Aquatic Ecology Assessment Report

Daunia West Infrastructure Project

Whitehaven Daunia Pty Ltd

Prepared by:
SLR Consulting Australia

SLR Project No.: 620.042120.00005
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Revision Record

Revision	Date	Prepared By	Checked By	Details
1.0	8 August 2025	Vanessa Clark & Andrew Mather	Ben Cook	
1.1	28 August 2025	Andrew Mather	Ben Cook	
1.2	4 September 2025	Andrew Mather	Ben Cook	
1.3	11 November 2025	Andrew Mather	Ben Cook	
1.4	14 May 2026	Andrew Mather	Ben Cook	

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Whitehaven Daunia Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Whitehaven Daunia Pty Ltd. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

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Acronyms and Abbreviations

ADR	Accepted Development Requirements
AES	Aquatic Environmental Services
AETG	Aquatic Ecosystem Task Group
ALA	Atlas of Living Australia
ANZG	Australian and New Zealand Guidelines
AquaBAMM	Aquatic Biodiversity Assessment Mapping Method
AUSRIVAS	Australian River Assessment System
Biosecurity Act	*Biosecurity Act 2014*
DGV	Default Guideline Value
DNM	Daunia Mine
DWIP	Daunia West Infrastructure Project
EA	Environmental Authority
EC	Electrical Conductivity
EIS	Environmental Impact Statement
EP Act	*Environmental Protection Act 1994*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EP Regulation	*Environmental Protection Regulation 2019*
EPP	*Environmental Protection (Water and Wetland Biodiversity) Policy 2019*
ERA	Environmentally Relevant Activities
EV	Environmental Values
FRREMP	Fitzroy Basin Regional Receiving Environment Monitoring Program
GBO	General biosecurity obligation
HCVAE	High Conservation Value Aquatic Ecosystem
HES	High Ecological Significance
HEV	High Ecological Value
km	kilometres
ML	Approved Mining Lease under the *Mineral Resources Act 1989*
MNES	Matters of National Environmental Significance
MSES	Matters of State Environmental Significance
NATA	National Association of Testing Authorities
NC Act	*Nature Conservation Act 1992*
OEM	Original equipment manufacturer

Offsets Act	*Environmental Offsets Act 2014*
Offsets Regulation	*Environmental Offsets Regulation 2014*
OOPD	Out of Pit Dump
PET	*Plecoptera/Ephemeroptera/Trichoptera*
Project	The Project is the construction and operation of an out-of-pit dump to the west of, and adjacent to, ML1781, off-lease from DNM
Project Area	The proposed out-of-pit dump to the west of, and adjacent to, ML1781, off-lease from DNM
REMP	Receiving Environment Monitoring Program
SIGNAL-2	Stream Invertebrate Grade Number – Average Level 2
SLR	SLR Consulting Pty Ltd
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
TSS	Total Suspended Solids
VM Act	*Vegetation Management Act 1999*
WHC	Whitehaven Daunia Pty Ltd
WPA	Wetland Protection Area
WQG	Water Quality Guideline
WQO	Water Quality Objective

1.0 Introduction

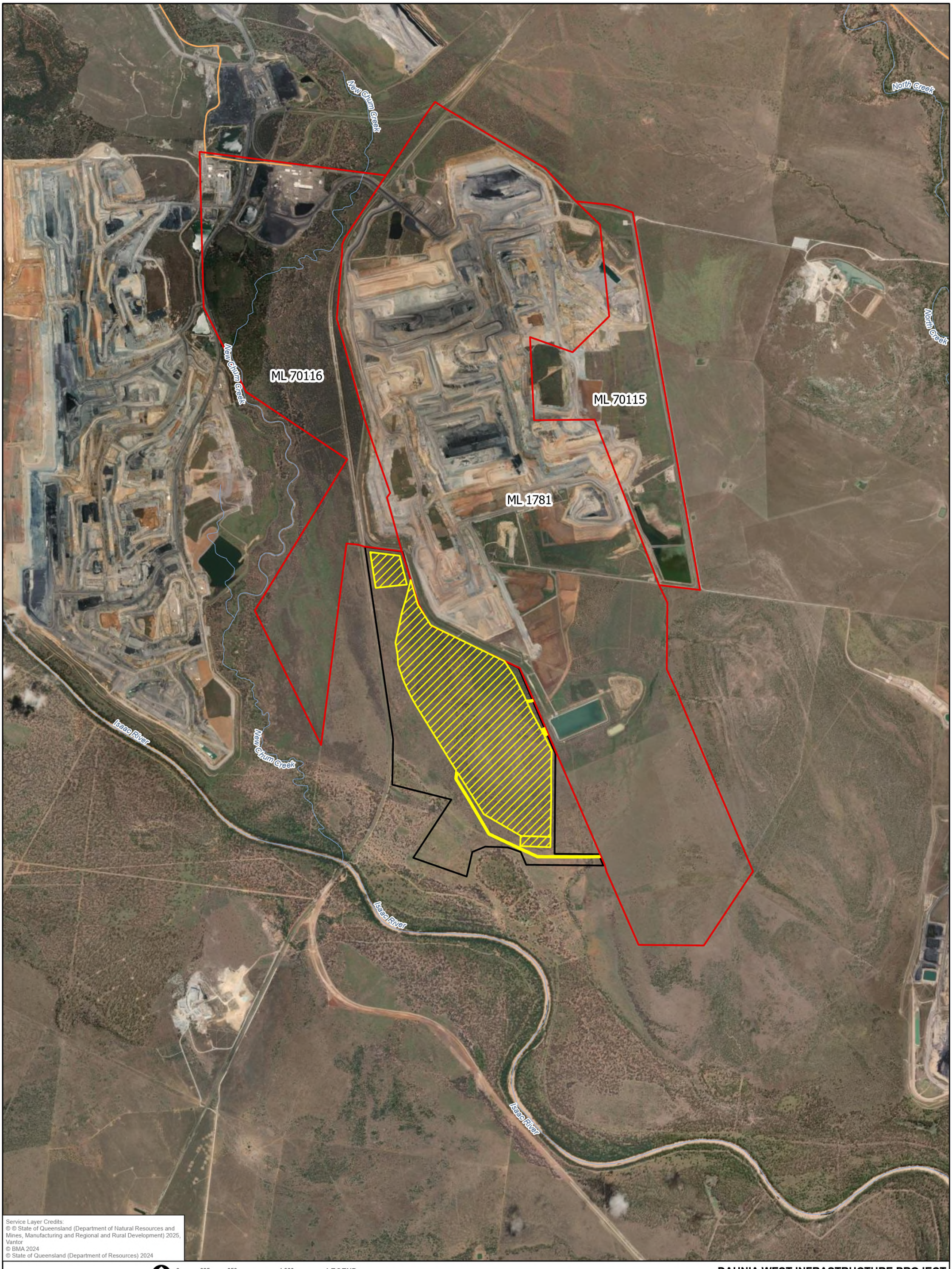
The Daunia Mine (DNM) is located approximately 30 kilometres (km) southeast of Moranbah in Central Queensland, on mining leases (ML) 1781, ML 70115, and ML 70116. Whitehaven Coal (WHC) owns and operates DNM, which was approved in 2009 and operates under the Environmental Authority (EA) EPML00561913 and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Approval 2008/4418. Environmentally Relevant Activities (ERA) at DNM include chemical storage, sewage treatment, resource recovery and transfer, mineral processing, and mining of black coal. WHC proposes the construction and operation of an out of pit dump (OOPD), two dams and a haul road to the west of, and adjacent to, ML 1781, off-lease from DNM (Daunia West Infrastructure Project (DWIP), the Project) (Figure 1-1). The OOPD footprint within the Project Area is approximately 282 ha. A new Mining Lease Application will be submitted across the Project Area.

SLR Consulting Australia Pty Ltd (SLR) is supporting WHC with approvals processes for the Project, and so the Aquatic Environmental Services (AES) team at SLR was commissioned to undertake an assessment of aquatic ecological values of the Project Area, including but not limited to aquatic Matters of National Environmental Significance (MNES), aquatic Matters of State Environmental Significance (MSES) and other aquatic ecological matters (e.g. surface expression groundwater-dependent ecosystems), and assessment of aquatic environmental impacts of the Project.

An unnamed ephemeral waterway traverses the Project Area, and the Project Area is bounded by an unnamed waterway to the east, the Isaac River to the south, New Chum Creek to the west, all within the Fitzroy River Basin. Construction of the OOPD, dams and haul road will require infilling of the west branch of the unnamed waterway, as well as construction/formalisation of required haul roads and access tracks, including construction of a culvert over the unnamed waterway.

The scope of this report is to present:

- An overview of relevant legislation and policy.
- An overview of the desktop and field-survey assessment methods and results.
- An assessment of the aquatic ecological values of waterways and wetlands of the Project Area.
- An assessment of potential impacts of the Project on aquatic ecological values, comprising application of:
    - Risk-based impact assessment.
    - The EPBC Significant Impact criteria for any identified aquatic MNES.
    - The Significant Residual Impact criteria for any identified aquatic MSES.



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0 325 650 1,300 Meters

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Drawn by:	AB
Reviewed by:	AM

LEGEND

- Mining Lease
- Mining Lease Application Area (Project Area)
- Disturbance Footprint
- Watercourse
- Lake/Reservoir

Roads and tracks

Road classification

- Local

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

DAUNIA WEST INFRASTRUCTURE PROJECT LAYOUT.

FIGURE 1-1

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2.0 Relevant Legislation and Policy

2.1 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework for the protection and management of matters of national environmental significance (MNES). The nine MNES to which the EPBC Act applies are:

- World heritage properties;
- National heritage places;
- Wetlands of international importance (often called 'Ramsar' wetlands after the international treaty under which such wetlands are listed);
- Nationally threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park;
- Nuclear actions (including uranium mining); and
- A water resource, in relation to coal seam gas development and large coal mining development.

The EPBC Act provides protection for threatened flora, fauna and ecological communities by:

- Identifying and listing species and ecological communities as threatened;
- Developing conservation advice and recovery plans for listed species and ecological communities;
- Developing a register of critical habitat;
- Recognising key threatening processes;
- Where appropriate, reducing the impacts of these processes through threat abatement plans and non-statutory threat abatement advices; and
- Requiring approval for certain actions or activities that will, or are likely to, have a significant impact on an MNES or other protected matter.

Under the EPBC Act, if an action has, will have, or is likely to have, a significant impact on a MNES, approval is required from the Australian Government Environment Minister (the Minister). The MNES Significant Impact Guidelines (DotE 2013) outline a ‘self-assessment’ process to assist in determining whether an action is likely to have a significant impact on a MNES. If this process determines there may be a significant impact to a MNES, a referral should be submitted to the Minister for a decision on whether assessment and approval is required under the EPBC Act.

The Minister can make one of three decisions regarding a proposal:

- Not a controlled action: if the proposed action is not likely to be significant, approval is not required if the action is taken in accordance with the referral. Consequently, the action can proceed subject to any state, territory or local government requirements.

- Not a controlled action – ‘particular manner’: if the proposed action is not likely to be significant if done in a particular manner.
- Controlled action: if the proposed action is likely to be significant, it is called a 'controlled action'. The matters which the proposed action may have a significant impact on (e.g. Ramsar wetlands or threatened species) are known as the controlling provisions. Controlled actions require approval and are subject to further assessment processes.

Once a controlled action is assessed, it can be approved, approved subject to constraints, or refused.

2.2 Queensland Environmental Protection Act 1994

The Queensland *Environmental Protection Act 1994* (EP Act) provides the legislative framework for ecologically sustainable development in Queensland, requiring people, companies and government to take all reasonable and practical steps to protect environmental values (EVs) (i.e. avoid harm to the environment). The EP Act provides a range of mechanisms to achieve the objective of the EP Act, including establishing Environmental Protection Policies that present strategies for protecting EVs.

The *Environmental Protection Regulation 2019* (EP Regulation), pursuant to the EP Act, specifies Environmentally Relevant Activities (ERAs) that are considered to have the potential to cause environmental harm. ERAs may require an environmental assessment to be prepared as part of the Project application process.

2.3 The Environmental Protection Policy (Water and Wetland Biodiversity) 2019

The quality of Queensland’s waters is protected under the *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP (Water and Wetland Biodiversity)). The purpose of the EPP (Water and Wetland Biodiversity) is to achieve the object of the EP Act in relation to waters and wetlands.

The purpose of the EPP (Water and Wetland Biodiversity) is achieved by:

- Identifying EVs for waters and wetlands to be enhanced or protected;
- Identifying management goals for waters;
- Stating water quality guidelines (WQG) and water quality objectives (WQO) for enhancing or protecting the EVs of waters;
- Providing a framework for making consistent, equitable and informed decisions about waters ; and
- Monitoring and reporting on the condition of waters.
- The EPP (Water and Wetland Biodiversity) defines:
    - EVs for waters (wetlands and waterways), including for high ecological value (HEV), slightly disturbed, moderately disturbed and highly disturbed waters.
- indicators and WQGs for EVs for waters, and provides:
    - A framework for assessment;
    - Management goals for waters, which for HEV waters is to maintain natural condition or improve water quality to return to natural condition;

- Water quality objectives for waters; and
- Guidance for monitoring and reporting.

EVs for Queensland waters include the protection of aquatic ecosystems.

Schedule 1 of the EPP (Water and Wetland Biodiversity) lists waters that have defined EVs and WQO, and lists the documents these are published in. For waters not listed in Schedule 1, the EPP (Water and Wetland Biodiversity) provides a process for defining EVs and WQO.

2.4 Queensland Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) provides for the conservation of Queensland's nature by declaring and managing a protected area network, protecting threatened species and their habitats, regulating the taking of wildlife and coordinating nature conservation with Traditional Owners and other landowners. Several freshwater species are protected wildlife under the NC Act.

Protected wildlife listed under the NC Act must be protected from threatening processes, and critical habitat for protected wildlife is required to be protected to the greatest extent possible.

2.5 Queensland Vegetation Management Act 1999

The *Vegetation Management Act 1999* (VM Act) regulates the clearing of vegetation to conserve threatened regional ecosystems, protect biodiversity and maintain ecological processes, amongst other purposes.

The VM Act provides for the chief executive to certify various classes of regulated vegetation maps, with regulated vegetation also comprising a Matter of State Environmental Significance (MSES). Classes of vegetation under the VM Act include: vegetation that is remnant and / or threatened (category B), high value regrowth vegetation (category C) or regrowth vegetation in a wetland, waterway or drainage feature area within a Great Barrier Reef catchment (category R). Vegetation in wetland areas and vegetation intersecting a waterway is also regulated vegetation under the VM Act. Vegetation clearing and development is regulated for Category R vegetation areas.

Vegetation in wetland areas and vegetation intersecting (within a defined distance of) a waterway are the vegetation types applicable for the aquatic ecology study, with other vegetation types relevant to terrestrial ecology.

2.6 Queensland Water Act 2000

The *Water Act 2000* provides a framework for the sustainable management of Queensland's water resources and quarry material by establishing a system for the planning, allocation and use of water; and the allocation of quarry material and riverine protection. The Act also provides for sustainable and secure water supply, and management of impacts on water resources.

Riverine Protection Permits are required under the *Water Act 2000* to clear vegetation in waterways.

2.7 Queensland Fisheries Act 1994

The *Fisheries Act 1994* provides for the management and protection of fisheries resources, including regulating development that might impact declared fish habitat areas, marine

plants and fish passage. Several fish species of special interest are listed as 'no take' species under the *Fisheries Act 1994*.

Fisheries resources, including declared fish habitat areas and marine plants, also contribute to the EVs of waterways and wetlands.

A waterway assessment was completed for the mapped (green) unnamed waterways (1 and 2 that traverses the Project Area to ground truth the mapping layer (Table 4-1 and Table 4-2), with it being defined as a 'waterway' under the *Fisheries Act 1994* due to having defined bed and banks, having fish habitat at or upstream of the site, and holding native fish during the survey.

2.8 Queensland Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (the Offsets Act) outlines the framework for environmental offsets in Queensland. Environmental offsets compensate for unavoidable significant impacts on prescribed environmental matters, and may be required as a condition of an authority or approval for a prescribed activity.

Prescribed activities and prescribed environmental matters are defined in Schedules 1 and 2, respectively, of the *Environmental Offsets Regulation 2014* (the Offsets Regulation). Prescribed Environmental Matters under Schedule 2 of the Offsets Regulation are referred to collectively as Matters of State Environmental Significance (MSES). MSES relevant to aquatic ecology comprise:

- Regulated Vegetation: Regional Ecosystems under the *Vegetation Management Act 1999* that are also prescribed Regional Ecosystems under the *Vegetation Management Regulation 2012*, specifically:
    - Regional Ecosystems within a wetland on the vegetation management wetlands map under the *Vegetation Management Act 1999.*
    - Regional Ecosystems located within a defined distance (as identified in the Environmental Offsets Policy) from the defining banks of a relevant watercourse (identified on the vegetation management watercourse and drainage feature map).
- Wetlands and Watercourses:
    - A wetland in a Wetland Protection Area as shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2019.
    - A High Ecological Significance (HES) wetland shown on the Map of Referable Wetlands under the Environmental Protection Regulation 2019.
    - A wetland or watercourse in High Ecological Values waters as defined under the Environmental Protection (Water and Wetland Biodiversity) Policy 2019.
- Protected Wildlife Habitat:
    - A habitat for an animal that is endangered (aquatic) wildlife or vulnerable wildlife or a special least concern animal under the *Nature Conservation (Animals) Regulation 2020.*
- Highly Protected Zones of State Marine Parks, meaning highly protected areas (i.e. conservation park zone, marine national park zone, preservation zone or other highly protected area) within relevant (i.e. Great Barrier Reef Coast Marine Park, Moreton Bay Marine Park, Great Sandy Marine Park) Queensland Marine Parks, under the *Marine Parks Act 2004*

- Fish Habitat Areas, as declared under the *Fisheries Act 1994.*
- Waterway Providing for Fish Passage, meaning any part of a waterway providing for passage of fish only if the construction, installation or modification of waterway barrier works carried out under an authority will limit the passage of fish along the waterway, with relevant definitions as per the *Fisheries Act 1994*.
- Marine Plants, as defined under the *Fisheries Act 1994*.
- Legally Secured Offset Areas, as defined under the *Environmental Offsets Act 2014*.

2.9 Queensland Biosecurity Act 2014

The *Biosecurity Act 2014* (Biosecurity Act) seeks to manage risks associated with exotic pests (plants and animals, including noxious and invasive species) and diseases that impact plant and animal industries including aquaculture and wild capture fisheries, tourism, infrastructure including water supply, shipping, biodiversity, and the natural environment.

The Biosecurity Act achieves its objective in a number of ways, including but not limited to:

- Defining biosecurity matters (e.g. prohibited and restricted matters);
- Establishing a general biosecurity obligation (GBO);
- Establishing obligations in relation to prohibited and restricted matters;
- Specifying what are notifiable incidents; and
- Providing for mechanisms to manage emergency biosecurity events.

Prohibited biosecurity matters are species that are not yet known to be present in Queensland, while restricted biosecurity matters are known to be present in one or more regions in Queensland.

The GBO states that individuals and other entities are obliged to:

- Take all reasonable and practical measures to minimise the likelihood of causing a biosecurity risk; and / or
- Do whatever is reasonably required to minimise the adverse effects of dealing with a biosecurity matter.

3.0 Methods used for Aquatic Ecological Values Assessment

3.1 Desktop Assessment

3.1.1 Matters of National Environmental Significance

A Protected Matters Search was completed on 29 May 2025 (Appendix A). The MNES identified by the searches were reviewed, with only those matters relating to aquatic ecology (e.g. protected wetlands, threatened aquatic species) considered in this study, and terrestrial MNES assumed to be assessed in the terrestrial ecology study or not relevant for the assessment.

For the assessed aquatic MNES, the likelihood of occurrence in the Project study area was assessed by suitably qualified aquatic ecologists, and review of habitat and hydrological characteristics of the waterways and biological traits of the species. For aquatic species that are listed as vulnerable under the EPBC Act it was also determined if an 'important population', as defined in the Significant Impact Guidelines (DotE 2013), likely occurs in the major waterways traversed by the Project.

3.1.2 Matters of State Environmental Significance

Searches of Queensland Globe and Queensland Government Environmental Reports were completed on 6 July 2025. The indicated MSES were reviewed, and those that relate to aquatic ecology were assessed further with respect to likelihood of occurrence and proximity to the Project footprint.

3.1.3 Flow Regime

Stream flow data was sourced from the Queensland Government gauging station at Deverill (130410A), and mean daily flow and percentage of time flow was recorded were calculated, and a flow duration curve graphed.

3.1.4 Water Quality

Water quality data was collected from the Isaac River by SLR's AES Team (formerly frc environmental) was collated and analysed, with the survey sites shown in Table 3-1 and Figure 3-1.

Summary statistics were calculated for data collected from 2015 to 2023 and the median value was compared to applicable Water Quality Objectives (WQOs) scheduled under the EPP (Water and Wetland Biodiversity) Policy 2019 for moderately disturbed waters for Upper Isaac River catchment waters (DEHP 2013) (Table 3-2), or Australian and New Zealand Guidelines (ANZG) toxicant default guideline values (DGVs) (ANZG 2018).

Table 3-1 Location of monitoring sites surveyed between 2015 and 2023.

Site	Latitude	Longitude	Description
IRPD	-22.049888	148.130473	Isaac River at Peak Downs Highway
IRUS (MP5)	-22.092570	148.239003	Isaac River 4.3 km upstream of confluence of New Chum Creek
IRDS (MP3/Regional 5)	-22.124488	148.295328	Isaac River 3 km downstream of confluence of New Chum Creek
IRDE	-22.167511	148.382223	Isaac River 15 km downstream of confluence of New Chum Creek
New Chum DS (MP2)	-22.054419	148.266733	New Chum Creek upstream of diversion from Poitrel Mine MP4
Regional 6 (MP4)	-22.116737	148.278263	Isaac River immediately downstream of New Chum Creek Confluence
Regional 7 (MP3)	-22.092103	148.239687	Isaac River directly upstream of confluence with New Chum Creek

Table 3-2 Default Water Quality Objectives for water quality for moderately disturbed waters for Upper Isaac River catchment waters.

Parameter	Unit	Water Quality Objective
Catchment		Isaac
Temperature	ºC	–
Electrical conductivity	µS/cm	<720 baseflow <250 high flow
pH	Unit	6.5 – 8.5
Dissolved oxygen	% saturation	85 – 110
Dissolved oxygen	mg/L	–
Turbidity	NTU	<50
Sulphate	mg/L	<25

Table 3-3 Toxicant Default Guideline Values for the protection of 95% of species in freshwaters (ANZG 2018).

Parameter	Unit	Default Guideline Value
Arsenic	µg/L	24
Boron	µg/L	940
Cadmium	µg/L	0.2
Chromium	µg/L	3.3
Cobalt	µg/L	2.8
Copper	µg/L	1.4
Iron	µg/L	–
Lead	µg/L	3.4
Manganese	µg/L	1900
Mercury	µg/L	0.6
Molybdenum	µg/L	34
Nickel	µg/L	11
Selenium	µg/L	11
Silver	µg/L	0.05
Uranium	µg/L	0.5
Vanadium	µg/L	6
Zinc	µg/L	8

SLR

0 800 1,600 3,200 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:100,000 at A3
Project Number:	620.042120.00005
Date Drawn:	19/05/2026
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Reviewed by:	AM

LEGEND

- Isaac River monitoring sites
- Mining Lease
- Mining Lease Application Area (Project Area)
- Disturbance Footprint
- Watercourse
- Lake/Reservoir

Roads and tracks

Road classification

- Highway
- Secondary

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

LOCATION OF MONITORING SITES SURVEYED FROM 2015 TO 2023.

FIGURE 3-1

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3.1.5 Aquatic Habitat

Broad aquatic habitat features of the Project study area were assessed using review of floodplain and groundwater-dependent ecosystem mapping, and aerial imagery.

Field survey data from 2015-2023 surveys (Table 3-1 and Figure 3-1) was summarised as part of the desktop assessment.

3.2 Aquatic Biota

The aquatic biota likely to occur in waterways and wetlands within and surrounding the Project Area was indicated by searches of Atlas of Living Australia (ALA) (ALA 2024), Wetland Info (DESI 2024) and Wildlife Online (DESI 2024) completed on 8 July 2025.

Further assessment of aquatic species identified by the searches was then completed for likelihood of occurrence. The aquatic biota assessed comprised turtles, platypus, fish, aquatic macroinvertebrates, and aquatic plants (i.e. wetland indicator plants excluding trees and shrubs).

Field survey data from 2015-2023 surveys (Table 3-1 and Figure 3-1) was summarised as part of the desktop assessment.

3.3 Field Survey

3.3.1 Survey design

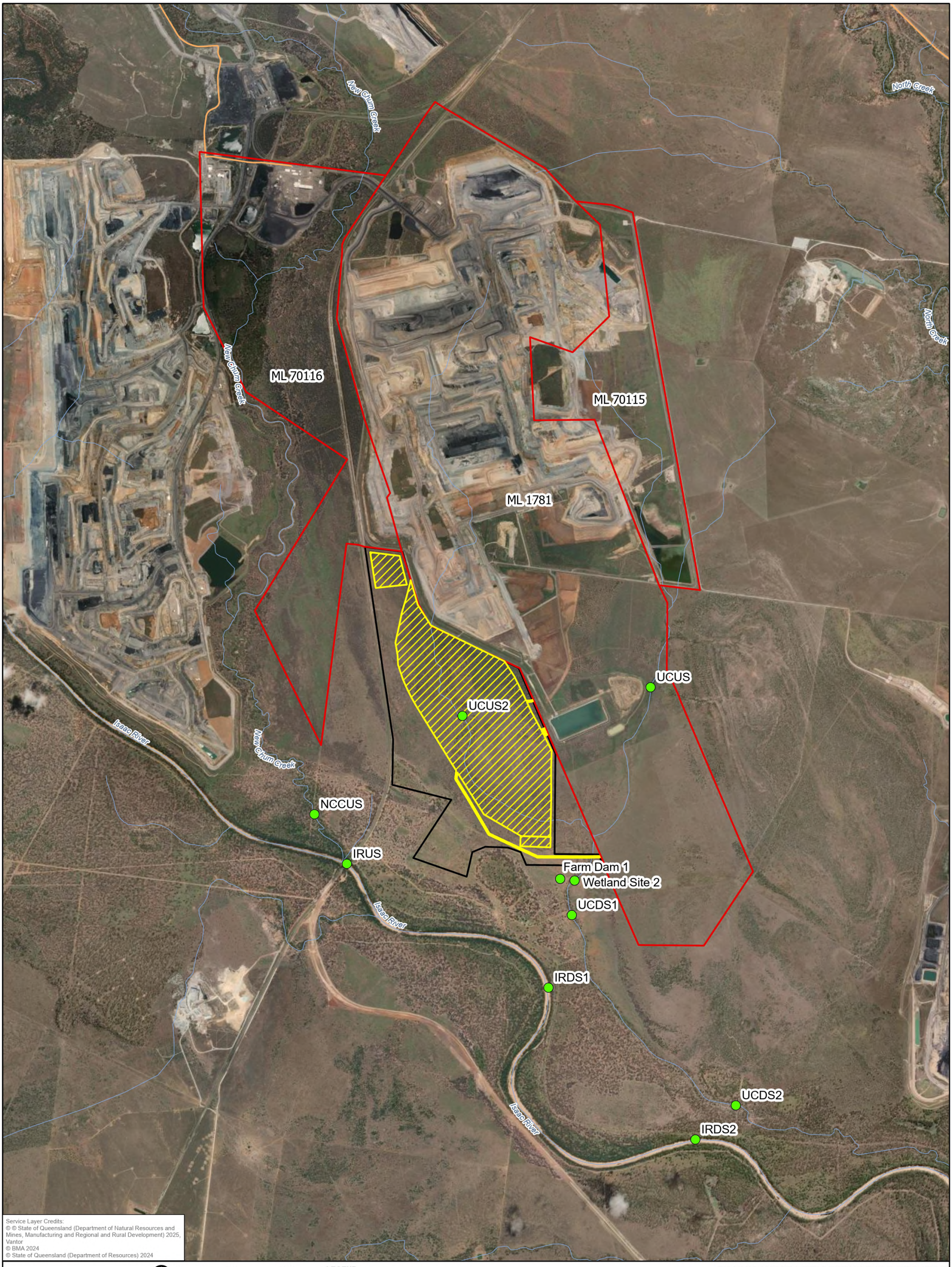
Aquatic ecology field surveys were conducted at 9 sites between the 27 to 29 July 2024, and at 10 sites between the 12 to 16 May 2025, by suitably qualified persons (i.e. professional aquatic ecologists from SLR) (Table 3-4, Figure 3-2). Field survey included in situ and laboratory water quality measurements, aquatic habitat, aquatic plant, macroinvertebrate, fish, and turtle assessments.

Table 3-4 Aquatic ecology sites surveyed in July 2024 and May 2025.

Site	Waterway	Site Description	Latitude	Longitude
Upstream Sites				
IRUS	Isaac River	Isaac River at Goonyella railway crossing	-22.116360	148.277030
NCCUS	New Chum Creek	New Chum Creek upstream of confluence with Isaac River	-22.111038	148.273222
UCUS	Unnamed Creek	Unnamed creek downstream of Daunia mine	-22.097010	148.312050
UCUS2[a]	Unnamed Creek	Unnamed creek downstream of Daunia mine and within the Project Area	-22.100278	148.290278
Downstream Sites				
IRDS1	Isaac River	Isaac River at Moorvale homestead	-22.129550	148.300517
IRDS2	Isaac River	Isaac River upstream of confluence with unnamed Creek	-22.145811	148.317692

Site	Waterway	Site Description	Latitude	Longitude
UCDS1	unnamed Creek	Unnamed creek downstream of Daunia mine Project Area at Moorvale homestead	-22.121690	148.303150
UCDS2	unnamed Creek	unnamed creek upstream of confluence with Isaac River	-22.142093	148.322348
Farm dams and wetlands				
Farm Dam 1 (FD1)	unnamed Creek	FD1 is a dam for watering cattle that has been built in the channel of the unnamed Creek downstream of the Daunia Mine	-22.117789	148.301764
Wetland site 2 (WS2)		WS2 is a wetland approximately 50 m southeast of FD1. It held very shallow pools at the time of survey (approximately 10cm deep) from a recent rainfall event, and would likely not hold water for most of the year	-22.117956	148.303439

[a] Site was not sampled in July 2024 as it was inaccessible



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LEGEND

- Mining Lease Application Area (Project Area)
- Mining Lease
- Disturbance Footprint
- Watercourse
- Aquatic Ecology Survey Sites

Roads and tracks

Road classification

- Local

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

AQUATIC ECOLOGY SITES SURVEYED IN JULY 2024 AND MAY 2025.

FIGURE 3-2

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3.3.2 Environmental Conditions

Rainfall in the 12 months leading up to the July 2024 survey recorded at weather station 034035 (Moranbah Airport) indicated that rainfall was equal to or higher than the long-term monthly average in November and December 2023, January, February and June 2024 (Figure 3-3). In all other months, including in July 2024 when the survey was conducted, monthly rainfall was below the long-term average.

Rainfall in the 12 months leading up to the May 2025 survey recorded at weather station 034035 (Moranbah Airport) indicated that rainfall was equal to or higher than the long-term monthly average in June, August and September 2024, January, February, March and April 2025. In all other months including May 2025 when the survey was conducted, monthly rainfall was below the long-term average.

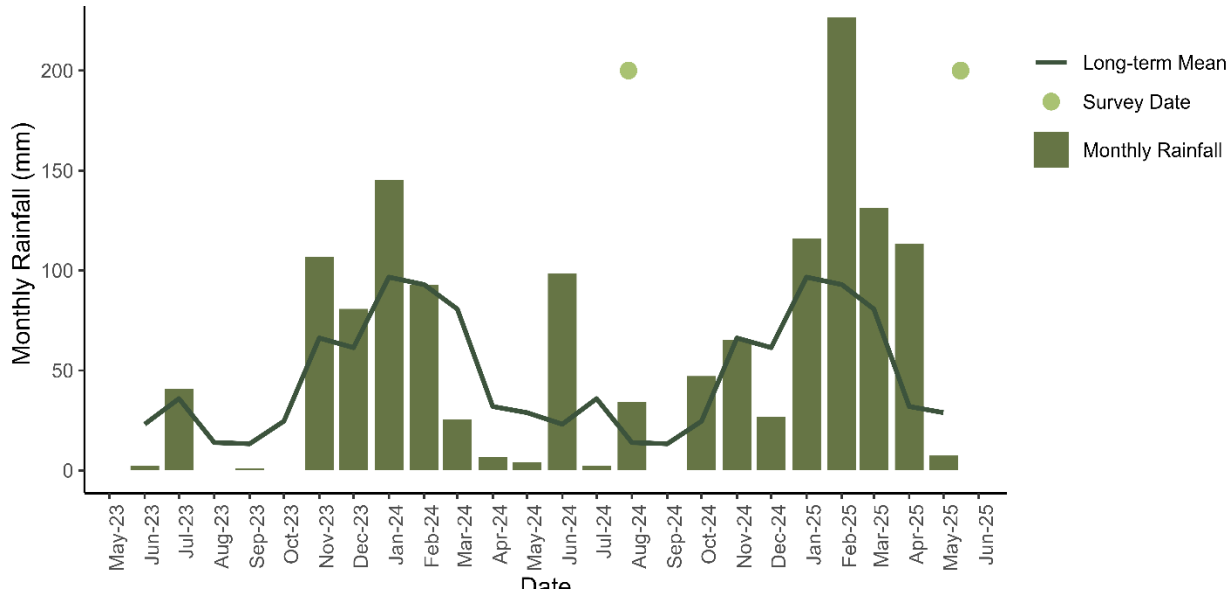

Figure 3-3 Monthly total rainfall compared to long-term average at weather station 035035 (Moranbah Airport) from 1 May 2023 to 26 May 2025.

3.3.3 Aquatic Habitat

In-stream habitat attributes and condition were assessed using a method based on the Australian River Assessment System (AUSRIVAS) protocol described in the Queensland Sampling and Processing Manual (DES 2018); see also DNRM (2001). The following parameters were assessed:

- Channel shape and pattern;
- Bank slope, composition, stability and vegetative cover;
- Bed substrate composition and stability;
- In-stream habitat features, including submerged or emergent aquatic plants, large woody debris, undercut banks, boulders;
- Water velocity, depth and width, and continuity through the site; and
- Riparian vegetation composition, extent and condition.

Riverine bioassessment scores (Table 3-5) were also recorded at sites where macroinvertebrates were sampled using the AUSRIVAS riverine bioassessment proforma (DES 2018; DNRM 2001), to aid interpretation of macroinvertebrate results.

Table 3-5 Riverine Habitat Bioassessment Criteria and Scores, and Overall Aquatic Habitat Quality Categories.

Habitat Category	Category Score Range			
	Excellent	Good	Moderate	Poor
Bed substrate or available cover	16–20	11–15	6–10	0–5
Embeddedness	16–20	11–15	6–10	0–5
Water velocity and depth	16–20	11–15	6–10	0–5
Channel alteration	12–15	8–11	4–7	0–3
Bed scouring & deposition	12–15	8–11	4–7	0–3
Pool:riffle and run:bend ratio	12–15	8–11	4–7	0–3
Bank stability	9–10	6–8	3–5	0–2
Bank vegetative stability	9–10	6–8	3–5	0–2
Streamside vegetation cover	9–10	6–8	3–5	0–2
Total (Habitat Bioassessment Score for the Site)	**111–135**	**75–110**	**39–74**	**0–38**

3.3.4 Water Quality

In situ water quality was measured for temperature, electrical conductivity, pH and dissolved oxygen using an AquaTroll 500 hand-held meter that was maintained and calibrated in accordance with OEM recommendations. Measurements were taken mid-channel and 0.3 m below the surface of the water, as described in DES (2018). Turbidity was also measured using this procedure and a calibrated Hach turbidity meter.

Water samples collected by SLR in July 2024 were analysed by a NATA-accredited laboratory for:

- Electrical conductivity (EC), pH, turbidity, and total suspended solids (TSS);
- Nutrients (total nitrogen, oxides of nitrogen, ammonia, nitrate, nitrite and total phosphorus);
- Major ions (sulphate, fluoride, sodium and water hardness);
- Dissolved and total metals and metalloids (As, B, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, U, V, Zn); and
- Total petroleum hydrocarbons (TPH) C6–C9 and C10–C36, and total recoverable petroleum hydrocarbons.

Water quality results were compared to the applicable WQOs (Table 3-2) or ANZG toxicant DGVs (ANZG 2018), and discussed with reference to the National Guidelines for Assessing and Managing Water Quality in Temporary Waters (ANZG 2020).

3.3.5 Aquatic Plants

Aquatic plants were surveyed at each site using a timed meander survey (i.e. 15 – 20 minutes per site) across in-stream and riparian habitats, as recommended in the Queensland Government's *Flora Survey Guidelines – Protected Plants* (DES 2020). Plants were identified to species level if they were flowering, otherwise they were identified to genus. It was noted if plants were growing in the water, or in dry in-stream or riparian areas. The growth form of plants growing in water was also recorded (Table 3-6).

Raw aquatic plant data was tabulated, noting growth form and location with reference to water (i.e. in water, or on dry bed or bank). Any aquatic plant species listed as threated under the EPBC Act or the Nature Conservation (plants) Regulation was noted and proximity to the Project Area assessed, and aquatic plant species that are restricted biosecurity matters under the Biosecurity Act were recorded.

Table 3-6 Growth forms of aquatic plants growing in water.

Growth Form	Description
Submerged	Submerged aquatic plants are rooted in the bed of the stream or wetland, with leaves totally covered by water most of the time. Some species may have underwater flowers, whereas other species may require water levels to decrease to trigger flowering and have flowers above the water level.
Attached floating	Attached floating aquatic plants are rooted in the bed of the stream or wetland, with leaves typically floating on top of the water. Flowers are usually above the water.
Free floating	Free floating plants float on top of the water, or in the water column, with roots trailing into the water column. Flowers are typically above the water.
Emergent	Emergent plants are rooted in the bed of the stream or wetland, with leaves and flowers above the water.

3.3.6 Aquatic Biota

3.3.7 Macroinvertebrate Communities

Macroinvertebrates were sampled from bed and edge habitat at each site holding water during the field survey using the AUSRIVAS sampling method as described in the Queensland AUSRIVAS manual (DNRM 2001) and the Queensland Monitoring and Sampling Manual (DES 2018). Samples were collected by disturbing a 10 m long section of bed or edge habitat with a standard triangular-framed dip net (250 µm mesh size), preserved using ethanol, and transported to SLR's biological laboratory.

In the laboratory, samples were sorted, identified to the lowest practical taxonomic level (in most instances family) and counted in accordance with Chessman (2003). For QA/QC procedures, macroinvertebrates in 10 per cent of the samples were re-identified and re-counted and 10 per cent of the data was re-entered by an ecologist other than the one who completed the original identifications and data entry. If any errors were found, then this process was repeated until no errors are found or they were within the accepted range (< 5 per cent (DES 2018); noting that final error rates in our laboratory are consistently < 2 per cent).

Standard freshwater macroinvertebrate indices were calculated and tabulated for macroinvertebrate communities: taxonomic richness, PET (Plecoptera / Ephemeroptera / Trichoptera) richness, SIGNAL-2 (Stream Invertebrate Grade Number – Average Level) scores and percent tolerant taxa. Macroinvertebrate results were compared to relevant WQOs (Table 3-7) and discussed with reference to the riverine bioassessment scores that were derived as part of the aquatic habitat assessment.

Table 3-7 Macroinvertebrate WQO for Upper Isaac River catchment waters.

Parameter	Bed/Composite WQO	Edge WQO
Taxa Richness	12 – 21	23 – 33
PET Richness	2 – 5	2 – 5
SIGNAL-2 Score	3.33 – 3.85	3.31 – 4.20
% Tolerant Taxa	25 – 50	44 – 56

3.3.8 Fish Communities

Fish were surveyed using fyke nets in accordance with recommendations in the Commonwealth Government's Survey Guidelines for Australia's Threatened Fish (DSEWPC 2012). Fishes were sampled under General Fisheries Permit (permit number 255214) and Animal Ethics Approval (permit number CA2024/01/1810) held by SLR. Fishing effort at each site (not including dry sites) is presented in Table 3-8 and Table 3-9.

Fish were identified to species and counted, with native species released unharmed to the place of capture and pest species euthanised using methods approved under our animal ethics approval.

Raw fish data was tabulated, and for each species we noted the conservation status and migratory pattern. Pest fish species were noted for biosecurity classification.

Table 3-8 Fish and turtle survey effort for July 2024 survey.

Site	Method	Date In	Time In	Date Out	Time Out	Effort
IRUS	fyke net (x1)	29/7/24	13:20	30/7/24	9:20	20 h
	Box traps (x5)	29/7/24	13:20	30/7/24	8:50	97.5 h
FD1	fyke net (x2)	30/7/24	14:30	31/7/24	9:05	37.17 h
	Box traps (x5)	30/7/24	14:40	31/7/24	9:05	92.08 h
UCDS1	fyke net (x2)	30/7/24	14:00	31/7/24	8:00	36 h
	Box traps (x5)	30/7/24	14:10	31/7/24	8:00	89.17 h
	Cathedral traps (x2)	30/7/24	14:10	31/7/24	8:00	35.67 h
UCUS	Seine net	31/7/24	11:20	31/7/24	11:40	1x 10 m haul

Table 3-9 Fish and turtle survey effort for May 2025 survey.

Site	Method	Date In	Time In	Date Out	Time Out	Effort
IRUS	fyke net (x2)	12/5/2025	15:00	13/5/25	9:30	37 h
	Cathedral traps (x2)	12/5/2025	15:00	13/5/25	9:30	3 7h
	Dip net	13/5/25	8:45	13/5/25	9:00	2 x 10 m sweep
FD1	fyke net (x2)	13/5/25	14:30	13/5/25	12:30	44 h
	Cathedral traps (x2)	13/5/25	14:30	13/5/25	12:30	44 h
WS2	Dip net	14/5/25	11:30	14/5/25	11:45	3 x 10 m sweep
UCDS1	fyke net (x2)	13/5/25	13:00	14/5/25	13:45	49.5 h
	Cathedral traps (x2)	13/5/25	13:00	14/5/25	13:45	49.5 h
IRDS1	Dip net	14/5/25	9:30	14/5/25	9:45	2 x 10 m sweep
IRDS2	Seine net	14/5/25	8:45	14/5/25	9:00	1 x 10 m haul
	Dip net	14/5/25	8:30	14/5/25	8:45	2 x 10 m sweep
UCUS	Dip net	15/5/25	10:20	15/5/25	10:40	3 x 10 m sweep
UCUS2	Seine net	15/5/25	14:30	15/5/25	14:45	1 x 10 m haul
	Dip net	15/5/25	14:00	15/5/25	14:30	2 x 10 m sweep

3.3.9 Turtle Communities

Turtles were surveyed using fyke nets and baited cathedral traps in accordance with the Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2022) and the Commonwealth's Survey Guidelines for Australia's Threatened Reptiles (DSEWPC 2012). Specimens were identified to species by experienced aquatic ecologists and native species released unharmed at the location of capture. Survey effort is presented in Table 3-8 and Table 3-9.

4.0 Existing Environment of Major Waterways

4.1 Matters of National Environmental Significance

The Protected Matter Search Tool (PMST) results (Appendix A) the following aquatic MNES may occur in the Project Area (Appendix A):

- White-throated snapping turtle (*Elseya albagula*) (critically endangered); and
- Fitzroy River turtle (*Rheodytes leukops*) (vulnerable).

The white-throated snapping turtle is listed as critically endangered under the EPBC Act and endangered under the *Nature Conservation Act 1992* (NC Act). This species is restricted to the Fitzroy, Burnett and Mary Basins, and adjacent coastal basins (e.g. Kolan and Gregory-Burrum systems) (Todd et al. 2013). Within the Fitzroy River Basin, white-throated snapping turtle occurs from the lower Fitzroy River from the tidal barrage to the Upper Dawson River, Callide Dam, lower Nogoa River, upper Connors River, and lower Isaac River in the Tartrus Weir impoundment (GHD 2016). This species is a habitat specialist, preferring permanent, flowing, clear and well oxygenated water with moderate to high cover of aquatic habitat (i.e. large woody debris and undercut banks) (Gordos et al. 2007; Limpus 2007; Limpus et al. 2011; Todd et al. 2013). White-throated snapping turtle generally inhabits deep (i.e. approximately 6 m) pools during the day and shallow riffles at night (Gordos et al. 2007), with both of these habitat types absent from waterways of the Project Area.

The Fitzroy River turtle is listed as vulnerable under the EPBC Act and vulnerable under the NC Act. This species is endemic to the Fitzroy River basin, with records of the species showing the centre of this species' distribution is the Fitzroy River (main stem) from the tidal barrage to Emerald, the Dawson River and the Connors River (ALA 2024). Published records of this species indicate that the species occurs from the Fitzroy Barrage to the upper Dawson River, the Mackenzie River and lower reaches of the Nogoa River, and to the Upper Connors River (Cann 1998; GHD 2016; Legler & Cann 1980; Limpus et al. 2011). Fitzroy River turtle prefers permanent freshwater reaches where there are large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles (Limpus et al. 2011), but has also been found in isolated permanent waterholes (frc environmental 2010; Limpus 2007). However, the species is not known to inhabit farm dams or ephemeral waterways (Limpus 2007). Nesting by Fitzroy River turtle occurs in spring (September to November), with hatching occurring in summer (November to March). The upper reaches of the Fitzroy Barrage on the lower Fitzroy River supports the largest known breeding aggregation of Fitzroy River turtles, with the reach of the Mackenzie River downstream of Tartrus Weir and the lower Isaac River in the upper reaches of the Tartrus Weir impoundment also supporting important nesting aggregations (GHD 2016; Limpus et al. 2011), although isolated nesting sites occur throughout the range of the species. Predation of nests and hatchlings by mainly feral animals (e.g. pigs, foxes, wild dogs, cats; and trampling of nests by cattle), but also predation by some native species (e.g. goannas, water rats), is the key threatening process, with the population of Fitzroy River turtle now strongly dominated by adults due to long-term lack of recruitment. Water resource development adversely impacts turtles by inundating pool:riffle sequences, changing downstream flow regimes and causing injury and mortality of turtles on spillways; and broad water quality impacts, primarily from agricultural and mining land uses, are thought to adversely impact turtle health (GHD 2016; Limpus et al. 2011). The nearest confirmed records of these two species of turtle to the Project Area are from Tartrus Weir, approximately 150 km straight line distance from the Project Area.

4.2 Matters of State Environmental Significance

4.2.1 Regional Ecosystems within a Wetland and within a Defined Distance of a Watercourse

Specific assessment of the Regional Ecosystem classification and conservation status is presented in the Terrestrial Ecology Report. However, riparian vegetation provides important functions for in-stream ecology, as summarised by Pusey & Arthington (2003), including buffering of inorganic material derived from catchment areas, stream bank stability, shading of the stream (which regulates light environment and water temperature), and exchange of organic material (e.g. leaf litter and large woody debris that support food and provide habitat.

The naturalness, longitudinal continuity and width of riparian vegetation determine the extent to which these functions are supported. The regulatory framework established by the *Environmental Offsets Act 2014* defines regulated riparian vegetation widths, and the extent of longitudinal continuity that can be disturbed without resulting in a Significant Residual Impact.

Within the Fitzroy River Basins, Regional Ecosystems are MSES relevant to aquatic ecology if they are within (Queensland Environmental Offsets Policy 2025):

- 10 m of waterways of stream order 1 and 2;
- 25 m of waterways of stream order 3 and 4; and
- 50 m of waterways of stream order 5 or greater.

The Isaac River is a stream order 6 system with tributaries and upper reaches being 1 to 3 stream order systems, New Chum Creek an order 3 system, and the Unnamed Creek an order 2 system (Figure 4-1). Therefore, riparian vegetation from 10 m to 50 m to either side of the waterways within the Project Area, depending on their stream order, is a MSES relevant to aquatic ecology.

Regulated vegetation within 100 m of a wetland does not occur in the Project Area (Figure 4-1).

4.2.2 Wetlands in a Wetland Protection Area

There are no Wetlands in a Wetland Protection Area (WPA) within or near the Project study area. However, two Wetlands in WPA occur along the Isaac River, one 5 km upstream and the other 1 km downstream from the Project Area, and both on the opposite bank of the Isaac River from the Project study area (Figure 4-2). These Wetland Protection Areas are sufficiently displaced from the Project Area to require no further assessment.

4.2.3 High Ecological Significance Wetlands

There are no High Ecological Significance (HES) wetlands within or near the Project study area. However, two HES wetlands occur along the Isaac River, one 5 km upstream and the other 1 km downstream from the Project Area, and both on the opposite bank of the Isaac River from the Project study area (Figure 4-2). These HES wetlands are sufficiently displaced from the Project Area to require no further assessment.

4.2.4 High Ecological Value Waters (Watercourses and Wetlands)

There are no High Ecological Values (HEV) Waters (Watercourses or Wetlands) within or near the Project study area (Figure 4-2).

4.2.5 Protected Wildlife Habitat

It is noted that there is no suitable habitat for Fitzroy River turtle (*Rheodytes leukops*) or white-throated snapping turtle (*Elseya albagula*) within or near the Project study area, and the closest confirmed records of these species are some 150 km to the southeast of the Project study area at Tartrus weir.

The closest confirmed records of platypus (*Ornithorhynchus anatinus*) are from the more permanent waters of the Connors River (ALA 2025). However, there are no records of platypus from the Isaac River or its tributaries, and there is no suitable habitat for platypus in the Project Area.

No other aquatic species protected under the Nature Conservation Act occurs within or near the Project study area.

There is no Protected Wildlife Habitat for an aquatic species within or near the Project study area.

4.2.6 State Marine Parks – Highly Protected Areas

There are no highly protected areas of State Marine Parks within or near the Project study area.

4.2.7 Declared Fish Habitat Areas

There are no declared fish habitat areas within or near the Project study area.

4.2.8 Waterways that Provide Fish Passage

The Isaac River has major (purple) risk of impact to fish passage by waterway barrier works, with some tributaries of the Isaac River in the Project Area having high (red) and moderate (amber) risk of impact to fish passage by waterway barrier works (Figure 4-3). Specifically, New Chum Creek has high (red) risk of impact to fish passage by waterway barrier works, and the unnamed creek in the Project Area has moderate (amber) and low (green) risk of impact to fish passage by waterway barrier works.

A waterway assessment was completed for the mapped (green) unnamed waterways (1 and 2) that traverses the Project Area to ground truth the mapping layer (Table 4-1 and Table 4-2), with it being defined as a ‘waterway’ under the *Fisheries Act 1994* due to having defined bed and banks, having fish habitat at or upstream of the site, and holding native fish during the survey.

These waterways are dry for the majority of the year, with New Chum Creek having relatively small proportions of upstream fish habitat at rare times it holds water, while the Isaac River has considerable upstream and downstream fish habitat that is periodically connected during times of flow.

Survey data (see Section 6.6.2) indicated low abundance of a small number of common fish species in permanent / near-permanent waterholes of the unnamed creeks of the Project study area. Therefore, the unnamed waterways are unlikely to provide migration pathways for large numbers of fish (in terms of both species and individuals) but rather provide temporary migration pathways for a small number of fish, while the Isaac River would provide a migration pathway for a large number of fish during periodic times of flow.

4.2.9 Marine Plants

There are no marine plants within or near the Project study area.

4.2.10 Legally Secured Offset Areas

Legally secured offset areas that are relevant to aquatic ecology do not occur within or near the Project study area.

ML 70116
ML 70115
ML 1781
UCUS
UCUS2
NCCUS
IRUS
Farm Dam 1
Wetland Site 2
UCDS1
IRDS1
UCDS2
IRDS2

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0 325 650 1,300 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:40,000 at A3
Project Number:	620.042120.00005
Date Drawn:	19/05/2026
Drawn by:	AB
Reviewed by:	AM

LEGEND

- Mining Lease Application Area (Project Area)
- Mining Lease
- Disturbance Footprint
- Aquatic Ecology Survey Sites

MSES regulated vegetation

- MSES regulated vegetation [defined watercourse]
- MSES regulated vegetation [category R-GBR riverine]
- MSES regulated vegetation [100m from wetland]

Roads and tracks

Road classification

- Local

DAUNIA WEST INFRASTRUCTURE PROJECT
AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

REGIONAL ECOSYSTEMS WITHIN DEFINED DISTANCE OF A WATERCOURSE, AND REGIONAL ECOSYSTEMS WITHIN A WETLAND ADJACENT TO THE PROJECT AREA.

FIGURE 4-1

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DAUNIA WEST INFRASTRUCTURE PROJECT
AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

WETLANDS IN A WETLAND PROTECTION AREA, HES AND HEV WETLANDS OF THE PROJECT AREA.

FIGURE 4-2

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ML 70116
ML 70115
ML 1781
UCUS
UCUS2
NCCUS
IRUS
Farm Dam 1
Wetland Site 2
UCDS1
IRDS1
UCDS2
IRDS2

SLR

0 325 650 1,300 Meters

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LEGEND

- Mining Lease Application Area (Project Area)
- Mining Lease
- Disturbance Footprint
- Aquatic Ecology Survey Sites

Queensland waterways for waterway barrier works

- 1 Low
- 2 Moderate
- 3 High
- 4 Major

Roads and tracks

Road classification

- Local

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

WATERWAYS THAT PROVIDE FISH PASSAGE WITHIN AND NEAR THE PROJECT AREA.

FIGURE 4-3

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4.3 Other Aquatic Matters

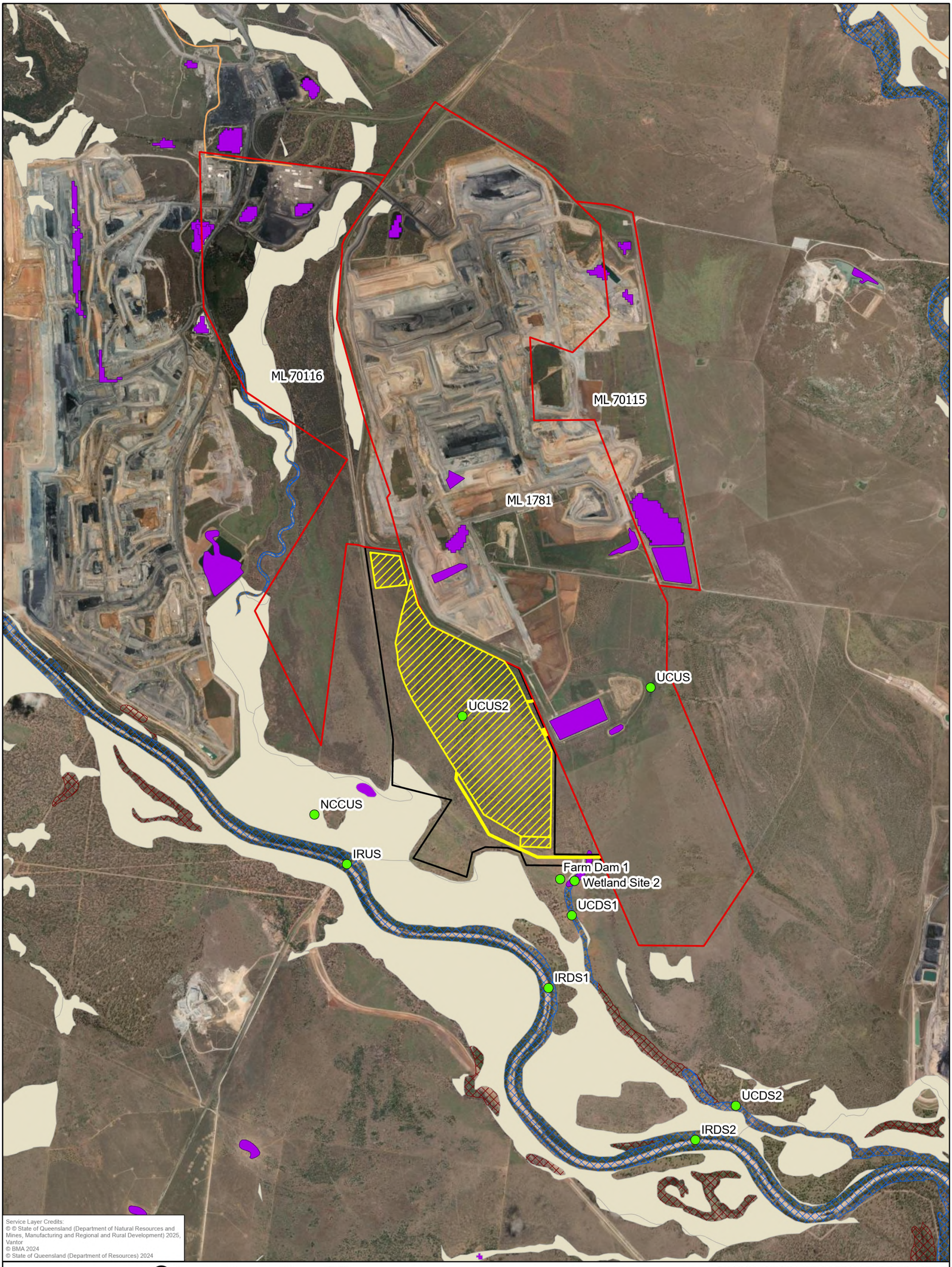
4.3.1 Aquatic Habitat

4.3.1.1 Desktop Assessment

Aerial imagery indicates that waterways of the Project Area are generally dry, comprising dry sandy/clay channels for most of the time. Mine water dams and farm dams within the Project Area are mapped under the Queensland Wetland Mapping layer as lacustrine wetlands, and natural wetlands that are concentrated in the central part of the Project Area are mapped as palustrine and riverine wetlands (Figure 4-4).

Survey data showed that waterway sites of the Project Area are on ephemeral waterways, with dry sandy beds and limited potential aquatic habitat present:

- Sites mostly consisted of well-defined channels, with mildly sinuous to irregularly meandering patterns. Banks ranged from low (0.5 m) to high (>6 m) and from flat to vertical in slope, with sections of bank erosion common.
- Sites were often dry, or when water was present it is generally restricted to shallow isolated pools.
- Channel substrates were dominated by sand with small percentages of larger substrates (boulder, cobble, pebble and gravel), and some sites having small sections of bedrock exposed due to channel erosion.
- Habitat features are limited, with sandy beds generally providing little potential aquatic habitat. Exposed tree roots, large woody debris and undercut banks were present at some sites and would provide some aquatic habitat at times the sites hold water. Aquatic plant species were of emergent growth form and at low densities at some sites, although aquatic plants are absent from many sites.
- Riparian vegetation was generally comprised of a native canopy (e.g. Eucalyptus and Casuarina) and an understory of weeds and terrestrial grasses. Trees in riparian zones also tended to be moderately to extensively cleared for grazing (i.e. canopy layer sparse and / or discontinuous).
- Sites had moderate to high levels of disturbance, with clearing of riparian vegetation for grazing, and erosion of the surrounding landscape the most common disturbances.



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0 325 650 1,300 Meters

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Reviewed by:	AM

LEGEND

- Mining Lease Application Area (Project Area)
- Mining Lease
- Disturbance Footprint
- Aquatic Ecology Survey Sites

Wetland areas

Hydrologically natural

- Palustrine wetlands
- Riverine wetlands

Hydrologically modified or artificial

- Lacustrine wetlands

Sub-dominant wetlands

- Sub-dominant wetlands (51 to 80%)

Roads and tracks

Road classification

- Local

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

QUEENSLAND WETLAND MAPPING LAYER.

FIGURE 4-4

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4.3.1.2 Field Survey Results

The July 2024 survey of aquatic habitat is presented in detail in Appendix B, and summarised as follows:

- Sites on the Isaac River (i.e. IRUS, IRDS1, IRDS2) were dry at the time of, and consisted of poor habitat, dominated by sandy substrate, with some woody debris, tree roots, and leaves and twigs that may provide very limited habitat at times when these sites hold water after significant rainfall events. Site disturbances include clearing for grazing, erosion and weeds (such as lantana and castor oil plant).
- The site on New Chum Creek (i.e. NCCUS), consisted of a narrow silty channel, with no water at the time of survey. Steep, heavily eroded banks were observed with minimal aquatic plants and habitat present at the time of survey. Site disturbances included clearing for grazing, erosion and high grass cover.
- Sites USUS, UCDS1on the Unnamed Creek held water at the time of the survey, while UCDS2 was dry. All sites had poor habitat, dominated by silty substrate, with some woody debris, tree roots, and leaves and twigs that may provide very limited habitat at times when these sites hold water after significant rainfall events. Site disturbances include clearing for grazing, erosion and weeds (such as lantana and castor oil plant).
- Farm Dam 1 was a small, dammed section of unnamed creek that in times of high flow overflows into the main channel. Farm Dam 1 was located on heavily disturbed farmland with active use by cattle. There was water present at the site at the time of the survey, however minimal woody debris, trailing vegetation and extensive blanketing silt provide limited aquatic habitat. Site disturbances include clearing for grazing, erosion and access for cattle to the water.
- Wetland Site 2 is located on an area of floodplain that is heavily disturbed by cattle, and it is not directly connected to a waterway. There was water present at the site at the time of the survey, however minimal woody debris, trailing vegetation and extensive blanketing silt provide limited aquatic habitat. W was too shallow to take in situ water quality measurements. Site disturbances include clearing for grazing, erosion and access for cattle to the water.
- No platypus burrows were observed at any site.

The May 2025 survey of aquatic habitat is presented in detail in Appendix C, and summarised as follows:

- Sites on the Isaac River (i.e. IRUS, IRDS1, IRDS2) had shallow (<0.3 m) flowing water at the time of survey, and consisted of poor aquatic habitat, dominated by sandy substrate, with some woody debris, tree roots, and leaves and twigs that may provide limited habitat at times when these sites hold water after significant rainfall events. Site disturbances include clearing for grazing, erosion and weeds (such as lantana and castor plant). Suitable nesting habitat for common turtle species was observed at all sites.
- The site on New Chum Creek (i.e. NCCUS) consisted of a narrow silty channel, with no water at the time of survey. Steep, heavily eroded banks were observed with minimal aquatic plants and habitat present at the time of survey. Site disturbances include clearing for grazing, erosion and high grass cover. The site had been recently graded.

- Sites UCUS and UCDS1 on the Unnamed Creek held water at the time of the survey, while UCDS2 was dry. All sites had poor habitat, dominated by silty substrate, with little woody debris, tree roots, and leaves and twigs that may provide very limited habitat at times when these sites hold water after significant rainfall events. Site disturbances include clearing for grazing, erosion and weeds (such as lantana and castor oil plant). Site UCUS had been cleared since the July 2024 survey.
- Farm Dam 1 was a small, dammed section of unnamed creek that in times of high flow overflows into the main channel. Farm Dam 1 was located on heavily disturbed farmland with active use by cattle. There was water present at the site at the time of the survey, however minimal woody debris, trailing vegetation and extensive blanketing silt provide limited aquatic habitat. Site disturbances include clearing for grazing, erosion and access for cattle to the water.
- Wetland Site 2 was located on heavily disturbed farmland with active use by cattle. There was water present at the site at the time of the survey, high density of aquatic plants with little woody debris, trailing vegetation and some blanketing silt provides some aquatic habitat at times when these sites hold water after significant rainfall events. Site disturbances include clearing for grazing, erosion and access for cattle to the water.
- No platypus burrows were observed at any site.

Descriptions of the unnamed waterways that traverse the Project Area as it pertains to fish habitat and fish passage under the *Fisheries Act 1994* is described in Table 4-1 and Table 4-2.

Table 4-1 Waterway description of unnamed waterway 1

Waterway Description	Site Photos
Site: Unnamed Waterway 1 (UW1) **Defined bed and banks?** Majority of the waterway did not have defined bed or banks, with the exception of one upstream site. The upstream site held significant water and was an isolated pool of roughly 100 m length with defined bank and beds. **Fish habitat at/or upstream of site?** There is no clear fish passage along the water way. No upstream or downstream connectivity most of the year would limit time when sufficient water would be present for fish passage. Dry channels look to be braided swampy channels that in times of high flow likely create wetland potentially leaving remnant pools. **Evidence of flow adequacy?** Non-flowing and dry the majority of the year. **Other Observations:**	 *Downstream reach July 2024*

Waterway Description	Site Photos
No aquatic plants were observed along the waterway, the surrounding forest is dominated by Eucalyptus and Melaleuca, and Acacia in some sections. **Survey date:** 29/07/2024	 *Upstream reach July 2024*

Table 4-2 Waterway description of unnamed waterway 2

Waterway Description	Site Photos
Site: Unnamed Waterway 2 (UW2) **Defined bed and banks?** Defined bed and banks were present along sections of the waterway, particularly at and upstream of UCUS2, in addition to isolated pools. However, the majority of downstream section of the waterway did not have defined bed or banks. Some braiding of channels observed. **Fish habitat at/or upstream of site?** Limited upstream or downstream connectivity most of the year would limit time when sufficient water would be present for fish passage, however habitat adequate for fish (and fish present at site) in May 2025. Rare times of flow would provide fish habitat but there is limited opportunity for movement throughout the year. **Evidence of flow adequacy?** Non-flowing and dry the majority of the year, however UCUS2 holding water and providing fish habitat in May 2025. **Other Observations:** Sedges were observed along the waterway. Surrounding forest is dominated by Eucalyptus and Melaleuca, and Acacia in some sections. Freshwater mussel and crab shells were observed along dry banks of the waterway. A box culvert at a road crossing in upstream reach but was dry. Site UCUS2 at	 *Upstream reach July 2024*  *Downstream reach July 2024*

Waterway Description	Site Photos
site of OOPD accessible in May 2025, holding water with native fish present (Agassizi's glassfish, common gudgeon and spangled perch) and limited aquatic plants present (submerged algae: *Chara* sp.). **Survey date:** 29/07/2024 and 15/05/2025	 *UCUS2 (middle reach) May 2025*

4.4 Surface Expression Groundwater Dependent Ecosystems

4.4.1 Desktop Assessment

There are no surface expression groundwater-dependent ecosystems (GDEs) mapped in the Project Area, and the predominantly dry waterway channels indicates that there are no areas of groundwater discharge to waterways.

4.4.2 Field Survey Results

The field survey indicated dry waterway channels, with few isolated pools created by antecedent rainfall, which indicates that there are no areas of groundwater discharge to waterways of the Project Area.

4.5 Flow Regime

The flow regime of the Isaac River and its downstream tributaries are ephemeral, with recorded flows being discrete short-duration events (Figure 4-5). Overall, flows are recorded approximately 20 per cent of the time in the Isaac River (Figure 4-6), with no sustained low flows occurring but sustained periods with zero flow dominating the hydrological regime. During the period of 1 May 2023 to 26 May 2025 the median daily flow was zero ML/day or35 ML/day if zero days were excluded and maximum daily flow of 79,568 ML/day were recorded for the Isaac River. Sixty-eight per cent of days had zero flow recorded.

There was no flow at any site at the time of the July 2024 survey and shallow flow (<0.3 m) at sites along the Isaac River (IRDS1 and IRDS2) at the time of the May 2025 survey. All sites holding water had small, isolated pools. Sites NCCUS, IRDS1, IRDS2 and UCDS2 were dry at the time of the July 2024 survey. Sites NCCUS and UCDS2 were dry at the time of the May 2025 survey.

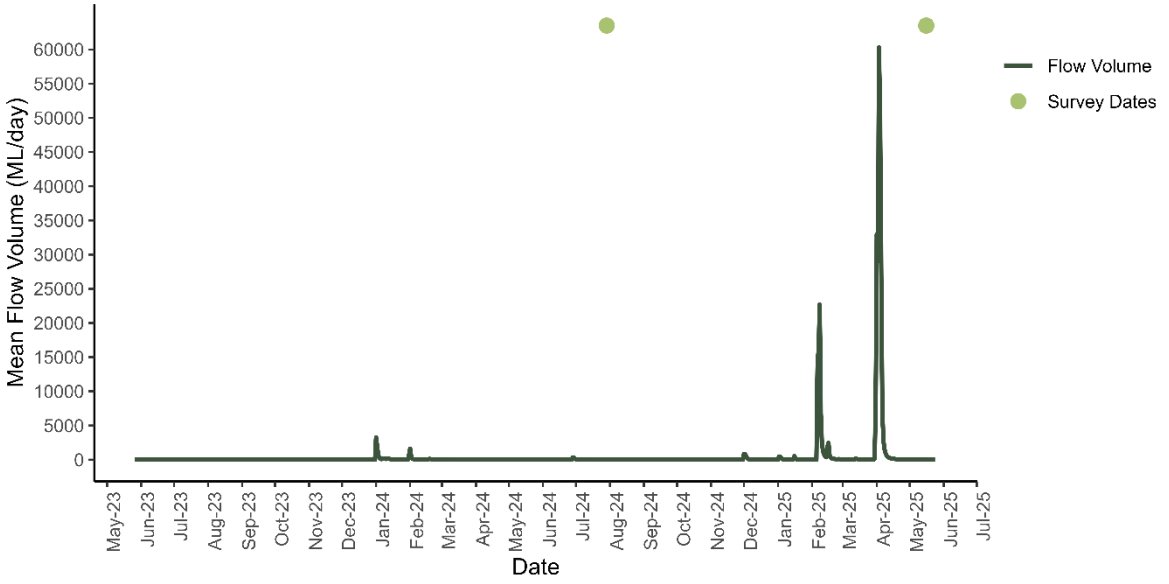

Figure 4-5 Mean Daily flow (ML/day) recorded at the Queensland Government gauging station at Deverill (130410A) from 1 May 2023 to 26 May 2025.

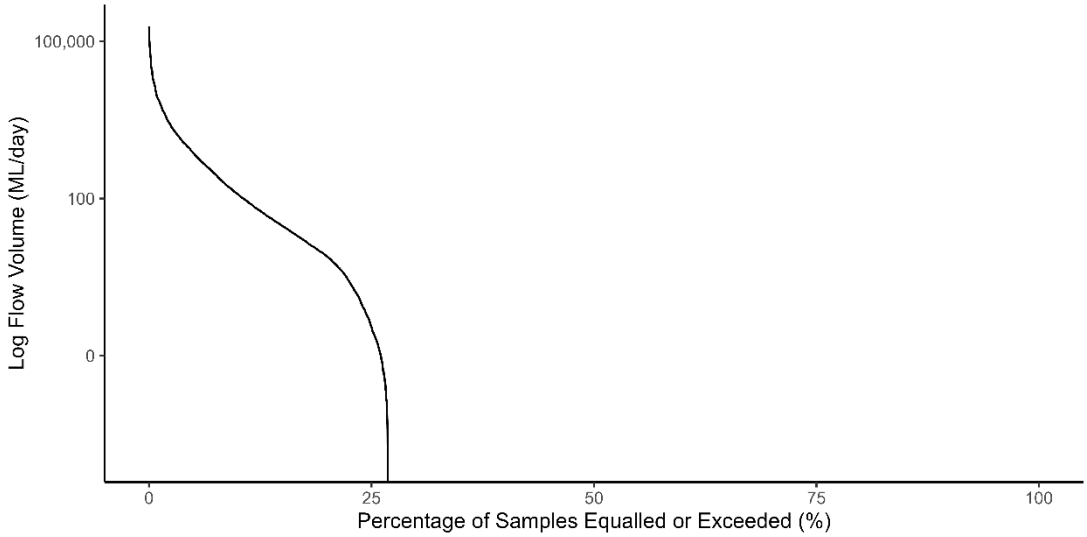

Figure 4-6 Daily flow (ML/day) recorded at the Queensland Government gauging station at Deverill (130410A).

4.6 Water Quality

4.6.1 Desktop Assessment

Water quality measured in situ for previous surveys of the area conducted between 2015 and 2023 were collated for relevant sites, and the minimum, median and maximum were calculated for each parameter (Table 4-3).

- The median value was compared to the WQO, with results indicating:
- The median per cent saturation of dissolved oxygen recorded were lower than the WQO at three of the four sites;
- The median turbidity was higher than the WQO at two of the four sites; and
- All other parameters and all sites met the WQO.
- Water quality was also collated from data provided by the client (WHC/BMA) from previous Daunia Mine REMP reports (Table 3-1 and Figure 3-1), and water quality monitoring reports over the previous year for the Project Area. These results showed (Table 4-4):
- dissolved oxygen (per cent saturation) is consistently low during periods of low/nil flow at Isaac River and New Chum Creek sites;
- high turbidity values are consistently reported for the Project Area;
- total nitrogen consistently exceeds WQO in the project area;
- ammonia consistently exceeds WQO in the project area; and
- sulfate has been reported during nil-flow sampling to exceed WQO in the project area.

Table 4-3 In situ water quality summary statistics at REMP sites compared to WQO from 2015 – 2023.

	Units	WQO		IRDE	IRDS	IRPD	IRUS
Temperature	ºC	–	Count	3	6	4	6
			Min	18.17	13.48	14.70	16.20
			Median	22.04	21.72	24.56	21.59
			Max	24.73	29.20	27.90	27.22
Electrical conductivity	µS/cm	<720 baseflow <250 high flow	Count	4	7	4	6
			Min	245	113	238	290
			Median	332	358	342	385
			Max	400	3,210	701	770
pH	units	6.5 – 8.5	Count	4	7	4	6
			Min	7.4	7.9	7.4	7.9
			Median	7.8	8.3	7.8	8.2
			Max	8.2	9.2	8.2	8.8
Dissolved Oxygen	% saturation	85 – 110	Count	4	7	4	5
			Min	14	79	65	57
			Median	95	102	75	96
			Max	103	133	108	139
Turbidity	NTU	<50	Count	4	7	4	6
			Min	13	16	37	8
			Median	43	57	86	46
			Max	65	579	167	208

Grey shading – median results above WQO

Green shading – median results below WQO

The baseflow WQO for electrical conductivity was applied

Table 4-4 Laboratory water quality water quality summary statistics at REMP sites compared to WQO from 2015 – 2023 for parameters that exceeded WQO in the current survey (July 2024).

	Units	WQO		IRDE	IRDS	IRPD	IRUS			
dissolved oxygen (in situ)	% saturation	85–110	Count	6	8	4	6	1	1	1
			Min	14	79	65	57	–	–	
			Median	95	103	82	95	56	30	78
			Max	103	133	108	116	–	–	

	Units	WQO		IRDE	IRDS	IRPD	IRUS			
pH	Units	6.5–8.5	Count	6.0	8.0	4.0	7.0	6	1	7
			Min	6.6	7.3	7.4	7.6	7.3	–	7.9
			Median	7.8	8.3	8.0	8.2	8.1	8.0	8.4
			Max	8.2	9.2	8.2	8.8	8.3	–	8.7
turbidity	NTU	50	Count	6	8	4	7	5	1	6
			Min	13	16	37	8	5	–	44
			Median	43	87	132	37	1,080	260	604
			Max	95	377	192	111	5,790	–	2,440
total nitrogen	µg/L	485	Count	5	7	3	6	2	1	3
			Min	260	200	730	280	200	–	500
			Median	400	500	1,000	350	1,210	3000	580
			Max	700	1,200	1,600	900	2,220	–	600
ammonia	µg/L	20	Count	6	8	4	7	6	1	7
			Min	14	10	7	10	24	–	11
			Median	75	50	15	30	60	304	30
			Max	110	210	30	100	190	–	110
total phosphorus	µg/L	485	Count	0	2	2	2	2	1	3
			Min	–	10	130	20	15	–	53
			Median	–	50	130	30	83	360	90
			Max	–	90	130	40	151	–	140
sulfate	mg/L	5	Count	6	8	4	7	6	1	7
			Min	4	5	4	6	4	–	4
			Median	6	11	6	9	8	412	8
			Max	34	32	34	42	35	–	31
dissolved copper	µg/L	2	Count	6	8	4	7	4	1	4
			Min	1	1	1	1	1	–	1
			Median	1	1	2	1	1.5	2	2
			Max	60	30	2	40	2	–	2

Grey shading – median results above WQO

4.6.2 Field Survey Results

In situ water quality parameters for the July 2024 and May 2025 field surveys generally complied with relevant WQOs, with the exception of (Table 4-5, Table 4-6):

- pH, which was lower than the WQO at all sites holding water in July 2024;
- dissolved oxygen, which was lower than the WQO at all sites holding water in July 2024 and at UCUS in May 2025; and
- turbidity, which was higher than the WQO at all sites holding water in July 2024.

Table 4-5 In situ water quality at all sites holding water during the July 2024 survey, compared to the relevant WQOs.

Site	Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen	Turbidity
Units	°C	µS/cm	units	mg/L	% saturation	NTU
WQO	–	<720 baseflow <250 high flow	6.5–8.5	–	85–110	<50
IRUS	9.9	190	5.7	5.00	44	96
UCUS	13.3	222	6.3	5.66	53	918
UCDS1	10.51	91	6.3	6.04	55	409
FD1	12.3	143	6.4	4.95	47	655

Grey shading – median results above WQO.

Green shading – median results below WQO.

The baseflow WQO for electrical conductivity was applied.

Table 4-6 In situ water quality at all sites holding water during the May 2025 survey, compared to the relevant WQOs.

Site	Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen	Turbidity[a]
Units	°C	µS/cm	units	mg/L	% saturation	NTU
WQO	–	<720 baseflow <250 high flow	6.5–8.5	–	85–110	<50
IRUS	21.1	401	6.8	8.11	93	–
IRDS1	20.38	383	7.0	7.76	88	–
IRDS2	19.94	348	7.1	7.49	83	–

Site	Temperature	Electrical Conductivity	pH	Dissolved Oxygen	Dissolved Oxygen	Turbidity[a]
UCUS	21.21	507	7.0	5.12	59	–
UCUS2	24.29	354	7.6	8.94	109	–
UCDS1	25.5	240	7.1	7.90	99	–
FD1	23.83	275	7.2	8.24	100	–
WS2	22.54	337	6.7	8.06	96	–

Grey shading – median results above WQO.

Green shading – median results below WQO.

The baseflow WQO for electrical conductivity was applied.

[a] Turbidity was not measured in-situ during the May 2025 survey due to a malfunctioning turbidity probe in the water quality meter, however turbidity was recorded in the laboratory.

Water quality parameters for each site holding water during the July 2024 and May 2025 surveys are presented in Table 4-7 and Table 4-8. Laboratory analysed water quality parameters generally complied with the WQO or toxicant DGVs, with the exception of:

- turbidity at sites FD1 and UCUS2 in May 2025;
- total nitrogen at sites IRUS, UCUS, UCDS1 and FD1 in July 2024 and sites WS2, FD1, USDS1, UCUS and UCUS2 in May 2025;
- nitrate and nitrite at site FD1;
- ammonia at sites IRUS, UCUS and FD1 in July 2024;
- total phosphorus at sites IRUS, UCUS, UCDS1 and FD1 in July 2024;
- sodium at sites IRUS, IRDS1 and IRDS2 in May 2025;
- total chromium at sites UCDS1 and FD1 in July 2024;
- total cobalt at sites UCDS1 and FD1 in July 2024 and May 2025;
- total copper at sites IRUS, UCUS, UCDS1 and FD1 in July 2024 and at sites UCUS, UCUS2, UCDS1 and FD1 in May 2025;
- dissolved copper at sites UCUS, UCDS1 and FD1 in July 2024, and sites FD1, UCUS, UCUS2 and FD1 in May 2025
- total lead at sites UCDS1 and FD1 in July 2024
- total nickel at sites UCDS1 and FD1 in July 2024
- total vanadium at sites UCDS1 and FD1
- total zinc at sites IRUS, UCDS1 and FD1 in July 2024; and
- total petroleum hydrocarbons (TPH) C10 – 36 at site UCUS in May 2025.

Table 4-7 Water quality data collected during the July 2024 survey

Parameter	Units	WQO/DGV	IRUS	UCUS	UCDS1	FD1
Physical-Chemical						
electrical conductivity (laboratory)	µS/cm	720a	202	280	111	170
pH (laboratory)	pH units	6.5–8.5	7.4	7.6	7.2	7.4
turbidity (laboratory)	NTU	50	–	–	–	–
total suspended solids (TSS)	mg/L	55	–	–	–	–
hardness	mg/L	–	60	97	37	53
Nutrients						
total nitrogen	µg/L	500	2,100	900	2,000	3,000
nitrite + nitrate (as N)	µg/L	60	60	<10	<10	80
ammonia	µg/L	20	200	30	20	870
nitrate	µg/L	1,100	50	<10	<10	50
nitrite	µg/L	60	<10	<10	<10	<10
total phosphorus	µg/L	50	70	60	500	740
Major Cations and Anions						
fluoride	mg/L	2	0.1	0.2	0.1	0.1
sodium	mg/L	30	14	15	4	6
sulfate	mg/L	25	7	1	1	1
Total Metals and Metalloids						
arsenic (V)	µg/L	24	1	4	4	6
boron	µg/L	940	<50	<50	<50	<50
cadmium	µg/L	0.2	<0.1	<0.1	<0.1	<0.1
chromium	µg/L	3.3	3	1	15	21

Parameter	Units	WQO/DGV	IRUS	UCUS	UCDS1	FD1
cobalt	µg/L	2.8	1	1	4	11
copper	µg/L	1.4	2	3	9	14
lead	µg/L	3.4	1	2	4	9
manganese	µg/L	1,900	28	110	158	647
mercury	µg/L	0.6	<0.1	<0.1	<0.1	<0.1
nickel	µg/L	11	4	4	14	21
selenium	µg/L	11	<10	<10	<10	<10
vanadium	µg/L	6	<10	<10	30	40
zinc	µg/L	8	10	5	25	32
Dissolved Metals and Metalloids						
arsenic	µg/L	24	1	3	1	2
boron	µg/L	940	<50	<50	<50	<50
cadmium	µg/L	0.2	<0.1	<0.1	<0.1	<0.1
chromium	µg/L	3.3	1	1	1	1
cobalt	µg/L	2.8	1	1	1	1
copper	µg/L	1.4	1	2	3	3
lead	µg/L	3.4	1	1	1	1
manganese	µg/L	1,900	11	21	44	160
mercury	µg/L	0.6	<0.1	<0.1	<0.1	<0.1
nickel	µg/L	11	1	3	3	3
selenium	µg/L	11	<10	<10	<10	<10
vanadium	µg/L	6	<10	<10	<10	<10
zinc	µg/L	8	<5	<5	7	<5
Total Recoverable Petroleum Hydrocarbons						

Parameter	Units	WQO/DGV	IRUS	UCUS	UCDS1	FD1
TRPH C6-C10	µg/L	–	<20	<20	<20	<20
TRPH C6-C10-BTEX (F1)	µg/L	–	<20	<20	<20	<20
TRPH C10-C16	µg/L	–	<100	<100	<100	<100
TRPH C16-C34	µg/L	–	<100	<100	<100	<100
TRPH C34-C40	µg/L	–	<100	<100	<100	<100
TRPH C10-C40	µg/L	–	<100	<100	<100	<100
TRPH C10-C16-Naphthalene	µg/L	–	<100	<100	<100	<100
Total Petroleum Hydrocarbons						
TPH C6 - C9	µg/L	20	<20	<20	<20	<20
TPH C10 - C14	µg/L	–	<50	<50	<50	<50
TPH C15 - C28	µg/L	–	<100	<100	<100	<100
TPH C29 - C36	µg/L	–	<50	<50	<50	<50
TPH C10 - C36	µg/L	100	<50	<50	<50	<50

[a] WQO for base flow conditions applied

Grey shading indicated values that are higher than WQO/DGV

Gold shading indicates values that are lower than the LOR but the LOR is higher than WQO/DGV

< value is below laboratory limit of reporting

– Not measured

Table 4-8 Water quality data collected during the May 2025 survey

Parameter	Units	WQO/DGV	IRUS	IRDS1	IRDS2	UCUS	UCUS2	USDS1	FD1	WS2
Physical-Chemical										
electrical conductivity (laboratory)	µS/cm	720a	436	420	376	542	379	258	296	362
pH (laboratory)	pH units	6.5–8.5	8.04	7.91	7.99	7.95	8.2	7.97	7.96	8.07
turbidity (laboratory)	NTU	50	3	2	2	14	92	19	89	7
total suspended solids (TSS)	mg/L	55	–	–	–	–	–	–	–	–
hardness	mg/L	–	105	96	87	222	125	86	103	146
Nutrients										
total nitrogen	µg/L	500	300	300	300	1,800	600	1,100	1,600	900
nitrite + nitrate (as N)	µg/L	60	<10	30	<10	<10	<10	<10	20	<10
ammonia	µg/L	20	<10	<10	<10	<10	<10	<10	<10	<10
nitrate	µg/L	1,100	<10	30	<10	<10	<10	<10	20	<10
nitrite	µg/L	60	<10	<10	<10	<10	<10	<10	<10	<10
total phosphorus	µg/L	50	20	20	20	200	40	140	200	110
Major Cations and Anions										
fluoride	mg/L	2	<0.1	<0.1	0.2	0.3	0.2	0.2	0.2	0.2
sodium	mg/L	30	42	42	40	26	24	17	20	19
sulfate	mg/L	25	12	11	11	<1	10	<1	<1	<1
Total Metals and Metalloids										
arsenic (V)	µg/L	24	<1	<1	<1	5	<1	4	3	3
boron	µg/L	940	80	60	<50	80	80	60	60	60
cadmium	µg/L	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
chromium	µg/L	3.3	<1	<1	<1	<1	<1	2	2	<1
cobalt	µg/L	2.8	<1	<1	<1	2	<1	3	3	<1

Parameter	Units	WQO/DGV	IRUS	IRDS1	IRDS2	UCUS	UCUS2	USDS1	FD1	WS2
copper	µg/L	1.4	<1	<1	<1	3	4	2	3	<1
lead	µg/L	3.4	<1	<1	<1	<1	<1	<1	2	<1
manganese	µg/L	1,900	19	30	32	641	59	477	495	161
mercury	µg/L	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
nickel	µg/L	11	<1	2	<1	4	2	4	5	3
selenium	µg/L	11	<10	<10	<10	<10	<10	<10	<10	<10
vanadium	µg/L	6	<10	<10	<10	<10	<10	<10	<10	<10
zinc	µg/L	8	<5	<5	<5	8	<5	<5	<5	<5
Dissolved Metals and Metalloids										
arsenic	µg/L	24	<1	<1	<1	4	<1	2	2	3
boron	µg/L	940	70	60	70	70	80	60	60	60
cadmium	µg/L	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
chromium	µg/L	3.3	<1	<1	<1	<1	<1	<1	<1	<1
cobalt	µg/L	2.8	<1	<1	<1	<1	<1	<1	<1	<1
copper	µg/L	1.4	<1	<1	<1	2	3	<1	2	<1
lead	µg/L	3.4	<1	<1	<1	<1	<1	<1	<1	<1
manganese	µg/L	1,900	3	18	28	501	4	195	191	130
mercury	µg/L	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
nickel	µg/L	11	<1	<1	<1	3	2	3	3	2
selenium	µg/L	11	<10	<10	<10	<10	<10	<10	<10	<10
vanadium	µg/L	6	<10	<10	<10	<10	<10	<10	<10	<10
zinc	µg/L	8	<5	<5	<5	<5	<5	<5	<5	8
Total Recoverable Petroleum Hydrocarbons										
TRPH C6-C10	µg/L	–	<20	<20	<20	<20	<20	<20	<20	<20

Parameter	Units	WQO/DGV	IRUS	IRDS1	IRDS2	UCUS	UCUS2	USDS1	FD1	WS2
TRPH C6-C10-BTEX (F1)	µg/L	–	<20	<20	<20	<20	<20	<20	<20	<20
TRPH C10-C16	µg/L	–	<100	<100	<100	<100	<100	<100	<100	<100
TRPH C16-C34	µg/L	–	<100	<100	<100	190	<100	<100	<100	<100
TRPH C34-C40	µg/L	–	<100	<100	<100	<100	<100	<100	<100	<100
TRPH C10-C40	µg/L	–	<100	<100	<100	190	<100	<100	<100	<100
TRPH C10-C16-Naphthalene	µg/L	–	<100	<100	<100	<100	<100	<100	<100	<100
Total Petroleum Hydrocarbons										
TPH C6 - C9	µg/L	20	<20	<20	<20	<20	<20	<20	<20	<20
TPH C10 - C14	µg/L	–	<50	<50	<50	<50	<50	<50	<50	<50
TPH C15 - C28	µg/L	–	<100	<100	<100	170	<100	<100	<100	<100
TPH C29 - C36	µg/L	–	<50	<50	<50	60	<50	<50	<50	<50
TPH C10 - C36	µg/L	100	<50	<50	<50	230	<50	<50	<50	<50

[a] WQO for base flow conditions applied

Grey shading indicated values that are higher than WQO/DGV

Gold shading indicates values that are lower than the LOR but the LOR is higher than WQO/DGV

< value is below laboratory limit of reporting

– Not measured

4.7 Turtles

4.7.1 Desktop Assessment

Desktop assessment indicated that three common species of turtle (*Chelodina longicolis, C. expansa* and *Emydura macquarii krefftii*) occur in the local area and may therefore periodically occur in the Project Area.

None of the turtle species known or likely to occur in the Project Area are listed threatened species under the EPBC Act or NC Act, as discussed in Sections 2 and 3.

4.7.2 Field Survey

During the July 2024 field survey, no turtles were recorded.

During the May 2025 survey one turtle was recorded; a broad-shelled river turtle (*Chelodina expansa*) at site IRUS (Table 4-12).

4.8 Platypus

4.8.1 Desktop Assessment

There are no records of platypus from the Isaac River or its tributaries, and closest records to the Project Area are from the Connors River (ALA 2025).

4.8.2 Field Survey

No platypus or platypus burrows were recorded during the July 2024 or May 2025 field surveys.

4.9 Fish

4.9.1 Desktop Assessment

Waterways of the Project Area are temporary and only hold water after significant rain. Thus, fish would only be present in the waterways of the Project Area after significant flow events that create hydrological connectivity with downstream refugia pools from which fish could migrate upstream and colonise the otherwise dry waterways. The fish species that would be present during wet conditions would have well-developed abilities for dispersal to capitalise on periodic flow events and would be tolerant of water quality with often high electrical conductivity, high turbidity and low dissolved oxygen. While 53 native species of fish are known from freshwater reaches of the Fitzroy River Basin (DESI 2024), database searches (ALA 2024; DESI 2024) and previous surveys indicate that only eight native fish species have been recorded from the Project Area and surrounds:

- Agassizi's glassfish (*Ambassis agassizii*);
- Blue catfish (*Neoarius graeffei*);
- Eastern rainbowfish (*Melanotaenia splendida splendida*);
- Fly-specked hardyhead (*Craterocephalus stercusmuscarum*);
- Spangled perch (*Leiopotherapon unicolor*);
- Bony bream (*Nematalosa erebi*);

- Southern purple spotted gudgeon (*Mogurnda adspersa*); and
- Common gudgeons (*Hypseleotris* spp.).
- It is likely that the following species would also occur periodically in or near the Project Area:
- Hyrtl's tandan (*Neosilurus hyrtlii*);
- Sleepy cod (*Oxyeleotris lineolata*); and
- Longfin eel (*Anguilla reinhardtii*).

These are all common species that are tolerant of harsh environmental conditions (e.g. variable flow, fluctuating water quality) that are typical of ephemeral watercourses of the region (Pusey et al. 2004). All species are potadromous (i.e. they migrate to various extents within freshwaters), with the exception of longfin eel which is diadromous (i.e. migrates between freshwaters and marine waters). None of these species have commercial or recreational fisheries value, except sleepy cod which has limited interest by recreational fishers.

None of the fish species known or likely to occur in the Project Area are listed threatened species under the EPBC Act or NC Act.

The three species of fish that are endemic to the Fitzroy River Basin (i.e. leathery grunter (*Scortum hillii*), southern saratoga (*Scleropages leichardti*) and the genetic population of golden perch from the Fitzroy River (*Macquaria ambigua*)) are not known from the Project Area or surrounds.

Tilapia (*Oreochromis mossambicus*) and eastern gambusia (*Gambusia holbrooki*), both of which are restricted biosecurity matters, are pest fish known from the wider region. The pest fish, platy (*Xiphophorus maculatus*) is also known from the region (frc environmental unpublished data), although this species is not a biosecurity matter.

4.9.2 Field Survey

The July 2024 field survey recorded 5 species of native freshwater fish present in waterways of the Project study area (Table 4-9), with species diversity ranging from 0 to 5 species at sites holding water. The May 2025 field survey recorded 10 species of native freshwater fish present in waterways of the Project study area (Table 4-11), with species diversity ranging from 0 to 10 at sites holding water (Site IRDS2 and UCUS had no fish recorded). All native species that were identified are migratory within freshwater reaches of waterways (potadromous) and are species that are often early colonisers of ephemeral waterways after rainfall.

During the July 2024 survey common gudgeons, and southern purple spotted gudgeon were the most abundant taxa, while the common gudgeons were the most widespread (recorded at all sites where fish were observed). During the May 2025 survey Agassiz's glassfish (905 individuals) were the most abundant taxa, while the eastern rainbowfish were the most widespread (recorded at five of six sites where fish were observed).

All native fish species recorded are common in the Isaac River catchment, and none of the species recorded are of conservation significance.

The restricted biosecurity matter Mozambique tilapia (*Oreochromis mossambicus*) was recorded at site FD1 during the July 2024 survey and at sites UCDS1 and FD1 during the May 2025 survey.

Table 4-9 Fish species recorded at each site holding water during the July 2024 survey.

Scientific Name	Common Name	Migration pattern	IRUS	UCUS	UCDS1	FD1
Native Fish Species						
Ambassis agassizii	Agassiz's glassfish	potadromous	3	–	–	9
Hypseleotris spp.	common gudgeon	potadromous	15	–	2	53
Melanotaenia splendida splendida	eastern rainbowfish	potadromous	5	–	–	–
Mogurnda adspersa	southern purple spotted gudgeon	potadromous	3	–	–	20
Oxyeleotris lineolata	sleepy cod	potadromous	2	–	–	–
Native Fish Total Abundance			**28**	**0**		**82**
Native Fish Species Diversity			**5**	**0**		**3**
Pest Fish Species						
Oreochromis mossambicus	Mozambique tilapia		–	–	–	2

– no species recorded

Table 4-10 Other aquatic species recorded at each site holding water during the July 2024 survey.

Scientific Name	Common Name	IRUS	UCUS	UCDS1	FD1
Caridina sp.	Freshwater shrimp	114	–	–	–
Austrothelphusa transversa	Freshwater crab	–	–	3	–
Branchinecta sp.	Fairy shrimp	–	1	–	–
Macrobrachium australiense	Freshwater prawn	37	–	–	–

– no species recorded

Table 4-11 Fish species recorded during the May 2025 survey.

Scientific Name	Common Name	Migration pattern	IRUS	UCDS1	FD1	IRDS1	UCUS2	WS2
Native Fish Species								
Ambassis agassizii	Agassiz's Glassfish	potadromous	55	166	165	–	519	–
Nematalosa erebi	Bony bream	potadromous	1	8	9	–		–
Hypseleotris spp.	Carp gudgeon	potadromous	4	1	9	–	550	–
Melanotaenia splendida splendida	Eastern rainbowfish	potadromous	145	19	152	42		25
Craterocephalus stercusmuscarum	Flyspecked hardyhead	potadromous	–	1	19	–	–	–
Neosilurus hyrtlii	Hyrtl's catfish	potadromous	–	32	1	–	–	–
Mogurnda adspersa	Purple spotted gudgeon	potadromous	7	–	8	–	–	–
Porochilus rendahli	Rendahl's catfish	potadromous	–	11	57	–	–	–
Oxyeleotris lineolata	Sleepy cod	potadromous	–	–	1	–	–	–
Leiopotherapon unicolor	Spangled perch	potadromous	22	30	67	–	4	–
Native Fish Total Abundance			**234**	**268**	**488**	**42**	**1073**	**25**
Native Fish Species Diversity			**6**	**8**	**10**	**1**	**3**	**1**
Pest Fish Species								
Oreochromis mossambicus	Mozambique tilapia		–	449	118	–	–	–

– no species recorded

Table 4-12 Other aquatic species recorded during the May 2025 survey.

Scientific Name	Common Name	IRUS	UCDS1	FD1	IRDS1	UCUS2	WS2
Chelodina expansa	broad-shelled river turtle	1	–	–	–	–	–
Cherax destructor	freshwater crayfish	–	5	1	–	–	–

Scientific Name	Common Name	IRUS	UCDS1	FD1	IRDS1	UCUS2	WS2
Macrobrachium australiense	freshwater prawn	54	15	3	–	–	–

– no species recorded

4.10 Macroinvertebrates

4.10.1 Desktop Assessment

Previous surveys in the Isaac River basin indicate that aquatic insects dominate macroinvertebrate communities (Table 4-13).

Other macroinvertebrate taxa that have commonly been recorded from the Project Area and surrounds include: arachnids, molluscs, decapod crustaceans (prawns and freshwater crabs), microcrustaceans and segmented worms.

The available data for macroinvertebrate taxonomic richness, PET (Plecoptera / Ephemeroptera / Trichoptera) richness, Stream Invertebrate Grade Number Average Level version 2 (SIGNAL-2) Score and percent tolerant taxa indicated that the macroinvertebrate communities of waterways of the Project Area are more impoverished than expected by the default biological objectives (Table 4-14). In some cases, these results may reflect the short period of time over which sites were holding water prior to sampling, thus there was insufficient time to allow colonisation of isolated pools by a greater number of taxa and thus attain a ‘mature’ macroinvertebrate community. However, the overall quality of aquatic habitat for macroinvertebrates in waterways of the Project Area was low and water quality was often characterised by high turbidity and low dissolved oxygen. Tthus, even ‘mature’ communities would likely have low diversity and few sensitive macroinvertebrate taxa. Compositionally, macroinvertebrate communities were dominated by insects (family diversity was highest in Coleoptera, Diptera, Hemiptera and Odonata), although other notable taxa included gastropods and decapod crustaceans.

These results are also consistent with previous REMP reports provided by WHC for the Project Area.

None of the macroinvertebrate taxa known or likely to occur in the Project Area are listed threatened species under the EPBC Act or NC Act.

Table 4-13 Aquatic insects reported from the Project Area and surrounds.

Order	Families
Coleoptera (beetles)	Curculionidae, Dytiscidae, Gyrinidae, Haliplidae, Heteroceridae, Hydraenidae, Hydrochidae, Hydrophilidae, Nanophyidae, Noteridae, Scirtidae, Spercheidae, Staphylinidae
Diptera (flies)	Ceratopogonidae, Chaoboridae, s-f Chironominae, Culicidae, Dolichopodidae, Empididae, Ephydridae, Muscidae, s-f Orthocladiinae, Simuliidae, Stratiomyidae, Tabanidae, s-f Tanypodinae, Tipulidae
Ephemeroptera (mayflies)	Baetidae, Caenidae, Leptophlebiidae
Hemiptera (true bugs)	Corixidae, Gelastocoridae, Gerridae, Hydrometridae, Mesoveliidae, Micronectidae, Nepidae, Notonectidae, Ochteridae, Pleidae, Veliidae
Odonata (dragonflies and damselflies)	Aeshnidae, Coenagrionidae, Corduliidae, Gomphidae, Isostictidae, Libellulidae,

Order	Families
	Lindeniidae, S.O. Epiproctiphora, S.O. Zygoptera
Trichoptera (caddisflies)	Ecnomidae, Hydroptilidae, Leptoceridae
Lepidoptera (butterflies)	Crambidae

Table 4-14 Macroinvertebrate indices summary statistics at previously surveyed sites compared to WQO from 2015 – 2023.

	WQO		IRDE	IRDS	IRPD	IRUS
Abundance	–	Count	6	8	4	6
		Min	106.0	183.3	203.7	54.3
		Median	892.8	477.2	310.8	309.7
		Max	5,142.0	1,665.0	831.0	875.0
Taxonomic Richness	23–33	Count	6	8	4	6
		Min	14.0	10.7	19.3	9.0
		Median	18.7	22.0	22.5	15.5
		Max	31.0	34.0	26.0	40.0
PET Richness	2–5	Count	6	8	4	6
		Min	2.0	2.0	2.7	1.7
		Median	3.2	3.2	3.5	2.8
		Max	5.0	4.0	5.0	4.0
SIGNAL-2	3.31–4.20	Count	6	8	4	6
		Min	3.1	3.2	3.2	3.3
		Median	3.6	3.3	3.4	3.4
		Max	3.8	3.7	3.7	3.5
% Tolerant Taxa	44–56	Count	1	3	2	3
		Min	44%	39%	54%	48%
		Median	44%	52%	58%	55%
		Max	44%	56%	62%	57%

Grey shading – median results above WQO

Green shading – median results below WQO

Only edge habitat was sampled in previous surveys

4.10.2 Field Survey Results

Results for the July 2024 and May 2025 surveys indicate that aquatic insects dominated macroinvertebrate communities, with high abundance of non-biting midges (subfamilies, Chironominae and/or Tanypodinae) recorded at all sites holding water. Samples collected during the July 2024 survey had mostly uniform species presence across bed and edge habitats. Beetle larvae (Coleoptera, including families Dytiscidae, Hydraenidae and Scirtidae), mayflies (Ephemeroptera in the family Baetidae) and snails (Gastropoda, in the family Bithyiniidae) were the dominant taxa observed. Samples collected during the May 2025 survey had greater difference in macroinvertebrate community composition between bed and edge habitats. After non-biting midges the dominant taxa collected from the bed habitat were mayflies (Ephomeroptera in the family Baetidae and Caenidae) with lower numbers of beetle larvae (Coleoptera, including families Dytiscidae, Hydraenidae and Hydrophilidae), mites (Arachnids, in the family Acarina) and caddisflies (Trichoptera in the families Leptoceridae). Samples collected from the edge habitat had the same species present however, Caddisfly (Trichoptera in the families Leptoceridae) and beetle larvae (Coleoptera, including families Dytiscidae, Hydraenidae and Hydrophilidae) made up a much greater proportion of the community than in bed samples.

Overall, macroinvertebrate communities were dominated by taxa that are tolerant of variable water quality and variable aquatic habitat condition; however, several PET taxa were recorded (groups Ephemeroptera and Trichoptera) from bed and edge habitat. No aquatic macroinvertebrate taxa that are listed threatened species were recorded in or near the Project study area.

Macroinvertebrate indices from the July 2024 and May 2025 survey indicated (Table 4-15 and Table 4-16):

- Taxonomic richness was lower than the WQO at all sites for bed and edge habitat during the July 2024 survey.
- Taxonomic richness was lower than the WQO at IRUS and FD1 for bed habitat, and IRUS, UCDS1, FD1 and UCUS for edge habitat during the May 2025 survey.
- PET richness was lower than the WQO at UCUS, UCDS1 and FD1 for bed habitat, and at IRUS and UCUS for edge habitat during the July 2024 survey.
- PET richness was lower than the WQO at FD1 and UCUS for edge habitat during the May 2025 survey.
- SIGNAL-2 score was lower than the WQO at IRUS and UCDS1 for bed habitat and IRUS and FD1 for edge habitat during the July 2024 survey.
- SIGNAL-2 score was lower the WQO at WS2 for bed habitat, and exceeded the WQO at IRUS, IRDS1 and UCUS2 for bed habitat during the May 2025 survey.
- Per cent tolerant taxa exceeded the WQO at IRUS, UCDS1 and FD1 for bed habitat and all sites for edge habitat during the July 2024 survey.
- Per cent tolerant taxa was lower than the WQO at UCUS for edge habitat and exceeded the WQO at UCUS for bed habitat and WS2 for edge habitat during the May 2025 survey.
- All other parameters complied with the relevant WQO.

Table 4-15 Macroinvertebrate indices for sites holding water during the July 2024 survey.

Site	Abundance	Taxonomic Richness	PET Richness	SIGNAL-2	% Tolerant Taxa
Bed					
WQO	**–**	**12–21**	**2–5**	**3.33–3.85**	**25–50%**
IRUS	75	10	2	3.30	60%
UCUS	143	6	0	3.93	33%
UCDS1	93	4	0	3.27	75%
FD1	55	8	1	3.38	62%
Edge					
WQO	**–**	**23–33**	**2–5**	**3.31–4.20**	**44–56%**
IRUS	356	18	1	2.78	66%
UCUS	506	10	0	3.43	80%
UCDS1	272	21	3	3.46	61%
FD1	277	17	2	3.28	58%

Grey shading indicates that a parameter was poorer than the relevant WQO
Green shading indicates that a parameter exceeded the relevant WQO

Table 4-16 Macroinvertebrate indices for sites holding water during the May 2025 survey.

Site	Abundance	Taxonomic Richness	PET Richness	SIGNAL-2	% Tolerant Taxa
Bed					
WQO	**–**	**12–21**	**2–5**	**3.33–3.85**	**25–50%**
IRUS	121	8	3	3.90	38%
IRDS1	230	12	4	4.49	25%
IRDS2	255	16	3	3.70	38%
UCUS	311	21	3	3.26	55%
UCUS2	184	14	3	3.97	36%
UCDS1	70	13	4	3.65	38%
FD1	92	8	2	3.65	38%
WS2	115	19	3	3.49	42%
Edge					
WQO	**–**	**23–33**	**2–5**	**3.31–4.20**	**44–56%**
IRUS	190	20	3	3.62	47%

Site	Abundance	Taxonomic Richness	PET Richness	SIGNAL-2	% Tolerant Taxa
IRDS1	320	23	4	3.54	52%
IRDS2	301	23	5	3.41	50%
UCUS	124	7	1	3.47	43%
UCUS2	212	20	3	3.42	50%
UCDS1	140	17	2	3.66	47%
FD1	114	14	1	3.81	54%
WS2	375	22	2	2.79	73%

Grey shading indicates that a parameter was poorer than the relevant WQO

Green shading indicates that a parameter exceeded the relevant WQO

4.11 Aquatic Plants

4.11.1 Desktop Assessment

Aquatic plant communities of the region are typically species-poor and have low per cent cover, which is likely due to the short duration of flows in ephemeral watercourses resulting in unsuitable habitat for many aquatic plant species (Van Manen 2005). Furthermore, at those sites in the wider region where more perennial water was present, submerged aquatic plants were uncommon due to high turbidity (Van Manen 2005), with emergent taxa dominating aquatic plant communities at these sites, including smartweeds (*Persicaria* spp.), rushes (*Eleocharis* spp.) and sedges (*Cyperus* spp.). Swamp lily (*Ottelia ovalifolia*), a floating attached species, was the most common aquatic plant not of an emergent growth form in the region.

Database searches (ALA 2024; DESI 2024) and previous surveys in the Isaac River area, indicate that aquatic plants that have been recorded in and near the Project Area are dominated by species with an emergent growth form that often grow on dry bed or banks (Table 4-17).

None of the recorded aquatic plant species are listed as threatened species under Queensland's NC Act.

There are no records of aquatic weeds, including those species that are biosecurity matters, from the Project Area and surrounds (ALA 2024; DESI 2024).

At the scale of the Fitzroy River Basin, 306 wetland indicator plant species are known, of which 156 are rare or threatened (DESI 2024). Thus, compared to the wider Fitzroy River Basin, the approximately 35 common aquatic plant species recorded from the Project Area and surrounds indicates a low diversity of aquatic plants, with none of the rare or threatened species that occur elsewhere in the basin occurring in or near the Project Area.

Table 4-17 Aquatic plants recorded from the Project Area and surrounds.

Common name	Species	Growth Form
sedges	*Cyperus esculentus, C. exaltatus, C. cristulatus, C. alopecuroides, C. polystachyos,*	emergent

Common name	Species	Growth Form
	C. difformis, C. squarrosus, C. scariosus; Fimbristylis nutans, F. microcarya, F. nuda	
common rush	*Juncus usitatus*	emergent
toad rush	*Juncus bufonius*	emergent
–	*Caldesia oligococca*	emergent
false daisy	*Eclipta prostrata*	emergent
sundew	*Drosera* spp.	emergent
water wort	*Elatine gratioloides*	emergent
–	*Lythrum paradoxum*	emergent
mat rush	*Lomandra* sp.	emergent
willow primrose	*Ludwigia octovalvis*	emergent
water primrose	*Ludwigia peploides*	emergent
hydrophilic grasses	*Walwhalleya subxerophila, Diplachne fusca* var. *fusca, Echinochloa colona, Panicum larcomianum*	emergent
knotweeds	*Persicaria orientalis, P. attenuata*	emergent
water milfoil	*Myriophyllum verrucosum*	submerged
water nymph	*Najas tenuifolia*	submerged
swamp lily	*Ottelia ovalifolia*	floating attached
blue water lily	*Nymphaea violacea*	floating attached
river she-oak	*Casuarina cunninghamiana* subsp. *Cunninghamiana*	riparian tree
river red gum	*Eucalyptus camaldulensis* subsp. *acuta*	riparian tree
paperbarks / tea-trees / bottlebrush	*Melaleuca bracteata, M. viminalis, M. fluviatilis. M. leucadendra, M. linariifolia*	riparian tree

4.11.2 Survey Results

During the July 2024 survey aquatic plants were recorded in low per cent cover at seven sites, with aquatic plants absent at two sites (UCUS and UCDS2) (Table 4-18). During the May 2025 survey aquatic plant were recorded in low per cent at six sites, with aquatic plants absent at one site (UCUS). High per cent cover of *Cyperus exaltatus* (60 per cent) was recorded at WS2.

Aquatic plants consisted of emergent growth forms, with sedge (*Cyperus*) the most abundant taxa on dry banks and stream beds.

None of the recorded aquatic plant species are listed as threatened species under Queensland's NC Act, and no aquatic weed plant species were recorded.

Table 4-18 Per cent cover of aquatic plants on banks and in bed at each site during the July 2024 survey.

Scientific Name	Common Name	IRUS	IRDS1	IRDS2	NCCUS	UCUS	UCDS1	UCDS2	FD1	WS2
On banks										
Cyperus exaltatus	giant sedge (tall flat-sedge)	1	5	2	–	–	–	–	–	–
Lomandra longifolia	long-leaved mat-rush	2	–	–	–	–	–	–	–	–
Marsilea drummondii	nardoo	–	–	–	1	–	–	–	–	
Carex sp.	sedge sp.	–	–	–	–	–	5	–	–	5
On bed										
Persicaria sp.	smartweed	–	–	–	–	–	–	–	1	–
Carex sp.	sedge sp.	–	–	–	–	–	2	–	–	–

Table 4-19 Per cent cover of aquatic plants on banks and in bed at each site during the May 2025 survey.

Scientific Name	Common Name	IRUS	IRDS1	IRDS2	NCCUS	UCUS	UCUS2	UCDS1	UCDS2	FD1	WS2
On banks											
Cyperus difformis	rice flat-sedge	–	–	–	–	–	–	1	–	–	–
Cyperus exaltatus	giant sedge (tall flat-sedge)	1	1	–	–	–	–	1	–	–	20
Cyperus haspan	sharp edge sedge	–	–	–	–	–	–	–	–	–	2
Cyperus rotundus	purple nutsedge	–	–	–	–	–	–	–	–	–	2
Ludwigia octovalvis	willow primrose	–	–	–	–	–	–	–	–	–	3
Persicaria attenuata	attenuated smartweed	–	–	–	–	–	–	1	–	–	–
On bed											

Scientific Name	Common Name	IRUS	IRDS1	IRDS2	NCCUS	UCUS	UCUS2	UCDS1	UCDS2	FD1	WS2
Chara spp.	stoneworts	–	–	–	–	–	20	–	–	–	–
Cyperus exaltatus	giant sedge (tall flat-sedge)	1	–	–	–	–	–	–	–	10	60
Parthenium hysterophorus	Parthenium weed	–	–	–	–	–	–	–	–	–	2
Persicaria attenuata	attenuated smartweed	–	–	–	–	–	–	–	–	5	–
Potamogeton sp.	pondweed sp.	–	–	–	–	–	–	–	–	–	2

5.0 Aquatic Ecological Values Assessment

5.1 Methods

Aquatic Environmental Values assessment used the Australian Government's Aquatic Ecosystems Task Group (AETG) High Ecological Conservation Value Aquatic Ecosystem (HCVAE) toolkit (DAWE 2012). Specifically, five criteria, with a range of sub-criteria, that describe 'high aquatic ecological value' are presented (Table 5-1), along with a range of methodologies for scoring aquatic ecosystems against each criterion.

One of the scoring methodologies presented is a ranked 'quartile' approach, where an aquatic ecosystem is ranked from 1 to 4 for each criterion; in this case:

- 1 = criteria not achieved;
- 2 = criteria achieved to a limited extent;
- 3 = criteria partly to mostly achieved; and
- 4 = criteria achieved.

The maximum value across all 17 sub-criteria is then taken as the overall score for the aquatic ecosystem, as follows:

- 1 = very low;
- 2 = low;
- 3 = moderate; and
- 4 = high.

The high conservation value aquatic ecosystem criteria and associated quartile scoring approach is similar to the aquatic ecosystem values assessment method used in the Aquatic Biodiversity Assessment Mapping Method (AquaBAMM) (Clayton et al. 2006), as referenced in the Aquatic Ecology EIS Preparation Guideline (DES 2022).

Table 5-1 Criteria for Defining High Ecological Value Aquatic Ecosystems in Australia.

Criteria	Sub-criteria
Diversity	exceptional diversity of native and migratory species
	exceptional diversity of aquatic habitats
	exceptional diversity of geomorphological features and processes
Distinctiveness	threatened aquatic ecosystem types
	threatened aquatic species (national or state level)
	threatened aquatic communities (national or state level)
	endemic aquatic species
	rare (but not threatened) aquatic species
	rare or unusual geomorphic features likely to support unusual assemblages of aquatic species adapted to these conditions
	rare or unusual geomorphic features that demonstrate key features of the evolution of Australia's landscape
Vital habitat	supports unusually large numbers of a particular native or migratory aquatic species
	maintenance of populations of specific aquatic species at critical life history stages
	provides important movement corridor for migration by aquatic fauna, linking breeding and feeding habitats
	key significant refugia for aquatic species that are dependent on the habitat, especially at times of stress
	key habitat that supports fisheries resources
Naturalness	the ecological character of the aquatic ecosystem is not adversely affected by modern human activity
Representativeness	the aquatic ecosystem is an outstanding example of an aquatic ecosystem class to which it has been assigned, within a drainage division.

5.2 Results

Using the HCVAE criteria, the assessment indicated that (Table 5-2):

- Isaac River, has very brief periods of flow and holds water for short periods after heavy rain, but provides important movement corridors for migration of aquatic fauna, has a moderate level of naturalness and is a good example of ephemeral waterways of central Queensland had moderate aquatic values.
- New Chum Creek has very low aquatic values due to only providing aquatic habitat and migration pathways at limited times of flow, having very low diversity of aquatic habitat, very low distinctiveness of aquatic habitat and aquatic communities, not providing vital habitat for aquatic communities, and is highly modified through clearing and cattle access.
- The Unnamed Creek, had refugial pools for periods of time through the dry season and provided fish habitat to several common native species, but was highly modified through clearing and cattle access and had low aquatic values.

Table 5-2 Assessment of Aquatic Ecological Values

Criteria	Sub-criteria	Isaac River	New Chum Creek	Unnamed Creek
Diversity	exceptional diversity of native and migratory species	2	1	2
	exceptional diversity of aquatic habitats	1	1	2
	exceptional diversity of geomorphological features and processes	2	1	2
Distinctiveness	threatened aquatic ecosystem types	1	1	1
	threatened aquatic species (national or state level)	1	1	1
	threatened aquatic communities (national or state level)	1	1	1
	endemic aquatic species	1	1	1
	rare (but not threatened) aquatic species	1	1	2
	rare or unusual geomorphic features likely to support unusual assemblages of aquatic species adapted to these conditions	1	1	1
	rare or unusual geomorphic features that demonstrate key features of the evolution of Australia's landscape	2	1	1
Vital habitat	supports unusually large numbers of a particular native or migratory aquatic species	1	1	2
	maintenance of populations of specific aquatic species at critical life history stages	1	1	1
	provides important movement corridor for migration by aquatic fauna, linking breeding and feeding habitats	4	1	2
	key significant refugia for aquatic species that are dependent on the habitat, especially at times of stress	1	1	2
	key habitat that supports fisheries resources	1	1	1
Naturalness	the ecological character of the aquatic ecosystem is not adversely affected by modern human activity	3	1	1
Representativeness	the aquatic ecosystem is an outstanding example of an aquatic ecosystem class to which it has been assigned, within a drainage division.	2	1	1
Maximum Score		**4**	**1**	**2**
Aquatic Ecological Value		**high**	**very low**	**low**

6.0 Impact Assessment

6.1 Aquatic Ecological Risk Assessment Method

Sources of potential impact were identified from review of the Project Description and the assessed aquatic EVs, and sensitivity of aquatic ecological receptors of the Project Area.

The assessment of potential impacts of the Project on the EVs of surface water ecosystems comprised:

- A risk-based assessment, with the level of risk being an outcome of the consequence and likelihood of the potential impact (Table 6-1, Table 6-2 and Table 6-3).
- Assessment of potential impacts to aquatic MNES using the Significant Impact Guidelines 1.1 (DotE 2013)
- Assessment of potential impacts to aquatic MSES using the Significant Residual Impact Criteria (DEHP 2014).

Table 6-1 Ratings Used to Assess the Likelihood of Potential Impacts.

Rating	Likelihood of occurrence
Very high	Almost certain to occur frequently
High	Probably would happen sometimes to frequently
Moderate	Could happen sometimes
Low	Remote possibility of occurring
Very low	Unlikely or not expected to occur

Table 6-2 Ratings Used to Assess the Consequence of Potential Impacts.

Rating	Likelihood of occurrence
Very high	Long-term harm to protected components of the environment.
High	Short-term but reversible harm to protected components of the environment; long-term harm to sensitive (i.e. rare, threatened, narrow range endemic) components of the environment.
Moderate	Long-term harm to non-protected components of the environment; no environmental harm to protected or sensitive (i.e. rare, threatened, narrow range endemic) components of the environment.
Low	Short-term but reversible harm to non-protected components of the environment; no environmental harm to protected or sensitive (i.e. rare, threatened, narrow range endemic) components of the environment.
Very low	Negligible or minimal impact with no material harm to any component of the environment.

Table 6-3 Aquatic Ecological Risk Matrix

Consequence	Likelihood				
	Very Low	Low	Moderate	High	Very High
Very Low	low	low	low	low	moderate
Low	low	low	low	moderate	moderate
Moderate	low	low	moderate	moderate	high
High	low	moderate	moderate	high	high
Very High	low	moderate	high	high	extreme

6.2 Sources of Potential Impact to Aquatic Ecological Values

The Project plans to clear vegetation for an OOPD, and requires permanent realignment of an unnamed green waterway to the west of the Project Area along with construction of access tracks and haul roads.

The Project may cause adverse impact to aquatic ecological receptors via:

- Increased turbidity and sedimentation associated with stormwater runoff from disturbed areas and earthworks, causing impacts to water quality and aquatic biota in receiving waters.
- Potential contamination of waterways during construction from fuel or chemical spills, causing direct impacts to water quality and aquatic biota in receiving waters.
- Contamination from introduction and spread of weeds within waterways and wetlands, which causes an indirect impact to aquatic ecology.
- Instream works and permanent waterway barriers (i.e. partial infilling of the waterway with the OOPD) within unnamed waterway, which causes direct impact to aquatic habitat and fish passage.
- Permanent waterway barriers associated with haul road waterway crossings over the unnamed waterway in the Project Area.
- Clearing of regulated vegetation within a defined distance of a watercourse (noting this impact pathway is assessed in the Terrestrial Ecology report).
- Potential changes to downstream flow patterns.
- Potential changes to downstream water quality from erosion and from the OOPD.

6.2.1 Contamination From Increased Turbidity and Sedimentation

Disturbance of soil from earth works, and stockpiles of soils, can cause stormwater runoff to have high turbidity and entrained sediments. When delivered to downstream aquatic environments, such stormwater can cause water quality impacts (increased turbidity),

aquatic habitat impacts (e.g. smothering of benthic habitats with sediment), and flow-on effects to aquatic biota.

Project will comply to the DNM Erosion and Sedimentation Control Plan as per the existing EA. This will mitigate impacts of turbidity and sedimentation. Furthermore, works in proximity to waterways will preferentially be undertaken at times of no rainfall. Monitoring (e.g. current Fitzroy River Receiving Environment Monitoring Program; FRREMP monitoring) will be implemented when required, and if water quality is adversely impacted then remedial actions will be undertaken to correct water quality issues.

The consequence of impact from increased turbidity and sedimentation to aquatic ecology receptors is low, because the impact would comprise a short-term but reversible harm to non-sensitive aquatic ecology receptors.

The likelihood of impact from increased turbidity and sedimentation to the aquatic ecology receptors is low, due to the sediment and erosion controls being well established mitigations, with FRREMP monitoring further contributing to the ability to control this source of impact to aquatic ecology. The impact would have a remote possibility of occurring.

With all controls in place, the mitigated risk from increased turbidity and sedimentation to the aquatic ecology receptors is low.

6.2.2 Contamination Due to Fuel and Chemical Spills

The spill of fuels, oils and other chemicals from vehicles and machinery can cause impacted water quality, and aquatic biota. DNM has in place a Spill Prevention and Response Procedure which outlines measures that mitigate and control risks from spills, these include:

- Refuelling in designated areas, which are located away from waterways (e.g. >50 m).
- Storing fuels and chemicals in bunded designated areas designed, constructed and maintained in accordance with Australian Standard 1940.
- Storage fuels and chemicals away from waterways, farm dams and drainage features.
- Deploying suitable spill kits for containment of any spill.

Monitoring will be implemented when required, and if water quality is adversely impacted then remedial actions will be undertaken to correct water quality issues.

The consequence of impact from fuel and chemical spills to aquatic ecology receptors is moderate, because the impact would comprise potentially long-term harm to non-sensitive aquatic ecological receptors.

The likelihood of impact from fuel and chemical spills to aquatic ecology receptors is low because bunded, designated refuelling and storage areas are well established mitigations, with water quality monitoring further contributing to the ability to control this source of impact to aquatic ecology by enabling investigations of potential exceedances and implementation of suitable remedial actions as needed. The impact is not expected to occur.

The mitigated risk of impact from fuel and chemical spills to aquatic ecology receptors is low.

6.2.3 Introduction and Spread of Weeds

Weeds, especially those species that are biosecurity matters, can greatly reduce habitat quality for native aquatic fauna, can outcompete native aquatic plants, and can lead to water quality issues (e.g. low dissolved oxygen caused by decomposition of excessive organic matter derived from weeds).

DNM has implemented a Weed Management Procedure which incorporates vehicle and machinery hygiene protocols. This will assist in effectively mitigating the potential impacts associated with contamination of waterways by weeds.

The consequence of impact from spread of aquatic weeds to aquatic ecology receptors is moderate, because the impact could comprise a long-term harm of the environment if weeds were introduced and were to become established.

The likelihood of impact from spread of aquatic weeds to aquatic ecology receptors is low, because vehicle and machinery hygiene protocols, and weed inspection and control programs, are well established mitigations; thus, impact would have a remote possibility of occurring.

The mitigated risk of impact from spread of aquatic weeds to aquatic ecology receptors is low.

6.2.4 Instream Works Required for Infillling of the Unnamed Waterway

Development of the OOPD will involve infilling a section of the green waterway.

Blockages to fish passage and stream flows (including temporary blockages) will prevent migration by aquatic fauna into, within and upstream of the Project Area, and this will impact their ability to access different habitats along a waterway, including habitats that may be important in their life cycle. Stranding of fish at temporary waterway barriers may also lead to fish mortality, especially in ephemeral waterways if the barriers prevent access to dry season refugial habitat.

The consequence of impact from permanent waterway barriers (i.e. infilling the waterway with the OOPD) to aquatic ecology receptors is high, because the impact would comprise a long-term and irreversible harm to protected components of the environment.

The likelihood of impact from permanent waterway barriers (i.e. infilling the waterway with the OOPD) to aquatic ecology receptors is very high, because the impact would be very likely to occur.

The risk of impact of permanent waterway barriers (i.e. infilling the waterway with the OOPD) to aquatic ecology receptors is high.

The proponent acknowledges this impact and proposes a financial offset.

6.2.5 Permanent Waterway Barrier Works Associated with Haul Road Waterway Crossings of the Unnamed Waterway

Permanent waterway barrier works comprise a permanent haul road the crosses the unnamed waterway within the general disturbance area. The section of waterway that requires permanent waterway barrier works put in place is downstream of the reach of unnamed waterway that is proposed to be removed and is mapped as having moderate (amber) risk to fish passage.

Poorly designed and constructed waterway crossings may create waterway barriers that prevent or impede movements of aquatic fauna, especially fishes, during flow events, especially low flow events. Many of the fish native to ephemeral systems migrate up and downstream and between different habitats at particular stages of their lifecycle, especially at the start of the wet season or on initiation of flow events. Blockages to fish passage and stream flows may prevent ephemeral wet season aquatic habitat being available to aquatic biota, or mean that aquatic biota cannot move to dry season refugial habitat at the end of the wet season, and thus perish.

Adverse impacts of waterway crossings to aquatic ecology will be mitigated by ensuring that the design of waterway barriers achieves the ADR for Waterway Barrier Works. Where achievement of the ADR is not possible, then a suitably qualified person will be engaged in the detailed design process to ensure the design achieves positive fish passage outcomes, and secondary approval will be sort.

The consequence of impact from permanent crossings of waterways to aquatic ecology receptors is moderate, because the impact would comprise a long-term harm to non-sensitive aquatic ecological receptors.

The likelihood of impact from permanent crossings of waterways to aquatic ecology receptors is low, because compliance with the ADR and/or engagement of a suitably qualified fish biologist in the detailed design processes are an established mitigation. The impact would be unlikely or not expected.

The mitigated risk of impact of permanent crossings of waterways to aquatic ecology receptors is low.

6.2.6 Changes to Downstream Water Quality

Release of mine-affected water to natural waterways can cause impacted water quality, and sub-lethal (e.g. poor health) and lethal (i.e. mortality) effects on aquatic biota where contaminants are present in unacceptable concentrations.

The Project will not require additional release points to those already used and approved under the EA, and any releases will continue to be made in accordance with the lease limits of the EA and as per current operations (WRM 2025).

The consequence of impact from release of mine-affected water to aquatic ecology receptors is moderate, because the impact would comprise potentially long-term harm to non-sensitive aquatic ecology receptors.

The likelihood of impact from release of mine-affected water to aquatic ecology receptors is low because the Project will not require additional release points to those already used and approved under the EA, and any releases will continue to be made in accordance with the EA and as per current operations. Ongoing water quality monitoring (e.g. FRREMP) will further contribute to the ability to control this source of impact to aquatic ecology by enabling investigation of potential exceedances and implementation of suitable remedial actions as needed. The impact is not expected to occur.

The mitigated risk of impact from release of mine-affected water to aquatic ecology receptors is low.

6.2.7 Changes to Downstream Hydrology

Significant alterations to downstream flow patterns can disrupt downstream aquatic ecological processes, including but not limited to breeding and migration by aquatic biota. The waterways of the Project Area are ephemeral and flow only during and after significant rainfall.

The release of MAW associated with the proposed Project will be in accordance with the existing EA conditions, including release volumes. Minor changes to downstream hydrology from removal of the unnamed waterway within the project area will reduce the mean annual flow in the remaining reach by approximately 36%, however will not have any material change to the frequency or duration of flows in the downstream reach of the unnamed waterway (WRM 2025). The natural flow pattern in the unnamed waterway will remain the same and the reduction in the magnitude of flows is not likely to have a significant impact on

run-off and flow in the unnamed waterway because hydrological connectivity will be maintained in the remaining amber waterway, and will have negligible impact on flows in the Isaac River (WRM 2025).

The consequence of changed downstream hydrology is low because the frequency and duration of flows in the unnamed waterway are unchanged from current condition. Stream flow patterns are related to rainfall run-off patterns that will be maintained through clean water diversion infrastructure where feasible (WRM 2025), this will be undertaken in accordance with DNMs Water Management System, and any releases of MAW to be in accordance with existing EA release criteria. Reductions in the overall magnitude of flows is not expected to change ecologically relevant aspects of hydrological connectivity in the unnamed waterway, and there will be no discernible changes to flows in the Isaac River.

The likelihood of flow changes in the downstream waterway is moderate because there will be an approximate 36% permanent reduction in flow magnitude downstream of the Project Area due to removal of the upstream section of the unnamed waterway. However, other measures of flow patterns, such as frequency and duration of flows, will be unchanged from current condition.

The likelihood of changed downstream hydrology is moderate because there will be an approximate 36% reduction in flow magnitude, however this impact is unlikely to occur.

6.3 MNES Significant Impact Guideline Assessment

There are no aquatic MNES relevant to the Project. The Project will not have a significant impact on an aquatic MNES.

6.4 MSES Significant Residual Impact Assessment

There are no HES wetlands or HEV wetlands or waterways relevant to the Project; thus, the Project will have no impact on these aquatic MSES. It is noted that the Project will likely require clearing of Regional Ecosystems within a Defined Distance of a Watercourse, noting that this impact pathway is assessed in the Terrestrial Ecology Report.

The Project will cause a significant residual impact on waterways that provide fish passage because a section of the unnamed green waterway will be permanently infilled by the OOPD (Table 6-4). The proponent acknowledges this impact and proposes a financial offset.

Table 6-4 Significant Residual Impact Criteria

Significant Residual Impact Criteria	Significant Residual Impact (Yes/No)	
	Low Risk (Green) Waterway	Moderate Risk (Amber Waterway
Result in the mortality or injury of fish.	Potentially	No
Result in conditions that substantially increase risks to the health, wellbeing and productivity of fish seeking passage, such as through the depletion of fishes energy reserves, stranding, increased predation risks, entrapment or confined schooling behaviour in fish.	Yes	No
Reduce the extent, frequency or duration of fish passage previously found at a site.	Yes	No

Significant Residual Impact Criteria	Significant Residual Impact (Yes/No)	
	Low Risk (Green) Waterway	Moderate Risk (Amber Waterway
Substantially modify, destroy, or fragment areas of fish habitat (including, but not limited to in-stream vegetation, snags and woody debris, substrate, bank or riffle formations) necessary for the breeding and/or survival of fish.	Yes	No
Result in a substantial and measurable change in the hydrological regime of the waterway, for example, a substantial change to the volume, depth, timing, duration and frequency of flows.	Yes	No
Lead to significant changes in water quality parameters such as temperature, dissolved oxygen, pH and conductivity that provide cues for movement in local fish species.	Potentially	No

6.4.1 Proposed Offsets

Under the *Environmental Offsets Act 2014*, an administering agency may impose an environmental offset condition if it is satisfied that the activity will, or is likely to have, a significant residual impact on a prescribed environmental matter that is a matter of state environmental significant (DSDIP 2014).

A financial settlement offset is proposed for the impacts of the proposed infilling of a section of the green mapped unnamed waterway on a waterway that provides fish passage. Only reaches of the unnamed waterway that were determined to be impacted by the Project are included in these calculations, and reaches further upstream where the unnamed waterway is already impacted by previous diversions of the waterway are not included. The area to be offset was calculated by estimating the channel length and the channel width for the reach of the unnamed waterway to be impacted. A breakdown of the impact area, notional offsets and associated costs are shown in Table 6-5 and Table 6-6. The impact areas are shown in Figure 6-1.

Table 6-5 Areas and Matter Groups Used in Offset Calculations.

Bioregion	Subregion	Distinct Matter Area (DMA)	DMA Impact Area	DMA Notional Offset Area (ha)	Matter Group
Rivers and inland waterways	Inland Waterways	1.1	1.5916	1.5916	1.1.1 Fish passage

Table 6-6 Financial Settlement Offset Costs.

Matter Group	Fish Passage
On ground cost	$31,832.00
Administrative cost	$7,958.00
Total non-protected area cost	$39,790.00

ML 70115

ML 70116

ML 1781

Isaac River

Isaac River

Isaac River

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SLR

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0 120 240 480 Meters

Coordinate System:	GDA2020 MGA Zone 55
Scale:	1:15,000 at A3
Project Number:	620.042120.00005
Date Drawn:	19/05/2026
Drawn by:	AB
Reviewed by:	AM

LEGEND

- Waterway to be offset
- Watercourse
- Disturbance Footprint
- Mining Lease
- Mining Lease Application Area (Project Area)

DAUNIA WEST INFRASTRUCTURE PROJECT AQUATIC ECOLOGY DESKTOP ASSESSMENT AND BASELINE STUDY

AREA OF THE UNNAMED WATERWAY TO BE OFFSET.

FIGURE 6-1

Path: C:\Users\andrew.bentley\OneDrive - SLR Consulting\Documents - FRC Utility\Mapping\Projects\2024\620031354_00600_DNM_Pandora\620042120_DWIP.aprx\AE_Fig_6-1_Offset

7.0 Summary

Thorough assessment of aquatic ecological values indicated that:

- Ephemeral waterways surrounding the DWIP and DNM (e.g. Isaac River and New Chum Creek) have very low (New Chum Creek) to high (Isaac River) aquatic ecological values. New Chum Creek rarely holds water and does not provide fish habitat for extended periods of time. Conversely, the Isaac River has short period of flow but provides important movement corridors for migration by aquatic fauna, linking breeding and feeding habitats.
- The unnamed green waterway has low aquatic ecological values, because it provides periodic habitat for common aquatic fish and macroinvertebrate species, but unusual, threatened or rare features or species do not occur.

The aquatic ecological receptors of the Project Area are not considered to be sensitive receptors because:

- Waterways are ephemeral and predominantly in dry condition, during which time they do not support aquatic species.
- Natural water quality is highly variable, which is typical for ephemeral systems.
- Threatened aquatic species do not occur in or near the Project Area.
- Aquatic species known from and likely to occur in the project area are tolerant of, and resilient to, a range of water quality and aquatic habitat conditions (e.g. many fish species are early colonisers of aquatic habitat following flow events after long periods of no flow; macroinvertebrate communities are dominated by tolerant taxa; aquatic plants are uncommon and dominated by low cover of ubiquitous emergent taxa).

The Project may cause adverse impact to aquatic ecological receptors via:

- Increased turbidity and sedimentation associated with stormwater runoff from disturbed areas and earthworks, causing impacts to water quality and aquatic biota in receiving waters.
- Potential contamination of waterways during construction from fuel or chemical spills, causing direct impacts to water quality and aquatic biota in receiving waters.
- Contamination from introduction and spread of weeds within waterways and wetlands, which causes an indirect impact to aquatic ecology.
- Instream works and permanent waterway barriers (i.e. partial infilling of the waterway with the OOPD) within unnamed waterway, which causes direct impact to aquatic habitat and fish passage.
- Permanent waterway barriers associated with haul road waterway crossings over the unnamed waterway in the Project Area, downstream of the infilled reach of waterway.
- Clearing of regulated vegetation within a defined distance of a watercourse (noting this impact pathway is assessed in the Terrestrial Ecology report).
- Potential changes to downstream hydrology and flow patterns.
- Potential changes to downstream water quality from erosion and from the OOPD.

Risk-based assessment of these sources of potential impact indicated low risk to aquatic ecological receptors where mitigations are applied, with the exception of infilling the green waterway with the OOPD, which has a high risk if impact to aquatic ecology.

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Appendix A Protected Matters Search Tool Results

Aquatic Ecology Assessment Report

Daunia West Infrastructure Project

Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00005

14 May 2026

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: 29-May-2025

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	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	30
Listed Migratory Species:	10

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:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	43
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area	In buffer area only
Natural Grasslands of the Queensland Central Highlands and northern Fitzroy Basin	Endangered	Community likely to occur within area	In feature area
Poplar Box Grassy Woodland on Alluvial Plains	Endangered	Community likely to occur within area	In feature area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area	In buffer area only

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			
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
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 likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat may occur within area	In feature area
[Geophaps scripta scripta](#) Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Grantiella picta](#) Painted Honeyeater [470]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Neochmia ruficauda ruficauda](#) Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area
[Poephila cincta cincta](#) Southern Black-throated Finch [64447]	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
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat may occur within area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			
[Dasyurus hallucatus](#) Northern Quoll, Digul [Gogo-Yimidir], Wijingadda [Dambimangari], Wiminji [Martu] [331]	Endangered	Species or species habitat likely to occur within area	In feature area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In feature area
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Petauroides volans](#)			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat known to occur within area	In feature area
[Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)](#)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
PLANT			
[Denhamia megacarpa](#)			
Large-fruited Denhamia [91342]	Endangered	Species or species habitat may occur within area	In buffer area only
[Dichanthium queenslandicum](#)			
King Blue-grass [5481]	Endangered	Species or species habitat known to occur within area	In feature area
[Dichanthium setosum](#)			
bluegrass [14159]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Eucalyptus raveretiana](#)			
Black Ironbox [16344]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Polianthion minutiflorum](#)			
[82772]	Vulnerable	Species or species habitat may occur within area	In feature area
[Samadera bidwillii](#)			
Quassia [29708]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
[Denisonia maculata](#)			
Ornamental Snake [1193]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Egernia rugosa](#)			
Yakka Skink [1420]	Vulnerable	Species or species habitat may occur within area	In feature area
[Elseya albagula](#)			
Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Furina dunmalli			
Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area	In feature area
Hemiaspis damelii			
Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area
Lerista allanae			
Allan's Lerista, Retro Slider [1378]	Endangered	Species or species habitat may occur within area	In feature area
Rheodytes leukops			
Fitzroy River Turtle, Fitzroy Tortoise, Fitzroy Turtle, White-eyed River Diver [1761]	Endangered	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			
Cuculus optatus			
Oriental Cuckoo, Horsfield's Cuckoo [86651]		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 known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
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
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Anseranas semipalmata			
Magpie Goose [978]		Species or species habitat may occur within area overfly marine 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 known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
[Chalcites osculans as Chrysococcyx osculans](#) Black-eared Cuckoo [83425]		Species or species habitat may 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
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area	In feature area
[Merops ornatus](#) Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat may occur within area overfly marine area	In buffer area only
[Pandion haliaetus](#) Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
[Rostratula australis as Rostratula benghalensis (sensu lato)](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

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

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Barada Barna Road upgrade	2024/09791		Assessment	In buffer area only
Isaac Downs coal mine project, near Moranbah, Qld	2019/8413		Post-Approval	In buffer area only
Isaac River Coal Mine Project	2021/8980		Post-Approval	In buffer area only
Moorvale South Extension Project	2024/09960		Referral Decision	In buffer area only
Moranbah South Project 2013 Seismic Exploration Program, Qld	2013/6814		Completed	In buffer area only
Olive Downs Project	2005/2377		Post-Approval	In feature area
Olive Downs Project Mine Site and Access Road	2017/7867		Post-Approval	In buffer area only
Peak Downs Mine Continuation Project	2022/09350		Assessment	In buffer area only
Peak Downs Mine Power Line Realignment Project	2024/09983		Assessment	In buffer area only
Winchester South Project Electricity Transmission Line, near Moranbah, Qld	2019/8458		Approval	In feature area
Winchester South Project Mine Site and Access Road, near Moranbah, Qld	2019/8460		Approval	In buffer area only
Winchester South Project Water Pipeline, near Moranbah, Qld	2019/8459		Approval	In feature area
Controlled action				

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
7 North Dam Extension Project - Peak Downs Mine	2012/6260	Controlled Action	Completed	In buffer area only
Alpha Coal Project - Mine and Rail Development	2008/4648	Controlled Action	Post-Approval	In buffer area only
Arrow Bowen Pipeline (CSG), QLD	2012/6459	Controlled Action	Post-Approval	In buffer area only
Bowen Gas Project	2012/6377	Controlled Action	Post-Approval	In feature area
Caval Ridge Open Cut Coal Mine Project	2008/4417	Controlled Action	Post-Approval	In buffer area only
Codrilla Open Cut Coal Mining and Processing Operation with Associated Infrastructure	2009/4892	Controlled Action	Post-Approval	In buffer area only
Construct and Operate the Connors River Dam and Pipelines	2008/4429	Controlled Action	Post-Approval	In buffer area only
Develop an Open Cut Coal Mine at Daunia	2008/4418	Controlled Action	Post-Approval	In feature area
Eagle Downs Coal Mine Central Queensland	2008/3945	Controlled Action	Post-Approval	In buffer area only
Extension to the exisiting Isaac Plains Mine, near Moranbah, Qld	2016/7827	Controlled Action	Post-Approval	In buffer area only
Goonyella Riverside Mine to South Walker Creek Mine Dragline Move	2016/7788	Controlled Action	Completed	In buffer area only
install & operate gas pipeline	2005/2059	Controlled Action	Post-Approval	In buffer area only
Millenium Open Cut Coal Mine Expansion Project, QLD	2009/4821	Controlled Action	Post-Approval	In buffer area only
Moranbah South Project Coal Mine, QLD	2012/6337	Controlled Action	Post-Approval	In buffer area only
Olive Downs Project Electricity Transmission Line	2017/7869	Controlled Action	Post-Approval	In buffer area only
Olive Downs Project Rail Spur	2017/7870	Controlled Action	Post-Approval	In buffer area only
Olive Downs Project Water Pipeline	2017/7868	Controlled Action	Post-Approval	In buffer area only
Open Cut Coal Mining	2004/1770	Controlled Action	Post-Approval	In feature area
Relocation of approximately 16km of Dysart Road and associated service infrastructure	2013/6868	Controlled Action	Post-Approval	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
The Grosvenor Coal Mine Project	2007/3785	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Broadlea North Coal Project open cut mine and associated infrastructure	2005/2179	Not Controlled Action	Completed	In buffer area only
Broadlea to Mallawa and Mallawa to Wotonga Rail Duplication	2006/3046	Not Controlled Action	Completed	In buffer area only
Carborough Downs mine extension	2006/3085	Not Controlled Action	Completed	In buffer area only
construction and operation of Carborough Downs Mine	2005/2064	Not Controlled Action	Completed	In buffer area only
Coppabella-Ingsdon Railway Duplication	2008/4103	Not Controlled Action	Completed	In buffer area only
Eagle-1 Exploration Drilling, North West Shelf, WA	2019/8578	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Integrated Isaac Plains Project	2006/3043	Not Controlled Action	Completed	In buffer area only
Open cut coal mine 7km NE of Moranbah (Isaac Plains)	2005/2070	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
Moranbah South Feasibility Seismic Survey	2010/5497	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Expansion of open cut coal mine and diversion of creeks in existing mine operati	2006/2845	Referral Decision	Completed	In buffer area only

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.

Appendix B Habitat Cards July 2024

Aquatic Ecology Assessment Report

Daunia West Infrastructure Project

Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00005620.042120.00005

14 May 2026

Appendix B Habitat Summary for Each Site

<table>
<tr><td>Site</td><td colspan="3">IRUS
Isaac River Upstream</td><td>Region</td><td colspan="2">Isaac River catchment</td></tr>
<tr><td>Date surveyed:</td><td colspan="3">30/7/24</td><td>Habitat Bioassessment Score</td><td colspan="2">30 (poor)</td></tr>
<tr><td colspan="2"> 
Downstream view</td><td colspan="2"> 
Upstream view</td><td colspan="2"> 
Left bank view</td><td> 
Right bank view</td></tr>
<tr><td colspan="2">Channel Description</td><td colspan="2">Substrate</td><td colspan="2">Aquatic Habitat</td><td>Riparian Zone</td></tr>
<tr><td>Stream order</td><td>6</td><td>Composition</td><td>bedrock 0%
boulder 0%
cobble 5%
pebble 3%
gravel 2%
sand 40%
silt / clay 50%</td><td>Habitat diversity</td><td>Low</td><td>Riparian width</td><td><1x channel width</td></tr>
<tr><td>Pattern</td><td>Regular meanders</td><td></td><td></td><td>Habitat features</td><td>Shallow pool, Isolated pool, undercut banks, large woody debris
Little sticks, branches, trailing tree roots, bank overhang
Some detritus, logs
Moderate blanketing silt</td><td>Disturbance</td><td>High</td></tr>
<tr><td>Bank stability</td><td>Minimal – moderate erosion</td><td></td><td></td><td></td><td></td><td>Dominant type</td><td>Native - Eucalypt
Casuarina
Melaleuca</td></tr>
<tr><td>Bank shape - left</td><td>Moderate, convex</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Bank shape - right</td><td>Vertical, undercut</td><td></td><td></td><td></td><td></td><td>Weed species</td><td>Castor plant, lantana</td></tr>
<tr><td colspan="2">Hydrology</td><td></td><td></td><td colspan="2">In-stream disturbance</td><td></td><td></td></tr>
<tr><td>Flow regime</td><td>ephemeral</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Water depth</td><td>0.1-0.5m</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Wetted width</td><td>1-3m</td><td>Deposits</td><td>Sand, silt</td><td>Flow modification</td><td>None</td><td></td><td></td></tr>
<tr><td>Flow</td><td>nil</td><td>Bed stability</td><td>Moderate aggradation</td><td>Waterway barrier</td><td>None</td><td>Adjacent land use</td><td>Grazing, native</td></tr>
<tr><td>Channel width</td><td>30m</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Comments:</td><td colspan="6">At the time of survey, the site comprised a well-defined channel with a regular meandering pattern and moderate to vertical (up to 15m), moderately stable banks. The site is on an ephemeral waterway and had one small shallow isolated pool at the time of survey. The substrate was dominated by sand and silt/clay, with some gravel, pebble and cobble present in sections of the channel bed. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Casuarina, Melaleuca and Eucalyptus, with grasses in the ground stratum and on the channel bed. Low density of Cyperus and Lomandra were present at the time of survey. Disturbance of the site was high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.</td></tr>
</table>

Site	NCCUS New Chum Creek			**Region**		Isaac River catchment	
Date surveyed:	29/7/24			**Habitat Bioassessment Score**		Dry (not assessed)	
							
Downstream view	Upstream view			Left bank view		Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	3	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width
Pattern	irregular		boulder 0%	**Habitat features**	Undercut banks, large woody debris	**Disturbance**	high
Bank stability	moderate – severe erosion		cobble 0%		Little detritus, branches, logs, blanketing silt, man-made debris	**Dominant type**	native – Eucalypt, melaleuca
Bank shape - left	Steep, undercut		pebble 0%		Some sticks		
Bank shape - right	Steep, convex		gravel 5%		Moderate bank overhang		
Hydrology			sand 5%			**Weed species**	None
Flow regime	ephemeral		silt / clay 90%				
Water depth	dry			**In-stream disturbance**			
Wetted width	dry	**Deposits**	Silt	**Flow modification**	None		
Flow	nil	**Bed stability**	Moderate erosion	**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	3 m						
Comments:	At the time of survey, the site comprised a well-defined, irregular channel with steep (up to 3 m), moderately eroded banks. The site is on an ephemeral waterway and was dry at the time of survey. The substrate was dominated by silt/clay, with some sand and gravel present in sections of the channel bed. Some presence of tree root and overhanging banks would provide minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is limited from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Melaleuca and Eucalyptus, with grasses in the ground stratum. Low density of Nardoo in the dry bed was the only aquatic plant present at the time of survey. Disturbance of the site was high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site		UCUS Unnamed Creek Upstream 1			**Region**		Isaac River catchment
Date surveyed:		31/7/24			**Habitat Bioassessment Score**		33 (poor)
 Downstream view		 Upstream view			 Left bank view		 Right bank view
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**
Stream order	1	**Composition**	bedrock	0%	**Habitat diversity**	Low	**Riparian width**	absent
Pattern	irregular		boulder	0%	**Habitat features**	Shallow pool, isolated pool, undercut bank	**Disturbance**	extreme
Bank stability	Moderate aggradation		cobble	0%		Little sticks, trailing bank veg	**Dominant type**	exotic – acacia
Bank shape - left	Steep, undercut		pebble	0%		Some detritus, trailing tree roots, bank overhang, blanketing silt		
Bank shape - right	Vertical, undercut		gravel	0%				
Hydrology			sand	0%			**Weed species**	None
Flow regime	ephemeral		silt / clay	100%				
Water depth	0.3m				**In-stream disturbance**			
Wetted width	2m	**Deposits**	Silt		**Flow modification**	None		
Flow	nil	**Bed stability**	Severe aggradation		**Waterway barrier**	None	**Adjacent land use**	Regrowth from cleared farmland
Channel width	2 m							
Comments:	At the time of survey, the site comprised a well-defined, irregular channel and steep to vertical (up to 2 m), moderately stable banks. The site is on an ephemeral waterway and had one large (>50m length) shallow isolated pool at the time of survey. The substrate was dominated by silt/clay. Some presence of tree root, trailing bank vegetation and overhanging banks would provide aquatic habitat structure during times that the site holds water after significant rain. The canopy layer of riparian vegetation comprised semi-continuous exotic species such as Acacia, with grasses in the ground stratum. No aquatic plant species were present at the time of survey. Disturbance of the site was extreme, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	IRDS1 Isaac River Downstream			**Region**		Isaac River catchment	
Date surveyed:	29/7/24			**Habitat Bioassessment Score**		Dry (not assessed)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**				**Aquatic Habitat**	
Stream order	6	**Composition**	bedrock	0%		**Habitat diversity**	Low
Pattern	Regular meanders		boulder	0%		**Habitat features**	Undercut bank, large woody debris
Bank stability	Moderate aggradation		cobble	1%			Little detritus, sticks, branches, logs, bank overhang, man-made debris
Bank shape - left	Moderate, convex		pebble	4%			
Bank shape - right	Steep, convex		gravel	5%			
Hydrology			sand	60%			
Flow regime	ephemeral		silt / clay	30%			
Water depth	dry					**In-stream disturbance**	
Wetted width	dry	**Deposits**	Silt, sand			**Flow modification**	none
Flow	nil	**Bed stability**	Moderate aggradation			**Waterway barrier**	none
Channel width	50 m						

Riparian Zone			
Riparian width	<1x channel width		
Disturbance	High		
Dominant type	native – Eucalypt		
	Melaleuca		
Weed species	Castor plant		
Adjacent land use	Grazing/native		

Comments: At the time of survey, the site comprised a well-defined channel with regular meanders and moderate to steep (up to 10 m), moderately stable banks. The site is on an ephemeral waterway and was dry at the time of survey. The substrate was dominated by sand and silt/clay, with some gravel, pebble and cobble present in sections of the channel bed. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal at this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Melaleuca and Eucalyptus, with grasses in the ground stratum and on the channel bed. Low density of *Cyperus* was present at the time of survey. Disturbance of the site was high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.

Site	IRDS2 Isaac River Downstream	**Region**	Isaac River catchment
Date surveyed:	29/7/24	**Habitat Bioassessment Score**	Dry (not assessed)

Downstream view

Upstream view

Left bank view

Right bank view

Channel Description

Stream order	6
Pattern	Regular meanders
Bank stability	Moderate aggradation
Bank shape - left	Moderate, convex
Bank shape - right	Steep, convex

Hydrology

Flow regime	ephemeral
Water depth	dry
Wetted width	dry
Flow	nil
Channel width	50 m

Substrate

Composition	bedrock	0%
	boulder	0%
	cobble	1%
	pebble	2%
	gravel	3%
	sand	64%
	silt / clay	30%
Deposits	Silt, sand	
Bed stability	Moderate aggradation	

Aquatic Habitat

Habitat diversity	Low
Habitat features	Undercut bank, large woody debris
	Little detritus, sticks, branches, logs, bank overhang, blanketing silt, man-made debris

In-stream disturbance

Flow modification	none
Waterway barrier	none

Riparian Zone

Riparian width	<1x channel width
Disturbance	High
Dominant type	native – Eucalypt Melaleuca Casuarina
Weed species	Castor plant Mexican poppy Lantana
Adjacent land use	Grazing/native

Comments: At the time of survey, the site comprised a well-defined channel with regular meanders and moderate to steep (up to 10 m), moderately stable banks. The site is on an ephemeral waterway and had was dry at the time of survey. The substrate was dominated by sand and silt/clay, with some gravel, pebble, and cobble present in sections of the channel bed. Limited presence of tree root and overhanging banks would provide minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal at this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Casuarina, Melaleuca and Eucalyptus, with grasses in the ground stratum and on the channel bed. *Cyperus* was present at the time of survey. Disturbance of the site was High, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.

Site		UCDS1 Unnamed Creek Downstream 1			**Region**		Isaac River catchment
Date surveyed:		31/7/24			**Habitat Bioassessment Score**		37 (poor)
							
Downstream view		Upstream view			Left bank view		Right bank view
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**
Stream order	2	**Composition**	bedrock	0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width
Pattern	Irregular meanders		boulder	0%	**Habitat features**	Shallow pool, deep pool, isolated pool, undercut bank	**Disturbance**	Very high
Bank stability	Moderate aggradation		cobble	0%		Little detritus, sticks	**Dominant type**	native – Eucalypt Melaleuca
Bank shape - left	Steep, convex		pebble	0%		Some bank overhang		
Bank shape - right	Steep, convex		gravel	0%		Extensive blanketing silt		
Hydrology			sand	0%			**Weed species**	None
Flow regime	ephemeral		silt / clay	100%				
Water depth	0.2-1m				**In-stream disturbance**			
Wetted width	2-4m	**Deposits**	Silt		**Flow modification**	None		
Flow	nil	**Bed stability**	Severe aggradation		**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	3 m							
Comments:	At the time of survey, the site comprised a well-defined channel with irregular meadners and steep (up to 2 m), moderately stable banks. The site is on an ephemeral waterway and had two moderately sized shallow isolated pools at the time of survey. The substrate was dominated by silt/clay. Presence of tree root and overhanging banks would provide very some aquatic habitat structure during times that the site holds water after significant rain, but overall aquatic habitat is minimal for this site. The canopy layer of riparian vegetation comprised semi-continuous Melaleuca and Eucalyptus, with grasses in the ground stratum. Low density of *Cyperus* were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	UCDS2 Unnamed Creek Downstream 2			**Region**		Isaac River catchment	
Date surveyed:	29/7/24			**Habitat Bioassessment Score**		Dry (not assessed)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	2	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	Absent/depleted
Pattern	Mildly sinuous		boulder 0%	**Habitat features**	dry	**Disturbance**	High
Bank stability	Bed stable		cobble 0%		Little detritus, sticks, branches, trailing tree roots	**Dominant type**	native – Eucalypt Acacia
Bank shape - left	Low, convex		pebble 0%				
Bank shape - right	Low, convex		gravel 0%				
Hydrology			sand 0%			**Weed species**	None
Flow regime	ephemeral		silt / clay 100%				
Water depth	dry			**In-stream disturbance**			
Wetted width	dry	**Deposits**	Silt	**Flow modification**	None		
Flow	nil	**Bed stability**	Moderate compaction	**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	3 m						
Comments:	At the time of survey, the site comprised an undefined, mildly sinuous channel low (<0.5 m), stable banks. The site is on an ephemeral waterway and was dry at the time of survey. The substrate was dominated by silt/clay. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Eucalyptus, with grasses in the ground stratum and on the channel bed. No aquatic plant species were present at the time of survey. Disturbance of the site was high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site		FD1 Farm Dam 1			**Region**		Isaac River catchment
Date surveyed:		31/7/24			**Habitat Bioassessment Score**		15 (poor)
							
Downstream view		Upstream view			Left bank view		Right bank view
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**
Stream order	2	**Composition**	bedrock	0%	**Habitat diversity**	Low	**Riparian width**	Absent/depleted
Pattern	Isolated lake		boulder	0%	**Habitat features**	Shallow pool, deep pool, isolated pool, undercut bank	**Disturbance**	Very high
Bank stability	Moderate aggradation		cobble	0%		Little sticks, trailing tree roots, emergent aquatic plants	**Dominant type**	native – Eucalypt Melaleuca
Bank shape - left	Moderate convex		pebble	0%		Some bank overhang		
Bank shape - right	Low, undercut		gravel	0%		Extensive blanketing silt		
Hydrology			sand	0%			**Weed species**	None
Flow regime	ephemeral		silt / clay	100%				
Water depth	0.5-1.2m				**In-stream disturbance**			
Wetted width	2-5m	**Deposits**	Silt		**Flow modification**	None		
Flow	nil	**Bed stability**	Severe aggradation		**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	6 m							
Comments:	At the time of survey, the site was an isolated lake with semi-defined banks of moderate steepness (up to 1 m), and moderate stability. The site is on an ephemeral waterway and had one small isolated pool at the time of survey. The substrate was dominated by silt/clay. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Melaleuca and Eucalyptus, with grasses in the ground stratum. *Persicaria* was present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	WS2 Wetland Site 2			**Region**		Isaac River catchment	
Date surveyed:	31/7/24			**Habitat Bioassessment Score**		9 (poor)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	NA	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	Absent/depleted
Pattern	Irregular meanders		boulder 0%	**Habitat features**	Shallow pool, isolated pool	**Disturbance**	Extreme disturbance
Bank stability	Moderate aggradation		cobble 0%		Little detritus, trailing bank veg	**Dominant type**	None
Bank shape - left	Flat, convex		pebble 0%		Extensive blanketing silt		
Bank shape - right	Flat, convex		gravel 0%				
Hydrology			sand 0%			**Weed species**	None
Flow regime	ephemeral		silt / clay 100%				
Water depth	0.2m			**In-stream disturbance**			
Wetted width	1-3m	**Deposits**	Silt	**Flow modification**	None		
Flow	nil	**Bed stability**	Moderate aggradation	**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	4 m						
Comments:	At the time of survey, the site comprised an undefined channel with irregular meanders and flat (<0.2 m), moderately stable banks. The site is on an ephemeral waterway and had one small shallow isolated pool at the time of survey. The substrate was dominated by silt/clay. Overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation was absent, with grasses in the ground stratum. No aquatic plant species were present at the time of survey. Disturbance of the site was extreme, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.						

Appendix C Habitat Cards May 2025

Aquatic Ecology Assessment Report

Daunia West Infrastructure Project

Whitehaven Daunia Pty Ltd

SLR Project No.: 620.042120.00005620.042120.00005

14 May 2026

Appendix C Habitat Summary for Each Site

Site	IRUS Isaac River Upstream			**Region**		Isaac River catchment	
Date surveyed:	13/5/25			**Habitat Bioassessment Score**		50 (Moderate)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	6	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	1 – 2 x channel width
Pattern	Mildly sinuous		boulder 0%	**Habitat features**	Shallow pool, connected slow, riffle, undercut bank	**Disturbance**	High
Bank stability	Moderate erosion		cobble 0%		Little detritus, sticks, trailing bank veg, trailing tree roots, bank overhang, blanketing silt, man-made debris, emergent aquatic plants	**Dominant type**	Native - Eucalypt
Bank shape - left	Moderate, convex		pebble 0%				Casuarina
Bank shape - right	Moderate, convex		gravel 5%				Callistemon
Hydrology			sand 95%			**Weed species**	Castor plant, Noogoora burr
Flow regime	ephemeral		silt / clay 0%	**In-stream disturbance**			
Water depth	0.1 - 0.7 m						
Wetted width	5 – 25 m	**Deposits**	Sand, silt	**Flow modification**	Minor changes to flow where rocks have been placed in a low raised bed crossing		
Flow	0.01 – 0.3 m	**Bed stability**	Moderate aggradation	**Waterway barrier**	Raised bed crossing with rocks deposited in bed at rail bridge crossing	**Adjacent land use**	Grazing
Channel width	100 m						
Comments:	At the time of survey, the site comprised a well-defined mildly sinuous channel with moderate (up to 15m), moderately eroded banks particularly around the rail bridge crossing. The site is on an ephemeral waterway and had one shallow flowing section of water with connected pools at the time of survey. The substrate was dominated by sand with some gravel present in sections of the channel bed. Limited presence of tree root, woody debris and overhanging banks would provide aquatic habitat during brief times that the site holds water after significant rain, but overall aquatic habitat is limited at this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Casuarina, Callistemon and Eucalyptus, with grasses and weeds (Castor and Noogoora burr) in the ground stratum and on the channel bed. Small amounts of *Cyperus* were present at the time of survey. Disturbance of the site was high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	NCCUS New Chum Creek			**Region**		Isaac River catchment	
Date surveyed:	13/5/25			**Habitat Bioassessment Score**		Dry (not assessed)	
 Downstream view		 Upstream view		 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	3	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width
Pattern	Irregular meanders		boulder 0%	**Habitat features**	Little detritus, sticks, branches, bank overhang	**Disturbance**	Very high
Bank stability	moderate erosion		cobble 0%		Some logs	**Dominant type**	Native – Eucalypt
Bank shape - left	Steep, convex		pebble 0%				
Bank shape - right	Steep, convex		gravel 10%				
Hydrology			sand 0%			**Weed species**	None
Flow regime	ephemeral		silt / clay 90%				
Water depth	dry			**In-stream disturbance**			
Wetted width	dry	**Deposits**	None	**Flow modification**	Recent groundworks in channel to clear riparian vegetation and flatten eroded areas		
Flow	nil	**Bed stability**	Bed stable	**Waterway barrier**	Bed level crossing at site	**Adjacent land use**	Grazing
Channel width	10 m						
Comments:	At the time of survey, the site comprised a well-defined, irregular channel with steep (up to 3 m), moderately eroded banks. The site is on an ephemeral waterway and was dry at the time of survey. The substrate was dominated by silt/clay, with some gravel present in sections of the channel bed. Some presence of tree overhanging banks would provide minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is limited from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Eucalyptus, with grasses in the ground stratum. No aquatic plants were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway with evidence of recent grading, and terrestrial weeds.						

Site	UCUS Unnamed Creek Upstream 1	**Region**	Isaac River catchment
Date surveyed:	15/5/25	**Habitat Bioassessment Score**	24 (Poor)

Downstream view

Upstream view

Left bank view

Right bank view

Channel Description

Stream order	1
Pattern	Mildly sinuous
Bank stability	Minimal erosion
Bank shape - left	Moderate, convex
Bank shape - right	Moderate, convex

Hydrology

Flow regime	ephemeral
Water depth	0 – 0.5 m
Wetted width	0 - 3 m
Flow	nil
Channel width	10 m

Substrate

Composition	bedrock	0%
	boulder	0%
	cobble	0%
	pebble	0%
	gravel	0%
	sand	0%
	silt / clay	100%
Deposits	Silt	
Bed stability	Bed stable	

Aquatic Habitat

Habitat diversity	Low
Habitat features	Shallow pool, isolated pool Little detritus, sticks, trailing bank veg Extensive blanketing silt

In-stream disturbance

Flow modification	None
Waterway barrier	None

Riparian Zone

Riparian width	Absent
Disturbance	Very high
Dominant type	Absent
Weed species	Parthenium
Adjacent land use	Grazing

Comments: At the time of survey, the site comprised a well-defined, mildly sinuous pattern with moderate, minimally eroded banks. The site is on an ephemeral waterway and had one large (>50m length) shallow isolated pool at the time of survey. The substrate was dominated by silt/clay. Little presence of trailing bank vegetation and extensive blanketing silt would provide minimal aquatic habitat structure during times that the site holds water after significant rain. The canopy layer of riparian vegetation was absent having been cleared since previous surveys, with grasses dominating the ground stratum. No aquatic plant species were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.

Site	UCUS2 Unnamed Creek Upstream 2			**Region**		Isaac River catchment	
Date surveyed:	15/5/25			**Habitat Bioassessment Score**		38 (Poor)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	1	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	Absent/depleted
Pattern	Mildly sinuous		boulder 0%	**Habitat features**	Shallow pool, isolated pool, large woody debris	**Disturbance**	Very high
Bank stability	Moderate erosion		cobble 0%		Little detritus, trailing bank veg, filamentous algae	**Dominant type**	Native – Eucalypt
Bank shape - left	Low, convex		pebble 0%		Moderate blanketing silt		
Bank shape - right	Low, convex		gravel 0%				
Hydrology			sand 10%			**Weed species**	Parthenium
Flow regime	ephemeral		silt / clay 90%				
Water depth	0.5 – 0.8 m			**In-stream disturbance**			
Wetted width	8 – 15 m	**Deposits**	Silt	**Flow modification**	None		
Flow	nil	**Bed stability**	Bed stable	**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	10 m						
Comments:	At the time of survey, the site was an isolated lake with semi-defined banks of low steepness and moderate stability. The site is on an ephemeral waterway and had one small isolated pool at the time of survey. The substrate was dominated by silt/clay. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation comprised of Eucalyptus, with grasses in the ground stratum. *Chara* sp. (algae) was present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site		IRDS1 Isaac River Downstream			**Region**		Isaac River catchment
Date surveyed:		14/5/25			**Habitat Bioassessment Score**		48 (Moderate)
 Downstream view		 Upstream view			 Left bank view		 Right bank view
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**
Stream order	6	**Composition**	bedrock	0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width
Pattern	Straight		boulder	0%	**Habitat features**	Shallow pool, connected slow, run, undercut bank, large woody debris	**Disturbance**	Moderate
Bank stability	Minimal to no erosion		cobble	0%		Little detritus, sticks, branches, logs, trailing bank veg, trailing tree roots, bank overhang	**Dominant type**	Native – Eucalypt and Callistemon
Bank shape - left	Moderate, convex		pebble	0%				
Bank shape - right	Steep, convex		gravel	5%				
Hydrology			sand	90%			**Weed species**	Lantana, Noogoora burr
Flow regime	ephemeral		silt / clay	5%				
Water depth	0.1 – 0.3 m				**In-stream disturbance**			
Wetted width	2 – 8 m	**Deposits**	Sand		**Flow modification**	None		
Flow	0.1 m/s	**Bed stability**	Bed stable		**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	100 m							
Comments:	At the time of survey, the site comprised a well-defined straight channel and moderate to steep (up to 10 m), stable banks. The site is on an ephemeral waterway had shallow running water at the time of survey. The substrate was dominated by sand with some silt/clay and gravel present in sections of the channel bed. Presence of tree root and overhanging banks as well as woody debris would provide aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal at this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Callistemon and Eucalyptus, with grasses in the ground stratum and on the channel bed. Some *Cyperus* was present at the time of survey. Disturbance of the site was moderate, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

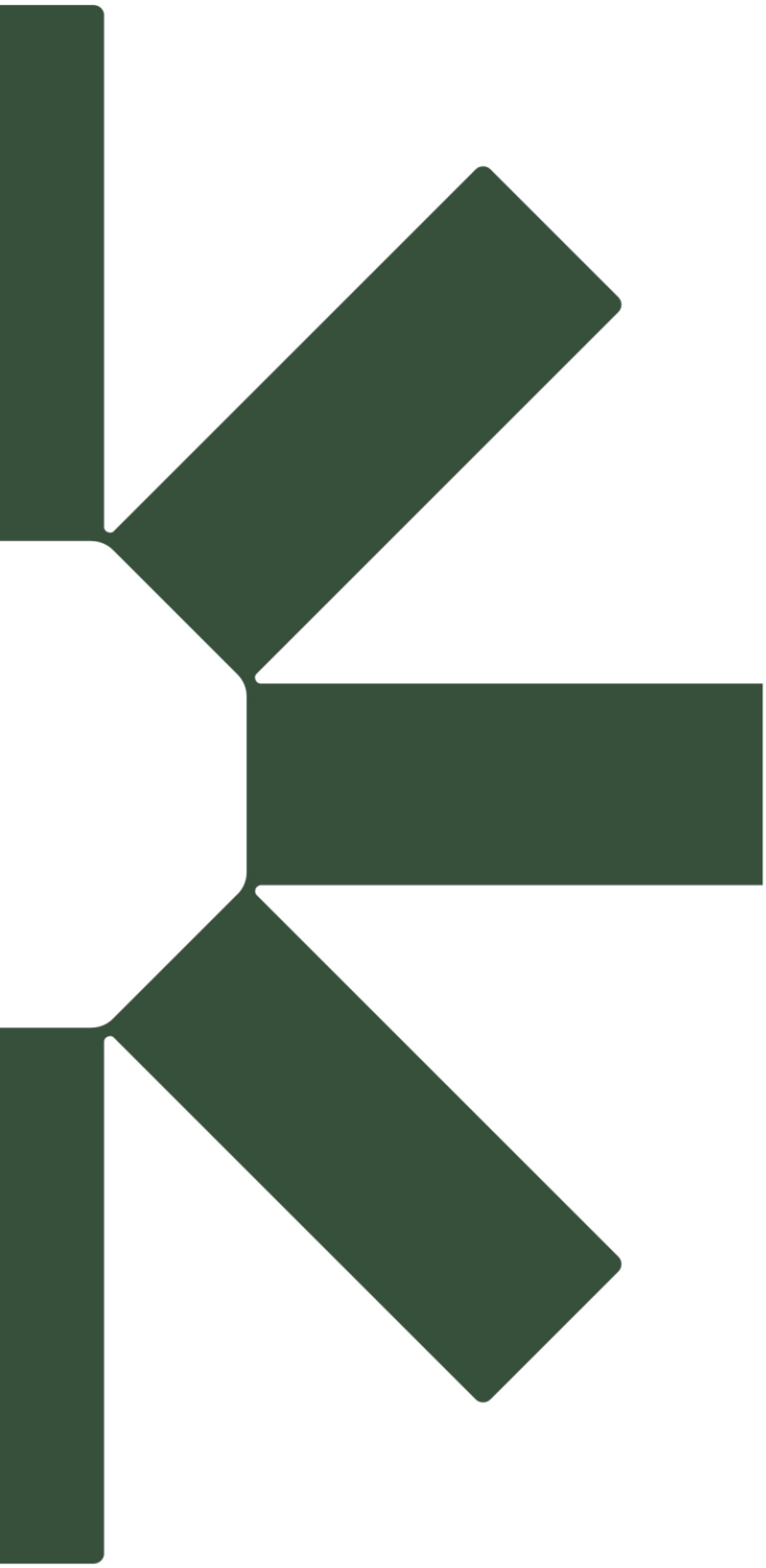
Site	IRDS2 Isaac River Downstream			**Region**		Isaac River catchment	
Date surveyed:	14/5/25			**Habitat Bioassessment Score**		46 (Moderate)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**				**Aquatic Habitat**	
Stream order	6	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width
Pattern	Mildly sinuous		boulder 0%	**Habitat features**	Shallow pool, connected slow, run, undercut bank, large woody debris	**Disturbance**	Moderate
Bank stability	Minimal to no erosion		cobble 0%		Little detritus, sticks, branches, logs, trailing bank veg, trailing tree roots, bank overhang, man-made debris	**Dominant type**	Native – Eucalypt Callistemon
Bank shape - left	Moderate, convex		pebble 0%				
Bank shape - right	Steep, convex		gravel 5%				
Hydrology			sand 90%			**Weed species**	Lantana
Flow regime	ephemeral		silt / clay 5%				
Water depth	0.05 – 0.2 m			**In-stream disturbance**			
Wetted width	2 – 5 m	**Deposits**	Sand	**Flow modification**	none		
Flow	0.1 m/s	**Bed stability**	Bed Stable	**Waterway barrier**	none	**Adjacent land use**	Grazing
Channel width	100 m						
Comments:	At the time of survey, the site comprised a well-defined straight channel with moderate to steep (up to 10 m), minimally eroded banks. The site is on an ephemeral waterway and had shallow running water at the time of survey. The substrate was dominated by sand with some gravel and silt/clay present in sections of the channel bed. Some presence of tree root and woody debris would provide aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal at this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Callistemon and Eucalyptus, with grasses in the ground stratum and on the channel bed. No aquatic plants were present at the time of survey. Disturbance of the site was moderate, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site		UCDS1 Unnamed Creek Downstream 1			**Region**		Isaac River catchment		
Date surveyed:		14/5/25			**Habitat Bioassessment Score**		35 (Poor)		
 Downstream view		 Upstream view			 Left bank view		 Right bank view		
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**		
Stream order	2	**Composition**	bedrock	0%	**Habitat diversity**	Low	**Riparian width**	<1x channel width	
Pattern	Mildly sinuous		boulder	0%	**Habitat features**	Shallow pool, deep pool, isolated pool, large woody debris, in-stream plants	**Disturbance**	Very high	
Bank stability	Minimal -moderate erosion		cobble	0%		Little detritus, sticks, branches, logs, trailing bank veg, bank overhang	**Dominant type**	Native – Eucalypt Acacia	
Bank shape - left	Flat, convex		pebble	0%		Moderate blanketing silt			
Bank shape - right	Moderate, convex		gravel	0%					
Hydrology			sand	0%			**Weed species**	Sida	
Flow regime	ephemeral		silt / clay	100%					
Water depth	0.5 - >1m				**In-stream disturbance**				
Wetted width	2-20m	**Deposits**	Silt		**Flow modification**	Farm dam in waterway channel			
Flow	nil	**Bed stability**	Bed stable		**Waterway barrier**	Farm dam in waterway creating pool at site	**Adjacent land use**	Grazing	
Channel width	25 m								
Comments:	At the time of survey, the site comprised a well-defined mildly sinuous channel with moderate (up to 2 m) to flat, moderately stable banks. The site is on an ephemeral waterway and had one moderately sized shallow/deep isolated pool at the time of survey. The substrate was dominated by silt/clay. Presence of tree root and overhanging banks would provide very some aquatic habitat structure during times that the site holds water after significant rain, but overall aquatic habitat is minimal for this site. The canopy layer of riparian vegetation comprised semi-continuous Acacia and Eucalyptus, with grasses in the ground stratum. Some *Cyperus* were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.									

Site	UCDS2 Unnamed Creek Downstream 2			**Region**		Isaac River catchment	
Date surveyed:	13/5/25			**Habitat Bioassessment Score**		Dry (not assessed)	
 Downstream view	 Upstream view			 Left bank view		 Right bank view	
Channel Description		**Substrate**		**Aquatic Habitat**		**Riparian Zone**	
Stream order	2	**Composition**	bedrock 0%	**Habitat diversity**	Low	**Riparian width**	Absent/depleted
Pattern	Irregular		boulder 0%	**Habitat features**	dry	**Disturbance**	Very High
Bank stability	Minimal erosion		cobble 0%		Little detritus, sticks, branches, trailing tree roots	**Dominant type**	Native – Eucalypt Acacia
Bank shape - left	Flat, convex		pebble 0%				
Bank shape - right	Low, convex		gravel 10%				
Hydrology			sand 80%			**Weed species**	None
Flow regime	ephemeral		silt / clay 10%				
Water depth	dry			**In-stream disturbance**			
Wetted width	dry	**Deposits**	Silt	**Flow modification**	None		
Flow	nil	**Bed stability**	Bed stable	**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	3 m						
Comments:	At the time of survey, the site comprised an undefined, irregular channel with low (<0.5 m), stable banks. The site is on an ephemeral waterway and was dry at the time of survey. The substrate was dominated by sand with silt/clay and gravel also present. Limited presence of tree root and overhanging banks would provide very minimal aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is absent from this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Eucalyptus, with grasses in the ground stratum and on the channel bed. No aquatic plant species were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	FD1 Farm Dam 1			**Region**		Isaac River catchment	
Date surveyed:	14/5/25			**Habitat Bioassessment Score**		27 (Poor)	
							
Downstream view	Upstream view			Left bank view		Right bank view	
Channel Description		**Substrate**			**Aquatic Habitat**		**Riparian Zone**
Stream order	2	**Composition**	bedrock 0%		**Habitat diversity**	Low	**Riparian width** Absent/depleted
Pattern	Mildly sinuous		boulder 0%		**Habitat features**	Shallow and deep pool, isolated pool, large woody debris, in-stream plants	**Disturbance** Very high
Bank stability	Minimal to moderate erosion		cobble 0%			Little detritus, sticks, branches, logs, trailing bank veg, in-stream wetland vegetation	**Dominant type** Native – Eucalypt Acacia
Bank shape - left	Flat, concave		pebble 0%			Some emergent aquatic plants	
Bank shape - right	Moderate, convex		gravel 0%			Extensive blanketing silt	
Hydrology			sand 0%				**Weed species** Parthenium Sida
Flow regime	ephemeral		silt / clay 100%		**In-stream disturbance**		
Water depth	0.7 - >1 m						
Wetted width	5 - 25 m	**Deposits**	Silt		**Flow modification**	Farm dam in waterway channel	
Flow	nil	**Bed stability**	Bed stable		**Waterway barrier**	Farm dam in waterway channel	**Adjacent land use** Grazing
Channel width	20 m						
Comments:	At the time of survey, the site was an isolated lake with semi-defined banks of flat to moderate steepness (up to 1 m), and moderate stability. The site is on an ephemeral waterway and had one small, isolated pool at the time of survey. The substrate was dominated by silt/clay. Presence of tree root, trailing bank vegetation and emergent aquatic plants would provide aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal for this typically dry site. The canopy layer of riparian vegetation comprised semi-continuous Acacia and Eucalyptus, with grasses in the ground stratum. *Persicaria* and *Cyperus* were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.							

Site	WS2 Wetland Site 2			**Region**		Isaac River catchment		
Date surveyed:	14/5/25			**Habitat Bioassessment Score**		Not assessed		
 Downstream view	 Upstream view			 Left bank view		 Right bank view		
Channel Description		**Substrate**				**Aquatic Habitat**		**Riparian Zone**	
Stream order	NA	**Composition**	bedrock	0%		**Habitat diversity**	Moderate	**Riparian width**	Absent/depleted
Pattern	Isolated lake		boulder	0%		**Habitat features**	Shallow pool, isolated pool, in-stream plants	**Disturbance**	Very high
Bank stability	Minimal to no erosion		cobble	0%			Little detritus, submerged aquatic plants, floating aquatic plants	**Dominant type**	Native - Acacia
Bank shape - left	Flat, convex		pebble	0%			Moderate trailing bank veg, blanketing silt, filamentous algae, emergent aquatic plants		
Bank shape - right	Flat, concave		gravel	0%					
Hydrology			sand	0%				**Weed species**	Parthenium
Flow regime	ephemeral		silt / clay	100%					
Water depth	0.3 – 0.5 m					**In-stream disturbance**			
Wetted width	3 – 6 m	**Deposits**	Silt			**Flow modification**	None		
Flow	nil	**Bed stability**	Bed stable			**Waterway barrier**	None	**Adjacent land use**	Grazing
Channel width	8 m								
Comments:	At the time of survey, the site comprised an isolated pool and flat (<0.2 m), stable banks. The site is on an ephemeral waterway and had one small isolated pool at the time of survey. The substrate was dominated by silt/clay Presence of in stream plants, trailing bank vegetation and emergent aquatic plants would provide aquatic habitat structure during brief times that the site holds water after significant rain, but overall aquatic habitat is minimal for this typically dry site. The canopy layer of riparian vegetation was absent with very few scattered small Acacia and parthenium and grasses in the ground stratum. *Cyperus, Potamogeton* and *Ludwigia* plant species were present at the time of survey. Disturbance of the site was very high, relating to past clearing of riparian and catchment vegetation for grazing and cattle access to the waterway, and terrestrial weeds.								



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