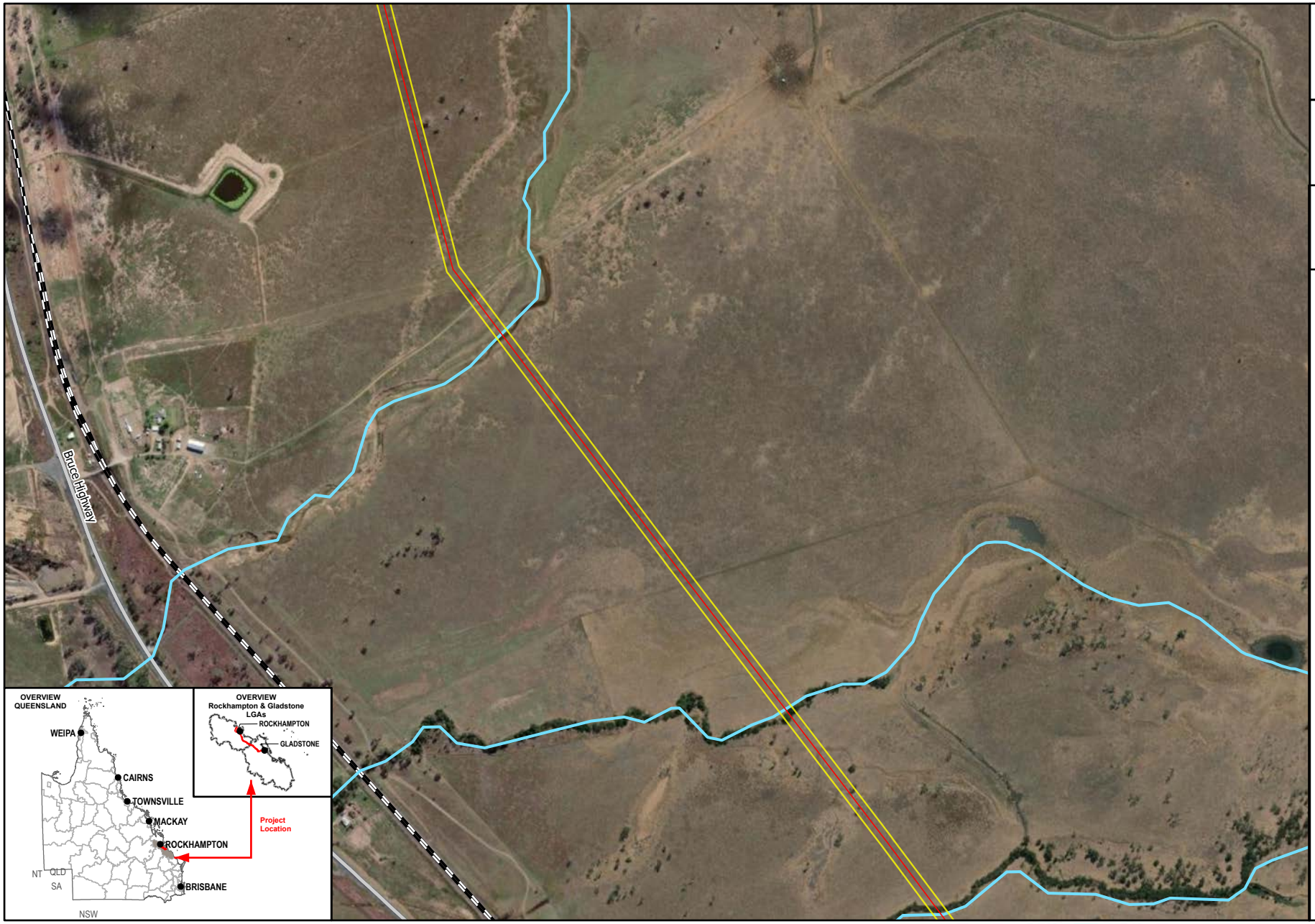

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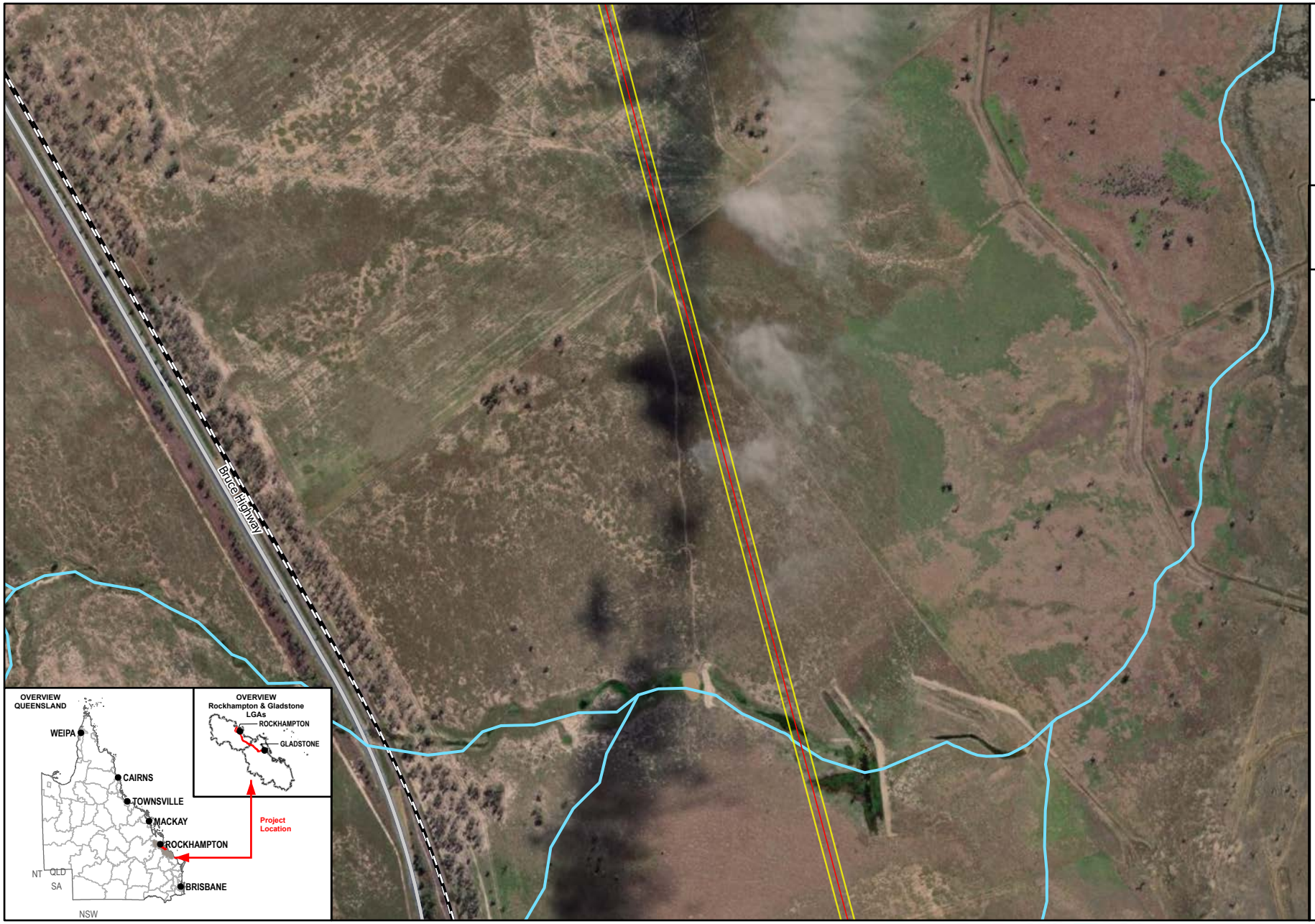

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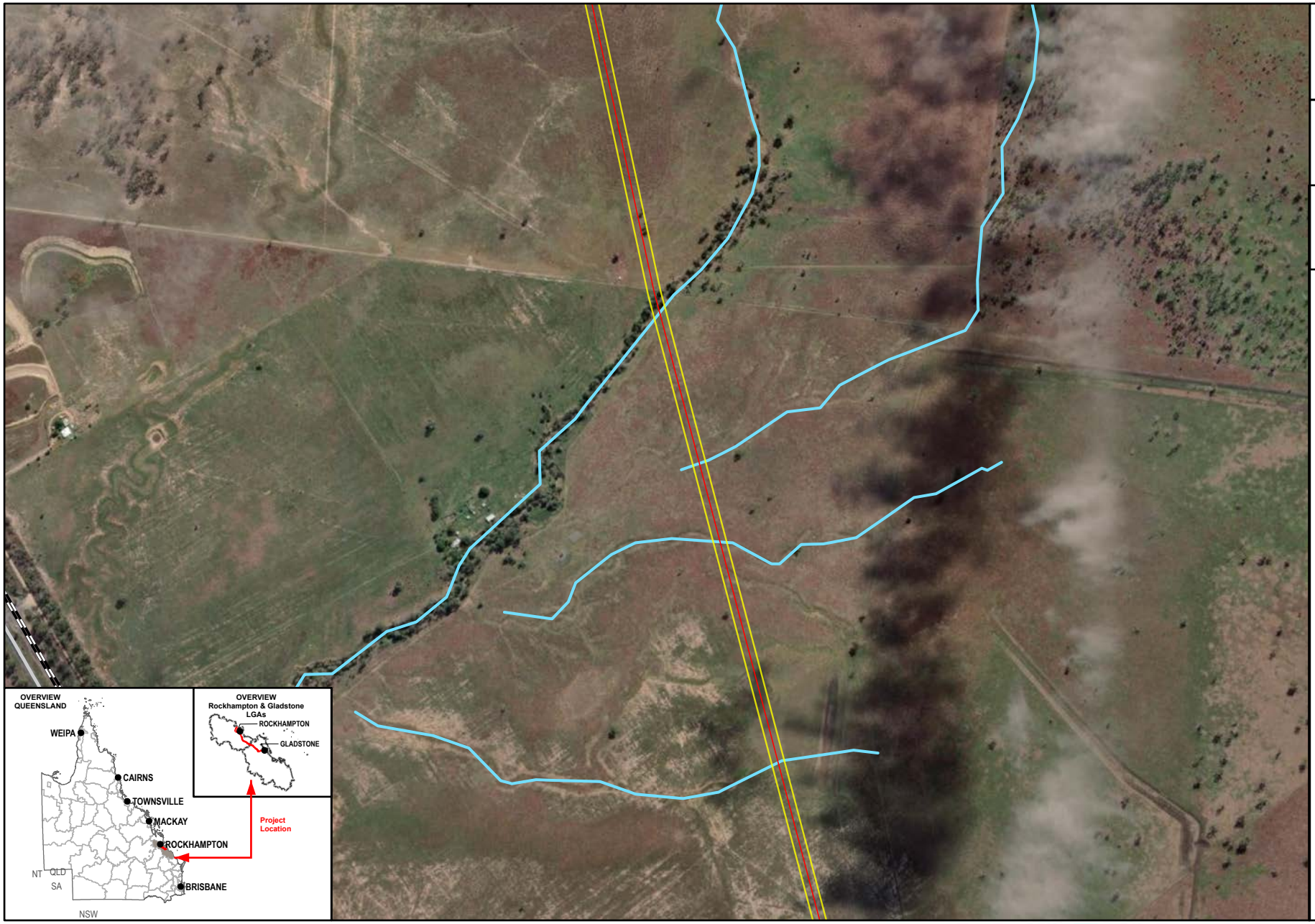

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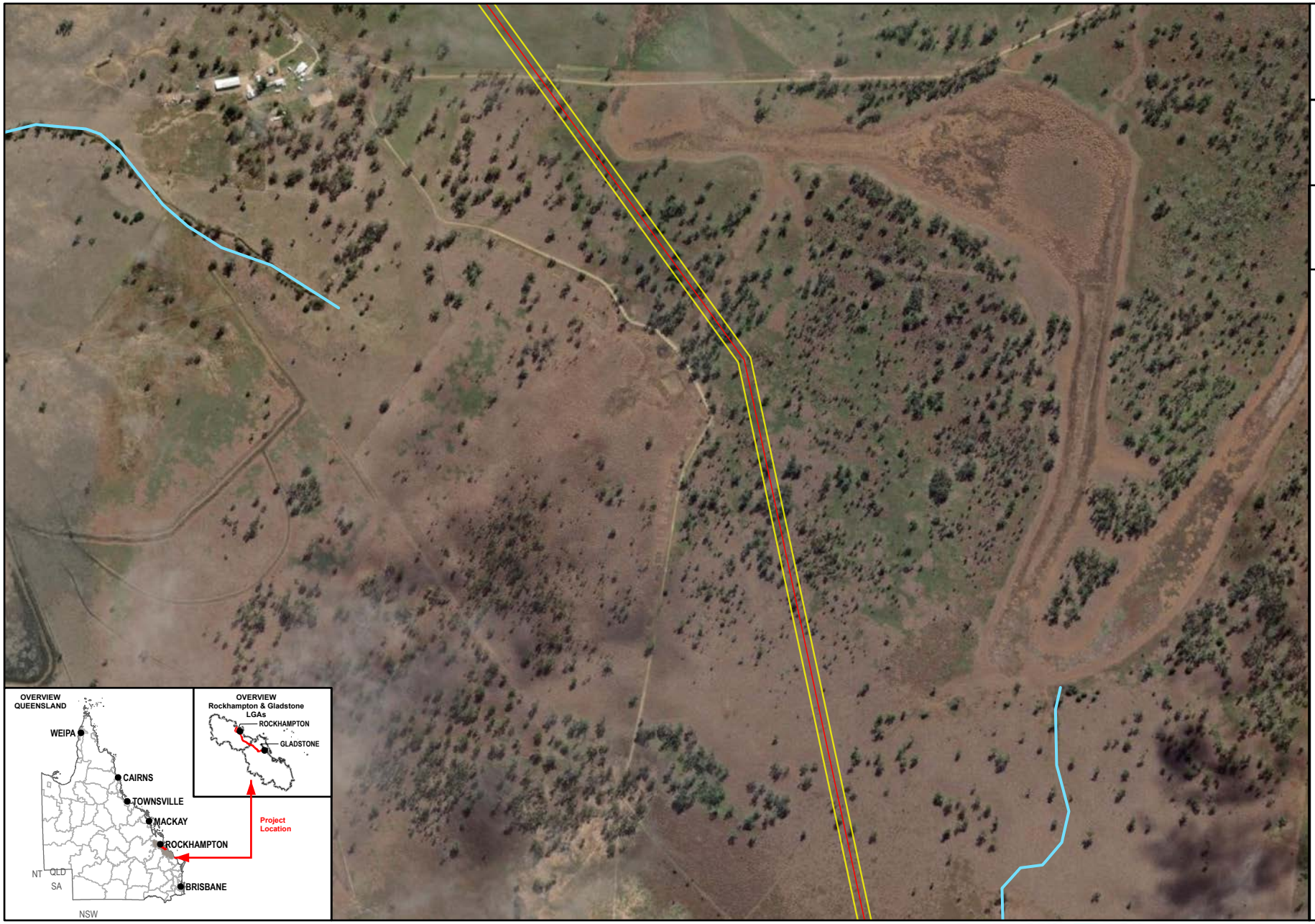

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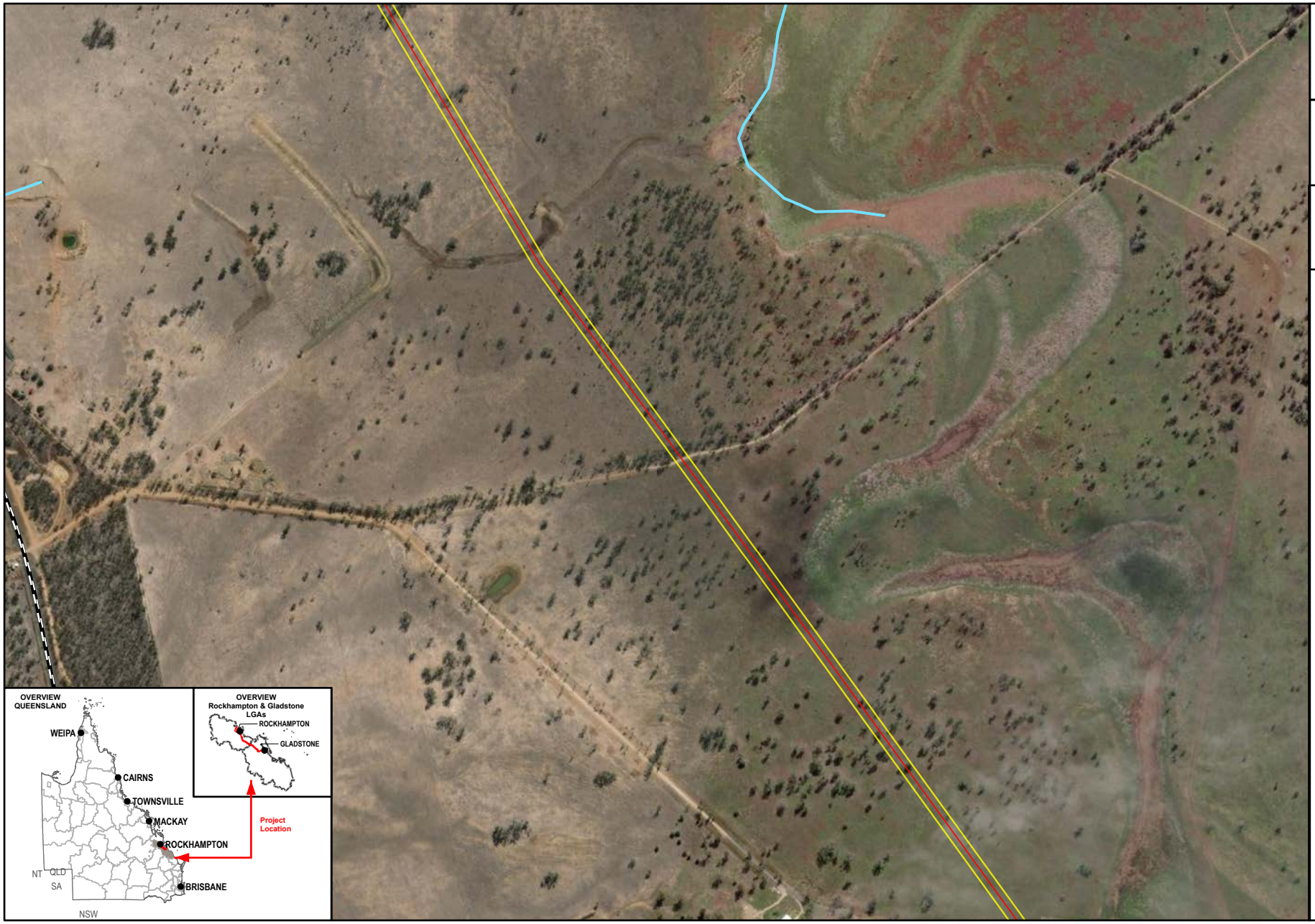

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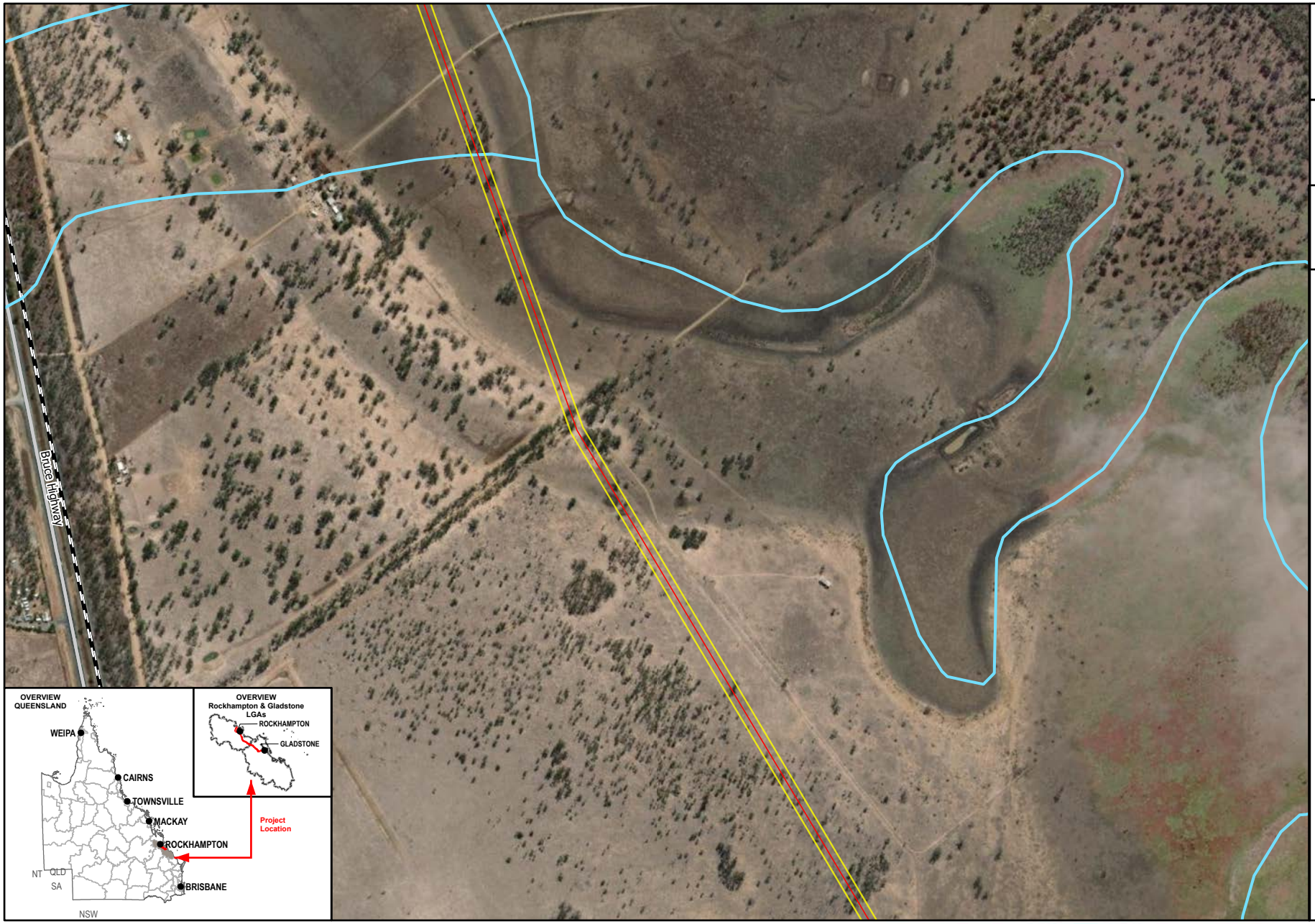

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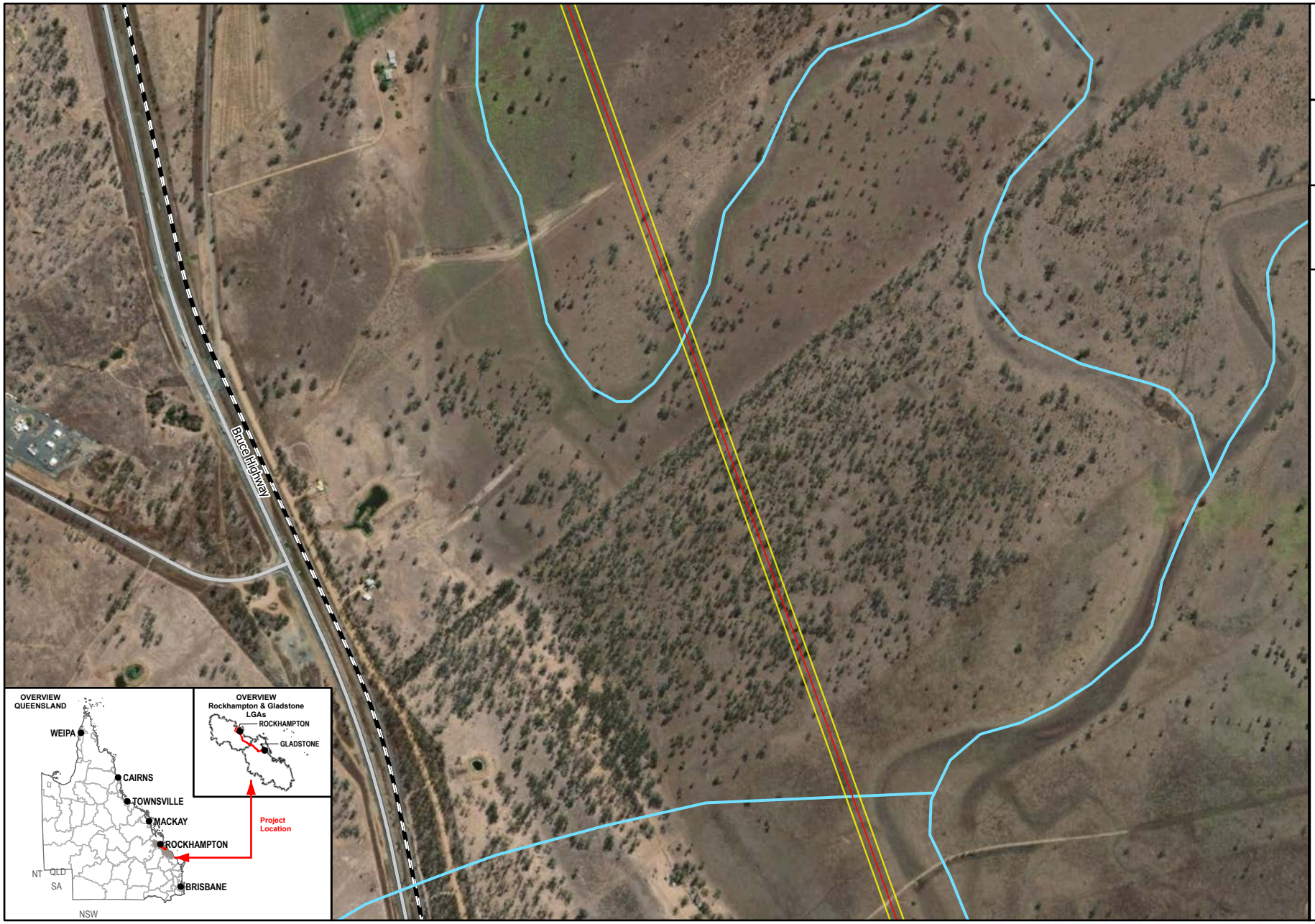

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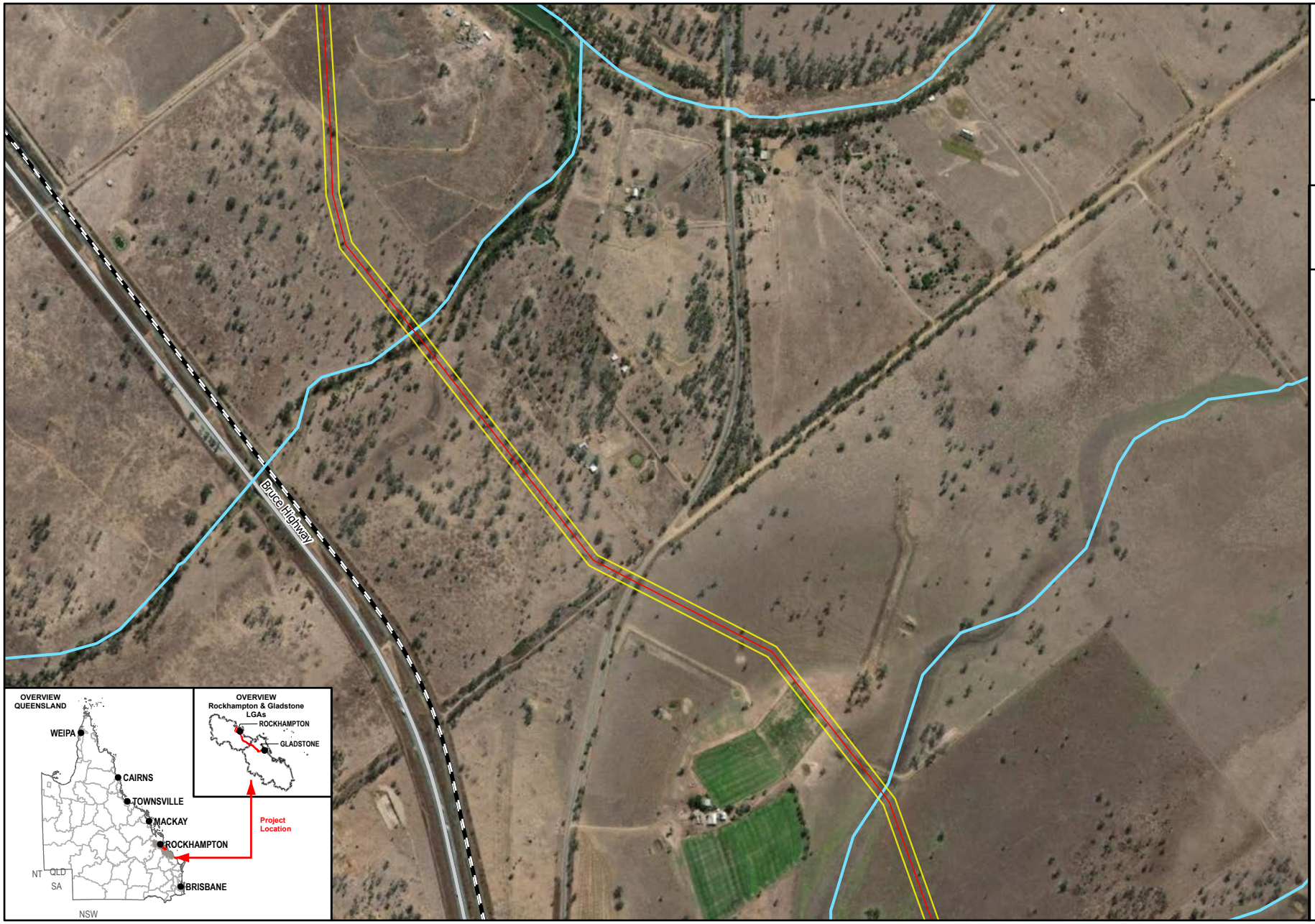

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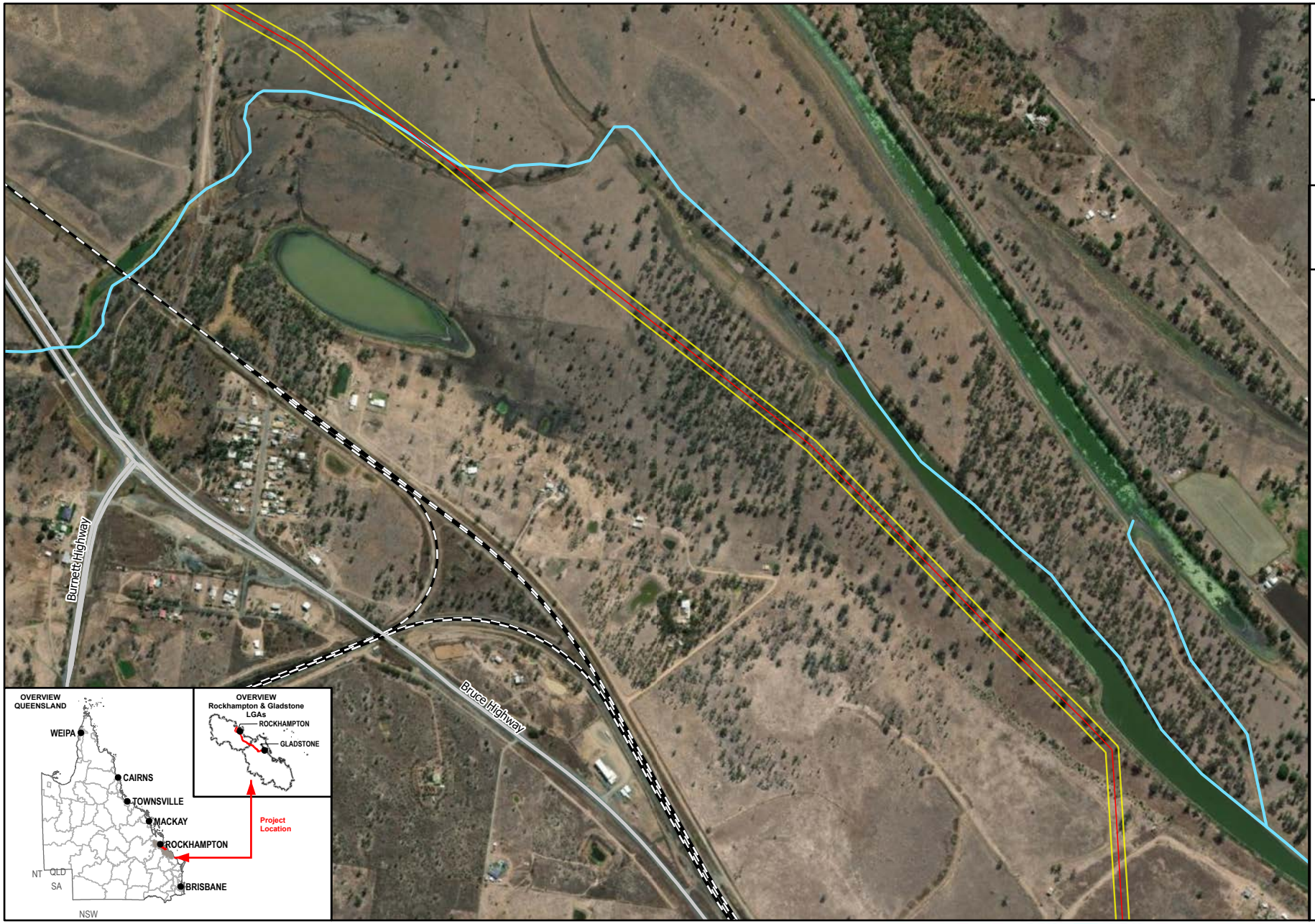

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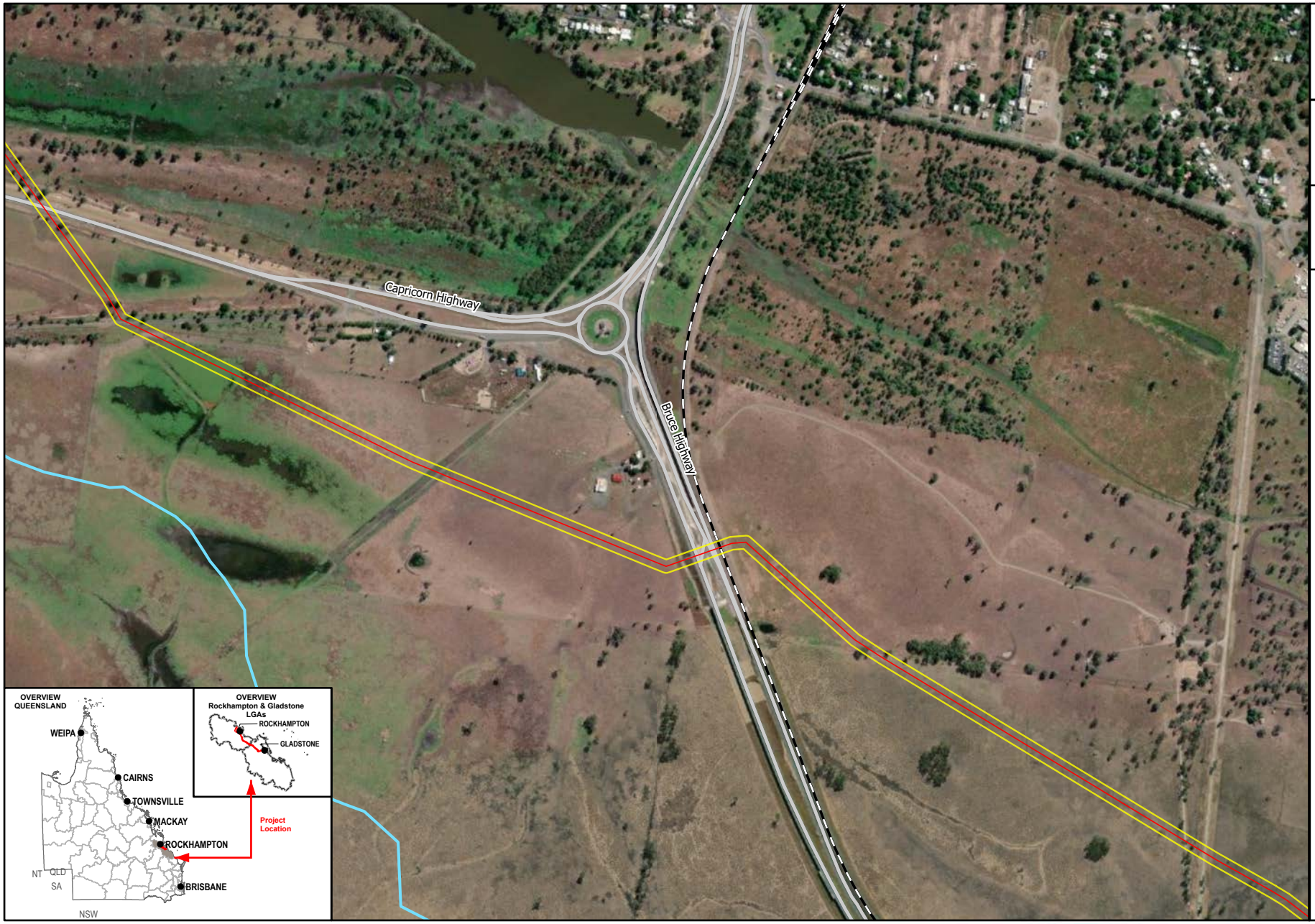

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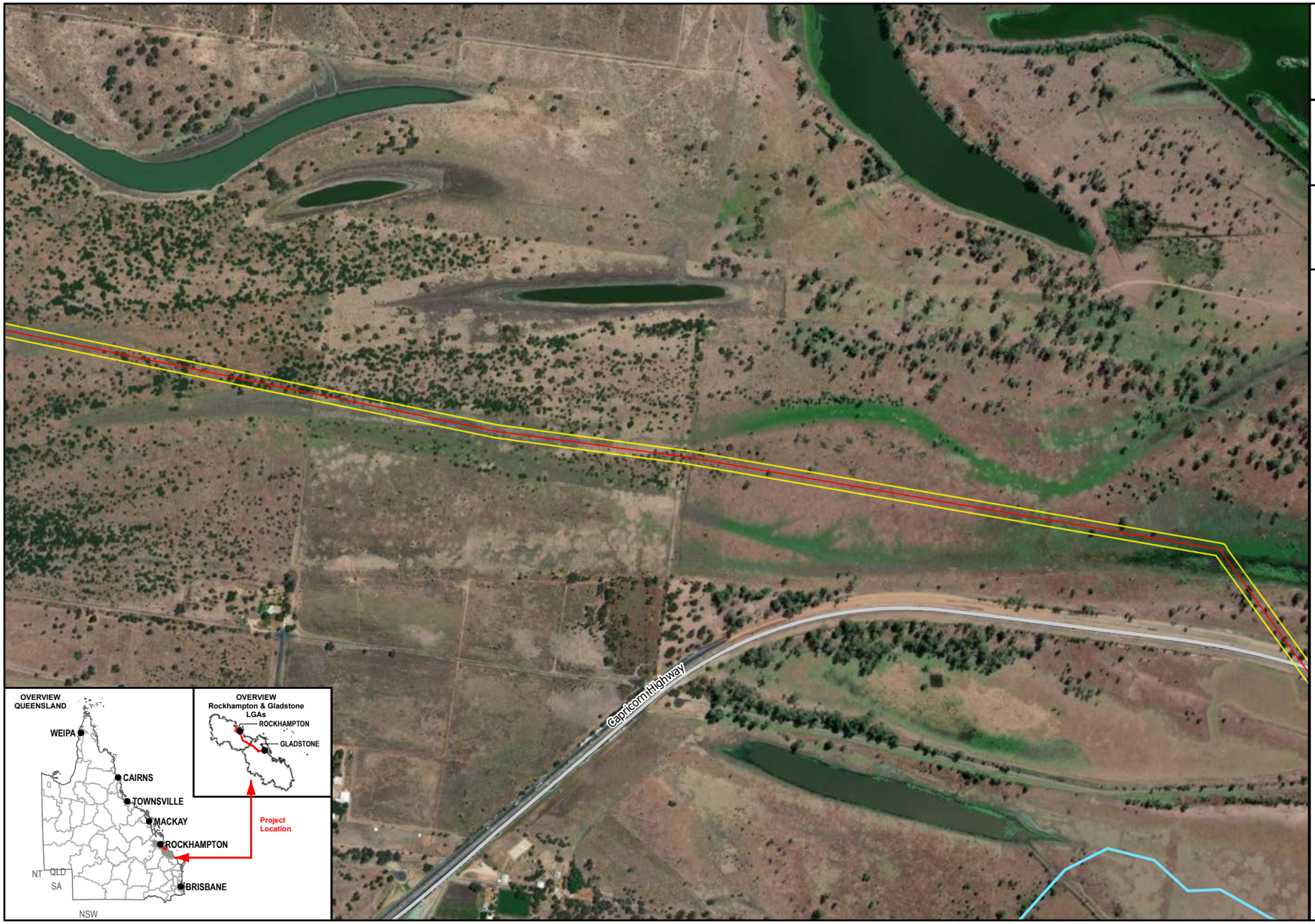

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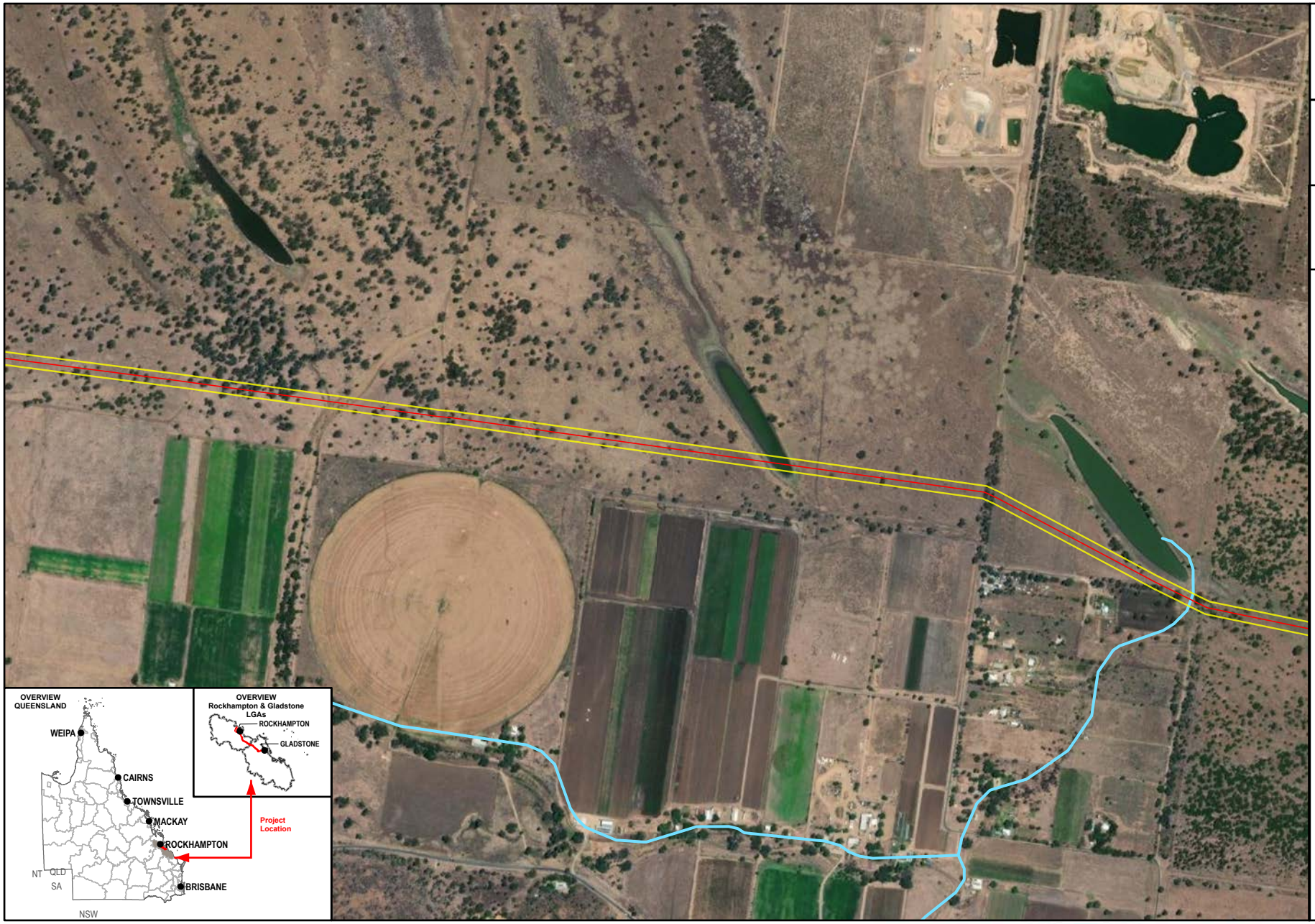

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7.2.2.15 Estuarine crocodile

Conservation status and species ecology

The estuarine crocodile is listed as marine and migratory under the EPBC Act and vulnerable under the NC Act. The species is found in a wide range of habitats including rivers, estuaries, creeks, swamps, lagoons and billabongs. Within Queensland, the distribution of the estuarine crocodiles generally extends from Gladstone in the south through to the Cape York Peninsula in the north and across to the border with the Northern Territory in the west. Individual estuarine crocodiles have historically been observed as far south as the New South Wales border, with occasional contemporary records in the Mary River catchment. This species is limited in their upstream movement primarily by physical barriers such as escarpments and instream water infrastructure such as dams and weirs (Cogger 2000).

Field survey results and distribution of suitable habitat

The estuarine crocodile was not recorded during field surveys but is considered likely to occur with two historic records occurring in the Fitzroy River within the desktop search extent (10km buffer). Optimal habitat also occurs within Raglan Creek (site 2) and Inkerman Creek (site 4) (Figure 7-20). Both sites are estuarine tidal creeks that connect to the Fitzroy River Delta and are considered suitable foraging and nesting habitat. Twelve Mile Creek (site 3) and Gavial Creek (site 6) contain sub-optimal habitat for the species and therefore the 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 but would be able to support a small crocodile throughout the year, not just during flood times and therefore the species may still occur at this location. All other sites surveyed along the SGIC SDA were outside the known range and did not contain suitable habitat for the estuarine crocodile.

Significant Residual Impact Assessment

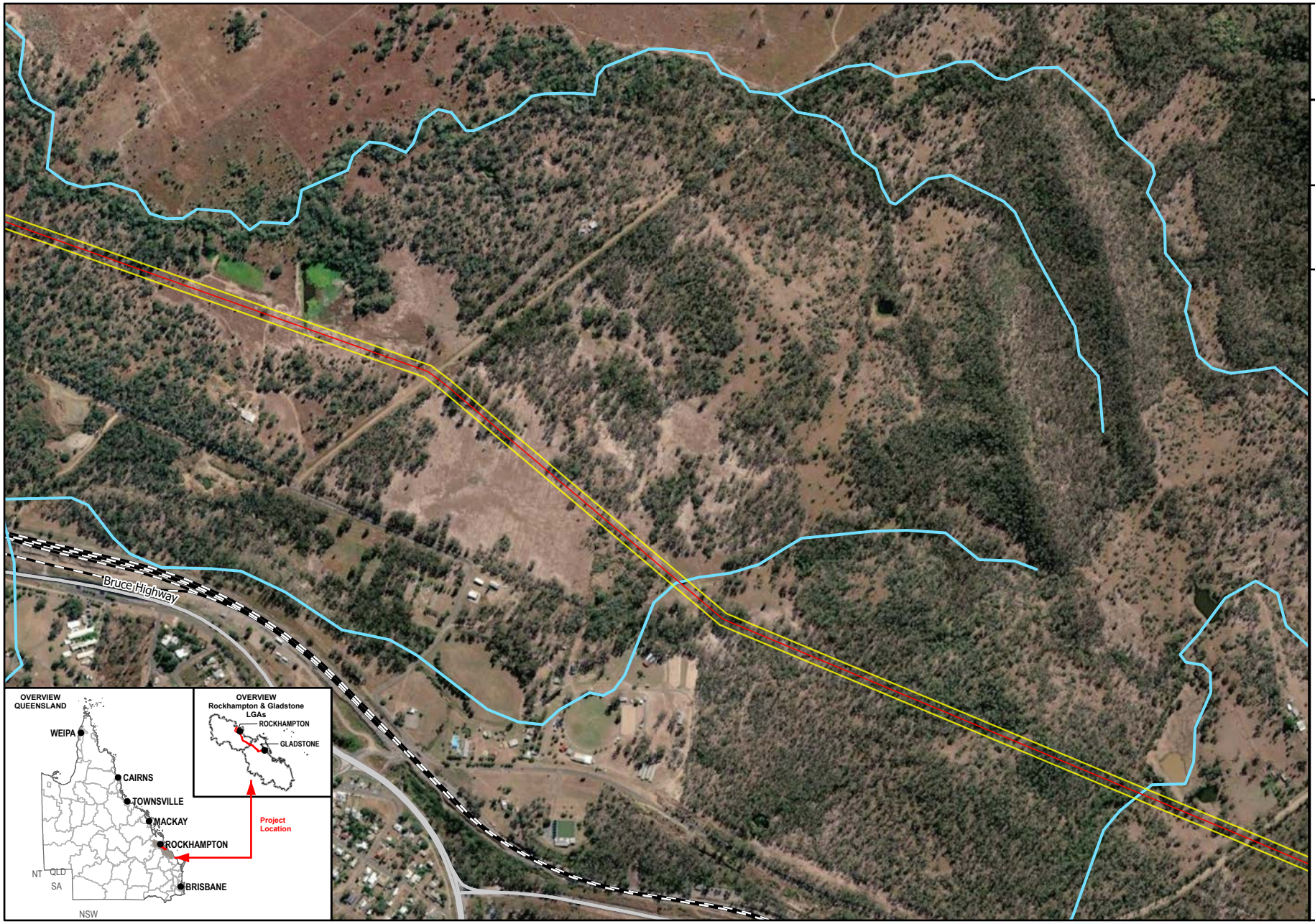
The project is unlikely to have a significant residual impact on the estuarine crocodile due to the temporary nature of the works and construction techniques that minimise disturbance of the creek bed and bank and avoid creating barriers for the creeks' connectivity. Restoration of habitat, including potential nesting banks, will also occur following construction. A significance of impact assessment of the project on the estuarine crocodile (migratory EPBC Act, vulnerable NC Act) is provided in Table 7-33.

Table 7-33 Significance of impact for estuarine crocodile

Significant residual impact criteria	Potential to occur
A long-term decrease in the size of a local population	**Unlikely** The estuarine crocodile is found in a wide range of habitats including rivers, estuaries, creeks, swamps, lagoons and billabongs. Within Queensland, the distribution of the estuarine crocodiles generally extends from Gladstone in the south through to the Cape York Peninsula in the north and across to the border with the Northern Territory in the west. This species is limited in their upstream movement primarily by physical barriers such as escarpments and instream water infrastructure such as dams and weirs (Cogger 2000). The estuarine crocodile was predicted to occur within the study area due to the presence of nearby historical records and areas of suitable habitat along the SGIC SDA pipeline alignment. Sites 2 and 4 both provide optimal foraging habitat with potential nesting habitat areas. Sites 3, 6 and 30 contain sub-optimal foraging habitat and marginal breeding habitat and therefore the species may occur at these locations. Proposed works for pipeline crossing creeks include trench and trenchless methods (trenchless methods are the preferred methods for any wetted creek crossings). Any trenched works conducted within creeks will be designed for minimal vegetation removal and minimal disturbance of the creek bed and bank as far as reasonably practicable. A maximum 30 m corridor for the SGIC SDA pipeline alignment will be cleared for the trench. The impact area for all sites will be rehabilitated with bed and banks restored to pre-works profile. Loss of habitat and restricted movement will be temporary and is therefore unlikely to lead to a long-term decrease in the size of the local population.

Significant residual impact criteria	Potential to occur
Reduce the extent of occurrence of the species	**Unlikely** The estuarine crocodile was predicted to occur within the study area due to the presence of nearby historical records and areas of suitable habitat along the SGIC SDA pipeline alignment. Sites 2 and 4 both provide optimal foraging habitat with potential nesting habitat areas. Sites 3, 6 and 30 contain sub-optimal foraging habitat and marginal breeding habitat and therefore the species may occur at these locations. All works at these sites will be conducted in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018). The works will be restricted temporally to a small, localised area, with measures in place to avoid long-term impacts to habitat. Following construction, habitat will be restored, and operation of the pipeline will have no direct or indirect impacts on the species or their habitat. With these measures in place, it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragment an existing population	The works will be restricted temporally to a small, localised area, with measures in place to ensure fragmentation of the species does not occur. Specifically, any restriction on flow or crocodile movement will be temporary with works undertaken within a maximum of 180 days (DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)). Following construction, habitat will be restored, and operation of the pipeline will have no direct or indirect impacts on the species or their habitat. These measures will ensure that no fragmentation of the population will occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The potential for habitat isolation during the construction phase of the project will occur outside of the estuarine crocodile active breeding season and will be limited to a maximum of 180 days (DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)). Once construction is complete, there will be no permanent barriers to crocodile movement and therefore the project is unlikely to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** Introduced fish species in the Fitzroy River and surrounding waterways are not known to be a key threatening process to the estuarine crocodile. The implementation of the CEMP and a Weed and Pest Management Plan will reduce the risk of introducing new invasive species or spreading existing weeds within the waterways, which could cause habitat degradation. As such, the project is not expected to result in the establishment of invasive species in crocodile habitat.
Introduce disease that may cause the population to decline	**Unlikely** There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that construction and operation of the pipeline will have the potential to introduce disease to the extent that the estuarine crocodile population will decline.
Interfere with the recovery of the species	**Unlikely** Relevant to the project, habitat destruction is a major threat to the species (DAWE, 2022d). Threat abatement and recovery of the estuarine crocodile is focused on the management of marine waters (DAWE, 2022d). A maximum 30 m corridor for the SGIC SDA pipeline alignment will be cleared for the trench. The impact area for all sites will be rehabilitated with bed and banks restored to pre-works profile. Loss of habitat and restricted movement will be temporary. Crocodile habitat won't be permanently destroyed, ensuring the project is unlikely to contribute to key threating processes or interfere with recovery actions.

Significant residual impact criteria	Potential to occur
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** The works will be restricted to a small, localised area around the site. The duration of works will be less than 180 days (DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)) and will be restricted to avoid construction during the active breeding season (wet season) of the species. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Works to be conducted at creek sites 2, 4, 3, 6 and 30 will ensure that crocodiles cannot enter the construction zone whilst installation of the pipeline structure occurs. Following construction, habitat will be restored, and operation of the pipeline will have no direct or indirect impacts on the species or their habitat. These measures result that the project is unlikely to cause disruption to ecologically significant locations of a species.
Conclusion	Restricted movement and loss of estuarine crocodile habitat is considered minimal and temporary; therefore, the project is not considered to have a significant residual impact on the species.



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- 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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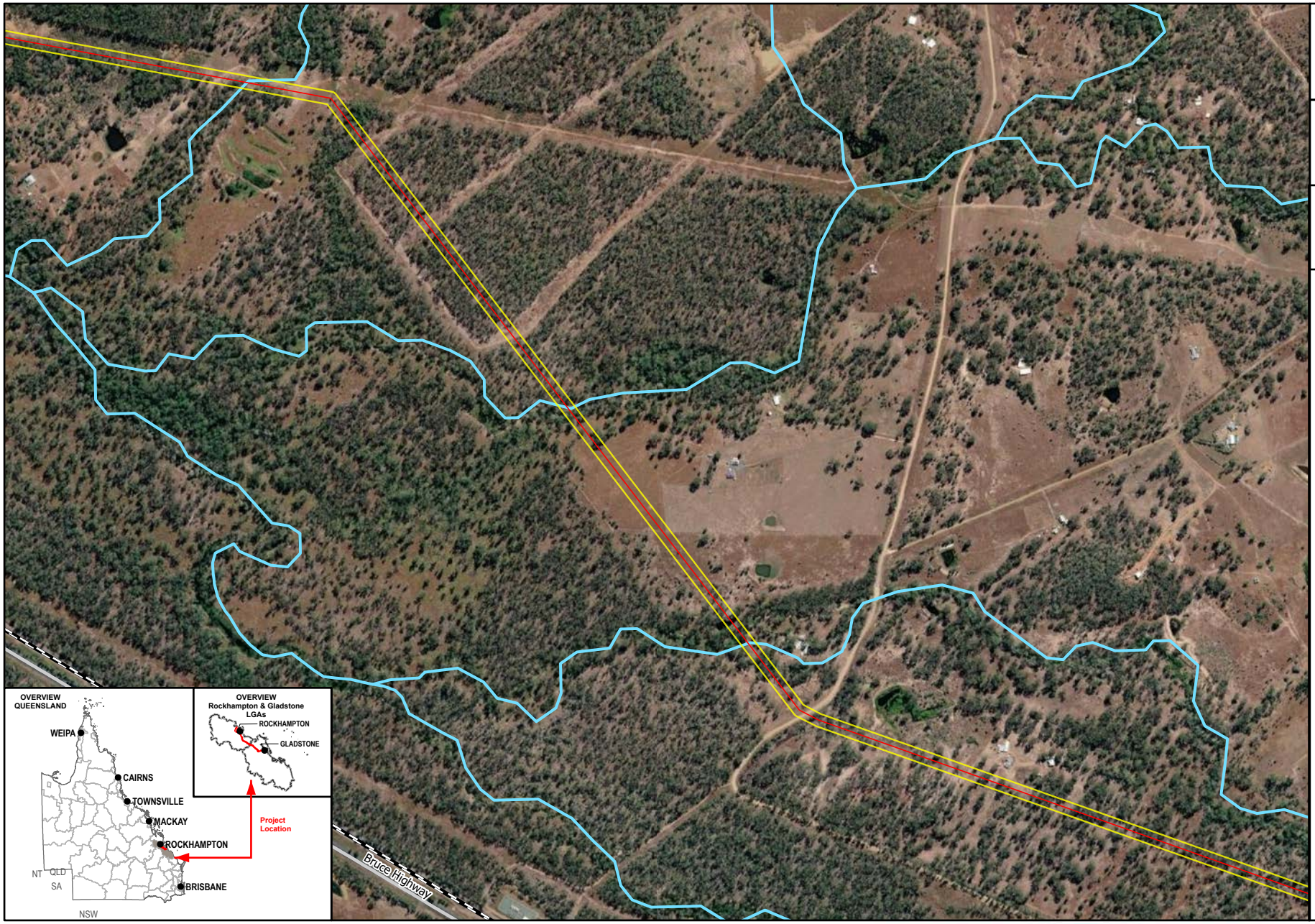
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20a
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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

Data Sources:
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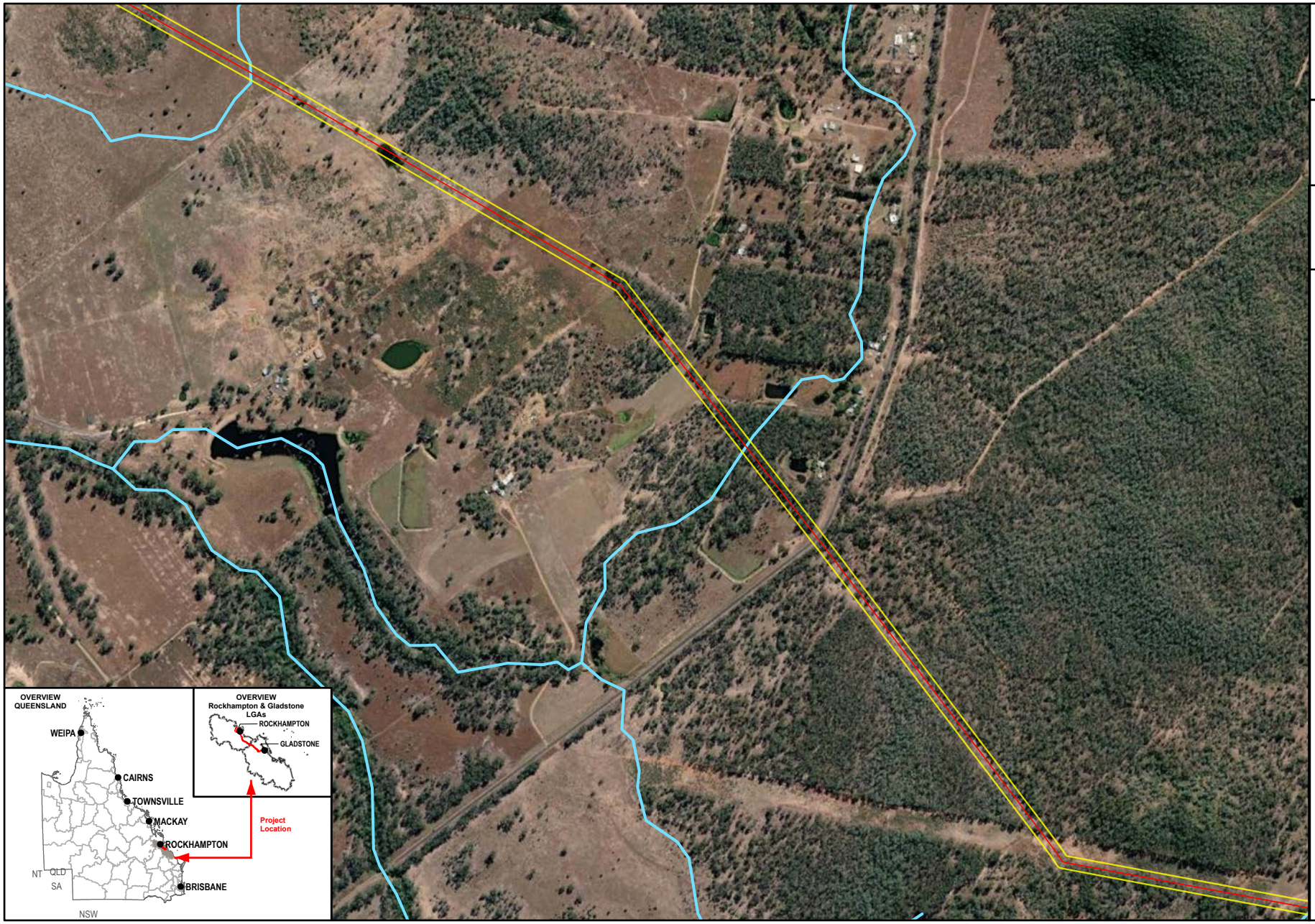
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20b
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

Data Sources:
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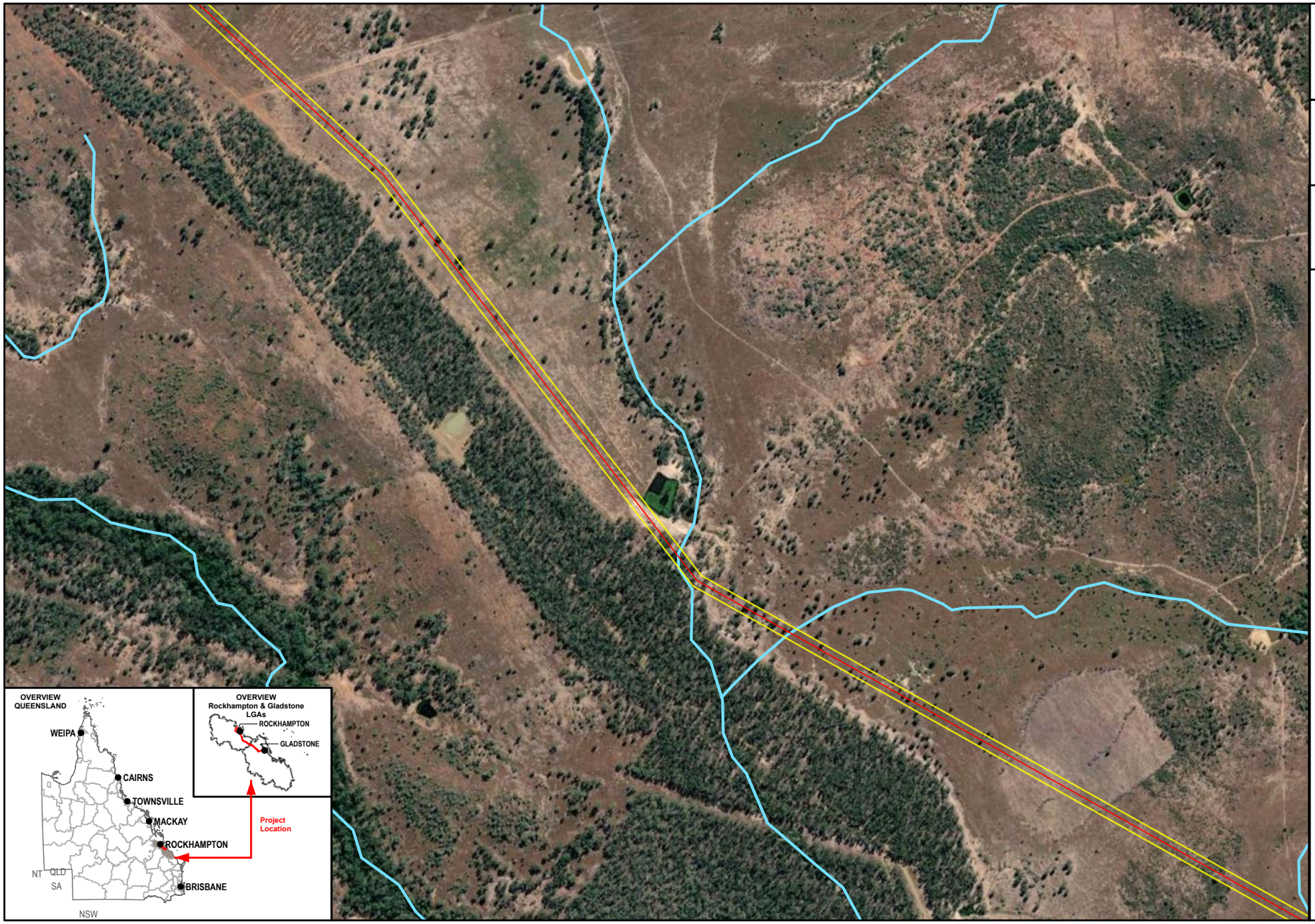
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20c
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

Data Sources:
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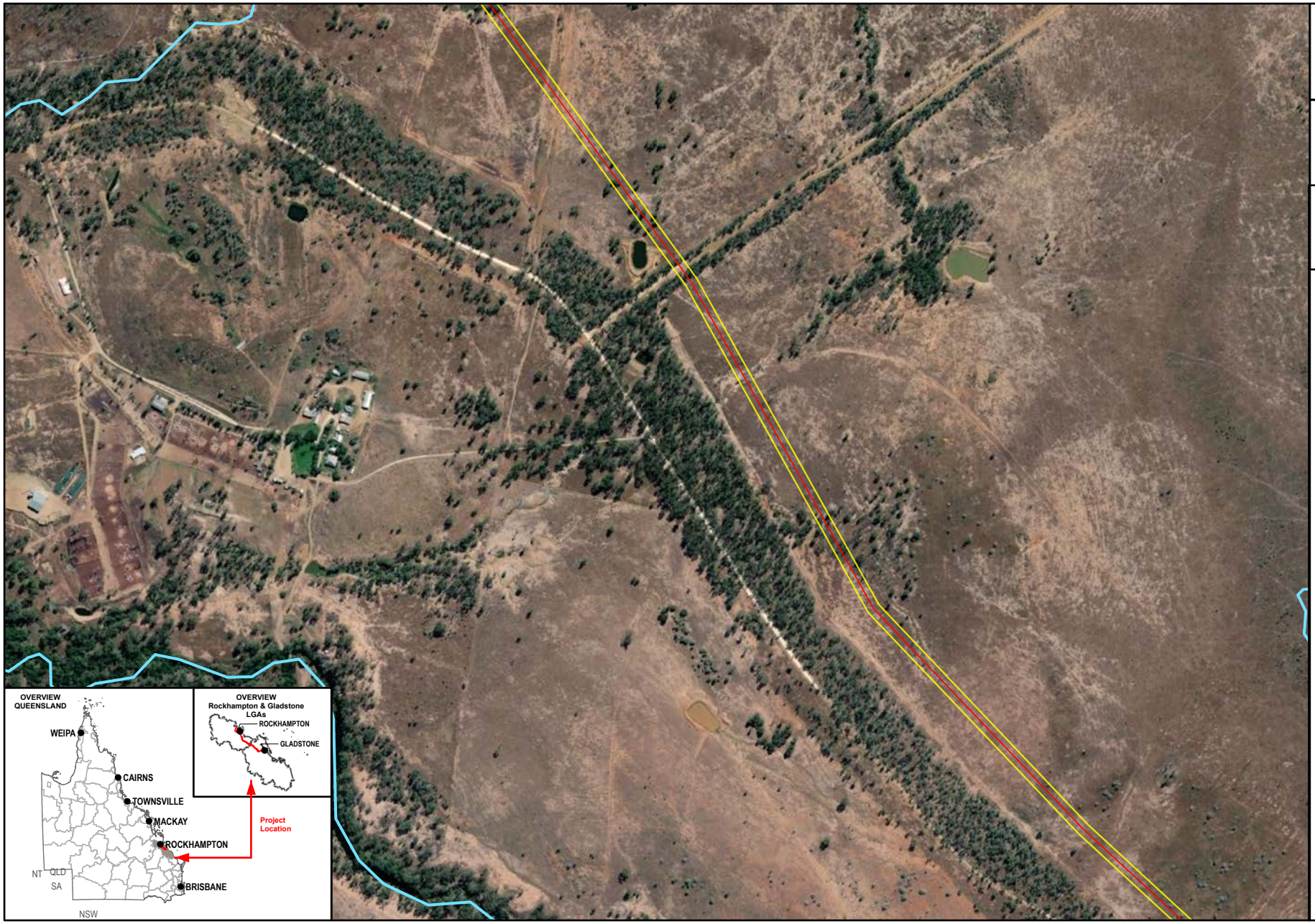
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20d
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

Data Sources:
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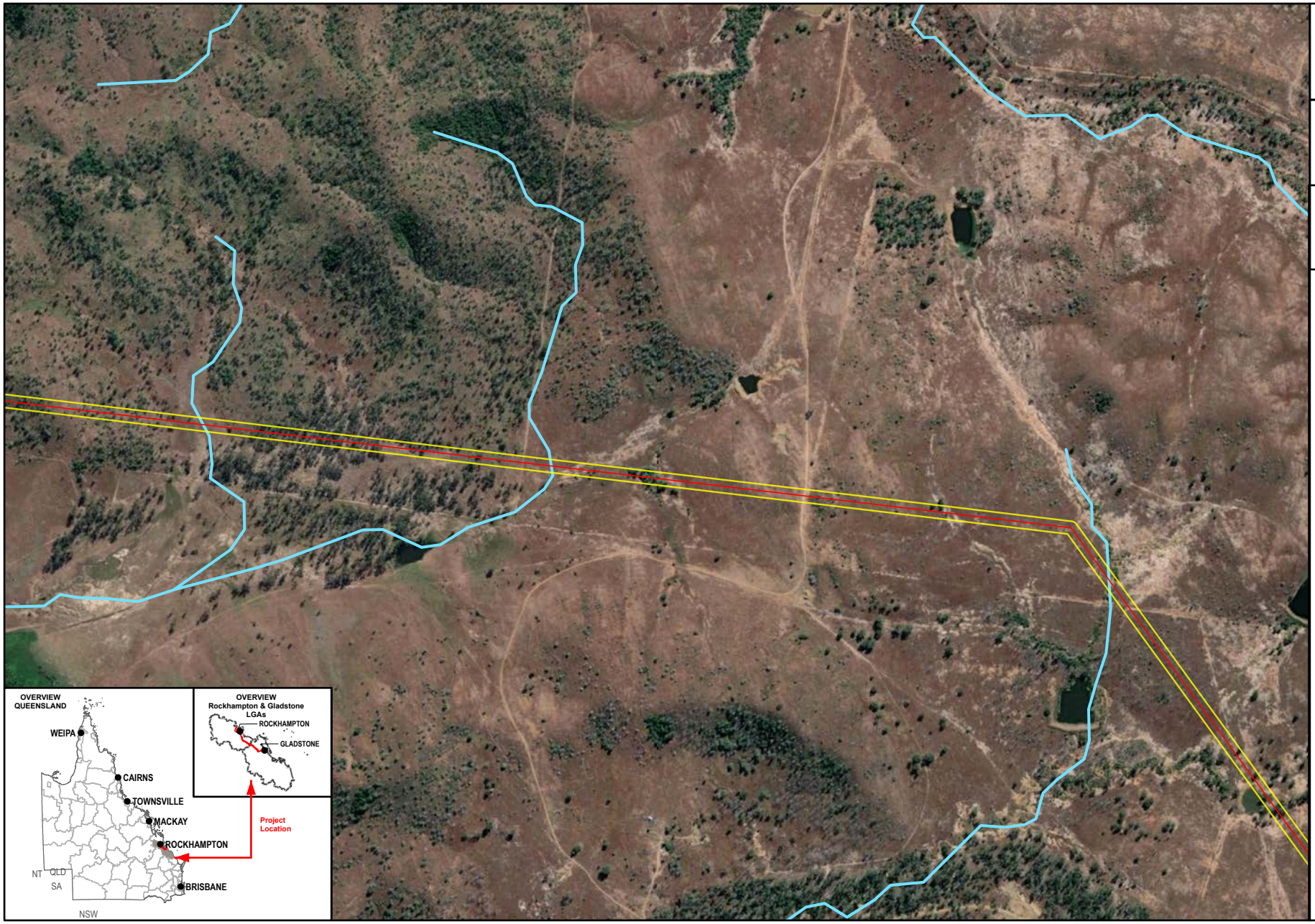
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20e
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

Data Sources:
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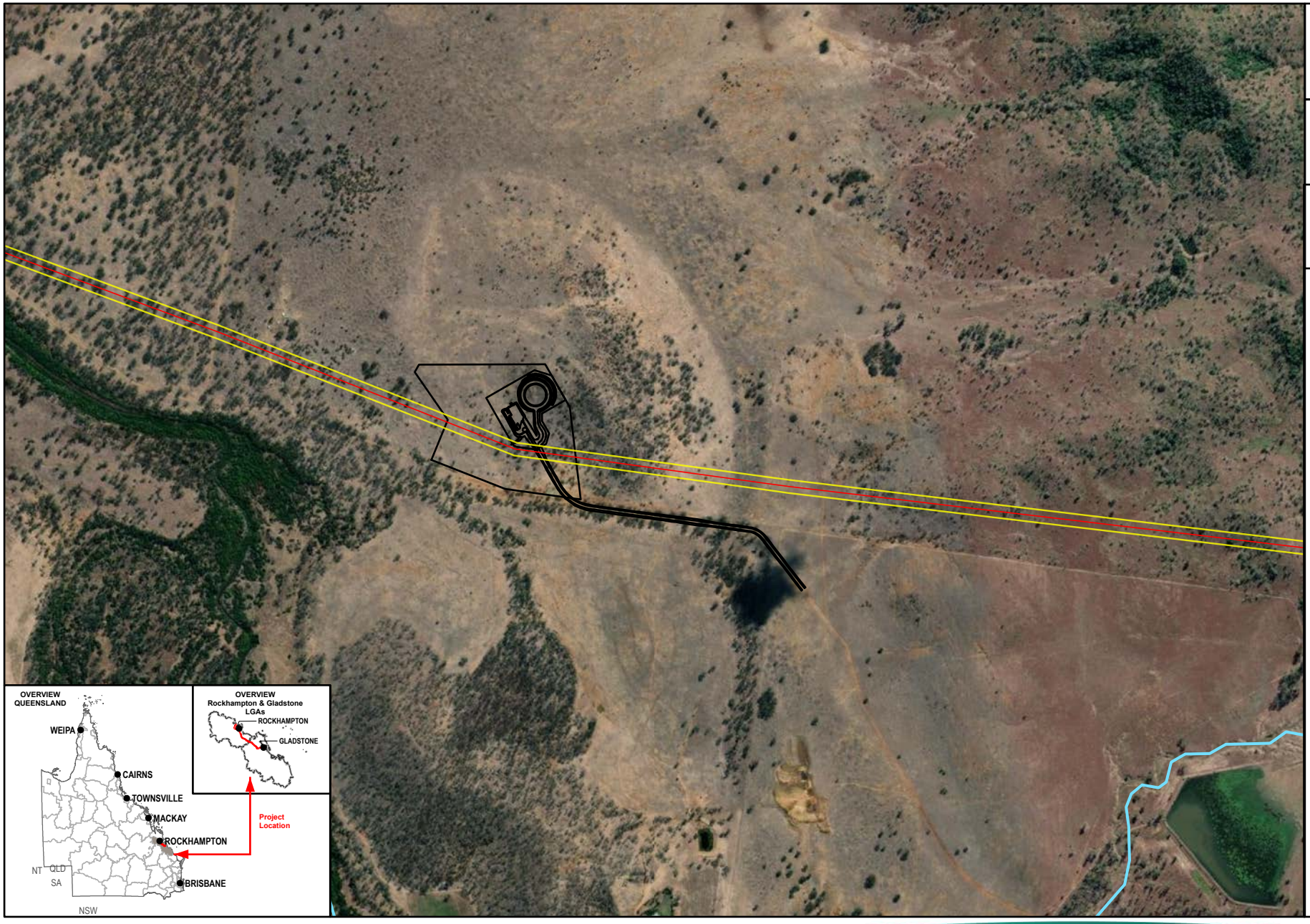
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20f
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

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

Data Sources:
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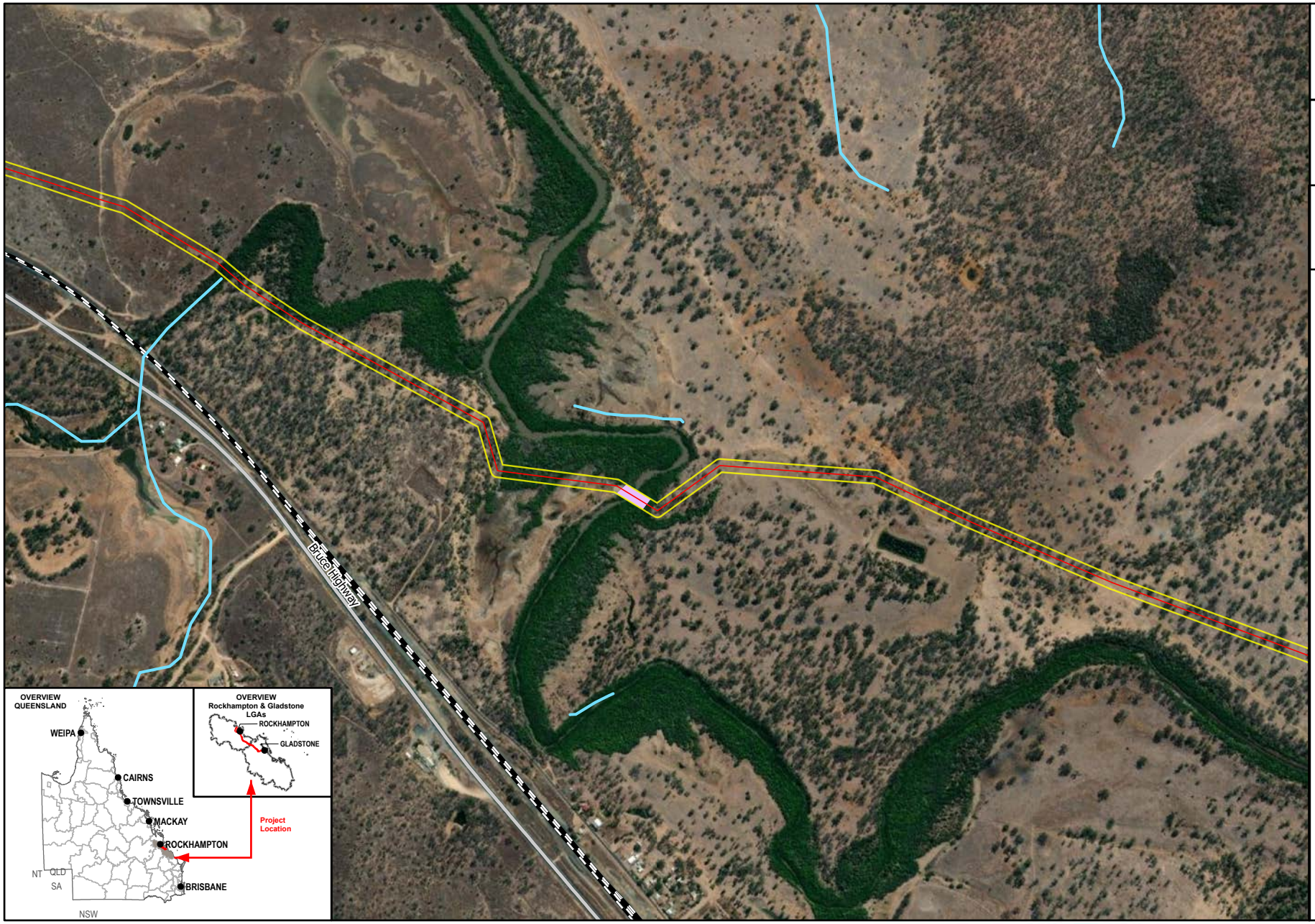
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20g
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Estuarine Crocodile Habitat
- Waterways
- Main Roads
- Railways

Data Sources:
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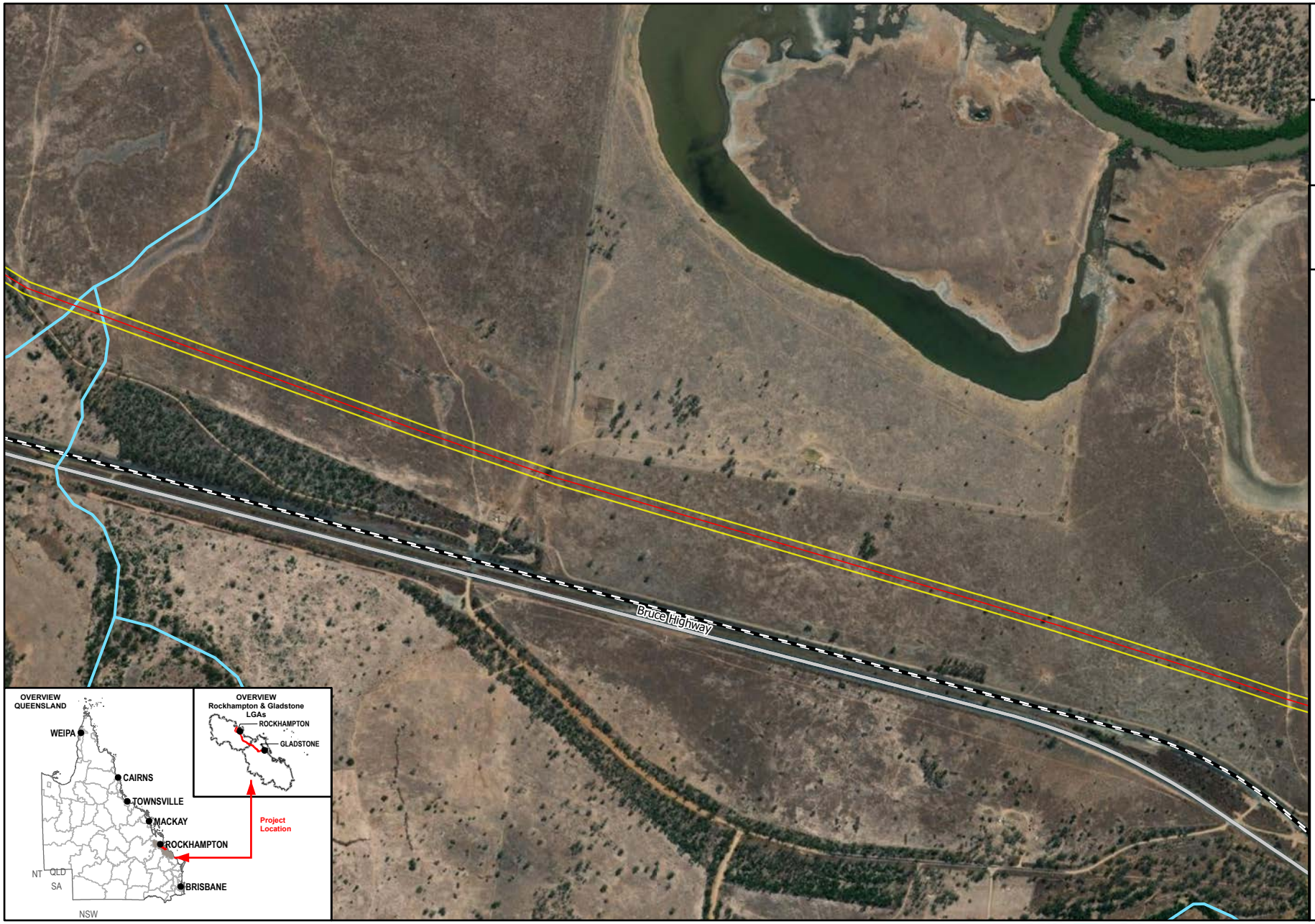
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20h
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

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

Data Sources:
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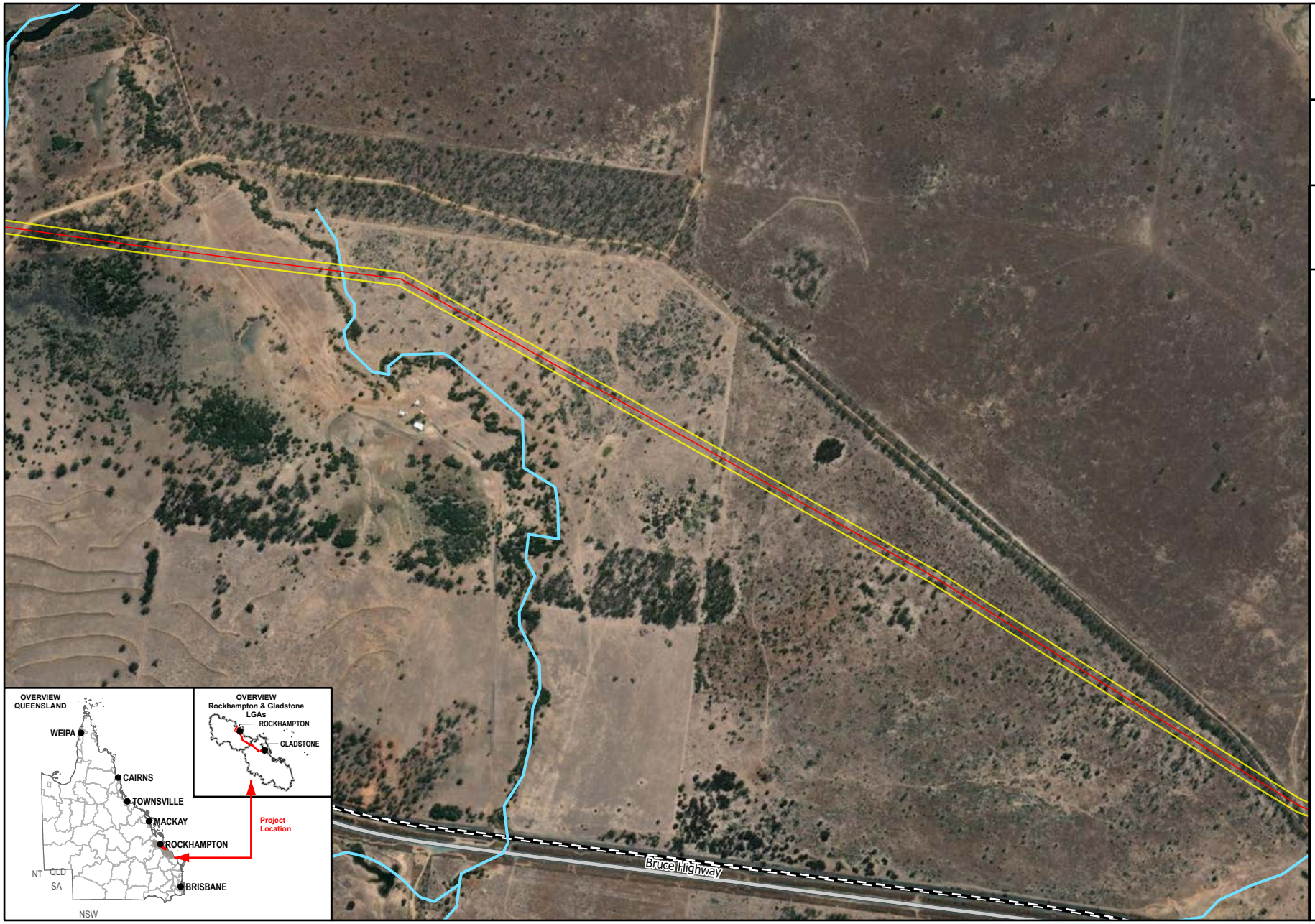
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20i
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

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

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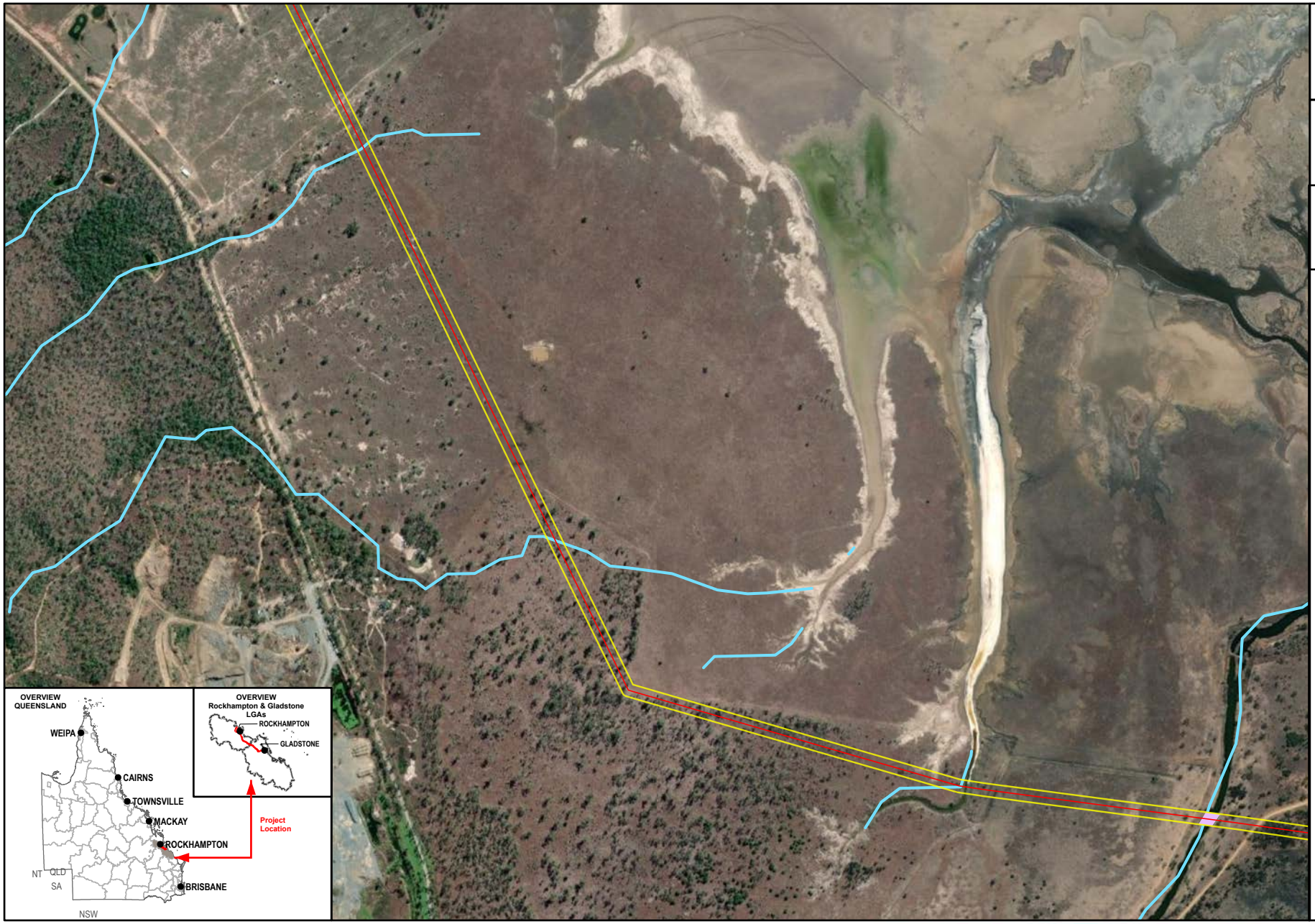
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20j
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Estuarine Crocodile Habitat
- Waterways

Data Sources:
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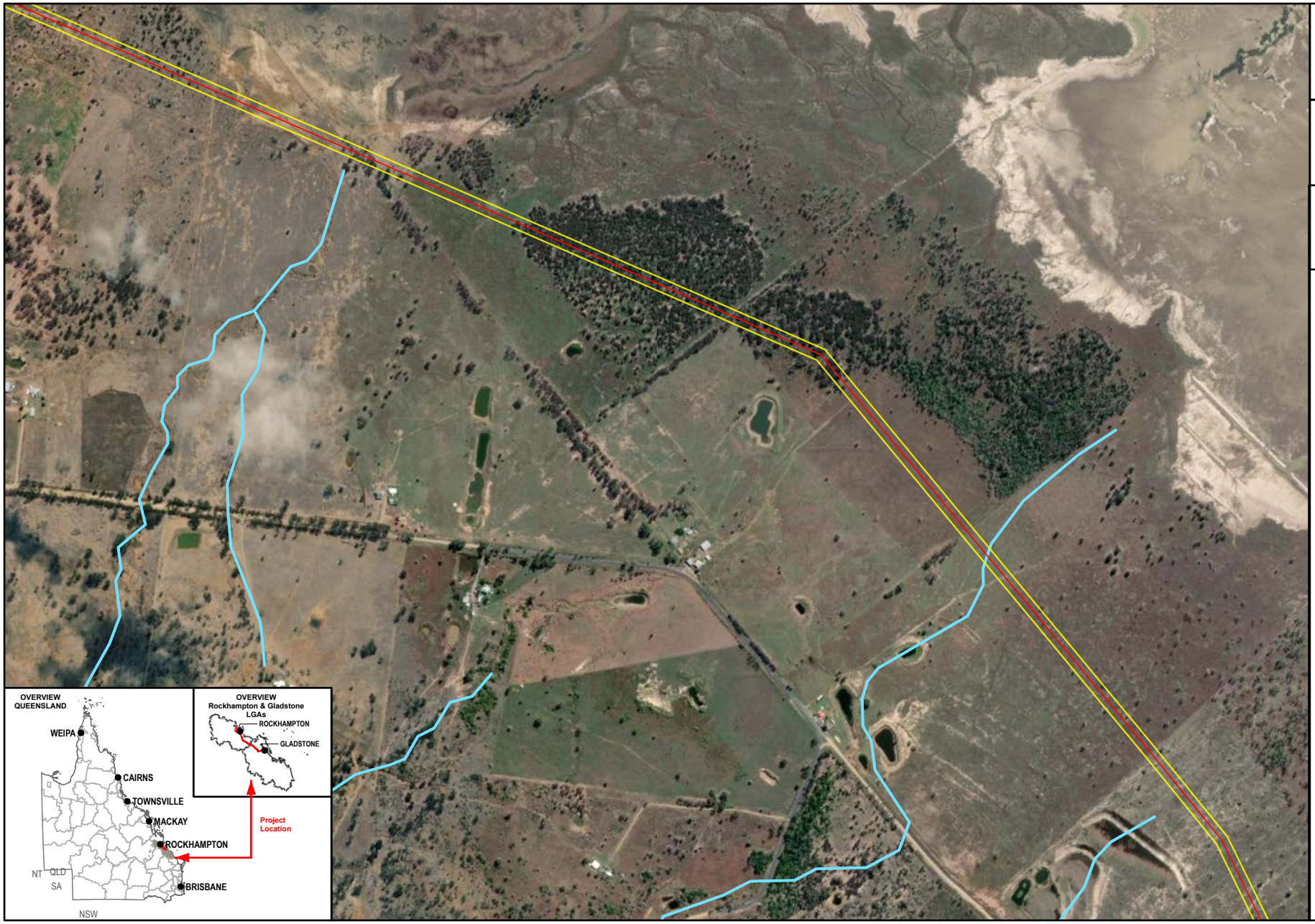
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20k
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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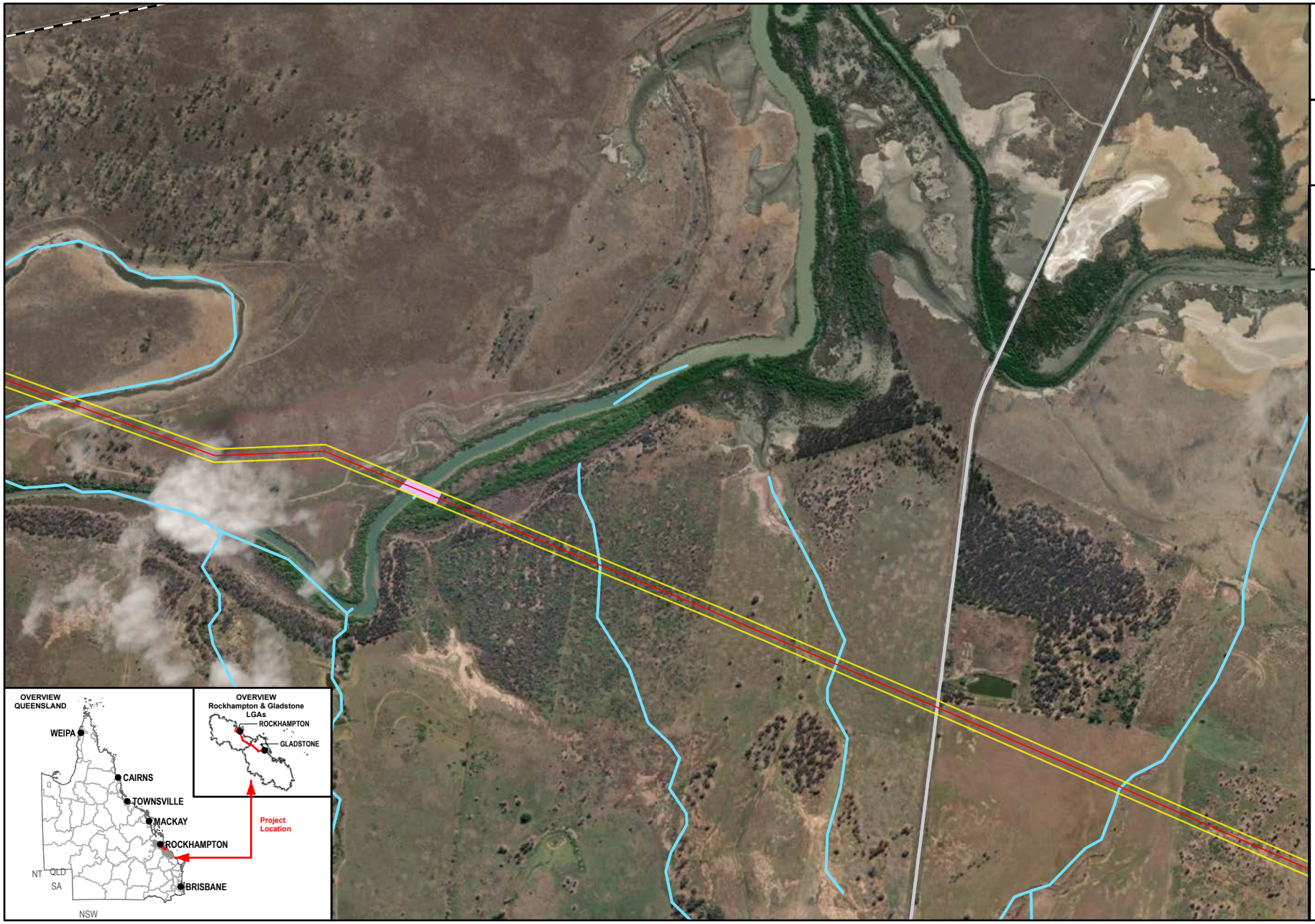
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20l
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Estuarine Crocodile Habitat
- Waterways
- 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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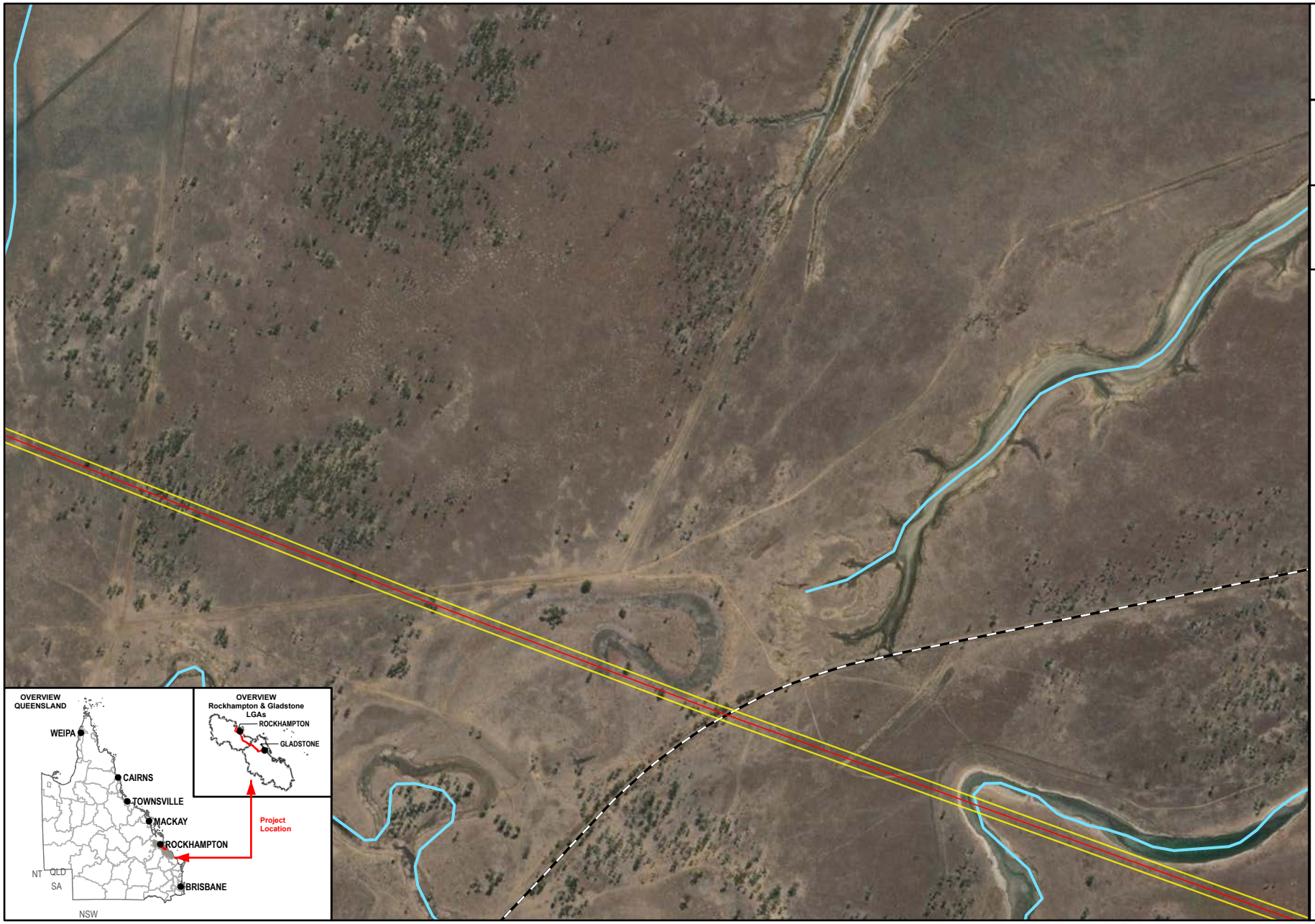
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20m
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- Railways

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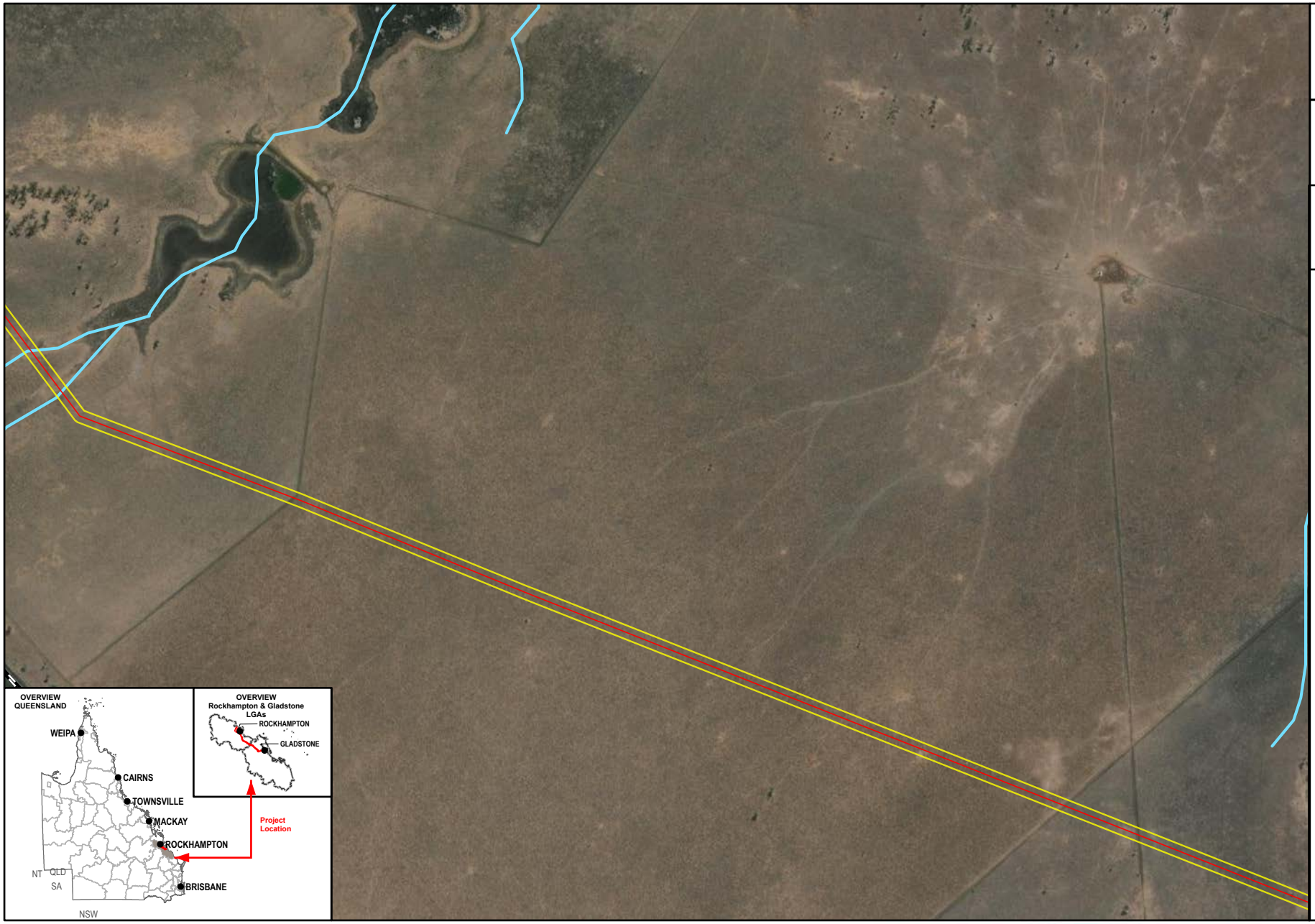
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20n
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- Railways

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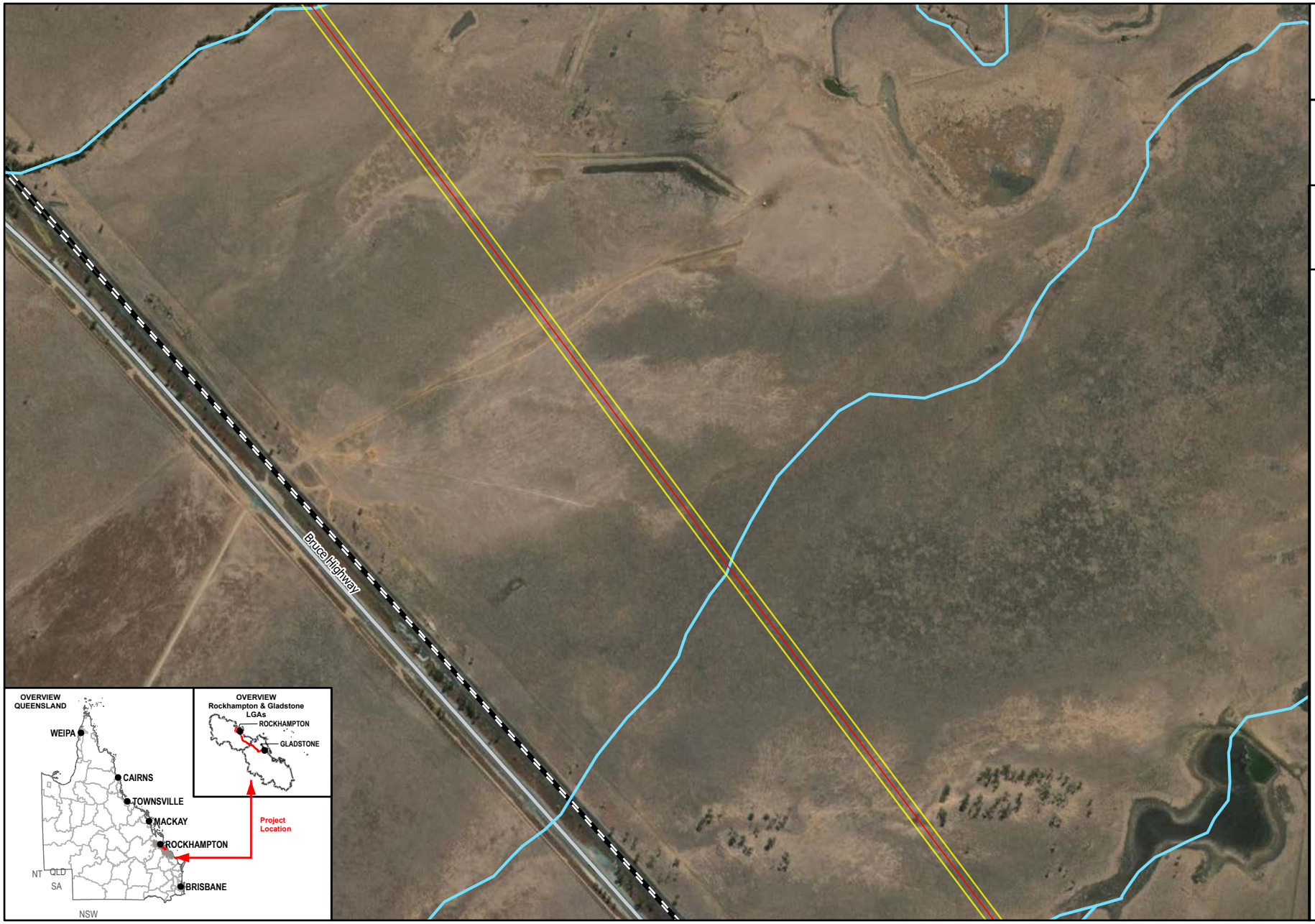
Figure 7-20o
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Legend

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

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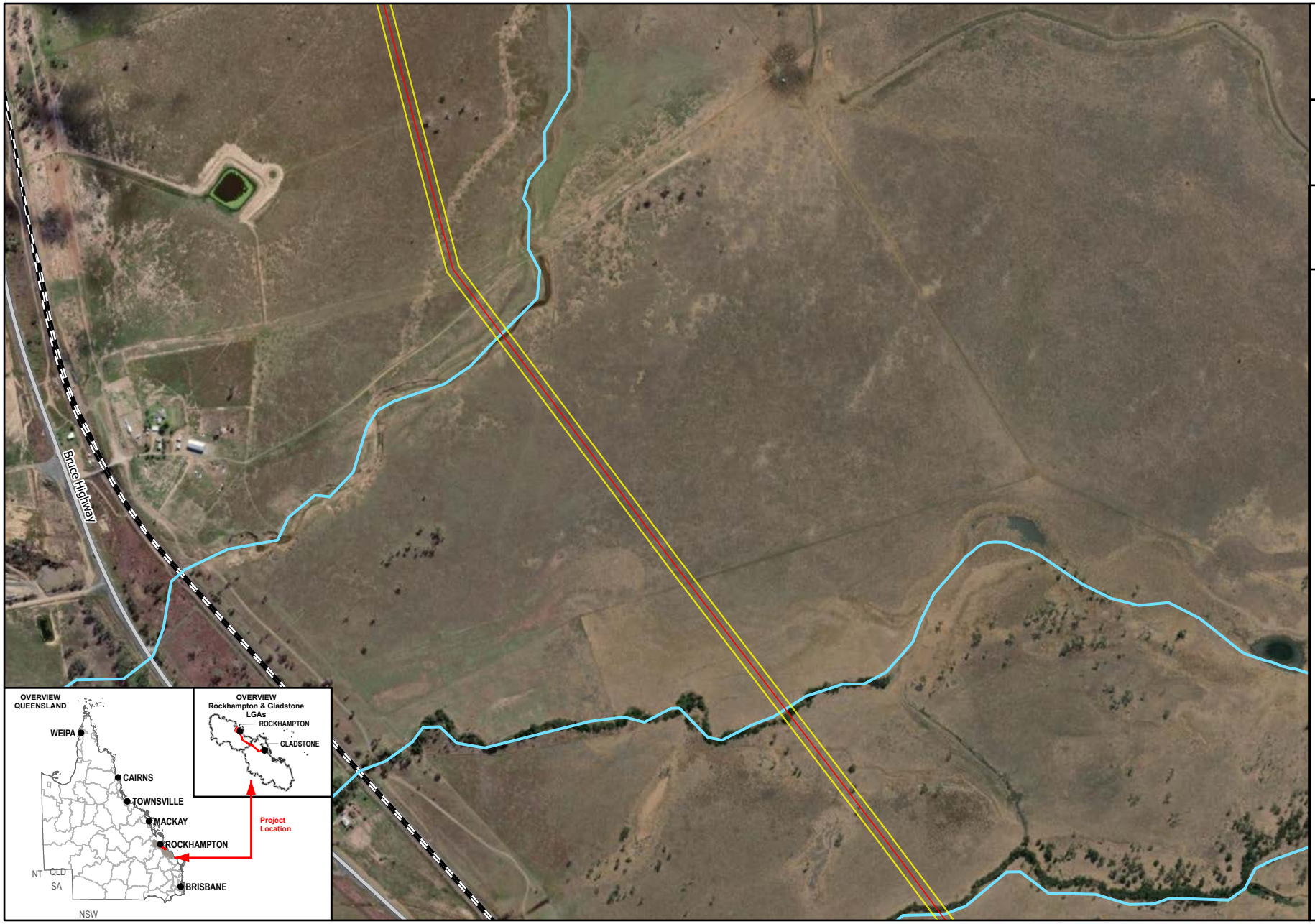
Figure 7-20p
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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

Data Sources:
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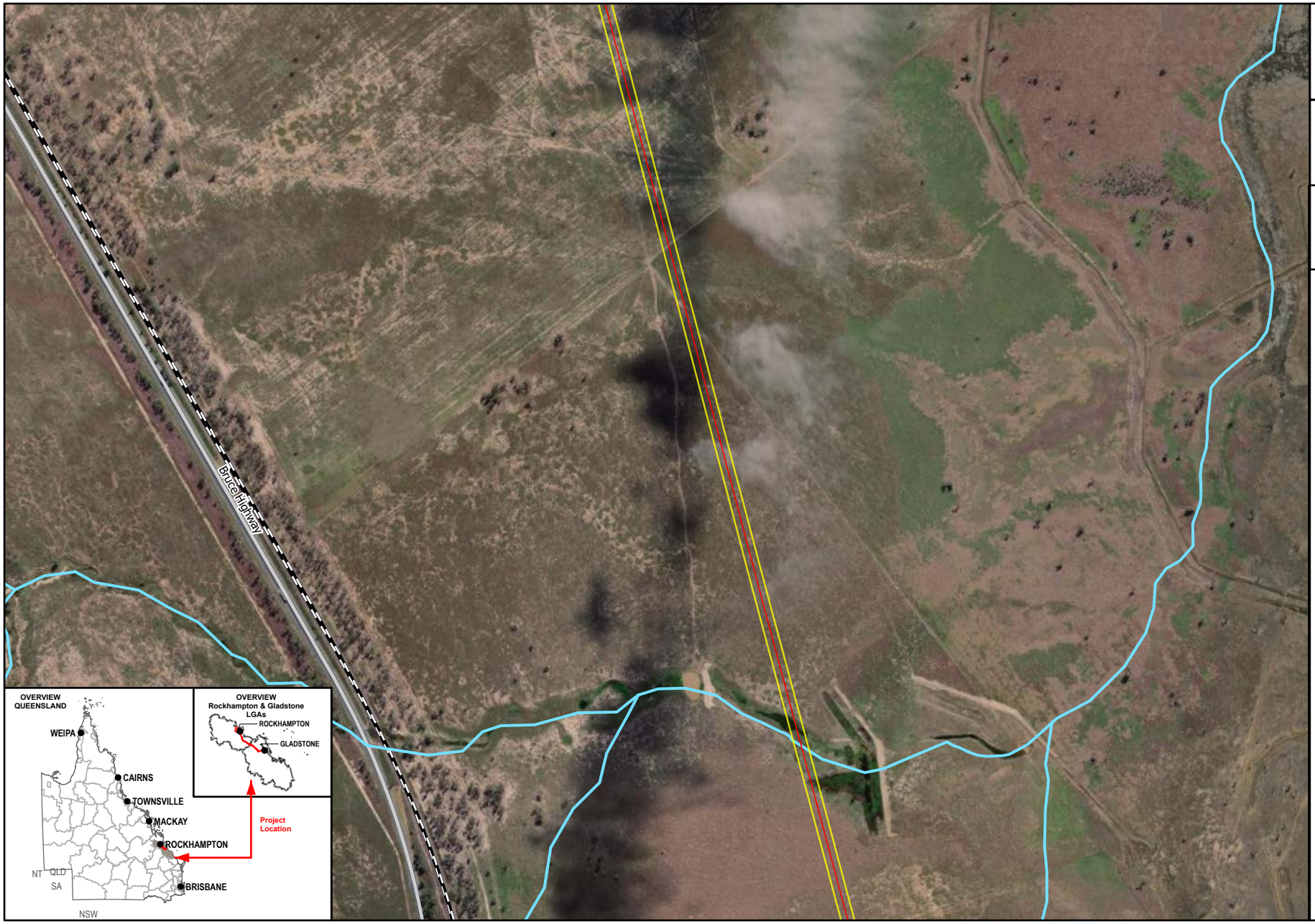
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20q
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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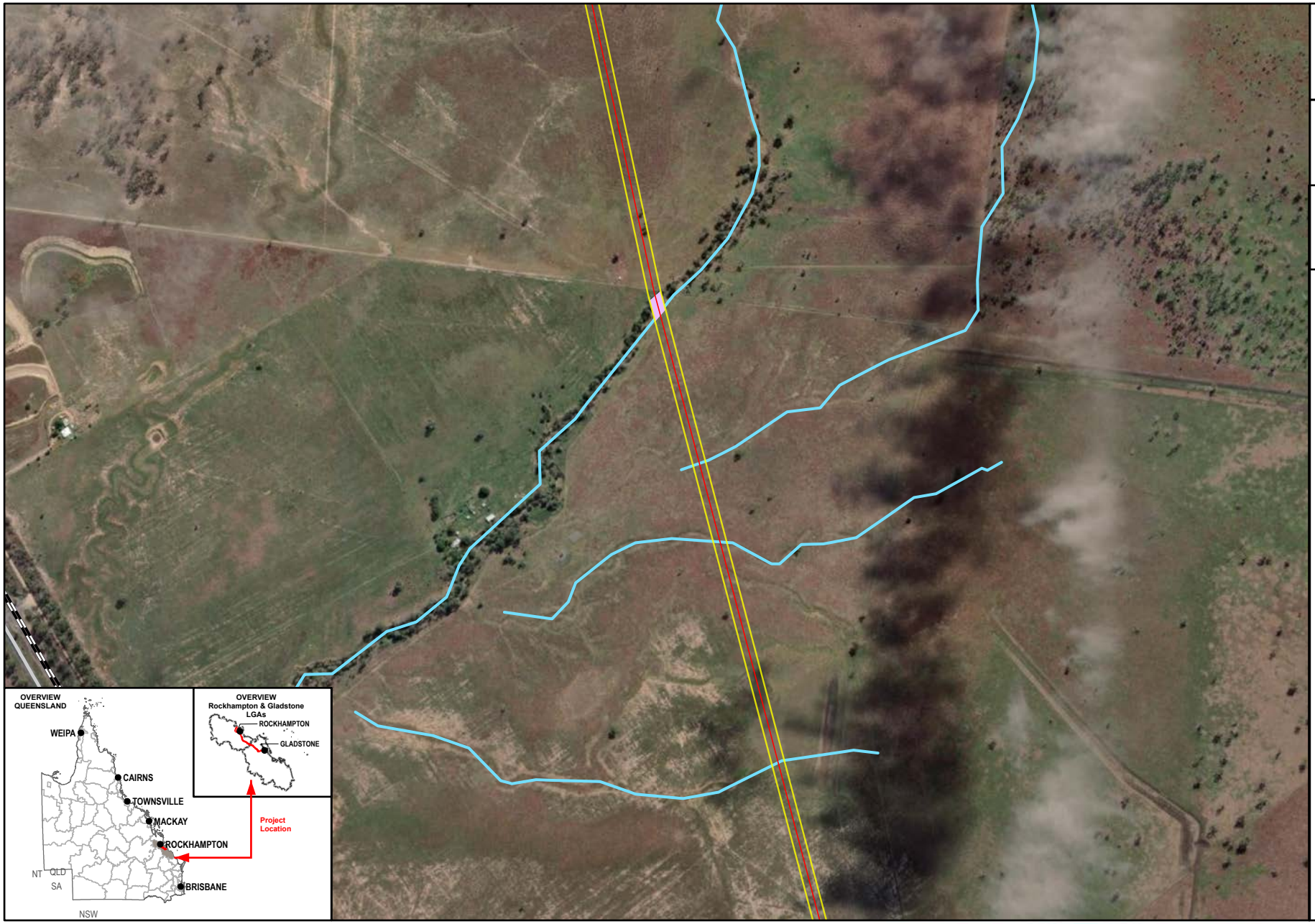
Figure 7-20r
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Estuarine Crocodile Habitat
- Waterways
- Main Roads
- Railways

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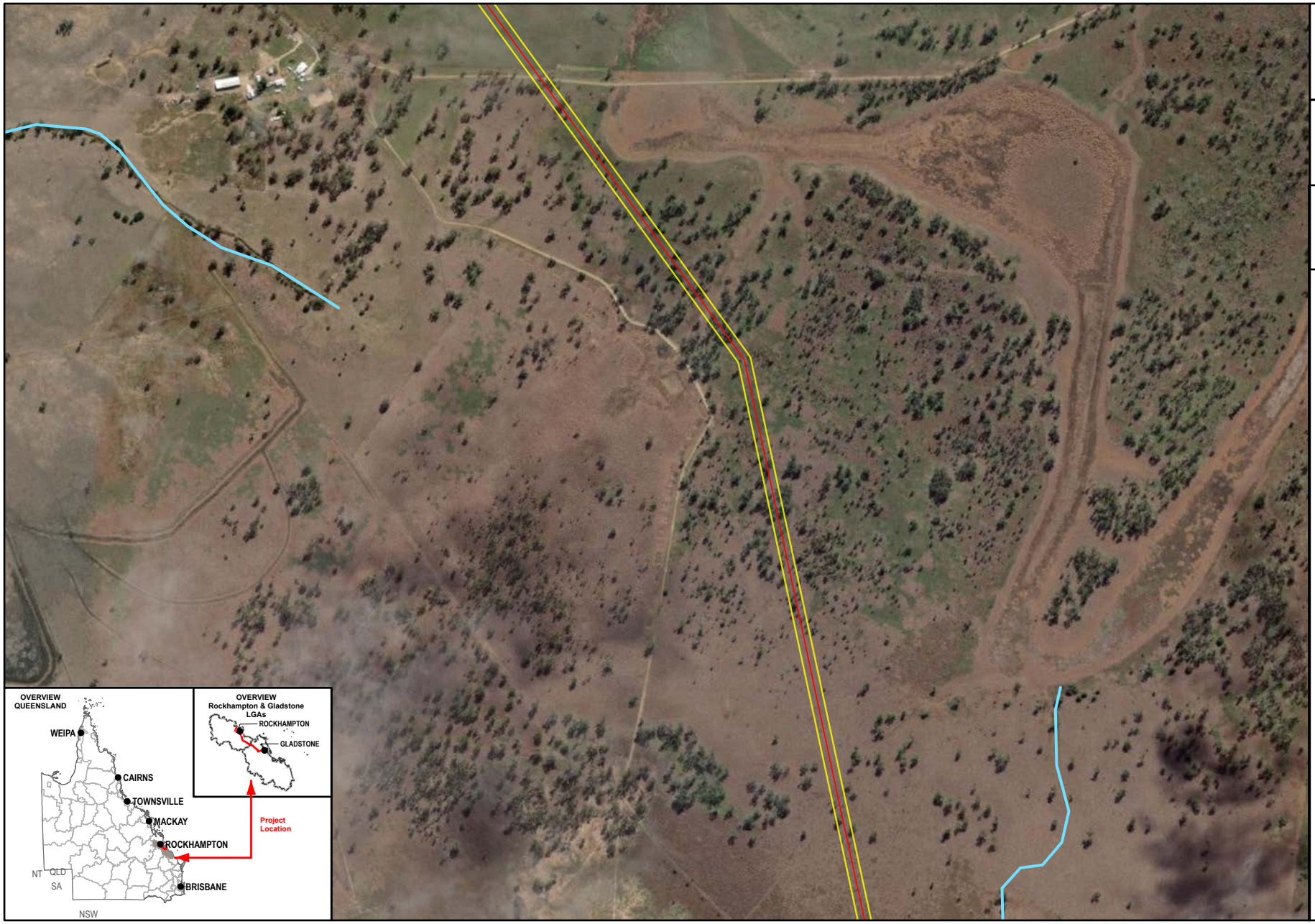
Figure 7-20s
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20t
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

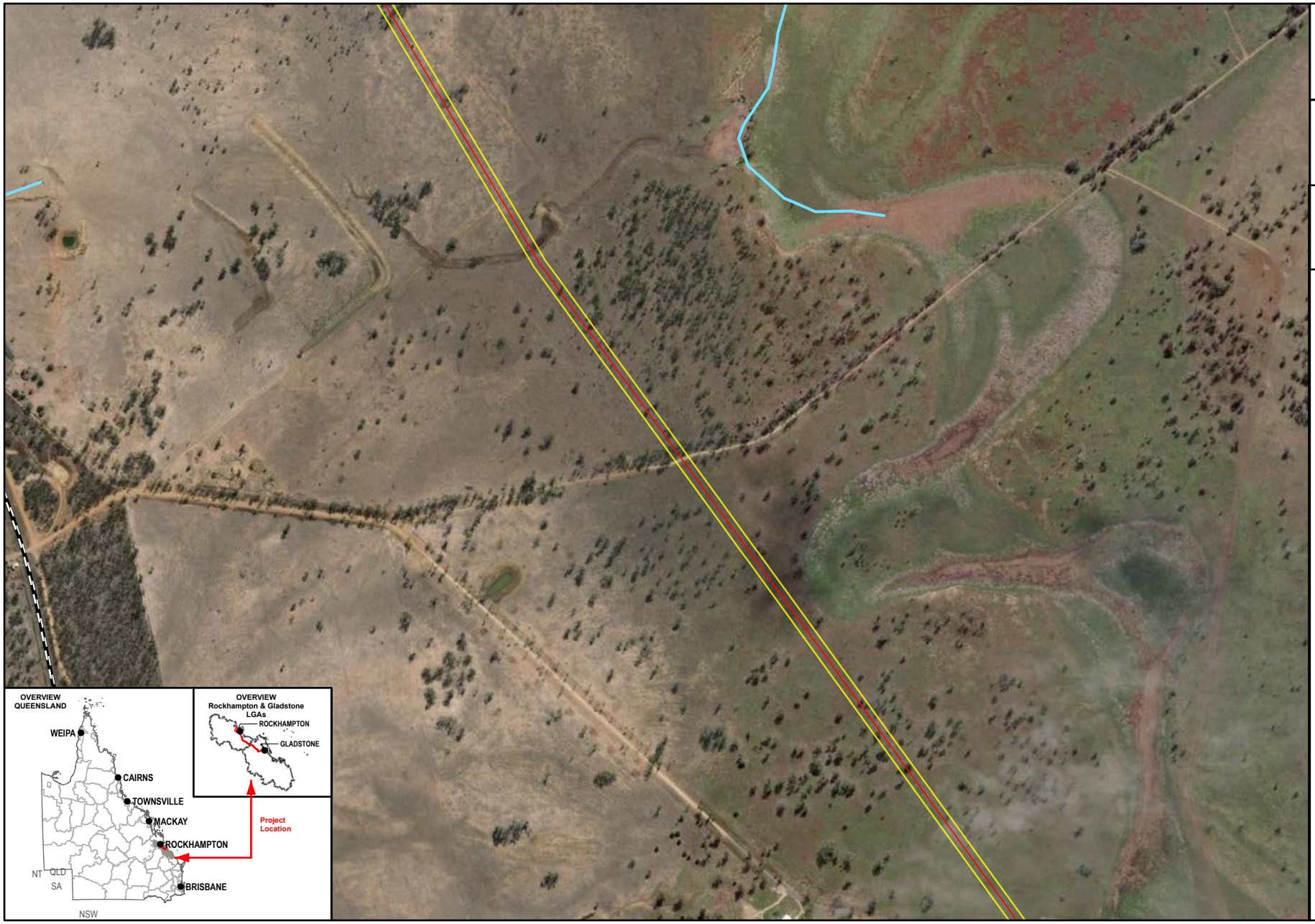

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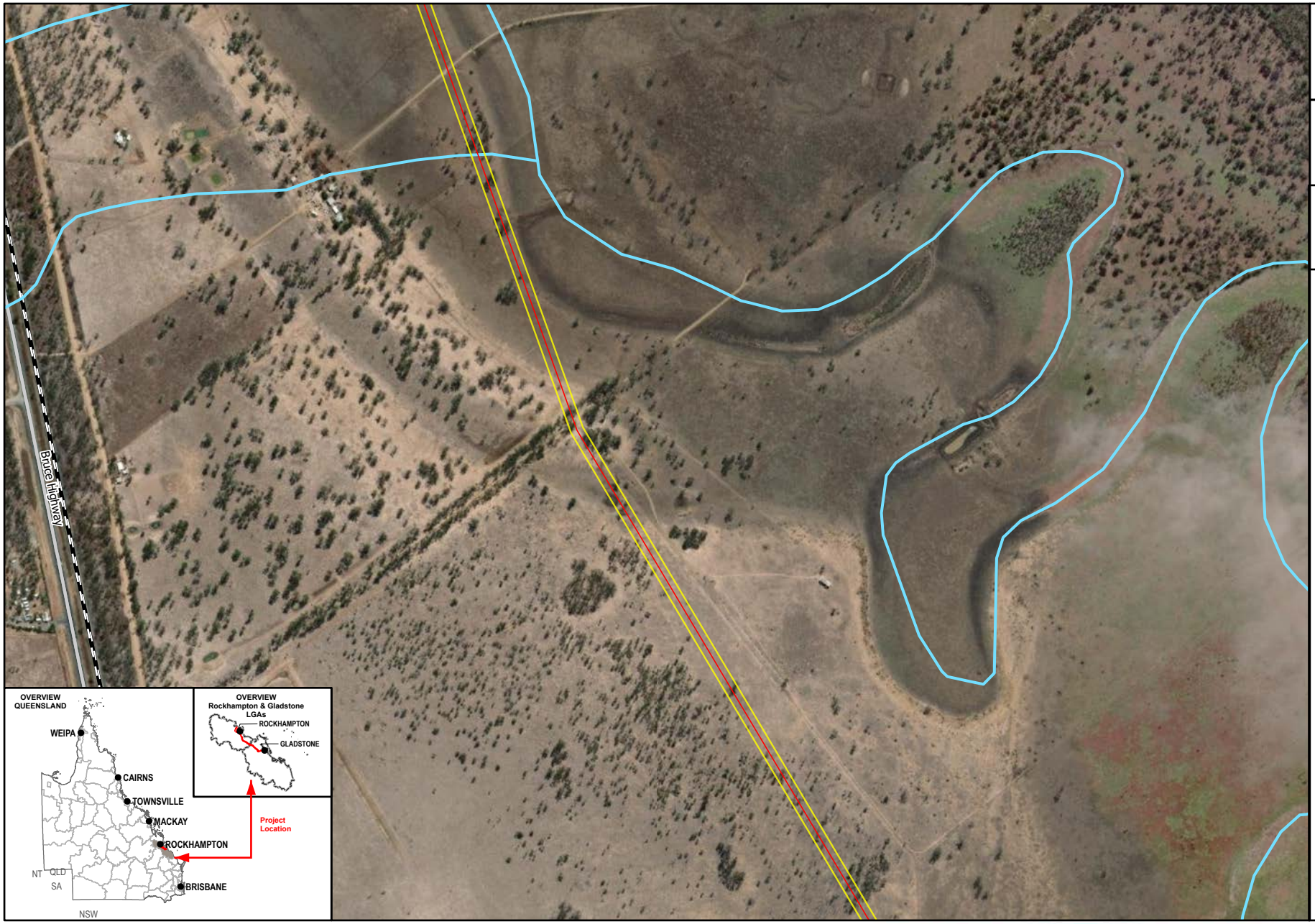
Figure 7-20u
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022



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- Study Area
- Waterways
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Figure 7-20v
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

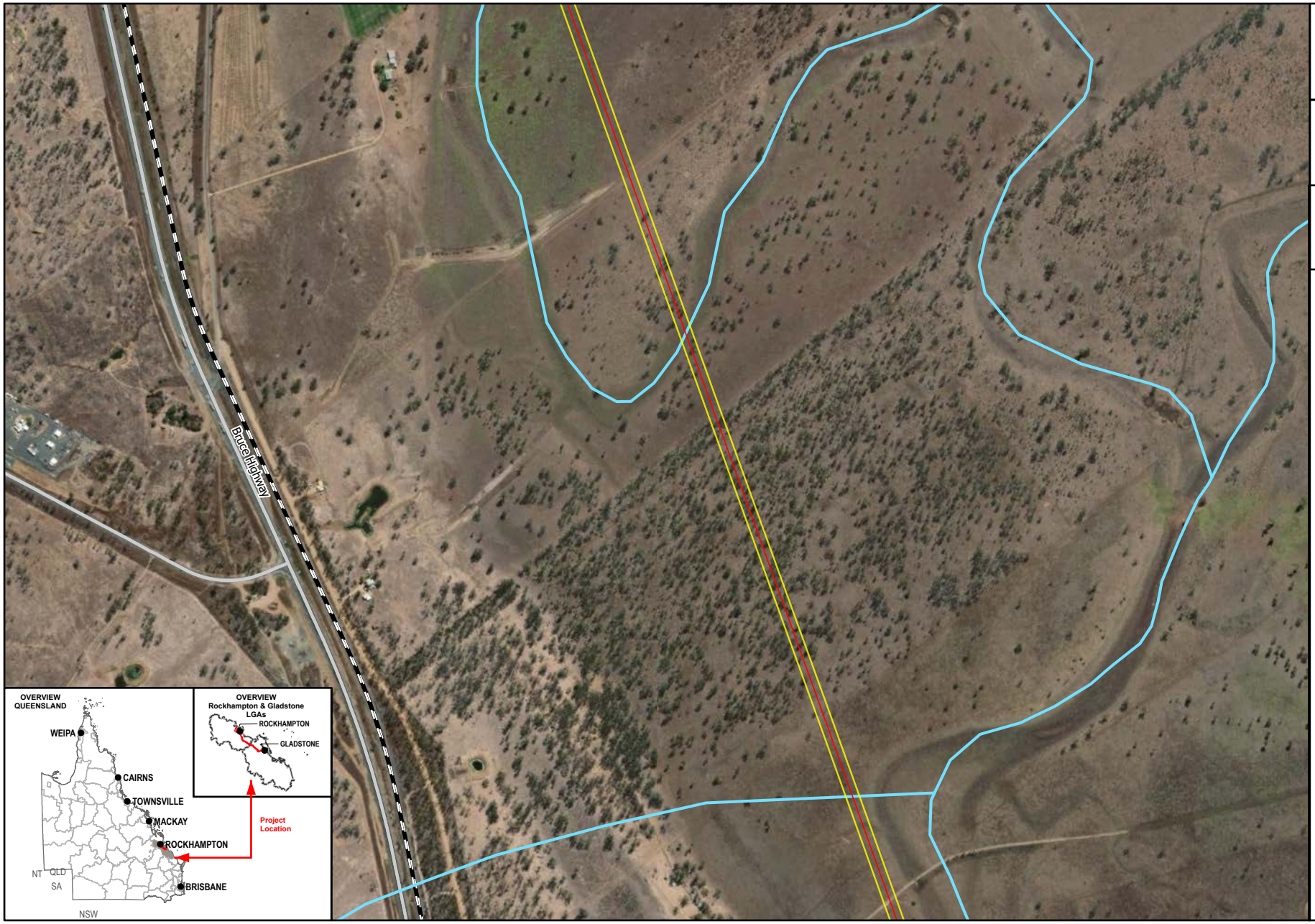

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Figure 7-20w
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

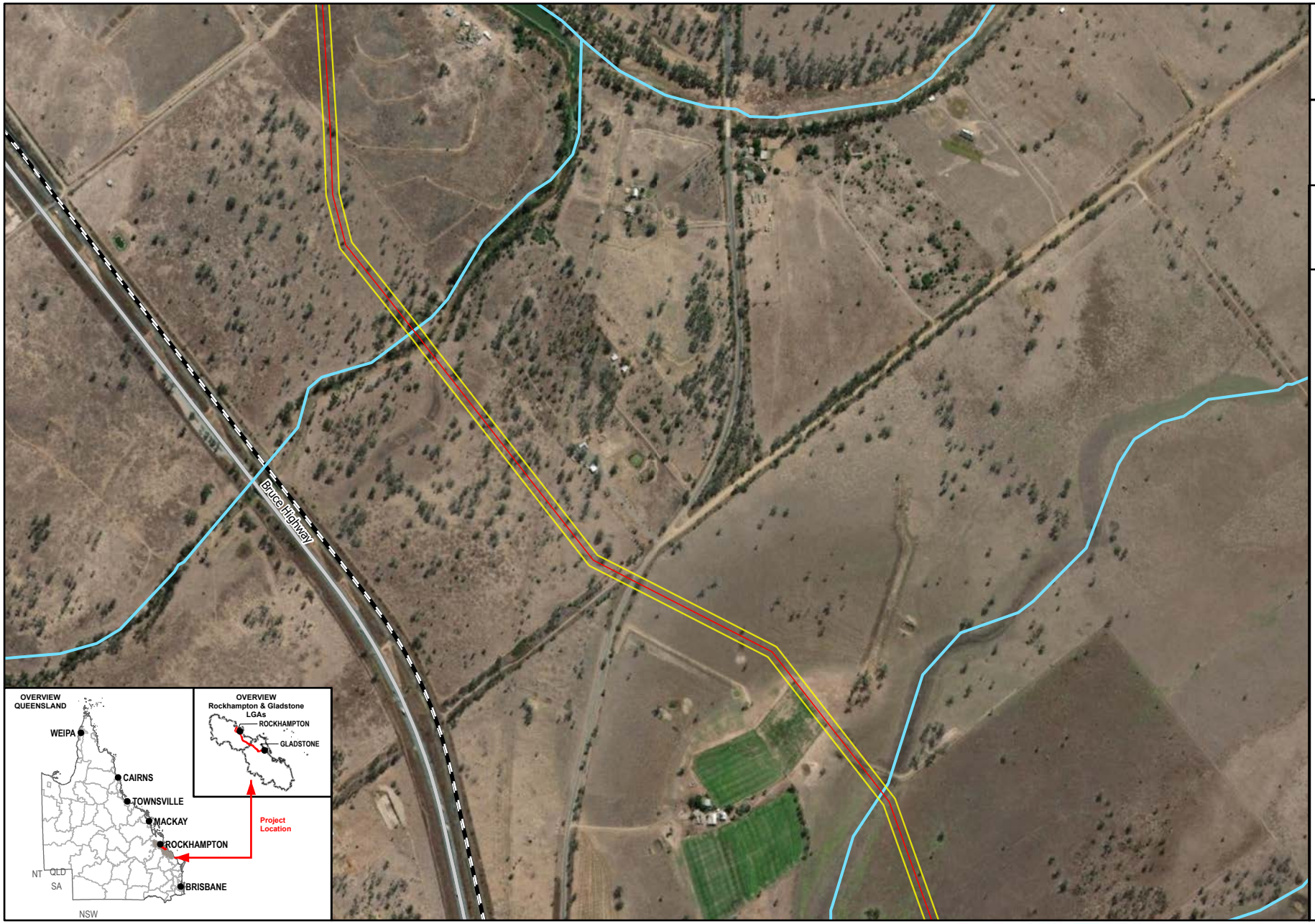

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Figure 7-20x
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

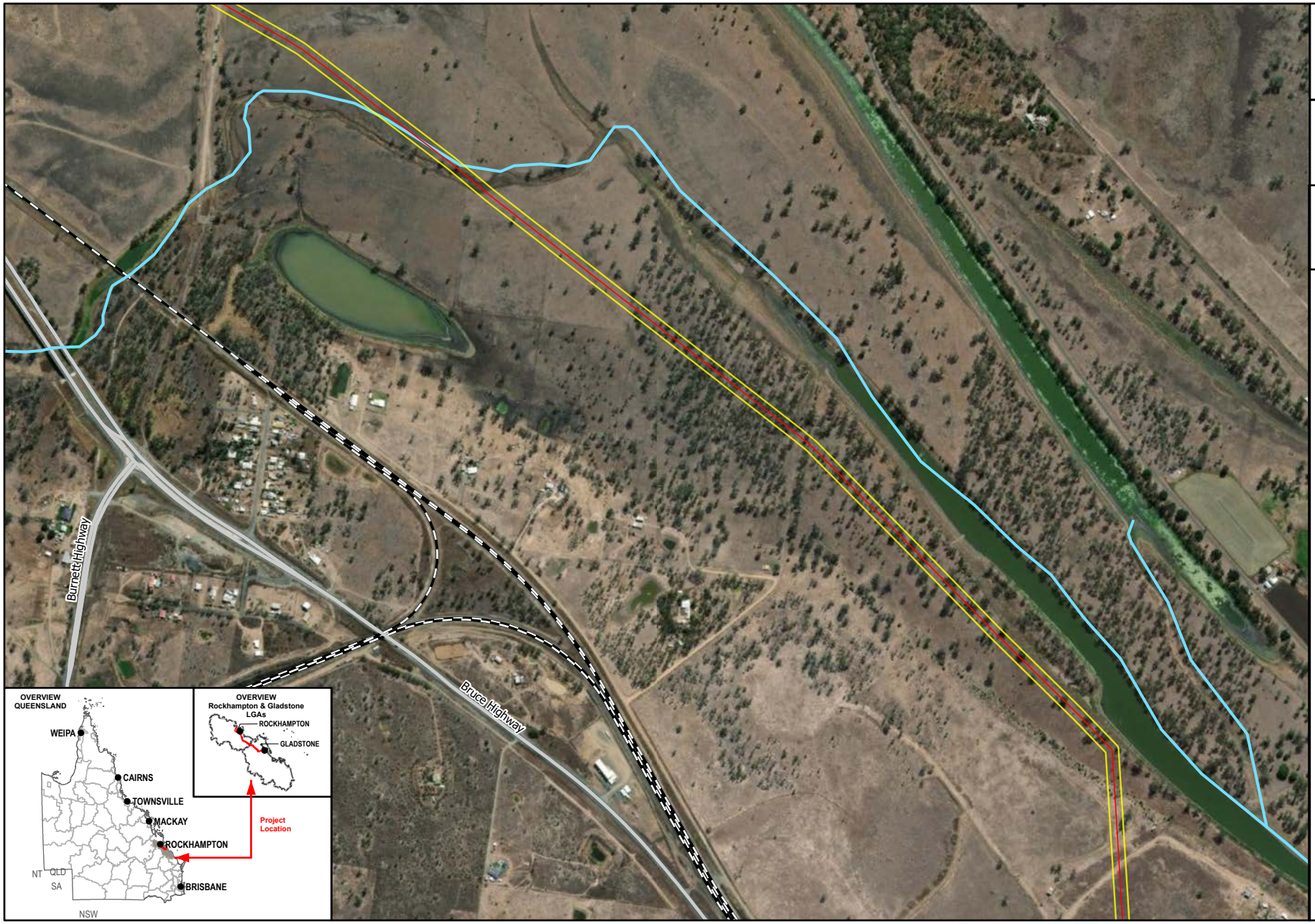

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Figure 7-20y
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

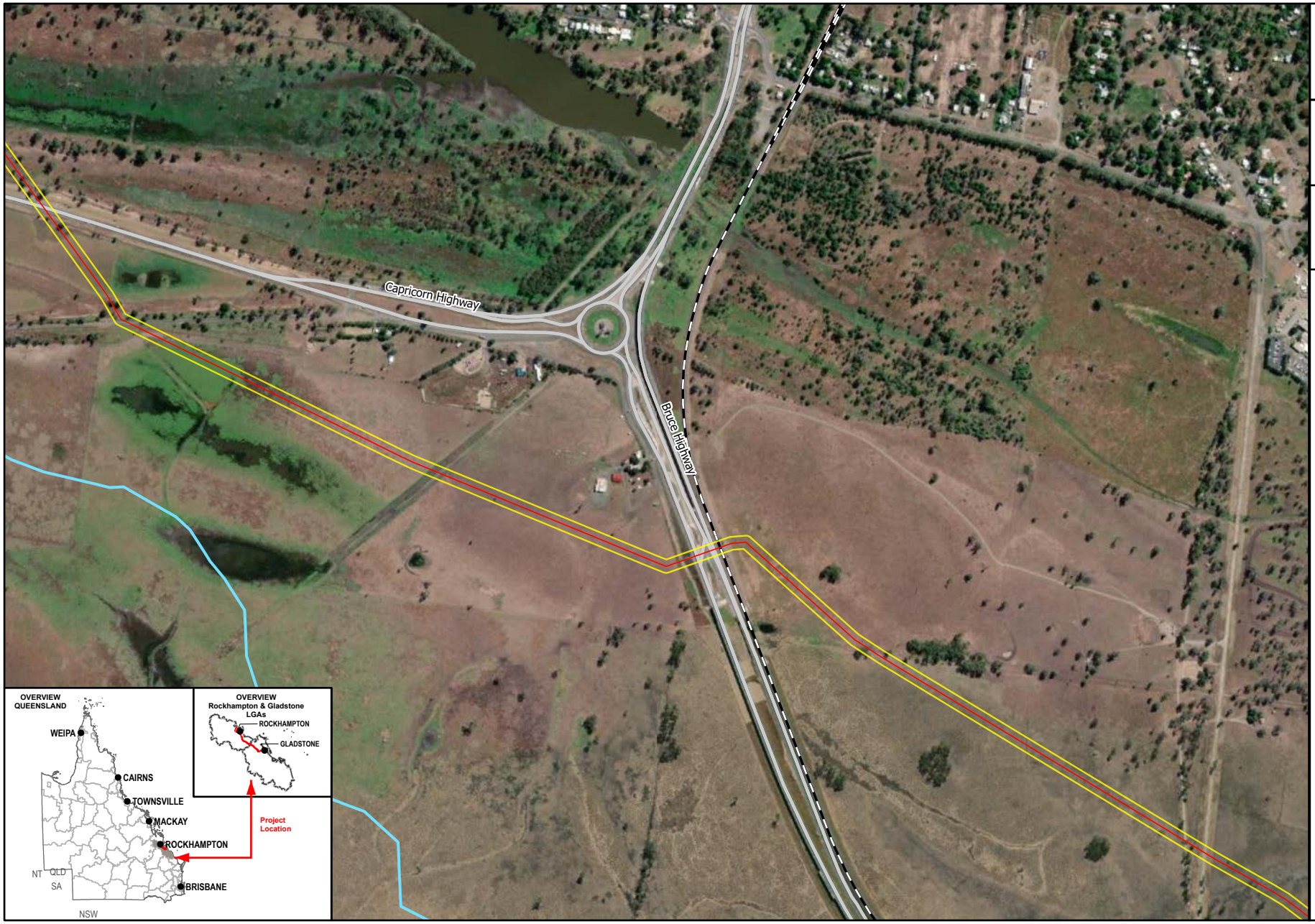

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Figure 7-20z
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
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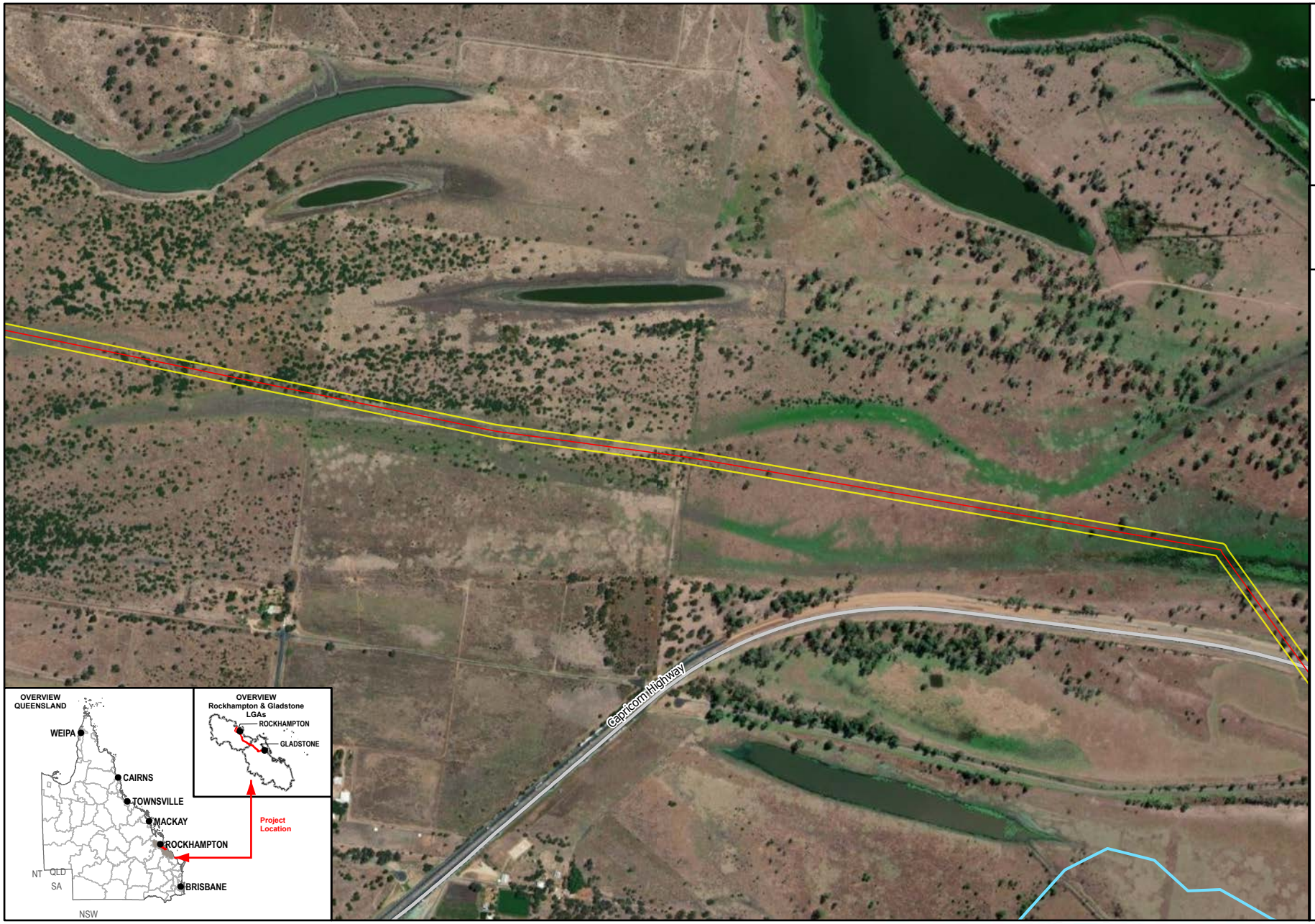

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Figure 7-20a1
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
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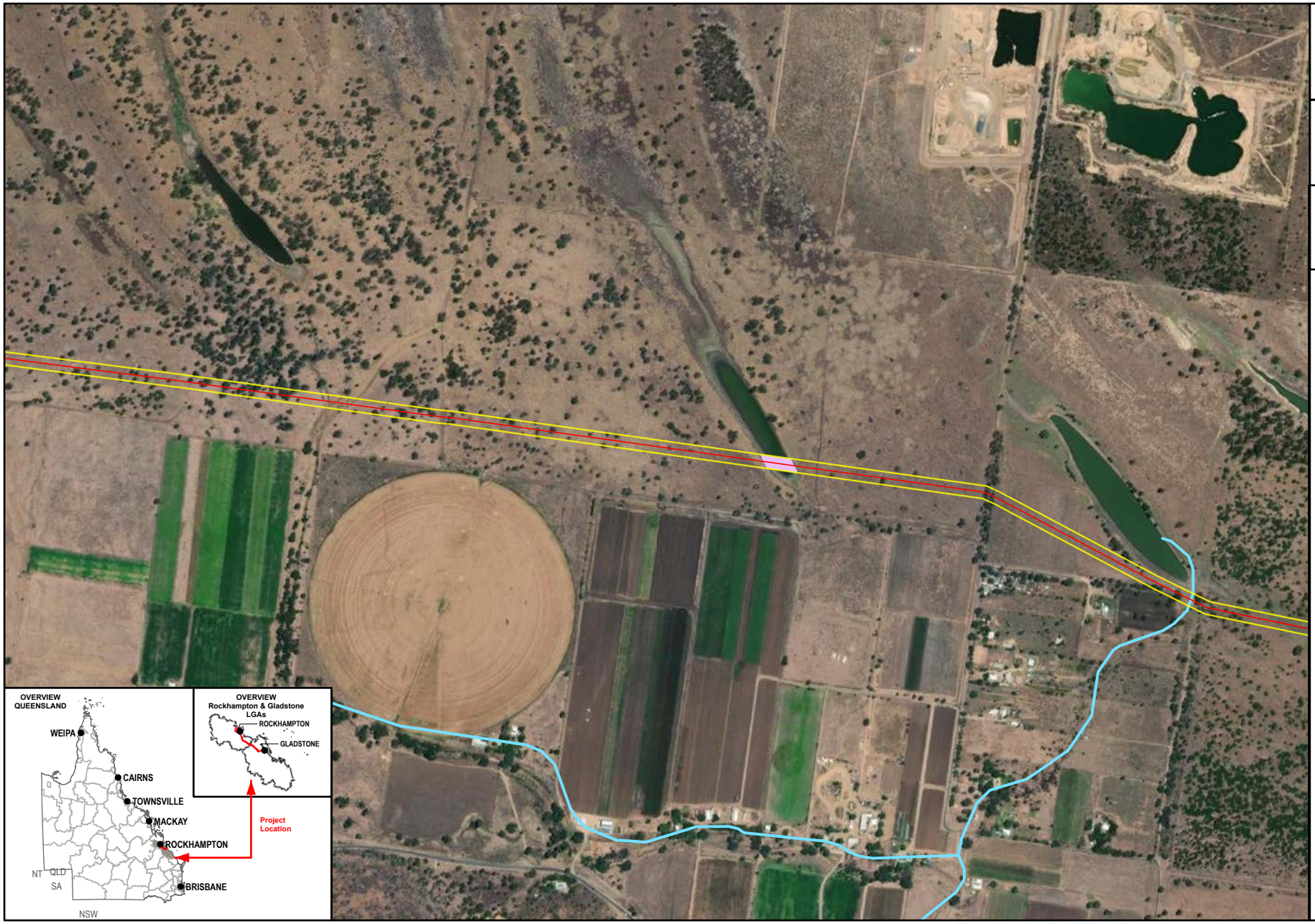

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- SGIC SDA Pipeline Alignment
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Data Sources:
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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-20b1
Distribution of Estuarine Crocodile Habitat Within the SGIC SDA Study Area
000-G-MAP-2441 Version:3 Date:20/09/2022

7.2.2.16 Platypus

Conservation status and species ecology

Platypi are found in eastern Australia from far north Queensland to Tasmania. In Queensland, the species inhabits rivers east of the Great Dividing Range, and some western-flowing streams (DES 2021a). Platypus habitat includes freshwater creeks, slow-moving rivers, lakes joined by rivers, and built water storages such as farm dams. Preferred habitat for the species is defined as areas that have steep, well vegetated banks (Grant and Temple-Smith 1998). Platypi occupy a wide range of aquatic habitats, are somewhat tolerant of degraded systems, and show notable adaptability (Grant and Temple-Smith 1998). Burrows are built in riverbanks, just above water level and often among a tangle of tree roots (DES 2021a).

Platypi mostly live alone but can share a water body with several other platypi. Platypi show fidelity to home ranges with daily foraging movements of several kilometres. Platypi eat small aquatic invertebrates such as insect larvae, freshwater shrimps, and crayfish. The species detects electrical currents in the water with its bill and this is used to find prey. Dawn and dusk are periods of increased activity (DES 2021a).

Field survey results and distribution of suitable habitat

The platypus is known to occur throughout upper, mid, and lower reaches of the Fitzroy River and throughout the basin. Large permanent freshwater pools, steep banks with overhanging vegetation, large woody debris and the presence of macrophytes provides suitable habitat and burrowing opportunities for platypi and is therefore likely to occur at Twelve Mile Creek (site 3), Bobs Creek (site 5) and Gavial Creek (site 6) (Figure 7-21). All other sites, the species is unlikely to occur due to a lack of available surface water and suitable habitat. During the survey at all locations, no individuals were observed, and no platypus burrows were detected.

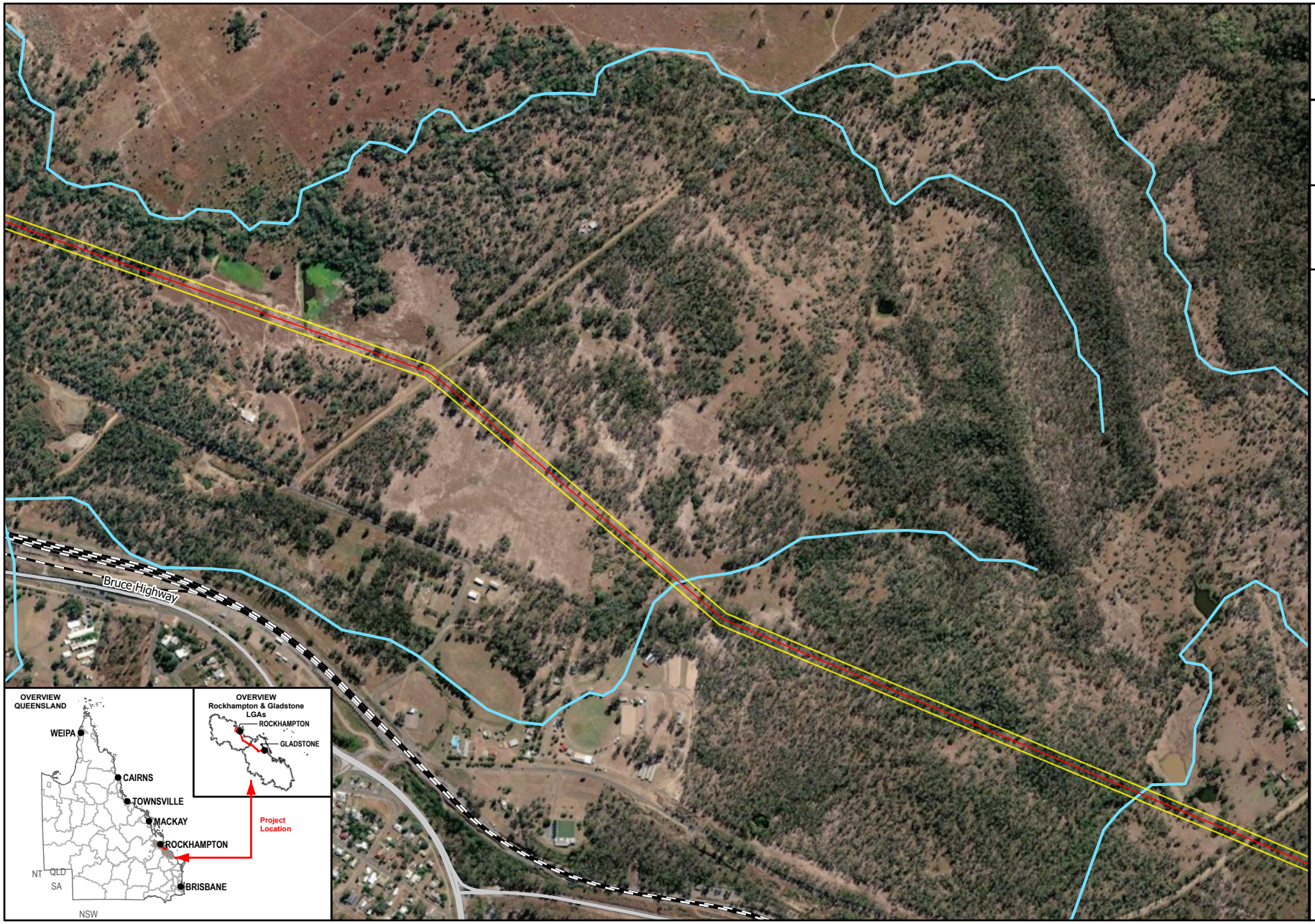
Significant Residual Impact Assessment

The project is unlikely to have a significant residual impact on the platypus due to the temporary nature of the works and implementation of avoidance measures for any identified breeding places. A significance of impact assessment on the platypus (special least concern NC Act) for the SGIC SDA section of the project is provided in Table 7-34 in accordance with the Queensland Government's significant residual impact guidelines (DEHP 2014b).

Table 7-34 Significance of Impact on the platypus

Significant residual impact criteria	Assessment
Lead to a long-term decrease in the size of a local population	**Unlikely** The platypus is known to occur throughout the Fitzroy River Catchment (ALA 2022), Sites 3, 5 and 6 provide foraging and potential burrowing habitat and are considered likely to occur at these locations. Works at sites 3, 5 and 6 will include trench and trenchless methods (trenchless methods are the preferred methods). Where trench methods are used, a maximum 30m corridor for the SGIC SDA pipeline alignment will be cleared for the trench. Construction works are to be limited to 180 days (DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)) with the impact area for all sites rehabilitated with bed and banks restored to pre-works profile. Temporary restricted platypus movement is expected during this construction phase. Design and implementation of a CEMP will further minimise risk to platypus and achieve protection of habitat. The impact area for all sites will be rehabilitated to minimise effects to localised disturbance of habitat degradation, no direct impacts to individuals upon a known population of platypus within the Fitzroy River catchment will occur. It is therefore unlikely to lead to a long-term decrease in the size of a local population.

Significant residual impact criteria	Assessment
Reduce the extent of occurrence of the species	**Unlikely** The platypus is known to occur throughout the Fitzroy River Catchment (ALA 2022), Sites 3, 5 and 6 provide foraging and potential burrowing habitat and are considered likely to occur at these locations. Works at sites 3, 5 and 6 include trench and trenchless methods (trenchless methods are the preferred methods). Where trenching is necessary, a coffer dam or similar structure is proposed to be installed around the pipeline alignment of the creek crossing alignment works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Design and implementation of a CEMP will further minimise risk to platypus and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. These measures ensure that it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragmentation an existing population	**Unlikely** The works will be restricted temporally to a small, localised area, with measures in place to ensure fragmentation of the species population does not occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The project is unlikely to fragment the species population and therefore is not considered to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** The introduced feral cat and European fox are identified as threats to the platypus. Considering these species are already locally established, the project is unlikely to introduce additional invasive fauna or facilitate the spread of these species. The risk of invasive fauna species will be controlled through implementation of a Feral Animal Control Program during construction and operations.
Introduce disease that may cause the population to decline	**Unlikely** There are few significant diseases known from wild platypus populations. A small number of platypi suffer from a murcomosis a fungal disease found in Tasmania however there have been no individuals recorded with the disease on mainland Australia. There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that the project will have the potential to introduce disease to the extent that the platypus population will decline.
Interfere with the recovery of the species	**Unlikely** Degradation of habitat will be localised and temporary. Cleared suitable habitat during the construction phase is expected to re-establish along the SGIC SDA pipeline alignment. No direct impact to the recovery of the species will occur as a result of the project.
Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	**Unlikely** Loss of instream vegetation, cobbles and woody debris for foraging and nesting banks within the 30 m corridor will occur for any trench methods used for sites 3, 5 and 6. Suitable habitat is expected to re-establish along the SGIC SDA pipeline alignment. The operation phase of the project is not expected to have any further impacts to breeding, feeding, nesting or migration of the platypus.
Conclusion	The operation phase of the project is not expected to have any significant residual impact for the species. Due to the temporary nature of the construction works and implementation of avoidance measures for any identified breeding or nesting places, the project is unlikely to have a significant impact on the platypus.



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

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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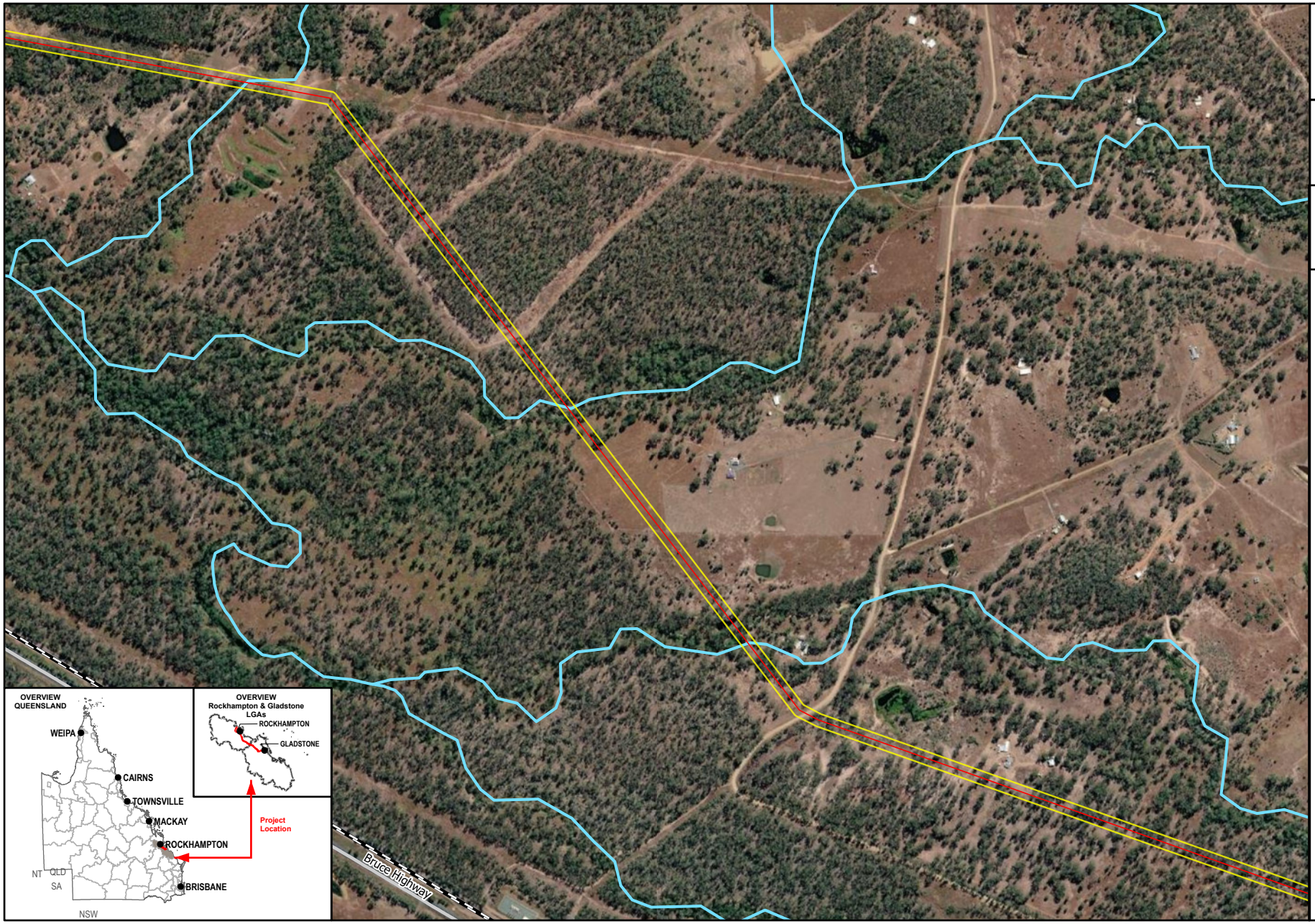
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21a
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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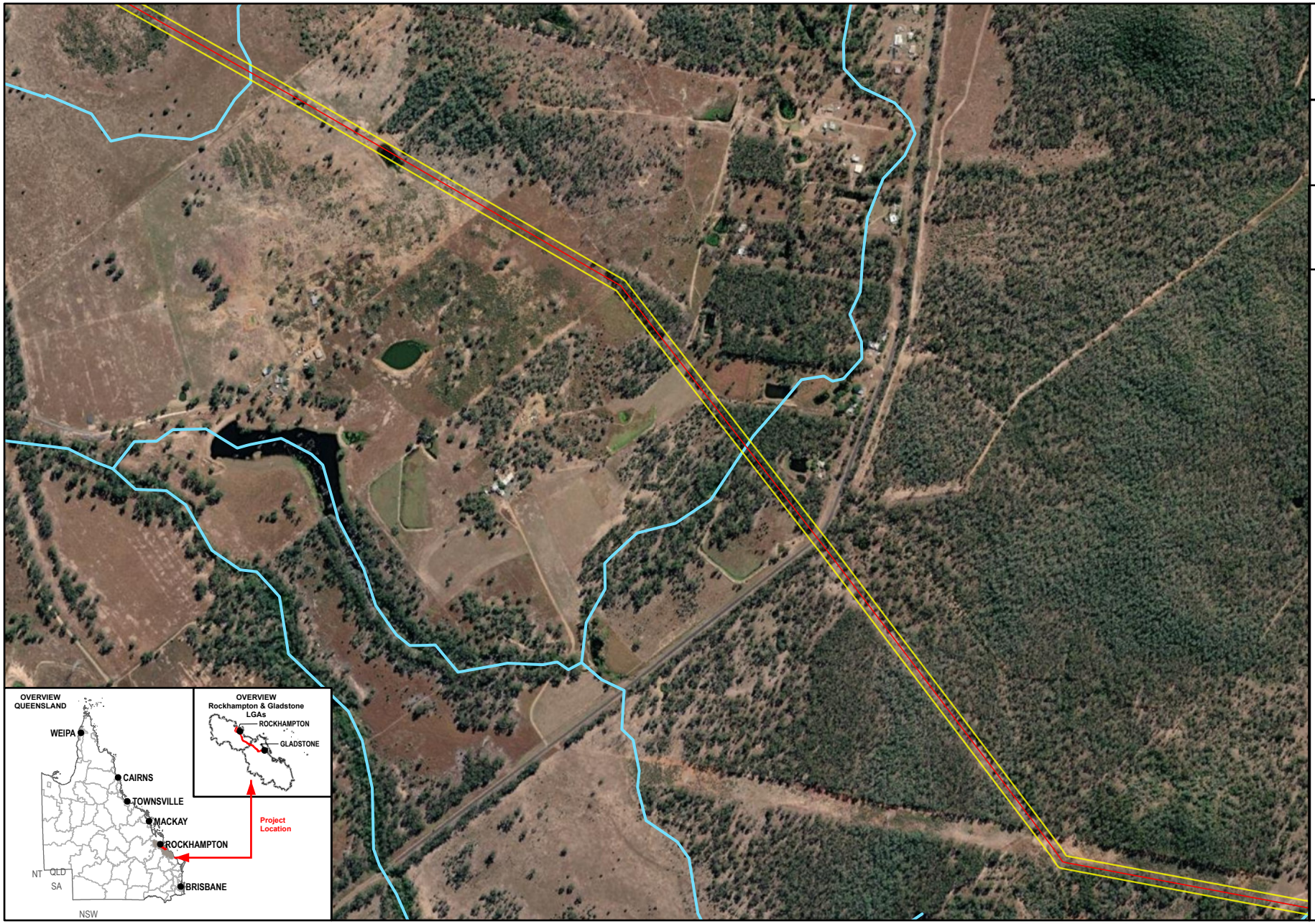
Figure 7-21b
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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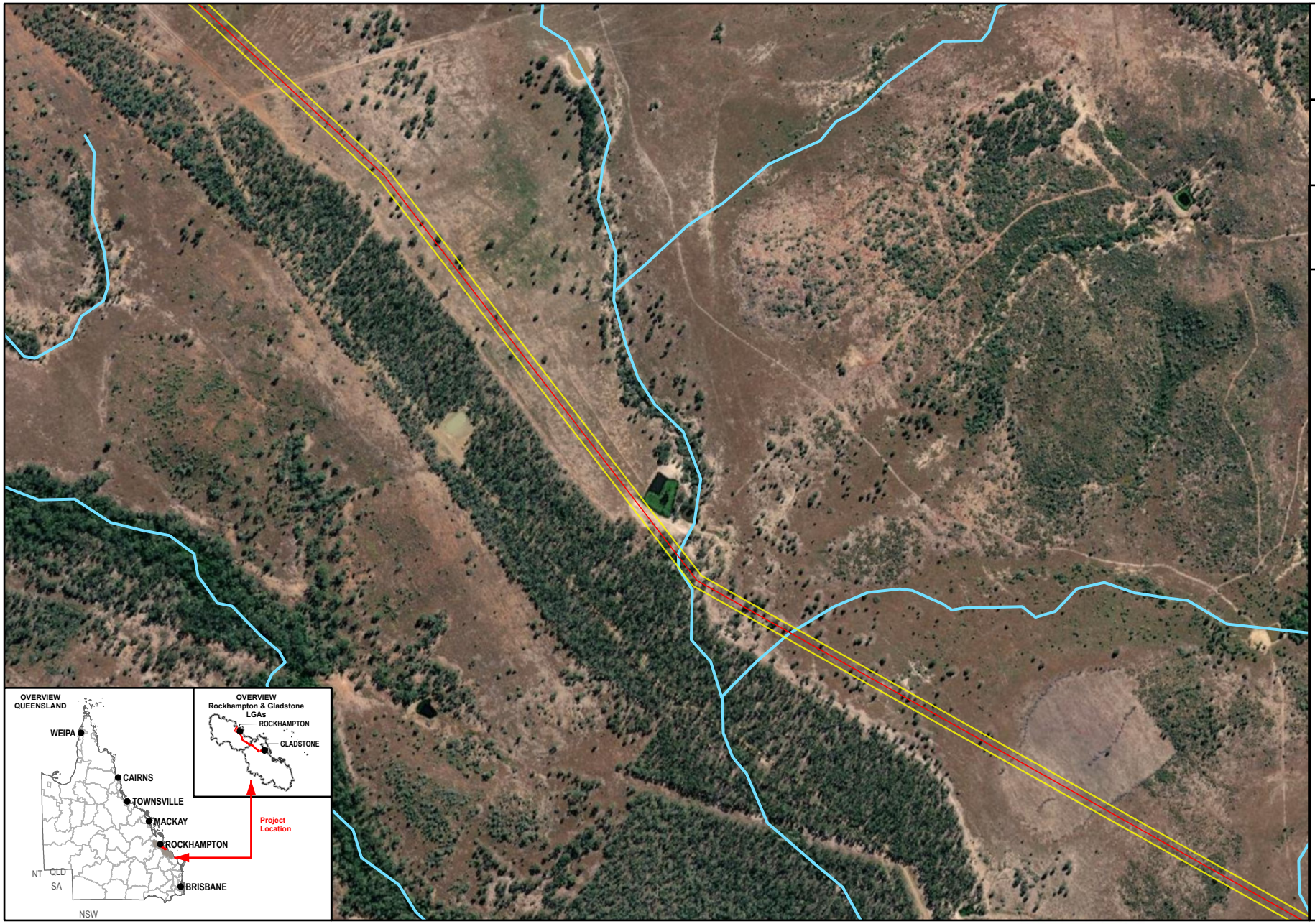
Figure 7-21c
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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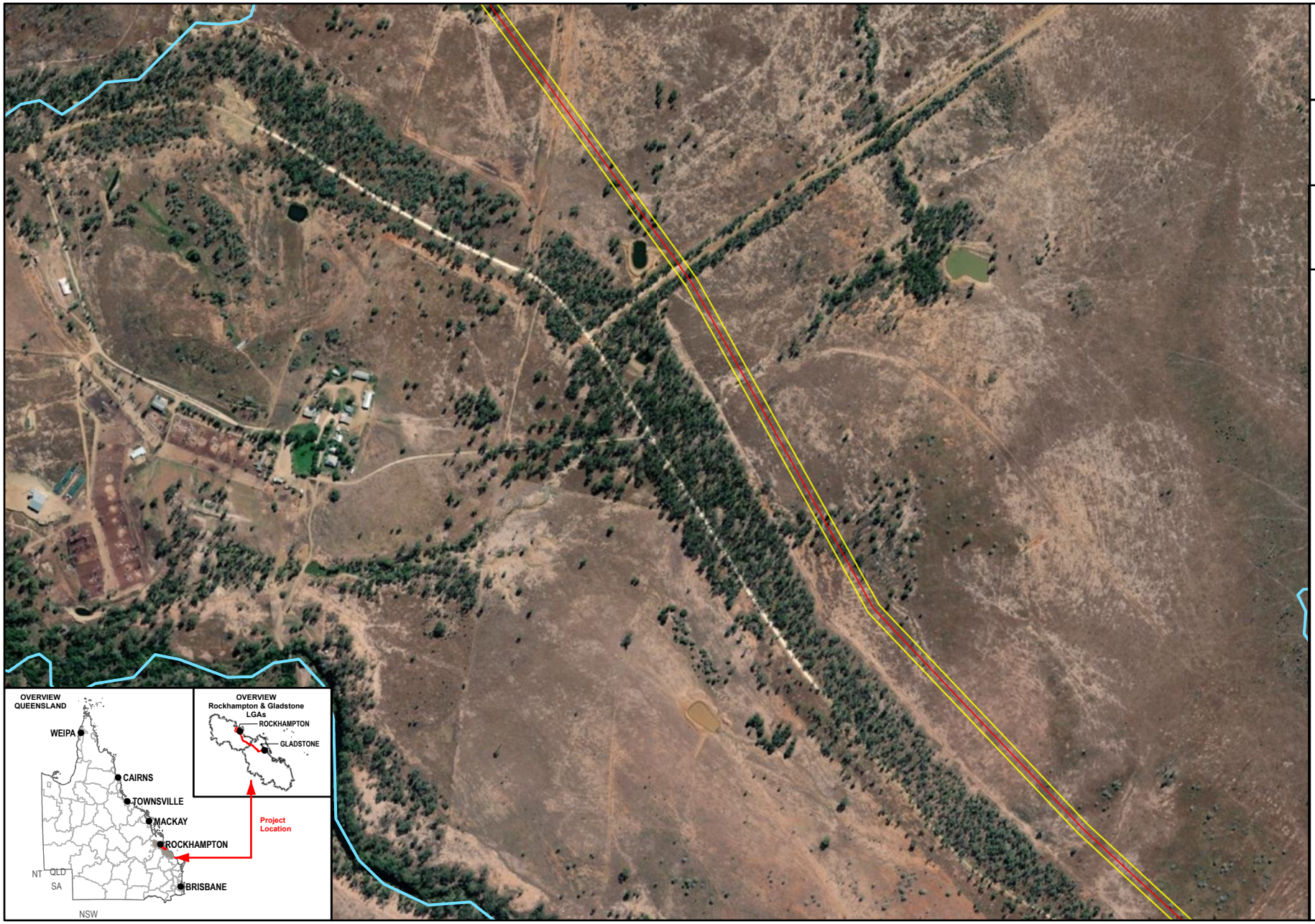
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21d
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21e
Distribution of Platypus Habitat Within the SGIC SDA Study Area
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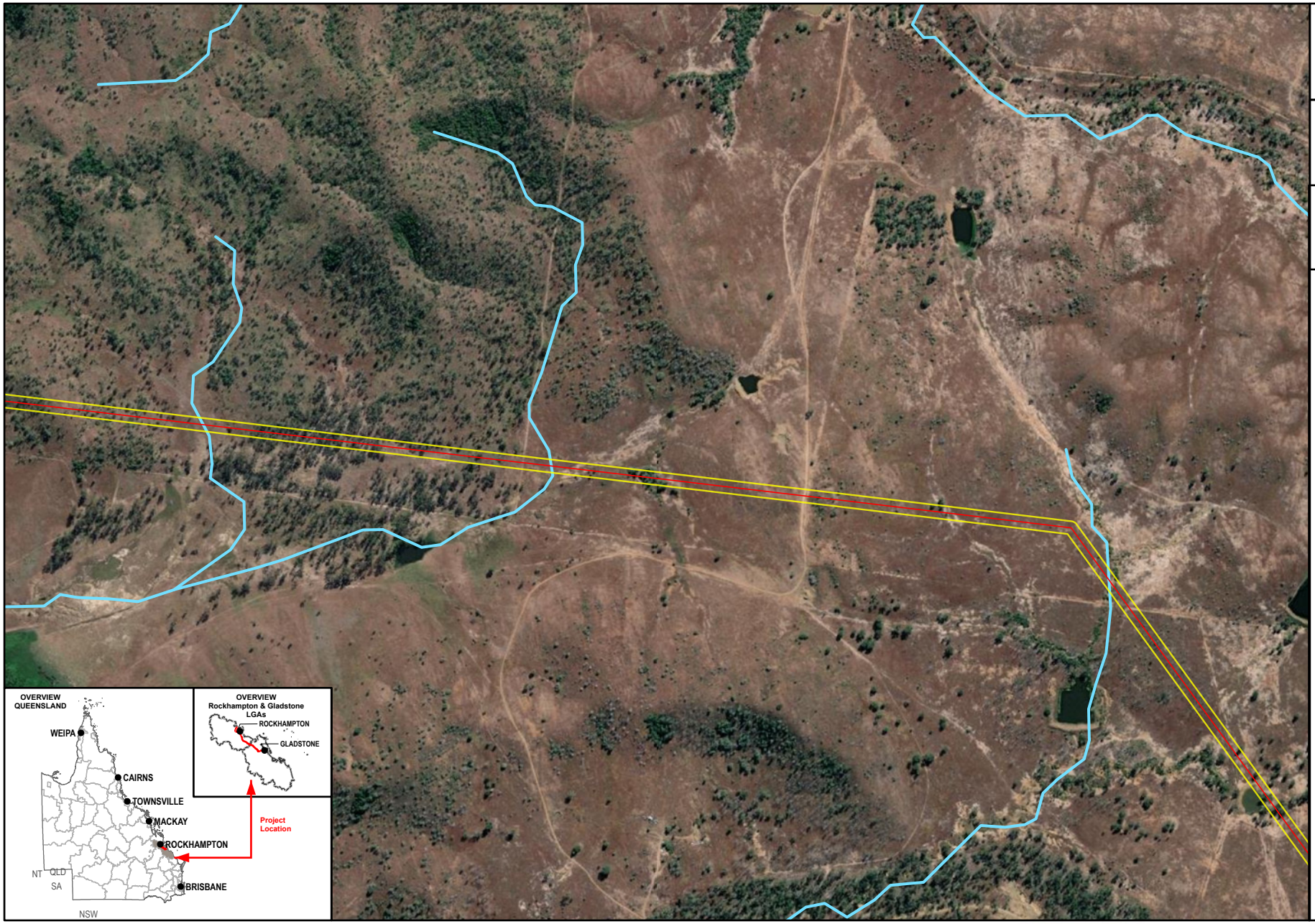

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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways

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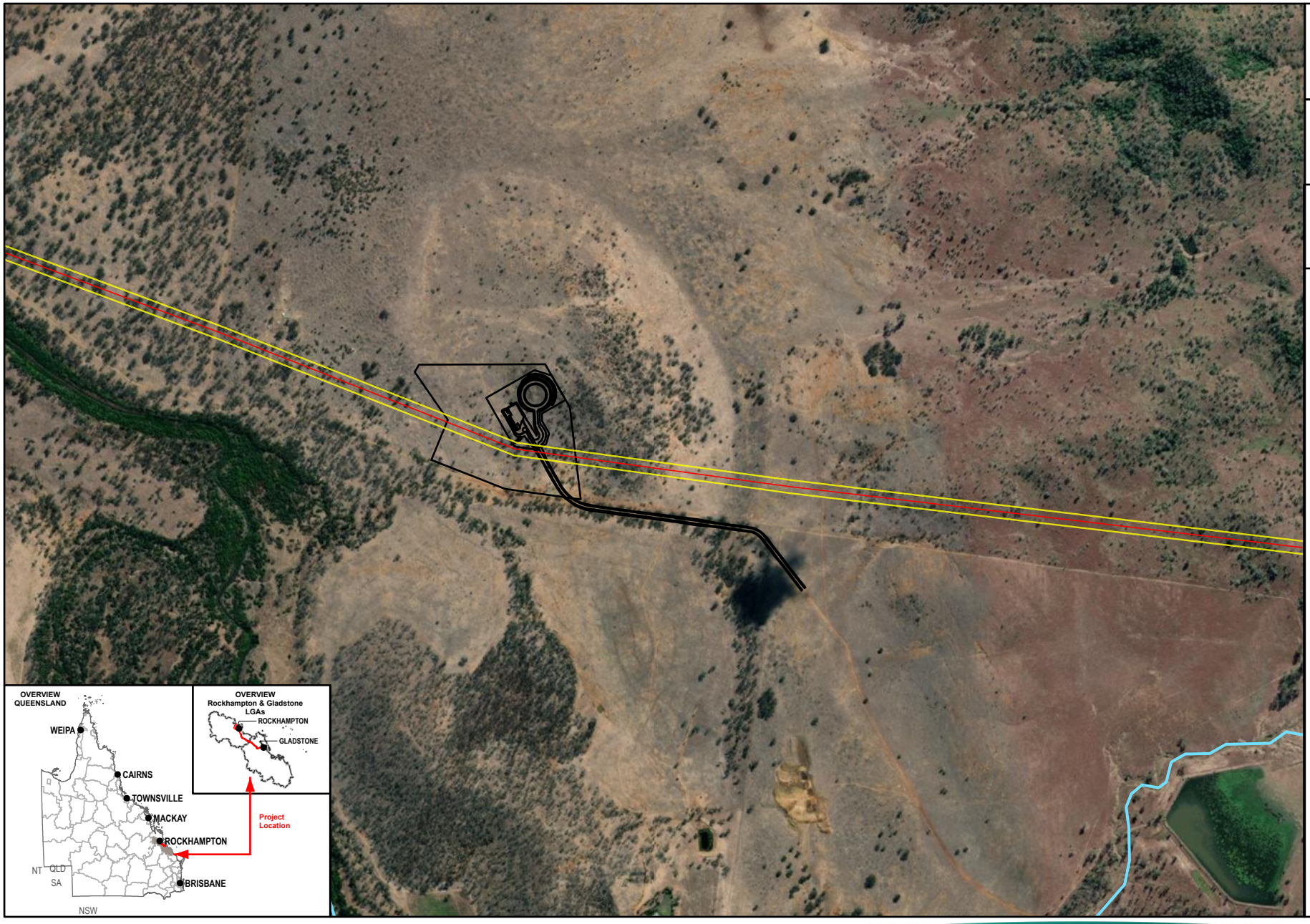
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21f
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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

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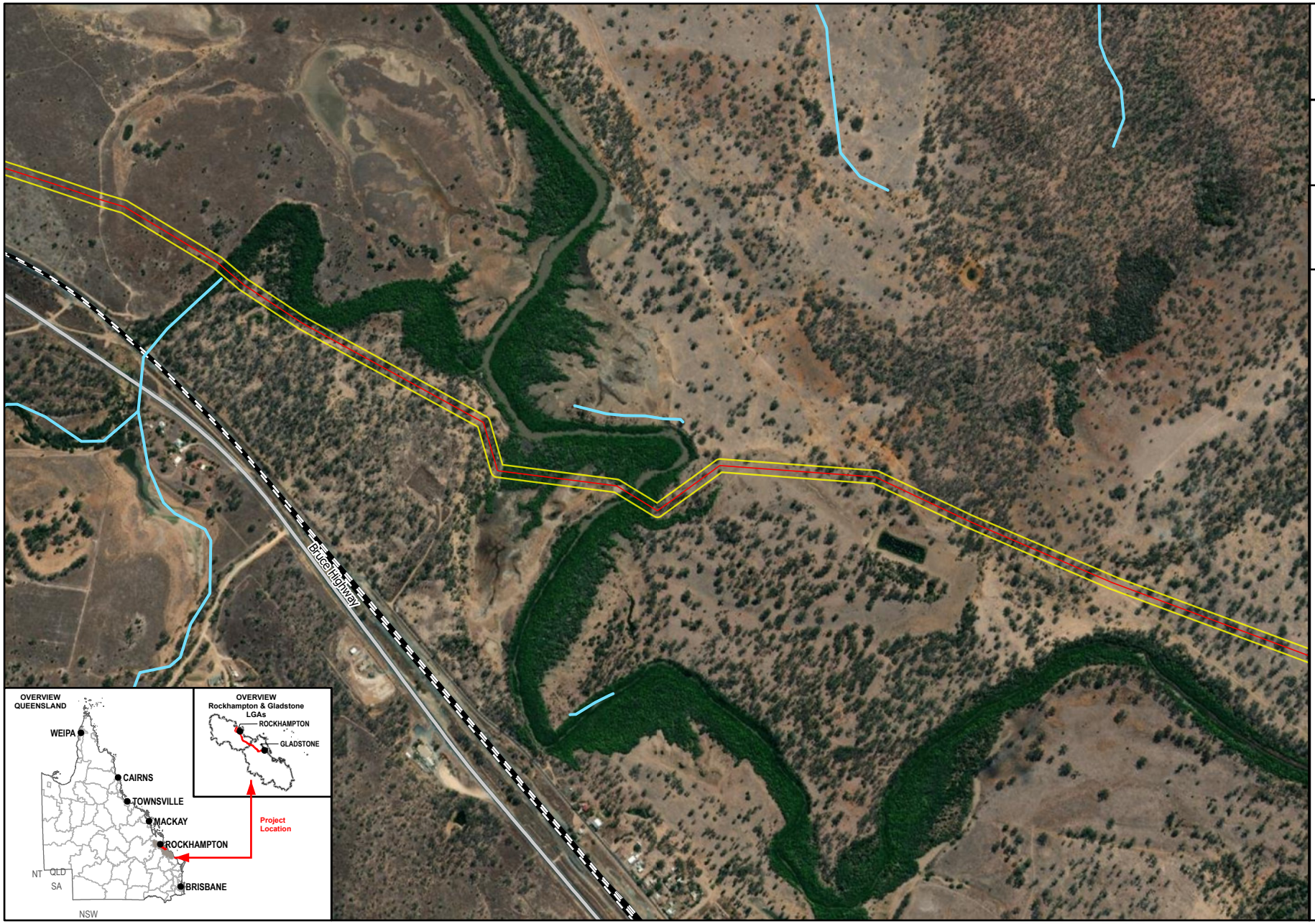
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21g
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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

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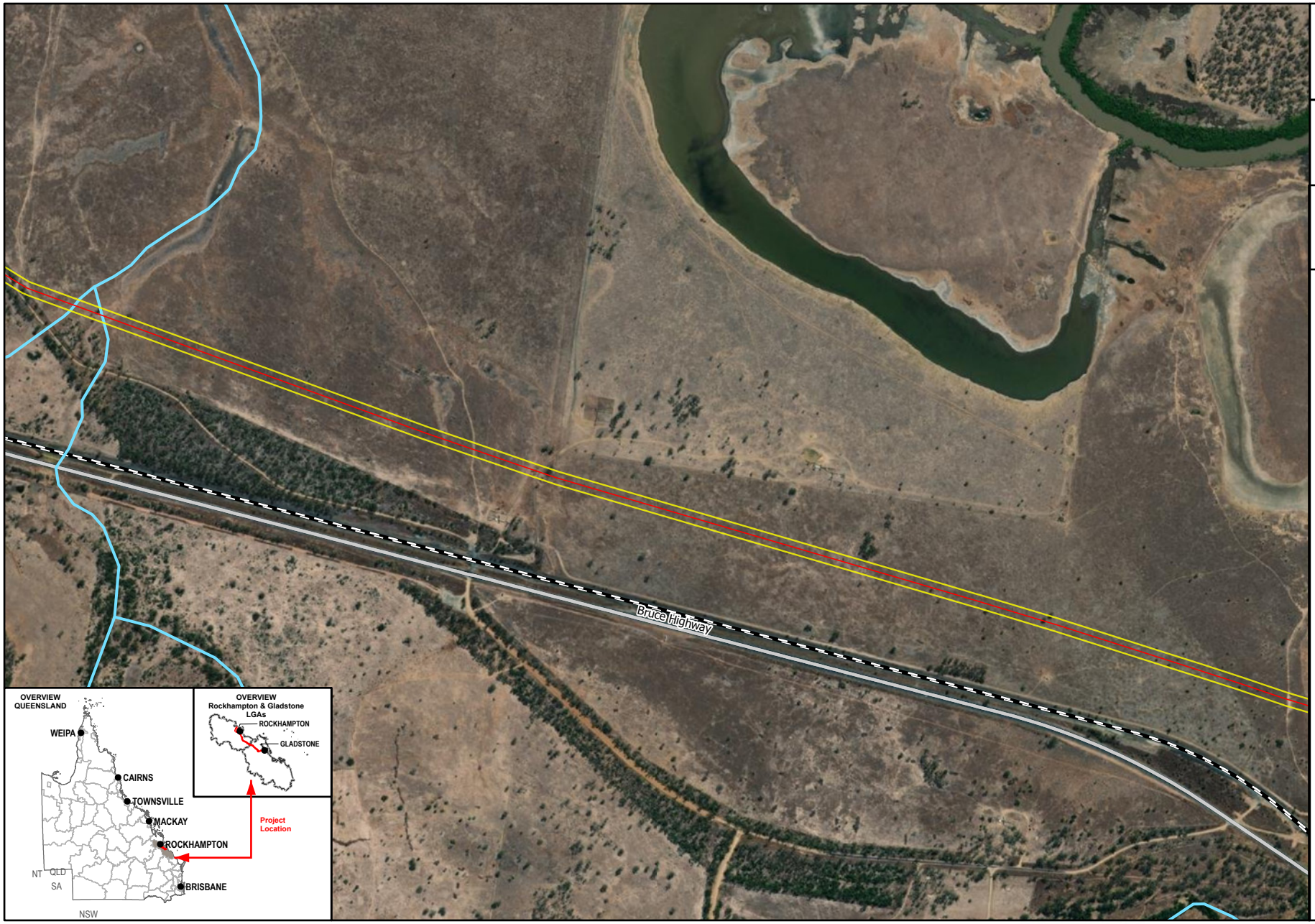
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21h
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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

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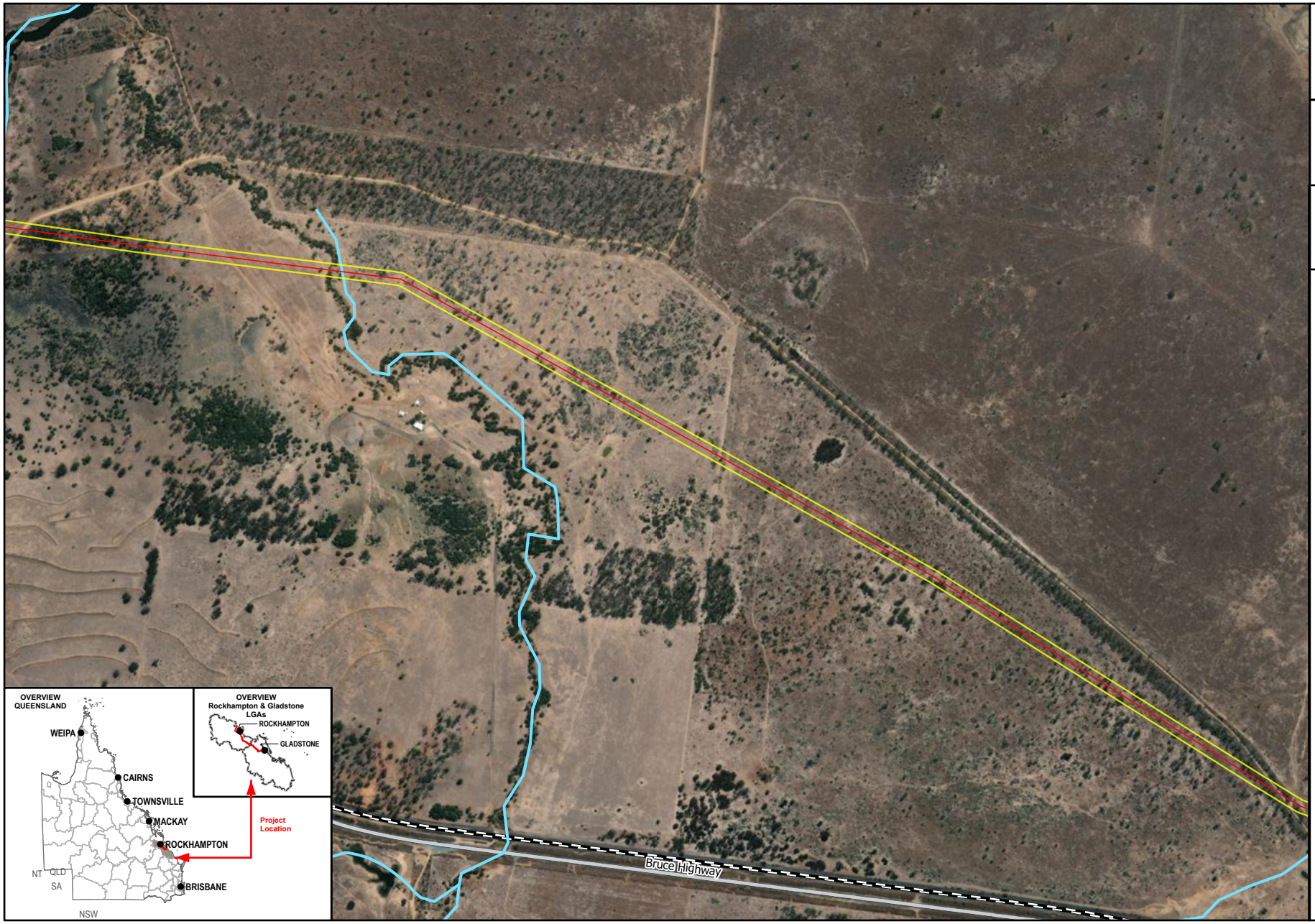
Figure 7-21i
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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Legend

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

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Fitzroy to Gladstone Pipeline
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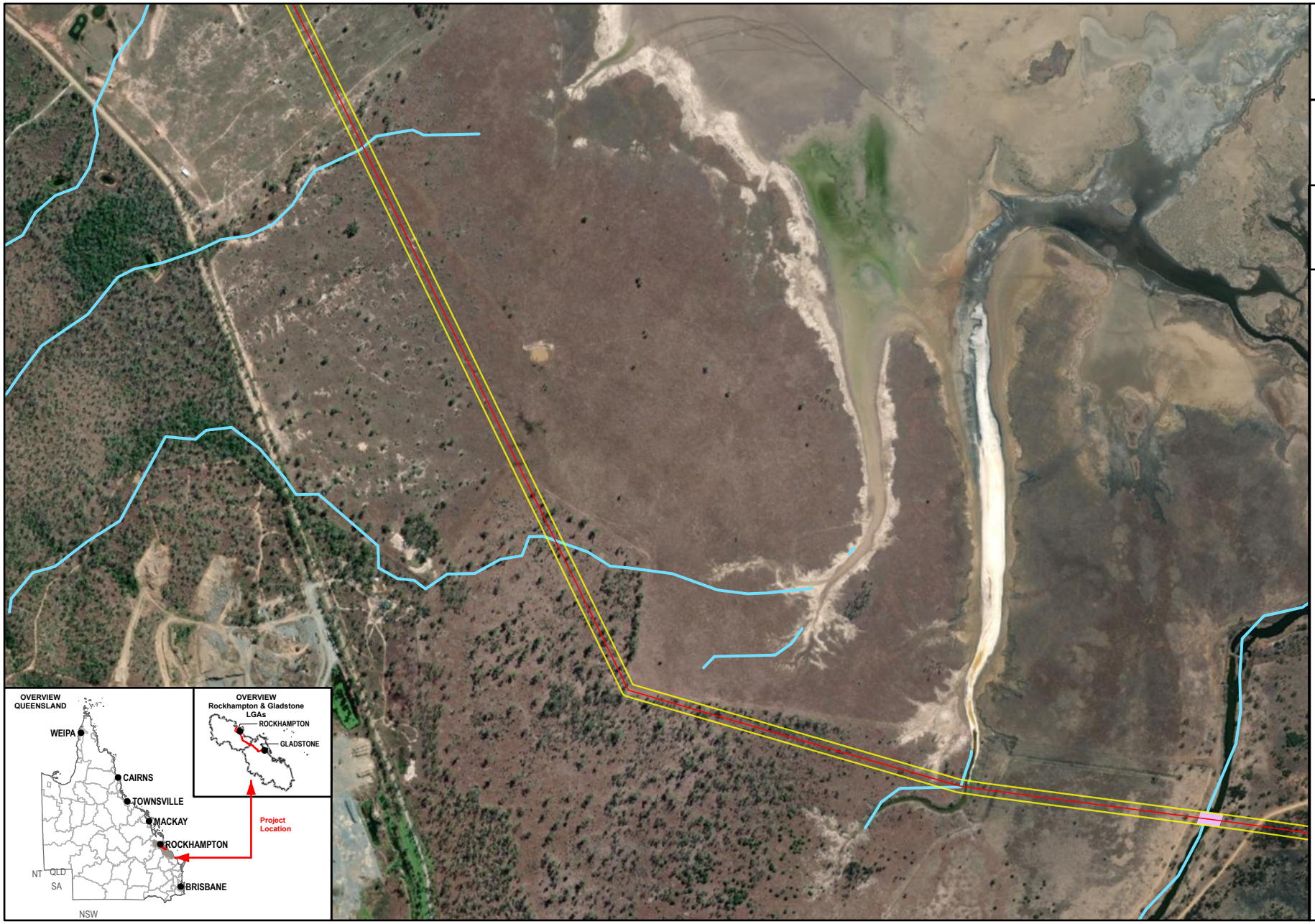
Figure 7-21j
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Platypus Habitat
- Waterways

Data Sources:
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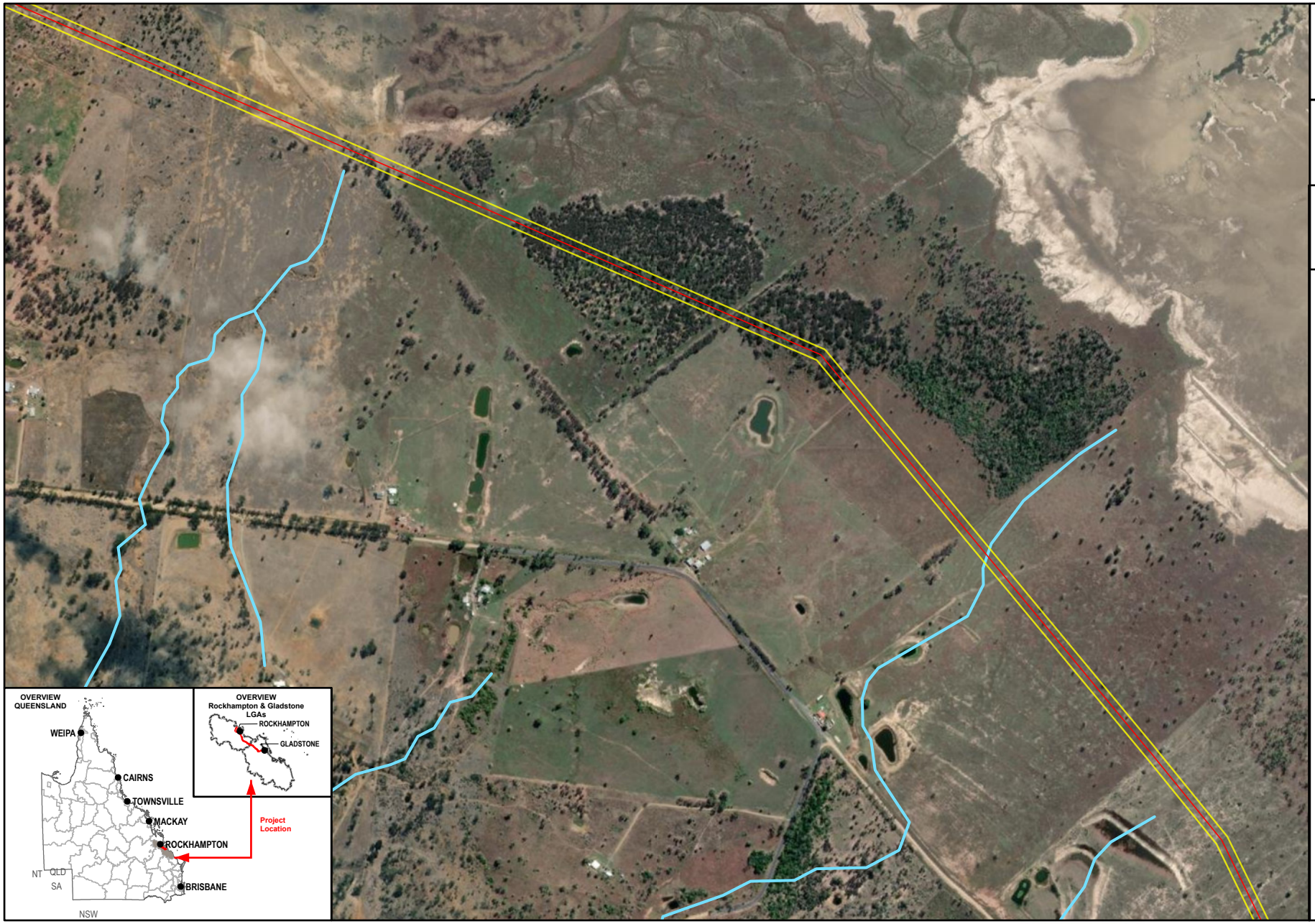
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21k
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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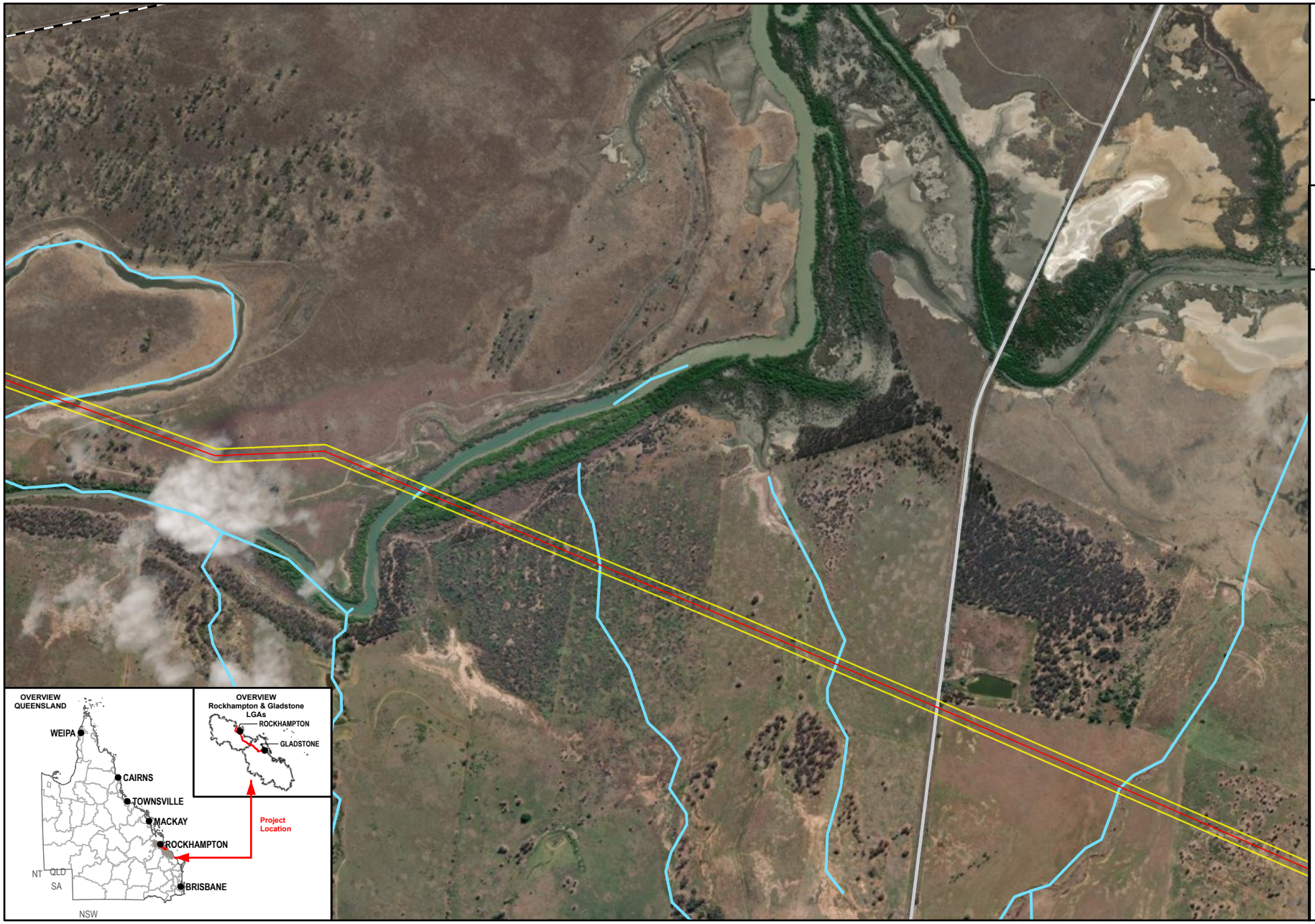
Figure 7-21l
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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Legend

- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- 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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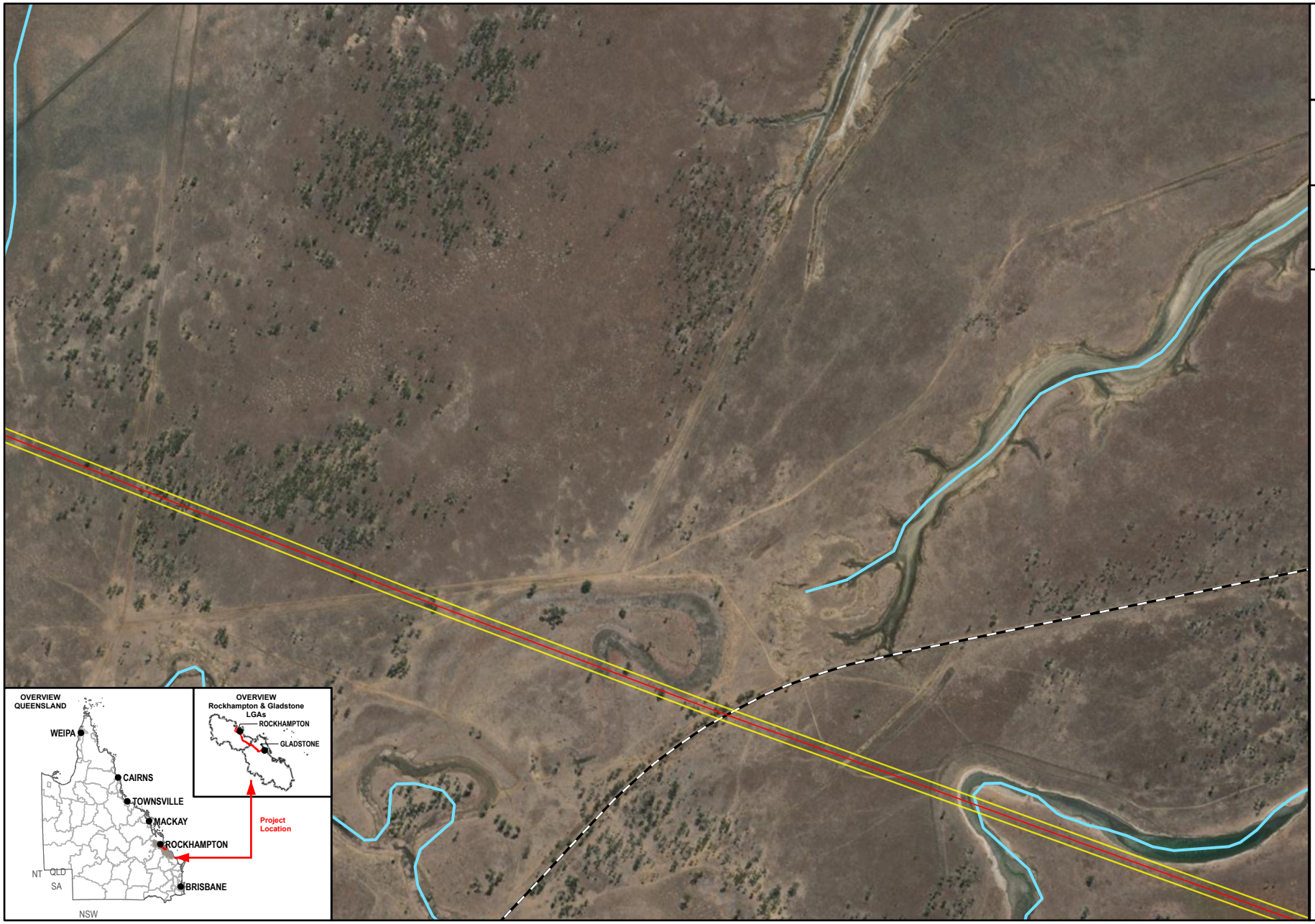
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21m
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21n
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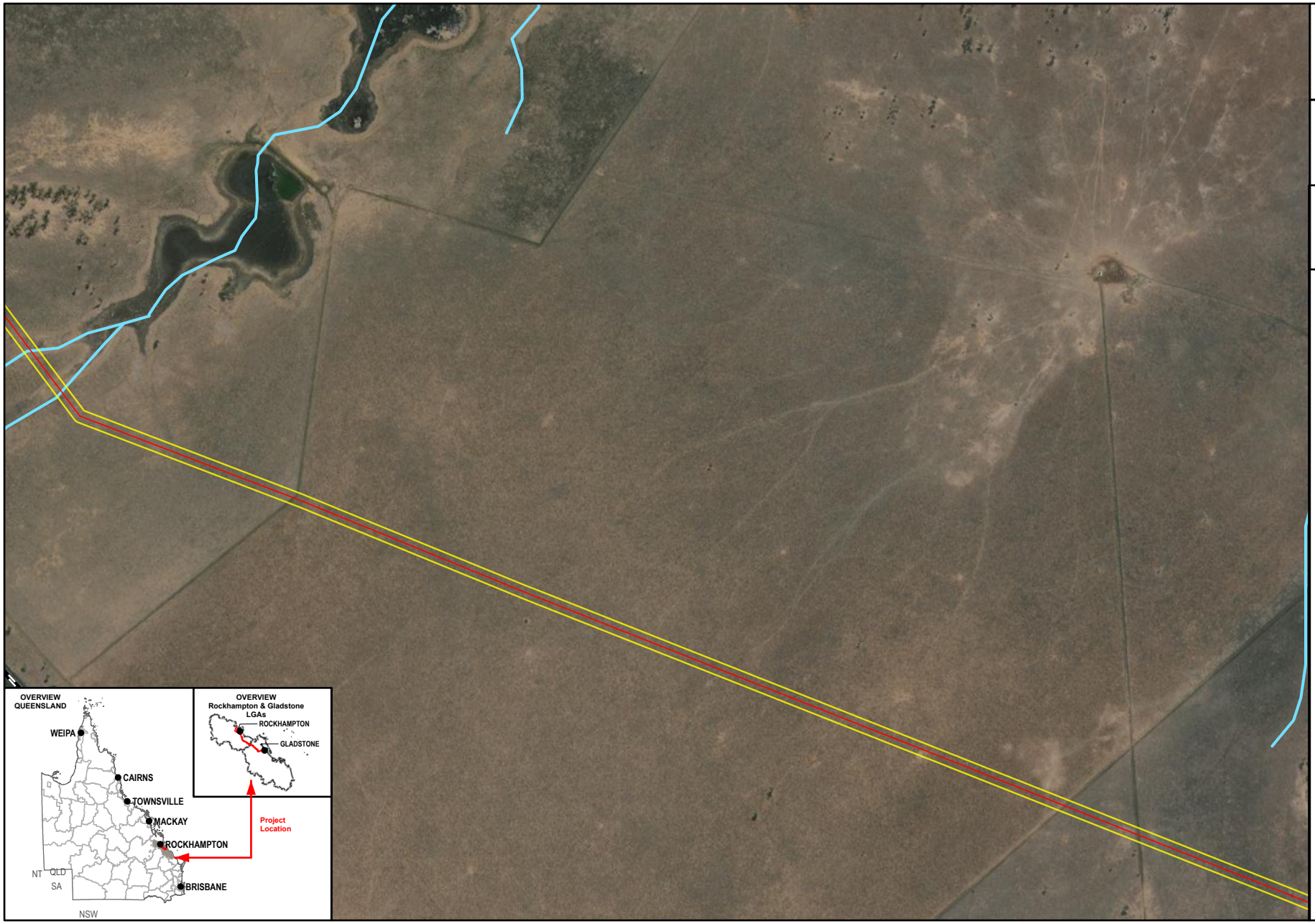
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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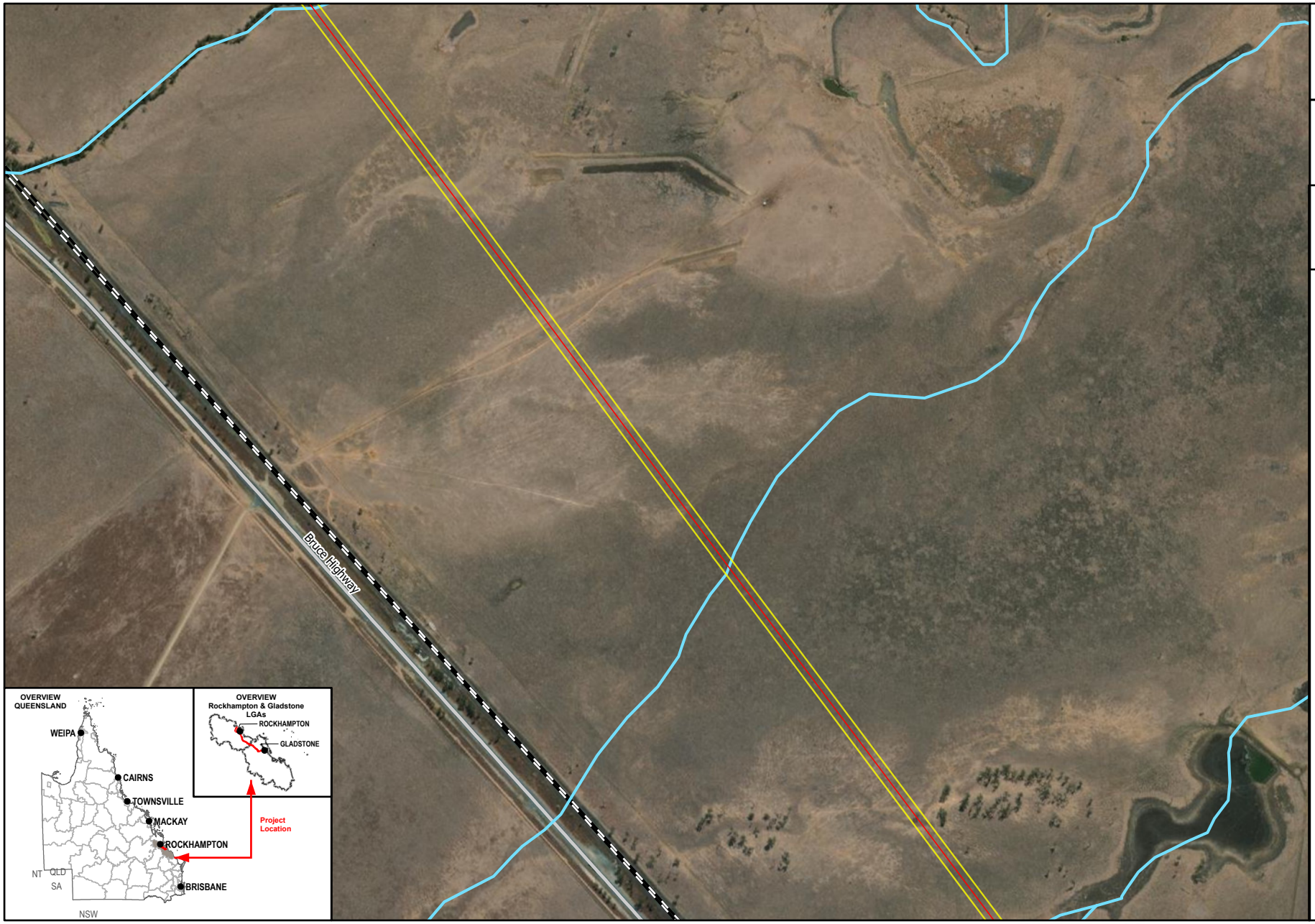
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21o
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
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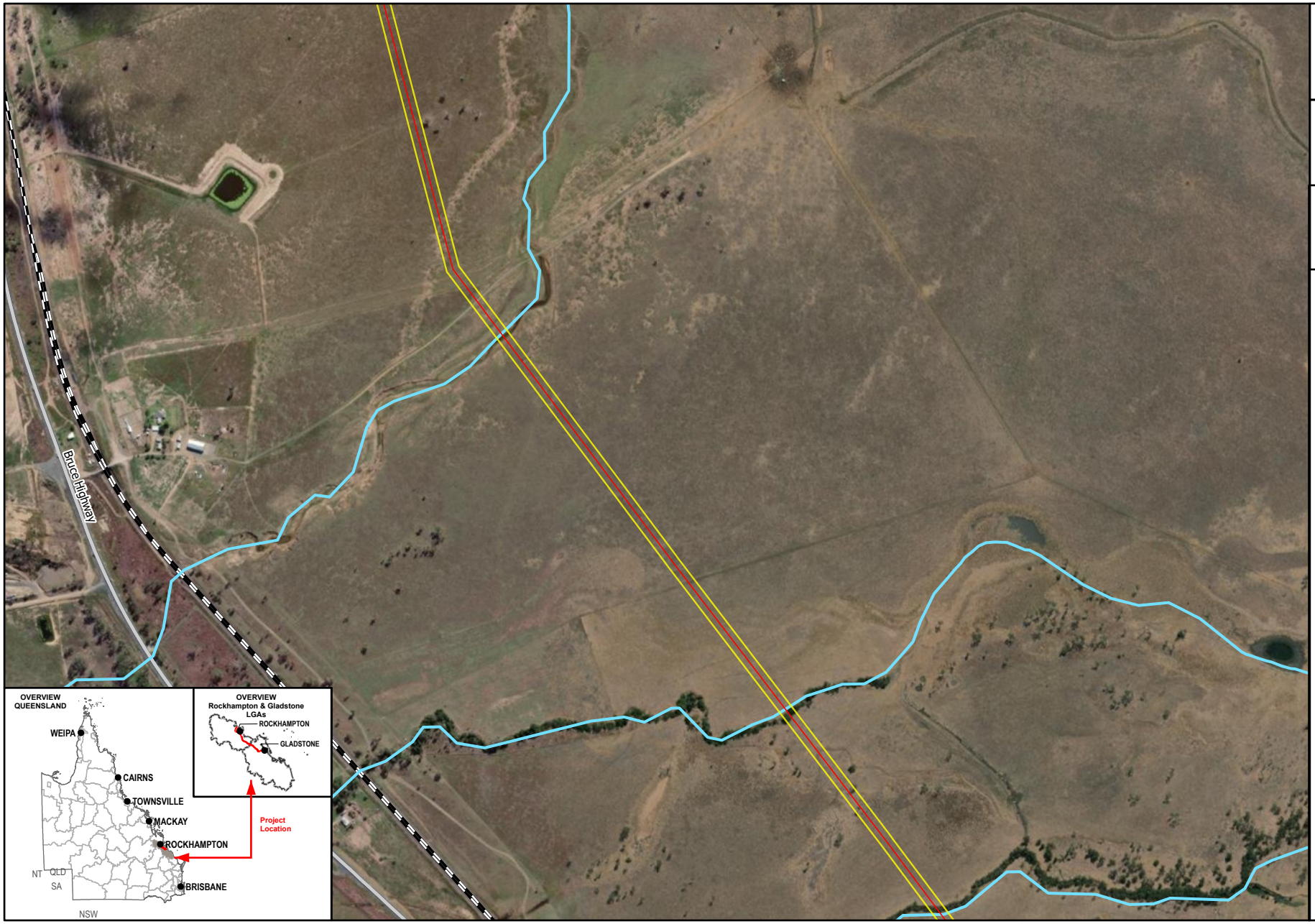
Figure 7-21p
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
- Main Roads
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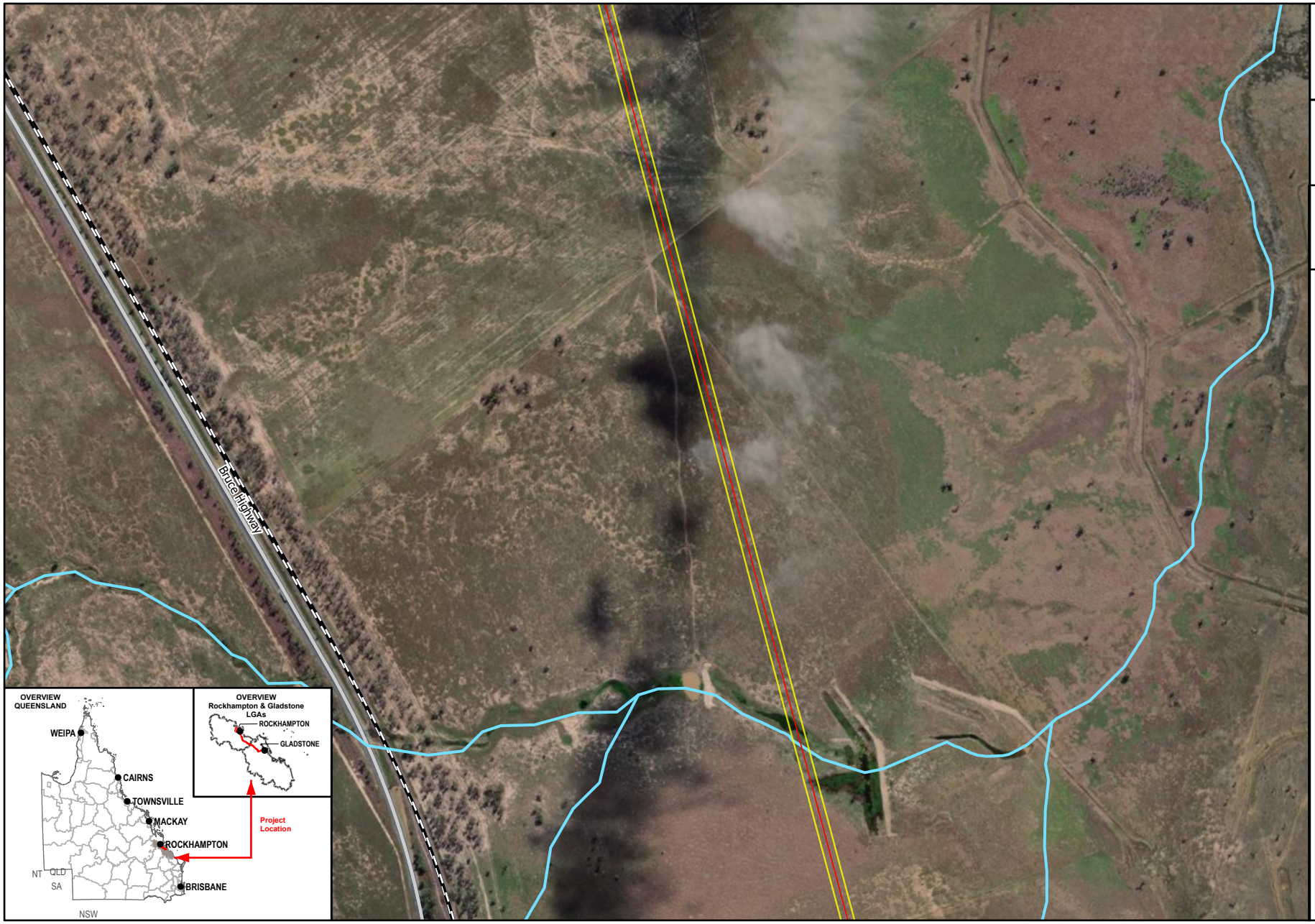
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21q
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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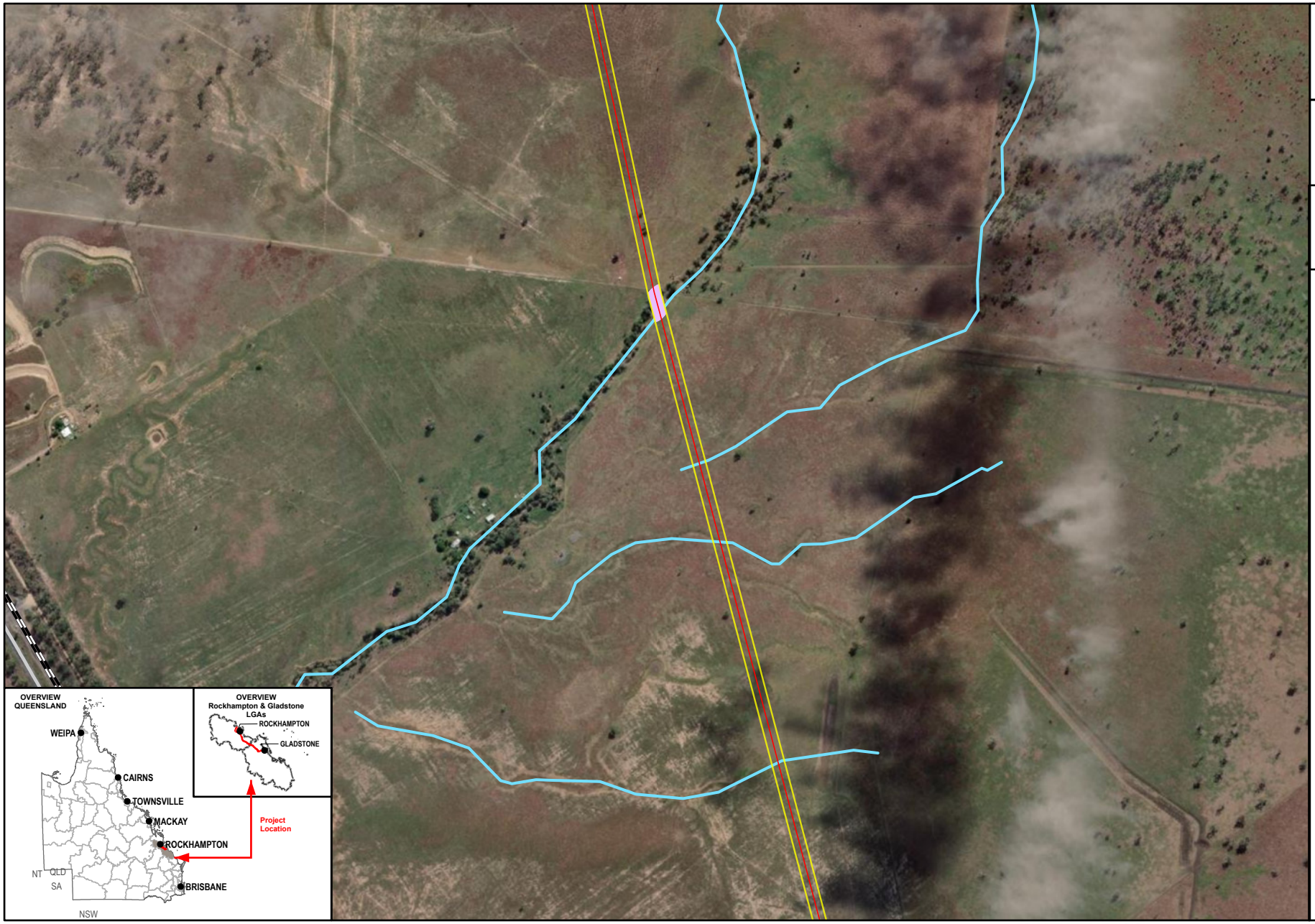
Figure 7-21r
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Predicted Platypus Habitat
- Waterways
- Main Roads
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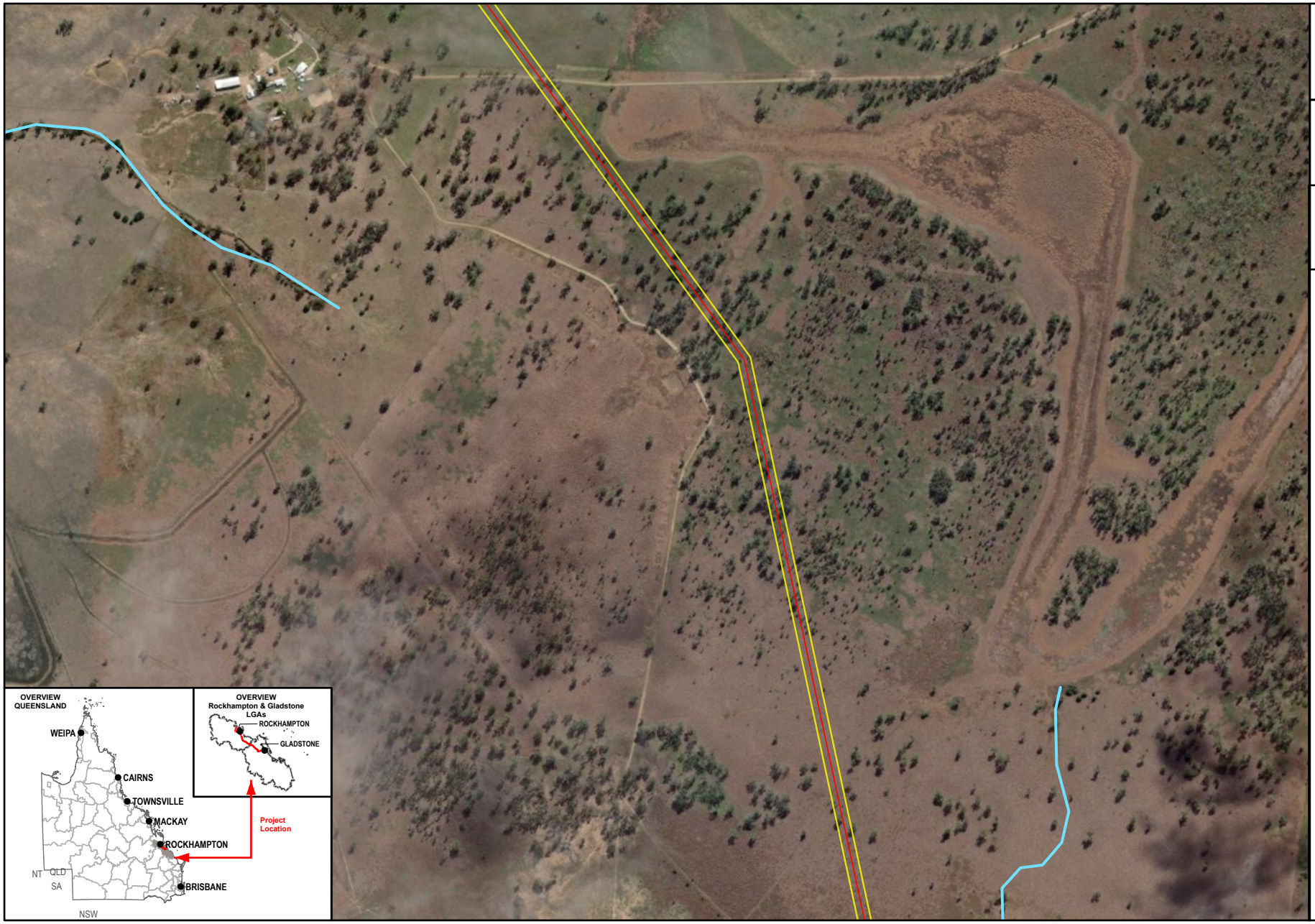
Figure 7-21s
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21t
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022

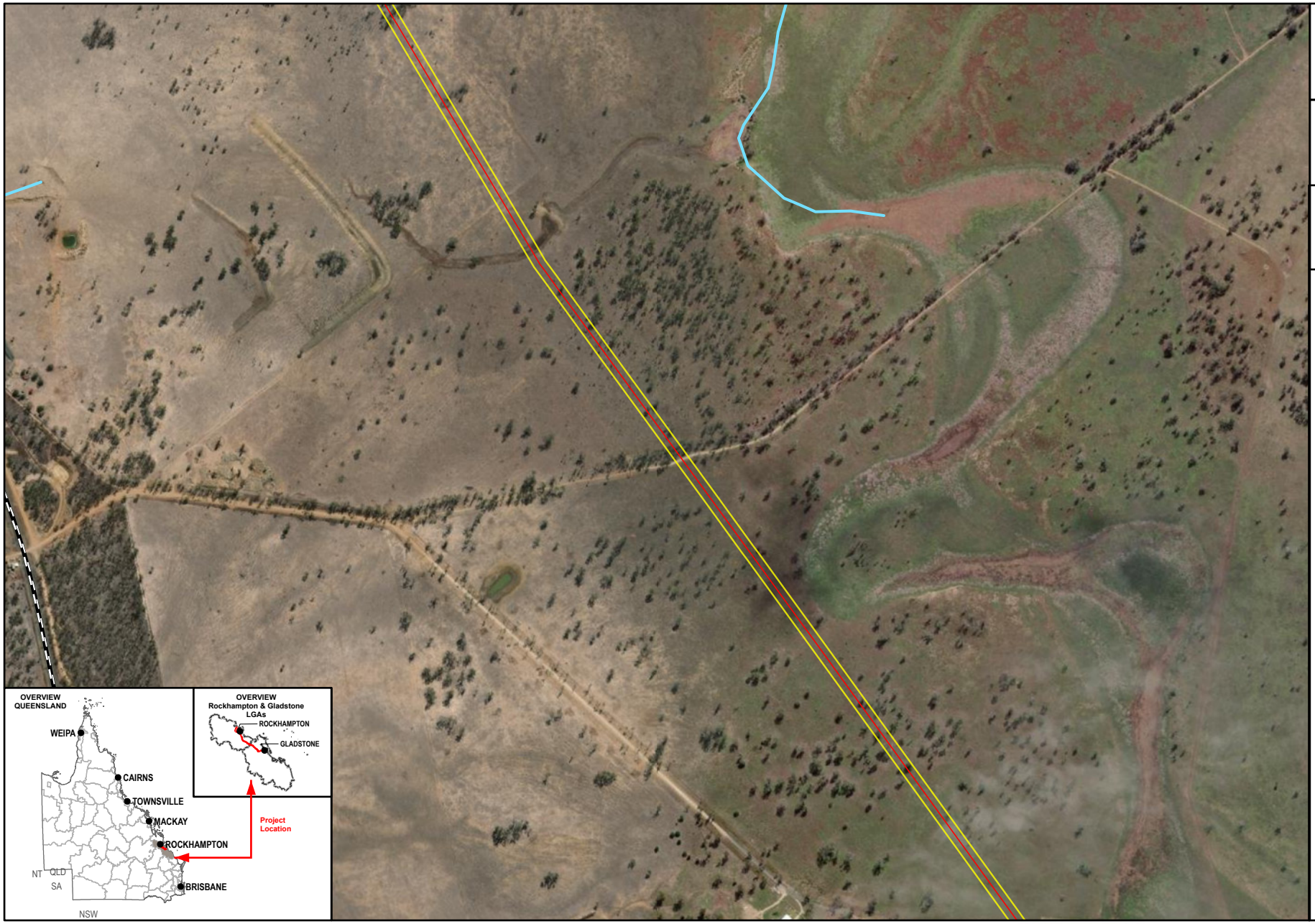

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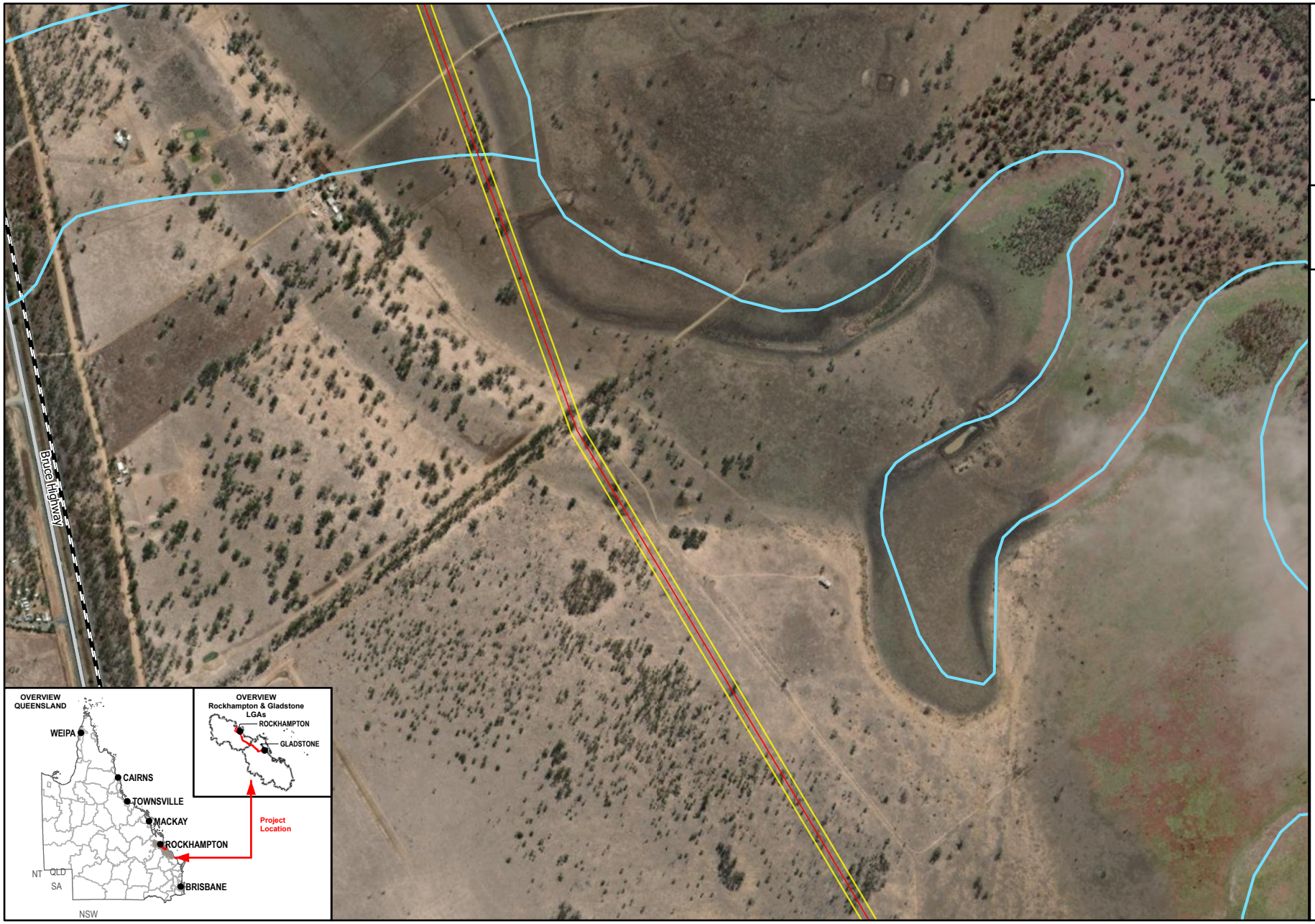
Figure 7-21u
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
- Study Area
- Waterways
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- Railways

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21v
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022

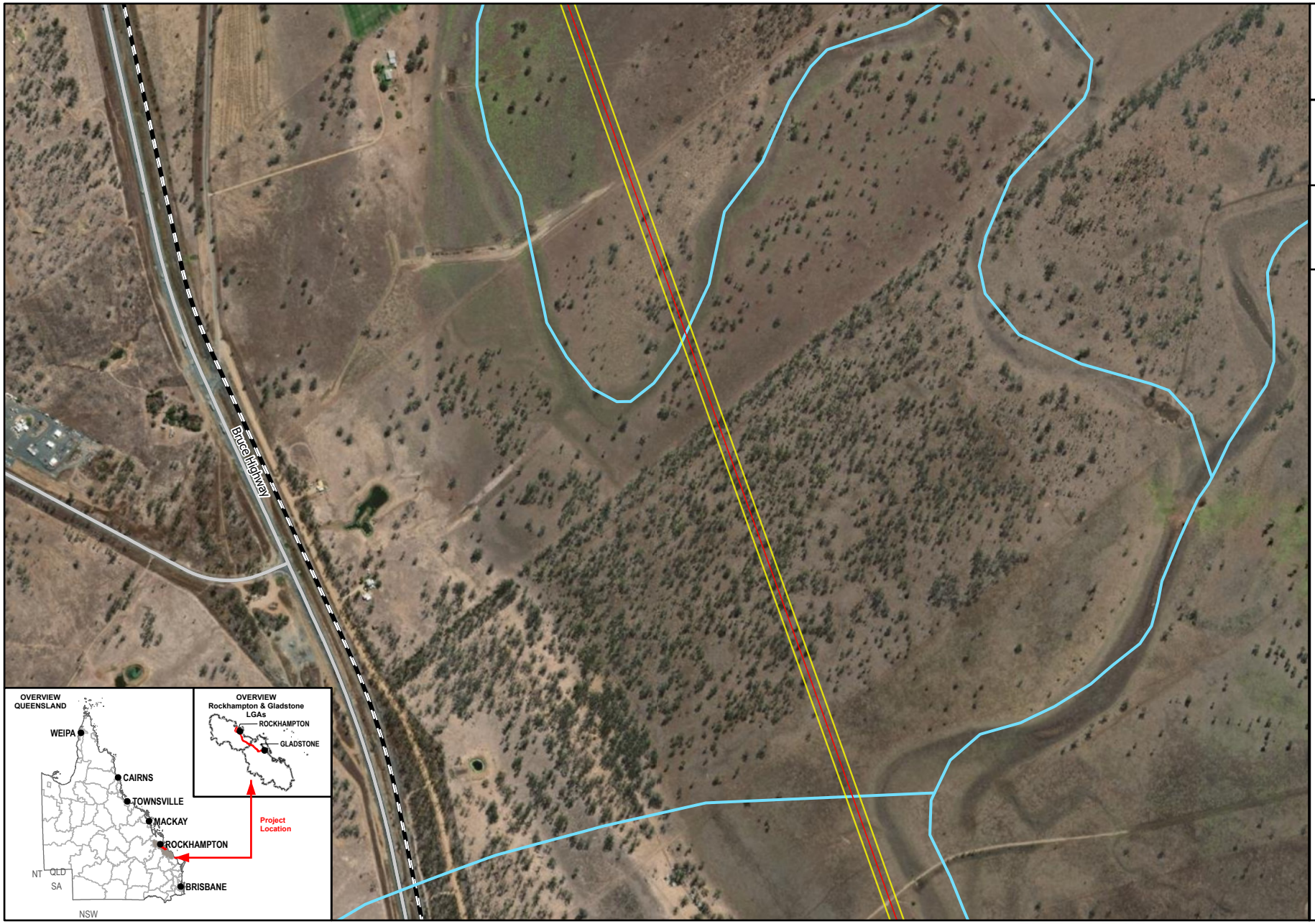

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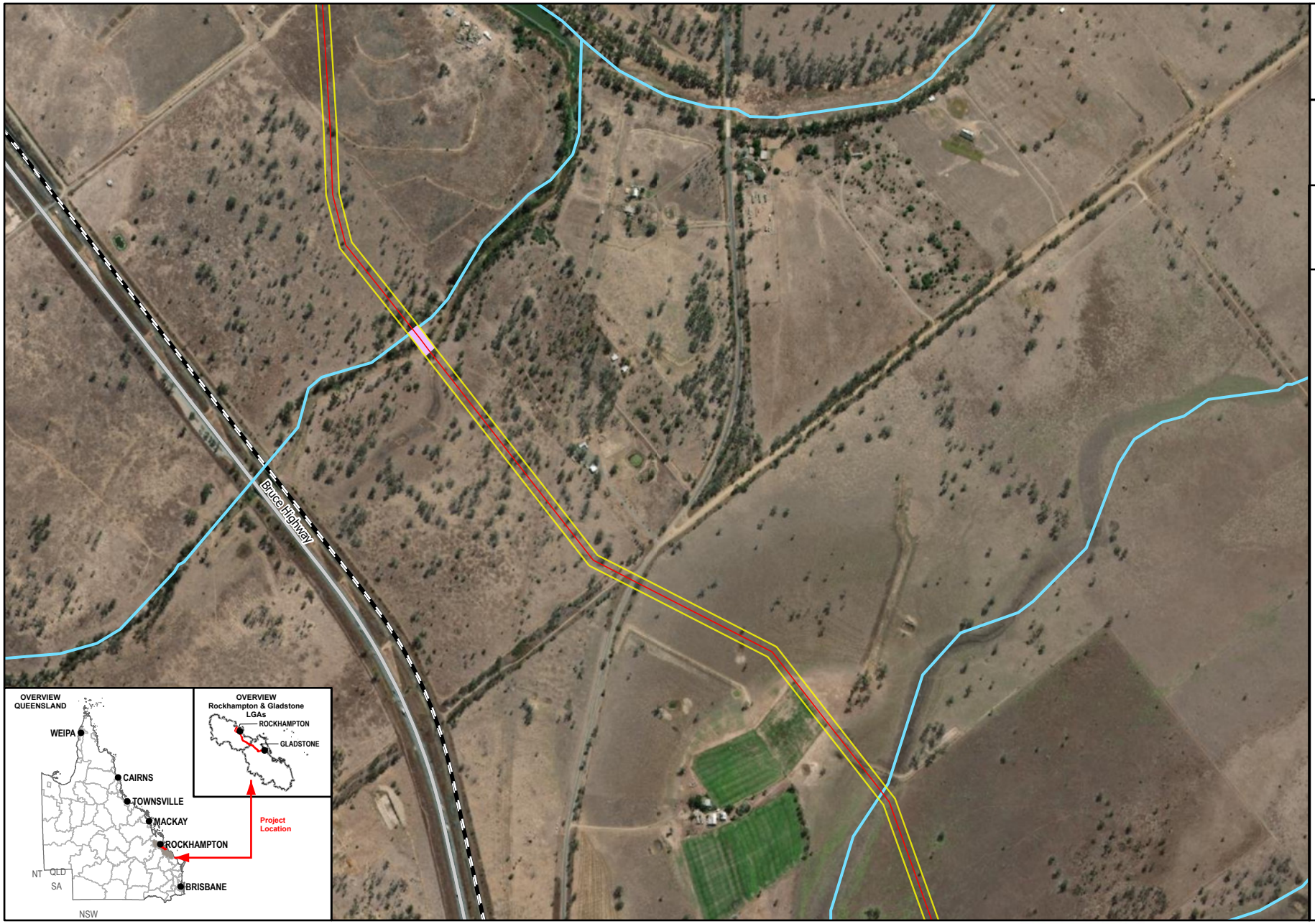
Figure 7-21w
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022



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- SGIC SDA Pipeline Alignment
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Figure 7-21x
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022

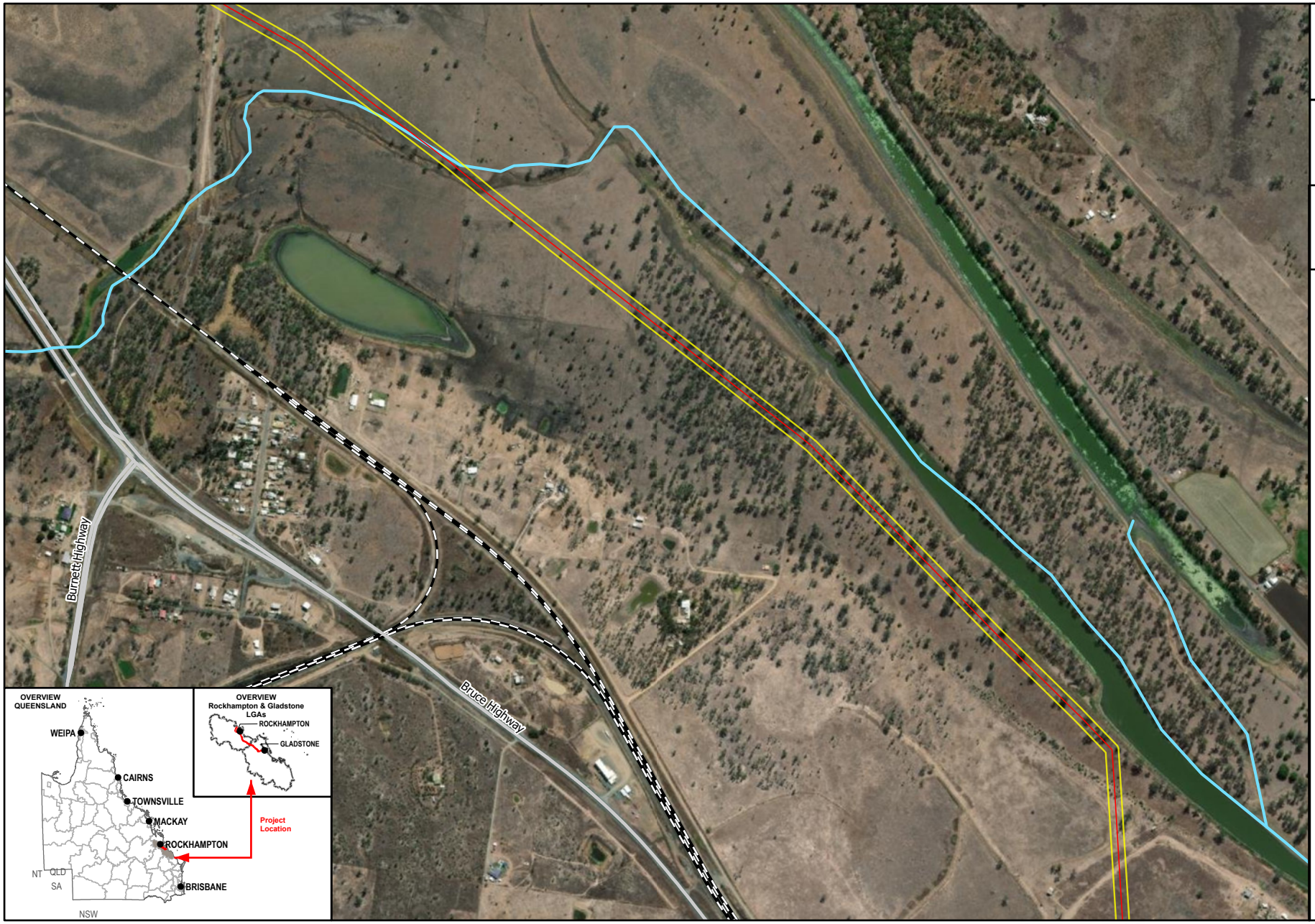

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Figure 7-21y
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022

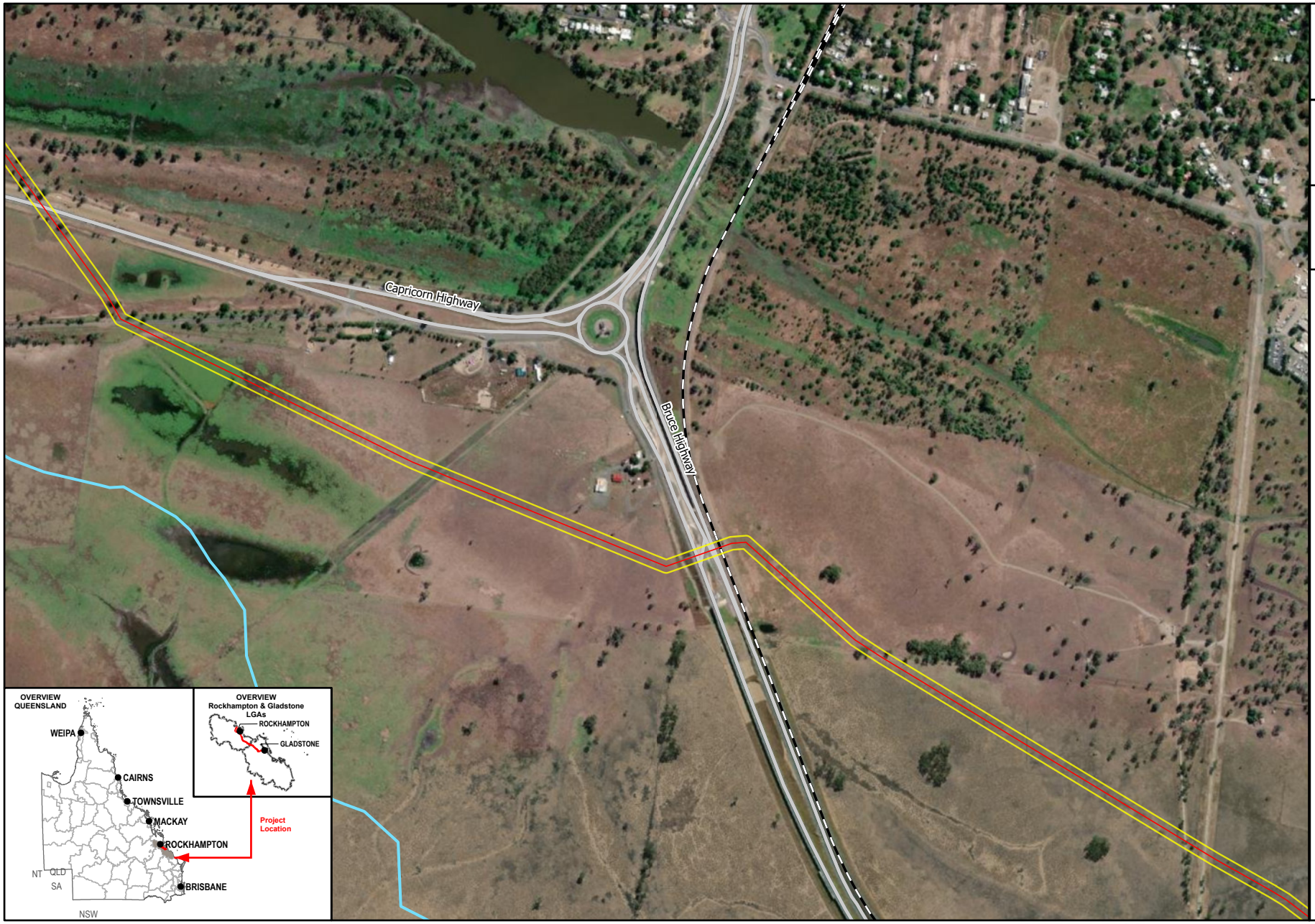

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Figure 7-21z
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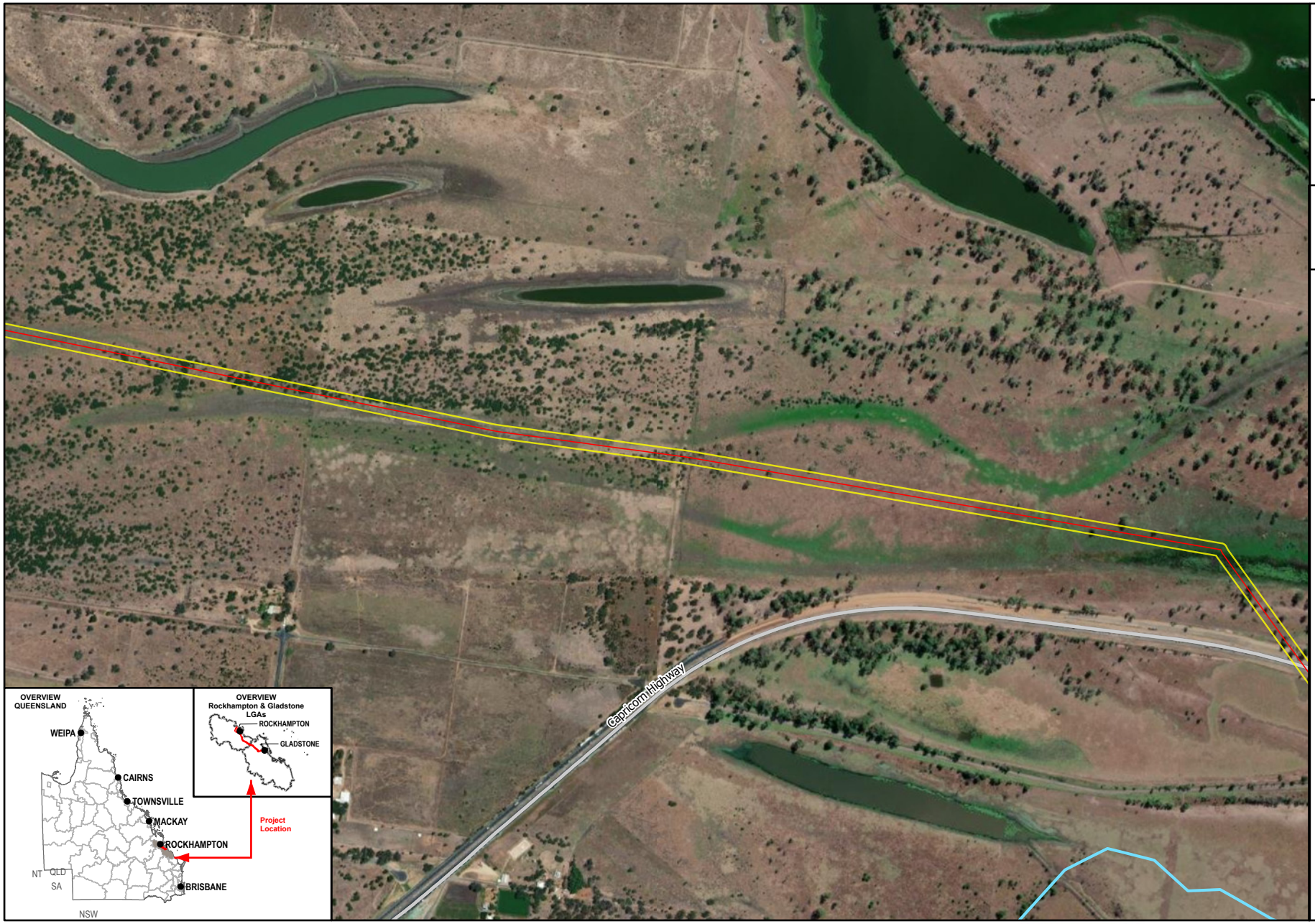

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21a1
Distribution of Platypus Habitat Within the SGIC SDA Study Area
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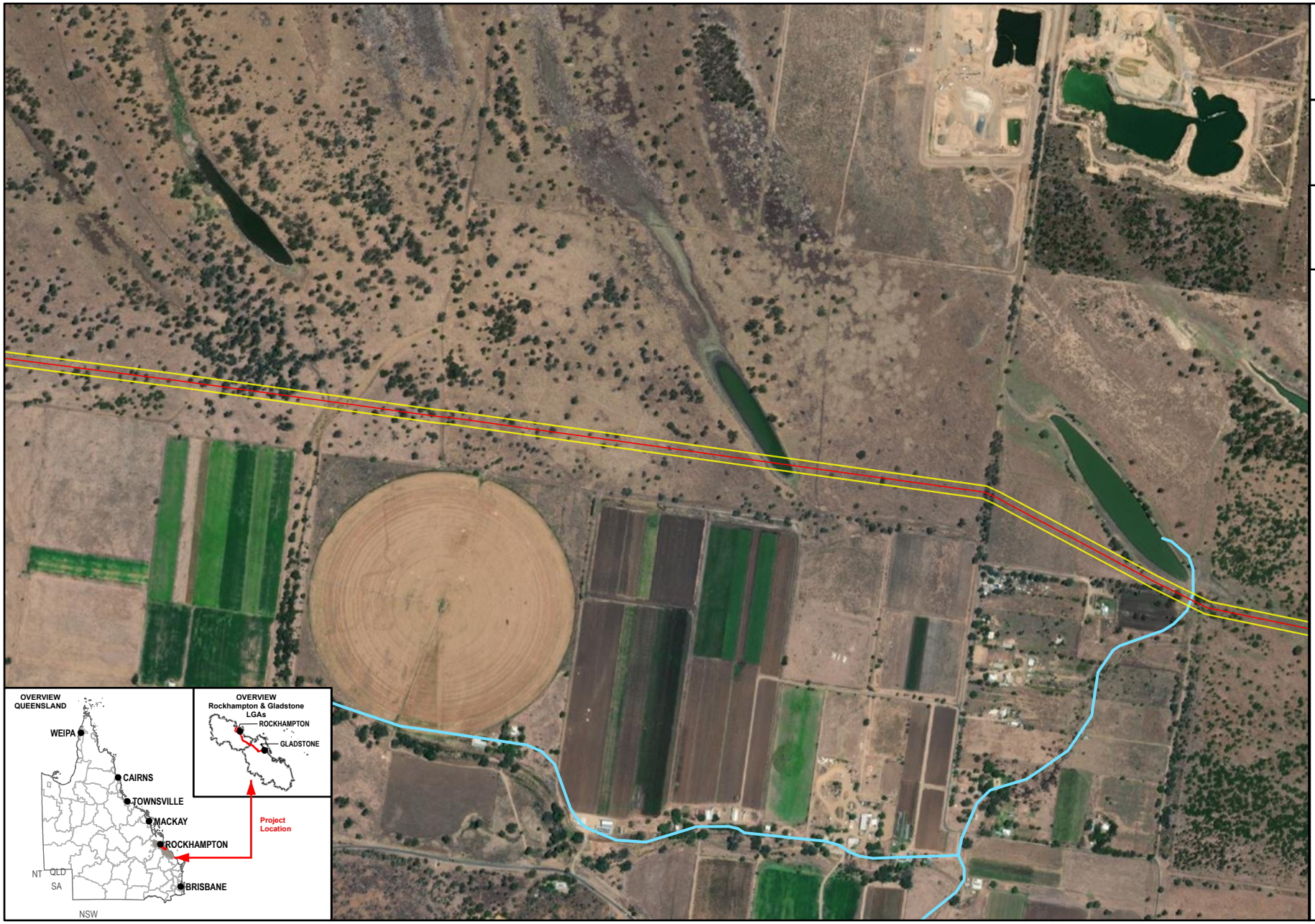

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P.O. Box 466, Gladstone QLD 4680
Ph: 07 4976 3000 www.gawb.qld.gov.au

PROJECTION UTM Zone 56
(Datum GDA2020)

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-21b1
Distribution of Platypus Habitat Within the SGIC SDA Study Area
000-G-MAP-2442 Version:3 Date:20/09/2022

7.2.3 Significant Residual Impact on MSES values

To identify and quantify any significant impact on connectivity within the SGIC SDA pipeline alignment, the Landscape Fragmentation Tool (LFC) was used. The LFC tool performs a desktop assessment of proposed impacts on connectivity areas containing remnant vegetation and determines whether the prescribed activity will be significant with respect to the Queensland Environmental Offset Framework.

The following MSES values in this Section listed in the Significant Residual Impact Guideline 2014 (DEHP 2014b) have been identified as having the potential to be impacted by the project. Note that potential impacts on MSES conservation significant species and their habitat have already been assessed above in Section 7.2.1. A summary of the significant residual impact assessments is provided in Table 7-35.

Table 7-35 Summary of the SGIC SDA residual impact assessments

Value	Is the residual impact significant?
Regulated vegetation	Likely
Connectivity areas	Unlikely
Wetlands and watercourses	Unlikely
Waterway providing for fish passage	Unlikely

7.2.3.1 Regulated vegetation

The project is likely to have a significant impact on regulated vegetation within the SGIC SDA pipeline alignment. A significant residual impact assessment is provided in Table 7-36.

Table 7-36 Significant residual impact assessment – regulated vegetation

Clearing in a regional ecosystem that is: endangered, or of concern	Clearing in the portion of a regional ecosystem that lies within a mapped wetland	Clearing in a regional ecosystem that is within the defined distance of a watercourse
Significant residual impact criteria		
For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem.	For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem.	For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem.
	Clearing within 50 m of the defining bank.	Clearing within 5 m of the defining bank.
Assessment		
Significant – Clearing greater than 10 m wide in a dense (structural category) endangered regional ecosystem and greater than 20 m wide in a sparse (structural category) of concern regional ecosystem is proposed to occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared.	**Significant** – Clearing greater than 20 m wide in a sparse (structural category) regional ecosystem that lies within a mapped wetland is proposed to occur. Clearing within 50 m of the defining bank will also occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared.	**Significant** – Clearing greater than 10 m wide in a dense (structural category) regional ecosystem and greater than 20 m wide in a sparse (structural category) regional ecosystem that are within the defined distance of a watercourse is proposed to occur. Clearing within 5 m of the defining bank will also occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared. The disturbance within 5 m of a bank will be rehabilitated after construction as the

Clearing in a regional ecosystem that is: endangered, or of concern	Clearing in the portion of a regional ecosystem that lies within a mapped wetland	Clearing in a regional ecosystem that is within the defined distance of a watercourse
		pipeline is proposed to be buried under watercourses and associated bank vegetation.

7.2.3.2 Connectivity areas

The following significant residual impact criteria for the significant residual impact test for connectivity as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assessed and the project is unlikely to have a significant impact on connectivity within the SGIC SDA pipeline alignment. A significant residual impact assessment of connectivity is provided in Table 7-37.

Table 7-37 Significant residual impact assessment – connectivity

Significant residual impact criteria	Assessment
Change in core remnant ecosystem extent at the local scale	Unlikely
Loss or fragmentation of core remnant ecosystem at the site scale	Unlikely

7.2.3.3 Wetlands and watercourses

The following significant residual impact criteria for wetlands and watercourses as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assessed and the project is unlikely to have a significant impact on wetlands within the SGIC SDA pipeline alignment. A significant residual impact assessment is provided in Table 7-38.

Table 7-38 Significant residual impact assessment – wetlands and watercourses

Significant residual impact criteria	Assessment
Areas of the wetland or watercourse being destroyed or artificially modified;	**Unlikely** The SGIC SDA pipeline alignment has been located to avoid and reduce impacts to HES wetlands. The pipeline will intersect with three HES listed wetlands, two are located south-west of Rockhampton either side of Fogarty Road, and the other is located at site 27. The two wetlands located south-west of Rockhampton are likely to contain water throughout the year. Construction will consist of various trenchless methods to minimise impacts to the habitat and water quality. Where works occur in ephemeral habitats, additional controls for the protection of habitat and flow will be implemented. These measures will include scheduling works during the dry season to avoid increased mobilisation or erosion and sedimentation and avoid key fish migration and spawning periods. Works in wetted waterways will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions, to avoid impacts to flow and fauna movement within the wetland. Site 27 is an ephemeral wetland system and trenching is expected to occur at this site. There will be a temporary modification to the dry bed during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. A 10 m corridor for the SGIC SDA pipeline alignment will be cleared within the wetland and a further 10 – 30 m will be cleared during construction. Cleared sections will be rehabilitated back to the natural state with no residual impact. Design and implementation of a CEMP will further minimise risk to aquatic fauna and achieve protection of habitat. There are also nine major, four high-risk, three tidal and numerous moderate and low waterways that intersect with the SGIC SDA pipeline alignment. Construction will primarily occur within dry ephemeral waterways in which there will be a temporary modification of the dry creek bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. It is expected that after construction, the watercourse beds and banks within the footprint will be rehabilitated back to their natural state with no residual impact.

Significant residual impact criteria	Assessment
	There are several permanent waterways that contain habitat values for threatened species including sites 2 and 4. It is expected that a pipe bridge will occur at site 2, while HDD will occur at site 4 and therefore no direct impacts to these waterways will occur. The other major and high-risk waterways within the SGIC SDA pipeline alignment will involve various trenchless construction techniques that will also have no direct impacts to waterways.
A measurable change in water quality of the wetland or watercourse—for example a change in the level of the physical and/or chemical characteristics of the water, including salinity, pollutants, or nutrients in the wetland or watercourse, to a level that exceeds the water quality guidelines for the waters; or	**Unlikely** The SGIC SDA pipeline alignment has been positioned to avoid impacts to wetlands and water courses where possible. There are three HES wetlands that intersect the SGIC SDA pipeline alignment. The water quality of the HES wetland watercourses at site 27 is unlikely to undergo a measurable change due to its ephemeral nature. Construction in this area will occur during the dry season when there is no water present and returned to its natural state. For mapped wetlands and waterways that contain water at the time of construction, methods will consist of various trenchless construction methods to minimise impacts to the habitat and water quality. A CEMP, including erosion and sediment control will be implemented to minimise impacts to water quality during construction. Within ephemeral watercourses, the pipeline will be constructed via trenching during the dry season. There will be a temporary modification of the dry creek bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks within the footprint will be rehabilitated back to their natural state with no residual impact.
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected; or	**Unlikely** The habitats or lifecycles of native species that are dependent on the waterway are unlikely to be seriously affected by the project. The SGIC SDA pipeline alignment has been positioned to avoid impacts to HES wetlands and high ecological waterways where possible. Within ephemeral watercourses and the ephemeral HES wetland at site 27, construction will occur during the dry season and the pipelines will be constructed via trenching. There will be a temporary modification of the dry bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks within the footprint will be rehabilitated back to their natural state with no residual impact. For the two HES wetlands located south-west of Rockhampton and any other wetland or watercourse containing water at the time of construction, various trenchless construction techniques will be used including HDD, pipe bridges and microtunnels and therefore no impact will occur to habitat or species.
A substantial and measurable change in the hydrological regime or recharge zones of the wetland, e.g. a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland; or	**Unlikely** No substantial or measurable change in the hydrological regime or recharge zones of the wetland is expected to occur. The SGIC SDA pipeline alignment has been positioned to avoid impacts to HES wetlands and high ecological waterways where possible. Within ephemeral watercourses and the ephemeral HES wetlands construction will occur during the dry season and the pipelines will be constructed via trenching. Various trenchless construction techniques will be used for wetlands and high and major risk waterways containing water at the time of construction and in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions, will maintain flow and water levels upstream and downstream of the construction site where required.
An invasive species that is harmful to the environmental values of the wetland being established (or an existing invasive species being spread) in the wetland.	**Unlikely** Establishment of an invasive species that is harmful to the environmental values of a wetland is unlikely to occur as a result of this project. Site-specific Weed and Pest Management Plan will be designed and implemented in accordance with relevant legislation. These plans will outline protocols to prevent the introduction of weed and pest species into the construction area and minimise the spread of declared weeds and pests within the project footprint.

7.2.3.4 Waterway providing for fish passage

The following significant residual impact criteria for waterways providing for fish passage as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assessed and the project is unlikely to have a significant impact on waterway providing for fish passage within the SGIC SDA pipeline alignment. A significant residual impact assessment is provided in Table 7-39.

Table 7-39 Significant residual impact assessment – waterway providing for fish passage

Significant residual impact criteria	Assessment
Result in the mortality or injury of fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will result in the mortality or injury of fish. Construction will occur during the dry season within ephemeral waterways thereby avoiding injury and mortality. For tidal, high and major risk flowing waterways and HES wetlands, the pipeline will be constructed via various trenchless construction methods, further avoiding potential risks of fish mortality or injury. All construction operations will be conducted according to the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions. If construction is required within a waterway supporting aquatic fauna, then fauna salvage will occur in accordance with DAF Fish Salvage Guidelines. A CEMP will be implemented to protect habitat quality downstream of construction.
Result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will result in conditions that substantially increases the risks to the health, wellbeing and productivity of fish seeking passage. Key mitigation measures include construction during the dry season, use of various trenchless construction methods at waterways mapped as tidal, high and major risk under the WWBW spatial layer and HES wetlands that contain water at the time of construction. The capture and relocation of fish in wetted waterways in accordance with DAF Fish Salvage Guidelines will occur in any wetted waterway where construction occurs. A CEMP will be implemented for the protection of habitat quality within and downstream of the construction footprints. All works will be conducted in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and therefore impacts to flow and fauna movement will be temporary and not result in health or ecological impacts to fish seeking passage.
Reduce the extent, frequency or duration of fish passage previously found at a site; or	**Unlikely** It is considered unlikely that the proposed pipeline works will reduce the extent, frequency or duration of fish passage within the SGIC SDA pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Construction will primarily occur within dry ephemeral waterways and no impacts to fish passage will occur. For tidal, high and major risk mapped waterways under the WWBW spatial layer and wetlands that contain water at the time of construction, various trenchless construction methods will be used to further avoid direct impacts to fish, fish movement and habitat quality. Where works occur in wetted habitats, additional controls for the protection of habitat and flow will be implemented including scheduling works outside of key migration or breeding periods., Works will be localised and unlikely to disrupt the passage of fish. Works in wetted waterways will be undertaken within 180 days (DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018)), or any approval conditions and will allow for continued or facilitated movements.
Substantially modify, destroy or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will substantially modify, destroy or fragment areas of fish habitat within the SGIC SDA pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Open trench construction methods will primarily occur within dry ephemeral waterways in which there will be a temporary modification of the dry creek bed and banks which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks, along with other fish habitats within the footprint will be rehabilitated back to their natural state with no residual impact. For tidal, high and major risk mapped waterways under the WWBW spatial layer and HES wetlands that contain

Significant residual impact criteria	Assessment
	water at the time of construction, various trenchless construction methods will be used to further avoid direct impacts to fish habitat. Where works occur in wetted habitats, additional controls for the protection of habitat will occur including retaining any fish habitat such as woody debris for reinstate following construction. Works will be localised and unlikely to substantially modify, destroy or fragment area of fish habitat.
Result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows; or	**Unlikely** It is considered unlikely that the proposed pipeline works will substantially or measurably change the hydrological regime of the waterways within the SGIC SDA pipeline alignment. Construction will primarily occur within dry ephemeral waterways and not impact upon the hydrological regime of these waterways. Mapped Wetlands and Waterways that contain water at the time of construction will utilise HDD to avoid impacts to the hydrological regime of the waterways. Where construction occurs in wetted habitats, works will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions to avoid significant residual impacts to flow and fauna movement. Where required, flow will be maintained through the construction footprint such that the volume, depth, timing, duration and frequency of flows will be maintained.
Lead to significant changes in water quality parameters such as temperature, dissolved oxygen, Ph and conductivity that provide cues for movement in local fish species.	**Unlikely** It is considered unlikely that the proposed pipeline works will lead to significant changes in water quality parameters within the SGIC SDA pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Construction will primarily occur within dry ephemeral waterways and not impact upon the water quality within these waterways. Mapped wetlands and waterways that contain water at the time of construction will utilise various trenchless construction methods that will avoid impacts to water quality of the waterways. During any works that may occur in wetted waterways and during any potential discharge from coffer dams a WQMP, as per the CEMP, will be developed to identify the potential for water quality degradation and allow for adaptive management if required. Therefore, works within the project are unlikely to impact upon water quality parameters and thereby not disrupt environmental cues for movement of local fish species.

7.3 Northern Section

7.3.1 Significant Impacts on MNES and MSES species

This section assesses the significance of the Northern Section impacts on MNES and MSES that have been confirmed present or are considered likely to occur within the Northern Section study area. The significance of impact assessment has been undertaken in accordance with the Queensland *Significant Residual Impact Guideline* (DEHP 2014b) and Commonwealth *Significant Impact Guidelines 1.1* (DoE 2013). A summary of outcomes of the MNES and MSES significant impact assessment are presented in Table 7-40.

Table 7-40 Summary of residual significant impact assessment on MSES

Species	Significant impact	EPBC Approval	Assessed as MSES	Assessed as MNES
Estuarine crocodile	Unlikely		✓	
White-throated snapping turtle	Unlikely		✓	
Squatter pigeon (southern)	Unlikely	✓	✓	
White-throated needletail	Unlikely		✓	
Platypus	Unlikely		✓	
Koala	Unlikely		✓	
Fitzroy River turtle	Unlikely	✓	✓	
Australian painted snipe	Unlikely	✓	✓	

7.3.1.1 Squatter pigeon (southern)

Conservation status and species ecology

The squatter pigeon (southern) is listed as vulnerable under the EPBC Act and NC Act and was listed as an MNES at the time of the approval. Its current distribution extends from central Queensland, west to Longreach and Charleville, and south to New South Wales (DCCEEW 2022h). The species occurs in remnant and regrowth open forest and woodland dominated by *Eucalyptus*, *Corymbia*, *Acacia* and *Callitris* species with tussock grassy understorey with 3 km of water sources (DCCEEW 2022h). Soils are generally a good predictor of their foraging and breeding habitat, which is generally restricted to well-draining, gravelly, sandy, or loamy soils. These typically have a patchy ground layer composed of native perennial tussock grasses or a mix of native perennial tussock grasses and low shrubs or forbs (Squatter Pigeon Workshop 2011). Breeding habitats are typically on stony rises within 1 km of permanent water (Squatter Pigeon Workshop 2011). The subspecies is unlikely to move far from woodland trees which provide protection from predatory birds (Squatter Pigeon Workshop 2011). Where scattered trees still occur, and the distance of cleared land between remnant trees or patches of habitat does not exceed 100 m, individuals may be found foraging in, or moving across modified or degraded environments (Squatter Pigeon Workshop 2011).

Field survey results and distribution of suitable habitat

The squatter pigeon (southern) was not recorded during the field surveys within the Northern Section study area. Survey effort for the squatter pigeon included driving and flushing surveys within potentially suitable habitat within the Northern Section study area. The species has been historically recorded at 194 locations within the desktop search extent, the most recent record recorded in 2019. No suitable breeding habitat was recorded within the Northern Section study area; however, areas of potentially suitable foraging habitat was recorded in open eucalypt woodland with grassy understorey. The distribution of predicted squatter pigeon (southern) habitat is mapped in Figure 7-22.

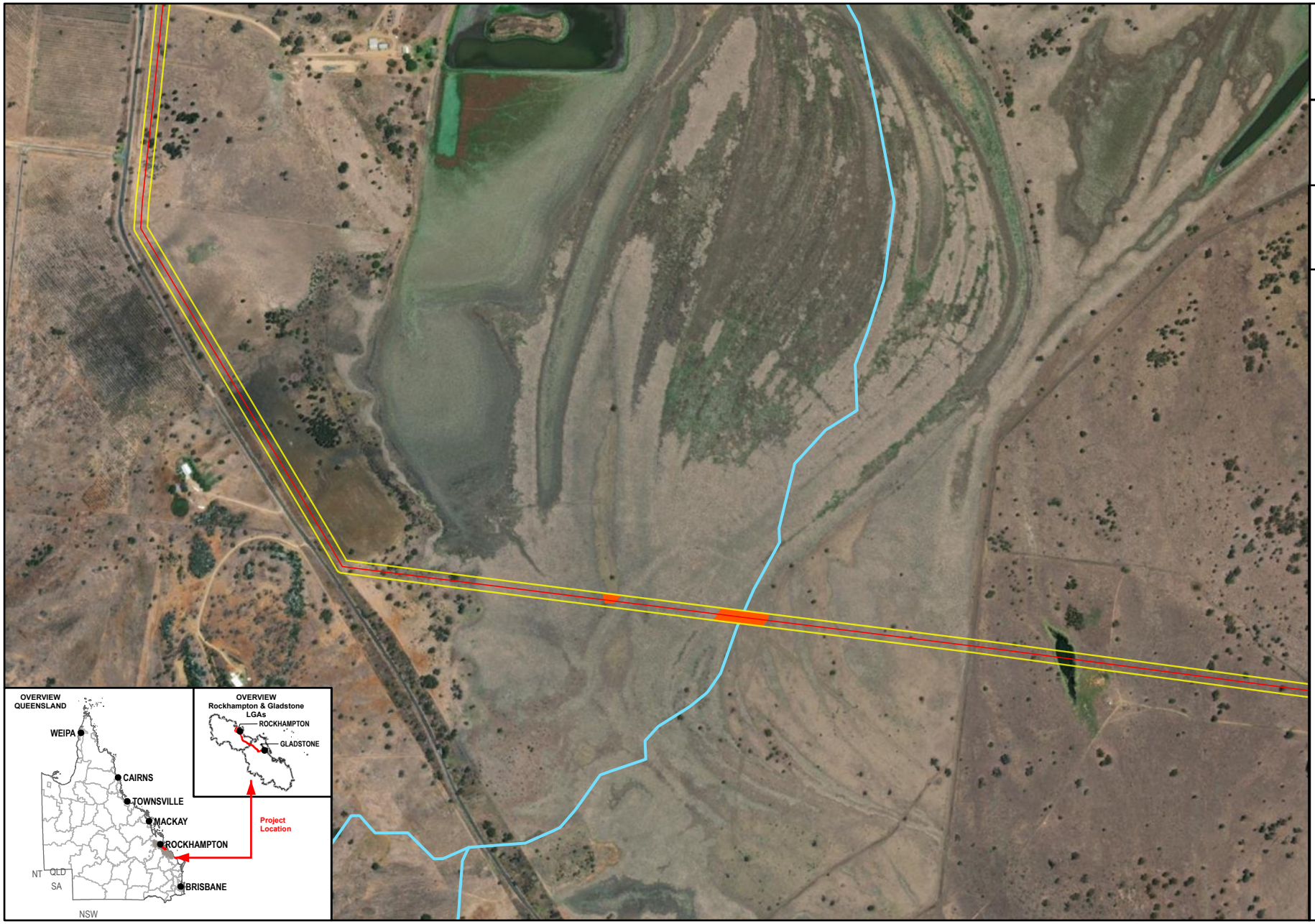
Significance of impact assessment

The project is unlikely to result in a significant residual impact on squatter pigeon (southern). A significance of impact assessment of the project on squatter pigeon (southern) (vulnerable under the EPBC Act and NC Act) is provided in Table 7-41.

Table 7-41 Significance of impact on squatter pigeon (southern)

Significant residual impact criteria	Assessment
A long-term decrease in the size of a local population	**Unlikely** The squatter pigeon (southern) is abundant within the region. The species has been historically recorded at 194 locations within the desktop search extent (10 km buffer), however no individuals were recorded during field sureys. The local population is not an important population at a national level. Important populations of the squatter pigeon (southern) have been identified in the Commonwealth approved conservation advice as all of the relatively small, isolated and sparsely distributed sub-populations occurring south of the Carnarvon Ranges in Central Queensland (Squatter Pigeon Workshop 2011). Populations in the southern parts of the subspecies range have experienced dramatic declines due to land clearing and grazing by sheep, which tends to have more significant adverse impacts on the subspecies than cattle grazing (TSSC 2015). The subspecies is still locally abundant within cattle grazing areas at the northern parts of its range (TSSC 2015). The loss of 5.55 ha of habitat (representing 0.17% of habitat within a 5 km buffer) is not expected to lead to a decline in the local squatter pigeon (southern) population and the subspecies will likely continue to persist in large numbers within the local area and surrounding region. Due to their localised and relatively temporary nature, construction and operation impacts associated with the Northern Section pipeline alignment are unlikely to have any permanent impacts on the persistence of local and regional squatter pigeon (southern) populations. Increased vehicular movements during construction will increase the risk of mortality and injury of squatter pigeons (southern); however, this will be managed through implementing speed limits and signage in areas that may support the subspecies. The project is expected to be relatively benign in terms of operational impacts with negligible noise, vibration, land disturbance and vehicular movements. Permanent speed limits and signage on internal roads and education of staff during inductions will minimise the risk of direct mortality by operational vehicles. As such, the project is unlikely to lead to a long-term decrease in the size of a local population of the species.
Reduce the extent of occurrence of the species	**Unlikely** As detailed above, the squatter pigeon (southern) is abundant within the region. The maximum width of clearing required for construction of the Northern Section pipeline alignment is 30 m. Once the pipeline has been installed and buried, a maximum width of 10 m will be permanently cleared with the remaining 20 m to be rehabilitated. The project will result in a loss of 5.55 ha of potential habitat for the squatter pigeon (southern). This represents only a small percentage of the predicted habitat available within a 5 km buffer (0.17%). Suitable foraging habitat and resources will persist in the area immediately adjacent to the Northern Section pipeline alignment, and the extent and magnitude of mortality during construction is such that the subspecies will continue to persist locally. Given the relatively benign nature of the project in its operation phase, and the continued presence of suitable habitat within the local area, the project is unlikely to result in a localised reduction in the extent of occurrence per the Queensland *Significant Residual Impact Guideline* (DEHP 2014b): *Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon.*
Fragment an existing population	**Unlikely** Fragmentation of the existing squatter pigeon (southern) population is not expected, as the maximum width of clearing required for construction of the Northern Section pipeline alignment (30 m) is narrow and linear. This is unlikely to present a permanent barrier to the squatter pigeon (southern) movement. Once the pipeline has been installed and buried, a maximum width of 10 m will be permanently cleared with the remaining 20 m to be rehabilitated. Habitat connectivity will be maintained among areas of habitat within and adjacent to the Northern Section pipeline alignment, by maintaining ground-level substrates and vegetation, and by retaining existing unsealed tracks that provide important pathways for local squatter pigeon (southern) movement. The implementation of the Weed Management Plan is expected to maintain suitable ground-level habitat and continue to facilitate ground-level movement of the squatter pigeon (southern). Based on these considerations, the project is unlikely to fragment the existing squatter pigeon (southern) population.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** As detailed above, the subspecies' capacity to move locally and regionally is unlikely to be limited by any localised land clearing necessary to construct the Northern Section pipeline alignment. As a result, the project is unlikely to cause any loss of gene transfer that would cause genetically distinct populations to form.

Significant residual impact criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** The project footprint is currently impacted by weed and pest species that could be harmful to the squatter pigeon (southern). The presence of these invasive species is unlikely to be exacerbated by the project, and any risks of their establishment will be managed via a site-specific CEMP and operational EMP.
Introduce disease that may cause the population to decline	**Unlikely** Recognised threats to the squatter pigeon (southern) do not include diseases. It is however, not expected that the project would result in the introduction of disease.
Interfere with the recovery of the species	**Unlikely** The project is unlikely to interfere substantially with the recovery of the species. The loss of habitat is unlikely to be significant, representing only 5.55 ha of habitat present within the GSDA pipeline alignment and 0.17% within a 5 km buffer. Implementation of a CEMP for the project has the potential to increase the value of local habitats through the control of weed and pest species. Local noise disturbance and mortality threats associated with the project are also expected to be low.
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** The project will require the clearing of 5.55 ha of potentially suitable foraging habitat for the squatter pigeon (southern). Despite the loss of suitable habitat within the Northern Section pipeline alignment, connectivity to extensive areas retaining suitable foraging and breeding habitat for the subspecies will persist in the surrounding landscape. The Northern Section pipeline alignment has largely been placed within or adjacent to areas that have been previously cleared for linear infrastructure such as railways, roads, access tracks and pipelines. Given the subspecies was recorded along existing access tracks and cleared areas within the GSDA and SGIC SDA study area during the 2022 field surveys, the project is unlikely to result in disruption to ecologically significant locations of the species.
Conclusion	The project is unlikely to result in a significant residual impact on the squatter pigeon (southern). The project has been located within areas that have been previously cleared for agricultural practices and will result in small loss of 5.55 ha of potentially suitable foraging habitat within the Northern Section pipeline alignment. Furthermore, the project is unlikely to impact the species' breeding cycle, as no suitable breeding habitat was not identified within the Northern Section pipeline alignment.



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Legend

- GSDA Pipeline Alignment
- Study Area

Predicted Squatter Pigeon (Southern) Habitat

Habitat Type

- Potential Foraging Habitat
- 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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PROJECTION UTM Zone 56
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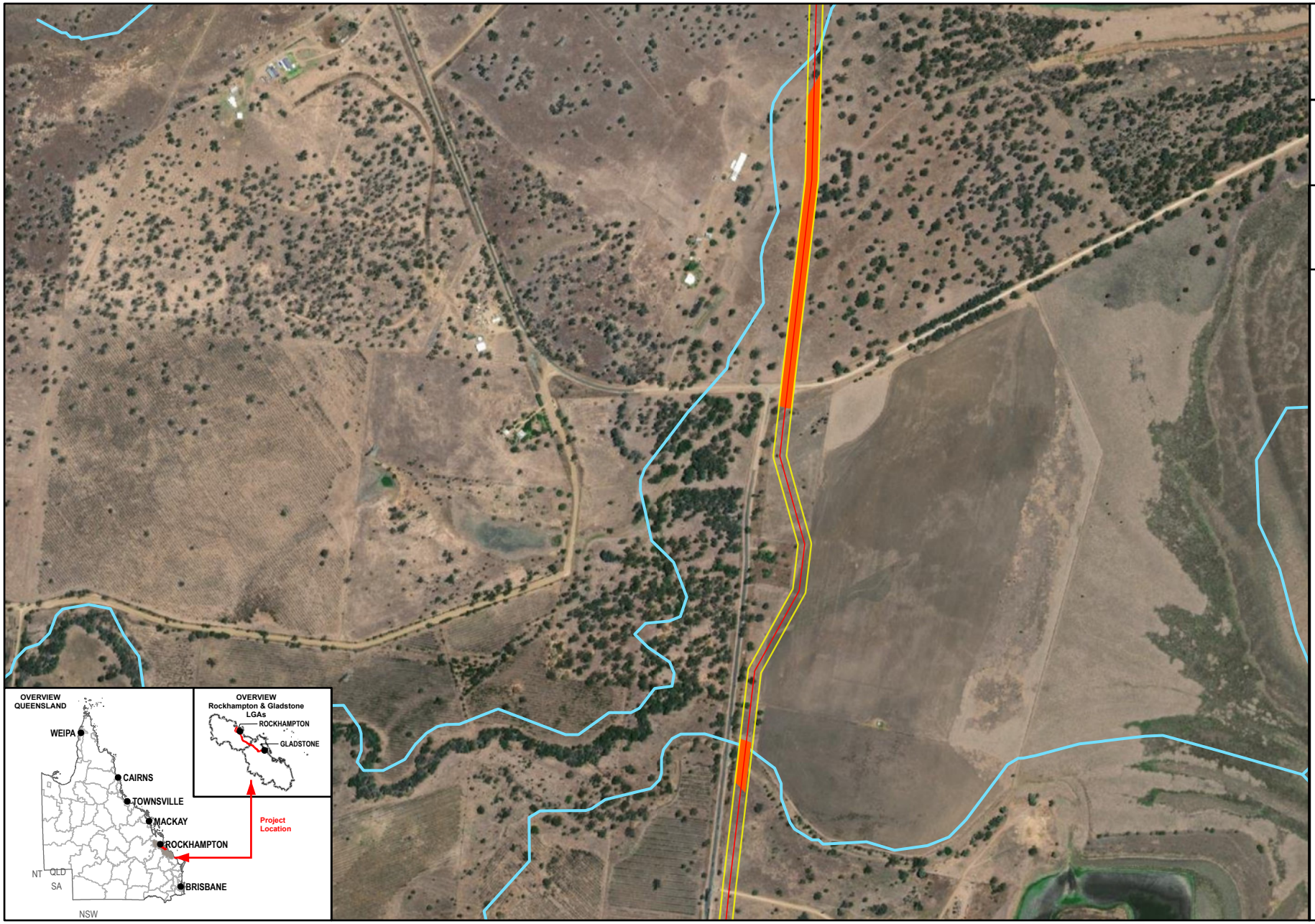
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-22a
Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
000-G-MAP-2443 Version:4 Date:21/09/2022



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Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
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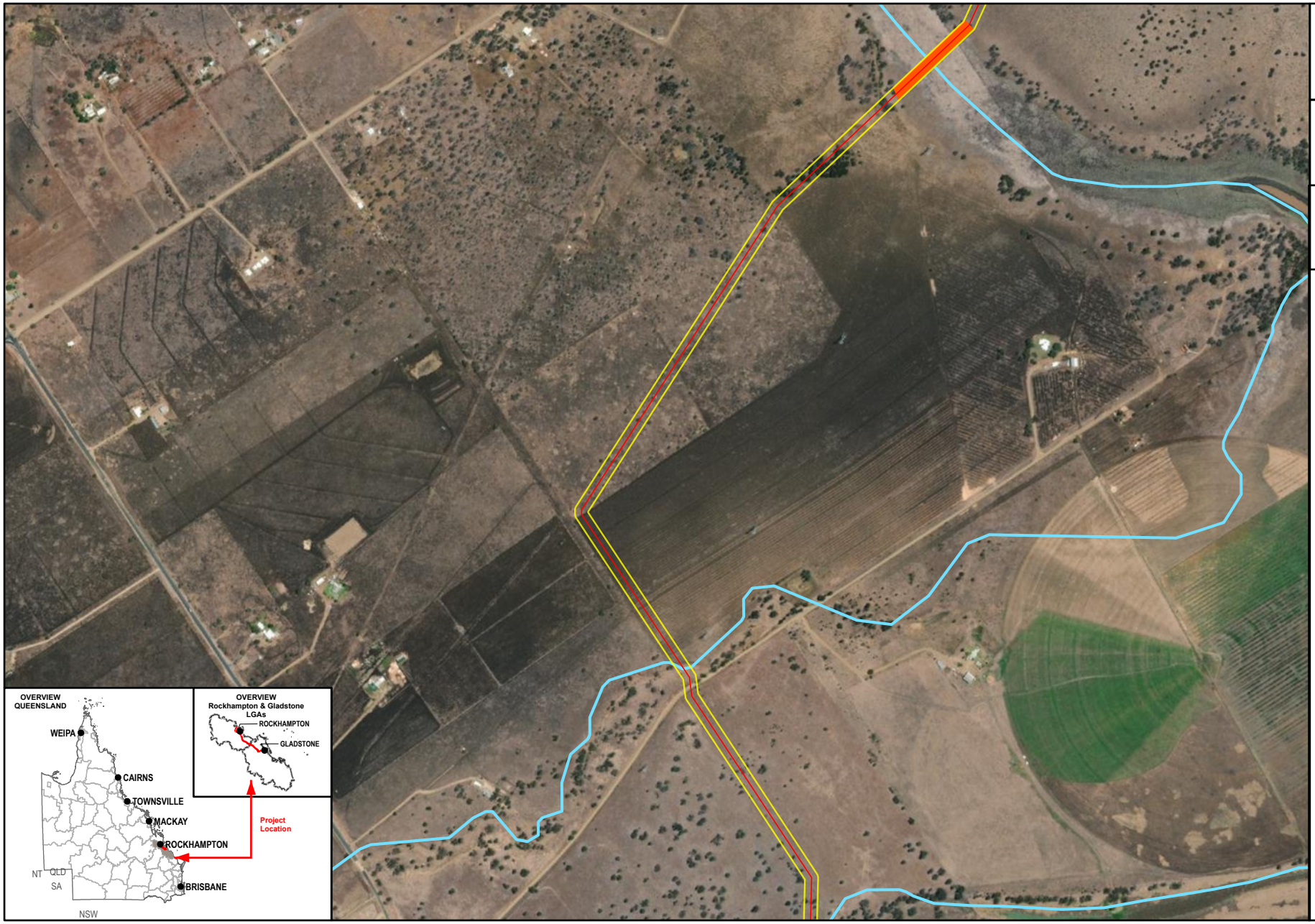

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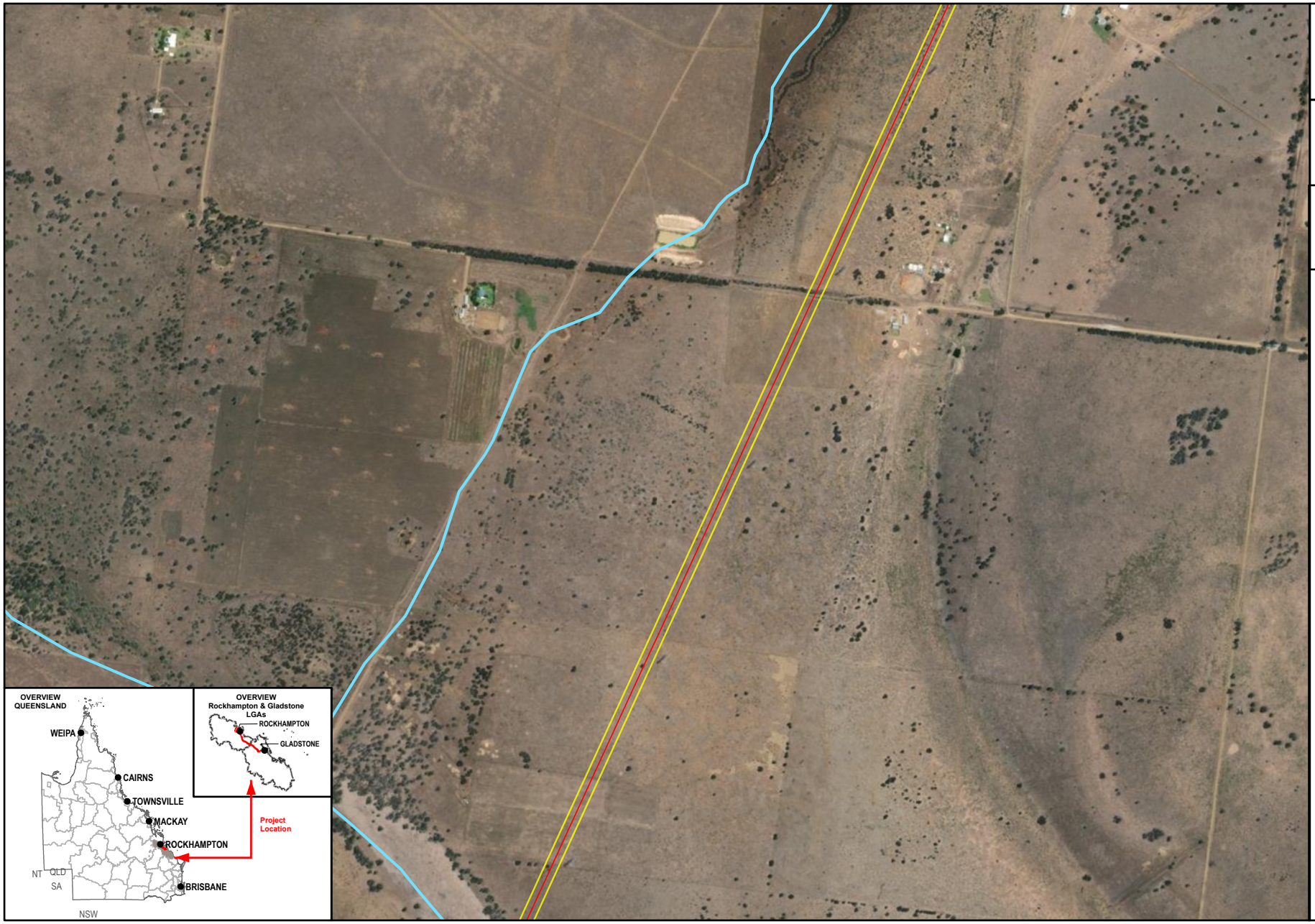
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-22c
Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
000-G-MAP-2443 Version:4 Date:21/09/2022



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Legend

- GSDA Pipeline Alignment
- Study Area
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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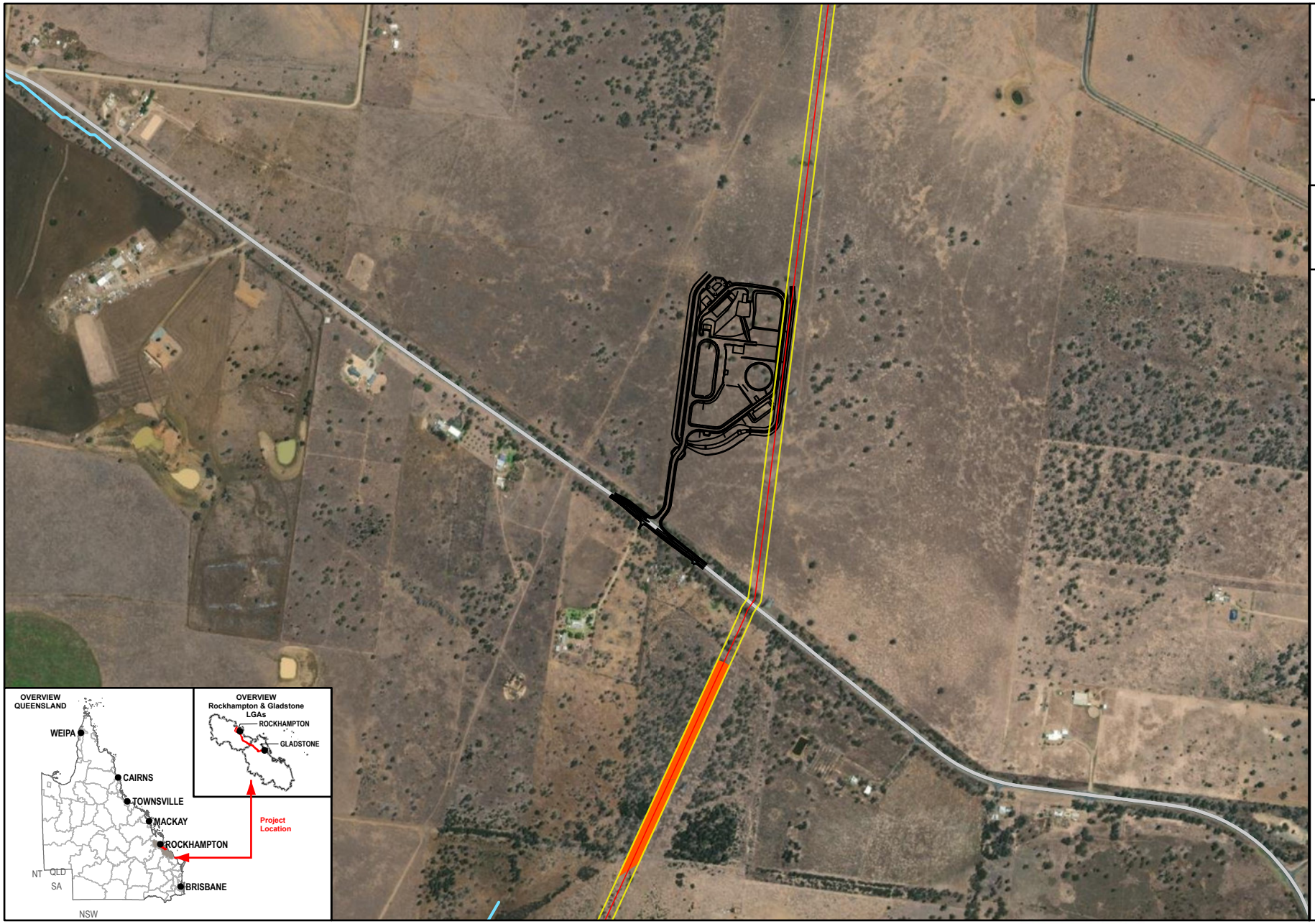
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-22d
Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
000-G-MAP-2443 Version:4 Date:21/09/2022



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Legend

- GSDA Pipeline Alignment
- Study Area

Predicted Squatter Pigeon (Southern) Habitat

Habitat Type

- Potential Foraging Habitat
- Alton Down WTP, Pump Station and Reservoir Layout
- Waterways
- 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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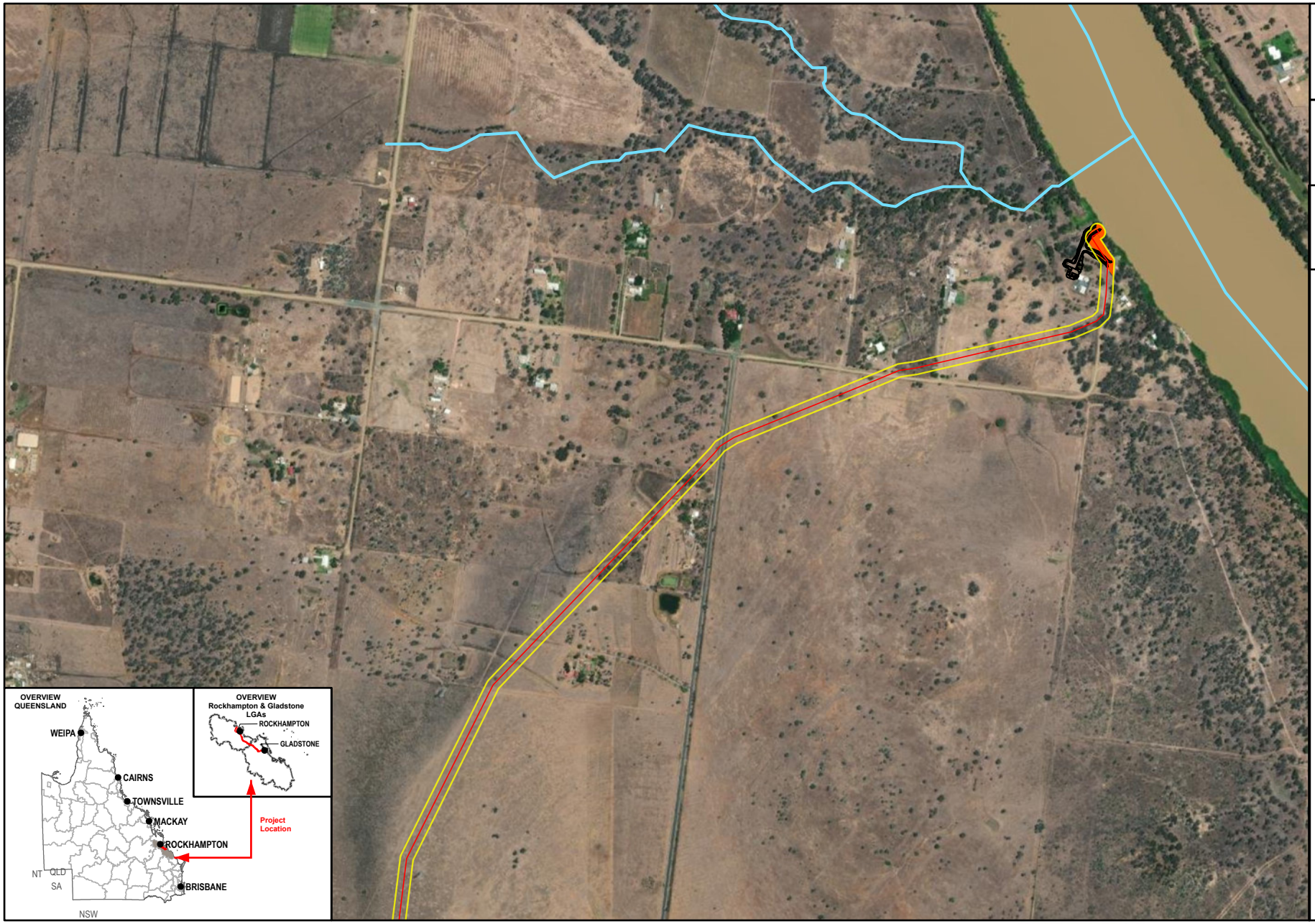
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-22e
Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
000-G-MAP-2443 Version:4 Date:21/09/2022



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Legend

- GSDA Pipeline Alignment
- Study Area

Predicted Squatter Pigeon (Southern) Habitat

Habitat Type

- Potential Foraging Habitat
- 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 7-22f
Distribution of Squatter Pigeon Habitat Within the Northern Section Study Area
000-G-MAP-2443 Version:4 Date:21/09/2022

7.3.1.2 White-throated needletail

Conservation status and species ecology

The white-throated needletail (*Hirundapus caudacutus*) is listed as vulnerable and migratory under the EPBC Act and vulnerable under the NC Act. The species was not listed as an MNES at the time of the approval. The species is almost exclusively aerial, occurring from heights of less than 1 m up to more than 1000 m above the ground (TSSC 2019). Recent research has shown that while the species is predominantly aerial, the white-throated needletail does roost on land at least occasionally, with roosts typically located in tall woodland on ridgelines and clifftops, where the birds can easily alight (Tarburton 2021). The species forages at heights up to cloud height over a range of habitat types including woodland, open forest, rainforest, heathland and partly cleared pasture and agricultural land (TSSC 2019). The species does not breed in Australia but occurs widely throughout Australia during the non-breeding period (TSSC 2019).

Field survey results and distribution of suitable habitat

The species was not recorded in field surveys but is considered likely to occur due to the presence of nearby historical records and the species' wide-ranging nature. Substantial areas of potential roosting habitat are located on ridgetops, east of the Northern Section study area. No suitable roosting habitat occurs within or immediately adjacent to the Northern Section study area. The species has the potential to forage across the entire Northern Section study area at heights between 15 m and 1000 m.

Significance of impact assessment

The project is unlikely to result in a significant residual impact on the white-throated needletail. A significance of impact assessment of the project on the white-throated needletail (vulnerable under the EPBC Act and NC Act) is provided in Table 7-42.

Table 7-42 Significance of impact on the white-throated needletail

Significant residual impact criteria	Assessment
A long-term decrease in the size of a local population	**Unlikely** While the white-throated needletail was not recorded in the Northern Section field surveys, the species has been historically recorded in the desktop search extent. The species is regarded as a transient visitor to the Northern Section study area, through the region in response to climatic conditions (e.g. bushfires, wind fronts and storm fronts). Given the species' capacity for large-scale migration and its enigmatic patterns of movement and occurrence, the concept of 'localised populations' is difficult to ascribe to this bird., The species is predominantly aerial and is generally not reliant on terrestrial habitats (DCCEEW 2022i). While the species does occasionally utilise terrestrial roosting sites, all nearby terrestrial roosting habitats are located on ridgetops away from the project and is unlikely to be directly or indirectly impacted by the construction and operation of the project.
Reduce the extent of occurrence of the species	**Unlikely** No potential habitat for the white-throated needletail will be directly or indirectly impacted by the project. The species has an extensive capacity for movement and is unlikely to experience any localised decline that would cause the species to no longer persist within the area. The project is likely to be relatively benign in its impact on the species during the operational phase.
Fragment an existing population	**Unlikely** The white-throated needletail is highly nomadic and can form large, mixed-species feeding flocks. This near-exclusively aerial, migratory species is capable of long-distance flight. The species' movements is unlikely to be restricted by the project. As such, the project is unlikely toto fragment the existing population.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The species' capacity to move locally and regionally is unlikely to be limited by any localised land clearing necessary to construct the Northern Section pipeline alignment. As a result, the project is unlikely to cause any loss of gene transfer that would cause genetically distinct populations to form.

Significant residual impact criteria	Assessment
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** No invasive species are identified as threats to the white-throated needletail. The extent of clearing for the Northern Section pipeline alignment may increase the accessibility of introduced predators including dogs, foxes and cats into the site. Pest fauna management practices will be implemented throughout the construction and operations periods and are anticipated to decrease the abundance of invasive predators, further reducing the species vulnerability within the Northern Section pipeline alignment.
Introduce disease that may cause the population to decline	**Unlikely** Disease is not identified as a key threat to the white-throated needletail. This species' almost exclusively aerial habit means it is unlikely to have many opportunities to contract diseases that could threaten the viability of individuals and populations. The project is therefore unlikely to introduce disease that cause the species to decline.
Interfere with the recovery of the species	**Unlikely** The proposed works are considered unlikely to negative impact the species, let alone interfere with the recovery of the species.
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** The species is predominantly aerial, foraging at heights up to cloud height over a range of habitat types (TSSC 2019). The white-throated needletail is a non-breeding visitor to Australia, and breeds between October and April throughout Siberia, China, Japan and Mongolia (DCCEEW 2022i). As such, habitat within the Northern Section pipeline alignment is not considered ecologically significant.
Conclusion	The project is considered unlikely to result in a significant impact on the white-throated needletail. The species is predominantly aerial and all nearby terrestrial roosting habitats are located on ridgetops away from the project and will not be directly or indirectly impacted by the construction and operation of the project.

7.3.1.3 Koala

Conservation status and species ecology

The koala is listed as endangered under the EPBC Act and NC Act and was not listed as an MNES at the time of the approval. The koala occurs in Queensland, New South Wales, the Australian Capital Territory, Victoria and South Australia. The species' occurrence is discontinuous across its distribution with several subpopulations separated by cleared lands and unsuitable habitat (DAWE 2022a). They are a wide-ranging species, typically occurring in forests and woodlands dominated by *Eucalyptus* species (DAWE 2022a). The species occurs in coastal and inland habitats – in Queensland this spans north Queensland to the Herberton area, westwards into semi-arid parts of central Queensland, and south into New South Wales (DAWE 2022a). The koala's range is restricted by food, habitat and environmental requirements, resulting in highly variable home range sizes. In Queensland and New South Wales, home ranges vary from 3 to 500 ha (DAWE 2022a), with home range increasing as trees become more widely spaced (DAWE 2022a; Youngentob 2021). Males typically have larger home ranges than females, and in general, home ranges are larger in semi-arid woodlands than in mesic coastal forests (DAWE 2022a). Since European colonisation, the koala's distribution and population size has declined significantly as a result of vegetation clearance and climate change drivers (DAWE 2022a).

In Queensland, koala inhabit moist coastal forests, southern and central western subhumid woodlands and eucalypt woodlands adjacent to waterbodies in semi-arid western parts of the state (Youngentob 2021). The species' occurrence is patchy, fragmented and often occurs in low-density populations across a number of bioregions including north to Einasleigh Uplands and Wet Tropics, Desert Uplands, Central Mackay Coast, Mitchell Grass Downs, Mulga Lands, Brigalow Belt North, Brigalow Belt South, and Southeastern Queensland where they are most frequently sighted (DAWE 2022a; Youngentob 2021).

The koala is an obligate folivore and its highly specialised diet Is defined by the availability and palatability of a limited variety of *Eucalyptus, Corymbia* and *Angophora* species (Youngentob 2021). Primary food species differ across the species' range – koalas have been recorded to feed on more than 120 species of *Eucalyptus,*

Corymbia and *Angophora* species. The koala is a relatively sedentary species, with movement increasing during the breeding period (September to February) (DAWE 2022a).

In the assessment of habitat quantity and quality, the National Recovery Plan for the koala (DAWE 2022b) highlights the importance of considering landscape patch size, form and spatial configuration within the context of the wider landscape, which can vary among landscapes and varies regionally (DAWE 2022b). Research has shown that koalas move very differently through different landscapes, depending on the level of habitat connectivity that has been retained (DAWE 2022b). In contiguous landscapes with high connectivity, koalas move slowly between koala habitat trees along vegetated watercourses, roadsides and other areas of functional connectivity. This increases their energetic efficiency and reduces their susceptibility to predation (DAWE 2020b). In more fragmented landscapes, koalas follow more direct movement pathways and demonstrate an increased willingness to cross open areas at ground level to move between isolated patches of vegetation (DAWE 2022b) albeit their safety is at risk and the open and exposed landscape proves to be a hostile environment (DAWE 2022b). In the context of a contiguous landscape, where high levels of linear habitat connectivity are retained along watercourses, vegetated roadsides and fence lines and where dog attacks on livestock have been reported by local landholders, large open paddocks are expected to receive low levels of utilisation by koalas.

Field survey results and distribution of suitable habitat

The koala was not recorded during the field surveys within the Northern Section study area. Survey effort for the koala included one night of 2-3 hours of spotlighting and faecal pellet searches at four locations within potentially suitable habitat in the Northern Section study area. The species has been historically recorded at five locations within the desktop search extent, the most recent recorded in 2011.

Potentially suitable habitat for this species was widespread within the Northern Section study area, particularly within habitats retaining koala food trees (i.e. *Melaleuca*, *Eucalyptus*, *Corymbia* and *Acacia* species) and fringing riparian vegetation. The distribution of predicted koala habitat was based on criteria detailed in Appendix F and is mapped in Figure 7-23. Habitat assessments undertaken within the Northern Section study area involved taking representative photos of the vegetation and general habitat. Eight habitat assessment sites within the Northern Section study area were selected to illustrate suitable habitat for the koala, as well as presenting photos of areas that do not represent suitable habitat due to the lack of koala food and shelter trees. Each survey photo reference number refers to the photo that was taken at that habitat assessment site and is presented in Appendix G. Of those eight habitat assessment site photos, two photos (i.e. photo number 32 and 35) represent suitable koala habitat.

Significance of impact assessment

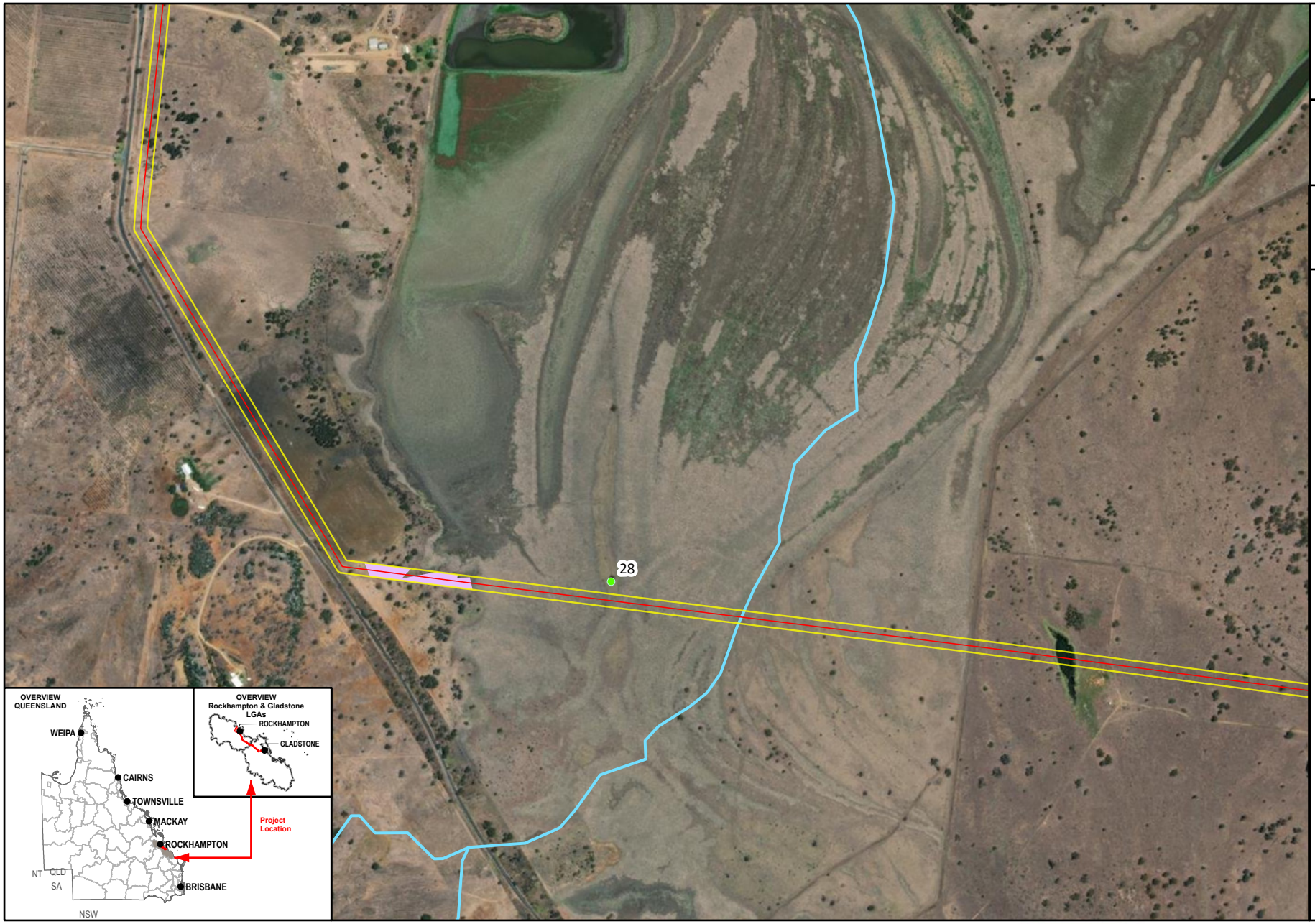
The project is unlikely to result in a significant residual impact on the koala. A significance of impact assessment of the project on the koala (endangered under the EPBC Act and NC Act) is provided in Table 7-43.

Table 7-43 Significance of impact on the koala

Significant residual impact criteria	Potential to occur
A long-term decrease in the size of a local population	**Unlikely** The koala population within the Northern Section study area is considered an important population in the accordance with the Commonwealth approved conservation advice. The koala has been historically recorded at five locations within the desktop search extent (10 km buffer). No individuals or evidence of presence was recorded during the 2022 field surveys. Based on the ecological field surveys and species ecology, koalas are predicted to occur at low densities within the Northern Section pipeline alignment. The project is anticipated to result in the loss of 5.26 ha of suitable koala habitat. This represents 0.17% of regional habitat (i.e. available within a 5 km buffer). The maximum width of clearing required for construction of the Northern Section pipeline alignment is 30 m. Once the pipeline has been installed and buried, a maximum width of 10 m will be permanently cleared with the remaining 20 m to be rehabilitated. The Northern Section pipeline alignment largely supports open landscapes that have been previously cleared for agricultural purposes with suitable koala habitat occurring along riparian corridors and large *Eucalyptus* and *Corymbia* trees occurring sparsely throughout the landscape.

Significant residual impact criteria	Potential to occur
	Relatively large areas of suitable habitat will persist in the surrounding landscape allowing opportunities for movement, including woodland habitats, riparian corridors and large areas of remnant habitat. Construction and operation impacts associated with the project are unlikely to have permanent impacts on the persistence of local and regional koala populations. Based on the scarcity of historical records and lack of koala traces in field surveys, koalas are likely to occur in low local densities. While the loss of 40.92 ha of suitable habitat will reduce the local availability of koala food and shelter trees, this is unlikely to lead to excessive competition for resources, given the low koala densities. The local loss of resources is therefore likely to be absorbed within remaining habitat in areas adjacent to the Northern Section pipeline alignment. Therefore, the local koala population is not expected to experience a significant reduction in foraging and breeding success due to any increase in competition for resources.
Reduce the extent of occurrence of the species	**Unlikely** The project is anticipated to result in the loss of 5.26 ha of suitable koala habitat. This represents 0.17% of regional habitat (i.e. available within a 5 km buffer A maximum width of 30 m will be cleared for construction of the Northern Section pipeline alignment, with 20 m to be rehabilitated after the pipeline has been installed and buried. A large proportion of the Northern Section study area has been previously cleared for agricultural purposes. Large areas of suitable koala habitat will persist within the landscape and along riparian corridors immediately adjacent to the Northern Section pipeline alignment. The project is unlikely to disrupt connectivity to the extent that movement between remnant patches will be disrupted. As such, there is not expected to be a change in the extent of occurrence of the species, especially noting the definition of extent of occurrence per the Queensland *Significant Residual Impact Guideline* (DEHP 2014b): *Extent of occurrence is defined as the area contained within the shortest continuous imaginary boundary which can be drawn to encompass all the known, inferred or projected sites of present occurrence of a taxon*.
Fragment an existing population	**Unlikely** A maximum width of 30 m will be cleared for construction of the Northern Section pipeline alignment, with 20 m to be rehabilitated after the pipeline has been installed and buried. A large proportion of the Northern Section study area has been previously cleared for agricultural and pastural purposes. Much of the Northern Section pipeline alignment is expected to clear small areas of regrowth vegetation, fringing vegetation along waterways and large, isolated *Eucalyptus* and *Corymbia* tree species. Habitat loss within the Northern Section pipeline alignment is not expected to impact connectivity with surrounding koala habitat as the habitat losses will be localised and is not considered to create large gaps to disrupt koala movement. Connectivity will persist within the landscape and along riparian corridors immediately adjacent to the Northern Section pipeline alignment. Therefore, the project is unlikely to fragment an existing koala population. It is noted that the local koala population in the landscape is likely to be very low, noting the low number of historic records and no contemporary records from 2022 field surveys.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** As detailed above, the species' capacity to move locally and regionally is unlikely to be limited by any localised land clearing necessary to construct the Northern Section pipeline alignment. As a result, the project is not considered to cause any form of genetic isolation at a population level.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** Invasive species including wild dogs already occur throughout the area. Predatory species are attracted to prey opportunities presented by cleared corridors or prey moving away from disturbance areas. While new infrastructure has the potential to increase the risk of wild dog attack on koala by facilitating regional movement of dogs, these threats are already present within the receiving environment and are not likely to be exacerbated by the project. Feral animal control measures will be implemented throughout the duration of the project and have been designed to mitigate such risks. There is also potential for the spread of invasive weeds during the construction and operation phase. This potential will be addressed within the EMP and could provide the opportunity to enhance the quality of the environment utilised by the koala by providing mitigation measures to combat introduced species. The eradication of ground-covering weeds could enhance local koala movement. Upon mitigation, the project is unlikely to result in the introduction of invasive species that are harmful to the koala.

Significant residual impact criteria	Potential to occur
Introduce disease that may cause the population to decline	**Unlikely** The project is not anticipated to introduce new diseases that may cause the species to decline. Stress may lead to an increase in the expression of chlamydia in koalas; however, the implementation of mitigation measure such as sequential clearing, site speed limits, use of experienced spotter-catchers during clearing and the requirement to allow koalas to self-disperse will reduce disturbance-related stress and risk of disease. Additionally, the species is susceptible to *Phytophthora cinnamomi* due the soil fungus's ability to infect *Eucalyptus* species. Biosecurity requirements (e.g. weed and seed declarations) will be implemented for the project, and thus, this risk has been assessed as low.
Interfere with the recovery of the species	**Unlikely** The project is expected to be relatively benign with no substantial long-term increase in mortality or any substantial barrier effects due to loss of habitat connectivity. All impacts are expected to be localised. Impacts along the Northern Section pipeline alignment are expected to be consistent with existing levels of impact from habitat fragmentation and exposure to road noise and traffic. The risk of koala mortality of injury will be managed by the mitigation measures contained within the CEMP, and an experienced and suitably qualified fauna spotter-catcher will be employed during all clearing works. Accordingly, the project is unlikely to substantially interfere with the recovery of the species.
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** The project will require the clearing of 5.26 ha of potentially suitable foraging and breeding habitat for the koala. the Northern Section pipeline alignment has largely been placed within or adjacent to areas that have been historically cleared and retains predominately open landscapes, regrowth and isolated paddock trees. Given the project will result in a small loss of koala food trees (i.e. *Melaleuca*, *Eucalyptus, Corymbia* and *Acacia* species),, it is likely to result in disruption to ecologically significant koala feeding locations.
Conclusion	The project is unlikely to result in a significant residual impact on the koala. The Northern Section pipeline alignment has been largely placed within or adjacent to areas that have been previously cleared and will result in a small loss of 5.26 ha of suitable foraging habitat (.e. *Melaleuca*, *Eucalyptus, Corymbia* and *Acacia* species) and breeding habitat.



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- Northern Section Pipeline Alignment
- Study Area
- Survey Photo Reference Number
- Predicted Koala Habitat
- Waterways

Data Sources:
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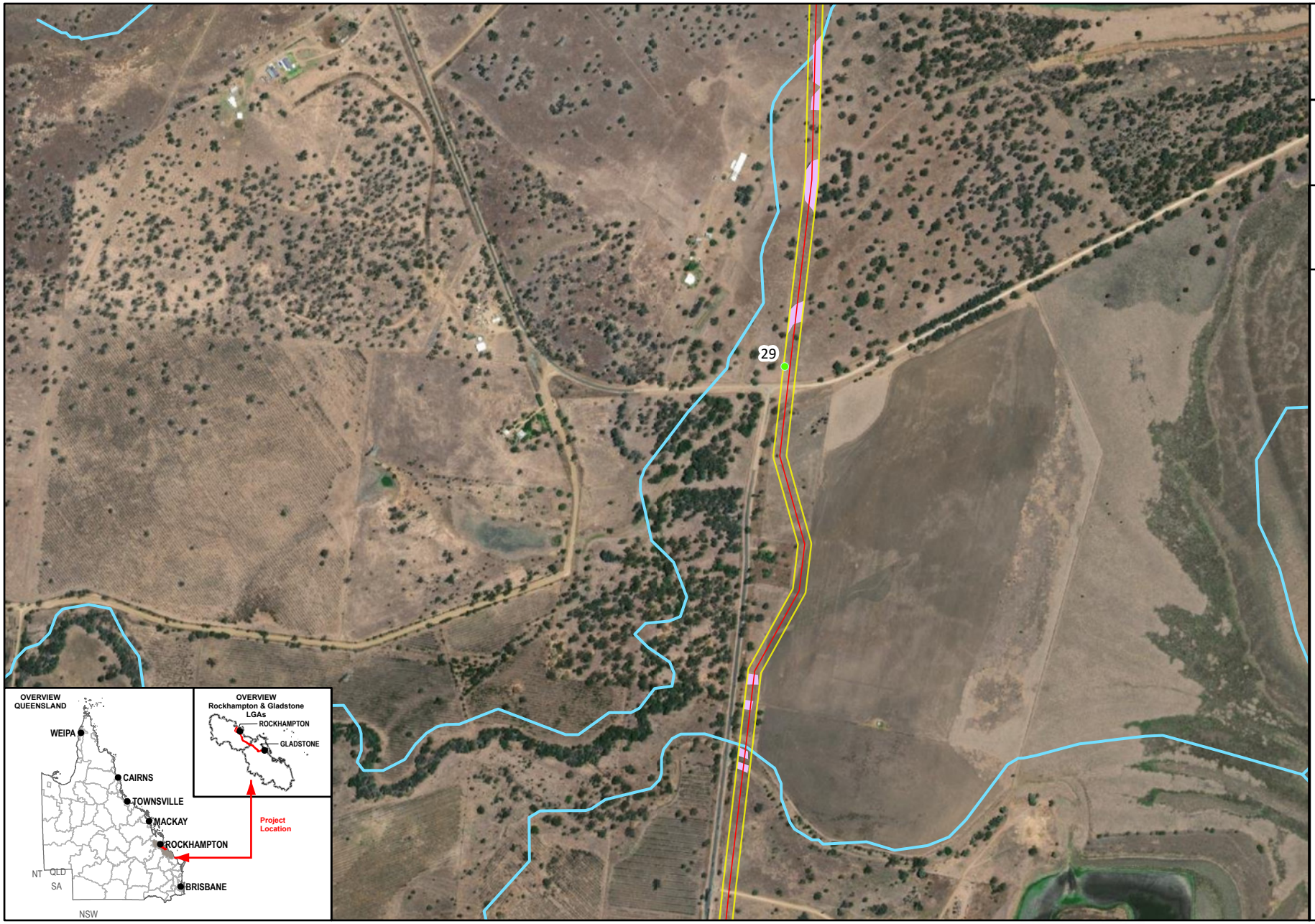
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-23a
Distribution of Koala Habitat Within the Northern Section Study Area

000-G-MAP-2444 Version:3 Date:20/09/2022



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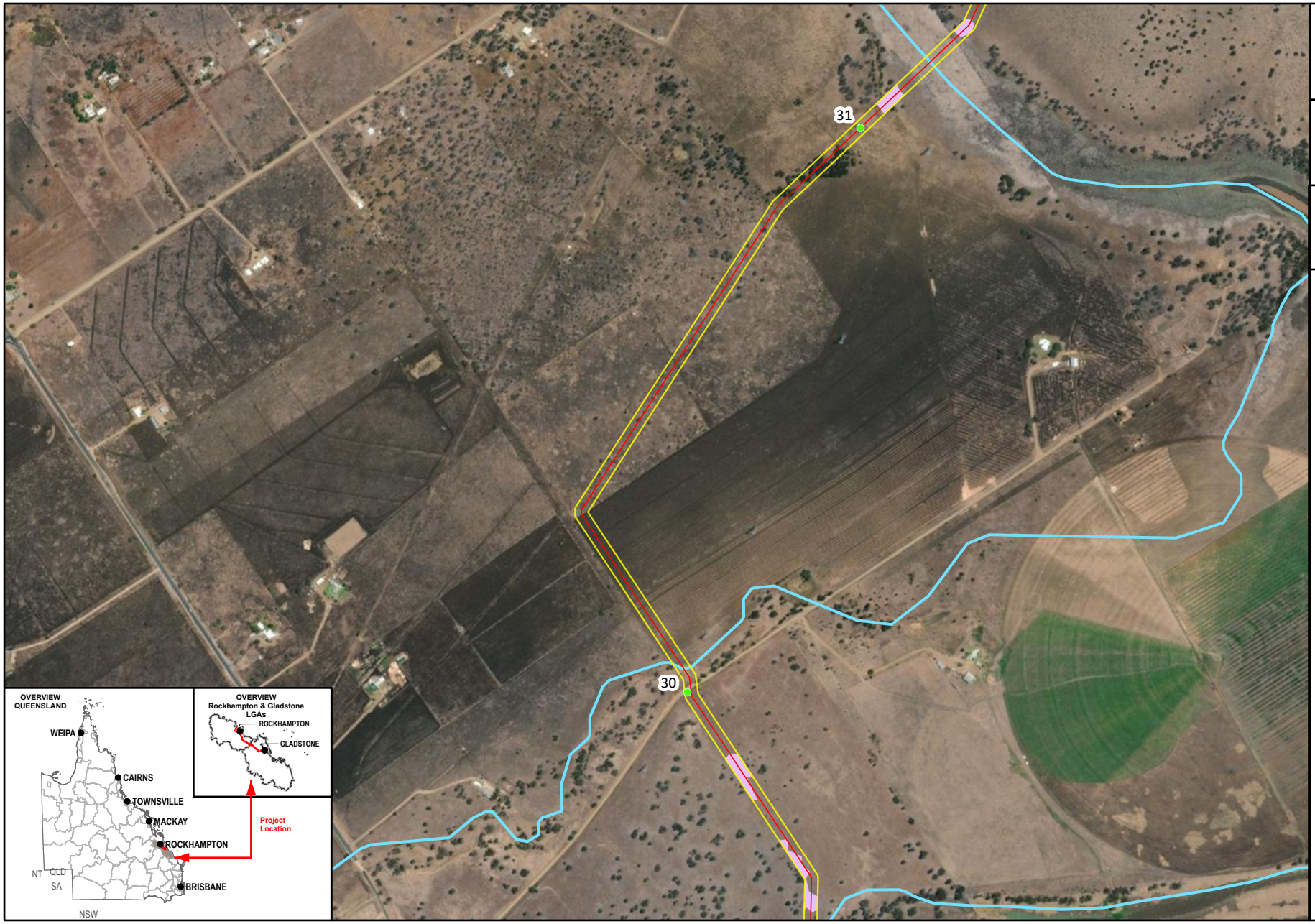

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Distribution of Koala Habitat Within the Northern Section Study Area

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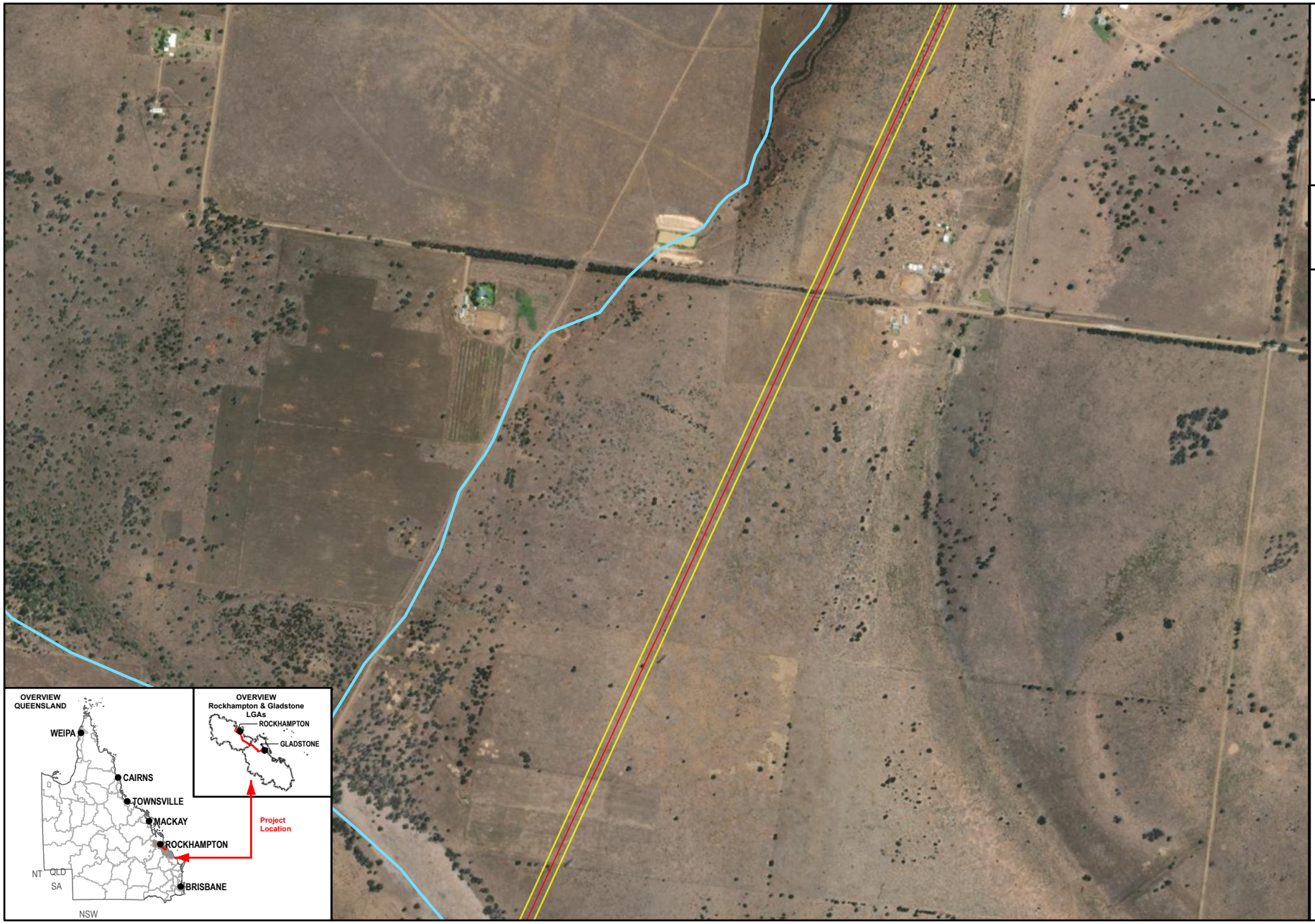

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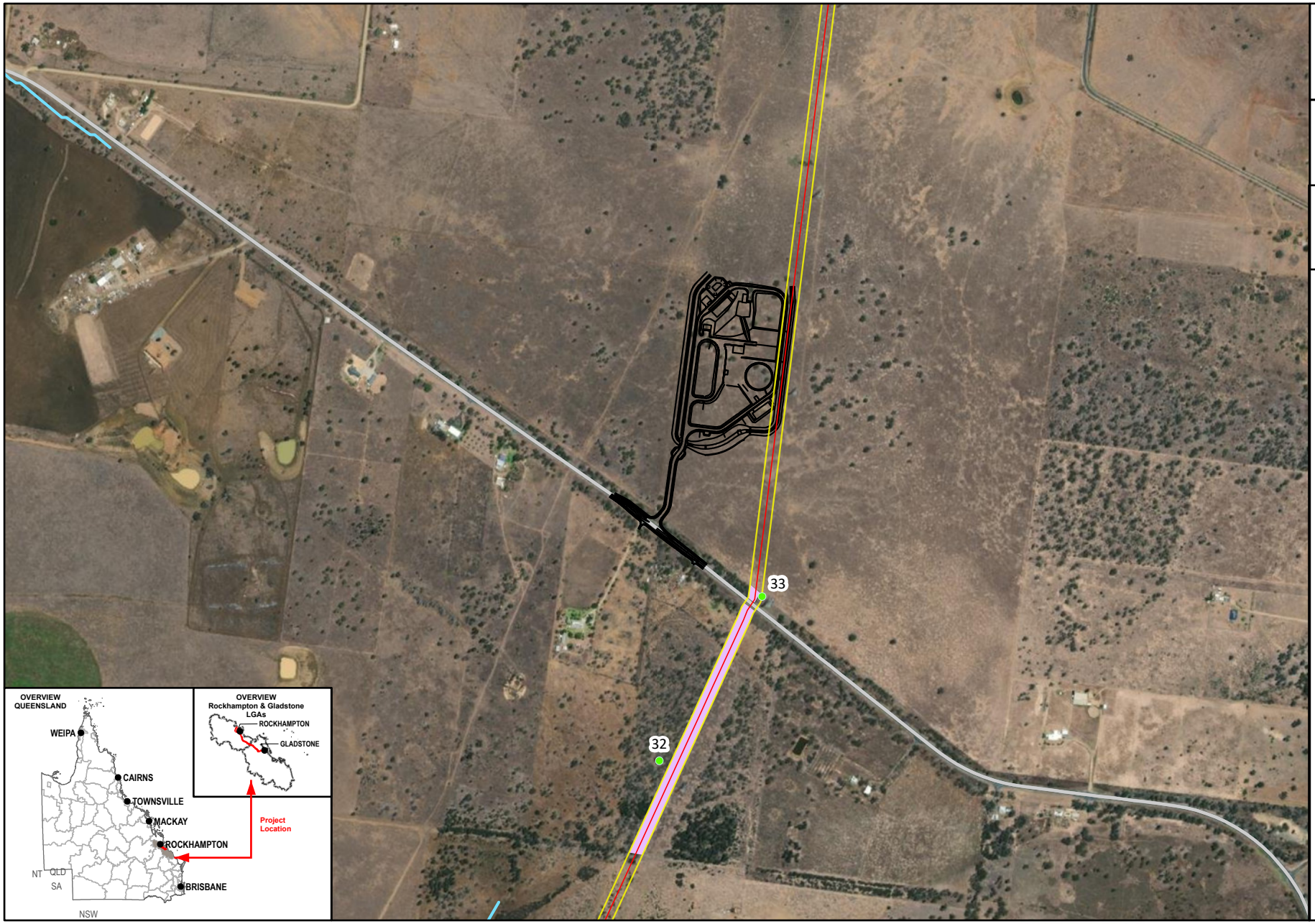
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-23d
Distribution of Koala Habitat Within the Northern Section Study Area

000-G-MAP-2444 Version:3 Date:20/09/2022



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- Northern Section Pipeline Alignment
- Study Area
- Survey Photo Reference Number
- Predicted Koala Habitat
- Alton Down WTP, Pump Station and Reservoir Layout
- Waterways
- 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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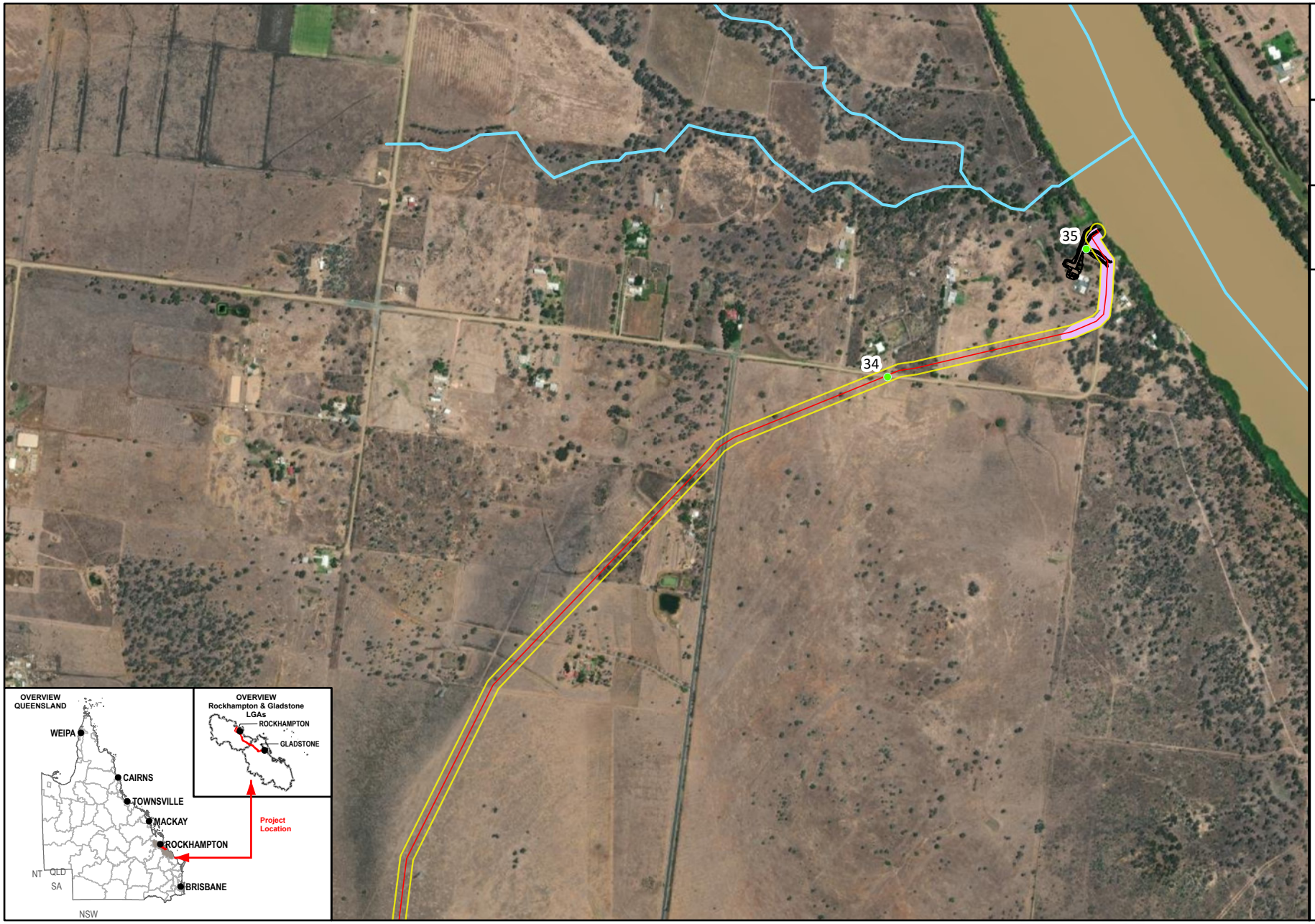
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-23e
Distribution of Koala Habitat Within the Northern Section Study Area

000-G-MAP-2444 Version:3 Date:20/09/2022



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- Northern Section Pipeline Alignment
- Study Area
- Survey Photo Reference Number
- Predicted Koala Habitat
- Fitzroy River Intake and Pump Station Layout
- Waterways

Data Sources:
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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-23f
Distribution of Koala Habitat Within the Northern Section Study Area

000-G-MAP-2444 Version:3 Date:20/09/2022

7.3.1.4 Australian painted snipe

Conservation status and species ecology

The Australian painted snipe is listed as endangered under the EPBC Act and NC Act and was listed as an MNES at the time of the approval. The Australian painted snipe is recorded in wetlands in all states of Australia. The most common occurrence is eastern Australia, scattered through much of Queensland, NSW, Victoria and south-eastern South Australia (DoE 2022). They occur in shallow freshwater wetlands, both ephemeral and permanent, including lakes, swamps, inundated or waterlogged grassland/saltmarsh, dams, sewage farms and bore drains (DSEWPC 2013). Nests are often placed in a scrape in the ground and is either a shallow bowl shaped made of dry grass or other material or has scant lining (DoE 2022). These are often located in swamps, cane grass swamps, flooded areas, grazing lands, among cumbungi, sedges, grasses, saltwater couch, saltbush and grass. The diet of the Australian painted snipe consists of vegetation, seeds, insects, worms and molluscs, crustaceans and other invertebrates (DoE 2022).

Field survey results and distribution of suitable habitat

The Australian painted snipe was not recorded during the field surveys within the Northern Section study area. Survey effort for the Australian painted snipe included two bird surveys within suitable wetland habitats in the Northern Section study area. The species is considered likely to occur due to the presence of suitable habitat and the species has been historically recorded at four locations within the desktop search extent (10 km buffer). Suitable habitat for the species was recorded at freshwater waterbodies and seasonal wetlands within the Northern Section study area. The distribution of predicted Australian painted snipe habitat is mapped in Figure 7-24.

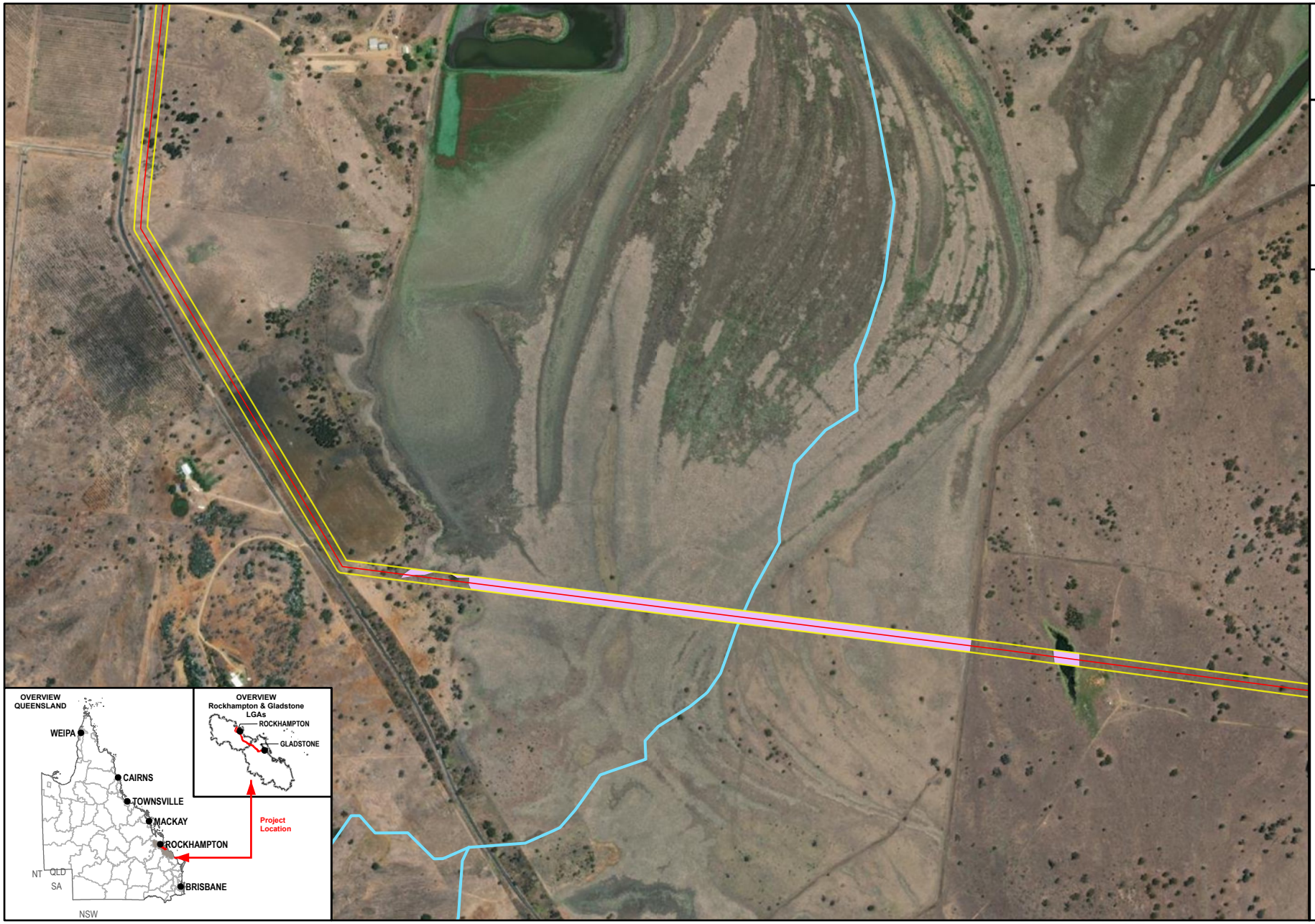
Significance of impact assessment

The project is considered unlikely to result in a significant residual impact on the Australian painted snipe. A significance of impact assessment of the project on the Australian painted snipe (endangered under the EPBC Act and NC Act) is provided in Table 7-44.

Table 7-44 Significance of impact on the Australian painted snipe

Significant residual impact criteria	Potential to occur
A long-term decrease in the size of a local population	**Unlikely** The Australian painted snipe is not considered to have a limited geographic distribution as it occurs within suitable habitat in all states and territories, although the Murray Darling Basin is considered a stronghold. There are no records for the species directly within Northern Section pipeline alignment; however, there are records within the greater Gladstone and Rockhampton region. Given the irregularity of records, there does not appear to be a resident local population and individuals sighted are likely transient. As such, the removal of 4.53 ha of potential habitat identified within the disturbance footprint is highly unlikely to lead to a long-term decrease in the size of the species' population.
Reduce the extent of occurrence of the species	**Unlikely** Occurrence of the species within the Northern Section pipeline alignment has not been recorded; however, records in the greater area are variable temporally and spatially. The species has irregular movements almost continent wide, and individuals likely access suitable foraging habitat based on availability. As such, the removal of 4.53 ha of potential habitat is unlikely to reduce the extent of occurrence of the species. Although the removal of habitat may marginally reduce availability of resources at a local scale, the habitat impacted by the project is not considered likely to reduce the extent of occurrence of the species within the greater landscape or subregion.
Fragment an existing population	**Unlikely** A maximum width of 30 m will be cleared for construction of the Northern Section pipeline alignment, with 20 m to be rehabilitated after the pipeline has been installed and buried. As the Northern Section pipeline alignment is narrow and linear and the Australian painted snipe is highly mobile, the project is unlikely to fragment the Australian painted snipe population.

Significant residual impact criteria	Potential to occur
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The species' capacity to move locally and regionally is unlikely to be limited by any localised land clearing necessary to construct the Northern Section pipeline alignment. As a result, the project is not considered to cause any loss of gene transfer that would cause genetically distinct populations to form.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	**Unlikely** Numerous invasive weeds and pasture grasses are currently well established within the Northern Section pipeline alignment. Implementation of a site-specific Weed and Pest Management Plan will reduce the risk of further weed spread. Therefore, the project is unlikely to result in the establishment of novel invasive species affecting Australian painted snipe habitat.
Introduce disease that may cause the population to decline	**Unlikely** Disease is not listed as a potential threat to the species. The project is unlikely to introduce a disease that may cause the species to decline.
Interfere with the recovery of the species	**Unlikely** Noting the above points relating to very limited if any effects on local populations (e.g. declines), extent of occurrence, fragmentation, invasive species, and disease, the project is not considered likely to interfere with the recovery of the Australian painted snipe.
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** While disturbance to individuals may be experienced during construction, this disturbance will be short-term such that no impact on the lifecycle of this species is anticipated. Furthermore, any disturbance during construction will be highly localised and therefore unlikely to impact ecologically significant locations of a species. This conclusion is based on the small extent of the proposed impact. Similarly, owing to the narrow clearing extent, food resources in the local landscape for the species' is unlikely to be substantially reduced and movement patterns are not anticipated to be impacted as there will be no functional disruption in habitat connectivity.
Conclusion	The project is unlikely to result in a significant residual impact on the Australian painted snipe. The project will result in a loss (4.53 ha) of potentially suitable foraging habitat for the Australian painted snipe; however, due to the narrow clearing extent, food resources in the local landscape for the species are unlikely to be substantially reduced and movement patterns are not anticipated to be impacted as there will be no functional disruption in habitat connectivity.



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- Northern Section Pipeline Alignment
- Study Area
- Predicted Australian Painted Snipe Habitat
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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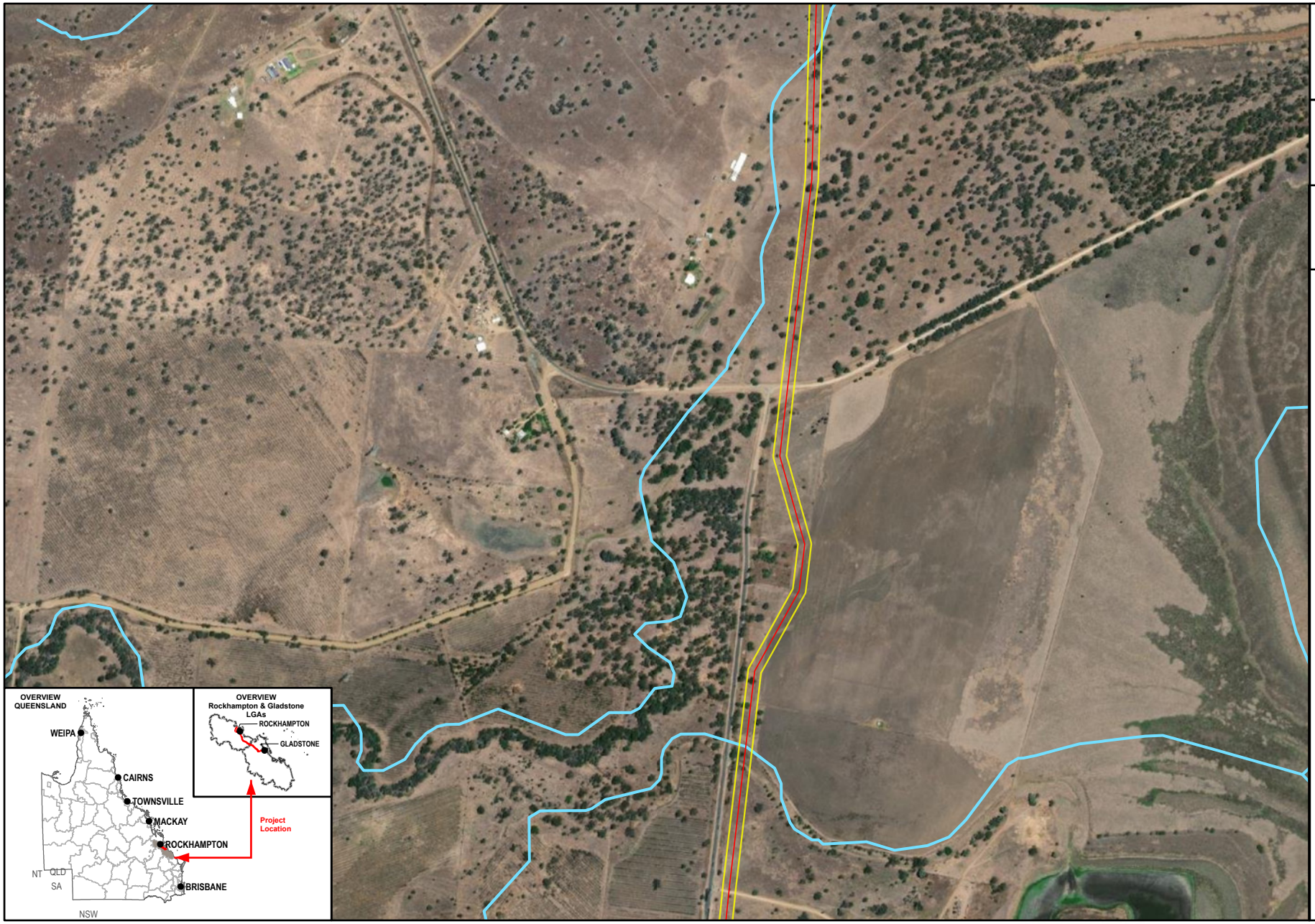
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24a
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area

000-G-MAP-2445 Version:4 Date:20/09/2022



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- Northern Section Pipeline Alignment
- Study Area
- Waterways

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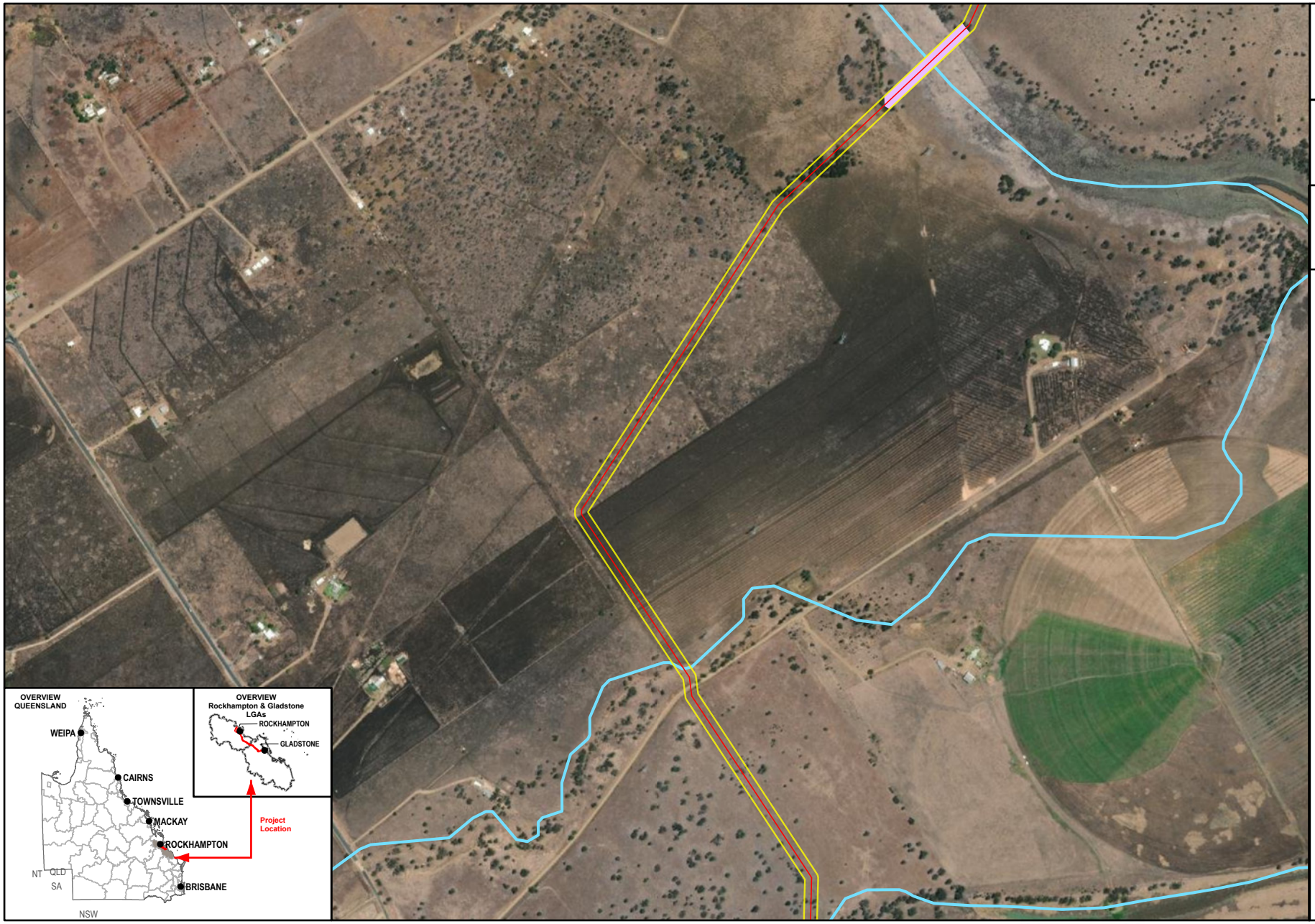
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24b
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area

000-G-MAP-2445 Version:4 Date:20/09/2022



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- Northern Section Pipeline Alignment
- Study Area
- Predicted Australian Painted Snipe Habitat
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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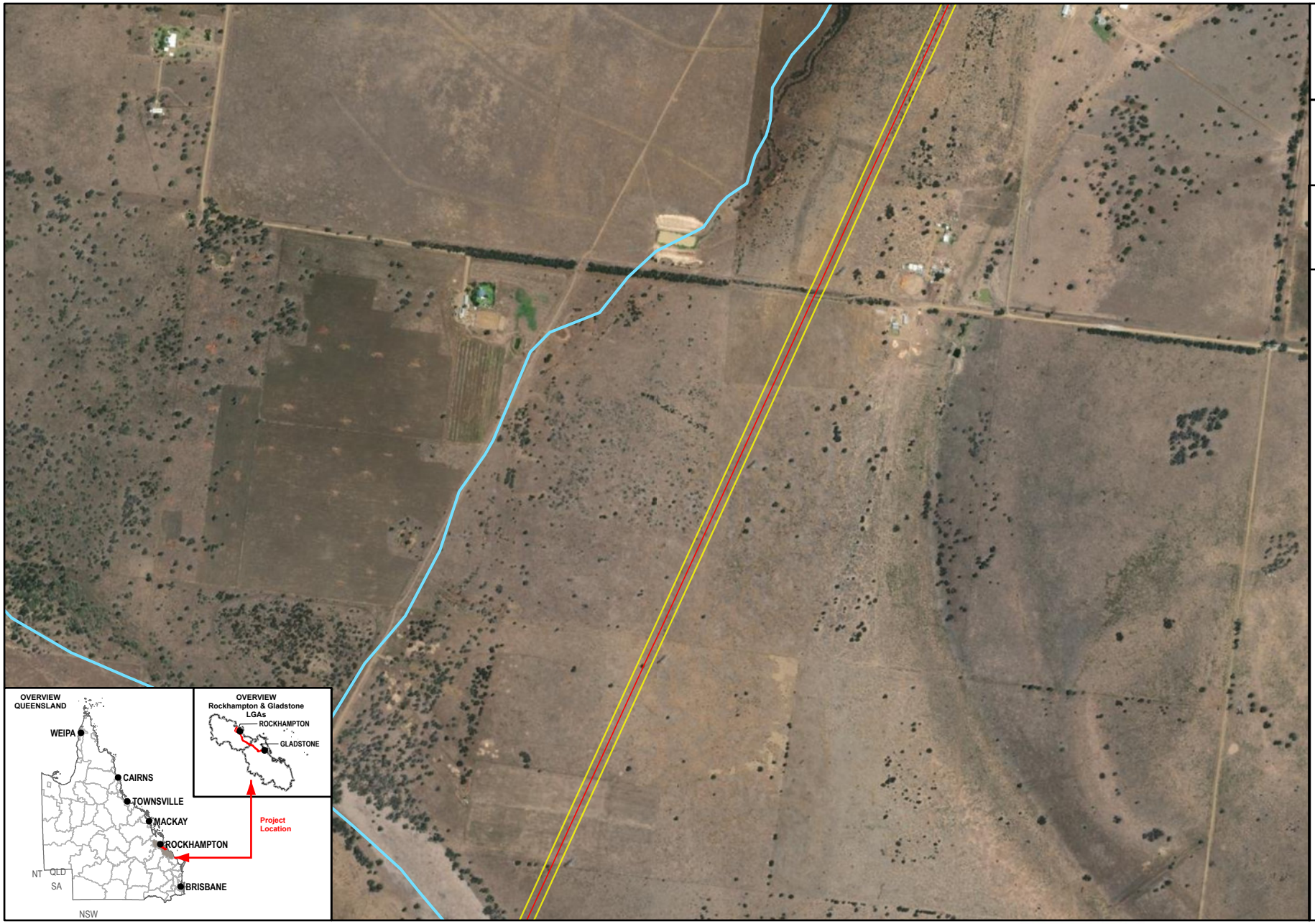
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24c
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area

000-G-MAP-2445 Version:4 Date:20/09/2022



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- Waterways

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24d
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area

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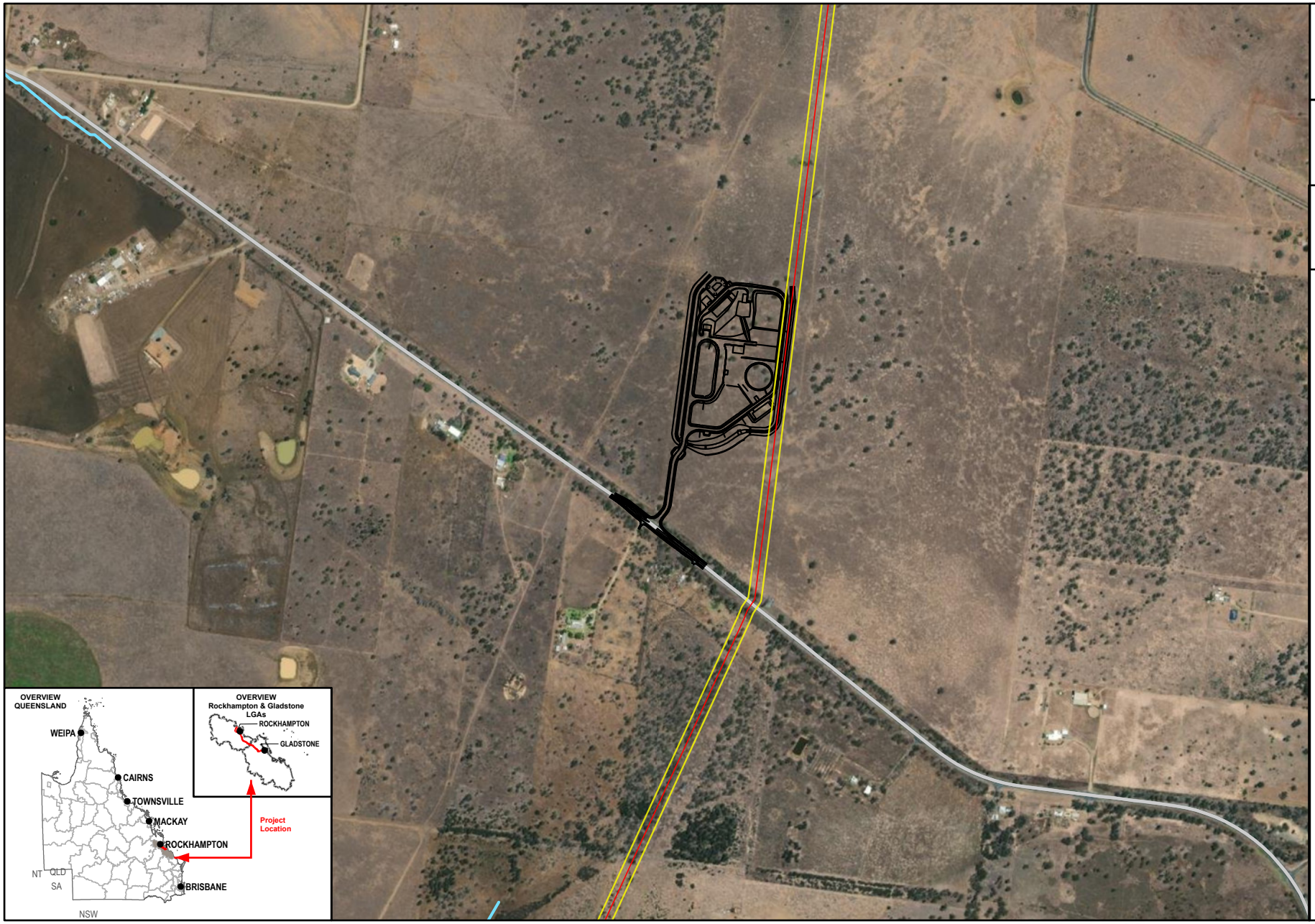

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Legend

- Northern Section Pipeline Alignment
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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24e
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area

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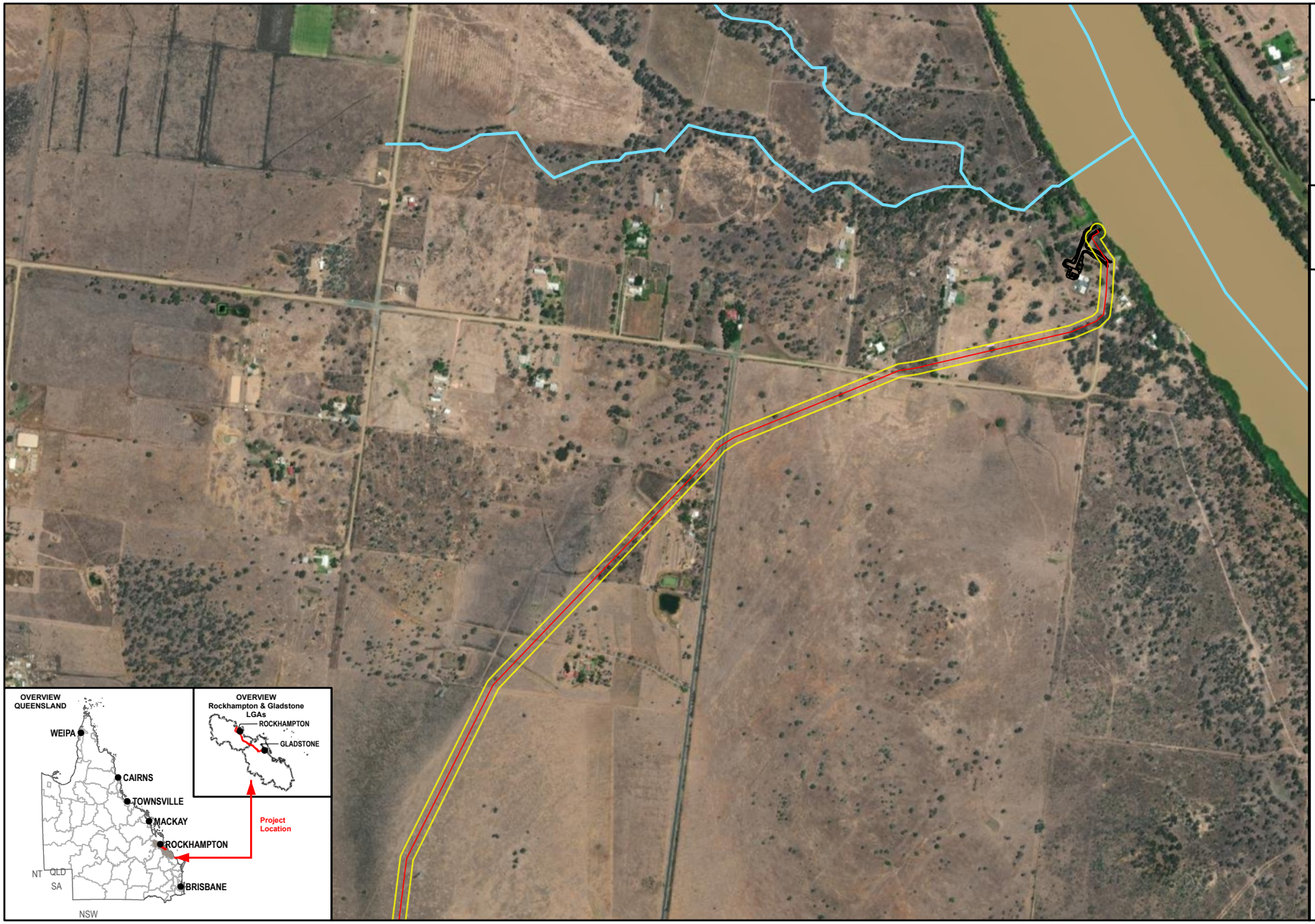

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-24f
Distribution of Australian Painted Snipe Habitat Within the Northern Section Study Area
000-G-MAP-2445 Version:4 Date:20/09/2022

7.3.1.5 Estuarine crocodile

Conservation status and species ecology

The estuarine crocodile is listed as marine and migratory under the EPBC Act and vulnerable under the NC Act. The species is found in a wide range of habitats including rivers, estuaries, creeks, swamps, lagoons, and billabongs. Within Queensland, the distribution of the estuarine crocodiles generally extends from Gladstone in the south through to the Cape York Peninsula in the north and across to the border with the Northern Territory in the west. Individual estuarine crocodiles have historically been observed as far south as the New South Wales border, with occasional contemporary records in the Mary River catchment. This species is limited in their upstream movement primarily by physical barriers such as escarpments and instream water infrastructure such as dams and weirs (Cogger 2000).

Field survey results and distribution of suitable habitat

The estuarine crocodile or species habitat was predicted likely to occur within the Northern Section area by the DCCEEW PMST results (DCCEEW 2022c). Optimal habitat occurs within Site 23 on the Fitzroy River (Figure 7-25), with a wide and large river system with a range of habitat types including resting banks and large deep waters. The species is known to occur throughout mid and lower reaches of the Fitzroy River (ALA 2022), which includes this site and therefore the species is likely to occur at this location. However, the absence of surface water in close proximity to the locations at sites 22, 25, 31, and 32 provides habitat that is unsuitable to support the presence of estuarine crocodiles or provide nesting habitats and therefore the species is unlikely to occur at these locations.

Significant Residual Impact Assessment

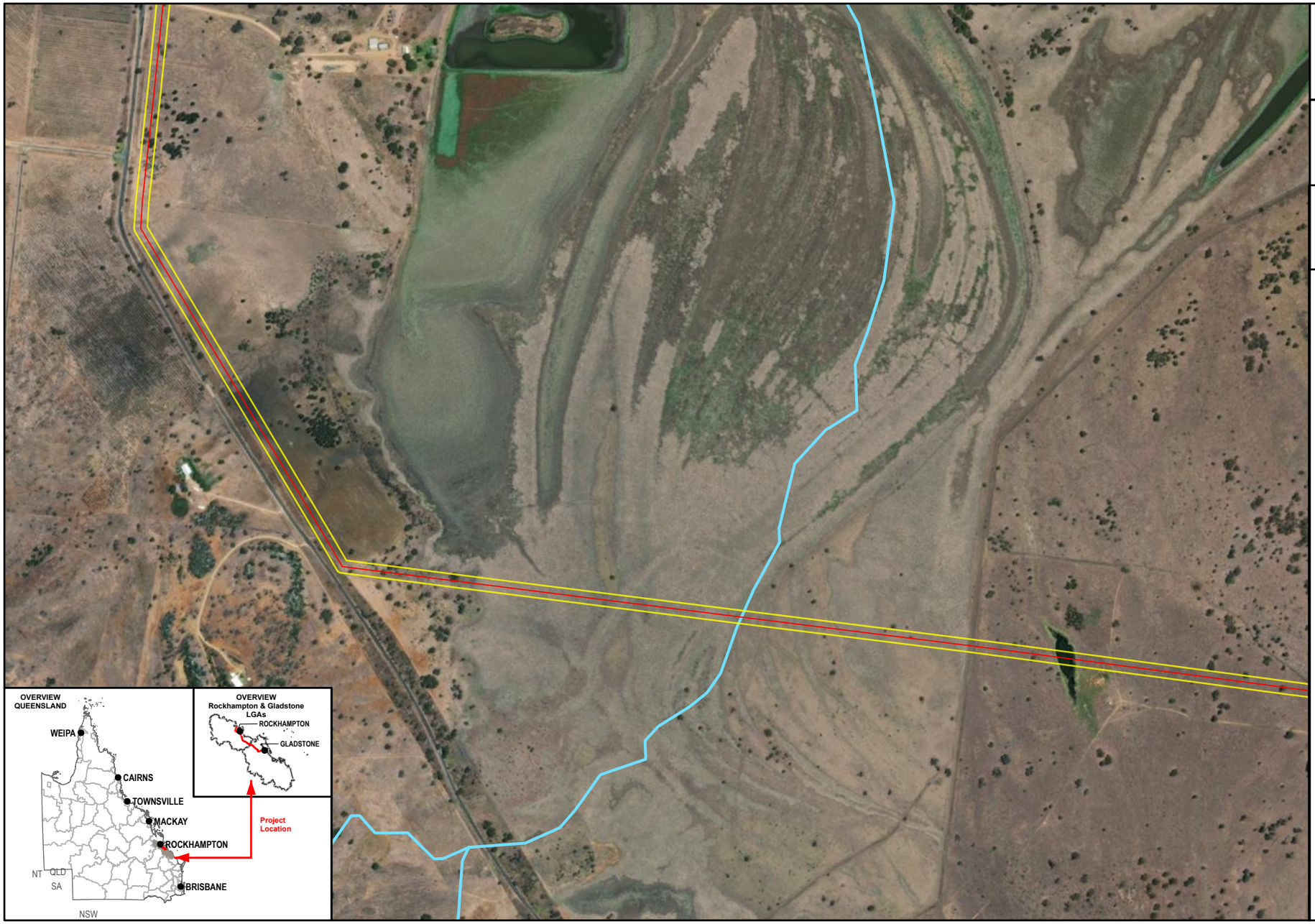
The project is unlikely to have a significant residual impact on the estuarine crocodile due to the temporary nature of the works and restoration of potential nesting banks after construction. A significance of impact assessment of the project on the estuarine crocodile (migratory EPBC Act, vulnerable NC Act) is provided in Table 7-45.

Table 7-45 Significance of impact on the estuarine crocodile

Significant residual impact criteria	Assessment
A long-term decrease in the size of a local population	**Unlikely** The estuarine crocodile is found in a wide range of habitats including rivers, estuaries, creeks, swamps, lagoons and billabongs. Within Queensland, the distribution of the estuarine crocodiles generally extends from Gladstone in the south through to the Cape York Peninsula in the north and across to the border with the Northern Territory in the west. This species is limited in their upstream movement primarily by physical barriers such as escarpments and instream water infrastructure such as dams and weirs (Cogger 2000). The estuarine crocodile or species habitat was predicted to occur within the study area by the PMST results. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 which provides optimal foraging habitat and potential nesting habitat. At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water. Works will be conducted at sites 22, 25, 31, and 32 during the dry season. Works at site 23 include the intake structure which will involve the localised disturbance of the bed and bank. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the estuarine crocodile. Design and implementation of a CEMP will further minimise risk to individual estuarine crocodile and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. The impact area for all sites will be rehabilitated and additional measures will be implemented in both the construction and operation phases of the intake structure as site 23 to minimise effects to localised disturbance of habitat degradation.

Significant residual impact criteria	Assessment
	No direct impacts to individuals upon a known population of estuarine crocodile within the Fitzroy River will occur. It is therefore unlikely to lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species	**Unlikely** The estuarine crocodile or species habitat was predicted to occur within the study area by the PMST results. At sites 22, 25, 31, and 32, the species is unlikely to occur due to the ephemeral nature of the sites and a lack of available surface water. Works will be conducted at sites 22, 25, 31, and 32 during the dry season, therefore not effecting the extent of occurrence of the species. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and potentially suitable nesting habitat. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the estuarine crocodile. The works will be restricted temporally to a small, localised area, with measures in place to ensure no long-term impacts to habitat. The population of estuarine crocodile will be maintained within, upstream and downstream of the pipeline intake location and therefore it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragment an existing population	**Unlikely** At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water and no fragmentation of the population will occur. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and potentially suitable nesting habitat. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) to avoid significant impact on flow and fauna movement. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the estuarine crocodile. The works will be restricted temporally to a small, localised area, with measures in place to ensure fragmentation of the species does not occur. These measures will ensure that no fragmentation of the population will occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The project is unlikely to fragment the species population and therefore is not considered to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** Introduced fish species in the Fitzroy River and surrounding waterways are not likely to be a key threatening process to the estuarine crocodile. The implementation of the CEMP and a Weed and Pest Management Plan will reduce the risk of introducing new invasive species or spreading existing weeds within the river. As such the project is not expected to result in the establishment of invasive species in crocodile habitat.
Introduce disease that may cause the population to decline	**Unlikely** There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that construction and operation of the intake structure and the waterway crossings will have the potential to introduce disease to the extent that the estuarine crocodile population will decline.

Significant residual impact criteria	Assessment
Interfere with the recovery of the species	**Unlikely** Habitat destruction and illegal harvesting are the major threats to the species (DAWE, 2022d). Threat abatement and recovery of the estuarine crocodile is focused on the sustainable harvesting of the species and the management of marine waters (DAWE, 2022d). Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Design and implementation of a CEMP will further minimise risk to individual estuarine crocodile and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. These measures will ensure that the project is unlikely to contribute to key threating processes or interfere with recovery actions.
Result in disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species	**Unlikely** At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water. With no population existing within these sites, the project is not expected to cause disruption to ecologically significant locations of a species. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and potentially suitable nesting habitat. The works will be restricted to a small, localised area around the site. The duration of works will be less than 180 days and will be restricted to avoid construction during the active season of the species during the wet season. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Works at this location will ensure that crocodiles cannot enter the construction zone whilst installation of the intake structure occurs. Water extraction rates will be monitored to avoid habitat degradation and maintain water quality with no impacts to crocodile or suitable habitat to occur during operation These measures result that the project is unlikely to cause disruption to ecologically significant locations of a species.
Conclusion	Due to the temporary nature of the construction works and restoration of potential nesting banks, the project is not expected to have a significant residual impact on the estuarine crocodile.



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Legend

- Northern Section Pipeline Alignment
- Study Area
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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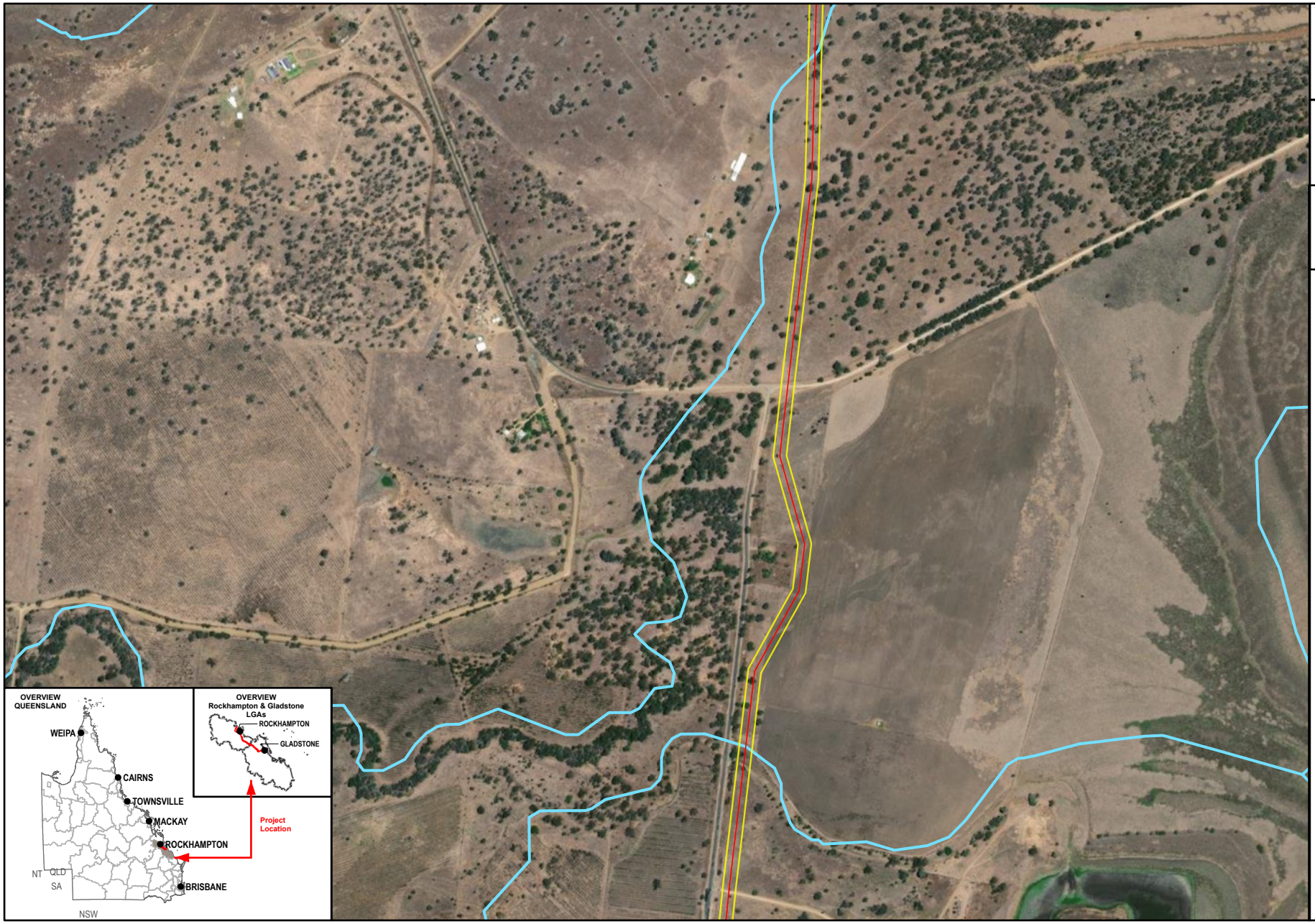
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-25a
Distribution of Estuarine Crocodile Habitat Within the Northern Section Study Area

000-G-MAP-2446 Version:3 Date:20/09/2022



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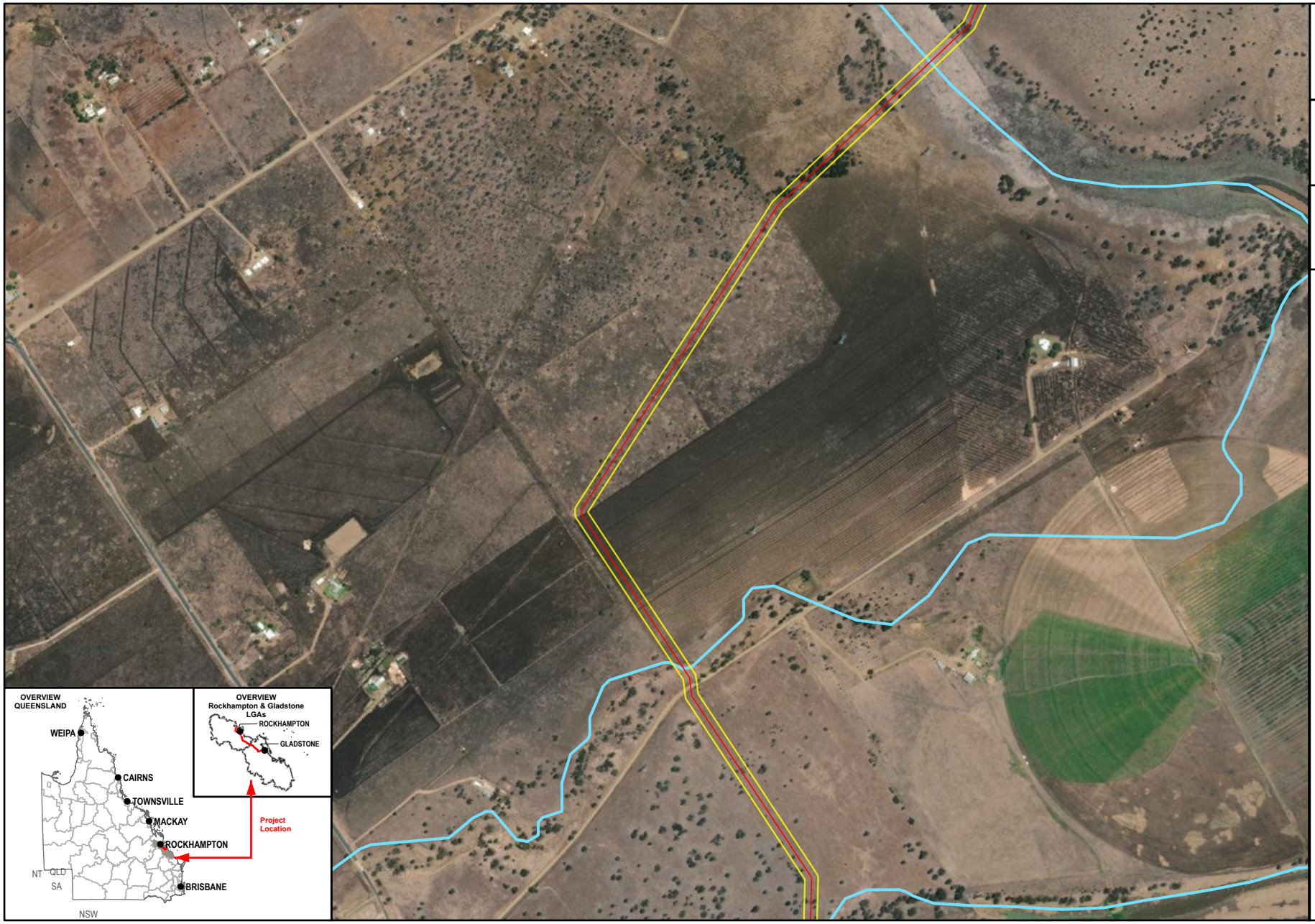

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- Waterways

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-25c
Distribution of Estuarine Crocodile Habitat Within the Northern Section Study Area

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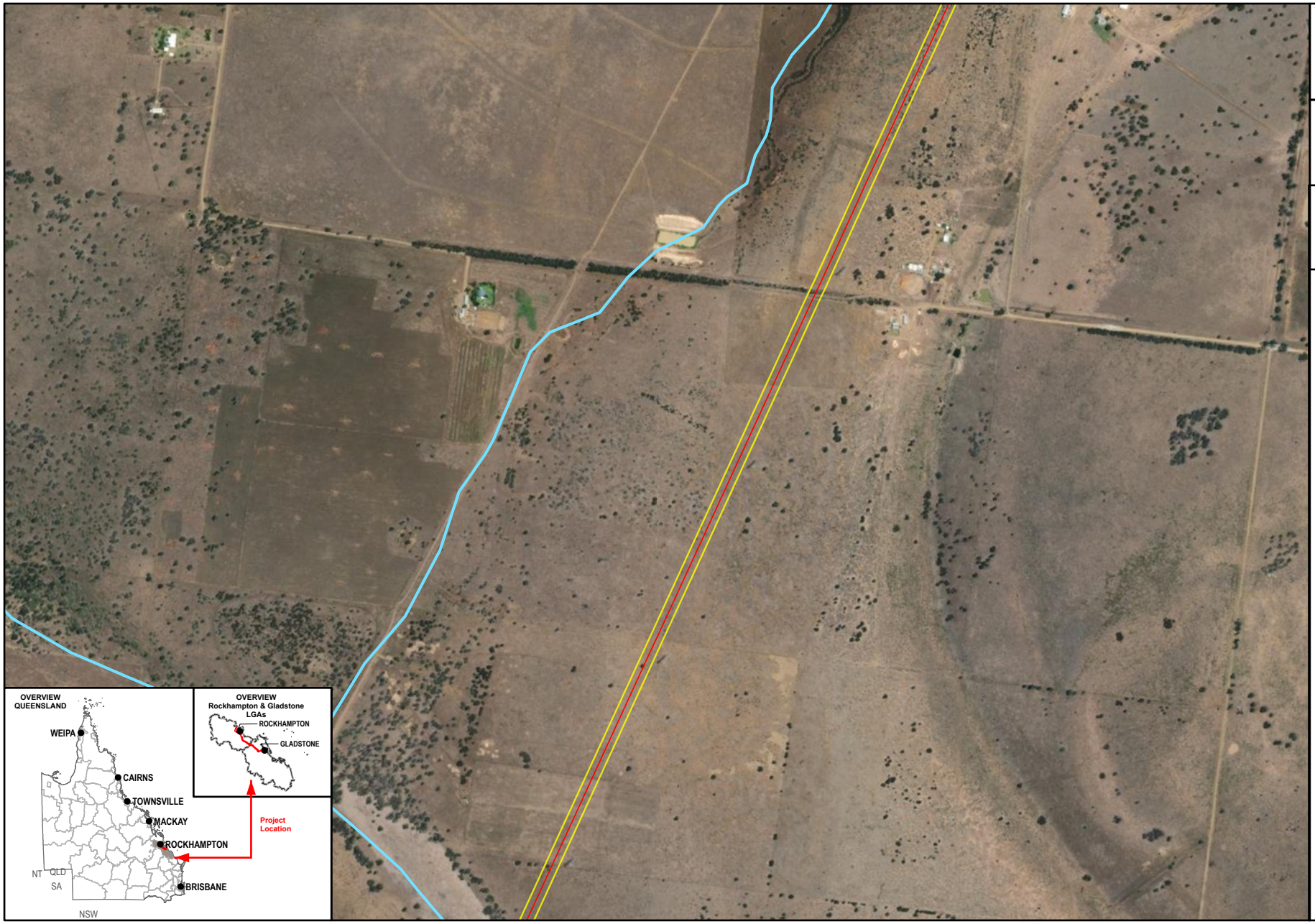

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- Northern Section Pipeline Alignment
- Study Area
- Waterways

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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-25d
Distribution of Estuarine Crocodile Habitat Within the Northern Section Study Area

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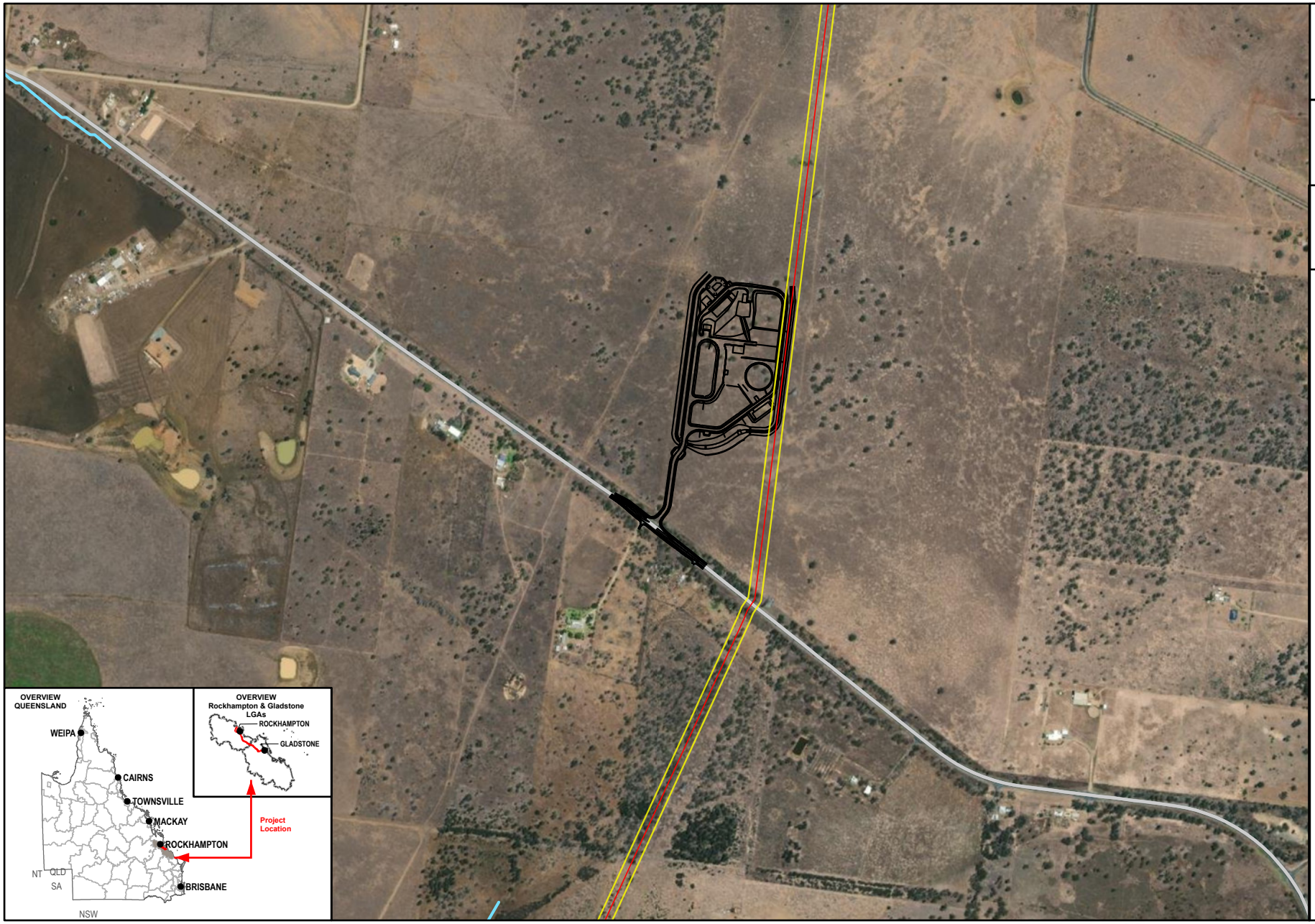

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Legend

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

Data Sources:
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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-25e
Distribution of Estuarine Crocodile Habitat Within the Northern Section Study Area

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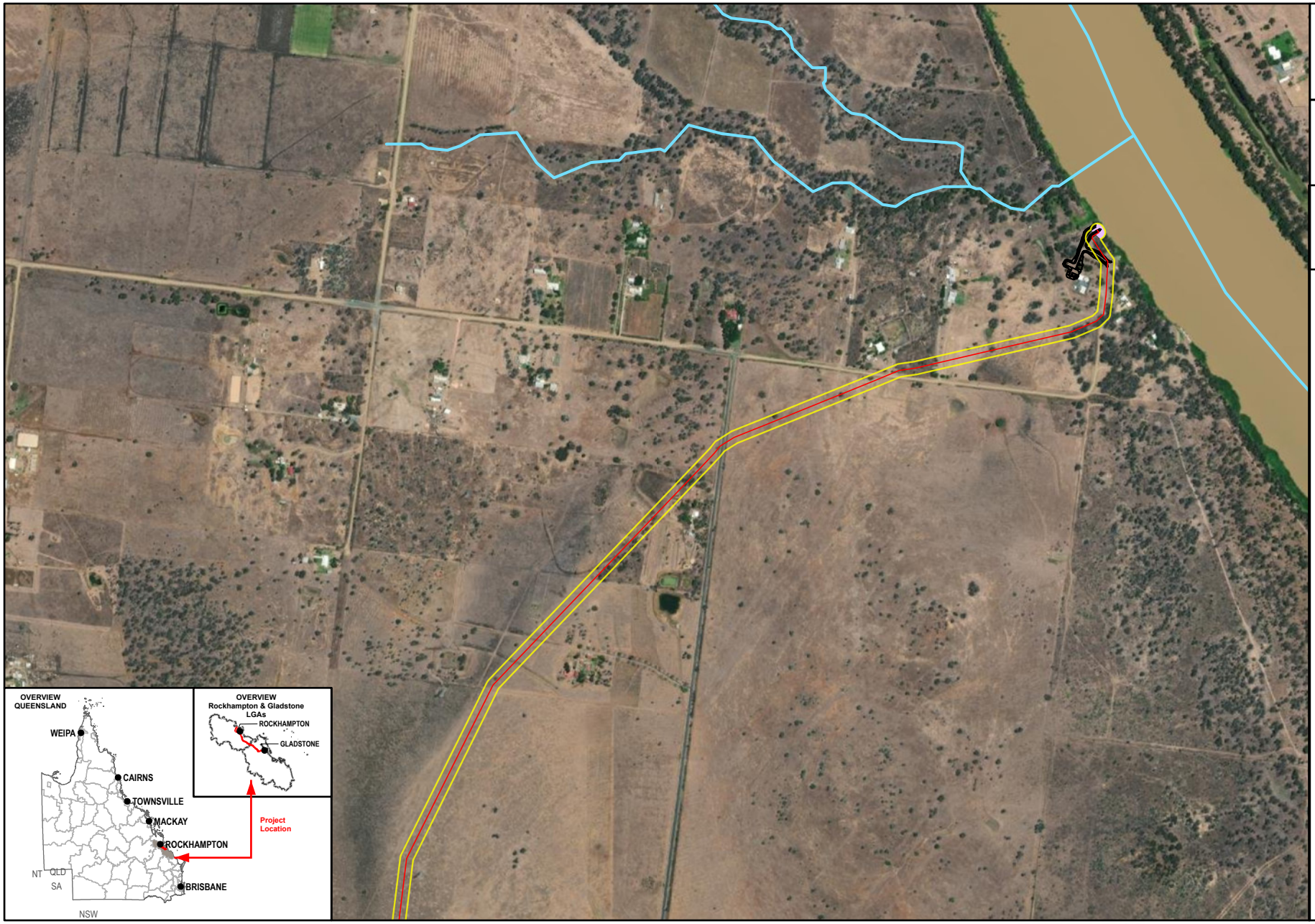

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- Northern Section Pipeline Alignment
- Study Area
- Predicted Estuarine Crocodile Habitat
- Fitzroy River Intake and Pump Station Layout
- Waterways

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Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-25f
Distribution of Estuarine Crocodile Habitat Within the Northern Section Study Area

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7.3.1.6 White-throated snapping turtle

Conservation status and species ecology

The white-throated snapping turtle is listed as critically endangered under the EPBC Act and NC Act but was not listed as MNES at the time of the approval. The white-throated snapping turtle is endemic to the Fitzroy, Burnett and Mary River catchments. This species primarily inhabits permanent flowing reaches of streams with a sand/gravel substrate and an abundance of refugia (i.e. rock crevices, submerged logs, macrophytes beds) (Hamann *et al.* 2007). The white-throated snapping turtle is not thought to occur within farm dams, ephemeral swamplands or brackish waters but does occur in impounded pools at lower densities (Limpus *et al.* 2011; Hamann *et al*. 2007). During the day, the white-throated snapping turtle is generally found in deep pools (>6 m) either up- or downstream from a riffle zone, whereas at night the turtle moves into the shallow riffle zones (Gordos *et al*. 2007; Hamann *et al*. 2007).

Field survey results and distribution of suitable habitat

The species is known to occur on the Fitzroy River near Site 23. No preferred nesting habitat for this species occurs in the immediate vicinity of Site 23. Foraging habitat within the study area is generally considered suitable for this species due to large deep permanent pools present within the study, instream connectivity, extensive shading along both banks and high complexity of instream habitat features and large woody debris. There was also the presence of several submerged macrophyte beds and aquatic vegetation, therefore it is likely that this species is present within the study site. The species is unlikely to occur at sites 22, 25, 31 and 32 due the absence of surface waters (Figure 7-26). Overall, habitat conditions within the study area are unsuitable for white-throated snapping turtle nesting.

Significant Residual Impact Assessment

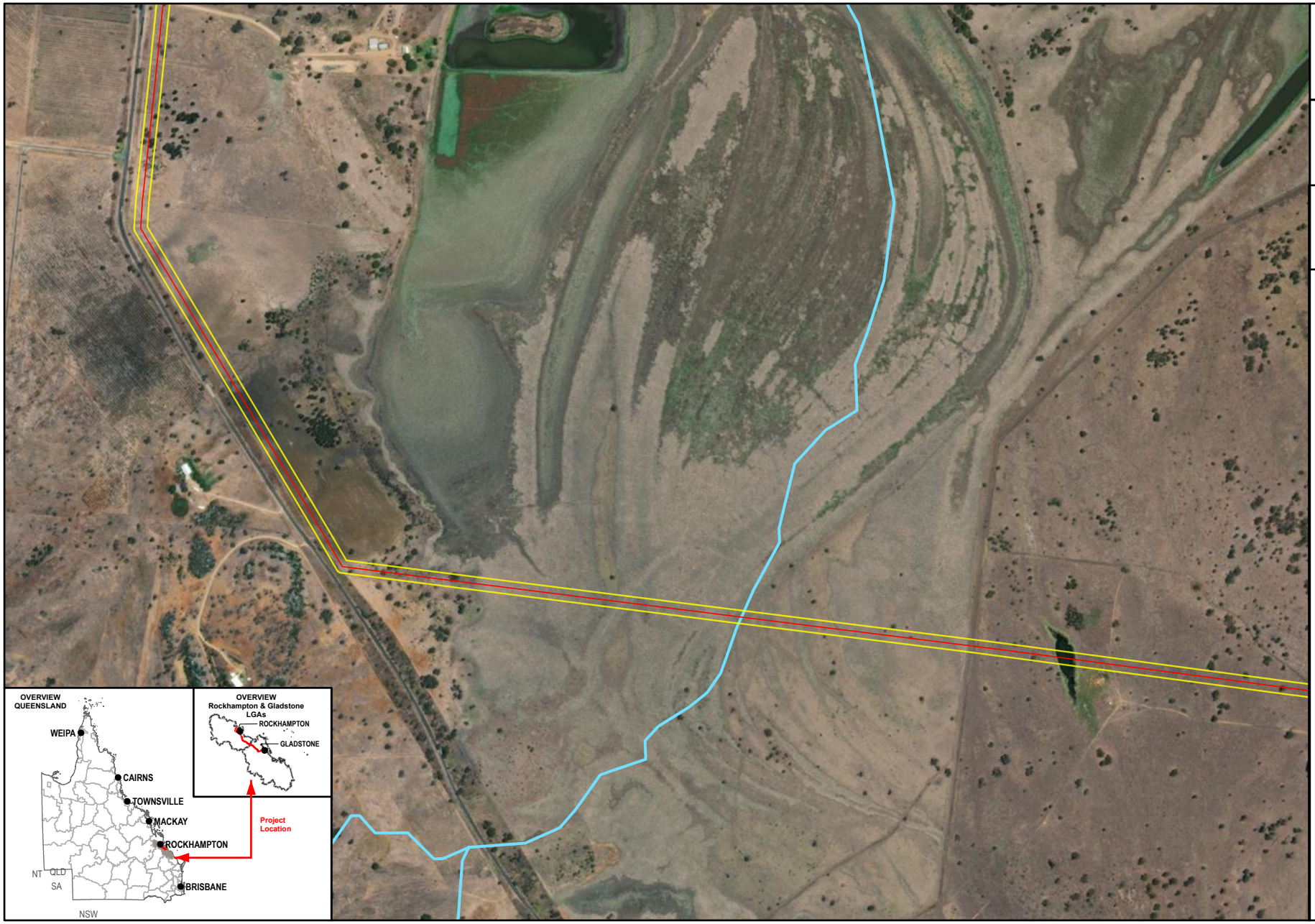
The project is unlikely to have a significant residual impact on the white-throated snapping turtle due to the temporary nature of the works and implementation of avoidance measures for any identified breeding places. A significance of impact assessment of the project on the white-throated snapping turtle (critically endangered EPBC Act and NC Act) is provided in Table 7-46.

Table 7-46 Significance of impact on the white-throated snapping turtle

Significant residual impact criteria	Assessment
Lead to a long-term decrease in the size of a local population	**Unlikely** The white-throated snapping turtle is listed as critically endangered under the EPBC Act and the NC Act, and is endemic to the Fitzroy, Burnett and Mary River catchments. The white-throated snapping turtle is known to occur throughout the Fitzroy River (Limpus 2008), including near site 23. At sites 22, 25, 31, and 32, the species is unlikely to occur. The suitability of bank habitat for white-throated snapping turtle nesting at site 23 is considered low due to dense bank riparian vegetation and highly compacted bank substrate. Works at site 23 include the intake structure which will involve the localised disturbance of the bed and bank. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the white-throated snapping turtle. Design and implementation of a CEMP will further minimise risk to individuals and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. The impact area for all sites will be rehabilitated and additional measures will be implemented in both the construction and operation phases of the intake structure as site 23 to minimise effects to localised disturbance of habitat degradation, no direct impacts to individuals upon a known population of white-throated snapping turtle within the Fitzroy River will occur. It is therefore unlikely to lead to a long-term decrease in the size of a local population.

Significant residual impact criteria	Assessment
Reduce the extent of occurrence of the species	**Unlikely** The white-throated snapping turtle is known to occur throughout the Fitzroy River (Limpus 2008), including near site 23. At sites 22, 25, 31, and 32, the species is unlikely to occur. Works will be conducted at sites 22, 25, 31, and 32 during the dry season, therefore not effecting the extent of occurrence of the species. At site 23, a coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the turtle. The works will be restricted temporally to a small, localised area, with measures in place to ensure no long-term impacts to habitat. The population of white-throated snapping turtle will be maintained within, upstream and downstream of the site and therefore it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragment an existing population	**Unlikely** No existing population of white-throated snapping turtle occurs at sites 22, 25, 31, and 32, and therefore no fragmentation of an existing population will occur. The white-throated snapping turtle is known to occur throughout the Fitzroy River (Limpus 2008), including near site 23. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Flow and fauna movement will be maintained adjacent to the construction footprint, such that no fragmentation of the population will occur. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the white-throated snapping turtle. The works will be restricted temporally to a small, localised area, with measures in place to avoid fragmentation of the species. Due to the localised and temporary nature of the construction impacts, no fragmentation of an existing population will occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The project is unlikely to fragment the species population and therefore is not considered to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	**Unlikely** Construction activities have the potential to increase the presence of introduced weed and pest species that can degrade turtle nesting habitat suitability and predate upon turtle nests. The suitability of habitat at site 23 for turtle nesting is limited as a result of the density of riparian bank vegetation and bank substrate. Implementation of best practice weed and pest management techniques coupled with erosion and sediment management controls will reduce the likelihood of impacts to potential turtle nesting habitats. The management actions proposed for the control of weed and pest species are considered sufficient such that no significant impact to the white-throated snapping turtle and/or the species' habitat is likely to occur.

Significant residual impact criteria	Assessment
Introduce disease that may cause the population to decline	**Unlikely** There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that construction and operation of the intake structure and the waterway crossings will have the potential to introduce disease to the extent that the white-throated snapping turtle population will decline.
Interfere with the recovery of the species	**Unlikely** The National Recovery Plan for the white-throated snapping turtle (*Elseya albagula*) which the Department of Agriculture, Water and the Environment (DAWE) is responsible for outlines of the recovery strategies for the species (DAWE, 2020). These are to: – Substantially improve the recruitment of hatchlings into the population – Reduce the incidence of adult mortality and injury – Maintain and/or improve stream flow and habitat quality throughout the species' distribution – Maintain and/or improve the connectivity within populations throughout teach catchment; and – Increase public awareness and participation in conservation of the species and its habitat. There are no existing populations of white-throated snapping turtle at sites 22, 25, 31, and 32, measures including construction at these sites occurring during the dry season will ensure that the project does not interfere with the recovery of the species. The species is known to occur throughout the Fitzroy River, including near site 23. The project potentially could cause incidence of adult mortality or injury and habitat degradation during construction. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Fauna salvage will be undertaken within the construction area of this intake structure in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and flow and fauna movement maintained adjacent to construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the white-throated snapping turtle. Design and implementation of a CEMP for the construction phase and an OEMP for the operational phase. OEMP is to include extraction monitoring to avoid habitat degradation. These measures will ensure that the project is unlikely to contribute to key threating processes or interfere with recovery actions.
Cause disruption to ecologically significant locations of a species	**Unlikely** At sites 22, 25, 31, and 32, the white-throated snapping turtle is unlikely to occur due to a lack of available surface water. With no population existing within these sites, the project is not expected to cause disruption to ecologically significant locations of a species. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat. The works will be restricted to a small, localised area around the site with the duration of works to be less than 180 days. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Design and implementation of a CEMP for the construction phase and an OEMP for the operational phase. OEMP is to include extraction monitoring to avoid habitat degradation. Works at this location will be designed so that the species cannot enter the construction zone whilst installation of the intake structure occurs. These measures result that the project is unlikely to cause disruption to ecologically significant locations of a species.
Conclusion	Due to the temporary nature of the construction works and restoration of any degradation of potential habitat, the project is not expected to have a significant residual impact on the white-throated snapping turtle.



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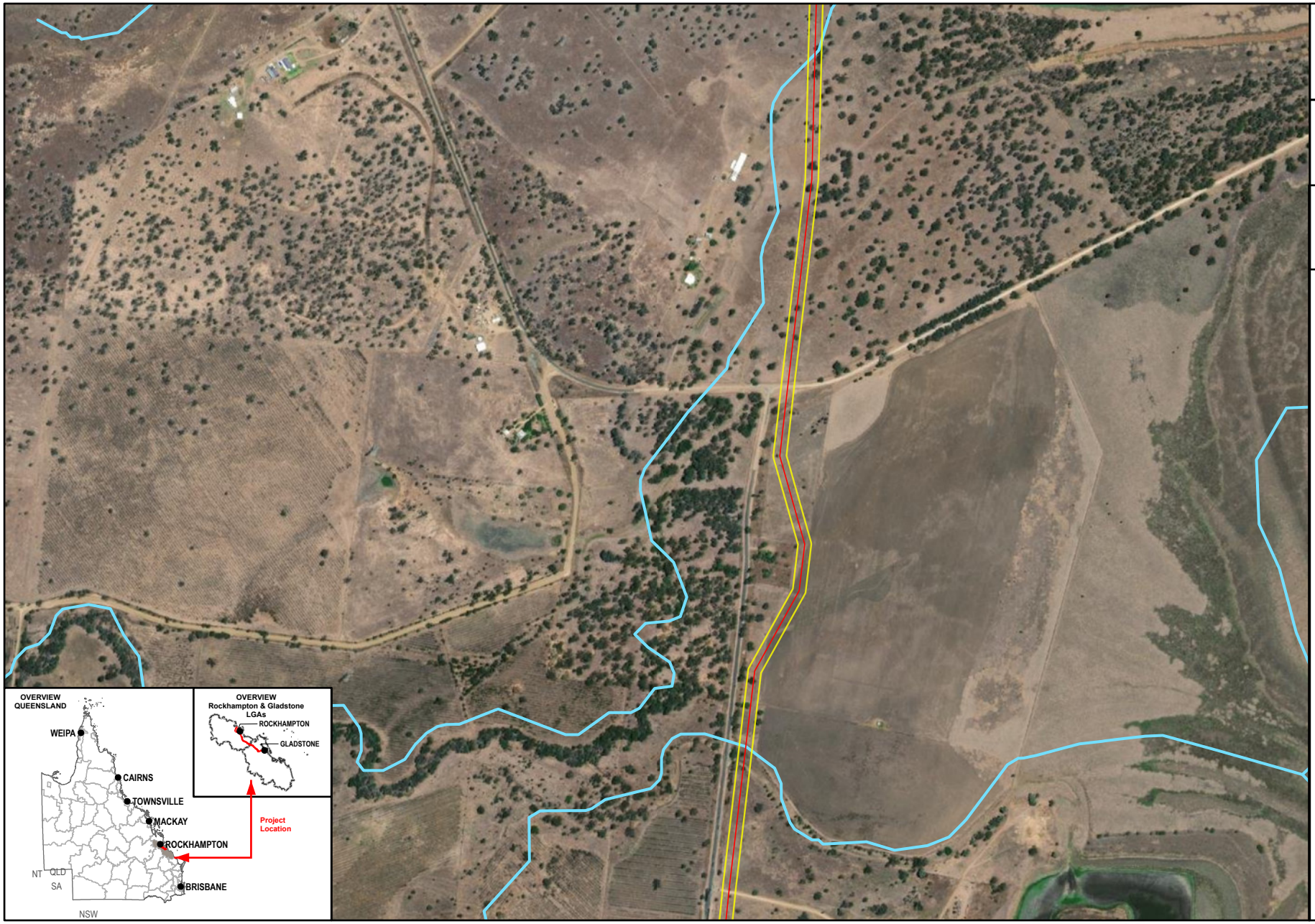
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-26a
Distribution of White-throated Snapping Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2447 Version:3 Date:20/09/2022



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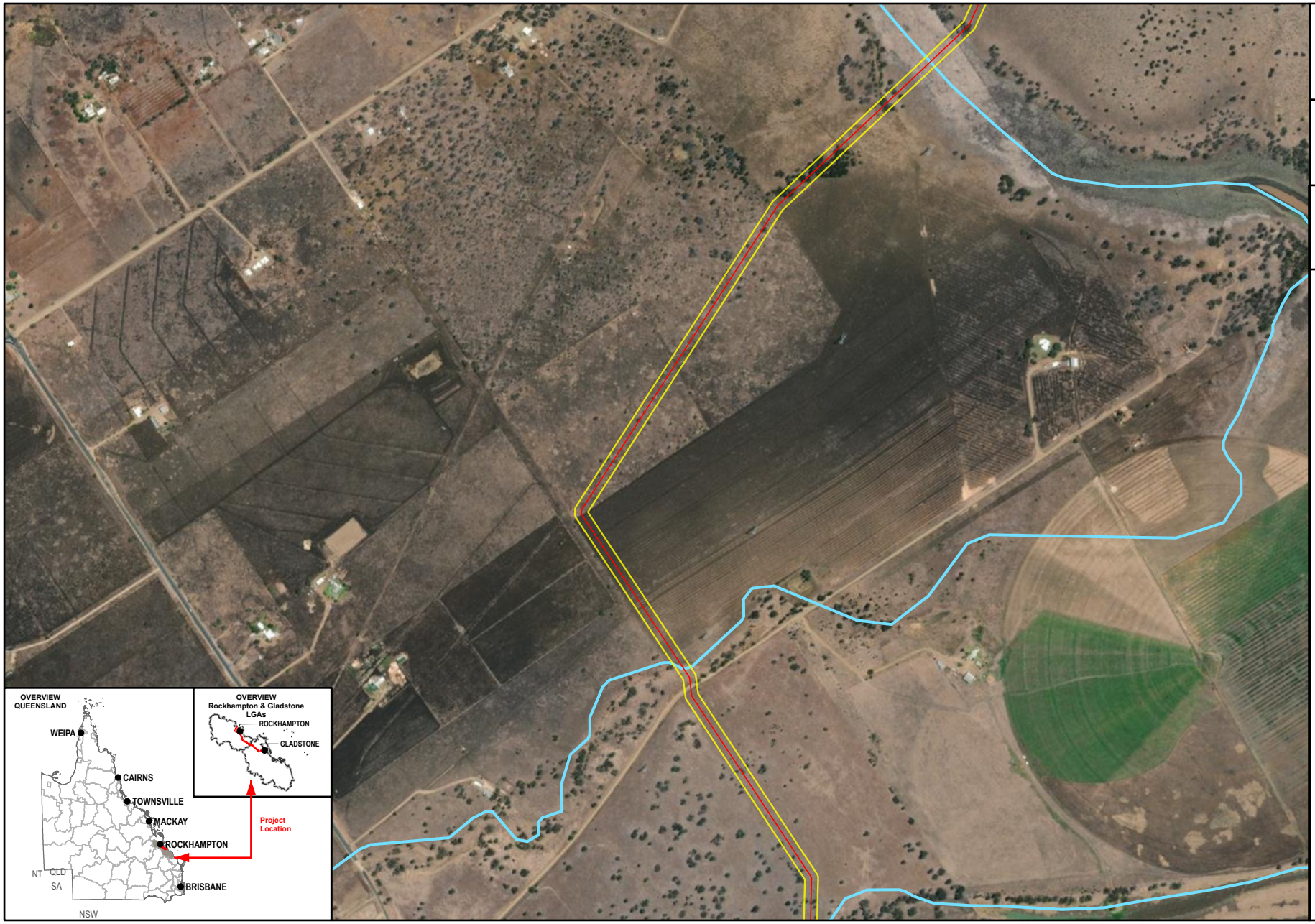

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Figure 7-26c
Distribution of White-throated Snapping Turtle Habitat Within the Northern Section Study Area

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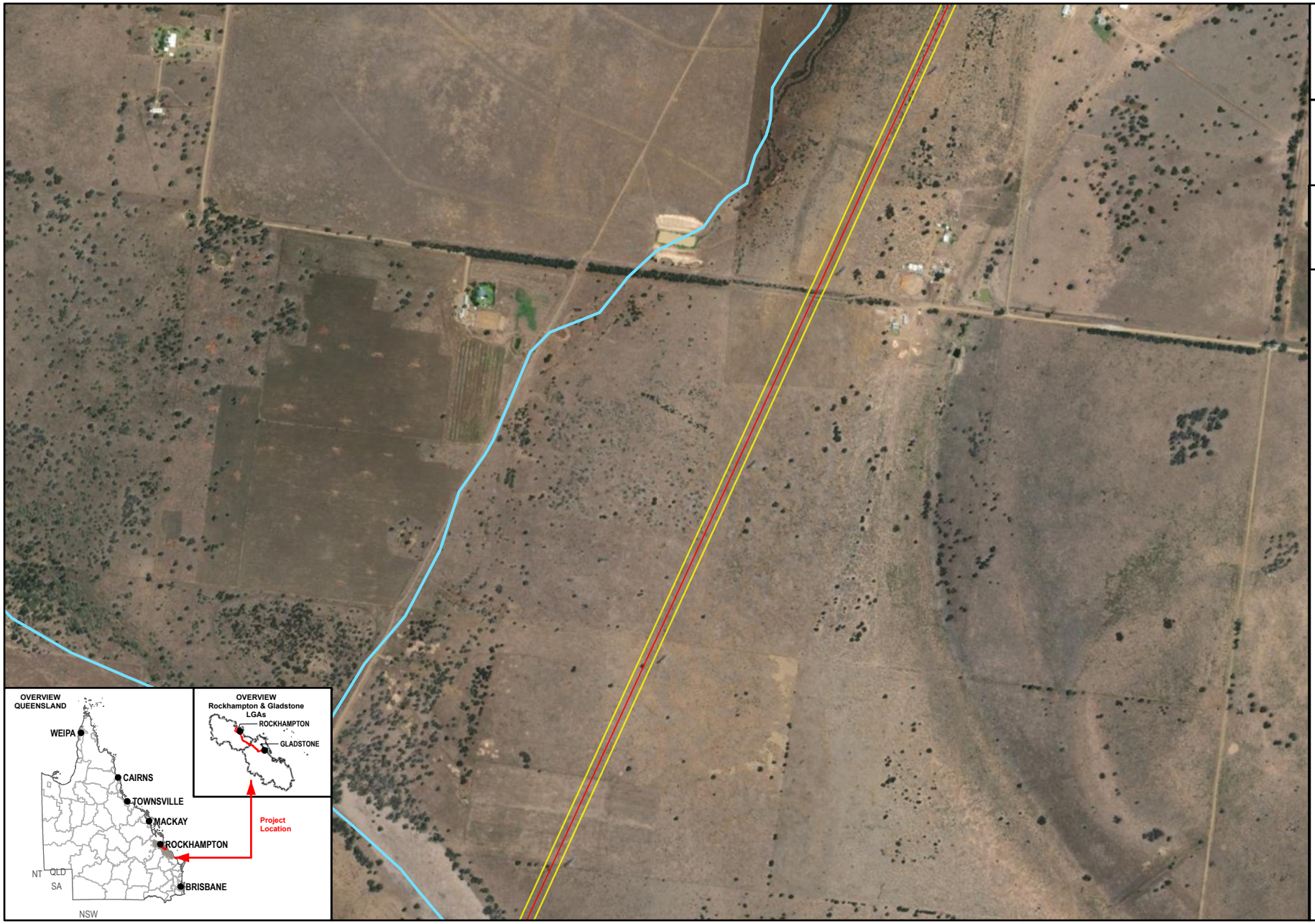

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Distribution of White-throated Snapping Turtle Habitat Within the Northern Section Study Area

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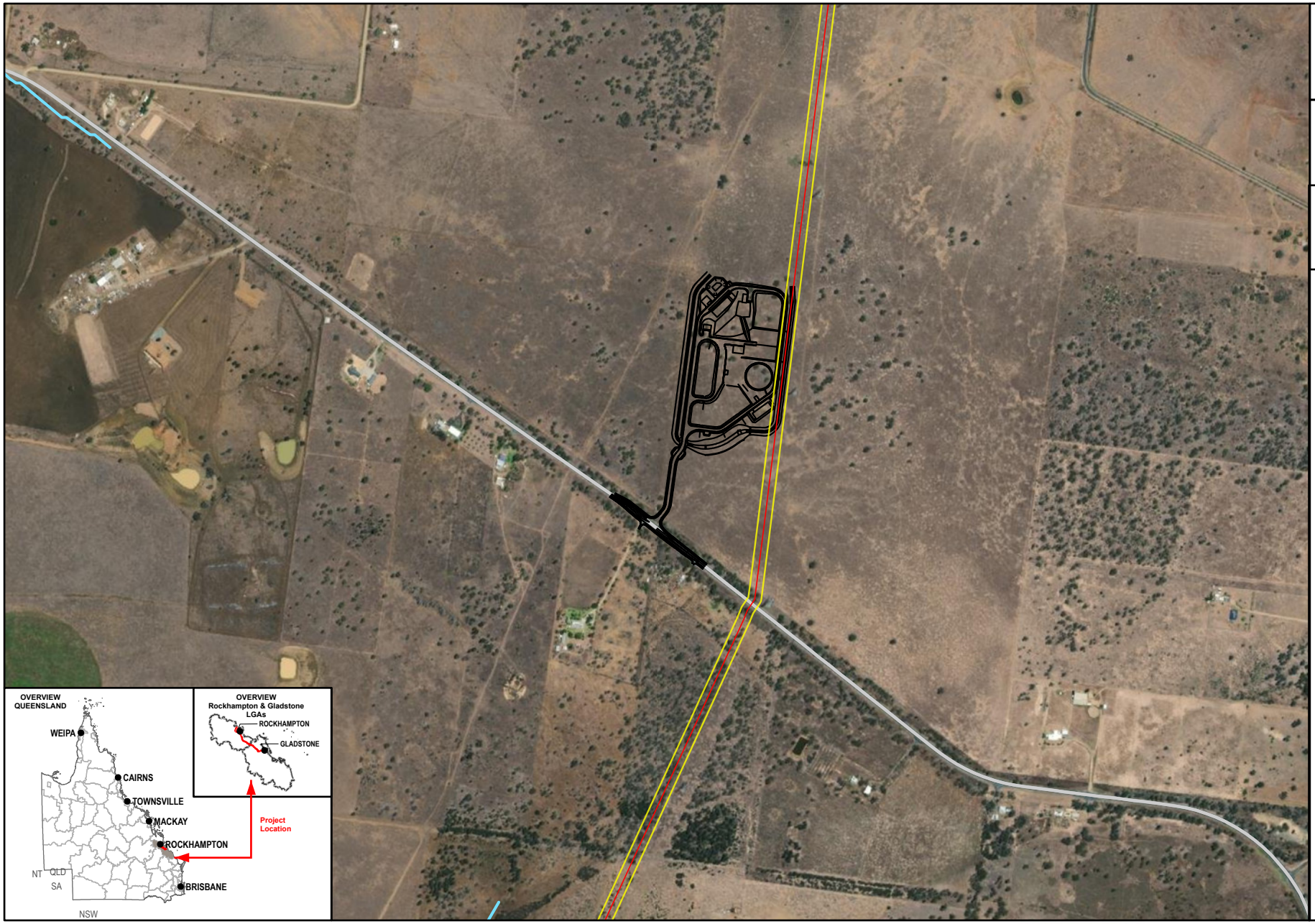

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- Northern Section Pipeline Alignment
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- Alton Down WTP, Pump Station and Reservoir Layout
- Waterways
- Main Roads

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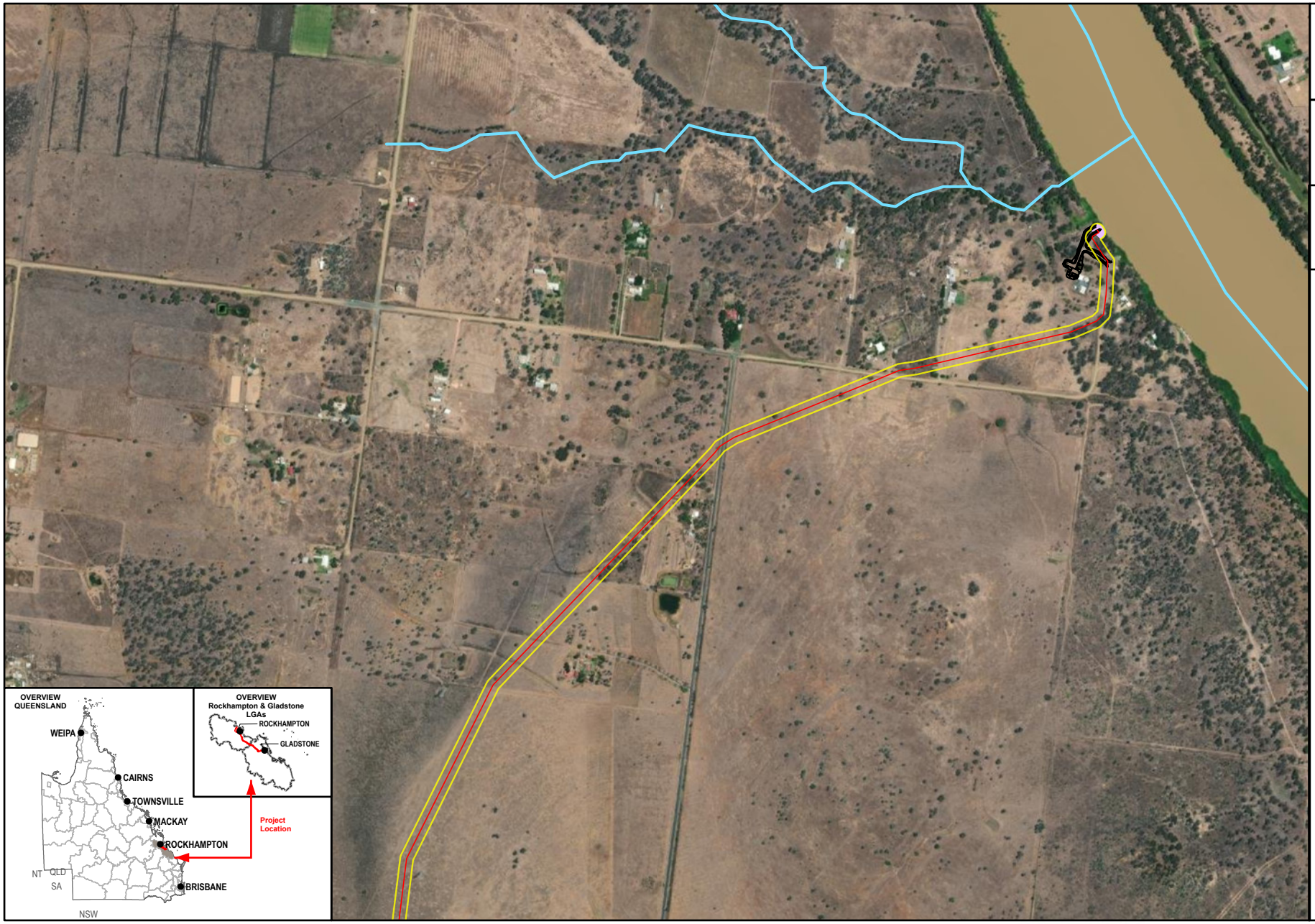
Figure 7-26e
Distribution of White-throated Snapping Turtle Habitat Within the Northern Section Study Area
000-G-MAP-2447 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Study Area
- Predicted White-throated Snapping Turtle Habitat
- 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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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-26f
Distribution of White-throated Snapping Turtle Habitat Within the Northern Section Study Area
000-G-MAP-2447 Version:3 Date:20/09/2022

7.3.1.7 Platypus

Conservation status and species ecology

Platypi are found in eastern Australia from far north Queensland to Tasmania. In Queensland, the species inhabits rivers east of the Great Dividing Range, and some western-flowing streams (DES 2021a). Platypus habitat includes freshwater creeks, slow-moving rivers, lakes joined by rivers, and built water storages such as farm dams. Preferred habitat for the species is defined as areas that have steep, well vegetated banks (Grant and Temple-Smith 1998). Platypi occupy a wide range of aquatic habitats, are somewhat tolerant of degraded systems, and show notable adaptability (Grant and Temple-Smith 1998). Burrows are built in riverbanks, just above water level and often among a tangle of tree roots (DES 2021a).

Platypi mostly live alone but can share a water body with several other platypi. Platypi show fidelity to home ranges with daily foraging movements of several kilometres. Platypi eat small aquatic invertebrates such as insect larvae, freshwater shrimps, and crayfish. The species detects electrical currents in the water with its bill and this is used to find prey. Dawn and dusk are periods of increased activity (DES 2021a).

Field survey results and distribution of suitable habitat

The platypus is known to occur throughout upper, mid, and lower reaches of the Fitzroy River and throughout the basin, and there are confirmed records of platypus within the study area (ALA 2022). The vertical banks with overhanging vegetation, large trees providing shading and abundant large woody debris in the throughout the year and the surrounding area at site 23 provides suitable habitat and burrowing opportunities for platypi and is therefore likely to occur at this site. At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water and suitable habitat (Figure 7-27). During the survey at all locations, no individuals were observed, and no platypus burrows were detected.

Significant Residual Impact Assessment

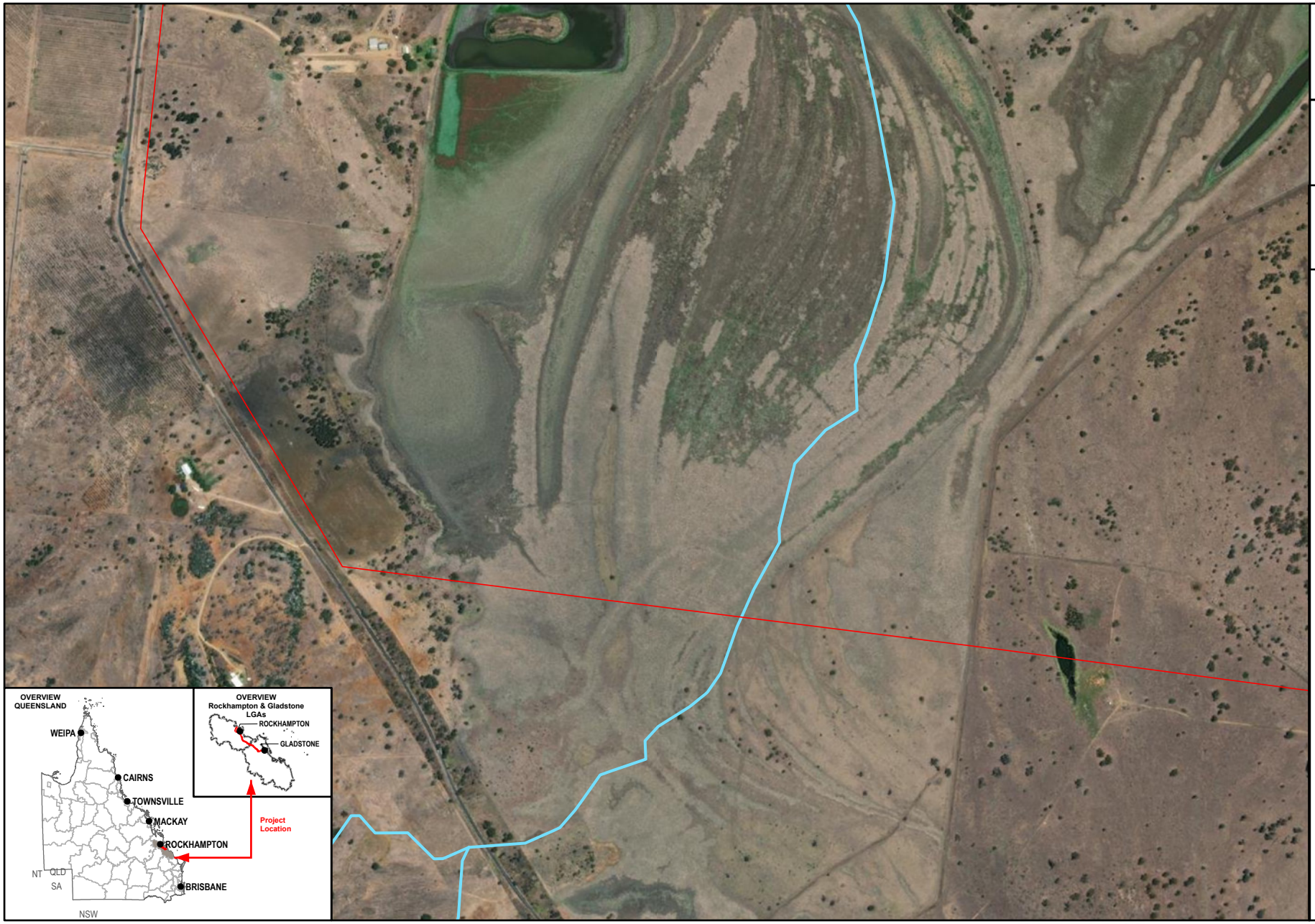
The project is unlikely to have a significant residual impact on the platypus due to the temporary nature of the works and implementation of avoidance measures for any identified breeding places. A significance of impact assessment of the project on the platypus (special least concern NC Act) is provided in Table 7-47 in accordance with the Queensland Government's significant residual impact guidelines (DEHP 2014b).

Table 7-47 Significance of impact on the platypus

Significant residual impact criteria	Assessment
Lead to a long-term decrease in the size of a local population	**Unlikely** At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water. Works will be conducted at sites 22, 25, 31, and 32 during the dry season and therefore is unlikely to lead to a long-term decrease in the size of local population. The platypus is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and likely optimal burrowing habitat. Works at site 23 include the intake structure which will involve the localised disturbance of the bed and bank. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the platypus. Design and implementation of a CEMP will further minimise risk to platypus and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. The impact area for all sites will be rehabilitated and additional measures will be implemented in both the construction and operation phases of the intake structure as site 23 to minimise effects to localised disturbance of habitat degradation, no direct impacts to individuals upon a known population of platypus within the Fitzroy River will occur. It is therefore unlikely to lead to a long-term decrease in the size of a local population.

Significant residual impact criteria	Assessment
Reduce the extent of occurrence of the species	**Unlikely** At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water. Works will be conducted at sites 22, 25, 31, and 32 during the dry season, therefore not effecting the extent of occurrence of the species. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and likely optimal burrowing habitat. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrapment, minimising potential effects of the local population of the platypus. The works will be restricted temporally to a small, localised area, with measures in place to ensure no long-term impacts to habitat. These measures ensure that it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragmentation an existing population	**Unlikely** The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and likely optimal burrowing habitat. Platypus are known to forage over a home range, typically 6-11 km for males and 2-4 km for females, although platypus do not need to undertake migrations as a critical component of their life history. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and flow and platypus movement will be maintained adjacent to the works. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrapment, minimising potential effects of the local population of the platypus. The works will be restricted temporally to a small, localised area, with measures in place to ensure fragmentation of the species does not occur. These measures will ensure that no fragmentation of the population will occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The project unlikely to fragment the species population and therefore is not considered to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species habitat	**Unlikely** The introduced feral cat and European fox are identified as threats to the platypus. Considering these species are already locally established, the project is unlikely to introduce additional invasive fauna or facilitate the spread of these species. The risk of invasive fauna species will be controlled through implementation of a Feral Animal Control Program during construction and operations.
Introduce disease that may cause the population to decline	**Unlikely** There are few significant diseases known from wild platypus populations. A small number of platypi suffer from a murcomosis a fungal disease found in Tasmania however there have been no individuals recorded with the disease on mainland Australia. There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that the project will have the potential to introduce disease to the extent that the platypus population will decline.
Interfere with the recovery of the species	**Unlikely** Degradation of habitat will be localised and temporary. Cleared suitable habitat during the construction phase is expected to re-establish along the Northern Section pipeline alignment. No direct impact to the recovery of the species will occur as a result of the project**.**

Significant residual impact criteria	Assessment
Disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species	**Unlikely** At sites 22, 25, 31, and 32, the species is unlikely to occur due to a lack of available surface water and therefore disruption to ecologically significant locations for the species is unlikely to occur. The species is known to occur throughout the Fitzroy River (ALA 2022), including near site 23 and the site provides optimal foraging habitat and likely optimal burrowing habitat. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and flow and platypus movement will be maintained adjacent to the works. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrapment, minimising potential effects of the local population of the platypus. The works will be restricted temporally to a small, localised area, with measures in place to ensure fragmentation of the species does not occur. Design and implementation of a CEMP during the construction phase along with an operation environmental management plan (OEMP) to monitor water extraction during operations will further minimise risk to individual platypus and achieve protection of ecologically significant locations. These measures will ensure that a disruption to ecologically significant locations for this species.
Conclusion	Due to localised disturbance with the restoration of potential platypus habitat post construction, the project is considered unlikely to have a significant impact on the platypus.



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Legend

- Northern Section Pipeline Alignment
- 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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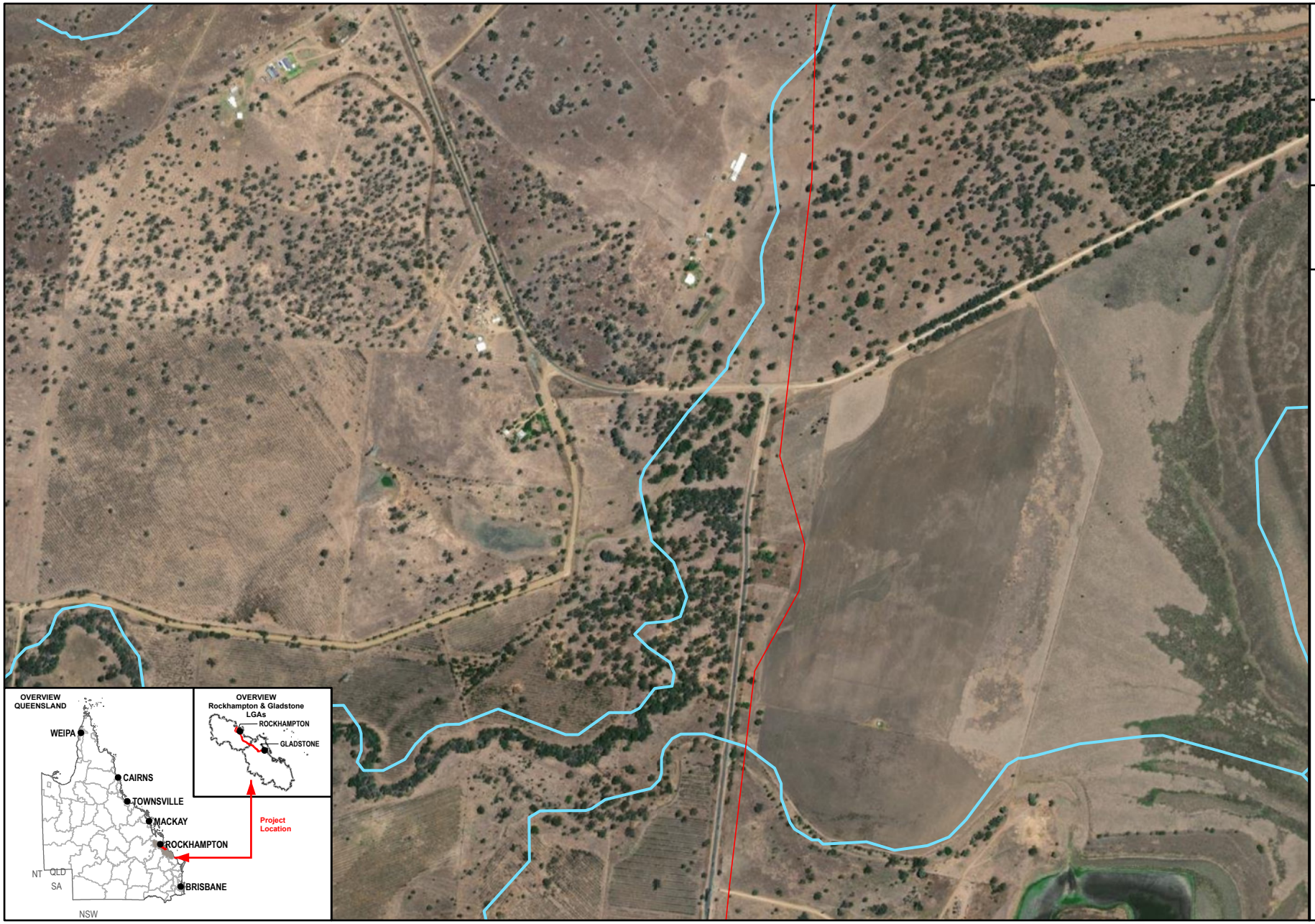
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-27a
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- 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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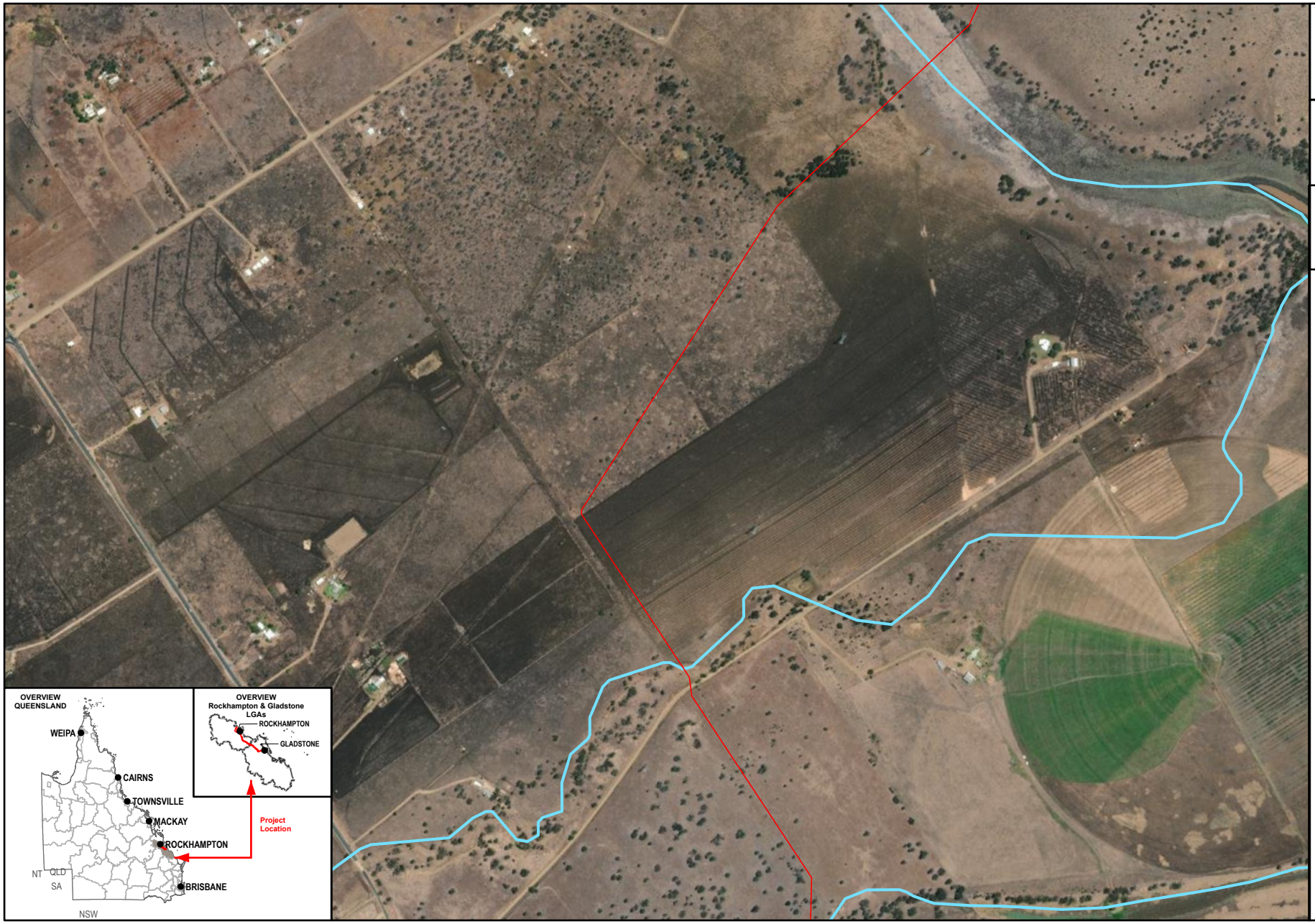
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-27b
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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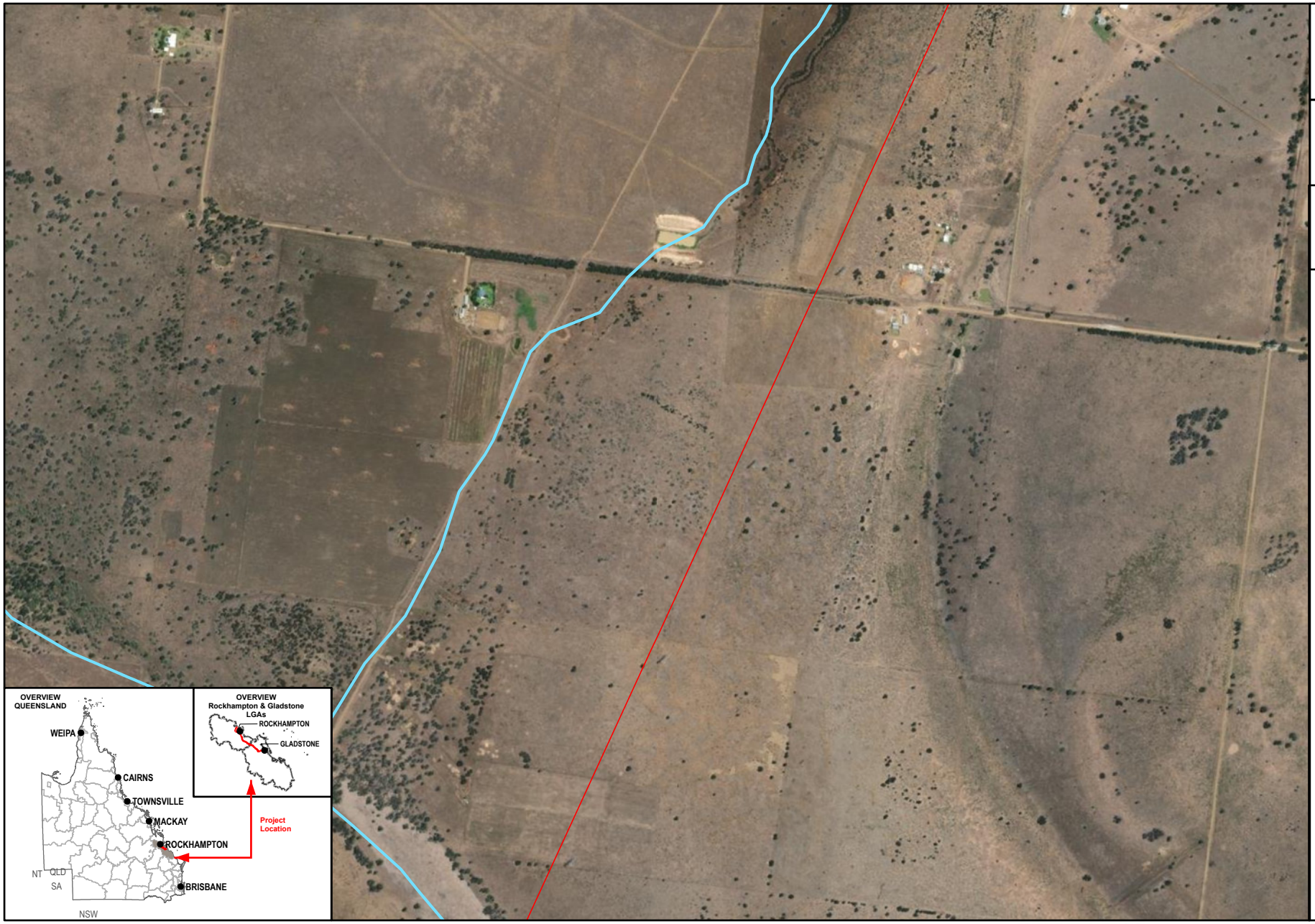
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-27c
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Waterways

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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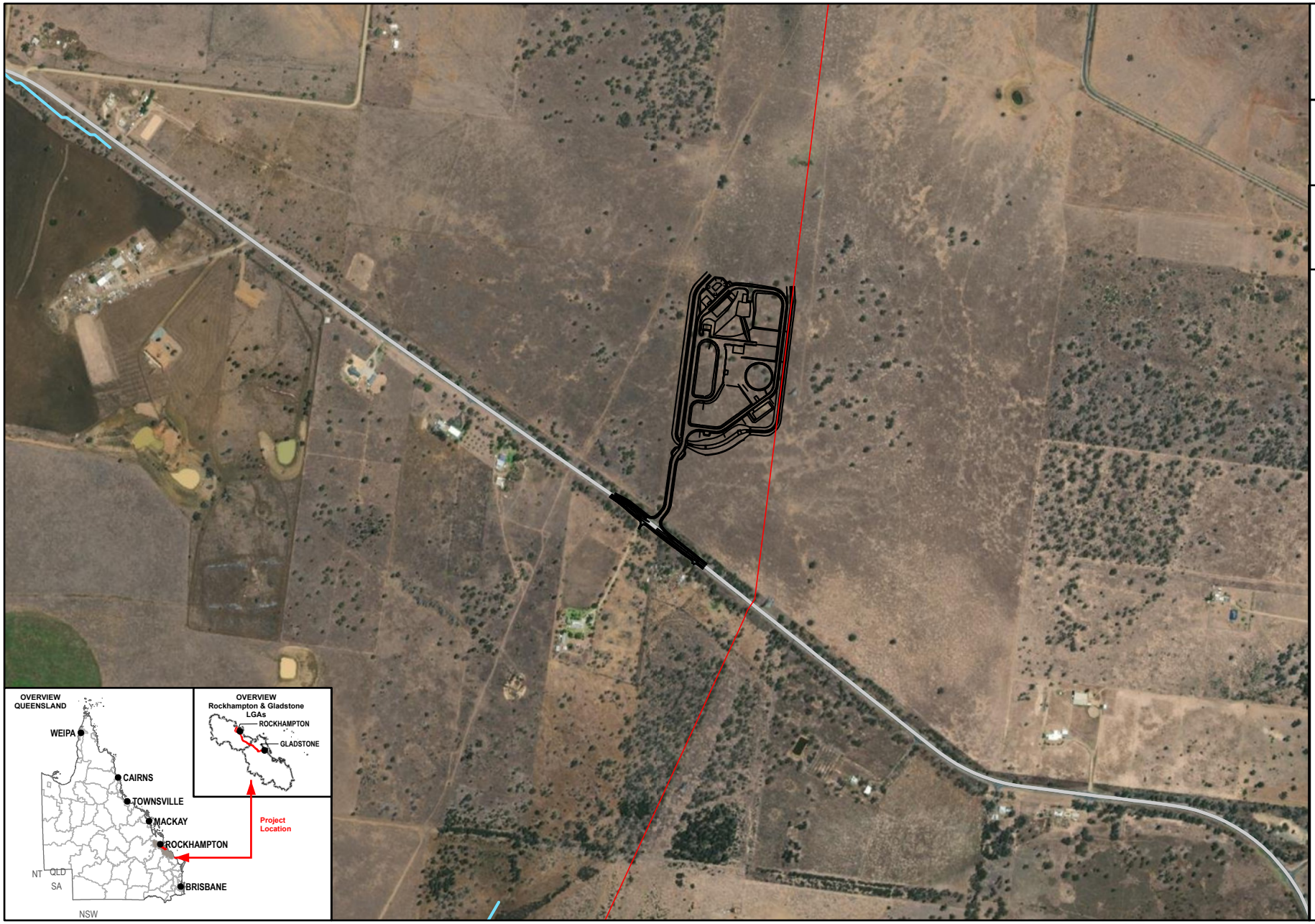
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-27d
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022



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Legend

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

Data Sources:
1. Base Layers (Roads, waterway, locality, LGA etc) @ QSpatial, 2021
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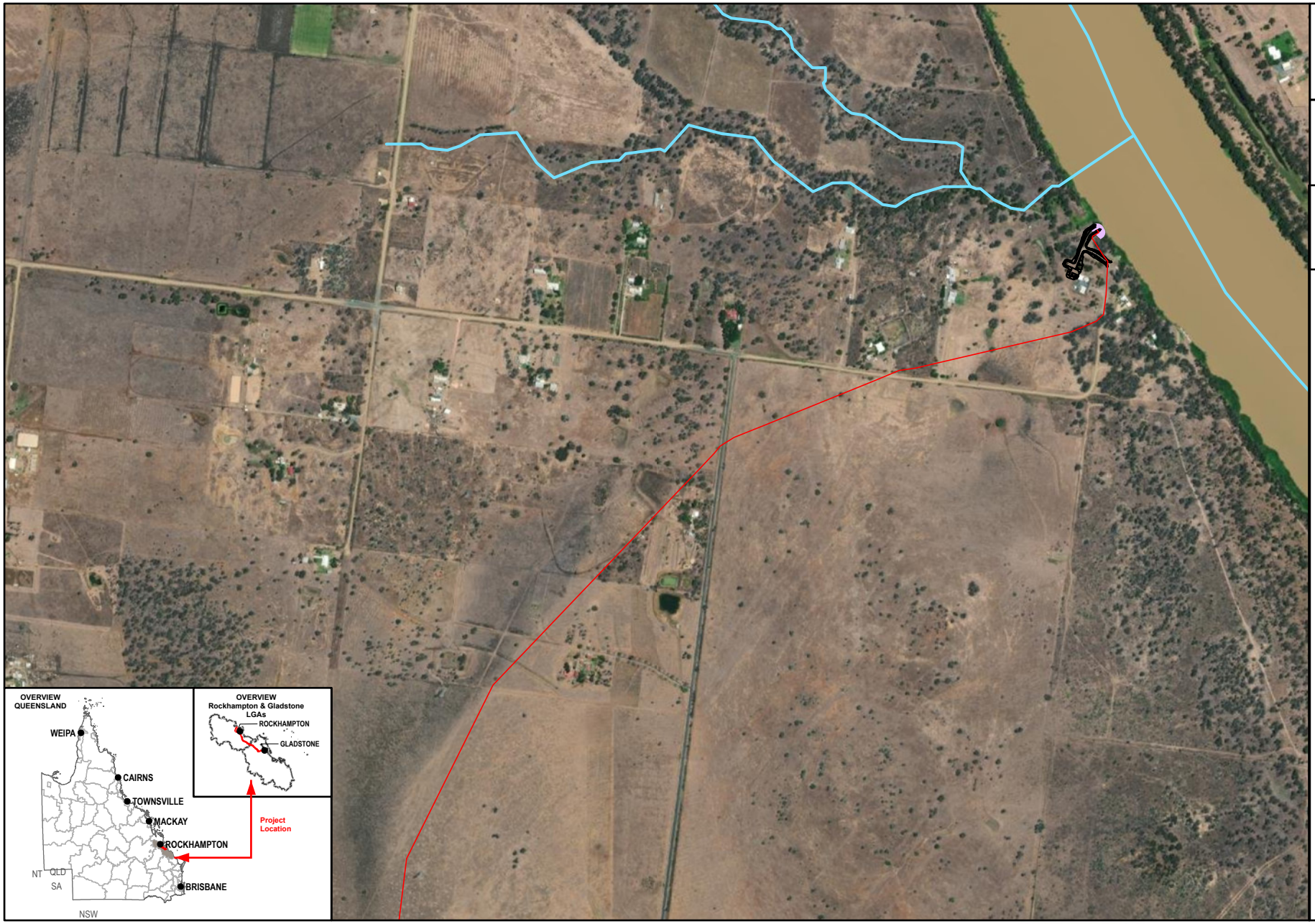
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-27e
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Predicted Platypus Habitat
- Fitzroy River Intake and Pump Station Layout
- 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 7-27f
Distribution of Platypus Habitat Within the Northern Section Study Area

000-G-MAP-2448 Version:3 Date:20/09/2022

7.3.1.8 Fitzroy River turtle

Conservation status and species ecology

The Fitzroy River turtle is listed as vulnerable under the EPBC Act and NC Act and was listed as an MNES at the time of the approval. The Fitzroy River turtle, endemic to the Fitzroy River and associated tributaries prefers flowing river sections with large deep pools with rocky, gravel or sandy substrates, connected by shallow riffles (Cogger *et.al.* 1993). It is a benthic feeder whose diet consists of insects, macro-invertebrates, crustaceans, algae, gastropods, worms, freshwater sponges and aquatic plants (Latta and Latta, 2005). Preferred areas have high water clarity and often associated with ribbonweed (*Vallisneria* sp.) beds (Cogger, et.al 1993). Nesting occurs between September and October on river sand banks typically 1-4 metres above water level (Cann, 1998).

Field survey results and distribution of suitable habitat

The species is known to occur throughout the Fitzroy River. No historical records were identified within the desktop search extent (10 km buffer) with the nearest record approximately 21 km upstream. Suitable habitat for the Fitzroy River turtle was present at Site 23. Similar to the white-throated snapping turtle, foraging habitat within the study area is generally considered suitable for this species due to large deep permanent pools present within the study, instream connectivity and habitat features such as large woody debris and rocky substrates. There was also the presence of several submerged macrophyte beds and aquatic vegetation, therefore it is likely that this species is present within the study site. No preferred nesting habitat for this species occurs in the immediate vicinity of Site 23. The species is unlikely to occur at sites 22, 25, 31 and 32 due the absence of surface waters (Figure 7-28). Overall, habitat conditions within the study area are unsuitable for Fitzroy River turtle nesting due to dense bank riparian vegetation and highly compacted bank substrate.

Significant Residual Impact Assessment

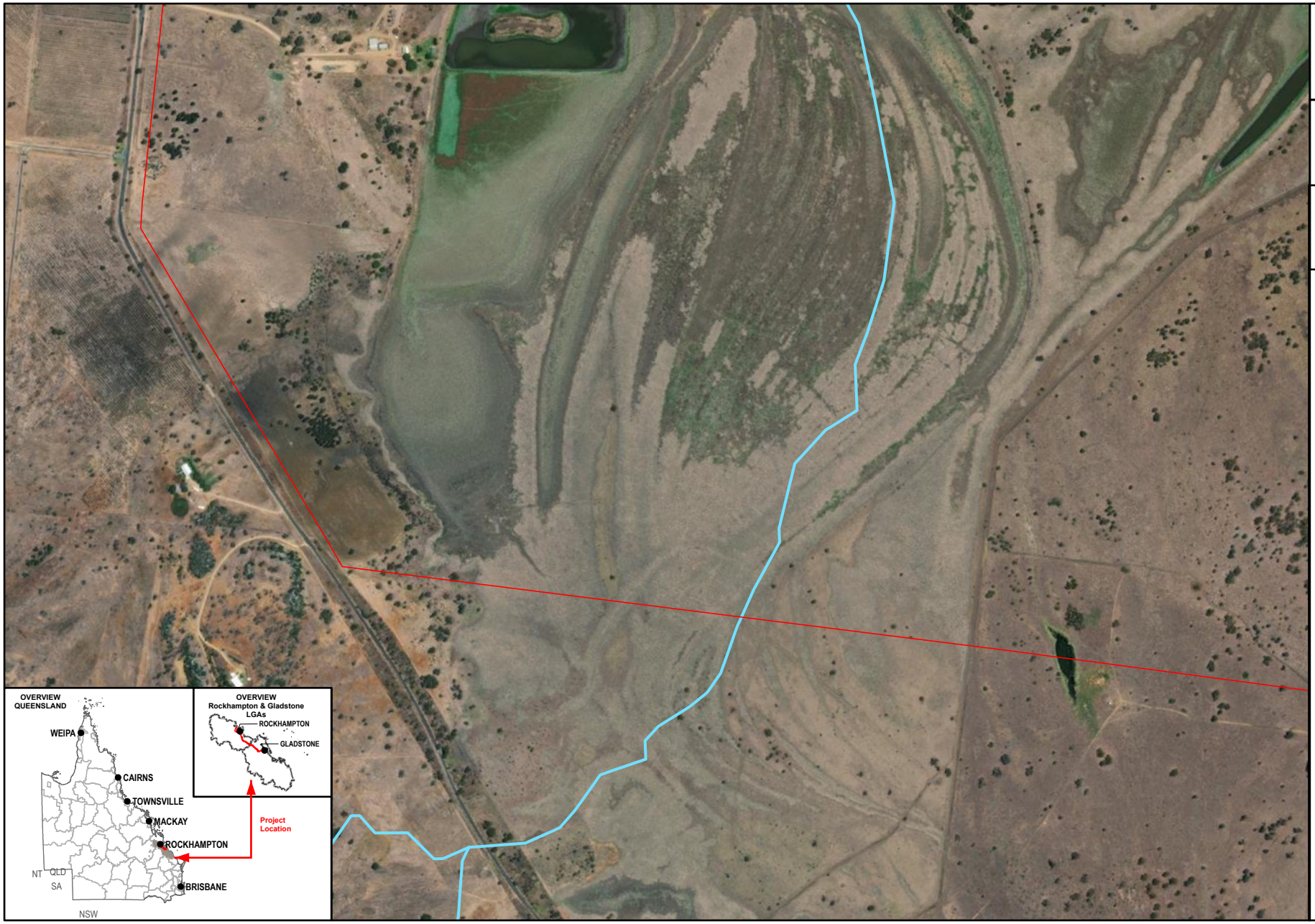
The project is unlikely to have a significant residual impact on the Fitzroy River turtle due to the temporary nature of the works and implementation of avoidance measures for any identified breeding places. A significance of impact assessment of the project on the Fitzroy River turtle (vulnerable EPBC Act and NC Act) is provided in Table 7-48.

Table 7-48 Significance of impact on the Fitzroy River turtle

Significant residual impact criteria	Assessment
Lead to a long-term decrease in the size of a local population	**Unlikely** The Fitzroy River turtle is listed as vulnerable under the EPBC Act and the NC Act, and is endemic to the Fitzroy River and associated tributaries, Suitable habitat was recorded present near site 23. At sites 22, 25, 31, and 32, the species is unlikely to occur. The suitability of bank habitat for Fitzroy River turtle nesting at site 23 is considered low due to dense bank riparian vegetation and highly compacted bank substrate. Works at site 23 include the intake structure which will involve the localised disturbance of the bed and bank. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the Fitzroy River turtle. Design and implementation of a CEMP will further minimise risk to individuals and achieve protection of habitat, such that no long-term decrease in the size of the population is expected to occur. The impact area for all sites will be rehabilitated and additional measures will be implemented in both the construction and operation phases of the intake structure as site 23 to minimise effects to localised disturbance of habitat degradation with no direct impacts to individuals upon a known population of Fitzroy River turtle. It is therefore unlikely to lead to a long-term decrease in the size of a local population.

Significant residual impact criteria	Assessment
Reduce the extent of occurrence of the species	**Unlikely** The Fitzroy River turtle is known to occur throughout the upper reaches of the Fitzroy and associated tributaries. Suitable habitat for the species was present at site 23. At sites 22, 25, 31, and 32, the species is unlikely to occur. Works will be conducted at sites 22, 25, 31, and 32 during the dry season, therefore not effecting the extent of occurrence of the species. At site 23, a coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the turtle. The works will be restricted temporally to a small, localised area, with measures in place to ensure no long-term impacts to habitat. The population of Fitzroy River turtle will be maintain within, upstream and downstream of the site and therefore it is unlikely that a reduction of the extent of occurrence of the species will occur.
Fragment an existing population	**Unlikely** No existing population of Fitzroy River turtle occurs at sites 22, 25, 31, and 32, and therefore no fragmentation of an existing population will occur. Suitable habitat for the Fitzroy River turtle was recorded near site 23. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Flow and fauna movement will be maintained adjacent to the construction footprint, such that no fragmentation of the population will occur. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the Fitzroy River turtle. The works will be restricted temporally to a small, localised area, with measures in place to avoid fragmentation of the species. Due to the localised and temporary nature of the construction impacts, no fragmentation of an existing population will occur.
Result in genetically distinct populations forming as a result of habitat isolation	**Unlikely** The project will not fragment the species population and therefore is unlikely to result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat	**Unlikely** Construction activities have the potential to increase the presence of introduced weed and pest species that can degrade turtle nesting habitat suitability and predate upon turtle nests. The suitability of habitat at site 23 for turtle nesting is limited as a result of the density of riparian bank vegetation and bank substrate. Implementation of best practice weed and pest management techniques coupled with erosion and sediment management controls will reduce the likelihood of impacts to potential turtle nesting habitats. The management actions proposed for the control of weed and pest species are considered sufficient such that no significant impact to the Fitzroy River turtle and/or the species' habitat is likely to occur.
Introduce disease that may cause the population to decline	**Unlikely** There are no known diseases that this species is susceptible to or threatened by that proposed works have the potential to introduce. Therefore, it is considered unlikely that construction and operation of the intake structure and the waterway crossings will have the potential to introduce disease to the extent that the Fitzroy River turtle population will decline.
Interfere with the recovery of the species	**Unlikely** The main identified threats to the Fitzroy River turtle include loss and disturbance of habitat, damning of rivers, and pollution and siltation of rivers and creek habitats (EPA, 2007). There are no existing populations of Fitzroy River turtle at sites 22, 25, 31, and 32, measures including construction at these sites occurring during the dry season will ensure that the project does not interfere with the recovery of the species.

Significant residual impact criteria	Assessment
	The species is known to occur throughout the Fitzroy River, including near site 23. The project potentially could cause incidence of adult mortality or injury and habitat degradation during construction. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Fauna salvage will be undertaken within the construction area of this intake structure in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and flow and fauna movement maintained adjacent to construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrainment, minimising potential effects of the local population of the Fitzroy River turtle. Design and implementation of a CEMP for the construction phase and an OEMP for the operational phase. OEMP is to include extraction monitoring to avoid habitat degradation. These measures will ensure that the project is unlikely to contribute to key threating processes or interfere with recovery actions.
Cause disruption to ecologically significant locations of a species	**Unlikely** At sites 22, 25, 31, and 32, the Fitzroy River turtle is unlikely to occur due to a lack of available surface water. With no population existing within these sites, the project is not expected to cause disruption to ecologically significant locations of a species. The species is known to occur throughout the Fitzroy River including near site 23 and the site provides optimal foraging habitat. The works will be restricted to a small, localised area around the site with the duration of works to be less than 180 days. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Design and implementation of a CEMP for the construction phase and an OEMP for the operational phase. OEMP is to include extraction monitoring to avoid habitat degradation. Works at this location will be designed so that the species cannot enter the construction zone whilst installation of the intake structure occurs. These measures result that the project is unlikely to cause disruption to ecologically significant locations of a species.
Conclusion	Due to the temporary nature of the construction works and restoration of any degradation of potential habitat, the project is not expected to have a significant residual impact on the Fitzroy River turtle.



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Legend

- Northern Section Pipeline Alignment
- 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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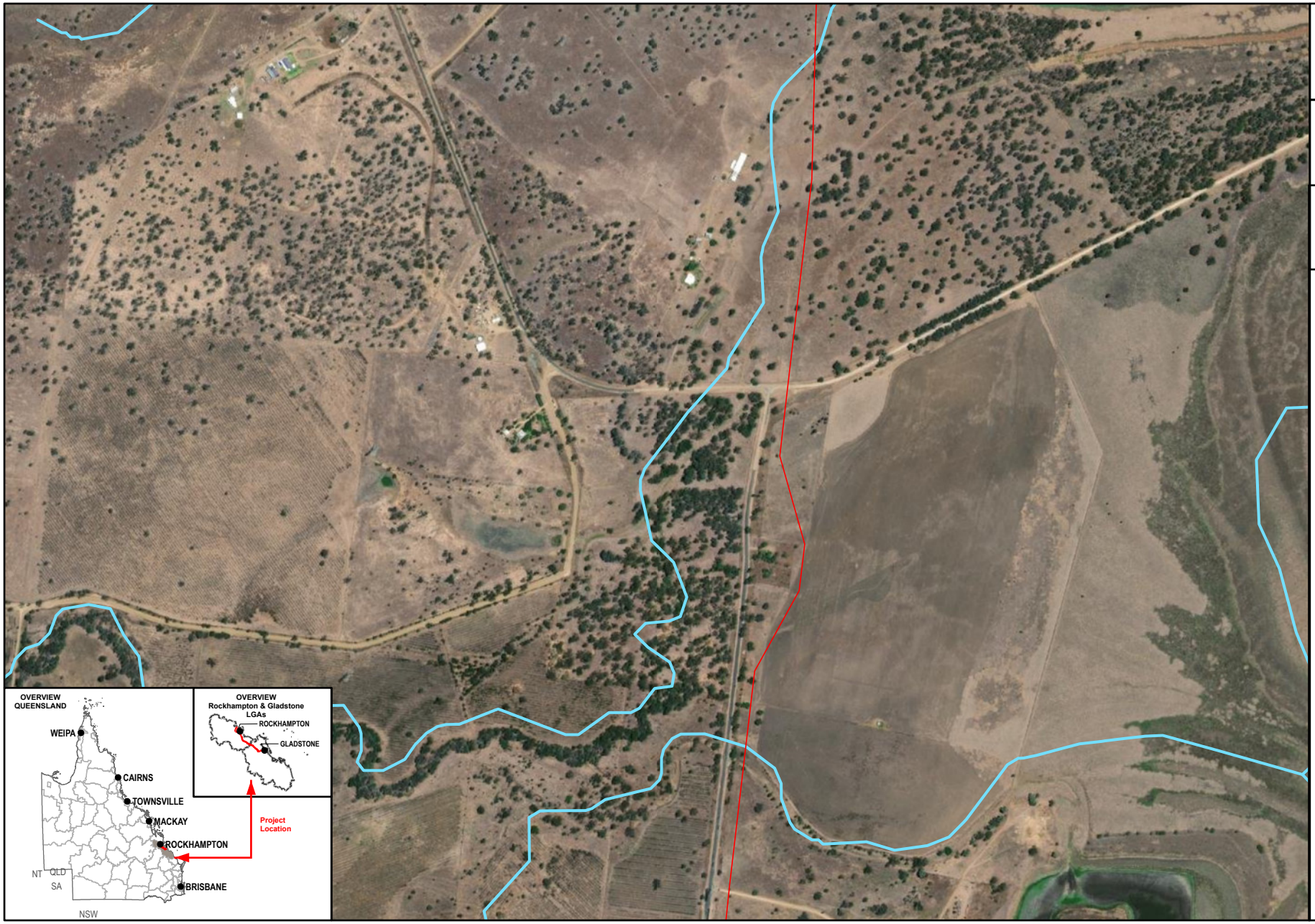
PROJECTION UTM Zone 56
(Datum GDA2020)

Compiled by:YS16239

Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28a
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2449 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- 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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PROJECTION UTM Zone 56
(Datum GDA2020)

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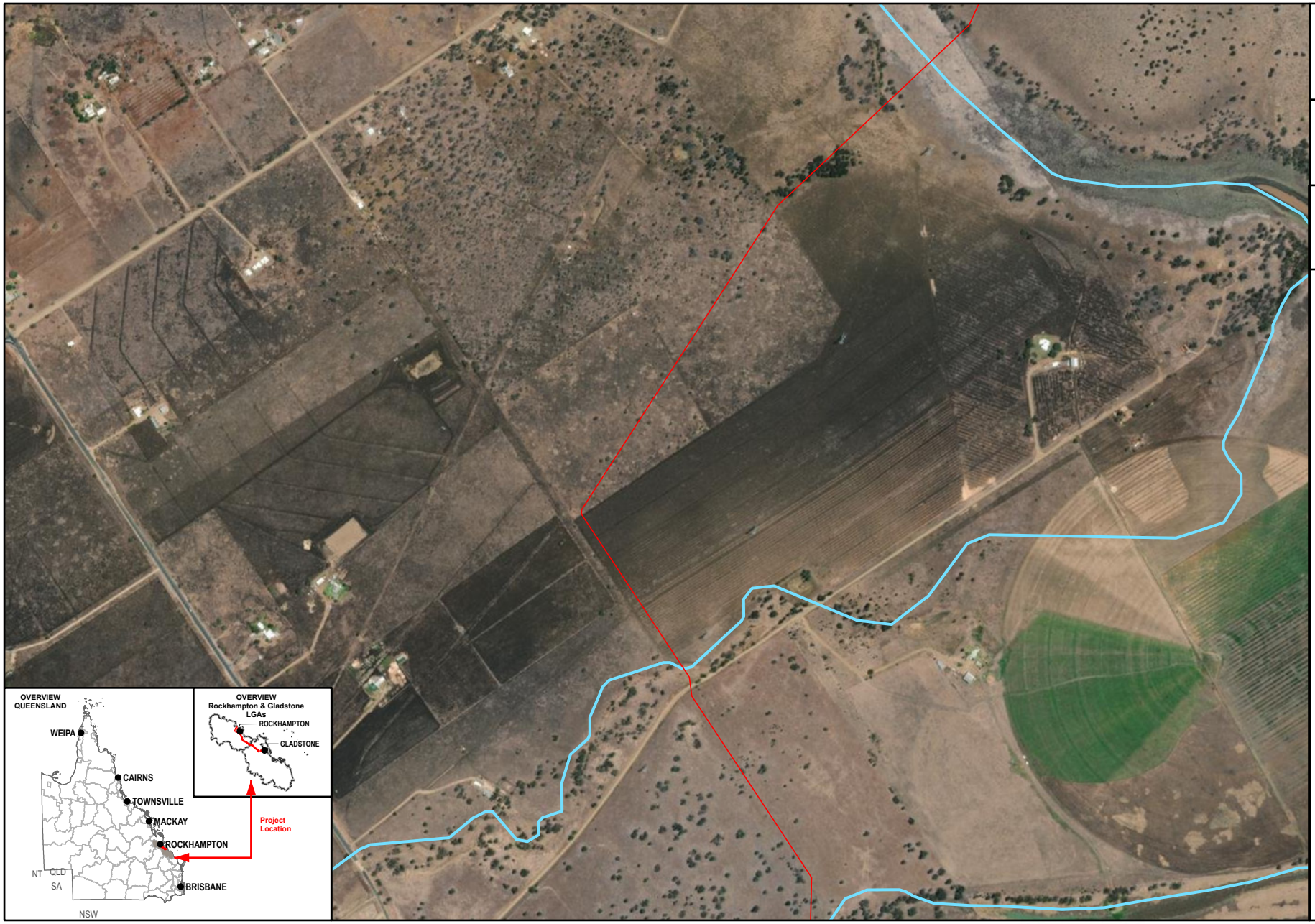
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28b
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2449 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- 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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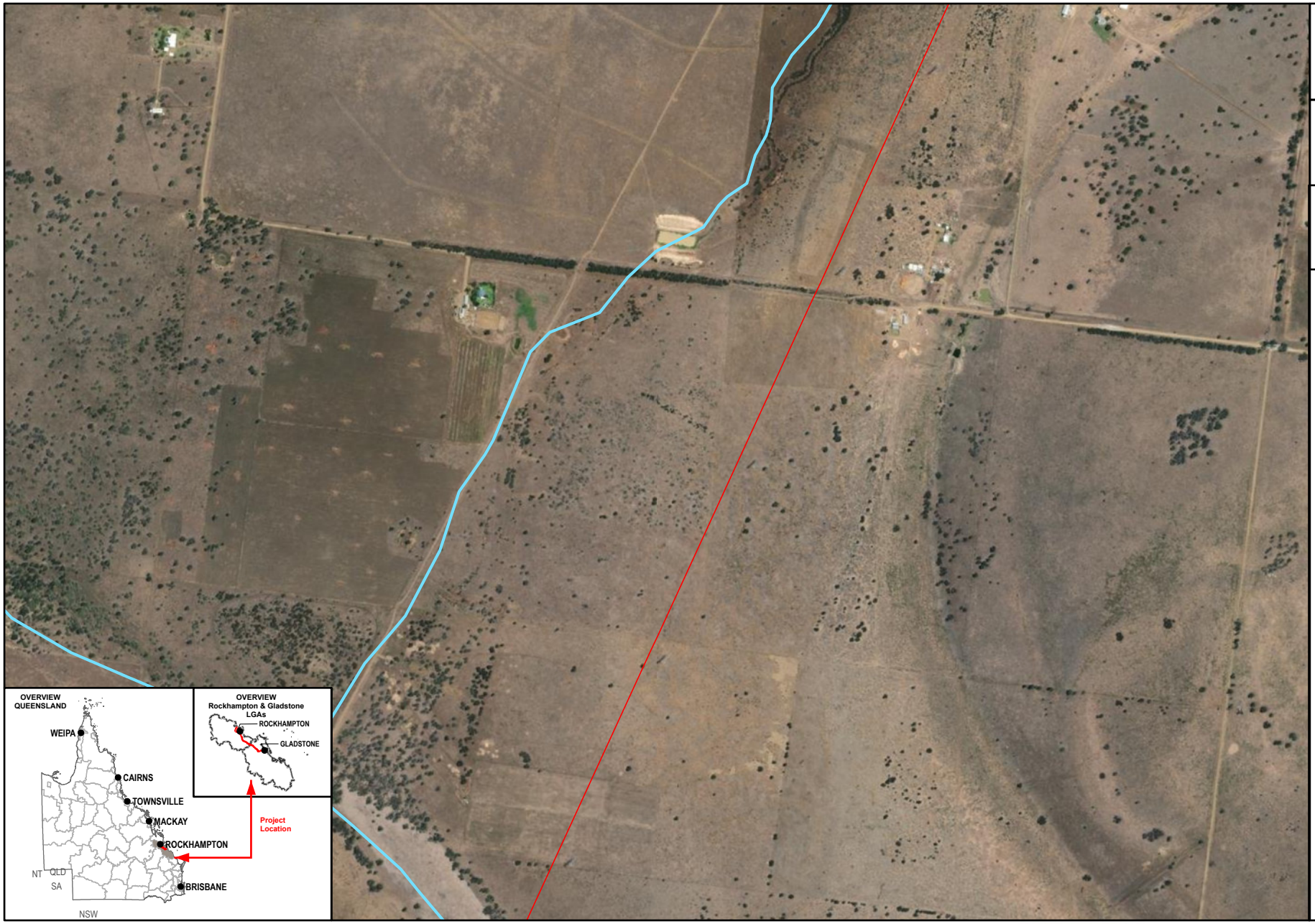
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28c
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2449 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- 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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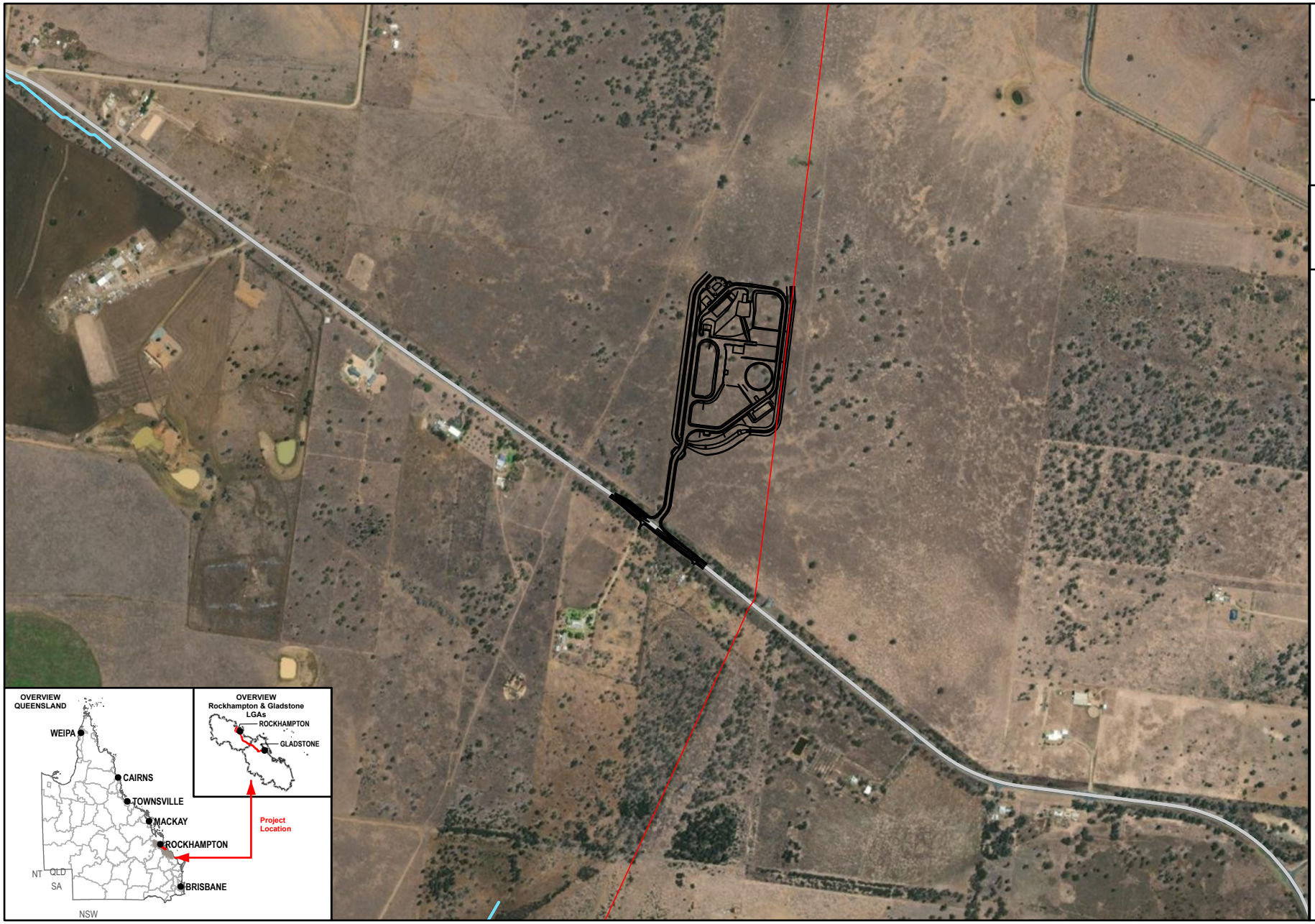
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28d
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2449 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Alton Down WTP, Pump Station and Reservoir Layout
- Waterways
- 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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PROJECTION UTM Zone 56
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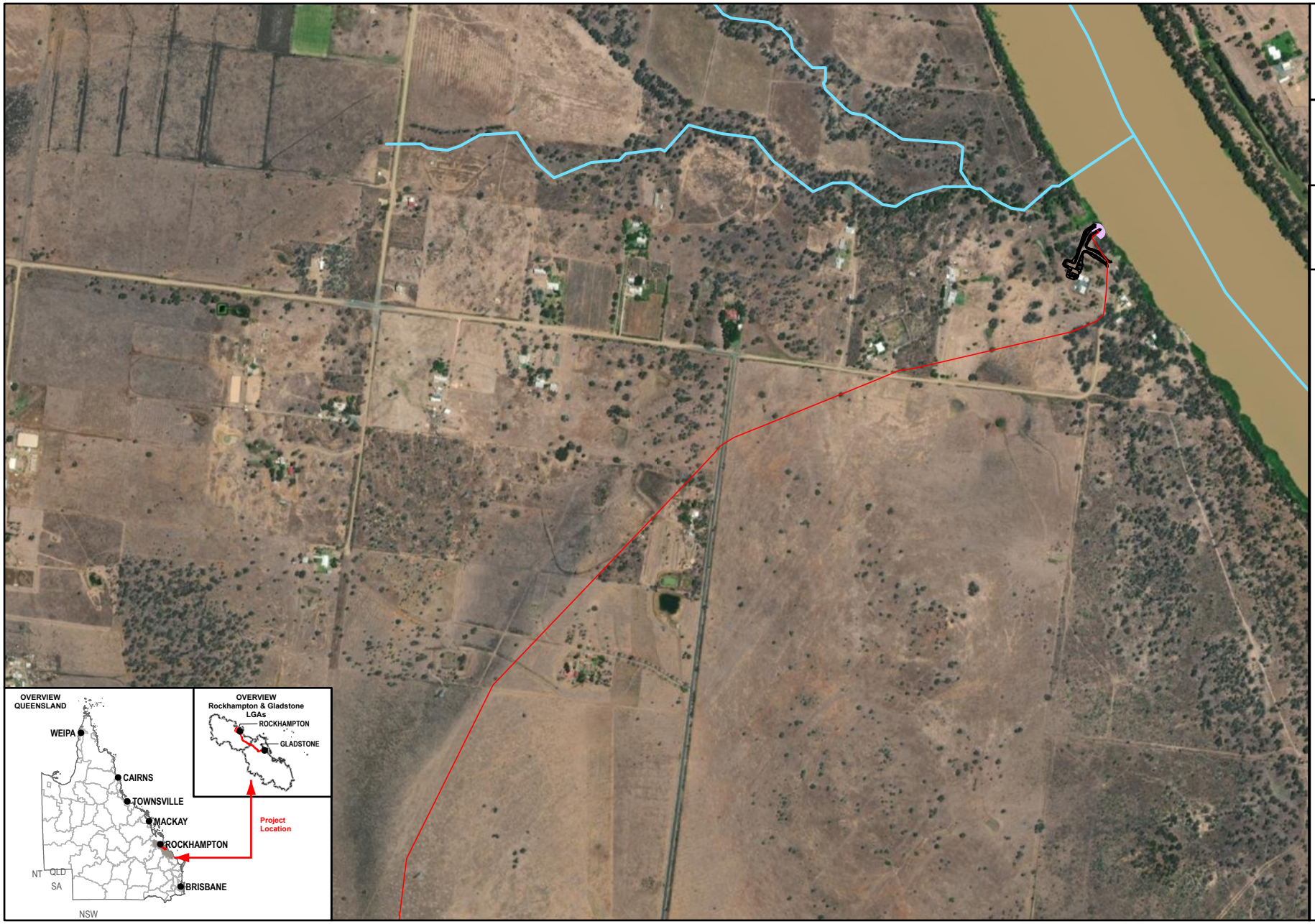
Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28e
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area

000-G-MAP-2449 Version:3 Date:20/09/2022



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Legend

- Northern Section Pipeline Alignment
- Predicted Fitzroy River Turtle Habitat
- 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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Fitzroy to Gladstone Pipeline
Baseline Terrestrial and Aquatic Ecology Technical Report
Figure 7-28f
Distribution of Fitzroy River Turtle Habitat Within the Northern Section Study Area
000-G-MAP-2449 Version:3 Date:20/09/2022

7.3.2 Significant Residual Impact on MSES values

To identify and quantify any significant impact on connectivity within the Northern Section pipeline alignment, the Landscape Fragmentation Tool (LFC) was used. The LFC tool performs a desktop assessment of proposed impacts on connectivity areas containing remnant vegetation and determines whether the prescribed activity will be significant with respect to the Queensland Environmental Offset Framework.

The following MSES values in this Section listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b) have been identified as having the potential to be impacted by the project. Note that potential impacts on MSES conservation significant species and their habitat have already been assessed above in Section 7.3.1. A summary of the significant residual impact assessments are provided in Table 7-49.

Table 7-49 Summary of the Northern Section residual impact assessments

Value	Is the residual impact significant?
Regulated vegetation	Likely
Connectivity areas	Unlikely
Wetlands and watercourses	Unlikely
Waterway providing for fish passage	Unlikely

7.3.2.1 Regulated vegetation

The project is likely to have a significant impact on regulated vegetation within the Northern Section pipeline alignment. A significant residual impact assessment is provided in Table 7-50.

Table 7-50 Significant residual impact assessment – regulated vegetation

Clearing in a regional ecosystem that is: endangered, or of concern	Clearing in the portion of a regional ecosystem that lies within a mapped wetland	Clearing in a regional ecosystem that is within the defined distance of a watercourse
Significant residual impact criteria		
For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem	For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem.	For clearing for linear infrastructure: – Greater than 25 m wide in a grassland (structural category) regional ecosystem; or – Greater than 20 m wide in a sparse (structural category) regional ecosystem; or – Greater than 10 m wide in a dense to mid-dense (structural category) regional ecosystem.
	Clearing within 50 m of the defining bank.	Clearing within 5 m of the defining bank.
Assessment		
Significant – Clearing greater than 10 m wide in a dense (structural category) endangered regional ecosystem and greater than 20 m wide in a sparse (structural category) of concern regional ecosystem is proposed to occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared.	**Significant** – Clearing greater than 20 m wide in a sparse (structural category) regional ecosystem that lies within a mapped wetland is proposed to occur. Clearing within 50 m of the defining bank will also occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared.	**Significant** – Clearing greater than 10 m wide in a dense (structural category) regional ecosystem and greater than 20 m wide in a sparse (structural category) regional ecosystem that are within the defined distance of a watercourse is proposed to occur. Clearing within 5 m of the defining bank will also occur. – Disturbance within 10 m to 30 m will be rehabilitated, leaving 10 m permanently cleared. The disturbance within 5 m of a bank will be rehabilitated after construction as the

Clearing in a regional ecosystem that is: endangered, or of concern	Clearing in the portion of a regional ecosystem that lies within a mapped wetland	Clearing in a regional ecosystem that is within the defined distance of a watercourse
		pipeline is proposed to be buried under watercourses and associated bank vegetation.

7.3.2.2 Connectivity areas

The following significant residual impact criteria for the significant residual impact test for connectivity as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assessed and the project is unlikely to have a significant impact on connectivity within the Northern Section pipeline alignment. A significant residual impact assessment of connectivity is provided in Table 7-51.

Table 7-51 Significant residual impact assessment – connectivity

Significant residual impact criteria	Assessment
Change in core remnant ecosystem extent at the local scale	Unlikely
Loss or fragmentation of core remnant ecosystem at the site scale	Unlikely

7.3.2.3 Wetlands and watercourses

The following significant residual impact criteria for wetlands and watercourses as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assessed and the project is unlikely to have a significant impact on wetlands within the Northern Section pipeline alignment. A significant residual impact assessment is provided in Table 7-52.

Table 7-52 Significant residual impact assessment – wetlands and watercourses

Significant residual impact criteria	Assessment
Areas of the wetland or watercourse being destroyed or artificially modified;	**Unlikely** The pipeline will intersect with two HES listed wetlands, located at sites 31 and 32. Within ephemeral watercourses, including the HES wetland at site 31, that are dry during construction, the pipelines will be constructed via trenching. There will be a temporary modification of the dry creek bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. However, it is expected that after construction, the ephemeral watercourse beds and banks within the footprint will be rehabilitated back to their natural state within 180 days. Where works occur in ephemeral habitats, additional controls for the protection of habitat and flow will be implemented. These measures will include scheduling works during the dry season to avoid increased mobilisation or erosion and sedimentation and avoid key fish migration and spawning periods. Works in wetted waterways will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions, to avoid impacts to flow and fauna movement within the wetland. Construction will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline. Fitzroy River is a major risk waterway within the Northern Section pipeline alignment at site 23. Works at this site include the intake structure which will involve the localised disturbance of the bed and bank. A coffer dam or similar structure is proposed to be installed around the footprint of the intake structure works to create a dry works area. Flow and movement outside of the construction area will be maintained throughout construction. The intake structure will incorporate a design to prevent bed scour and reduce the potential for entrapment, minimising potential effects of the local population of the estuarine crocodile. An OEMP will be designed for the operational phase with water extraction to be monitored in accordance with licence conditions to avoid habitat degradation.

Significant residual impact criteria	Assessment
A measurable change in water quality of the wetland or watercourse—for example a change in the level of the physical and/or chemical characteristics of the water, including salinity, pollutants, or nutrients in the wetland or watercourse, to a level that exceeds the water quality guidelines for the waters; or	**Unlikely** There are two HES wetlands that intersect the Northern Section pipeline alignment. The Northern Section pipeline alignment has been positioned to avoid impacts on HES wetlands and water courses where possible. The water quality of the two HES wetlands watercourses that intersect the Northern Section pipeline alignment are unlikely to undergo a measurable change in water quality due to their ephemeral nature. Construction in these areas will occur during the dry season when there is no water present and returned to its natural state. For mapped wetlands and waterways that contain water at the time of construction, methods will consist of various trenchless construction methods to minimise impacts to the habitat and water quality. A CEMP, including erosion and sediment control will be designed for protection of water quality. Within ephemeral watercourses that are dry during construction, the pipelines will be constructed via trenching. There will be a temporary modification of the dry creek bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks within the footprint will be rehabilitated back to their natural state with no residual impact. Pipelines will be constructed via trenchless construction methods for any wetted watercourse intersecting the Northern Section pipeline alignment. The water quality of watercourses that intersect the Northern Section pipeline alignment are unlikely to undergo a measurable change in water quality. Fitzroy River is a major risk waterway within the Northern Section pipeline alignment at site 23. Works at this site include the intake structure which will involve the localised disturbance of the bed and bank. The CEMP at this location which includes erosion and sediment control measures for effective management of the cofferdam, and the control of hazardous materials such as fuels and oils, will be designed for protection of water quality.
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected; or	**Unlikely** The habitats or lifecycles of native species that are dependent on the waterway are unlikely to be seriously affected by the project. The Northern Section pipeline alignment has been positioned to avoid impacts to HES wetlands and high ecological waterways where possible. Within ephemeral watercourses and the HES wetland, construction will occur during the dry season and the pipelines will be constructed via trenching. There will be a temporary modification of the dry creek bed and banks during construction to clear vegetation within the pipeline trenching footprint which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks within the footprint will be rehabilitated back to their natural state with no residual impact. Construction will involve microtunneling through wetted areas at the HES wetland and at site 32 habitat areas intersecting the pipeline and have no impacts upon the species within the wetland. Where works occur in wetted habitats, additional controls for the protection of habitat and flow including short duration of works outside of key migration or breeding periods will occur, these works will be localised and unlikely to disrupt the lifecycles of native species.
A substantial and measurable change in the hydrological regime or recharge zones of the wetland, e.g. a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland; or	**Unlikely** No substantial or measurable change in the hydrological regime or recharge zones of the wetland is expected to occur. The Northern Section pipeline alignment has been positioned to avoid impacts to HES wetlands and high ecological waterways where possible. Within ephemeral watercourses and the HES wetland at site 31, construction will occur during the dry season and the pipelines will be constructed via trenching. Where works occur in wetted habitats including site 32, additional controls for the protection of habitat and flow including short duration of works these works will be localised and unlikely to disrupt flow within the waterbody. Works in wetted waterways will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions, and will allow for continued or facilitated movements.
An invasive species that is harmful to the environmental values of the wetland being established (or an existing	**Unlikely** Establishment of an invasive species that is harmful to the environmental values of the wetland is unlikely to occur as a result of this project. Site-specific Weed and Pest Management Plan in accordance with relevant legislation and plans will be implemented that outlines protocols to prevent the introduction of weed and pest

Significant residual impact criteria	Assessment
invasive species being spread) in the wetland.	species into the construction area and minimise the spread of declared weeds and pests within the project footprint.

7.3.2.4 Waterway providing for fish passage

The following significant residual impact criteria for waterways providing for fish passage as listed in the *Significant Residual Impact Guideline 2014* (DEHP 2014b), have been assess and the project is unlikely to have a significant impact on waterway providing for fish passage within the Northern Section pipeline alignment. A significant residual impact assessment is provided in Table 7-53.

Table 7-53 Significant residual impact assessment – waterway providing for fish passage

Significant residual impact criteria	Assessment
Result in the mortality or injury of fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will result in the mortality or injury of fish. Construction will occur during the dry season within ephemeral waterways thereby avoiding injury and mortality. Construction will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline and will avoid impacts to the waterways and fish community. If trenching construction is required within a waterway supporting aquatic fauna, then fauna salvage will occur in accordance with DAF Fish Salvage Guidelines. A CEMP will be implemented to protect habitat quality downstream of construction. Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. The intake structure will incorporate a design to prevent bed scour and reduce the potential for fish entrapment, and consequently mortality or injuries to fish.
Result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will result in conditions that substantially increases the risks to the health, wellbeing and productivity of fish seeking passage. Key mitigation measures include construction during the dry season and will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline at waterways that contain water at the time of construction. A CEMP will be implemented for the protection of habitat quality within and downstream of the construction footprints. Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. Fauna salvage will be undertaken within the construction area in accordance with DAF Aquatic Fauna Salvage Guidelines to capture and relocate any trapped fauna from within the construction footprints. Pre-clearance surveys will be undertaken prior to the construction to identify risks to individuals and breeding habitat, and a high-risk SMP prepared if required. Works will be undertaken in accordance with DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) with flow and fish passage maintained adjacent to the works.
Reduce the extent, frequency or duration of fish passage previously found at a site; or	**Unlikely** It is considered unlikely that the proposed pipeline works will reduce the extent, frequency or duration of fish passage within the Northern Section pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Construction will primarily occur within dry ephemeral waterways and no impacts to fish passage will occur. Construction will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline and will avoid impacts to a waterbody and fish passage.

Significant residual impact criteria	Assessment
	Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. Works will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and will allow for continued flow of water and fish passage around the construction area. Works will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and will allow for continued or facilitated movements.
Substantially modify, destroy or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish; or	**Unlikely** It is considered unlikely that the proposed pipeline works will substantially modify, destroy or fragment areas of fish habitat within the Northern Section pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Open trench construction methods will primarily occur within dry ephemeral waterways in which there will be a temporary modification of the dry creek bed and banks which will cause a temporary disturbance. However, it is expected that after construction, the watercourse beds and banks, along with other fish habitats within the footprint will be rehabilitated back to their natural state with no residual impact. Construction will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline will be used to further avoid direct impacts to fish, fish movement and habitat quality. Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. The CEMP at this location which includes erosion and sediment control and measures for effective management of the cofferdam will be designed for the protection of fish habitat. These works will be localised and unlikely to substantially modify, destroy or fragment area of fish habitat.
Result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows; or	**Unlikely** It is considered unlikely that the proposed pipeline works will substantially change the hydrological regime of the waterways within the Northern Section pipeline alignment. Construction will primarily occur within dry ephemeral waterways and not impact upon the hydrological regime of these waterways. Waterways containing water at the time of construction, trenchless construction methods will be used to further avoid direct impacts to fish, fish movement and habitat quality. Works in wetted waterways will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018), and any approval conditions and is unlikely to impact the hydrological regime of the waterways. Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. Works will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and will allow for continued flow of water around the construction area.
Lead to significant changes in water quality parameters such as temperature, dissolved oxygen, PH and conductivity that provide cues for movement in local fish species.	**Unlikely** It is considered unlikely that the proposed pipeline works will lead to significant changes in water quality parameters within the Northern Section pipeline alignment. The location of the pipeline has been located to avoid and reduce impacts to permanent waterways. Construction will primarily occur within dry ephemeral waterways and not impact upon the water quality within these waterways. Mapped wetlands and waterways that contain water at the time of construction will utilise various trenchless construction methods that will avoid impacts to water quality of the waterways. Construction will involve microtunneling through wetted areas at the HES wetland at site 32 habitat areas intersecting the pipeline will be used to further avoid direct changes to water quality parameters. Works within the Northern Section pipeline alignment at site 23 include the intake structure at the Fitzroy River. Construction of the intake structure will involve a coffer dam or similar structure to be installed around the footprint of the intake structure works to create a dry works area. Works will be undertaken in accordance with the DAF's 'ADR for operational work that is constructing or raising waterway barrier works' (DAF 2018) and will allow for continued flow of water around the construction area. A WQMP, as per the CEMP, will be developed to identify the potential for water quality degradation and allow for adaptive management if required for

Significant residual impact criteria	Assessment
	any potential discharge from the coffer dam. Therefore, works within the project are unlikely to impact upon water quality parameters and thereby not disrupt environmental cues for movement of local fish species.

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Appendices

Appendix A

Desktop search results

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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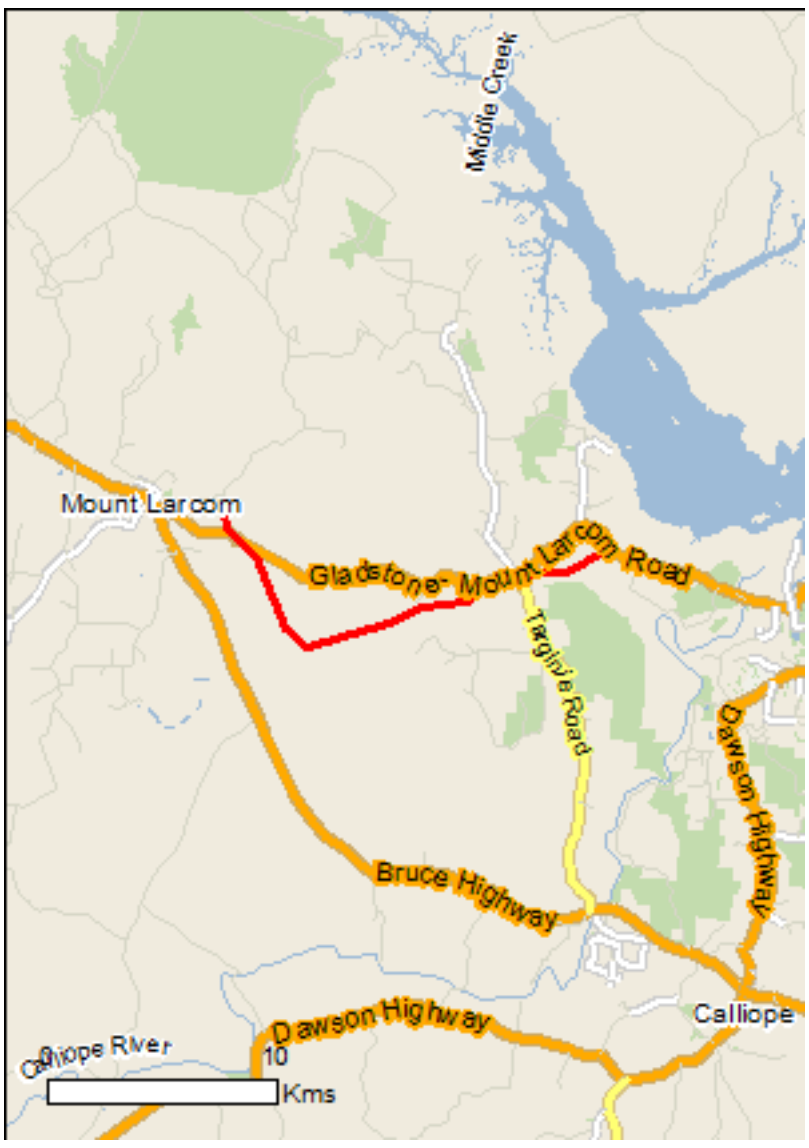
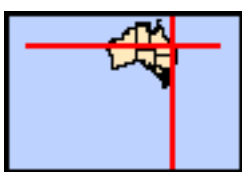


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

Coordinates

Buffer: 10.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	1
National Heritage Places:	1
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	9
Listed Threatened Species:	59
Listed Migratory Species:	60

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	101
Whales and Other Cetaceans:	12
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	1
Regional Forest Agreements:	None
Invasive Species:	40
Nationally Important Wetlands:	2
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

World Heritage Properties [Resource Information]

Name	State	Status
Great Barrier Reef	QLD	Declared property

National Heritage Properties [Resource Information]

Name	State	Status
Natural		
Great Barrier Reef	QLD	Listed place

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	Community may occur within area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community likely to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	Critically Endangered	Community likely to occur within area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community may occur within area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community may occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Cyclopsitta diophthalma coxeni Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area

Name	Status	Type of Presence
Epthianura crocea macgregori Capricorn Yellow Chat, Yellow Chat (Dawson) [67090]	Critically Endangered	Species or species habitat may occur within area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat likely to occur within area
Poephila cincta cincta Southern Black-throated Finch [64447]	Endangered	Species or species habitat may occur within area
Pterodroma neglecta neglecta Kermadec Petrel (western) [64450]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Turnix melanogaster Black-breasted Button-quail [923]	Vulnerable	Species or species habitat known to occur within area
Mammals		
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Dasyurus hallucatus Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat known to occur within area
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat known to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Xeromys myoides Water Mouse, False Water Rat, Yirrkoo [66]	Vulnerable	Species or species habitat known to occur within area
Plants		
Atalaya collina Yarwun Whitewood [55417]	Endangered	Species or species habitat known to occur within area
Bosistoa transversa Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
Bulbophyllum globuliforme Miniature Moss-orchid, Hoop Pine Orchid [6649]	Vulnerable	Species or species habitat likely to occur within area
Cossinia australiana Cossinia [3066]	Endangered	Species or species habitat likely to occur within area
Cupaniopsis shirleyana Wedge-leaf Tuckeroo [3205]	Vulnerable	Species or species habitat known to occur within area
Cycas megacarpa [55794]	Endangered	Species or species habitat known to occur within area
Cycas ophiolitica [55797]	Endangered	Species or species habitat may occur within area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area
Eucalyptus raveretiana Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area
Macadamia integrifolia Macadamia Nut, Queensland Nut Tree, Smooth-shelled Macadamia, Bush Nut, Nut Oak [7326]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Marsdenia brevifolia [64585]	Vulnerable	Species or species habitat may occur within area
Parsonsia larcomensis Mt Larcom Silk Pod [64587]	Vulnerable	Species or species habitat known to occur within area
Phaius australis Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
Samadera bidwillii Quassia [29708]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Delma torquata Adorned Delma, Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
Denisonia maculata Ornamental Snake [1193]	Vulnerable	Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Egernia rugosa Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Furina dunmalli Dunmall's Snake [59254]	Vulnerable	Species or species habitat known to occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rheodytes leukops Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Vulnerable	Species or species habitat may occur within area
Sharks		
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species [Resource Information]		
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Anous stolidus Common Noddy [825]		Species or species habitat known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Migratory Marine Species		
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat may occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcaella heinsohni Australian Snubfin Dolphin [81322]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Pristis zijsron Green Sawfish, Dindagubba, Narrowsnout Sawfish [68442]	Vulnerable	Breeding may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Migratory Terrestrial Species		
Cuculus optatus Oriental Cuckoo, Horsfield's Cuckoo [86651]		Species or species habitat may occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur

Name	Threatened	Type of Presence
		within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - GLADSTONE ARES DEPOT

Listed Marine Species [Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Anous stolidus Common Noddy [825]		Species or species habitat known to occur within area
Anseranas semipalmata Magpie Goose [978]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Fregata ariel Lesser Frigatebird, Least Frigatebird [1012]		Species or species habitat likely to occur within area
Fregata minor Great Frigatebird, Greater Frigatebird [1013]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limnodromus semipalmatus Asian Dowitcher [843]		Species or species habitat may occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Monarcha trivirgatus Spectacled Monarch [610]		Species or species habitat known to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat likely to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
Acentronura tentaculata Shortpouch Pygmy Pipehorse [66187]		Species or species habitat may occur within area
Campichthys tryoni Tryon's Pipefish [66193]		Species or species habitat may occur within area
Choeroichthys brachysoma Pacific Short-bodied Pipefish, Short-bodied		Species or species

Name	Threatened	Type of Presence
Pipefish [66194]		habitat may occur within area
Corythoichthys amplexus Fijian Banded Pipefish, Brown-banded Pipefish [66199]		Species or species habitat may occur within area
Corythoichthys flavofasciatus Reticulate Pipefish, Yellow-banded Pipefish, Network Pipefish [66200]		Species or species habitat may occur within area
Corythoichthys haematopterus Reef-top Pipefish [66201]		Species or species habitat may occur within area
Corythoichthys intestinalis Australian Messmate Pipefish, Banded Pipefish [66202]		Species or species habitat may occur within area
Corythoichthys ocellatus Orange-spotted Pipefish, Ocellated Pipefish [66203]		Species or species habitat may occur within area
Corythoichthys paxtoni Paxton's Pipefish [66204]		Species or species habitat may occur within area
Corythoichthys schultzi Schultz's Pipefish [66205]		Species or species habitat may occur within area
Doryrhamphus excisus Bluestripe Pipefish, Indian Blue-stripe Pipefish, Pacific Blue-stripe Pipefish [66211]		Species or species habitat may occur within area
Festucalex cinctus Girdled Pipefish [66214]		Species or species habitat may occur within area
Filicampus tigris Tiger Pipefish [66217]		Species or species habitat may occur within area
Halicampus dunckeri Red-hair Pipefish, Duncker's Pipefish [66220]		Species or species habitat may occur within area
Halicampus grayi Mud Pipefish, Gray's Pipefish [66221]		Species or species habitat may occur within area
Halicampus nitidus Glittering Pipefish [66224]		Species or species habitat may occur within area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species habitat may occur within area
Hippichthys cyanospilos Blue-speckled Pipefish, Blue-spotted Pipefish [66228]		Species or species habitat may occur within area
Hippichthys heptagonus Madura Pipefish, Reticulated Freshwater Pipefish [66229]		Species or species habitat may occur within area
Hippichthys penicillus Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species habitat may occur within area
Hippocampus bargibanti Pygmy Seahorse [66721]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Hippocampus kuda Spotted Seahorse, Yellow Seahorse [66237]		Species or species habitat may occur within area
Hippocampus planifrons Flat-face Seahorse [66238]		Species or species habitat may occur within area
Hippocampus zebra Zebra Seahorse [66241]		Species or species habitat may occur within area
Lissocampus runa Javelin Pipefish [66251]		Species or species habitat may occur within area
Micrognathus andersonii Anderson's Pipefish, Shortnose Pipefish [66253]		Species or species habitat may occur within area
Micrognathus brevirostris thorntail Pipefish, Thorn-tailed Pipefish [66254]		Species or species habitat may occur within area
Nannocampus pictus Painted Pipefish, Reef Pipefish [66263]		Species or species habitat may occur within area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species habitat may occur within area
Solenostomus cyanopterus Robust Ghostpipefish, Blue-finned Ghost Pipefish, [66183]		Species or species habitat may occur within area
Solenostomus paradoxus Ornate Ghostpipefish, Harlequin Ghost Pipefish, Ornate Ghost Pipefish [66184]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Trachyrhamphus bicoarctatus Bentstick Pipefish, Bend Stick Pipefish, Short-tailed Pipefish [66280]		Species or species habitat may occur within area
Mammals		
Dugong dugon Dugong [28]		Species or species habitat known to occur within area
Reptiles		
Acalyptophis peronii Horned Seasnake [1114]		Species or species habitat may occur within area
Aipysurus duboisii Dubois' Seasnake [1116]		Species or species habitat may occur within area
Aipysurus eydouxii Spine-tailed Seasnake [1117]		Species or species habitat may occur within area
Aipysurus laevis Olive Seasnake [1120]		Species or species habitat may occur within area
Astrotia stokesii Stokes' Seasnake [1122]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Crocodylus porosus Salt-water Crocodile, Estuarine Crocodile [1774]		Species or species habitat likely to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Disteira major Olive-headed Seasnake [1124]		Species or species habitat may occur within area
Emydocephalus annulatus Turtle-headed Seasnake [1125]		Species or species habitat may occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Lapemis hardwickii Spine-bellied Seasnake [1113]		Species or species habitat may occur within area
Laticauda colubrina a sea krait [1092]		Species or species habitat may occur within area
Laticauda laticaudata a sea krait [1093]		Species or species habitat may occur within area
Lepidochelys olivacea Olive Ridley Turtle, Pacific Ridley Turtle [1767]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Delphinus delphis Common Dolphin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcaella brevirostris Irrawaddy Dolphin [45]		Species or species habitat likely to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Breeding known to occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves	[Resource Information]
Name	State
Calliope	QLD

Invasive Species	[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Frogs		
Rhinella marina Cane Toad [83218]		Species or species habitat known to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area
Equus caballus Horse [5]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Plants		
Acacia nilotica subsp. indica Prickly Acacia [6196]		Species or species habitat may occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Jatropha gossypifolia Cotton-leaved Physic-Nut, Bellyache Bush, Cotton-leaf Physic Nut, Cotton-leaf Jatropha, Black Physic Nut [7507]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Prosopis spp. Mesquite, Algaroba [68407]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss,		Species or species

Name	Status	Type of Presence
Kariba Weed [13665] Vachellia nilotica		habitat likely to occur within area
Prickly Acacia, Blackthorn, Prickly Mimosa, Black Piquant, Babul [84351]		Species or species habitat likely to occur within area
Reptiles		
Ramphotyphlops braminus		
Flowerpot Blind Snake, Brahminy Blind Snake, Cacing Besi [1258]		Species or species habitat may occur within area

Nationally Important Wetlands [Resource Information]

Name	State
Port Curtis	QLD
The Narrows	QLD

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-23.82995 151.15804,-23.8377 151.14275,-23.83886 151.11827,-23.84847 151.10294,-23.85001 151.08596,-23.85586 151.07269,-23.8648 151.04089,-23.85736 151.03218,-23.83188 151.02061,-23.82119 151.0088,-23.81583 151.00803,-23.81237 151.00051

Acknowledgements

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

Department of Agriculture Water and the Environment
GPO Box 858
Canberra City ACT 2601 Australia
+61 2 6274 1111