Bulloo Interlink Pipeline

Environmental Authority

Aquatic Ecology Assessment

APA Bulloo Interlink Pipeline Pty Ltd

June 2026



Contents

Executive summary **v**

Acronyms and abbreviations **vii**

Glossary **ix**

1. Introduction **1**

1.1 Project overview 1

1.2 Purpose and scope of this report 3

1.3 Report structure and content 3

1.4 Limitations 3

2. Legislative and policy context **4**

2.1 Commonwealth legislation 4

2.2 Queensland legislation 4

2.3 Regulations and guidelines 7

3. Methodology **8**

3.1 Study area 8

3.2 Assessment approach 10

3.3 Assessment criteria 41

4. Existing environment **43**

4.1 Protected aquatic matters 43

4.2 Catchments 44

4.3 Wetlands, watercourses and waterways 50

4.4 Waterholes 61

4.5 Groundwater dependent ecosystems 68

4.6 Existing hydrology 68

4.7 Aquatic habitat 72

4.8 Water quality 78

4.9 Aquatic flora 79

4.10 Aquatic fauna 81

4.11 Condition 91

4.12 MNES Likelihood of occurrence assessment 91

4.13 MSES Likelihood of occurrence assessment 91

4.14 MLES Likelihood of occurrence assessment 91

5. Construction impacts **92**

6. Operation impacts **96**

7. Cumulative impacts **97**

7.1 Approach 97

7.2 Potential cumulative impacts 97

8. Decommissioning impacts **98**

9. Recommended mitigation and management measures **99**

9.2 Significant impact assessment 101

10. Conclusion **105**

11. References **106**

Table index

Table 1.1	Structure and content	3
Table 3.1	Desktop assessment information sources	10
Table 3.2	Summary of survey effort	13
Table 3.3	Weather conditions during aquatic field surveys (Thargomindah Airport, Station 045025)	32
Table 3.4	Habitat characteristics and features recorded during habitat assessments	34
Table 3.5	River bioassessment program: habitat assessment score criteria (DNRM, 2001)	34
Table 3.6	Macroinvertebrate sampling survey effort during the post-wet and pre-wet surveys	35
Table 3.7	Summary of fish and turtle survey effort for comprehensive aquatic sites	37
Table 3.8	Water quality objectives relevant to the project	39
Table 3.9	Macroinvertebrate biological water quality objectives relevant to the project	39
Table 3.10	Likelihood of occurrence framework	40
Table 3.11	Criteria for assessing the significance of potential impacts	41
Table 3.12	Criteria for assessing the significance of residual impacts	42
Table 4.1	Protected aquatic matters of relevance to the project	43
Table 4.2	Directory of Important Wetlands in Australia in the study area	51
Table 4.3	In-situ water quality results	78
Table 4.4	Aquatic flora species confirmed present within the post-wet survey area (July 2025)	79
Table 4.5	Aquatic flora species confirmed present within the pre-wet survey area (October 2025)	80
Table 4.6	Edge macroinvertebrate indices in post-wet and pre-wet surveys	84
Table 4.7	Bed macroinvertebrate indices in post-wet and pre-wet surveys	85
Table 4.8	Desktop field results of aquatic fauna species	86
Table 4.9	Freshwater macrocrustaceans and fish species confirmed present in the study area (July 2025)	87
Table 4.10	Freshwater macrocrustaceans, turtle and fish species confirmed present in the study area (October 2025)	88
Table 4.11	Aquatic conservation significant fauna identified during the desktop assessment	89
Table 9.1	Pre-construction and construction mitigation and management measures	99
Table 9.2	Operational mitigation and management measures	100
Table 9.3	Decommissioning mitigation and management measures	101
Table 9.4	Significant impact assessment – Ramsar wetlands	101
Table 9.5	Significant impact assessment – waterways providing for fish passage	103

Figure index

Figure 1.1	Project location and key features	2
Figure 3.1	Aquatic ecology study area and project site	9
Figure 3.2	Aquatic ecology survey effort within the study area	18
Figure 3.3	Total monthly rainfall in 2025 and mean monthly rainfall from 1999 – 2025 (Thargomindah Airport, Station 045025).	33
Figure 4.1	Drainage basins of the study area	46
Figure 4.2	Aquatic conservation assessment of riverine areas within the study area	47
Figure 4.3	Nationally and regionally important wetlands within the study area	54
Figure 4.4	Aquatic conservation assessment of non-riverine (wetland) areas within the study area	57
Figure 4.5	Watercourses (Water Act 2000) and waterholes within the study area	62
Figure 4.6	Waterways providing for fish passage (WWBW) within the study area	65
Figure 4.7	Predicted aquatic groundwater dependent ecosystems within the study area	69
Figure 4.8	nMDS ordination plot indicating differences in edge macroinvertebrate community composition between post-wet and pre-wet survey conditions.	82
Figure 4.9	nMDS ordination plot indicating differences in bed macroinvertebrate community composition between post-wet and pre-wet survey conditions	83

Plate index

Plate 3.1	Fyke net deployed at a site during the post-wet survey.	38
Plate 4.1	Bulloo Lake in July 2025	50
Plate 4.2	Examples of ‘boom’ (left) and ‘bust’ (right) conditions during post-wet July 2025 survey (left) and pre-wet October 2025 survey (right), at Aquatic site 15 (top) and Aquatic site 38 (bottom)	52
Plate 4.3	Examples of gilgai (left) and wetlands (Bulloo Lake, right) within the study area	53
Plate 4.4	A straight channel (left) and an irregular channel (right) at Aquatic site 39 during the post-wet survey	73
Plate 4.5	Braided channels at Aquatic site 4A during the pre-wet survey	73
Plate 4.6	Algal growth (left) and evidence of erosion of the bank due to cattle access (right) at Aquatic site 12 (post-wet)	74
Plate 4.7	Aquatic habitat features in broader survey sites including adjacent wetlands: Top: Bulloo Lake wetland holding water (top left) and fringed by low-lying vegetation (top right). Middle: Aquatic site 73, adjacent Cooper Creek – Wilson River Junction wetland with shallow disconnected pools (middle left). This is the main channel within the immediate broader region (middle right). Bottom: Bulloo River, with scouring from past flows (bottom left), and bridge crossing at riffle section (bottom right)	75
Plate 4.8	Aquatic habitat features in waterholes: Top: Noccundra Waterhole; Bottom: Nockatunga Waterhole. Both holding deep and relatively unbroken pool habitat with fringing continuous riparian vegetation	76
Plate 4.9	High quality riparian vegetation and cobbled substrate at Aquatic site 17 (post-wet survey)	77
Plate 4.10	Site 17 during the pre-wet survey along the updated alignment	77
Plate 4.11	Aquatic flora species observations in the study area from top left: tail flat-sedge (Cyperus exaltatus), flat spike-rush (Eleocharis plana), lesser joyweed (Alternanthera denticulata), and channel nutgrass (Cyperus victoriensis).	80

Appendices

Appendix A Desktop results
Appendix B Habitat and watercourse (Water Act 2000) assessment results
Appendix C Bioassessment results
Appendix D Likelihood of occurrence

Executive summary

The project

APA Bulloo Interlink Pipeline Pty Ltd (APA), which is part of the APA group of companies (the APA Group) is planning to develop the Bulloo Interlink Pipeline, an underground high-pressure gas pipeline linking the South West Queensland Pipeline in Queensland (QLD) with the Moomba to Wilton Pipeline in New South Wales (NSW). The Queensland section of the Bulloo Interlink Pipeline (referred to as 'the project' for the purposes of this document) is approximately 236 kilometres (km) long. Overall, the pipeline has a total length of approximately 339 km and will provide a more direct route for natural gas to travel from Australia's northern production areas to southern gas markets.

This report

This report has been prepared by GHD Pty Ltd (GHD) as part of the environmental authority (EA) for the project. The EA supports an application for approval of the project in accordance with the Environmental Protection Act 1994 (Qld) (EP Act).

This report assesses the potential impacts of the project on aquatic ecology in accordance with the environmental assessment requirements of the EP Act and the *Application requirements for petroleum activities guidelines* (DESI, 2024).

Existing environment

The Queensland section of the Bulloo Interlink Pipeline traverses a predominantly ephemeral river system within the Bulloo River catchment. The project intersects 77 mapped watercourses, which range from low-order ephemeral channels to higher-order drainage features that provide for fish passage. These waterways are classified under matters of state environmental significance (MSES) and range from low-risk to major-risk waterway barrier works under the Queensland waterway classification framework.

Desktop assessments and targeted field surveys confirmed that no conservation significant aquatic flora or fauna are likely to occur or were recorded within the project footprint or the surrounding landscape. Aquatic habitats encountered along the alignment were generally assessed as being in poor to fair condition, reflecting widespread historical disturbance from land uses such as cattle grazing and riparian vegetation clearing.

Field surveys were undertaken following a relatively uncommon regional flooding event in March 2025; however, aquatic flora and fauna assemblages remained dominated by disturbance-tolerant species with comparatively low diversity. This observation is consistent with the highly variable hydrological regime of the Bulloo catchment, which is characterised by a boom-and-bust cycle of rainfall, episodic flow, and extended dry periods.

There are no wetlands of international importance (Ramsar wetlands) within the project footprint. Bulloo Lake, a nationally important wetland, occurs downstream in the broader region and is hydrologically associated with Caryapundy Swamp in New South Wales, the nearest Ramsar-listed wetland located approximately 130 km south of the Wilson River. The project alignment is located more than 2 km upstream of Bulloo Lake and does not intersect the wetland or its defined boundary.

Impacts from the project during construction

Construction activities have the potential to temporarily disturb aquatic environments at watercourse crossings through vegetation clearing, earthworks, and short-term changes in sediment mobilisation and water quality. The project will not result in direct loss or modification of Bulloo Lake or any other wetland habitat, as all works occur upstream within ephemeral drainage features.

Although hydrological connectivity exists at a regional scale within the Bulloo catchment, indirect impact pathways to Bulloo Lake via altered hydrology, sediment transport, or water quality are considered limited. This is due to the ephemeral nature of upstream channels, which only convey flow during rainfall events, and the implementation of construction controls that restrict works during high-risk flow conditions.

Across the 77 watercourse crossings, the project is not expected to result in a significant residual impact on waterways providing for fish passage. Avoidance, minimisation, and mitigation measures, including adherence to waterway crossing guidelines, reinstatement of beds and banks, and application of appropriate crossing construction methods, are expected to limit impacts to short-term, localised, and reversible effects.

Impacts from the project during operation

Operational impacts on aquatic values are expected to be minimal. Potential impacts are limited to infrequent maintenance activities, which may result in short-term generation of dust, localised sedimentation, or erosion if not appropriately managed. The likelihood of a pipeline failure affecting aquatic habitats is low, and existing design standards and integrity management systems further reduce the risk of environmental harm.

Impacts from the project during decommissioning

Decommissioning impacts are anticipated to be negligible, as the pipeline is expected to remain largely in situ. This approach will significantly limit ground disturbance and avoid renewed impacts to watercourses and riparian areas. No significant cumulative impacts to aquatic ecology have been identified.

Recommended mitigation measures

Based on the impact assessment findings, a number of key recommendations and mitigation measures have been proposed to minimise the potential impacts of the project during construction and operation, including:

– implementation of construction methods, such as horizontal directional drilling (HDD) at Wilson River
– ensuring immediate reinstation of beds and banks following construction
– development and implementation of an erosion and sediment control plan (ESCP) as part of the Construction Environmental Management Plan (CEMP)
– identification of no-go zones around critical habitats and riparian buffers with clear marking based on ecological surveys (i.e. any area outside of the construction right of way or laydown areas) in the construction footprint and mark out the locations where the CRoW will be reduced for the protection of waterway and wetland values.

Conclusion

With implementation of the proposed mitigation and management measures, the project can be constructed, operated, and decommissioned without significant adverse impacts on aquatic ecological values. Potential water-related impacts are expected to be localised, temporary, and manageable, with no long-term degradation of water quality, hydrological function, or downstream wetland ecological character anticipated.

Acronyms and abbreviations

Acronym/abbreviation	Description
ACA	Aquatic conservation assessment
ADR	Accepted development requirements
ALA	Atlas of Living Australia
ANZECC	Australian and New Zealand Environment and Conservation Council
APA	APA Bulloo Interlink Pipeline Pty Ltd, which is part of the APA group of companies (the APA Group)
APGA	Australian Pipelines and Gas Association
AS 2885	*AS 2885 Pipelines – Gas and Liquid Petroleum*
AusRivAS	Australian Rivers Assessment System
Biosecurity Act	*Biosecurity Act 2014*
BoM	Bureau of Meteorology
cm	Centimetre
CEMP	Construction Environmental Management Plan
CRoW	Construction right of way
DAF	(former) Department of Agriculture and Fisheries (Qld)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Cth)
DEHP	(former) Department of Environment and Heritage Protection (Qld)
DES	(former) Department of Environment and Science (Qld)
DESI	Department of Environment, Science and Innovation
DETSI	Department of the Environment, Tourism, Science and Innovation (Qld)
DIWA	Directory of Important Wetlands of Australia
DNRM	(former) Department of Natural Resources and Mines (Qld)
DoE	(former) Department of the Environment (Cth)
DPI	Department of Primary Industries (Qld)
DSDI	(former) Department of State Development and Infrastructure (Qld)
DSEWPC	(former) Department of Sustainability, Environment, Water, Population and Communities (Cth)
EA	Environmental authority
EIS	Environmental impact statement
ENSO	El Niño–Southern Oscillation
EO Act	*Environmental Offsets Act 2014* (Qld)
EP Act	*Environmental Protection Act 1994* (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EPP	*Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (Qld)
ERA	Environmentally relevant activity
ESCP	Erosion and Sediment Control Plan
FHA	Fish habitat areas
Fisheries Act	*Fisheries Act 1994* (Qld)
GBR	Great Barrier Reef
GDE	Groundwater dependent ecosystem
GES	General ecological significance

Acronym/abbreviation	Description
HDD	Horizontal directional drilling
HES	High ecological significance
IECA	International Erosion Control Association
km	Kilometres
KP	Kilometre point
LGA	Local government area
m	Metres
m^2	Square metres
mg/kg	Milligrams per kilogram
mg/L	Milligrams per litre
MLES	Matter of local environmental significance
mm	Millimetres
MNES	Matters of national environmental significance
MSES	Matters of state environmental significance
MLES	Matters of local environmental significance
n.d.	No date
NC Act	*Nature Conservation Act 1992* (Qld)
NSW	New South Wales
NTU	Nephelometric Turbidity Unit
Planning Act	*Planning Act 2016* (Qld)
PMST	Protected matters search tool
QAQC	Quality assurance/quality control
Qld	Queensland
QWQG	Queensland Water Quality Guidelines
RIDA	Regional Interests Development Approval
SEA	Strategic environmental area
SIGNAL-2	Stream Invertebrate Grade Number Average Level – Version 2
SPP	State Planning Policy
SPRAT	Species Profile and Threats Database
µg/L	Micrograms per litre
µm	Micrometre
Water Act	*Water Act 2000* (Qld)
WQO	Water quality objectives
WWBW	Waterways for waterway barrier works

Glossary

Term	Definition
Construction footprint	The CRoW and other areas of the project site that will be used to construct the project (including ancillary facilities, compounds and laydown areas).
Construction right of way (CRoW)	The area that will be directly disturbed to construct the pipeline within the project site (includes the trench, temporary storage areas and construction manoeuvring areas). The nominal corridor width is up to 40 m.
Desktop search extent	The 20 km buffer around the proposed pipeline alignment used for desktop database searches and spatial mapping.
Pipeline alignment	Refers to the pipeline centreline.
Pipeline easement (the easement)	The permanent operational easement for the project that would be established to facilitate ongoing access and maintenance. Allows the pipeline operator a legal right to enter land to construct, operate and maintain the pipeline. It is registered on the underlying land title and remains on title. The nominal easement width for the project is 30 m.
Project	The project includes constructing, operating (including maintaining) and decommissioning approximately 236 km of underground natural gas transmission pipeline located in Queensland, and associated above ground infrastructure to connect to the South West Queensland Pipeline.
Project site	The term project site is used to refer to the land required to construct, operate (including maintain) and decommission the project, and defines the extent of land subject to project approval. The project site comprises the 40 metre wide construction right of way, within which the permanent easement and surface operational facilities would be located. It also includes additional land required outside the construction right of way for temporary and ancillary facilities, including construction compounds, temporary workspaces, temporary accommodation facilities and access track works.
Study area	The full extent of land with the potential to be directly or indirectly affected by the project (e.g. by noise and vibration, visual or traffic impacts), assessed for environmental values, including the project site, survey area, and surrounding context. For the purposes of the assessment, this extent was defined by a 2 km buffer from the project site.
Survey area	The area physically surveyed on the ground, within and adjacent to the study area (120 m total, from 60 m upstream to 60 m downstream of the project site for each survey site).
Survey site	Sites within both the project site and the broader study area where potential impacts may occur and directly affect aquatic ecosystems. Additional survey sites were selected upstream and downstream of the pipeline alignment to assess existing condition and aquatic values in the surrounding environment.

1. Introduction

1.1 Project overview

APA Bulloo Interlink Pipeline Pty Ltd (APA), which is part of the APA group of companies (the APA Group) is planning to develop the Bulloo Interlink Pipeline, an underground high-pressure gas pipeline that will link the South West Queensland Pipeline in Queensland with the Moomba to Wilton Pipeline in New South Wales (NSW).

The Bulloo Interlink Pipeline includes an approximately 236-kilometre (km) long section in Queensland, which will provide a more direct route for natural gas to travel from Australia's northern production areas to southern gas markets. The pipeline has a total length of approximately 339 km, comprising about 103 km in NSW.

The section of the Bulloo Interlink Pipeline located in Queensland (referred to as 'the project' for the purposes of this document) will require an environmental authority (EA) under the *Environmental Protection Act 1994* (Qld) (EP Act). Approval for the NSW section of the Bulloo Interlink Pipeline will be sought under a separate approval process in accordance with NSW legislation and approval requirements.

1.1.1 Location

The project is located within the Bulloo Shire local government area in the vicinity of the Noccundra township within the traditional Country of the Wangkumarra People and Kullilli People. The project site extends south from the tie-in point with the South West Queensland Pipeline for about 186 km, then traverses south-west for about 30 km, and south about 20 km to the Queensland–NSW border. The project location and key project features are shown in Figure 1.1.

1.1.2 Key project features

The project will be designed, constructed and operated in accordance with the *AS 2885 Pipelines – Gas and Liquid Petroleum* series of standards (AS 2885) and the Australian Pipelines and Gas Association (APGA) *Code of Environmental Practice – Onshore Pipelines* (APGA Code of Environmental Practice) (APGA, 2022).

The key operational features of the project include:

– an underground high pressure, steel gas transmission pipeline with a length of about 236 km
– a permanent easement of up to 30 metres (m)
– supporting surface infrastructure, including:
    - beginning of line facility, including a connection to the South West Queensland Pipeline
    - temperature control station, including main line valve
    - cathodic protection units
    - main line valve
    - pipeline marker signs
    - permanent access tracks.

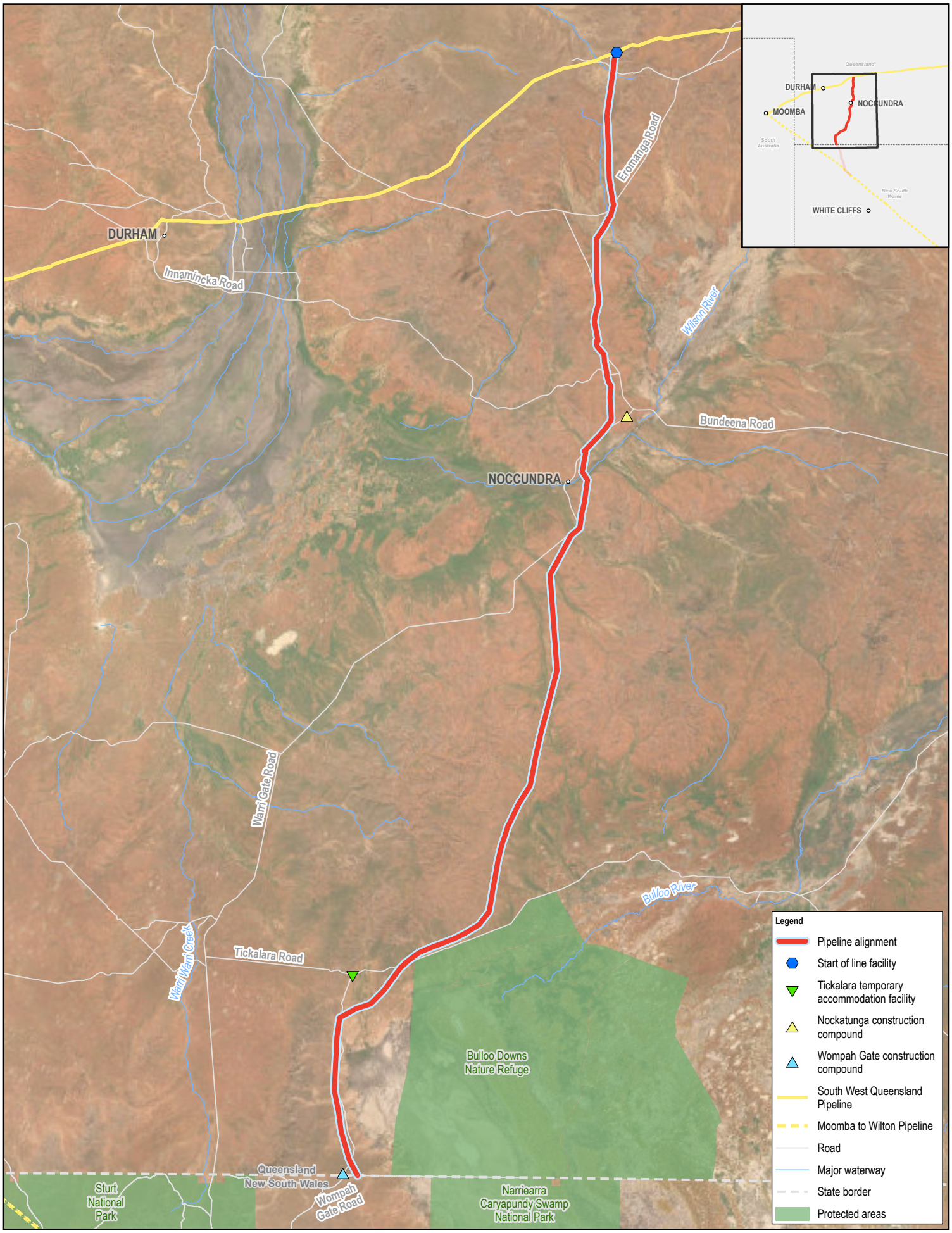
An approximately 40 m wide CRoW will be established to facilitate construction and access.

Key ancillary facilities and infrastructure outside the CRoW would include:

– a temporary accommodation facility located at the intersection of Wompah Gate Road and Tickalara Road
– a construction compound facility to stockpile line pipe located on Wompah Gate Road near the southern end of the project site.

Smaller temporary workspaces are also proposed at regular intervals along the CRoW to support construction activities.

Further information on the project's features and indicative construction methodology is provided in Chapter 4 (Project description) of the Environmental Authority Supporting Information Report.



Paper Size ISO A4

0 4.5 9 13.5 18

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Project No. **12661648**
Revision No. **0**
Date **15/06/2026**

Project location and key features

Figure 1.1

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_OBIL_1.aprx - BIL_KeyFeatures_QLD_1pg_A4P / Print date: 15 Jun 2026 - 10:00

Data source: Earthstar Geographics, Esri, CGIARDNRMMRRD: Roads, Watercourse (2023), LGA (2025); GA: State border (2006). APA: Pipeline alignments, infrastructure, pipe stockpiles, camps (2026). NPWS: Estates (2026). Created by: acjackson

1.2 Purpose and scope of this report

This report assesses the potential aquatic ecology impacts of the project in accordance with the environmental assessment requirements of the Application requirements for petroleum activities guidelines (DESI, 2024). This report describes the existing aquatic environmental values:

– assesses the impacts of constructing, operating and decommissioning the project in relation to aquatic environmental values
– recommends measures to mitigate and manage the impacts identified.

1.3 Report structure and content

The structure and content of this report are outlined in Table 1.1.

Table 1.1 Structure and content

Section	Description
Section 1 – Introduction	Outlines the key elements of the project, and the purpose of this report (this section).
Section 2 – Legislative and policy context	Summarises the key legislative requirements and guidelines relevant to aquatic ecology.
Section 3 – Methodology	Describes the study area and methodology for the assessment.
Section 4 – Existing environment	Describes the existing environmental values of the study area and project site relevant to aquatic ecology.
Section 5 – Construction impacts	Examines the potential for impacts to aquatic ecology during construction.
Section 6 – Operation impacts	Examines the potential for impacts to aquatic ecology during operation (which includes maintenance)
Section 7 – Cumulative impacts	Examines the potential for impacts to aquatic ecology during decommissioning.
Section 8 – Decommissioning impacts	Provides an assessment of cumulative impacts.
Section 9 – Recommended mitigation and management measures	Recommends measures to mitigate and manage the potential impacts identified.
Section 10 – Conclusion	Provides the key findings of the assessment.

1.4 Limitations

This report has been prepared by GHD for APA Bulloo Interlink Pipeline Pty Ltd and may only be used and relied on by APA Bulloo Interlink Pipeline Pty Ltd for the purpose agreed between GHD and APA Bulloo Interlink Pipeline Pty Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than APA Bulloo Interlink Pipeline Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and sampling undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

2. Legislative and policy context

This report has been prepared to support the EA application under the EP Act. It also informs assessment under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) where relevant. The key legislation, regulations and guidelines relevant to the project and this assessment are described in the following sections.

2.1 Commonwealth legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the principal environmental law administered by the Australian Government. The EPBC Act provides for the protection of Aquatic MNES relevant to the project. These include:

– wetlands of international importance
– MNES listed threatened aquatic species
– MNES listed migratory species dependent on aquatic habitats.

The assessment of the presence (or likelihood of occurrence) of MNES is discussed in, sections 4.12, 4.13 and 4.14.

No Commonwealth land located within or adjacent to the project site.

This report contributes to the evaluation of the presence and potential impacts to aquatic MNES, informing the EPBC Act referral and assessment process. The terrestrial flora and fauna threatened species that are MNES are discussed in the Matters of National Environmental Significance Report (GHD, 2026a).

2.1.2 Environment Protection and Biodiversity Conservation Act 1999 Environmental Offset Policy

The EPBC Act Environmental Offsets Policy (DSEWPC 2012) establishes the Commonwealth framework for offsets where significant residual impacts to MNES remain after avoidance and mitigation.

As there are no predicted residual impacts to aquatic MNES, there are no aquatic offsets proposed for the project.

2.2 Queensland legislation

2.2.1 Environmental Protection Act 1994

The EP Act establishes a framework to provide for the protection of Queensland's environment while allowing for development to occur in an ecologically sustainable manner. The project requires an EA as it involves petroleum activities prescribed as environmentally relevant activities (ERAs) under Schedule 2 of the Environmental Protection Regulation 2019.

This aquatic ecology report has been prepared to support the EA application by:

– identifying aquatic environmental values associated with waterways and wetlands
– assessing potential impacts to aquatic flora, fauna and habitat
– describing measures to avoid or minimise environmental harm, consistent with the general environmental duty under the EP Act.

An environmental impact statement is not required under the EP Act, as the project does not exceed the EIS thresholds for resource projects:

– the project is unlikely to result in a total disturbance area exceeding 2,000 ha at any one time
– the project does not involve the construction of more than 300 km of pipeline within Queensland
– the project does not include the construction of a liquefied natural gas facility.

2.2.2 Environmental Protection (Water and Wetland Biodiversity) Policy 2019

The Environmental Protection (Water and Wetland Biodiversity) Policy 2019 (EPP) is a subordinate piece of legislation that supports the EP Act. The purpose of this policy is to identify environmental values, water quality objectives (WQO) and management goals for Qld waters, monitor and report on the condition of waters, and to provide a framework for the management of waters.

Environmental values specify the uses of water by aquatic ecosystems and for human purposes (i.e. drinking water, irrigation), while the WQO set targets for the physical, chemical and biological characteristics of the water (i.e. dissolved oxygen, turbidity).

This report includes an assessment of the environmental values and WQO relevant to the study area as per the Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins Environmental Values and Water Quality Objectives (DES, 2020). There are no scheduled environmental values or WQO for the Cooper Creek basin. However, due to the close proximity of the two basins and the similar ephemeral nature of the waterways, the Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins Environmental Values and Water Quality Objectives (DES, 2020) will be applied to all waterways for the project. A detailed water quality assessment is provided in section 4.8.

2.2.3 Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) establishes a framework to safeguard Qld's economy, agricultural and tourism industries, environment, and way of life from:

– Pests (e.g. wild dogs and weeds)
– Diseases (e.g. foot-and-mouth disease)
– Contaminants (e.g. lead on grazing land).

The Biosecurity Act classifies biosecurity risks as either a prohibited matter or a restricted matter. The Biosecurity Act is administered by the Department of Primary Industries (DPI) and includes a 'general biosecurity obligation' to enforce that all people in Qld do not spread a pest, disease or a contaminant. Under the general biosecurity obligation, all individuals and corporations whose activities pose a biosecurity risk must:

– take all reasonable and practical steps to prevent or minimise biosecurity risks
– minimise the likelihood of causing a biosecurity event and limit the consequences if such an event is caused
– prevent or minimise the harmful effects a risk could have, and not do anything that might make any harmful effects worse.

The project will involve activities that have the potential to increase biosecurity risks, particularly the spread of weeds and pests, via activities such as clearing vegetation, transport and movement of vehicles, machinery and people, and working in and around waterways. APA and all contractors and subcontractors involved with the project are required to adhere to the general biosecurity obligation under the Biosecurity Act.

Biosecurity risks to aquatic flora and fauna are assessed in sections 4.9 and 4.10, respectively.

2.2.4 Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) establishes a framework to provide environmental offsets for any significant residual impacts of prescribed activities on prescribed environmental matters. This framework includes:

– EO Act
– Environmental Offsets Regulation 2014
– Queensland Environmental Offsets Policy.

The EO Act defines an environmental offset as an activity undertaken to counterbalance a significant residual impact of a prescribed activity on a prescribed environmental matter. The EO Act also states that an environmental offset must achieve a conservation outcome for the impacted prescribed environmental matter. Environmental offsets may include, but not be limited to, carrying out work to maintain viability of a prescribed environmental matter or payment of a financial settlement concerning the environmental matter.

Prescribed activities are activities that are the subject of an authority under another act and for which an offset condition may be imposed and that is prescribed under a regulation. Prescribed activities include but are not limited to an ERA under the EP Act and development for which an environmental offset may be required under the State Development Assessment Provisions (SDAP) under the *Planning Act 2016* (Planning Act).

Prescribed environmental matters include MNES, MSES and MLES.

Under section 14 of the EO Act, an administering agency may impose an environmental offset as a condition of approval for a prescribed activity under another Act.

The project is not expected to result in a significant residual impact on a prescribed aquatic environmental matter. No waterways providing for fish passage are likely to be significantly impacted by the project. Additionally, no aquatic MNES or MLES are predicted to be significantly impacted by the project.

2.2.5 Fisheries Act 1994

The *Fisheries Act 1994* (Fisheries Act) establishes the framework for the management, use, development and protection of Queensland's fisheries resources and fish habitat while promoting ecologically sustainable development. It provides for the declaration of inshore and estuarine fish habitat areas (FHAs) and regulates development in these areas. Operational work within a watercourse for waterway barrier works (WWBW) is assessable under the Fisheries Act, where the works cannot be undertaken in accordance with the accepted development requirements (ADR) for works involving disturbance to waterways under the Fisheries Act for construction of the project will require a development approval under the Planning Act. The development approval will be assessed against the SDAP, where development cannot not be undertaken in accordance with the ADR.

There are no declared FHAs in proximity to the project site.

The project will require the pipeline to cross the Wilson River, which is a waterway providing for fish passage mapped as a 'purple' waterway for WWBW under DPI's WWBW spatial layer. Purple waterways are those with a high risk of instream barrier works affecting fish passage. APA has elected to horizontal directional drill (HDD) beneath the Wilson River therefore not triggering the Fisheries Act for this crossing.

There are 77 waterways (including the Wilson River) within the project site that are mapped under DPI's WWBW spatial layer. Due to the braided nature of the waterways, waterway channels were counted rather than the individual mapped lines as per the GIS mapping layer. Impacts associated with the construction of waterway barriers are assessed in section 4.3 and Appendix B.

2.2.6 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) aims to conserve nature through the management of protected areas and the protection of native wildlife, and wildlife habitat. It provides for the dedication of a range of protected areas (e.g. conservation parks, special wildlife reserves and nature refuges). The NC Act also provides for the listing of protected wildlife and sets restrictions on taking or otherwise interfering with that wildlife. It provides for the making of management plans and conservation plans concerning protected areas and protected wildlife.

No aquatic species (fauna or flora) listed under the NC Act were identified in proximity to the project site. A likelihood of occurrence assessment is provided in Appendix D.

2.2.7 Regional Planning Interests Act 2014

The *Regional Planning Interests Act 2014* (RPI Act) protects areas of regional interest, including Strategic Environmental Areas (SEAs), from inappropriate impacts of resource activities.

As the project involves a resource activity within areas of regional interest, a Regional Interests Development Approval (RIDA) is required. APA has applied for a RIDA separate to the EA Application.

2.2.8 Water Act 2000

The *Water Act 2000* (Water Act) regulates water take, watercourse interference and riverine protection. The project will intersect mapped watercourses and require water extraction to support construction activities.

HDD is proposed at the Wilson River to avoid instream disturbance. Where water take or interference with watercourses is required, appropriate water licences or approvals will be obtained.

The project will impact watercourses mapped under the Water Act, including taking water from watercourses and interfering with the flow of water in a watercourse. Water will be sourced from a combination of existing and new bores (if required) and water take points on the Wilson River. Water permits under the Water Act will be required for the supply of surface or groundwater to the project. Watercourses are described in section 4.3 of this report and potential impacts and mitigation measures are discussed in section 9.

2.3 Regulations and guidelines

2.3.1 Queensland Environmental Offsets Policy, Significant Residual Impact Guideline

The Queensland *Significant Residual Impact Guideline* (DEHP, 2014), assists in deciding whether or not a prescribed activity will, or is likely to, have a significant residual impact on a MSES. This guideline applies to any activity prescribed in the Environmental Offsets Regulation 2014 that requires an approval in relation to MSES, under the NC Act, *Marine Parks Act 2004* and EP Act. Where a species is listed under multiple levels of legislation, an assessment is undertaken under the legislation that provides the species with the highest level of protection in the order of Commonwealth, state and then local.

This guideline applies to the project as it involves prescribed activities under the Environmental Offsets Regulation 2014 that have potential impacts on MSES. Any significant residual impacts identified through the assessment will be addressed through appropriate environmental offsets in accordance with this guideline.

2.3.2 Application requirements for activities with impacts to land, and Application requirements for petroleum activities

The *Application requirements for activities with impacts to land* (DETSI, 2025a) and *Application requirements for petroleum activities guideline* (DESI, 2024) inform the scope, structure and content of this aquatic ecology assessment.

This includes identification of aquatic environmental values and assessment of land-based impact pathways that may affect waterways and wetlands, including sedimentation, altered drainage, water quality impacts, and contaminant transport, together with consideration of likelihood, consequence, and appropriate mitigation and rehabilitation measures.

2.3.3 Preparing an environmental impact statement: Guideline for proponents

Although an EIS is not required, the *Preparing an environmental impact statement: Guideline for proponents* (DSDI, 2024) have been used to inform a comprehensive and regulator-ready aquatic assessment, including guidance on aquatic ecology, biosecurity, groundwater dependent ecosystems and fish salvage.

Relevant guidance materials for aquatic ecological assessments include:

– *Aquatic Ecology – EIS information guideline* (DETSI, 2024b)
– *Biosecurity – EIS information guideline* (DETSI, 2024c)
– *Groundwater dependent ecosystems – EIS information guideline* (DETSI, 2024d)
– *Fish salvage guidelines and approvals* (Queensland Government, 2024).

These documents have been used to inform the environmental impact assessments related aquatic flora and fauna, biosecurity, and groundwater dependent ecosystems (GDEs) in this report.

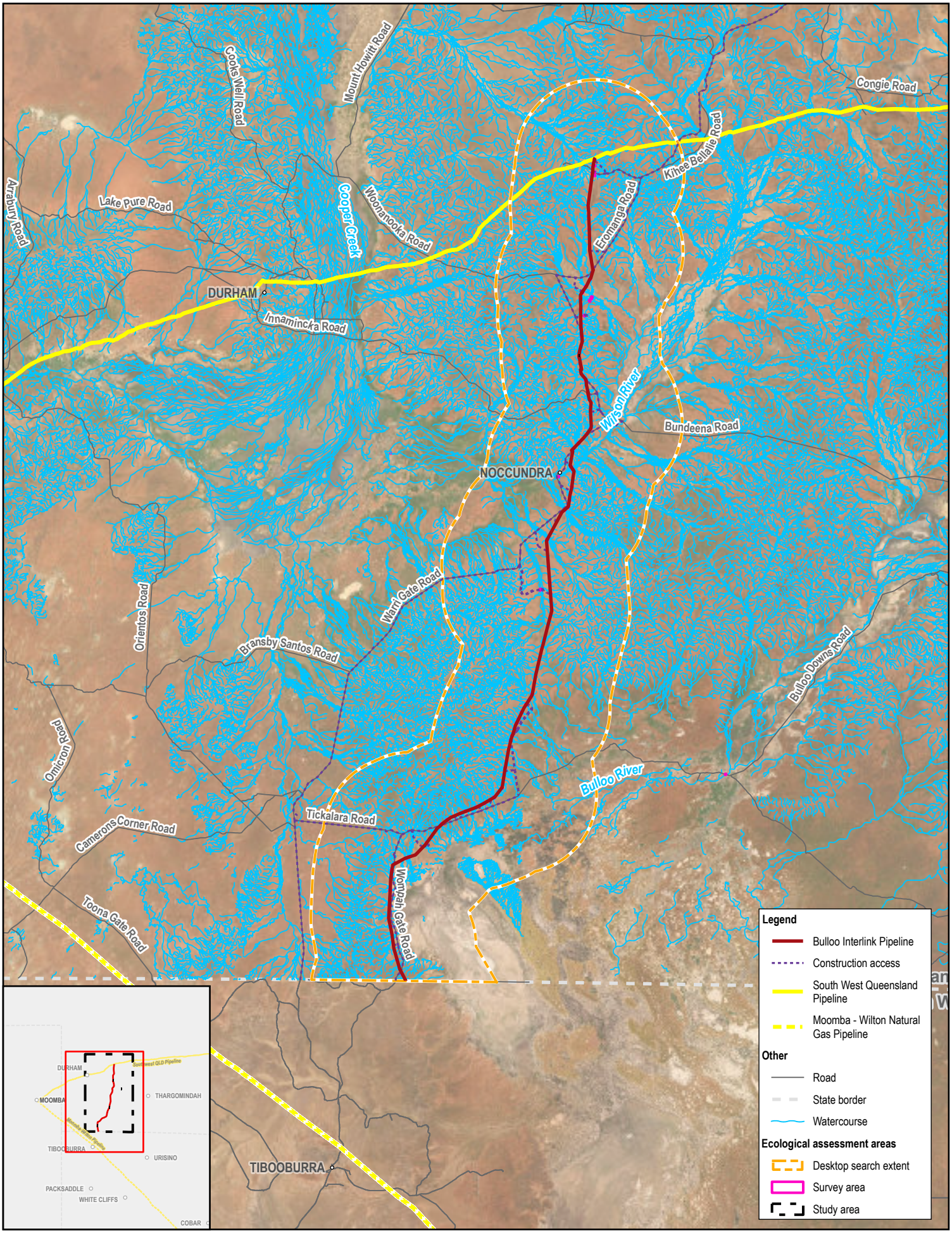
3. Methodology

3.1 Study area

For the assessment documented in this report, the study area has been defined as a 20 km buffer around the pipeline alignment including the CRoW (generally 40 m wide), access tracks, ancillary facilities and surface infrastructure as shown in Figure 3.1. The defined study area is considered sufficient to capture the full extent of all potential direct and indirect impacts associated with the construction, operation and decommissioning of the project are appropriately identified and assessed, consistent with the requirements of the EP Act and the *Application requirements for petroleum activities guidelines* (DESI, 2024).

Beyond the pipeline alignment, the broader study area comprises of aquatic environments including mapped and unmapped watercourses within and adjacent to the project site and downstream environments that could be potentially affected by the project via hydrology, sediment transport and water quality (Figure 3.1).

The study area considers aquatic habitats that support MNES, MSES and MLES and regionally significant features such as Bulloo Lake which is hydrologically connected at a regional scale to Caryapundy Swamp (Ramsar Site No. 2520).



Paper Size ISO A4

0 6 12 18 24

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA Group
Bulloo Interlink Pipeline

Aquatic ecology, study area and project footprint

Project No. 12661648
Revision No. 0
Date 17/06/2026

Figure 3.1

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P / Print date: 17 Jun 2026 - 02:02

Data source: Earthstar Geographics, Esri, CGIARDNRMMRRD; Roads (2021), Watercourse (2023); GHD: survey area, Ecological assessment areas (2026); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016) Created by: caburo2

3.2 Assessment approach

3.2.1 Desktop assessment

Prior to the field surveys, a desktop assessment in June 2025 was undertaken to facilitate an informed approach to the field surveys. The desktop assessment incorporated a review of the relevant government databases and mapping layers. Databases and desktop mapping utilised during the desktop assessments are shown in Table 3.1, with outputs of desktop searches provided in Appendix A. The results of the desktop assessment are presented in section 4 in combination with field survey results.

Table 3.1 Desktop assessment information sources

Desktop search	Purpose
Commonwealth	
Protected Matters Search Tool (PMST)	The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) PMST search was used to identify MNES protected under the EPBC Act that have the potential to occur within the desktop search extent (DCCEEW, 2025b).
Species Profile and Threats Database (SPRAT)	The DCCEEW SPRAT profiles were assessed to determine habitat requirements and ecology of potentially occurring threatened species (DCCEEW, 2025c).
Directory of Important Wetlands of Australia (DIWA)	The DIWA database was searched to understand if any nationally important wetlands are present within the study area (DCCEEW, 2025a).
GDE Atlas	The GDE Atlas was used to identify potential groundwater-dependent ecosystems within the desktop search extent and study area more broadly (BoM, 2025b).
State	
Queensland Globe	Queensland Globe was used to view spatial features mapped within the study area (Queensland Government, 2025).
WildNet platform	The DETSI WildNet platform was searched to retrieve historical records of flora and fauna species previously recorded within the desktop search extent (DETSI, 2025c).
Biomaps	The WildNet online database was assessed through Biomaps to identify the location and date of historical records of threatened species within the desktop search extent (DETSI, 2025c).
MSES database	The MSES environmental database and report tool was utilised to identify MSES within the desktop search extent. This included aquatic protected areas, essential wetland habitats and waterways, and conservation significant species protected under the NC Act (DETSI, 2025a).
Watercourse identification mapping	The watercourse identification mapping was assessed through Queensland Globe (Queensland Government, 2025) to determine any watercourses, and drainage features as defined by the Water Act within the study area.
WetlandInfo and WetlandMaps	WetlandInfo (DETSI, 2025b) and WetlandMaps (DETSI, 2019) were used to obtain information on, and visualise catchments and waterbodies in the study area, including lacustrine, riverine and palustrine areas.
Queensland waterways for waterway barrier works mapping	The Queensland WWBW mapping was assessed through Queensland Globe (Queensland Government, 2025) to identify any mapped waterways providing for fish passage in the study area.
Other sources	
Atlas of Living Australia (ALA) database	The ALA database (2025) was utilised to search and retrieve historical sighting records of threatened flora and fauna species within the desktop search extent.

3.2.2 Field surveys

Targeted field survey methods were developed based on expected site conditions and species likelihood of occurrence determined during desktop assessments. Field surveys were undertaken in accordance with relevant survey guidelines including:

- *Aquatic Ecology – EIS information guideline* (DETSI, 2024b)
- *Queensland Australian River Assessment System* (AusRivAS) *Sampling and Processing Manual* (DNRM, 2001)
- *Monitoring and Sampling Manual, Environmental Protection (Water) Policy 2009* (DES, 2018)
- *Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the EPBC Act* (Commonwealth of Australia, 2011a)
- *Survey guidelines for Australian's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act* (Commonwealth of Australia, 2011b)
- Standard DETSI survey techniques for freshwater turtles (Limpus et al., 2002; Hamann et al., 2007; Limpus et al., 2011).

Survey effort

Across the post-wet (July 2025) and pre-wet (October 2025) aquatic ecology surveys, a total of 88 aquatic sites were surveyed to identify and describe the existing aquatic ecological values within, downstream and upstream of the project site as shown in Table 3.2 and Figure 3.2.

The initial post-wet field team comprised four aquatic ecologists, split into two teams. The pre-wet field team consisted of a single team of two aquatic ecologists. Between the two surveys, updates to the pipeline alignment occurred. The pre-wet survey had a reduced effort as it was specifically targeted towards sites along the updated alignment as well as any sites that were missed or contained water during the initial post-wet survey.

Survey sites were selected within both the project site and the broader study area where potential impacts may occur. Within the project site, sites were targeted where works will directly affect aquatic ecosystems. Additional sites were selected upstream and downstream of the alignment to assess existing condition and aquatic values in the surrounding environment.

At each site various aquatic field assessment methods were undertaken to describe and understand ecological values within, upstream and downstream of the project site. The field survey assessment included:

- AusRivAS habitat assessment and bioassessment
- assessments for watercourses and drainage features unmapped under the Water Act
- in situ water quality testing (where water was available)
- macroinvertebrate sample collection and identification
- aquatic fauna surveys for freshwater macrocrustacean, fish, and turtles
- aquatic flora surveys
- still photographs, drone imagery and videography.

Sites were designated as either a 'rapid' or 'comprehensive' assessment based on conditions of water availability, including depth, at each site. A rapid assessment comprised of an AusRivAS habitat assessment and bioassessment, watercourse assessment, aquatic flora inventory, and drone footage where permissible.

A comprehensive assessment comprised of the same assessments as a rapid site, as well as macroinvertebrate sample collection, *in-situ* water quality and aquatic fauna surveys. The method of aquatic fauna survey was dependent on the size of the wetted site, as shallow pools will not support larger fauna targeted in certain trapping techniques (e.g. cathedral traps for freshwater turtles).

In total, 67 rapid and 21 comprehensive assessments were undertaken across both the July and October 2025 surveys. The July 2025 survey consisted of 55 rapid and 10 comprehensive surveys. The October 2025 survey consisted of 12 rapid and 11 comprehensive surveys. A summary of the survey effort, including hydrological conditions and assessment conducted is shown in Table 3.2.

Animal ethics and legislative permits

The ecological field surveys were conducted in accordance with the following permits and approvals held by GHD:

– Animal Research Authority (ARA 24/25) issued by the accredited GHD Animal Ethics Committee (2024)
– DPI Scientific Users Registration Certificate (SUR000132)
– DETSI Scientific Purposes Permit (P-SPP-100800544)
– DPI General Fisheries Permit (266945).

Table 3.2 Summary of survey effort

Site name	Date(s)	Season	Hydrological condition	Assessment type	Location	Latitude	Longitude
Aquatic site 1	14/07/2025	Post-wet	Dry	Rapid	~0.3 km point of alignment	-27.090608	142.668310
Aquatic site 2	14/07/2025	Post-wet	Dry	Rapid	~0.3 km upstream of aquatic site 2A	-27.105361	142.668635
Aquatic site 2A	9/10/2025	Pre-wet	Dry	Rapid	~2.2 km point of alignment	-27.106766	142.664859
Aquatic site 3	14/07/2025	Post-wet	Dry	Rapid	Tributary of Windula Creek, ~0.6 km upstream of aquatic site 4A (first tributary)	-27.120102	142.668823
Aquatic site 4	14/07/2025	Post-wet	Dry	Rapid	Tributary of Windula Creek, ~0.8 km upstream of aquatic site 4A (second tributary)	-27.127364	142.668727
Aquatic site 4A	9/10/2025	Pre-wet	Dry	Rapid	Upper extent of Windula Creek, ~4.0 km point of alignment	-27.121874	142.663398
Aquatic site 5	14/07/2025	Post-wet	Dry	Rapid	~18.5 km point of alignment	-27.252300	142.657075
Aquatic site 76	9/10/2025	Pre-wet	Dry	Rapid	Kercummurra Creek, ~31.5 km point of alignment	-27.367658	142.367658
Aquatic site 79	9/10/2025	Pre-wet	Dry	Rapid	~35.1 km point of alignment	-27.396091	142.642929
Aquatic site 80	9/10/2025	Pre-wet	Dry	Rapid	~33.9 km point of alignment	-27.386127	142.649636
Aquatic site 6	13/07/2025	Post-wet	Dry	Rapid	Kercummurra Creek, ~3 km downstream of 35.1 km point of alignment	-27.409004	142.666555
Aquatic site 7A	9/10/2025	Pre-wet	Dry	Rapid	~35.6 km point of alignment	-27.399404	142.640563
Aquatic site 7	13/07/2025 15/07/2025	Post-wet	Pool	Comprehensive	Braided tributaries of Kercummurra Creek, ~3.6 km downstream of aquatic site 7A	-27.413293	142.664066
Aquatic site 83	10/10/2025	Pre-wet	Dry	Rapid	~37.1 km point of alignment	-27.413641	142.637081
Aquatic site 8	13/07/2025	Post-wet	Dry	Rapid	Braided tributaries of Kercummurra Creek ~3.6 km downstream of aquatic site 83	-27.418455	142.660343
Aquatic site 82	10/10/2025	Pre-wet	Dry	Rapid	~40.0 km point of alignment	-27.439701	142.637118
Aquatic site 9	13/07/2025	Post-wet	Dry	Rapid	~0.4 km east of 41 km point of alignment. ~0.5 km downstream this waterway intersects the with alignment buffer only.	-27.447475	142.641579
Aquatic site 10	13/07/2025	Post-wet	Dry	Rapid (no bioassessment)*	~44.7 km point of alignment	-27.471906	142.638454
Aquatic site 11	13/07/2025	Post-wet	Dry	Rapid	~47.0 km point of alignment	-27.501410	142.641491
Aquatic site 12	14/07/2025 9/10/2025	Post-wet Pre-wet	Pool	Comprehensive	Gum Creek, ~59.2 km point of alignment	-27.603095	142.654030

Site name	Date(s)	Season	Hydrological condition	Assessment type	Location	Latitude	Longitude
Aquatic site 81	9/10/2025	Pre-wet	Pool	Comprehensive	Nockatunga Waterhole along Wilson River, ~17 km upstream of aquatic site 15. Considering as a water supply for the project.	-27.706293	142.736172
Aquatic site 74	13/10/2025	Pre-wet	Dry	Rapid	~71.8 km point of alignment	-27.668173	142.714385
Aquatic site 13	13/07/2025	Post-wet	Dry	Rapid	~76.7 km point of alignment	-27.748593	142.370346
Aquatic site 14	11/07/2025	Post-wet	Dry	Rapid	Tirtywinna Creek, ~78.6 km point of alignment	-27.761206	142.623855
Aquatic site 75	13/10/2025	Pre-wet	Dry	Rapid	Along CRoW, ~0.3 km north-west from 83 km point of alignment	-27.796056	142.612646
Aquatic site 15	14/07/2025 15/07/2025 13/10/2025	Post-wet Pre-wet	Pool	Comprehensive	Wilson River, ~83.7 km point of alignment	-27.803786	142.617606
Aquatic site 16	11/07/2025	Post-wet	Dry	Rapid	Tributary of Wilson River, ~84.7 km point of alignment	-27.810737	142.623078
Aquatic site 84	10/10/2025	Pre-wet	Pool	Comprehensive	Noccundra Waterhole which runs parallel to main channel of Wilson River, ~4.5 km downstream of aquatic site 16, and ~1 km south of Noccundra Hotel. Considering as a water supply for the project.	-27.584815	142.826883
Aquatic site 17	11/07/2025 14/10/2025	Post-wet Pre-wet	Pool	Comprehensive	~81.9 km point of alignment	-27.849697	142.620730
Aquatic site 18	11/07/2025	Post-wet	Dry	Rapid	~92.7 km point of alignment	-27.881822	142.614071
Aquatic site 19	11/07/2025	Post-wet	Dry	Rapid	~94.6 km point of alignment	-27.897648	142.610144
Aquatic site 20	11/07/2025	Post-wet	Dry	Rapid	Tippera Creek, ~95.6 km point of alignment	-27.903122	142.602867
Aquatic site 21	11/07/2025 14/10/2025	Post-wet Pre-wet	Pool	Comprehensive	Murrawarra Creek, ~104.5 km point of alignment	-27.968937	142.560499
Aquatic site 22	11/07/2025	Post-wet	Dry	Rapid	~111.7 km point of alignment	-28.036929	142.562339
Aquatic site 23	11/07/2025	Post-wet	Dry	Rapid	~115.6 km point of alignment	-28.073391	142.565684
Aquatic site 77	13/10/2025	Pre-wet	Dry	Rapid	Along CRoW ~3.0 km north-west from 119 km point of alignment	-28.089874	142.541374
Aquatic site 78	13/10/2025	Pre-wet	Small shallow pool	Comprehensive	Along CRoW ~3.0 km north-west from 119 km point of alignment	-28.088589	142.543440
Aquatic site 24	11/07/2025 14/10/2025	Post-wet Pre-wet	Small shallow pool	Rapid Comprehensive	~118.4 km point of alignment	-28.097430	142.568164

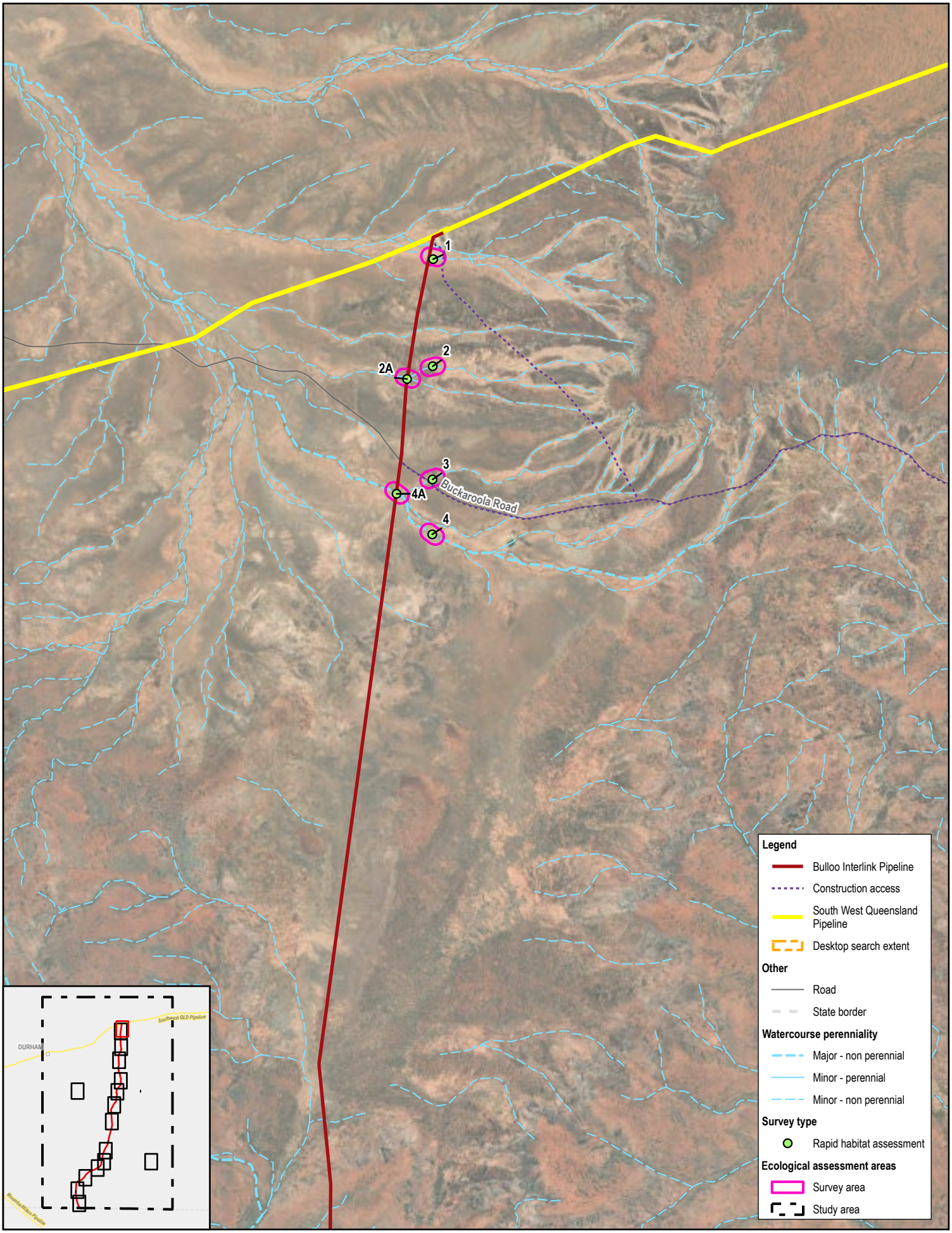
Site name	Date(s)	Season	Hydrological condition	Assessment type	Location	Latitude	Longitude
Aquatic sites 25 to 30	-	-	-	Sites were not accessible due to washouts, gullies or other impassable terrain by 4WD	~123.6 km to 139.0 km length of the alignment	-28.143837	142.570501
Aquatic site 31	12/07/2025	Post-wet	Dry	Rapid	Parrabinna Creek, ~145.0 km point of alignment	-28.332143	142.523612
Aquatic site 32	12/07/2025	Post-wet	Dry	Rapid	~146.8 km point of alignment	-28.346359	142.514795
Aquatic site 33	12/07/2025	Post-wet	Dry	Rapid	~148.0 km point of alignment	-28.355904	142.508280
Aquatic site 34	12/07/2025	Post-wet	Dry	Rapid	~150.3 km point of alignment	-28.374030	142.497434
Aquatic site 35	12/07/2025	Post-wet	Dry	Rapid	~152.3 km point of alignment	-28.390403	142.488773
Aquatic site 36	12/07/2025	Post-wet	Dry	Rapid	~153.4 km point of alignment	-28.399018	142.484247
Aquatic site 37	12/07/2025	Post-wet	Dry	Rapid	~155.0 km point of alignment	-28.412710	142.478668
Aquatic site 38	12/07/2025 11/10/2025	Post-wet Pre-wet	Small shallow pool	Rapid Comprehensive	Muggera Creek, ~156.8 km point of alignment	-28.428082	142.472972
Aquatic site 39	12/07/2025	Post-wet	Dry	Rapid	~158.1 km point of alignment	-28.440192	142.469032
Aquatic site 40	12/07/2025 11/10/2025	Post-wet Pre-wet	Pool	Comprehensive	~160.3 km point of alignment	-28.458681	142.464272
Aquatic site 41	-	-	-	Not accessible	~163.4 km point of alignment	-28.486357	142.459122
Aquatic site 42	10/07/2025 11/10/2025	Post-wet Pre-wet	Small shallow pool (pre-wet), dry (post-wet)	Comprehensive AND Rapid	~165.4 km point of alignment	-28.503810	142.455767
Aquatic site 43	-	-	-	Not accessible	~166.7 km point of alignment	-28.516529	142.453582
Aquatic site 44	-	-	-	Not accessible	~168.5 km point of alignment	-28.532023	142.450773
Aquatic site 45	12/07/2025	Post-wet	Dry	Rapid assessment	~170.4 km point of alignment	-28.549090	142.447691
Aquatic site 46	10/07/2025 AND 12/07/2025	Post-wet	Small shallow pool	Comprehensive	~173.6 km point of alignment	-28.571946	142.427248
Aquatic site 47	10/07/2025	Post-wet	Dry	Rapid	~176.5 km point of alignment	-28.585685	142.402279
Aquatic site 48	10/07/2025	Post-wet	Dry	Rapid	~179.0 km point of alignment	-28.595448	142.380392
Aquatic site 49	9/07/2025	Post-wet	Dry	Rapid	Elipilla Creek, ~181.8 km point of alignment	-28.605142	142.352848

Site name	Date(s)	Season	Hydrological condition	Assessment type	Location	Latitude	Longitude
Aquatic site 50	10/07/2025	Post-wet	Dry	Rapid	~184.6 km point of alignment	-28.614595	142.327021
Aquatic site 51	10/07/2025	Post-wet	Dry	Rapid	~185.7 km point of alignment	-28.619098	142.316183
Aquatic site 52	10/07/2025	Post-wet	Dry	Rapid	~187.1 km point of alignment	-28.625947	143.304557
Aquatic site 53	10/07/2025	Post-wet	Dry	Rapid	~188.9 km point of alignment	-28.635741	142.290122
Aquatic site 54	9/07/2025	Post-wet	Dry	Rapid	~189.8 km point of alignment	-28.640946	142.284348
Aquatic site 55	9/07/2025	Post-wet	Dry	Rapid	~192.2 km point of alignment	-28.657928	142.268586
Aquatic site 56	9/07/2025	Post-wet	Dry	Rapid	~195.0 km point of alignment	-28.678261	142.251966
Aquatic site 57	9/07/2025	Post-wet	Dry	Rapid	Tickalara Creek (braided section), ~201.1 km point of alignment	-28.713715	142.203745
Aquatic site 58	9/07/2025	Post-wet	Dry	Rapid	Tickalara Creek (braided section), ~201.8 km point of alignment	-28.715221	142.197971
Aquatic site 59	9/07/2025	Post-wet	Dry	Rapid (no bioassessment)*	~205.4 km point of alignment	-28.729796	142.165199
Aquatic site 60	9/07/2025	Post-wet	Dry	Rapid	~206.9 km point of alignment	-28.741632	142.160752
Aquatic site 61	8/07/2025	Post-wet	Dry	Rapid	~207.5 km point of alignment	-28.746626	142.160049
Aquatic site 62	8/07/2025	Post-wet	Dry	Rapid	~212.0 km point of alignment	-28.787733	142.156460
Aquatic site 62A	8/07/2025	Post-wet	Dry	Rapid	~212.4 km point of alignment	-28.784071	142.162363
Aquatic site 63	8/07/2025	Post-wet	Dry	Rapid	Morris Creek, ~216.2 km point of alignment	-28.824959	142.155192
Aquatic site 64	8/07/2025	Post-wet	Dry	Rapid	~218.5 km point of alignment	-28.846456	142.154100
Aquatic site 65	8/07/2025	Post-wet	Dry	Rapid	Gidya Creek, ~221.5 km point of alignment	-28.873449	142.157962
Aquatic site 66	8/07/2025	Post-wet	Dry	Rapid	~223.9 km point of alignment	-28.893604	142.162800
Aquatic site 67	8/07/2025	Post-wet	Dry	Rapid	Wanka Creek, ~224.7 km point of alignment	-28.901289	142.164087
Aquatic site 68	8/07/2025	Post-wet	Dry	Rapid	~230.2 km point of alignment	-28.949641	142.176143
Aquatic site 69	8/07/2025	Post-wet	Dry	Rapid	~232.9 km point of alignment	-28.964081	142.180863
Aquatic site 70	8/07/2025	Post-wet	Dry	Rapid	~234.3 km point of alignment	-28.983638	142.190461
Aquatic site 71				N/A – Not accessible by vehicle, however drone shots taken of the wetland from afar	North-east edge of Bulloo Lake (DIWA listed wetland) approximately 9 km downstream of project site	-28.673222	142.353715

Site name	Date(s)	Season	Hydrological condition	Assessment type	Location	Latitude	Longitude
Aquatic site 72	10/07/2025 12/10/2025	Post-wet Pre-wet	Pool and small riffle	Comprehensive	Bulloo River at intersection with Bulloo Downs Road, approximately 57 km east of project site. This site is considered a reference site as it is located outside of the project site and does not occur downstream of project activities.	-28.511881	143.039150
Aquatic site 73	13/07/2025	Post-wet	Pool	Comprehensive	Unnamed tributary of Wilson River, located more than 50 km downstream of project site, crossing areas of overland flow and wetlands. This site is adjacent Cooper Creek – Wilson River Junction (DIWA listed wetland).	-27.771967	142.150760

Note: *Site did not contain evidence of aquatic habitat (i.e. no channel/bed/banks).

Cells shaded grey are sites situated outside of the final project site. This includes sites upstream/downstream of the project site, reference sites, and wetland sites. Surveyed sites in this table are all relevant to the final project alignment and any sites that were impacted by changes of alignment post-survey were recontextualised.



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

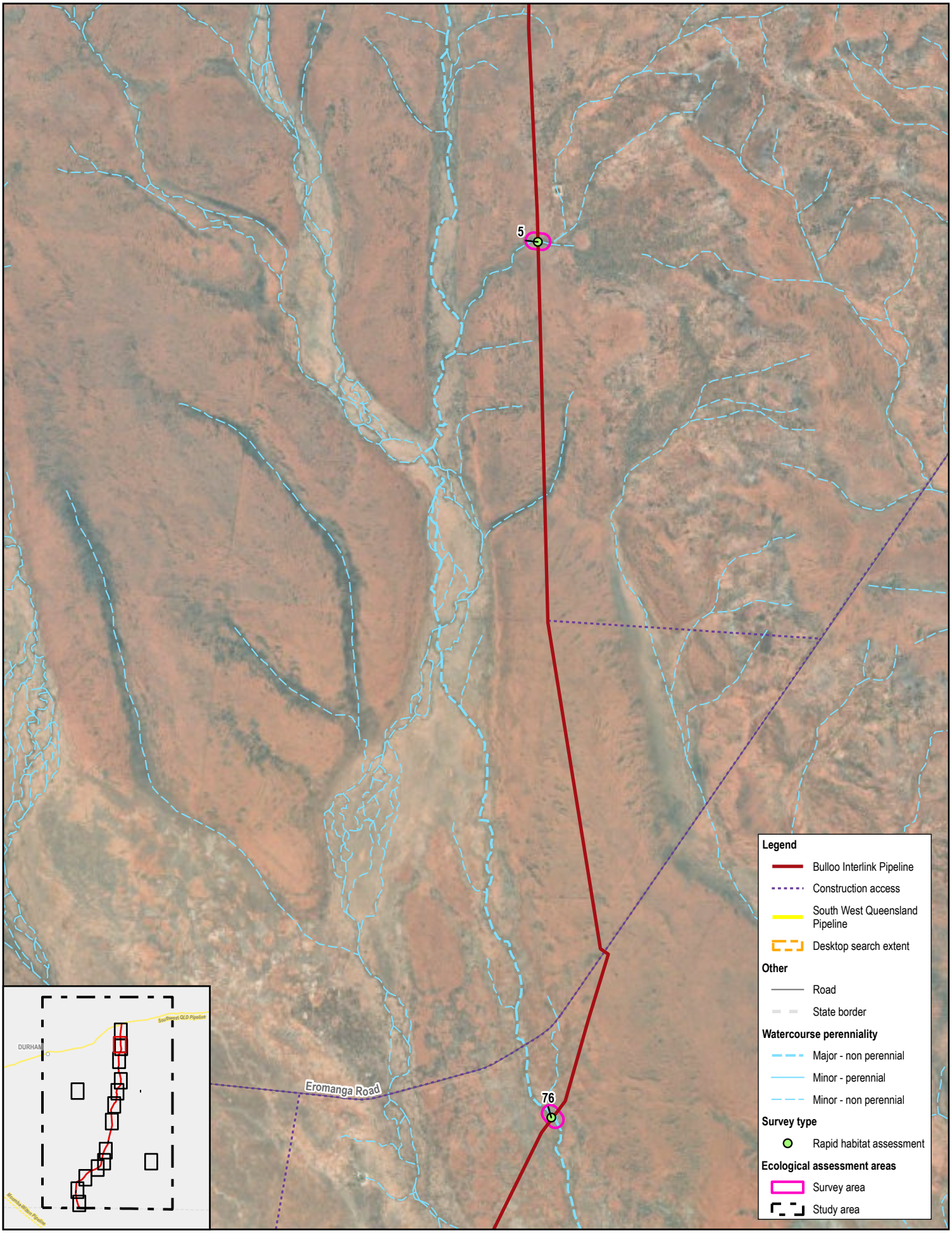
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 1 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:15

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

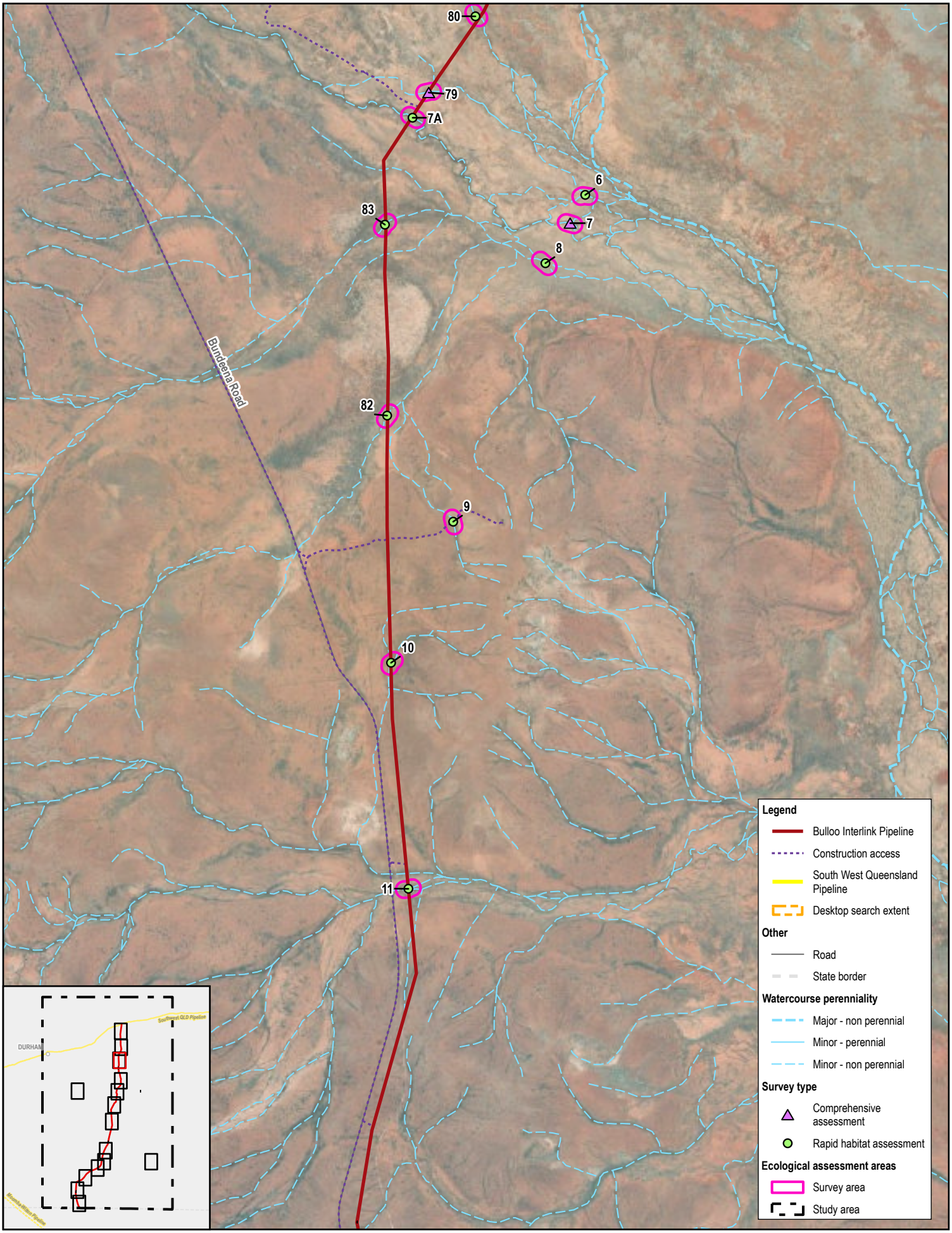
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 2 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:15

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

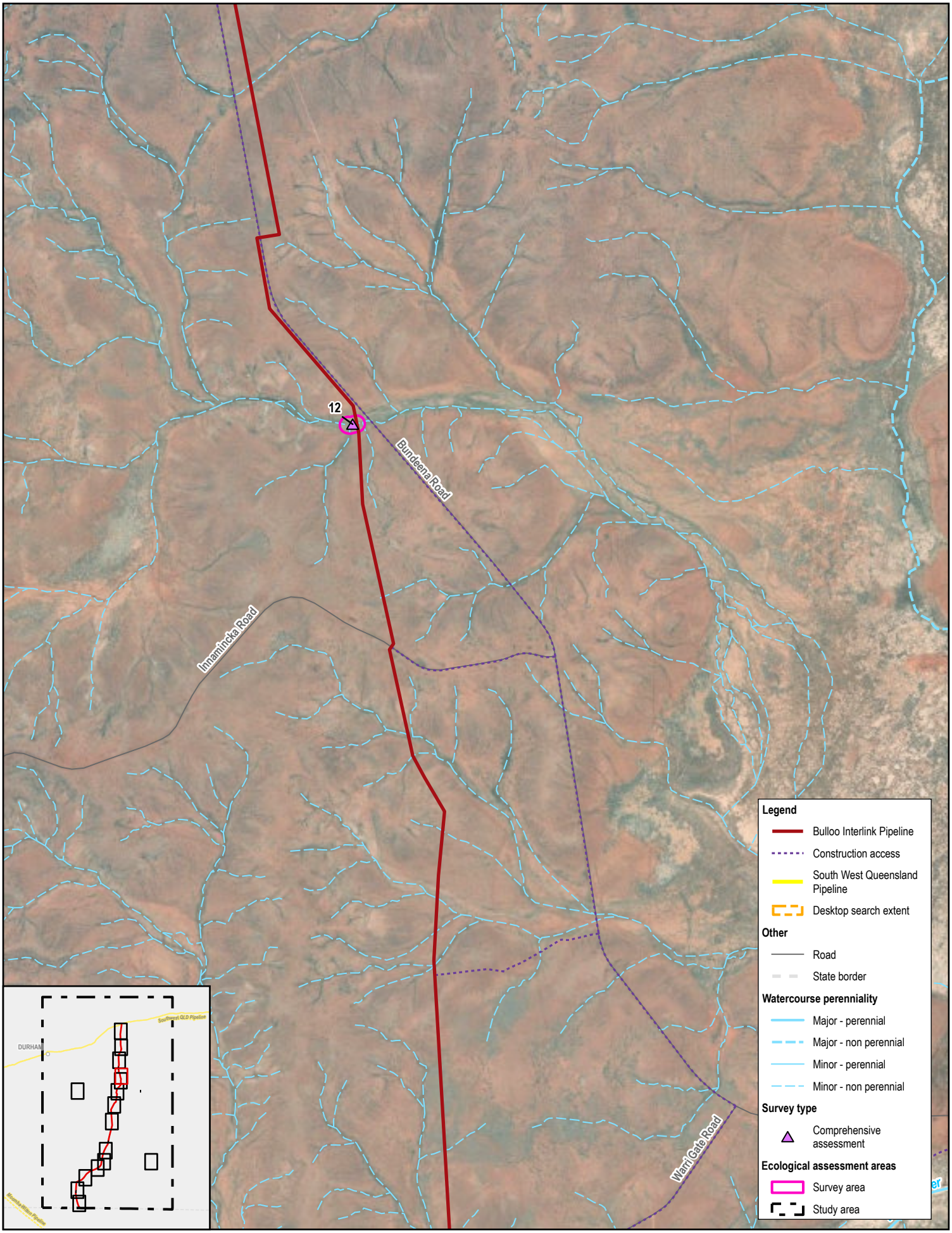
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 3 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:15

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

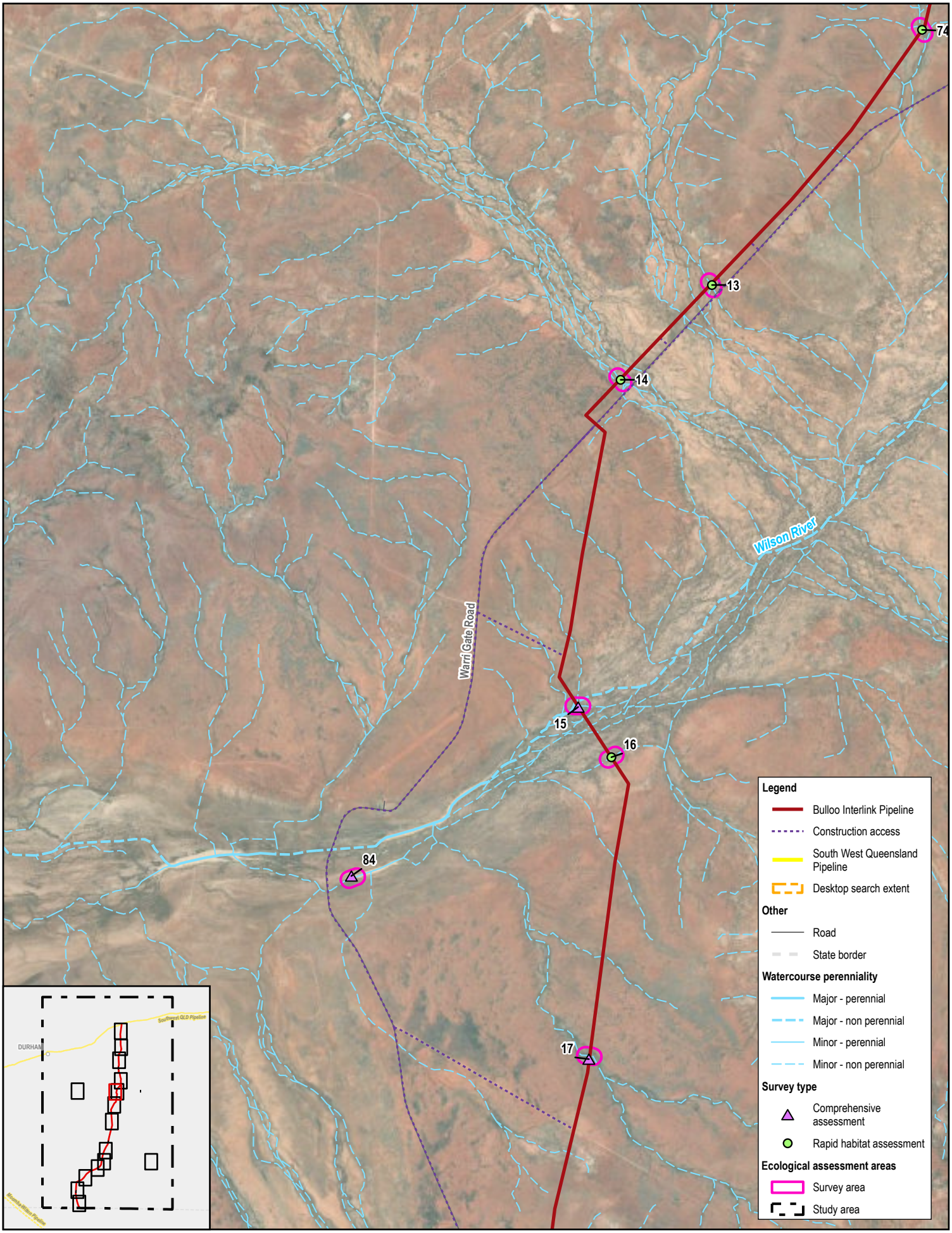
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 4 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASCS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

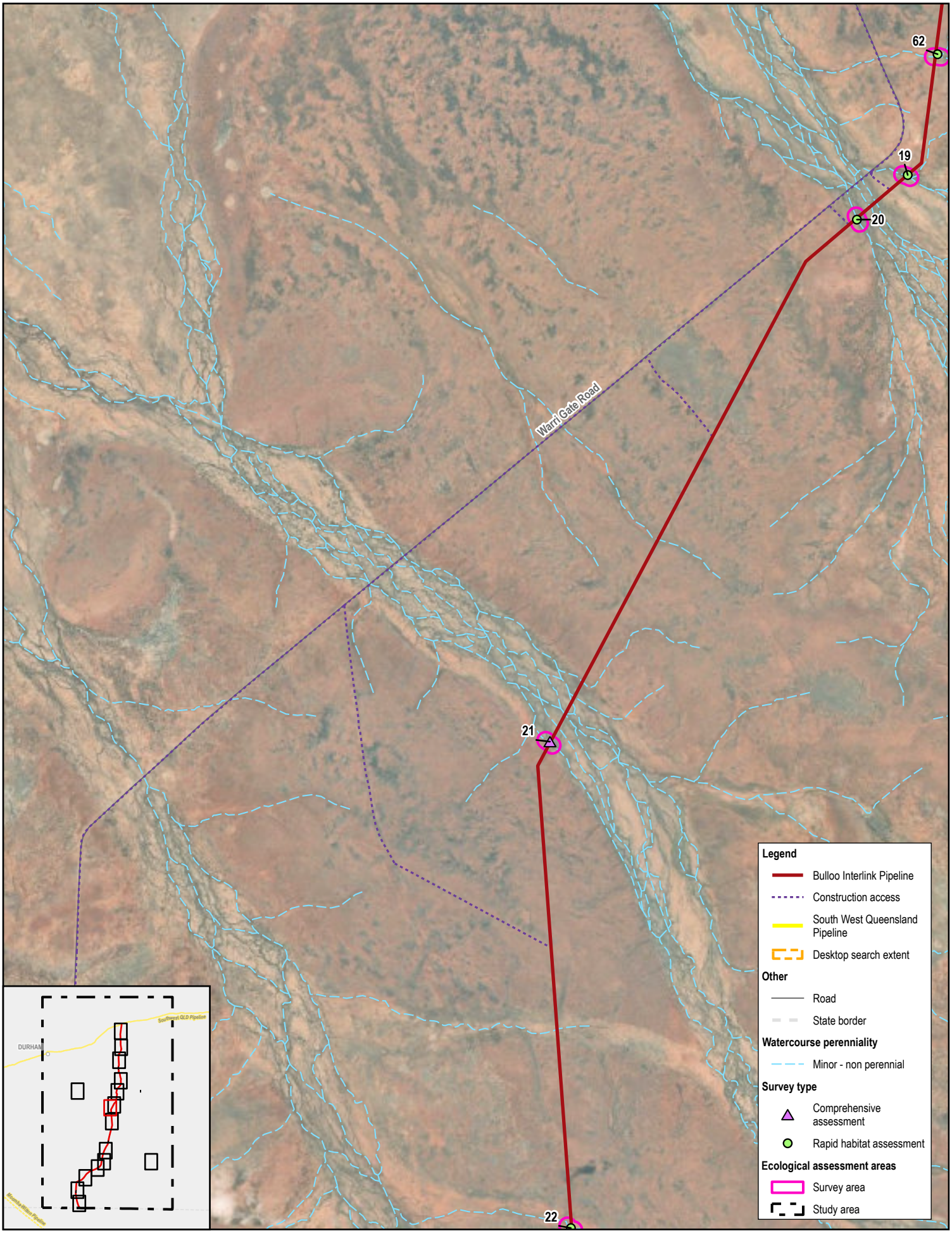
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 5 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASCS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

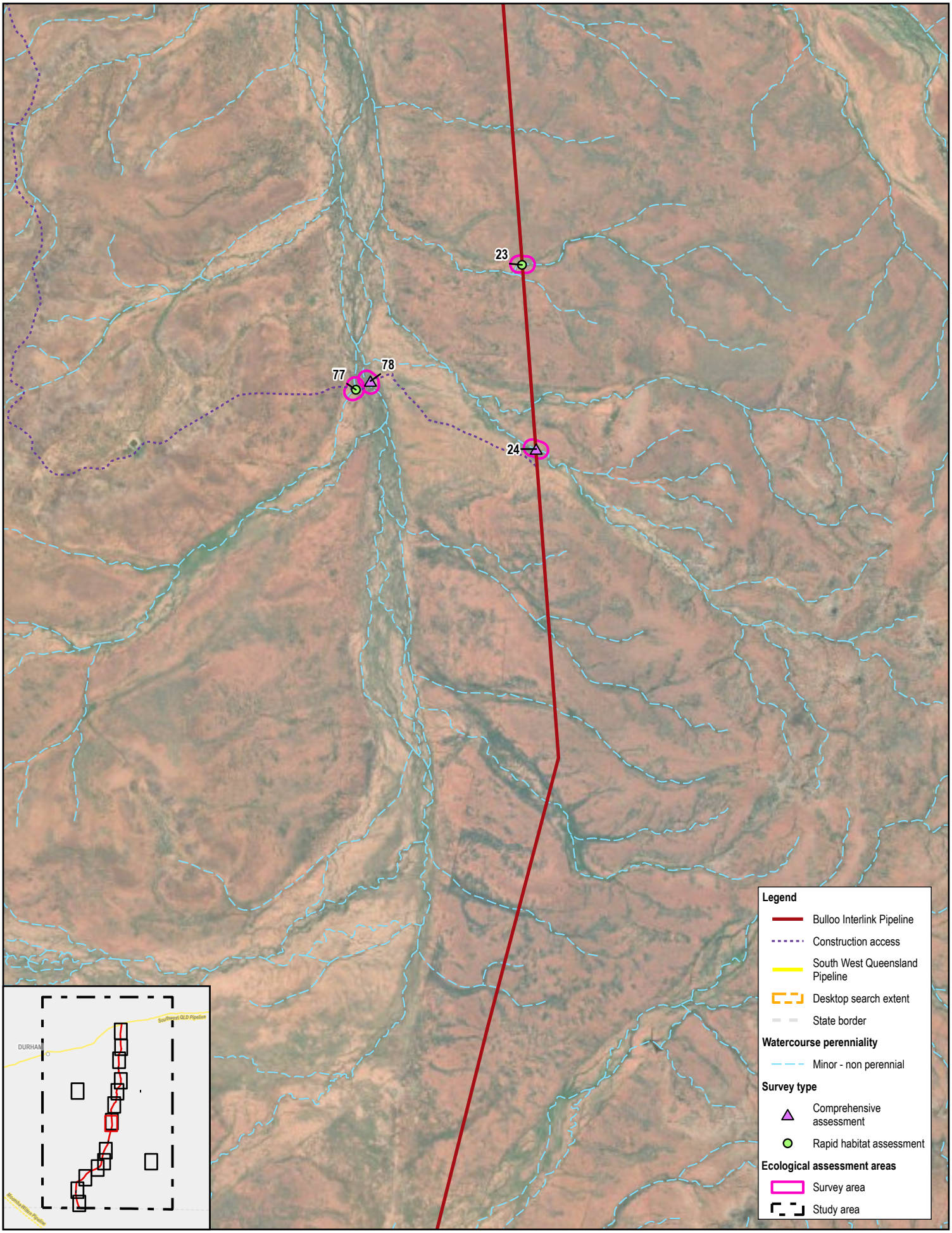
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 6 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

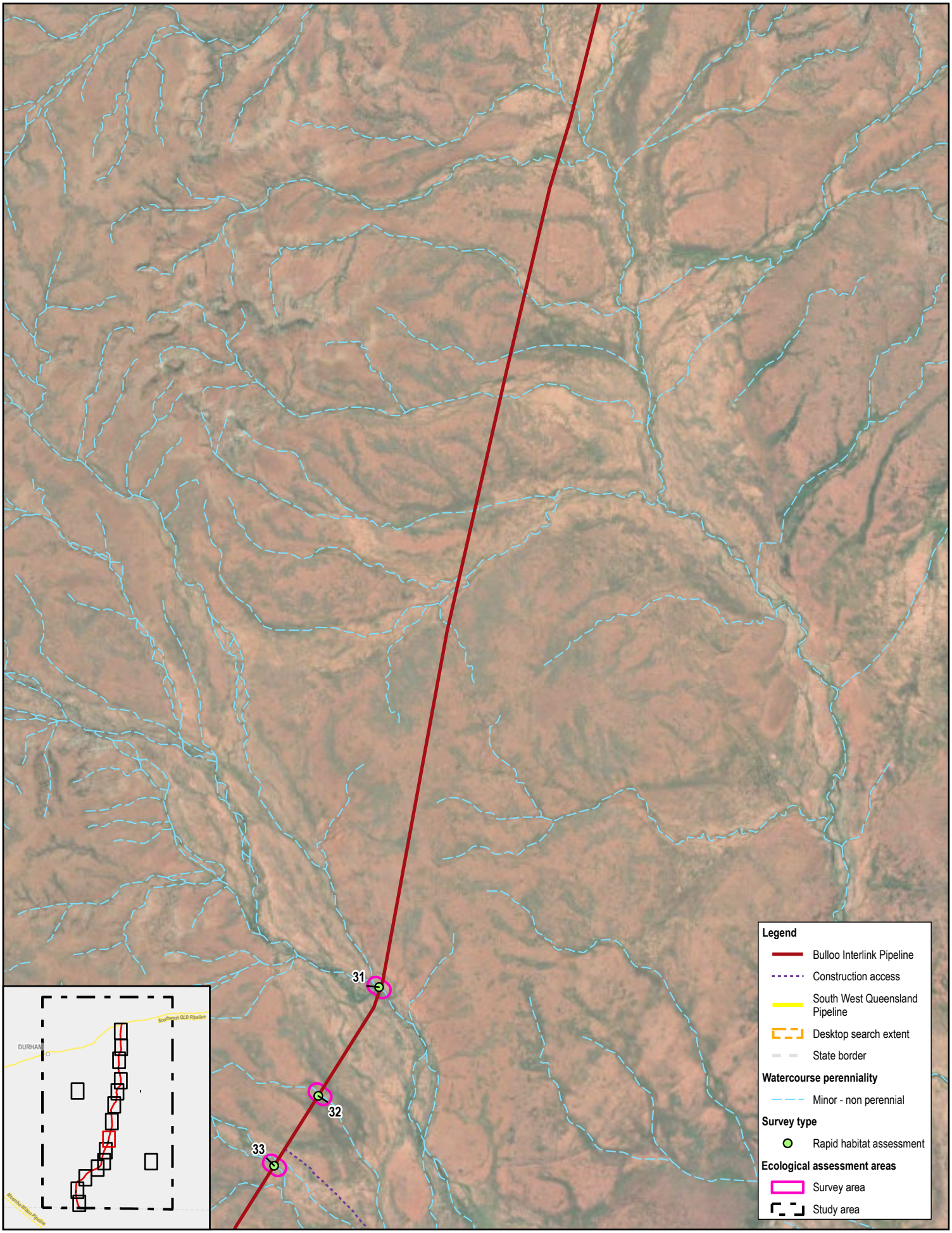
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 7 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

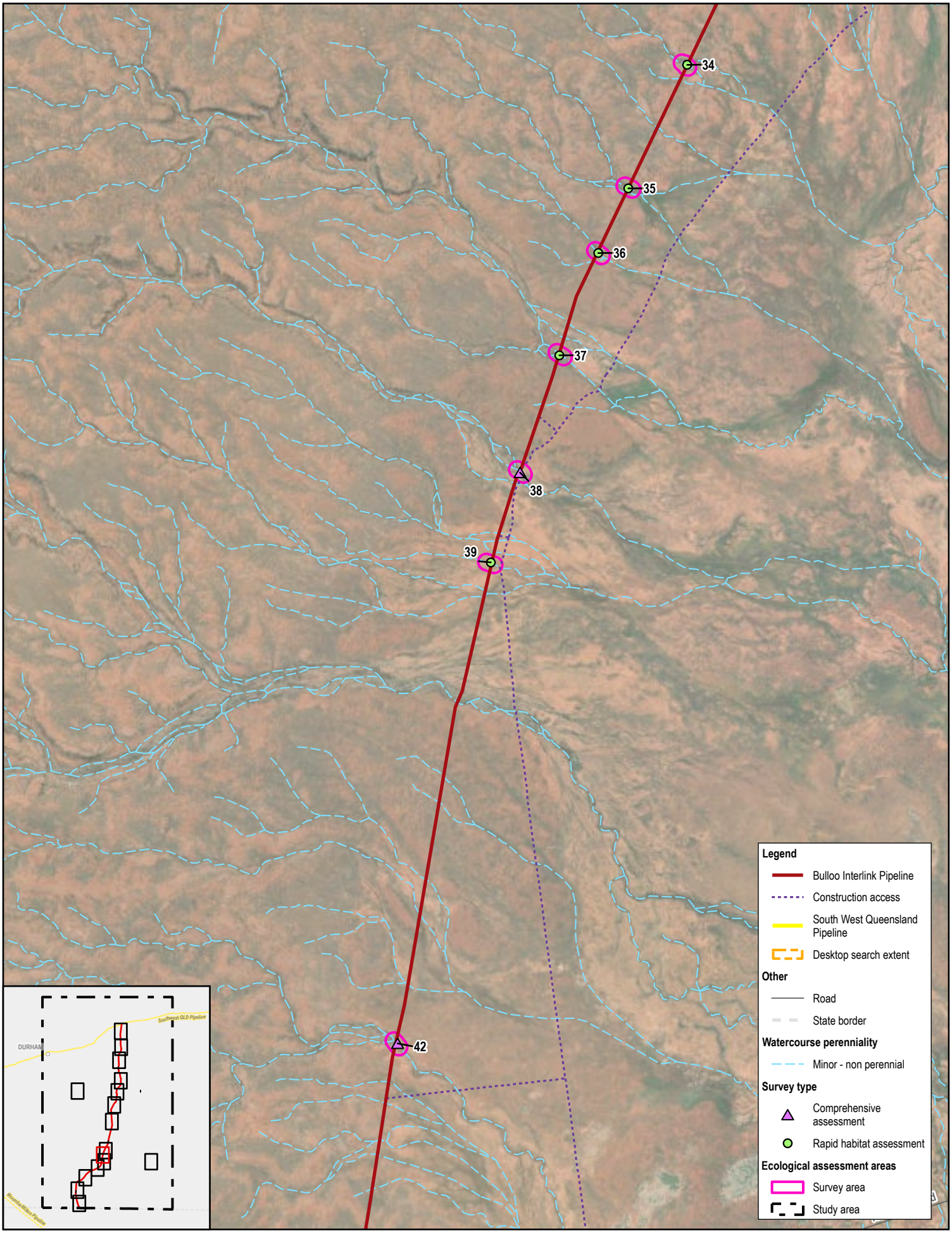
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 8 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASCS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

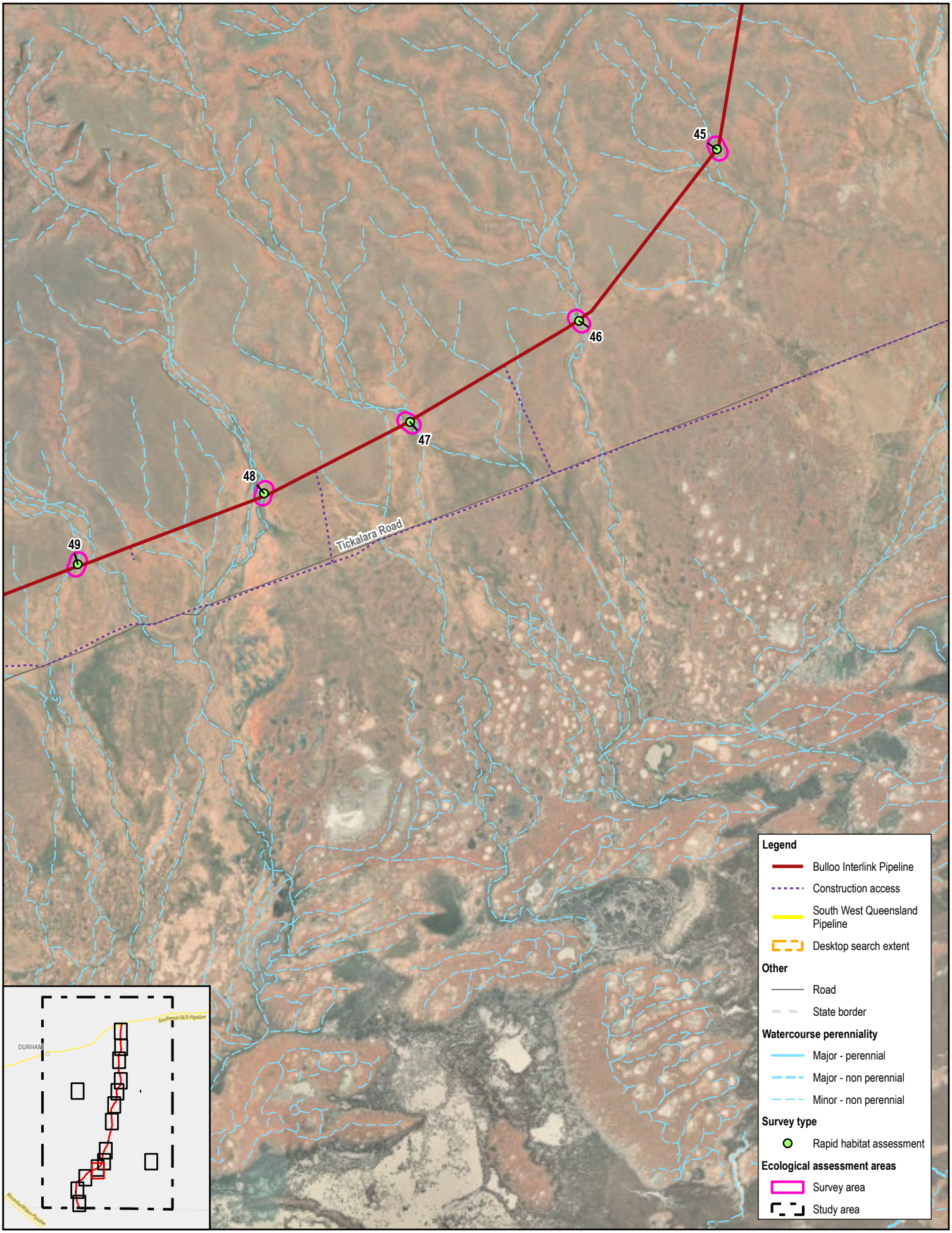
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 9 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:16

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRM/RRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

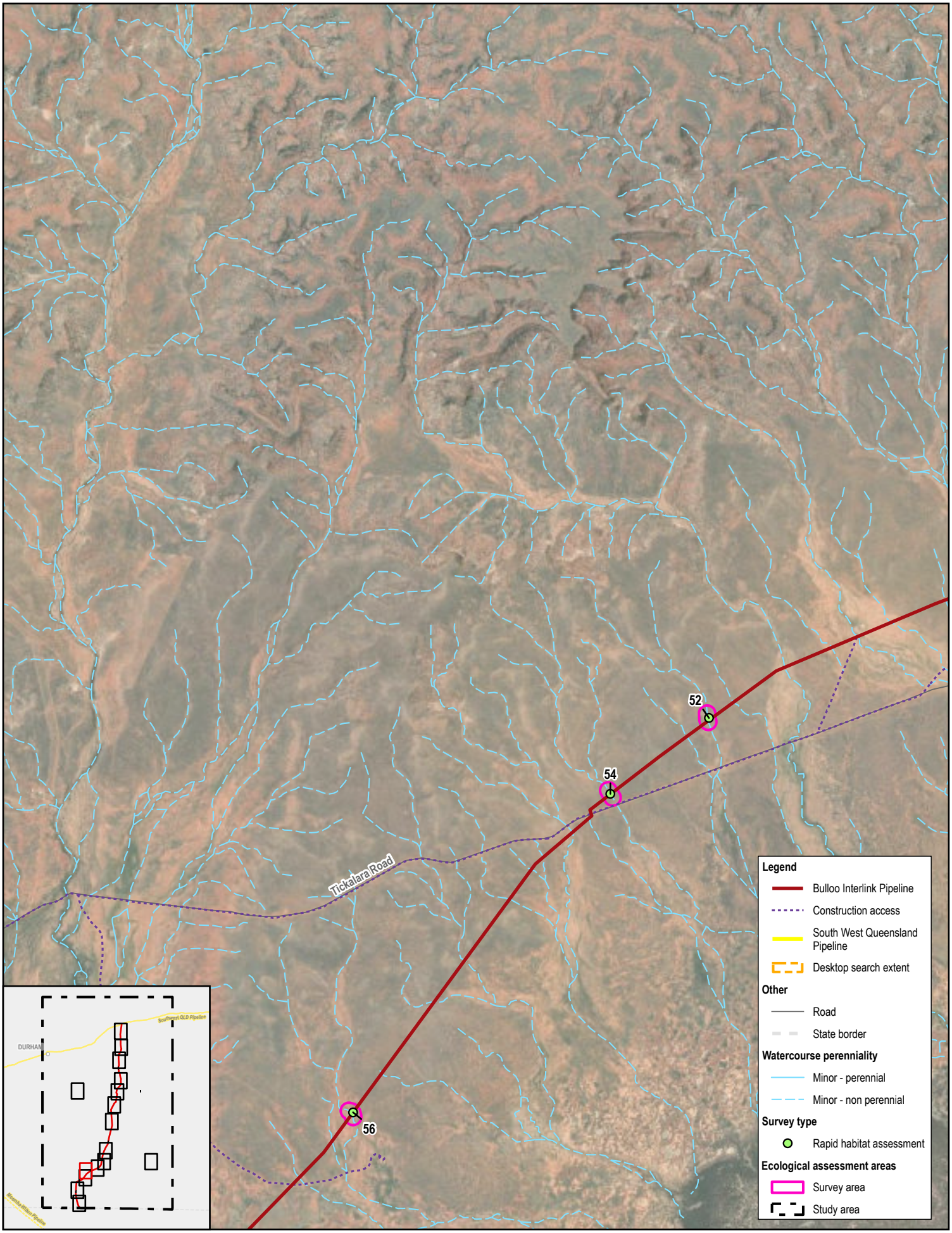
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 10 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:17

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

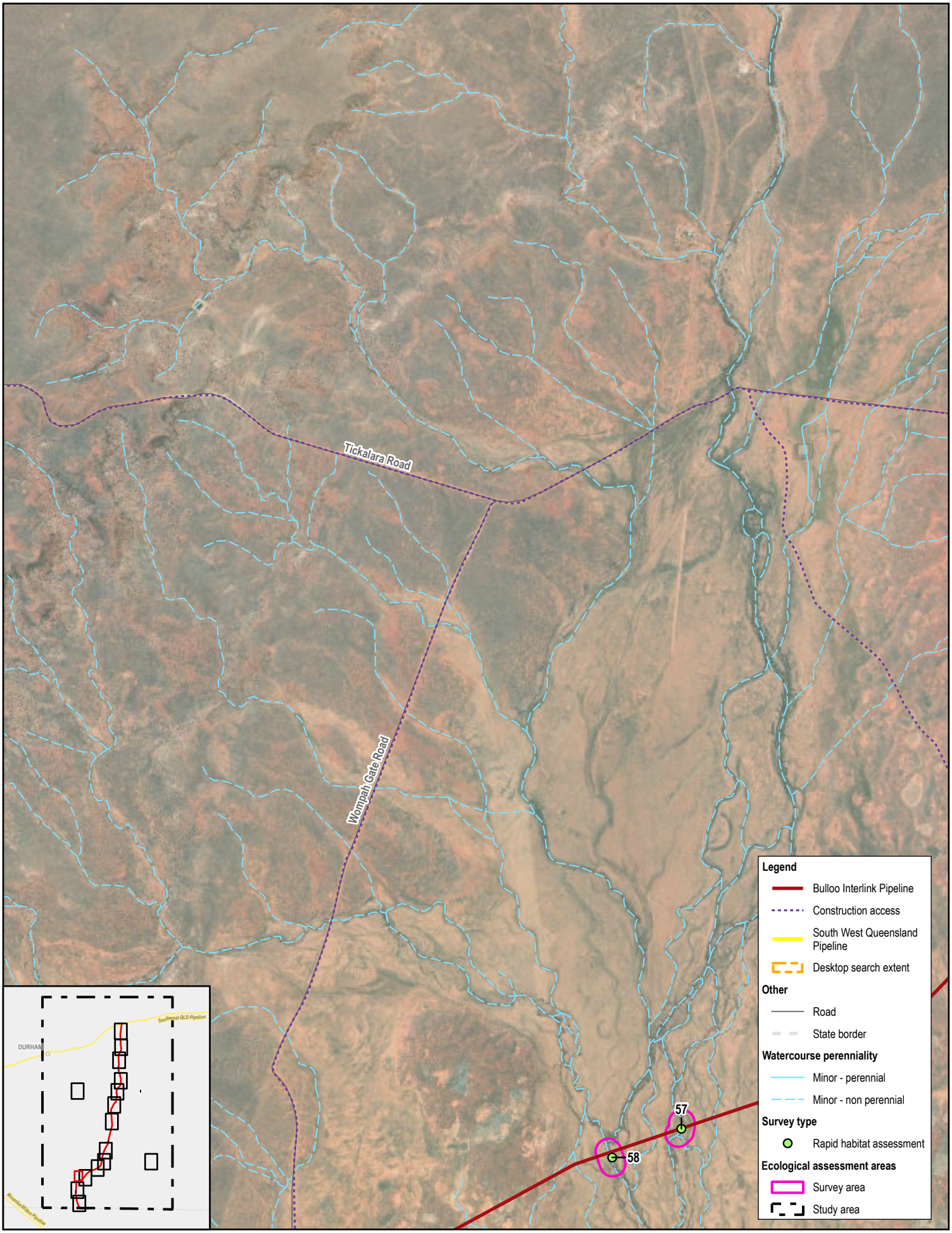
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 11 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:17

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS\DNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASCS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.2 0.4 0.6 0.8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

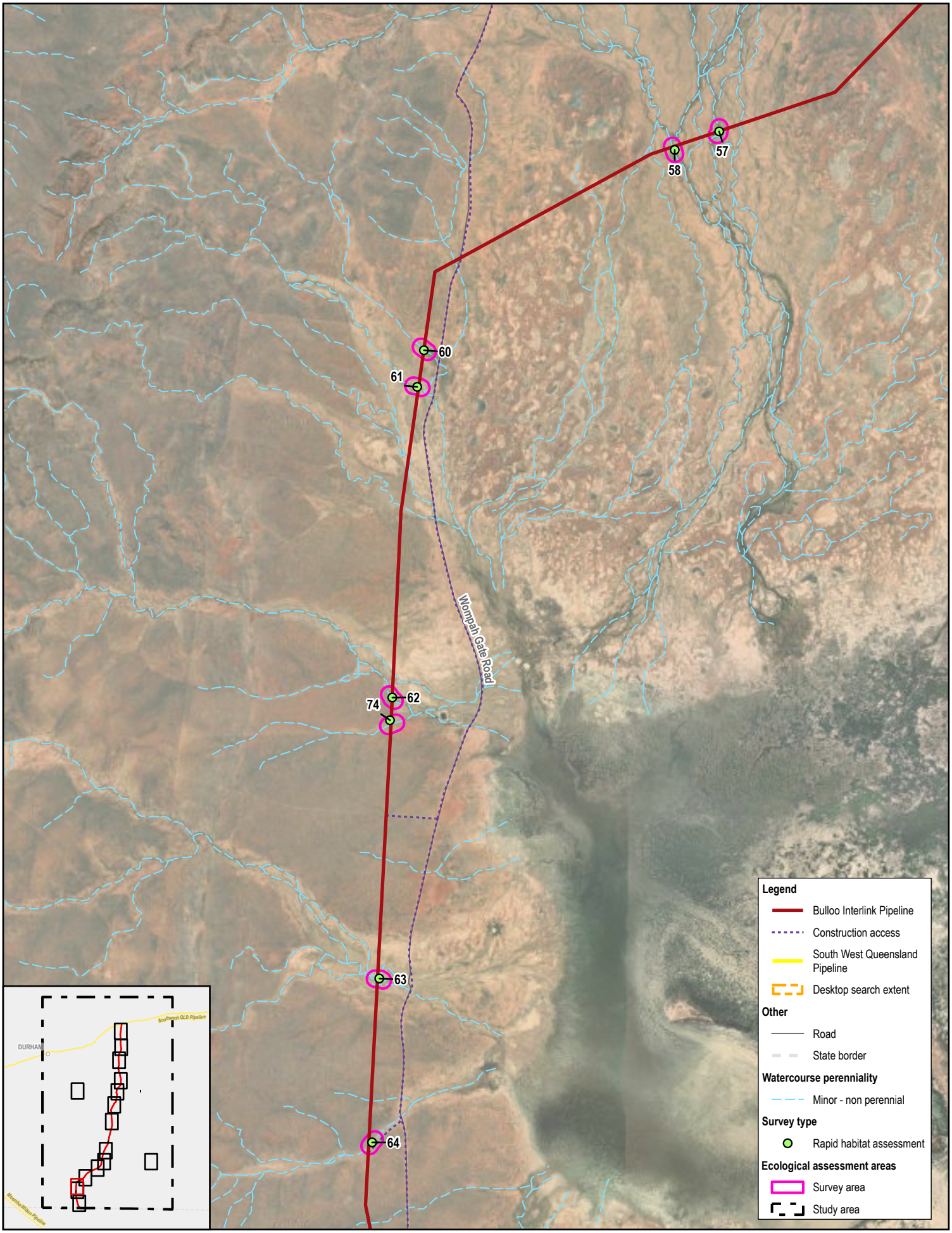
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 12 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:17

Data source: Vantor, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

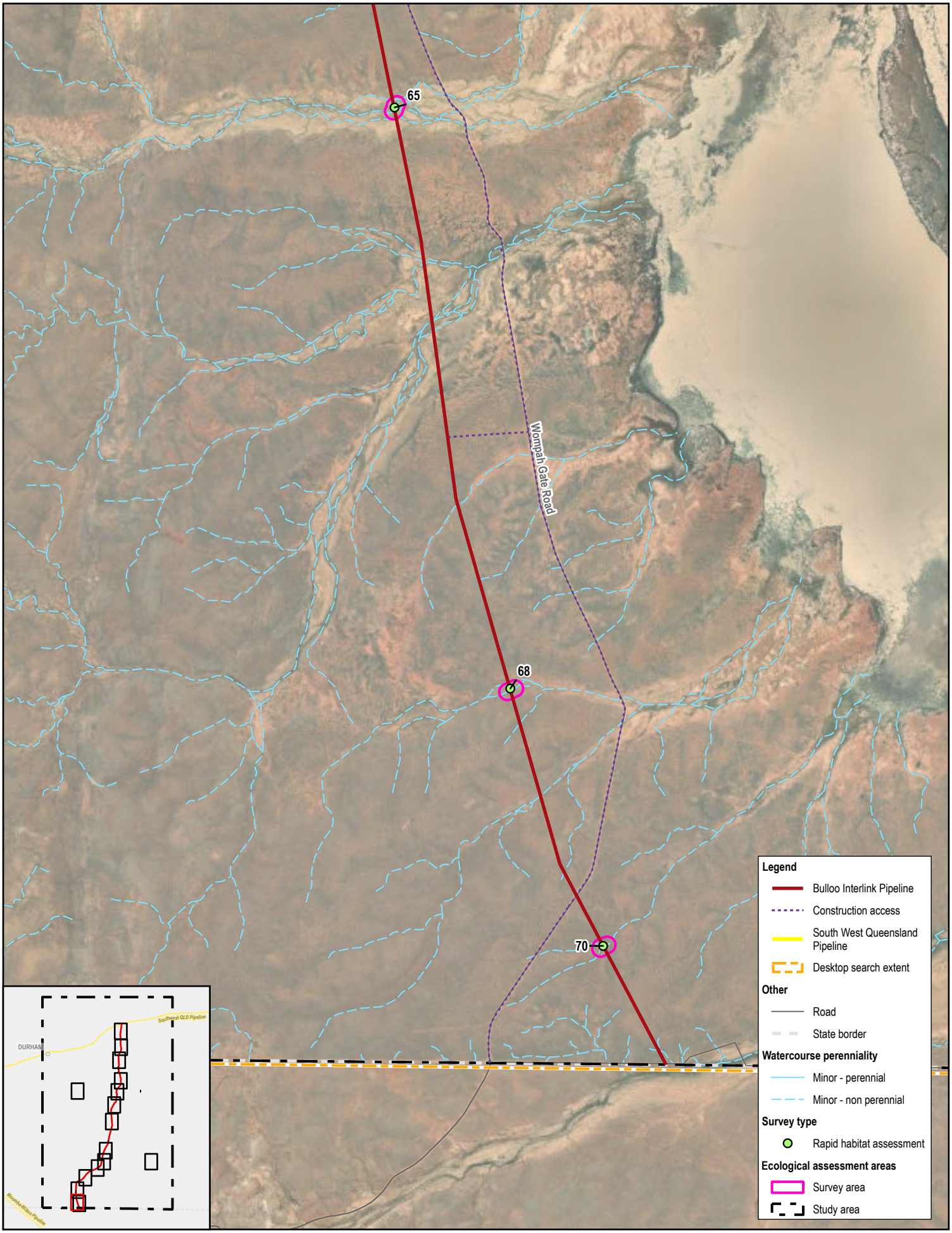
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 13 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:17

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/NRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 0.35 0.7 1.05 1.4

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

APA Group
Bulloo Interlink Pipeline

Aquatic ecology survey effort in study area

Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 14 / 14

Figure 3.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_regional_MB / Print date: 17 Jun 2026 - 02:17

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); GHD: Aquatic survey sites (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); GHD: Study area (2026); ASGS: State border (2016) Created by: calburo2

Field conditions

Aquatic field surveys were conducted within the study area over two seasons:

– Post-wet season from 6 to 17 July 2025
– Pre-wet season from 7 to 17 October 2025.

While July is typically considered the dry season, in 2025 there was an unusually wet period in March that led to extensive flooding in the region. Sites could not be accessed until approximately June when the roads were able to be utilised again post flood and there was considerable water around for the survey to be classified as a post-wet season survey. Weather conditions prior to and during these two survey periods are shown in Table 3.3 and Figure 3.3. (Thargomindah Airport, Station ID: 045025; BoM, 2025a). Figure 3.3 shows the total monthly rainfall for 2025 compared to the long-term monthly mean (1999–2025).

During the July 2025 survey period, conditions were as expected for winter, with cold to mild temperatures and moderate humidity (BoM, 2025a). Temperatures were variable, ranging from 1.5 °C to 23.6 °C, and relative humidity was similarly variable ranging between 20 per cent and 79 per cent (Table 3.3). No rain was recorded the week prior to, or throughout the survey period. However, in March 2025 there was higher than usual rainfall in the study area, with total of 175.7 mm rainfall (Figure 3.3).

This resulted in significant flooding across the region (NASA Earth Observatory, 2025). This represents approximately four times the typical March total rainfall of approximately 44.2 mm for the area and is the highest recorded rainfall for March since 1956. The post-wet season survey was completed in July following this significant rainfall event. As such, field conditions during field surveys were representative of the region's infrequent post-flood phase, rather than its prevailing arid regime that typically dominates the landscape during most years.

During the October pre-wet survey period, temperatures were variable, ranging from 10.8 °C to 39.1 °C, with relative humidity similarly variable though slightly lower than in July (between 11 per cent and 65 per cent) (Table 3.3). Rainfall was slightly higher than average through August and September before declining in October in the lead up to the pre-wet season survey (Figure 3.3). A small amount of rain was recorded during the field survey (4.4 mm); however, no rain was recorded the week prior to the survey period (Table 3.3). Large storm cells were observed sweeping through the landscape during the pre-wet survey, but they did not impact on the field survey effort or timing.

Table 3.3 Weather conditions during aquatic field surveys (Thargomindah Airport, Station 045025)

Date	Temperature (°C)		Rainfall (mm)	Relative humidity		Max wind gust	
	Min (°C)	Max (°C)		9am (%)	3pm (%)	Direction*	Speed (km/h)
July 2025							
6/07/2025	7.0	20.1	0.0	55	30	WNW	37
7/07/2025	5.1	20.0	0.0	61	37	W	20
8/07/2025	5.6	23.6	0.0	58	23	NNW	39
9/07/2025	7.4	22.0	0.0	49	33	W	44
10/07/2025	8.1	17.7	0.0	52	33	SW	37
11/07/2025	1.5	18.7	0.0	63	32	SSE	20
12/07/2025	3.2	20.6	0.0	59	34	ESE	28
13/07/2025	3.7	23.6	0.0	61	20	NNE	33
14/07/2025	4.3	23	0.0	47	22	NNW	17
15/07/2025	9.1	23.1	0.0	47	25	SE	35
16/07/2025	8.9	20.1	0.0	79	43	ESE	39
17/07/2025	8.1	20.2	0.0	62	25	S	41
October 2025							
07/10/2025	19.6	36.9	0.0	26	12	S	43
08/10/2025	22.4	39.1	0.0	19	11	N	54

Date	Temperature (°C)		Rainfall (mm)	Relative humidity		Max wind gust	
	Min (°C)	Max (°C)		9am (%)	3pm (%)	Direction*	Speed (km/h)
09/10/2025	25.6	35.1	0.0	28	25	S	50
10/10/2025	18.6	34.1	4.2	65	27	SW	28
11/10/2025	18.1	36.1	0.2	19	15	SW	31
12/10/2025	20.9	33.8	0.0	27	22	SW	46
13/10/2025	19.8	31.0	0.0	48	32	ESE	30
14/10/2025	17.2	33.7	0.0	21	16	SSE	28
15/10/2025	18.8	36.4	0.0	17	19	E	44
16/10/2025	22.2	37.1	0.0	51	24	NNW	46
17/10/2025	23.7	38.8	0.0	31	21	W	48

Notes: *N = north, NNW = north-northwest, E = east, ESE = east-southeast, S = south, SE = southeast, SSE = south-southeast, SW = southwest, W = west, WNW = west-northwest.

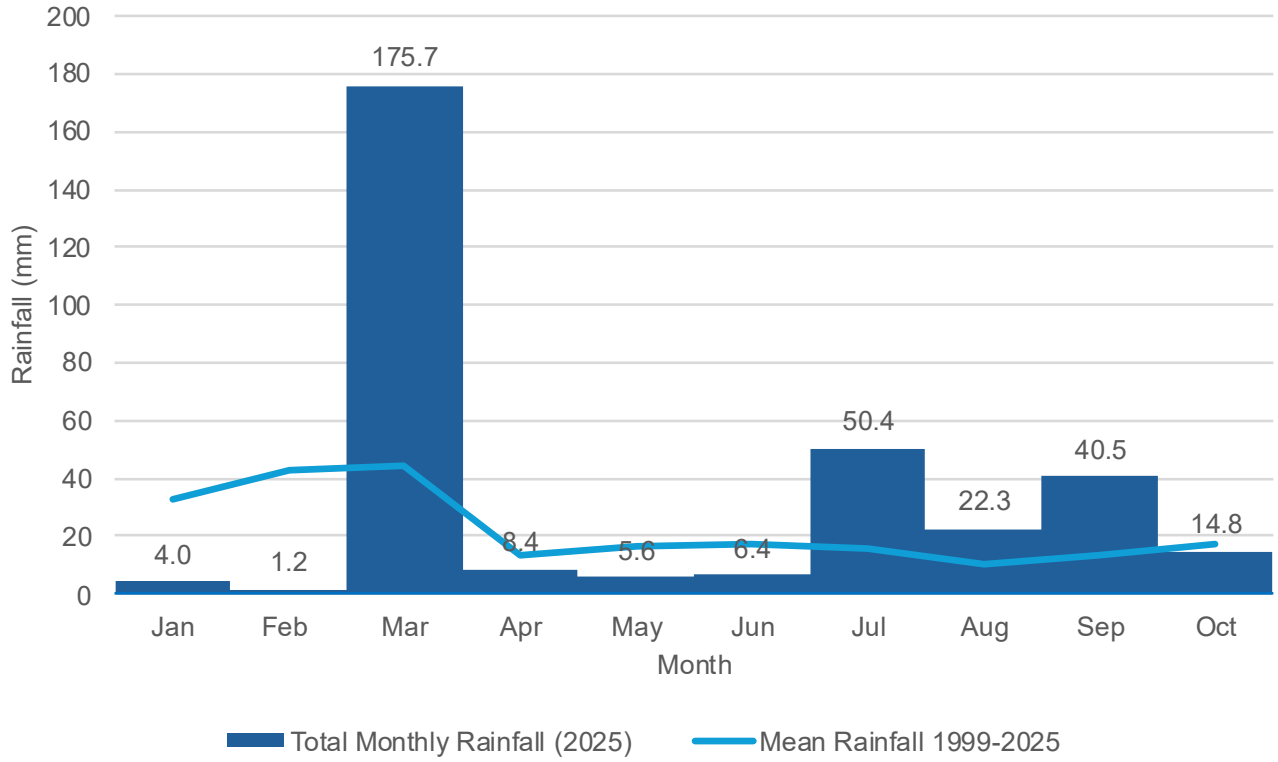


Figure 3.3 Total monthly rainfall in 2025 and mean monthly rainfall from 1999 – 2025 (Thargomindah Airport, Station 045025).

Aquatic habitat assessment

Aquatic habitat assessments were undertaken to describe the presence and condition of key aquatic habitat features and overall condition of each survey site. The assessments were conducted in accordance with the *AusRivAS Sampling and Processing Manual* (DNRM, 2001) and the *Monitoring and Sampling Manual* (DES, 2018).

Habitats were characterised in terms of the key features shown in Table 3.4. Photographs of each survey site were taken as an additional record of habitat conditions at the time of the survey.

An overall condition score was calculated by scoring each habitat variable shown in Table 3.4 against condition criteria shown in Table 3.5. These scores were then compared between survey sites to identify patterns within the data and provide an ecologically relevant interpretation of the results.

Table 3.4 Habitat characteristics and features recorded during habitat assessments

Habitat characteristic	Key features
Channel type	**Reach morphology:** bank full bank height, bank full stream width, stream wetted width, normal wetted width, water depth.
Habitat diversity and extent	**Variety of habitat:** the presence of shallow, deep, pool, run, riffle, undercut bank, woody debris and macrophytes habitats.
Bed and bank composition	**Substrate:** percent representation by bedrock, boulder (>256 mm), cobble (64–256 mm), pebble (4–64 mm), gravel (2–4 mm), sand (0.05–2 mm) and silt/clay (<0.05 mm) classifications. Sediment deposits: presence of instream deposits of either sand or silt (or none).
Surface water attributes	**Water quality:** substrate anoxia, water surface colour and condition, the presence of water or substrate odour was noted.
Instream habitat	**Snags and woody debris:** representation of detritus (leaves, twigs), sticks (<2 cm diameter), branches (<15 cm diameter) and logs (>15 cm diameter) classifications. These were estimated in terms of cover within the reach as either none, little (1–10%), some (10–50%), moderate (50–75%) or extensive (>75%). **Habitat attributes:** presence of periphyton, moss, filamentous algae, macrophytes, bank overhang vegetation, trailing bank vegetation, blanketing silt and substrate anoxia. The same 'none' to 'extensive' categories were used as for snags and woody debris. **Macrophytes:** general characterisations of visible macrophytes.
Riparian condition	**Riparian zone:** width of riparian zone, per cent canopy cover, per cent shading, cover (none' to 'extensive') of bare ground, grass, shrubs, tress <10 m high; trees >10 m high and presence of exotic species.
Existing disturbances/ modifications or barriers	**Disturbances:** impacts from humans, pastoral animals, non-pastoral animals. Presence of erosion, artificial and/or natural barriers.
Breeding habitat	Location and suitability of potential breeding habitats.

Table 3.5 River bioassessment program: habitat assessment score criteria (DNRM, 2001)

Habitat variable	Poor	Fair	Good	Excellent
Bottom substrate	0–5	6–10	11–15	16–20
Embeddedness	0–5	6–10	11–15	16–20
Velocity and depth category	0–5	6–10	11–15	16–20
Channel alteration	0–3	4–7	8–11	12–15
Bottom scouring and deposition	0–3	4–7	8–11	12–15
Pool/riffle, run/bend ratio	0–3	4–7	8–11	12–15
Bank stability	0–2	3–5	6–8	9–10
Bank vegetation and stability	0–2	3–5	6–8	9–10
Streamside cover	0–2	3–5	6–8	9–10
Total	**0–38**	**39–74**	**75–110**	**111–135**

In-situ water quality

At each survey site where water was present, surface water quality was measured in-situ using a YSI ProDSS multi-parameter probe or a Hanna Instruments HI98194. Measurements were collected approximately 0.1–0.3 m below the water's surface. The following physio-chemical parameters were measured:

– Dissolved oxygen (per cent saturation and mg/L)
– Electrical conductivity (µS/cm)
– pH (pH units)
– Turbidity (NTU) (YSI only)
– Water temperature (°C).

Freshwater macroinvertebrates

Macroinvertebrate community sampling was carried out following protocols for sampling outlined in the *AusRivAS Sampling and Processing Manual* (DNRM, 2001), and the expanded methodology outlined in the *Monitoring and Sampling Manual* (DES, 2018).

Two AusRivAS macroinvertebrate samples were collected at each survey site where there was sufficient water available: one sample from edge habitat and one from bed habitat (Table 3.6).

Sampling of the habitats was undertaken by sweeping a 250 µm mesh net in an upwards direction, perpendicular to the bank along a 10 m stretch. For edge samples, this included areas of overhanging or submerged habitat (e.g. logs, leaf litter, tree roots).

Where minimal water was present, only an edge habitat sample was collected, as reduced water volume limits the development of any deep bed habitat (DES, 2018). In cases with extremely limited water (<1 m²), no invertebrate samples were taken, as such conditions are unlikely to support representative aquatic macroinvertebrate communities.

Samples were directly transferred to a screw-capped jar and preserved using methanol and transported to GHD's biological laboratory. In the laboratory, samples were sorted, identified to the lowest taxonomic level possible (family level in most cases) and enumerated, in accordance with AusRivAS standards (DES, 2018).

Table 3.6 Macroinvertebrate sampling survey effort during the post-wet and pre-wet surveys

Survey site	Edge habitat	Bed habitat	Comment
July 2025			
Aquatic site 7	✓	✓	–
Aquatic site 12	✓	✓	–
Aquatic site 15	✓	✓	–
Aquatic site 17	✓	✓	–
Aquatic site 21	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 40	✓	✓	–
Aquatic site 42	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 46	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 72	✓	✓	–
Aquatic site 73	✓	✓	–
October 2025			
Aquatic site 12	✓	✓	–
Aquatic site 15	✓	✓	–
Aquatic site 17	✓	–	Pool was shallow and had little distinction between edge and bed.

Survey site	Edge habitat	Bed habitat	Comment
Aquatic site 21	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 24	✓	✓	–
Aquatic site 38	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 40	✓	✓	–
Aquatic site 72	✓	✓	–
Aquatic site 78	✓	–	Pool was shallow and had little distinction between edge and bed.
Aquatic site 81	✓	✓	–
Aquatic site 84	✓	✓	–

Fish

Fish surveys were undertaken at each survey site where sufficient water was available using a combination of passive (i.e. baited box traps and fyke nets) and active methods (i.e. backpack electrofishing) to target a variety of habitats, fish sizes and survey site conditions in accordance with the *Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the EPBC Act* (Commonwealth of Australia, 2011a) and the *Monitoring and Sampling Manual* (DES, 2018). Details of the fishing effort are provided in Table 3.7.

At survey sites with adequate water depth (>0.5 m deep) five standard square box traps (400 mm x 250 mm x 250 mm) with 50 mm openings at each end were placed in stream and set for a minimum of one hour. Similarly, at survey sites with adequate water depth, one fyke net comprising two wings 10 m wide, with a 0.6 m drop and 25 mm mesh was set in-stream for a minimum of one hour (Table 3.7; Plate 3.1). Fyke nets were positioned with the opening facing upstream to capture fish moving throughout the waterway. Fyke nets were not deployed at survey sites with snags or debris and nets could not be set to effectively capture fish.

Backpack electrofishing was conducted at each comprehensive survey site where suitable water depth was present (i.e. no deeper than 1.5 m). Electrofishing was conducted by two operators using a Smith-Root LR-20 backpack unit. The methodology at each survey site was conducted in accordance with the Australian Rivers Institute (Kennard et al., 2011) and the *Australian Code of Electrofishing Practice* (NSW Fisheries, 1997).

Within each reach with sufficient water available, fish sampling covered the full range of major habitat types represented, with the amount of sampling effort per habitat type proportional to the representation of that habitat type at the survey site. Once immobilised, fish were collected in landing nets and transferred to a bucket for identification, examination and recovery before being released back into the waterway. All visible fish were collected, and "blind netting" (random sweeps of the net through areas where electrical pulses have been generated) were also used where turbid waters or aquatic vegetation limited visibility of fish. Fish community data was assessed to determine relative abundance and diversity of species collected at each survey site, as well as health and general population structure. Backpack electrofishing was not conducted at survey sites deeper than 1.5 m, or at survey sites with conductivity greater than 2,000 µS/cm due to safety and limitations of the equipment (Smith-Root, 2020). At these survey sites, only netting methods were used for fish capture.

After completion of processing, all native species were released at the point of capture. In the event that noxious specimens, declared under relevant Commonwealth and state legislation were identified, they were euthanised and disposed of in accordance with GHD's animal ethics approvals (see section 3.2.2).

Table 3.7 Summary of fish and turtle survey effort for comprehensive aquatic sites

Site	Macrocrustacean and freshwater fish	Freshwater turtles
July survey		
Aquatic site 7	Backpack electrofishing Fyke net (1) Baited box traps (5)	Fyke net (1)
Aquatic site 12	Backpack electrofishing	–
Aquatic site 15	Backpack electrofishing	–
Aquatic site 17	Backpack electrofishing	–
Aquatic site 21	Backpack electrofishing	–
Aquatic site 40	Backpack electrofishing Fyke net (1) Baited box traps (5)	Fyke net (1)
Aquatic site 42	–*	–*
Aquatic site 46	–*	–*
Aquatic site 72	Backpack electrofishing Fyke net (1) Baited box traps (5)	Cathedral trap (1)
Aquatic site 73	Backpack electrofishing Fyke net (1) Baited box traps (5)	Fyke net (1)
October survey		
Aquatic site 12	Backpack electrofishing Fyke net (1)	Cathedral trap (1)
Aquatic site 15	Backpack electrofishing Fyke net (1)	Cathedral trap (1)
Aquatic site 17	Dip netting	–*
Aquatic site 21	Backpack electrofishing	–*
Aquatic site 24	Backpack electrofishing	–*
Aquatic site 38	Backpack electrofishing	–*
Aquatic site 40	Backpack electrofishing Fyke net (1)	Cathedral trap (1)
Aquatic site 72	Backpack electrofishing Fyke net (2) Baited box traps (5)	Cathedral trap (1)
Aquatic site 78	Dip netting	–*
Aquatic site 81	Backpack electrofishing Fyke net (1) Baited box traps (5)	Cathedral trap (1) Fyke net (1)
Aquatic site 84	Backpack electrofishing Fyke net (2) Baited box traps (5)	Cathedral trap (1)

Note: * Pool too small and shallow for adequately deploying trapping techniques



Plate 3.1 Fyke net deployed at a site during the post-wet survey.

Freshwater turtles

At each survey site where water was sufficiently deep, one baited cathedral trap was placed in-stream for a minimum of one hour in accordance with the DETSI standard methodology (Limpus et al., 2002; Hamann et al., 2007; Limpus et al., 2011) and the *Survey guidelines for Australian's threatened reptiles* (Commonwealth of Australia, 2011b). Details of the turtle capture effort are provided in Table 3.7 (above). Any turtle caught was identified in the field and returned to the environment where caught, in accordance with GHD's animal ethics approvals (see section 3.2.2).

Aquatic plants

At each survey site, a walking transect survey of approximately 100 m was conducted along the banks of the waterway to identify aquatic plants growing in-stream or on the banks. Aquatic plants were identified to the lowest taxonomic level possible and relative condition (e.g. healthy, moderate, or poor) was assessed visually. For plants unable to be identified in the field, representative samples were collected and sent to the Queensland Herbarium for confirmation.

3.2.3 Data analysis

In-situ water quality

The project alignment is partially within the Bulloo River catchment of the Lake Eyre basin, which triggers the EPP *Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins Environmental Values and Water Quality Objectives* (DES, 2020). The rest of the alignment is within the Cooper Creek- Bulloo River catchment of the Lake Eyre Basin and corresponds with the Queensland water quality guidelines (QWQG) in the absence of the EPP WQO.

The QWQG does not outline WQO for the Lake Eyre basin, stating: "There is very little water quality information available for the Lake Eyre basin. Default ANZECC 2000 Guidelines are very unlikely to be appropriate for the ephemeral streams of the region. Users are strongly encouraged to collect local data and develop local guidelines" (DES, 2009). Based on this, all sites were assessed under the *Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins Environmental Values and Water Quality Objectives* EPP guidelines.

The EPP WQO applied were those established for the moderately disturbed Upper Bulloo River at low flow (Table 3.8). The exception to this was the site at Bulloo River (Aquatic site 72) which is located within the Lower Bulloo River. As such, it was more appropriate to apply WQO for moderately disturbed waters of Lower Bulloo River at low flow for this site (Table 3.8).

Table 3.8 Water quality objectives relevant to the project

Analyte	Units	EPP Guidelines (DES, 2020)	
		Moderately disturbed waters of Upper Bulloo River at low flow	Moderately disturbed waters of Lower Bulloo River at low flow
Electrical conductivity	µS/cm	100	95
pH	pH units	6.5–8.0	6.5–8.0
Dissolved oxygen	% sat	60–110	60–110
Turbidity	NTU	270	780

Freshwater macroinvertebrates

Univariate analyses

Macroinvertebrate data was analysed using the following univariate metrics:

– Taxonomic richness: refers to the number of different taxa (usually families) contained in a sample.
– EPT richness is the number of collected families belonging to the Ephemeroptera (i.e. mayflies), Plecoptera (i.e. stoneflies) and Trichoptera (i.e. caddisflies) orders. These groups of macroinvertebrates have been found to be particularly sensitive to changes in their environment (Karr & Chu, 1999) and, therefore, can be used to assess impacts due to chemical and physical changes.
– SIGNAL-2 (Stream Invertebrate Grade Number Average Level – Version 2) (Chessman, 2003) is a simple scoring system for macroinvertebrate communities in Australian rivers. SIGNAL-2 is a biotic index based on pollution sensitivity values (grade numbers) assigned to macroinvertebrate families. Grade numbers have been derived from published and unpublished information on the tolerance of macroinvertebrate families to pollutants such as sewage, salinity, and nitrification. Each taxon is assigned a grade from 1 (tolerant) to 10 (sensitive) based on the ecotoxicology assessment data. The average of the grades for each survey site is the SIGNAL-2 score. Animals that could not be identified to family level due to damage or immaturity are excluded from this analysis to avoid ‘double-counting’. The animals that could not be identified were still recorded as unidentified individuals.

Macroinvertebrate indices were also compared to the WQO set out in the EPP *Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins Environmental Values and Water Quality Objectives* (DES, 2020; Table 3.9).

Table 3.9 Macroinvertebrate biological water quality objectives relevant to the project

EPP Guideline	Taxa richness	Average SIGNAL grade
Macroinvertebrate indexes for edge habitat in Bulloo Basin (20th and 80th percentiles)	15.5–25	3.04–3.63

Multivariate analyses

Non-metric multidimensional scaling (NMDS) ordination provides a representation of the relative similarity of entities (i.e. site samples) based on their attributes (i.e. macroinvertebrate community composition) within a reduced dimensional space. The more similar sites are to each other, the closer they are located in the ordination space. NMDS ordination was performed on similarity matrix for all pairs of samples based on the Bray-Curtis similarity coefficient.

As the sampling method used is non-quantitative, all data was converted to presence-absence format prior to analysis. The number of axes used in the ordination was based on resultant stress levels. The stress level is a measure of the distortion produced by compressing multi-dimensional data into a reduced set of dimensions. The stress level will typically increase as the number of axes (i.e. dimensions) is reduced, under the assumption that

the data will become increasingly difficult to fit the given dimensions. A stress level of less than 0.2 is considered acceptable.

Freshwater fish and turtle community

Fish community data were analysed and reported at the species level where accurate identification was possible, and at the genus level where species-level determination could not be confirmed. Both species richness (the number of distinct taxa recorded) and abundance (the total number of individuals observed) were calculated for each site. These metrics were used to describe community composition and to allow comparison of fish assemblages among sites within the survey area.

3.2.4 Likelihood of occurrence

A likelihood of occurrence assessment was conducted to attribute a 'likelihood rating' to all threatened species that were predicted to occur in the study area based on desktop assessment (see Appendix D). The likelihood of occurrence assessment was based on a review of species distributions, habitat requirements, historical records for the region, and the results of aquatic field surveys conducted within the survey area.

The likelihood of occurrence assessment ranking was based on the following framework shown in Table 3.10.

Table 3.10 Likelihood of occurrence framework

Likelihood	Criteria	Implication for assessment and reporting
Confirmed present	– Species has been recorded within the survey area during field surveys.	**Included in all reporting** These species were included in all reporting to: – Assess and map species habitat – Define key ecological features including important populations and habitat critical to the survival of the species – Assess species-specific impacts – Identify avoidance and mitigation measures – Undertake significance of impact assessments on the residual impacts – Provide offsets for any significant residual impact.
Likely to occur	– There are recent (<10 years) and nearby (<10 km of project site or survey sites) historical records of the species. – Suitable high-quality habitat is present within the survey area.	
Potential to occur	– There are older (10–20 years) and more regional (10–30 km) historical records of the species. – The species was not detected in field surveys. – Low to moderate habitat suitability/quality is present within the survey area. – The species has life historical characteristics that warrant increased conservatism in likelihood assessment (i.e. cryptic species or species with temporal or spatial dynamism such as transient wide-ranging species or species that are dormant for extended periods). – The species is unlikely to occur in the survey area but has a reasonable likelihood of occurring immediately adjacent and should be included in impact assessment due to the potential for indirect impacts on the species.	
Unlikely to occur	– The species has been historically recorded locally or regionally; however, no suitable habitat occurs within the survey area, and the species has limited mobility or temporal dynamism, allowing increased confidence that it is unlikely to occur within the survey area even on a transient basis. – The species has NOT been recorded locally or regionally AND only small areas of very low-quality habitat are present in the survey area AND the species is readily detected wherever present.	**Included in likelihood of occurrence reporting only** These species were not included in impact assessment given they are unlikely to occur in the survey area.
Highly unlikely to occur	– The species has not been historically recorded in the region. – No suitable habitat is present, and the survey area is generally outside the species current known range. – The species has well-known and highly specific habitat requirements that are not present in the survey area. – The species has low mobility.	

3.3 Assessment criteria

3.3.1 Significant impact assessment

A significant impact assessment was undertaken for MNES and MSES, using the EPBC Act *Significant impact guidelines 1.1* (DoE, 2013) and Queensland *Significant residual impact guideline* (DEHP, 2014), respectively. For other aquatic ecological values, the significance of environmental impacts was undertaken before and after mitigation using the impact significance frameworks shown in Table 3.11 and Table 3.12. In all significant impact assessments, consideration was given to the intensity, duration, cumulative impact, irreversibility and the risk of environmental harm.

Significance ratings reflect consideration of impact intensity, duration, spatial extent, cumulative effects, reversibility and the feasibility of mitigation, consistent with Commonwealth and Queensland assessment guidance

Table 3.11 Criteria for assessing the significance of potential impacts

Issue significance	Criteria
Positive	– Expected to improve the environment, resulting in benefits for ecological communities. – Expected to generate socio-economic opportunities/benefits resulting in an improvement to the wellbeing of the affected stakeholder group(s).
Minor	– Unlikely to be a significant issue for the project, the community, or the environment. – Associated risks/potential impacts, if any, can be managed through typical established industry practices. – Minimal, if any, design modification required to address.
Moderate	– May be a significant issue in some circumstances. – Associated risks/potential impacts can be managed through a combination of established industry practices, and some targeted mitigation. – May require minor modification of design to address.
Major	– Expected to be a significant issue for the project, the community, or the environment. – Associated risks/potential impacts can only be managed through targeted, bespoke mitigation measures. – Likely to require some modification of design to address.
Critical	– Potentially insurmountable issue. – Associated risks/potential impacts cannot be feasibly addressed through application of mitigation measures. – Requires a substantial re-design of one or more project elements to address.

Table 3.12 Criteria for assessing the significance of residual impacts

Issue significance	Criteria
Positive	– Proposed measures to enhance potential benefits and opportunities are adequate. – The project will continue to investigate additional opportunities to enhance potential benefits and opportunities through future stages of design.
Minor	– Proposed measures are appropriate to mitigate the associated risks/potential impacts to an acceptable degree. – These measures may be further refined as development of the project progresses, however no further re-design is likely to be required.
Moderate	– Proposed measures are expected to reduce the significance of the risk/potential impact, however further mitigation may still be required. – Additional measures, which may include minor modification of design, will need to be identified as development of the project progresses. – Environmental offsets or other compensation for residual impacts may be required.
Major	– Proposed measures are not sufficient to mitigate the associated risk/potential impact to an acceptable degree. – Additional measures, including further modification of design, are likely to be required as development of the project progresses. – Environmental offsets or other compensation for residual impacts are expected to be required.
Critical	– Proposed measures are clearly insufficient to mitigate the risk/potential impact to an acceptable degree. – Substantial re-design of one or more fundamental project elements should be prioritised as development of the project progresses. – Extensive environmental offsets or other compensation for residual impacts required. – Requires amendment to government policy or statutory instruments in order for the project to progress.

4. Existing environment

4.1 Protected aquatic matters

The desktop review identified protected matters relating to aquatic ecological values within the study area. A protected matter refers to any matter of national or state environmental significance that are legally protected under the EPBC Act at the federal level, and under state laws to provide long-term conservation of biodiversity and heritage. These matters are shown in Table 4.1, with additional detail provided in the following sections.

Table 4.1 Protected aquatic matters of relevance to the project

Protected matter	Value and description
MNES	
World Heritage properties	There are no World Heritage properties within the desktop search extent.
National Heritage places	There are no National Heritage places within the desktop search extent.
Wetlands of international importance (Ramsar wetlands)	A Ramsar-listed wetland (Caryapundy Swamp; Ramsar Site No. 2520) is located approximately 2.7 km from the Project site at the nearest point. The Ramsar site is situated downstream of the Project and is hydrologically connected to Bulloo Lake, which lies approximately 2.5 km east of the Project site. Indirect impacts pathway to this Ramsar-listed wetland via changes to hydrology, sediment transport or water quality are limited as the study area avoids disturbance to wetland substrate, vegetation and hydrology, and will not alter flow regimes or connectivity. Coongie Lakes (Site number 376) was identified during desktop assessment; however, this is located over 150 km downstream of the desktop search extent, and is unlikely to be impacted due to limited ground disturbance (refer to section 4).
Listed threatened species and ecological communities	One aquatic threatened species, the Edgbaston goby (*Chlamydogobius squamigenus*) currently listed as vulnerable under the EPBC Act was identified in the WetlandInfo desktop search (Appendix A) for the Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creek basins. A likelihood of occurrence assessment for the species is presented in section 4.11.
Listed migratory species	There are no listed aquatic migratory species present within the study area.
Commonwealth marine areas/Great Barrier Reef Marine Park	None present within or downstream of the study area.
Nuclear actions	The project is not related to any nuclear-related activity.
Water resource, in relation to coal seam gas development and large coal mining development	The project is not related to coal seam gas development nor a large coal mining development.
Directory of Important Wetlands of Australia	
Nationally important wetlands	The following wetlands of national importance (DIWA wetlands) occur within, upstream and/or downstream of the project site (section 4.3): – Bulloo Lake (Wetland ID: QLD024) – approximately 2.4 km east of the project site – Cooper Creek–Wilson River Junction (Wetland ID: QLD027) – approximately 49 km west of the project site. Further detail is provided in section 4.3.
MSES	
Regulated vegetation	Regulated vegetation within the defined distance of a watercourse is present on all watercourses within, downstream and upstream of the project site. Regulated vegetation is discussed further in the Environmental Assessment Report (GHD, 2026b).

Protected matter	Value and description
Connectivity areas	There are two state significance riparian wildlife corridors intersecting with the project site; one following the Wilson River, and the other along Kercummurra Creek which then flows into Wilson River. There are also several state significant riparian wildlife corridors mapped outside of the project site in the broader study area, namely along the Bulloo River to the south-east of the project site, and Cooper Creek to the north-west of the project site. Several tributaries and anastomosing branches of these main river systems are also designated as state-recognised riparian wildlife corridors. Riparian corridors are discussed further in the Terrestrial Ecology Assessment Report (Queensland) (GHD, 2026b).
Wetlands and waterways	There are no high ecological value wetlands, high ecological value waterways, or wetland protection areas within the study area.
Strategic environmental area (SEA) – designated precinct	There is one designated precinct in a SEA (i.e. Channel Country) within the project site. This is situated along the Wilson River and extends upstream and downstream of the project site to the border with South Australia. A separate RIDA is being prepared for activity in this area.
Listed threatened species	WetlandInfo identified two threatened species under the NC Act, including the Edgbaston goby (*Chlamydogobius squamigenus*) currently listed as critically endangered and the Murray cod (*Maccullochella peelii*) currently listed as vulnerable. Further detail is provided in section 4.1.
Protected areas (e.g. estates, nature refuges, marine parks)	Bulloo Downs Nature Refuge is located to the south-east of the project site, approximately 0.75 km south-east at the closest point. Further detail is provided in section 4.3.
Declared FHAs and highly protected zones of state marine parks	None present within the study area.
Waterways providing for fish passage	Waterways providing for fish passage are present within the study area. Further detail is provided in section 4.3.
Marine plants	None present within the study area.
Legally secured offset areas	None present within the study area.
Other matters	
Groundwater dependent ecosystems (GDEs)	State mapped potential aquatic GDEs within the study area include: – Potential GDE aquifers comprised of unconsolidated sediments underlying majority of the study area, including the project site. Nationally mapped potential aquatic GDEs within the study area include: – Moderate potential aquatic GDE adjacent to Cooper Creek located approximately 46 km west of the project site. Further detail is provided in section 4.5.

4.2 Catchments

The project is located in Channel Country and due to the length of the pipeline it crosses two catchment regions: the northern extent (~KP 0–128 (Kilometre Point)) situated within the Cooper Creek drainage basin, and the southern extent (~KP 128–236.2) within the Bulloo drainage basin (Figure 4.1).

These are the largest endorheic (i.e. internally draining) basins in Australia, and both share similar hydrology, characterised by ephemeral braided and anastomosing (i.e. rejoining and cross-connecting) networks of river and creek channels, with extensive floodplains, wetlands, riparian areas and overflows (Cottingham, 1999; Capon, 2004). Being located in arid or semi-arid regions, these basins are typically dry year-round, except for sparse waterholes (Brown, 1983).

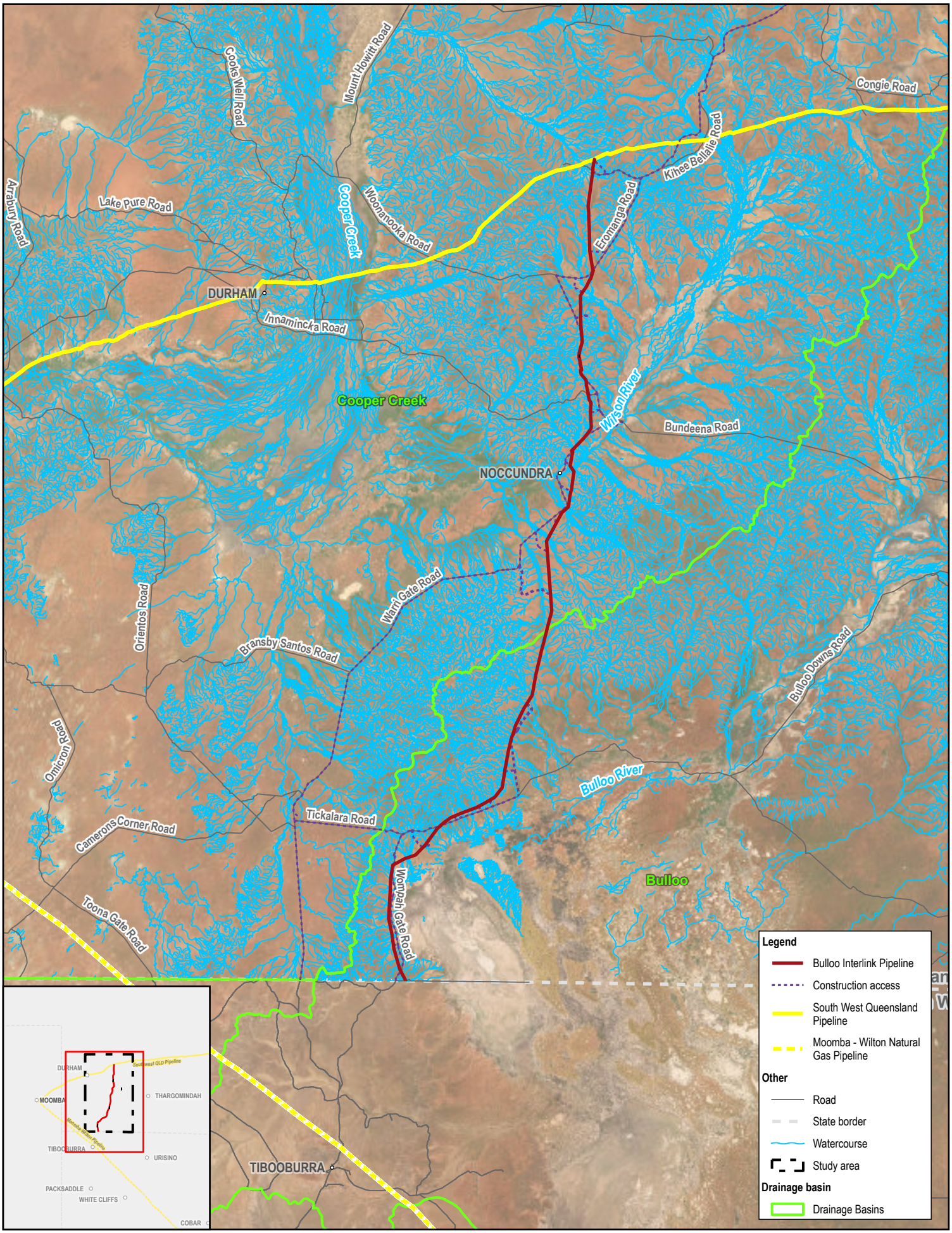
These waterholes generally form within enlarged segments of channels, which have been scoured and deepened from strong flows during major flooding events (Knighton & Nanson, 1994; Cendón et al., 2010), with the remaining surface water flow lost to groundwater recharge, floodplain storage and evaporation (Costelloe et al., 2006). Large-scale flooding events resulting in flow and connectivity across these basins are relatively rare (Kotwicki, 1986), with only two notable rainfall and flooding events over the last two decades; once in early 2011 and more recently in early 2025 (NASA Earth Observatory, 2025).When rainfall does occur, it has high spatial and temporal variability, falling often in localised areas and in high intensity, and typically occurring during summer months (Capon, 2004). This was observed during the October 2025 pre-wet season field survey where large storms passed in the distance but did not pass over the project site. As such, the wetlands and waterways of Cooper Creek and Bullo basins are some of the most hydrologically variable in the world (Knighton & Nanson, 1994; Cottingham, 1999; Capon, 2004).

The Cooper Creek drainage basin forms part of the Kati Thanda–Lake Eyre drainage division, the largest internally draining basin in the world (Capon, 2004) and one of the most ecologically important dryland river systems in Australia (Kingsford et al., 1999). Cooper Creek itself is considered the largest contributor of water to Kati Thanda–Lake Eyre when significant rainfall and flooding occurs. In Queensland alone, the Cooper Creek catchment covers an area of approximately 243,868 km^2 (14.1 per cent of total catchment area) (DETSI, 2016b). This area is comprised primarily of natural palustrine wetlands (52.9 per cent) in the form of floodplain swamps, which are connected by riverine systems (29 per cent) in high flows. Whilst there are some lake (lacustrine) areas (17.4 per cent), these are considered saline, with fresh surface waters interacting and recharging the shallow, saline groundwater table (DETSI, 2016b; Cendón et al., 2010). Little of Cooper Creek basin is artificially modified (<0.5 per cent); however, adjacent land is almost exclusively used for grazing activities (92.9 per cent) (DETSI, 2016b). As such, aquatic communities in proximity to intensive agriculture may be impacted by runoff of surface water pollutants during major flow events (e.g. excess nutrients and instream sediment suspension) (Cooper, 1993).

The Bulloo drainage basin is comparatively much smaller than Cooper Creek, covering an area of ~52,036 km^2 in Queensland (3 per cent of total catchment area) (DETSI, 2016a). It is similarly dominated by natural palustrine wetlands (77.1 per cent) with smaller extents of riverine systems and saline lakes (12 per cent and 10.5 per cent, respectively) (DETSI, 2016b). As for Cooper Creek, there is very little artificial or highly modified areas within the Bullo drainage basin (<0.5 per cent); however, much of the surrounding area is used for grazing (89.5 per cent), making aquatic habitats and communities therein also susceptible to surface water pollutants when flows occur (DETSI, 2016b; Cooper, 1993).

The unique features of these catchments are reflected in the Queensland Aquatic Conservation Assessment (ACA) for riverine systems. The ACA is based on the Aquatic Biodiversity Assessment and Mapping Methodology (AquaBAMM), which systematically evaluates the biodiversity values of waterways using criteria such as naturalness, habitat diversity, connectivity, and the presence of threatened or unique species/habitats (DETSI, 2024d). Noting that this method relies on desktop information and that field survey results provide a better understanding of the condition of the waterways.

Under the ACA, sections of the Cooper Creek and Bulloo catchments intersecting with the project site are mapped as having medium to very high conservation significance (Figure 4.2). Reaches rated as having very high conservation value represent waterways in near-natural condition that provide aquatic values across typically all criteria; for example having exceptional habitat diversity, strong ecological connectivity, support for regionally or state-significant species, and ecosystem processes or notable representation of significance special features (e.g. unique geomorphology) (Inglis & Howell, 2009). Medium significance areas comparatively comprise fewer aquatic values of high to medium importance but still represent areas considered to support aquatic biodiversity and ecological connectivity.



Paper Size ISO A4

0 6 12 18 24

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

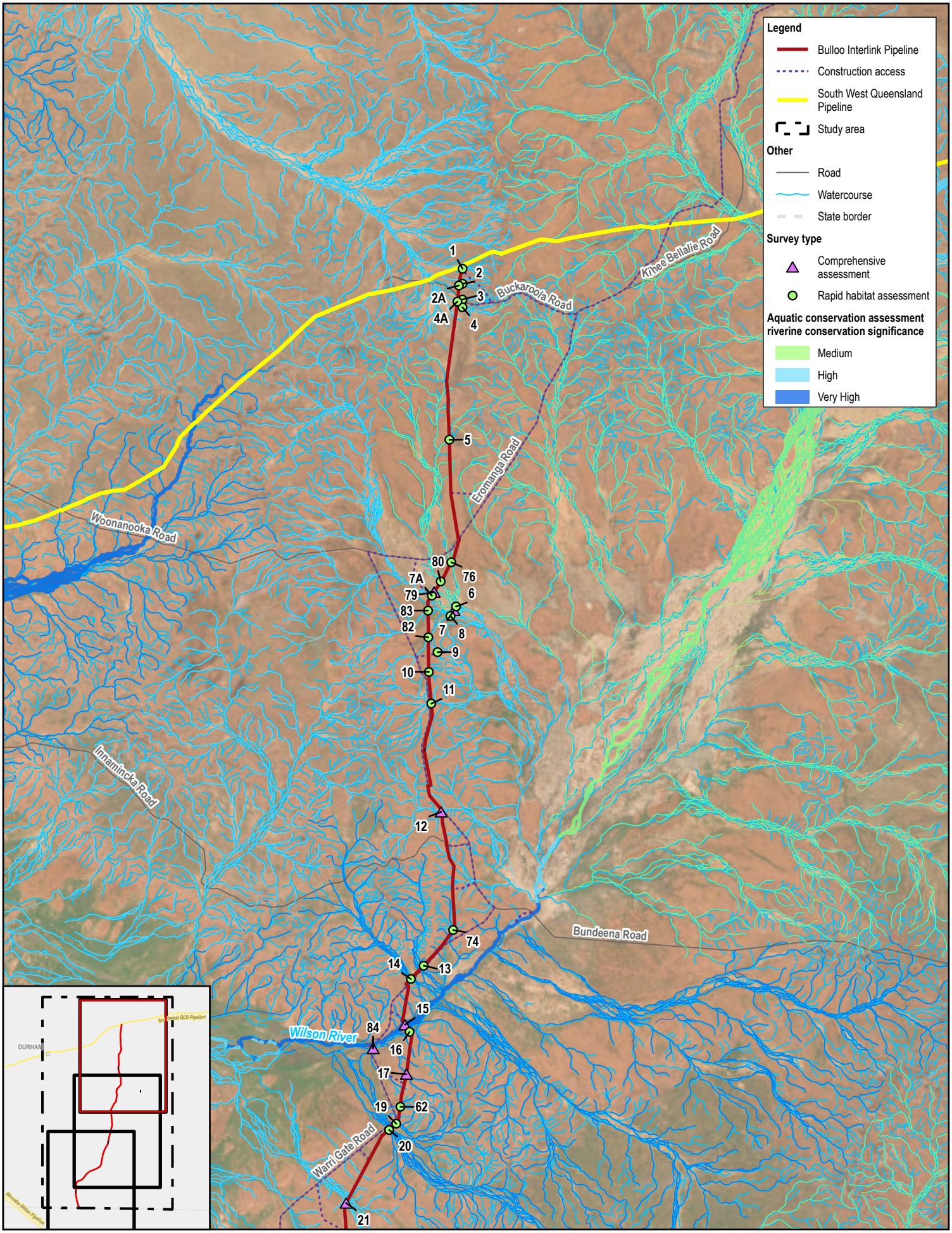
Drainage basins of the study area

Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Figure 4.1

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P / Print date: 17 Jun 2026 - 02:02

Data source: Earthstar Geographics, Esri, CGIARDNRMRRD: Roads (2021), Watercourse (2023); WRMC: Drainage basins (2024); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD study area, Ecological assessment areas (2026). Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of riverine areas within the study area

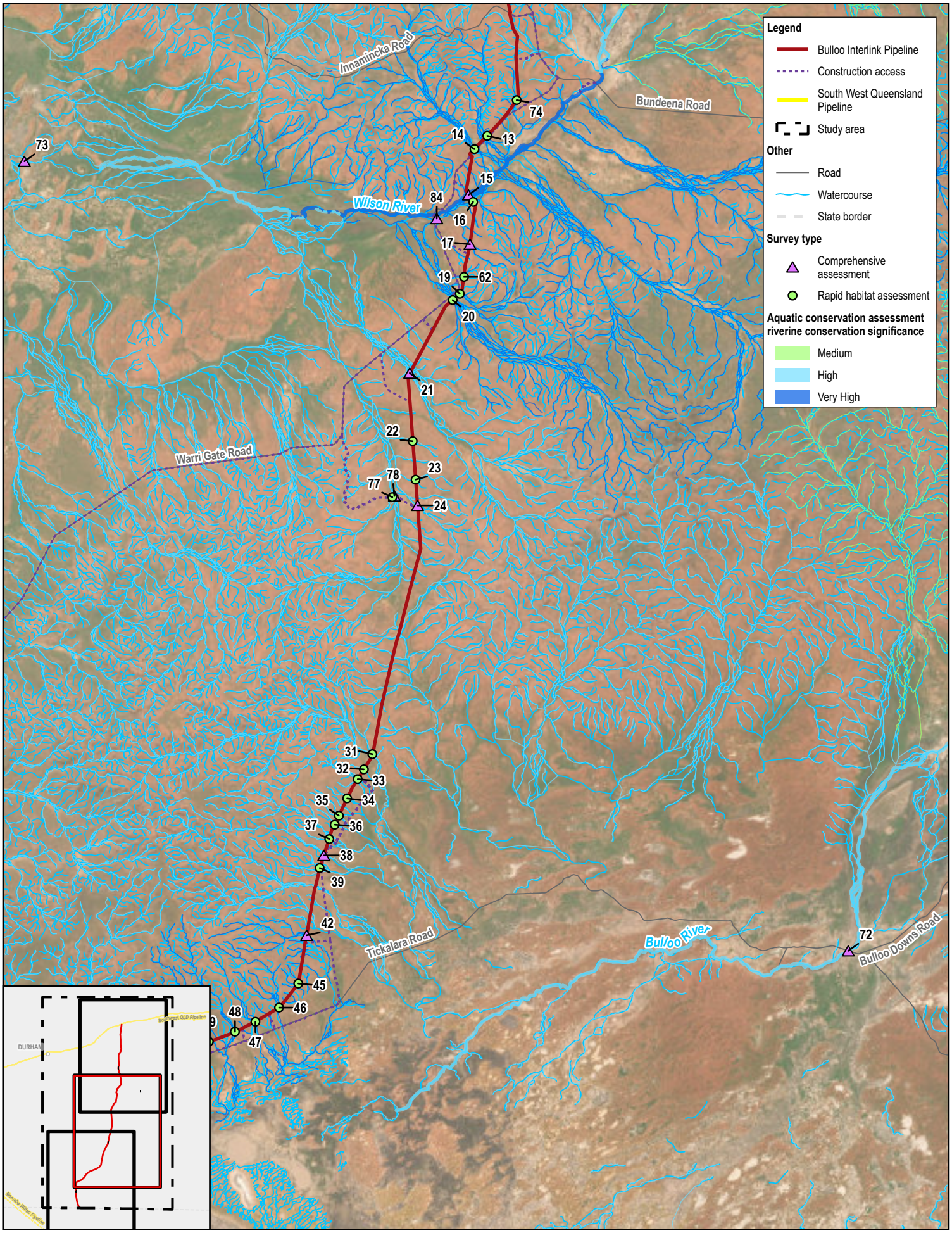
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 1 / 3

Figure 4.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:21

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS|DNRM|MRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of riverine areas within the study area

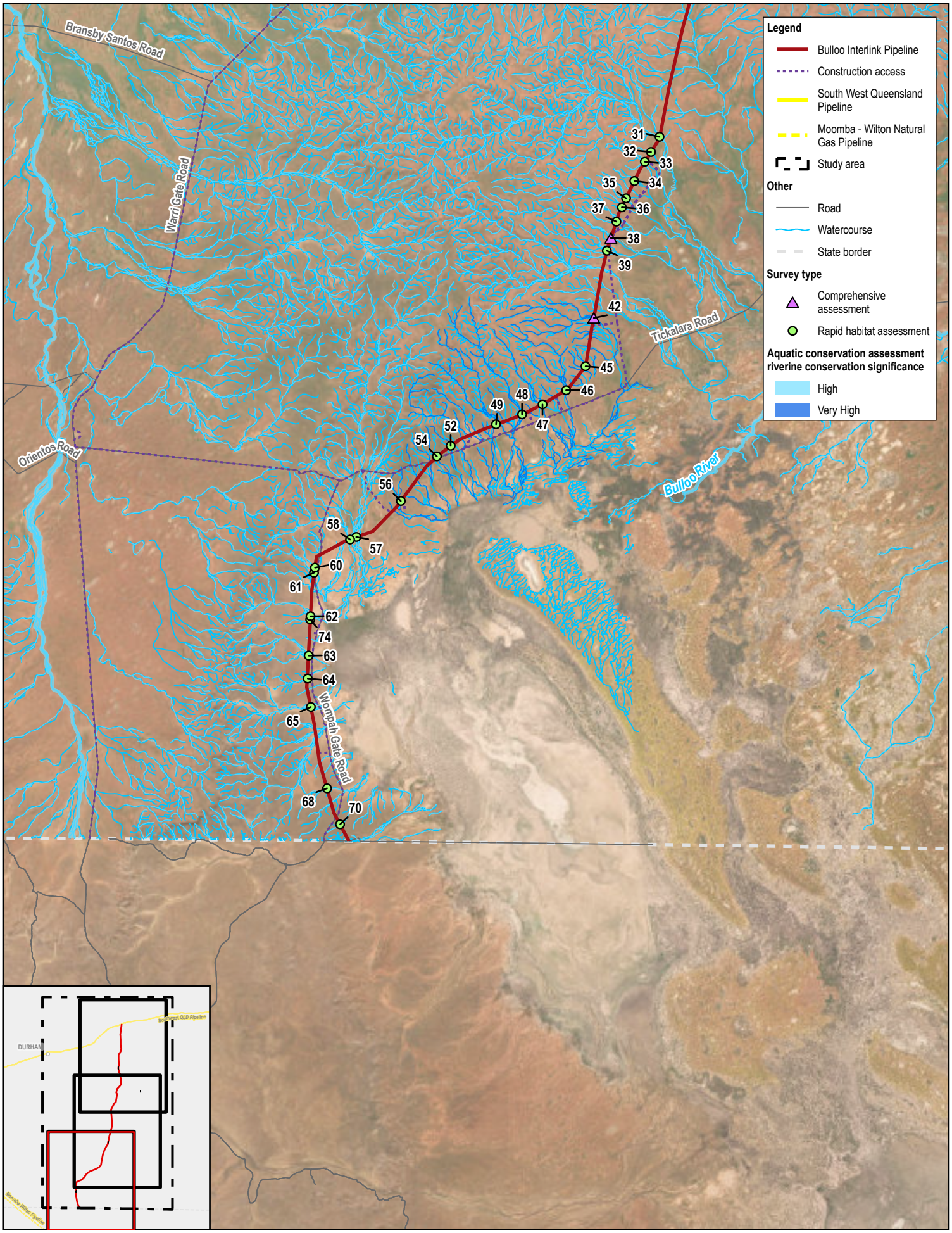
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 2 / 3

Figure 4.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:21

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of riverine areas within the study area

Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 3 / 3

Figure 4.2

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:21

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2

4.3 Wetlands, watercourses and waterways

A summary description of the wetlands, watercourses and waterways within the study area is provided in the following sections.

4.3.1 Wetlands

The Map of Queensland wetland environmental values identifies multiple general ecological significance (GES) and high ecological significance (HES) wetlands under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019 in the wider region and within the project site. Wetlands of GES are identified areas that contribute to regional aquatic biodiversity, supporting ecosystem health, natural processes, and habitat connectivity. Wetlands of HES are typically associated with Great Barrier Reef (GBR) catchments and are critical, legally protected ecosystems that act as natural filters, improving water quality for the reef while supporting biodiversity.

GES wetlands within the project area that are crossed by the alignment are associated with Tippera Creek and Murrawara Creek, while other GES wetlands are downstream of the alignment associated with Windula Creek, Kercummura Creek, Tirtywinna Creek, Gum Creek, Wilson River, Whippa Creek, Parrabinna Creek, Muggera Creek, and some other minor waterways.

Bulloo Lake and some of the inflow tributaries are mapped as HES wetlands; however, the project does not directly or indirectly impact any HES areas.

As most mapped GES and HES wetland areas are associated with waterway channels, except for Bulloo Lake, they are consistent with the wider aquatic ecology comprising ephemeral waterways dominated by fine substrates (e.g. silt, clay and sand) with cleared riparian vegetation and minimal in-stream habitat features (e.g. woody debris, aquatic plants and trailing bank vegetation).

Bulloo Lake at the time of both surveys was unable to be accessed; however, drone footage was captured identifying that the lake was full, with water overflowing to the surrounding floodplain (Plate 4.1). Birds were observed utilising the wetland area and the lake appeared to be fully fenced to prevent cattle access.



Plate 4.1 Bulloo Lake in July 2025

Nationally and regionally important wetlands

The Directory of Important Wetlands in Australia (DIWA) identifies wetlands that are nationally significant based on criteria set by the Australian and New Zealand Environment Conservation Council (ANZECC) Wetlands Network in 1994. A wetland qualifies for inclusion if it meets at least one of the following criteria:

1. It is a good example of a wetland type occurring within a biogeographic region in Australia.
2. It is a wetland which plays an important ecological or hydrological role in the natural functioning of a major wetland system/complex.
3. It is a wetland which is important as the habitat for animal taxa at a vulnerable stage in their life cycles or provides a refuge when adverse conditions such as drought prevail.
4. The wetland supports one per cent or more of the national populations of any native plant or animal taxa.
5. The wetland supports native plant or animal taxa or communities which are considered endangered or vulnerable at the national level.
6. The wetland is of outstanding historical or cultural significance (DCCEEW, 2025a).

There are two wetlands listed under DIWA within the study area, both located outside and downstream of the project site (Table 4.2; Figure 4.3). Whilst there are no Ramsar-listed wetlands within Queensland, Bulloo Lake (Plate 4.3) lies directly adjacent to the Caryapundy Swamp (Ramsar Site No. 2520) in NSW (Ramsar Convention Secretariat, 2023). This Ramsar wetland is addressed under a separate aquatic ecology scope of works for the NSW portion of the project. However, it is noted that hydrological and ecological connectivity between Bulloo Lake and the Caryapundy Swamp Ramsar site is not distinctly separate.

Table 4.2 Directory of Important Wetlands in Australia in the study area

Wetland name	Wetland ID	Distance from project site	Criteria for inclusion
Cooper Creek–Wilson River Junction	QLD027	~49 km west of the project site, and over 50 km downstream.	1,2
Bulloo Lake	QLD024	~2.5 km east of the project site, and ~9 km downstream.	1,2,3

At the regional scale, there are no MSES wetlands of high ecological value present in the study area. However, there is a state-recognised privately owned protected area, the Bulloo Downs Nature Refuge, which contains mapped wetland systems that includes floodplains, ephemeral creeks and swamps. This Nature Refuge intersects with the DIWA listed Bulloo Lake wetland (Figure 4.3) and is considered a protected area under the NC Act.

These designated wetlands collectively play a major ecological role supporting breeding and foraging habitat for migratory waterbirds, as well as supporting aquatic flora (e.g. sedges and rushes) and aquatic fauna (e.g. turtles, fish and yabbies) when flows occur (Ramsar Convention Secretariat, 2023; DETSI, 2013b; DETSI, 2016a; DETSI, 2016b). However, biodiversity fluctuates significantly; characterised by long dry periods (i.e. ‘busts’) punctuated by floods and high productivity (i.e. ‘boom’ periods; Kingsford, 1999). These ‘boom and bust’ cycles encourage the proliferation of seasonally ephemeral species (Silcock & Fensham, 2019).

As western Queensland received significant rainfall and flooding over March to April 2025 (refer to section 3.2.2, ‘Field conditions’), this confers a representative “boom” period. This recent “boom” was evident in field surveys (Plate 4.2); sites which retained more water in July 2025, following flooding in March/April, supported noticeably greater abundance and diversity of aquatic species. By October 2025, when conditions had reverted to the typical dry phase (Plate 4.2), there was markedly lower water levels and reduced biodiversity (section 4.10).

Wetland areas within the study area have also been evaluated and subsequently mapped under Queensland’s ACA for non-riverine areas (DETSI, 2024). Within the study area, wetlands are considered to have medium to very high aquatic conservation significance (Figure 4.3). Similar to riverine ACA mapping, non-riverine areas (i.e. wetlands) mapped as very high significance are typically in excellent condition and provide important habitat and ecological functions, while medium significance areas remain valuable for maintaining local ecosystem integrity. Notably, the very high and high value areas within the study area closely align with nationally recognised wetlands listed in in DIWA and with the Bulloo Downs Nature Refuge, reinforcing the significance of these wetland ecosystems in the broader landscape.

Whilst not formally mapped, during field surveys it was also identified that the study area contains additional palustrine (i.e. wetland) habitat in the form of gilgai. Gilgai are small natural hollows common on the clay floodplains (Plate 4.3). These shallow depressions, or “microreliefs”, form in cracking clay soils of the channel country, and often hold water after rain, creating temporary habitats (Williams, 1955; Fagan & Nanson, 2004). Gilgai are also formally recognised as palustrine wetlands under the Queensland Wetland Classification Scheme (Queensland Government, 2015).

However, because they are small, shallow, and only hold water intermittently, they do not reliably support populations of aquatic fauna. Aquatic flora may persist if species are adapted to dry conditions or survive in soil seedbanks (e.g. *Cyperus* species), though assemblages will inevitably fluctuate with seasonal patterns (Williams, 1955; Davies et al., 2018). Whilst the extent of gilgai habitats could not be verified during field surveys, Queensland wetland habitat mapping (DES, 2023) identifies small patches of natural palustrine wetlands within the project site, as well as broader surrounding areas mapped with 1–50% confidence of containing wetlands (Figure 4.3).

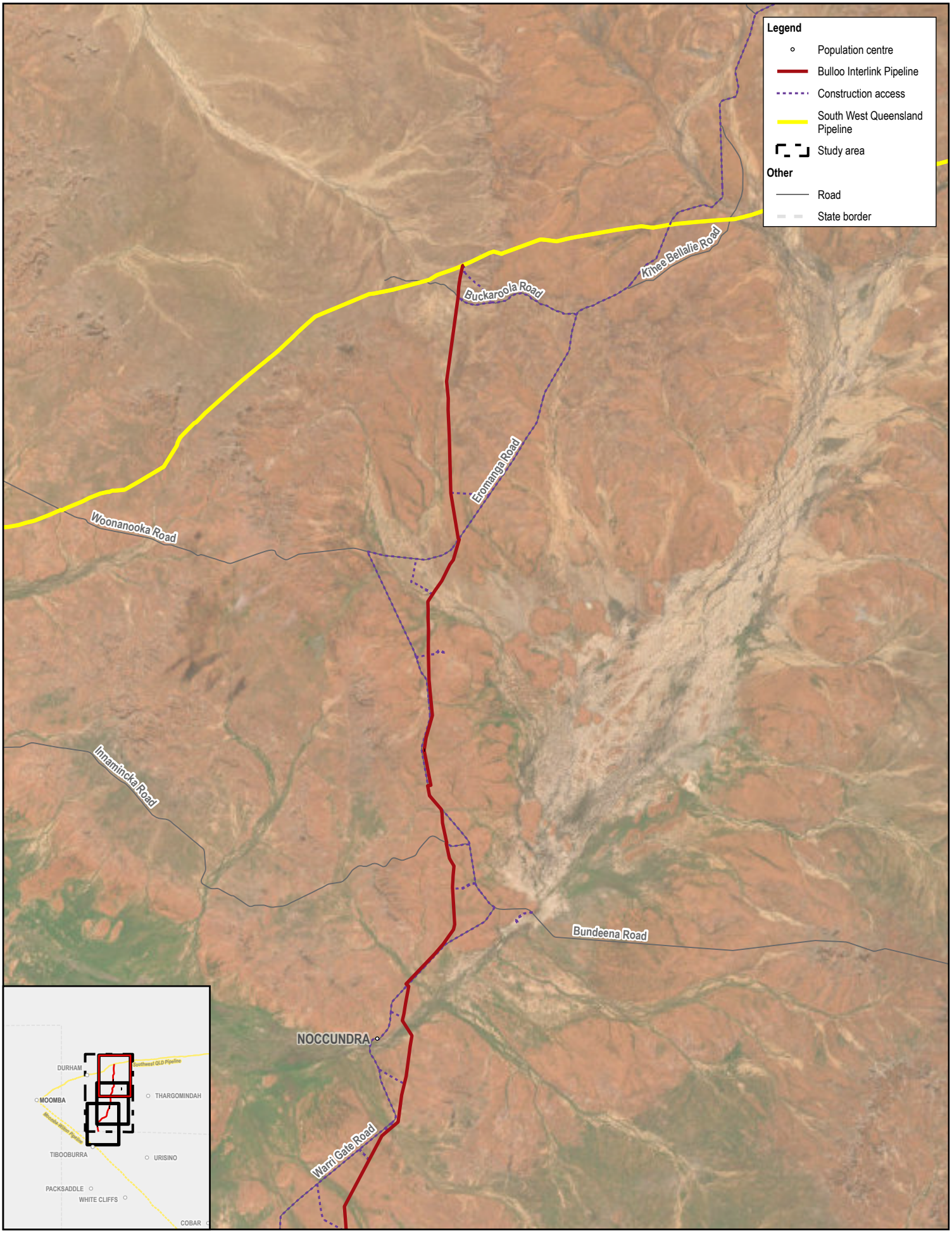
Additionally, ACA mapping of non-riverine wetland areas also identified smaller wetland patches distributed throughout the study area (Figure 4.4). These layers support the potential presence of gilgai features and other small-scale wetland habitats outside nationally listed (e.g. DIWA) and state-recognised sites (e.g. Bulloo Downs Nature Refuge).



Plate 4.2 ***Examples of ‘boom’ (left) and ‘bust’ (right) conditions during post-wet July 2025 survey (left) and pre-wet October 2025 survey (right), at Aquatic site 15 (top) and Aquatic site 38 (bottom)***



Plate 4.3 Examples of gilgai (left) and wetlands (Bulloo Lake, right) within the study area



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Nationally and regionally important wetlands within the study area

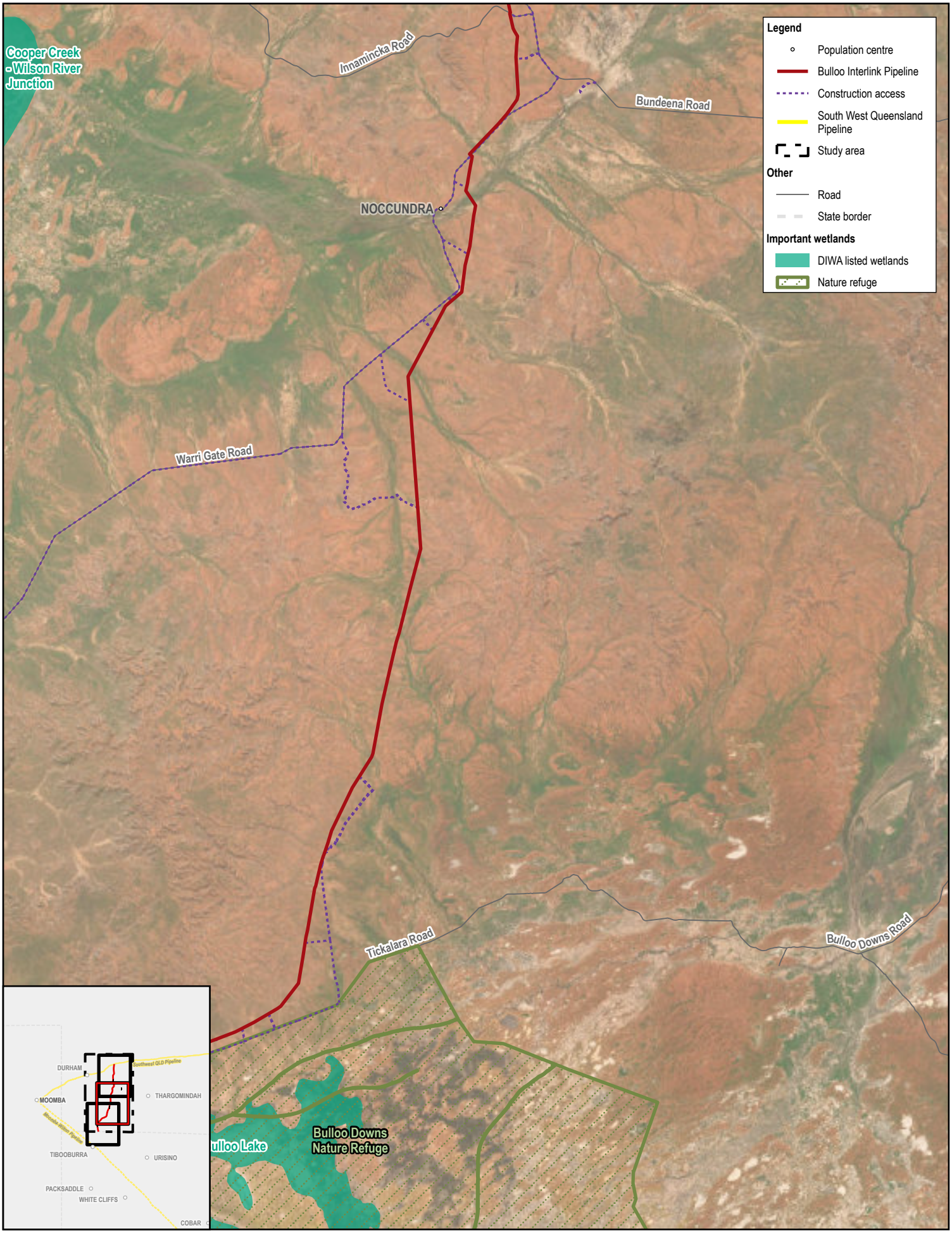
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 1 / 3

Figure 4.3

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:33

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRM/RRD: Roads (2021), Watercourse (2023); DETS: Nature refuge (2025); DEE: Ramsar wetlands (2025); DES: Nationally important wetlands (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Nationally and regionally important wetlands within the study area

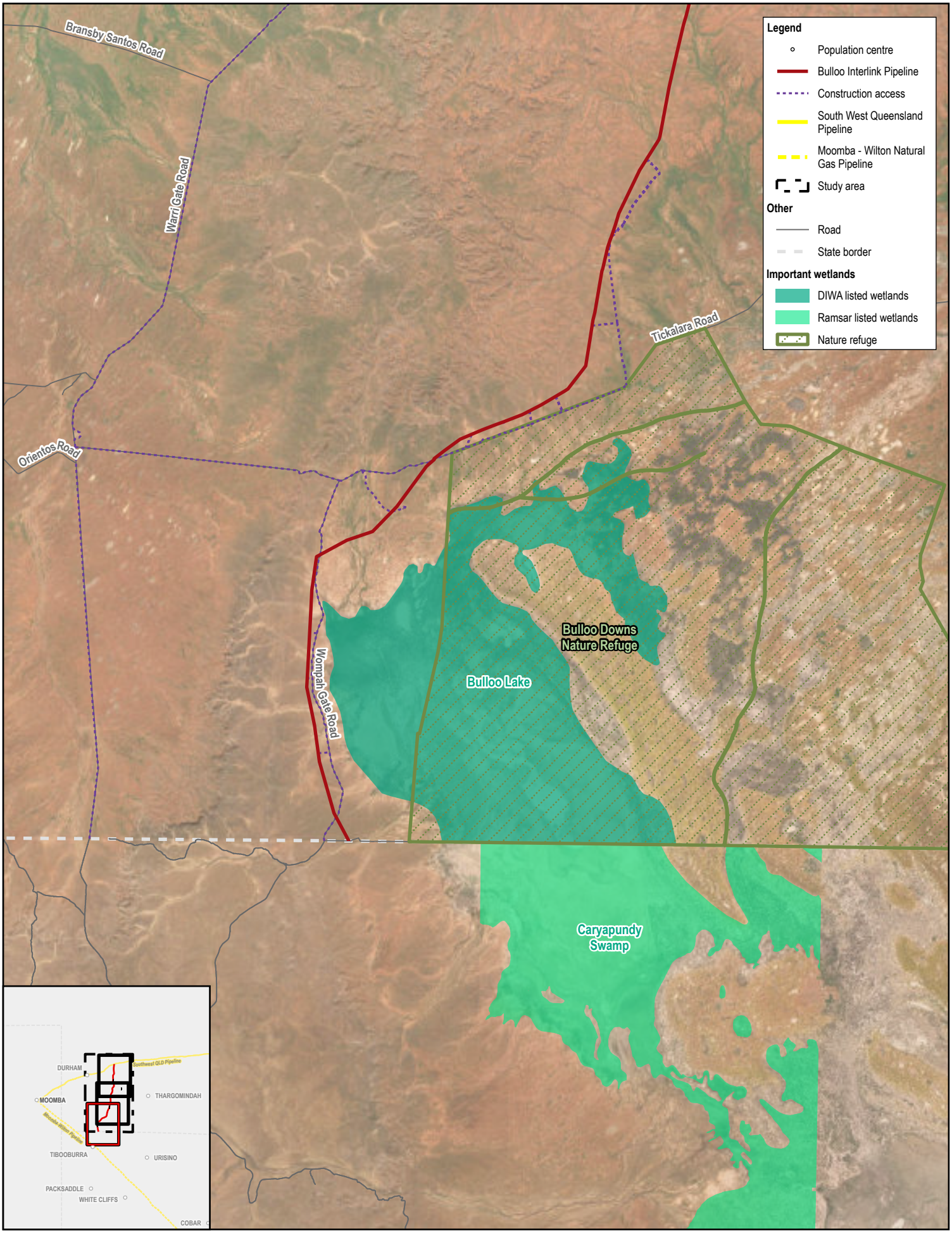
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 2 / 3

Figure 4.3

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:33

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DETS: Nature refuge (2025); DEE: Ramsar wetlands (2025); DES: Nationally important wetlands (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA GHD

APA Group
Bulloo Interlink Pipeline

Nationally and regionally important wetlands within the study area

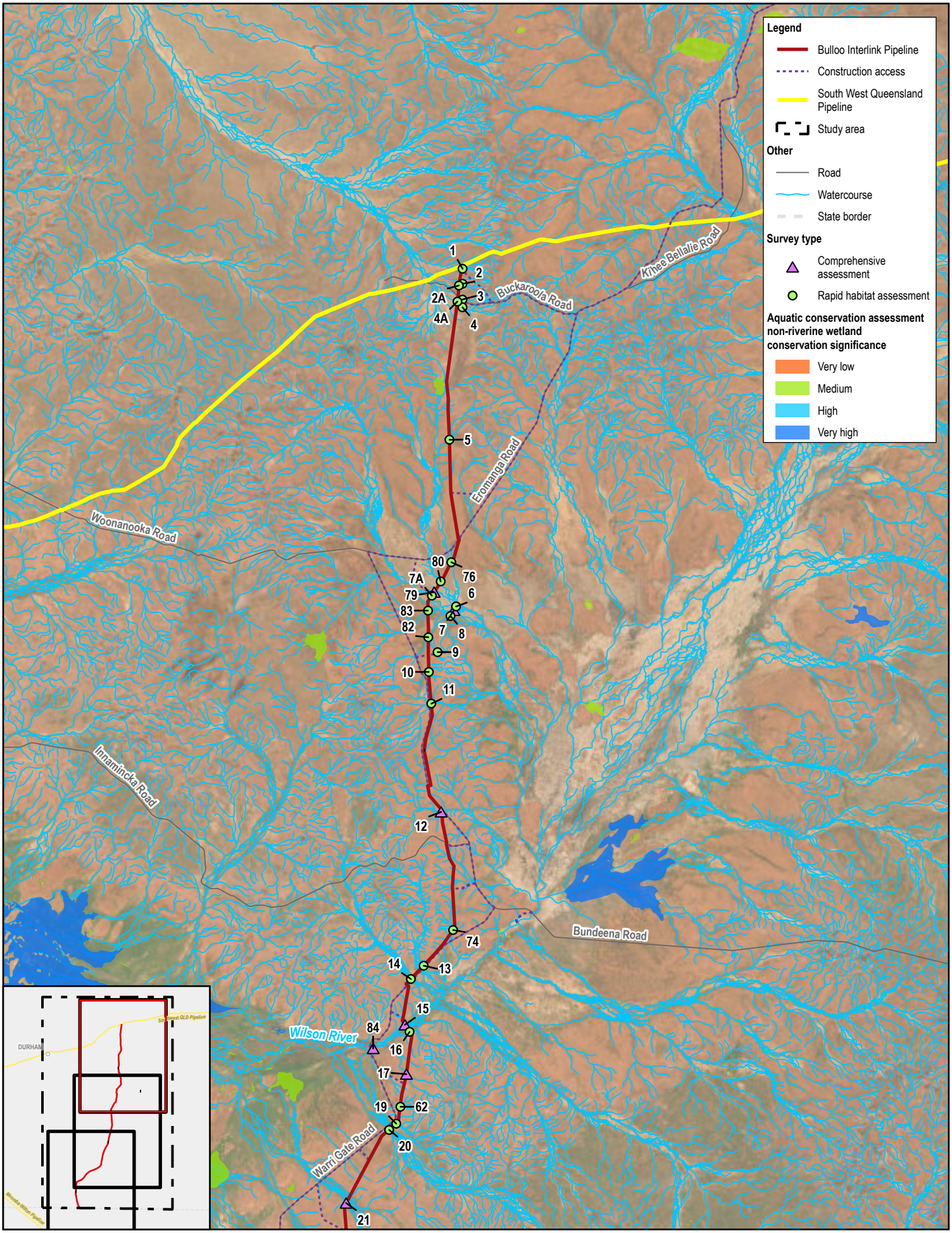
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 3 / 3

Figure 4.3

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:33

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRM/RRD: Roads (2021), Watercourse (2023); DETS: Nature refuge (2025); DEE: Ramsar wetlands (2025); DES: Nationally important wetlands (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of non-riverine (wetland) areas within the study area

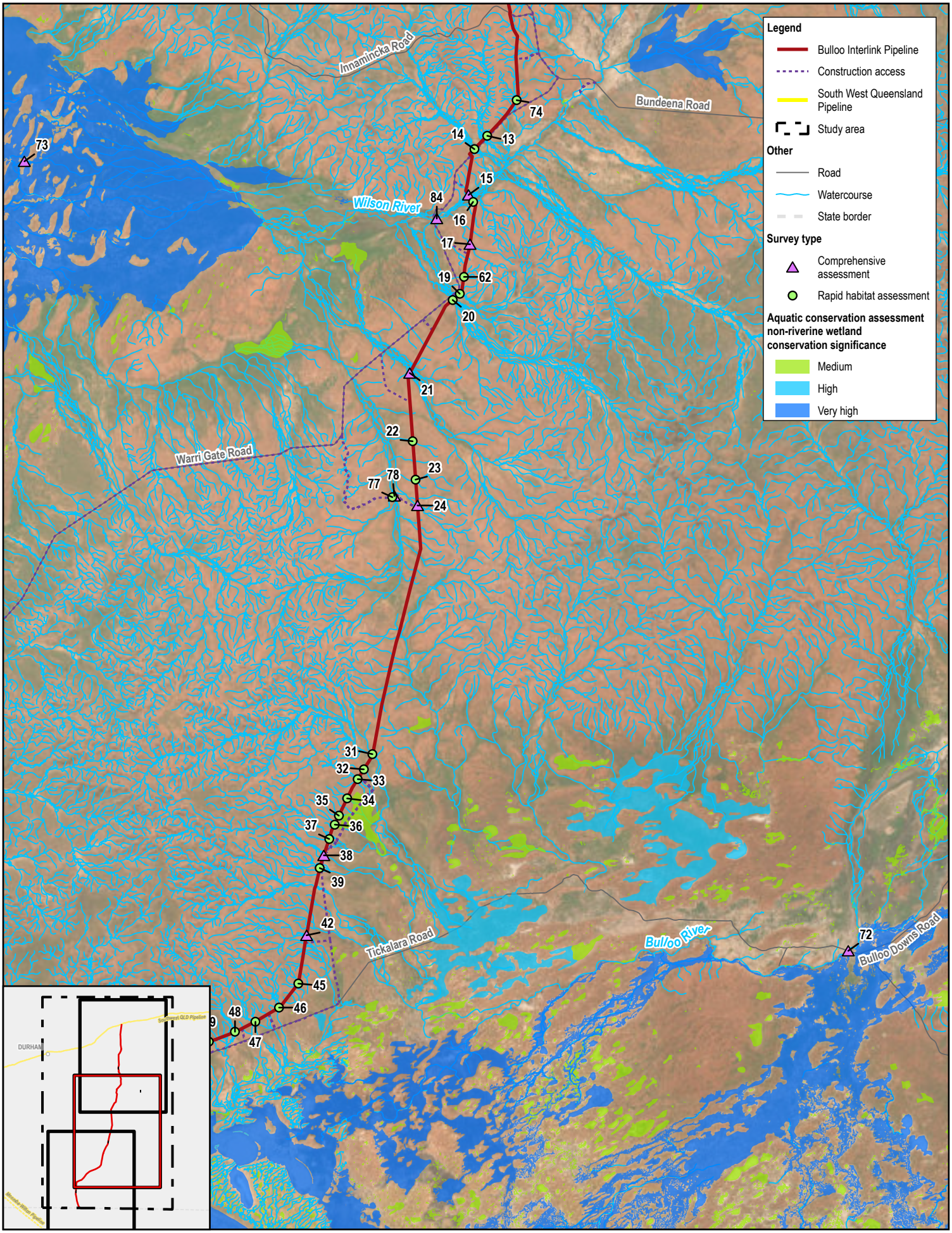
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 1 / 3

Figure 4.4

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:21

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of non-riverine (wetland) areas within the study area

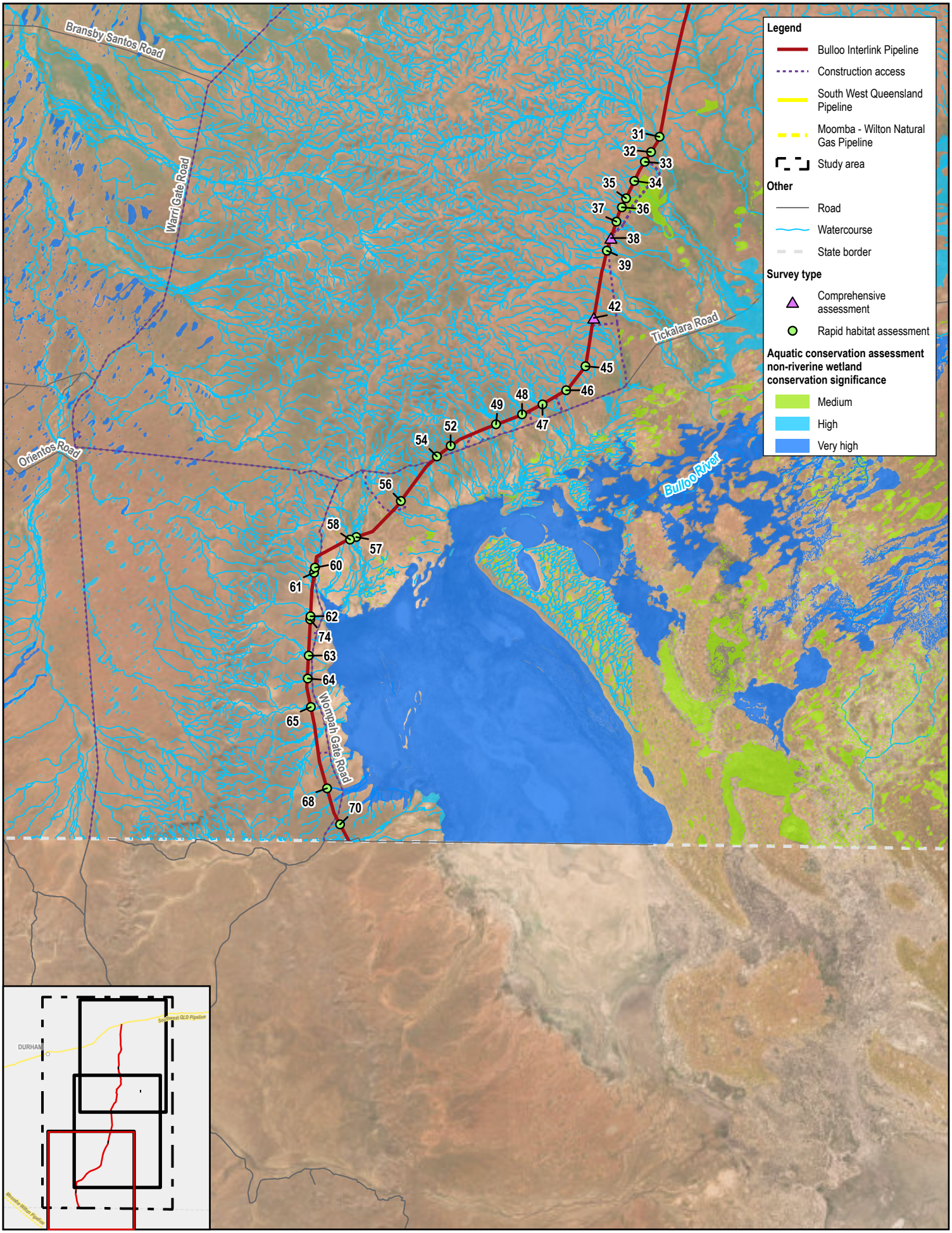
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 2 / 3

Figure 4.4

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:22

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Aquatic conservation assessment of non-riverine (wetland) areas within the study area

Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 3 / 3

Figure 4.4

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:22

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DES: Aquatic conservation assessment (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2026), Aquatic survey sites (2025) Created by: calburo2

4.3.2 Watercourses and waterways

Two prominent waterways occur near the study area (Figure 3.1). To the north-west, the Wilson River forms part of the Cooper Creek catchment. It flows south-west into the Cooper Creek–Wilson River Junction wetland, where it meets Cooper Creek. From there, Cooper Creek continues westward through a network of braided channels and associated wetlands before eventually entering South Australia, provided flows are not first lost to infiltration or evaporation.

The proposed pipeline crosses the Wilson River at approximately the 84 km point along the alignment. To the south-east extent of the project site lies the Bulloo River, which flows south and terminates at the Bulloo Downs Nature Refuge (Queensland) and adjacent Caryapundy Swamp wetlands (NSW). Since the Bulloo River does not intersect with the proposed pipeline or associated infrastructure, the field survey conducted here (Aquatic site 72) was used as a reference site.

Cooper Creek, Wilson River and the Bulloo River are designated as watercourses under the Water Act. Additionally, various unnamed tributaries of Wilson River, which flow into Cooper Creek, are also formally recognised as watercourses. Interference with, or the use of, water within a watercourse requires an authorisation under the Water Act.

Apart from these watercourses, all other waterways within the study area (including 305 intersecting with the project site) are considered 'unmapped waterways' under the Water Act. Watercourse assessments were undertaken at each site and results are presented in Appendix B (Figure 4.5). Of the unmapped waterways, only five were assessed to be watercourses, and 67 unmapped waterways were assessed to be drainage features as defined by the Water Act. Four waterways were part of existing watercourses and did not require assessment.

Waterways providing for fish passage

Throughout the study area, there are numerous mapped WWBW providing for fish passage (Figure 4.6). Waterways providing for fish passage are considered a MSES only if the construction, installation or modification of a WWBW will limit the passage of fish along the waterway (DAF, 2018).

The project site will intersect a total of 77 waterways mapped as WWBW (Figure 4.6). This high number of mapped WWBW designations can be attributed to the project's extensive linear extent and the braided nature of waterways within the Channel Country region resulting in multiple channels at individual waterway crossings. However, these channels can be poorly defined and are subject to change during major flow events. Therefore, these braided channels have been counted as one waterway crossing where a discrete watercourse is evident (i.e. based on the overall channel bank).

WWBW intersecting with the project site include:

– 2 major risk (purple) waterways, including (from north to south):
  - Wilson River
  - Murrawarra Creek.
– 19 high risk (red) waterways, including (from north to south):
  - Kercummurra Creek
  - Gum Creek
  - Tirtywinna Creek
  - Wilson River
  - Tippera Creek
  - Parabinna Creek
  - Elipilla Creek
  - Tickalara Creek
  - Morris Creek
  - Gidya Creek
  - Wanka Creek.

– 25 moderate risk (amber) waterways, including:
    - Windula Creek
    - Muggera Creek.
– 31 low risk (green) waterways.

The waterway barrier works risk ratings of waterways assist with the determination of ADR, based on the shape and location of the waterway in the basin, as well as the characteristics of species that reside within them (DAF, 2018).

Waterways with a rating of major (purple) or high (red) risk to fish passage generally contain larger biomasses of fish populations and species that are more likely to have weaker swimming abilities (DAF, 2018). These waterways are most at risk of impact from barriers to fish movement. Low (green) or moderate (amber) risk waterways for fish passage are often in the upper reaches of a basin and have steeper slopes and will generally have a lower biomass of fish populations than downstream reaches (DAF, 2018).

Given many of these waterways are unmapped under the Water Act spatial layer, it appears that WWBW significance has been primarily inferred from stream order. Under this approach, second-order streams are generally considered low risk, third-order streams as moderate risk (amber), fourth- and fifth-order streams as high risk (red), and some fifth- and sixth-order streams as major risk. As formal field verification has not been undertaken by DPI, WWBW designations in the study area should be considered indicative only and interpreted with caution.

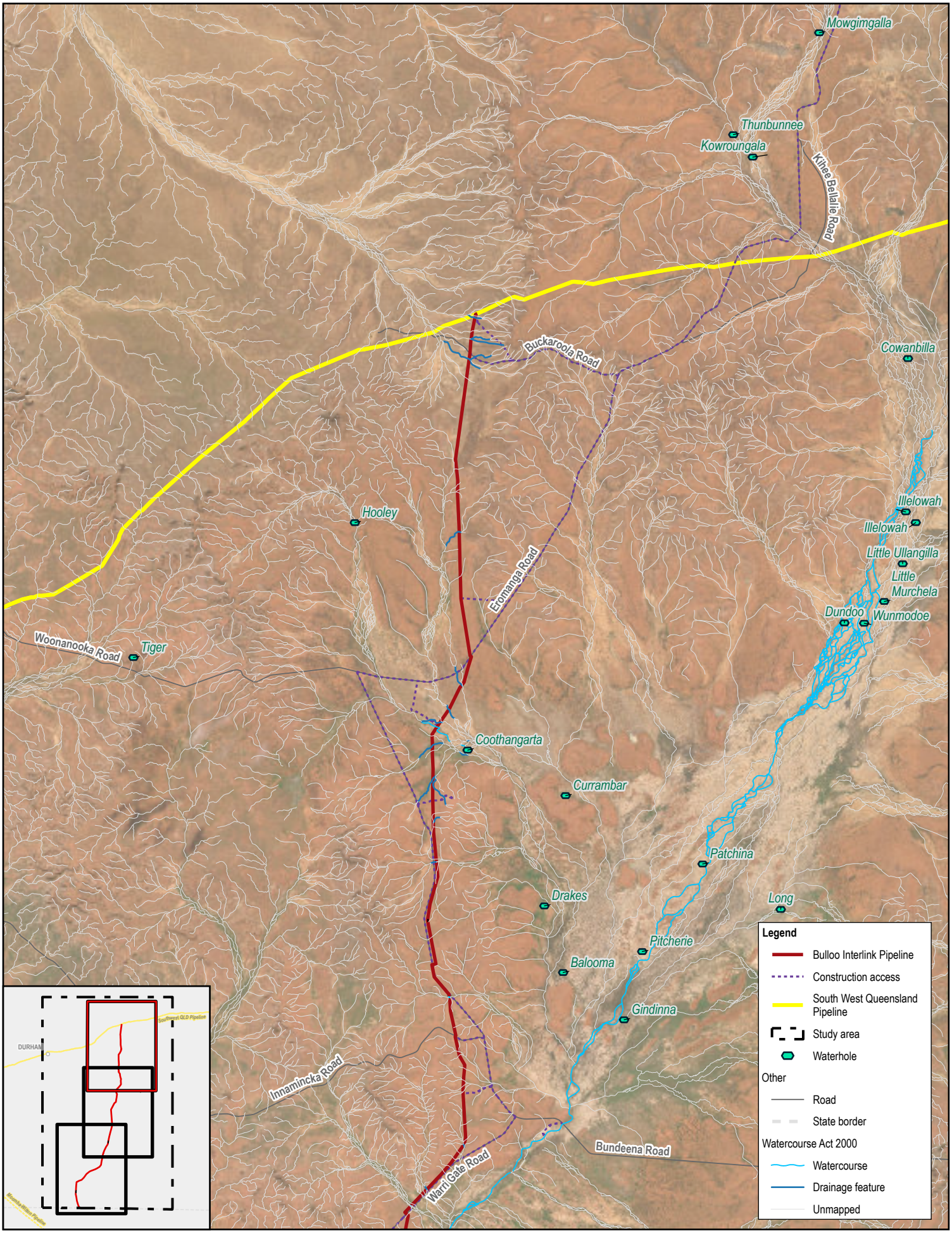
4.4 Waterholes

Waterholes are considered a form of wetland where water pools in a depression within a landform element (Zivec et al., 2020), such as along a river. As part of the project, several waterholes situated along the Wilson River are being considered as a source for water supply (Figure 4.5). One potential location is the Noccundra Waterhole near the Noccundra Hotel (Aquatic site 84; ~3.8 km west of KP 87). The second option surveyed was the Nockatunga Waterhole near Nockatunga Station (Aquatic site 81; ~6.6 km west of KP 71). These are two of the three major permanent waterholes along the Wilson River (Silcock, 2009).

As these waterholes occur along a defined watercourse under the Water Act (i.e. Wilson River), the taking or interfering with water from them requires a water permit. Any such use must also comply with the relevant water plan and environmental flow provisions that govern sustainable water extraction within the catchment.

These waterholes retain water year-round, indicating their perennial character and their role as refuge habitats for aquatic species in the absence of flow. However, they are also accessible via road, making them prone to anthropogenic influences. Noccundra Waterhole in particular is a popular campsite and fishing spot for locals and visitors. It also supports a variety of wildlife including wetland birds (e.g. pelicans, brolgas, egrets and herons), freshwater fishes (including golden perch, catfish and silver perch), yabbies and freshwater turtles (Outback Queensland Tourism Association, n.d.).

However, invasive species such as gambusia have also been noted in the Noccundra Waterhole (Kerezsy, 2009). Comparatively, Nockatunga Waterhole is less frequently visited, but biodiversity is subsequently poorly understood.



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Watercourses (Water Act 2000) and waterholes within the study area

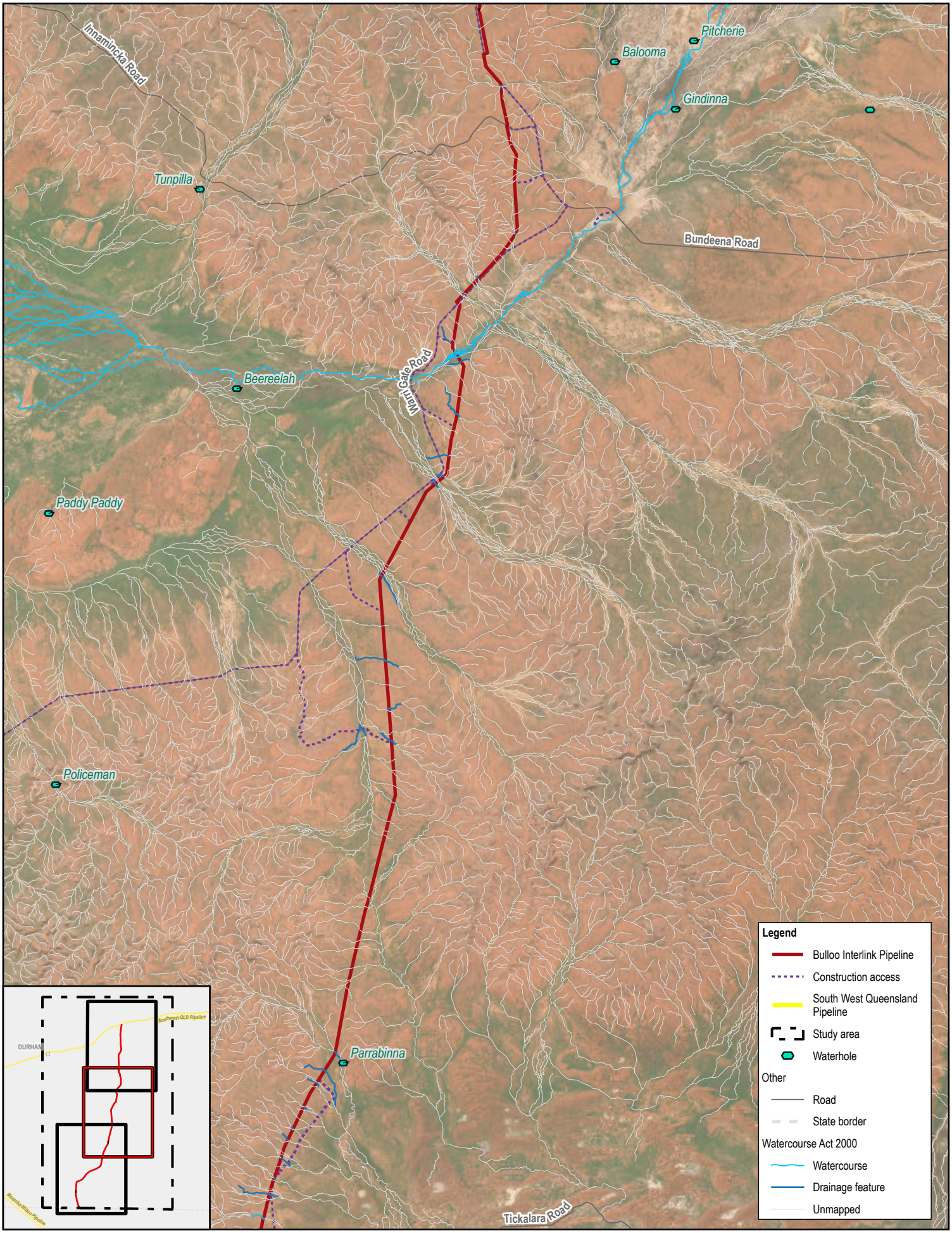
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 1 / 3

Figure 4.5

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:25

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/DNRM/MRRD: Roads (2021), Waterhole (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); DLGWV: Watercourse Act 2000 (2025); GHD: Study area (2025) Created by: calburo2



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Watercourses (Water Act 2000) and waterholes within the study area

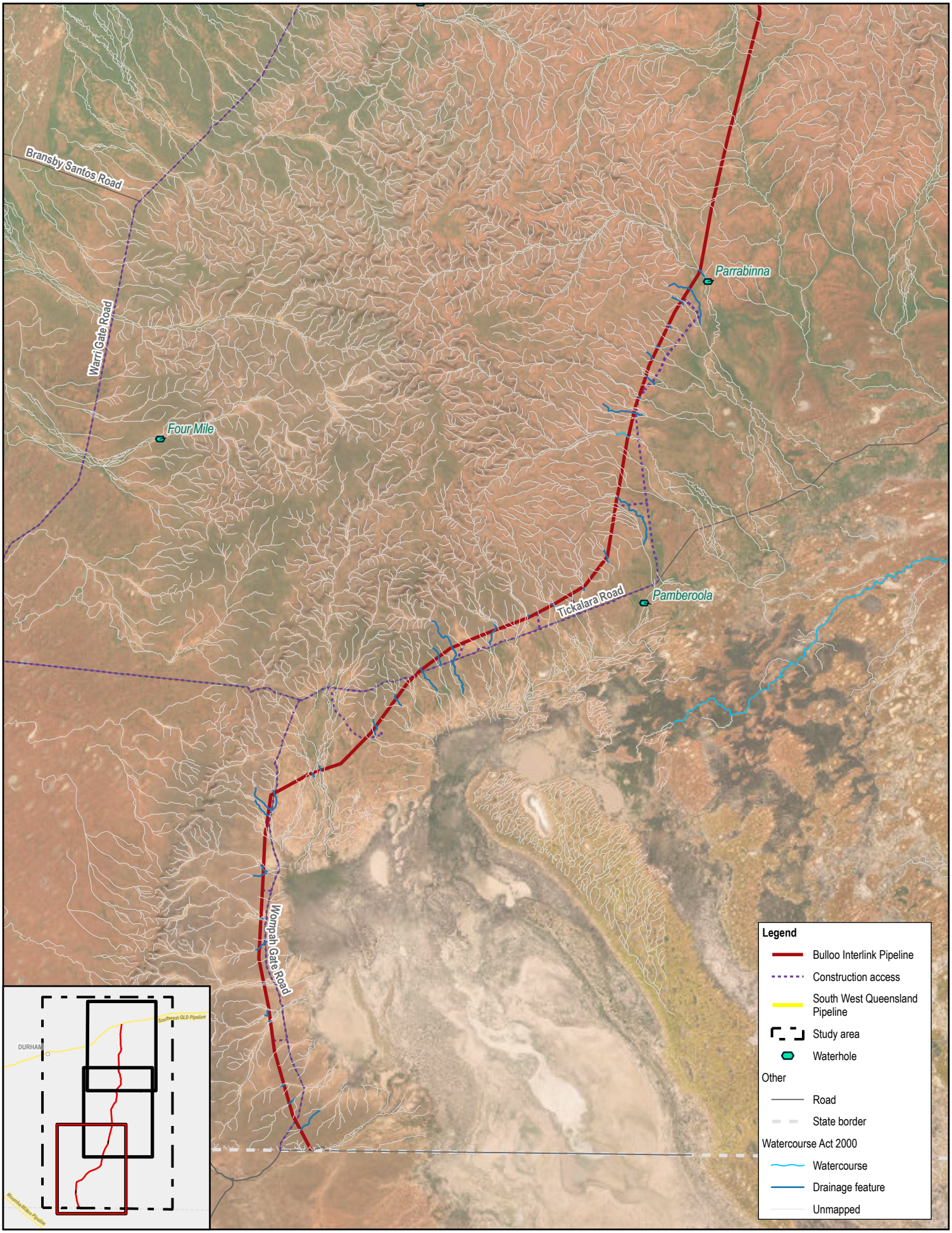
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 2 / 3

Figure 4.5

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:26

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Waterhole (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); DLGWV: Watercourse Act 2000 (2025); GHD: Study area (2025) Created by: calburo2



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Watercourses (Water Act 2000) and waterholes within the study area

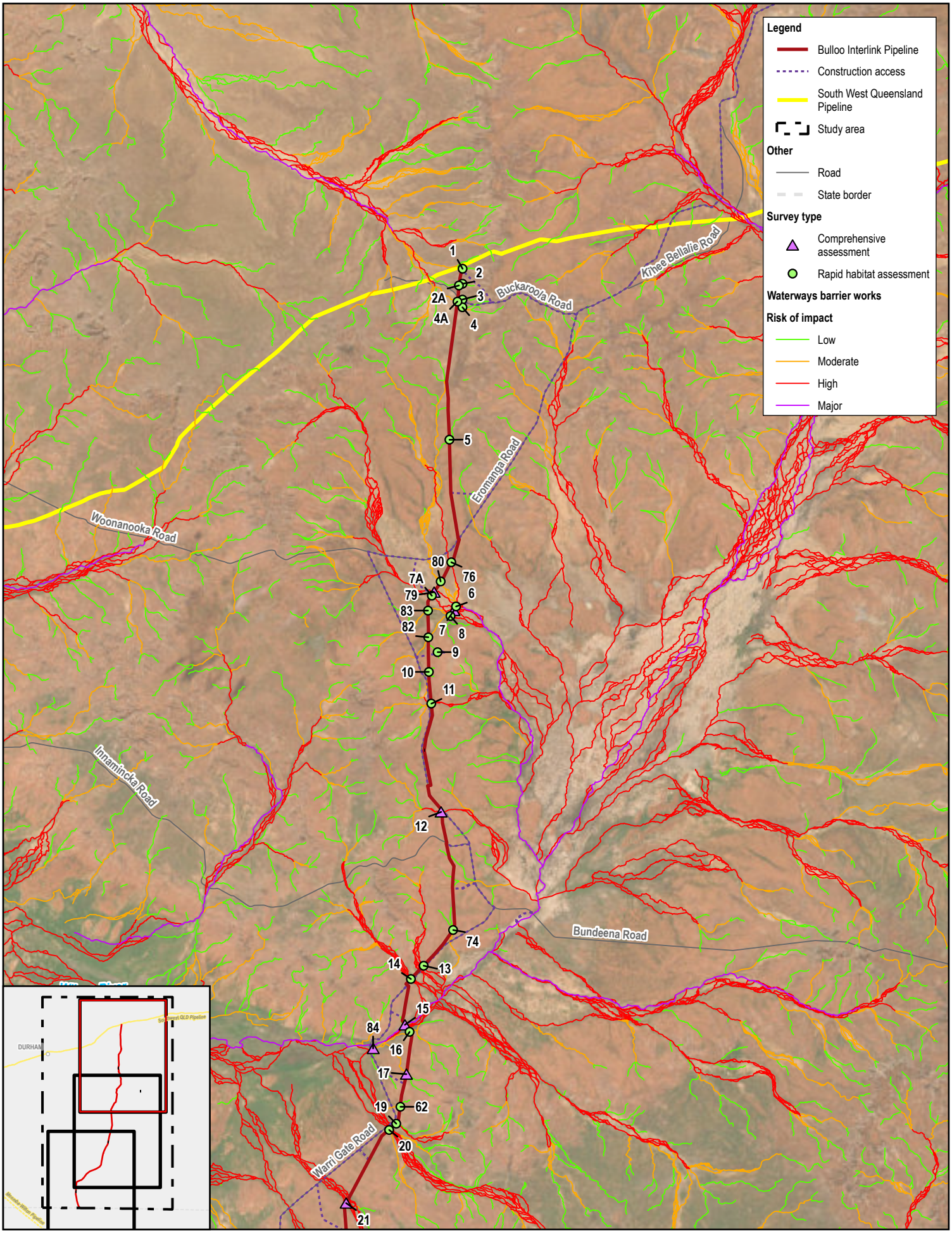
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 3 / 3

Figure 4.5

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:26

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS/DNRM/MRRD: Roads (2021), Waterhole (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); DLGWV: Watercourse Act 2000 (2025); GHD: Study area (2025) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Waterways providing for fish passage (WWBW) within the study area

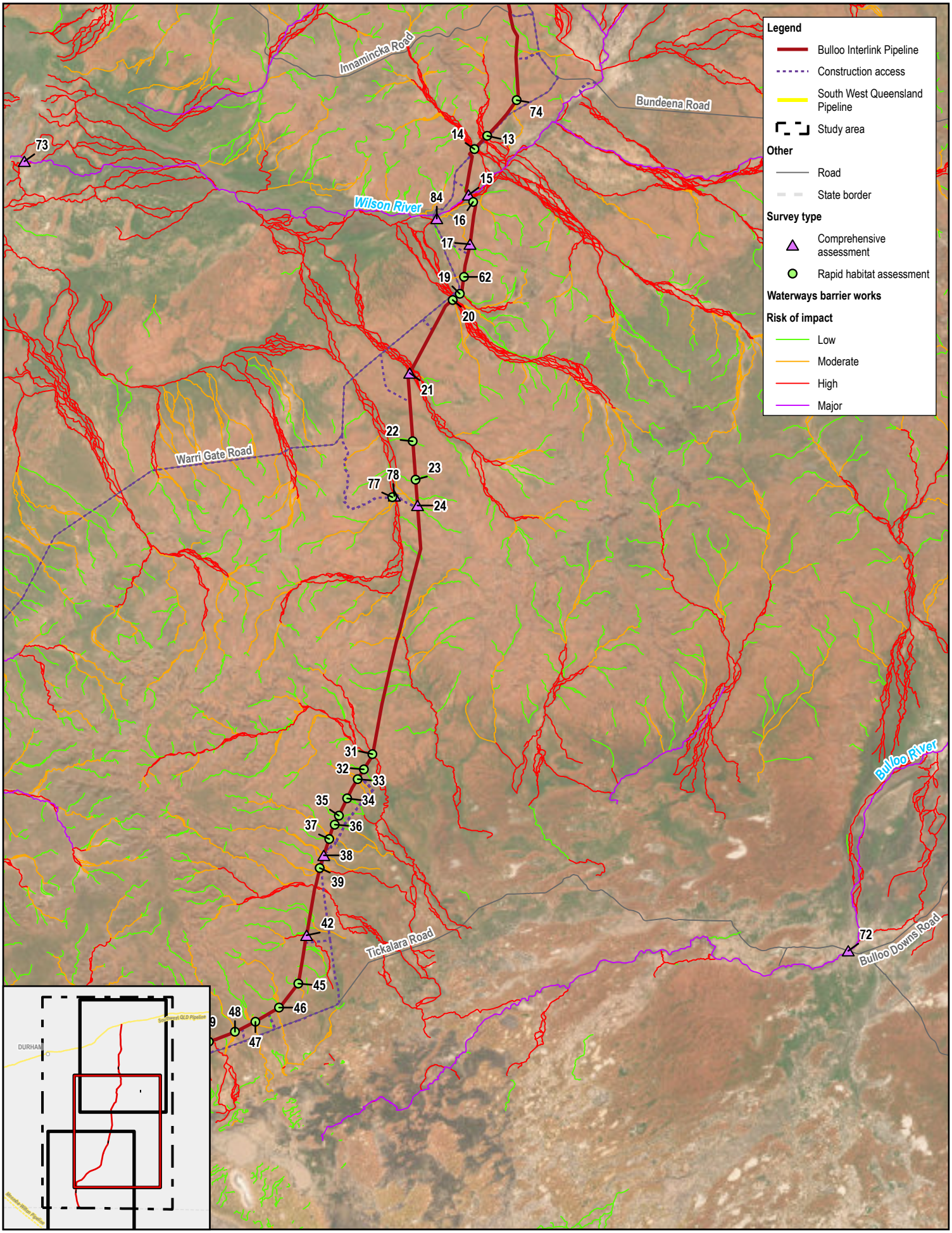
Project No.	**12661648**
Revision No.	**0**
Date	**17/06/2026**

Sheet 1 / 3

Figure 4.6

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:26

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS\DNRMMRRD: Roads (2021), Watercourse (2023); DAF: Waterways barrier works (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Aquatic survey sites (2025), Study area (2026) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Waterways providing for fish passage (WWBW) within the study area

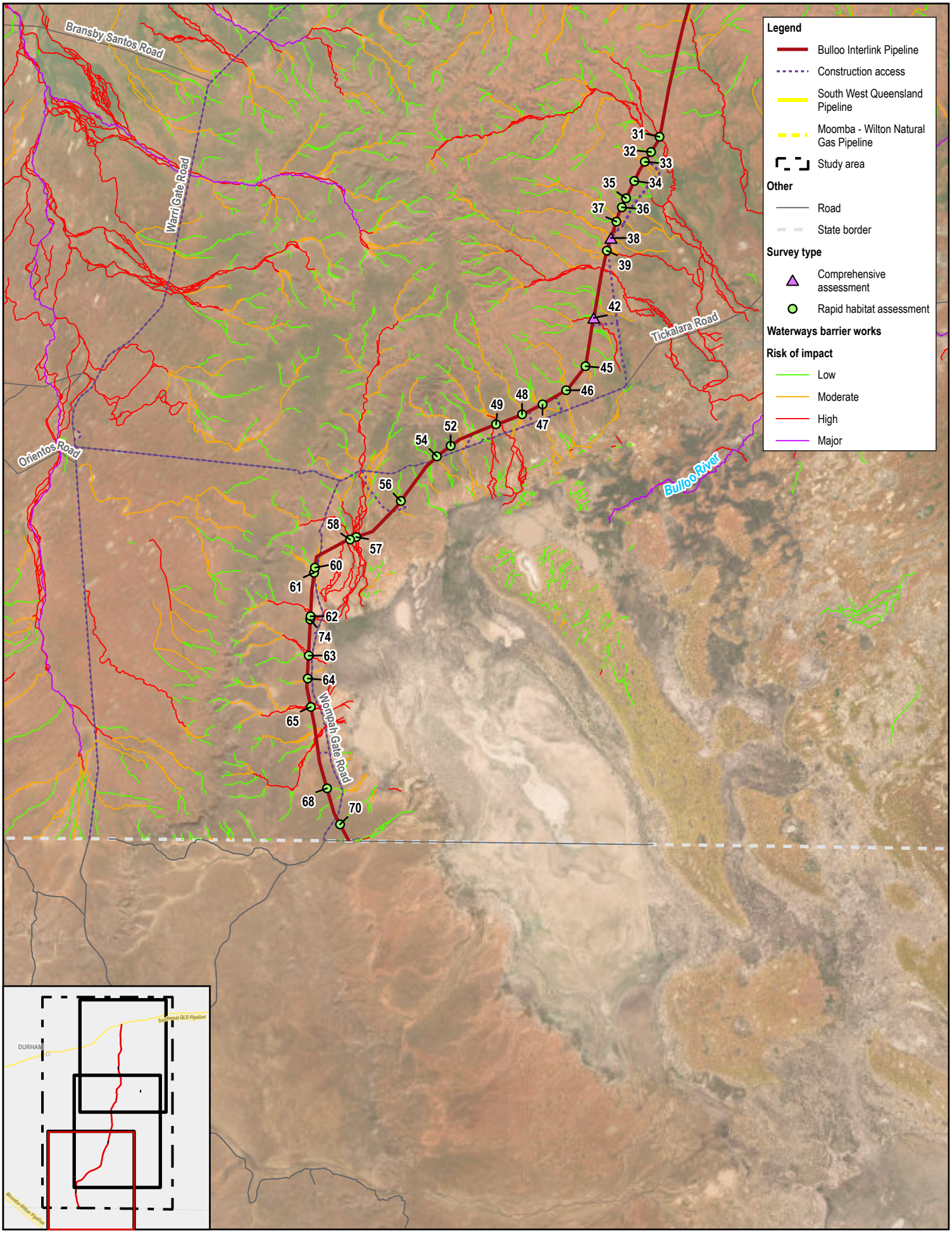
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 2 / 3

Figure 4.6

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:26

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DAF: Waterways barrier works (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Aquatic survey sites (2025), Study area (2026) Created by: calburo2



Paper Size ISO A4

0 2.5 5 7.5 10

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA Group
Bulloo Interlink Pipeline

Waterways providing for fish passage (WWBW) within the study area

Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 3 / 3

Figure 4.6

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_500k_MB / Print date: 17 Jun 2026 - 02:26

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGSDNRMMRRD: Roads (2021), Watercourse (2023); DAF: Waterways barrier works (2025); APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Aquatic survey sites (2025), Study area (2026) Created by: calburo2

4.5 Groundwater dependent ecosystems

GDEs rely on either permanent, intermittent or opportunistic groundwater access to sustain themselves through the surface expression of groundwater, presence of groundwater within the capillary zone or subterranean presence of groundwater (Eamus et al., 2016). GDEs can be categorised as aquatic, terrestrial or subterranean. Only aquatic GDEs (i.e. surface water expression) are relevant to this report.

There are no confirmed aquatic GDEs within the project site. However, state-level mapping suggests that most waterways and wetlands in the study area are underlain by potential GDE aquifers comprised of unconsolidated sediments (Figure 4.7). Nationally derived mapping layers (BoM, 2025b) indicate potential surface expression GDE aquifers (1–80 per cent derived GDE; moderate confidence) located along the eastern margins of Cooper Creek's braided channels, adjacent to the Cooper Creek–Wilson River Junction and its associated DIWA wetland (DETSI, n.d.) (Figure 4.7). This feature is not a confirmed aquatic GDE and is located approximately 46 km west of the project site.

4.6 Existing hydrology

The Bulloo and Cooper Creek basins lie within the Channel Country of south-western Queensland, which experiences an arid to semi-arid climate characterised by highly variable rainfall, hot summers, and cool, dry winters. When rainfall does occur, it is typically concentrated in the summer months, often falling in localised, high-intensity events (Capon, 2004). These rainfall patterns contribute to the exceptional hydrological variability of the region, with the Cooper Creek and Bulloo basins recognised among the most hydrologically variable systems globally (Knighton & Nanson, 1994; Cottingham, 1999; Capon, 2004).

Topographically, the Bulloo and Cooper Creek catchments extend from the Grey Ranges in the north, which form the principal drainage divide separating the two basins. These ranges influence local rainfall distribution and surface runoff, generating episodic flows into the Bulloo River to the south and Cooper Creek to the west. Across both basins, the low channel gradients and expansive floodplains result in limited hydraulic confinement, meaning that overbank and floodplain flows dominate during high-rainfall periods rather than confined channelised flow.

Hydrologically, both catchments are defined by ephemeral flow regimes within low-gradient, internally draining (endorheic) landscapes that do not discharge to the sea. Instead, surface waters terminate in local depressions including Bulloo Lake and Caryapundy Swamp in the Bulloo Basin, and Lake Eyre during exceptional flood years in the Cooper Creek system. Most flow events originate in the upper catchments along the Grey Ranges and eastern uplands; however, a large proportion of this water is lost to evaporation and limited floodplain storage within the region's clay-dominated substrates (Costelloe et al., 2006) before reaching terminal wetlands.

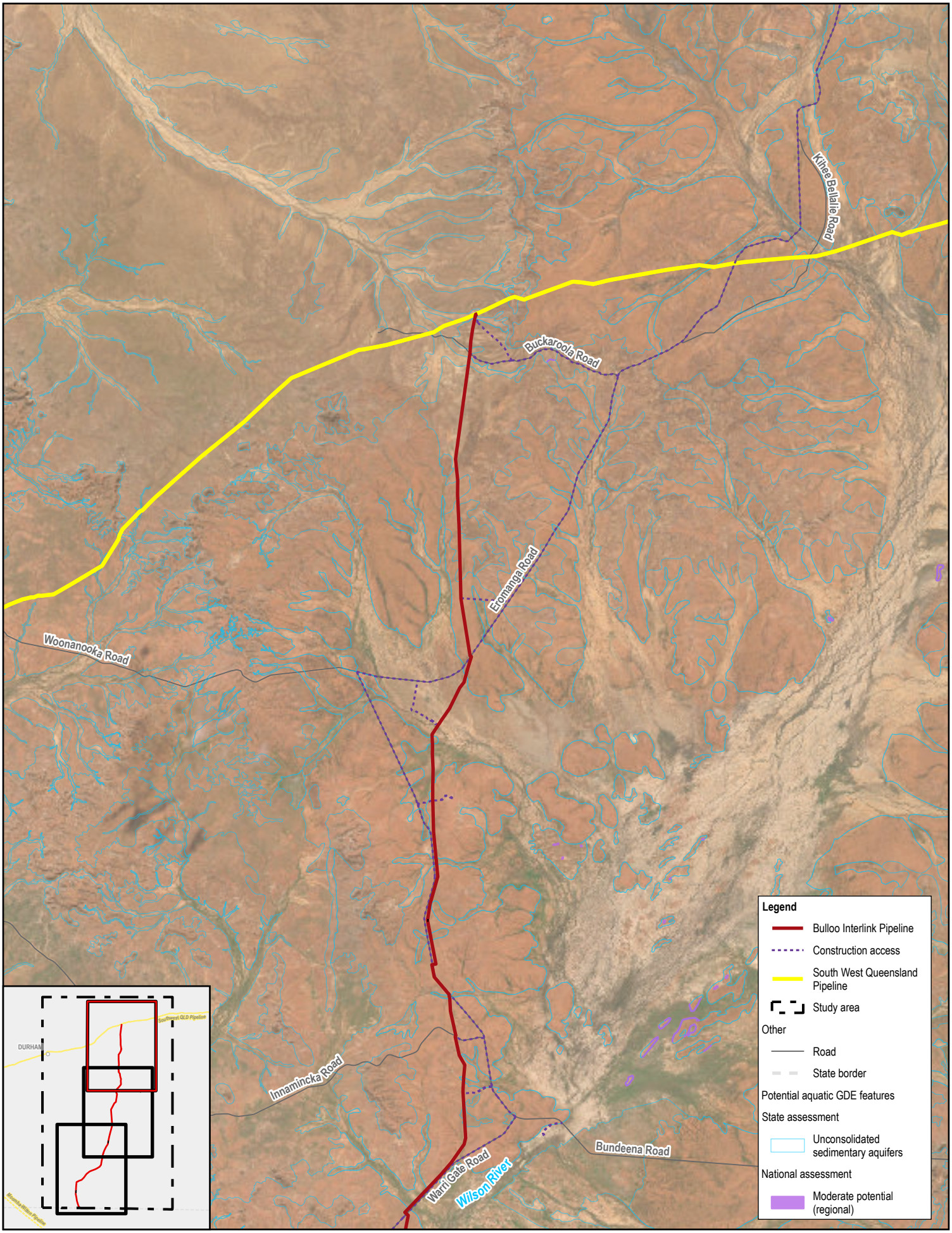
Flooding dynamics across the Channel Country are driven by large-scale and unpredictable climatic events. Whilst major floods occur rarely (Kotwicki, 1986), they are typically associated with La Niña phases of the El Niño–Southern Oscillation, when northern Australia experiences enhanced summer monsoonal rainfall (Allan, 1988; Puckridge et al., 2000). During extensive flood events, surface water transforms the otherwise arid landscape into a network of wetlands, anastomosing channels, and floodplain swales. Between these infrequent events, channels remain dry for extended periods, and aquatic habitats persist only in isolated waterholes or man-made dams.

4.6.1 Ecohydrology

Ecohydrology is study of interactions between hydrological processes and ecological systems, focusing on how water availability influences ecosystem structure, function, and resilience (Chen, 2024). Within the study area, the episodic hydrology underpins the 'boom-and-bust ecology of the Channel Country, where bursts of aquatic productivity after floods are followed by prolonged dry phases with little productivity.

Consequently, aquatic habitats within the study area exhibit pronounced spatial and temporal variability, resulting in a high degree of habitat heterogeneity and adaptive ecological strategies among aquatic and riparian species (Sheldon et al., 2002). These strategies include rapid life cycles, broad or adaptable food preferences, desiccation tolerance and dormancy, physiological resilience to extreme conditions, and the maintenance of soil seed banks by aquatic and riparian flora (Kerezsy, 2010; Balcombe, 2005).

More sensitive species may also depend on refugia habitats, such as deep waterholes (e.g. Noccundra Waterhole) and shaded floodplain depressions (e.g. Bulloo Lake), to persist through extended dry periods.



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Predicted aquatic groundwater dependent ecosystems (GDEs) within the study area

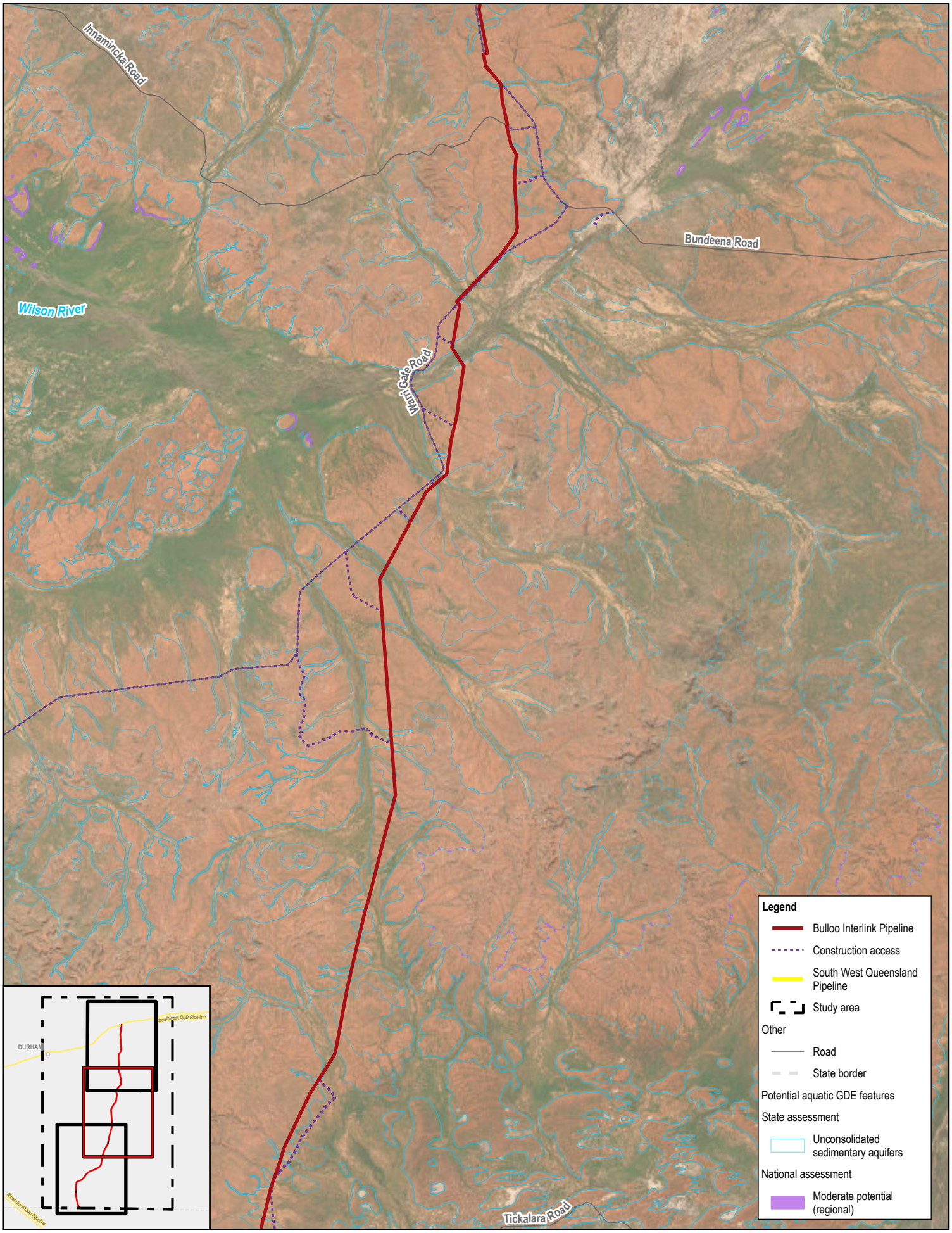
Project No. 12661648
Revision No. 0
Date 17/06/2026

Sheet 1 / 3

Figure 4.7

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:27

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS\DNRMMRRD: Roads (2021), Watercourse (2023); BOM: Potential quatic GDE features (National Groundwater Dependent Ecosystems (GDE) Atlas (2025); DES: Potential aquatic GDE features (State assessment) (2018);APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2025) Created by: calburo2



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Predicted aquatic groundwater dependent ecosystems (GDEs) within the study area

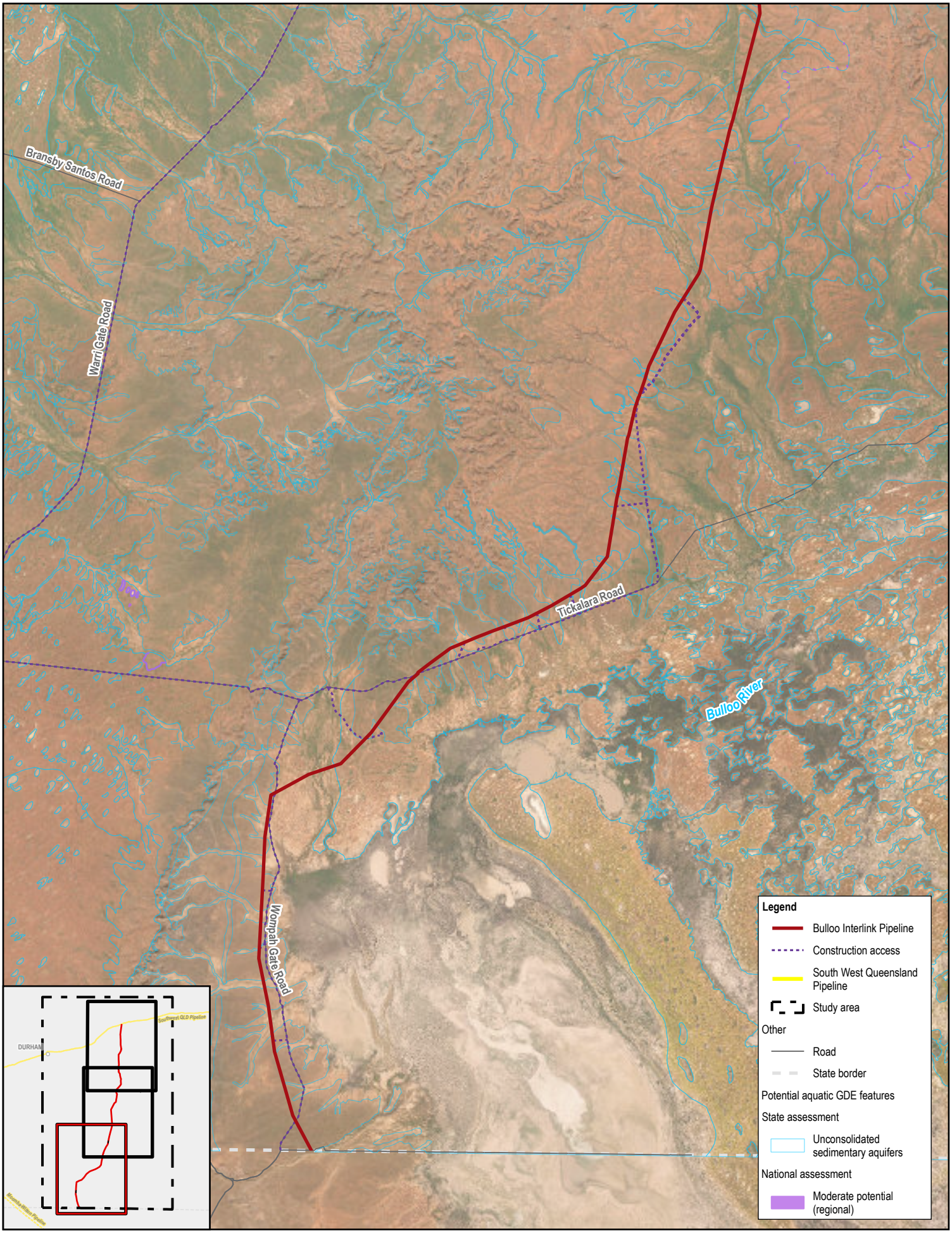
Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 2 / 3

Figure 4.7

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:28

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS|DNRMMRRD: Roads (2021), Watercourse (2023); BOM: Potential quatic GDE features (National Groundwater Dependent Ecosystems (GDE) Atlas (2025); DES: Potential aquatic GDE features (State assessment) (2018);APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2025) Created by: calburo2



Paper Size ISO A4

0 2 4 6 8

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA2020
Grid: GDA2020 MGA Zone 54

N

APA

GHD

APA Group
Bulloo Interlink Pipeline

Predicted aquatic groundwater dependent ecosystems (GDEs) within the study area

Project No. **12661648**
Revision No. **0**
Date **17/06/2026**

Sheet 3 / 3

Figure 4.7

N:\AU\Sydney\Projects\21\12661648\GIS\Maps\Deliverables\Queensland\12661648_AEco_1.aprx - AquaticFauna_1pg_A4P_MB / Print date: 17 Jun 2026 - 02:28

Data source: Earthstar Geographics, Esri, Geoscience Australia, NASA, NGA, USGS|DNRMMRRD: Roads (2021), Watercourse (2023); BOM: Potential quatic GDE features (National Groundwater Dependent Ecosystems (GDE) Atlas (2025); DES: Potential aquatic GDE features (State assessment) (2018);APA: Project alignment, Camp locations, Aboveground infrastructure, Pipe stockpile, Construction access, Additional work area (2025); ASGS: State border (2016); GHD: Study area (2025) Created by: calburo2

4.7 Aquatic habitat

Aquatic habitat assessments conducted during field surveys have been consolidated here to inform the presence and condition of key aquatic habitat features within the project site, as well as characterise wetlands, waterholes, and survey sites visited across the broader survey area. The diversity, abundance, structure, function and condition of aquatic habitat within the survey area is driven by existing hydrological conditions described in section 4.6. A complete description of habitat assessments for each site is provided in Appendix B.

4.7.1 Within, upstream and downstream of the project site

Within, upstream, and downstream of the project site, all surveyed waterways were assessed as ephemeral and were predominantly dry at the time of inspection. Across both field surveys, 15 of the 79 sites contained standing water, indicating limited availability of aquatic habitat for species, particularly aquatic fauna, even after periods of extensive rainfall. Although no active flow was observed during the post- and pre-wet seasons surveys, evidence of channel erosion and scour suggested periods of high or overland flow, likely associated with the flooding occurring across the catchment.

Channels were morphologically diverse across sites, from individual straight streams to complex anastomosing channels, with widths ranging from less than 1 m in narrow incised sections to over 30 m in deeper developed rivers (e.g. Wilson River). This was expected, as in the Channel Country, channel morphology is highly variable due to its extremely low gradients, variable flow regimes, and fine sediment loads, which cause channels to shift, braid, and reform across wide floodplains during episodic flood and dry cycles (Plate 4.4; Plate 4.5).

Substrates were typically reflective of the Channel Country, comprising a generally uniform composition dominated by clay, sand, and minor silt, with little to no coarse material such as cobbles or boulders. Even at wetted sites, coarse substrate was scarce, suggesting low interstitial space available for aquatic fauna. At times, the channel bed contained sand slugs, temporary accumulations of sand likely deposited during high-flow events and not expected to persist through subsequent floods.

A distinct section of the waterways intersecting the pipeline corridor featured noticeably rockier terrain, which occurred between Parrabinna Creek (Aquatic site 31; ~KP 145) to Muggera Creek (Aquatic site 38; ~KP 157). Accordingly, these sites had greater proportion of cobble and pebbles as bed substrate. However, these areas were completely dry and will not be expected to provide consistent reliable habitat for aquatic species.

Waterway banks consisted mainly of cracking clays, appearing unstable and weakly consolidated due to limited vegetation cover. Bank slopes ranged from gently graded (indicative of slow overland flow channels) to steep and eroded sections (associated with faster flows). More established channels tended to be deeper, with noticeably eroded banks, although the surrounding landscape remained flat.

Aquatic habitat exhibited significant disturbance, primarily due to historic riparian vegetation clearing and cattle access to the channels. Cattle grazing has likely contributed to elevated nutrient inputs from surrounding agricultural land, resulting in localised eutrophication observable at several wetted sites where dense algae was growing.

Gum Creek (Aquatic site 12) contained a shallow pool with extensive blue-green algal growth and a distinct odour associated with cattle access, likely from manure and urine contamination (Plate 4.6). Cattle grazing is expected to exacerbate bank instability and further reduce water quality (and aquatic habitat by proxy) where water is present.

Riparian vegetation was heavily cleared along most waterways, with only scattered trees remaining along some banks and complete removal in more open sections. This extensive riparian clearing is consistent across the broader region (DETSI, 2013a) and is expected to further impair bank stability and subsequently aquatic habitat. Where riparian vegetation was present, it consisted primarily of *Acacia* species, with some *Eucalyptus* species also present. This vegetation may provide temporary aquatic habitat for fauna and flora during flow periods, including shading, detritus, root overhang and trailing bank vegetation.

Overall, there was minimal aquatic habitat present in waterways surveyed within, upstream and downstream of project site. Where aquatic habitat was present, it was of relatively low quality and quantity, but comprised woody debris, varied substrates and overhanging vegetation. This was expected, as the broader Lake Eyre and Bulloo region is known to have sparse in-stream habitats (DETSI, 2013a).

There was typically no aquatic flora or fauna present at sites, and any aquatic flora present was largely desiccated. This lack of habitat, combined with the absence of water and associated aquatic species, indicates the waterways are unlikely to support aquatic species, and instead waterways are likely used as transient habitat during periods of high flow for moving to more suitable aquatic habitat refugia such as waterholes and wetlands.

Across the project site, there were no major barriers to fauna passage observed apart from some existing road crossings, usually dirt access tracks raised above the natural channel bed level.



Plate 4.4 ***A straight channel (left) and an irregular channel (right) at Aquatic site 39 during the post-wet survey***



Plate 4.5 ***Braided channels at Aquatic site 4A during the pre-wet survey***



Plate 4.6 Algal growth (left) and evidence of erosion of the bank due to cattle access (right) at Aquatic site 12 (post-wet)

4.7.2 Within the broader survey area

Additional habitat assessments were conducted to characterise wetlands, waterholes, and waterway sites visited across the broader survey area.

Wetland assessments were conducted in proximity to Bulloo Lake and Cooper Creek–Wilson River Junction (Aquatic site 71 and 73, respectively; DIWA wetlands), which are located 6 and 49 km downstream of the project site respectively. Bulloo Lake could not be accessed by vehicle, and assessment was therefore limited to drone observations, which confirmed that the lake was holding water at the time of both surveys (Plate 4.7). However, substrate, vegetation, and in-stream habitat features, as well as fauna communities could not be verified.

Bulloo Lake forms the central waterbody of the Bulloo Overflow, supporting flood-dependent vegetation and migratory waterbirds during major flood events (DETSI, 2016a). Water comes primarily from Bulloo River, and Bulloo Lake typically fills only when the adjacent Caryapundy Swamp Ramsar site in NSW reaches capacity as a terminal basin. This means aquatic habitat availability is episodic, occurring mainly after major rainfall and flooding events such as those in March/April 2025. For the majority of the time, for periods up to 10 years of more, this area is a dry flat clay lakebed with low lying vegetation (Rowlands & Rowlands, 1969; Plate 4.7).

At the Cooper Creek–Wilson River junction, the aquatic habitat reflected post–major flood conditions within an otherwise dry region (DETSI, 2016b). During the field survey, the assessed site (Aquatic site 73) contained a series of disconnected pools along established channels, and drone footage showed this was the dominant channel within the surrounding floodplain (Plate 4.7). The channel bed comprised a uniform, tightly compacted silt and clay substrate, while banks of similar composition supported mature eucalypts and shrubs that provided moderate shading and canopy cover. Some woody debris and organic detritus were present in-stream, though most of the riverbed remained uniform in composition. This site could not be assessed in October 2025 as water pooled over the access track from rainfall prior to the survey, highlighting the variable nature of the channels and flow in the area.

The Bulloo River site (Aquatic site 72) is located external to project-related impacts and is situated over 50 km east of the project site. At this site, Bulloo River was flowing during both post- and pre-wet season field surveys. Whilst the Bulloo River is typically dry apart from isolated waterholes, heavy monsoonal rains (such as those in early 2025) can trigger extensive flooding and prolonged flows that move south toward internally draining wetlands including Bulloo Lake and Caryapundy Swamp.

These high-flow events have resulted in severe scouring and high, steep banks (Plate 4.7). Additionally, past flows have widened the channel, decreasing the canopy cover provided by large fringing eucalypts. Some in-stream habitat was present, with a small riffle section with cobble and pebble substrate, and some larger woody debris and overhanging vegetation on channel margins. However, these aquatic habitat features were limited, and substrate was typically uniform, tightly compacted clay. A bridge spans the river, creating a minor obstruction (Plate 4.7), and a cattle fence was observed downstream, which may restrict movement of larger aquatic fauna in periods of higher flows.

Noccundra Waterhole and Nockatunga Waterhole were surveyed during pre-wet conditions only. At the time of survey, both waterholes comprised similarly extensive, permanent deep pool habitats, characterised by relatively straight channel morphology and a uniform, compacted sandy substrate (Plate 4.8). Riparian vegetation showed evidence of disturbance, and water quality was highly turbid. Despite these conditions, turtles and fish were recorded at both sites, reflecting their function as the largest and most permanent aquatic habitats within the surrounding landscape.

Overall, compared to sites within, upstream, and downstream of the project site, these wetland, waterhole and waterway sites in the broader region supported more diverse and abundant aquatic habitats. This is predominantly due to their location in areas where water is retained permanently or semi-permanently. This persistence of water promotes the development of key aquatic habitat features, such as accumulations of detritus and large woody debris. These areas also showed less disturbance from vegetation clearing and cattle grazing, resulting in more stable banks and well-established riparian vegetation that provides greater shading, and organic inputs (i.e. detritus) into the channel. Despite this, aquatic habitat availability and quality in these areas is expected to contract during extended dry periods. Species requiring permanent water may only persist if able to reach perennial refugia; otherwise, they risk becoming stranded within ephemeral or isolated pools. As such, wetland habitats and the Bulloo River system are likely to function as corridors for connectivity during flood events to perennial refugia, such as the Noccundra and Nockatunga Waterholes.



Plate 4.7 ***Aquatic habitat features in broader survey sites including adjacent wetlands: Top: Bulloo Lake wetland holding water (top left) and fringed by low-lying vegetation (top right). Middle: Aquatic site 73, adjacent Cooper Creek – Wilson River Junction wetland with shallow disconnected pools (middle left). This is the main channel within the immediate broader region (middle right). Bottom: Bulloo River, with scouring from past flows (bottom left), and bridge crossing at riffle section (bottom right)***



Plate 4.8 ***Aquatic habitat features in waterholes: Top: Noccundra Waterhole; Bottom: Nockatunga Waterhole. Both holding deep and relatively unbroken pool habitat with fringing continuous riparian vegetation***

4.7.3 Bioassessment results

A total of 82 river condition bioassessments were conducted: 62 in July 2025 and 20 in October 2025 field surveys. All condition scores are provided in Appendix C, with results consolidated here to describe the overall condition of the Queensland extent of aquatic habitat across the survey area. Any sites without defined beds or banks were not assessed.

During the post-wet field survey (July 2025), the majority of sites were classified as being in either *poor* or *fair* condition. This included both the Bulloo River (Aquatic site 72) and the Cooper Creek–Wilson River Junction (Aquatic site 73) sites. The relatively low condition ratings were primarily attributed to uniform bed substrates composed of fine silt and clay, limited or absent surface water, poor bank stability, and sparse riparian vegetation.

Only one site (Aquatic site 17) was assessed as being in *good* condition, characterised by a heterogenous coarse substrate of cobbles, boulders and pebbles with strong embeddedness, minimal evidence of scouring or sediment deposition, and the presence of mature riparian vegetation (Plate 4.9).

During the pre-wet season field survey (October 2025), all sites were described as *poor* or *fair.* Notably, Aquatic site 17 was downgraded to *fair* due to a reduction in water presence and decreased bank and vegetation stability. It should also be noted that this site was adjusted for the updated alignment (Plate 4.10).

While the AusRivAS methodology is not a perfect fit for the ephemeral streams of western Queensland, the scores are indicative of aquatic habitat condition at each site. The *poor* and *fair* scores reflect the modified riparian vegetation and heavy cattle impact within the survey area.



Plate 4.9 *High quality riparian vegetation and cobbled substrate at Aquatic site 17 (post-wet survey)*



Plate 4.10 *Site 17 during the pre-wet survey along the updated alignment*

4.8 Water quality

4.8.1 Field results

Water quality monitoring during the post-wet (July 2025) and pre-wet (October 2025) surveys identified multiple exceedances of applied EPP guidelines for the Upper and Lower Bulloo River as shown in Table 4.3. Electrical conductivity ranged from 88.6 to 296 µS/cm in July and up to 273.3 µS/cm in October, with majority of sites above recommended guideline values. The pH was generally within the range of 6.5–8.0, although some sites recorded values above 8.0, particularly in October (maximum 8.92).

Dissolved oxygen was mostly within the guideline range but included low saturation (11 per cent) at Aquatic site 73 in July and high saturation (132 per cent) at Aquatic site 12 in October. Turbidity exceeded guideline thresholds at multiple sites, with maximum values of 1,100 NTU in July and 1,105.61 NTU in October. High turbidity was reflective of the highly mobile sediments observed in the channel beds and surrounding landscape at each site. Seasonal variation was observed, with higher temperatures and turbidity during the pre-wet survey, which is common in the dry season when evaporation reduces water levels and concentrations to increase.

Table 4.3 In-situ water quality results

Site	Date and time	Depth (m)	Temperature (ºC)	Electrical conductivity (µS/cm)	pH	DO (% sat)	Turbidity (NTU)
EPP guideline values							
1: EPP guideline (Upper Bulloo River)		–	–	*<100*	*6.5–8.0*	*60–110*	*<270*
2: EPP guideline (Lower Bulloo River)		–	–	*<95*	*6.5–8.0*	*60–110*	*<780*
Post-wet survey – July 2025							
Aquatic site 7[1]	13/07/2025 12:44	0.2	11.70	88.60	**8.55**	**112.20**	73.01
Aquatic site 12[1]	14/07/2025 9:10	0.2	10.30	**129.40**	**9.4**	104.30	8.87
Aquatic site 15[1]	14/07/2025 11:48	0.2	9.60	87.30	7.71	79.60	**418.00**
Aquatic site 17[1]	12/07/2025 11:04	0.3	12.10	**213.80**	7.3	88.30	21.36
Aquatic site 21[1]	12/07/2025 19:53	0.1	11.70	93.33	7.11	87.9	**771.16**
Aquatic site 24[1]	11/07/2025 17:14	0.2	6.75	**295.00**	6.56	**22.100**	–
Aquatic site 38[1]	13/07/2025 14:04	0.3	17.00	**337.00**	7.11	85.20	49.02
Aquatic site 40[1]	13/07/2025 10:19	0.3	12.70	**141.40**	7.87	107.50	3.01
Aquatic site 42[1] (Pool 1)	13/07/2025 18:22	0.2	15.20	**747.00**	7.64	**27.70**	176.00
Aquatic site 42[1] (Pool 2)	12/07/2025 14:08	0.2	16.70	**278.50**	**8.63**	**125.70**	95.04
Aquatic site 72[2]	11/07/2025 1:21	0.3	12.60	**119.70**	7.15	96.00	758.45
Aquatic site 73[1]	13/07/2025 13:56	0.3	10.90	**184.00**	**8.06**	**11.00**	**1,100.00**
Pre-wet survey – October 2025							
Aquatic site 12[1]	09/10/2025 14:44	0.3	25.50	**124.50**	**8.85**	**132.00**	25.00
Aquatic site 15[1]	13/10/2025 13:09	0.3	24.50	**171.30**	**8.22**	94.10	37.00
Aquatic site 17[1]	14/10/2025 10:50	0.3	20.70	**117.60**	7.58	**117.60**	4.66
Aquatic site 21[1]	14/10/2025 08:57	0.2	17.30	**112.30**	7.64	69.40	**741.00**
Aquatic site 24[1]	14/10/2025 06:53	0.2	17.30	**156.40**	7.67	80.60	44.80
Aquatic site 38[1]	11/10/2025 10:06	0.3	19.70	**1,707.00**	**8.41**	8.20	67.00
Aquatic site 40[1]	11/10/2025 11:35	0.3	23.50	**273.30**	**8.92**	93.80	3.97
Aquatic site 72[2]	12/10/2025 10:42	0.3	23.10	**171.80**	7.83	90.20	**782.00**
Aquatic site 78[1]	14/10/2025 09:09	0.3	19.70	**109.10**	7.70	82.00	**1,105.61**

Site	Date and time	Depth (m)	Temperature (ºC)	Electrical conductivity (µS/cm)	pH	DO (% sat)	Turbidity (NTU)
Aquatic site 81[1]	09/10/2025 12:38	0.3	23.20	**111.70**	7.47	89.20	**507.00**
Aquatic site 84[1]	10/10/2025 14:09	0.3	24.80	89.50	7.76	98.40	220.00

Note: Yellow shading indicates results non-compliant with the EPP guidelines.

4.9 Aquatic flora

4.9.1 Species observations

Desktop searches identified 167 wetland indicator plant species predicted to occur throughout the Cooper Creek basin and 58 wetland species in the Bulloo drainage basin (DETSI, 2016b; DETSI, 2016a). This included various aquatic plants including emergent sedges and rushes (i.e. *Cyperus*, *Eleocharis*, *Juncus*, and *Fimbristylis spp.*) which typically grow along the edges of watercourses, as well as some floating attached aquatic flora species such as Nardoo (*Marsilea spp.*). As desktop resources only provide information at a broad scale, it was anticipated that fewer aquatic flora species will be observed during field surveys.

During the post-wet season aquatic ecology survey in July 2025, there were 13 aquatic flora species recorded. Of these species, all are native and six are considered wetland identifier plants as shown in Table 4.4. Lesser joyweed (*Alternanthera denticulata*) was the most commonly observed aquatic plant with the species occurring at 12 sites. Multiple sedge species (*Cyperus sp.*) occurred throughout the survey area (Plate 4.11).

During the pre-wet season survey conducted in October 2025, there were 11 aquatic flora species observed. All species were native, with six being wetland identifiers (Table 4.5). Similar to the July survey findings, lesser joyweed (*Alternanthera denticulata*) was the most commonly observed aquatic plant with the species occurring at eight sites (Plate 4.11).

During both survey periods, biodiversity and coverage of aquatic flora species was typically low across the survey area. Aquatic plants were generally absent or limited within the dry tributaries, except for *Cyperus* species along banks, which can withstand long periods without water. When species were observed, they were generally healthy across the sites, although some were dried out slightly as expected due to the lack of water availability in October 2025. No conservation significant aquatic flora species were observed during field surveys.

Table 4.4 Aquatic flora species confirmed present within the post-wet survey area (July 2025)

Scientific name	Common name	Wetland indicator	Aquatic site #
Alternanthera denticulata	Lesser joyweed	–	5, 14, 19, 20, 23, 33, 40, 42, 45, 47, 54, 57
Cyperus bifax	Western nutgrass	–	31
Cyperus dactylotes	–	Yes	16, 40
Cyperus difformis	Dirty dora	Yes	6, 37, 38
Cyperus exaltatus	Tail flat-sedge	Yes	33
Cyperus victoriensis	Channel nutgrass	–	5, 15, 18, 21, 38, 46, 49, 51
Duma florulenta	Lignum	Yes	57, 65, 73
Eleocharis plana	Flat spike-rush	–	5, 17, 31, 33, 37, 38, 40
Fimbristylis dichotoma	Forked fimbry	–	54, 55, 17, 32, 34, 35, 5
Juncus usitatus	Common rush	Yes	15, 49
Leersia hexandra	Swamp rice grass	–	19, 40
Leptochloa digitata	Umbrella cane grass	Yes	14, 57
Marsilea drummondii	Nardoo	–	5, 32, 33, 35, 39, 55, 56, 63

Table 4.5 Aquatic flora species confirmed present within the pre-wet survey area (October 2025)

Scientific name	Common name	Wetland indicator	Aquatic site #
Alternanthera denticulata	Lesser joyweed	–	4A, 7A, 17, 24, 76, 77 79, 80
Cyperus bifax	Western nutgrass	–	31
Cyperus dactylotes	–	Yes	16, 40
Cyperus difformis	Dirty dora	Yes	37, 38, 6
Cyperus exaltatus	Tail flat-sedge	Yes	33
Cyperus victoriensis	Channel nutgrass	–	5, 15, 18, 21, 38, 46, 49, 51
Duma florulenta	Lignum	Yes	7A, 81, 83, 84
Eleocharis plana	Flat spike-rush	–	17
Juncus usitatus	Common rush	Yes	15, 40, 81, 84
Leptochloa digitata	Umbrella cane grass	Yes	17
Persicaria sp.	Knot weeds	–	72



Plate 4.11 Aquatic flora species observations in the study area from top left: tail flat-sedge (Cyperus exaltatus), flat spike-rush (Eleocharis plana), lesser joyweed (Alternanthera denticulata), and channel nutgrass (Cyperus victoriensis).

4.9.2 Herbarium identification

Eight aquatic flora samples were collected during field surveys and submitted to Queensland Herbarium for species identification. The following six distinct species were identified, noting that some samples collected were the same species:

- *Cyperus bifax* – western nutgrass
- *Cyperus dactylotes*
- *Cyperus victoriensis* – channel nutgrass
- *Eleocharis plana* – flat spike-rush
- *Fimbristylis dichotoma* – forked fimbry
- *Bulbine alata*.

All species are native to Queensland and are commonly associated with seasonally inundated wetlands, drainage lines, and riparian habitats.

4.9.3 Threatened species

There was no threatened aquatic flora species identified in the study area based on desktop and field assessments.

4.9.4 Invasive species

No restricted aquatic flora species were recorded within the survey area during the field surveys, nor were identified as part of desktop assessments.

4.10 Aquatic fauna

4.10.1 Species observations

Freshwater macroinvertebrates

Macroinvertebrate community composition and diversity indices are described below in detail in relation to edge and pool-bed habitats. Overall, across both edge and bed samples, community composition was comprised of species which prefer ephemeral waterways and that can tolerate harsh conditions. Low taxa richness, EPT richness and low SIGNAL-2 scores further indicate that macroinvertebrate assemblages were dominated by disturbance-tolerant taxa. Whilst this pattern can be reflective of disturbances associated with anthropogenic activities (e.g. grazing and/or pollution), this may also be indicative of macroinvertebrate communities which are adapted to fluctuating conditions including intermittent flow, drying and re-wetting cycles, and high-energy flow events characteristic of the Channel Country.

As such, macroinvertebrate communities are likely shaped by the overarching hydrological regime in addition to anthropogenic disturbances. Low substrate heterogeneity and near-complete dominance of finer substrates (see section 4.7) typical of the Lake Eyre and Bulloo basins is also likely to be a significant contributor to the low macroinvertebrate diversity observed (DETSI, 2013a).

Community composition

Edge samples

During the post-wet survey, the dominant macroinvertebrate taxa in the edge samples were microcrustaceans (e.g. *Copepoda* sp., *Ostracoda* sp. and *Cladocera* sp.). During the pre-wet survey, the dominant taxa was microcrustaceans and midge larvae (family *Tanypodinae*). These taxa are commonly found in ephemeral waterways and are known to be tolerant of harsh conditions. An analysis of similarity (ANOSIM) identified that there was no significant difference in macroinvertebrate community composition between post-wet and pre-wet seasons (Global R = 0.116, p value = 0.064). This is evident in the nMDS plot where samples between the two seasons are not distinguished into separate groups (Figure 4.8).

During the pre-wet survey, fairy shrimp (*Thamnocephalidae*) were recorded at Aquatic site 78. Fairy shrimp are important food sources for many birds and fish and are unique in their ability to enter diapause where they suspend their development during unfavourable conditions. This allows them to continue to survive in the ephemeral conditions in the region (Hairston & Cáceres, 1996).

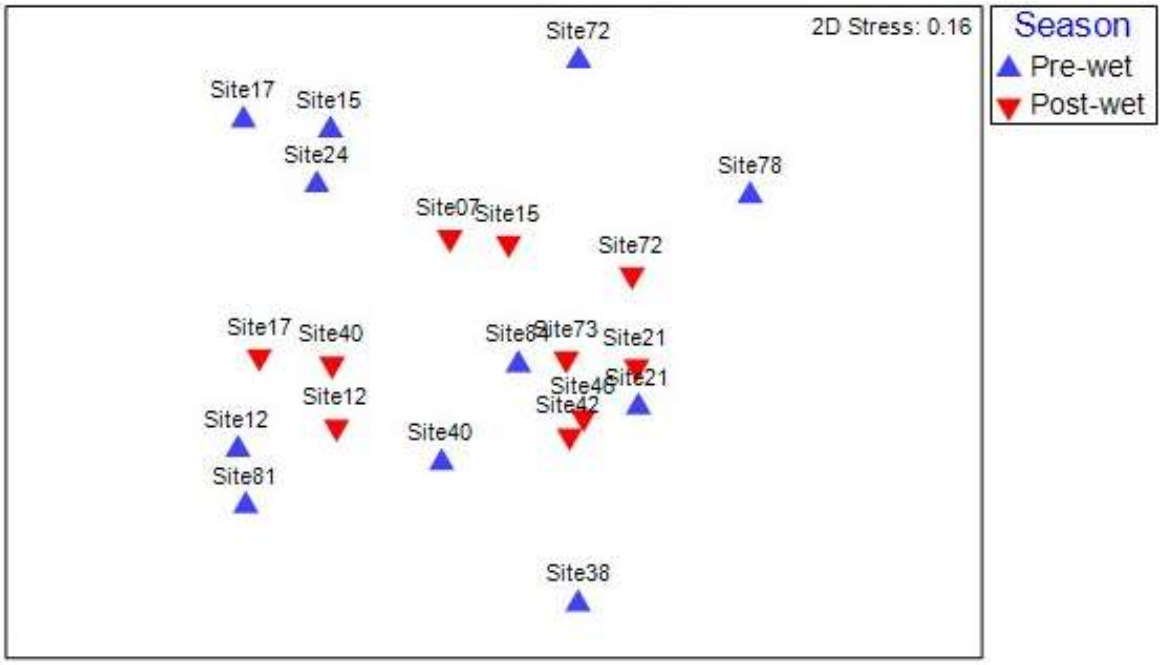


Figure 4.8 ***nMDS ordination plot indicating differences in edge macroinvertebrate community composition between post-wet and pre-wet survey conditions.***

Bed samples

During the post-wet survey, the dominant macroinvertebrate taxa in the bed samples were microcrustaceans and biting midge larvae (family Ceratopogonidae). During the pre-wet survey, the dominant taxa was *Copepoda* sp. and non-biting midge larvae (families Chironominae, and Tanypodinae). These taxa are commonly found in ephemeral waterways and are known to be tolerant of harsh conditions.

There was a significant difference in macroinvertebrate community composition between post-wet and pre-wet seasons (Global R = 0.185, p value = 0.042). This is evident in the nMDS plot (Figure 4.9), where the post-wet season surveys are grouped at the top of the plot and the pre-wet, except for Aquatic site 40, are grouped at the bottom. The greatest contributors to this significance were the decreased abundance of *Cladocera* sp, *Ostracoda* sp. and Tanypodinae and the increased abundance of *Copepoda* sp. between post-wet and pre-wet surveys.

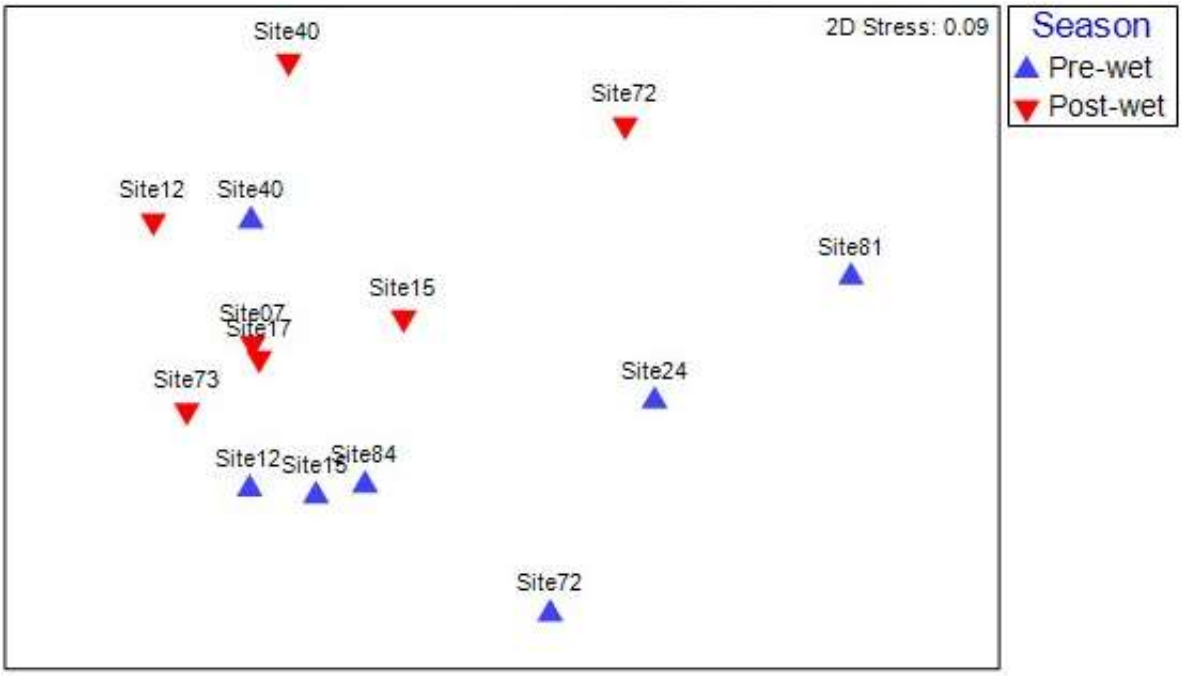


Figure 4.9 ***nMDS ordination plot indicating differences in bed macroinvertebrate community composition between post-wet and pre-wet survey conditions***

Macroinvertebrate indices

Macroinvertebrate indices for samples collected during the post-wet (July 2025) and pre-wet (October 2025) sampling events are presented in Table 4.6 for edge habitat samples and Table 4.7 for pool-bed samples.

Edge samples

Taxa richness during the post-wet survey ranged from 12 (Aquatic site 12) to 23 (Aquatic site 42) and between 10 (Aquatic site 81) and 20 (Aquatic site 17) during the pre-wet survey period. Aquatic sites 7, 12, 15, 46 and 72 were below the EPP guideline values during the post-wet survey. Most sites were outside the EPP guideline during the pre-wet survey, with the exception of Aquatic sites 17, 40 and 84. Taxa richness decreased at all sites surveyed in both seasons (Table 4.6). The mean taxa richness across sites decreased between post-wet (16.4) and pre-wet (14.8) seasons.

EPT richness ranged from 0 (Aquatic sites 7 and 21) to 4 (Aquatic site 42) during both survey periods. There are no EPP guideline values or QWQG guidelines for EPT richness. EPT richness at sites 12 and 72 decreased from post-wet to pre-wet seasons; however, Aquatic site 40 increased during the pre-wet season (Table 4.6). The mean EPT richness across sites remained similar between post-wet (1.8) and pre-wet (1.73) seasons. These relatively low EPT scores are expected given the ephemeral nature of the system, as EPT taxa are sensitive to flow variability and are typically less represented in ephemerally flowing waterways such as those in the Channel Country (Herman & Nejadhashemi, 2015).

The SIGNAL-2 index during the post-wet survey ranged from 1.67 (Aquatic site 7) to 2.57 (Aquatic site 72) and between 1.69 (Aquatic site 72) and 2.30 (Aquatic site 81) during the pre-wet survey period. All sites were below the EPP SIGNAL-2 index guideline value (3.04–3.63) across both survey periods. The SIGNAL-2 index at Aquatic sites 15, 17, 21, 40 and 72 decreased from post-wet to pre-wet seasons; however, site 12 increased during the pre-wet season from 1.92 to 2.27 (Table 4.6). The mean SIGNAL-2 index decreased between post-wet (2.16) and pre-wet (1.99) surveys. Overall, the SIGNAL-2 scores are indicative of waterways impacted by high nutrients and/or poor habitat.

All indices showed a general decrease from post-wet to pre-wet seasons, which is common in ephemeral ecosystems when waterways dry out, concentrations of nutrients and other contaminants increase from evaporation and habitat is reduced.

Bed samples

Taxa richness during the post-wet survey ranged from 10 (Aquatic site 15) to 21 (Aquatic site 40) and between 8 (Aquatic site 12) and 16 (Aquatic site 40) during the pre-wet survey period. Aquatic sites 15 and 17 were below the EPP guideline values during the post-wet survey. All sites were below the EPP guideline during the pre-wet survey, except Aquatic site 40. Taxa richness decreased at all sites surveyed in both seasons (Table 4.6). The mean taxa richness decreased between post-wet (16) and pre-wet (11.1) seasons.

EPT richness ranged from 1 (Aquatic sites 7, 17 and 73) to 4 (Aquatic sites 12 and 72) during the post-wet survey and between 0 (Aquatic sites 12 and 15) and 3 (Aquatic site 40) during the pre-wet survey period. There are no EPP guideline values or QWQG guidelines for EPT richness. EPT richness at all sites decreased from post-wet to pre-wet seasons (Table 4.6). The mean EPT richness decreased between post-wet (2.43) and pre-wet (1.43) seasons. As for edge samples, low EPT richness in bed samples was expected given the sensitivity of EPT taxa to dynamic, ephemeral flow regimes (Herman & Nejadhashemi, 2015).

The SIGNAL-2 index during the post-wet survey ranged from 1.76 (Aquatic site 7) to 3 (Aquatic site 72) and between 1 (Aquatic site 15) and 2.79 (Aquatic site 84) during the pre-wet survey period. All sites were below the EPP guideline value across both survey periods. The SIGNAL-2 index at all sites decreased from post-wet to pre-wet seasons (Table 4.6). The mean SIGNAL-2 index decreased between post-wet (2.27) and pre-wet (1.77) surveys. Overall, the SIGNAL-2 scores are indicative of waterways impacted by high nutrients and/or poor habitat.

All variables showed a general decrease from post-wet to pre-wet seasons. As per edge habitat, this is due to the ephemeral nature of the waterways as well as constant cattle presence in the surrounding land use degrading bed habitats.

Table 4.6 Edge macroinvertebrate indices in post-wet and pre-wet surveys

Edge	Taxa richness	EPT richness	SIGNAL-2 biotic index
EPP guideline values			
–	15.5–25	–	3.04–3.63
Post-wet survey – July 2025			
Aquatic site 7	15	0	1.67
Aquatic site 12	12	1	1.92
Aquatic site 15	13	2	2.00
Aquatic site 17	16	2	2.00
Aquatic site 21	21	0	2.29
Aquatic site 40	20	3	2.30
Aquatic site 42	23	4	2.48
Aquatic site 46	14	2	2.14
Aquatic site 72	14	3	2.57
Aquatic site 73	16	1	2.25
Pre-wet survey – October 2025			
Aquatic site 12	15	2	2.27
Aquatic site 15	15	2	1.80
Aquatic site 17	20	2	1.95
Aquatic site 21	14	0	1.86
Aquatic site 24	12	1	1.75
Aquatic site 38	14	0	2.14
Aquatic site 40	18	4	2.28
Aquatic site 72	13	1	1.69
Aquatic site 78	13	2	1.85

Edge	Taxa richness	EPT richness	SIGNAL-2 biotic index
Aquatic site 81	10	1	2.30
Aquatic site 84	19	4	2.05

Note: Yellow shading indicates values outside the EPP guideline value.

Table 4.7 Bed macroinvertebrate indices in post-wet and pre-wet surveys

Bed	Taxa richness	EPT richness	SIGNAL-2 biotic index
EPP guideline values			
–	15.5–25	–	3.04–3.63
Post-wet survey – July 2025			
Aquatic site 7	17	1	1.76
Aquatic site 12	16	4	2.50
Aquatic site 15	10	3	2.10
Aquatic site 17	13	1	2.00
Aquatic site 40	21	3	2.05
Aquatic site 72	19	4	3.00
Aquatic site 73	16	1	2.50
Pre-wet survey – October 2025			
Aquatic site 12	8	0	1.38
Aquatic site 15	9	0	1.00
Aquatic site 24	10	1	1.40
Aquatic site 40	16	3	1.38
Aquatic site 72	10	2	2.20
Aquatic site 81	11	2	2.27
Aquatic site 84	14	2	2.79

Note: Yellow shading indicates values outside the EPP guideline value.

Fish

In Cooper Creek and other rivers of the Lake Eyre Basin, diversity of invertebrates and fish at a broad (temporal) scale follows a boom-and-bust cycle (Smith et al., 2015). In the inland rivers, as floods recede and water flow is no longer continuous, waterholes and riverine wetlands take on the role of refuges where species populations retreat and persist during times of environmental stress (Davis et al., 2013).

Fish communities recorded in Lake Eyre Basin waterholes during non-flood conditions in 2012 and 2013 recorded 21 native species across the entire drainage basin, but only three to 13 fish species were detected at any one waterhole (Cockayne et al., 2013; Sternberg et al., 2014). Just four species (bony herring (*Nematalosa erebi*), desert rainbow fish (*Melanotaenia splendida tatei*), Hyrtl's tandan (*Neosilurus hyrtlii*) and silver tandan (*Porochilus argenteus*)) represented more than 70% of the catch during three sampling campaigns and were present at more than 50% of sites. The spangled perch (*Leiopotherapon unicolor*) was also present at more than 50% of sites, but at low abundance, while the other 16 species were observed at a few waterholes and in low numbers.

Government desktop assessments identified seven species of fish that have been observed along the proposed pipeline survey area as historical records as shown in Table 4.8. These species are not listed under the EPBC Act or NC Act. No conservation significant fish were identified during desktop assessments.

Table 4.8 Desktop field results of aquatic fauna species

Common name (*Scientific name*)	NC Act status	EPBC Act status	Source	Records	Latest record
Australian smelt (*Retropinna semoni*)	NL	NL	WildNet	1	23/09/1986
Barcoo grunter (*Scortum barcoo*)	NL	NL	WildNet	1	29/04/2011
Bony bream (*Nematalosa erebi*)	NL	NL	WildNet	2	29/04/2011
Golden perch (*Macquaria ambigua*)	NL	NL	WildNet	2	29/04/2011
Goldfish (*Carassius auratus*)	NL	NL	WildNet	1	29/04/2011
Spangled perch (*Leiopotherapon unicolor*)	NL	NL	WildNet	2	29/04/2011
Welch's grunter (*Bidyanus welchi*)	NL	NL	WildNet	2	29/04/2011

Note: NL = not listed.

During the post-wet field surveys in July 2025, 12 species of fish were identified. Of these species caught, desert rainbowfish (*Melanotaenia splendida tatei*) was the most abundant with 226 individuals caught across all sites (Table 4.9). However, spangled perch (*Leiopotherapon unicolor*) were more commonly caught at sites throughout the project area. Site 40 had the highest abundance with 160 individual fish caught. Hyrtl's catfish was the least prevalent species, with only one individual found in the eight sites surveyed. All field identified fish species are of least concern under the NC Act and EPBC Act.

One pest species was caught, eastern gambusia (*Gambusia holbrooki*), which is considered a category 3, 5, 6 and 7 restricted noxious species under the Biosecurity Act and therefore must not be kept, fed, given away, sold or released into the environment. During the July 2025 survey, gambusia was caught at three sites; 17,15 and 73. During the October 2025 survey eastern gambusia were caught at site 15 only. These fish were subsequently euthanised according to standard operating procedures approved by GHD's ethics committee (section 3.2.2).

In the post-wet season, the fish assemblage was dominated by juvenile individuals, with adults less frequently encountered across the study area. Species richness and abundance varied considerably between sites, ranging from a single spangled perch (*Leiopotherapon unicolor*) at one location to several hundred individuals representing multiple species at others (Table 4.9). This variability is likely attributable to differences in habitat size among sites. For example, Site 12 comprised a small, shallow pool, whereas site 73 was a larger wetland habitat with deeper isolated pools providing more habitable space.

During pre-wet surveys in October 2025, there were seven fish species observed across 11 sites. Of these species, eastern gambusia was the most abundant with 53 individuals caught at site 15 (Table 4.10). There was reduced species diversity during this survey. This was expected due to the combination of reduction of water in the dry season constricting available aquatic habitat for fish species, as well as fewer sites being sampled overall. No new species were identified in the October 2025 survey.

Table 4.9 Freshwater macrocrustaceans and fish species confirmed present in the study area (July 2025)

Species	Aquatic site #								Total
	7	12	15	17	21	40	72	73	
Fish									
Agassiz's glassfish *Ambassis agassizii*	–	–	–	**10** *A=5, J=5*	–	–	–	–	**10**
Eastern gambusia* *Gambusia holbrooki*	–	–	–	**73** *J=73*	–	–	–	**35** *A=21, I=10 J=4*	**108**
Western carp gudgeon *Hypseleotris klunzingeri*	–	–	**1** *A=1*	**3** *J=3*	–	–	–	–	**4**
Golden perch *Macquaria ambigua*	**1** *J=1*	–	**5** *I=1, J=4*	–	–	–	**9** *J=9*	**33** *I=2, J=31*	**48**
Spangled perch *Leiopotherapon unicolor*	**1** *I=1*	**1** *I= 1*	**3** *J=3*	**8** *J=8*	**2** *I=1, J=1*	**13** *A=1, I=12*	–	**1** *J=1*	**29**
Desert rainbowfish *Melanotaenia splendida tatei*	**102** *I=45, J=57*	–	**1** *J=1*	**1** *J=1*	**2** *J=2*	**120** *A=70, I=50*	–	–	**226**
Bony bream *Nematalosa erebi*	**3** *A= 3*	–	**26** *A=1, I=7, J=18*	–	–	–	–	**25** *I=17, J=8*	**54**
Hyrtl's catfish *Neosilurus hyrtlii*	–	–	–	–	–	–	–	**1** *I=1*	**1**
Australian smelt *Retropinna semoni*	**3** *J=3*	–	–	–	–	–	–	**7** *I=1, J=6*	**10**
Crustaceans									
Freshwater shrimp *Atyidae* sp.	–	–	**11** *A=11*	–	–	–	–	–	**11**
Common yabby *Cherax destructor*	**3** *A=3*	**1** *A=1*	**1** *A=1*	**70** *A=5, I=15, J=50*	**66** *A=4, I=12, J=50*	**3** *A=3*	–	**2** *A=2*	**146**
Freshwater prawn *Macrobrachium* sp.	**16** *A=16*	–	**23** *A=23*	–	–	–	**208** *I=100, J=108*	–	**208**
Total fauna richness	**7**	**2**	**8**	**6**	**3**	**3**	**2**	**7**	**12**
Total fauna abundance	**129**	**2**	**71**	**165**	**70**	**136**	**217**	**104**	**894**

Note: A = adult, I = intermediate, J = juvenile. **Bold** = total.

*Restricted noxious species under Biosecurity Act.

Table 4.10 Freshwater macrocrustaceans, turtle and fish species confirmed present in the study area (October 2025)

Species	Aquatic site #									Total
	12	15	21	24	38	40	72	81	84	
Fish										
Eastern gambusia* *Gambusia holbrooki*	–	53 *A=17, I=35, J=1*	–	–	–	–	–	–	–	**53**
Western carp gudgeon *Hypseleotris klunzingeri*	–	–	–	–	–	–	–	11 *A=7, I=3, J=1*	–	**11**
Golden perch *Macquaria ambigua*	–	–	–	–	–	–	–	**5** *J=5*	–	**5**
Spangled perch *Leiopotherapon unicolor*	**16** *I=15, J=1*	–	–	–	**9** *I=8, J=1*	**25** *A=12, I=13*	–	–	–	**50**
Rainbowfish sp. *Melanotaenia sp.*	–	**5** *A=2, I=3*	–	–	–	**2** *A=2*	**1** *A=1*	–	–	**8**
Bony bream *Nematalosa erebi*	1 *I=1*	**2** *A=2*	–	–	–	–	1 *I=1*	–	–	**4**
Australian smelt *Retropinna semoni*	–	–	–	–	–	–	–	**12** *A=1, I=6, J=5*	–	**12**
Crustaceans										
Common yabby *Cherax destructor*	**6** *A=6*	**10** *A=10*	**3** *A=3*	–	–	**4** *A=2, I=2*	**1** *A=1*	–	–	**24**
Freshwater prawn *Macrobrachium* sp.	–	**69** *A=69*	–	–	–	–	***221*** *A=221*	**59** *A=59*	–	**349**
Freshwater turtles										
Krefft's turtle *Emydura krefftii*	–	–	–	–	–	–	–	**10** *A=1, I=5, J=4*	**1** *A=1*	**11**
Amphibians										
Unknown native tadpole	–	–	–	**50**	–	–	–	–	–	**50**
Total fauna richness	**3**	**5**	**1**	**1**	**1**	**3**	**4**	**5**	**1**	**11**
Total fauna abundance	**23**	**139**	**3**	50	**9**	**31**	**224**	**97**	**1**	**577**

Note: A = adult, I = intermediate, J = juvenile. **Bold** = total.

*Restricted noxious species under Biosecurity Act.

Freshwater turtles

Turtle capture methods were deployed at four sites across the survey area (see section 3.2.2) during the post-wet field survey (July 2025); however, no freshwater turtles were captured or incidentally observed.

During the pre-wet survey (October 2025), 11 Krefft's turtles (*Emydura krefftii*) were captured during surveys at the Noccundra and Nockatunga waterholes (Table 4.10). Whilst only one adult individual was recorded at Noccundra Waterhole, at the Nockatunga waterhole, there was a spread of juvenile and adult Krefft's turtle found, indicating this is a breeding area for this species. Freshwater turtles were not observed at any of the sites along the proposed alignment. Given the ephemeral nature of the waterways along the alignment, it is unlikely that turtles are using these areas often for passage and are likely staying within the permanent waterholes.

Other fauna

During the July 2025 survey, three crustacean species were recorded: the common yabby (*Cherax destructor),* freshwater shrimp (*Atyidae* sp.) and freshwater prawn (*Macrobrachium* sp.). Of these species, *Macrobrachium* was most abundant comprising 247 individuals. There were also 10 native frog tadpoles recorded at Aquatic site 17 but could not be identified to species (Table 4.9).

In October 2025, two crustacean species, and one tadpole of an unknown native frog species were recorded during the survey. The common yabby and freshwater prawn were recorded, with 349 individual freshwater prawns recorded across three sites (i.e. Aquatic sites 15, 72 and 81). There were 50 tadpoles recorded at Aquatic site 24 during this survey at various stages of development.

4.10.2 Conservation significant species

No conservation significant species have been previously recorded within the project site. The desktop assessment identified two species relevant to the study area, the Edgbaston goby (*Chlamydogobius squamigenus*) and Murray cod (*Maccullochella peelii*) (Table 4.11). Likelihood of occurrence assessments for these species are provided in Appendix D.

Table 4.11 Aquatic conservation significant fauna identified during the desktop assessment

Common name (*Scientific name*)	NC Act status	EPBC Act status	Source	ALA/Wildnet records	Recorded during surveys
Edgbaston goby (*Chlamydogobius squamigenus*)	CE	V	WetlandInfo	Closest record located 540 km north of the project site.	No
Murray cod (*Maccullochella peelii*)	V	NL	WetlandInfo	Closest record located 245 km east of the project site.	No

Note: CE = critically endangered, V = vulnerable, NL = not listed.

Edgbaston goby

The Edgbaston goby is a highly range-restricted desert fish endemic to a small number of Great Artesian Basin spring wetlands in central Queensland (Pusey et al., 2004). It typically occupies very small, shallow spring pools and bore drains with fine substrates and emergent or edge vegetation, and is known to tolerate extreme short-term temperature variations typical of spring-fed arid environments. This species is threatened by the invasive eastern gambusia, which also colonises bore drains and outcompetes the Edgbaston goby (Kerezsy, 2020).

Murray cod

The Murray cod is a large-bodied native predator with a natural distribution across the Murray–Darling Basin in south-eastern Australia. It most commonly occurs in larger rivers and streams, favouring deep pools and runs with substantial instream cover such as woody debris (snags), undercut banks, and boulders, which provide shelter and feeding habitat (Pusey et al., 2004). The species is not naturally distributed within the Lake Eyre or Bulloo Basin, except where they may have been artificially translocated or stocked in isolated waterbodies (Kerezsy, 2010).

4.10.3 Fisheries Act values

Under the Fisheries Act, values include FHA and fish communities (e.g. fish spawn/eggs and invertebrate species are considered to fall under the definition of fish). As such, fisheries values also include prawns, crayfish, crabs, other crustaceans, molluscs, sponges and annelid worms.

Within the study area, there are no mapped FHA. During field surveys, fish and invertebrates were observed, of which the following taxa were confirmed present:

- Eight native freshwater fishes – *Ambassidae, Clupeidae, Eleotridae, Melanotaeniidae, Percichthyidae, Plotosidae, Retropinnidae, and Terapontidae,* (refer to section 4.10.1, 'Fish')
- Two families of prawns/shrimp – *Palaemonidae* and *Atyidae*
- One family of crayfish – *Parastacidae* (species: *Cherax destructor*).
- Four other crustacean taxa were recorded in the macroinvertebrate samples:
  - Crustacea – *Cladocera*, *Ostracoda*, *Copepoda, Conchostraca* sp.
- Seven mollusc taxa from two classes:
  - Gastropoda – *Ancylidae, Gastropoda sp., Physidae, Planorbidae, Viviparidae*
  - Bivalvia – *Pelecypoda* (Imm), *Sphaeriidae*
- One sub-class of annelid worms – *Oligochaeta*.

No sponges (*Porifera*) or freshwater crabs (*Parathelphusidae*) were confirmed during the field surveys; however, these macroinvertebrates are potentially present within the study area, where water is present. For example, freshwater crabs (*Parathelphusidae*) were not recorded alive, but several desiccated carapaces were observed at Cooper Creek–Wilson River Junction (Aquatic site 73) and assumed to be present when conditions are suitable.

Within the project site, most Fisheries Act values will require reliable aquatic habitat, as species such as fish, molluscs, sponges, and shrimps require permanent water for feeding, shelter, and breeding. While these species may temporarily occur along ephemeral waterways during flow events, these waterways cannot sustain them over time. Consequently, these Fisheries Act values are expected to be confined primarily to permanent pool refugia, occurring outside of the project site.

Some values may persist in dry period, for example freshwater crayfish species can survive by burrowing into the streambed, creating chambers in moist, fine-grained sediments such as clay or silty loam that retain subsurface moisture (Kouba et al., 2016). These burrows can sometimes extend deep enough to access residual groundwater, allowing crayfish to remain dormant for several months until surface water returns. Therefore, this Fisheries Act value has the potential to be present within semi-permanent pool or wetland habitats throughout the study area.

Fisheries Act values of spat, spawn, and eggs as early life stages of the existing fish community will occur within the study area where suitable habitats for breeding and spawning exist. The occurrence of these values will similarly be restricted to permanent water sources, which do not occur within the project site. During major flow events, spat, spawn and eggs will be expected to occur, such as in intermittent pool habitats along larger ephemeral waterways (e.g. the Wilson River), and potentially within the project site. However, this will not provide reliable recruitment for fish species when such habitats become frequently disconnected, and/or dry out entirely.

4.10.4 Invasive species

Bulloo and Cooper Creek basins have a relatively low diversity of introduced and noxious fish species, with one known noxic fish species occurring within the study area, eastern gambusia (*Gambusia holbrooki*) (Kerezsy, 2009), of which 108 specimens were captured during field surveys.

No goldfish (*Carassius auratus*) were recorded during field surveys; however, they are considered likely to occur given their previous records in the region (ALA, 2025), high adaptability to a variety of environmental conditions and wide distribution throughout eastern Australia (Pusey et al., 2004).

Both the eastern gambusia and goldfish are category 3, 5, 6 and 7 restricted noxious species under the Biosecurity Act and therefore must not be kept, fed, given away, sold or released into the environment.

4.11 Condition

4.11.1 Agricultural activities

Cattle grazing was the primary land use observed for properties along the alignment, with widespread cattle grazing impacts evident across all sites. Cattle grazing practices degrade aquatic habitats through:

– physical disturbance to bed and banks of waterways from cattle movement (loss of bank stability and increased erosion)
– alteration or loss of riparian vegetation from cattle grazing (loss of shading, fish habitat, reduced bank stability)
– increased sedimentation and turbidity (reduced light penetration, clogging of fish gills and filter feeder invertebrates, reduced suitable spawning substrate for aquatic species)
– nutrient enrichment through increased nitrogen and phosphorus loads (eutrophication, lower dissolved oxygen levels).

4.11.2 Biosecurity matters

Biosecurity species, including invasive plants and animals, pose a potential threat to ecological integrity. During the survey, the invasive eastern gambusia was recorded at a single site. While goldfish were not observed in the field, desktop investigations indicate historical records of the species within the area. Neither the eastern gambusia nor goldfish are listed as prohibited matter under the Bulloo Shire Council Biosecurity Plan 2022 (Bulloo Shire Council, 2022).

Invasive species such as these are known to outcompete native species for resources, leading to declines in native biodiversity. These species can alter habitat structure, water quality, and food web dynamics, further exacerbating the stress on native species.

4.12 MNES Likelihood of occurrence assessment

Based on desktop searches, field surveys and previous records, Bulloo Lake, a Nationally Significant Wetland was identified to occur within the study area. Cooper Creek–Wilson River Junction also listed as a Nationally Significant Wetland is located approximately 49 km west of the project site. Both of these wetlands are hydrologically connected to the Caryapundy Swamp Ramsar wetland and MNES, which is located in NSW. Although the project is not anticipated to have a direct impact on this Ramsar wetland, there is potential for indirect impacts via changes to hydrology, sediment transport, or water quality.

The project is not considered to impact Cooper Creek–Wilson River junction due to the relatively localised impacts expected for the project; therefore, no further assessment was undertaken for the wetland. An assessment of the significance of the potential impacts of the project associated with the hydrological connectivity between Bulloo Lake and the Caryapundy Swamp Ramsar wetland is provided in section 9.2.1.

A likelihood of assessment for MNES listed species is provided in Appendix D. Listed threatened fish species were considered unlikely to occur due to the lack of suitable habitat and no records of these species in the project area. No other relevant MNES values were identified for the project.

4.13 MSES Likelihood of occurrence assessment

Within the project site there are 77 mapped waterways providing for fish passage, comprising 2 major risk, 19 high risk, 25 moderate risk and 31 low risk waterway barrier works ratings (refer to section 4.3.2 and Figure 4.6).

Refer to Appendix D for the full likelihood of occurrence assessment.

4.14 MLES Likelihood of occurrence assessment

No aquatic MLES are predicted to occur within the project site or broader desktop search extent. Accordingly, a likelihood of occurrence assessment was not required for MLES.

5. Construction impacts

Loss of aquatic habitat

Construction of the Project will require the crossing of 77 waterways mapped as potential fish passage habitat, as well as watercourses mapped under the Water Act. These works have the potential to result in short-term disturbance to watercourses through temporary bed and bank disturbance, vegetation removal, and limited interference with water during construction.

The Project is located within channel-country landscapes dominated by ephemeral creek systems, which are typically dry for extended periods and experience flow only in response to large, episodic rainfall events. In these systems, channel morphology, substrate distribution, and in-stream habitat are naturally subject to frequent reworking during flood events, resulting in a dynamic and disturbance-driven aquatic environment.

To minimise potential impacts to aquatic habitat where permanent effects could otherwise occur, HDD is being implemented at the Wilson River crossing. This approach enables the pipeline to be installed beneath the watercourse without direct disturbance to the bed or banks, thereby avoiding direct impacts on aquatic habitat and maintaining channel integrity. HDD requires the drill rig to be located away from the watercourse banks, with the pipeline tunnelled beneath the channel.

While HDD does not disturb the wetted channel, minor vegetation clearing may be required at drill entry and exit points. These impacts are addressed separately within the project's terrestrial ecology assessment.

At all other waterway crossings, pipeline installation will be undertaken using open-cut trenching, consistent with standard pipeline construction practice in ephemeral environments. Depending on ground conditions, a trench approximately 1.5 m wide will be excavated using appropriate mechanical equipment. Excavated materials will be segregated such that topsoil and subsoil are stripped, stockpiled separately along the CRoW outside of the riparian zone, and reinstated post-construction.

Excluding the Wilson River, aquatic habitat disturbance will be restricted to ephemeral, typically dry waterways. Construction will result in a temporary loss of in-channel habitat within the footprint of the trench and CRoW. Additional disturbance may occur at access crossings, including localised removal of riparian vegetation and short-term in-stream disturbance.

Following construction, creek beds and banks will be reinstated to pre-construction contours using the previously excavated material, and in-stream habitat features such as large woody debris will be replaced where present prior to disturbance. Rehabilitation will be undertaken in accordance with industry best practice to support channel stability and recovery.

Many waterways within the Project area are already subject to modification from cattle grazing and historical riparian clearing, and field observations indicate limited habitat complexity at the majority of crossings. Given the ephemeral nature of these creeks, the absence of surface water at the time of construction, and the dominance of large flood events in shaping channel form, the temporary disturbances associated with pipeline installation are not expected to result in long-term reduction in aquatic habitat extent, function, or connectivity.

Overall, the loss of aquatic habitat from construction activities of the project includes:

– 20.18 ha for the CRoW located on 77 waterways including:
  - 0.17 ha at the 2 purple (major risk) waterways
  - 7.18 ha at the 19 red (high-risk) waterways
  - 5.30 ha 25 amber (moderate risk) waterways
  - 7.53 ha at the 31 green (low-risk) waterways.

However, as identified in the post-wet survey most waterways do not hold water for long periods of time and channels are likely to be dry throughout most of the year. The impact to the purple (major risk) waterways is greatly reduced due to the proposed HDD method of construction at those crossings.

Overall, considering the availability of habitat types and intended construction approach, the extent of aquatic habitat loss during construction is assessed as low.

Degradation of aquatic habitat

Construction of the Project has the potential to result in temporary degradation of aquatic habitat and water quality, primarily through indirect mechanisms associated with construction activities. Potential impact pathways include:

– dust generation and mobilisation of sediments, leading to bank erosion and sedimentation
– storage, handling and accidental spillage of hazardous materials (e.g. fuels and lubricants)
– accidental entry of construction-related waste into waterways.

Wilson River and downstream refugia

Degradation of aquatic habitat along the Wilson River will be avoided through the use of HDD. Aquatic field surveys identified the Wilson River crossing and associated downstream habitats, including Noccundra Waterhole and the Cooper Creek–Wilson River junction, as being in fair condition, supporting permanent and semi-permanent aquatic refugia and exhibiting comparatively lower levels of disturbance from cattle grazing and riparian clearing than other drainage features within the Project area.

The use of HDD is expected to substantially reduce the risk of aquatic habitat degradation at this location by avoiding direct disturbance to the channel bed and banks. Drill entry and exit points will be located outside the riparian zone, and as a result, this construction method is not expected to generate an increase in sedimentation or adversely affect downstream aquatic habitats.

Ephemeral waterways

At all other crossings, pipeline installation will be undertaken using open-cut trenching methods, resulting in direct disturbance to waterways during construction. Excluding the Wilson River and associated downstream habitats, the Project will intersect approximately 77 ephemeral waterways, which are typically dry and are located within channel-country environments. These waterways were generally assessed as being in poor to fair condition, having been historically impacted by agricultural practices, grazing pressure and extensive riparian clearing.

Construction activities within ephemeral waterways will result in a temporary loss and degradation of aquatic habitat, albeit dry, within the construction footprint. Earthworks within the bed and banks, combined with localised removal of riparian vegetation, have the potential to reduce bank stability, increase sediment mobilisation and temporarily alter in-channel habitat structure.

Riparian vegetation within these waterways is generally sparse and discontinuous, providing limited shading and structural complexity. As such, vegetation removal will be localised and limited in extent and is not expected to result in a measurable reduction in aquatic ecological value. While vegetation removal may reduce bank stability, existing bank stability across much of the Project area is already low to moderate, and construction activities are unlikely to exacerbate baseline conditions beyond the short term.

Sedimentation, water quality and downstream receptors

Earthworks and vegetation removal during construction have the potential to increase erosion and sedimentation within the immediate construction footprint. If heavy rainfall occurs during construction, mobilised sediments may be transported downstream, with the potential to affect water quality and aquatic habitat condition. Potential effects include altered water chemistry (e.g. increased turbidity, reduced light penetration and decreased dissolved oxygen), changes to channel morphology (e.g. pool infilling or localised scouring), alteration of substrate composition and smothering of habitat resources such as food sources and structural habitat.

Unmitigated, these impacts may result in localised and temporary effects on aquatic fauna, including reduced habitat availability (e.g. refugia, microhabitats and food resources), short-term reductions in abundance and, in some cases, reduced breeding success within affected reaches.

Given the ephemeral nature of the majority of waterways in the Project area, and the dominance of large episodic flow events in shaping channel form and habitat condition, construction-related impacts are expected to be minor relative to natural disturbance processes and are unlikely to result in long-term degradation of downstream aquatic ecosystems, including Bulloo Lake and Caryapundy Swamp.

Contamination and waste risks

The use of construction machinery introduces a potential risk of downstream environmental degradation through accidental release of contaminants, such as fuels and lubricants, or disturbance of contaminated soils. Hydrocarbon spills could occur during refuelling or from unplanned leaks at machinery or storage areas. Large-scale or uncontained spills have the potential to cause acute toxicity to aquatic communities, resulting in mortality, adverse health effects and reduced reproductive success for fish and macroinvertebrate taxa.

In addition, there is a risk of construction-related waste entering waterways, including plastic packaging, drink containers and other debris. Such materials can degrade habitat quality and pose risks to aquatic fauna through ingestion, entanglement or physical obstruction.

Fauna injury and mortality

Risk of fauna injury or mortality can occur when construction works are within or adjacent to waterways that contain aquatic fauna at the time of works. Aquatic fauna may be injured or killed due to excavation, dewatering and establishment of coffer dams during trenching leading to impaling of fauna.

Waterways intersecting with the project site exist as ephemeral waterways and the risk of injury or mortality on aquatic fauna is anticipated to be negligible, as these waterways will likely be dry during construction. The use of HDD drilling to install the pipeline below the Wilson River will avoid the potential for direct impacts to aquatic fauna.

Disturbance of aquatic fauna from increased light, noise and vibration

The project has the capacity to cause indirect impacts to aquatic fauna behaviour due to a temporary increase in the exposure to light, noise and vibration from construction machinery and construction vehicles. Increased light, noise and vibration can alter individual species' behaviours and disrupt the balance of inter-species interactions. Light impacts, for example, may include altering navigational behaviours of fish or their food source (i.e. macroinvertebrates), increase in predation from terrestrial fauna and other potential physiological responses (Holker et al., 2023). Such disruptions typically favour feral predators and generalist species that owe their success to broad ecological tolerances and possess the ability to actively exploit disturbed environments (Ryikiel, 1985; May & Norton, 1996).

The study area has historically been exposed intensive cattle grazing and associated riparian clearing, but fewer industrial development activities. As such, the project site is likely to have already been historically exposed to moderate levels of artificial noise and vibration, and artificial light to a lesser extent. Reducing night works and limiting site lighting to the minimum needed for safety will minimise light disturbance and disruption of nocturnal behaviours. Potential impacts will be restricted to the temporary construction period. Additionally, no high-risk noise/vibration activities (i.e. pile driving) will occur during construction of the project. The use of HDD may result in an increase in noise and vibration within the immediate area but given the works are underground, sediment above will absorb the noise and vibration.

Alteration of flow and fauna movement

The Cooper Creek and Bulloo basins are endorheic systems (i.e. have no connectivity to the sea). Aquatic species within these basins are therefore confined to closed freshwater networks, where habitat availability fluctuates expanding during flood events and contracting to isolated refugial pools throughout the dry season. As a result, there is limited opportunity for broad-scale dispersal or migration of aquatic fauna. The species confirmed present, or with the potential to occur, are primarily potamodromous, completing their entire life cycles and movement within freshwater environments.

Within the project site, watercourses are ephemeral, carrying flow only during intense or prolonged monsoonal rainfall (refer to section 4.6). For much of the year, they remain dry or reduced to scattered pools, providing temporary refuge for aquatic fauna. Given this ephemeral nature, fauna movement and hydrological connectivity are already highly constrained. However, construction activities still have the potential to impact flow and fauna movement locally.

If unexpected rainfall occurs during construction, temporary trenches may briefly impede the movement of aquatic species utilising these channels for breeding or refuge connectivity. However, as construction will occur primarily during no-flow conditions, the likelihood of such impacts is minimal, and flow diversions are unlikely to be required.

To minimise any potential disturbance, the design incorporates measures to avoid impacts on flow and fauna movement. HDD be used beneath the Wilson River, avoiding direct disturbance to the bed and banks of this waterway. At the remaining ephemeral crossings, the pipeline will be installed via open-cut trenching. It is noted that the dry season is prolonged in Channel Country and takes place across April to September (approximately).

The project alignment crosses waterways providing for fish passage designated under the Queensland waterways providing for fish passage spatial layer (Queensland Government, 2025). The risk ratings assist with the determination of DPI's (formerly DAF's) *Accepted Development Requirements for operational work that is constructing or raising waterway barrier works* (DAF, 2018). Overall, the project is expected to comply with DPI's ADR. Through the combined use of HDD at one crossing with aquatic ecology values and seasonal scheduling of open-cut works, no residual impacts to flow or aquatic fauna movement are anticipated, and the dispersal requirements of native species will be maintained.

Introduction and spread of invasive species

The construction footprint hosts a number of common weeds at varying densities, but no aquatic weed species or biosecurity species were recorded in the field survey. Terrestrial invasive species are not discussed in this report.

The spread of aquatic weeds may occur where vehicles/machinery are washed down incorrectly or not at all and driven between locations along the pipeline, which allows seeds to enter nearby waterways. Aquatic weeds may also come from other sites, if vehicles and machinery are not cleared properly prior to coming to site.

Pest fish may be spread by disturbance and degradation of waterways allowing the pest fish to outcompete native fish and cause localised displacement of native fish. Pest fish may be spread during construction through a variety of vectors including (Scanlon et al., 2011):

– translocation of fish or eggs when water is collected and used in other areas
– flooding events where connectivity is provided through channels created by construction access tracks.

Aquatic weeds and pest fish reduce the habitat quality for all native aquatic species. Pest fish also have the potential to outcompete native fish species for resources and habitats.

Under the Biosecurity Act, restricted invasive species must not be released into the environment (without a permit). During construction, this requirement will be relevant to moving restricted invasive plants and animals into areas that currently do not contain restricted invasive species. Immediate revegetation of disturbed areas with native species is anticipated to reduce the likelihood of invasive species becoming established by reducing the availability of bare ground.

6. Operation impacts

Following construction, the pipeline will be inert and fully contained below the ground, with surrounding soils and waterways restored to pre-construction contours and vegetation cover. Potential impacts to aquatic ecology values from operation of the project are expected to be minimal.

Similarly to construction, the spread of aquatic weeds may occur during routine maintenance and inspections where vehicle washdown procedures are not implemented prior to entering site, allowing seeds to enter nearby waterways.

Operational access tracks will allow for the maintenance of the pipeline; however, maintenance activities may degrade water quality through impacts from vehicular movement generating dust, sedimentation and erosion, possible spills of oils and fuels, and particles generated by exhaust (Nguyen et al., 2019; Müller et al., 2020). The project alignment has been selected to run adjacent to existing roads as far as practical and therefore limited new access tracks and waterway crossings will be required for ongoing maintenance. Maintenance is expected to be infrequent. The alignment will therefore minimise potential risks from access tracks such as erosion, sedimentation and spills.

There is an extremely low likelihood that the pipes may burst or develop a slow leak from age or geological processes surrounding the pipeline causing a release of natural gas into the aquatic ecosystem. The escaping gas composed primarily of methane will move into the surrounding soil and migrate upward through the ground, dispersing rapidly into the atmosphere. Because methane is lighter than air and non-toxic, it typically does not accumulate in soil or water; however, it can pose a fire or explosion hazard if an ignition source is present near the leak site. Localised effects such as ground disturbance, vegetation dieback, or minor subsidence may occur, but significant impacts to aquatic environments are unlikely.

7. Cumulative impacts

7.1 Approach

Cumulative impacts can be defined as the successive, incremental, and combined effect of multiple impacts, which may in themselves be minor, but could become significant when considered together.

Key projects relevant to the potential for aquatic ecology impacts are considered in the following sections. These projects have been selected as the key major projects that may result in cumulative aquatic impacts with the project, and where sufficient information is available to undertake an assessment.

Cumulative impacts could occur as a result of an interface during construction, if construction activities are undertaken in the same physical location or at the same time. As the assessment determined there would be a low risk of operational impacts from the project, cumulative (operational) impacts are not considered likely.

7.1.1 Project identification

To identify relevant projects for the cumulative impact assessment, a desktop review was undertaken using the following sources, to identify relevant projects located within the Bulloo Shire local government area and/or a 20 km radius of the project site:

– Office of the Coordinator-General projects website, to identify state-significant projects (coordinated projects and large resource projects)
– EPBC Act Public Notices List.

7.2 Potential cumulative impacts

No relevant major future projects in the vicinity of the project site have been identified from publicly available information including the Queensland Department of Housing and Public Works website, the Office of the Coordinator General Coordinated Projects website, DETSI's public information portal with current EA applications or EPBC Act Public Notices List that would be considered to be developed concurrently with the project.

8. Decommissioning impacts

A central requirement of the decommissioning of gas pipelines is preparation of a comprehensive plan (referred to as an abandonment plan), which must be underpinned by a robust safety management study. The abandonment plan outlines the technical and procedural steps necessary to assure that all potential risks associated with a retired pipeline are effectively identified, assessed and managed.

The plan must also consider the future land use of the pipeline corridor, ensuring that the decommissioned pipeline does not pose a hazard to people, property or the environment. The decommissioning approach should be tailored to the specific conditions of the pipeline, and the surrounding waterway uses established in this report. There is a risk of gas leakage and contamination of the existing waterways along the pipeline after the project lifecycle, which will impact aquatic values.

At this time, during decommissioning most of the pipeline is expected to remain in situ, significantly limiting disturbance. Any impacts associated with removal of surface infrastructure are expected to be localised, temporary and readily managed through standard controls as per construction phase activities.

9. Recommended mitigation and management measures

This section outlines the recommended mitigation measures for the project focusing on avoidance, minimisation and management of potential impacts of the project on aquatic ecology. Mitigation measures aimed to reduce potential impacts include the development and implementation of project-specific environmental management plans (including a Construction Environmental Management Plan (CEMP), Operation Environmental Management Plan (OEMP), ESCP and Decommissioning Environmental Management Plan, to avoid and minimise impacts to aquatic ecology.

9.1.1 Avoidance

Substantial avoidance of aquatic ecology values was achieved through the preliminary site selection process. Specifically, the alignment of the project was chosen to minimise river crossings for the pipeline alignment and utilise existing infrastructure for access tracks and CRoW. Additional changes were made to the alignment to avoid aquatic fauna refuge pools identified during the post-wet field surveys.

The spatial requirements of the project limit the amount of avoidance that can be achieved. However, efforts have been made to identify and avoid landscape features that hold increased ecological value for local flora and fauna. Specifically, alignment refinement was undertaken to avoid impacts to mature riparian zones and permanent waterholes. Outside these areas, the project site has been located along areas of cleared vegetation, where possible, or where there are existing vehicle access tracks.

The use of HDD under the Wilson River is a key design/construction approach selected to avoid direct impacts on this major risk waterway and associated waterhole refugia distributed along this waterway. This also avoids the risks of habitat and water quality degradation to areas of high value downstream of Wilson River, such as the Cooper Creek–Wilson River Junction.

9.1.2 Construction

Table 9.1 below summarises the potential impacts, mitigation and management measures associated with the construction phase of the project, to guide CEMP requirements and environmental compliance in accordance with APGA *Code of Environmental Practice – Onshore Pipelines* (APGA, 2022) and the outcomes required to meet the standard conditions for petroleum pipeline activities (DETSI, 2025).

Table 9.1 Pre-construction and construction mitigation and management measures

Potential impact	Mitigation and management measures	Timing
Loss of aquatic habitat	– Confirm that the following waterway crossing methods are adopted: • special crossing methods for higher risk waterways • HDD for Wilson River. – Develop a reinstatement plan for high-risk (red) waterways, prioritising engineered bed and bank stabilisation measures to ensure long-term channel stability post-installation. – All waterway crossing structures are to consider the suite of fish present in the waterway and the fish species' passage requirements.	Design, Pre-construction, Construction
Degradation of aquatic habitat	– Undertake rehabilitation of creeks as soon as reasonably practicable after completion of the crossing including the reinstatement of large woody debris. – Progressively compact or stabilise ground surfaces as required during construction works. – Implement erosion and sediment control measures in accordance with the project ESCP. – Implement specific management procedures for soils rated as having 'moderate' or worse erosion potential during construction of the pipeline, and confirm that they are not left exposed for any significant period of time without stabilisation.	Design, Pre-construction, Construction

Potential impact	Mitigation and management measures	Timing
	– Visually monitor aquatic habitats immediately upstream and downstream of the construction footprints for signs of degradation during construction. – Implement measures for managing fuel and chemical handling, storage, distribution and spill response during construction. – Chemicals or fuels shall be stored ≥50 m away from watercourses, where practicable. Storage and handling of dangerous and hazardous materials (e.g. fuel, oil and other chemicals) will be undertaken in accordance with AS 1940:2017 The storage and handling of flammable and combustible liquids.	
Fauna injury and mortality	– In the event that water is present, or rain events occur during construction at waterway crossings/wetlands, develop a dewatering management plan to identify appropriate management strategies for aquatic fauna to minimise injury and death during construction. – Notify fauna spotter-catchers or suitably qualified environmental representatives if fauna injury occurs. A fauna spotter must have formal training or demonstrated skills, such as being a qualified ecologist, zoologist, or holding a rehabilitation permit.	Pre-construction, Construction
Alteration of flow and fauna movement	– Prioritise that the design and construction of the pipeline is compliant with the waterway barrier works acceptable development requirements for green and amber waterways, to avoid adverse impacts on flow and aquatic fauna movement.	Design, Pre-construction, Construction
Introduction and/or spread of invasive species	– Undertake a pre-clearing weed and pest surveys to document areas of existing weed and pest infestations for treatment and management. – Prepare a biosecurity management plan that incorporates descriptions and mapping of major weed infestations identified during a pre-clearing survey and appropriate management actions to be undertaken. – Implement machinery and vehicle washdown procedures in accordance with the project CEMP. – Record all sightings or evidence of pest animals during construction. If increased densities of pest animals are observed, or new pest animals are identified, humane pest controls will be implemented to manage numbers.	Pre-construction, Construction

9.1.3 Operation

APGA *Code of Environmental Practice – Onshore Pipelines* (APGA, 2022) and the outcomes required to meet the standard conditions for petroleum pipeline activities (DETSI, 2025).

Table 9.2 below summarises the potential impacts, mitigation and management measures associated with the operation phase of the project, to guide CEMP requirements and environmental compliance in accordance with APGA *Code of Environmental Practice – Onshore Pipelines* (APGA, 2022) and the outcomes required to meet the standard conditions for petroleum pipeline activities (DETSI, 2025).

Table 9.2 Operational mitigation and management measures

Potential impact	Mitigation and management measures	Timing
Introduction and/or spread of invasive species	– Undertake a pre-clearing weed and pest surveys to document areas of existing weed and pest infestations for treatment and management. – Prepare a biosecurity management plan that incorporates descriptions and mapping of major weed infestations identified during a pre-clearing survey and appropriate management actions to be undertaken. – Implement fuel and chemical handling, storage and distribution procedures in accordance with the project OEMP.	Operation
Degradation of water quality	– Undertake regular construction site housekeeping to prevent litter entering waterways when on-site undertaking maintenance. – Maintenance access will occur via existing roads or designated access tracks. – Monitoring aquatic habitats immediately upstream and downstream of the construction footprints will be undertaken for signs of degradation during the operation phase during any maintenance activities.	Operation

9.1.4 Decommissioning

Table 9.3 below summarises the potential impacts, mitigation and management measures associated with the decommissioning phase of the project, to guide CEMP requirements and environmental compliance in accordance with the APGA *Code of Environmental Practice – Onshore Pipelines* (APGA, 2022) and the outcomes required to meet the standard conditions for petroleum pipeline activities (DETSI, 2025).

Table 9.3 Decommissioning mitigation and management measures

Potential impact	Mitigation and management measures	Timing
Degradation of aquatic habitat and/or water quality	– Prepare and implement an abandonment plan for the decommissioning of the pipeline, in accordance with *AS 2885*. – Implement erosion and sediment control measures during decommissioning works in accordance with the project ESCP, to prevent sediment-laden runoff entering surface waters and wetlands.	Decommissioning

9.2 Significant impact assessment

For each MNES and MSES that was confirmed present or with potential to occur in the study area, a significant impact assessment was undertaken using the relevant legislative guidelines. In all significant impact assessments, consideration was given to the intensity, duration, cumulative impact, irreversibility and the risk of environmental harm. The assessment is based on residual risk, after all identified mitigation measures have been applied.

9.2.1 Matters of national environmental significance

An assessment has been undertaken against the EPBC Act *Significant impact guidelines 1.1* (DoE, 2013) for MNES values that were confirmed present, likely to occur or considered to have the potential to occur within the study area.

Ramsar Wetlands

There are no Ramsar wetlands (which are listed as MNES) located within the study area; however, Bulloo Lake (a nationally important wetland, though not an MNES), is located approximately 2.5 km east of the project site. Bulloo Lake is located upstream of, and is hydrologically connected to, the Caryapundy Swamp Ramsar wetland located in NSW. Although the project is not anticipated to have a direct impact on this Ramsar listed wetland, there is potential for indirect impacts via changes to hydrology, sediment transport, or water quality.

The significance of the potential indirect impacts of the project, associated with the hydrological connectivity between Bulloo Lake and the Caryapundy Swamp Ramsar wetland, has been assessed against the EPBC Act *Significant impact guidelines 1.1* (DoE, 2013), as presented in Table 9.4. The project has been assessed as **unlikely** to have a significant impact on Ramsar wetlands.

Table 9.4 Significant impact assessment – Ramsar wetlands

Impact criteria	Assessment
An action is likely to have a significant impact on the ecological character of a declared Ramsar wetland if there is a real chance or possibility that it will result in:	
Areas of the wetland being destroyed or substantially modified	**Unlikely** The pipeline alignment is outside the boundary of Caryapundy Swamp and will not result in direct loss of the wetland's aquatic habitat. The alignment is also located outside the boundary of Bulloo Lake, which is hydrologically connected to Caryapundy Swamp, and will not result in a direct loss of this connected wetland habitat. Construction methods proposed within the pipeline alignment will avoid wetland excavation (i.e. no removal of wetland substrate or wetland-dependant vegetation). Additionally, no permanent structures will be placed within the wetland, preventing any long-term alteration of flow patterns, water quality, or sedimentation processes.

Impact criteria	Assessment
	Works will occur upstream of the wetland, with disturbance to minor waterways and drainage channels that flow downstream to the wetland area. However, these channels are ephemeral, and water only flows after periods of heavy rainfall. The proposed pipeline alignment is located more than 2 km upstream from the Bulloo Lake wetland at its closest point, and works in these waterways will not impact on wetland fringes at the confluences. Therefore, no downstream indirect impacts of the project are anticipated to substantially modify the Caryapundy Swamp.
A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland	**Unlikely** The project is unlikely to result in changes to the hydrological regime of Bulloo Lake, or Caryapundy Swamp further downstream. The pipeline will primarily be installed using open-cut trenching when water is not flowing. As noted, the waterways are also ephemeral creeks, and water only present unless after heavy rainfall. Construction will only occur in dry periods and will avoid impacts on flows and fish movement, with minimal erosion risk. There are no works proposed directly within or adjacent to the Bulloo Lake wetland that will alter the hydrological regime downstream in Caryapundy Swamp. Additionally, the design and construction of the project will comply with all relevant ADR for waterway barrier works, with all nearby waterway bed and banks to be reinstated at crossings post-installation. In the event that flows occur, there will be a provision for flows to continue through the site to allow natural movement downstream. As such, the natural variability and seasonal flow that underpins the ecological processes within Bulloo Lake are expected to remain unaffected, and consequently have no downstream impact on the Caryapundy Swamp.
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected	**Unlikely** The proposed works are unlikely to have a significant impact on native invertebrate fauna or fish species dependent on the Caryapundy Swamp. As the waterways within the project area are ephemeral, movement upstream from the wetland into the creeks is limited to periods of high flows. There is no permanent connectivity from the Bulloo Lake wetland to any upstream area due to the lack of permanent flows (i.e. springs). The project will not alter wetland hydrology, water quality, connectivity, or the timing or extent of inundation. The ecological functions that support the lifecycle requirements of wetland dependent native fish and invertebrate fauna species will be maintained, and critical habitat features such as permanent refuge pools will remain present, apart from natural evaporation that reduces water availability naturally over time. All fish and invertebrate species recorded or known to occur in the region are adapted to these ephemeral conditions, and often have strategies to cope with the harsh conditions.
A substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health	**Unlikely** All construction activities will be located outside the wetland boundary, preventing direct disturbance of wetland soils or vegetation that could release nutrients or increase turbidity within the system. Erosion and sediment control measures will be implemented and maintained during construction (e.g. silt fencing, stabilised work areas), so that sediment-laden runoff will not enter the wetland affecting turbidity and nutrient loads. Additionally, the upstream waterways are ephemeral with no permanent natural flows. Therefore, alteration of water quality is highly unlikely to occur during construction, as water only flows after periods of heavy rainfall (during which works will not occur). The sediments within the catchment are currently highly mobile due to historic riparian vegetation clearing, stock access and existing erosion hotspots throughout the catchment.
An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland	**Unlikely** To mitigate biosecurity risks, a biosecurity management plan will be implemented via the CEMP. This plan will include targeted measures for invasive aquatic flora and fauna species, supporting the maintenance of habitat quality. Combined with the preservation of downstream flow and water quality, these measures will help protect the ecological values of Bulloo Lake, which will also protect the connected ecological values of the Caryapundy Swamp further downstream. There were no aquatic weed species identified in the desktop or field surveys, and the risk of spreading aquatic invasive species is considered to be low. The Bulloo Lake wetland could not be accessed during field surveys; however, eastern gambusia were recorded within the catchment, and it is likely that they will also exist in the wetland area. Due to the ephemeral nature of the waterways, the proposed works will not lead to an invasive species being spread further into the wetland area. Works will occur when there is no flow, and the pipeline alignment avoids major waterholes where fauna will be present.

Threatened flora species

No nationally-listed aquatic flora species considered MNES were identified within the study area during the desktop or field assessments. Field survey effort was able to comprehensively assess the survey area; as such, no threatened aquatic flora species listed under the EPBC Act are considered as likely to occur or having the potential to occur within the study area. Therefore, no significant impact assessment is required.

Threatened fauna species

No nationally-listed aquatic fauna species considered MNES were identified during the field surveys. While the Edgbaston goby was identified by the WetlandInfo desktop search, the species has been assessed as unlikely to occur in the waterways located within the project site; therefore no significant impact assessment is required.

9.2.2 Matters of state environmental significance

An assessment has been undertaken against the Queensland *Significant Residual Impact Guideline* (DEHP, 2014) for MSES values that were confirmed present, likely to occur or considered to have the potential to occur within the study area.

Waterways providing for fish passage

The CRoW intersects with 77 waterways that provide for fish passage. Direct impacts to the Wilson River (major risk waterway for waterway barrier works) have been avoided through the use of HDD. This approach will avoid significant direct impacts to fish species, habitat and passage within the Wilson River. The design and construction of the project at all other waterway crossings will comply with the ADR for waterway barrier works, with waterway bed and banks to be reinstated at all waterway crossings post-installation (DAF, 2018).

The significance of the potential residual impacts of the project on waterways providing for fish passage has been assessed against the Queensland *Significant Residual Impact Guideline* (DEHP, 2014), as presented in Table 9.5. The project has been assessed as **unlikely** to have a significant residual impact on waterways providing for fish passage.

Table 9.5 Significant impact assessment – waterways providing for fish passage

Impact criteria	Assessment
An action is likely to have a significant residual impact on a waterway providing for fish passage if the action will result in:	
A permanent modification to the volume, depth, timing, duration or flow frequency of the waterway	**Unlikely** The project is unlikely to result in changes to the hydrological regime of waterways. The pipeline is anticipated to be installed using HDD or open cut trenching. Ephemeral creek crossings will be conducted via trenching will be undertaken when the creek bed is dry where possible to avoid impacts to flow and fish and avoid erosion risks. The design and construction of the project will comply with the ADR for waterway barrier works (DAF, 2018). All waterway bed and banks will be reinstated at all waterway crossings post installation and therefore no permanents modification to the waterways or the flow regime will occur.
Permanent modification or fragmentation of fish habitat including but not limited to in stream vegetation, snags and woody debris, substrate, bank or riffle formation necessary for breeding and/or survival of native fish species	**Unlikely** The project crosses 77 waterways that provide for fish passage. The project site has been located to avoid impact to permanent flowing waterways and utilises existing road corridors where possible. Construction will primarily occur within dry ephemeral waterways and fish habitat will be restored following construction. HDD will be employed at the Wilson River site to further avoid direct impacts to fish, fish movement, and habitat quality. Indirect impacts have the potential to cause habitat degradation, disturbance, alteration of flow/fauna movement and introduction/spread of introduced species. These impacts will be managed through avoidance and standard practice mitigation controls including implementation of an ESCP and CEMP. As such, no substantial modification or fragmentation of areas of fish habitat will occur.

Impact criteria	Assessment
Result in the mortality or injury of fish species	**Unlikely** It is considered unlikely that the project will result in the mortality or injury of fish. Key mitigation measures include the use of HDD at tidal waterways that contain water at the time of construction, and capture and relocation of fish in accordance with the Fish Salvage Guidelines (Queensland Government, 2024) in the event of rainfall. There is not expected to be any injury or mortality of fish during the operational phase. The pipeline will be maintained, and should a leak occur, industrial water is non-toxic and will dissipate rapidly in the surrounding environment. In addition, the project will implement shut-down procedures should an event occur to limit any release of industrial water if there was damage to the buried pipeline.
Works that permanently reduce the level of fish passage provided in a tidal waterway or a waterway identified as a major high-risk waterway for waterway barrier works, to a level that will increase stress on fish populations	**Unlikely** There are 10 pipeline crossings of a major risk waterway and 63 crossings of high-risk waterways in the proposed alignment. However, these crossings will be constructed using open cut and HDD. Open cut will have temporary direct impacts to fish passage; however, they will be constructed as per the ADR for waterway barrier works (DAF, 2018), and passage will be maintained during construction. For the Wilson River site, the use of HDD methodologies will result in no direct impacts to fish passage. During trenching post installation, the bed and banks will be reinstated to existing levels so that fish passage is maintained during operation. Potential impacts to water quality will be managed through implementation of an ESCP and CEMP. The CEMP will include the controls and emergency procedures for hazardous materials and management of stockpiles.

Threatened flora species

No state-listed aquatic flora species considered MSES were identified within the study area during the desktop or field assessments. Field survey effort was able to comprehensively assess the survey area; as such, no threatened aquatic flora species listed under the NC Act are considered as likely to occur or having the potential to occur within the study area. Therefore, no significant impact assessment is required.

Threatened fauna species

No state-listed aquatic fauna species considered MSES were identified during the field surveys. While the Murray cod and Edgbaston goby were identified by the WetlandInfo desktop search, they have been assessed as unlikely to occur in the waterways located within the project site; therefore no significant impact assessment is required.

10. Conclusion

This report has been prepared to provide an assessment of the aquatic ecological values specific to the study area within the Project area. Baseline desktop assessments and field surveys have been undertaken to assess the aquatic ecological values for MNES, MSES and MLES.

Based on the desktop and subsequent field assessments, the likelihood of occurrence identified the following MNES and MSES values as either confirmed present or outside of but connected to the study area:

– MSES – Waterways providing for fish passage
– one nationally important wetland that is hydraulically connected to a Ramsar wetland (MNES) downstream.

Waterways and impacts to aquatic MNES and MSES values have been avoided wherever possible in the design of the project. Substantial avoidance of aquatic values was achieved through the preliminary site selection process where the alignment of the project was chosen to avoid high ecological value areas. Construction and operation methodologies have been selected to avoid/mitigate direct and indirect impacts where possible. HDD will be used for the Wilson River crossing, avoiding loss and degradation of habitat within the high-risk waterway.

Construction of the pipeline will be managed through the implementation of a CEMP and a site specific ESCP, incorporating measures to further minimise impacts to aquatic ecological values where practicable. With mitigation measures in place, the project is not anticipated to have a negative impact on the aquatic ecology of surrounding waterways or downstream freshwater environments. Disturbed areas will be reinstated following the completion of construction activities.

MNES and MSES values were assessed against the EPBC Act *Significant impact guidelines 1.1* (DoE, 2013) and Queensland *Significant Residual Impact Guideline* (DEHP, 2014), respectively. The project was assessed as **unlikely** to have a significant impact on the Caryapundy Swamp Ramsar wetland and waterways providing for fish passage, in consideration of the avoidance and mitigation measures proposed.

Overall, with the implementation of the proposed mitigation and management measures, the Project can be constructed, operated and decommissioned without significant adverse impacts on aquatic ecological values within or downstream of the Project area. Any water-related impacts are expected to be localised, temporary and reversible, with no long-term degradation of water quality, hydrological processes or sensitive water-dependent receptors anticipated.

11. References

Australian Pipelines and Gas Association (APGA). (2022). Code of Environmental Practice – Onshore Pipelines. Revision 5, April 2022. https://apga.org.au/hubfs/apga_code_of_environmental_practice_2022.pdf?hsLang=en

Allan, R.J. (1988). El Niño–Southern Oscillation influences in the Australasian region. *Progress in Physical Geography*, *12*(3), 313–348.

Atlas of Living Australia (ALA). (2025). *Spatial analysis (Spatial Portal).* https://www.ala.org.au/

Balcombe, S.R., Bunn, S.E., McKenzie-Smith, F.J. & Davies, P.M. (2005). Variability of fish diets between dry and flood periods in an arid zone floodplain river. *Journal of Fish Biology*, *67*(6), 1552–1567.

Bhattacharyya, S., Klerks, P.L. & Nyman, J.A. (2003). Toxicity to freshwater organisms from oils and oil spill chemical treatments in laboratory microcosms. *Environmental Pollution*, *122*(2), 205–215.

Brown, J.A.H. (1983). *Australia's surface water resources.* Australian Government Publishing Service.

Bulloo Shire Council. (2022). *Bulloo Shire Council Biosecurity Plan 2022 onwards* bulloo.qld.gov.au/files/assets/public/v/1/council-services/documents/bulloo_shire_council_biosecurity_plan_2022_onwards_adopted_25102022.pdf

Bureau of Meteorology (BoM). (2025a). *Climate Data Online.* Retrieved August 27, 2025, from https://www.bom.gov.au/climate/data/

Bureau of Meteorology (BoM). (2025b). *Groundwater Dependent Ecosystems (GDE) Atlas*. http://www.bom.gov.au/water/groundwater/gde/

Capon, S. J. (2004). *Flow variability and vegetation dynamics in a large arid floodplain: Cooper Creek, Australia* (Doctoral thesis, Griffith University). research-repository.griffith.edu.au/items/ee66e419-f19d-5a83-afc0-42c2b91a92a0

Chen, Y. (2024). Ecohydrology. *Nature.* nature.com/collections/ffjfecgjbb

Chessman, B. C. (2003). *SIGNAL 2.iv: A scoring system for macroinvertebrates ("water bugs") in Australian rivers: User manual* (Version 2). Department of the Environment and Heritage.

Cockayne, B., Schmarr, D., Duguid, A. and Mathwin, R. (2013) Lake Eyre Basin Rivers Assessment 2012 Monitoring Report. Report to the Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Commonwealth of Australia. (2011a). *Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the EPBC Act.*

Commonwealth of Australia. (2011b). *Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act.*

Cooper, C. M. (1993). Biological effects of agriculturally derived surface water pollutants on aquatic systems–a review. *Journal of Environmental Quality*, *22*(3), 402–408. doi.org/10.2134/jeq1993.00472425002200030003x

Costelloe, J., Western, A. W., & Irvine, E. C. (2006, January). Recharge mechanisms in an arid zone river: Effects of channelisation. In *Proceedings of the 3rd Hydrology and Water Resources Symposium* (Launceston, Tasmania).

Cottingham, P. (1999). *Scientific forum on river condition and flow management of the Moonie, Warrego, Paroo, Bulloo and Nebine River Basins.* Cooperative Research Centre for Freshwater Ecology.

Cendón, D. I., Larsen, J. R., Jones, B. G., Nanson, G. C., Rickleman, D., Hankin, S. I., Pueyo, J. J., Maroulis, J., & (2010). Freshwater recharge into a shallow saline groundwater system, Cooper Creek floodplain, Queensland, Australia. *Journal of Hydrology*, *392*(3–4), 150–163. doi.org/10.1016/j.jhydrol.2010.08.003

Davies, R. J. P., Mackay, D. A., Whalen, M. A., & Smyth, A. K. (2018). Vegetation and seed banks of arid ephemeral gilgai wetlands subject to contrasting grazing regimes. *Journal of Arid Environments*, *154*, 51–60.

Department of Agriculture and Fisheries. (2018). *Requirements for operational work that is constructing or raising waterway barrier works (Accepted development requirements).* publications.qld.gov.au/dataset/b1259f08-152a-439e-ab6a-0ed30bab6412/resource/011a916e-30ad-4f52-87e9-f9c5a6b2532f/download/requirements-waterway-barrier-works-accepted-development.pdf

Department of Climate Change, Energy, the Environment and Water. (2025a). *Directory of Important Wetlands in Australia.* Retrieved August 27, 2025, from dcceew.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands

Department of Climate Change, Energy, the Environment and Water. (2025b). *Protected Matters Search Tool.* pmst.environment.gov.au/#/map?lng=131.52832031250003&lat=-28.6905876542507&zoom=5&baseLayers=Imagery,ImageryLabels

Department of Climate Change, Energy, the Environment and Water. (2025c). *Species Profile and Threats Database (SPRAT).* environment.gov.au/cgi-bin/sprat/public/sprat.pl

Department of the Environment (2013) Matters of National Environmental Significance: Significant Impact Guidelines 1.1. Canberra: Commonwealth of Australia. Available at: dcceew.gov.au/sites/default/files/documents/nes-guidelines_1.pdf

Department of Environment and Heritage Protection. (2014, December). *Queensland environmental offsets policy – Significant residual impact guideline (Nature Conservation Act 1992; Environmental Protection Act 1994; Marine Parks Act 2004).* State of Queensland.

Department of Environment and Science. (2018). *Monitoring and sampling manual: Environmental Protection (Water) Policy 2009.*

Department of Environment and Science. (2009). *Queensland Water Quality Guidelines.* environment.qld.gov.au/__data/assets/pdf_file/0020/95150/water-quality-guidelines.pdf

Department of Environment and Science. (2020). *Warrego, Paroo and Bulloo Rivers and Nebine, Mungallala and Wallam Creeks basins: Environmental values and water quality objectives.* Queensland Government.

Department of Environment and Science. (2023). *Wetland areas (Layer ID 15)* [ArcGIS REST service]. Queensland Spatial GIS. spatial-gis.information.qld.gov.au/arcgis/rest/services/Biota/Wetlands/MapServer/15

Department of Environment, Science and Innovation (DESI). (2024). Application requirements for petroleum activities guideline. ESR/2016/2357, Version 4.01. https://www.des.qld.gov.au/policies?a=272936:policy_registry/rs-gl-application-requirements.pdf

Department of Environment, Tourism, Science and Innovation. (2025). *Draft environmentally relevant activity standard for petroleum pipeline activities (ESR/2016/2388).* Queensland Government. https://www.detsi.qld.gov.au/__data/assets/pdf_file/0020/408620/draft-petroleum-pipeline-standard.pdf

Department of Environment, Tourism, Science and Innovation. (n.d.). *Surface expression GDE (areas) – spatial metadata* (WetlandInfo). Retrieved September 18, 2025, from wetlandinfo.des.qld.gov.au/wetlands/facts-maps/get-mapping-help/metadata/gde/surface-area/

Department of Environment, Tourism, Science and Innovation. (2013a). *Queensland Lake Eyre and Bulloo freshwater biogeographic province – Habitat* (WetlandInfo). Retrieved October 22, 2025, from wetlandinfo.des.qld.gov.au/wetlands/ecology/aquatic-ecosystems-natural/riverine/freshwater-biogeo/lake-eyre-and-bulloo/habitat.html

Department of Environment, Tourism, Science and Innovation. (2013b). *Wildlife of Bulloo Downs Nature Refuge* (WetlandInfo). Retrieved September 18, 2025, from wetlandinfo.des.qld.gov.au/wetlands/facts-maps/wildlife/?AreaID=nature-refuge-bulloo-downs-nature-refuge

Department of Environment, Tourism, Science and Innovation. (2016a). *Bulloo drainage basin — facts and maps* (WetlandInfo). Retrieved September 16, 2025, from wetlandinfo.des.qld.gov.au/wetlands/facts-maps/basin-bulloo/

Department of Environment, Tourism, Science and Innovation. (2016b). *Cooper Creek drainage basin — facts and maps* (WetlandInfo). Retrieved September 16, 2025, from wetlandinfo.des.qld.gov.au/wetlands/facts-maps/basin-cooper-creek/

Department of Environment, Tourism, Science and Innovation. (2019). *WetlandMaps – Interactive maps and wetlands data in Queensland* (WetlandInfo). Retrieved January 27, 2026, from wetlandinfo.detsi.qld.gov.au/wetlands/facts-maps/get-mapping-help/wetland-maps/

Department of Environment, Tourism, Science and Innovation. (2024a). *Aquatic Conservation Assessments (ACA) and AquaBAMM* (WetlandInfo). Retrieved October 15, 2025, from wetlandinfo.des.qld.gov.au/wetlands/assessment/assessment-methods/aca/

Department of the Environment, Tourism, Science and Innovation. (2024b). *Aquatic ecology – EIS information guideline.* des.qld.gov.au/policies?a=272936:policy_registry/eis-tm-aquatic-ecology-information-guide.pdf

Department of the Environment, Tourism, Science and Innovation. (2024c). *Biosecurity – EIS information guideline.* detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5297&name=eis-tm-biosecurity-information-guide.pdf

Department of the Environment, Tourism, Science and Innovation. (2024d). *Groundwater dependent ecosystems – EIS information guideline.* detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=5301&name=eis-tm-gde-information-guide.pdf

Department of Environment, Tourism, Science and Innovation. (2025a). *Matters of state environmental significance.* environment.qld.gov.au/management/planning-guidelines/method-mapping-mses

Department of Environment, Tourism, Science and Innovation. (2025b). *WetlandInfo.* wetlandinfo.detsi.qld.gov.au/wetlands/

Department of Environment, Tourism, Science and Innovation. (2025c). *WildNet platform.* qld.gov.au/environment/plants-animals/species-information/wildnet

Department of Natural Resources and Mines. (2001). *Queensland AusRivAS sampling and processing manual.* Queensland Government.

Department of State Development and Infrastructure. (2024, February). *Preparing an Environmental Impact Statement: Guideline for proponents.* Queensland Government.

Department of Sustainability, Environment, Water, Population and Communities. (2013). *Actions on, or impacting upon, Commonwealth land and actions by Commonwealth agencies: Significant impact guidelines 1.2.* Commonwealth of Australia. dcceew.gov.au/sites/default/files/documents/commonwealth-guidelines_1.pdf

Eamus, D., Fu, B., Springer, A. E., & Stevens, L. E. (2016). Groundwater dependent ecosystems: Classification, identification techniques and threats. In *Integrated groundwater management: Concepts, approaches and challenges* (pp. 313–346). Springer.

Fagan, S. D., & Nanson, G. C. (2004). The morphology and formation of floodplain-surface channels, Cooper Creek, Australia. *Geomorphology*, *60*(1–2), 107–126.

GHD. (2026a) *Matters of National Environmental Significance Report*. Prepared for the APA Group.

GHD. (2026b). Bulloo Interlink Pipeline Project Terrestrial Ecology Assessment Report (Queensland). Prepared for the APA Group.

Hairston, N. G., Jr., & Cáceres, C. E. (1996). Distribution of crustacean diapause: Micro- and macroevolutionary pattern and process. *Hydrobiologia*, *320*, 27–44**.** doi.org/10.1007/BF00016802

Hamann, M., Schauble, C. S., Limpus, D. J., Emerick, S. P., & Limpus, C. J. (2007). *Management plan for the conservation of Elseya sp. (Burnett River) in the Burnett River Basin.* Queensland Environmental Protection Ancy.

Herman, M. R., & Nejadhashemi, A. P. (2015). A review of macroinvertebrate-and fish-based stream health indices. *Ecohydrology & Hydrobiology*, *15*(2), 53-67.

Inglis, S. N., & Howell, S. (2009). *Aquatic Conservation Assessments (ACA), using AquaBAMM, for the riverine wetlands of the Great Barrier Reef catchment.* Department of Environment and Resource Management. track.org.au/publications/registry/track973

International Erosion Control Association (Australasia). (2025). *Best Practice Erosion and Sediment Control for Building and Construction Sites (BPESC).* connect.ieca.org/austieca/resources/resources-list/bpesc-document

Karr, J., & Chu, E. (1998). *Restoring life in running waters: Better biological monitoring.* Island Press.

Kennard, M. J., Pusey, B. J., Allsop, Q., Perna, C., Burrows, D., & Douglas, M. M. (2011). *Field manual—including protocols for quantitative sampling of fish assemblages, habitat, water quality and sample preservation.* Tropical Rivers and Coastal Knowledge, Charles Darwin University. track.org.au/publications/registry/track973

Kerezsy, A. (2009). *Gambusia control in spring wetlands.* South Australian Arid Lands Natural Resources Management Board.

Kerezsy, A. (2010). *The distribution, recruitment and movement of fish in far western Queensland.*

Kerezsy, A. (2020). The distribution of the endangered fish Edgbaston goby, *Chlamydogobius squamigenus*, and recommendations for management. *Proceedings of the Royal Society of Queensland*, *126*, 129–141.

Kingsford, R. T., Curtin, A. L., & Porter, J. (1999). Water flows on Cooper Creek in arid Australia determine "boom" and "bust" periods for waterbirds. *Biological Conservation*, *88*(2), 231–248.

Knighton, A. D., & Nanson, G. C. (1994). Flow transmission along an arid zone anastomosing river, Cooper Creek, Australia. *Hydrological Processes*, *8*(2), 137–154.

Kotwicki, V. (1986). *Floods of Lake Eyre* (Technical Paper 23). Engineering and Water Supply Department, Government of South Australia.

Kouba, A., Tíkal, J., Císař, P., Veselý, L., Fořt, M., Příborský, J., Patoka, J., & Buřič, M. (2016). The significance of droughts for hyporheic dwellers: Evidence from freshwater crayfish. *Scientific Reports*, *6*, 26569.

Limpus, C. J., Limpus, D., & Hamann, M. (2002). Freshwater turtle populations in the area to be flooded by the Walla Weir, Burnett River: Baseline study. *Memoirs of the Queensland Museum*, *48*, 155–168.

Limpus, C. J., Limpus, D. J., Parmenter, C. J., Hodge, J., Forrest, M. J., & McLachlan, J. (2011). *The biology and management strategies for freshwater turtles in the Fitzroy Basin, with particular emphasis on Elseya albagula and Rheodytes leukops.* Queensland Government.

May, S. A., & Norton, T. W. (1996). Influence of fragmentation and disturbance on the potential impact of feral predators on native fauna in Australian forest ecosystems. *Wildlife Research*, *23*(4), 387–400.

Müller, A., Österlund, H., Marsalek, J., & Viklander, M. (2020). The pollution conveyed by urban runoff: A review of sources. *Science of the Total Environment*, *709*, 136125. doi.org/10.1016/j.scitotenv.2019.136125

NASA Earth Observatory. (2025, September 18). *Cooper Creek replenishes Lake Eyre.* earthobservatory.nasa.gov/images/154803/cooper-creek-replenishes-lake-eyre

Nguyen, T. C. H., Nguyen, P. Q. P., & Dang, T. N. (2019). Environmental pollution issues in inland waterway transportation. *World Wide Journal of Multidisciplinary Research and Development*, *5*(12), 62–66.

NSW Fisheries. (1997). *Australian code of electrofishing practice.* Standing Committee on Fisheries and Aquaculture.

Outback Queensland Tourism Association. (n.d.). *Noccundra*. Retrieved October 21, 2025, from outbackqueensland.com.au/town/noccundra/

Puckridge, J. T., Sheldon, F., Walker, K. F., & Boulton, A. J. (2000). Flow variability and the ecology of large rivers in arid central Australia. *Marine and Freshwater Research*, *49*(1), 55–72.

Pusey, B. J., Kennard, M. J., & Arthington, A. H. (2004). *Freshwater fishes of north-eastern Australia.* CSIRO Publishing.

Queensland Government. (n.d. a). *Application requirements for activities with impacts to land*. des.qld.gov.au/policies?a=272936:policy_registry/era-gl-land-impacts.pdf

Queensland Government. (n.d. b). *Application requirements for petroleum activities*. detsi.qld.gov.au/policies?a=272936:policy_registry/rs-gl-application-requirements.pdf

Queensland Government. (2015). *Queensland wetland classification scheme* (Version 2.0). Queensland Wetlands Program. wetlandinfo.des.qld.gov.au/resources/static/pdf/resources/reports/classification-scheme.pdf

Queensland Government. (2020). *Criteria for environmental impact statements for resource projects under the Environmental Protection Act 1994*. des.qld.gov.au/policies?a=272936:policy_registry/eis-gl-eis-criteria.pdf

Queensland Government. (2024). *Fish salvage.* business.qld.gov.au/industries/farms-fishing-forestry/fisheries/development/waterways/salvage

Queensland Government. (2025). *QLD Globe.* qldglobe.information.qld.gov.au/

Ramsar Convention Secretariat. (2023). *Caryapundy Swamp (Site No. 2520).* Ramsar Sites Information Service. rsis.ramsar.org/ris/2520

Rykiel, E. J. (1985). Towards a definition of ecological disturbance. *Australian Journal of Ecology*, *10*, 361–365.

Rowlands, R. J., & Rowlands, J. M. (1969). An Aboriginal dam in northwestern New South Wales. *Mankind*, *7*(2), 132–136.

Scanlon, M., Marsden, T., & Moore, M. (2011). *Shoalwater Bay Training Area pest fish management strategy.* doi.org/10.13140/RG.2.2.27708.08329

Sheldon, F., Boulton, A. J., & Puckridge, J. T. (2002). Conservation value of variable connectivity: Aquatic invertebrate assemblages of channel and floodplain habitats of a central Australian arid-zone river, Cooper Creek. *Biological Conservation*, *103*(1), 13–31.

Silcock, J. L. (2009). *Identification of permanent refuge waterbodies in the Cooper Creek & Georgina-Diamantina River Catchments for Queensland and South Australia: Final report to the South Australian Arid Lands Natural Resources Management Board.* South Australian Arid Lands NRM Board. cdn.environment.sa.gov.au/landscape/docs/saal/water-identification-of-permanent-refuge-rep.pdf

Silcock, J. L., & Fensham, R. J. (2019). Degraded or just dusty? Examining ecological change in arid lands. *BioScience*, *69*(7), 508–522. doi.org/10.1093/biosci/biz054

Smith, M., Karim, F., Sparrow, A., Cassel, R. and Hall, L. (2015) Context statement for the Cooper subregion. Product 1.1 for the Cooper subregion from the Lake Eyre Basin Bioregional Assessment. Department of the Environment, Bureau of Meteorology, CSIRO and Geoscience Australia, Australia.

Smith-Root. (2020). *LR-20B electrofisher.* smith-root.com/electrofishers/lr-20b

Sternberg, D., Cockayne, B., Schmarr, D., Duguid, A., Mathwin, R. and McNeil, D. (2014) Lake Eyre Basin Rivers Assessment (LEBRA) 2012/13 Monitoring Report. Report to the Department of the Environment, Canberra.

Topping, G., Davies, J. M., Mackie, P. R., & Moffat, C. F. (1997). The impact of the *Braer* spill on commercial fish and shellfish. *Edinburgh Statutory Office*, 121–143.

Wheeler, A. P., Angermeier, P. L., & Rosenberger, A. E. (2005). Impacts of new highways and subsequent landscape urbanization on stream habitat and biota. *Reviews in Fisheries Science*, *13*(3), 141–164.

Williams, O. B. (1955). Studies in the ecology of the Riverine Plain. I. The gilgai microrelief and associated flora. *Australian Journal of Botany*, *3*(1), 99–112.

Wood, P. J., & Armitage, P. D. (1997). Biological effects of fine sediment in the lotic environment. *Environmental Management*, *21*(2), 203–217.

Zivec, P., Glanville, K., & Ronan, M. (2020). *The Queensland Waterhole Classification Scheme.* Queensland Wetlands Program, Queensland Government – Department of Environment and Science. wetlandinfo.des.qld.gov.au/resources/static/pdf/resources/reports/waterhole-class-scheme-2020-01-24.pdf

Appendices

Appendix A

Desktop results

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: 20-Mar-2026

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

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:	20
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/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:	13
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:	3
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
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	100 - 150km 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
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	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
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Grantiella picta](#)			
Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Lophochroa leadbeateri leadbeateri](#)			
Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern) [82926]	Endangered	Species or species habitat known to occur within area	In feature area
[Neophema chrysostoma](#)			
Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pedionomus torquatus](#)			
Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
[Pezoporus occidentalis](#)			
Night Parrot [59350]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Rostratula australis](#)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
[Notomys fuscus](#)			
Dusky Hopping-mouse, Wilkiniti [125]	Vulnerable	Species or species habitat may 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 feature area
[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
[Grevillea kennedyana](#)			
Flame Spider-flower [6974]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Sclerolaena walkeri [16152]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Xerothamnella parvifolia [3141]	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
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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]	Vulnerable	Species or species habitat may occur within area	In feature area

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]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat likely to 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 known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
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]	Vulnerable	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

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Bulloo Downs	Nature Refuge	QLD	In feature area
Narriearra Caryapundy Swamp	National Park	NSW	In buffer area only
Sturt	National Park	NSW	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
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 feature area
Not controlled action (particular manner)				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action (particular manner)				
ATP 732 Petroleum Exploration Program, SW QLD	2012/6335	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Bioregional Assessments

[Resource Information]

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

Geological and Bioregional Assessments

[Resource Information]

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 is 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 on the contents of this report.

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 point locations and environmental data layers.

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 when time permits.

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 breeding sites; and
- 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.

© Commonwealth of Australia
Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

AREA REPORT

Atlas of Living Australia
ala.org.au
sharing biodiversity knowledge

www.ala.org.au

Area: 10,337.76 sq km	Species: 1091	Occurrences: 15255
Endemic species: 2	All threatened species: 211	Migratory species: 0
All invasive species: 4	Iconic species: 17	JournalMap Articles: 2
Animals: 586	Plants: 506	Birds: 253

Table of Contents

Alignment Comb 3
All threatened species 4
Migratory species 9
Further Links 10
References 11

Alignment Comb

Area: 10,337.76 sq km

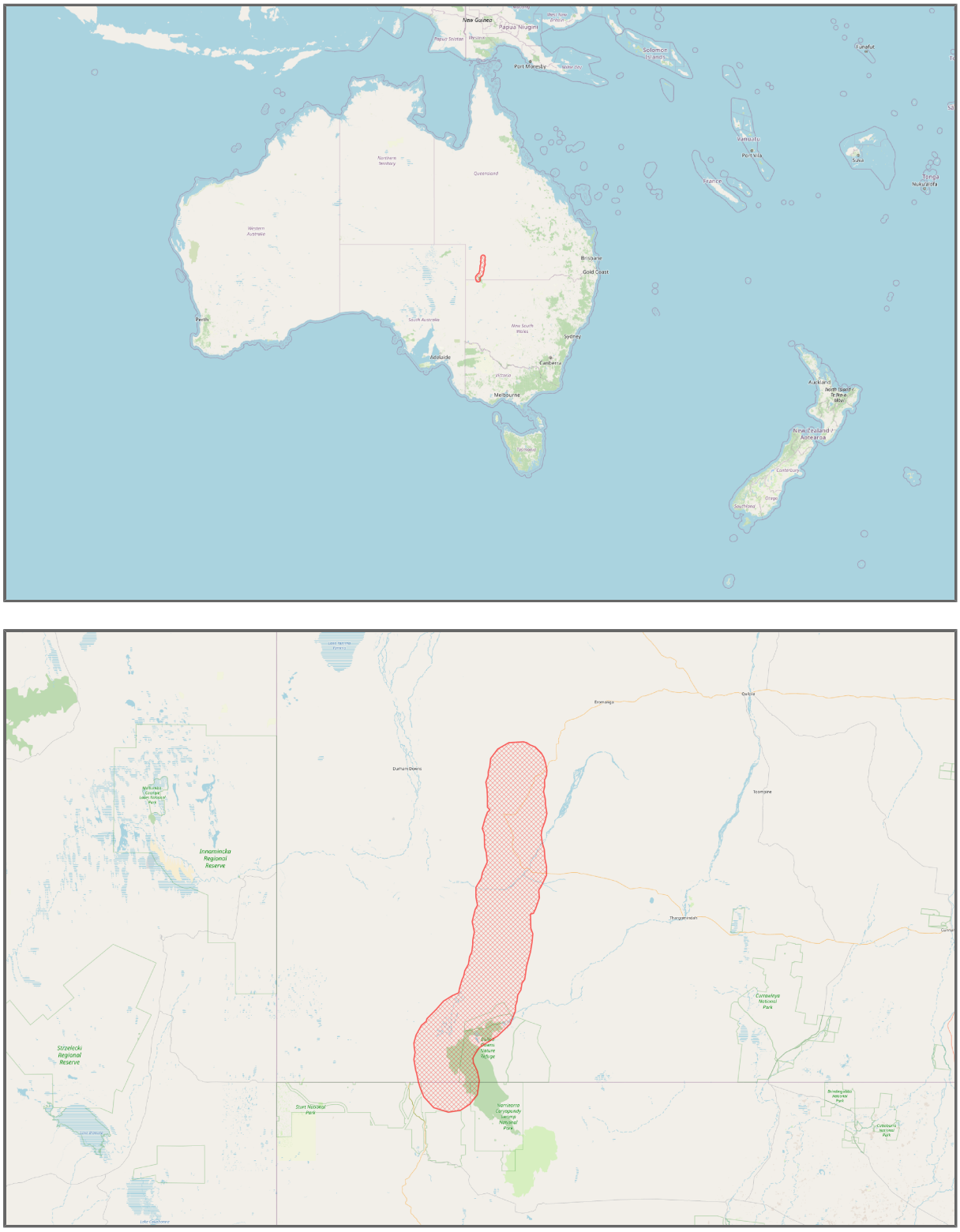


Figure 1 : Map of Alignment Comb

All threatened species

Number of threatened species: **211**

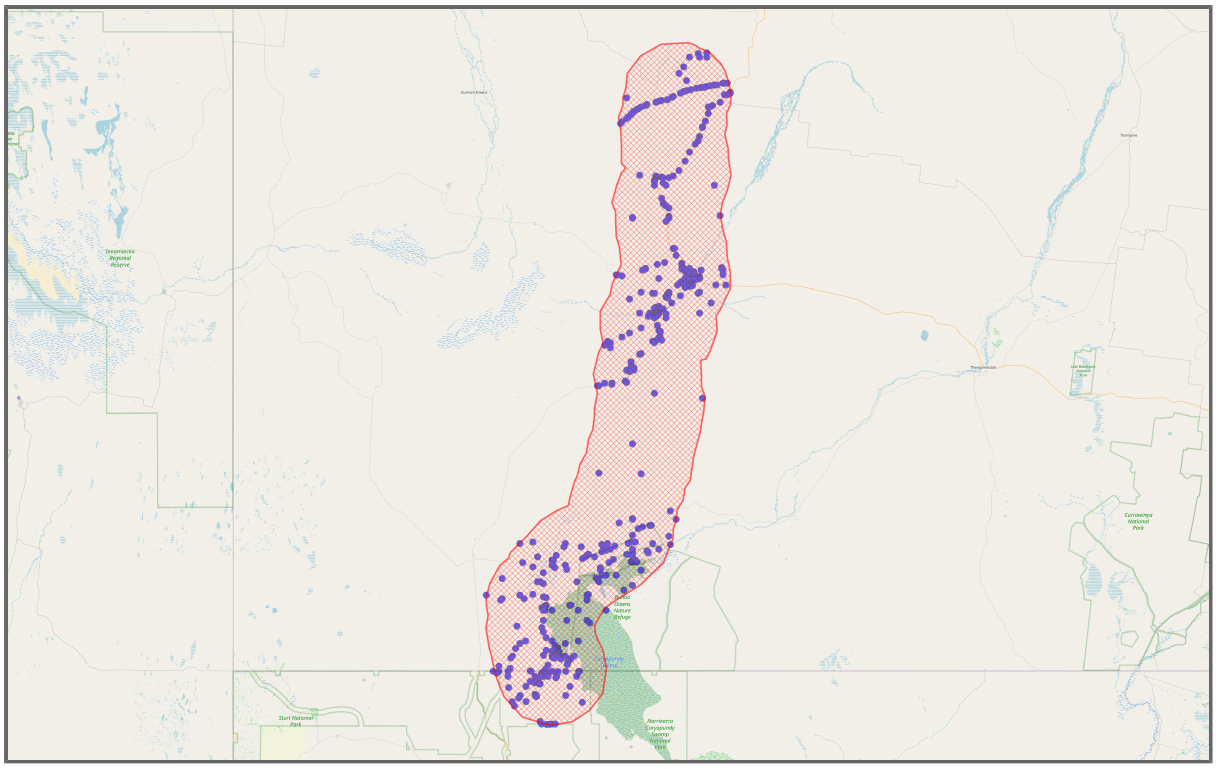


Figure 2 : Map of All threatened species

Table 1: All threatened species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences
Psophodidae	Psophodes (Sphenostoma) cristatus	Chirruping Wedgebill	186
Columbidae	Geopelia cuneata	Diamond Dove	143
Maluridae	Amytornis (Maluropsis) barbatus	Grey Grasswren	133
Gruidae	Antigone rubicunda	Brolga	100
Proteaceae	Grevillea kennedyana	Flame Spider Flower	79
Campephagidae	Lalage (Lalage) tricolor	White-winged Triller	59
Corcoracidae	Struthidea cinerea	Apostlebird	56
Otididae	Ardeotis australis	Australian Bustard	48
Muridae	Rattus villosissimus	Long-haired Rat	48
Monarchidae	Myiagra (Seisura) inquieta	Restless Flycatcher	46
Ardeidae	Ardea alba modesta	Great Egret	44
Accipitridae	Circus assimilis	Spotted Harrier	43
Oreoicidae	Oreoica gutturalis	Crested Bellbird	40
Acanthizidae	Aphelocephala leucopsis	Southern Whiteface	37
Ptilonorhynchidae	Chlamydera maculata	Spotted Bowerbird	37
Meliphagidae	Certhionyx (Certhionyx) variegatus	Pied Honeyeater	33
Climacteridae	Climacteris (Climacteris) picumnus	Brown Treecreeper	31
Chelidae	Emydura macquarii	Macquarie River Turtle	29
Pelodryadidae	Cyclorana cultripes	Knife-footed Frog	26
Petroicidae	Melanodryas (Melanodryas) cucullata	Hooded Robin	24
Threskiornithidae	Plegadis falcinellus	Glossy Ibis	24
Accipitridae	Hieraaetus (Hieraaetus) morphnoides	Little Eagle	23
Columbidae	Phaps (Histriophaps) histrionica	Flock Bronzewing	19
Dasyuridae	Sminthopsis macroura	Stripe-faced Dunnart	18
Charadriidae	Peltohyas australis	Inland Dotterel	16

Muridae	Pseudomys hermannsburgensis	Sandy Inland Mouse	15
Cacatuidae	Calyptorhynchus (Calyptorhynchus) banksii	Red-tailed Black Cockatoo	14
Falconidae	Falco (Hierofalco) subniger	Black Falcon	14
Alaudidae	Mirafra (Mirafra) javanica	Horsfield's Bushlark	14
Meliphagidae	Epthianura (Epthianura) albifrons	White-fronted Chat	13
Scrophulariaceae	Eremophila bignoniiflora	Bignonia Emu-bush	13
Chenopodiaceae	Atriplex holocarpa	Pop Saltbush	12
Campephagidae	Coracina (Pteropodocys) maxima	Ground Cuckoo-shrike	12
Falconidae	Falco (Hierofalco) hypoleucos	Grey Falcon	12
Maluridae	Malurus (Leggeornis) assimilis bernieri	Shark Bay Purple-backed Fairy-wren	12
Macropodidae	Petrogale persephone	Proserpine Rock-wallaby	12
Asteraceae	Brachyscome ciliaris	Variable Daisy	11
Asteraceae	Minuria integerrima	Smooth Minuria	11
Chenopodiaceae	Neobassia proceriflora	Soda Bush	11
Poaceae	Panicum laevinode	Pepper Grass	11
Pomatostomidae	Pomatostomus (Pomatostomus) halli	Hall's Babbler	10
Chenopodiaceae	Sclerolaena lanicuspis	Woolly Copper Burr	10
Poaceae	Eragrostis setifolia	Lovegrass	9
Scrophulariaceae	Eremophila sturtii	Narrow-leaved Emu-bush	9
Falconidae	Falco (Hierofalco) peregrinus	Peregrine Falcon	9
Laridae	Hydroprogne caspia	Caspian Tern	9
Acanthizidae	Pyrrholaemus brunneus	Redthroat	9
Meliphagidae	Grantiella picta	Painted Honeyeater	8
Accipitridae	Hamirostra melanosternon	Black-breasted Buzzard	8
Brassicaceae	Lepidium phlebopetalum	Veined Peppercress	8
Podicipedidae	Podiceps cristatus	Great Crested Grebe	8
Pygopodidae	Pygopus schraderi	Eastern Hooded Scaly-foot	8
Aizoaceae	Trianthema triquetrum	Red Spinach	8
Myobatrachidae	Uperoleia rugosa	Chubby Gungan	8
Maluridae	Amytornis (Maluropsis) barbatus barbatus	Bulloo Grey Grasswren	7
Scincidae	Cyclodomorphus venustus	Saltbush Slender Blue-tongue	7
Poaceae	Eragrostis australasica	Lovegrass	7
Frankeniaceae	Frankenia serpyllifolia	Thyme Sea-heath	7
Malvaceae	Hibiscus brachysiphonius	Low Hibiscus	7
Chenopodiaceae	Salsola australis	Buckbush	7
Chenopodiaceae	Sclerolaena intricata	Tangled Poverty Bush	7
Anatidae	Spatula rhynchotis	Australasian Shoveler	7
Scolopacidae	Calidris (Erolia) acuminata	Sharp-tailed Sandpiper	6
Psittacidae	Neophema (Neonanodes) chrysostoma	Blue-winged Parrot	6
Asteraceae	Rhodanthe stricta	Slender Sunray	6
Santalaceae	Santalum lanceolatum	Northern Sandalwood	6
Chenopodiaceae	Sclerolaena decurrens	Green Copper Burr	6
Malvaceae	Abutilon malvifolium	Mallow-leaf Lantern-flower	5
Fabaceae	Acacia victoriae subsp. victoriae	Bramble Wattle	5
Apodidae	Apus (Apus) pacificus	Fork-tailed Swift	5
Anatidae	Biziura lobata	Musk Duck	5
Scincidae	Ctenotus joanae	Black-soil Ctenotus	5
Poaceae	Dactyloctenium radulans	Button Grass	5
Euphorbiaceae	Euphorbia parvicaruncula	Rough-seeded Caustic Bush	5
Laridae	Gelochelidon nilotica	Gull-billed Tern	5
Muridae	Hydromys chrysogaster	Water-rat	5
Amaranthaceae	Ptilotus obovatus	Silver Tails	5
Asteraceae	Rhodanthe floribunda	Large White Sunray	5
Asteraceae	Senecio gregorii	Fleshy Groundsel	5
Fabaceae	Senna artemisioides subsp. alicia	Cassia	5
Malvaceae	Sida fibulifera	Pin Sida	5

Fabaceae	Swainsona oligophylla	Swainsona	5
Poaceae	Tripogonella loliiformis	Five-minute Grass	5
Pythonidae	Antaresia childreni	Children's Python	4
Poaceae	Astrebla lappacea	Curly Mitchell Grass	4
Cyperaceae	Cyperus dactylotes	Nutgrass	4
Elapidae	Demansia rimicola	Soil-crack Whipsnake	4
Scrophulariaceae	Eremophila polyclada	Lignum Fuchsia Bush	4
Cyperaceae	Fimbristylis dichotoma	Fringe-rush	4
Scolopacidae	Gallinago (Gallinago) hardwickii	Latham's Snipe	4
Asteraceae	Leiocarpa leptolepis	Leiocarpa	4
Chenopodiaceae	Maireana georgei	Satiny Bluebush	4
Strigidae	Ninox (Hieracoglaux) connivens	Barking Owl	4
Anatidae	Oxyura australis	Blue-billed Duck	4
Elapidae	Pseudonaja modesta	Ringed Brown Snake	4
Malvaceae	Abutilon otocarpum	Desert Lantern	3
Fabaceae	Acacia oswaldii	Umbrella Wattle	3
Poaceae	Eragrostis lacunaria	Lovegrass	3
Fabaceae	Glycine canescens	Silky Glycine	3
Goodeniaceae	Goodenia		3
Scincidae	Morethia adelaidensis	Saltbush Morethia Skink	3
Diplodactylidae	Oedura cincta	Inland Marbled Velvet Gecko	3
Meliaceae	Owenia acidula	Sour Apple	3
Asteraceae	Rutidosis helichrysoides subsp. helichrysoides	Grey Wrinklewort	3
Santalaceae	Santalum acuminatum	Sweet Quandong	3
Asteraceae	Senecio lanibracteus	Inland Shrubby Groundsel	3
Dasyuridae	Sminthopsis crassicaudata	Fat-tailed Dunnart	3
Amaranthaceae	Surreya diandra	Mallee Hemichroa	3
Amaranthaceae	Surreya mesembryanthema		3
Poaceae	Triraphis mollis	Needle Grass	3
Turnicidae	Turnix pyrrhothorax	Red-chested Button-quail	3
Fabaceae	Acacia calcicola	Northern Myall	2
Poaceae	Aristida holathera var. holathera	Tall Kerosene Grass	2
Chenopodiaceae	Atriplex angulata	Fan Saltbush	2
Chenopodiaceae	Atriplex lindleyi subsp. conduplicata	Baldoo	2
Canidae	Canis familiaris	Dingo	2
Asteraceae	Centipeda thespidioides	Desert Sneezeweed	2
Climacteridae	Climacteris (Climacterobates) affinis	White-browed Treecreeper	2
Corcoracidae	Corcorax melanorhamphos	White-winged Chough	2
Fabaceae	Crotalaria smithiana	Yellow Rattlepod	2
Fabaceae	Cullen pallidum	Woolly Scurf-pea	2
Brassicaceae	Cuphonotus humistratus	Mother-of-misery	2
Cyperaceae	Cyperus victoriensis	Yelka	2
Neosittidae	Daphoenositta (Neositta) chrysoptera	Varied Sittella	2
Acanthaceae	Dipteracanthus australasicus subsp. corynothecus		2
Euphorbiaceae	Euphorbia stevenii	Bottletree Caustic	2
Euphorbiaceae	Euphorbia tannensis subsp. eremophila	Bottle Tree Caustic	2
Laridae	Gelochelidon nilotica macrotarsa		2
Convolvulaceae	Ipomoea polymorpha	Silky Cow-vine	2
Muridae	Leggadina forresti	Forrest's Mouse	2
Asteraceae	Leucochrysum molle	Hoary Sunray	2
Meliphagidae	Lichmera (Lichmera) indistincta indistincta	Western Brown Honeyeater	2
Asteraceae	Minuria cunninghamii	Bush Minuria	2
Fabaceae	Neptunia dimorphantha	Nervous Plant	2
Pedionomidae	Pedionomus torquatus	Plains Wanderer	2
Brassicaceae	Phlegmatospermum eremaeum	Spreading Cress	2
Elapidae	Pseudonaja guttata	Speckled Brown Snake	2

Meliphagidae	Ptilotula plumula	Grey-fronted Honeyeater	2
Amaranthaceae	Ptilotus nobilis	Yellow-tails	2
Amaranthaceae	Ptilotus stirlingii		2
Asteraceae	Rhodanthe uniflora	Woolly Daisy	2
Diplodactylidae	Rhynchoedura ornata	Western Beaked Gecko	2
Solanaceae	Solanum lacunarium	Lagoon Nightshade	2
Chenopodiaceae	Tecticornia pergranulata subsp. divaricata	Samphire	2
Elapidae	Vermicella annulata	Bandy-bandy	2
Campanulaceae	Wahlenbergia tumidifructa	Swollen-fruit Bluebell	2
Accipitridae	ACCIPITRIDAE		1
Malvaceae	Abutilon fraseri	Dwarf Lantern-flower	1
Fabaceae	Acacia petraea	Lancewood	1
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed	1
Chenopodiaceae	Atriplex limbata	Spreading Saltbush	1
Chenopodiaceae	Atriplex spongiosa	Small Pop Saltbush	1
Nyctaginaceae	Boerhavia coccinea	Scarlet Spiderling	1
Goodeniaceae	Brunonia australis	Blue Pincushion	1
Scolopacidae	Calidris (Erolia) ferruginea	Curlew Sandpiper	1
Amaryllidaceae	Calostemma luteum	Yellow Garland-lily	1
Cacatuidae	Calyptorhynchus (Calyptorhynchus) banksii samueli	Inland Red-tailed Black-cockatoo	1
Capparaceae	Capparis loranthifolia var. loranthifolia	Narrow-leafed Bumble	1
Asteraceae	Centipeda pleiocephala	Tall Sneezeweed	1
Charadriidae	Charadrius (Charadrius) leschenaultii	Greater Sand Plover	1
Pteridaceae	Cheilanthes lasiophylla	Woolly Cloak-fern	1
Cinclosomatidae	Cinclosoma (Malleeavis) castanotum	Chestnut Quail-thrush	1
Scincidae	Coeranoscincus reticulatus	Three-toed Snake-tooth Skink	1
Convolvulaceae	Convolvulus clementii	Desert Bindweed	1
Convolvulaceae	Convolvulus graminetinus	Grassland Bindweed	1
Fabaceae	Crotalaria cunninghamii	Green Bird Flower	1
Scincidae	Ctenotus olympicus	Saltbush Striped Skink	1
Fabaceae	Cullen australasicum	Native Scurf-pea	1
Fabaceae	Cullen cinereum	Annual Scurf-pea	1
Fabaceae	Cullen tenax	Emu-foot	1
Chenopodiaceae	Dissocarpus biflorus var. biflorus	Twin-flower Saltbush	1
Poaceae	Echinopogon ovatus	Common Hedgehog-grass	1
Meliphagidae	Epthianura (Aurepthianura) crocea	Yellow Chat	1
Poaceae	Eragrostis lanicaulis	Lovegrass	1
Scrophulariaceae	Eremophila maculata subsp. maculata	Spotted Fuchsia	1
Asteraceae	Ethuliopsis cunninghamii	Tall Nut-heads	1
Boraginaceae	Euploca geocharis		1
Goodeniaceae	Goodenia collaris		1
Goodeniaceae	Goodenia heteromera	Spreading Goodenia	1
Goodeniaceae	Goodenia lunata	Stiff Goodenia	1
Haloragaceae	Haloragis aspera	Rough Raspwort	1
Malvaceae	Hibiscus krichauffianus	Velvet-leaf Hibiscus	1
Apodidae	Hirundapus caudacutus	White-throated Needletail	1
Cacatuidae	Lophochroa leadbeateri leadbeateri	Major Mitchell's Cockatoo	1
Cacatuidae	Lophochroa leadbeateri	Major Mitchell's Cockatoo	1
Accipitridae	Lophoictinia isura	Square-tailed Kite	1
Diplodactylidae	Lucasium steindachneri	Box-patterned Gecko	1
Chenopodiaceae	Maireana pentagona	Slender Fissure-plant	1
Chenopodiaceae	Malacocera tricornis	Soft Horns	1
Petroicidae	Melanodryas (Melanodryas) cucullata cucullata	South-eastern Hooded Robin	1
Asteraceae	Minuria denticulata	Woolly Minuria	1
Asteraceae	Minuria		1
Pythonidae	Morelia spilota variegata		1

Psittacidae	Neophema (Neonanodes) elegans	Elegant Parrot	1
Psittacidae	Neophema (Neophema) pulchella	Turquoise Parrot	1
Menyanthaceae	Nymphoides crenata	Wavy Marshwort	1
Agamidae	Pogona barbata	Common Bearded Dragon	1
Pomatostomidae	Pomatostomus (Pomatostomus) temporalis	Grey-crowned Babbler	1
Gentianaceae	Schenkia australis	Schenkia	1
Chenopodiaceae	Sclerolaena ventricosa	Salt Bindyi	1
Fabaceae	Senna artemisioides subsp. artemisioides	Cassia	1
Fabaceae	Sesbania cannabina var. cannabina	Sesbania Pea	1
Poaceae	Sporobolus caroli	Yakka Grass	1
Brassicaceae	Stenopetalum lineare	Narrow Thread-petal	1
Anatidae	Stictonetta naevosa	Freckled Duck	1
Fabaceae	Swainsona flavicarinata	Yellow-keel Swainson-pea	1
Phasianidae	Synoicus ypsilophora australis	Swamp Quail	1
Phyllanthaceae	Synostemon trachyspermus	Rough-seed Spurge	1
Scincidae	Tiliqua multifasciata	Centralian Blue-tongue	1
Fabaceae	Trigonella suavissima	Sweet Fenugreek	1
Scolopacidae	Tringa (Glottis) nebularia	Common Greenshank	1

Migratory species

Number of migratory species: **0**

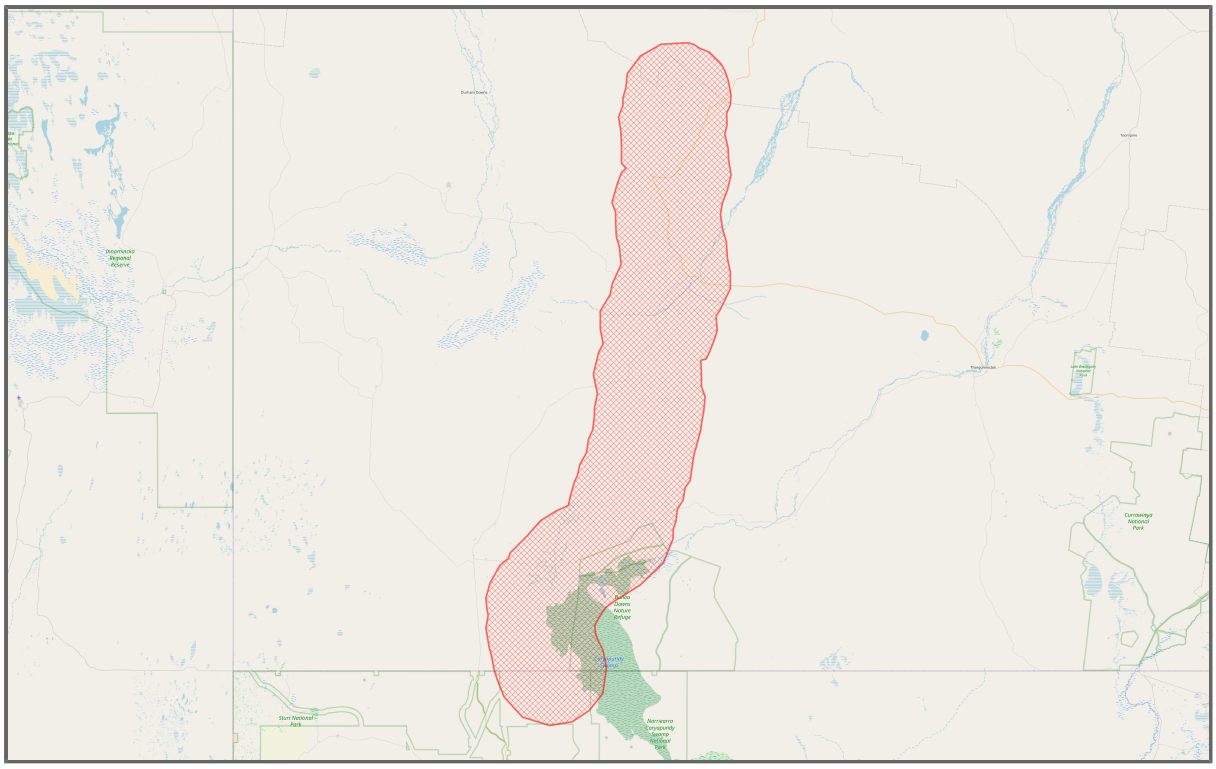


Figure 3 : Map of Migratory species

Table 2: Migratory species (Link to full list)

Family	*Scientific Name*	Common Name	No. Occurrences

Further Links

Geoscience Australia: http://www.ga.gov.au/
Global Biodiversity Information Facility: https://www.gbif.org/
Threatened Species & Ecological Communities: https://www.environment.gov.au/topics/threatened-species-ecological-communities
WWF Ecoregions: https://worldwildlife.org/biomes
Environmental Resources Information Network (ERIN): https://www.environment.gov.au/topics/science-and-research/databases-and-maps/erin
Australian National Fish Expert Distributions: https://collections.ala.org.au/public/show/dr803
Lists of Australian endemic species: http://Intreasures.com/australia.html

Federal

Department of Climate Change, Energy, the Environment and Water: https://www.dcceew.gov.au

State/Territory

Australian Capital Territory

Environment and Sustainable Development Directorate: https://www.act.gov.au/environment

New South Wales

Department of Climate Change, Energy, the Environment and Water: https://www.environment.nsw.gov.au

Northern Territory

Department of Lands, Planning and Environment: https://environment.nt.gov.au

Queensland

Department of the Environment, Tourism, Science and Innovation: https://environment.qld.gov.au

South Australia

Department for Environment and Water: https://www.environment.sa.gov.au

Tasmania

Department of Natural Resources and Environment Tasmania: https://nre.tas.gov.au

Victoria

Department of Energy, Environment and Climate Action: https://www.deeca.vic.gov.au

Western Australia

Department of Biodiversity, Conservation and Attractions: https://www.dbca.wa.gov.au

References

1. Lymburner, L., Tan, P., Mueller, N., Thackway, R., Lewis, A., Thankappan, M., Randall, L., Islam, A. and Senarath, U. (2010). 250 metre Dynamic Land Cover Dataset of Australia (1st Edition), Geoscience Australia, Canberra.
2. Olson, D. M., Dinerstein, E., Wikramanayake, E. D., Burgess, N. D., Powell, G. V. N., Underwood, E. C., D'Amico, J. A., Itoua, I., Strand, H. E., Morrison, J. C., Loucks, C. J., Allnutt, T. F., Ricketts, T. H., Kura, Y., Lamoreux, J. F., Wettengel, W. W., Hedao, P. and Kassem, K. R. (2001). Terrestrial ecoregions of the world: a new map of life on Earth. Bioscience 51(11):933-938.
3. Commonwealth of Australia (2006). A Guide to the Integrated Marine and Coastal Regionalisation of Australia Version 4.0. Department of the Environment and Heritage, Canberra, Australia.
4. Spalding, M.D., Fox, H.E., Allen, G.R., Davidson, N., Ferdaña, Z.A., Finlayson, M., Halpern, B.S., Jorge, M.A., Lombana, A., Lourie, S.A., Martin, K.D., McManus, E., Molnar, Jennifer, Recchia, C.A. and Robertson, J. (2007). Marine Ecoregions of the World: A Bioregionalization of Coastal and Shelf Areas. Bioscience 57(7): 573–583.
https://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/colorado/scienceandstrategy/marine-ecoregions-of-the-world.pdf
5. Abell, R., Thieme, M.L., Revenga, C., Bryer, M., Kottelat, M., Bogutskaya, N., Coad, B., Mandrak, N., Contreras Balderas, S., Bussing, W., Stiassny, M.L.J., Skelton, P., Allen, G.R., Unmack, P., Naseka, A., Ng, R., Sindorf, N., Robertson, J., Armijo, E., Higgins, J.V., Heibel, T.J., Wikramanayake, E., Olson, D., Lopez, H.L., Reis, R.E., Lundberg, J.G., Sabaj Pérez, M.H. and Petry, P. (2008). Freshwater Ecoregions of the World: A new map of biogeographic units for freshwater biodiversity conservation. BioScience 58(5): 403-414.
http://www.feow.org/download/Abell_et_al_08_BioScience.pdf
6. Crisp, M.D., Laffan, S. Linder, H.P. and Monro, A. (2001). Endemism in the Australian flora. Journal of Biogeography 28: 183-198.
7. Atlas of Living Australia (2013). Spatial Portal Help: Area Report. https://www.ala.org.au/spatial-portal-help/area-report/
8. Commonwealth of Australia (2013). Migratory Species in Australia. Department of the Environment, Canberra.
https://www.environment.gov.au/topics/biodiversity/migratory-species
9. Atlas of Living Australia (2013). FAQ: Data Sensitivity. https://www.ala.org.au/faq/data-sensitivity/
10. Commonwealth of Australia (2010). Gazetteer of Australia Place Name Search. Geoscience Australia, Canberra.
http://www.ga.gov.au/place-names/
11. NASA Earth Observatory (2000). Net Primary Productivity. https://earthobservatory.nasa.gov/GlobalMaps/view.php?d1=MOD17A2_M_PSN
12. Belbin, L., Wallis, E., Hobern, D. and Zerger, A. (2021). The Atlas of Living Australia: History, current state and future directions. Biodiversity Data Journal 9: e65023. https://doi.org/10.3897/BDJ.9.e65023

Point No.	Latitiude	Longitude	Kingdom	Class	Scientific name	Common name	NC status	EPBC Status	Records	ALA location	Last record
1	-27.0876	142.6699	Animalia	Mammalia	Tachyglossus aculeatus	short-beaked echidna	SL	-	2	-27.1301, 142.7864	Oct-2012
			Plantae	Equisetopsida	Santalum lanceolatum	northern sandalwood	SL	-	1	NA	NA
2	-27.1763	142.6566	Animalia	Mammalia	Tachyglossus aculeatus	short-beaked echidna	SL	-	2	-27.1301, 142.7864	Oct-2012
3	-27.2662	142.6576	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	1	-27.365, 142.6178	NA
			Animalia	Mammalia	Tachyglossus aculeatus	short-beaked echidna	SL	-	1	-27.1301, 142.7864	Oct-2012
4	-27.3548	142.666	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	3	-27.4661, 142.6367	Aug-2004
5	-27.438	142.6375	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	3	-27.4661, 142.6367	Aug-2004
6	-27.5275	142.6383	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	4	-27.6558, 142.6883	May-2024
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	1	-27.68, 142.73	NA
7	-27.6098	142.6547	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	4	-27.6558, 142.6883	May-2024
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-27.7263, 142.7165	Aug-1994
			Animalia	Aves	Tringa nebularia	common greenshank	E	E	1	-27.7667, 142.6333	Oct-2001
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	2	-27.7628, 142.6246	Aug-2024
8	-27.6976	142.6684	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	4	-27.6558, 142.6883	May-2024
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-27.82, 142.5923	Aug-2021
			Animalia	Aves	Falco hypoleucos	grey falcon	V	V	2	-27.7, 142.6	Jul-2017
			Animalia	Aves	Grantiella picta	painted honeyeater	V	V	3	-27.82, 142.5923	Jun-2024
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	3	-27.7628, 142.6246	Aug-2024
			Plantae	Equisetopsida	Rhodanthe rufescens	-	NT	-	1	-27.8068, 142.5929	Aug-1987
			Animalia	Aves	Tringa nebularia	common greenshank	E	E	1	-27.7667, 142.6333	Oct-2001
9	-27.7703	142.6211	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	5	-27.6558, 142.6883	May-2024
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-27.82, 142.5923	Aug-2021
			Animalia	Aves	Falco hypoleucos	grey falcon	V	V	2	-27.7, 142.6	Jul-2017
			Animalia	Aves	Grantiella picta	painted honeyeater	V	V	3	-27.82, 142.5923	Jun-2024
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	2	-27.8651, 142.5346	May-1977
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	3	-27.7628, 142.6246	Aug-2024
			Plantae	Equisetopsida	Rhodanthe rufescens	-	NT	-	1	-27.8068, 142.5929	Aug-1987
			Animalia	Aves	Tringa nebularia	common greenshank	E	E	1	-27.7667, 142.6333	Oct-2001
10	-27.8568	142.6191	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	4	-27.8, 142.5833	Aug-2007
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-27.82, 142.5923	Aug-2021
			Animalia	Aves	Falco hypoleucos	grey falcon	V	V	2	-27.7, 142.6	Jul-2017
			Animalia	Aves	Grantiella picta	painted honeyeater	V	V	3	-27.82, 142.5923	Jun-2024
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	2	-27.8651, 142.5346	May-1977
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	2	-27.7628, 142.6246	Aug-2024
			Plantae	Equisetopsida	Rhodanthe rufescens	-	NT	-	1	-27.8068, 142.5929	Aug-1987
			Animalia	Aves	Tringa nebularia	common greenshank	E	E	1	-27.7667, 142.6333	Oct-2001
11	-27.9363	142.5795	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	3	-27.8, 142.5833	Aug-2007
			Animalia	Aves	Falco hypoleucos	grey falcon	V	V	2	-27.9, 142.6	NA
			Animalia	Aves	Grantiella picta	painted honeyeater	V	V	3	-27.82, 142.5923	Jun-2024
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	2	-27.8651, 142.5346	May-1977
			Animalia	Aves	Plegadis falcinellus	glossy ibis	SL	-	1	-27.7628, 142.6246	Aug-2024
			Plantae	Equisetopsida	Rhodanthe rufescens	-	NT	-	1	-27.8068, 142.5929	Aug-1987
			Animalia	Aves	Tringa nebularia	common greenshank	E	E	1	-27.7667, 142.6333	Oct-2001
12	-28.0214	142.5609	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	1	-27,91, 142.41	Aug-1978
			Animalia	Aves	Falco hypoleucos	grey falcon	V	V	1	-27.9, 142.6	NA
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	2	-27.8651, 142.5346	May-1977
			Plantae	Equisetopsida	Santalum lanceolatum	northern sandalwood	SL	-	1	-28.0569, 142.3689	Apr-2008
13	-28.1115	142.5696				NA					
14	-28.1996	142.5553				NA					
15	-28.2875	142.5326				NA					
16	-28.3711	142.4989	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	1	-28.5247, 142.5386	Jul-1999
			Plantae	Equisetopsida	Wahlenbergia tumidifructa	-	SL	-	2	NA	NA
17	-28.456	142.4652	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	1	-28.5247, 142.5386	Jul-1999
			Plantae	Equisetopsida	Wahlenbergia tumidifructa	-	SL	-	2	-28.5509, 142.5026	NA
18	-28.5449	142.4486	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	5	-28.63, 142.3164	Jul-1999
			Animalia	Aves	Hydroprogne caspia	caspian tern	SL	-	1	-28.6827, 142.4006	Aug-1994
			Plantae	Equisetopsida	Lobelia darlingensis	-	SL	-	1	-28.636, 142.5135	Aug-2023
			Plantae	Equisetopsida	Wahlenbergia capillaris	-	SL	-	2	-28.6389, 142.5151	Aug-2022
			Plantae	Equisetopsida	Wahlenbergia graniticola	granite bluebell	SL	-	1	-28.691, 142.3621	Aug-2022
			Plantae	Equisetopsida	Wahlenbergia tumidifructa	-	SL	-	2	-28.5509, 142.5026	NA
19	-28.599	142.371	Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	7	-28.63, 142.3164	Jul-1999
			Animalia	Aves	Cacatua leadbeateri leadbea	pink cockatoo	E	E	1	-28.7068, 142.2929	Jun-1975
			Animalia	Aves	Hydroprogne caspia	caspian tern	SL	-	1	-28.6827, 142.4006	Aug-1994
			Plantae	Equisetopsida	Lobelia darlingensis	-	SL	-	1	-28.636, 142.5135	Aug-2023
			Plantae	Equisetopsida	Santalum lanceolatum	northern sandalwood	SL	-	1	-28.5914, 142.2425	Apr-2008
			Plantae	Equisetopsida	Wahlenbergia capillaris	-	SL	-	2	-28.6389, 142.5151	Aug-2022
			Plantae	Equisetopsida	Wahlenbergia graniticola	granite bluebell	SL	-	1	-28.691, 142.3621	Aug-2022
			Plantae	Equisetopsida	Wahlenbergia tumidifructa	-	SL	-	2	-28.5509, 142.5026	Aug-2022
20	-28.6421	142.2829	Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	1	-28.8, 142.2	Sep-1985
			Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	8	-28.6827, 142.3829	Aug-1994
			Animalia	Aves	Cacatua leadbeateri leadbea	pink cockatoo	E	E	2	-28.7068, 142.2929	Jun-1975
			Animalia	Aves	Hydroprogne caspia	caspian term	SL	-	1	-28.6827, 142.4006	Aug-1994
			Plantae	Equisetopsida	Lobelia darlingensis	-	SL	-	1	-28.6991, 142.3621	Aug-2022
			Plantae	Equisetopsida	Santalum lanceolatum	northern sandalwood	SL	-	1	-28.5914, 142.2425	Apr-2008
			Plantae	Equisetopsida	Wahlenbergia graniticola	granite bluebell	SL	-	1	-28.691, 142.3621	Aug-2022
21	-28.709	142.2161	Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	6	-28.8, 142.3	Apr-2025
			Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	8	-28.63, 142.3164	Jul-1999
			Animalia	Aves	Cacatua leadbeateri leadbea	Pink Cockatoo	E	E	2	-28.7068, 142.2929	Jun-1975
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-28.7833, 142.1754	Oct-2018
			Plantae	Equisetopsida	Grevillea kennedyana	-	V	V	1	-28.7614, 142.0958	Oct-1998
			Animalia	Aves	Hydroprogne caspia	caspian tern	SL	-	1	-28.7614, 142.0958	Oct-1998
			Plantae	Equisetopsida	Lobelia darlingensis	-	SL	-	1	-28.691, 142.3621	Aug-2022
			Animalia	Aves	Pedionomus torquatus	plains wanderer	CR	CE	1	-28.7943, 142.1721	Aug-1985
			Plantae	Equisetopsida	Santalum lanceolatum	northern sandalwood	SL	-	1	-28.5914, 142.2425	Apr-2008
			Plantae	Equisetopsida	Wahlenbergia graniticola	granite bluebell	SL	-	1	-28.691, 142.3621	Aug-2022

			Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	264	-28.8, 142.3	Apr-2025
			Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	4	-28.9397, 142.2131	Aug-2002
			Animalia	Aves	Cacatua leadbeateri leadbea	pink cockatoo	E	E	2	-28.7068, 142.2929	Jun-1975
22	-28.7688	142.1575	Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-28.7833, 142.1754	Oct-2018
			Plantae	Equisetopsida	Grevillea kennedyana	-	V	V	3	-28.8504, 142.0676	Dec-2013
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	2	-28.9283, 142.2208	Aug-1999
			Animalia	Aves	Pedionomus torquatus	plains wanderer	CR	CE	1	-28.7943, 142.1721	Aug-1985
			Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	270	-29, 142.2	Aug-2025
			Animalia	Aves	Aphelocephala leucopsis	southern whiteface	V	V	2	-28.9397, 142.2131	Aug-2002
			Animalia	Aves	Cacatua leadbeateri leadbea	pink cockatoo	E	E	1	NA	NA
23	-28.8589	142.1545	Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	2	-28.948, 142.2112	Oct-2018
			Animalia	Aves	Epthianura crocea crocea	yellow chat (gulf)	V	-	1	NA	NA
			Plantae	Equisetopsida	Grevillea kennedyana	-	V	V	4	-29.0349, 142.1336	Jun-2017
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	3	-28.9475, 142.2111	Apr-2018
			Animalia	Aves	Pedionomus torquatus	plains wanderer	CR	CE	1	-28.7943, 142.1721	Aug-1985
			Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	271	-29, 142.2	Aug-2025
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	2	-28.948, 142.2112	Oct-2018
24	-28.947	142.1753	Animalia	Aves	Epthianura crocea crocea	yellow chat (gulf)	V	-	1	NA	NA
			Plantae	Equisetopsida	Grevillea kennedyana	-	V	V	3	-29.0407, 142.1512	Jun-2017
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	3	-28.9475, 142.2111	Apr-2018
			Animalia	Aves	Pedionomus torquatus	plains wanderer	CR	CE	1	-29, 142	Apr-2021
			Animalia	Aves	Amytornis barbatus	grey grasswren	NT	-	265	-29, 142.2	Aug-2025
			Animalia	Aves	Calidris acuminata	sharp-tailed sandpiper	V	V	1	-28.948, 142.2112	Oct-2018
25	-28.999	142.2001	Animalia	Aves	Epthianura crocea crocea	yellow chat (gulf)	V	-	1	NA	NA
			Plantae	Equisetopsida	Grevillea kennedyana	-	V	V	2	-29.0407, 142.1512	Jun-2017
			Animalia	Aves	Neophema chrysostoma	blue-winged parrot	V	V	3	-28.9475, 142.2111	Apr-2018

Appendix B

Habitat and watercourse (Water Act 2000) assessment results

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 1	**0.3**	**26 (Poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of inundation. Substrate is uniform and comprises silt, clay and sand. The left bank is moderately stable and low sloping with little to no riparian vegetation along the banks. Heavy cattle access and severe degradation of the right bank was noted. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic flora/fauna species were present at the site. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This site was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

<table>
<tr><th>Site ID:</th><th>Approximate KP:</th><th>Bioassessment Condition Score:</th><th>Waterway barrier work classification:</th></tr>
<tr><td>Aquatic site 2</td><td>2</td><td>29 (poor)</td><td>Low Risk (Green)</td></tr>
<tr><td>Habitat characteristics:</td><td colspan="3">The waterway is ephemeral and was dry at the time of the survey.
Site comprises a straight channel that is a mixture of silt, sand and clay soils with banks that are moderately steep and moderately unstable. There was highly disturbed riparian vegetation due to historical clearing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic flora/fauna species were present at the site.
There were no existing barriers to fauna movement within the surveyed reach.</td></tr>
<tr><td>Photographs:</td><td colspan="3">
Upstream

Left bank.

Downstream

Right bank</td></tr>
<tr><td>Waterway determination:</td><td colspan="3">The waterway is unmapped under the Water Act 2000 watercourse identification layer. This site was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the Water Act 2000.</td></tr>
</table>

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 2A	**2**	**47 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprises a straight channel that is a mixture of silt and sandy soils with some gravel and pebble inclusions. The banks are moderately steep and moderately unstable. There was highly disturbed riparian vegetation due to historical clearing. In periods of flow, there would be minimal aquatic habitat present as there was little evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic flora/fauna species were present at the site. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	Upstream  Left bank. 	Downstream  Right bank 	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 3	**3.7**	**33 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a mildly sinuous channel with heavy sediment deposits and areas of erosion. There was evidence of cattle access and riparian clearing for grazing. Channal contained unstable, low banks with little vegetation cover. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic flora/fauna species were present at the site. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 4	**4.5**	**38 (poor)**	**Moderate Risk (Amber) and Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. The site comprised two waterway channels with the confluence downstream of the originally proposed crossing. The new proposed crossing is at site 4A (below), and these waterways are upstream of this site. In both channels, the substrate comprised silt, sand and clay. Banks were moderately sloped with moderate stability. There was evidence of riparian vegetation clearing and degradation of banks from cattle access. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging bank vegetation such as rushes, woody debris or cobbled substrate). No aquatic flora/fauna species were present during field surveys. There were no existing barriers to fauna movement within the surveyed reaches.		
Photographs:	 Upstream (amber waterway reach)  Upstream (green waterway reach)	 Downstream (amber waterway reach)  Downstream (green waterway reach)	
Waterway determination:	Both waterway reaches are unmapped under the *Water Act 2000* watercourse identification layer. These waterways were assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area only holds water for short periods following extensive rainfall events. These waterways are considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 4A	**40**	**38 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Substrate comprises of uniformed silt/sand. There were steep slopes on both banks with moderate instability. Evidence of riparian vegetation clearing and degradation from cattle. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). There were no barriers to fauna movement within the surveyed reach. No species were present during field surveys.		
Photographs:	 Upstream (amber waterway reach)  Left bank		 Downstream (amber waterway reach)  Right bank
Waterway determination:	Both reaches of the site are unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature with a braided channel. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 5	**18.5**	**30 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised compacted soil of clay and silt. There were steep banks with moderate instability, riparian clearing and evidence of cattle access. Six species of aquatic flora were found in survey area along the banks. There were no existing barriers to fauna movement withing the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 6 (Kercummurra Creek)	**36**	**47 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised uniform, unconsolidated soil of clay with moderately steep banks with moderate instability. Riparian vegetation was dominated by Acacias and Eucalyptus species found present on both banks with thinly disturbed vegetation coverage in the understorey. There was evidence of cattle grazing and access to the channel. One species of aquatic flora was found during field surveys along the banks. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This site was assessed in the post-wet season; however, no water was present. No riverine vegetation communities were observed but riparian vegetation (i.e. Acacia and Eucalyptus trees) were found fringing the channel but are not considered to be aquatic depended species. There were no defined banks or channels, and this lack of definition is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 7	**37**	**68 (fair)**	**High Risk (Red)**
Habitat characteristics:	There was low flow (<0.1 m/s) present at the time of survey, and the site was dominated by pool habitat. The banks were moderately stable with steep slopes. There was evidence of heavy cattle usage and riparian vegetation clearing for grazing. Aquatic habitat comprised trailing roots, algae, large woody debris and deep pools. The waterway acted as a refuge for fish and aquatic invertebrates; however, there were minimal aquatic plants along the banks. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act* 2000 watercourse identification layer. The waterway had evidence of flow during the field survey in the post-wet season and had defined bed and banks in an inundated channel. No riverine vegetation communities were observed during field surveys. Nonetheless, this area is considered to meet the definition of a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 7A	**37**	**41 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised uniform, sandy soil with steep banks with moderate stability. Riparian vegetation was dominated by Eucalyptus species found present on both banks. There was evidence of cattle grazing in surrounding land use. Two species of aquatic flora was found during field surveys along the banks. There is evidence of potential fish habitat (woody debris) that would be present during flow. There were no existing barriers to fauna movement within the surveyed reach. No aquatic fauna species were observed in survey area.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The watercourse is unmapped under the *Water Act* 2000 watercourse identification layer. The watercourse had evidence of flow during the field survey in the post-wet season. The watercourse was found to have defined banks and an inundated channel. No riverine vegetation communities or aquatic species were observed during field surveys. This area is considered to meet the definition of a 'watercourse' as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 8	**37**	**37 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised an irregular channel with uniform soil comprising primarily of sand. The channel had low bank with moderate stability. Riparian vegetation on both banks was degraded from access by cattle. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic species recorded on site during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sand substrate indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 9	**41.2**	**42 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a cobble and gravel substrate embedded into silt/clay. The banks were low and moderately stable. There was evidence of moderate grazing intensity. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic species recorded on site during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble/gravel substrate, indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 10	**44**	***NA – no defined channel to assess***	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. The landscape was flat, with no evidence of waterway as there were no defined bed or banks and no riparian vegetation present to indicate a common flow path. No aquatic species were identified during field surveys. In periods of flow, there would be no aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the lack of any defining features this area is unlikely to hold water for any period of time. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 11	**47.3**	**66 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with substrate primarily of clay, pebbles and bedrock moderate compaction in river bed, banks with moderate stability, composition of. Disturbed riparian vegetation on both banks, evidence of degradation through cattle grazing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic species observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing clay/pebble/bedrock substrate, indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 12	**59.1**	**61 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway comprised an isolated pool with extensive filamentous blue-green algae in-stream. The substrate consists of a variety of substrates ranging from clay to bedrock. Banks have moderate stability with steep to vertical slopes. There was water odour due to heavy cattle use, decaying organic matter and surface scum present. Aquatic habitat comprised little overhanging vegetation, varied substrates, trailing roots and shallow to deep pools. The site supported aquatic flora and fauna but were subject to impacts due to cattle access and eutrophication (also due to cattle). Downstream of the site, there was a barrier to fauna movement in the form of culverts under the road crossing.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. The waterway had evidence of flow during the field survey in the post-wet season and no flow in the dry season. The waterway had defined bed and banks, and there was still considerable water pooled in the dry season to indicate a semi-permanent pool of water. No riverine vegetation communities were observed during field surveys. Overall, this waterway would be considered to meet the definition of a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 13	**77**	**50 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was dominated by clay with some sand. Channel banks were steep and unstable with evidence of riparian vegetation clearing for cattle grazing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic flora/fauna species were present during survey. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 14	**79**	**40 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate varies throughout survey area, comprising patches of silt and clay with patches of sand and gravel. There was evidence of freshwater mussels at time of survey along the banks. Banks were moderately steep and unstable with evidence of erosion. Riparian vegetation was continuous and dominated by Acacia trees. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Two species of aquatic flora were recorded during the field surveys; lesser joyweed (*Alternanthera denticulata*) and umbrella cane grass (*Leptochloa digitata*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 15	**84**	**63 (fair)**	**Main channel: Major Risk (Purple)** **Braided channels: High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was reduced to an isolated pool at the time of the survey. Site comprised an irregular channel with substrate dominated by clay. There was evidence of woody debris in-stream with some trailing bank and overhanging vegetation. Banks were steep with moderate levels of instability. Riparian vegetation was disturbed due to cattle grazing and historic clearing. Two aquatic flora species were identified during field surveys; sedge (*Cyperus victoriensis*) and common rush (*Juncus usitatus*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream (post-wet)  Upstream (pre-wet)	 Downstream (post-wet)  Downstream (pre-wet)	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. The waterway had evidence of flow during the field survey in the post-wet season but was not flowing. Water was still present in the dry season with no flow. The waterway was found to have defined bed and banks and would be considered to meet the definition of a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 16	**85**	**40 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was dominated by silt and clay but was moderately compacted. Banks are moderately stable with a steep slope. Riparian vegetation was disturbed due to cattle grazing and historic clearing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). One aquatic flora species was present, nutgrass (*Cyperus dactylotes*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, this indicates that the waterway only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 17	**89.1**	**88 (good)**	**Moderate Risk (Amber)**
Habitat characteristics:	Site comprised an isolated pool within an ephemeral stream system in both the post-wet and dry season. The channel was highly braided with several other dry channels in the vicinity of the surveyed reach. Channel substrate was varied comprising tightly packed hardened clay surrounding a gravel and pebble matrix. Banks were moderately unstable and moderately sloped. During wet season, the watercourse could likely be capable of yielding a greater density of aquatic flora and fauna species as potential aquatic habitat is present including trailing roots, overhaning vegetation and trailing bank vegetation. There was evidence of eutrophication during field surveys with algae present in the isolated pool. Riparian vegetation was fairly continuous and comprised large Eucalyptus trees providing a high cover of shade over the channel. Three aquatic flora species identified during field surveys including sedge (*Cyperus victoriensis*), forked fimbry (*Fimbristylis dichotoma*) and flat spie-sedge (*Eleocharis plana*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing clay/gravel substrate, indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 18	**93**	**28 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate comprises silt and clay that was compacted. Banks were steep with moderate stability; however, the left bank had high erosion over multiple areas. Riparian vegetation was highly disturbed from cattle grazing and historical clearing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). One aquatic species presents during field surveys (i.e. sedge (*Cyperus victoriensis*)). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 19	**94.5**	**30 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a braided channel that is highly disturbed, with little evidence of frequent inundation. Substrate was dominated by silt and clay with lots of deposition and scouring in the main channel. Riparian vegetation was fairly continuous but highly distributed due to historic clearing and cattle access through the site. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Three aquatic plant species were recorded during field surveys; lesser joyweed (*Alternanthera denticulata*), swamp rice grass (*Leersia hexandra*) and sedge (*Cyperus victoriensis*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 20	**95.5**	**38 (poor)**	**High Risk (red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised an irregular channel that is highly disturbed with little evidence of frequent inundation. Substrate is uniform and comprises silt and clay. Riprian vegetation was semi-continuous with an understorey of grasses and a canopy of short trees (i.e. <10m)/ banks were low with moderate stability. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Two aquatic species were identified during field surveys; lesser joyweed (*Alternanthera denticulata*) and sedge (*Cyperus victoriensis*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 21	**104**	**52 (fair)**	**Major Risk (Purple)**
Habitat characteristics:	The waterway is ephemeral and had a small, shallow, isolated pools present during both surveys. Site comprises a straight channel that is highly disturbed and primarily dry with little evidence of frequent inundation. Substrate comprised of sand and clay. Banks were moderately unstable and vertical to steep. In periods of flow, there would be some aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). One species of aquatic plant was recorded during field surveys (i.e. sedge (*Cyperus victoriensis*)). There were no existing barriers to fauna movement within the surveyed reach. Three native aquatic species were observed at this site, including the highest abundance of common yabbies (*Cherax desctructor*) observed across all sites.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period and retained some water in the form of isolated pools. No riverine vegetation communities were observed and with the prevailing clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 22	**112**	**33 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was uniform and comprised silt and clay. Banks were steep and unstable, with many portions eroded and scoured. Riparian vegetation is mostly cleared for cattle grazing. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). No aquatic species were observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing clay substrate that indicates this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 23	**116**	**28 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised an irregular channel that is highly disturbed, with little evidence of frequent inundation. Substrate was uniform and comprised silt and clay. Banks were vertical with heavy erosion particularly at bends and constructions in the channel. Riparian vegetation was mostly cleared and limited to grasses and sparse trees. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Two species of aquatic flora were present during the field surveys; lesser joyweed (*Alternanthera denticulata*) and sedge (*Cyperus victoriensis*). There were no barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 24	**118**	**38 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was reduced to several small, isolated pools at the time of the survey. There was more water present in the dry season than in the post-wet season survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was dominated by silt and clay. The channel was deep and incised with evidence of erosion from high flows and cattle access. No aquatic flora species were present during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream (post-wet)  Upstream (pre-wet) _	 Downstream (post-wet)  Downstream (pre-wet)	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 31	**145**	**53 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was varied ranging from cobbles to clay and silt. Banks were steep and moderately stable with minor signs of erosion. Riparian vegetation was highly disturbed and variable over both banks but predominantly cleared. A yabby carapace was found during July surveys indicating aquatic fauna are present when water is in the channel. Three aquatic flora species were recorded during the field surveys including flat spike-sedge (*Eleocharis plana*), downs nutgrass (*Cyperus bifax*) and swamp rice grass (*Leersia hexandra*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 32	**147**	**29 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. There was very little evidence of defined banks, and the channel was a minor depression in the landscape. Site comprised of primarily clay substrate with some gravel and pebbles. Banks were low and stable with shrub species present in the riparian zone. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of a defined channel to hold water to where it would support aquatic fauna. Two aquatic flora species were recorded during field surveys including forked fimbry (*Fimbristylis dichotoma*) and nardoo (*Marsilea drummondii*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble/gravel substrate this indicates that this area is unlikely to hold water for any period of time. Additionally, there were no defined bed or bank; therefore, this waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 33	**148**	**60 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate is variable and comprised cobble, pebble, gravel, sand, clay and silt with moderate compaction. Both banks are stable with evidence of riparian vegetation clearing; however, *Eucalyptus tereticornis* were present on both banks. Heavy cattle access was noted at the time of survey. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Four species of aquatic flora were identified during field surveys including tall flat-sedge (*Cyperus exaltatus*), flat spike-sedge (*Eleocharis plana*), nardoo (*Marsilea drummondii*) and lesser joyweed (*Alternanthera denticulata*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the highly mixed sand/clay/silt substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 34	**150**	**64 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprises a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate is variable and comprises of cobble and boulders with some sandy areas with moderate compaction. Riparian vegetation had been mostly cleared with only a few sparse trees in the landscape. The site is located downstream of several anabranching channels, which have confluence downstream of the surveyed reach. Overall, the channel did not have defined bed or banks and in periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). One species of aquatic flora was identified during field surveys (i.e. forked fimbry (*Fimbristylis dichotoma*)). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 35	**152**	**66 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a braided channel that is highly disturbed, with little evidence of frequent inundation. Substrate was varied comprising cobble, sand, and clay. There were no defined bed or banks. Riparian vegetation was mostly cleared and limited to some trees with an understorey of pasture grasses. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). Two species of aquatic flora were recorded during field surveys' nardoo (*Marsilea drummondii*) and forked fimbry (*Fimbristylis dichotoma*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble/gravel substrate that indicates that this area is unlikely to hold water for any period of time. There were no defined bed or banks; therefore, this waterway is considered to meet the definition of a 'drainage feature' and is not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 36	**153**	**50 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate comprised cobble, pebbles, sand and clay. There was no defined bed or banks, and riparian vegetation was historically cleared riparian vegetation from cattle. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris or cobbled substrate). There were no aquatic species observed during field surveys. There were no barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. There are no defined bed or banks, and this waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 37	**155**	**66 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised an irregular channel that is highly disturbed, with little evidence of frequent inundation. Substrate is varied comrising cobble, pebbles, sand and clay with moderate compaction. The left bank was steep, comprised of clay and was moderately unstable. The right bank was low with moderate stability, comprised of clay, cobble and pebbles. Both banks had sparse Eucalyptus species, and the right bank had Acacias in the riparian zone. Overall, riparian vegetation was historically cleared with evidence of cattle grazing in, adjacent to, and upstream of watercourse. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). Two aquatic species were recorded during field surveys; dirty dora (*Cyperus difformis*) and flat spike-sedge (*Eleocharis plana*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. There were no defined bed or banks, and this waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 38	**157**	**59 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was reduced to a muddy isolated pool downstream of an existing dirt access track. There was no flow and substrate comprised cobble intermixed with areas of mud and silt deposition. Banks were moderately sloped with moderate stability. Riparian vegetation was mostly cleared with both banks having sparse Eucalyptus and Acacia trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). Three aquatic plants were recorded during the survey; sedge (*Cyperus victoriensis*), flat spike-sedge (*Eleocharis plana*) and dirty dora (*Cyperus difformis*). The existing dirt access track provided a minor barrier to fauna movement within the surveyed reach creating an uneven channel bed level; however, this would only impede fauna movement in periods of no flow when most fauna would likely be resting in refuge pools rather than migrating.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period and a small portion of the site was inundated, with presence of usage by cattle. No riverine vegetation communities were observed and with the prevailing mud/silt substrate this indicates that this area only holds water for short to moderate periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 39	**158**	**13 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was uniform comprising unconsolidated silt and clay. Both banks were steep and unstable with signs of erosion. Riparian vegetation was historically cleared and there was evidence of cattle grazing in, adjacent to, and upstream of watercourse. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic species was recorded during field surveys (*Marsilea drummondii*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area is unlikely to hold water for any period of time. This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 40	**160**	**70 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was a singular deep isolated pool. The water level lowered considerably in the dry season reducing the site to a shallow isolated pool and algal growth was occurring on the substrate throughout the channel. Substrate was uniform comprising moderately compacted silt and clay. The left bank was low sloped with moderate stability, while the right bank was vertical and unstable with heavy erosion. Riparian vegetation on both banks was cleared, and sparse Eucalyptus trees grew in the channel. During periods of flow, the waterway would have a variety of aquatic habitat present. Aquatic habitat in the isolated pool comprised large woody debris, variable substrate, trailing bank vegetation and overhanging vegetation. There were five aquatic flora species recorded during field surveys including nutgrass (*Cyperus dactylotes*), lesser joyweed (*Alternanthera denticulata*), flat spike-sedge (*Eleocharis plana*), swamp rice grass (*Leersia hexandra*), and stonewart (*Chara* species), a submerged grgeen algae species. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	This waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet and dry period with water present in both seasons. No riverine vegetation communities were observed; however, there was defined bed and banks with a deep waterhole providing refuge for aquatic fauna. This waterway would be considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 42	**165**	**55 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consists of uniform, moderately compacted silt and clay. Both banks were steep and unstable with evidence of erosion. Riparian vegetation was mostly cleared with sparse Eucalyptus tree species along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic species was observed during field surveys (*Marsilea drummondii*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 45	**170**	**29 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised an irregular channel that is highly disturbed, with little evidence of frequent inundation. Substrate consists of uniform, moderately compacted silt, sand and clay. Both banks were vertical and unstable with many eroded areas. Riparian vegetation was mostly cleared with a few sparse juvenile trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed during field surveys, lesser joyweed (*Alternanthera denticulata*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/sand substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 46	**174**	**47 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was varied with cobble, pebble, gravel, sand, silt and clay. The left bank was steep and moderately unstable, while the right bank has a low slope and is moderately stable. Riparian vegetation was mostly cleared with only a few sparse trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed during field surveys, channel nutgrass (*Cyperus victoriensis*) There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 47	**176**	**47 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consists of uniform, moderately compacted sand, silt and clay with some gravel. Both banks were steep to vertical and had moderate stability with evidence of erosion. Riparian vegetation was mostly cleared and comprised of grasses with sparse Eucalyptus trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). Two aquatic species were observed during field surveys; lesser joyweed (*Alternanthera denticulata*) and channel nutgrass (*Cyperus victoriensis*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 48	**179**	**29 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a mildly sinuous channel that is highly disturbed, with little evidence of frequent inundation. Substrate was varied comprising cobble, pebble, gravel, sand, silt and clay. Both banks were steep to vertical and moderately unstable with evidence of erosion. Riparian vegetation was mostly cleared with some Eucalyptus trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). No aquatic species were observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 49	**182**	**67 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was variable but dominated by sand surrounding boulders, cobbles, pebbles and gravel. Both banks were low sloping and moderately unstable. Riparian vegetation was mostly cleared with some *Eucalyptus tereticornis* trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). Two aquatic flora species were observed during field surveys; common rush (*Juncus usitatus*) and channel nutgrass (*Cyperus victoriensis*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy, cobble substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 50	**184**	**39 (fair)**	**Low Risk (Green)**
Habitat characteristics:	There was no evidence of a waterway as the landscape was flat with no signs of depressions or channels. Substrate was uniform and moderately compact silt and sand. Vegetation was mostly cleared for cattle grazing and no signs of riparian vegetation were present.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. No riverine vegetation communities were observed and there were no defined bed and bank features. This waterway would not meet the definition of a 'drainage feature' or a 'watercourse' as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 51	**183**	**42 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Substrate was variable but dominated by sand with some gravel, silt and clay. Banks were low sloping and moderately stable. Riparian vegetation was mostly cleared with sparse Eucalyptus species present along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). One aquatic flora species was observed during field surveys; channel nutgrass (*Cyperus victoriensis*), along the banks. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 52	**187**	**48 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consists of uniform, moderately compacted sand, silt and clay. Both banks were low sloping and moderately stable. Riparian vegetation was mostly cleared with some shrubs, Eucalyptus and Acacia trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). No aquatic species were observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy/grassy substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 53	**189**	**53 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was varied with a combination of cobble, pebble, gravel, sand, silt and clay. Both banks were low sloping and moderately stable. Riparian vegetation was mostly cleared with some Acacia trees along the banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). No aquatic species were observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy/grassy substrate this indicates that this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 54	**190**	**58 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate was variable with a combination of cobble, pebble, gravel, sand, silt and clay. The left bank was moderately sloped with moderate instability while the right bank was lowly sloped with moderate stability. Riparian vegetation was mostly cleared with a few sparse trees along the banks and thin understorey of pasture grasses. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). Two aquatic flora species were observed during field surveys; forked fimbry (*Fimbristylis dichotoma*) and lesser joyweed (*Alternanthera denticulata*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 55	**192**	**65 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, tightly compacted cobble and pebble matrix surrounded by sand and silt. Both banks were low and stable with no evidence of erosion. Riparian vegetation was mostly cleared with sparse Acacia species present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). Two aquatic flora species were observed during field surveys; forked fimbry (*Fimbristylis dichotoma*) and nardoo (*Marsilea drummondii*), both species were highly desiccated due to the lack of permanent water. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank		 Downstream  Right bank
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing cobble substrate this indicates that this area is unlikely to hold water for any period of time. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 56	**195**	**25 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated sand. The left bank was low and moderately stable with heavy erosion on some banks. The right bank had a moderate slope and was moderately unstable. Riparian vegetation was mostly cleared and sparse. Acacia species were present. Heavy cattle impacts were noted at the time of survey. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. One aquatic species was observed during field surveys (*Marsilea drummondii*).		
Photographs:	 Upstream Left bank	 Downstream Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 58	**202**	**60 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that was highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt and clay. The left bank was steep and moderately unstable. The right bank had a moderate slope and was moderately unstable. Riparian vegetation was highly disturbed and sparse. Cattle impacts were observed during field surveys. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 59	**205**	***NA –no defined channel to assess***	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of survey. There was no evidence of defined banks and no evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt and clay. There was no riparian vegetation, and the land was cleared and highly disturbed. Impacts of cattle was observed across the site. In periods of flow, there would be no aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank		 Downstream  Right bank
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 60	**207**	**34 (poor)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated sand, silt and clay. Both banks were low and moderately stable. Riparian vegetation was highly disturbed, cleared and sparse. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 61	**207**	**35 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt and clay. The left bank was low with moderate stability. The right bank was flat with moderately stability. Riparian vegetation was mostly cleared, and sparse Acacia species were present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 62	**212**	**35 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a curved channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt and clay. The left bank was low/moderate and moderately stable. The right bank was moderate/steep and moderately stable. Riparian vegetation was mostly cleared with sparse Eucalyptus species present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 63	**216**	**33 (poor)**	**High Risk (Red)**
Habitat characteristics:	This floodplain is ephemeral and was dry at the time of the survey. Site comprised multiple braided channels that are highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt and clay. Within the main channel, the left bank was steep and moderately unstable. The right bank was moderate and moderately unstable. Riparian vegetation was mostly cleared with sparse Eucalyptus species on both banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). One aquatic species (*Marsilea drummondii*) was observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 64	**218**	**37 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt, clay, sand, cobble. Both banks were flat with moderate stability. Riparian vegetation was cleared with unknown sparse grass/shrub species on both banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 65	**221**	**36 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt and clay. Both banks had moderate sloping with moderate stability. Riparian vegetation was mostly cleared, with sparse eucalyptus species on both banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). One aquatic species was observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

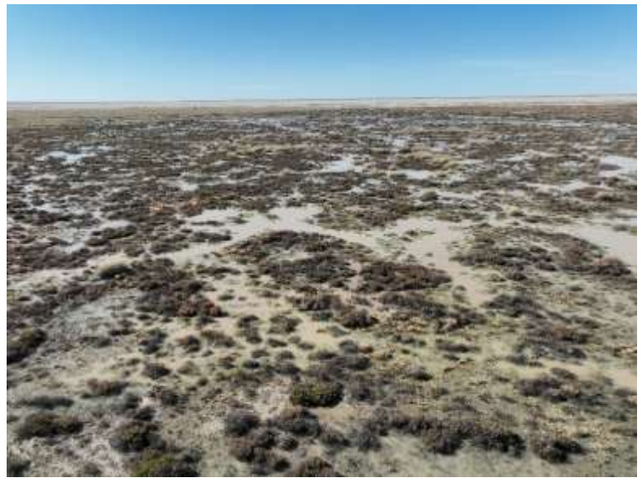
Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 66	**224**	**46 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated clay, silt and sand. Both banks were steep with moderate instability. Riparian vegetation was mostly cleared with sparse Acacia species on both banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 67	**224.6**	**39 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt and clay. Left bank was low and stable. Right bank was steep and unstable, with high erosion. Riparian vegetation was mostly cleared with Eucalypts and Acacia on both banks. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature with a straight channel. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area only holds water for short periods following extensive rainfall events. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 68	**230**	**45 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site had little evidence of defined banks with no evidence of frequent inundation. Substrate consisted of uniform, moderately compacted soil. Banks were flat and stable, with shrub species present in the riparian zone and along the 'bed'. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank.	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 69	**232**	**44 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site had little evidence of defined bed and banks, with no evidence of frequent inundation. Substrate consisted of uniform, moderately compacted soil. TRiparian vegetation was highly disturbed, with shrubs dominating the riparian zone. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 70	**234**	**44 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of tightly compacted pebbles/gravel, surrounded by sand and silt. Both banks were low and moderately stable. Riparian vegetation was mostly cleared, with shrub species present along each bank. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate) There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 71	**184 – Bulloo Lake wetland ~9 km downstream of project footprint**	**N/A – unable to access**	**N/A – Site is a wetland**
Habitat characteristics:	This wetland was inaccessible via vehicle. Drone shots show at time of survey this wetland was holding water, following a flood event. The wetland is fed by the Bulloo catchment and supports numerous migratory bird species. Whilst habitat was not assessed, publicly available information suggests this area is transient aquatic habitat for species requiring permanent water and may support drought and flood-resistant aquatic species (Raymond and Raymond 1969). Vegetation was observed to be low lying, providing little canopy cover.		
Photographs:	 Wetland – water present  Wetland edge	 Wetland edge (close up on vegetation)  Wetland edge	
Waterway determination:	This site was inaccessible and unable to be assessed for waterway determination. However, as a DIWA listed wetland, this area would not be considered a watercourse.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 72	**Reference site X km east of Project footprint**	**65 (fair)**	**Major Risk (Purple)**
Habitat characteristics:	This site was flowing at the time of surveying. Site comprised of a straight channel with variable muddy and cobbled substrates. Banks were vertical and moderately unstable with high evidence of erosion. Riparian vegetation was highly disturbed, with Eucalyptus species present. The site was impacted by eutrophication and highly turbid, with a bovine odour observed. One aquatic species was identified during field surveys (*Cyperus victoriensis*). The bridge has been designed to facilitate fauna passage through the site.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	This waterway is part of Wilson River and as such does not require waterway determination under Water Act 2000.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 73	**West of 83– Cooper Creek – Wilson River Junction**	**49 (fair)**	**Major Risk (Purple)**
Habitat characteristics:	This waterway had a series of shallow, turbid and disconnected pools during survey timing. These pools occurred within an area considered more broadly as wetland habitat (i.e. Cooper Creek – Wilson River Junction). Site comprised a sinuous channel that is disturbed, with evidence of inundation. Substrate consists of uniform, tightly compacted silt and clay. Both banks were low with moderate levels of stability. Both banks had thinly disturbed/cleared riparian vegetation with eucalyptus on both banks. Evidence of cattle grazing in, adjacent to, and upstream of watercourse, as well as cattle and eutrophication directly impacting the site. There were no barriers to fauna movement within the surveyed reach. Two aquatic species were observed during field surveys, and desiccated freshwater crab remains were observed on the banks.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The watercourse is unmapped under the *Water Act 2000* watercourse identification layer. The watercourse had evidence of flow during the field survey in the post-wet season. The watercourse was found to have defined banks and an inundated channel. No riverine vegetation communities or aquatic species were observed during field surveys. This area is considered to meet the definition of a 'watercourse' as relevant to the *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 74	**72 (opportunistic observation)**	**32 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a meandering channel that is highly disturbed, with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt and clay. Both banks were flat and stable. Riparian vegetation was highly disturbed with sparse shrubs present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 75	**83**	**41 (fair)**	**Low Risk (Green)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a moderately sinuous channel with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt/sand/clay with some gravel and cobble inclusions. Both banks were low and moderately unstable. Riparian vegetation was disturbed with Acacia species present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris, cobbled substrate). There were no existing barriers to fauna movement within the surveyed reach. No aquatic species were observed during field surveys.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing sandy substrate, indicates this area is unlikely to hold water for any period of time due to there being no defined banks or channels. This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 76	**31**	**42 (fair)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, unconsolidated silt/sand/clay with some gravel and cobble inclusions. Both banks were low and moderately unstable. Riparian vegetation was disturbed with Eucalypt and Casuarina species present. In periods of flow, there would be minimal aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). Two aquatic flora species were observed, *Alternanthera denticulata*, and *Cyperus victoriensis* within the study reach. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing sandy/grassy substrate this indicates that this area is unlikely to hold water for any period of time This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 77	**117**	**28 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted sand and silt with some gravel and cobble inclusions. Both banks were steep and unstable. Riparian vegetation was disturbed with Acacia species present. In periods of flow, there would be minimal aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed, *Alternanthera denticulata*, within the study reach. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing sandy substrate this indicates that this area is unlikely to hold water for any period of time This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 78	**117**	**23 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted sand and silt with some gravel and cobble inclusions. Both banks were steep and unstable. Riparian vegetation was disturbed with Acacia species present. In periods of flow, there would be minimal aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed, *Cyperus spp.*, within the study reach. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing sandy substrate this indicates that this area is unlikely to hold water for any period of time This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 79	**35**	**30 (poor)**	**High Risk (Red)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt/clay. Banks were low to moderate and moderately unstable. Riparian vegetation was disturbed with Casuarina species present. In periods of flow, there would be minimal aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed, *Alternanthera denticulata.*, within the study reach. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing sandy/grassy substrate this indicates that this area is unlikely to hold water for any period of time. This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 80	**34**	**35 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt/clay. Banks were moderate/steep and moderately unstable. Riparian vegetation was disturbed with Eucalypt and Casuarina species present. In periods of flow, there would be aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was observed, *Alternanthera denticulata.*, within the study reach. There were barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank		 Downstream  Right bank
Waterway determination:	The waterway is unmapped under the *Water Act 2000* watercourse identification layer. This waterway was assessed following a wet period; however, no water was present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate, this indicates that this area only holds water for short periods following extensive rainfall events. This waterway is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 81 (Nockatunga waterhole)	**N/A**	**47 (fair)**	**Major Risk (Purple)**
Habitat characteristics:	This site contained water at the time of survey and would likely hold water for long periods of time. Site comprised of a deep pool within a straight channel with uniform and moderately compact sandy substrate. Banks were steep to moderate and moderately stable. Riparian vegetation was disturbed, with Eucalyptus and Casuarina species present. The site was highly turbid. Two aquatic species were identified during field surveys (*Juncus usitatus* and *Duma florulenta*). There are no existing man-made barriers for fauna passage at this site; however, the site comprised an isolated pool with no connectivity to upstream or downstream reaches.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	This reach is part of Wilson River and would be considered a waterway under *Water Act 2000.*		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 82	**40**	**31 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt/clay. Banks were low and moderately stable. Riparian vegetation was disturbed with Casuarina species present. In periods of flow, there would be minimal aquatic habitat present as there was some evidence of key habitat features (e.g. overhanging vegetation, woody debris). No aquatic flora was observed during field surveys. There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area is unlikely to hold water for any period of time This area is considered to meet the definition of a ‘drainage feature’ and is therefore not considered a ‘watercourse’ as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 83	**37**	**32 (poor)**	**Moderate Risk (Amber)**
Habitat characteristics:	The waterway is ephemeral and was dry at the time of the survey. Site comprised a straight channel with little evidence of frequent inundation. Substrate consisted of uniform, moderately compacted silt/clay. Banks were flat and stable. Riparian vegetation was disturbed with adult Eucalypt and Acacia saplings species present. In periods of flow, there would be minimal aquatic habitat present as there was no evidence of key habitat features (e.g. overhanging vegetation, woody debris). One aquatic flora species was identified during field surveys (*Duma florulenta*). There were no existing barriers to fauna movement within the surveyed reach.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	The site is unmapped under the *Water Act 2000* watercourse identification layer. The site presents an ephemeral drainage feature. This location was assessed during a dry period with no water present. No riverine vegetation communities were observed and with the prevailing silt/clay substrate this indicates that this area is unlikely to hold water for any period of time This area is considered to meet the definition of a 'drainage feature' and is therefore not considered a 'watercourse' as relevant to the *Water Act 2000*.		

Site ID:	Approximate KP:	Bioassessment Condition Score:	Waterway barrier work classification:
Aquatic site 84 (Noccundra waterhole)	**N/A**	**56 (fair)**	**Moderate Risk (Amber)**
Habitat characteristics:	This site contained water at the time of surveying. Site comprised of a deep pool within a straight channel with uniform and moderately compact silt/cobble substrate. Banks were low and moderately stable. Riparian vegetation was disturbed, with scattered Eucalyptus species present. The site was highly turbid, and instream aquatic habitat limited to some woody debris. Two aquatic flora species were identified during field surveys (*Juncus usitatus* and *Duma florulenta*). There are no existing man-made barriers for fauna passage at this site; however, the site comprised an isolated pool with no connectivity to upstream or downstream reaches.		
Photographs:	 Upstream  Left bank	 Downstream  Right bank	
Waterway determination:	This reach is part of Wilson River and would be considered a waterway under *Water Act 2000.*		

Appendix C

Bioassessment results

C-1 July 2025 results

Table C.1 July 2025 bioassessment scores – Aquatic sites 1–21

Habitat variable	Scale	Aquatic site #																			
		1	2	3	4	5	6	7	8	9	11	12	13	14	15	16	17	18	19	20	21
Bottom substrate	0–20	3	3	4	4	3	5	4	5	8	11	10	7	7	5	6	16	3	2	4	4
Embeddedness	0–20	3	3	4	4	3	5	4	5	8	11	10	7	7	5	8	16	3	2	5	4
Velocity and depth category	0–20	0	0	0	0	0	0	10	0	0	0	6	0	0	7	0	5	0	0	0	3
Channel alteration	0–15	3	3	6	6	4	8	8	6	7	11	6	8	6	7	3	11	5	5	6	3
Habitat variable	0–15	3	3	6	7	3	9	11	5	6	10	8	8	5	9	6	11	4	5	3	9
Pool/riffle, run/bend ratio	0–15	0	0	2	2	0	0	8	0	0	0	3	0	2	7	3	7	3	0	5	9
Bank stability	0–10	6	5	4	5	4	6	7	5	4	7	5	6	4	6	4	5	4	3	5	6
Bank vegetation and stability	0–10	4	5	4	5	4	6	7	5	4	8	6	6	4	8	4	8	3	6	5	8
Streamside cover	0–10	4	7	3	5	9	8	9	6	5	8	7	8	5	9	6	9	3	7	5	6
Totals	**0–135**	**26**	**29**	**33**	**38**	**30**	**47**	**68**	**37**	**42**	**66**	**61**	**50**	**40**	**63**	**40**	**88**	**28**	**30**	**38**	**52**
Condition		Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good	Poor	Poor	Poor	Fair

Table C.2 July 2025 bioassessment scores – Aquatic sites 22–50

Habitat variable	Scale	Aquatic site #																		
		22	23	24	31	32	33	34	35	36	37	38	39	40	42	45	46	47	48	49	50
Bottom substrate	0–20	4	4	4	11	4	15	11	12	11	13	10	1	13	8	5	8	8	4	13	1
Embeddedness	0–20	4	4	4	11	4	15	11	12	11	13	10	1	13	8	5	9	7	4	13	14
Velocity and depth category	0–20	0	0	4	0	0	0	0	0	0	0	3	0	5	3	0	0	0	0	0	0
Channel alteration	0–15	6	3	6	6	3	7	11	11	7	10	7	2	9	4	4	6	3	4	9	3
Habitat variable	0–15	7	4	6	8	4	8	11	12	6	10	8	2	10	7	6	10	6	4	10	5
Pool/riffle, run/bend ratio	0–15	0	4	3	2	0	0	0	0	0	0	4	0	5	7	0	0	3	0	0	2
Bank stability	0–10	4	2	3	4	5	5	9	9	5	7	7	1	6	4	2	5	4	4	8	8
Bank vegetation and stability	0–10	4	3	4	6	4	5	6	6	6	6	5	3	5	6	4	5	6	6	7	4
Streamside cover	0–10	4	4	4	5	5	5	5	4	4	7	5	3	4	8	3	4	10	3	7	2
Totals	**0–135**	**33**	**28**	**38**	**53**	**29**	**60**	**64**	**66**	**50**	**66**	**59**	**13**	**70**	**55**	**29**	**47**	**47**	**29**	**67**	**39**
Condition		Poor	Poor	Poor	Fair	Poor	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair	Poor	Fair	Fair

Table C.3 July 2025 bioassessment scores – Aquatic sites 51–73

Habitat variable	Scale	Aquatic site #																					
		51	52	53	54	55	56	57	58	60	61	62	63	64	65	66	67	67A	68	69	70	72	73
Bottom substrate	0–20	7	11	9	12	13	3	3	7	4	5	3	4	6	6	5	4	3	6	7	8	8	4
Embeddedness	0–20	7	9	8	12	13	3	3	7	4	5	3	4	6	6	5	4	3	6	7	8	8	4
Velocity and depth category	0–20	0	0	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	2	5	0	0	5
Channel alteration	0–15	6	5	9	10	11	3	6	7	6	4	6	4	4	5	7	6	7	4	5	7	7	8
Habitat variable	0–15	7	4	9	9	11	3	5	11	5	5	7	6	4	6	7	8	6	4	5	8	8	8
Pool/riffle, run/bend ratio	0–15	0	3	0	0	0	0	0	10	0	4	0	0	4	0	0	0	0	6	2	0	0	5
Bank stability	0–10	5	6	7	6	6	3	4	2	6	4	6	4	5	5	6	6	7	5	5	5	5	6
Bank vegetation and stability	0–10	7	5	7	6	6	5	4	5	6	5	6	6	3	5	8	5	6	6	5	4	4	5
Streamside cover	0–10	3	5	4	3	5	5	4	8	3	3	4	5	4	3	8	6	0	6	3	4	4	4
Totals	**0–135**	**42**	**48**	**53**	**58**	**65**	**25**	**29**	**60**	**34**	**35**	**35**	**33**	**37**	**36**	**46**	**39**	**32**	**45**	**44**	**44**	**65**	**49**
Condition		Fair	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Fair

C-2 October 2025 results

Table C.4 October 2025 bioassessment scores

Habitat variable	Scale	Aquatic site #																			
		2A	4A	7A	15	17	21	24	38	40	74	75	76	77	78	79	80	81	82	83	84
Bottom substrate	0–20	8	5	3	4	14	3	4	12	13	7	4	4	2	1	3	5	3	3	3	8
Embeddedness	0–20	8	5	3	4	14	3	4	12	13	7	4	4	2	1	3	5	3	3	3	8
Velocity and depth category	0–20	0	0	0	7	2	3	5	4	5	0	0	0	0	2	0	0	5	0	0	5
Channel alteration	0–15	5	5	5	7	6	4	7	8	8	4	7	6	4	4	5	3	10	4	3	9
Habitat variable	0–15	7	5	7	7	8	3	7	9	8	4	8	6	3	3	8	5	8	3	5	8
Pool/riffle, run/bend ratio	0–15	6	7	4	5	7	4	5	3	5	5	3	6	4	4	2	3	3	3	5	3
Bank stability	0–10	4	3	6	5	6	4	5	5	5	2	5	5	2	2	4	4	6	5	4	6
Bank vegetation and stability	0–10	4	4	7	6	7	6	6	4	7	3	5	5	4	3	2	5	5	5	5	4
Streamside cover	0–10	5	4	6	7	6	7	5	2	6	3	5	6	7	3	3	5	4	5	4	5
Totals	**0–135**	**47**	**38**	**41**	**52**	**70**	**37**	**48**	**59**	**70**	**35**	**41**	**42**	**28**	**23**	**30**	**35**	**47**	**31**	**32**	**56**
Condition		Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair	Fair	Poor	Fair	Fair	Poor	Poor	Poor	Poor	Fair	Poor	Poor	Fair

Appendix D

Likelihood of occurrence

Table D.5 Likelihood of occurrence assessment

Scientific name	Common name	EPBC Act status	NC Act status	Source	Habitat requirements and distribution	Study area in mapped SPRAT distribution	Nearby historical records	Habitat presence and quality	Recorded during field surveys	Likelihood of occurrence
Conservation significant species										
Chlamydogobius squamigenus	Edgbaston goby	Vulnerable	Critically endangered	WetlandInfo	The Edgbaston Goby (*Chlamydogobius squamigenus)* is restricted to artesian spring-fed mound springs within the Great Artesian Basin discharge springs in arid central Queensland (Fishes of Australia). They occur in shallow pools with clay or silty substrate often with aquatic vegetation and stable spring discharge. The goby's distribution is extremely narrow with only a few spring fed systems in Central Queensland.	No	No – Closest record approximately 540 km north of the project site.	No – The species is associated with spring-fed creeks, that are found only in the Longreach region.	No	**Unlikely to occur** The project site is outside of the species typical distribution; and the species has a specific ecological niche that is unlikely to occur within the study area.
M*accullochella peelii*	Murray cod	–	Vulnerable	WetlandInfo	Murray cod (*Maccullochella peelii*) is endemic to the Murray-Darling basin, occupying freshwater rivers, streams, billabongs and impoundments. Adults favour deep pools and holes with abundant in-stream large woody debris and undercut overhanging banks. These features provide shelter, ambush points for prey and spawning sites. In Queensland, Murray cod typically occur within the Dumaresq, Macintyre, Moonie, Condamine, Balonne and Warrego rivers and associated tributaries.	No	No – Closest record approximately 245 km east of the project site.	No – Suitable habitat for the species does not occur within the project area.	No	**Unlikely to occur** The project site is outside of the species typical distribution; and no suitable habitat occurs within the project site.
Other matters (excluding species)										
Waterways providing for fish passage (WWBW)		N/A	N/A	Queensland Globe	–	N/A	–	–	–	**Confirmed present** The Project site contains 77 mapped waterways providing for fish passage, the majority of which are ephemeral and only convey flow intermittently..
Bulloo Lake nationally important wetland (DIWA)		N/A	N/A	Queensland Globe	–	N/A	–	–	–	**Confirmed present** Bulloo Lake is located within the study area approximately 2.5 km east of the project site, and 9 km downstream.



ghd.com

The Power of Commitment