Santos

Amendment Application

Environmental Authority (EA) 0002115

Petroleum Pipeline Licence (PPL) 2050

Response to Notice of Information Request

1. Introduction

Santos Limited (Santos) lodged an application to amend Environmental Authority (EA) 0002115 with the Department of Environment and Science (DES) on the 12th May 2022. Santos received a Notice of Information Request (IR Notice) on the 13th June 2022 (refer to Appendix A) outlining the further information required by DES to assess the application.

Santos provides the following information in response to all of the information requested in the IR Notice, prior to the end of the information response period of 13th December 2022.

1.1. Summary of Changes Following RFI

As detailed in the amendment application for EA 0002115 submitted to DES 12th May 2022 (the Application), proposed petroleum activities are limited to the construction and operation of two buried gas pipelines. The pipelines are required to connect existing and proposed gas wells located in the Wackett gas field. The pipelines will have a total combined length of approximately 4 km. The pipelines include the Wackett South-2 pipeline and Wackett-14 redirection pipeline (refer to Figure 1).

Due to ongoing Cooper Creek flooding in the region, the project area is inaccessible, and the pipeline alignments cannot be surveyed on the ground. As per the Application, due to the inability to access the site, Santos defined a broad Construction Disturbance Zone (CDZ) within which the proposed pipelines will be installed. Final pipeline alignments will be confirmed once the site is accessible to undertake field surveying and scouting activities (refer to Figure 1). The proposed pipelines will utilise a maximum 19 m wide construction Right of Way (RoW) and the total disturbance area required to construct the pipelines was conservatively estimated at 9.6 ha. This was a very conservative upper disturbance limit to allow a degree of flexibility for final alignment placement within the CDZ, and the total disturbance area will likely be less.

Following receipt of the IR Notice, Santos commissioned Eco Logical Australia Pty Ltd (ELA) to undertake a detailed third-party desktop ecological assessment of the CDZ. ELA have extensive experience conducting field based ecological assessment in the cooper basin and have undertaken many field assessments in the Cooper Creek floodplain. Given their field experience ELA were also commissioned to undertake a Significant Residual Impact (SRI) assessment of the proposed activities in accordance with the *'Queensland Environmental Offsets Policy Significant Residual Impact Guideline'* (DEHP 2014). The results of the third-party SRI assessment are provided in the *Wackett Flowlines – Desktop Ecological Assessment* (ELA, 2022) attached as Appendix B. Refer to Section 2.1 for further information.

Following receipt of the IR Notice and a review of the proposed activities, Santos has reduced the size of the CDZ (refer to Figure 1), and maximum proposed disturbance area has also been reduced from 9.6 ha to 8.6 ha. The revised 8.6 ha disturbance area remains a conservative upper disturbance estimate and retains some flexibility to place the final pipeline alignments within the CDZ. Refer to Section 2.1 for further information. Moreover, the reduced size of the CDZ has meant that it no longer intersects areas of regulated vegetation located within 50 metres of a Vegetation Management Wetland (refer to Figure 2). Refer to Section 2.3 for further information.

Further, potential impacts to a waterway providing for fish passage (a Matter of State Environment Significance) as a result of the proposed activities were conservatively considered to be a possibility by the Application. Following a review of the proposed activities and in consultation with the Santos engineering team, Santos has confirmed that pipeline construction will not occur if standing or flowing surface water are present in drainage features in the project area. Where areas of standing shallow surface water are present in drainage features at the time of construction, Santos will delay construction until these areas have sufficiently dried out. Under these conditions, fish or potential for fish passage

would not be supported by these drainage features. Therefore, no impact to fish or fish passage will occur as part of the proposed activities. Refer to Section 2.2 for further information.

2. Information Request and Response

Sections 2.1 to 2.4 provide the elements of the DES IR Notice and the Santos response to the request.

2.1. DES Information Request Element (1)

Issue 1:

The application does not adequately describe the environmental values likely to be affected by the proposed amendment.

The amendment application does not demonstrate:

- the disturbance area that is required for the overall amendment, where the disturbance is proposed and how much disturbance will impact upon prescribed environmental matters outlined under Schedule 2 of the Environmental Offsets Regulation 2014; and
- that the activity has been designed to avoid impacts to prescribed environmental matters.

Information requested:

As the environmental values are prescribed environmental matters, detail must be provided in accordance with the Queensland Environmental Offset Policy (QEOP) framework.

Please provide appropriate detail required to support the QEOP framework which includes an assessment that demonstrates:

i) the mitigation hierarchy 'avoid – mitigate - offset' has been undertaken; and
ii) the extent of the significant residual impact area and associated ecology studies and conclusions relating to the relevant prescribed environmental matters and disturbance.

Santos Response to Element 1 (i to ii)

As detailed in the Application and Section 1.1 of this response, proposed petroleum activities are limited to the construction and operation of two buried gas pipelines. Further, due to the project area being inaccessible due to flooding in the region, Santos has defined a CDZ, within which the proposed pipelines will be installed, with final alignments to be confirmed once the site is accessible. Indicative pipeline alignments are present in Figure 1.

To avoid and mitigate disturbance, Santos plans to co-locate the proposed Wackett South-2 pipeline with the existing pipeline RoW for the Wackett South-1 pipeline to minimise disturbance to remnant vegetation. The proposed Wackett-14 redirection pipeline has been tentatively placed to travel north from the Wackett-14 gas well (avoiding disturbance to the drainage feature located to the west) and connect into existing gathering infrastructure (refer to Figure 1). However, field inspection is required to confirm the proposed pipeline alignments are viable for engineering purposes, and to ensure environmental and other sensitivities (e.g. cultural heritage) are avoided and/or impacts are mitigated.

As discussed in Section 1.1, total disturbance area required to construct the pipelines was conservatively estimated at 9.6 ha in the Application. Following review, Santos has refined both the size of the CDZ and reduced the proposed disturbance area to 8.6 ha (refer to Figure 1). The 8.6 ha disturbance area remains a conservative estimate and retains some flexibility to place the final pipeline alignments within the CDZ.

As detailed in the Application, a maximum 19 m wide construction RoW will be required for pipeline installation. The RoW must provide sufficient safe working area to locate topsoil banks on either side of the RoW, safe access for pipe truck and side boom tractor/excavator movement, the pipeline trench, and a trench spoil bank. RoW width will be restricted to the smallest extent practicable through watercourse crossings.

Following completion of pipeline construction, the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities to ensure natural surface water flows in the area are maintained. Any wheel and equipment ruts created along the pipeline route during installation will be filled in and levelled by grading equipment. Any topsoil and seed stock removed during installation will be re-spread over the RoW, and any windrows will be removed.

Once operational, the pipelines will transfer gas from the wells into the existing gas pipeline network. Pipeline maintenance activities and inspections are required to be carried out from time to time. A maximum 3 m wide corridor located within the rehabilitated RoW will be used to provide access for inspections via light vehicles. No formed roads will be required or be maintained within the RoW.

As discussed in Section 1.1, following receipt of the IR Notice, Santos commissioned ELA to undertake a detailed third-party desktop ecological assessment of the CDZ, and an SRI assessment of the proposed activities in accordance with the *'Queensland Environmental Offsets Policy Significant Residual Impact Guideline'* (DEHP 2014). The results of the third-party assessment are provided in the *Wackett Flowlines – Desktop Ecological Assessment* (ELA, 2022) attached as Appendix B.

No field validation was undertaken as part of the ELA assessment as site access is not currently possible due to flooding in the region. ELA utilised a range of desktop assessment methods, including Aerial Photographic Interpretation (API), to map Regional Ecosystems (REs) and habitat values within the CDZ. Further, detailed site photos of vegetation and landforms present within the CDZ were provided to ELA by Santos to provide context on landforms, vegetation and habitat features in the CDZ. The supplied photos were taken by Santos field personnel in September 2019 as part of field scouting activities for the existing Wackett South-1 Flowline. As discussed above, the Wackett South-1 Flowline is located immediately adjacent to the proposed alignment for the Wackett South-2 pipeline alignment.

Refer to Table 1 for a detailed summary of REs mapped by ELA within the CDZ. All REs mapped by ELA in the CDZ have a *Vegetation Management Act 1999* (VMA) of 'Least Concern' and a structural class of 'Sparse'.

Habitat value assessments undertaken by ELA predicted that potential protected wildlife habitat within the CDZ largely consists of seasonal foraging resources, and where potential for breeding habitat may occur within the CDZ, it is of marginal quality, and the species are considered to occur as per a precautionary principle.

Habitat mapping undertaken by ELA indicates that REs within the CDZ may provide potential protected wildlife habitat for several species, which are prescribed Matters of State Environmental Significant (MSES), as detailed in Table 2. Refer to Appendix B for further detail.

Table 1: Regional Ecosystems within the CDZ

Regional Ecosystem	Short description	Structural Category	Biodiversity status[1]	VM Act status[2]	RE Area in CDZ (ha)
5.3.18a	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland. Palustrine wetland	Sparse	NC	LC	43.2
5.3.18b	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland	Sparse	NC	LC	63.5
5.3.8a	*Eucalyptus coolabah* low open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans	Sparse	NC	LC	17
Non-remnant vegetation					8.8
Total:					132.5

[1]NC = no concern at present [2]LC = least concern

Table 2: Potential protected wildlife habitat present within the CDZ

Scientific Name	Common Name	NC Act	RE Association	Habitat Values within CDZ	RE-Habitat Area in CDZ (ha)
Amytornis barbatus barbatus	Bulloo grey grasswren	E	5.3.8a	Potential marginal foraging / breeding habitat	17
Epthianura crocea crocea	yellow chat (gulf)	V	5.3.8a / 5.3.18a	Potential foraging/breeding habitat	60.2
Falco hypoleucos	grey falcon	V	5.3.8a / 5.3.18a/b	Potential foraging habitat	123.5
Pedionomus torquatus	plains-wanderer	V	5.3.18b	Potential marginal foraging / breeding habitat	63.5
Rostratula australis	Australian painted snipe	E	5.3.8a / 5.3.18a	Potential breeding and foraging habitat	60.2
Tachyglossus aculeatus	short-beaked echidna	SLC	5.3.8a / 5.3.18a/b	Potential foraging habitat	123.5

ELA undertook the SRI assessment under the assumption that the precise location of the proposed pipeline alignments within the CDZ will be confirmed following field scouting and surveying activities. For this reason, ELA conservatively assumed the majority of the 8.6 ha of disturbance could be located in areas of remnant vegetation i.e. use of the existing pre-disturbed Wackett South-1 pipeline to minimise disturbance has not been factored into the ELA assessment. ELA therefore conservatively estimated that pipeline construction may impact up to 8.6 ha of protected wildlife habitat comprised of remnant native vegetation.

The ELA SRI assessment has been completed based on an assumption that activity within the CDZ can be micro-sited by Santos to avoid impacts within areas of higher environmental value.

Further, ELA noted the outcome of the SRI assessment is unlikely to change based on minor variations to the location of proposed disturbance within the CDZ. The ratio of disturbance to particular REs within the CDZ may vary slightly from the exact area descriptions in this report. However, minor variations are not expected to result in a change to the quantum of potential ecological impacts. This is due to the nature of the proposed disturbance (linear infrastructure), and the homogeneity of the landscape within the CDZ, which comprises large areas of the same or similar REs (5.3.18a/b and 5.3.8a). These have a relatively similar composition (herblands, grasslands, forblands with minor areas of chenopod shrubland associated with drainage features) and structure (sparse). Potential impacts to protected species habitat due to the proposed activities are detailed in Table 3. Refer to Appendix B for further information.

Refer to the Santos responses to IR Notice Elements 2, 3 and 4 for an SRI assessment and discussion of other relevant prescribed environmental matters (i.e. waterway providing for fish passage, regulated vegetation and protected wildlife habitat).

Table 3: Potential protected wildlife habitat disturbance within the CDZ

Species	RE Association	RE-Habitat Area in CDZ (ha)	RE-Habitat Disturbance Area in CDZ (ha)
Bulloo grey grasswren (*Amytornis barbatus barbatus*)	5.3.8a	17	2 ha of potential marginal breeding / foraging habitat
yellow chat (gulf) (*Epthianura crocea crocea*)	5.3.8a / 5.3.18a/b	60.2	4.4 ha potential foraging / breeding habitat
grey falcon (*Falco hypoleucos*)	5.3.8a / 5.3.18a	123.5	8.6 ha of potential foraging and dispersal habitat
plains-wanderer (*Pedionomus torquatus*)	5.3.18b	63.5	4.2 ha of potential marginal breeding / foraging habitat
Australian painted snipe (*Rostratula australis*)	5.3.8a / 5.3.18a	60.2	4.2 ha potential foraging habitat 4.4 ha of potential breeding habitat
short-beaked echidna (*Tachyglossus aculeatus*)	5.3.8a / 5.3.18a/b	123.5	8.6 ha potential foraging and dispersal habitat

The *Queensland Environmental Offset Policy (QEOP)* mitigation hierarchy 'avoid - mitigate - offset' applies to prescribed activities that impact prescribed environmental matters. This means that in designing or planning the prescribed activity, impacts on prescribed environmental matters should, in the first instance, be avoided wherever possible. For impacts that cannot be avoided, the extent of those impacts should be carefully managed and mitigated to the greatest possible extent. These measures can reduce and, in some cases, remove the need for offsets.

The proposed activities have been planned to avoid and mitigate impacts to prescribed environmental values wherever practicable – as summarised below:

- Surface disturbance restricted to the minimum area required to safely carry out activities.
- Consider alternate alignments during the scouting phase to minimise environmental impacts i.e. micro-site the pipelines to avoid impacts to areas of higher environmental value.
- Avoiding areas of high habitat value for the grey grasswren including dense patches of lignum to 2.5 m tall, and/or clumps of northern bluebush.
- RoW widths will be restricted to the smallest extent practicable through watercourses.
- Where practicable, avoid clearing of mature trees and preferentially lop branches rather than removing whole trees or large shrubs.
- Disturbance of grey grasswren habitat will be preferentially timed to occur outside of the breeding season (July – August) for the species.
- Preferentially locating infrastructure adjacent to areas of pre-existing disturbance (i.e. co-locate proposed Wackett South-2 pipeline with the Wackett South-1 pipeline wherever practical) to minimise habitat clearing.
- In higher value environments (including dense lignum and wetlands), disturbance will be avoided, and boundaries will be pegged during construction to delineate the approved maximum extent of disturbance.
- Where nests of threatened species are identified as active with adults, eggs or nestlings, disturbance will be avoided.
- Works will not commence if construction areas are inundated. If the construction area is at risk of becoming inundated (i.e. if weather forecasts are predicting significant rain or flooding), then works will cease and construction areas will be secured (i.e., trenches backfilled and reinstated) until the inundation has subsided.
- Fuels, chemicals and wastes will be stored, handled and transported in accordance with applicable company and regulatory requirements. This includes storing fuels, chemicals and waste in bunded areas outside of the floodplain. An appropriately sized spill kit will be available and stored in close proximity to fuel, chemical and waste storage areas.
- Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens from plant and vehicle movement.
- Lengths of pipe will be capped or sealed when they are left overnight.
- Following completion of pipeline installation activities:
  - Reinstate the RoWs to the condition and surface profiles existing at the commencement of construction activities
  - Ensure any wheel and equipment ruts or windrows created along the RoWs during installation are filled in and levelled by grading equipment; and
  - Re-spread topsoil and seed stock removed during installation over the RoWs.
- The above-mentioned measures will ensure natural pre-existing surface water flows in the area are maintained, and the disturbance area will naturally progressively rehabilitate in accordance with the Environmental Authority conditions.
- Following construction, all redundant plant and equipment will be removed from the RoWs.

Given the nature of the proposed activities, minimal disturbance to potential largely marginal habitat, and implementation of the abovementioned avoidance, mitigation and management strategies (and those further detailed in the Application), the ELA SRI assessment determined that proposed activities within the CDZ requiring disturbance to a maximum of 8.6 ha will not have a significant residual impact on MSES values, provided regulated vegetation clearing limits are adhered to (refer to Appendix B for further information).

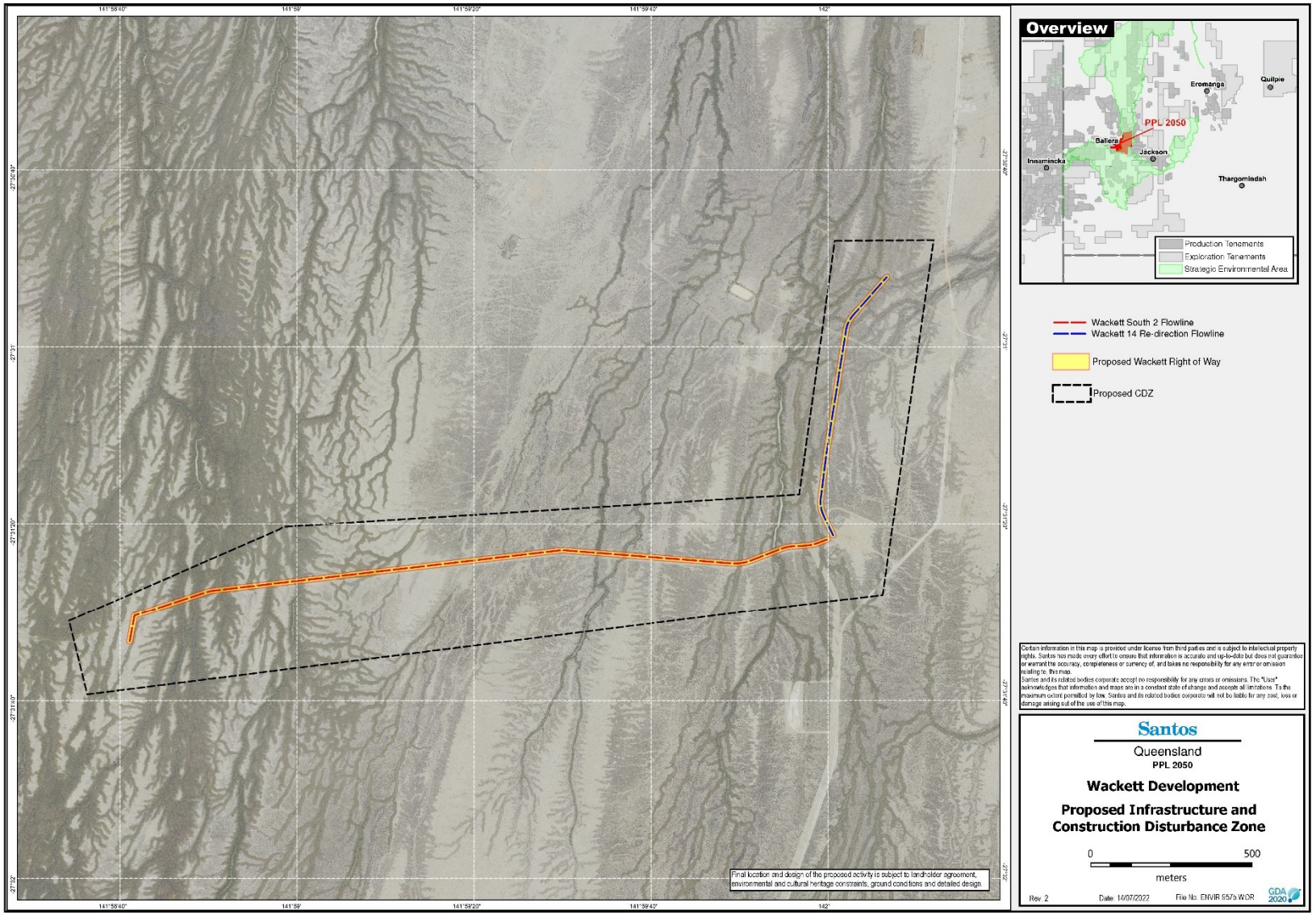

Figure 1: Location of Construction Disturbance Zone and Preliminary Pipeline Alignments

2.2. DES Information Request Element (2)

Issue 2:

The application (Application Supporting Information, page 36) states that a waterway providing for fish passage may be disturbed. Under Schedule 2, section 10 of the Environmental Offsets Regulation 2014, a waterway providing for fish passage is defined as "any part of a waterway providing for passage of fish, only if the construction, installation or modification of waterway barrier works will limit passage of fish". The Department of Agriculture and Fisheries is responsible for determining whether a waterway is providing for passage of fish. It is unclear whether you have made contact with the Department of Agriculture and Fisheries about your proposal.

Information requested: Please provide the following information:

- *i) confirmation on whether you have made contact with the Department of Agriculture and Fisheries, if you haven't it is recommended you do so. You may contact the department via the following email PlanningAssessment@daf.qld.gov.au.*
- *ii) details of correspondence with the Department of Agriculture and Fisheries advising whether the waterways to be disturbed are, or are not, providing for passage of fish.*
- *iii) details of waterways which are to be impacted on and an assessment of the impacts to the receiving environment against the relevant environmental values of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and relevant water quality objectives.*
- *iv) a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (the watercourses) due to the proposed disturbance*.

Santos Response to Element 2 (i to iv)

As stated in the Application, the proposed activities were conservatively assessed to potentially result in disturbance to a waterway providing for fish passage.

This determination was made by assessing the waterways located in the project area that may be crossed by the proposed pipelines against the *"Queensland waterways for waterway barrier works"* spatial data layer (refer to https://qldglobe.information.qld.gov.au) and *Queensland waterways for waterway barrier works spatial data layer Guide to determining waterways Version 2.0* (DAF, April 2021).

Five (5) ephemeral Stream Order (SO) 8 watercourses are mapped to be located in the CDZ, and will be crossed to construct the proposed pipelines (refer to "*Vegetation management watercourse/drainage*" and "*Queensland waterways for waterway barrier"* spatial layers at https://qldglobe.information.qld.gov.au). These mapped drainage features are identified by the *Queensland waterways for waterway barrier works* spatial data layer as Category 4 – Major risk (purple) waterways. Waterways that have been classified as Category 3, 4 or 5 typically contain larger biomass of fish populations, more species of fish with larger size classes and include species that may have weaker swimming abilities.

The potential for these drainage features to provide for fish passage during times of flow was therefore considered as likely in the Application. Further, the potential for impacts to fish passage was conservatively considered as a possibility in the Application in the rare circumstance where very small volumes of surface water were present in the drainage features at the time of pipeline construction (refer to Photo 1 for an example of such conditions). Santos could not practically construct the proposed pipelines in the project area if substantial volumes of surface water or flowing water were present i.e. the area would not be accessible by construction equipment.

Following consultation with the Santos engineering team, Santos has now confirmed that pipeline construction will not occur if standing or flowing surface water is present in drainage features in the project area. Where areas of standing shallow surface water are present in drainage features at the time

of construction, Santos will delay construction until these areas have sufficiently dried out. Under these conditions, fish or potential for fish passage would not be supported by these drainage features.

Further, the pipeline RoW will be reinstated to the condition and surface profiles existing at commencement of construction activities to ensure natural surface water flows in the area are maintained to ensure natural fish movement is uninterrupted.

Therefore, no impact to fish or fish passage will occur as part of the proposed activities.

Please refer to the Santos response to IR Notice Element 1, Figure 1, and the Application for a description of the proposed disturbance, including location and total disturbance area.

Photo 1: Example of surface water conditions in minor drainage feature located close to proposed Wackett South-2 pipeline alignment (Photo taken 2019, location: GDA94, Decimal Degrees: -27.524687 S, 141.979910 E).

2.3. DES Information Request Element (3)

Issue 3:

As part of the project, disturbance will occur to regulated vegetation within the defined distance from the defining banks of a watercourse defined under the Vegetation Management Act 1999, as outlined under Schedule 2, section 2(5) of the Environmental Offsets Regulation 2014. The defined distance for a regional ecosystem within the defining bank in non-coastal bioregions and sub-regions is measured and defined in Appendix 3 of the Queensland Environmental Offsets Policy (v1.8). This information has not been provided.

Information requested: Please provide the following information:

i) *the names of the watercourses which are to be disturbed as a result of the activities.*

ii) *the watercourse stream order and the defined distance (metres) for a regional ecosystem in accordance with Appendix 3 of the Queensland Environmental Offsets Policy (v1.8).*

iii) *a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (regulated vegetation) due to the proposed disturbance.*

iv) *a description of the locations of disturbance which will impact on regulated vegetation within 50 metres of a Vegetation Management Wetland. Include location; total area (hectares); and impacts on environmental values due to the proposed disturbance.*

v) *If the activities are proposing to disturb regulated vegetation within the defined distance from the defining banks of a watercourse or 50m of a Vegetation Management Wetland; a Significant Residual Impact Assessment using the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (DEHP 2014) must be provided.*

Santos Response to Element 3 (i to v)

i) *the names of the watercourses which are to be disturbed as a result of the activities.*

Five (5) unnamed ephemeral SO 8 watercourses are mapped in the CDZ, which will be crossed to construct the proposed pipelines (refer to "*Vegetation management watercourse/drainage*" and "*Queensland waterways for waterway barrier"* spatial layers at https://qldglobe.information.qld.gov.au).

ii) *the watercourse stream order and the defined distance (metres) for a regional ecosystem in accordance with Appendix 3 of the Queensland Environmental Offsets Policy (v1.8).*

As per the Santos response to IR Notice Element 3i, five (5) SO 8 watercourses are mapped in the CDZ, which will be crossed to construct the proposed pipelines. The defined distance (metres) for a Regional Ecosystem (RE) in accordance with Appendix 3 of the *Queensland Environmental Offsets Policy* v1.12 for mapped watercourses in the project area is 100m.

Please note the *Queensland Environmental Offsets Policy v1.8* has been superseded by v1.12.

iii) *a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (regulated vegetation) due to the proposed disturbance.*

As detailed in the Santos response to IR Notice Element 1, pipeline construction is conservatively estimated to disturb an area of up to 8.6 ha. 8.6 ha is a conservative disturbance estimate and the total disturbance area will likely be less than 8.6 ha. Please refer to Figure 1 for the location of the CDZ and tentative proposed pipeline alignments.

As detailed in the Santos response to IR Notice Element 1 and the Application, the pipeline construction RoW will be no wider than 19 m, and where the pipelines intersect watercourses, the RoW will be restricted to the smallest width practicable. As stated in the Santos response to IR Notice Elements 3i and 3ii, five (5) mapped SO 8 watercourses will be crossed by the proposed pipelines. Pipeline construction may therefore conservatively impact 2 to 2.5 ha of regulated vegetation intersecting a watercourse as follows:

- 5 crossings.
- Defined distance from defining banks of 200 m (100 m either side of the watercourse).
- 19 m wide RoW.
- Assuming an average watercourse width of 50 m.
- Total disturbance area: ~2.375 ha

Regulated vegetation intersecting a watercourse within the CDZ is displayed in Figure 2.

Please note that REs located in the CDZ have been mapped by ELA (2022) to be REs 5.3.18a, 5.3.18b and 5.3.8a. These REs all have a structural category of 'sparse' (Refer to Appendix B).

iv) a description of the locations of disturbance which will impact on regulated vegetation within 50 metres of a Vegetation Management Wetland. Include location; total area (hectares); and impacts on environmental values due to the proposed disturbance.

As discussed in Section 1.1, following receipt of the IR Notice, Santos has reduced the size of the CDZ, and it no longer intersects with areas of regulated vegetation located within 50 metres of a Vegetation Management Wetland. Only regulated vegetation intersecting a watercourse is located within the CDZ (refer to Figure 2).

Therefore, no disturbance to areas of regulated vegetation located within 50 metres of a Vegetation Management Wetland will occur as a result of the proposed activities.

v) If the activities are proposing to disturb regulated vegetation within the defined distance from the defining banks of a watercourse or 50m of a Vegetation Management Wetland; a Significant Residual Impact Assessment using the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (DEHP 2014) must be provided.

A Significant Residual Impact Assessment using the *'Queensland Environmental Offsets Policy Significant Residual Impact Guideline'* (the Guideline) (DEHP 2014) was provided in the Application, and it specifically assessed impacts to Regulated Vegetation, and confirmed no SRI to regulated vegetation would occur as a result of undertaking the proposed activities.

Further, ELA (2022) undertook a Significant Residual Impact Assessment using the Guideline, and concluded that provided the proposed activities comply with the clearing limits outlined in Section 2.1 of the SRI Guideline, the proposed development will not result in a significant residual impact to regulated vegetation.

Nonetheless, a Significant Residual Impact Assessment using the Guideline is summarised below.

Please note, as discussed in Section 1.1, and detailed in the Santos response to IR Notice Element 3iv, no disturbance to areas of regulated vegetation located within 50 metres of a Vegetation Management Wetland will occur as a result of the proposed activities. Consideration of impacts to regulated vegetation located within 50 metres of a Vegetation Management Wetland has therefore been excluded from the following assessment.

Clearing regulated vegetation in a Regional Ecosystem that is within the defined distance of a watercourse

Table 1 of the Guideline details the significant residual impact test criteria for regulated vegetation.

Regulated vegetation is a 'prescribed regional ecosystem' that:

- is an endangered or of concern regional ecosystem, as defined under the *Vegetation Management Act 1999*; or
- intersects with an area shown on the vegetation management wetlands map, as defined under the *Vegetation Management Act 1999*, to remove doubt this refers to that component of a regional ecosystem that lies within a mapped wetland; or
- is located within the defined distance from the defining banks of a watercourse identified on the vegetation management watercourse map, as defined under the *Vegetation Management Act 1999*.

Where disturbance to regulated vegetation exceeds the clearing limits for relevant criteria set out in Table 1 of the Guideline, a significant residual impact to regulated vegetation will occur.

For a prescribed activity to have a significant residual impact on a RE that is within the defined distance of watercourses, criteria 1 and 3 in Table 1 of the Guideline must be exceeded.

- As detailed above, criteria 1 specifies clearing width limits for linear infrastructure located in different RE structural categories.
- Criteria 3 is exceeded if clearing occurs within 5m of the defining bank of a vegetation management watercourse.

As per the Santos response to RFI Element 3iii, the proposed linear infrastructure construction activities will require clearing of minor areas of regulated vegetation located within the defining distance (100 m) of a mapped vegetation management watercourse. Further, the proposed clearing will occur within 5m of the defining bank of the mapped vegetation management watercourse. Therefore, criteria 3 is exceeded. Regulated vegetation intersecting a watercourse within the CDZ is displayed in Figure 2.

However, where clearing occurs within the defining distance of a vegetation management watercourse (criteria 1), it will not exceed 20 m. Please note that REs located in the CDZ have been mapped by ELA (2022) to be REs 5.3.18a, 5.3.18b and 5.3.8a with a structural category of ‘sparse’ (Refer to Appendix B).

As specified in the Santos response to IR Notice Element 1 and in the Application, the proposed pipeline construction RoWs will be no greater than 19 m wide, and will be located in ‘sparse’ structural category REs (refer to Appendix B). Therefore, criteria 1 in Table 1 of the Guideline is not exceeded.

For a prescribed activity to have a significant residual impact on a RE that is within the defined distance of watercourses, criteria 1 and 3 in Table 1 of the Guideline must be exceeded.

Therefore, No SRI to this MSES will occur.

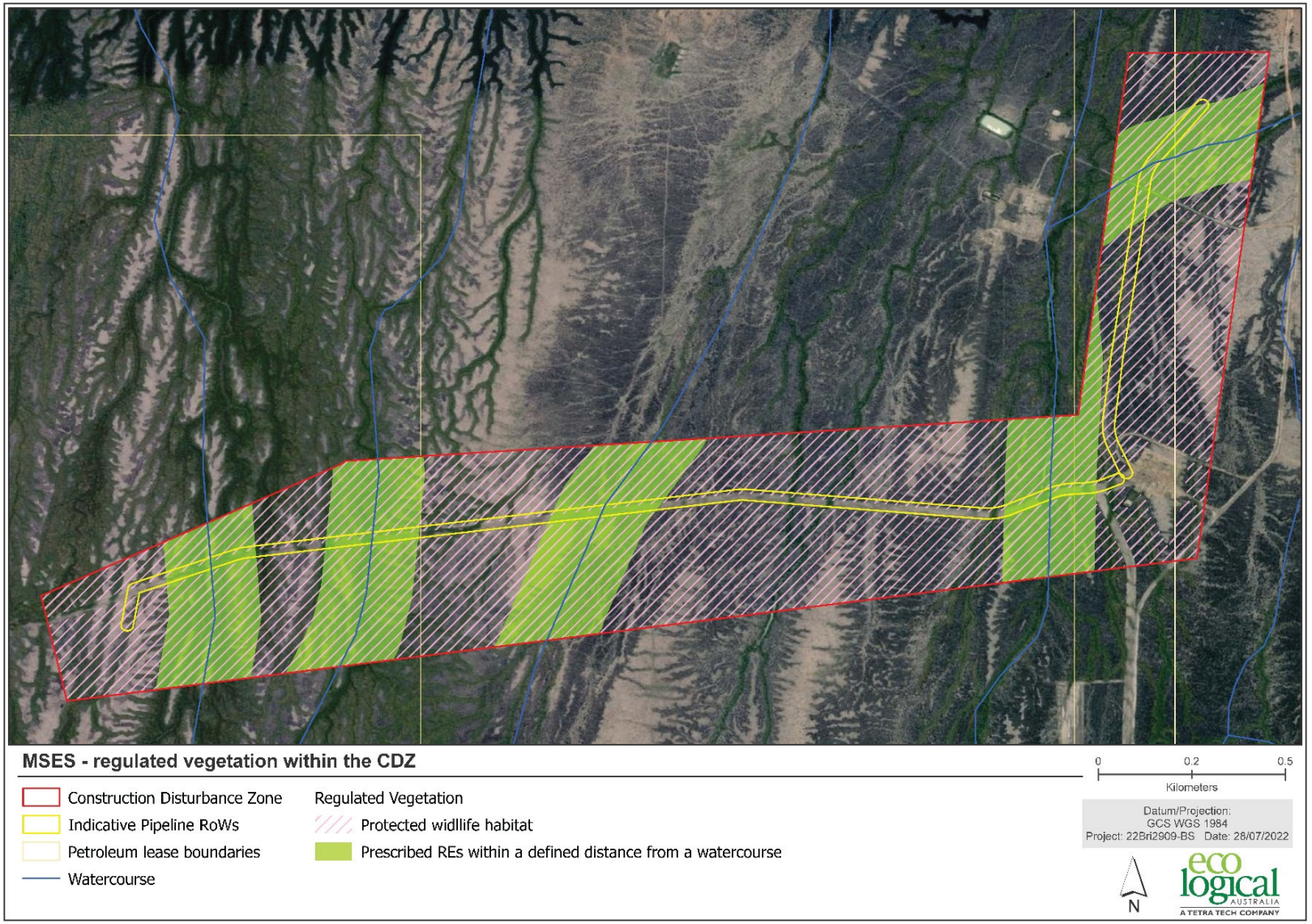

Figure 2: Regulated vegetation intersecting a watercourse within the CDZ

2.4. DES Information Request Element (4)

Issue 4:

The application material (Application Supporting Information, page 35) states activities may be undertaken in an area of wildlife habitat (ie: foraging, roosting, nesting or breeding habitat) for an animal that is vulnerable, endangered or special least concern:

- Grey grasswren (*Amytornis barbatus*), *Nature Conservation Act 1992*, endangered.
- Dusky hopping-mouse (*Notomys fuscus*), *Nature Conservation Act 1992*, endangered; and
- Yellow chat (gulf) (*Epithianura crocea crocea*), *Nature Conservation Act 1992*, vulnerable.

A search of departmental databases records of possible essential habitat, as defined under Schedule 2, section 2 of the Environmental Offsets Regulation 2014 for a number of threatened, special least concern, and vulnerable fauna species including:

- Fierce snake (western taipan) (*Oxyuranus microlepidotus*)

- Plains-wanderer (*Pedionomus torquatus*)

- Grey grasswren (*Amytornis barbatus*)

- Grey Falcon (*Falco hypoleucos*)

- Glossy ibis (*Plegadis falcinellus*)

- Provides wetland habitat for a wide range of water birds and other flora and fauna. There is potential to be further wetland species that have not been considered.

A field survey has not been undertaken to assess significant residual impacts on the protected wildlife habitat of the species listed above.

Information requested: Please provide:

i) a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (protected habitat) due to the proposed disturbance.

ii) Provide the following:

   a. complete a fauna survey to determine the presence of species listed above and their potential habitat to determine whether a significant residual impact will occur to protected wildlife habitat of those species, and provide the results of this assessment in the response to this information request. A Significant Residual Impact Assessment using the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (DEHP 2014) is required for each species presence determined as a result of the fauna survey; OR

   b. a description of how prescribed environmental matters, including ecologically significant locations, will be detected and reported to the administering authority in response to this information request, and delay the significant residual impact assessment to prior to disturbance occurring. Significant residual impacts to prescribed environmental matters will not be authorised by the amended EA, and any authorisation of such impacts will be required through a separate EA amendment application prior to disturbance occurring.

The presence of any protected wildlife species or protected wildlife habitat such as nests and feeding areas in proposed disturbance areas must be reported to the administering authority with a significant residual impact assessment.

Fauna surveys under both options above must be undertaken in line with the guideline, 'Terrestrial Vertebrate Fauna Survey Guidelines for Queensland' June 2018, Version 3.0.

Alternatively, the application may continue without conducting the fauna survey under the assumption that the protected wildlife habitats of the species listed above are present within the project area. Please note, this may result in the requirement of offsets for some species.

Santos Response to Element 4

As discussed in Section 1.1, the total disturbance area required to construct the pipelines was conservatively estimated at 9.6 ha in the Application. Following review, Santos has refined both the size of the CDZ, and reduced the proposed disturbance area to 8.6 ha (refer to Figure 1).

Further, as discussed in the Santos response to IR Notice Element 1, Santos commissioned ELA to undertake a detailed third-party desktop ecological assessment of the CDZ, and undertake a Significant Residual Impact (SRI) Assessment of the proposed activities using *the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline'* (DEHP 2014).

ELA assessed impacts associated with the construction and operation of two buried gas pipelines constituting a maximum disturbance area of 8.6 ha within the CDZ.

The results of the third-party assessment are summarised in the Santos response to IR Notice Element 1, and detailed in the *Wackett Flowlines – Desktop Ecological Assessment* (ELA, 2022) attached as Appendix B.

The ELA ecological assessment identified the following species to have the potential to occur in the CDZ, and that are listed as endangered, vulnerable, near threatened, special least concern (SLC), and migratory under the *Nature Conservation Act 1992* (NC Act):

- Thirteen bird species:
  - Australian painted snipe (*Rostratula australis*)
  - Bulloo grey grasswren (*Amytornis barbatus barbatus*)
  - Caspian tern (*Hydroprogne caspia*)
  - Common greenshank (*Tringa nebularia*)
  - Fork-tailed swift (*Apus pacificus*)
  - Glossy ibis (*Plegadis falcinellus*)
  - Grey falcon (*Falco hypoleucos*)
  - Gull-billed tern (*Gelochelidon nilotica*)
  - Latham's snipe (*Gallinago hardwickii*)
  - Marsh sandpiper (*Tringa stagnatilis*)
  - Plains-wanderer (*Pedionomus torquatus*)
  - Sharp-tailed sandpiper (*Calidris acuminata*)
  - Yellow chat (gulf) (*Epthianura crocea crocea*)
- One mammal species
  - Short-beaked echidna (*Tachyglossus aculeatus*)
- One reptile species
  - Woma python (*Aspidites ramsayi*)
- One flora species
  - *Rhodanthe rufescens*

Further details on these species along with justification of likelihood of occurrence, are summarised in Appendix B.

Of the abovementioned species, habitat for the following species is a prescribed environmental matter as defined in Schedule 2 of the *Environmental Offsets Regulation* (EO Reg) 2014:

- Australian painted Snipe (*Rostratula australis*) – Endangered
- Grey falcon (*Falco hypoleucos*) – Vulnerable
- Grey grasswren (*Amytornis barbatus barbatus*) – Endangered
- Plains-wanderer (Pedionomus torquatus) – Vulnerable
- Short-beaked echidna (*Tachyglossus aculeatus*) – SLC
- Yellow chat (gulf) (*Epthianura crocea crocea*) – Vulnerable

Habitat for the remaining species is not considered a MSES as they are not listed as endangered or vulnerable, and special least concern species are limited to the echidna and platypus (as defined in schedule 2 of the EO Reg). As such, these species and associated habitat are not discussed further. Habitat associated with these species has been defined and documented in the *Wackett Flowlines – Desktop Ecological Assessment* (ELA, 2022) attached as Appendix B.

Moreover, as identified by DES, Fierce snake (western taipan) (*Oxyuranus microlepidotus*) (NCA listed least concern) and Glossy ibis (*Plegadis falcinellus*) (NCA listed special least concern) are also not considered a Matter of State Environmental Significance under schedule 2 of the EO Reg. As such, these species and associated habitat are not discussed further.

As discussed in the Santos response to IR Notice Element 1, no field validation was undertaken as part of the ELA assessment because access to the project area is not possible due to flooding in the region. ELA therefore utilised a range of desktop assessment methods, including Aerial Photographic Interpretation (API), to map REs and habitat values within the CDZ. Further, detailed site photos of vegetation and landforms present within the CDZ were provided to ELA by Santos to provide context on landforms, vegetation and habitat features in the CDZ.

As the assessment was desktop based, a conservative approach on the presence of potential threatened species habitat has been implemented. That is, all relevant fauna habitat features of a particular habitat type were assumed to be present within the CDZ. This conservative approach results in a potential over-estimate of habitat present and associated impacts as all areas have been mapped as habitat. Field surveys would likely reduce the extent of threatened species habitat mapping.

Details of the habitat values for each species and proposed disturbances are provided in Table 2 and Table 3 in the Santos response to IR Notice Element 1, and representative photos of potential habitat are provided in Appendix B.

Further, the ELA SRI assessment has been completed based on an assumption that activity within the CDZ can be micro-sited by Santos to avoid impacts within areas of higher environmental value. Santos also proposes to implement a range of avoidance, mitigation and management strategies for the proposed activities as detailed in the Santos response to IR Notice Element 1.

As discussed in the Santos response to IR Notice Element 1, given the nature of the proposed activities, minimal disturbance to potential largely marginal habitat, and implementation of avoidance, mitigation and management strategies (and those further detailed in the Application), the ELA (2022) SRI assessment determined that proposed activities within the CDZ requiring disturbance to a maximum of 8.6 ha will not have a significant residual impact on protected wildlife habitat (refer to Appendix B for further information).

This SRI assessment has been conducted taking in consideration of the context of the landscape the project is proposed to occur in, and its boom-and-bust ecology. The Cooper Basin Bioregional

Assessment Potential Impacts on Protected Fauna and Flora (Australian Government, 2022) was viewed for context and reads:

"Broadscale landscape management (grazing, fire) strongly influences biodiversity persistence at a regional scale. While intense localised impacts on habitat (for example, roads, fence lines, seismic lines and well pads) are important for large regions, these are dwarfed by land management across vast areas (Eldridge et al., 2016). While wetter years offer potential for recovery, ongoing land use impacts in dryer years may amplify habitat degradation, which may be relevant when considering a potentially warmer and drier future.

Habitat condition changes with annual precipitation and declines spatially along the rainfall gradient from the north-east of the region to the south-west (Figure 15). During low rainfall periods (for example, 2001 to 2009, 2012 to 2015) habitat condition declines, and then increases after high rainfall (for example, 2010, 2011, 2016)."

Appendix A – Notice of Information Request

Notice

onmental Protection Act 1994

Information request

This information request is issued by the administering authority under section 140 of the Environmental Protection Act 1994 *to request further information needed to assess an amendment application for a site-specific environmental authority.*

To: Santos Limited
Delhi Petroleum Pty Ltd
Santos Petroleum Pty Ltd
Beach Energy (Operations) Limited
Vamgas Pty Ltd
Santos Australian Hydrocarbons Pty Ltd
60 Flinders Street
ADELAIDE SA 5000
Email: liz.dunlop@santos.com

ATTN: Alex Clarke

Our reference: EA0002115

Further information is required to assess an amendment application for environmental authority

1. Application details

The amendment application for a site-specific environmental authority was received by the administering authority on 12 May 2022.

The application reference number is: A-EA-AMD-100258271

Land description: Petroleum pipeline licence (PPL) 2050

2. Information request

The administering authority has considered the abovementioned application and is writing to inform you that further information is required to assess the application (an information request).

The information requested is provided below:

Issue 1: The application does not adequately describe the environmental values likely to be affected by the proposed amendment.

The amendment application does not demonstrate:

- the disturbance area that is required for the overall amendment, where the disturbance is proposed and how much disturbance will impact upon prescribed environmental matters outlined under Schedule 2 of the Environmental Offsets Regulation 2014; and
- that the activity has been designed to avoid impacts to prescribed environmental matters.

Information requested: As the environmental values are prescribed environmental matters, detail must be provided in accordance with the Queensland Environmental Offset Policy (QEOP) framework. Please provide appropriate detail required to support the QEOP framework which includes an assessment that demonstrates:

i) the mitigation hierarchy 'avoid – mitigate - offset' has been undertaken; and

ii) the extent of the significant residual impact area and associated ecology studies and conclusions relating to the relevant prescribed environmental matters and disturbance.

Issue 2: The application (Application Supporting Information, page 36) states that a waterway providing for fish passage may be disturbed. Under Schedule 2, section 10 of the Environmental Offsets Regulation 2014, a waterway providing for fish passage is defined as "any part of a waterway providing for passage of fish, only if the construction, installation or modification of waterway barrier works will limit passage of fish". The Department of Agriculture and Fisheries is responsible for determing whether a waterway is providing for passage of fish. It is unclear whether you have made contact with the Department of Agriculture and Fisheries about your proposal.

Information requested: Please provide the following information:

i) confirmation on whether you have made contact with the Department of Agriculture and Fisheries, if you haven't it is recommended you do so. You may contact the department via the following email PlanningAssessment@daf.qld.gov.au.

ii) details of correspondence with the Department of Agriculture and Fisheries advising whether the waterways to be disturbed are, or are not, providing for passage of fish.

iii) details of waterways which are to be impacted on and an assessment of the impacts to the receiving environment against the relevant environmental values of the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 and relevant water quality objectives.

iv) a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (the watercourses) due to the proposed disturbance.

Issue 3: As part of the project, disturbance will occur to Regulated Vegetation within the defined distance from the defining banks of a watercourse defined under the *Vegetation Management Act 1999*, as outlined under Schedule 2, section 2(5) of the Environmental Offsets Regulation 2014. The defined distance for a regional ecosystem within the defining bank in non-coastal bioregions and sub-regions is measured and defined in Appendix 3 of the Queensland Environmental Offsets Policy (v1.8). This information has not been provided.

Information requested: Please provide the following information:

i) the names of the watercourses which are to be disturbed as a result of the activities.

ii) the watercourse stream order and the defined distance (metres) for a regional ecosystem in accordance with Appendix 3 of the Queensland Environmental Offsets Policy (v1.8).

iii) a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (regulated vegetation) due to the proposed disturbance.

iv) a description of the locations of disturbance which will impact on regulated vegetation within 50 metres of a Vegetation Management Wetland. Include location; total area (hectares); and impacts on environmental values due to the proposed disturbance.

v) If the activities are proposing to disturb regulated vegetation within the defined distance from the defining banks of a watercourse or 50m of a Vegetation Management Wetland; a Significant Residual Impact Assessment using the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (DEHP 2014) must be provided.

Issue 4: The application material (Application Supporting Information, page 35) states activities may be undertaken in an area of wildlife habitat (ie: foraging, roosting, nesting or breeding habitat) for an animal that is vulnerable, endangered or special least concern:

- Grey grasswren (*Amytornis barbatus*), *Nature Conservation Act 1992*, endangered.
- Dusky hopping-mouse (*Notomys fuscus*), *Nature Conservation Act 1992*, endangered; and
- Yellow chat (gulf) (*Epithianura crocea crocea*), *Nature Conservation Act 1992*, vulnerable.

A search of departmental databases records of possible essential habitat, as defined under Schedule 2, section 2 of the Environmental Offsets Regulation 2014 for a number of threatened, special least concern, and vulnerable fauna species including:

- Fierce snake (western taipan) (*Oxyuranus microlepidotus*)

- Plains-wanderer (*Pedionomus torquatus*)

- Grey grasswren (*Amytornis barbatus)*

- Grey Falcon (*Falco hypoleucos)*

- Glossy ibis (*Plegadis falcinellus)*

- Provides wetland habitat for a wide range of water birds and other flora and fauna. There is potential to be further wetland species that have not been considered.

A field survey has not been undertaken to assess significant residual impacts on the protected wildlife habitat of the species listed above.

Information requested: Please provide:

i) a description of the proposed disturbance, including location; total area (hectares); and impacts on environmental values (protected habitat) due to the proposed disturbance.

ii) Provide the following:

   a. complete a fauna survey to determine the presence of species listed above and their potential habitat to determine whether a significant residual impact will occur to protected wildlife habitat of those species, and provide the results of this assessment in the response to this information request. A Significant Residual Impact Assessment using the 'Queensland Environmental Offsets Policy Significant Residual Impact Guideline' (DEHP 2014) is required for each species presence determined as a result of the fauna survey; OR

   b. a description of how prescribed environmental matters, including ecologically significant locations, will be detected and reported to the administering authority in response to this information request, and delay the significant residual impact assessment to prior to disturbance occurring. Significant residual impacts to prescribed environmental matters will not

be authorised by the amended EA, and any authorisation of such impacts will be required through a separate EA amendment application prior to disturbance occurring.

The presence of any protected wildlife species or protected wildlife habitat such as nests and feeding areas in proposed disturbance areas must be reported to the administering authority with a significant residual impact assessment.

Fauna surveys under both options above must be undertaken in line with the guideline, 'Terrestrial Vertebrate Fauna Survey Guidelines for Queensland' June 2018, Version 3.0.

Alternatively, the application may continue without conducting the fauna survey under the assumption that the protected wildlife habitats of the species listed above are present within the project area. Please note, this may result in the requirement of offsets for some species.

3. Actions

The abovementioned application will lapse unless you respond by giving the administering authority -

(a) all of the information requested; or
(b) part of the information requested together with a written notice asking the authority to proceed with the assessment of the application; or
(c) a written notice –
    i. stating that you do not intend to supply any of the information requested; and
    ii. asking the administering authority to proceed with the assessment of the application.

Should the information request require an EIS process or applicant to submit a progressive rehabilitation and closure (PRC) plan then it must be completed and submitted.

A response to the information requested must be provided by 13 December 2022 (the information response period). If you wish to extend the information response period, a request to extend the period must be made at least 10 business days before the last day of the information response period.

The response to this information request or a request to extend the information response period can be submitted to the administering authority by email to EnergyandExtractive@des.qld.gov.au.

If the information provided in response to this information request is still not adequate for the administering authority to make a decision, your application may be refused as a result of section 176 of the *Environmental Protection Act 1994,* where the administering authority must have regard to any response given for an information request.

4. Human rights

A human rights assessment was carried out in relation to this decision/action and it was determined that the decision/action is compatible with human rights.

If you require more information, please contact Stacey McLennan, Principal Environmental Officer on the telephone number listed below.

Signature

13/06/2022

Date

Daniel Spelchan
Department of Environment and Science
Delegate of the administering authority
Environmental Protection Act 1994

Enquiries:
Energy and Extractive Resources Business Centre
GPO Box 2454, Brisbane QLD 4001
Phone: (07) 3330 5715
Email: EnergyandExtractive@des.qld.gov.au

Appendix B – Wackett Flowlines – Desktop Ecological Assessment (ELA, 2022)

Wackett Flowlines – Desktop Ecological Assessment

Santos Limited

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1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Wackett Flowlines – Desktop Ecological Assessment
Project Number	22BRI-2909
Project Manager	Dr Sam Capon
Prepared by	Dr Sam Capon, Bianca Staker, Emily Fittell, Renee Whitchurch
Reviewed by	Dr Sam Capon, Garry Davies
Approved by	Rachel Murray
Status	Final
Version Number	V3
Last saved on	29 July 2022

This report should be cited as 'Eco Logical Australia 2022. *Wackett Flowlines – Desktop Ecological Assessment*. Prepared for Santos Limited.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Santos Limited.

Template 2.8.1

Contents

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Abbreviations

Abbreviation	Description
API	Aerial Photographic Interpretation
CDZ	Construction Disturbance Zone
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DES	Department of Environment and Science
DEM	Digital Elevation Model
DNRME	Department of Natural Resources, Mines and Energy
EA	Environmental Authority
ELA	Eco Logical Australia
EP Act	QLD *Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Areas
GES	General ecological significance (wetlands)
HES	High ecological significance (wetlands)
LGA	Local Government Area
MSES	Matters of State Environmental Significance
NC Act	*Nature Conservation Act 1992*
PL	Petroleum Lease
PPL	Petroleum Pipeline License
PMST	Protected Matters Search Tool
RE	Regional Ecosystem
REDD	Regional Ecosystem Description Database
SEA	Strategic Environmental Area
SLC	Special Least Concern
SMP	Species Management Program
SRI	Significant Residual Impact
VM Act	*Vegetation Management Act 1999*
WPA	Wetland Protection Area

Executive Summary

Santos Limited (Santos) are proposing to construct and operate two new buried gas pipelines (Wackett-14 redirection pipeline and Wackett South-2 pipeline) and associated infrastructure (i.e. pipeline risers) located in Petroleum Pipeline License Area (PPLA) 2050. The proposed pipelines are located in the Cooper Basin, South-West Queensland. The pipelines are required to connect existing and proposed gas wells in the Wackett gas field.

The two gas pipelines will be buried, and the surface rehabilitated following installation to ensure natural surface water flows in the area are maintained. The two pipelines will be approximately 4 km total combined length utilising a 19 m wide installation Right of Ways (RoWs) i.e. a maximum 19 m wide construction corridor will be cleared to facilitate pipeline installation. The total required disturbance area for construction will be approximately 8.6 ha. This is a conservative upper disturbance estimate to allow a degree of flexibility for final alignment placement, and the total disturbance area will likely be less than 8.6 ha.

Due to recent Cooper Creek flooding in the region, the proposed pipeline RoWs could not be inspected on the ground because the project area has been inaccessible.

Santos has defined a Construction Disturbance Zone (CDZ), within which the proposed pipelines will be installed, with final alignments to be confirmed once the site is accessible to undertake field scouting and surveying activities. The CDZ will also allow a degree of flexibility during final pipeline RoW placement to avoid sensitivities such as drainage features, areas of denser vegetation, cultural heritage, and mature trees and large shrubs.

Eco Logical Australia (ELA) undertook a desktop assessment to identify ecological values potentially occurring within the CDZ. The desktop assessment included a review of publicly available environmental databases, maps and associated literature to identify ecological values protected under both State and Commonwealth legislation.

The CDZ was found to be comprised of remnant vegetation, dominated by *Chenopodicum auricomum (Queensland bluebush)* open shrubland and sparse, variable herbland as well as wetland habitat dominated by *Duma florulenta* (tangled lignum) and herbland communities.

The CDZ is entirely located within the Channel Country Strategic Environmental Area (SEA) and several Matters of State Environmental Significance (MSES) were identified as potentially existing within the area. A Significant Residual Impact Assessment (SRI) was undertaken for all identified MSES values in accordance with relevant policy guidance.

SRIs were based on the assumption that activity within the CDZ can be micro-sited to avoid impacts within areas of higher environmental value. To avoid a significant residual impact on MSES values, clearing limits within areas of regulated vegetation as defined by the Significant Residual Impact Guidelines (DES, 2014) must be adhered to. This approach will also substantially reduce impacts to habitat for threatened and migratory bird species within the area.

The findings of the significant impact assessments indicate that activity within the CDZ requiring disturbance to a maximum of 8.6 ha will not have a significant residual impact on MSES values, provided regulated vegetation clearing limits are adhered to.

Introduction

1.1. Project background

Santos is proposing to construct and operate two new buried gas pipelines and associated infrastructure (i.e. pipeline risers) located in Petroleum Pipeline License Area (PPLA) 2050. The proposed pipelines include the Wackett-14 redirection pipeline and the Wackett South-2 pipeline. These pipelines are required to connect existing and proposed future gas wells located in the Wackett gas field.

PPLA 2050 is located in south-west Queensland, within the Bulloo Shire Local Government Area (LGA). Operations within PPLA 2050 are currently undertaken in accordance with Environmental Authority (EA) 0002115 granted under the *Environmental Protection Act 1994* (EP Act).

Due to recent Cooper Creek flooding in the region, the proposed pipeline RoWs could not be inspected on the ground because the project area has been inaccessible.

Santos has defined a Construction Disturbance Zone (CDZ) within which the proposed pipelines will be installed, with final alignments to be confirmed once the site is accessible to undertake field scouting and surveying activities. Indicative pipeline alignments / RoWs are displayed on **Figure 1**.

Eco Logical Australia (ELA) was engaged to conduct a desktop ecological assessment to identify potential Commonwealth and State protected ecological values present within the CDZ situated within PPLA 2050. Further, ELA undertook a significant residual impact (SRI) assessment of disturbance associated with the proposed pipelines in accordance with relevant policy guidance for identified MSES values.

1.2. Objectives and scope of works

The objective of this assessment was to identify ecological values within the CDZ and indicative RoW via a review of available desktop resources and data. No field validation was undertaken as part of this assessment.

Site photographs of the Wackett South-1 pipeline alignment were provided by Santos to assist the revision of Regional Ecosystem mapping and associated threatened species habitat interpretation. The supplied site photographs were taken by Santos field personnel in September 2019 whilst field scouting the existing Wackett South 1 Flowline. Wackett South 1 Flowline is located immediately adjacent to the proposed Wackett South-2 pipeline alignment.

Site photographs were not provided for the Wackett-14 redirection pipeline alignment, and thus environmental values were extrapolated from associations made between satellite imagery and site photos from the adjacent Wackett south-1 pipeline alignment.

Specifically, the scope of works included:

- Determining the likely presence and absence of Commonwealth and State significant species and associated habitats
- Validating the likely habitat values of the study area, particularly in relation to supporting State and Commonwealth significant species
- Assessing the presence and extent of MSES

- Determining the likelihood of significant impacts to Commonwealth values
- Determining the likelihood of Significant Residual Impacts to State values
- Providing guidance on the regulatory implications of the identified ecological values.

1.3. Proposed Activities

The proposed pipelines will be an approximately 4 km total combined length and a maximum of 19 m wide. The total required disturbance area for construction of the pipelines is approximately **8.6 ha.** This is a conservative upper disturbance limit to allow a degree of flexibility for final alignment placement, and the total disturbance area will likely be less than 8.6 ha. Final pipeline alignments will be confirmed once the site is accessible to undertake field scouting and surveying activities.

The Wackett South-2 pipeline is proposed to be co-located with the existing buried pipeline RoW, the Wackett South-1 pipeline, to minimise disturbance. However, the final pipeline alignments will be confirmed following field scouting and surveying activities. The Wackett-14 redirection pipeline will also include a mid-line riser (i.e. a small section of above-ground pipe infrastructure required to access the pipeline). The pipelines will be buried, and following completion of installation, the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. Any wheel and equipment ruts created along the RoWs during installation will be filled in and levelled by grading equipment and windrows will be removed to ensure that natural surface water flows are maintained. Topsoil and seed stock removed during installation will then be re-spread over the RoWs and the disturbance area will be allowed to naturally rehabilitate.

Pipeline maintenance activities and inspections will be carried out intermittently once the pipelines become operational. A maximum 3 m wide corridor located within the rehabilitated RoWs will be used to provide light vehicle access for inspections and maintenance. No formed roads are required within the rehabilitated pipeline RoWs.

1.4. Study Area

The CDZ is located approximately 150 km northwest of Thargomindah in the Cooper Basin, Queensland (Figure 1). The CDZ comprises an area of approximately 132.5 ha. The CDZ will allow a degree of flexibility during final pipeline RoW placement to allow Santos to avoid sensitivities such as drainage features, denser patches of vegetation, cultural heritage sites, and mature trees.

The CDZ is located in the Channel Country Bioregion, within the Cooper-Diamantina Plains subregion. The CDZ is dominated by floodplain and wetland habitats. Vegetation includes open shrubland fringing channels dominated by lignum (*Duma florulenta*) and northern bluebush (*Chenopodium auricomum*), and varied tussock grassland and forbland communities on floodplains. Five (5) minor ephemeral watercourses associated with Cooper Creek intersect the CDZ. The dominant land uses in the region are cattle and sheep grazing, as well as oil and gas exploration and production.

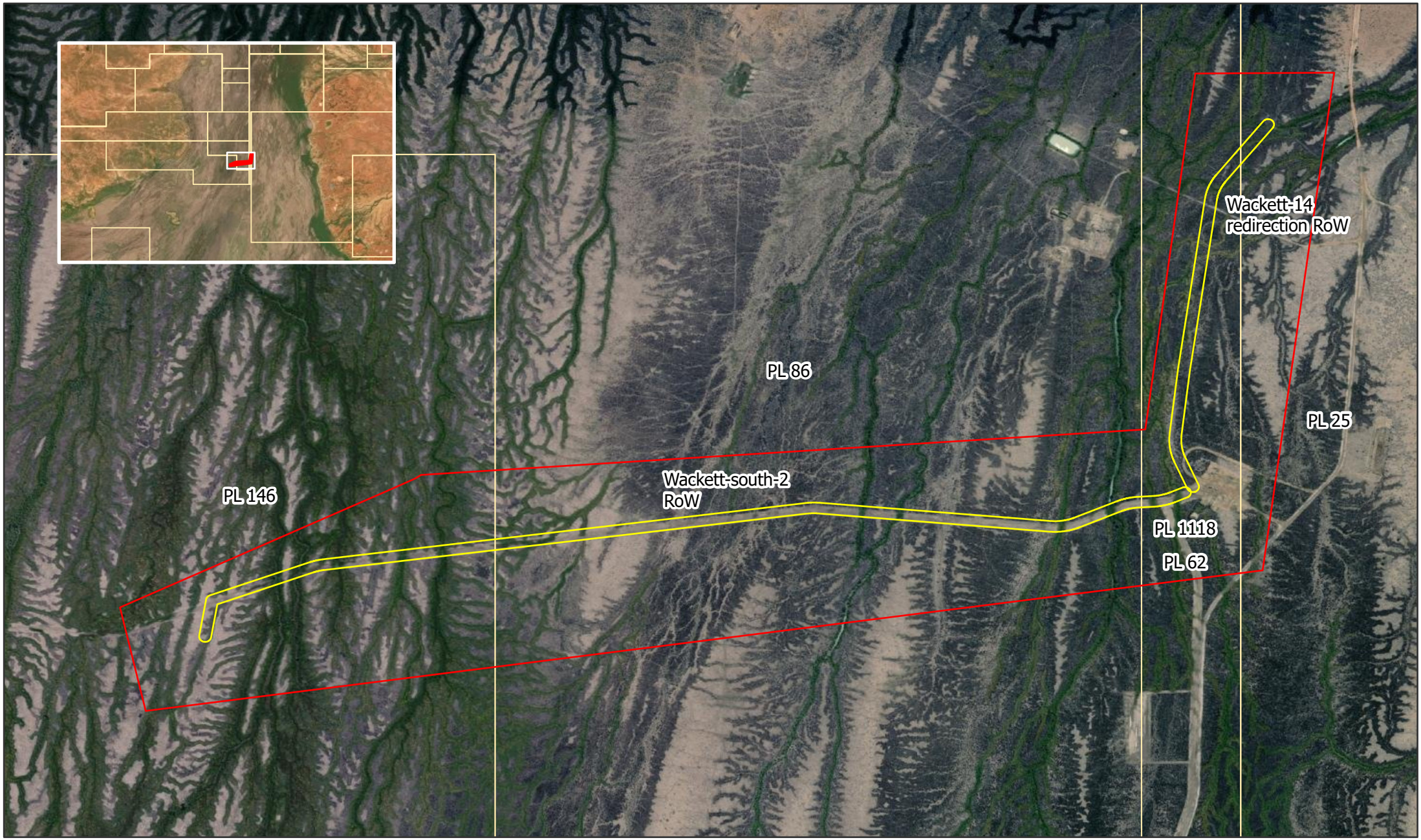

Figure 1: Location of the Construction Disturbance Zone

- Construction Disturbance Zone
- Indicative pipeline RoWs
- Petroleum lease boundaries

N

0 0.2 0.5
Kilometers

Datum/Projection:
GCS WGS 1984

Project: 22Bri2909-BS Date:
29/07/2022

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Methodology

2.1. Desktop assessment and literature review

A desktop assessment and review of previous ecological studies, environmental databases, maps and associated literature was undertaken to evaluate existing data and identify the potential presence of significant ecological values within the study area.

2.1.1. Database searches

The following databases were reviewed to assess the potential for ecological values to occur within the CDZ:

- Protected Matters Search Tool (PMST) Report (Project Area shapefile; 50 km buffer)
- Wildlife Online database (PL25, PL62, PL86, PL146)
- Regional Ecosystem (RE) mapping (version 11.0)
- Queensland geological digital data (Queensland Globe)
- Land system mapping
- Department of Environment and Science (DES) Environmentally Sensitive Areas (ESA) map
- Protected Plant Flora Survey Trigger mapping (version 7.1)
- Department of Natural Resources, Mines and Energy (DNRME) Regulated Vegetation Management Map (version 4.02)
- Map of Queensland wetland environmental values
- *Vegetation Management Act 1999* (VM Act) watercourse data
- VM Act wetland data
- MSES mapping
- Atlas of Living Australia species records
- Approved Conservation Advice, National Recovery Plans and Survey Guidelines for significant species occurring within the study area
- Santos aerial imagery.

A copy of the relevant reports is provided as **Appendix A**.

2.1.2. Likelihood of occurrence assessment

A likelihood of occurrence assessment for threatened species was completed following the desktop assessment and literature review. The likelihood of occurrence assessment was based on species' known distribution (database records), preferred habitat (scientific papers), extent of potential suitable habitat within the study area (vegetation and RE mapping), and ecological knowledge of the study area and surrounds. Each species was assessed as either known, likely, potential or unlikely to occur based on the criteria in **Table 1.**

Table 1: Likelihood of occurrence assessment criteria

Likelihood	Definition
Known	Species has been recorded within the study area.
Likely	Species has not been recorded previously within the study area, however there are known records within the nearby surrounding area and important habitat (foraging or breeding) is abundant and/or good condition general habitat exists on site.
Potential	Species has not been recorded in the study area, however limited and/or moderate condition general habitat is present within the study area.
Unlikely	There is a low probability that the species will occur within the study area as it is outside the species known distribution, low quality habitat occurs within the area or the species is not known to occur within the region.

2.2. Regional ecosystem mapping

Mapping of REs was conducted in accordance with methods presented by Neldner et. al. (2020). A number of rules were developed prior to the commencement of mapping:

- The minimum polygon size is 0.1 ha
- The minimum polygon width is 10 m
- Avoid or minimise heterogenous (multiple unit/mosaic) polygons.

The final mapped product is considered accurate at a 1:10,000 scale. The fine scale nature of the available imagery and supporting site photographs allowed for the identification of REs across the landscape based on landscape position, visual signature (texture, pattern and colour) and structure.

Spatial accuracy and attribute accuracy were assigned either a high, moderate or low confidence rating in accordance with Neldner et. al. (2020) (Table 2).

Table 2: RE spatial and attribute accuracy confidence ratings

Attribute	Confidence rating
Spatial accuracy of boundaries	A = high confidence in accuracy of polygon boundary B = moderate confidence in accuracy of polygon boundary C = low confidence in accuracy of polygon boundary
Attribute accuracy	A = high confidence in accuracy of polygon attribute B = moderate confidence in accuracy of polygon attribute C = low confidence in accuracy of polygon attribute

2.3. Limitations

A desktop study utilising publicly available reports and data was undertaken. Some limitations apply to the desktop assessment methodology due to the reliance on pre-existing data.

Impact assessments have been based on disturbance of a maximum area of 8.6 ha located within the CDZ. Changes to the CDZ may result in changes to the location and quantum of impacts to ecological values, however minor changes to the exact location of the pipeline alignments within the CDZ are not expected to result in changes to the quantum of impacts to ecological values.

There are relatively few records of threatened species in close proximity to the CDZ, which is considered likely to be the result of a lack of survey effort rather than an indication of lack of threatened species at this location The presence of threatened fauna species is unlikely to affect results given the highly variable condition of the landscape following big seasonal shifts and the transient occupation by species during favourable conditions i.e. the presence of wetland bird species following heavy rainfall. Threatened species habitat has been mapped with a precautionary approach, and field validation surveys would be required to determine the exact quality of threatened species habitat.

State values

3.1. Vegetation communities

The CDZ is currently shown on the Regulated Vegetation Management Map (DNRME, version 4.02) as Category B remnant vegetation. The Department of Environment and Science (DES) RE mapping (version 12.2.0) shows remnant vegetation as the following mixed polygon:

- RE 5.3.8a/5.3.18a/5.3.18b (60/30/10%)

The RE mapping was reviewed and revised to resolve mixed polygons. REs mapped within the CDZ described in Table 3 and presented in **Figure 2**, along with the biodiversity status as per the Regional Ecosystem Description Database (REDD) and the VM Act classification. Within this product, the braided channel area of the Cooper Creek is largely a single mixed polygon of 5.3.8a/5.3.18a/5.3.18b.

Site photographs provided by Santos of areas nearby and adjacent to the CDZ revealed the presence of minor areas of sparse *Duma florulenta* (lignum) and *Chenopodium auricomum* (northern bluebush) and large areas of elevated open herbland. Site photos and interpretation of satellite imagery guided the redefinition of the RE boundaries.

Table 3: Revised REs within the Construction Disturbance Zone

RE	Short description	Structural Category	Biodiversity status[1]	VM Act status[2]	Extent within the CDZ (ha)
5.3.18a	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland. Palustrine wetland	Sparse	NC	LC	43.2
5.3.18b	Braided channel complex of major alluvial plains, includes *Chenopodium auricomum* open shrubland and variable sparse to open-herbland	Sparse	NC	LC	63.5
5.3.8a	*Eucalyptus coolabah* low open woodland +/- *Duma florulenta* on braided channels, drainage lines, flood plain lakes and claypans	Sparse	NC	LC	17
Non-remnant vegetation					8.8
Total:					132.5

[1]NC = no concern at present [2]LC = least concern

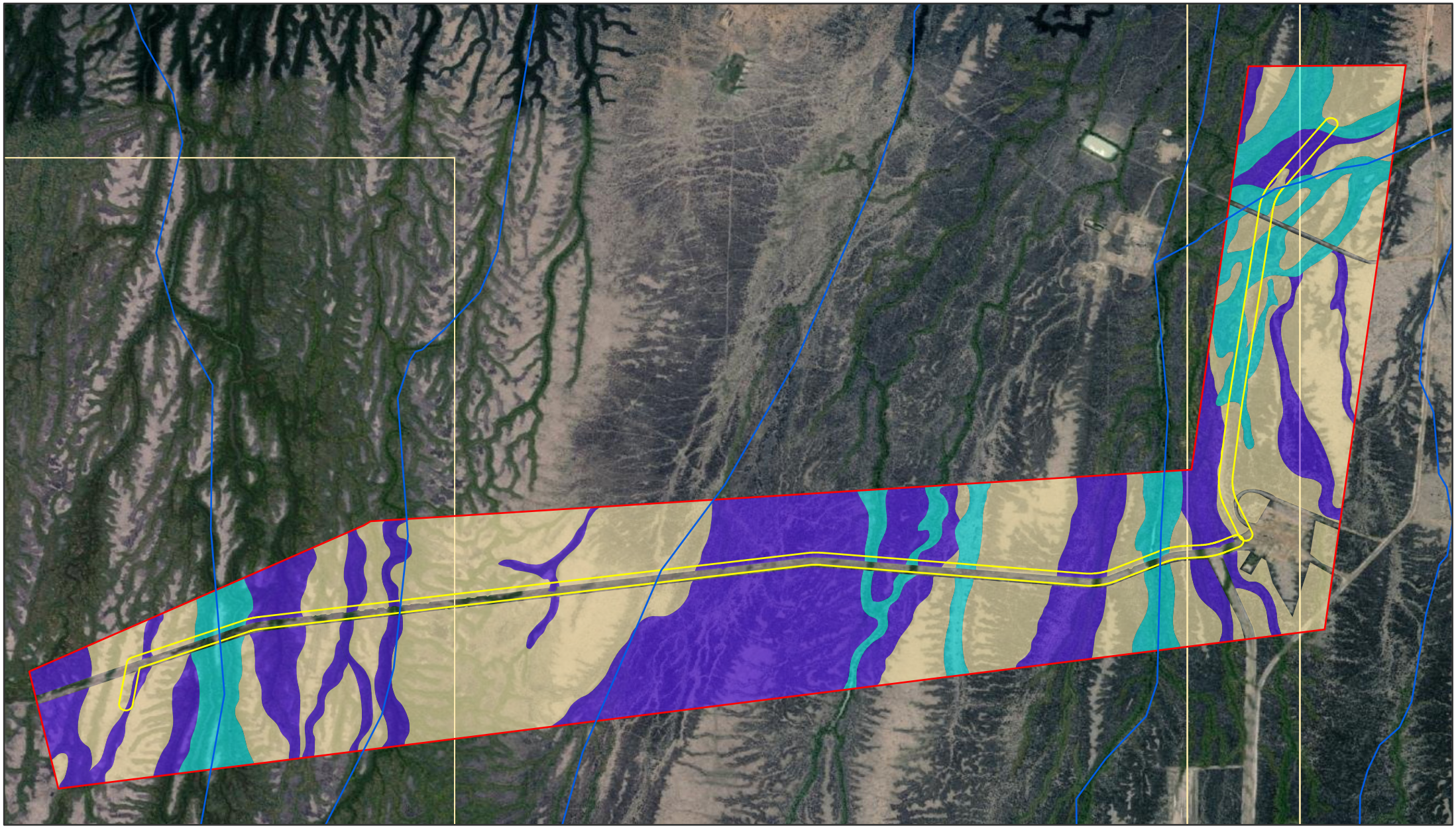

Figure 2: Regional Ecosystems

Construction Disturbance Zone
Indicative pipeline RoWs
Petroleum lease boundaries
Watercourse

RE
5.3.8a
5.3.18a
5.3.18b

0 0.2 0.5
Kilometers

Datum/Projection:
GCS WGS 1984
Project: 22Bri2909-BS Date: 29/07/2022

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3.2. Threatened, near threatened or special least concern species

3.2.1. Threatened species

Species that have the potential to occur in the study area and that are listed as endangered, vulnerable, near threatened, special least concern (SLC), and migratory under the *Nature Conservation Act 1992* (NC Act) include:

- Thirteen bird species:
  - Fork-tailed swift (*Apus pacificus*)
  - Bulloo grey grasswren (*Amytornis barbatus barbatus*)
  - Sharp-tailed sandpiper (*Calidris acuminata*)
  - Yellow chat (*Epthianura crocea crocea*)
  - Grey falcon (*Falco hypoleucos*)
  - Latham's snipe (*Gallinago hardwickii*)
  - Gull-billed tern (*Gelochelidon nilotica*)
  - Caspian tern (*Hydroprogne caspia*)
  - Plains-wanderer (*Pedionomus torquatus*)
  - Glossy ibis (*Plegadis falcinellus*)
  - Australian painted snipe (*Rostratula australis*)
  - Common greenshank (*Tringa nebularia*)
  - Marsh sandpiper (*Tringa stagnatilis*)
- One mammal species
  - Short-beaked echidna (*Tachyglossus aculeatus*)
- One reptile species
  - Woma python (*Aspidites ramsayi*)
- One flora species
  - *Rhodanthe rufescens*

Further details on these species along with justification of likelihood of occurrence, are summarised in **Table 4**. A full likelihood of occurrence assessment is provided in **Appendix B**.

Table 4: NC Act listed threatened or SLC species potentially occurring within the CDZ

Scientific Name	Common Name	EPBC Act[1]	NC Act[1]	Functional group	Likelihood	Justification
Birds						
Amytornis barbatus barbatus	Bulloo grey grasswren	E	E	26	Potential	Species occurs on floodplains in the drainage basin of the Bulloo River, with most species records located approximately 160 km south of the study area (ALA, 2022). No records occur within 50 km of the CDZ. The closest record exists approximately 68 km south of the study area, however, is an isolated record without a date. Potential habitat for this species occurs within the CDZ in the form of vegetated wetlands fringing drainage lines, in particular where lignum occurs (5.3.8a). Habitat of this description is limited to approximately 13% of the CDZ, occurs intermittently throughout the area, however, is predicted to be more concentrated in the Wackett-14 redirection RoW. Where habitat containing lignum does occur, it is limited to the narrow fringes of drainage lines and does not occur as expanses of dense thickets up to 2 m tall. Preferrable habitat would be occupied by moderately dense vegetation of grasses, rushes, and reeds (lignum, swamp canegrass, open timber, or samphire) (DESWPC, 2013). Habitat within the CDZ is therefore considered to be of marginal suitability.
Epthianura crocea crocea	yellow chat (gulf)	-	V	5	Potential	ALA species records exist approximately 35 km south-west of the CDZ in similar state-mapped habitat. The species is generally associated with shrub swamps, saltbushes, wet thickets and drying lakebeds and is known to use both natural and artificial wetlands. Potential habitat exists within the study area in the form of open shrubland with *Chenopodium auricomum* and *Duma florulenta* on drainage lines (5.3.8a and 5.3.18a). This habitat is restricted to approximately half of the CDZ (33%) which occurs as sparsely vegetated wetlands, dominated by *Chenopodium auricomum.* The more densely vegetated wetlands containing larger shrub species such as lignum and *acacia stenophylla* are restricted to approximately 13% of the CDZ.
Falco hypoleucos[2]	grey falcon	V	V	44	Potential	A single record occurs within 50 km of the CDZ, 8 km west of the CDZ in adjacent terrestrial habitats (outside the floodplain). The species is known to occur throughout channel country, and multiple records exist on EBird. Habitat within the CDZ is likely to support foraging habitat for the species, which will utilise both tree-lined channels (such as in 5.3.8a), and open shrubland (such as in 5.3.18a). Vegetated wetland habitat fringing channels was observed through site photos to be relatively tree-less. *Acacia stenophylla* occasionally occurred, however, *Eucalyptus coolabah* is likely absent from this habitat within the CDZ. The absence of E. coolabah and other large-tree species meant that this area was not identified as potential breeding habitat, and likely only supports foraging resources for grey falcon.

Scientific Name	Common Name	EPBC Act[1]	NC Act[1]	Functional group	Likelihood	Justification
Pedionomus torquatus	plains-wanderer	CE	V	10	Potential	No records occur within 50 km of the CDZ, however, the species is elusive and is known to occur in the Channel Country region. Plains-wanderer prefer grassland habitat with particular structural characteristics (5 cm height, 50% bare ground cover). The specific characteristics of grasslands/forblands within the CDZ is unknown. Potential species habitat in the form of grass/forb open herb lands occur across majority of the CDZ, approximately 48% (RE 5.3.18b). However, preferrable species habitat in Queensland is considered to occur in the Mitchell Grass Downs Bioregion (DoE, 2016).
Rostratula australis	Australian painted snipe	E, Ma	E	15	Potential	No records occur within 50 km of the study area (ALA, 2022). The species utilises a variety of vegetated wetland habitats, such as what occurs within the CDZ. Given the CDZ is located entirely within the braided channels, potential wetland habitat may occur throughout the entire CDZ during periods of inundation. Preferable habitat for the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ.
Migratory birds						
Apus pacificus	fork-tailed Swift	Mi	SLC	-	Potential	A species record occurs within 6 km of the CDZ. The species is almost exclusively aerial when in Australia. It is possible it may fly over and/or forage over the study area from time to time. Given the species is highly mobile and is known to occur within close proximity to the CDZ, it is considered potential to occur.
Calidris acuminata	sharp-tailed sandpiper	Mi	SLC	-	Likely	Multiple records occur within 50 km of the study area (ALA, 2022). Potential habitat for the species occurs across the entirely of the CDZ, as it is located within braided channels, which experiences seasonal inundation and transformation into suitable wetland habitat. The suitability of habitat will vary seasonally with the degree of water inundation. The species occurs across much of Australia, particularly south-eastern Australia. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Gallinago hardwickii	Latham's Snipe	Mi	SLC	-	Potential	Identified in the PMST as 'species or species habitat may occur within area'. No records were identified within 50 km of the CDZ. Ebird records are also mostly absent from Channel Country. Potential habitat, however, does occur in the form of freshwater wetlands and swamplands during times of inundation. The species prescence in the area is largely dependent on seasonal rainfall and the degree of inundation creating suitable shallow foraging habitat. The species is therefore considered as potentially occurring within the CDZ. The species is a non-breeding

Scientific Name	Common Name	EPBC Act[1]	NC Act[1]	Functional group	Likelihood	Justification
						visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Gelochelidon nilotica	gull-billed tern	Mi	SLC	-	Likely	Multiple ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA,2022). Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Hydroprogne caspia	caspian tern	Mi	SLC	-	Likely	ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA, 2022). Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species breeds at known sites within Queensland, and likely will only utilised habitat within the CDZ for foraging. Preferable habitat for the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Plegadis falcinellus	glossy ibis	Mi	SLC	-	Likely	ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA, 2022). Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. Preferable habitat for the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. The glossy ibis is known to breed within the Cooper Channel Country, and therefore, where conditions are suitable, may utilise vegetated wetlands for breeding habitat.

Scientific Name	Common Name	EPBC Act[1]	NC Act[1]	Functional group	Likelihood	Justification
Tringa nebularia	common greenshank	Mi	SLC	-	Likely	A single ALA record occurs within 50 km of the CDZ, in similar open shrubland habitat on floodplains (ALA, 2022). Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Tringa stagnatilis	marsh Sandpiper	Mi	SLC	-	Likely	A single ALA record occurs within 50 km of the CDZ, however, the record is located outside of the braided channels in more vegetated habitat. The species utilises a variety of wetland habitats, and therefore has the potential to occur throughout the braided channels within the CDZ. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Mammals						
Tachyglossus aculeatus	short-beaked echidna	-	SLC	11	Potential	No records occur within 50 km of the project area (ALA, 2022). The species is the only specialised ant-eating mammal in Australia and does not require distinct differences in habitat to meet both foraging and reproductive needs (ALA, 2022b). Given the species is widespread across Australia and utilises a wide array of habitats, including those present within the project area, the species may utilise habitat within the project area. The species is unlikely to occur during seasonal inundation.
Reptiles						
Aspidites ramsayi	Woma python	-	NT	-	Potential	No ALA records occur within 50 km of the CDZ (ALA, 2022). However, the species occurs in a variety of habitat types, and its distributional range covers the entirely of Channel Country. The species has been recorded to occupy a wide variety of dry habitats from spinifex desert to brigalow, eucalypt and acacia woodlands, heaths and shrublands. The species is therefore considered to have the potential to occur within the CDZ.
Flora						

Scientific Name	Common Name	EPBC Act[1]	NC Act[1]	Functional group	Likelihood	Justification
Rhodanthe rufescens	-	-	NT	-	Potential	One record occurs within 50 km of the study area (ALA, 2020). The species has been recorded in the wider region within RE 5.3.21a. Similar habitat to this is mapped in the CDZ, such as 5.3.18a and 5.3.8a. Given little is known about the species and its occurrence on alluvial plains within Channel country, a precautionary approach is taken and the species is considered to have the potential to occur.

[1]Current status under the EPBC Act: CE = Critically; E = Endangered; V = Vulnerable; M = Migratory, OR NC Act: E = Endangered; V = Vulnerable; NT = Near Threatened; SL = Special Least Concern

3.3. Habitat types

A total of two broad habitat types were identified within the CDZ (**Table 5, Figure 3**). These habitats provide a range of resources for native fauna species, including the threatened species discussed in **Section 3.2.1**. The habitat types within the CDZ may be represented by a single RE or multiple REs and REs may overlap between habitat types. The habitat values for a particular threatened species may relate to a single RE within a broad habitat type.

Habitat across the CDZ forms an interchanging pattern between areas of more dense and larger vegetation fringing channels (the vegetated wetlands), and areas of sparse tussock grass and forb-land between channels. The entire area is located within the floodplain and braided channels of the Cooper Basin, and seasonally provides important wetland habitat.

Table 5: Habitat types and threatened species associations

Habitat type	Associated REs	Threatened species	Area inside CDZ (ha)
Vegetated wetlands (dominated by lignum / northern bluebush) fringing channels	5.3.8a 5.3.18a	Fork-tailed swift, Grey Falcon, Yellow Chat, Bulloo Grey Grasswren, Australian Painted Snipe, Sharp-Tailed Sandpiper, Latham's Snipe, Gull-Billed Tern, Caspian Tern, Common Greenshank, Marsh Sandpiper, And Glossy Ibis	60.5
Tussock grasslands, forblands	5.3.18b	Fork-Tailed Swift, Plains -Wanderer, Yellow Chat, Bulloo Grey Grasswren, *Rhodanthe rufescens*	63.0

3.3.1. Vegetated wetlands

The CDZ is situated within the complex braided channels and wetlands (vegetated swamps) of the Cooper Creek channel country. This habitat experiences extreme changes in vegetation cover, diversity and complexity during periods of drought and inundation. Vegetation fringing the channels within the CDZ is often treeless and characterised by a dominant shrub layer of *Duma florulenta* (lignum) and/or *Chenopodium auricomum* (northern bluebush). Occasional low tree species occur such as *Acacia stenophylla* (river cooba) and *Eremophila bignoniflora* (creek wilga). No *Eucalyptus coolabah* trees were observed in the CDZ from available site photos. Ephemeral wetland habitat is typically dry throughout the year, and requires significant seasonal rainfall to experience widespread inundation. During prolonged seasons without adequate rainfall, vegetation is relatively sparse with limited shrub cover. During periods of inundation, the shrub and tree layer can experience high mortality, while the ground layer is often abundant and diverse, comprising many grass and forb species. Vegetated wetlands account for approximately 45 % of the area of the CDZ.

Wetlands provide important habitat for a range of flora and fauna species. In particular, periodically inundated swampy floodplains where thickets of lignum and tussock grasses occur, such as REs 5.3.8a and 5.3.18a, provide potential habitat for the Bulloo grey grasswren to shelter and forage.

Vegetated lignum swamps are also the preferred habitat of the Yellow chat (Gulf), which inhabits low peripheral vegetation around ephemeral wetlands such as floodplains and swamps (Curtis et al., 2012).

The lack of riparian woodland across this habitat, in particular an absence of *Eucalyptus coolabah*, means that suitable habitat for threatened species such as painted honeyeater and pink cockatoo is unlikely to occur.

The Grey falcon will utilise treeless forb and shrubland for foraging, especially in times of increased prey abundance following periods of inundation. No *Eucalyptus coolabah* trees were observed in the CDZ from available site photos, which would otherwise provide potential breeding habitat for the species.

Vegetated wetlands provide seasonal shelter and foraging habitat for migratory wetland birds. Migratory wetland species including Australian painted snipe, Sharp-tailed sandpiper, Latham's snipe, gull-billed tern, Caspian tern, Common greenshank, Marsh sandpiper, and Glossy ibis. The Glossy ibis is known to breed within the Cooper Channel Country, and therefore, where conditions are suitable, may utilise vegetated wetlands for breeding habitat.

Plate 1: Vegetated wetland dominated by tangled lignum, RE 5.3.8a (photo provided by client)

3.3.2. Tussock grasslands, forblands

Tussock grasslands and forblands account for approximately 48% of habitat within the CDZ and occur in-between vegetated channels. The structure of this habitat type varies from sparse to open grassland, herbland or forbland and can be denuded of any extant vegetation under dry conditions. Given the variability of presence of this resource, it is likely only to provide habitat seasonally for some fauna species and potential habitat for threatened flora species *Rhodanthe rufescens*.

The Yellow chat (Gulf) forages in grasslands adjacent to wetlands and in drier vegetation dominated by chenopods. Areas with tall vegetation, such as *Eragrostis australasica* (swamp canegrass) interspersed between low shrubs, provides cover for foraging individuals (Curtis et al., 2012). Swamp canegrass was not observed in site photos, and tall vegetation is largely absent from this habitat type within the CDZ. It is likely that tussock grasslands and forblands within the CDZ provide marginal quality habitat for the species.

The Plains-wanderer inhabits sparse, treeless, species-rich, lowland native grasslands with areas of bare ground (approximately 50 % ground cover) (DoEE, 2016). This habitat type therefore has the potential to provide suitable habitat for this species, however suitability would require field verification. Further, the species is considered to prefer habitats further north in the Mitchell Grass Downs Bioregion.

Plate 2: Open tussock grassland/forbland, RE 5.3.18b (photo provided by client)

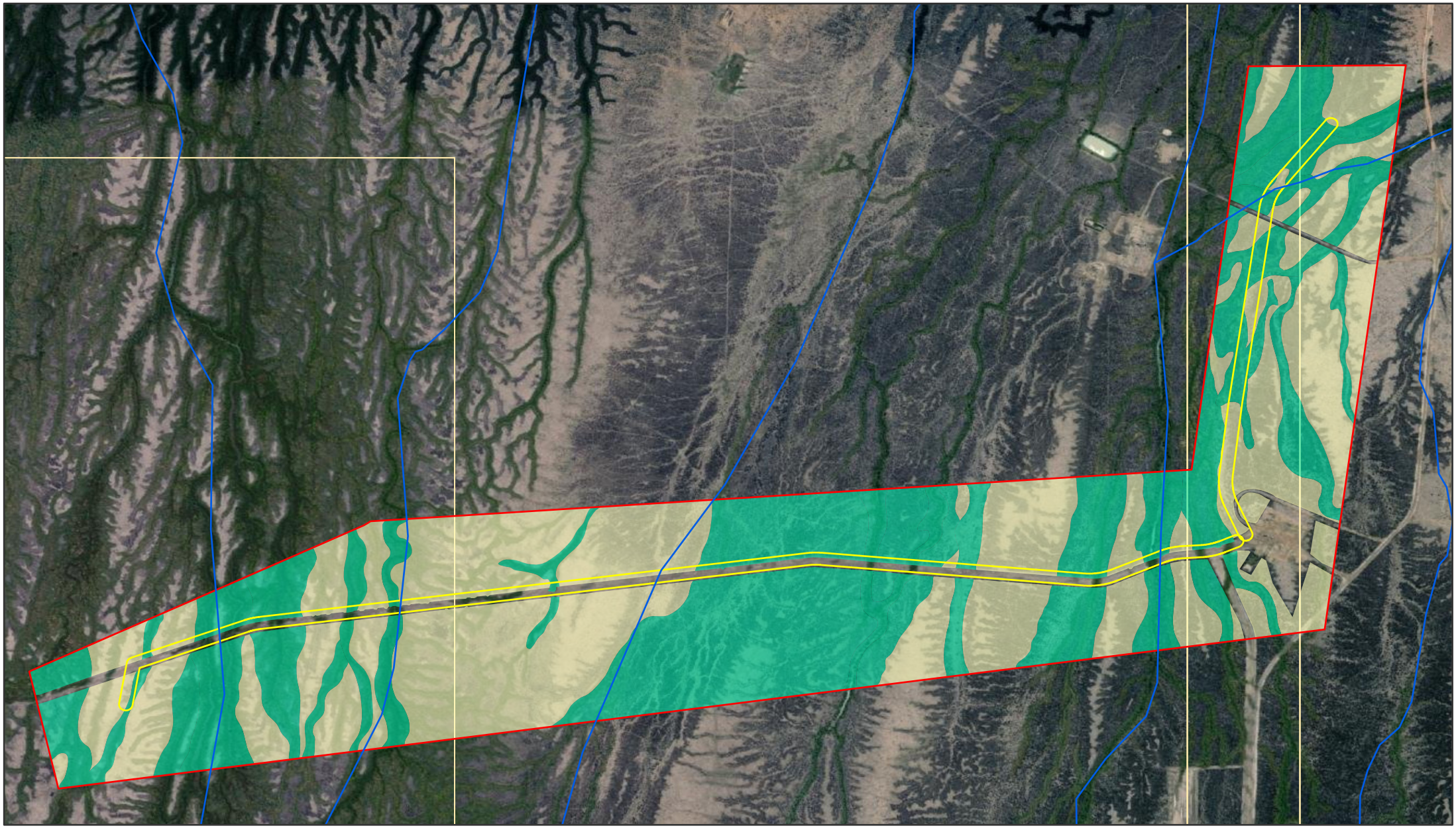

Figure 3: Broad habitat types

Construction Disturbance Zone
Indicative pipeline RoWs
Petroleum lease boundaries
Watercourse

Habitat Type
Vegetated wetlands
Tussock grasslands and forblands

0 0.2 0.5
Kilometers

Datum/Projection:
GCS WGS 1984
Project: 22Bri2909-BS Date: 29/07/2022

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Matters of State Environmental Significance

MSES, as defined in Schedule 2 of the *Environmental Offsets Regulation 2014*, were assessed within the CDZ (**Table 6, Figure 4**).

Table 6: Assessment of MSES present in the CDZ

MSES	Presence within the Construction Disturbance Zone
Regulated vegetation • Prescribed regional ecosystems that are endangered regional ecosystems • Prescribed regional ecosystems that are of concern regional ecosystem Prescribed regional ecosystems that: • intersect with an area shown as a wetland on the vegetation management wetlands map; or • an area of essential habitat on the essential habitat map for an animal that is endangered wildlife or vulnerable wildlife or a plant that is endangered wildlife or vulnerable wildlife • A prescribed regional ecosystem is a matter of State environmental significance, for a prescribed activity mentioned in schedule 1, item 7(e), if the ecosystem is an area of essential habitat on the essential habitat map for an animal that is near threatened wildlife or a plant that is near threatened wildlife • A prescribed regional ecosystem to the extent that the ecosystem is located within a defined distance from the defining banks of a relevant watercourse	Present as prescribed RE's located within the defined distance of the defining banks of a relevant watercourse (Cooper Creek, stream order 8 buffered by 100 m) (Figure 5). Not present as: • endangered REs or of concern REs, • mapped essential habitat, • interest with an area shown as a wetland or within 100 m from a wetland
Connectivity areas	Present as 132.5 ha of remnant vegetation within the CDZ.
Wetlands and watercourses a wetland: • in a wetland protection area (WPA); or • of high ecological significance (HES) shown on the map of Queensland wetland environmental values; • a wetland or watercourse in high ecological value waters.	Not present as: • a wetland in a wetland protection area • a wetland of high ecological significance • high ecological value waters or wetlands
Designated precinct in a strategic environmental area	The study area is wholly located within the Channel Country SEA.
Protected wildlife habitat	Present as potential habitat for the following species listed as special least concern (short-beaked echidna only), endangered or vulnerable under the NC Act: • Australian painted snipe • Grey falcon • Yellow chat (Gulf) • Plains-wanderer • Bulloo grey grasswren

MSES	Presence within the Construction Disturbance Zone
	• Short-beaked echidna
Protected areas	Not present
Highly protected zones of State marine parks	Not present
Fish habitat areas	Not present
Waterway providing for fish passage	Present - only applicable if waterway barrier works are proposed
Marine plants	Not present
Legally secured offset areas	Not present

4.1. Strategic environmental areas

A Strategic Environmental Area (SEA) is an area of regional interest under the *Regional Planning Interests Act 2014*. The study area is located entirely within the Channel Country SEA.

4.2. Environmentally sensitive areas

No Category A, B or C ESAs, as defined under the *Environmental Protection Regulation 2019*, occur within the project area (refer to **Appendix A**).

4.3. Significant residual impact assessment

A significant residual impact (SRI) assessment has been undertaken in accordance with the *Queensland Significant Residual Impact Guideline* (DES, 2014) for all MSES values potentially occurring within the CDZ (Table 7). MSES identified within the study area include (Figure 4):

- Regulated vegetation (intersecting a watercourse)
- SEA (Channel Country SEA)
- Connectivity areas
- Protected wildlife habitat
- Waterway providing for fish passage

Impacts have been assessed for potential disturbance associated with two buried gas pipelines constituting a maximum disturbance area of 8.6 ha within the CDZ (as outlined in **Section 1.3)**. As discussed in **Section 1.4**, the precise location of proposed pipeline alignments within the CDZ will be confirmed once flooding in the region recedes and site access is possible. For this reason, the majority of disturbance has been conservatively assumed to be located in areas of remnant vegetation.

The outcome of this SRI assessment is unlikely to change based on minor variations to the location of proposed disturbance within the CDZ. The ratio of disturbance to particular REs within the CDZ may vary slightly from the exact area descriptions in this report. However, minor variations are not expected to result in a change to the quantum of potential ecological impacts. This is due to the nature of the proposed disturbance (linear infrastructure), and the homogeneity of the landscape within the CDZ, which comprises large areas of the same or similar REs (5.3.18a/b and 5.3.8a). These have a relatively similar composition (herblands, grasslands, forblands with minor areas of chenopod shrubland associated with drainage features) and structure (sparse). **Table 7** and **Table 8** summarise the results of the SRI assessment.

The SRI assessment has been completed based on an assumption that activity within the CDZ can be micro-sited by Santos to avoid impacts within areas of higher environmental value.

Further, as discussed in Section 1.3, total required disturbance area for construction of the pipelines will be approximately **8.6 ha.** This is a conservative upper disturbance limit to allow a degree of flexibility for final alignment placement, and the total disturbance area will likely be less than 8.6 ha.

The pipelines will be buried, and following completion of installation, the RoW will be reinstated to the condition and surface profiles existing at the commencement of activities. Topsoil and seed stock removed during installation will then be re-spread over the RoWs, and any windrows will be removed. This will ensure natural surface water flows in the area are maintained, and the disturbance area will be allowed to naturally rehabilitate. Pipeline maintenance activities and inspections will be carried out from time to time once the pipelines become operational. A maximum 3 m wide corridor located within the rehabilitated RoWs will be used to provide access for inspections via light vehicles. No formed roads will be required or be maintained within the rehabilitated pipeline RoWs.

To avoid an SRI on MSES values, clearing limits within areas of regulated vegetation should be adhered to as per Table 1 in the Significant Residual Impact Guideline (DES, 2014). This approach will also substantially reduce impacts to potential threatened species habitat within the CDZ.

Species-specific avoidance measures include:

- Surface disturbance restricted to the minimum area required to safely carry out activities.
- Consider alternate alignments during the scouting phase to minimise environmental impacts i.e. micro-site the pipelines to avoid impacts to areas of higher environmental value.
- Avoiding areas of high habitat value for the grey grasswren including dense patches of lignum 1.0 to 2.5 m tall, and/or clumps of northern bluebush.
- RoW widths will be restricted to the smallest extent practicable through watercourses
- Where practicable, avoid clearing of mature trees and preferentially lop branches rather than removing whole trees or large shrubs.
- Whilst breeding habitat will be avoided, disturbance of grey grasswren foraging habitat will be preferentially timed to occur outside of the breeding season (July – August) for the species.
- Preferentially locating infrastructure adjacent to areas of pre-existing disturbance (i.e. co-locate proposed Wackett South-2 pipeline with the Wackett South-1 pipeline wherever practical) to minimise habitat clearing.
- In higher value environments (including lignum and wetlands), disturbance will be avoided, and boundaries will be pegged during construction to delineate the approved maximum extent of disturbance.
- Where nests of threatened species are identified as active with adults, eggs or nestlings, disturbance must be avoided.
- Works will not commence if construction areas are inundated. If the construction area is at risk of becoming inundated (i.e. if weather forecasts are predicting significant rain or flooding), then works will cease and construction areas will be secured (i.e., trenches backfilled and reinstated) until the inundation has subsided.
- Fuels, chemicals and wastes will be stored, handled and transported in accordance with applicable company and regulatory requirements. This includes storing fuels, chemicals and

waste in bunded areas outside of the floodplain. An appropriately sized spill kit will be available and stored in close proximity to fuel, chemical and waste storage areas.

- Hygiene protocols implemented as appropriate to minimise the introduction, spread and persistence of weeds, pest plants, animals and pathogens from plant and vehicle movement.
- Lengths of pipe will be capped or sealed when they are left overnight.
- Following completion of pipeline installation activities:
    - Reinstate the RoWs to the condition and surface profiles existing at the commencement of construction activities
    - Ensure any wheel and equipment ruts or windrows created along the RoWs during installation are filled in and levelled by grading equipment; and
    - Re-spread topsoil and seed stock removed during installation over the RoWs.
- The above-mentioned measures will ensure natural pre-existing surface water flows in the area are maintained, and the disturbance area will naturally progressively rehabilitate in accordance with relevant Environmental Authority conditions.
- Following construction, all redundant plant and equipment will be removed from the RoWs.

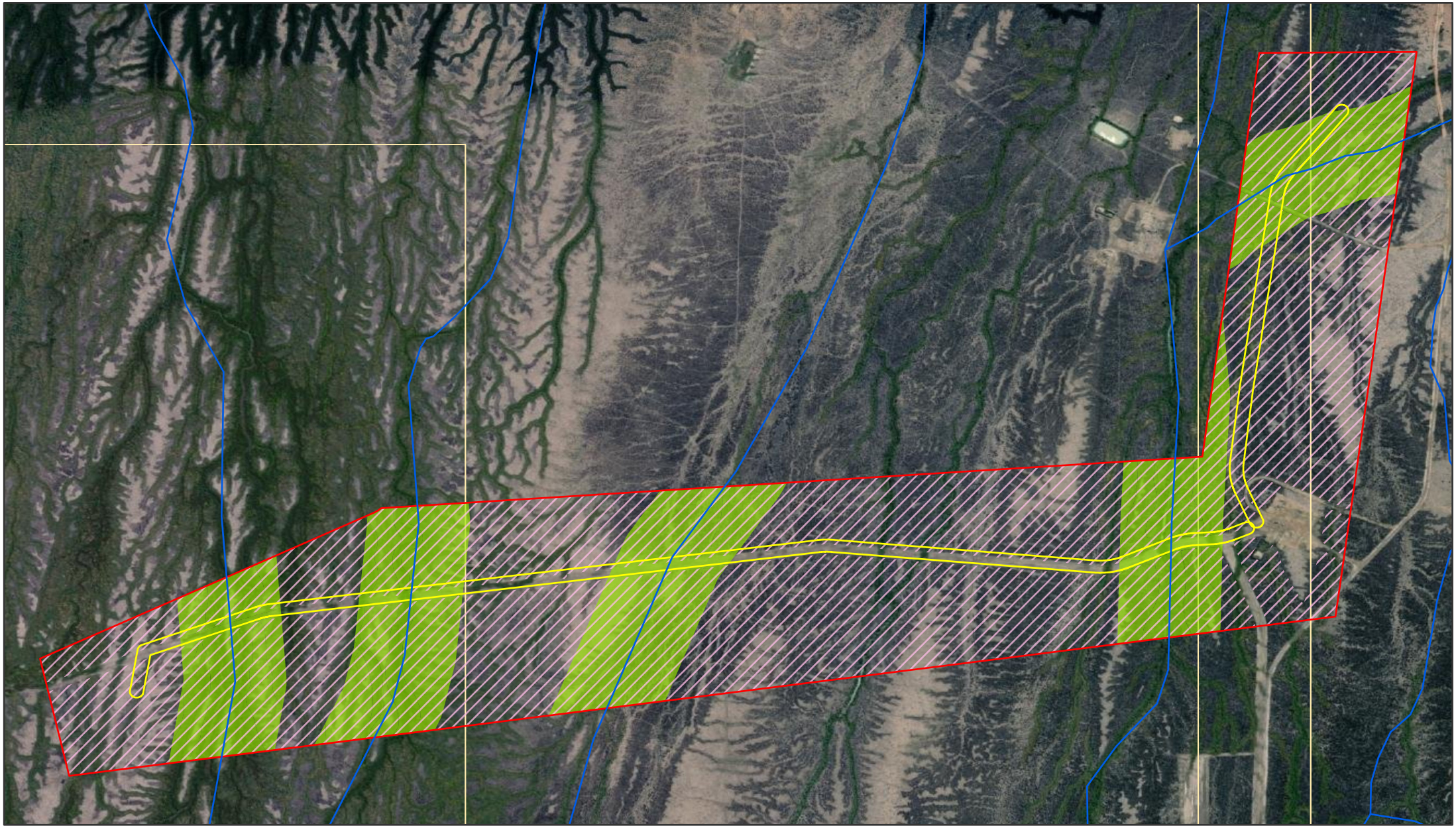

Figure 4: MSES - regulated vegetation within the CDZ

Construction Disturbance Zone
Indicative pipeline RoWs
Petroleum lease boundaries
Watercourse

Regulated Vegetation
Protected widllife habitat
Prescribed REs within a defined distance from a watercourse

0 0.2 0.5
Kilometers

Datum/Projection:
GCS WGS 1984
Project: 22Bri2909-BS Date: 29/07/2022

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4.3.1. Significant residual impact assessment

4.3.1.1. Significant Residual Impact Guideline Clearing Limits – Regulated Vegetation

The SRI Guideline (EHP, 2014) provides criteria for identifying when an impact to a MSES may be deemed significant. The SRI Guideline contains tests and criteria that provide a trigger for when Environmental Offsets may be required.

The SRI Guideline provides test criteria for regulated vegetation MSES occurring within the PPL, namely:

- Regulated vegetation - intersecting a watercourse

Section 2.1 of the SRI Guideline states that for an SRI to occur for regulated vegetation MSES, proposed disturbance must exceed clearing area and width limits (**Table 7**) and clearing must occur within a specific distance of the 'defining bank' of the wetland or watercourse.

For the purposes of this SRI assessment, the following rules and assumptions have been applied for clearing in a regional ecosystem that is within the defined distance of a watercourse:

1. Vegetation Management Watercourses are as per the Vegetation Management Watercourse and Drainage Feature Map (as per Section 20AA of the VM Act) to the extent the RE contains remnant vegetation.
2. Defined distance from the defining banks of Vegetation Management Watercourses is as per the Queensland Environmental Offsets Policy V1.10 (DES 2020) using stream order as per the Vegetation Management Watercourse and Drainage Feature Map.
3. The location of defining banks for Vegetation Management Watercourses was estimated by buffering the centreline of Vegetation Management Watercourses by 100 m on each side. For stream orders greater than 5, a 100 m buffer is applied.

The maximum area of 'regulated vegetation - intersecting a watercourse' was estimated by buffering the Vegetation Management Watercourse and Drainage Feature Map by the defined distance as per the Queensland Environmental Offsets Policy V1.10 (DES 2021), using stream order as per the Vegetation Management Watercourse and Drainage Feature Map. The maximum area of 'regulated vegetation - intersecting a watercourse' includes

a. the defined distance, and
b. the average channel width area as described at point 3 above.

Consequently, provided the proposed activities comply with the clearing limits outlined in Section 2.1 of the SRI Guideline and **Table 7**, the proposed development will not result in a significant residual impact to regulated vegetation (**Table 8**).

Table 7: SRI test criteria and impact minimisation measures

MSES	Infrastructure type	SRI test criteria (EHP 2014)	Impact minimisation for the project
Regulated vegetation - intersecting a watercourse	Linear	20 m wide in a sparse or very sparse RE; or 25 m wide in a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI.	Linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.
	Non-linear	2 ha within a sparse or very sparse RE; or 5 ha within a grassland RE. Clearing must also occur within the defined distance or within 5 m of the defining bank to trigger a SRI.	Non-linear infrastructure will be located outside the defined distance from the defining banks of Vegetation Management Watercourses and Drainage Features, where practicable. Where disturbance occurs within the defined distance of Vegetation Management Watercourses and Drainage Features and within 5 m of the defining bank, it will comply with SRI clearing limits.

Table 8: Significant impact assessment for MSES

Significant impact criteria	Response to criteria
Regulated vegetation – prescribed REs intersecting a watercourse and prescribed REs within a mapped wetland* An action is LIKELY to have a significant impact on regulated vegetation intersecting a watercourse if vegetation clearing exceeds the following limits: 1a. 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. 1b. For clearing other than clearing for linear infrastructure: • Area greater than 5 ha where in a grassland (structural category) regional ecosystem; or • Area greater than 2 ha where in a sparse (structural category) regional ecosystem; or • Area greater than 0.5 ha where in a dense to mid-dense (structural category) regional ecosystem. 2. Clearing within 50 m of the defining bank of a wetland (within a mapped wetland only) 3. Clearing within 5 m of the defining bank of a watercourse (intersecting a watercourse only)	REs within the study area have structural categories of sparse or very sparse (**Table 3**). Proposed clearing for linear infrastructure construction activities will require clearing of minor areas of regulated vegetation located within the defining distance (100m) of a mapped Vegetation Management Watercourse (as per Figure 4). Further, proposed Regulated Vegetation clearing will occur within 5m of the defining bank of the mapped Vegetation Management Watercourse. Therefore, Criteria 3 is exceeded. However, where clearing (For clearing for linear infrastructure) occurs within the defining distance of a Vegetation Management Watercourse (Criteria 1), it will not exceed 20m. The proposed pipeline construction RoWs (disturbance areas) will be no greater than 19m wide, and will be located in a Sparse to Very Sparse structural category RE. Therefore, Criteria 1 in Table 1 is not exceeded. For a prescribed activity to have a significant residual impact on a RE that is within the defined distance of watercourses, Criteria 1 and 3 in Table 1 of the Guideline must be exceeded. **Outcome: potential for significant residual impact unlikely**
Wetlands and watercourses An action is likely to have a significant residual impact on prescribed wetlands or watercourses if it is likely that the action will result in environmental values being affected in any of the following ways: • areas of the wetland or watercourse being destroyed or artificially modified; • 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 • the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected; or	HES wetlands and waterways do not occur within the CDZ, and therefore the proposed disturbance will not result in a significant impact. **Outcome: no significant residual impact**

Significant impact criteria	Response to criteria
• 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 • 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.	

Designated precinct in a strategic environmental area
No significant residual impact criteria are provided in the Guideline.
	The *Regional Planning Interests Regulation 2014* identifies the following environmental attributes for the Channel Country SEA:
	• the natural hydrologic processes of the area characterised by:
	  ○ natural, unrestricted flows in and along stream channels and the channel network in the area
	  ○ overflow from stream channels and the channel network onto the flood plains of the area, or the other way
	  ○ natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and
	  ○ groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area
	• the natural water quality in the stream channels and aquifers and on flood plains in the area; and
	• the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.
	These attributes are unlikely to be diminished by the proposed development. No additional significant residual impacts are considered likely to occur to SEAs.
	See **Section 4.3.** for recommendations relating to works within the Channel Country SEA.

Protected wildlife habitat (endangered and vulnerable wildlife including essential habitat) An action is LIKELY to have a significant impact on endangered and vulnerable wildlife if the impact on the habitat is likely to: • lead to a long-term decrease in the size of a local population; or • reduce the extent of occurrence of the species; or • fragment an existing population; or • result in genetically distinct populations forming as a result of habitat isolation; or • result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat; or	Habitat for the following species listed as, special least concern, endangered or vulnerable under the NC Act occur within the development footprint. Habitat values within the CDZ are predicted to mostly include foraging resources. Where the potential for breeding habitat occurs, it is of marginal quality and the species are considered to occur as per a precautionary principle. Detailed significant impact assessments are provided in **Appendix C:** • Australian painted snipe (4.2 ha potential foraging habitat, 4.4 ha of potential breeding habitat) • Grey falcon (8.6 ha of potential foraging and dispersal habitat)

Significant impact criteria	Response to criteria
• introduce disease that may cause the population to decline, or • interfere with the recovery of the species; or • cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species. **Special least concern (non-migratory) animal wildlife habitat** • An action is likely to have a significant impact on a special least concern (non-migratory) animal wildlife habitat if it is likely that it will result in: • a long-term decrease in the size of a local population; • a reduced extent of occurrence of the species; • fragmentation of an existing population; • result in genetically distinct populations forming as a result of habitat isolation; • disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.	• Grey grasswren (2 ha of potential marginal breeding / foraging habitat) • Yellow chat (Gulf) (4.4 ha potential foraging / breeding habitat) • Plains wanderer (4.2 ha of potential marginal breeding / foraging habitat) • Short-beaked echidna (8.6 ha potential foraging and dispersal habitat) **Outcome: potential for significant residual impact unlikely**
Connectivity A development impact on connectivity areas is determined to be significant if either of the following tests are true: The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale; or Any core area that is greater than or equal to 1 ha is lost or reduced to patch fragments (core to non-core).	As the proposed amendment does not relate to a fixed footprint, it cannot be assessed using the Landscape Fragmentation and Connectivity Tool. However, the significant impact criteria can be examined at a project scale. A development impact on connectivity areas is determined to be significant if either of the following tests are true: • The change in the core remnant ecosystem extent at the local scale (post impact) is greater than a threshold determined by the level of fragmentation at the regional scale; or • Any core area that is greater than or equal to 1 ha is lost or reduced to patch fragments (core to non-core). Test 1 - 94 % of the study area is covered by remnant vegetation therefore the change threshold for test 1 is 50%. The proposed amendment will not result in the clearance of greater that 50% of the remnant vegetation across the study area. Test 2 - The vegetation within the study area occurs in a large consolidated remnant patch. The development of buried pipelines (linear infrastructure) in these remnant patches will not result in a core area being lost or reduced to patch fragments. In conclusion, there are not expected to be any significant impacts on connectivity as a result of the proposed activities. **Outcome: potential for significant residual impact unlikely**

Significant impact criteria	Response to criteria
Waterway providing for fish passage An action is likely to have a significant impact on a waterway providing for fish passage if there is a real possibility that it will: • result in the mortality or injury of fish; or • 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 • reduce the extent, frequency or duration of fish passage previously found at a site; or • 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 • 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 • 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.	The proposed amendment would not have a significant residual impact on this prescribed environmental matter due to the following: • Santos will not undertake pipeline construction activities if surface water or flowing surface water is present in drainage features in the CDZ. • Where areas of standing surface water are present in drainage features at the time of construction, Santos will delay construction until these areas have sufficiently dried out. • Under these conditions, no fish (or potential for fish passage) would occur in the drainage features. • Further, the pipeline RoWs will be reinstated to the condition and surface profiles existing at commencement of construction activities to ensure natural surface water flows in the area are maintained to ensure natural fish movement is uninterrupted. Therefore, • Construction within watercourses would not occur during periods of streamflow, avoiding fish mortality or injury; • The temporary construction of pipeline infrastructure within watercourses would not: o reduce the extent, frequency, or duration of fish passage; o result in a substantial change to the hydrological regime of the watercourse; or o lead to significant changes in water quality parameters within the watercourse. **Outcome: potential for significant residual impact unlikely**

*For a prescribed activity to have a significant impact on an RE within a mapped wetland, criteria 1 and 2 must be exceeded. For a prescribed activity to have a significant impact on an RE that is within the defined distance of a watercourse, criteria 1 and 3 must be exceed.

Conclusion and recommendations

A desktop assessment was undertaken to identify ecological values potentially present within the CDZ. The CDZ was found to be entirely located within the Channel Country SEA. The desktop assessment identified the presence of several MSES values within the area. A significant impact assessment was undertaken in accordance with relevant policy guidance for all identified MSES values.

Significant residual impact assessments were completed based on the assumption that activity within the CDZ can be micro-sited to avoid impacts within areas of higher environmental value. To avoid a significant residual impact on MSES values, clearing limits within areas of regulated vegetation as defined by the Significant Residual Impact Guidelines (DES, 2014) should be adhered to. This approach will also substantially reduce impacts to habitat for threatened and migratory bird species within the area.

As noted in **Section 4.3**, the SRI assessment conservatively assumes all proposed disturbance will be located in remnant vegetation. However, approximately 3.6 ha (42%) of the proposed RoW area is mapped as non-remnant vegetation. This is because the larger Wackett-south-2 pipeline is proposed to sit adjacent to the existing Wackett-south-1 pipeline. The strategy of pipeline placement to occupy already existing disturbed vegetation reduces the potential impact to values of MSES by almost half. Further, intact vegetation will be rehabilitated and restored to the condition present prior to disturbance.

The findings of the significant impact assessments indicate that activity within the CDZ requiring disturbance to a maximum of 8.6 ha will not have a significant residual impact on MSES values, provided regulated vegetation clearing limits are adhered to.

5.1. State values

The MSES values regulated vegetation, protected wildlife habitat, connectivity, wetlands and watercourses and strategic environmental areas were identified within the study area (**Table 9**).

Table 9: Summary of MSES values present within the CDZ

MSES value	Description	Significant impact	Recommendations
Regulated vegetation	Prescribed REs within a defined distance from the defining banks of a relevant watercourse	Proposed clearing for linear infrastructure construction activities will require clearing of minor areas of regulated vegetation located within the defining distance (100m) of a mapped Vegetation Management Watercourse. For a prescribed activity to have a significant residual impact on a RE that is within the defined distance of watercourses, Criteria 1 and 3 in Table 1 of the Guideline must be exceeded. A SRI is therefore avoided if clearing is restricted to the prescribed limits for clearing in REs with a structural category of sparse as per the guidelines: maximum of 20 m wide for linear infrastructure.	Clearing limits should be adhered to. Adhere to avoidance and mitigation measures identified in **Section 4.3.**
Protected wildlife habitat	Potential habitat for 5 threatened	Unlikely if disturbance is restricted to the minimum area possible, infrastructure is micro-sited to avoid impacts to threatened species habitat and appropriate	Adhere to avoidance and mitigation

MSES value	Description	Significant impact	Recommendations
	bird species, and one SLC mammal	mitigation and rehabilitation measures are implemented. Habitat values within the CDZ are predicted to mostly include foraging resources. Where the potential for breeding habitat occurs, it is of marginal quality and the species are considered to occur as per a precautionary principle.	measures identified in **Section 4.3**.
Connectivity areas	Remnant vegetation present within study area	Unlikely due to the extent of remnant vegetation present within the CDZ and the relatively small area to be cleared – an upper disturbance limit of 8.6 ha. Vegetation in the disturbance area will be restored to the condition present prior to disturbance, and therefore connectivity restored.	N/A
Strategic environmental area	Channel Country designated precinct	Unlikely due to the scale and location of impact.	No disturbance within mapped HES wetlands Undertake activities in accordance with Schedule B (Water) EA conditions.

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Appendix A Desktop searches

- DES MSES report (provided by client)
- DES Modelled potential habitat report (provided by client)
- Protected plants flora survey trigger report (provided by client)
- DES RE report (provided by client)
- DES Biodiversity and Conservation values report (provided by client)
- Wildlife Online report (provided by client)
- PMST report

Queensland Government

Department of Environment and Science

Environmental Reports

Matters of State Environmental Significance

For the selected area of interest

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: Planning.Support@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

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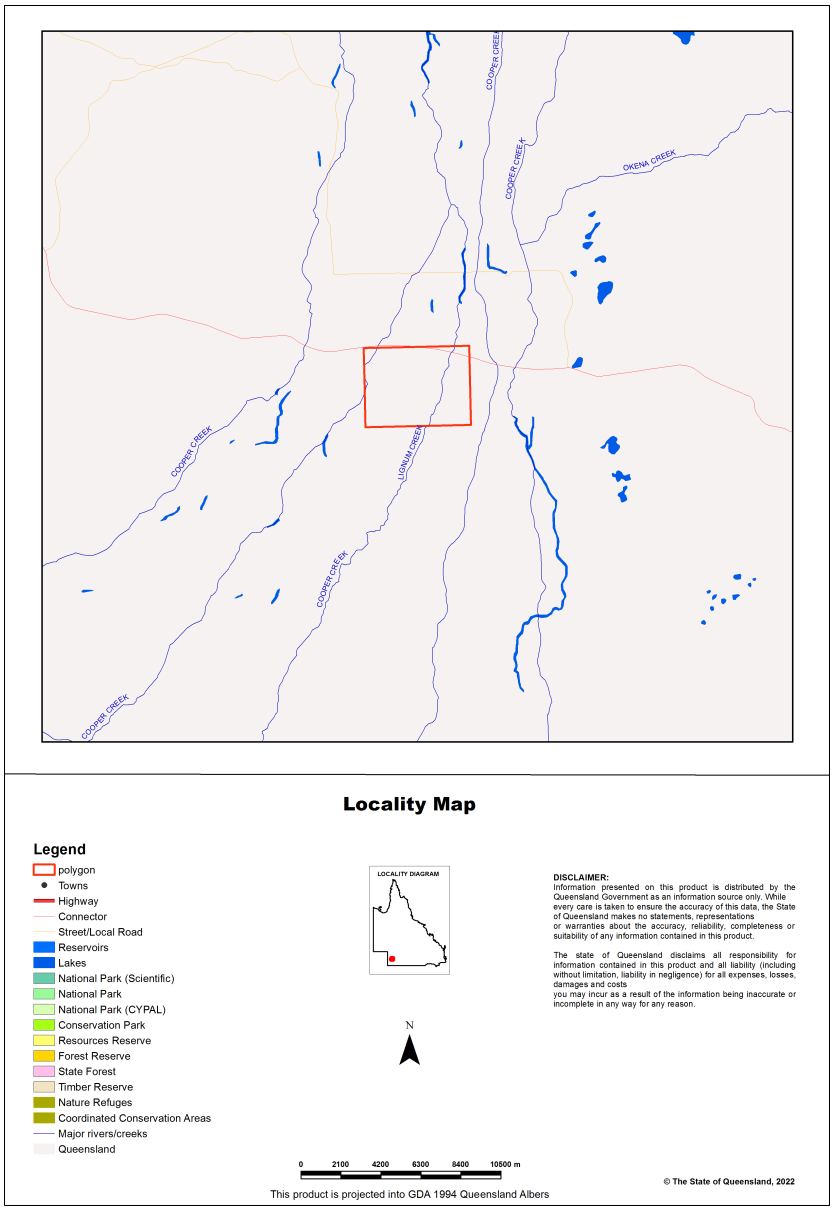
Assessment Area Details

The following table provides an overview of the area of interest (AOI) with respect to selected topographic and environmental values.

Table 1: Summary table, details for AOI

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek



Matters of State Environmental Significance (MSES)

MSES Categories

Queensland's State Planning Policy (SPP) includes a biodiversity State interest that states:

'The sustainable, long-term conservation of biodiversity is supported. Significant impacts on matters of national or state environmental significance are avoided, or where this cannot be reasonably achieved; impacts are minimised and residual impacts offset.'

The MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The SPP defines matters of state environmental significance as:

- Protected areas (including all classes of protected area except coordinated conservation areas) under the *Nature Conservation Act 1992* ;

- Marine parks and land within a 'marine national park', 'conservation park', 'scientific research', 'preservation' or 'buffer' zone under the *Marine Parks Act 2004* ;

- Areas within declared fish habitat areas that are management A areas or management B areas under the Fisheries Regulation 2008;

- Threatened wildlife under the *Nature Conservation Act 1992* and special least concern animals under the Nature Conservation (Wildlife) Regulation 2006;

- Regulated vegetation under the *Vegetation Management Act 1999* that is:

    • Category B areas on the regulated vegetation management map, that are 'endangered' or 'of concern' regional ecosystems;

    • Category C areas on the regulated vegetation management map that are 'endangered' or 'of concern' regional ecosystems;

    • Category R areas on the regulated vegetation management map;

    • Regional ecosystems that intersect with watercourses identified on the vegetation management watercourse and drainage feature map;

    • Regional ecosystems that intersect with wetlands identified on the vegetation management wetlands map;

- Strategic Environmental Areas under the *Regional Planning Interests Act 2014* ;

- Wetlands in a wetland protection area of wetlands of high ecological significance shown on the Map of Queensland Wetland Environmental Values under the Environment Protection Regulation 2019;

- Wetlands and watercourses in high ecological value waters defined in the Environmental Protection (Water) Policy 2009, schedule 2;

- Legally secured offset areas.

MSES Values Present

The MSES values that are present in the area of interest are summarised in the table below:

Table 2: Summary of MSES present within the AOI

1a Protected Areas- estates	0.0 ha	0.0 %
1b Protected Areas- nature refuges	0.0 ha	0.0 %
1c Protected Areas- special wildlife reserves	0.0 ha	0.0 %
2 State Marine Parks- highly protected zones	0.0 ha	0.0 %
3 Fish habitat areas (A and B areas)	0.0 ha	0.0 %
4 Strategic Environmental Areas (SEA)	2296.59 ha	100.0%
5 High Ecological Significance wetlands on the map of Referable Wetlands	0.0 ha	0.0 %
6a High Ecological Value (HEV) wetlands	0.0 ha	0.0 %
6b High Ecological Value (HEV) waterways **	0.0 km	Not applicable
7a Threatened (endangered or vulnerable) wildlife	0.0 ha	0.0 %
7b Special least concern animals	0.0 ha	0.0 %
7c i Koala habitat area - core (SEQ)	0.0 ha	0.0 %
7c ii Koala habitat area - locally refined (SEQ)	0.0 ha	0.0 %
8a Regulated Vegetation - Endangered/Of concern in Category B (remnant)	0.0 ha	0.0 %
8b Regulated Vegetation - Endangered/Of concern in Category C (regrowth)	0.0 ha	0.0 %
8c Regulated Vegetation - Category R (GBR riverine regrowth)	0.0 ha	0.0 %
8d Regulated Vegetation - Essential habitat	45.4 ha	2.0%
8e Regulated Vegetation - intersecting a watercourse **	46.1 km	Not applicable
8f Regulated Vegetation - within 100m of a Vegetation Management Wetland	546.74 ha	23.8%
9a Legally secured offset areas- offset register areas	0.0 ha	0.0 %
9b Legally secured offset areas- vegetation offsets through a Property Map of Assessable Vegetation	0.0 ha	0.0 %

Additional Information with Respect to MSES Values Present

MSES - State Conservation Areas

1a. Protected Areas - estates

(no results)

1b. Protected Areas - nature refuges

(no results)

1c. Protected Areas - special wildlife reserves

(no results)

2. State Marine Parks - highly protected zones

(no results)

3. Fish habitat areas (A and B areas)

(no results)

Refer to **Map 1 - MSES - State Conservation Areas** for an overview of the relevant MSES.

MSES - Wetlands and Waterways

4. Strategic Environmental Areas (SEA)

Regional planning interest type	Region	Status
Strategic Environmental Area - Designated Precinct	Channel Country	Current - June 2014

5. High Ecological Significance wetlands on the Map of Queensland Wetland Environmental Values

(no results)

6a. Wetlands in High Ecological Value (HEV) waters

(no results)

6b. Waterways in High Ecological Value (HEV) waters

(no results)

Refer to **Map 2 - MSES - Wetlands and Waterways** for an overview of the relevant MSES.

MSES - Species

7a. Threatened (endangered or vulnerable) wildlife

Not applicable

7b. Special least concern animals

Not applicable

7c i. Koala habitat area - core (SEQ)

Not applicable

7c ii. Koala habitat area - locally refined (SEQ)

Not applicable

Threatened (endangered or vulnerable) wildlife habitat suitability models

Species	Common name	NCA status	Presence
Boronia keysii		V	None
Calyptorhynchus lathami	Glossy black cockatoo	V	None
Casuarius casuarius johnsonii	Sthn population cassowary	E	None
Crinia tinnula	Wallum froglet	V	None
Denisonia maculata	Ornamental snake	V	None
Litoria freycineti	Wallum rocketfrog	V	None
Litoria olongburensis	Wallum sedgefrog	V	None
Melaleuca irbyana		E	None
Petaurus gracilis	Mahogany Glider	E	None
Petrogale persephone	Proserpine rock-wallaby	E	None
Phascolarctos cinereus	Koala - outside SEQ*	V	None
Pezoporus wallicus wallicus	Eastern ground parrot	V	None
Taudactylus pleione	Kroombit tinkerfrog	E	None
Xeromys myoides	Water Mouse	V	None

**For koala model, this includes areas outside SEQ. Check 7c SEQ koala habitat for presence/absence.*

Threatened (endangered or vulnerable) wildlife species records

(no results)

Special least concern animal species records

(no results)

**Nature Conservation Act 1992 (NCA) Status- Endangered (E), Vulnerable (V) or Special Least Concern Animal (SL). Environment Protection and Biodiversity Conservation Act 1999 (EPBC) status: Critically Endangered (CE) Endangered (E), Vulnerable (V)*

Migratory status (M) - China and Australia Migratory Bird Agreement (C), Japan and Australia Migratory Bird Agreement (J), Republic of Korea and Australia Migratory Bird Agreement (R), Bonn Migratory Convention (B), Eastern Flyway (E)

To request a species list for an area, or search for a species profile, access Wildlife Online at:

https://www.qld.gov.au/environment/plants-animals/species-list/

Refer to **Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals** and **Map 3b - MSES - Species - Koala habitat area (SEQ)** for an overview of the relevant MSES.

MSES - Regulated Vegetation

For further information relating to regional ecosystems in general, go to:
https://www.qld.gov.au/environment/plants-animals/plants/ecosystems/
For a more detailed description of a particular regional ecosystem, access the regional ecosystem search page at:
https://environment.ehp.qld.gov.au/regional-ecosystems/

8a. Regulated Vegetation - Endangered/Of concern in Category B (remnant)

Not applicable

8b. Regulated Vegetation - Endangered/Of concern in Category C (regrowth)

Not applicable

8c. Regulated Vegetation - Category R (GBR riverine regrowth)

Not applicable

8d. Regulated Vegetation - Essential habitat

Values are present

8e. Regulated Vegetation - intersecting a watercourse**

A vegetation management watercourse is mapped as present

8f. Regulated Vegetation - within 100m of a Vegetation Management wetland

Regulated vegetation map category	Map number
B	7242

Refer to **Map 4 - MSES - Regulated Vegetation** for an overview of the relevant MSES.

MSES - Offsets

9a. Legally secured offset areas - offset register areas

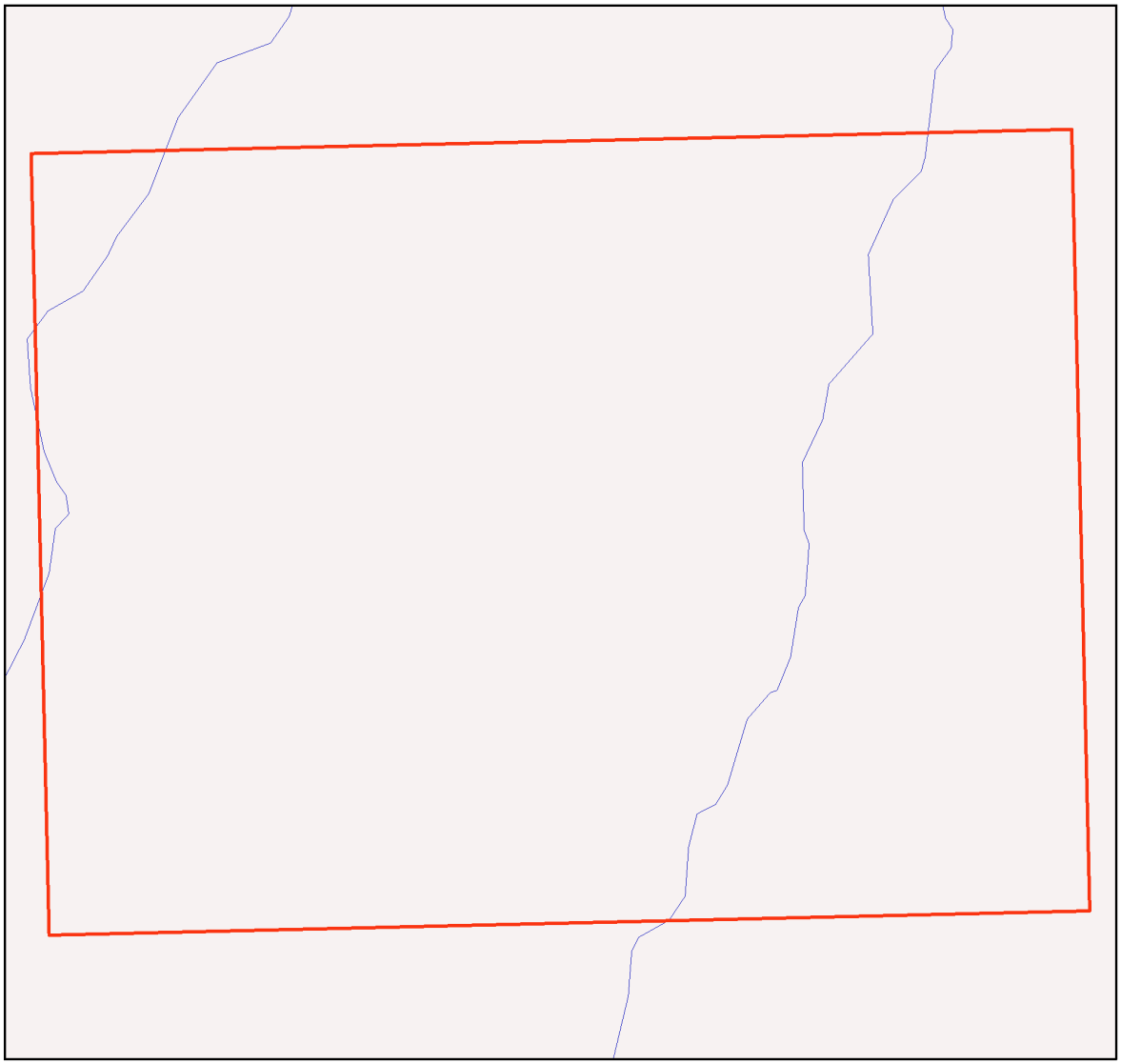
(no results)

9b. Legally secured offset areas - vegetation offsets through a Property Map of Assessable Vegetation

(no results)

Refer to **Map 5 - MSES - Offset Areas** for an overview of the relevant MSES.

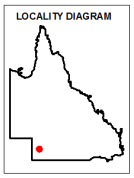
Map 1 - MSES - State Conservation Areas



MSES - State Conservation Areas

Area of Interest

- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Protected area (estates, nature refuges, special wildlife reserves)
- Declared fish habitat area (A and B areas)
- Marine park (highly protected)

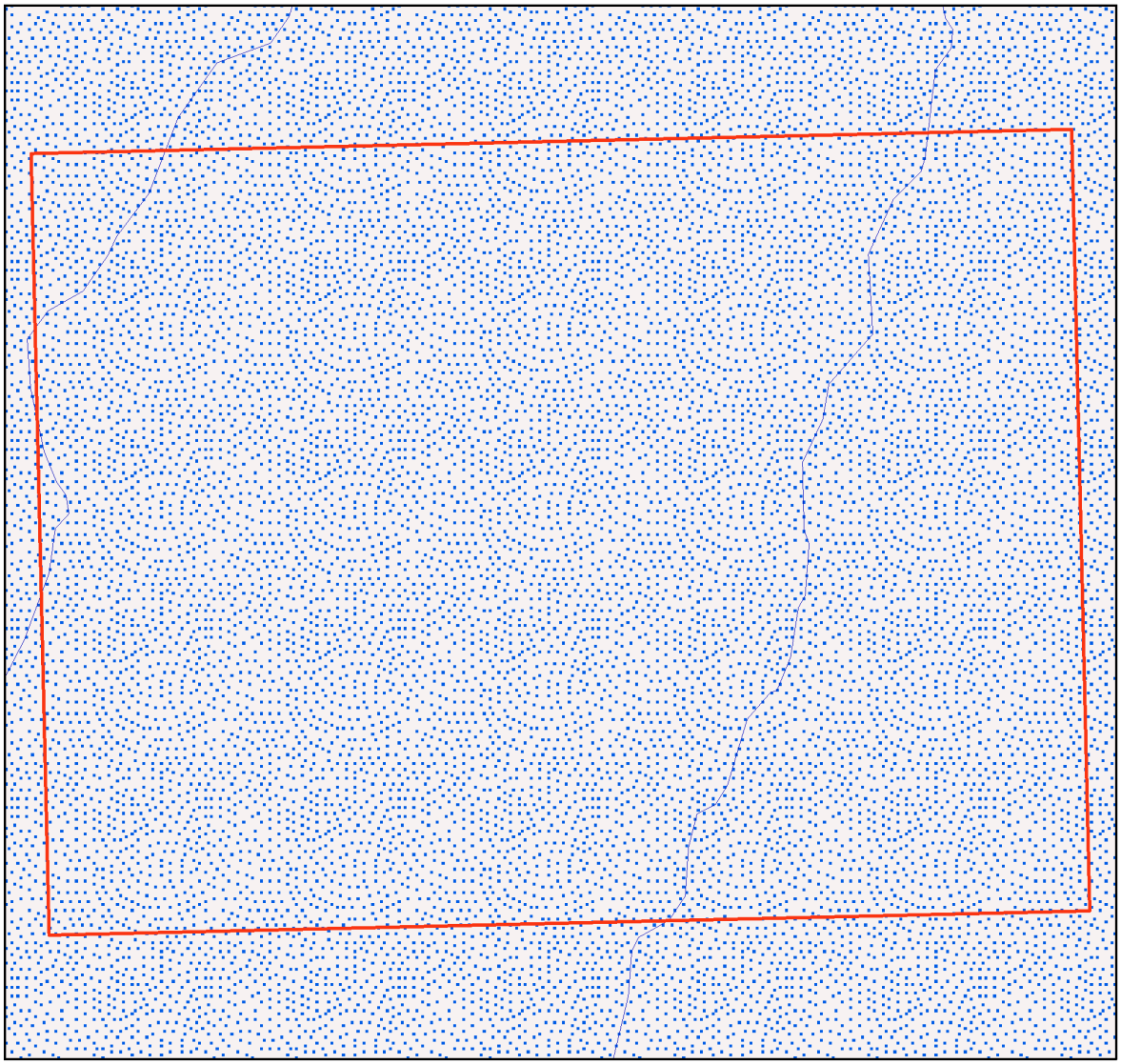


N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

Map 2 - MSES - Wetlands and Waterways

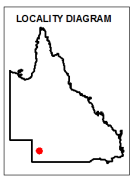


MSES - Wetlands and Waterways

Area of Interest

- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Declared high ecological value waters (watercourse)
- Strategic environmental area (designated precinct)
- Declared high ecological value waters (wetland)
- High ecological significance wetlands

LOCALITY DIAGRAM



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0 320 640 960 1280 1600 m

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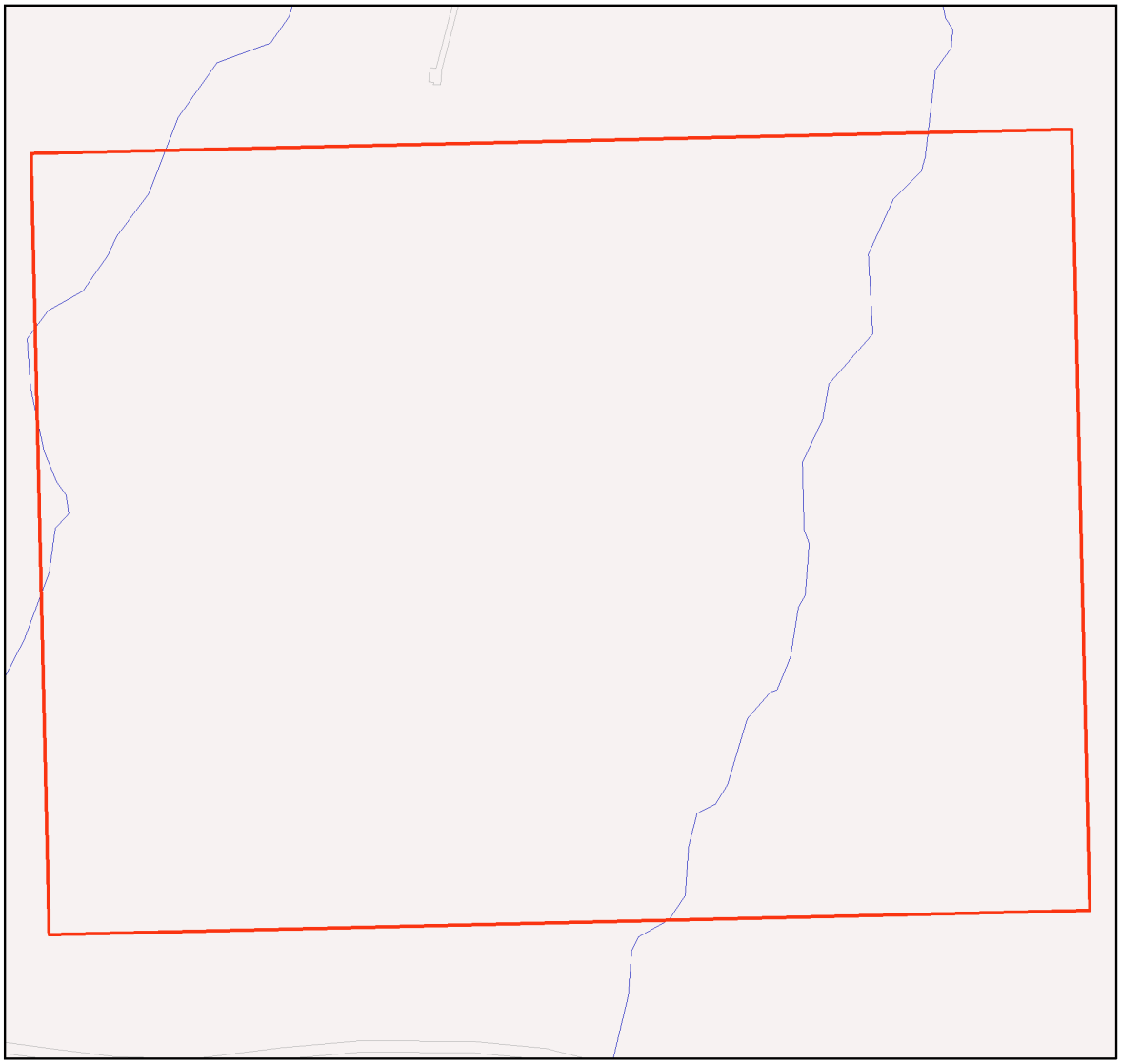
Map 3a - MSES - Species - Threatened (endangered or vulnerable) wildlife and special least concern animals

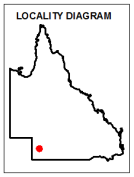


MSES - Species
Threatened (endangered or vulnerable) wildlife and special least concern animals

Area of Interest

- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Wildlife habitat (special least concern)
- Wildlife habitat (endangered or vulnerable)

LOCALITY DIAGRAM

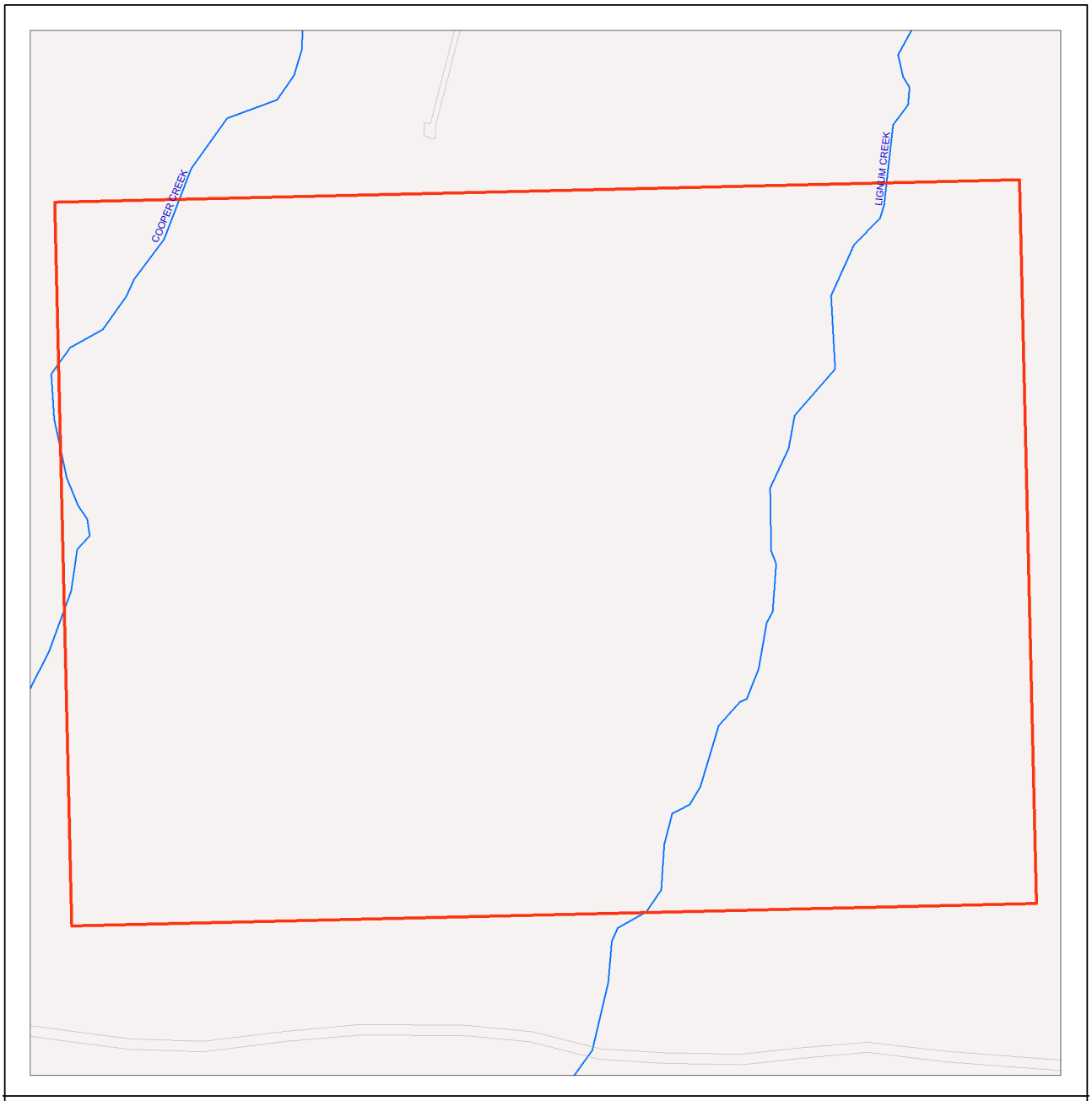


N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

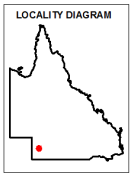
Map 3b - MSES - Species - Koala habitat area (SEQ)



MSES - Species
Koala habitat area (SEQ)

Area of Interest
- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Koala habitat area (core)
- Koala habitat area (locally refined)

LOCALITY DIAGRAM



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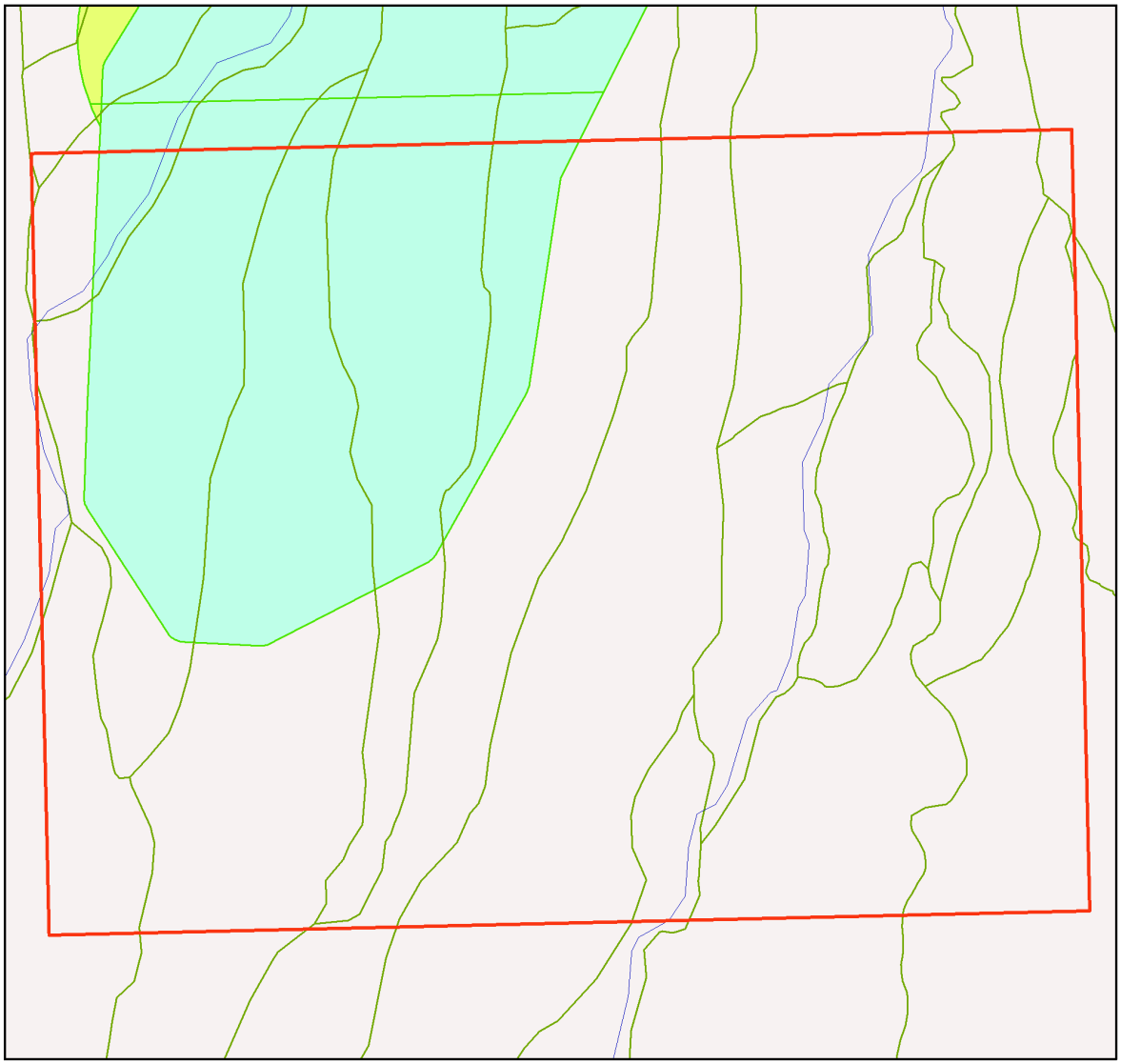
The represented layers for SEQ 'koala habitat area-core' and 'koala habitat area- locally refined' in MSES are sourced directly from the regulatory mapping under the Nature Conservation (Koala) Conservation Plan 2017. Whilst every effort is made to ensure the information remains current, there may be delays between updating versions. Please refer to the original mapping for the most recent version. See https://environment.des.qld.gov.au/wildlife/animals/living-with/koalas/mapping

The koala habitat mapping within South East Queensland uses regional ecosystem linework compiled at a scale varying from 1:25,000 to 1:100,000. Linework should be used as a guide only. The positional accuracy of regional ecosystem data mapped at a scale of 1:100,000 is +/- 100 metres.

0 300 600 900 1,200 1,500 m

This product is projected into GDA 1994 Queensland Albers

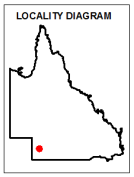
Map 4 - MSES - Regulated Vegetation



MSES - Regulated Vegetation

Area of Interest

- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Regulated vegetation (intersecting a watercourse)
- Regulated vegetation (100m from wetland)
- Regulated vegetation (category B - endangered or of concern)
- Regulated vegetation (category C - endangered or of concern)
- Regulated vegetation (category R - GBR riverine)
- Regulated vegetation (essential habitat)

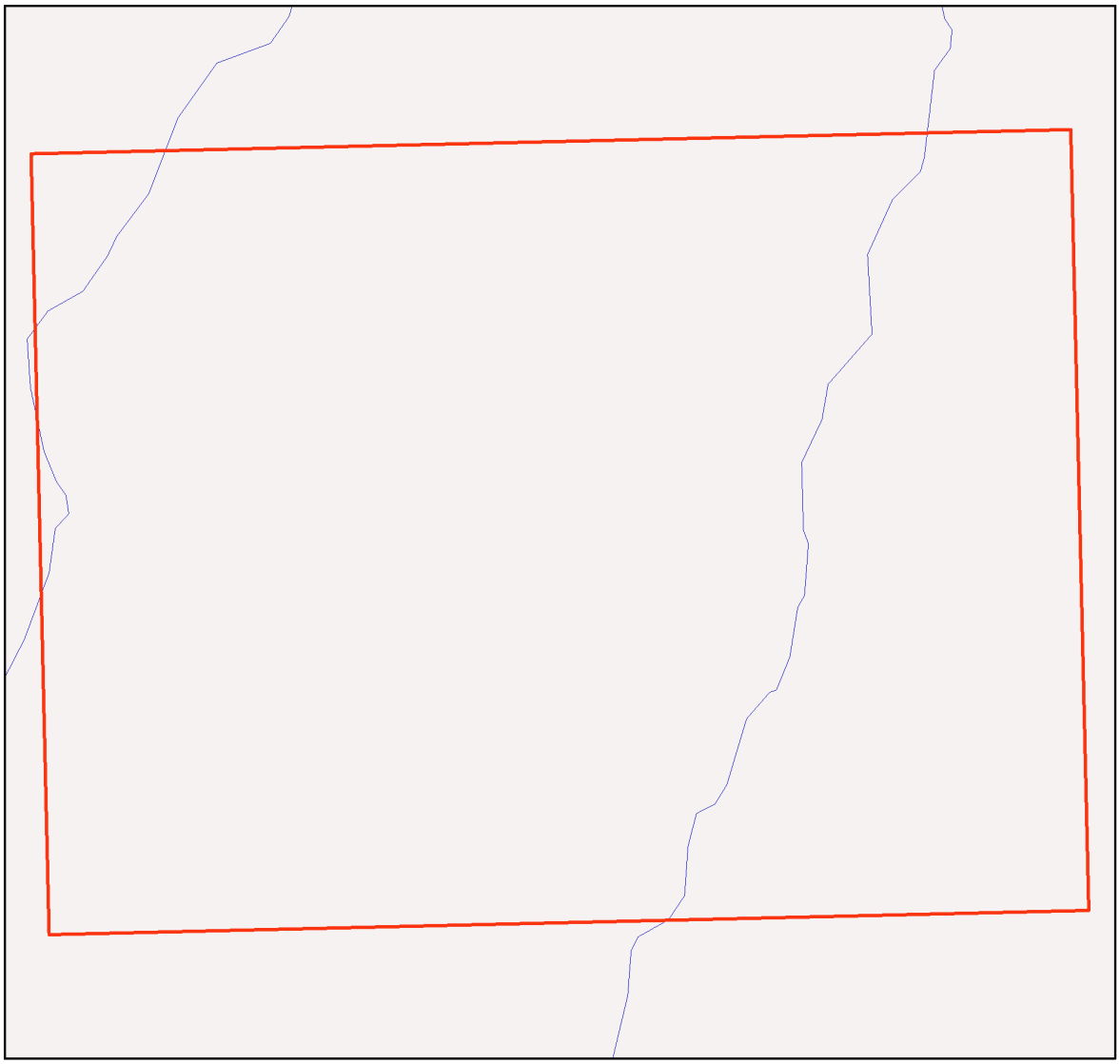


N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

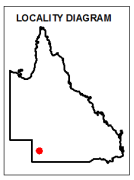
Map 5 - MSES - Offset Areas



MSES - Offsets

Area of Interest

- polygon
- Towns
- Freeways/Highways
- Secondary roads
- Major rivers/creeks
- Legally secured offset area (offset register)
- Legally secured offset area (vegetation offsets)



N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

Appendices

Appendix 1 - Matters of State Environmental Significance (MSES) methodology

MSES mapping is a regional-scale representation of the definition for MSES under the State Planning Policy (SPP). The compiled MSES mapping product is a guide to assist planning and development assessment decision-making. Its primary purpose is to support implementation of the SPP biodiversity policy. While it supports the SPP, the mapping does not replace the regulatory mapping or environmental values specifically called up under other laws or regulations. Similarly, the SPP biodiversity policy does not override or replace specific requirements of other Acts or regulations.

The Queensland Government's "Method for mapping - matters of state environmental significance for use in land use planning and development assessment" can be downloaded from:

http://www.ehp.qld.gov.au/land/natural-resource/method-mapping-mses.html .

Appendix 2 - Source Data

The datasets listed below are available on request from:

http://qldspatial.information.qld.gov.au/catalogue/custom/index.page

- Matters of State environmental significance

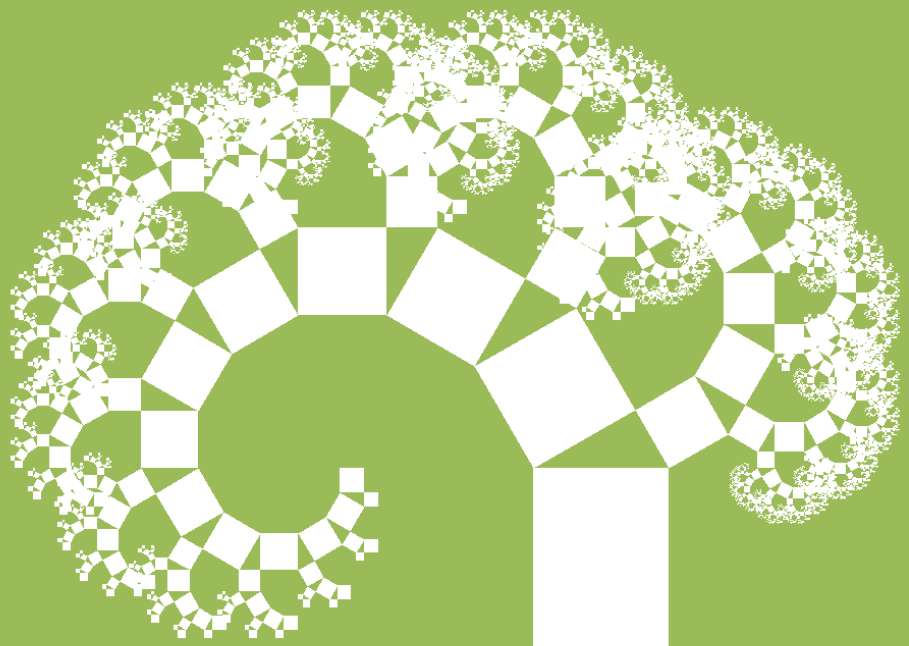
Note: MSES mapping is not based on new or unique data. The primary mapping product draws data from a number of underlying environment databases and geo-referenced information sources. MSES mapping is a versioned product that is updated generally on a twice-yearly basis to incorporate the changes to underlying data sources. Several components of MSES mapping made for the current version may differ from the current underlying data sources. To ensure accuracy, or proper representation of MSES values, it is strongly recommended that users refer to the underlying data sources and review the current definition of MSES in the State Planning Policy, before applying the MSES mapping.

Individual MSES layers can be attributed to the following source data available at QSpatial:

MSES layers	**current QSpatial data (http://qspatial.information.qld.gov.au)**
Protected Areas-Estates, Nature Refuges, Special Wildlife Reserves	- Protected areas of Queensland - Nature Refuges - Queensland - Special Wildlife Reserves- Queensland
Marine Park-Highly Protected Zones	Moreton Bay marine park zoning 2008
Fish Habitat Areas	Queensland fish habitat areas
Strategic Environmental Areas-designated	Regional Planning Interests Act - Strategic Environmental Areas
HES wetlands	Map of Queensland Wetland Environmental Values
Wetlands in HEV waters	HEV waters: - EPP Water intent for waters Source Wetlands: - Queensland Wetland Mapping (Current version 5) Source Watercourses: - Vegetation management watercourse and drainage feature map (1:100000 and 1:250000)
Wildlife habitat (threatened and special least concern)	-WildNet database species records - habitat suitability models (various) - SEQ koala habitat areas under the Koala Conservation Plan 2019
VMA regulated regional ecosystems	Vegetation management regional ecosystem and remnant map
VMA Essential Habitat	Vegetation management - essential habitat map
VMA Wetlands	Vegetation management wetlands map
Legally secured offsets	Vegetation Management Act property maps of assessable vegetation. For offset register data-contact DES
Regulated Vegetation Map	Vegetation management - regulated vegetation management map

Appendix 3 - Acronyms and Abbreviations

AOI	- Area of Interest
DES	- Department of Environment and Science
EP Act	- *Environmental Protection Act 1994*
EPP	- Environmental Protection Policy
GDA94	- Geocentric Datum of Australia 1994
GEM	- General Environmental Matters
GIS	- Geographic Information System
MSES	- Matters of State Environmental Significance
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
SPP	- State Planning Policy
VMA	- *Vegetation Management Act 1999*



Modelled potential habitat

For the selected area of interest 2296.59ha

Current as at 26/04/2022

Queensland Government

Introduction

Species lists in this report are derived from Maxent pre-clear potential habitat models and buffered point coverages produced by the Queensland Herbarium for NCA listed 'endangered' or 'vulnerable' species, EPBC listed 'critically endangered', 'endangered' or 'vulnerable' species and other priority species.

The models utilise records of fauna species occurrence compiled for the purpose of Biodiversity Assessment by the Queensland Department of Environment and Resource Management (EPA 2002) and specimen backed flora records compiled from the Queensland Herbarium's Herbrecs database. All records have a location precision of better than 2000 m, and all fauna records are less than 50 years old. Models were constrained within an occurrence mask for each species, defined by a buffer of 200 km around a convex hull that encompasses all records. All models were based on seven environmental layers, annual mean temperature, temperature seasonality (coefficient of variation), annual precipitation, mean moisture index of the lowest quarter moisture index, pre-clearing broad vegetation group (1:1M), land zone and taxonomic ruggedness. Climate layers were modelled using Anuclim software on an 83 m digital elevation model. A mask of Queensland's road network was used to down-weight species records collected along roads. Model performance was assessed by comparing the area under the ROC curve (AUC) with the 95th percentile AUC from 1000 null models for each species created by randomly selecting locations from within the minimum convex hull of species presence records. For species with very restricted ranges, model performance was further tested using randomly selected locations from within the species mask. Thresholds were applied (either equal training sensitivity and specificity logistic threshold or 10th percentile training presence logistic threshold, whichever was highest) in order to convert model output to a prediction of potential habitat. Any presence records excluded by the threshold applied were incorporated into the output with a 1km buffer. The output was clipped to the species mask and simplified using a majority filter algorithm to remove outlying orphan cells in the model output. The resulting shapefile defines the modelled pre-clear potential habitat for selected threatened and priority species.

If a species is not listed in the report, it does not indicate that its habitat is absent from the queried location and conversely, species listed may not currently inhabit the area.

Threatened fauna species

Threatened fauna species modelled to have pre-clear potential habitat within the area of interest , with an area of 2296.59ha hectares

Threatened Species animals

Class	Scientific name	Common name	NCA Status	EPBC Status	Area (ha)
birds	*Epthianura crocea crocea*	yellow chat (gulf)	V	None	492.12
birds	*Amytornis barbatus barbatus*	grey grasswren (Bulloo)	E	E	47.38
mammals	*Notomys fuscus*	dusky hopping-mouse	E	V	1809.84

Threatened flora species

Threatened flora species modelled to have pre-clear potential habitat within the selected area

Threatened Species plants

Class	Scientific name	Common name	NCA Status	EPBC Status	Area (ha)
higher dicots	*Xerothamnella parvifolia*	None	C	V	105.63
higher dicots	*Sclerolaena walkeri*	None	C	V	2296.65

Links and support

Modelled potential habitat for selected threatened and priority species in Queensland - access the geodatabase of modelled potential habitat for Queensland's threatened species.

Disclaimer

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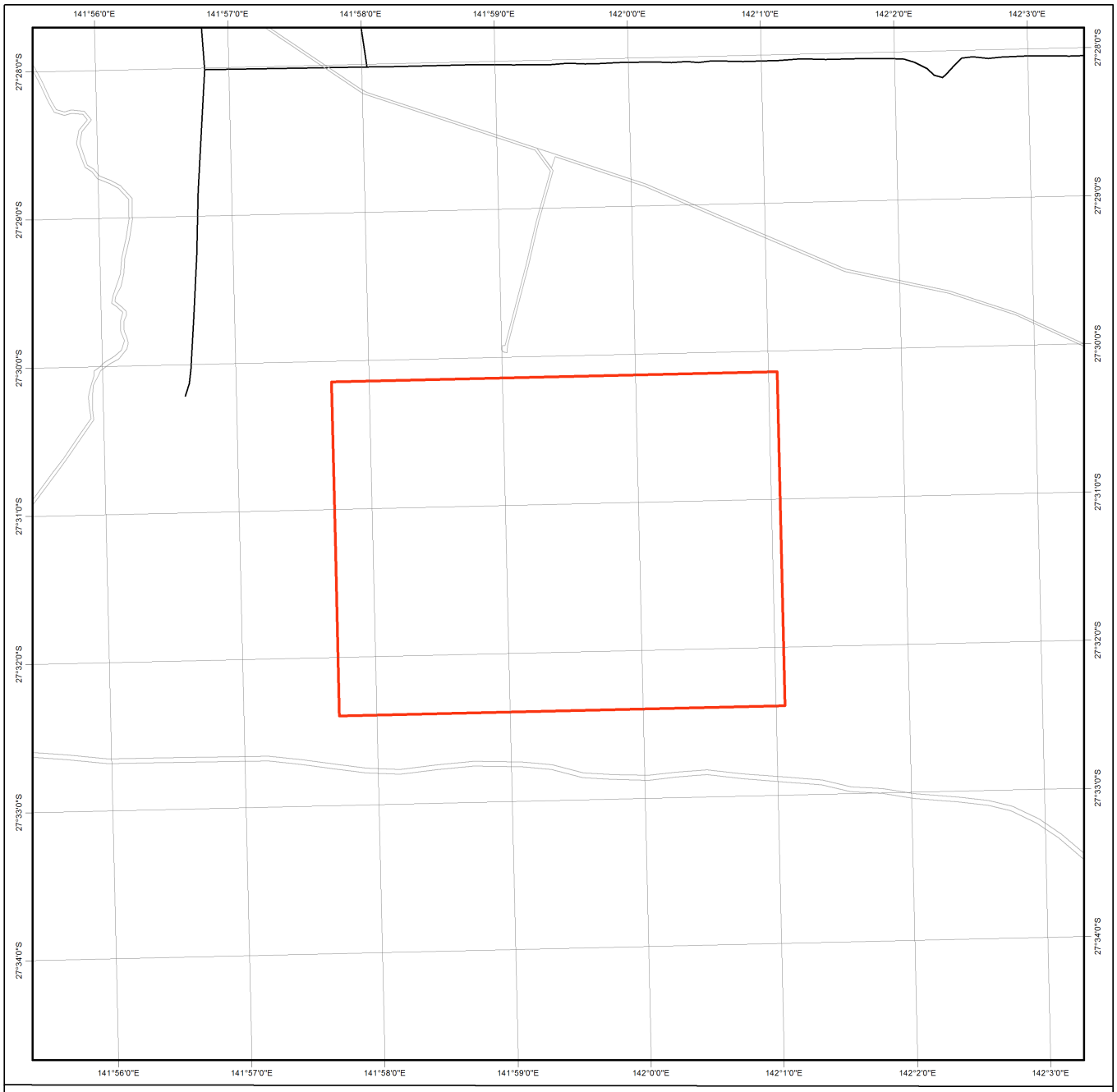
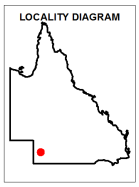


Protected Plants Flora Survey Trigger Map

Legend

- polygon
- High risk area
- Other land parcel boundaries
- Freeways / motorways / highways
- Secondary roads / streets



N

0 480 960 1,440 1,920 2,400 m

This product is projected into:
GDA 1994 Queensland Albers

This map shows areas where particular provisions of the Nature Conservation Act 1992 apply to the clearing of protected plants.

Land parcel boundaries are provided as locational aid only.

This map is produced at a scale relevant to the size of the area selected and should be printed as A4 size in portrait orientation.

For further information or assistance with interpretation of this product, please contact the Department of Environment and Science at palm@des.qld.gov.au

Protected plants flora survey trigger map

The protected plants flora survey trigger map identifies 'high risk areas' where endangered, vulnerable or near threatened plants are known to exist or are likely to exist. Under the *Nature Conservation Act 1992* (the Act) it is an offence to clear protected plants that are 'in the wild' unless you are authorised or the clearing is exempt, for more information see section 89 of the Act.

Please see the Department of Environment and Science webpage on the clearing of protected plants for information on what exemptions may apply in your circumstances, whether you may need to undertake a flora survey, and whether you may need a protected plants clearing permit.

Updates to the data informing the flora survey trigger map

The flora survey trigger map will be reviewed, and updated if necessary, at least every 12 months to ensure the map reflects the most up-to-date and accurate data available.

Species information

Please note that flora survey trigger maps do not identify species associated with 'high risk areas'. While some species information may be publicly available, for example via the Queensland Spatial Catalogue, the Department of Environment and Science does not provide species information on request. Regardless of whether species information is available for a particular high risk area, clearing plants in a high risk area may require a flora survey and/or clearing permit. Please see the Department of Environment and Science webpage on the clearing of protected plants for more information.

Queensland Government

Department of Environment and Science

Environmental Reports

Regional Ecosystems

Biodiversity Status

For the selected area of interest

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or area of interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "central coordinates" option, the resulting assessment area encompasses an area extending for a 2km radius from the input coordinates.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no matters of interest have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Important Note to User

Information presented in this report is based upon the Queensland Herbarium's Regional Ecosystem framework. The Biodiversity Status has been used to depict the extent of "Endangered", "Of Concern" and "No Concern at Present" regional ecosystems in all cases, rather than the classes used for the purposes of the *Vegetation Management Act 1999* (VMA). Mapping and figures presented in this document reflect the Queensland Herbarium's Remnant and Pre-clearing Regional Ecosystem Datasets, and not the certified mapping used for the purpose of the VMA.

For matters relevant to vegetation management under the VMA, please refer to the Department of Resources website https://www.dnrme.qld.gov.au/

Please direct queries about these reports to: Queensland.Herbarium@qld.gov.au

Disclaimer

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Table of Contents

Summary Information

The following table provides an overview of the AOI with respect to selected topographic and environmental themes. Refer to **Map 1** for locality information.

Table 1: Area of interest details:

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

The table below summarizes the extent of remnant vegetation classed as "Endangered", "Of concern" and "No concern at present" regional ecosystems classified by Biodiversity Status within the area of interest (AOI).

Table 2: Summary table, biodiversity status of regional ecosystems within the AOI

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	2,296.59	100.0
Total remnant vegetation	2,296.59	100.0

Refer to **Map 2** for further information.

Regional Ecosystems

1. Introduction

Regional ecosystems are vegetation communities in a bioregion that are consistently associated with particular combinations of geology, landform and soil (Sattler and Williams 1999). Descriptions of Queensland's Regional ecosystems are available online from the Regional Ecosystem Description Database (REDD). Descriptions are compiled from a broad range of information sources including vegetation, land system and geology survey and mapping and detailed vegetation site data. The regional ecosystem classification and descriptions are reviewed as new information becomes available. A number of vegetation communities may form a single regional ecosystem and are usually distinguished by differences in dominant species, frequently in the shrub or ground layers and are denoted by a letter following the regional ecosystem code (e.g. a, b, c). Vegetation communities and regional ecosystems are amalgamated into a higher level classification of broad vegetation groups (BVGs).

A published methodology for survey and mapping of regional ecosystems across Queensland (Neldner et al 2020) provides further details on regional ecosystem concepts and terminology.

This report provides information on the type, status, and extent of vegetation communities, regional ecosystems and broad vegetation groups present within a user specified area of interest. Please note, for the purpose of this report, the Biodiversity Status is used. This report has not been developed for application of the *Vegetation Management Act 1999* (VMA). Additionally, information generated in this report has been derived from the Queensland Herbarium's Regional Ecosystem Mapping, and not the regulated mapping certified for the purposes of the VMA. If your interest/matter relates to regional ecosystems and the VMA, users should refer to the Department of Resources website.

https://www.dnrme.qld.gov.au/

With respect to the Queensland Biodiversity Status,

"Endangered" regional ecosystems are described as those where:

- remnant vegetation is less than 10 per cent of its pre-clearing extent across the bioregion; or 10-30% of its pre-clearing extent remains and the remnant vegetation is less than 10,000 hectares, or
- less than 10 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss*, or
- 10-30 per cent of its pre-clearing extent remains unaffected by severe degradation and/or biodiversity loss and the remnant vegetation is less than 10,000 hectares; or
- it is a rare** regional ecosystem subject to a threatening process.***

"Of concern" regional ecosystems are described as those where:

- the degradation criteria listed above for 'Endangered' regional ecosystems are not met and,
- remnant vegetation is 10-30 per cent of its pre-clearing extent across the bioregion; or more than 20 per cent of its pre-clearing extent remains and the remnant extent is less than 10,000 hectares, or
- 10-30 percent of its pre-clearing extent remains unaffected by moderate degradation and/or biodiversity loss.****

and "No concern at present" regional ecosystems are described as those where:

- remnant vegetation is over 30 per cent of its pre-clearing extent across the bioregion, and the remnant area is greater than 10,000 hectares, and
- the degradation criteria listed above for 'Endangered' or 'Of concern' regional ecosystems are not met.

**Severe degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 50 years even with the removal of threatening processes; or soil surface is severely degraded, for example, by loss of A horizon, surface expression of salinity; surface compaction, loss of organic matter or sheet erosion.*

***Rare regional ecosystem: pre-clearing extent (1000 ha); or patch size (100 ha and of limited total extent across its range).*

****Threatening processes are those that are reducing or will reduce the biodiversity and ecological integrity of a regional ecosystem. For example, clearing, weed invasion, fragmentation, inappropriate fire regime or grazing pressure, or infrastructure development.*

*****Moderate degradation and/or biodiversity loss is defined as: floristic and/or faunal diversity is greatly reduced but unlikely to recover within the next 20 years even with the removal of threatening processes; or soil surface is moderately degraded.*

2. Remnant Regional Ecosystems

The following table identifies the remnant regional ecosystems and vegetation communities mapped within the AOI and provides their short descriptions, Biodiversity Status, and remnant extent within the selected AOI. Please note, where heterogeneous vegetated patches (mixed patches of remnant vegetation mapped as containing multiple regional ecosystems) occur within the AOI, they have been split and listed as individual regional ecosystems (or vegetation communities where present) for the purposes of the table below. In such instances, associated area figures have been generated based upon the estimated proportion of each regional ecosystem (or vegetation community) predicted to be present within the larger mixed patch.

Table 3: Remnant regional ecosystems, description and status within the AOI

Regional Ecosystem	Short Description	BD Status	Area (Ha)	% of AOI
5.3.18a	Braided channel complex of major alluvial plains, includes Chenopodium auricomum open shrubland and variable sparse to open-herbland	No concern at present	688.98	30.0
5.3.18b	Braided channel complex of major alluvial plains, includes Chenopodium auricomum open shrubland and variable sparse to open-herbland	No concern at present	1,377.96	60.0
5.3.8a	Eucalyptus coolabah low open woodland +/- Duma florulenta on braided channels, drainage lines, flood plain lakes and claypans	No concern at present	229.66	10.0

Refer to **Map 2** for further information. **Map 3** also provides a visual estimate of the distribution of regional ecosystems present before clearing.

Table 4 provides further information in regards to the remnant regional ecosystems present within the AOI. Specifically, the extent of remnant vegetation remaining within the bioregion, the 1:1,000,000 broad vegetation group (BVG) classification, whether the regional ecosystem is identified as a wetland, and extent of representation in Queensland's Protected Area Estate. For a description of the vegetation communities within the AOI and classified according to the 1:1,000,000 BVG, refer to **Table 6**.

Table 4: Remnant regional ecosystems within the AOI, additional information

Regional Ecosystem	Remnant Extent	BVG (1 Million)	Wetland	Representation in protected estate
5.3.18a	Pre-clearing 1867000 ha; Remnant 2019 1866000 ha	34g	Palustrine	Low
5.3.18b	Pre-clearing 1867000 ha; Remnant 2019 1866000 ha	31a	Not a Wetland	Low
5.3.8a	Pre-clearing 385000 ha; Remnant 2019 384000 ha	16a	Riverine	Medium

Representation in Protected Area Estate: High greater than 10% of pre-clearing extent is represented; Medium 4 - 10% is represented; Low less than 4% is represented, No representation.

The distribution of mapped wetland systems within the area of interest is displayed in **Map 6**.

The following table lists known special values associated with a regional ecosystem type.

Table 5: Remnant regional ecosystems within the AOI, special values

Regional Ecosystem	Special Values
5.3.18a	Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18a: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18b: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna.
5.3.18b	Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18a: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna. 5.3.18b: Potential habitat for threatened fauna species including plains-wanderer Pedionomus torquatus and fierce snake (western taipan) Oxyuranus microlepidotus. Provides wetland habitat for a wide range of water birds and other flora and fauna.
5.3.8a	None

3. Remnant Regional Ecosystems by Broad Vegetation Group

BVGs are a higher-level grouping of vegetation communities. Queensland encompasses a wide variety of landscapes across temperate, wet and dry tropics and semi-arid climatic zones. BVGs provide an overview of vegetation communities across the state or a bioregion and allow comparison with other states. There are three levels of BVGs which reflect the approximate scale at which they are designed to be used: the 1:5,000,000 (national), 1:2,000,000 (state) and 1:1,000,000 (regional) scales.

A comprehensive description of BVGs is available at:

https://publications.qld.gov.au/dataset/redd/resource/

The following table provides a description of the 1:1,000,000 BVGs present and their associated extent within the AOI.

Table 6: Broad vegetation groups (1 million) within the AOI

BVG (1 Million)	Description	Area (Ha)	% of AOI
16a	Open forest and woodlands dominated by Eucalyptus camaldulensis (river red gum) (or E. tereticornis (blue gum)) and/or E. coolabah (coolabah) (or E. microtheca (coolabah)) fringing drainage lines. Associated species may include Melaleuca spp., Corymbia tessellaris (carbeen), Angophora spp., Casuarina cunninghamiana (riveroak). Does not include alluvial areas dominated by herb and grasslands or alluvial plains that are not flooded. (land zone 3) (MGD, BRB, GUP, CHC, MUL, DEU, EIU, NWH, SEQ, [NET, WET]) (All bioregions except CYP and CQC)	229.66	10.0
31a	Open forblands to open tussock grasslands which may be composed of Atriplex spp. (saltbush), Sclerolaena spp. (burr), Asteraceae spp. and/or short grasses on alluvial plains. (land zone 3) (CHC, MGD, MUL, GUP, [BRB, DEU])	1,377.96	60.0

BVG (1 Million)	Description	Area (Ha)	% of AOI
34g	Palustrine wetlands. Generally intermittent swamps/claypans on floodplains in inland areas dominated by chenopods e.g. Chenopodium auricomum (Queensland blue bush) or Tecticornia spp. (samphire) or herbs. (land zone 3) (CHC, DEU)	688.98	30.0

Refer to **Map 4** for further information. **Map 5** also provides a representation of the distribution of vegetation communities as per the 1:5,000,000 BVG believed to be present prior to European settlement.

4. Technical and BioCondition Benchmark Descriptions

Technical descriptions provide a detailed description of the full range in structure and floristic composition of regional ecosystems (e.g. 11.3.1) and their component vegetation communities (e.g. 11.3.1a, 11.3.1b). See:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

The descriptions are compiled using site survey data from the Queensland Herbarium's CORVEG database. Distribution maps, representative images (if available) and the pre-clearing and remnant extent (hectares) of each vegetation community derived from the regional ecosystem mapping data are included. The technical descriptions should be used in conjunction with the fields from the regional ecosystem description database (REDD) for a full description of the regional ecosystem.

Technical descriptions include data on canopy height, canopy cover and native plant species composition of the predominant layer, which are attributes relevant to assessment of the remnant status of vegetation under the *Vegetation Management Act 1999*. However, as technical descriptions reflect the full range in structure and floristic composition across the climatic, natural disturbance and geographic range of the regional ecosystem, local reference sites should be used for remnant assessment where possible (Neldner et al. 2020 (PDF)* section 3.3 of:

https://publications.qld.gov.au/dataset/redd/resource/

The technical descriptions are subject to review and are updated as additional data becomes available.

When conducting a BioCondition assessment, these technical descriptions should be used in conjunction with BioCondition benchmarks for the specific regional ecosystem, or component vegetation community.

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

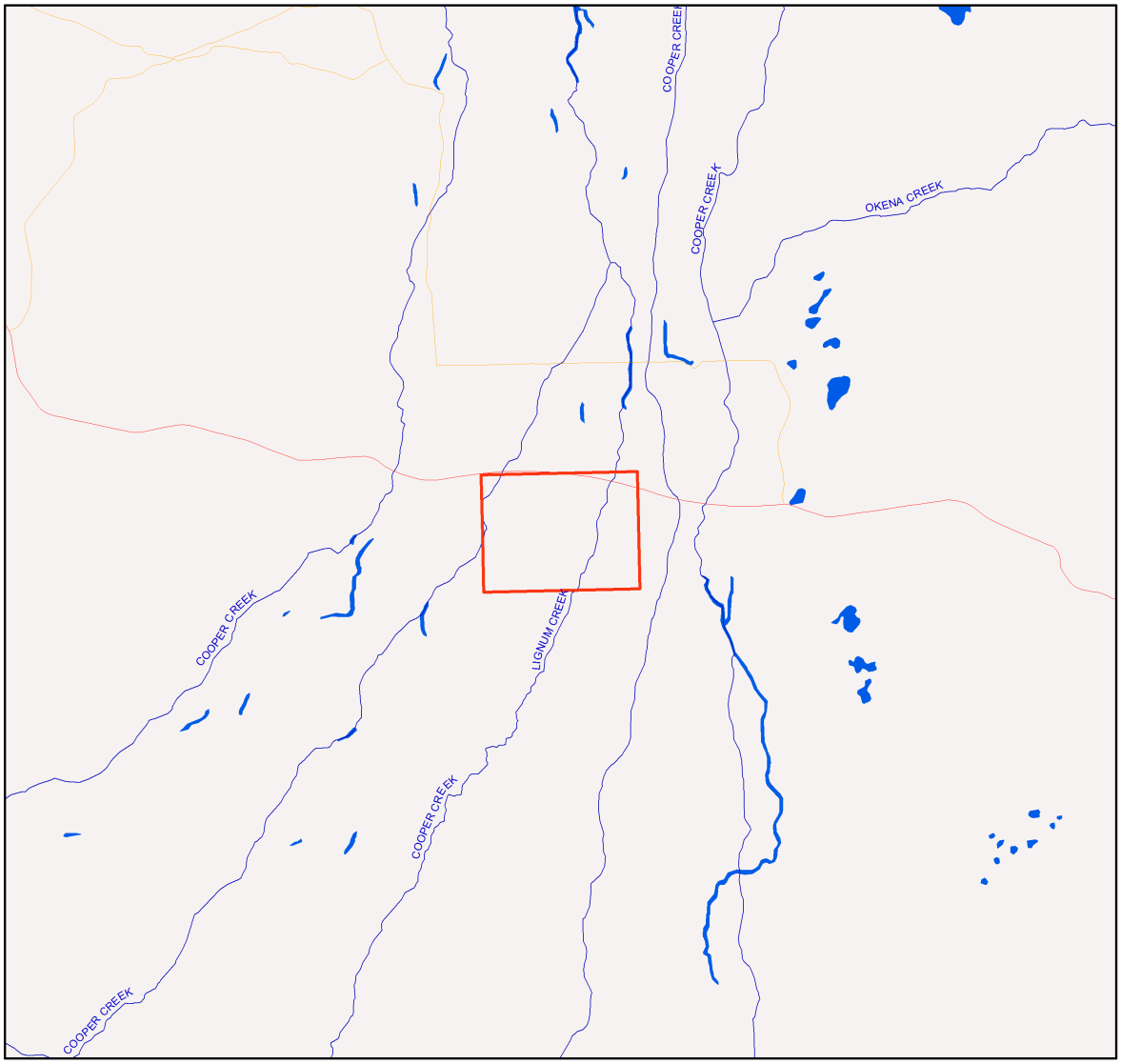
Benchmarks are based on a combination of quantitative and qualitative information and should be used as a guide only. Benchmarks are specific to one regional ecosystem vegetation community, however, the natural variability in structure and floristic composition under a range of climatic and natural disturbance regimes has been considered throughout the geographic extent of the regional ecosystem. Local reference sites should be used for this spatial and temporal (seasonal and annual) variability.

Table 7: List of remnant regional ecosystems within the AOI for which technical and biocondition benchmark descriptions are available

Regional ecosystems mapped as within the AOI	Technical Descriptions	Biocondition Benchmarks
5.3.18a	Not currently available	Not currently available
5.3.18b	Not currently available	Not currently available
5.3.8a	Not currently available	Not currently available

Maps

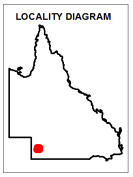
Map 1 - Location



Locality Map

Legend

- polygon
- Towns
- Highway
- Connector
- Street/Local Road
- Reservoirs
- Lakes
- National Park (Scientific)
- National Park
- National Park (CYPAL)
- Conservation Park
- Resources Reserve
- Forest Reserve
- State Forest
- Timber Reserve
- Nature Refuges
- Coordinated Conservation Areas
- Major rivers/creeks
- Queensland



N

0 2100 4200 6300 8400 10500 m

This product is projected into GDA 1994 Queensland Albers

DISCLAIMER:
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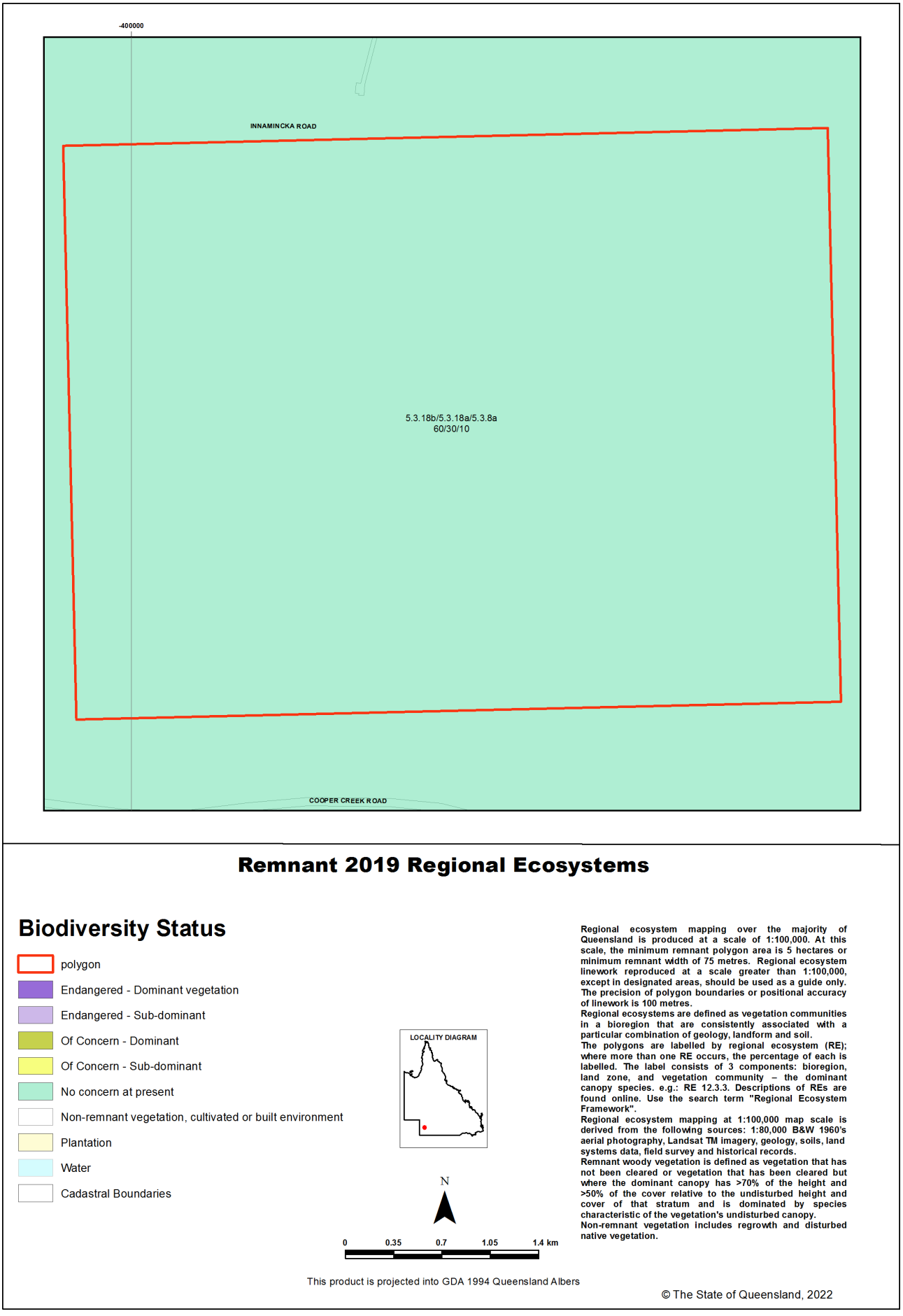
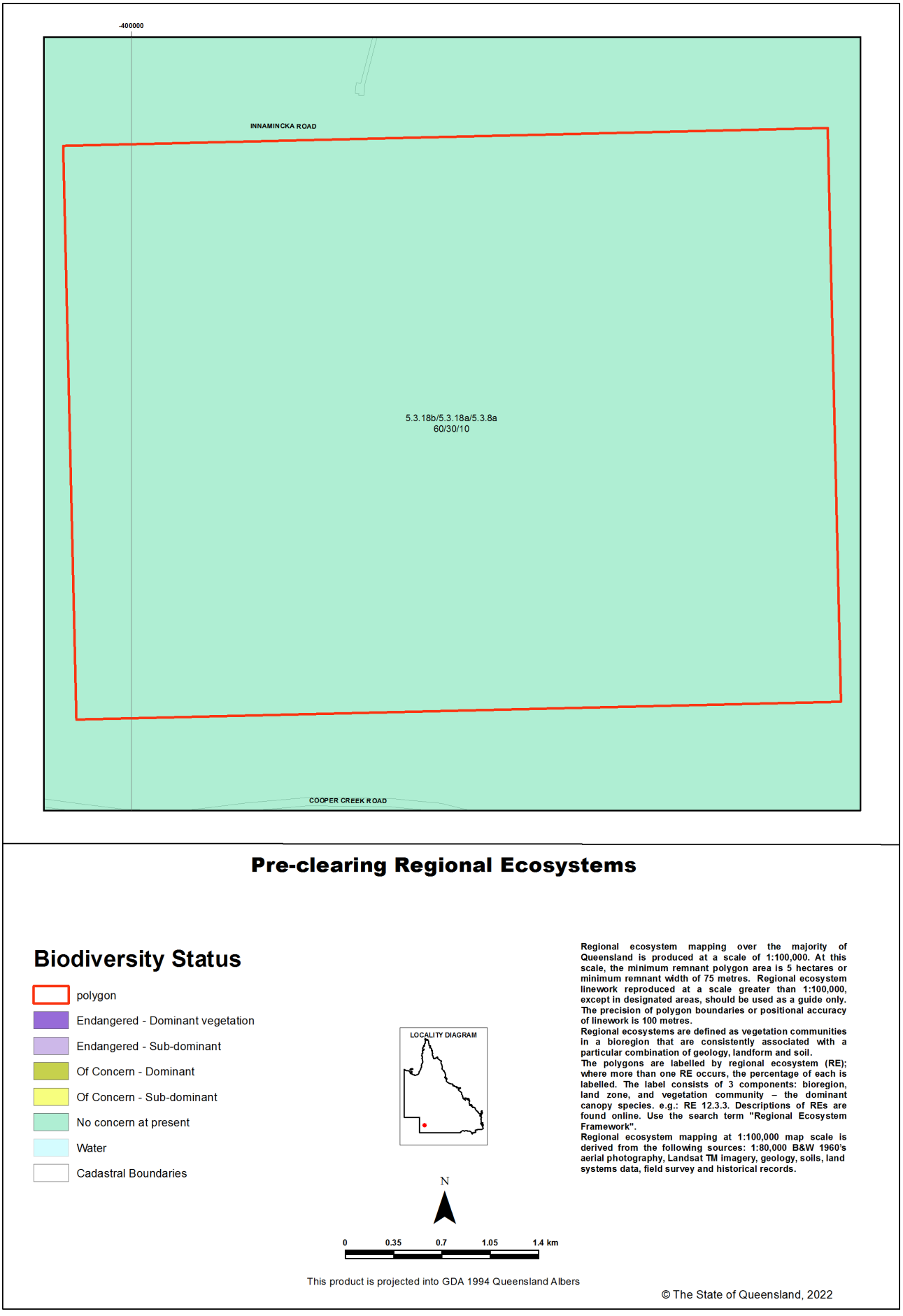
The state of Queensland disclaims all responsibility for information contained in this product and all liability (including without limitation, liability in negligence) for all expenses, losses, damages and costs you may incur as a result of the information being inaccurate or incomplete in any way for any reason.

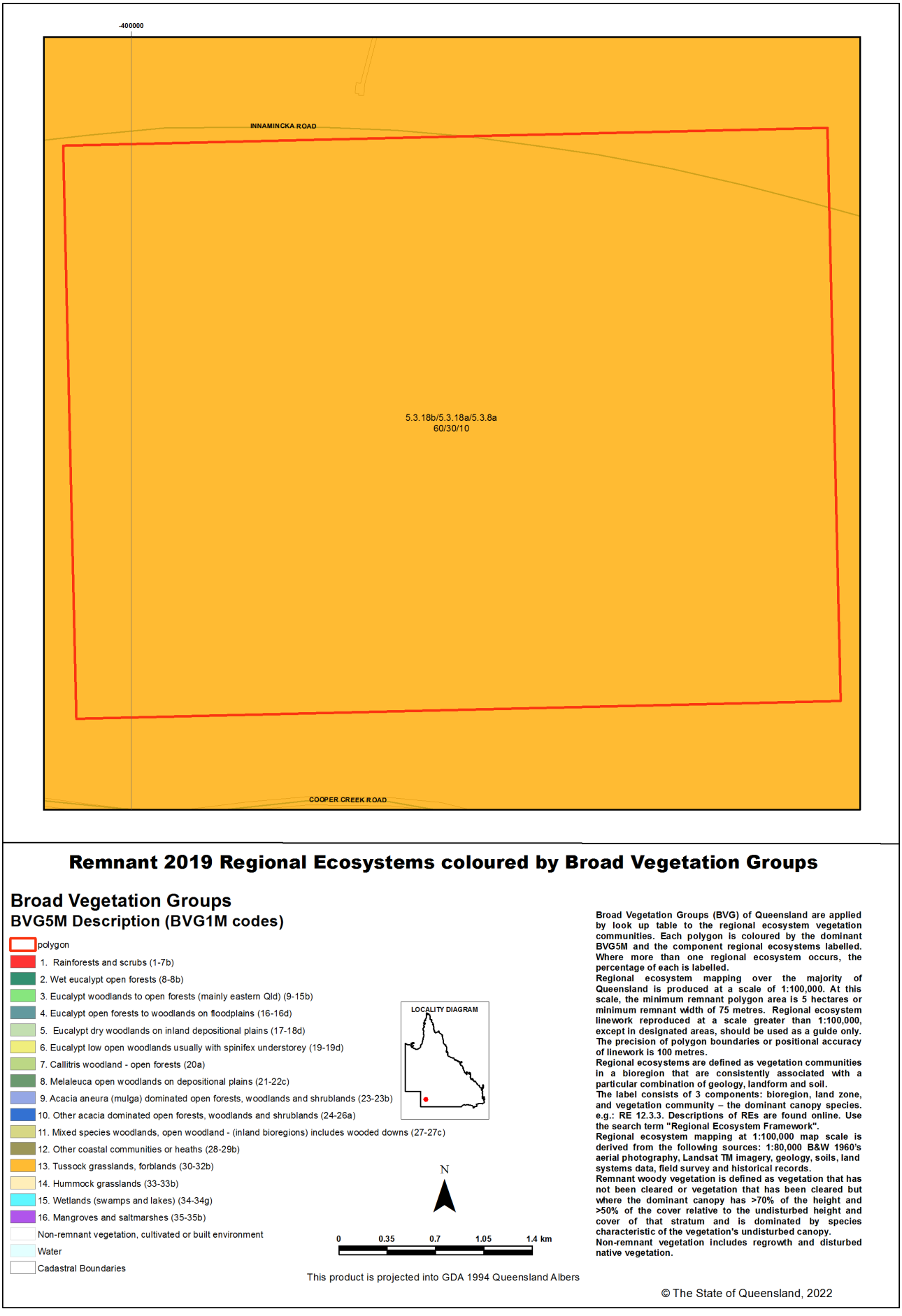
Map 2 - Remnant 2019 regional ecosystems



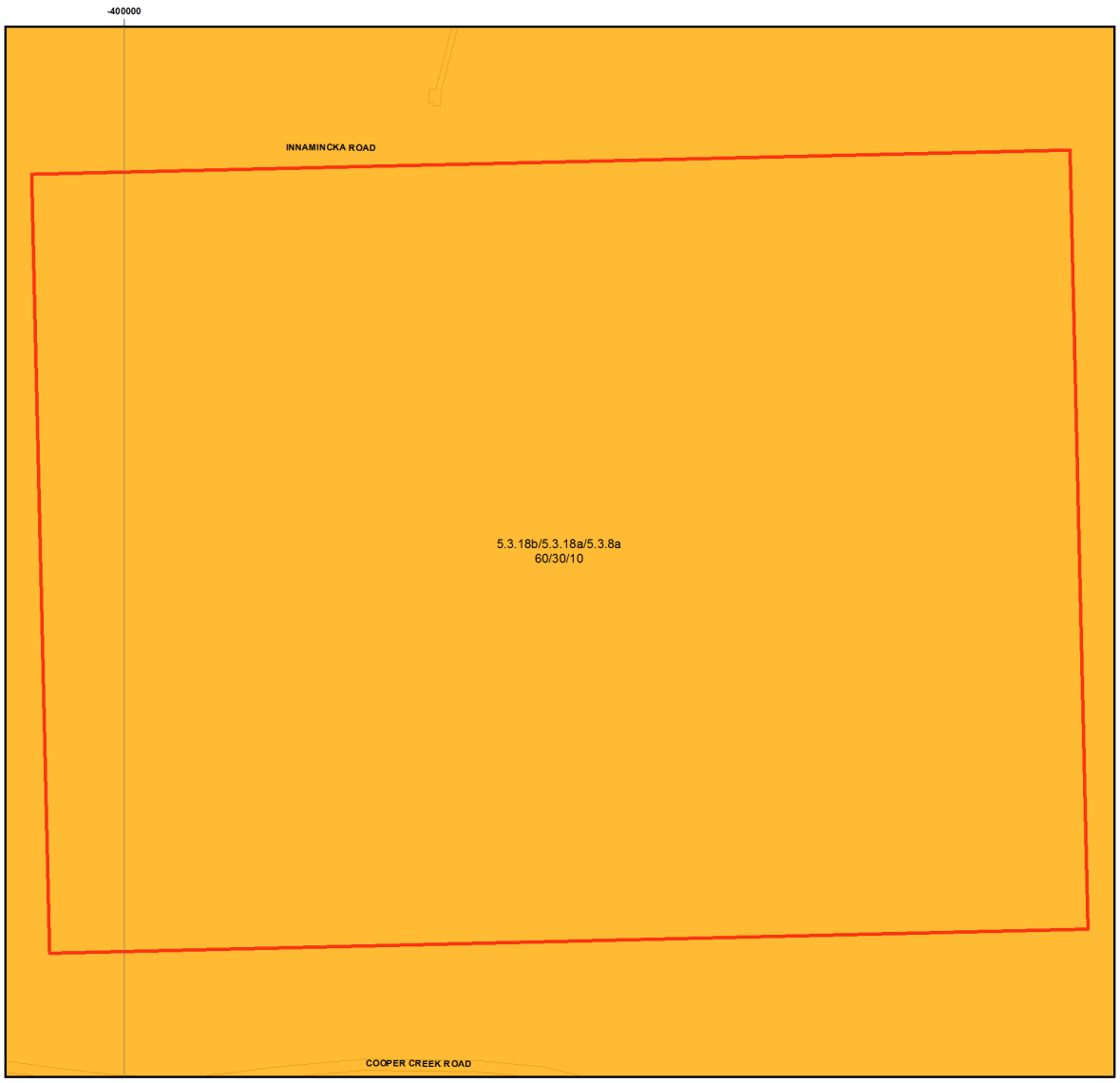
Map 3 - Pre-clearing regional ecosystems



Map 4 - Remnant 2019 regional ecosystems by BVG (5M)



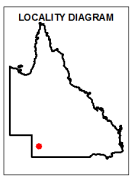
Map 5 - Pre-clearing regional ecosystems by BVG (5M)



Pre-clearing Regional Ecosystems coloured by Broad Vegetation Groups

Broad Vegetation Groups
BVG5M Description (BVG1M codes)

- polygon
- 1. Rainforests and scrubs (1-7b)
- 2. Wet eucalypt open forests (8-8b)
- 3. Eucalypt woodlands to open forests (mainly eastern Qld) (9-15b)
- 4. Eucalypt open forests to woodlands on floodplains (16-16d)
- 5. Eucalypt dry woodlands on inland depositional plains (17-18d)
- 6. Eucalypt low open woodlands usually with spinifex understorey (19-19d)
- 7. Callitris woodland - open forests (20a)
- 8. Melaleuca open woodlands on depositional plains (21-22c)
- 9. Acacia aneura (mulga) dominated open forests, woodlands and shrublands (23-23b)
- 10. Other acacia dominated open forests, woodlands and shrublands (24-26a)
- 11. Mixed species woodlands, open woodland - (inland bioregions) includes wooded downs (27-27c)
- 12. Other coastal communities or heaths (28-29b)
- 13. Tussock grasslands, forblands (30-32b)
- 14. Hummock grasslands (33-33b)
- 15. Wetlands (swamps and lakes) (34-34g)
- 16. Mangroves and saltmarshes (35-35b)
- Water
- Cadastral Boundaries



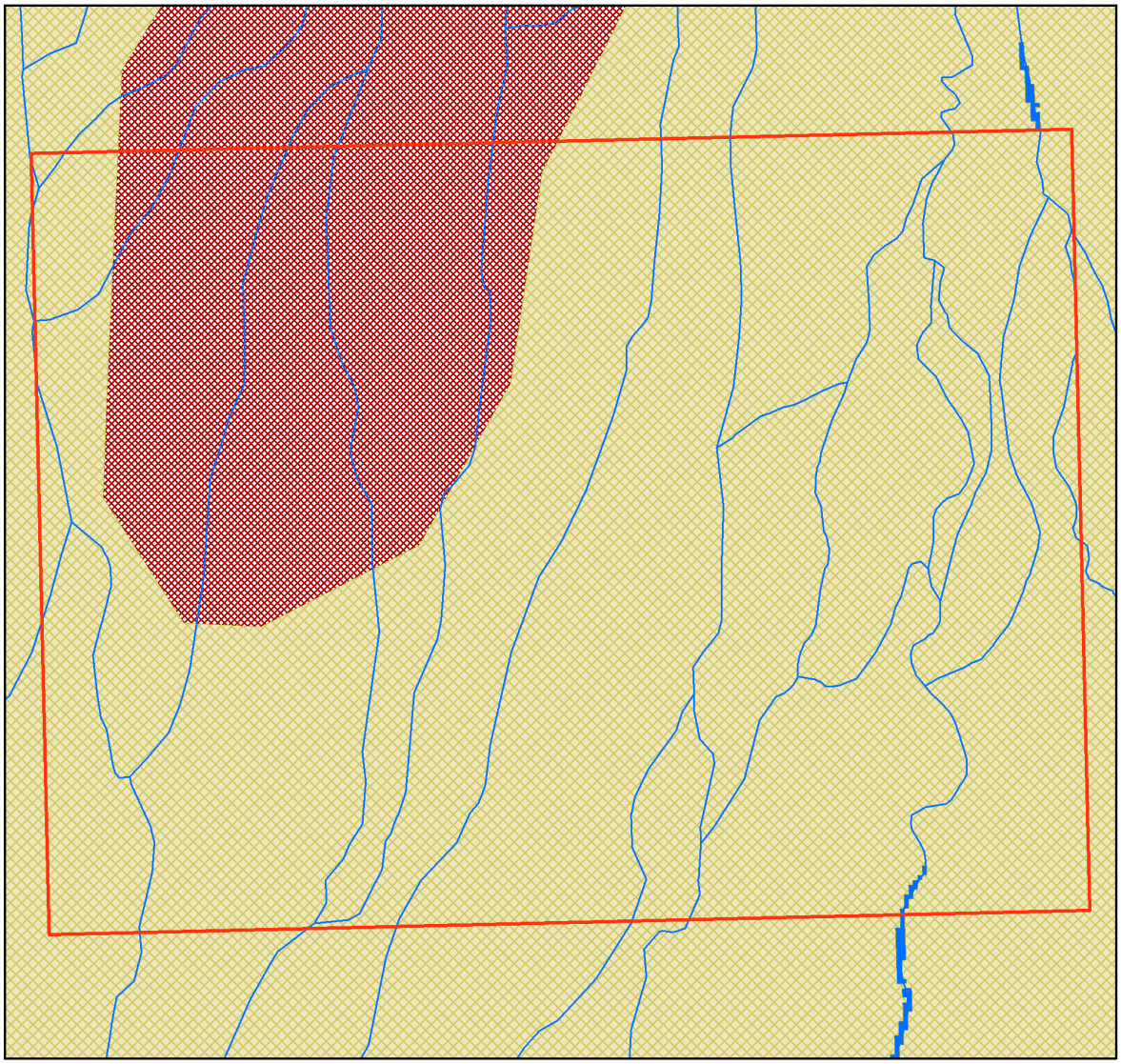
N

0 0.35 0.7 1.05 1.4 km

This product is projected into GDA 1994 Queensland Albers

Broad Vegetation Groups (BVG) of Queensland are applied by look up table to the regional ecosystem vegetation communities. Each polygon is coloured by the dominant BVG5M and the component regional ecosystems labelled. Where more than one regional ecosystem occurs, the percentage of each is labelled.
Regional ecosystem mapping over the majority of Queensland is produced at a scale of 1:100,000. At this scale, the minimum remnant polygon area is 5 hectares or minimum remnant width of 75 metres. Regional ecosystem linework reproduced at a scale greater than 1:100,000, except in designated areas, should be used as a guide only. The precision of polygon boundaries or positional accuracy of linework is 100 metres.
Regional ecosystems are defined as vegetation communities in a bioregion that are consistently associated with a particular combination of geology, landform and soil.
The label consists of 3 components: bioregion, land zone, and vegetation community – the dominant canopy species. e.g.: RE 12.3.3. Descriptions of REs are found online. Use the search term "Regional Ecosystem Framework".
Regional ecosystem mapping at 1:100,000 map scale is derived from the following sources: 1:80,000 B&W 1960's aerial photography, Landsat TM imagery, geology, soils, land systems data, field survey and historical records.

Map 6 - Wetlands and waterways



Queensland Wetland Data

Legend

- polygon
- Towns

Queensland Wetland Data

- Riverine Drainage Lines
- Springs

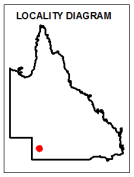
Wetland System - Water Bodies

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies

Wetland System - Regional Ecosystems

- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)

LOCALITY DIAGRAM



N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

Accuracy information: The positional accuracy of wetland data mapped at a scale of 1:100,000 is +/-100m with a minimum polygon size of 5ha or 75m wide for linear features, except for areas along the east coa st which are mapped at the 1:50,000 scale with a positional accuracy of +/-50m, with a minimum polygon size of 1ha or 35m wide for linear features. Wetlands smaller than 1ha are not delineated on the wetland data. Consideration of the effects of mapped scale is necessary when interpret ing data at a larger scale, e.g. 1:25,000. For property assessment, digital linework should be used as a guide only. The extent of wetlands depicted on this map is based on rectified 2013 Landsat ETM+ imagery supplied by Statewide Landcover and Trees Study (SLATS), Department of Environment and Science. The extent of water bodies is based on the maximum extent of inundation derived from available Landsat imagery up to and including the 2013 imagery.

Links and Other Information Sources

The Department of Environment and Science's Website -

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/

provides further information on the regional ecosystem framework, including access to links to the Regional Ecosystem Database, Broad Vegetation Group Definitions, Regional Ecosystem and Land zone descriptions.

Descriptions of the broad vegetation groups of Queensland can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

The methodology for mapping regional ecosystems can be downloaded from:

https://publications.qld.gov.au/dataset/redd/resource/

Technical descriptions for regional ecosystems can be obtained from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/technical-descriptions/

Benchmarks can be obtained from:

http://www.qld.gov.au/environment/plants-animals/biodiversity/benchmarks/

For further information associated with the remnant regional ecosystem dataset used by this report, refer to the metadata associated with the Biodiversity status of pre-clearing and Remnant Regional Ecosystems of Queensland dataset (version listed in **Appendix 1**) which is available through the Queensland Government Information System portal,

http://dds.information.qld.gov.au/dds/

The Queensland Globe is a mapping and data application. As an interactive online tool, Queensland Globe allows you to view and explore Queensland maps, imagery (including up-to-date satellite images) and other spatial data, including regional ecosystem mapping. To further view and explore regional ecosystems over an area of interest, access the Biota Globe (a component of the Queensland Globe). The Queensland Globe can be accessed via the following link:

http://www.dnrm.qld.gov.au/mapping-data/queensland-globe

References

Neldner, V.J., Niehus, R.E., Wilson, B.A., McDonald, W.J.F., Ford, A.J. and Accad, A. (2019). The Vegetation of Queensland. Descriptions of Broad Vegetation Groups. Version 4.0. Queensland Herbarium, Department of Environment and Science.

(https://publications.qld.gov.au/dataset/redd/resource/78209e74-c7f2-4589-90c1-c33188359086)

Neldner, V.J., Wilson, B.A., Dillewaard, H.A., Ryan, T.S., Butler, D.W., McDonald, W.J.F, Addicott, E.P. and Appelman, C.N. (2020). Methodology for survey and mapping of regional ecosystems and vegetation communities in Queensland. Version 5.1. Updated March 2020. Queensland Herbarium, Queensland Department of Environment and Science, Brisbane.

(https://publications.qld.gov.au/dataset/redd/resource/6dee78ab-c12c-4692-9842-b7257c2511e4)

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

The dataset listed below is available for download from:

http://www.qld.gov.au/environment/plants-animals/plants/ecosystems/download/

- Regional Ecosystem Description Database

The datasets listed below are available for download from:

http://dds.information.qld.gov.au/dds/

- Biodiversity status of pre-clearing and 2019 remnant regional ecosystems of Queensland
- Pre-clearing Vegetation Communities and Regional Ecosystems of Queensland
- Queensland Wetland Data Version - Wetland lines
- Queensland Wetland Data Version - Wetland points
- Queensland Wetland Data Version - Wetland areas

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
VMA	- *Vegetation Management Act 1999*

Queensland Government

Department of Environment and Science

Environmental Reports

Biodiversity and Conservation Values

Biodiversity Planning Assessments and Aquatic Conservation Assessments

For the selected area of interest

Environmental Reports - General Information

The Environmental Reports portal provides for the assessment of selected matters of interest relevant to a user specified location, or Area of Interest (AOI). All area and derivative figures are relevant to the extent of matters of interest contained within the AOI unless otherwise stated. Please note, if a user selects an AOI via the "Central co-ordinates" option, the resulting assessment area encompasses an area extending from 2km radius from the point of interest.

All area and area derived figures included in this report have been calculated via reprojecting relevant spatial features to Albers equal-area conic projection (central meridian = 146, datum Geocentric Datum of Australia 1994). As a result, area figures may differ slightly if calculated for the same features using a different co-ordinate system.

Figures in tables may be affected by rounding.

The matters of interest reported on in this document are based upon available state mapped datasets. Where the report indicates that a matter of interest is not present within the AOI (e.g. where area related calculations are equal to zero, or no values are listed), this may be due either to the fact that state mapping has not been undertaken for the AOI, that state mapping is incomplete for the AOI, or that no values have been identified within the site.

The information presented in this report should be considered as a guide only and field survey may be required to validate values on the ground.

Please direct queries about these reports to: biodiversity.planning@des.qld.gov.au

Disclaimer

Whilst every care is taken to ensure the accuracy of the information provided in this report, the Queensland Government makes no representations or warranties about its accuracy, reliability, completeness, or suitability, for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which the user may incur as a consequence of the information being inaccurate or incomplete in any way and for any reason.

Table of Contents

Summary Information

Tables 1 to 8 provide an overview of the AOI with respect to selected topographic and environmental values.

Table 1: Area of interest details:

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

The following table identifies available Biodiversity Planning Assessments (BPAs) and Aquatic Conservation Assessments (ACAs) with respect to the AOI.

Table 2: Available Biodiversity Planning and Aquatic Conservation Assessments

Assessment Type	Assessment Area and Version
Biodiversity Planning Assessment(s)	Channel Country v1.1
Aquatic Conservation Assessment(s) (riverine)	Lake Eyre and Bulloo Basins v1.1
Aquatic Conservation Assessment(s) (non-riverine)	Lake Eyre and Bulloo Basins v1.1

Table 3: Remnant regional ecosystems within the AOI as per the Qld Herbarium's 'biodiversity status'

Biodiversity Status	Area (Ha)	% of AOI
Endangered	0.0	0.0
Of concern	0.0	0.0
No concern at present	2,296.59	100.0

The following table identifies the extent and proportion of the user specified area of interest (AOI) which is mapped as being of "State", "Regional" or "Local" significance via application of the Queensland Department of Environment and Science's *Biodiversity Assessment and Mapping Methodology* (BAMM).

Table 4: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	2,296.60	100.0
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Table 5: Non-riverine wetlands intersecting the AOI

Non-riverine wetland types intersecting the area of interest	#
Number of Palustrine wetlands	1
Number of Lacustrine wetlands	0

Non-riverine wetland types intersecting the area of interest	#
Total number of non-riverine wetlands	1

NB. The figures presented in the table above are derived from the relevant non-riverine Aquatic Conservation Assessment(s). Later releases of wetland mapping produced via the Queensland Wetland Mapping Program may provide more recent information in regards to wetland extent.

Table 6: Named waterways intersecting the AOI

Name	Permanency
COOPER CREEK	Non-perennial
LIGNUM CREEK	Non-perennial

Refer to **Map 1** for general locality information.

The following two tables identify the extent and proportion of the user specified AOI which is mapped as being of "Very High", "High", "Medium", "Low", or "Very Low" aquatic conservation value for riverine and non-riverine wetlands via application of the Queensland Department of Environment and Science's *Aquatic Biodiversity Assessment and Mapping Method* (AquaBAMM).

Table 7: Summary table, aquatic conservation significance (riverine)

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	2,296.60	100.0
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Table 8: Summary table, aquatic conservation significance (non-riverine)

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	482.09	20.99
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

Biodiversity Planning Assessments

Introduction

The Department of Environment and Science (DES) attributes biodiversity significance on a bioregional scale through a Biodiversity Planning Assessment (BPA). A BPA involves the integration of ecological criteria using the *Biodiversity assessment and Mapping Methodology* (BAMM) and is developed in two stages: 1) **diagnostic criteria**, and 2) **expert panel criteria**. The diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion, while the expert panel criteria allows for the refinement of the mapped information from the diagnostic output by incorporating local knowledge and expert opinion.

The BAMM methodology has application for identifying areas with various levels of significance solely for biodiversity reasons. These include threatened ecosystems or taxa, large tracts of habitat in good condition, ecosystem diversity, landscape context and connection, and buffers to wetlands or other types of habitat important for the maintenance of biodiversity or ecological processes. While natural resource values such as dryland salinity, soil erosion potential or land capability are not dealt with explicitly, they are included to some extent within the biodiversity status of regional ecosystems recognised by the DES.

Biodiversity Planning Assessments (BPAs) assign three levels of overall biodiversity significance.

- **State significance** - areas assessed as being significant for biodiversity at the bioregional or state scales. They also include areas assessed by other studies/processes as being significant at national or international scales. In addition, areas flagged as being of State significance due to the presence of endangered, vulnerable and/or near threatened taxa, are identified as "State Habitat for EVNT taxa".
- **Regional significance** - areas assessed as being significant for biodiversity at the subregional scale. These areas have lower significance for biodiversity than areas assessed as being of State significance.
- **Local significance and/or other values** - areas assessed as not being significant for biodiversity at state or regional scales. Local values are of significance at the local government scale.

For further information on released BPAs and a copy of the underlying methodology, go to:

http://www.qld.gov.au/environment/plants-animals/biodiversity/planning/

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

http://qspatial.information.qld.gov.au/geoportal/

The following table identifies the extent and proportion of the user specified AOI which is mapped as being of "State", "Regional" or "Local" significance via application of the BAMM.

Table 9: Summary table, biodiversity significance

Biodiversity significance	Area (Ha)	% of AOI
State Habitat for EVNT taxa	0.0	0.0
State	2,296.60	100.0
Regional	0.0	0.0
Local or Other Values	0.0	0.0

Refer to **Map 2** for further information.

Diagnostic Criteria

Diagnostic criteria are based on existing data which is reliable and uniformly available across a bioregion. These criteria are diagnostic in that they are used to filter the available data and provide a "first-cut" or initial determination of biodiversity significance. This initial assessment is then combined through a second group of other essential criteria.

A description of the individual diagnostic criteria is provided in the following sections.

Criteria A. Habitat for EVNT taxa: Classifies areas according to their significance based on the presence of endangered, vulnerable and/or rare (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the

Environment Protection and Biodiversity Conservation Act 1999. It excludes highly mobile fauna taxa which are instead considered in Criterion H and brings together information on EVNT taxa using buffering of recorded sites or habitat suitability models (HSM) where available.

Criteria B. Ecosystem value: Classifies on the basis of biodiversity status of regional ecosystems, their extent in protected areas (presence of poorly conserved regional ecosystems), the presence of significant wetlands; and areas of national importance such as the presence of Threatened Ecological Communities, World Heritage areas and Ramsar sites. Ecosystem value is applied at a bioregional (**B1**) and regional (**B2**) scale.

Criteria C. Tract size: Measures the relative size of tracts of vegetation in the landscape. The size of any tract is a major indicator of ecological significance, and is also strongly correlated with the long-term viability of biodiversity values. Larger tracts are less susceptible to ecological edge effects and are more likely to sustain viable populations of native flora and fauna than smaller tracts.

Criteria D. Relative size of regional ecosystems: Classifies the relative size of each regional ecosystem unit within its bioregion (**D1**) and its subregion (**D2**). Remnant units are compared with all other occurrences with the same regional ecosystem. Large examples of a regional ecosystem are more significant than smaller examples of the same regional ecosystem because they are more representative of the biodiversity values particular to the regional ecosystem, are more resilient to the effects of disturbance, and constitute a significant proportion of the total area of the regional ecosystem.

Criteria F. Ecosystem diversity: Is an indicator of the number of regional ecosystems occurring within an area. An area with high ecosystem diversity will have many regional ecosystems and ecotones relative to other areas within the bioregion.

Criteria G. Context and connection: Represents the extent to which a remnant unit incorporates, borders or buffers areas such as significant wetlands, endangered ecosystems; and the degree to which it is connected to other vegetation.

A summary of the biodiversity status based upon the diagnostic criteria is provided in the following table.

Table 10: Summary of biodiversity significance based upon diagnostic criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains an RE that is one of the largest of its type in the bioregion (D1) & Remnant has high connectivity or buffers an endangered RE or Sig. Wetland (G)	1,814.50	79.01
Local or Other Values	Refer to diagnostic data for additional information	482.1	20.99

Assessment of diagnostic criteria with respect to the AOI

The following table reflects an assessment of the individual diagnostic criteria noted above in regards to the AOI.

Table 11: Assessment of individual diagnostic criteria with respect to the AOI

Diagnostic Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
A: Habitat for EVNT Taxa					2,296.60	100.0		
B1: Ecosystem Value (Bioregion)					2,296.60	100.0		
B2: Ecosystem Value (Subregion)					2,296.60	100.0		
C: Tract Size			2,296.60	100.0				
D1: Relative RE Size (Bioregion)	1,814.50	79.0					482.1	21.0
D2: Relative RE Size (Subregion)	1,814.50	79.0					482.1	21.0
F: Ecosystem Diversity			2,296.60	100.0				
G: Context and Connection	2,296.60	100.0						

Other Essential Criteria

Other essential criteria (also known as expert panel criteria) are based on non-uniform information sources and which may rely more upon expert opinion than on quantitative data. These criteria are used to provide a "second-cut" determination of biodiversity significance, which is then combined with the diagnostic criteria for an overall assessment of relative biodiversity significance. A summary of the biodiversity status based upon the other essential criteria is provided in the following table.

Table 12: Summary of biodiversity significance based upon other essential criteria with respect to the AOI

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I)	1,075.88	46.85

Biodiversity significance	Description	Area (Ha)	% of AOI
State	Remnant contains Special Biodiversity Values (view Expert Panel data for further information) (I) & Remnant forms part of a bioregional corridor (J)	1,220.72	53.15

A description of each of the other essential criteria and associated assessment in regards to the AOI is provided in the following sections.

Criteria H. Essential and general habitat for priority taxa: Priority taxa are those which are at risk or of management concern, taxa of scientific interest as relictual (ancient or primitive), endemic taxa or locally significant populations (such as a flying fox camp or heronry), highly specialised taxa whose habitat requirements are complex and distributions are not well correlated with any particular regional ecosystem, taxa important for maintaining genetic diversity (such as complex spatial patterns of genetic variation, geographic range limits, highly disjunct populations), taxa critical for management or monitoring of biodiversity (functionally important or ecological indicators), or economic and culturally important taxa.

Criteria I. Special biodiversity values: areas with special biodiversity values are important because they contain multiple taxa in a unique ecological and often highly biodiverse environment. Areas with special biodiversity values can include the following:

- Ia - centres of endemism - areas where concentrations of taxa are endemic to a bioregion or subregion are found.
- Ib - wildlife refugia (Morton *et al*. 1995), for example, islands, mound springs, caves, wetlands, gorges, mountain ranges and topographic isolates, ecological refuges, refuges from exotic animals, and refuges from clearing. The latter may include large areas that are not suitable for clearing because of land suitability/capability.
- Ic - areas with concentrations of disjunct populations.
- Id - areas with concentrations of taxa at the limits of their geographic ranges.
- Ie - areas with high species richness.
- If - areas with concentrations of relictual populations (ancient and primitive taxa).
- Ig - areas containing REs with distinct variation in species composition associated with geomorphology and other environmental variables.
- Ih - an artificial waterbody or managed/manipulated wetland considered by the panel/s to be of ecological significance.
- Ii - areas with a high density of hollow-bearing trees that provide habitat for animals.
- Ij - breeding or roosting sites used by a significant number of individuals.
- Ik - climate change refuge.

The following table identifies the value and extent area of the Other Essential Criteria H and I within the AOI.

Table 13: Relative importance of expert panel criteria (H and I) used to access overall biodiversity significance with respect to the AOI

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
H: Core Habitat Priority Taxa								
Ia: Centres of Endemism	482.88	21.0						
Ib: Wildlife Refugia	2,296.60	100.0						
Ic: Disjunct Populations			482.88	21.0				
Id: Limits of Geographic Ranges	2,296.60	100.0						

Expert Panel	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
Ie: High Species Richness	2,296.60	100.0						
If: Relictual Populations			482.88	21.0				
Ig: Variation in Species Composition	2,296.60	100.0						
Ih: Artificial Wetland								
Ii: Hollow Bearing Trees								
Ij: Breeding or Roosting Site	2,296.60	100.0						
Ik: Climate Refugia								

NB. Whilst biodiversity values associated with Criteria I may be present within the site (refer to tables 12 and 15), for the New England Tableland and Central Queensland Coast BPAs, area and % area figures associated with Criteria Ia through to Ij cannot be listed in the table above (due to slight variations in data formats between BPAs).

Criteria J. Corridors: areas identified under this criterion qualify either because they are existing vegetated corridors important for contiguity, or cleared areas that could serve this purpose if revegetated. Some examples of corridors include riparian habitats, transport corridors and "stepping stones".

Bioregional and subregional conservation corridors have been identified in the more developed bioregions of Queensland through the BPAs, using an intensive process involving expert panels. Map 3 displays the location of corridors as identified under the Statewide Corridor network. The Statewide Corridor network incorporates BPA derived corridors and for bioregions where no BPA has been assessed yet, corridors derived under other planning processes. *Note: as a result of updating and developing a statewide network, the alignment of corridors may differ slightly in some instances when compared to those used in individual BPAs.*

The functions of these corridors are:

- **Terrestrial** Bioregional corridors, in conjunction with large tracts of remnant vegetation, maintain ecological and evolutionary processes at a landscape scale, by:

  • Maintaining long term evolutionary/genetic processes that allow the natural change in distributions of species and connectivity between populations of species over long periods of time;

  • Maintaining landscape/ecosystems processes associated with geological, altitudinal and climatic gradients, to allow for ecological responses to climate change;

  • Maintaining large scale seasonal/migratory species processes and movement of fauna;

  • Maximising connectivity between large tracts/patches of remnant vegetation;

  • Identifying key areas for rehabilitation and offsets; and

- **Riparian** Bioregional Corridors also maintain and encourage connectivity of riparian and associated ecosystems.

The location of the corridors is determined by the following principles:

- Terrestrial

  • Complement riparian landscape corridors (i.e. minimise overlap and maximise connectivity);

  • Follow major watershed/catchment and/or coastal boundaries;

  • Incorporate major altitudinal/geological/climatic gradients;

  • Include and maximise connectivity between large tracts/patches of remnant vegetation;

  • Include and maximise connectivity between remnant vegetation in good condition; and

- Riparian

• Located on the major river or creek systems within the bioregion in question.

The total extent of remnant vegetation triggered as being of "State", "Regional" or "Local" significance due to the presence of an overlying BPA derived terrestrial or riparian corridor within the AOI, is provided in the following table. For further information on how remnant vegetation is triggered due to the presence of an overlying BPA derived corridor, refer to the relevant landscape BPA expert panel report(s).

Table 14: Extent of triggered remnant vegetation due to the presence of BPA derived corridors with respect to the AOI

Biodiversity Significance	Area (Ha)	% of AOI
State	1,220.72	53.15
Regional	0.0	0.0
Local	0.0	0.0

NB: area figures associated with the extent of corridor triggered remnant vegetation are only available for those bioregions where a BPA has been undertaken.

Refer to **Map 3** for further information.

Threatening process/condition (Criteria K) - areas identified by experts under this criterion may be used to amend (upgrade or downgrade) biodiversity significance arising from the "first-cut" analysis. The condition of remnant vegetation is affected by threatening processes such as weeds, ferals, grazing and burning regime, selective timber harvesting/removal, salinity, soil erosion, and climate change.

Assessment of Criteria K with respect to the AOI is not currently included in the "Biodiversity and Conservation Values" report, as it has not been applied to the majority of Queensland due to data/information limitations and availability.

Special Area Decisions

Expert panel derived "Special Area Decisions" are used to assign values to Other Essential Criteria. The specific decisions which relate to the AOI in question are listed in the table below.

Table 15: Expert panel decisions for assigning levels of biodiversity significance with respect to the AOI

Decision Number	Description	Panel Recommended Significance	Criteria Values
chc_l_16	Ephemeral wetlands	State	Ia (centre of endemism): VERY HIGH Ib (wildlife refugia): VERY HIGH Ic (disjunct populations): HIGH Id (geographic range limit): HIGH Ie (high species diversity): VERY HIGH If (relictual populations): HIGH Ig (RE's show distinct variation in species composition): VERY HIGH Ij (breeding or roosting sites): VERY HIGH
chc_l_17	Floodplain linkages	State	Ib (wildlife refugia): VERY HIGH Id (geographic range limit): VERY HIGH Ie (high species diversity): VERY HIGH Ig (RE's show distinct variation in species composition): VERY HIGH Ij (breeding or roosting sites): VERY HIGH
chc_l_19	Riparian Corridors	State	J (Corridors): State

Expert panel decision descriptions:

chc_l_16

Habitat for a wider range of invertebrates and algae than permanent and semi-permanent waterholes, including species such as fairy shrimp and shield shrimp which do not occur in more permanent waterholes where fish predation is higher. Support waterbird populations estimated systematically to be in the millions of individuals and breeding colonies or dispersed waterbird breeding numbering tens of thousands of pairs (for multiple species) (Reid and Jaensch in Costelloe et al 2004);

among the most important recruitment areas for waterbirds in Australia (Jaensch 2009); include the most important sites in Australia for a suite of waterbird species in terms of numbers (supporting >1% of total population size). Many of the wetlands, at several scales, can be demonstrated to meet criteria for international importance.

Includes areas outside of floodplains that may fill from local runoff. Includes salt pan systems which have their own unique suit of species.

These wetlands go dry every year or nearly every year. They will go dry by end of the year in average seasons but last during good seasons or after very large floods and when clusters of good flood seasons occur.

chc_l_17

Links wetland type ecosystems. Provides all ecosystem services associated with flood events. These biodiversity values are defined using the greatest flood event.

Good Flood (above Major). All channels, gutters and floodways are activated, with overland flows across the tops of channels banks and levees; sand dunes become isolated islands; 80 - 100% of the floodplain inundated

Handy Flood (Major). Braid gutters activated as sheets of water spread out from the main channels, most downstream water flow is via the floodways formed by braid gutters; 50 - 60% of the floodplain inundated

Gutter Flood (Moderate). Water escaping from primary and secondary channels into channel and braid gutters but generally contained within gutter channels; 5 - 15% of the floodplain inundated

Channel Flood (Minor). Water just escaping from primary channels and into channel gutters; <5% of the floodplain inundated

River flow (below Minor). Water contained within river banks; no floodplain inundation

chc_l_19

Riparian corridors in the Channel Country are significant for biodiversity both as a climatic refuge and as a major element of habitat continuity including connecting permanent waterholes.

Includes major channels (250k geodata hierarchy 1) plus minor channels (250k geodata hierarchy 2 3) necessary to capture permanent waterholes, buffered by 1km either side and clipped to land zone 3.

Aquatic Conservation Assessments

Introduction

The Aquatic Biodiversity Assessment and Mapping Method or AquaBAMM (Clayton *et al.* 2006), was developed to assess conservation values of wetlands in queensland, and may also have application in broader geographical contexts. It is a comprehensive method that uses available data, including data resulting from expert opinion, to identify relative wetland conservation/ecological values within a specified study area (usually a catchment). The product of applying this method is an Aquatic Conservation Assessment (ACA) for the study area.

An ACA using AquaBAMM is non-social, non-economic and identifies the conservation/ecological values of wetlands at a user-defined scale. It provides a robust and objective conservation assessment using criteria, indicators and measures that are founded upon a large body of national and international literature. The criteria, each of which may have variable numbers of indicators and measures, are naturalness (aquatic), naturalness (catchment), diversity and richness, threatened species and ecosystems, priority species and ecosystems, special features, connectivity and representativeness. An ACA using AquaBAMM is a powerful decision support tool that is easily updated and simply interrogated through a geographic information system (GIS).

Where they have been conducted, ACAs can provide a source of baseline wetland conservation/ecological information to support natural resource management and planning processes. They are useful as an independent product or as an important foundation upon which a variety of additional environmental and socio-economic elements can be added and considered (i.e. an early input to broader 'triple-bottom-line' decision-making processes). An ACA can have application in:

- determining priorities for protection, regulation or rehabilitation of wetlands and other aquatic ecosystems
- on-ground investment in wetlands and other aquatic ecosystems
- contributing to impact assessment of large-scale development (e.g. dams)
- water resource and strategic regional planning prcesses

For a detailed explanation of the methodology please refer to the summary and expert panel reports relevant to the ACA utilised in this assessment. These reports can be accessed at Wetland *Info*:

http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca

The GIS results can be downloaded from the Queensland Spatial Catalogue at:

http://qspatial.information.qld.gov.au/geoportal/

Explanation of Criteria

Under the AquaBAMM, eight criteria are assessed to derive an overall conservation value. Similar to the Biodiversity Assessment and Mapping Methodology, the criteria may be primarily diagnostic (quantitative) or primarily expert opinion (qualitative) in nature. The following sections provide a brief description of each of the 8 criteria.

Criteria 1. Naturalness - Aquatic: This attribute reflects the extent to which a wetland's (riverine, non-riverine, estuarine) aquatic state of naturalness is affected through relevant influencing indicators which include: presence of exotic flora and fauna; presence of aquatic communities; degree of habitat modification and degree of hydrological modification.

Criteria 2. Naturalness - Catchment: The naturalness of the terrestrial systems of a catchment can have an influence on many wetland characteristics including: natural ecological processes e.g. nutrient cycling, riparian vegetation, water chemistry, and flow. The indicators utilised to assess this criterion include: presence of exotic flora and/or fauna; riparian, catchment and flow modification.

Criteria 3. Naturalness - Diversity and Richness: This criterion is common to many ecological assessment methods and can include both physical and biological features. It includes such indicators as species richness, riparian ecosystem richness and geomorphological diversity.

Criteria 4. Threatened Species and Ecosystems: This criterion evaluates ecological rarity characteristics of a wetland. This includes both species rarity and rarity of communities / assemblages. The communities and assemblages are best represented by regional ecosystems. Species rarity is determined by NCA and EPBC status with Endangered, Vulnerable or Near-threatened species being included in the evaluation. Ecosystem rarity is determined by regional ecosystem biodiversity status i.e. Endangered, Of Concern, or Not of Concern.

Criteria 5. Priority Species and Ecosystems: Priority flora and fauna species lists are expert panel derived. These are aquatic, semi-aquatic and riparian species which exhibit at least 1 particular trait in order to be eligible for consideration. For

flora species the traits included:

- It forms significant macrophyte beds (in shallow or deep water).
- It is an important food source.
- It is important/critical habitat.
- It is implicated in spawning or reproduction for other fauna and/or flora species.
- It is at its distributional limit or is a disjunct population.
- It provides stream bank or bed stabilisation or has soil binding properties.
- It is a small population and subject to threatening processes.

Fauna species are included if they meet at least one of the following traits:

- It is endemic to the study area (>75 per cent of its distribution is in the study area/catchment).
- It has experienced, or is suspected of experiencing, a serious population decline.
- It has experienced a significant reduction in its distribution and has a naturally restricted distribution in the study area/catchment.
- It is currently a small population and threatened by loss of habitat.
- It is a significant disjunct population.
- It is a migratory species (other than birds).
- A significant proportion of the breeding population (>one per cent for waterbirds, >75 per cent other species) occurs in the waterbody (see Ramsar criterion 6 for waterbirds).
- Limit of species range.

See the individual expert panel reports for the priority species traits specific to an ACA.

Criteria 6. Special Features: Special features are areas identified by flora, fauna and ecology expert panels which exhibit characteristics beyond those identified in other criteria and which the expert panels consider to be of the highest ecological importance. Special feature traits can relate to, but are not solely restricted to geomorphic features, unique ecological processes, presence of unique or distinct habitat, presence of unique or special hydrological regimes e.g. spring-fed streams. Special features are rated on a 1 - 4 scale (4 being the highest).

Criteria 7. Connectivity: This criterion is based on the concept that appropriately connected aquatic ecosystems are healthy and resilient, with maximum potential biodiversity and delivery of ecosystem services.

Criteria 8. Representativeness: This criterion applies primarily to non-riverine assessments, evaluates the rarity and uniqueness of a wetland type in relation to specific geographic areas. Rarity is determined by the degree of wetland protection within "protected Areas" estate or within an area subject to the *Fisheries Act 1994*, *Coastal Protection and Management Act 1995*, or *Marine Parks Act 2004*. Wetland uniqueness evaluates the relative abundance and size of a wetland or wetland management group within geographic areas such as catchment and subcatchment.

Riverine Wetlands

Riverine wetlands are all wetlands and deepwater habitats within a channel. The channels are naturally or artificially created, periodically or continuously contain moving water, or connecting two bodies of standing water. AquaBAMM, when applied to riverine wetlands uses a discrete spatial unit termed subsections. A subsection can be considered as an area which encompasses discrete homogeneous stream sections in terms of their natural attributes (i.e. physical, chemical, biological and utilitarian values) and natural resources. Thus in an ACA, an aquatic conservation significance score is calculated for each subsection and applies to all streams within a subsection, rather than individual streams as such.

Please note, the area figures provided in Tables 16 and 17, are derived using the extent of riverine subsections within the AOI. Refer to **Map 5** for further information. A summary of the conservation significance of riverine wetlands within the AOI is provided in the following table.

Table 16: Overall level/s of riverine aquatic conservation significance

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
Very High	2,296.60	100.0

Aquatic conservation significance (riverine wetlands)	Area (Ha)	% of AOI
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The individual aquatic conservation criteria ratings for riverine wetlands within the AOI are listed below.

Table 17: Level/s of riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic			1,402.70	61.1	893.9	38.9		
2. Naturalness catchment	2,296.60	100.0						
3. Diversity and richness					2,296.60	100.0		
4. Threatened species and ecosystems			2,296.60	100.0				
5. Priority species and ecosystems	2,296.60	100.0						
6. Special features	2,296.60	100.0						
7. Connectivity	2,296.60	100.0						
8. Representative-ness								

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to riverine wetlands within the AOI.

Table 18: Expert panel decisions for assigning overall levels of riverine aquatic conservation significance

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
cp_r_ec_02	Wilson's Swamp, Tanbar and Eulbertie waterholes	Cooper	6.1.1	3
cp_r_fa_05	Lower Cooper waterbird - Tooley Wooley Water Hole and Naryilco Complex	Cooper	5.1.4	4
cp_r_fa_07	Permanent waterholes - long term	Cooper	6.3.1	4
cp_r_fl_01	Lignum swamps along channels	Cooper	5.2.1	3

4 is the highest rating/value

Expert panel decision descriptions:

cp_r_ec_02

The unique geomorphology of the sand dunes has created permanent water holes (Wilson's Swamp, Tanbar and Eulbertie waterholes).

cp_r_fa_05

Large accumulations of waterbirds. Ten to 15 colonial nesting waterbird breeding species, large numbers of each. The permanent waterholes provide a significant resource in an otherwise arid region (Blackman et al. 1999). The Bilpa-Baryulah ('Nappa Merrie') to Tooley Wooley's Water Holes area is a significant waterbird breeding floodplain on the lower Cooper in Qld, but poorly researched (DERM 2009a). AridFlo was not granted permission to survey the Nappa Merrie portion in 2000, but historical accounts (Chenery 1921) attest to the large ibis-egret colonies there, and we (R. Jaensch and J. Reid) have observed colonial nesting waterbirds breeding there and on the Tooley Woolies in smaller flood years on the Cooper. This tract could be drawn to include the southern portions of the 'Big Bend', e.g. Yetally Waterhole, to capture all of the important waterbird breeding habitat in this district.

cp_r_fa_07

Ecological processes in the LEBB work over vast timeframes of centuries or 1000's of years. The permanent waterholes (100% permanent >100 years) that never go dry over these longer timeframes are critically important to aquatic species persistence in these arid landscapes. They have a major influence on the genetic diversity and gene flow between river catchments. These waterholes act as refugia (Hamilton et al. 2005), e.g. metapopulation and genetics of the Cooper Creek turtle requires long time frames of persistence to sustain populations and species. However, the panel cautioned that care is required for broad application of this decision as some wetlands have been modified through water extraction (Bunn et al. 2006).

cp_r_fl_01

Large lignum swamps provide important habitat for waterbirds, including breeding and feeding habitat especially for colonial waterbird species, e.g. egrets, herons, ibis, and for other fauna. These swamps are associated with river channels lined with river coolabahs. etc. 5.3.13a: Palustrine wetland of **Muehlenbeckia florulenta** open-shrubland sometimes with scattered low trees such as **Acacia stenophylla, A. victoriae, Eremophila bignoniiflora, Eucalyptus coolabah**. Occurs on floodplains in depressions or fringing channels.

Non-riverine Wetlands

Non-riverine wetlands include both lacustrine and palustrine wetlands, however, do not currently incorporate estuarine, marine or subterranean wetland types. A summary of the conservation significance of non-riverine wetlands within the AOI is provided in the following table. Refer to **Map 6** for further information.

Table 19: Overall level/s of non-riverine aquatic conservation significance

Aquatic conservation significance (non-riverine wetlands)	Area (Ha)	% of AOI
Very High	482.09	20.99
High	0.0	0.0
Medium	0.0	0.0
Low	0.0	0.0
Very Low	0.0	0.0

The following table provides an assessment of non-riverine wetlands within the AOI and associated aquatic conservation criteria values.

Table 20: Level/s of non-riverine aquatic conservation significance based on selected criteria

Criteria	Very High Rating - Area (Ha)	Very High Rating - % of AOI	High Rating - Area (Ha)	High Rating - % of AOI	Medium Rating - Area (Ha)	Medium Rating - % of AOI	Low Rating - Area (Ha)	Low Rating - % of AOI
1. Naturalness aquatic	482.09	21.0						
2. Naturalness catchment	482.09	21.0						
3. Diversity and richness	482.09	21.0						
4. Threatened species and ecosystems	482.09	21.0						
5. Priority species and ecosystems					482.09	21.0		
6. Special features								
7. Connectivity								
8. Representative-ness	482.09	21.0						

The table below lists and describes the relevant expert panel decisions used to assign conservation significance values to non-riverine wetlands within the AOI.

Table 21: Expert panel decisions for assigning overall levels of non-riverine aquatic conservation significance.

Decision number	Special feature	Catchment	Criteria/Indicator/Measure	Conservation rating (1-4)
cp_nr_ec_02	Temporary claypan wetlands	Cooper	5.2.1	3
cp_nr_fl_01	Bluebush with or without lignum swamps	Cooper	5.2.1	2
cp_nr_fl_02	Lignum swamps	Cooper	5.2.1	3

4 is the highest rating/value

Expert panel decision descriptions:

cp_nr_ec_02

A number of temporary claypan wetlands not fed by rivers have different biota adapted to different desiccation cycles e.g. fairy shrimp. For the majority of their time they are dry and are susceptible to cattle damage and woody debris removal. The REs associated with this decision are: 4.3.12b, d; 5.3.13b; 5.3.15a, b; 5.3.16a; 5.3.22a; 5.3.8b; 6.3.11; 6.3.11b.

cp_nr_fl_01

Bluebush with or without lignum swamps were identified as having significant flora and fauna values (though lesser value than wetlands of 5.3.13a\b and 5.3.16b). 5.3.12a/b: Palustrine wetland of **Chenopodium auricomum** open-shrubland sometimes with scattered **Eucalyptus coolabah** low trees and **Eremophila bignoniiflora** tall shrubs. Occurs in swampy depressions on alluvial plains and on frequently flooded inter-dune flats and clay pans. Soils very deep, grey cracking clays of light to medium texture, and contain varying amounts of silt and sand. RE 4.3.24: **Chenopodium auricomum** +\- **Muehlenbeckia florulenta** open shrubland in swampy depressions within floodplains with braided channels.

cp_nr_fl_02

Large lignum swamps provide important habitat for waterbirds, including breeding and feeding habitat especially for colonial waterbird species (e.g. egrets, herons, ibis), and for other fauna. These swamps are associated with river channels lined with river coolabahs. etc. 5.3.13a/b: Palustrine wetland of **Muehlenbeckia florulenta** open-shrubland sometimes with scattered low trees such as **Acacia stenophylla, A. victoriae, Eremophila bignoniiflora, Eucalyptus coolabah**. Occurs on floodplains in depressions or fringing channels or in depressions, lakes or larger claypans in dune systems.

Threatened and Priority Species

Introduction

This chapter contains a list of threatened and priority flora and/or fauna species that have been recorded on, or within 4km of the Assessment Area.

The information presented in this chapter with respect to species presence is derived from compiled databases developed primarily for the purpose of BPAs and ACAs. Data is collated from a number of sources and is updated periodically.

It is important to note that the list of species provided in this report, may differ when compared to other reports generated from other sources such as the State government's WildNet, Herbrecs or the federal government's EPBC database for a number of reasons.

Records for threatened and priority species are filtered and checked based on a number of rules including:

- Taxonomic nomenclature - current scientific names and status,
- Location - cross-check co-ordinates with location description,
- Taxon by location - requires good knowledge of the taxon and history of the record,
- Duplicate records - identify and remove,
- Expert panels - check records and provide new records,
- Flora cultivated records excluded,
- Use precise records less than or equal to 2000m,
- Use recent records greater than or equal to 1975 animals, greater than or equal to 1950 plants.

Threatened Species

Threatened species are those species classified as "Endangered" or "Vulnerable" under the *Environment Protection and Biodiversity Conservation Act 1999* or "Endangered", "Vulnerable" or "Near threatened" under the *Nature Conservation Act 1992*.

The following threatened species have been recorded on, or within approximately 4km of the AOI.

Table 22: Threatened species recorded on, or within 4km of the AOI

Species	Common name	NCA status	EPBC status	Back on Track rank	Migratory species*	Wetland species**	Identified flora/fauna
Amytornis barbatus barbatus	grey grasswren (Bulloo)	E	E	High			FA
Amytornis barbatus diamantina	grey grasswren (Lake Eyre basin)	NT		High			FA

NB. Please note that the threatened species listed in this section are based upon the most recently compiled DES internal state-wide threatened species dataset. This dataset may contain additional records that were not originally available for inclusion in the relevant individual BPAs and ACAs.

**JAMBA - Japan-Australia Migratory Bird Agreement; CAMBA - China-Australia Migratory Bird Agreement; ROKAMBA - Republic of Korea-Australia Migratory Bird Agreement; CMS - Convention on the Conservation of Migratory Species*.

***I - wetland indicator species; D - wetland dependent species*.

BPA Priority Species

A list of BPA priority species that have been recorded on, or within approximately 4km of the AOI is contained in the following table.

Table 23: Priority species recorded on, or within 4km of the AOI

(no results)

NB. Please note that the list of priority species is based on those species identified in the BPAs, however records for these species may be more recent than the originals used. furthermore, the BPA priority species databases are updated from time to time. At each update, the taxonomic details for all species are amended as necessary to reflect current taxonomic name and/or status changes.

ACA Priority Species

A list of ACA priority species used in riverine and non-riverine ACAs that have been recorded on, or within approximately 4km of the AOI are contained in the following tables.

Table 24: Priority species recorded on, or within 4 km of the AOI - riverine

Species	Common name	Back on Track rank	Identified flora/fauna
Chlidonias hybrida	Whiskered Tern	Low	FA
Erythrogonys cinctus	Red-kneed Dotterel	Low	FA
Ninox connivens	Barking Owl	Low	FA
Porzana fluminea	Australian Spotted Crake	Low	FA
Tribonyx ventralis	Black-tailed Native-hen	Low	FA

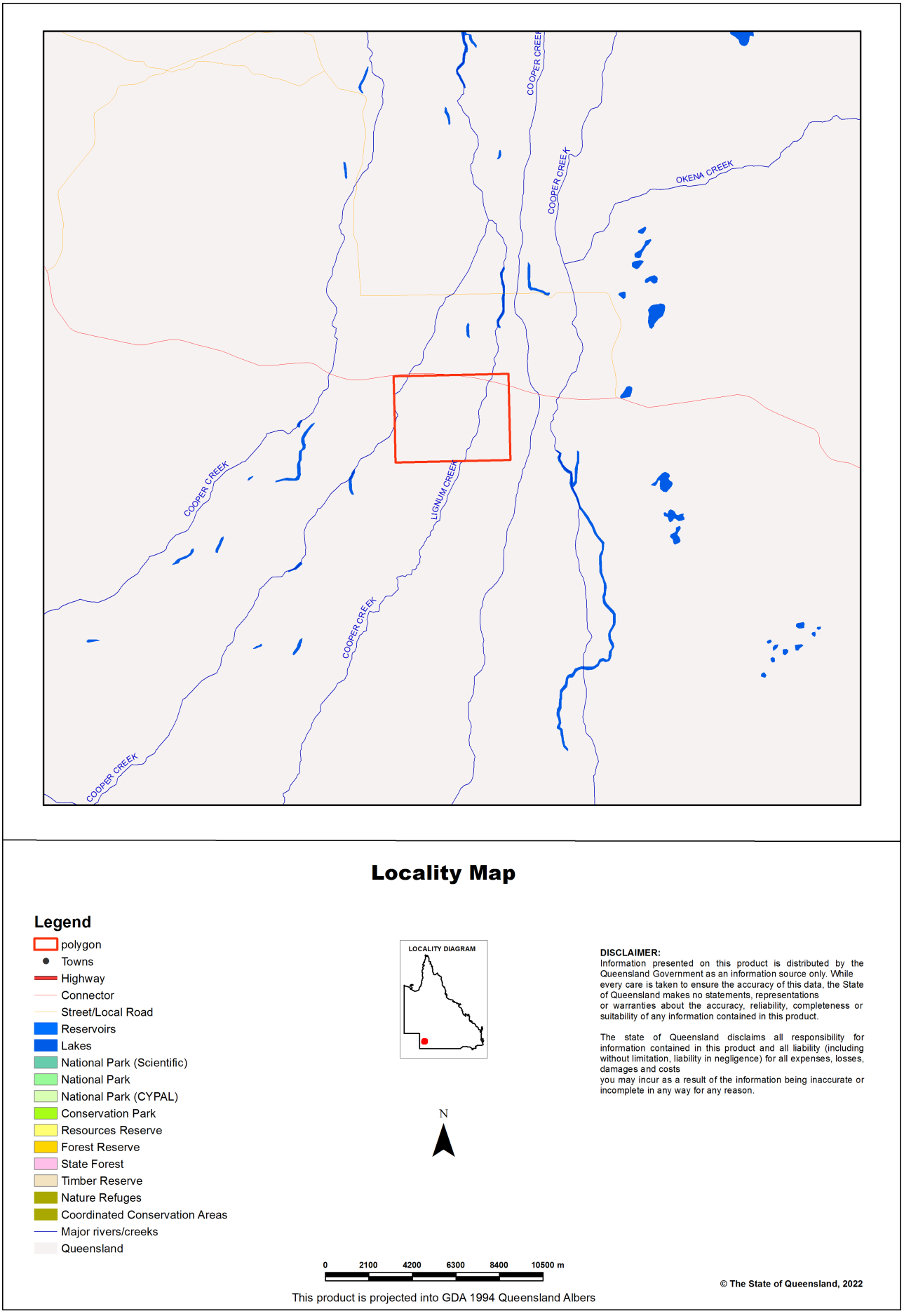
Table 25: Priority species recorded on, or within 4 km of the AOI - non-riverine

Species	Common name	Back on Track rank	Identified flora/fauna
Chlidonias hybrida	Whiskered Tern	Low	FA
Erythrogonys cinctus	Red-kneed Dotterel	Low	FA
Ninox connivens	Barking Owl	Low	FA
Porzana fluminea	Australian Spotted Crake	Low	FA
Tribonyx ventralis	Black-tailed Native-hen	Low	FA

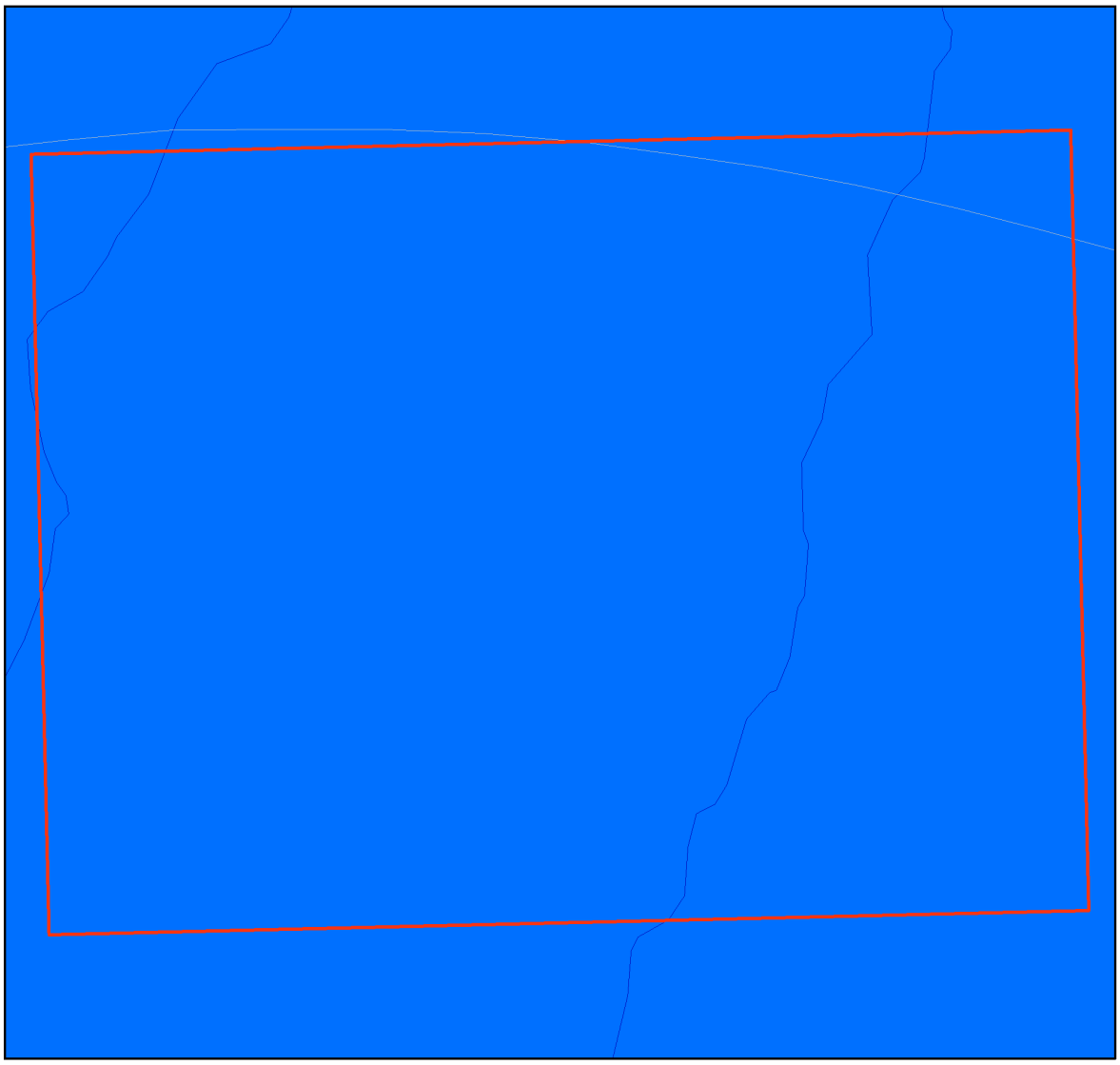
NB. Please note that the priority species records used in the above two tables are comprised of those adopted for the released individual ACAs. The ACA riverine and non-riverine priority species databases are updated from time to time to reflect new release of ACAs. At each update, the taxonomic details for all ACAs records are amended as necessary to reflect current taxonomic name and/or status changes.

Maps

Map 1 - Locality Map



Map 2 - Biodiversity Planning Assessment (BPA)



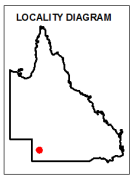
Biodiversity Planning Assessments

Legend

- polygon
- Towns
- Roads
- Major rivers/creeks
- Queensland

Biodiversity Planning Assessment

- State Habitat for EVNT taxa
- State
- Regional
- Local or Other Values
- Non Bioregion Ecosystem



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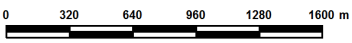
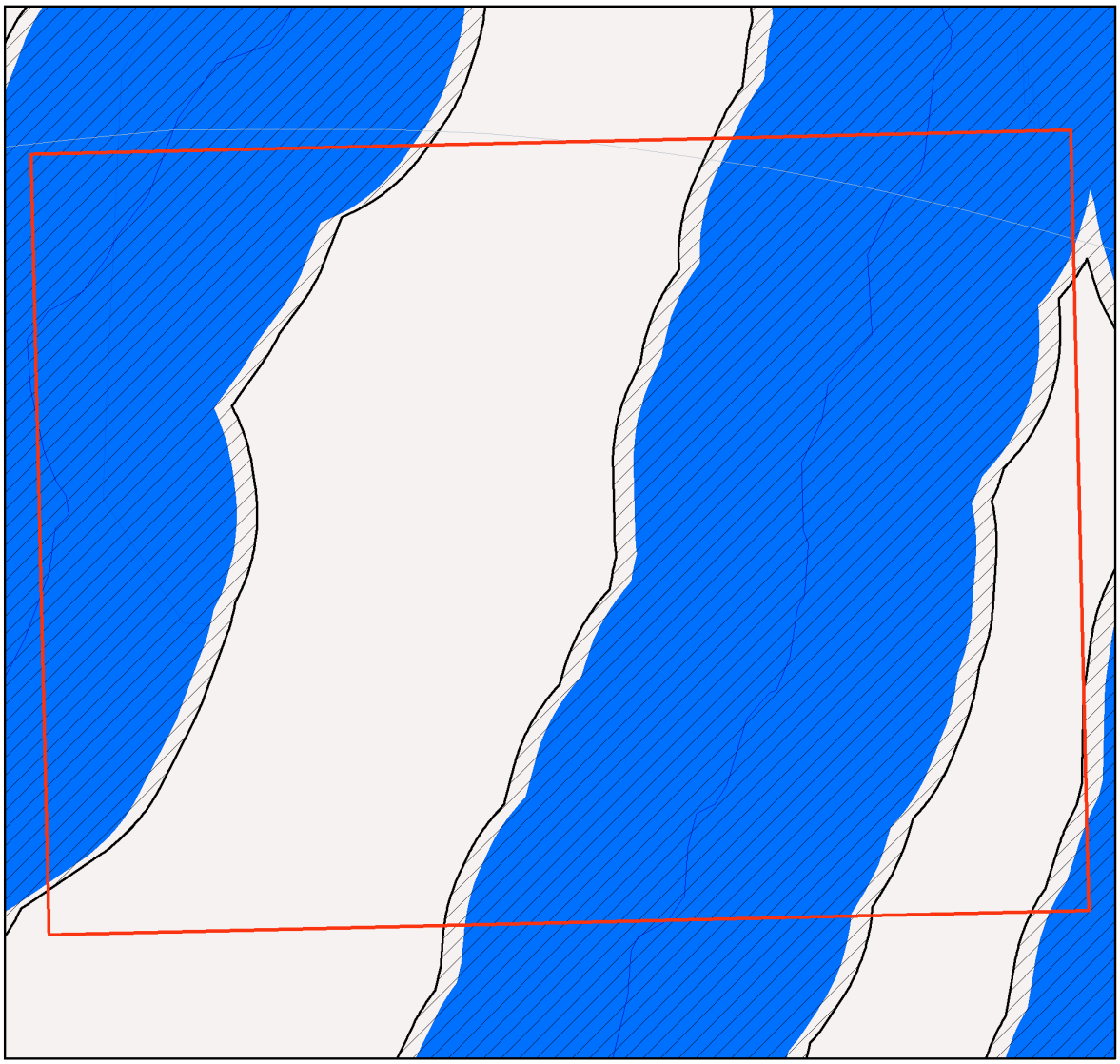
you may incur as a result of the information being inaccurate or incomplete in any wayfor any reason.



This product is projected into GDA 1994 Queensland Albers

Map 3 - Corridors



Corridors

Legend

- polygon
- Towns
- Roads
- Major rivers/creeks
- Queensland

Corridors

- State
- Regional

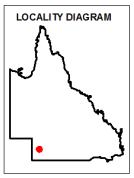
Corridor Triggered Vegetation

- State
- Regional
- Local

Core Area Vegetation

- Brigalow Belt only

LOCALITY DIAGRAM



N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

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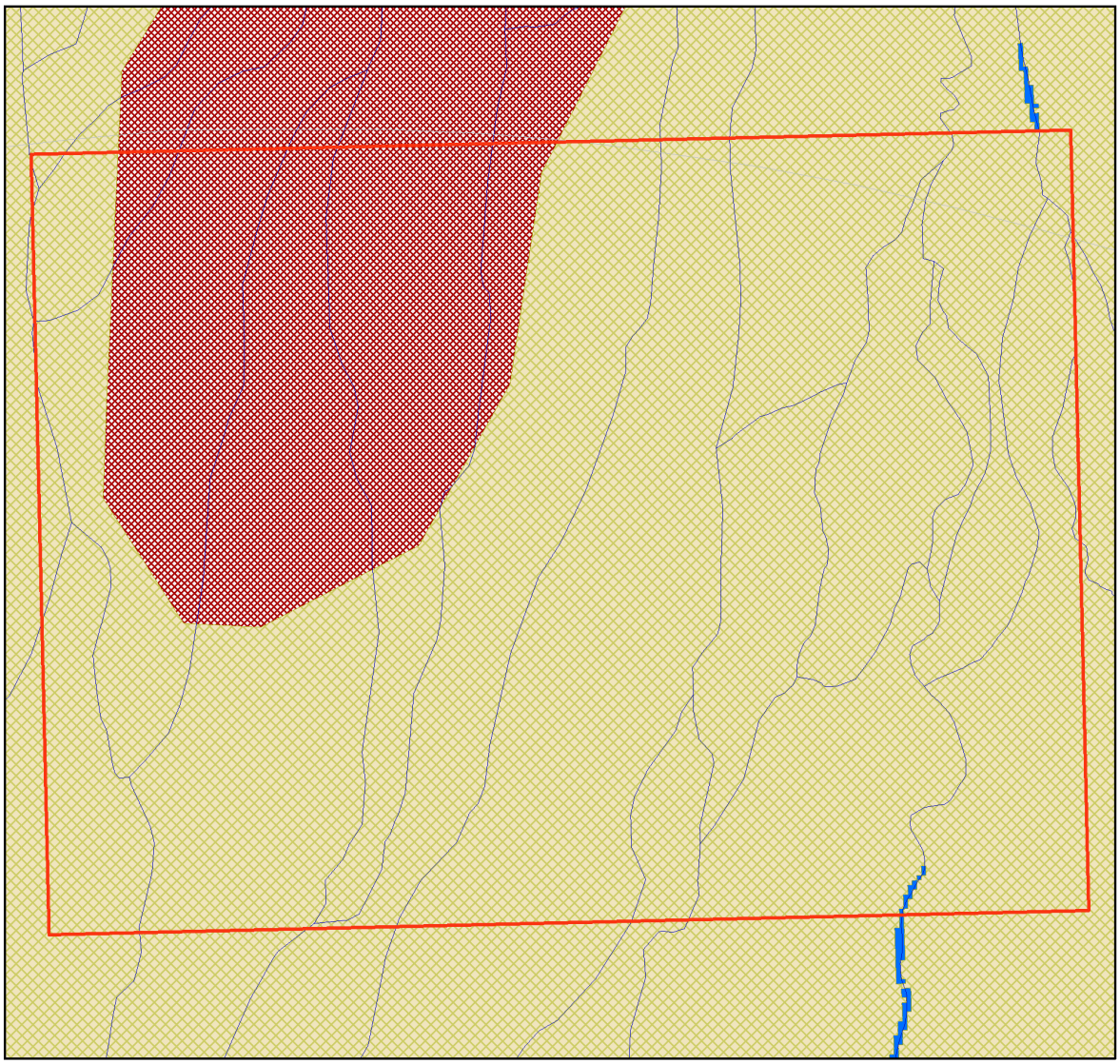
Map 4 - Wetlands and waterways



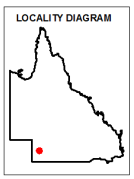
Wetlands and Waterways

Legend

- polygon
- Towns
- Roads
- Springs
- Rivers/Creeks
- Directory of Important Wetlands
- Ramsar Sites - QLD
- Queensland

Wetland Type

- Marine Waterbodies
- Estuarine Waterbodies
- Riverine Waterbodies
- Lacustrine Waterbodies
- Palustrine Waterbodies
- Marine RE
- Estuarine RE
- Riverine RE
- Lacustrine RE
- Palustrine RE
- RE 51-80% wetland (mosaic units)
- RE 1-50% wetland (mosaic units)



N

0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

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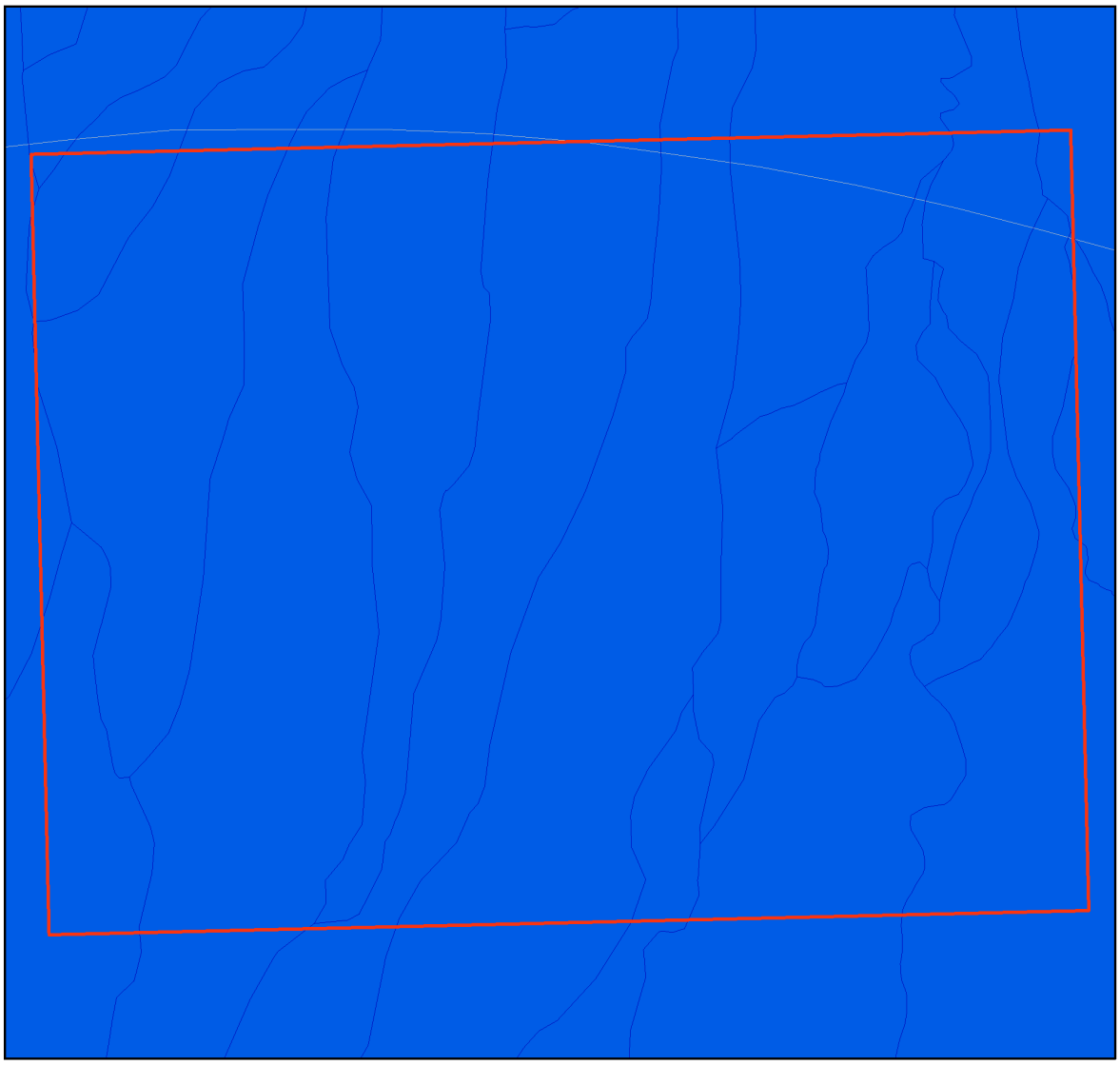
Map 5 - Aquatic Conservation Assessment (ACA) - riverine



Aquatic Conservation Assessment (ACA) - riverine

Legend

- polygon
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Riverine - Subcatchment Significance

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

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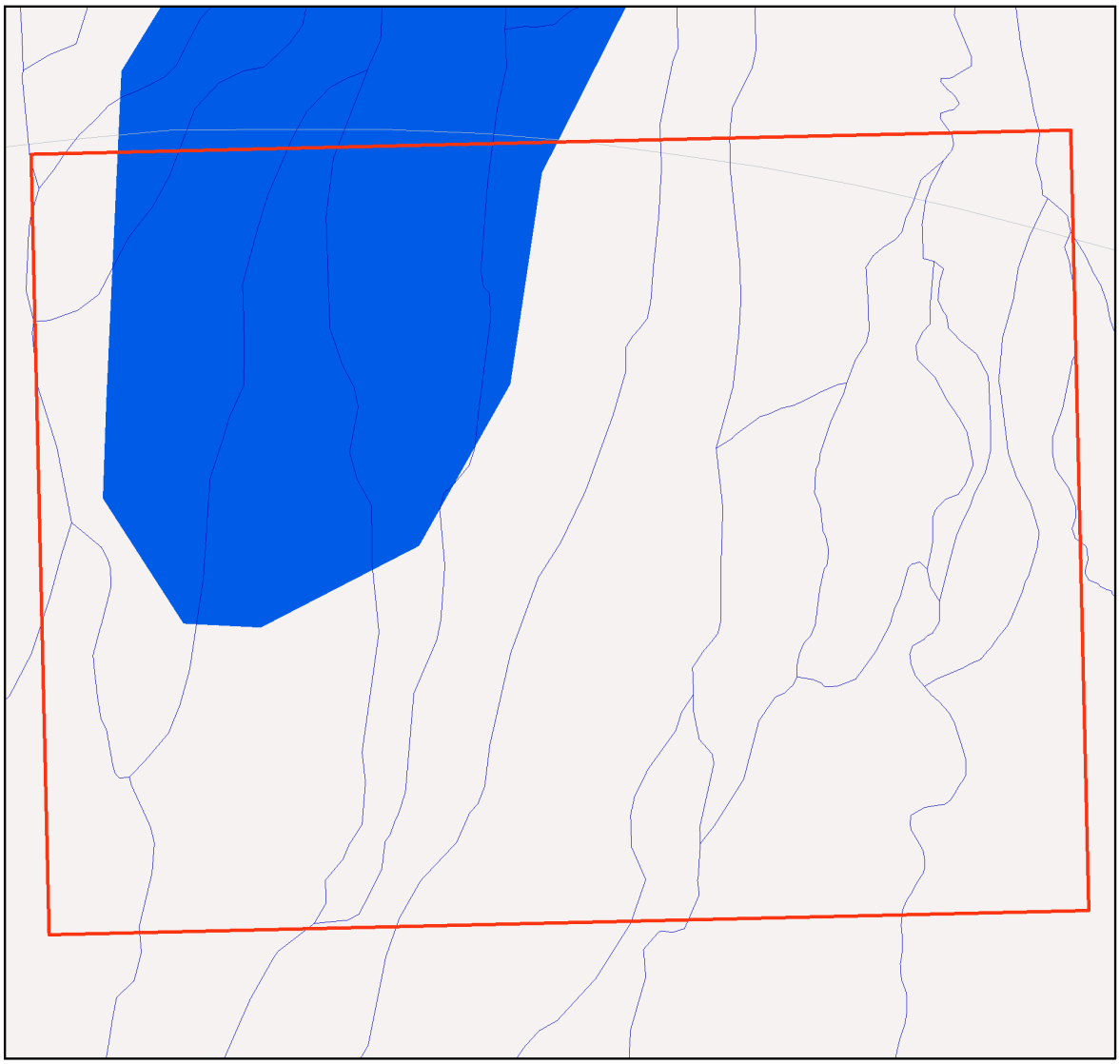
0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

Map 6 - Aquatic Conservation Assessment (ACA) - non-riverine



Aquatic Conservation Assessment (ACA) - nonriverine

Legend

- polygon
- Towns
- Roads
- Rivers/Creeks
- Queensland

ACA Non-riverine

- Very High
- High
- Medium
- Low
- Very Low

LOCALITY DIAGRAM

N

DISCLAIMER:
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0 320 640 960 1280 1600 m

This product is projected into GDA 1994 Queensland Albers

References

Clayton, P.D., Fielder, D.F., Howell, S. and Hill, C.J. (2006) *Aquatic biodiversity assessment and mapping method (AquaBAMM): a conservation values assessment tool for wetlands with trial application in the Burnett River catchment.* Published by the Environmental Protection Agency, Brisbane. ISBN 1-90928-07-3. Available at

http://wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/

Environmental Protection Agency (2002) *Biodiversity Assessment and Mapping Methodology. Version 2.1, July 2002.* (Environmental Protection Agency, Brisbane).

Morton, S. R., Short, J. and Barker, R. D. with an Appendix by G.F. Griffin and G. Pearce (1995). *Refugia for Biological Diversity in Arid and Semi-arid Australia. Biodiversity Series* , Paper No. 4, Biodiversity Unit, Environment Australia.

Sattler, P.S. and Williams, R.D. (eds) (1999). *The Conservation Status of Queensland's Bioregional Ecosystems*. Environmental Protection Agency, Brisbane.

Appendices

Appendix 1 - Source Data

Theme	Datasets
Aquatic Conservation Assessments Non-riverine*	Combination of the following datasets: Cape York Peninsula Non-riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Non-riverine v1.3 Lake Eyre and Bulloo Basins v1.1 QMDB Non-riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Non-riverine ACA v1.1 Southern Gulf Catchments Non-riverine ACA v1.1
Aquatic Conservation Assessments Riverine*	Combination of the following datasets: Cape York Peninsula Riverine v1.1 Eastern Gulf of Carpentaria v1.1 Great Barrier Reef Catchment Riverine v1.1 Lake Eyre and Bulloo Basins v1.1 QMDB Riverine ACA v1.4 Southeast Queensland ACA v1.1 WBB Riverine ACA v1.1 Southern Gulf Catchments Riverine ACA v1.1
Biodiversity Planning Assessments*	Combination of the following datasets: Brigalow Belt BPA v2.1 Cape York Peninsula BPA v1.1 Central Queensland Coast BPA v1.3 Channel Country BPA v1.1 Desert Uplands BPA v1.3 Einasleigh Uplands BPA v1.1 Gulf Plains BPA v1.1 Mitchell Grass Downs BPA v1.1 Mulga Lands BPA v1.4 New England Tableland v2.3 Northwest Highlands v1.1 Southeast Queensland v4.1 Wet Tropics v1.1
Statewide BPA Corridors*	Statewide corridors v1.6
Threatened Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
BPA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.
ACA Priority Species	An internal DES database compiled from Wildnet, Herbrecs, Corveg, the QLD Museum, as well as other incidental sources.

***These datasets are available at:**

http://dds.information.qld.gov.au/DDS

Appendix 2 - Acronyms and Abbreviations

AOI	- Area of Interest
ACA	- Aquatic Conservation Assessment
AQUABAMM	- Aquatic Biodiversity Assessment and Mapping Methodology
BAMM	- Biodiversity Assessment and Mapping Methodology
BoT	- Back on Track
BPA	- Biodiversity Planning Assessment
CAMBA	- China-Australia Migratory Bird Agreement
DES	- Department of Environment and Science
EPBC	- *Environment Protection and Biodiversity Conservation Act 1999*
EVNT	- Endangered, Vulnerable, Near Threatened
GDA94	- Geocentric Datum of Australia 1994
GIS	- Geographic Information System
JAMBA	- Japan-Australia Migratory Bird Agreement
NCA	- *Nature Conservation Act 1992*
RE	- Regional Ecosystem
REDD	- Regional Ecosystem Description Database
ROKAMBA	- Republic of Korea-Australia Migratory Bird Agreement

WildNet Records
Species List

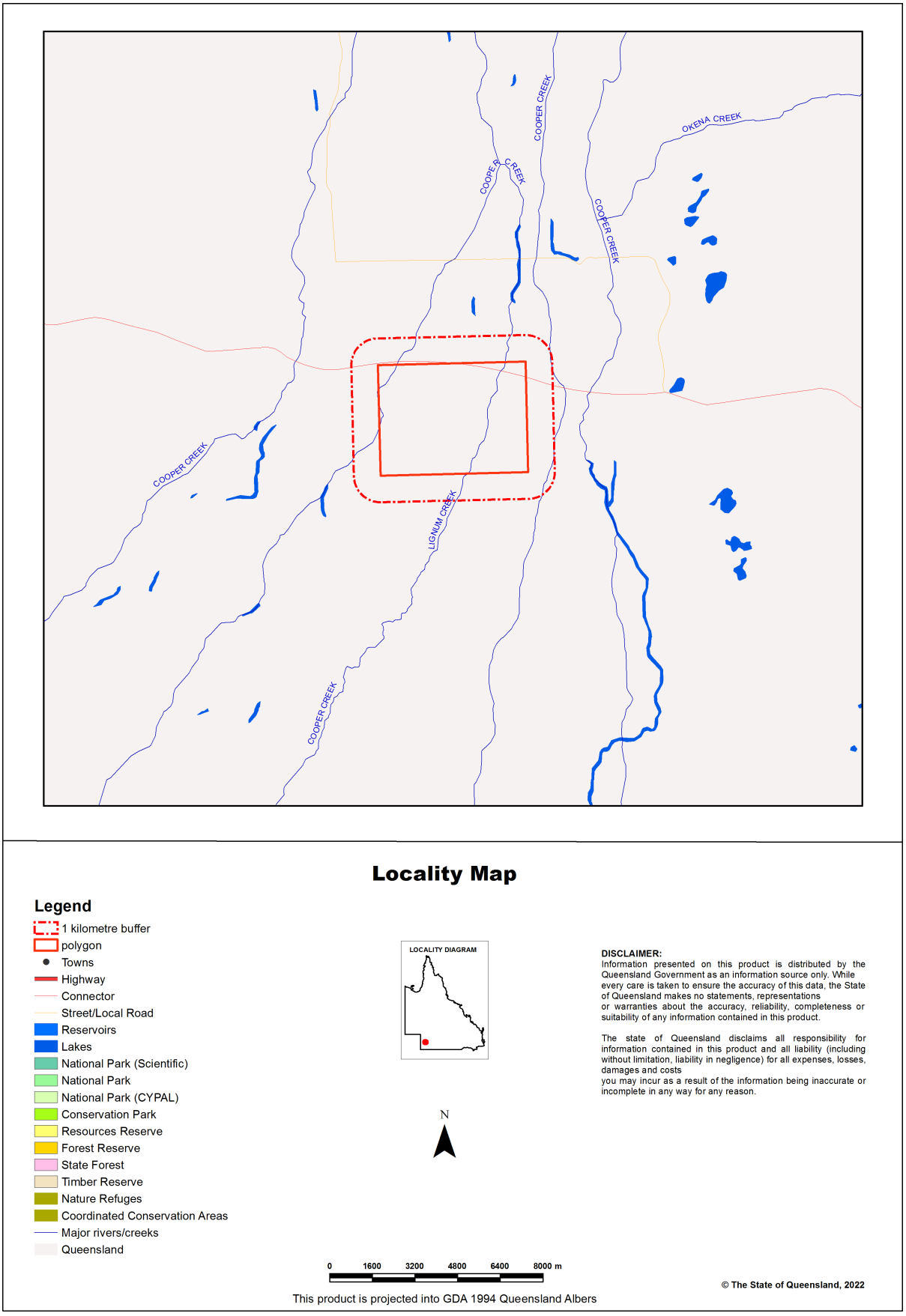
For the selected area of interest 2296.59ha

Current as at 26/04/2022

Wackett

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest .

Table 1. Area of interest details

Size (ha)	2,296.59
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the animals recorded within the area of interest and its one kilometre buffer.

Table 3 lists the plants recorded within the area of interest and its one kilometre buffer.

Table 4 lists the fungi recorded within the area of interest and its one kilometre buffer.

Table 5 lists the other species recorded within the area of interest and its one kilometre buffer.

Table 2. Animals recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1732	Aves	Accipitridae	*Aquila audax*	wedge-tailed eagle	C	None	0	1	12/12/2001
1722	Aves	Accipitridae	*Circus approximans*	swamp harrier	C	None	0	1	22/08/2000
1723	Aves	Accipitridae	*Circus assimilis*	spotted harrier	C	None	0	1	29/10/2012
1707	Aves	Accipitridae	*Haliastur sphenurus*	whistling kite	C	None	0	1	24/08/2006
1714	Aves	Accipitridae	*Milvus migrans*	black kite	C	None	0	3	24/08/2006
1305	Aves	Acrocephalidae	*Acrocephalus australis*	Australian reed-warbler	C	None	0	1	07/07/2000
1652	Aves	Alaudidae	*Mirafra javanica*	Horsfield's bushlark	C	None	0	1	13/12/2001

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1993	Aves	Anatidae	*Anas gracilis*	grey teal	C	None	0	1	22/08/2000
1998	Aves	Anatidae	*Anas superciliosa*	Pacific black duck	C	None	0	1	22/08/2000
1999	Aves	Anatidae	*Aythya australis*	hardhead	C	None	0	1	07/07/2000
1279	Aves	Anhingidae	*Anhinga novaehollandiae*	Australasian darter	C	None	0	1	22/08/2000
1829	Aves	Ardeidae	*Ardea alba modesta*	eastern great egret	C	None	0	2	22/08/2000
1840	Aves	Ardeidae	*Egretta garzetta*	little egret	C	None	0	1	01/06/1976
1826	Aves	Ardeidae	*Egretta novaehollandiae*	white-faced heron	C	None	0	1	22/08/2000
1173	Aves	Cacatuidae	*Nymphicus hollandicus*	cockatiel	C	None	0	1	24/08/2006
1642	Aves	Campephagidae	*Lalage tricolor*	white-winged triller	C	None	0	1	24/08/2006
1809	Aves	Columbidae	*Geopelia cuneata*	diamond dove	C	None	0	1	12/12/2001
1608	Aves	Corvidae	*Corvus coronoides*	Australian raven	C	None	0	2	13/12/2001
1716	Aves	Falconidae	*Falco berigora*	brown falcon	C	None	0	1	22/08/2000
1761	Aves	Halcyonidae	*Todiramphus pyrrhopygius*	red-backed kingfisher	C	None	0	1	24/08/2006
1585	Aves	Hirundinidae	*Petrochelidon ariel*	fairy martin	C	None	0	4	24/08/2006
1563	Aves	Maluridae	*Amytornis barbatus*	grey grasswren	NT	None	0	1	24/08/2006
1557	Aves	Maluridae	*Malurus leucopterus*	white-winged fairy-wren	C	None	0	3	13/12/2001
1291	Aves	Megaluridae	*Cincloramphus cruralis*	brown songlark	C	None	0	1	24/08/2006
1287	Aves	Megaluridae	*Poodytes gramineus*	little grassbird	C	None	0	1	07/07/2000
1527	Aves	Meliphagidae	*Epthianura aurifrons*	orange chat	C	None	0	1	24/08/2006
1518	Aves	Meliphagidae	*Ptilotula penicillata*	white-plumed honeyeater	C	None	0	1	22/08/2000
1589	Aves	Monarchidae	*Grallina cyanoleuca*	magpie-lark	C	None	0	1	22/08/2000
1455	Aves	Motacillidae	*Anthus novaeseelandiae*	Australasian pipit	C	None	0	3	13/12/2001
1680	Aves	Otididae	*Ardeotis australis*	Australian bustard	C	None	0	2	13/12/2001
1264	Aves	Phalacrocoracidae	*Phalacrocorax varius*	pied cormorant	C	None	0	1	22/08/2000
1699	Aves	Phasianidae	*Coturnix pectoralis*	stubble quail	C	None	0	1	07/07/2000
1249	Aves	Podicipedidae	*Tachybaptus novaehollandiae*	Australasian grebe	C	None	0	2	22/08/2000
1151	Aves	Psittacidae	*Melopsittacus undulatus*	budgerigar	C	None	0	1	24/08/2006
1686	Aves	Rallidae	*Fulica atra*	Eurasian coot	C	None	0	1	22/08/2000

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1662	Aves	Rallidae	*Porphyrio melanotus*	purple swamphen	C	None	0	2	07/07/2000
1664	Aves	Rallidae	*Porzana fluminea*	Australian spotted crake	C	None	0	1	07/07/2000
1576	Aves	Rhipiduridae	*Rhipidura leucophrys*	willie wagtail	C	None	0	2	22/08/2000
1822	Aves	Threskiornithidae	*Platalea flavipes*	yellow-billed spoonbill	C	None	0	2	22/08/2000
1823	Aves	Threskiornithidae	*Platalea regia*	royal spoonbill	C	None	0	2	22/08/2000
1825	Aves	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	SL	None	0	1	07/07/2000
1800	Aves	Threskiornithidae	*Threskiornis spinicollis*	straw-necked ibis	C	None	0	2	22/08/2000

Table 3. Plants recorded within the area of interest and its one kilometre buffer

Taxon Id	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
30175	Equisetopsida	Asteraceae	*Senecio depressicola*	None	C	None	1	1	29/09/2005
15039	Equisetopsida	Asteraceae	*Sonchus oleraceus*	common sowthistle	None	None	1	1	29/09/2005
5309	Equisetopsida	Euphorbiaceae	*Euphorbia dallachyana*	None	C	None	1	1	29/09/2005
12156	Equisetopsida	Haloragaceae	*Haloragis glauca forma glauca*	None	C	None	1	1	29/09/2005

Table 4. Fungi recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Table 5. Other species recorded within the area of interest and its one kilometre buffer

No species found within the area of interest and its one kilometre buffer.

Species table headings and codes

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records

- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

WildNet Records
Conservation Significant Species List

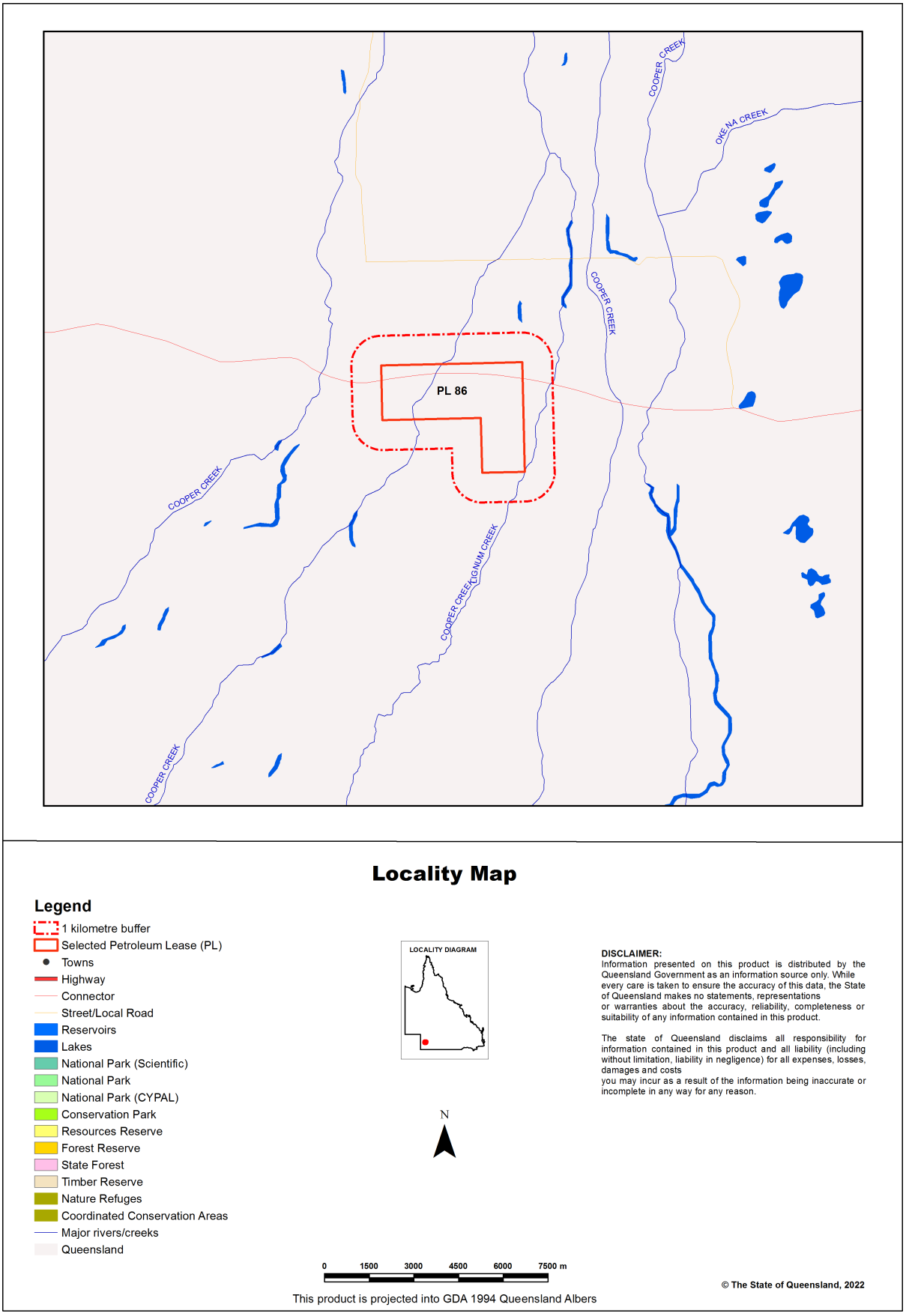
For the selected area of interest 1135.51ha pl: 86

Current as at 26/04/2022

WildNetCSSpeciesList

Queensland Government

Map 1. Locality Map



Summary Information

The following table provides an overview of the area of interest pl: 86.

Table 1. Area of interest details

Size (ha)	1,135.51
Local Government(s)	Bulloo Shire
Bioregion(s)	Channel Country
Subregion(s)	Cooper - Diamantina Plains
Catchment(s)	Cooper Creek

Protected Area(s)
No estates or reserves are located within the area of interest.

World Heritage Area(s)
No World Heritage Areas are located within the area of interest.

Ramsar Area(s)
No Ramsar Areas are located within the area of interest.

Conservation Significant Species List

Introduction

This report is derived from a spatial layer generated from the WildNet database managed by the Department of Environment and Science. The layer which is generated weekly contains the WildNet wildlife records that are not classed as erroneous or duplicate, that have a location precision equal to or less than 10000 metres and do not have a count of zero.

Conservation significant species are species listed:

- as threatened or near threatened under the Nature Conservation Act 1992;
- as threatened under the *Environment Protection and Biodiversity Conservation Act 1999* or
- migratory species protected under the following international agreements:
  - Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)
  - China-Australia Migratory Bird Agreement
  - Japan-Australia Migratory Bird Agreement
  - Republic of Korea-Australia Migratory Bird Agreement

The WildNet dataset is constantly being enhanced and the taxonomic and status information revised. If a species is not listed in this report, it does not mean it doesn't occur there and listed species may also no longer inhabit the area. It is recommended that you also access other internal and external data sources for species information in your area of interest (Refer Links and Support).

Table 2 lists the species recorded within the area of interest and its one kilometre buffer.

Table 2. Conservation significant species recorded within the area of interest and its one kilometre buffer

Taxon Id	Kingdom	Class	Family	Scientific Name	Common Name	NCA	EPBC	Specimens	Records	Last record
1563	Animalia	Aves	Maluridae	*Amytornis barbatus*	grey grasswren	NT	None	0	1	24/08/2006
1825	Animalia	Aves	Threskiornithidae	*Plegadis falcinellus*	glossy ibis	SL	None	0	1	07/07/2000

Taxon Id: Unique identifier of the taxon from the WildNet database.

NCA: Queensland conservation status of the taxon under the *Nature Conservation Act 1992* (Least Concern (C), Critically Endangered (CR), Endangered (E), Extinct (EX), Near Threatened (NT), Extinct in the Wild (PE), Special Least Concern (SL), and Vulnerable (V)).

EPBC: Australian conservation status of the taxon under the *Environment Protection and Biodiversity Conservation Act 1999* (Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Vulnerable (V), and Extinct in the Wild (XW)).

Specimens: The number of specimen-backed records of the taxon.

Records: The total number of records of the taxon.

Last record: Date of latest record of the taxon.

Links and Support

Other sites that deliver species information from the WildNet database include:

- Species profile search - access species information approved for publication including species names, statuses, notes, images, distribution maps and records
- Species lists - generate species lists for Queensland protected areas, forestry areas, local governments and areas defined using coordinates
- Biomaps - view biodiversity information, including WildNet records approved for publication, and generate reports
- Queensland Globe - view spatial information, including WildNet records approved for publication
- Qld wildlife data API - access WildNet species information approved for publication such as notes, images and records etc.
- Wetland*Maps* - view species records, survey locations etc. approved for publication
- Wetland*Summary* - view wildlife statistics, species lists for a range of area types, and access WildNet species profiles
- WildNet wildlife records - published - Queensland - spatial layer of WildNet records approved for publication generated weekly
- Generalised distribution and densities of Queensland wildlife - Queensland species distributions and densities generalised to a 10 km grid resolution
- Conservation status of Queensland wildlife - access current lists of priority species for Queensland including nomenclature and status information
- Queensland Confidential Species - the list of species flagged as confidential in the WildNet database.

Please direct queries about this report to the WildNet Team.

Other useful sites for accessing Queensland biodiversity data include:

- Useful wildlife resources
- Queensland Government Data
- Atlas of Living Australia (ALA)
- Online Zoological Collections of Australian Museums (OZCAM)
- Australia's Virtual Herbarium (AVH)
- Protected Matters Search Tool

Disclaimer

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. Please see the caveat for interpretation of information provided here.

Report created: 05-Jul-2022

Summary

Matters of National Environment 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:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	13
Listed Migratory Species:	9

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

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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	14
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	2
EPBC Act Referrals:	7
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	1

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Coongie lakes	40 - 50km upstream from Ramsar site	In feature area

Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Amytornis barbatus barbatus Bulloo Grey Grasswren, Grey Grasswren (Bulloo) [67065]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In feature area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pezoporus occidentalis Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
MAMMAL			
Macroderma gigas Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Notomys fuscus Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Petrogale xanthopus celeris Yellow-footed Rock-wallaby (central-western Queensland) [87608]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pseudomys australis Plains Rat, Palyoora, Plains Mouse [108]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
Frankenia plicata [4225]	Endangered	Species or species habitat likely to occur within area	In feature area
Sclerolaena walkeri [16152]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Listed Migratory Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla cinerea](#) Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
[Neophema chrysostoma](#) Blue-winged Parrot [726]		Species or species habitat known to occur within area overfly marine area	In feature area
[Rostratula australis as Rostratula benghalensis (sensu lato)](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia			
Common Greenshank, Greenshank [832]		Species or species habitat may occur within area overfly marine area	In buffer area only

Extra Information

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Cooper Creek Swamps - Nappa Merrie	QLD	In feature area
Cooper Creek - Wilson River Junction	QLD	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Ballera Lateral Gas Pipeline	2006/2563	Controlled Action	Completed	In buffer area only
Not controlled action				
Gas Pipeline from Psyche to Winninia	2002/797	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
QSN3 Project, expand 935km gas pipeline and supporting infrastructure	2009/5072	Not Controlled Action	Completed	In buffer area only
Thoar 3D seismic survey at Cooper Creek-Wilson River floodplain	2003/1178	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
QSN Underground Gas Pipeline	2008/4043	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Texas Tickalara Holdings Petroleum Production Project	2021/9088	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only

Bioregional Assessments

SubRegion	BioRegion	Website	Buffer Status
Cooper	Lake Eyre Basin	BA website	In feature area

Geological and Bioregional Assessments

Name	State	Website	Buffer Status
Cooper GBA region	QLD, SA, NSW	GBA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-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.

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Appendix B Threatened flora and fauna likelihood of occurrence assessment

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
Fauna species						
Birds						
Actitis hypoleucos	Common Sandpiper	Mi	SLC	Inhabits a wide range of coastal wetlands and some inland wetlands. has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. Forages in shallow water and on bare soft mud at the edges of wetlands, sometimes ventures into grassy areas adjoining wetlands.	Unlikely	Identified in the PMST search as 'species or species habitat may occur within the area'. No records occur within 50 km of the study area (ALA, 2022). Species records are more concentrated around the coastline of Australia. Wetlands within the study area may provide habitat for the species periodically.
Amytornis barbatus barbatus	Bulloo Grey Grasswren	E	E	Inhabits periodically-inundated swampy floodplains in the Bulloo River drainage basin. It inhabits patches of dense vegetation that are comprised of thickets of *Duma florulenta* (Lignum), 1.0 to 2.5 m tall, with clumps of *Eragrostis australasica* (swamp canegrass), about 1 or 2 m tall, and/or clumps of *Atriplex nummularia* (oldman saltbush).	Potential	Species occurs on floodplains in the drainage basin of the Bulloo River, with most species records located approximately 160 km south of the study area (ALA, 2022). No records occur within 50 km of the CDZ. The closest record exists approximately 68 km south of the study area, however, is an isolated record without a date. Potential habitat for this species occurs within the CDZ in the form of vegetated wetlands fringing drainage lines, in particular where lignum occurs (5.3.8a). Habitat of this description is limited to approximately 13% of the CDZ, occurs intermittently throughout the area, however, is predicted to be more concentrated in the Wackett-14 redirection RoW. Where habitat containing lignum does occur, it is limited to the narrow fringes of drainage lines and does not occur as expanses of dense thickets up to 2 m tall. Preferrable habitat would be occupied by

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
						moderately dense vegetation of grasses, rushes, and reeds (lignum, swamp canegrass, open timber, or samphire) (DESWPC, 2013). Habitat within the CDZ is therefore considered to be of marginal suitability.
Apus pacificus	Fork-tailed Swift	Mi	SLC	Species is predominantly aerial and occurs over inland areas and occasionally above the foothills in coastal areas with dry and open habitat. Can also occur over low scrub, heathland, saltmarsh and riparian woodlands and are associated with low pressure systems that favour the occurrence of insect prey.	Potential	A species record occurs within 6 km of the Construction Disturbance Zone. The species is almost exclusively aerial when in Australia. It is possible it may fly over and/or forage over the study area. Given the species is highly mobile and is known to occur within close proximity to the CDZ, it is considered potential to occur.
Calidris acuminata	Sharp-tailed Sandpiper	Mi	SLC	Widespread across the coast and inland, preferring muddy edges of shallow fresh or brackish wetlands with inundated or emergent sedges, grasses, saltmarsh or other low vegetation.	Likely	Multiple records occur within 50 km of the study area (ALA, 2022). Potential habitat for the species occurs across the entirely of the CDZ, as it is located within braided channels, which experiences seasonal inundation and transformation into suitable wetland habitat. The suitability of habitat will vary seasonally with the degree of water inundation. The species occurs across much of Australia, particularly south-eastern Australia. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Calidris ferruginea	Curlew Sandpiper	CE, Mi	E	Species usually forages and roosts in intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes	Unlikely	The species was identified in the PMST as 'species or species habitat may occur within area'. No records occur within 50 km of the CDZ (ALA, 2022;

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
				and lagoons near the coast, and ponds in saltworks and sewage farms.		eBird, 2020). The species typically utilises coastal wetland habitat and rarely occurs inland. The Species is considered unlikely to occur within the CDZ.
Calidris melanotos	Pectoral Sandpiper	Mi	SLC	Most records occur around Cairns with scattered records elsewhere. Prefers shallow fresh to saline wetlands such as coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	Unlikely	The species was identified in the PMST as 'species or species habitat may occur within area'. No records occur within 50 km of the CDZ (ALA, 2022; eBird, 2020). The species typically utilises coastal wetland habitat and rarely occurs inland. The Species is considered unlikely to occur within the CDZ.
Epthianura crocea crocea	Yellow Chat	-	V	The species is generally associated with shrub swamps, wet thickets and drying lakebeds and is known to use both natural and artificial wetlands. It has been recorded in association with *Chenopodium auricomum* (Northern Bluebush), *Duma florulenta* (Lignum), *Sesbania* spp. (Pea-bush), *Cullen cinerea* (Annual Verbine), *Acacia stenophylla* (River Cooba), *Poa fordeana*, *Eleocharis pallens* (Spike Rush) and *Marsilea sp.* (Nardoo).	Potential	ALA species records exist approximately 35 km south-west of the CDZ in similar state-mapped habitat. The species is generally associated with shrub swamps, saltbushes, wet thickets and drying lakebeds and is known to use both natural and artificial wetlands. Potential habitat exists within the study area in the form of open shrubland with *Chenopodium auricomum* and *Duma florulenta* on drainage lines (5.3.8a and 5.3.18a). This habitat is restricted to approximately half of the CDZ (33%) which occurs as sparsely vegetated wetlands, dominated by *Chenopodium auricomum.* The more densely vegetated wetlands containing larger shrub species such as lignum and *acacia stenophylla* are restricted to approximately 13% of the CDZ.
Falco hypoleucos	Grey Falcon	V	V	Distribution is poorly known, likely to prefer timbered lowland plains that are crossed by tree-lined watercourses and adjacent to treeless areas, grasslands and open woodlands that are used for foraging.	Potential	A single record occurs within 50 km of the CDZ, 8 km west of the CDZ in adjacent terrestrial habitats (outside the floodplain). The species is known to occur throughout channel country, and multiple

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
						records exist on EBird. Habitat within the CDZ is likely to support foraging habitat for the species, which will utilise both tree-lined channels (such as in 5.3.8a), and open shrubland (such as in 5.3.18a). Vegetated wetland habitat fringing channels was observed through site photos to be relatively tree-less. *Acacia stenophylla* occasionally occurred, however, *Eucalyptus coolabah* is likely absent from this habitat within the CDZ. The absence of E. coolabah and other large-tree species meant that this area was not identified as potential breeding habitat, and likely only supports foraging resources for grey falcon.
Gallinago hardwickii	Latham's Snipe	Mi	SLC	Occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies).	Potential	Identified in the PMST as 'species or species habitat may occur within area'. No records were identified within 50 km of the CDZ. Ebird records are also mostly absent from Channel Country. Potential habitat, however, does occur in the form of freshwater wetlands and swamplands during times of inundation. The species prescence in the area is largely dependent on seasonal rainfall and the degree of inundation creating suitable shallow foraging habitat. The species is therefore considered as potentially occurring within the CDZ. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
Grantiella picta	Painted Honeyeater	V	V	Prefers forest and woodland habitats with an abundance of mistletoe. Habitat includes mistletoes in eucalypt forests, box-ironbark-yellow gum woodlands, paperbarks, casuarinas, mulgas/acacias. Highly specialised diet feeding almost exclusively on mistletoe fruit requires a high abundance to be suitable habitat.	Unlikely	The species was identified in the PMST as 'species or species habitat may occur within area'. Four ALA records from the same location occur within 6 km of the CDZ, in adjacent more terrestrial/vegetated habitat (RE 9.5.3). Eucalypt woodlands or heavily treed habitats do not occur within the CDZ. Drainage lines appear to be mostly shrub land with occasional *Acacia stenophylla*. Habitats within the CDZ are therefore unlikely to support mistletoe populations, which is an essential resource to the species. The species is therefore considered unlikely to occur.
Gelochelidon nilotica	Gull-billed Tern	M	SLC	Inhabits freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands.	Likely	Multiple ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA,2022). Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Hydroprogne caspia	Caspian Tern	M	SLC	Mostly prefer in sheltered coastal embankments, however, they will utilise inland terrestrial wetlands that	Likely	ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA, 2022).

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
				are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks.		Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species breeds at known sites within Queensland, and likely will only utilised habitat within the CDZ for foraging. Preferable habitat for the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Lophochroa leadbeateri	Pink Cockatoo	-	V	Found mainly in inland arid regions, west from St George in Queensland. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	Unlikely	Species records do occur within 50 km of the CDZ in more vegetated/woodland habitats (ALA, 2022). Eucalypt woodlands or heavily treed habitats do not occur within the CDZ. Drainage lines appear to be mostly shrub and forb land with occasional *Acacia stenophylla*. *Eucalyptus coolabah* my potentially occur, however, was not able to be identified from site photographs and is unknown whether it occurs within the CBZ. The species is therefore considered unlikely to occur.
Motacilla cinerea	Gray Wagtail	M	-	Primarily recorded in the Cairns/Townsville region and the Cape York Peninsula as a summer migrant. Prefers running water in disused quarries, sandy and rocky streams in escarpments and rainforests, sewage ponds, ploughed fields, and airfields.	Unlikely	The CDZ is outside species known range. Limited suitable wetland habitat present within the study area and no species records within 50 km of the study area (ALA, 2022; eBird, 2022).

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
Motacilla flava	Yellow Wagtail	Mi	-	Occupies a range of damp or wet habitats with low vegetation, from damp meadows, marshes, waterside pastures, sewage farms and bogs to damp steppe and grassy tundra.	Unlikely	The CDZ is outside species known range. Limited suitable wetland habitat present within the study area and no species records within 50 km of the study area (ALA, 2022; eBird, 2022).
Pedionomus torquatus	Plains-wanderer	CE	V	The species typically inhabits sparse, lowland native grasslands which are treeless and generally occur on hard red-brown soils. It has been recorded in areas with Sclerolaena tricuspis (Bindyi), S. patenticuspis (Spear-fruit Bindyi), Atriplex stipitate (Bitter Saltbush), A. vesicaria (Bladder Saltbush) and Eriochiton sclerolaenoides (Woolly-fruit Bluebush) as the dominant species.	Potential	No records occur within 50 km of the CDZ, however, the species is elusive and is known to occur in the Channel Country region. Plains-wanderer prefer grassland habitat with particular structural characteristics (5 cm height, 50% bare ground cover). The specific characteristics of grasslands/forblands within the CDZ is unknown. Potential species habitat in the form of grass/forb open herb lands occur across majority of the CDZ, approximately 48% (RE 5.3.18b). However, preferrable species habitat in Queensland is considered to occur in the Mitchell Grass Downs Bioregion (DoE, 2016).
Pezoporus occidentalis	Night Parrot	E	E	Distribution is poorly known, however habitat is across the arid zone, in particular in association with spinifex hummock grasslands, on rocky ranges, and with open herbaceous flats around salt lakes.	Unlikely	No suitable spinifex habitat present within the CDZ and no species records within 50 km of study area (ALA, 2022).
Plegadis falcinellus	Glossy Ibis	M i	SLC	The Glossy Ibis preferred habitat for foraging and breeding are fresh water marshes at the edges of lakes and rivers, lagoons, flood-plains, wet meadows, swamps, reservoirs, sewage ponds, rice-fields and cultivated areas under irrigation.	Likely	ALA records occur within 50 km of the CDZ, with the closest record within 6 km (ALA, 2022). Records occur within the same braided channel habitat as which occurs within the CDZ. Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. Preferable habitat for

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
						the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. The glossy ibis is known to breed within the Cooper Channel Country, and therefore, where conditions are suitable, may utilise vegetated wetlands for breeding habitat.
Rostratula australis	Australian Painted Snipe	E, Ma	E	Species is dependent on wetlands including shallow terrestrial freshwater (occasionally brackish) wetlands, temporary and permanent lakes, swamps and claypans. Preferred wetland habitat is characterised by emergent vegetation (including tussocks, grasses, sedges, rushes, reeds, canegrass and/or paperbarks) where nesting will occur. Artificial habitats that are occasionally used include reservoirs, farm dams, sewage ponds, inundated grasslands, and leaking irrigation channels.	Potential	No records occur within 50 km of the study area (ALA, 2022). The species utilises a variety of vegetated wetland habitats, such as what occurs within the CDZ. Given the CDZ is located entirely within the braided channels, potential wetland habitat may occur throughout the entire CDZ during periods of inundation. Preferable habitat for the species is likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ.
Tringa nebularia	Common Greenshank	Mi	SLC	Species occurs in all types of wetlands. Typical habitat includes a wide variety of inland wetlands and sheltered coastal habitats of varying salinity.	Likely	A single ALA record occurs within 50 km of the CDZ, in similar open shrubland habitat on floodplains (ALA, 2022). Potential wetland habitat will occur during periods of seasonal inundation when open forb and shrub lands become widespread wetlands. The CDZ is located entirely within braided channel floodplains, therefore the species is considered to have the potential to occur. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
						may provide potential foraging habitat during times of widespread inundation.
Tringa stagnatilis	Marsh Sandpiper	Mi	SLC	Inhabits a variety of wet habitats, including permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewage farms and saltworks.	Likely	A single ALA record occurs within 50 km of the CDZ, however, the record is located outside of the braided channels in more vegetated habitat. The species utilises a variety of wetland habitats, and therefore has the potential to occur throughout the braided channels within the CDZ. The species is a non-breeding visitor to Australia, and potential foraging habitat for the species is most likely to occur in the vegetated wetlands (REs 5.3.18a, 5.3.8a) which accounts for approximately 45% of the CDZ. Open herb lands may provide potential foraging habitat during times of widespread inundation.
Mammals						
Macroderma gigas	Ghost bat	V	E	Many habitats - from hot and dry mulga country to wet tropical forests. Generally, species forage within 1-2 km of their daytime roost site. Roost sites are typically in caves, rock crevices, and old mines.	Unlikely	No ALA records occur within 50 km of the CDZ. Suitable habitat for either foraging or breeding does not occur within the CDZ.
Notomys fuscus	Dusky Hopping-mouse	V	E	Species typically occupies a diversity of soft sandy habitats across its range, preferring sand dunes, sand hills and ridges with sandhill canegrass (Zygochloa paradoxa), sandhill wattle (Acacia ligulata), nitre bush (Nitraria billardieri) and sticky hopbush (Dodonaea viscosa). It traverses but does not inhabit inter-dune swales and gibber plains, and typically does not occur in sand dunes containing Spinifex (Triodia sp.).	Unlikely	No records occur within 50 km of the study area, which is slightly outside the species' range. (ALA, 2022). No suitable habitat in the form of sand dunes occurs within the CDZ, which is all mapped on alluvial plains (landzone 3).

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
Petrogale xanthopus celeris	Yellow-footed Rock-wallaby	V	V	Restricted distribution in the rocky ranges of central western Queensland. Primary habitat includes rugged rocky areas, along the edges of low sandstone tablelands and hills, utilising caves and rock crevices.	Unlikely	Suitable habitat in the form of rugged rocky areas are absent from the CDZ, which is entirely mapped over alluvial plains (land zone 3). No ALA species records occur within 50 km of CDZ (ALA, 2022).
Pseudomys australis	Plains mouse	V	E	Restricted to the gibber plains of the Lake Eyre Basin in northern South Australia. The species is presumed extinct in Queensland, NSW and Victoria (DOE, 2022; ALA, 2022). Outlying recent records (from 2001) of the species in Diamantina National Park come from remains extracted from Barn Owl pellets. These are likely representative of large scale dispersal by predators, or due to temporary increases in the species' spread after favourable seasonal conditions, rather than an indication of a permanent population (Moseby, 2012).	Unlikely	Restricted to northern South Australia. Records in Queensland are approx. 300 km north of the project area and are not representative of a permanent population, rather outlying records of the species' remains. Presumed extinct in Queensland.
Tachyglossus aculeatus	Short-beaked Echidna	-	SLC	Widely distributed across a variety of habitats, including open woodlands, forest, savanna, agricultural areas, semi-arid, and arid regions.	Potential	No records occur within 50 km of the project area (ALA, 2022). The species is the only specialised ant-eating mammal in Australia and does not require distinct differences in habitat to meet both foraging and reproductive needs (ALA, 2022b). Given the species is widespread across Australia and utilises a wide array of habitats, including those present within the project area, the species may utilise habitat within the project area. The species is unlikely to occur during seasonal inundation.
Reptiles						
Aspidites ramsayi	Woma	-	NT	Found throughout arid and semi-arid Australia, particularly in the dry subtropics to the west in Queensland. Occupies a wide variety of dry habitats	Potential	No ALA records occur within 50 km of the CDZ (ALA, 2022). However, the species occurs in a variety of habitat types, and its distributional range covers the entirely of Channel Country. The

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
				from spinifex desert to brigalow, eucalypt and acacia woodlands, heaths and shrublands.		species is therefore considered to have the potential to occur within the CDZ, particularly within the more vegetated channels (such as 5.3.8a).
Flora species						
Frankenia plicata	Sea Heath	E	-	Species has only been recorded in South Australia. Species grows in a range of habitats, including on small hillside channels. It commonly occurs in swales of loamy sand to clay and is found in association with a wide range of vegetation communities.	Unlikely	The species is not known to occur within Queensland, therefore, no ALA records occur within 50 km of the CDZ (ALA, 2022). The species is not know to occur within the braided channel habitat of the Cooper Basin.
Grevillea kennedyana	Flame Spider-flower	V	V	The Flame Spider-flower occurs on scree slopes of mesas, steep jump-ups and rocky drainage lines. The species grows in loamy soils on weathered silcrete (Makinson 2000b) in areas which receive low annual rainfall. On lower slopes, the Flame Spider-flower is usually the only species of low shrub present with other low shrub and tree species occurring on higher slopes (BRI Rare and Threatened Plant Database 2001). The species normally occurs in sparse shrubland or low woodland of Mulga (*Acacia aneura*), Gidgee (*A. cambagei*), Curara (*A. tetragonophylla*), Whitewood (*Atalaya hemiglauca*) and occasionally Black Oak (Casuarina pauper) with a chenopodiaceous ground cover (BRI Rare and Threatened Plant Database 2001; Duncan 1992b; NSW Herbarium undated). Other associated low shrubs include Limestone Fuchsia (*Eremophila freelingii*) (predominant upslope), Maroon Bush (*Scaevola spinescens*) and Senna spp. (Duncan 1992b). Ground layer species include *Astrebla* spp., *Sclerolaena* spp. and Yellow Tails (*Ptilotus nobilis*).	Unlikely	No records occur within 50 kms of the CDZ (ALA, 2022). Suitable habitat does not occur within the CDZ or surrounds, and the study area is outside of the species range.

Species	Common name	EPBC Act status[1]	NC Act status[1]	Habitat description[2]	Likelihood of occurrence	Justification
Rhodanthe rufescens	-	-	NT	Very little is known about this species.	Potential	One record occurs within 50 km of the study area (ALA, 2020). The species has been recorded in the wider region within RE 5.3.21a, similar habitat to this is mapped such as 5.3.13 and 5.3.13. Given little is known about the species and it occurs on the alluvial plains within Channel country, a precautionary approach is taken and the species is considered to have the potential to occur.
Sclerolaena walkeri	-	V	-	Species is found on saline river flats throughout central and western Queensland. Has been recorded in association with Soda Bush (*Neobassia proceriflora*), Queensland Bluebush (*Chenopodium auricomum*) and Yapunyah (*Eucalyptus ochrophloia*).	Potential	The species is known to occur on floodplains and in channels, in associated with *Chenopodium auricomum.* In broad terms the species is considered to occur within desert channels in south-west Qld. Although no ALA records occur with 50 km of the CDZ, all habitat within the CDZ has the potential to support the species. The species is therefore considered to have the potential to occur.
Xerothamnella parvifolia	-	V	-	Species occurs on stony ridges and lower slopes of rocky escarpments, often in association with Gidgee (*Acacia cambagei*). In Queensland, the species has been recorded in Gidgee low open woodland with Senna sp. on reddish clays with a gravelly surface and on lower slopes of dissected low tablelands in reddish clay soil with stony surface debris.	Unlikely	No species records or suitable habitat occur within 50 km of the study area (ALA, 2022).

[1]CE = Critically Endangered, E = Endangered, M = Migratory, V = Vulnerable, SLC = Special Least Concern, NT = Near Threatened
[2]Information derived from the relevant species SPRAT page or conservation listing advice.

Appendix C Significant impact assessments

Habitat mapping was conducted for the entire project area based on broad habitat types, RE associations and site data. A combination of site photos and public species records was utilised to map species habitat specifically in the CDZ (**Figure 5, Figure 6**). Representative photos of potential species habitat occurring in the CDZ are provided in **Appendix D.** The SRI assessment conservatively assumes all proposed disturbance will be located in remnant vegetation. However, approximately 3.6 ha (42%) of the proposed RoW area is mapped as non-remnant vegetation. This is because the larger Wackett-south-2 pipeline is proposed to sit adjacent to the existing Wackett-south-1 pipeline. The strategy of pipeline placement to occupy already existing disturbed vegetation reduces the potential impact to values of MSES by almost half. Further, intact vegetation will be rehabilitated and restored to the condition present prior to disturbance.

An SRI has been prepared for all MSES identified within the CDZ and RoW as known, likely or potentially occurring. This assessment has been undertaken in accordance with the Significant Residual Impact Guidelines (EHP 2014) for MSES.

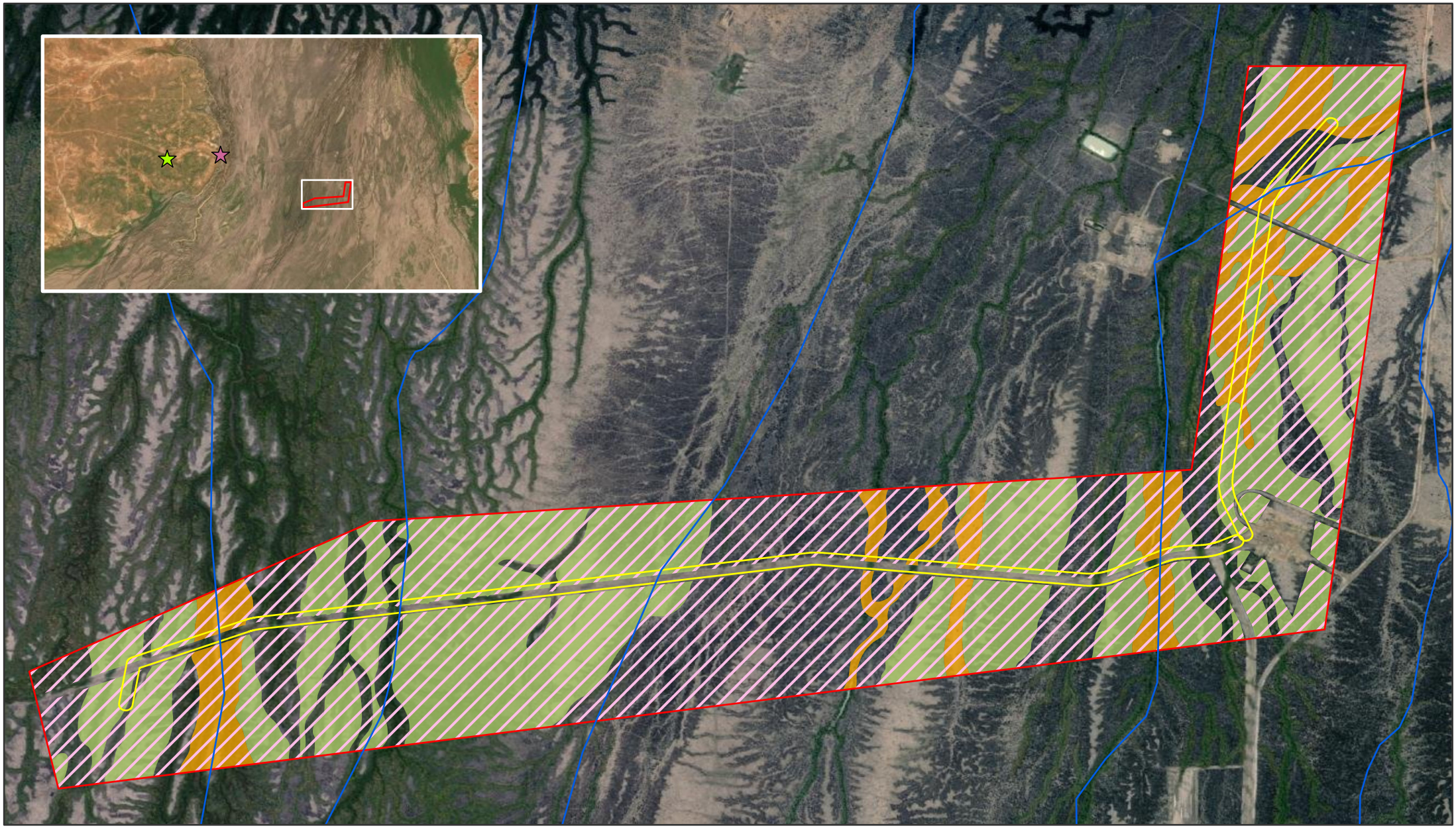

Figure 5: Potential habitat for Short-beaked echidna, Grey falcon, Fork-tailed swift, Plains-wanderer, and Bulloo grey grasswren

Construction Disturbance Zone
Indicative pipeline RoWs
Watercourse

Short-beaked echidna, fork-tailed swift, grey falcon
Potential foraging habitat
Plains-wanderer
Potential marginal foraging/breeding habitat
Grey grasswren
Potential marginal foraging/breeding habitat

ALA records
Fork-tailed swift
Grey Falcon

Datum/Projection:
GCS WGS 1984
Project: 22Bri2909-BS Date: 29/07/2022

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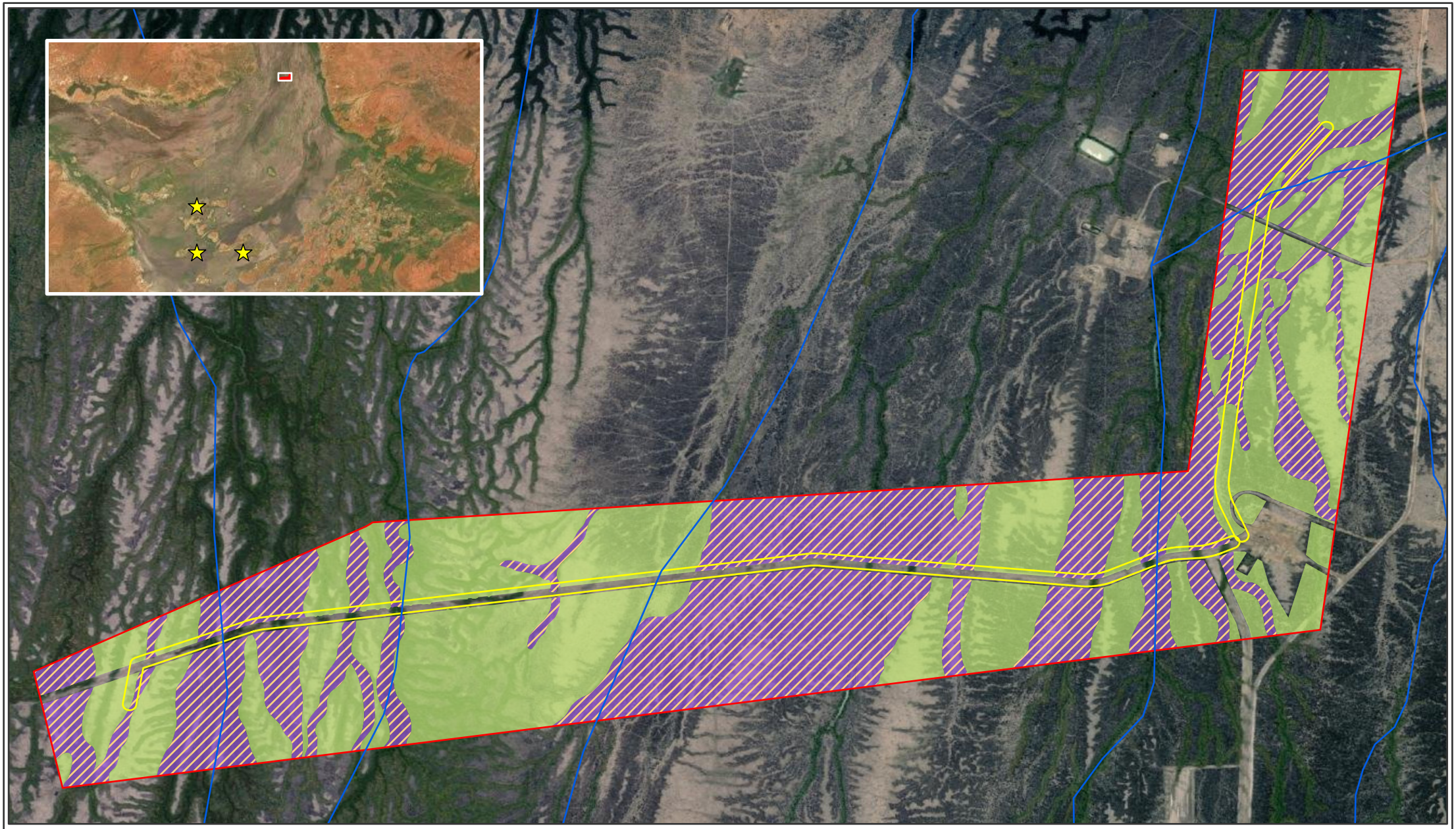

Figure 6: Potential habitat for Australian painted snipe and Yellow chat (Gulf)

Construction Disturbance Zone
RoW
Watercourse

Australian painted snipe
Potential breeding and foraging habitat
Potential foraging habitat

Yellow chat (Gulf)
Potential foraging/breeding habitat

ALA records
Yellow Chat

Datum/Projection:
GCS WGS 1984
Project: 22Bri2909-BS Date: 29/07/2022

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Kilometers

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Australian Painted Snipe

Australian Painted Snipe is listed as Endangered under both the NC Act and the EPBC Act.

Ecology and distribution:

The Australian painted snipe has been recorded across majority of the Australian continent; however, is most common in eastern Australia where its presence is still patchy and unpredictable (ALA, 2022b). It is known to frequent shallow, freshwater wetlands (occasionally brackish) – both ephemeral and permanent, such as lakes, swamps, claypans, dams, and waterlogged grasslands (DESWPC, 2013). Habitat generally is occupied by moderately dense vegetation of grasses, rushes, and reeds. The species is known to commonly occur in Qld channel country and other semi-arid regions, and occupy habitat comprised of lignum, swamp canegrass, open timber, or samphire (DESWPC, 2013). The species forages in wetland habitat for invertebrates such as worms and crustaceans, as well as seeds and other vegetation. The species may breed opportunistically in suitable habitats which have recently flooded, where vegetation cover offers suitable shelter, and shallow water where exposed mud provides abundant food resources.

Species-specific threatening processes:

- Habitat loss, disturbance, and modification
- Invasive weeds
- Pressure from grazing – trampling, and habitat displacement
- Predation by feral species

Pressures such as trampling by livestock and habitat displacement at wetland sites are unlikely to be increased or result from the proposed development.

Proposed impacts to species habitat within the RoWs:

A maximum clearing area is proposed:

- potential foraging/breeding habitat – 4.4 ha
- potential foraging habitat – 4.2 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to Australian painted snipe.

Significant impact assessment Australian Painted Snipe

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of a population of a species	No records of Australian painted snipe occur within 50 km of the study area (ALA, 2022). The species occurs opportunistically and uses areas depending on the occurrence of suitable wetland habitat and prey species throughout its range. The

Significant impact criteria	Response to criteria
OR Lead to a long-term decrease in the size of a local population	species may move within the Channel Country seasonally, driven by summer-autumn rainfall inundating floodplains and wetlands. Potential foraging habitat for this species occurs across the entirely of the CDZ, as it is located within braided channels, which experiences seasonal inundation and transformation into widespread suitable wetland habitat. The suitability of habitat will vary seasonally with the degree of water inundation. This species is widespread and highly mobile, capable of moving between suitable habitat. Approximately 9 ha of potential habitat would be removed by the project. Given the abundance of similar habitat within the surrounds of the CDZ, it is unlikely that the removal of a small area (approximately 9 ha) of potential habitat as part of the project will lead to a long-term decrease in the size of a local population of Australian painted snipe, should it occur.
Reduce the area of occupancy of the species OR Reduce the extent of occurrence of the species	The Australian Painted Snipe is recorded in all States and Territories throughout Australia, with the majority of sightings occurring in eastern-Australia. The current extent of occurrence is estimated to be 7,100,100 km^2 and stable, with an area of occupancy estimated to be 2000 km^2. Wetlands and clay pans provide potentially suitable habitat for the species and occur throughout the Bulloo region. Given the species area of occupancy occurring throughout QLD and into surrounding States, the availability of similar habitat in the surrounds, and the relatively small, and linear nature of proposed impact to potential habitat (9 ha), it is unlikely the Project will reduce the area of occupancy or extent of occurrence of the Australian painted snipe.
Fragment an existing important population into two or more populations	The Australian Painted Snipe commonly inhabits wetlands throughout Australia, however, its presence within a landscape is often patchy and unpredictable. Habitat potentially suitable for the species occurs throughout the region, with a very small proportion of this occurring within the CDZ. Potential impacts to a small, linear area (i.e. ~19 m wide) are unlikely to fragment an existing population given the highly mobile nature of this species, and extent of suitable habitat surrounding the CDZ.
Adversely affect habitat critical to the survival of the species	The Draft National Recovery Plan for the Australian painted snipe (*Rostratula australis*) (DoEE, 2019) provides guidance on what habitat should be considered habitat critical to the survival of the species. Any categorisation of habitat critical to survival must acknowledge that the species exists in a mosaic of wetland habitats, with carrying capacity fluctuating with seasonal or episodic floods and effects of threats (DoEE, 2019). The species habitat is also influenced by biophysical environments that varies across the species range (DoEE, 2019). A such, there is no one definition, but a definition should be delivered at a bioregional scale to account for species specific requirements of that region. As a guide, habitat critical to the survival of the Australian Painted Snipe can be considered to include: • Any habitat where the species is known or likely to occur (especially with suitable breeding habitat) within the indicative distribution map provided in the Draft National Recovery Plan for the Australian painted snipe (*Rostratula australis*) (DoEE, 2019) • Any location outside the above area that may be periodically occupied by Australian painted snipe when conditions are favourable. Given the broad guidance and the local habitat preferences of the region being seasonal wetlands / clay pans associated with summer rains, habitat critical to the survival will consist of vegetated wetlands during periods of inundation and therefore suitability to the species ecological requirements. Of particular importance, are the vegetated wetlands fringing channels (5.3.8a, 5.3.18a). If impact to vegetated wetlands is avoided (4.4 ha) during periods of inundation and therefore

Significant impact criteria	Response to criteria
	occupancy by the species, impact to the species and habitat critical to survival can be avoided.
Disrupt the breeding cycle of a population OR Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	The species may breed in response to wetland conditions, rather than during a particular season. Breeding habitat requirements for Australia painted snipe are thought to be specific – shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. At the present time Cooper creek is experiencing inundation and therefore conditions are temporarily suitable to breeding and consequently considered to be ecologically significant. It is recommended that all proposed disturbance be avoided until wetlands are dry and vacated by breeding wetland bird species such as Australian painted snipe. This action would avoid any potential disruption to the breeding cycle of the species, and provide opportunity for habitat restoration and recovery before the following seasonal rainfall. In conclusion, if avoidance strategies are implemented, significant impact to breeding cycle of a population or disruption to ecologically significant locations are unlikely.
Result in genetically distinct populations forming as a result of habitat isolation	Impacts to such a small proportion of available habitat is not expected to decrease the availability or quality of habitat within the region to the extent that it would result in a decline in the species, or genetically distinct populations. A maximum of 9 ha is proposed to be developed. Given the presence of potential habitat scattered throughout the project area, and surrounding region, it is unlikely the project could result in species population decline – especially when avoiding key seasonal periods of wetland inundation.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	Appropriate weed hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of new invasive species. The Project is therefore considered unlikely to result in the introduction or establishment of any new invasive species.
Introduce disease that may cause the species to decline	Appropriate hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of diseases. It is unlikely that the Project will result in the introduction of diseases that may cause Australian painted snipe numbers to decline.
Interfere with the recovery of the species	There is no adopted or made recovery plan for this species. The species may breed opportunistically in suitable habitats which have recently flooded, where vegetation cover offers suitable shelter, and shallow water where exposed mud provides abundant food resources. Therefore, the proposed action has the potential to impact the species breeding during the current environmental condition – given Cooper Creek is currently inundated. If the proposed development occurs outside of suitable breeding conditions (wetland inundation), it is unlikely to interfere with species reproduction, and therefore recovery opportunity.
Significant impact outcome	**Unlikely to be significant**

Grey Falcon

Grey Falcon is listed as vulnerable under the EPBC Act and the NC Act.

Ecology and distribution:

The species occupies arid to semi-arid zones of Australia where it is found at low densities. The breeding distribution of the species is largely limited to areas of the highest annual average temperatures, where there is an average annual rainfall of less than 500 mm (Schoenjahn *et al*., 2011). Whilst the species

frequents habitats such as grasslands and sand dune habitats, it prefers lightly timbered and tree-less lowland plains that are intersected by tree-lined watercourses (Schoenjah, 2016). The species feeds almost exclusively on birds, including finches, doves, pigeons and small cockatoos (Schoenjahn *et al.*, 2013). Like other falcons, grey falcon utilise other birds' nests, particularly corvids (Schoenjahn *et al.*, 2013). The nests they choose to occupy are usually high, in living eucalyptus trees, often near water or watercourses, including *Eucalyptus coolabah* (coolibah) or *E. camaldulenisis* (river red gum).

Species-specific threatening processes:

The species is thought to be in decline due to:

- overgrazing in arid zone rangelands
- clearance of open woodland in the semi-arid zone for marginal farming, which degraded habitat and affected prey abundance and nest site availability (Garnett, 1993)
- potential reduction in nest-site availability due to grazing by introduced herbivores preventing tree regeneration
- predation by cats. Schoenjahn (2018) documented that Grey Falcons will roost on the bare open ground and documented Grey Falcon in the gut contents of cats. Chicks may be vulnerable to cat predation at accessible nests (TSSC, 2020).

Although some clearing of foraging habitat is proposed, the proposed development does not include key threatening processes such as grazing practices that are degrading and reducing species habitat availability on a landscape scale. Cats are already established in the area, and the project is unlikely to increase or introduce additional invasive predators.

Proposed impacts to species habitat within the RoWs:

The project will result in a maximum clearing area of:

- potential foraging / dispersal habitat – 8.6 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to Grey Falcon.

Significant impact assessment for Grey Falcon

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of an important population of a species OR Lead to a long-term decrease in the size of a local population	The species occurs in low-densities across the arid to semi-arid zone of Australia. No defined definition of important habitat for the species occurs. Further, habitat present within the CDZ is considered unlikely to support an important population based on the following criteria: • unlikely to be a key source populations either for breeding or dispersal, given the absence of potential breeding habitat, • unlikely to host a population that is necessary for maintaining genetic diversity, given that habitat in the project area is characteristic of the

Significant impact criteria	Response to criteria
	surrounding landscape, and that the species is highly mobile and has a large home range that would extend outside the CDZ • is not a population that is near the limit of the species range, given the species occupies large areas of arid and semi-arid Australia and the proposed development is not at the limit of this range. Grey falcon has not been recorded within the CDZ (no ALA records). The nearest species record is located 8 km to the north-west of the CDZ, in adjacent terrestrial habitats (outside the floodplain). Habitat within the CDZ is likely to support foraging habitat for the species, which will utilise both tree-lined channels (such as in 5.3.8a), and open shrubland (such as in 5.3.18a and 5.3.18b). Recent flood events have caused extensive dieback of trees along drainage lines within the region, and therefore the CDZ currently lacks the mature trees utilised by this species for nesting, therefore no breeding habitat for the grey falcon occurs within the CDZ. Approximately 8.6 ha of potential foraging habitat for the grey falcon would be removed by the project. Similar habitat is likely to occur throughout much of south-west Queensland. Given the highly mobile nature of this species, lack of breeding habitat within the CDZ, and availability of suitable habitat within the region, the proposed action is considered unlikely to lead to a long-term decrease in the size of a local population of Grey falcon.
Reduce the area of occupancy of an important population OR Reduce the extent of occurrence of the species	The grey falcon is a highly mobile species with a wide distribution across Australia. The CDZ is not at the limit of this species distribution. Given the availability of suitable habitat throughout the region, and the relatively small, linear (i.e. ~19 m wide) impact to potential habitat within the CDZ, it is unlikely the proposed impact will reduce the extent of occurrence and/or the area of occupancy of the Grey Falcon.
Fragment an existing important population into two or more populations	Grey falcon inhabits a variety of habitat types throughout Queensland. Habitat potentially suitable for the species occurs throughout the Bulloo region, with a very small proportion of this proposed to be removed by the project. Approximately 8.6 ha of potential habitat would be removed. Potential impacts to a small, linear area (i.e. ~19 m wide) are unlikely to fragment an existing population into two or more populations given the highly mobile nature of this species, and extent of suitable habitat surrounding the CDZ. Further, these habitats are rapid to recover following seasonal rain and will be restored to prior condition.
Adversely affect habitat critical to the survival of the species	No habitat critical to the survival of the species is defined for grey falcon. Whilst potential habitat for the species may be present in the form of potential foraging habitat, the habitat present in the CDZ is typical of that in the surrounding landscape and is unlikely to be necessary for the long-term maintenance of the species, or to maintain genetic diversity or for the reintroduction of populations. As such, habitat within the CDZ is unlikely to be habitat critical to the survival of the grey falcon. The proposed development will directly impact up to 8.6 ha of potential foraging habitat, and even less in the context of available habitat within the surrounding region. Foraging habitat in the form of sparse tussock grasslands is an abundant vegetation community in the region, and in consideration of these facts, the proposed development is unlikely to adversely affect habitat critical to the survival of the species.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent	Grey falcon occurs within a variety of habitat types throughout Queensland and is a highly mobile species. The proposed habitat disturbance is relatively small (8.6 ha), linear (~19 m wide), and is unlikely to inhibit movement of the species throughout the

Significant impact criteria	Response to criteria
that the species is likely to decline OR Result in genetically distinct populations forming as a result of habitat isolation	region. The project is therefore unlikely to lead to the formation of genetically distinct populations as a result of habitat isolation.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Appropriate weed hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of new invasive species. The Project is therefore considered unlikely to result in the introduction or establishment of any new invasive species.
Introduced disease that may cause the population to decline	Appropriate hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of diseases. It is unlikely that the Project will result in the introduction of diseases that may cause grey falcon numbers to decline.
Interfere substantially with the recovery of the species	There is no adopted or made recovery plan for this species. None-the-less, the good quality habitat surrounding the CDZ will not be impacted, and the clearing of a relatively small area of foraging habitat within the CDZ is unlikely to interfere with the recovery of grey falcon.
Disrupt the breeding cycle of an important population OR Cause disruption to ecologically significant locations (breeding, migration or resting sites) of a species	Ecologically significant locations for the grey falcon are predominantly nesting sites, usually located in the tallest trees along watercourses. These features are absent from the CDZ. None-the-less if the species, or a possible raptor nest is identified prior to or during clearing activities, controls (such as exclusion zones) will be put in place to avoid disruption to the location.
Significant impact outcome	**Unlikely to be significant**

Yellow Chat

Yellow Chat (Gulf) is listed as vulnerable under the NC Act.

Ecology and distribution:

There are three subspecies of yellow chat in Australia, all preferring chenopod shrublands, grasslands around water, wetlands, braided channels and depressions with associated vegetation. The gulf subspecies (*Epthianura crocea crocea*) is generally associated with shrub swamps, saltbushes, wet thickets and drying lakebeds and is known to use both natural and artificial wetlands. It has been recorded in association with *Chenopodium auricomum* (northern bluebush), *Duma florulenta* (Lignum), *Sesbania* spp. (Pea-bush), *Cullen cinerea* (Annual Verbine), *Acacia stenophylla* (River Cooba), *Poa fordeana*, *Eleocharis pallens* (Spike Rush) and *Marsilea* sp. (Nardoo). The subspecies occurs from Roebuck Plains, near Broome (Western Australia), to Barkly Tablelands (Northern Territory) and in Queensland from Gulf lowlands to Hughenden and inland to south-west Queensland (near Windorah), with records occurring in the Cooper Creek system (Pizzey & Knight, 2022; ALA, 2022). The species is predominately insectivorous, searching for prey in damp substrates, low vegetation or shallow water.

Species-specific threatening processes:

Threatening processes for the subspecies are not well understood, however, may include that subject to the other subspecies (*E. crocea tunneyi, E. crocea macgregori*) which include:

- invasion of floodplain habitat from exotic flora species
- habitat degradation from exotic fauna species (pigs and cattle)
- reduced reproduction success from predation by feral cats
- changed fire regimes.

Although some clearing of habitat is proposed, the proposed development does not include key threatening processes such as degrading habitat through invasive species or reproductive success. Cats and pigs are already established in the area, and the project is unlikely to introduce additional invasive predators beyond those already occurring.

Proposed impacts to species habitat within the RoWs:

The project will result in a maximum clearing area of:

- potential foraging / breeding habitat – 4.4 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to Yellow Chat (Gulf).

Significant impact assessment for Yellow Chat

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of a local population	The nearest record of the yellow chat is located approximately 35 km to the south-west of the CDZ in similar state-mapped habitat. Approximately 4.4 ha of potential habitat for this species in the form of open shrublands along channels containing lignum would be removed as part of the proposed operations. The removal of a very small amount of habitat, relative to the remaining high-quality habitat within the region is considered unlikely to lead to a long-term decrease in the size of a local population.
Reduce the extent of occurrence of the species	The species is known to occupy floodplain and wetland habitat within the region. Suitable habitat for this species is widely available in the surrounds of the CDZ. The CDZ is not at the limit of the species range. The removal of a relatively small amount of potential habitat within the CDZ (4.4 ha) is therefore considered unlikely to reduce the extent of occurrence of yellow chat within the region.
Fragment an existing population	Yellow chat inhabits a variety of floodplain and wetland habitat types throughout western Queensland. Habitat potentially suitable for the species occurs throughout the region, with a very small proportion of this occurring within the CDZ. Impacts to a linear (i.e. ~19 m wide) and small area (4.4 ha) are unlikely to fragment an existing population, particularly given the extent of suitable habitat within and surrounding the CDZ, and the mobility of the species.

Significant impact criteria	Response to criteria
Result in genetically distinct populations forming as a result of habitat isolation	Yellow chat occurs within a variety of floodplain and wetland habitat types throughout western Queensland and is a highly mobile species. Impacts to a linear (i.e. ~19 m wide) and small area (4.4 ha) are unlikely to inhibit movement of the species throughout the region and will therefore not lead to the formation of genetically distinct populations as a result of habitat isolation.
Result in invasive species that are harmful to an endangered or vulnerable species becoming established in the endangered or vulnerable species' habitat	Appropriate weed hygiene procedures will be implemented during the construction and operational phases of the proposed action to minimise the risk of introduction of new invasive species. The Project is therefore considered unlikely to result in the introduction or establishment of any new invasive species.
Introduced disease that may cause the population to decline	Appropriate hygiene procedures will be implemented during the construction and operational phases of the proposed action to minimise the risk of introduction of diseases. It is unlikely that the Project will result in the introduction of diseases that may cause yellow chat to decline.
Interfere with the recovery of the species	There is no adopted or made recovery plan for this species. None-the-less, the majority of good quality habitat (open shrublands / vegetated wetlands) within and surrounding the CDZ will not be impacted. Given the proposed impacts are linear and narrow (maximum 19 m wide), there is less risk the species will be exposed (i.e. not have access to nearby shelter in the form of shrubs) to threatening processes such as predation during the period of development and vegetation recovery. The clearing of a relatively small and linear area of habitat (4.4 ha) is unlikely to interfere with the recovery of Yellow Chat.
Cause disruption to ecologically significant locations (breeding, migration or resting sites) of a species	Ecologically significant locations for yellow chat are predominantly nesting sites, which are usually low in sedges of grasses. The proposed impact area is linear and narrow (maximum 19 m wide), therefore the thorough inspection of vegetating for nest sites is practically manageable during clearing activities. If the species is identified prior to or during clearing activities, controls (such as exclusion zones) will be put in place to avoid disruption to the location. With the implementation of controls, the Project is unlikely to cause disruption to ecologically significant locations of the yellow chat.
Significant impact outcome	**Unlikely to be significant**

Plains-wanderer

Plains-wanderer is listed as critically endangered under the EPBC Act and vulnerable under the NC Act.

Ecology and distribution:

The Plains-wanderer (*Pedionomus torquatus*) is a small, ground-dwelling bird that inhabits the highly fragmented arid grasslands of south-eastern Australia in low densities. The species is a habitat specialist that is highly responsive to changes in grassland structure, so is sensitive to both decreased and increased densities of grass during periods of low and high rainfall and overgrazing by domestic stock (Baker-Gabb et al. 2016). Throughout its distribution, habitat of the species has also been impacted by cultivation, introduced pastures and the application of fertilisers, particularly in the southern parts of its range (Baker-Gabb 1998). Favoured plains-wanderer habitat are red-brown earths with sparse native ground cover, and available habitat in inland Queensland appear to be important for conservation of the species (Baker-Gabb 1998). The species forages on a variety of seeds and ground-dwelling invertebrates, although tend to forage selectively on seeds from native grasses and salt bush where available. They nest in shallow scrapes lined with grass, and in central-west Queensland breed during

autumn and early winter. Male plains-wanderers do most of the egg incubation and guarding of the chicks (Baker-Gabb 1998).

Species-specific threatening processes:

- cultivation of native grasslands
- habitat degradation from exotic fauna species (pigs and cattle)
- predation by feral cats

Although some clearing of habitat is proposed, the proposed development does not include key threatening processes such as continual long-term degradation of habitat through grazing pressure and cultivation. Cats and pigs are already established in the area, and the project is unlikely to introduce additional invasive predators beyond those already occurring.

Proposed impacts to species habitat within the RoWs:

The project will result in a maximum clearing area of:

- Marginal foraging / breeding habitat – 4.2 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to plains-wanderer.

Significant impact assessment for Plains-wanderer

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of a population of a species OR Lead to a long-term decrease in the size of a local population	No records for this species occur within 50 km of the CDZ (ALA, 2022), however, the species is elusive and is known to occur in the Channel Country region. Plains-wanderer prefer grassland habitat with particular structural characteristics (5 cm height, 50% bare ground cover). The specific characteristics of grasslands within the CDZ is unknown. Grass/forb open herb lands throughout the CDZ have been conservatively assumed to provide potential habitat for the plains-wanderer. Approximately 4.2 ha of potential plains-wanderer habitat would be removed by the project. Although potential habitat occurs within the CDZ, similar habitat is mapped extensively throughout the surrounding region by DES. Given the availability of habitat within the region and the lack of species records near the CDZ, the project is considered unlikely to lead to a long-term decrease in the size of a population of Plains-wanderer. Further, likely species habitat in Queensland is considered to occur in the Mitchell Grass Downs Bioregion (DoE, 2016).
Reduce the area of occupancy of the species OR Reduce the extent of occurrence of the species	Plains-wanderer inhabits grasslands of Queensland, NSW, Victoria and South Australia. The estimated extent of occurrence is 930,000 km^2, which is not considered to be very restrictive. The estimated area of occupancy is 330 km^2, which is considered to be restrictive. Suitable habitat for this species is widely available in the surrounds of the CDZ. The CDZ is not at the limit of the species range, and the species is not known to occur within the channels of cooper creek. The removal of a relatively small amount (4.2

Significant impact criteria	Response to criteria
	ha) of precautionary mapped marginal habitat within the CDZ is therefore considered unlikely to reduce the extent of occurrence of plains-wanderer within the region.
Fragment an existing population into two or more populations	Plains-wanderer inhabits grasslands of Queensland, NSW, Victoria and South Australia. Habitat potentially suitable for the species occurs throughout the region, with a very small proportion of this occurring within the CDZ. The species is sedentary and is known to typically occupy relatively small home ranges between 7 and 21 ha (DoE, 2016). If a population were to be detected within the CDZ, is it therefore likely to result in population fragmentation. However, consideration of the species as potentially occurring is a necessary precautionary approach given the species ecological requirements, elusive nature and rarity of encounter. An existing population is not known or considered likely to occur. Therefore, it is considered unlikely that the proposed impact will result in fragmentation of an *existing* population into two or more populations.
Adversely affect habitat critical to the survival of the species	Habitat critical to the survival of the Plains-wanderer is defined in the National Recovery Plan for the species as: • Any regions where the species is likely to occur; and • Any newly discovered locations that extend the likely range of the Plains-wanderer. The National Recovery plan maps 'likely to occur' habitat in the north-western portion of Channel Country where it meets Mitchell Grass Downs. The CDZ is situated in habitat mapped as 'species may occur', and therefore is not considered to be habitat critical to the survival of the species. The species is highly elusive and known distribution should not be used in isolation to gauge where the species may occur. Taking a conservative approach, the species is considered to have a potential to occur. The project will result in the loss of a relatively small proportion of potential habitat (4.2 ha) mapped within the CDZ, and even less when compared to the area of species occupancy at 930,00 km2. The loss of such a small proportion of the available habitat is not expected to have a detrimental effect on the remaining habitat within the broader region and the ability of plains-wanderer to persist in the region.
Disrupt the breeding cycle of a population OR Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	The CDZ is not located within a known ecologically significant location to Plains-wanderer, who's habitat in Queensland is considered likely to occur in the Mitchell Grass Downs. Any population of Plains-wanderer is considered to be an important population, given the species is critically endangered and is rarely encountered. It is considered unlikely, however, that a population occurs within the CDZ which is not located in preferrable habitat. Consideration of the species as potentially occurring is a necessary precautionary approach. The proposed action only accounts for 4.2 ha of marginal habitat outside of the species known preferable habitat distribution, therefore, it is considered unlikely to disrupt the breeding cycle of the population, or, cause disruption to ecologically significant locations.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline OR Result in genetically distinct populations forming as a result of habitat isolation	Consideration of the species as potentially occurring is a necessary precautionary approach given the species ecological requirements, elusive nature and rarity of encounter. Impacts to such a small (4.2 ha) proportion of marginal habitat is not expected to decrease the availability or quality of habitat within the region to the extent that it would result in a decline in the species, or, result in a genetically distinct population forming as a result of habitat isolation.
Result in invasive species that are harmful to a critically	Appropriate weed hygiene procedures will be implemented during the construction and operational phases of the proposed action to minimise the risk of introduction of new

Significant impact criteria	Response to criteria
endangered or endangered species becoming established in the critically endangered or endangered species' habitat	invasive species. The Project is therefore considered unlikely to result in the introduction or establishment of any new invasive species. Further, key threatening processes to the species such as predatory mammals (cats, foxes, dogs) already occur throughout the region and are unlikely to be impacted from the proposed action.
Introduce disease that may cause the species to decline	Appropriate hygiene procedures will be implemented during the construction and operational phases of the proposed action to minimise the risk of introduction of diseases. It is unlikely that the Project will result in the introduction of diseases that may cause plains-wanderer to decline.
Interfere with the recovery of the species	The recovery plan for this species lists the following recovery objectives: • reverse the long-term population trend of decline and increase the numbers of plains-wanderers to a level where there is a viable, wild breeding population, even in poor • breeding years; and to Enhance the condition of habitat across the plains-wanderers' range to maximise survival and reproductive success, and provide refugia during periods of extreme environmental fluctuation. Preferrable and likely habitat for the species occurs in the Mitchell Grass Downs Bioregion of Queensland. Impact to a maximum of 2.6 ha of precautionary assessed marginal habitat is unlikely to interfere with the recovery of the species, as these efforts will be concentrated in areas of the most suitable habitat. Further, the sparse tussock grass and forblands of the CDZ are considered to be highly versatile, fluctuating in condition with the boom-and-bust cycle of the Channel Country. It is considered that these habitats are highly capable of rapid recovery following intense seasonal rain.
Significant impact outcome	**Unlikely to be significant**

Bulloo Grey Grasswren

Bulloo grey grasswren is listed as endangered under both the NC Act and EPBC Act.

Ecology and distribution:

The Cooper Creek floodplain is known to support grey grasswren; however, the subspecies status of this population is uncertain (Black et al. 2011). The Cooper Creek population may comprise either the Bulloo subspecies (Amytornis barbatus barbatus), listed as endangered under NC Act; or the Diamantina subspecies (*Amytornis barbatus diamantina*), listed as near threatened under the NC Act. In light of this uncertainty, for the purposes of this report, the grey grasswren population has been assumed to comprise the endangered Bulloo subspecies.

The Bulloo grey grasswren (*Amytornis barbatus barbatus*) is a subspecies endemic to the floodplain of the Bulloo River on the New South Wales and Queensland border including the Bulloo River overflow, Caryapundy and Jerrira Swamps (DoE, 2014). Within this region the species occupies a highly specialised niche habitat amongst swampy wetlands dominated by tall/dense lignum (*Duma florulenta*). Suitable habitat can also occur where swamp canegrass (*Eragrostis australasica*), when lignum is also present, forming dense thickets in wetlands. The species typically will exclusively nest in dense thickets of lignum, but will utilise other nearby habitat including canegrass, saltbush (*Atriplex nummularia*), and samphire (*Halosarcia* spp.) for foraging. Habitat of this description is largely absent from the CDZ, and where potential habitat does occur it is restricted to the vegetated drainage lines (5.3.8a). Grey grasswren will forage on the seeds of native grass and shrubs within their direct territory, as well as insects. The species

is believed to be sedentary with a relatively restricted home range (up to 200m2) to their surrounding suitable habitat (DoE, 2014) and can occur as small, apparently isolated, populations (DoE, 2014). Grasswrens are typically well hidden and inconspicuous when foraging within their habitat, making them particularly difficult to detect during survey.

Species-specific threatening processes:

- Habitat loss and degradation due to over grazing
- Prevention of habitat regeneration due to continued grazing
- poor fire regimes
- predation by feral cats and foxes
- water extraction from the Bulloo River system for irrigation
- noxious weed invasion

Although some clearing of habitat is proposed, the proposed development does not include key threatening processes such as grazing practices that are degrading and reducing species long-term habitat availability on a landscape scale. The clearing also avoids core species habitat and is limited to marginal habitat that may be used seasonally.

Proposed impacts to species habitat within the RoWs:

The project will result in a maximum clearing area of:

- Marginal foraging / breeding habitat – 2 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to Grey Grasswren.

Significant impact assessment for Bulloo grey grasswren

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of a population of a species OR Lead to a long-term decrease in the size of a local population	Bulloo grey grasswren occurs on floodplains in the drainage basin of the Bulloo River, with most species records located approximately 160 km south of the CDZ (ALA, 2022). No records of this species occur within 50 km of the CDZ. The closest record exists approximately 68 km south of the CDZ, however, is an isolated record with no date supplied. The CDZ is outside of the mapped distribution of this species. Potential habitat for the Bulloo grey grasswren occurs within the CDZ in the form of periodically inundated vegetated wetlands, especially where lignum occurs (RE 5.3.8a). Habitat of this description is very limited, and only potentially occurs within drainage lines that intersect the CDZ. Similar habitat of much higher quality occurs extensively in the surrounds of the CDZ. The project would remove approximately 2 ha of marginal Bulloo grey grasswren habitat and is unlikely to lead to a long-term decrease in the size of a population of this species.
Reduce the area of occupancy of a population	The CDZ is outside of the mapped distribution for this species. The closest record of this species is approximately 68 km south of the CDZ and is an isolated record with no date supplied. Given the lack of records within the CDZ and surrounds, availability of

Significant impact criteria	Response to criteria
OR Reduce the extent of occurrence of the species	higher value suitable habitat throughout the region, and the relatively small (2 ha), linear (i.e. ~19 m wide) impact to marginal habitat within the CDZ, it is unlikely the proposed impact will reduce the extent of occurrence of the Bulloo grey grasswren.
Fragment an existing population into two or more populations	Habitat potentially suitable for the species occurs throughout the Bulloo region, with a very small proportion of this occurring within the CDZ. Approximately 2 ha of marginal habitat would be removed as part of the project. Potential impacts to a small, linear area are unlikely to fragment an existing population into two or more populations given the highly mobile nature of this species, and extent of higher quality suitable habitat surrounding the CDZ.
Adversely affect habitat critical to the survival of the species	The study area is not expected to comprise habitat critical to the survival of the species as it is outside of the species known range and comprises a very small amount of marginal habitat relative to the abundance of better-quality habitat within the region.
Disrupt the breeding cycle of an important population OR Cause disruption to ecologically significant locations (breeding, feeding, nesting, migration or resting sites) of a species.	The CDZ is absent of large areas of tall/dense patches of lignum (>2m), which is the species preferrable habitat for breeding. The consideration of the species occurrence within the CDZ is precautionary. The removal of a small amount of marginal habitat outside of the known species range is considered extremely unlikely to disrupt the breeding cycle of an important population, or cause disruption to ecologically significant locations when better-quality habitat exists outside of the project area
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline OR Result in genetically distinct populations forming as a result of habitat isolation	The Project will result in potential clearing of a very small (2 ha) accumulative area of habitat, relative to the extensive area of habitat available within the region. The CDZ is located outside of the mapped species range (Bulloo River drainage basin), and there are no nearby records of the Bulloo grey grasswren (ALA, 2022). The Project is therefore unlikely to lead to a decrease in availability or quality of habitat that would lead to a decline in the species, or result in genetically distinct populations forming as a result of habitat isolation.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat	Invasive species that could lead to habitat degradation for the species include pasture plants such as *Prosopis*. Appropriate weed hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of new invasive species. The Project is therefore considered unlikely to result in the introduction or establishment of any new invasive species.
Introduce disease that may cause the species to decline	Appropriate hygiene procedures will be implemented during the construction and operational phases of the Project to minimise the risk of introduction of diseases. It is unlikely that the Project will result in the introduction of diseases that may cause Bulloo grey grasswren numbers to decline.
Interfere with the recovery of the species	There is no adopted or made recovery plan for this species. None-the-less, the good quality habitat surrounding the CDZ will not be impacted, and the clearing of a relatively small area of marginal habitat within the CDZ is unlikely to interfere with the recovery of Bulloo grey grasswren.
Significant impact outcome	**Unlikely to be significant**

Short-beaked Echidna

The Short-beaked Echidna is listed as a special least concern animal under the NC Act.

Ecology and distribution:

The short-beaked echidna is a habitat generalist and occurs across the Australian continent from arid zones to tropical rainforest (ALA, 2022b). The species is solitary and does not occupy a fixed shelter or nest site, nor defend a distinct territory (ALA, 2022b). Home range size is known to extend from 48 to 107 ha and will considerably overlap between multiple individuals (ALA, 2022b). Echidnas will both burrow for shelter and seek out shrubs and hollow logs to burrow under. The species is the only specialised ant-eating mammal in Australia and does not require distinct differences in habitat to meet both foraging and reproductive needs (ALA, 2022b). Echidnas will undergo a state of hibernation, known as torpor, during the winter months and will therefore be less detectable during this time.

Species-specific threatening processes:

- Direct mortality due to habitat clearing, and vehicle strike
- Mechanical agricultural cropping

The short beaked echidna is a relatively resilient species to ecological impacts due to its generalist habitat requirements for both breeding and foraging, and behavioural and reproductive ecology in which allows considerable overlap in home range and lack of intra-species competition.

Proposed impacts to species habitat within the RoWs:

The project will result in a maximum clearing area of:

- Potential foraging and dispersal habitat – 8.6 ha

In order to reduce the magnitude of potential project impacts, key management and mitigation measures for the species relevant to project related threats are provided in **Section 4.3**.

With the implementation of the proposed mitigation and management strategies, the project is unlikely to result in a significant impact to Short-beaked Echidna.

Significant impact criteria	Response to criteria
Lead to a long-term decrease in the size of a local population	The species has potential to occur in the CDZ. A maximum of 8.6 ha of species habitat may be impacted by the project. It is unlikely the project would interfere with the local population as individuals are mobile with extensive home ranges and occupy a large array of habitat types. Possible impact to some individuals of a local population may occur via direct mortality during mechanical clearing processes, as echidna can be difficult to detect and are not flight responsive to disturbance. To minimise impacts to species habitat and reduce the risk of species entrapment, the following will be conducted: • infrastructure will be co-located wherever possible to minimise disturbance • Lengths of pipe will be capped or sealed when they are left overnight. Regardless, these impacts are unlikely to result in a long-term decrease in the size of a local population as the species is widespread and known to occupy a range of habitat types.
Reduce the extent of occurrence of the species	The species is Australia's most widespread native mammal occupying most of the country. It is unlikely that the project will reduce the extent of occurrence of the

Significant impact criteria	Response to criteria
	species given its ability to inhabit most of Australia, and the proposed disturbance is less than 8.6 ha.
Fragmentation of an existing population	Almost the entirety of the CDZ forms potential habitat for the species given the broad range of habitat it can occupy. The project is unlikely to fragment an existing population of short-beaked echidna, as the species is mobile and extensive suitable habitat is available in adjacent areas. Further, the species is known to traverse areas of non-suitable habitat such as roads and non-remnant vegetation.
Result in genetically distinct populations forming as a result of habitat isolation	Echidna do not defend and occupy territories, which would otherwise limit their dispersal ability in habitat undergoing minor fragmentation from clearing. The species is highly mobile and is known to commonly traverse areas of non-suitable habitat such as roads and non-remnant vegetation. Therefore, the proposed disturbance is unlikely to result in geographical isolation of a population which could have the potential to result in loss of genetic diversity and resilience. The level of proposed impact to species habitat is considered to be unlikely to result in genetically distinct populations forming as a result of habitat isolation.
Disruption to ecologically significant locations (breeding, feeding or nesting sites) of a species.	Echidna is a habitat generalist, occurring in most habitat types across Australia. Habitat requirements for breeding and foraging are not distinct from one another, as the species forages and burrows throughout its home range. Therefore, no specific habitat area within the CDZ is considered to be more ecologically significant than another. The CDZ will continue to support echidna habitat after development and minor rehabilitation and is unlikely to impede the species' use of this habitat. The proposed development is therefore unlikely to cause disruption to ecologically significant locations of the species.
Significant impact outcome	**Unlikely to be significant**

Appendix D Habitat photos

Plate 3: Potential wetland habitat for Grey-grasswren, Yellow Chat (Gulf), Australian Painted Snipe, Short-beaked Echidna, and wetland-bird species

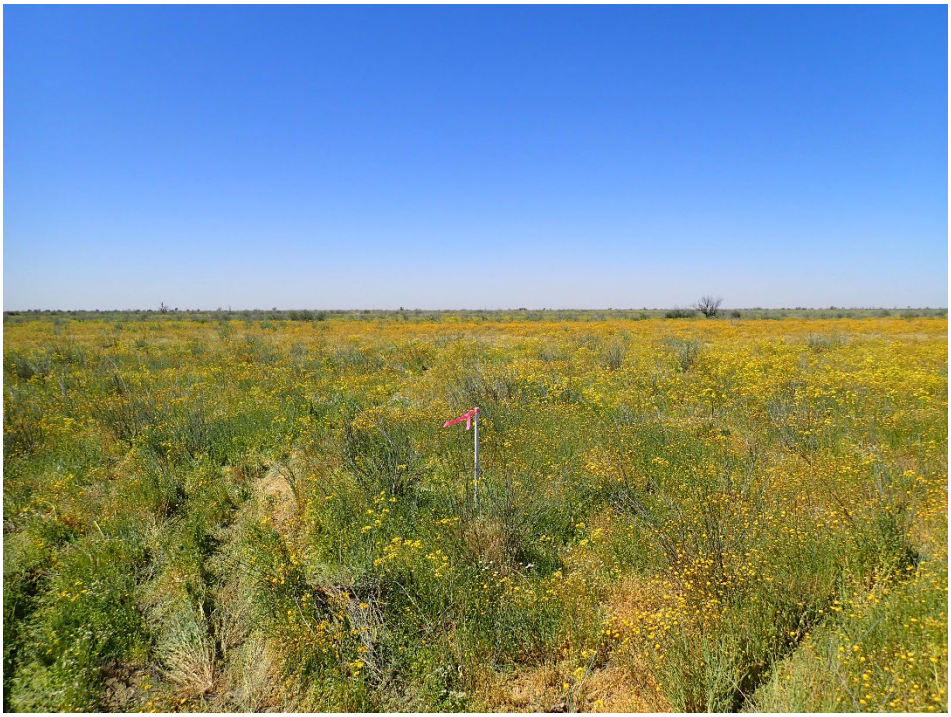

Plate 4: Potential habitat for Short-beaked Echidna, Grey Falcon, and Plains-wanderer

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