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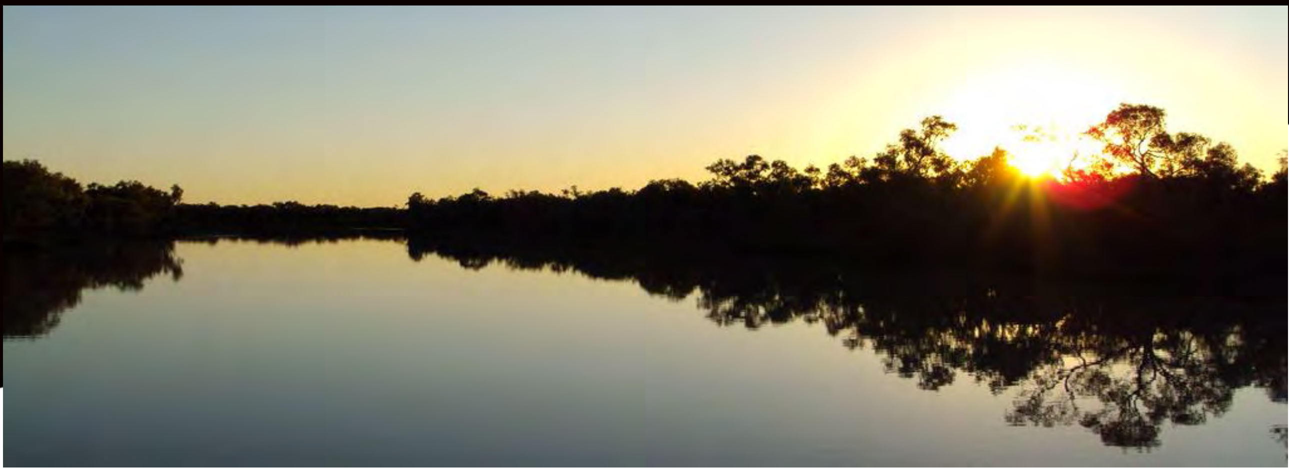

REGIONAL INTERESTS DEVELOPMENT APPLICATION

Regional Planning Interests Act 2014

Thomson River Weir Project

Thomson River, Longreach

SUPPORTING INFORMATION

JANUARY 2024

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REGIONAL INTERESTS DEVELOPMENT APPLICATION

Regional Planning Interests Act 2014

Thomson River Weir Project

Thomson River, Longreach

Thomson River Riparian Corridor and Lot 2 SP123565 & Lot 4 SP232181

Prepared For: Longreach Regional Council

JANUARY 2024

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EXECUTIVE SUMMARY

SITE DETAILS

Real Property Description	Thomson River Riparian Corridor and Lot 2 SP123565 & Lot 4 SP232181
Local Government	Longreach Regional Council
Planning Scheme	Longreach Regional Planning Scheme 2015
Planning Scheme Zoning	Rural Zone
Regional Plan	Central West Regional Plan 2009
Areas of Regional Interest	Strategic Environmental Area – Designated Precinct

APPLICANT DETAILS

Applicant	Longreach Regional Council c/- Precinct Urban Planning PO Box 3038 TOOWOOMBA QLD 4350
Contact Person	James Williams Phone: (07) 4632 2535 Mobile: 0481 127 412 Email: james@precinctplan.com.au
Our Reference	2023-111

1.0 INTRODUCTION

This report has been prepared in support of a Development Application for a Regional Interests Development Approval (RIDA). Longreach Regional Council (Council) are seeking to upgrade/replace existing water storage infrastructure within the Thomson River Riparian Corridor to increase the storage capacity of the Longreach Waterhole. The proposed development includes upgrades to Town Weir and four (4) associated anabranch weirs.

The Thomson River and associated flood plain is identified as a Strategic Environmental Area – Designated Precinct (SEA-DP) under the *Central West Regional Plan 2009* (the Regional Plan). In accordance with Section 27 of the *Regional Planning Interests Act 2014* (RPI Act), the proposed development will result in impacts which affect a feature, quality characteristic or other attribute of the area relating to a matter associated with a SEA and involves undertaking a Regulated Activity within an Area of Regional Interest (ARI). Accordingly, a Regional Interests Development Approval must be obtained in accordance with the requirements of the RPI Act prior to the commencement of the works.

This report has been prepared on behalf of the applicant, Longreach Regional Council, and seeks to demonstrate the suitability of the proposal within the locality and its compliance with the relevant provisions of the RPIA.

1.1 APPLICATION MATERIAL

The following documentation is provided in support of this application in accordance with the requirements of the RPIA.

- Supporting Information Document – this report.
- RPI Act Assessment Application Form – completed via online lodgement portal.
- Development Plans – attached at Appendix A.
- Notification activities undertaken with stakeholders – Section 6.0 of this report.
- Specialist Reports – attached at Appendices B-H.

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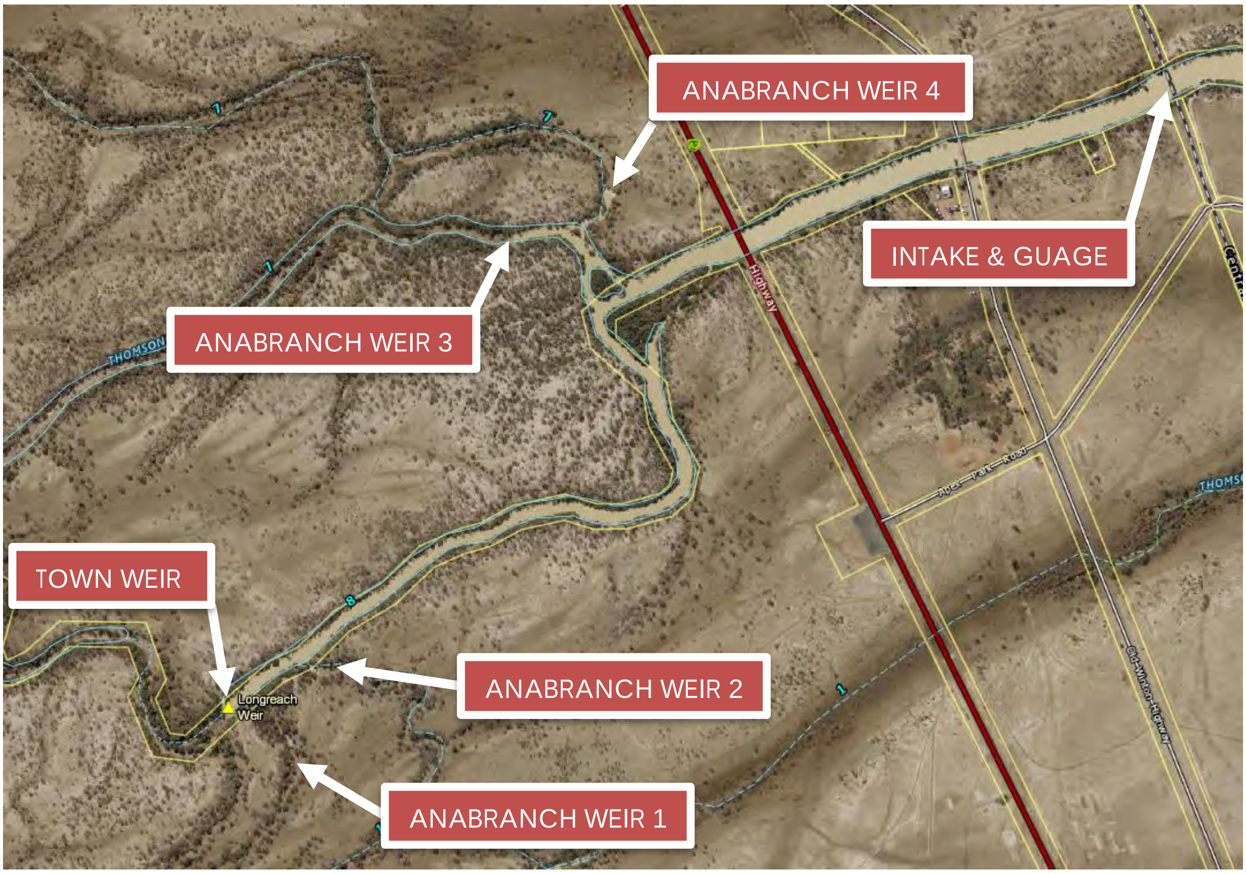
2.0 SUBJECT SITE

2.1 SITE OVERVIEW

The subject land consists of the Thomson River Riparian Corridor, Lot 2 SP123565 and Lot 4 SP212181. The proposed development (Town Weir) is located approximately 4.5km north-west of the Longreach town centre. The subject land is currently utilised for water storage associated with the Longreach Waterhole. The subject land outside the Thomsen River Riparian Corridor is currently utilised for agricultural purposes and contains structures ancillary to site operations. The features of the subject land and surrounding locality are illustrated in Figure 1.

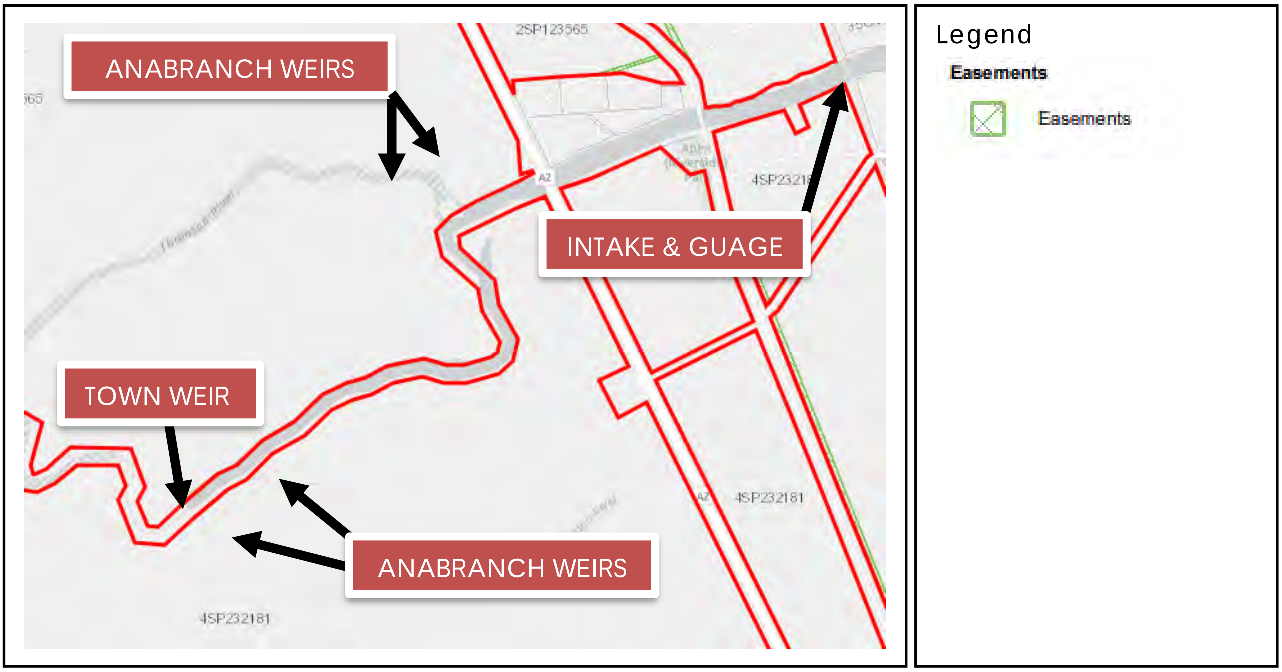
FIGURE 1 - AERIAL PHOTOGRAPH



2.2 EASEMENTS AND ENCUMBRANCES

The development area is not burdened by, nor does it benefit from, any easements. It is noted that Lot 4 SP232181 is burdened by an easement, however this does not impact the proposed development area.

FIGURE 2 - EASEMENT AND INFRASTRUCTURE MAPPING



2.3 INFRASTRUCTURE

2.3.1 TRANSPORT NETWORKS

2.3.1.1 Existing Road Network

Access to the existing facilities is provided from the State and Local road networks via vehicle existing access tracks traversing Lot 4 SP232181 and Lot 2 SP123565.

2.3.1.2 Existing Public Transport Network

There are currently no public passenger transport services or infrastructure provided to the site.

2.3.2 UTILITY SERVICES

The existing facilities are connected to Council's water supply infrastructure.

2.4 APPROVAL HISTORY

Longreach Town Weir and associated anabranch weirs have been operational since the 1950s and are not subject to current development approvals. The proposed development seeks to formalise the infrastructure while allowing for the upgrade/replacement of this infrastructure.

2.5 SURROUNDING LAND USES

The surrounding land predominately consists of agricultural uses; refer to Figure 3. Land along the southern bank of the Thomsen River also consists of community facilities, including Apex Riverside Park, as well as small-scale commercial and residential development.

FIGURE 3 - AERIAL VIEW OF SURROUNDING LOCALITY

3.0 PROJECT DETAILS

3.1 BACKGROUND

Longreach Regional Council currently operates the Town Weir system along the Thomson River, located approximately 3.5km north-west of the Longreach township. The Town Weir system comprises one (1) main weir (i.e. Town Weir) and four (4) Anabranch Weirs; refer to Figure 1. The weir system was constructed in the 1950s by the Thomson River Authority.

The Town Weir system facilitates the 'Longreach Waterhole' which is the primary freshwater supply for the Longreach township. At capacity, the waterhole is approximately 10km in length, between Town Weir and the upstream Fairmont Weir, and holds approximately 3,300ML of water. Longreach Regional Council currently holds water access licence 604058, which permits Council to a nominal entitlement of 2,200 ML per year from the Thomson River system, with water from the upstream weirs realised as required to supplement town supplies.

Longreach Regional Council also hold Water Interference Licence 609661 under the *Water Plan (Cooper Creek) 2011*. This licence permits the storage of water along the Thomson River for domestic purposes.

Anabranch Weirs 3 and 4 failed during flooding events in 2022 and 2020, respectively, requiring upgrades by Council to repair and reinforce these weirs.

3.2 PROPOSAL

Longreach Regional Council with support from the Queensland Government, through the Department of Resources, have identified a need to replace and upgrade the weirs to provide greater water security for the Longreach Township and reduce the likelihood of the weirs failing during future flood events.

The proposed development involves raising the five (5) weirs by approximately one (1) metre in height, increasing the capacity of the Longreach Waterhole from approximately 3,300ML to approximately 4,200ML, equating to an increase in capacity of approximately 28%. Details on the proposed construction methods and activities are detailed at section 3.3 of the Ministerial Infrastructure Designation Report, prepared by NGH and attached at Appendix B.

Longreach Regional Council, as part of a separate process, will obtain updated water licensing for interfering with the Thomson River system prior to undertaking the proposed works. Water entitlements will be considered by Council as required to accommodate future water demand increases.

The extent of the proposed works will be generally in accordance with the Project Layout Plan, prepared by NGH, attached at Appendix A and reproduced as Figure 4. Further details and cross-sections of the proposed weirs are illustrated in the Concept Design Plans, prepared by Engeny and attached at Appendix A. An extract of the cross section of the upgraded Town Weir is provided as Figure 5.

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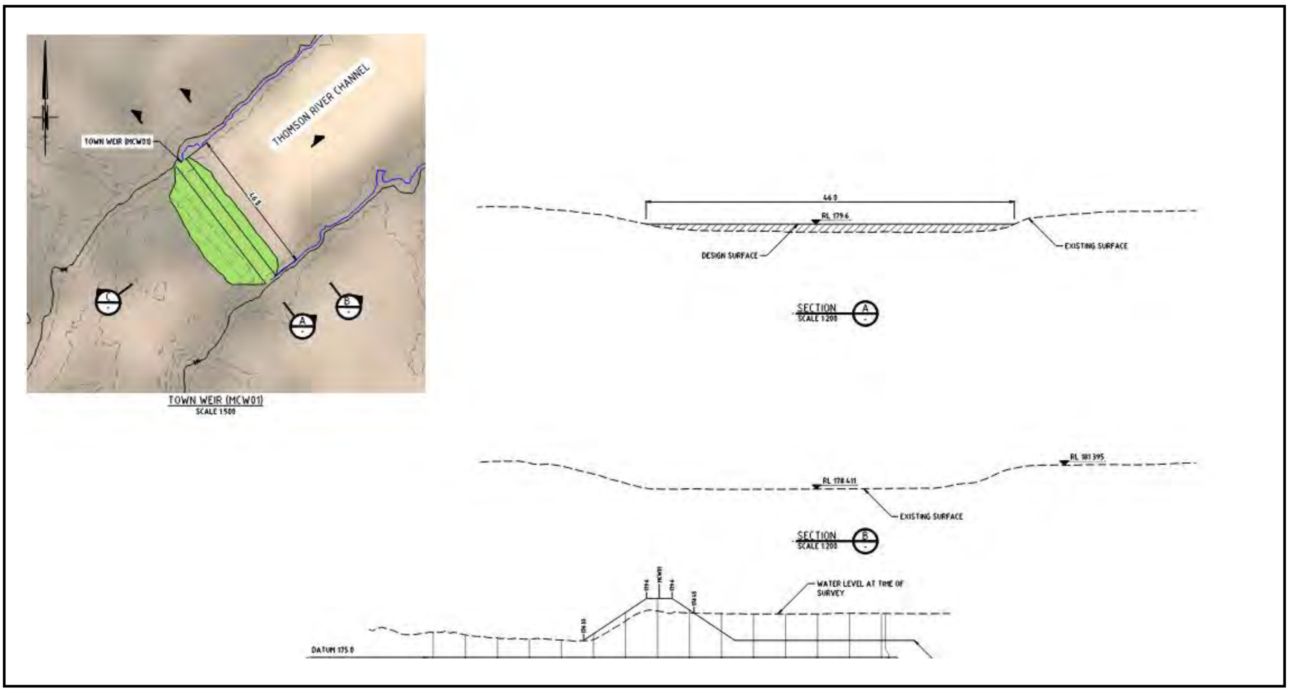
FIGURE 4 - EXTRACT OF PROJECT LAYOUT PLAN

FIGURE 5 - EXTRACT OF TOWN WEIR CROSS-SECTION



4.0 LEGISLATIVE FRAMEWORK

4.1 PLANNING ACT 2016

The purpose of the *Planning Act 2016* (Planning Act) is to establish an efficient, effective, transparent, integrated, coordinated, and accountable system of land use planning (planning), development assessment and related matters that facilitates the achievement of ecological sustainability.

The proposal involves upgrades to existing weir structures and accordingly constitutes Operational Works and Building Works pursuant to Schedule 2 of the PA. Accordingly, approval must be sought under the provisions of the PA prior to the commencement of works.

This development is subject to a separate Ministerial Infrastructure Designation (MID) application which, if approved, will allow for the commencement of works under the provisions of the Planning Act. The proposal has been assessed against the Planning Act and associated Commonwealth, State and Local Government planning and environmental legislation as part of the MID application material.

4.1.1 CENTRAL WEST REGIONAL PLAN 2009

The Central West Regional Plan was adopted in July 2009 and covers the local government areas of Boula Shire, Winton Shire, Diamantina Shire, Barcoo Shire, Longreach Regional, Blackall Tambo Regional, Barcaldine Regional and Winton Shire. The policies contained in the regional plan contribute towards the protection of strategic areas of priority agricultural land use from potentially incompatible resource activities and seek to maximise opportunities for co-existence of resources and agricultural land use. The regional plan also safeguards areas required for the growth of towns in the regions through the establishment of Priority Living Areas while providing for resource activities to locate within these areas where it meets communities' expectations as determined by the relevant local government.

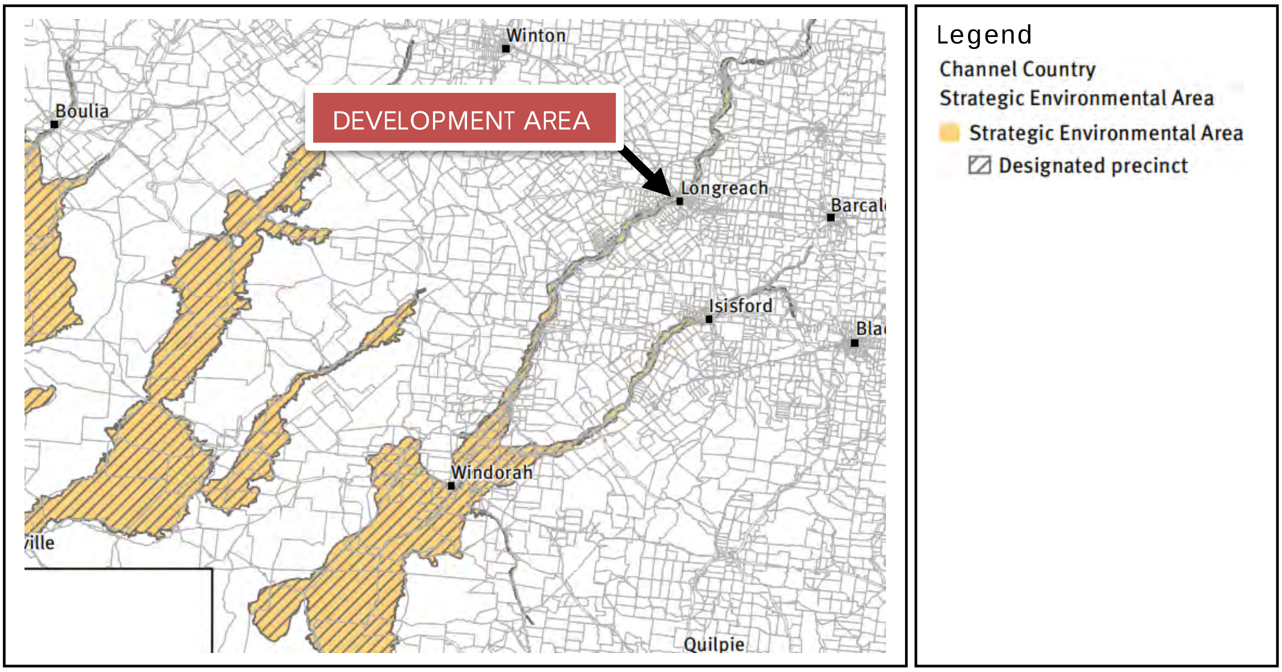
The subject land is located within a Strategic Environmental Area – Designated Precinct. The development involves the upgrade/replacement of existing water storage infrastructure and has been designed and will be constructed to ensure it does not impact on the ecological features of the locality. Accordingly, the development will not compromise the outcomes sought under the Central West Regional Plan.

4.2 REGIONAL PLANNING INTERESTS ACT 2014

The *Regional Planning Interests Act 2014* was implemented to give rise to matters of State interest detailed in the various Regional Plans, identify areas of regional interest and mitigate the impact of regulated activities on areas of regional interest.

The subject land is located within a Strategic Environmental Area – Designated Precinct under the Central West Regional Plan. Strategic Environmental Areas are identified due to their environmental attributes for the area. In this case, the Strategic Environmental Area consists of the Thomson River and surrounding flood plain. The SEA associated with the subject land forms part of the Channel Country Strategic Environmental Area (CC-SEA) as identified at Part 3 of the *Regional Planning Interests Regulation 2014* (RPI Regulation); refer to Figure 6.

FIGURE 6 - CHANNEL COUNTRY STRATEGIC ENVIRONMENTAL AREA MAPPING



The environmental attributes associated with the CC-SEA are identified at Part 3, Section 7 of the RPI Regulation and reproduced as follows:

> *The following are the environmental attributes for the Channel Country strategic environmental area –*
>
> *(a) the natural hydrologic processes of the area characterised by –*
>
> *(i) natural, unrestricted flows in and along stream channels and the channel network in the area; and*
>
> *(ii) overflow from stream channels and the channel network onto the flood plains of the area, or the other way; and*
>
> *(iii) natural flow paths of water across flood plains connecting waterholes, lakes and wetlands in the area; and*
>
> *(iv) groundwater sources, including the Great Artesian Basin and springs, that support waterhole persistence and ecosystems in the area;*
>
> *(b) the natural water quality in the stream channels and aquifers and on flood plains in the area;*
>
> *(c) the beneficial flooding of land that supports flood plain grazing and ecological processes in the area.*

Part 4 of the RPI Regulation identifies development for water storage as a "Regulated activity" as follows:

> *(3) Water storage (dam) is storing water using a dam, other than storing water on land to be used only for any or all of the following purposes –*
>
> *(a) to meet the domestic needs of the occupants of the land;*
>
> *(b) to water the stock that is usually grazed on the land;*
>
> *(c) to water stock that is travelling on a stock route on or near the land.*

In accordance with Section 27 of the RPI Act, the proposed development will result in impacts which affect a feature, quality characteristic or other attribute of the area relating to a matter associated with a SEA.

Schedule 2 of the RPI Regulation provides criteria for the assessment or decision of a Regional Planning Interests Application. Part 5 relates to an activity within a SEA. An assessment of the proposal against the identified criteria is provided in Table 1.

TABLE 1 - CRTERIA FOR ASSESSMENT OR DECISION – PART 5 – STRATEGIC ENVIRONMENTAL AREA

Criteria	Response
Required Outcome	
The activity will not result in widespread or irreversible impact on an environmental attribute of a strategic environmental area.	The proposal involves upgrades to existing water storage infrastructure to increase the storage capacity of the Longreach Waterhole. The development has been designed to minimise impacts on the ecological features of the area, whilst also incorporating additional features such as fish ladders to improve the movement of fish through the waterway. Reference is made to the Aquatic and Terrestrial Ecology Reports attached at Appendices D & E and Section 4.2.1.
Prescribed Solution	
(1) The application demonstrates either – (a) the activity will not, and is not likely to, have a direct or indirect impact on an environmental attribute of the strategic environmental area; or	The proposal involves upgrades to existing water storage infrastructure to increase the storage capacity of the Longreach Waterhole. The development has been designed to ensure it does not result in additional direct or indirect impacts on the attributes of the SEA. Reference is made to the Aquatic and Terrestrial Ecology Reports attached at Appendices D & E and Section 4.2.1
(b) all of the following – (i) if the activity is being carried out in a designated precinct in the strategic environmental area – the activity is not an unacceptable use for the precinct;	Refer to response at Prescribed Solution (2) below. The proposed development involves the upgrading of five (5) existing weirs within the SEA and accordingly, it is considered that the proposal is an acceptable use in this instance.
(ii) the construction and operation footprint of the activity on the environmental attributes is minimised to the greatest extent possible;	The development has been designed to minimise the footprint of the activity, noting that the increased storage area does not exceed the high water bank of the Thomson River and accordingly, will not result in additional impacts on the attributes of the SEA. Reference is made to the Project Plans, prepared by NGH and Engeny, and attached at Appendix A.
(iii) the activity does not compromise the preservation of the environmental attribute within the strategic environmental area;	The proposal involves upgrades to existing water storage infrastructure to increase the storage capacity of the Longreach Waterhole. The development has been designed to ensure it does not result in additional direct or indirect impacts on the attributes of the SEA. Reference is made to the Aquatic and Terrestrial Ecology Reports attached at Appendices D & E and Section 4.2.1

Criteria	Response
(iv) if the activity is to be carried out in a strategic environmental area identified in a regional plan – the activity will contribute to the regional outcomes, and be consistent with the regional policies, stated in the regional plan.	The proposal involves upgrades to existing water storage infrastructure to increase the storage capacity of the Longreach Waterhole to cater for the additional demands of the Longreach township and surrounding locality. The provision of additional water supplies facilitates the ongoing operation and growth of the surrounding locality in accordance with the outcomes sought under the *Central West Regional Plan 2009*. Refer also to section 4.1.1.
(2) The following are unacceptable uses for a designated precinct in a strategic environmental area – (a) if the designated precinct is in the Cape York strategic environmental area – a mining resource activity; (b) if the designated precinct is in the North Queensland strategic environmental area – a resource activity; (c) open cut mining; (d) broadacre cropping; (e) water storage (dam).	The proposed development involves a "water storage (dam)" use. In accordance with Prescribed Solution (2), the development is considered an unacceptable use. Notwithstanding this, the proposal involves upgrades to existing water storage infrastructure and is located in an area where water storage infrastructure cannot be located outside of the identified SEA. Accordingly, it is considered that the proposal can be considered an acceptable use in this instance.

On the above basis, it is considered that the proposed development complies with the intent sought for the Channel Country Strategic Environmental Area. Accordingly, this application and subsequent approval will ensure compliance with the outcomes sought under the *Regional Planning Interests Act 2014* and will ensure the protection of the Strategic Environmental Area.

4.2.1 RPI ACT STATUTORY GUIDELINE 05/14

The RPI Act Statutory Guideline 05/14 (the Guideline) provides guidance for applying for a Regional Interests Development Approval, where involving a Resource or Regulated Activity within a Strategic Environmental Area (SEA). Table 2 of the Guideline provides further considerations which a development should have regard to when assessing whether an activity compromises the preservation of the environmental attributes in a SEA. These considerations are addressed in Section 4.2.1.1 – 4.2.1.6 below.

At the outset it is noted that the proposed development involves upgrading and raising the height of existing weirs along the Thomson River to facilitate greater storage capacity. Accordingly, it is considered that the existing weirs and associated impacts are taken to be granted, with this application to consider the increased or additional impacts on the system as a result of increasing the height only.

4.2.1.1 Hydrological Processes

As noted above, the proposal involves raising the height of five (5) existing weirs and accordingly, the natural flows and connectivity with other river elements is already hampered as a result of the existing.

It is acknowledged that raising the height of the weirs will result in further impact on the flow of the system, due to the increased storage capacity of the Longreach Waterhole, and connectivity with other river elements due to the height increase. Notwithstanding this, the weirs have been designed to minimise further impacts on hydrological processes where possible and incorporate additional measures such as fish ladders to minimise these impacts on other components of the system.

Reference is made to the Aquatic Ecology Report and Flood Impact Assessment, attached at Appendices D & E. These reports confirm that the proposed development will not adversely impact on existing flows or connectivity with other elements of the system and will not result in adverse flooding impacts on the associated floodplain or nearby premises.

On the above basis, it is considered that the proposed development will not compromise the preservation of the environmental attributes of the SEA in regard to hydrological processes.

4.2.1.2 Geomorphic Processes

As noted above, the proposal involves raising the height of five (5) existing weirs and accordingly, the natural erosion, transportation and deposition of sediment is already impacted. The proposed development will not result in additional impacts on existing geomorphic processes of the system, with the increased height of the river to remain within the existing banks of the system.

Reference is made to the Aquatic Ecology Assessment, attached at Appendix D, which provides a further assessment of water and sediment quality within the system.

On the above basis, it is considered that the proposed development will not compromise the preservation of the environmental attributes of the SEA in regard to geomorphic processes.

4.2.1.3 Riparian Function

Construction activities associated with the proposed development will be confined to the area immediately surrounding the weirs, with laydown and temporary site offices located in areas of cleared or sparse vegetation to minimise required clearing.

Reference is made to the Terrestrial Ecology Assessment, attached at Appendix E, which provides a detailed assessment of the impacts associated with the construction and operation of the proposed development. This report confirms that any vegetation loss is insignificant in the context of the entire Thomson River system and accordingly will not compromise the preservation of the environmental attributes of the SEA in this regard.

4.2.1.4 Wildlife Corridor Function

As noted above, the proposal involves raising the height of five (5) existing weirs and accordingly, the function of the waterway for fish and wildlife passage is already compromised. Additionally, it is noted that the river flows on a seasonal basis during summer monsoons, with the system resulting in a series of billabongs and waterholes during the dry season, which provide consolidated refuge for various species. On this basis, it is considered that the retention of water within the Longreach waterhole is consistent with the existing characteristics of the river and the system itself is limited in terms of fish passage outside of the wet season.

Notwithstanding this, the development has been designed to incorporate additional features, such as fish ladders adjacent to the Town Weir, to improve the movement of fish along the corridor. This is an additional measure not currently incorporated into the existing weirs and as such is considered to result in an improved outcome for the system in this regard.

The development has also been designed to minimise impacts outside of the development footprint, ensuring that the upgraded weirs do not prohibit the movement of other wildlife along the corridor.

Reference is made to the Aquatic and Terrestrial Ecology Assessments, attached at Appendices D & E which confirm that the development will not adversely impact on the function of the SEA as a wildlife corridor.

On the above basis, it is considered that the proposed development will not compromise the preservation of the environmental attributes of the SEA in regard to wildlife movement and management.

4.2.1.5 Water Quality

The proposed development involves raising the height of five (5) existing weirs and does not involve activities which would impact on the water quality of the system. Additionally, construction activities will be undertaken in accordance with the relevant requirements to minimise sediment runoff and water quality impacts.

Reference is made to the Aquatic Ecology Report, attached at Appendix D. This report provides a detailed assessment of the existing water quality within the Thomson River and confirms that the development will not result in adverse impacts on water quality during operations.

Construction of the development will be undertaken in accordance with the Preliminary Construction Environmental Management Plan, attached at Appendix G. This plan has been prepared to ensure construction activities do not result in adverse impact on water quality or environmental features in the SEA.

On the above basis, it is considered that the proposed development will not compromise the preservation of the environmental attributes of the SEA in regard to water quality.

4.2.1.6 Beneficial Flooding

As noted above, the proposal involves raising the height of five (5) existing weirs and accordingly, the flood characteristics of the system are already altered. The proposed development has been designed to ensure that raising the height of the weirs by one (1) metre will not adversely impact the flood characteristics of the system as a whole and will not hamper the flow of flood waters across the flood plain.

Reference is made to the Flood Impact Assessment, attached at Appendix F. This report confirms that any increase in water level as a result of the development will be minor and inconsequential given the predicted water depth over the top of the structures during a flood event. Additionally, any increase in flow velocities downstream of the weir will also be minor and inconsequential.

Given the extent of the floodplain, the development will not result in adverse flooding impacts outside of the floodplain.

On the above basis, it is considered that the proposed development will not compromise the preservation of the environmental attributes of the SEA in regard to flood characteristics.

4.2.1.7 Summary

On the above basis, it is considered that the proposed development does not compromise the preservation of environmental attributes within the Channel Country Strategic Environmental Area and complies with the outcomes sought under Schedule 2, Part 5 of the RPI Regulation (refer to Table 1).

5.0 MANAGEMENT & MITIGATION MEASURES

5.1 SITE SELECTION & ALTERNATIVE OPTIONS

A Water Supply Security Assessment (attached at Appendix C) was undertaken by the Department of Resources in 2019 to understand the water demand scenarios of the Longreach township and identify requirements to ensure the future water security of the town. As part of this assessment, it was determined that the Longreach Waterhole is and will continue to be the main freshwater supply for the Longreach township, with other water supply sources such as the Hooray Sandstone unit of the Great Artesian Basis identified as unsuitable for town supply due to high fluoride content and the condition of extraction infrastructure. This report determined that providing new or increased water supply infrastructure was required to ensure water security for the township and provided various options to achieve this.

Coincidently following this assessment, Anabranch Weirs 3 and 4 failed during flooding events in 2022 and 2020, respectively, requiring upgrades by Council to repair and reinforce these weirs. To ensure the safe operation of all the weirs and to further ensure the water security of the Longreach township is maintained, it has been determined that maintenance of all five (5) weirs is required. Given the outcomes of the Water Supply Security Assessment, and the requirement to reinforce and upgrade the existing weirs, Longreach Regional Council determined the most appropriate strategy would be to increase the height of the weirs while undertaking the required upgrade works. This ensures the future safety of the weirs while also increasing the town water supply further ensuring water security for the Longreach township.

Reference is also made to section 2 of the Ministerial Infrastructure Designation Report, prepared by NGH and attached at Appendix C. This report provides further details and justification in support of the proposed works.

5.2 ECOLOGICAL MANAGEMENT

The Terrestrial Ecology Report, attached at Appendix E confirms that vegetation clearing and environmental impacts associated with the construction of the development are only minor and inconsequential in nature and will not adversely impact on the overall Thomson River system and the SEA. Further to this, construction activities will be undertaken in accordance with the Construction Environmental Management Plan, attached at Appendix G. On this basis, it is considered that the proposed construction activities will not result in adverse impacts on the surrounding environment.

Operation of the proposed weirs will not result in adverse impacts on the environment which would require specific operational management or mitigation measures. Any maintenance works, required to ensure the safety of the structures, will be undertaken in accordance with separate management plans, depending on the scale and location of works required.

5.3 FISH HABITAT & PASSAGE

The proposal involves raising the height of five (5) existing weirs along the Thomson River and anabranches and accordingly, it is acknowledged that the existing weirs have previously compromised the function of the waterway for fish passage. The proposed development has been designed to incorporate additional features, such as fish ladders adjacent to the Town Weir, to improve the movement of fish along the corridor. This is an additional measure not currently incorporated into the existing weirs and as such is considered to result in an improved outcome for the system in this regard.

5.4 WATER QUALITY

The Aquatic Ecology Report, attached at Appendix D, provides a detailed assessment of the water quality within the Longreach Waterhole and confirms that the operation of the upgraded weirs will not adversely impact on water quality. Construction activities will be undertaken in accordance with the Construction Environmental Management Plan, attached at Appendix G, which incorporates measures to reduce sediment run-off and minimise impacts on water quality as a result of construction activities.

5.5 MONITORING ACTIVITIES

Following completion of the upgraded weirs, Longreach Regional Council will resume standard operational procedures, including monitoring of the weirs. Monitoring activities will continue to record various data which assists in the maintenance of the weirs, flooding characteristics and storage capacity of the Longreach Waterhole. This monitoring will ensure that any adverse impacts on the environment and the safety of downstream areas can be monitored and corrected as required.

5.6 CONSTRUCTION ACTIVITIES

Construction activities will be undertaken in accordance with the Construction Environmental Management Plan, attached at Appendix G. This plan provides requirements for construction activities as well as management and mitigation measures (section 10) to minimise impacts of construction activities on the environment.

6.0 CONSULTATION

6.1 PRELIMINARY CONSULTATION

The proposed development is subject to a separate Ministerial Infrastructure Designation application under the requirements of the *Planning Act 2016* and associated legislation. Under the MID process, affected stakeholders (including affected landowners, Council, Native Title Owners, and Members for Parliament) are required to be notified of the proposed development prior to the preparation and lodgement of the Environmental Assessment Report (i.e. application material).

Due to the nature of the proposed development, being an MID and RIDA that are required to be obtained prior to the commencement of works, it is considered that the outcomes of this preliminary consultation applies to both applications. The outcomes of this consultation are detailed below.

6.1.1 PRELIMINARY CONSULTATION OUTCOMES

The Preliminary Consultation undertaken as part of the MID process is detailed in the Stakeholder Engagement Strategy, prepared by IAG2 and attached at Appendix H. Section 6 of this report details the stakeholder engagement activities that were undertaken and the key outcomes of these engagements. The outcomes of this consultation has been taken into consideration in the design of the development and preparation of this Regional Interests Development Application.

6.1.2 DEPARTMENT OF STATE DEVELOPMENT, INFRASTRUCTURE, LOCAL GOVERNMENT & PLANNING

Pre-lodgement meetings have been undertaken with the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP) to discuss both the MID and RIDA applications. The outcomes of these discussions have been taken into consideration in the design of the development and preparation of this application.

6.2 PUBLIC NOTIFICATION

The proposed development involves a Regulated Activity within a Strategic Environmental Area and accordingly may be required to be notified under Section 44(1)(c) of the RPI Act. During pre-lodgement discussions with DSDILGP, it was identified that public notification will be required in this instance. Accordingly, Public Notification for this application will be undertaken at the applicable stage of the assessment process in accordance with the requirements of the RPI Act Statutory Guideline 06/14.

Given that the MID and RIDA applications will be undertaken concurrently, submissions lodged in response to consultation activities undertaken as part of the MID application will also be considered by the applicant as part of this application. The consultation associated with MID will be undertaken in accordance with the consultation strategy detailed at section 10.2 of the Ministerial Infrastructure Designation Report attached at Appendix B.

7.0 CONCLUSION

This application seeks Regional Interests Development Approval for the upgrade of weir infrastructure along the Thomson River to improve the storage capacity of the Longreach Waterhole.

The proposed development involves upgrading existing weir infrastructure and has been designed to minimise impacts on the surrounding ecological features, whilst improving other components such as fish movement along the corridor.

Having regard to the matters and issues raised in this report it is recommended that DSDILGP support this application for a Development Permit for Regional Interests Development Approval.

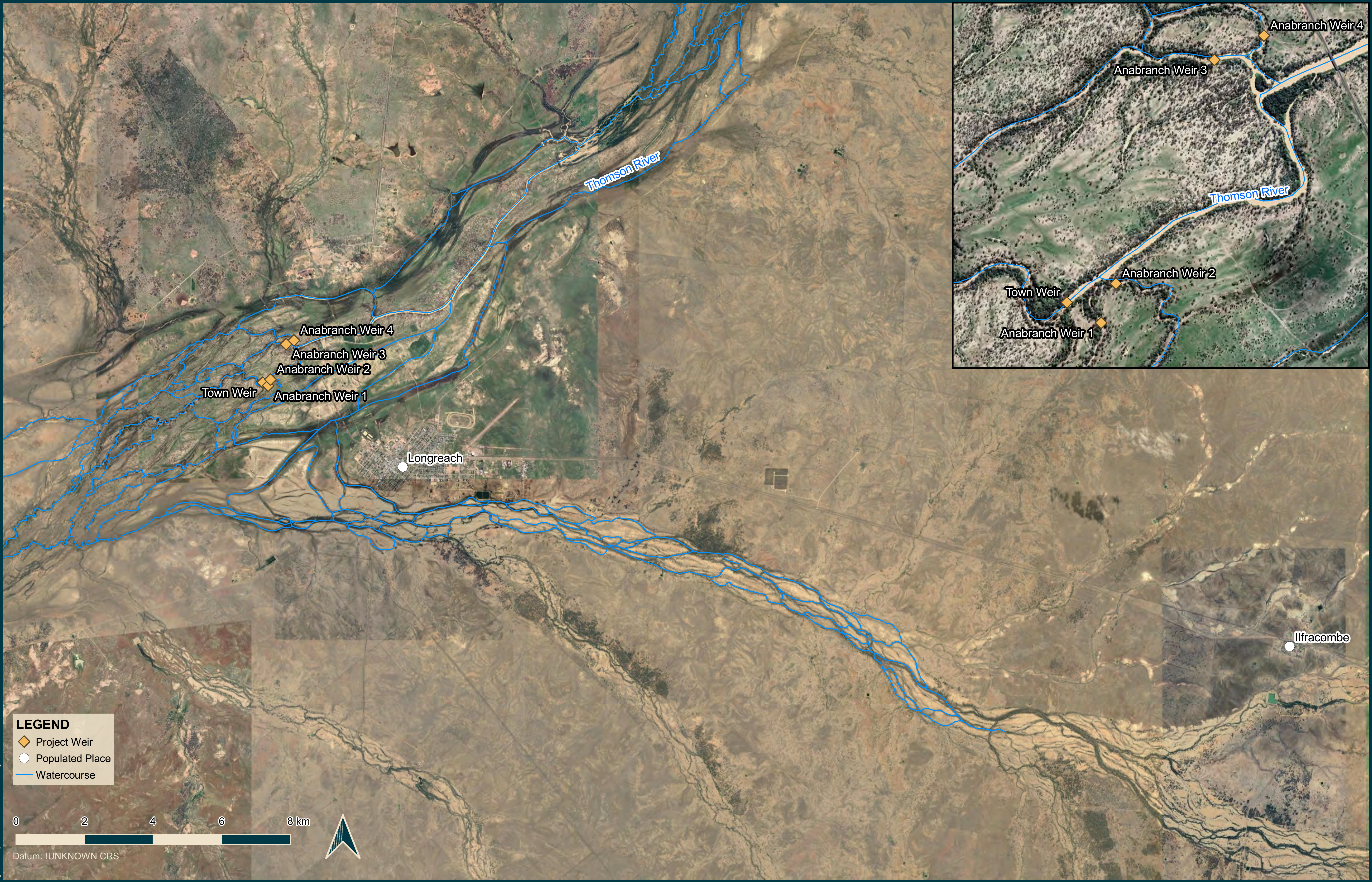
The proposal warrants approval subject to the imposition of reasonable and relevant conditions.

James Williams
Precinct Urban Planning

precinct URBAN PLANNING

APPENDIX A – DEVELOPMENT PLANS

NGH & Engeny



Ref: MID Proposal Workspace \ Figure 1. Project Location Author: Joe Flanagan Date created: 01.06.2023 © NGH 2023 © ESRI 2022

NGH

Thomson River Weir Raising Project

Figure ES-1 Project location

Thomson River Weir Raising Project

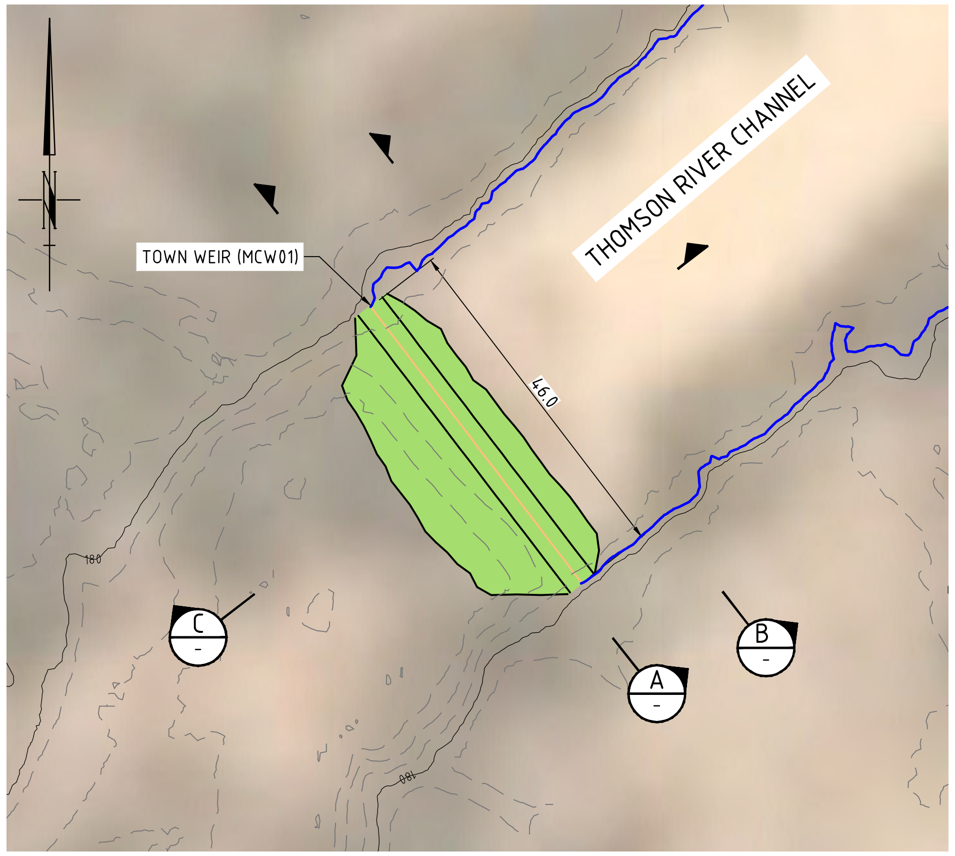
Figure ES-2 Project layout

Ref: MID Proposal Workspace \ MID Figure 1-3i Project full supply level Author: Joe Flanagan Date created: 24.10.2023 © NGH 2023 © ESRI 2022

NGH

Thomson River Weir Raising Project

Figure ES-3 Project full supply level



TOWN WEIR (MCW01)
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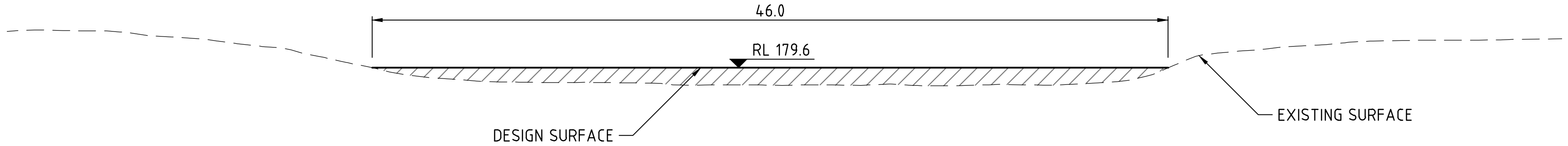

SECTION A
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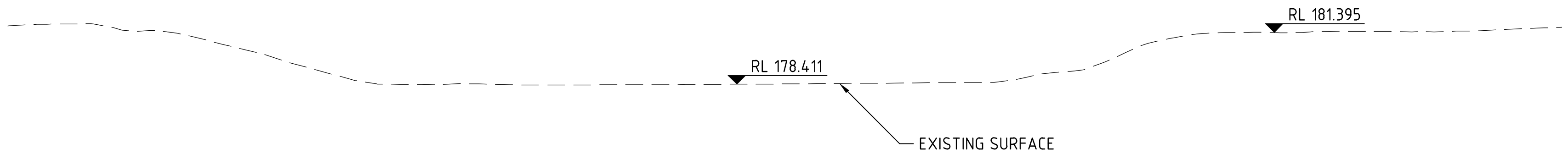

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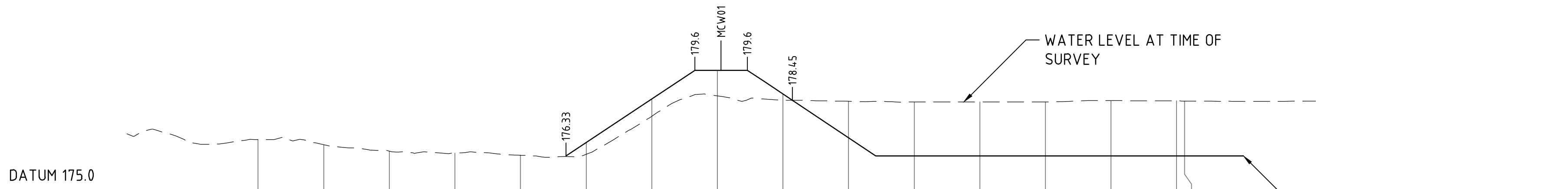

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CHAINAGES	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	55.000	60.000	65.000	70.000 70.606

CONTROL LINE MCW01 SECTION C (WEIR)
SCALE 1:250 HORZ.
SCALE 1:125 VERT.

LEGEND

EXISTING SURFACE
DESIGN SURFACE

0 1.25 2.5 3.75 5.0 6.25m
SCALE 1:125 (A1)
SCALE BEFORE REDUCTION

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

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TOWN WEIR UPGRADE - CONCEPT DESIGN
TYPICAL SECTIONS AND DETAILS
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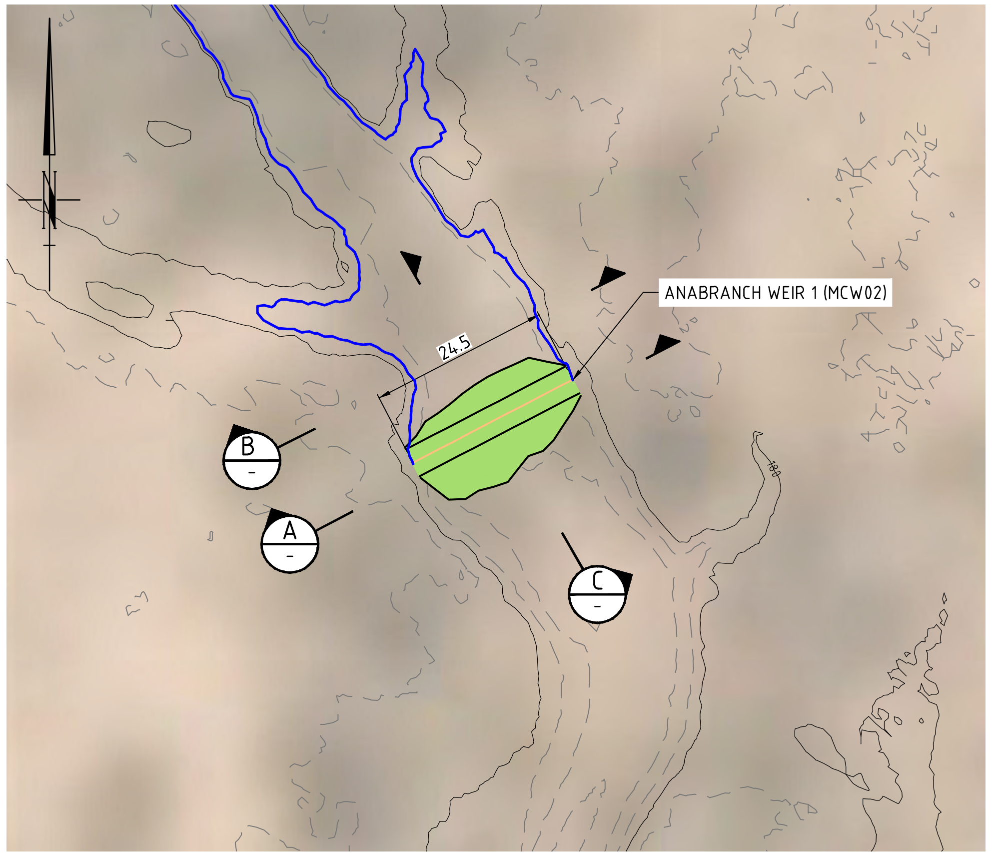

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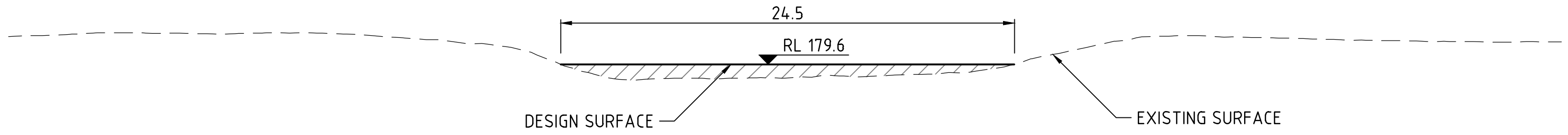

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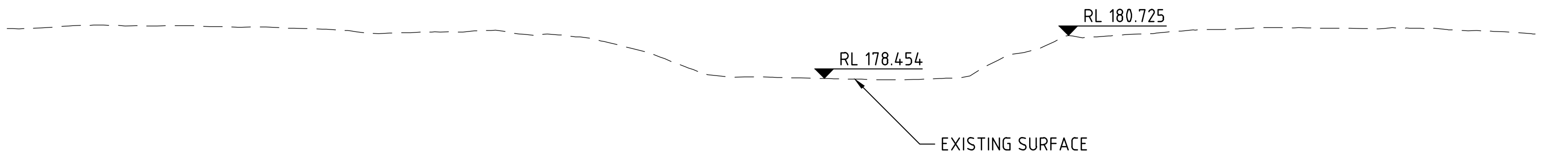

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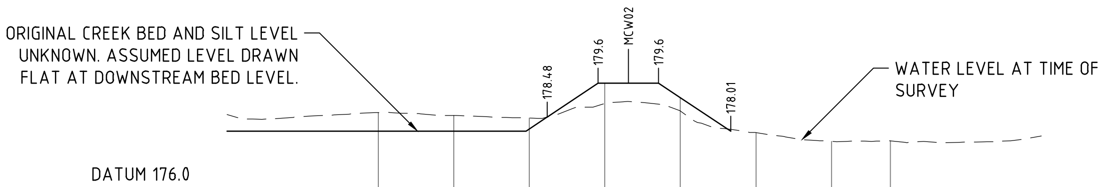

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CHAINAGES	0.000	5.000	10.000	15.000	20.000	25.000	30.000	33.896

CONTROL LINE MCW02 SECTION C (WEIR)
SCALE 1:250 HORZ.
SCALE 1:125 VERT.

LEGEND

- — — — EXISTING SURFACE
- ——— DESIGN SURFACE

0 1.25 2.5 3.75 5.0 6.25m
SCALE 1:125 (A1)
SCALE BEFORE REDUCTION

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

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TOWN WEIR UPGRADE - CONCEPT DESIGN
TYPICAL SECTIONS AND DETAILS
SHEET 2 OF 5

ORIGINAL SIZE	DWG NO.	REV.
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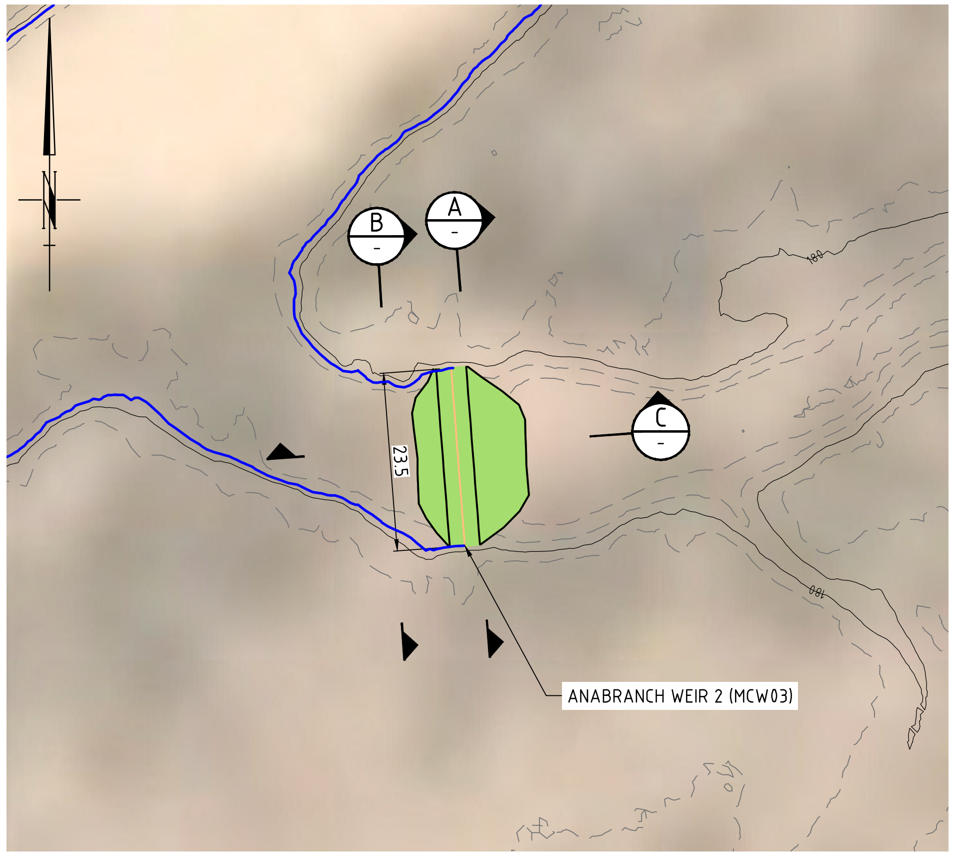

ANABRANCH WEIR 2 (MCW03)
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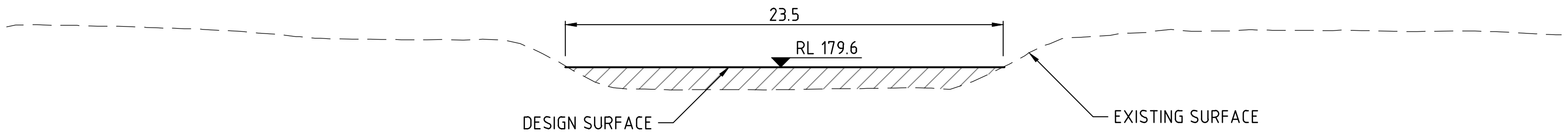

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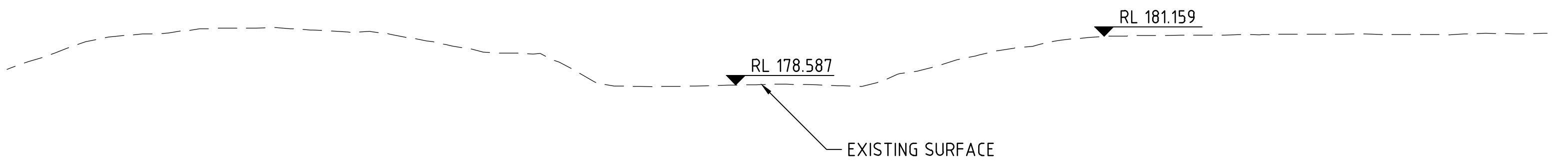
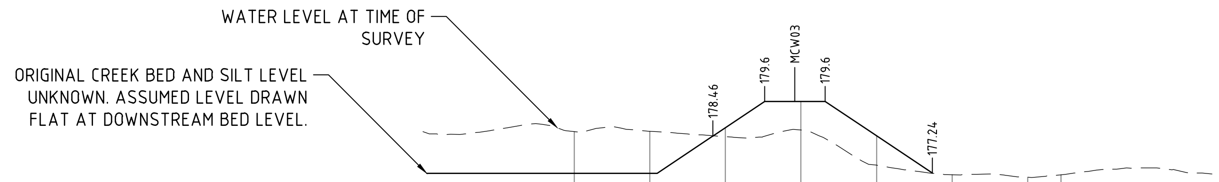


SECTION B
SCALE 1:200



DATUM 175.0

HORIZ. DETAILS	L=32.200							
EXISTING SURFACE	178.601	178.618	178.437	178.657	177.495	177.185	177.100	177.184
CHAINAGES	0.000	5.000	10.000	15.000	20.000	25.000	30.000	32.200

CONTROL LINE MCW03 SECTION C (WEIR)
SCALE 1:250 HORZ.
SCALE 1:125 VERT.

LEGEND

- — — — EXISTING SURFACE
- ——— DESIGN SURFACE

0 1.25 2.5 3.75 5.0 6.25m
SCALE 1:125 (A1)
SCALE BEFORE REDUCTION

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

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TOWN WEIR UPGRADE - CONCEPT DESIGN
TYPICAL SECTIONS AND DETAILS
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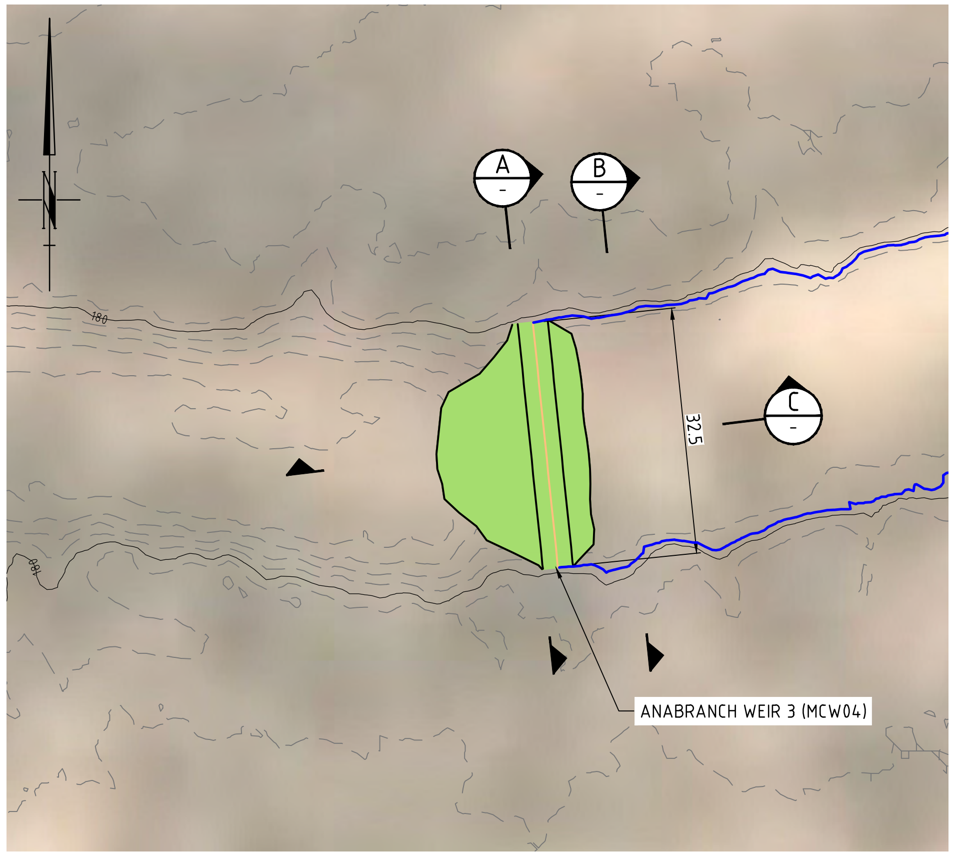
ORIGINAL SIZE A1
DWG NO. QC2031-001-DWG-0303
REV. A



ANABRANCH WEIR 3 (MCW04)
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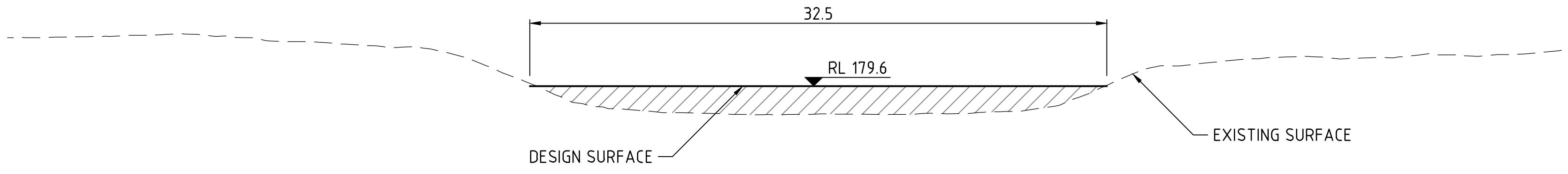

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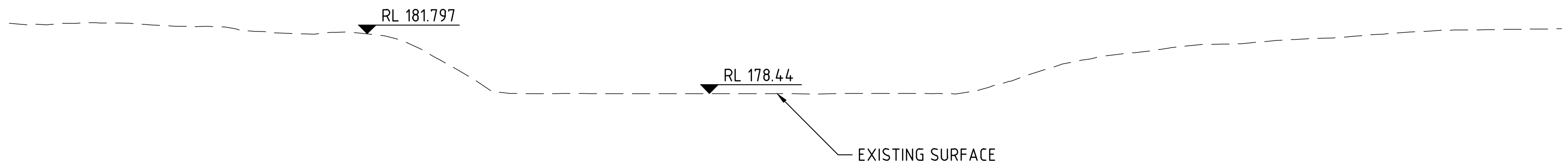

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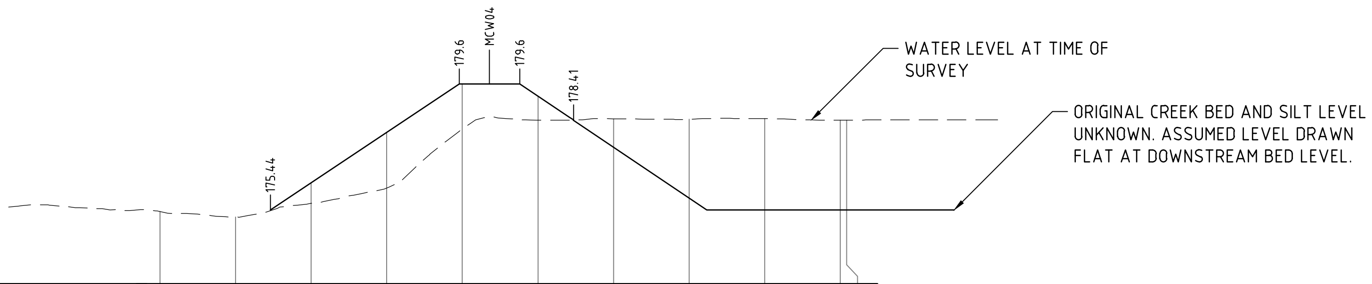

DATUM 173.0

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CHAINAGES	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000 45.413

CONTROL LINE MCW04 SECTION C (WEIR)
SCALE 1:250 HORZ.
SCALE 1:125 VERT.

LEGEND

EXISTING SURFACE
DESIGN SURFACE

0 1.25 2.5 3.75 5.0 6.25m
SCALE 1:125 (A1)
SCALE BEFORE REDUCTION

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

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TOWN WEIR UPGRADE - CONCEPT DESIGN
TYPICAL SECTIONS AND DETAILS
SHEET 4 OF 5

ORIGINAL SIZE	DWG NO.	REV.
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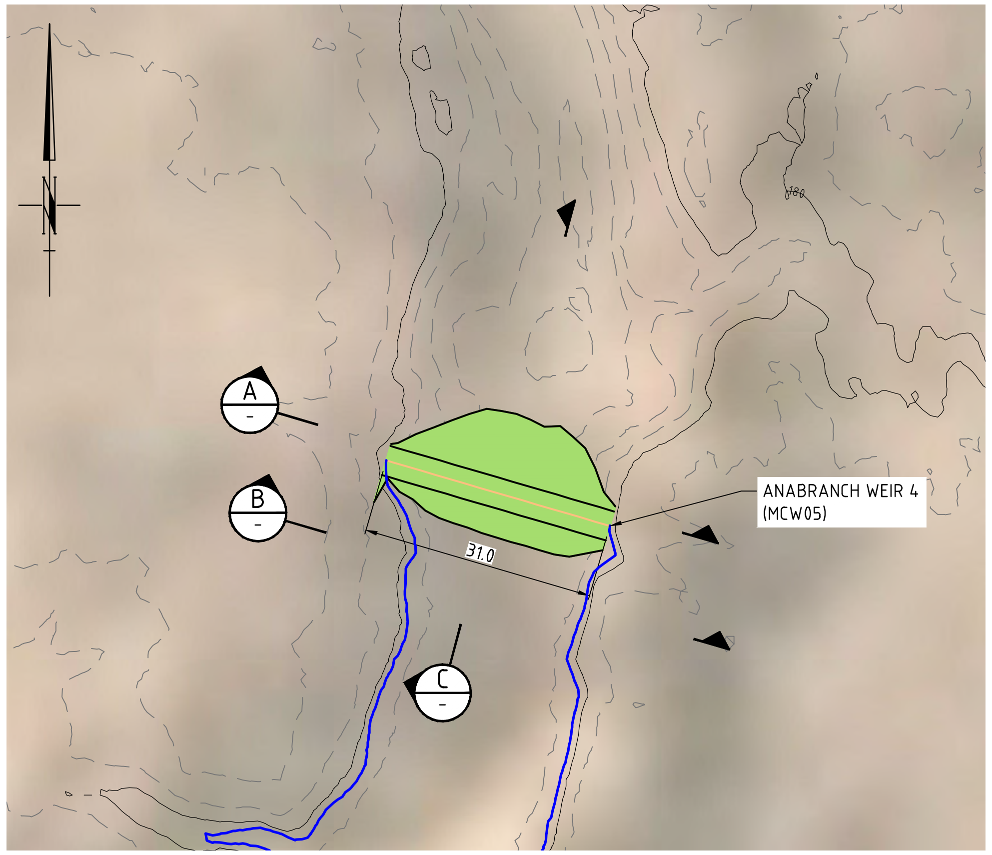

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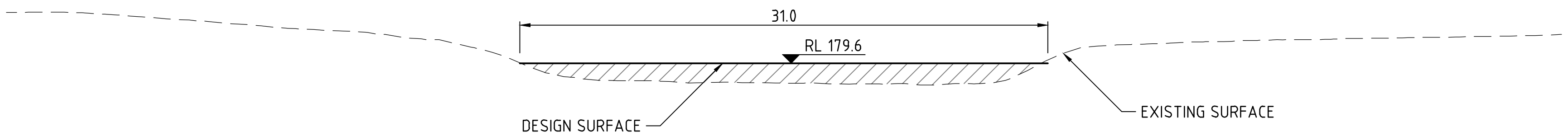

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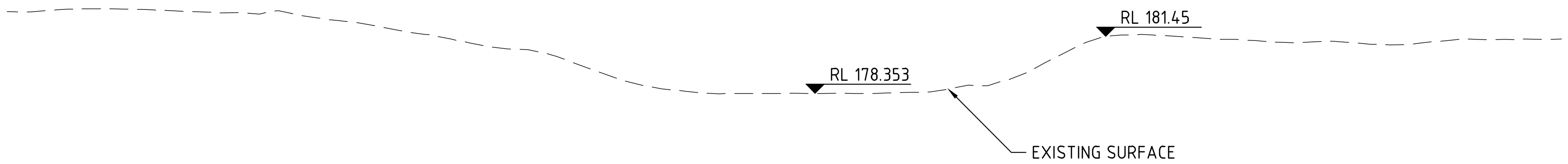

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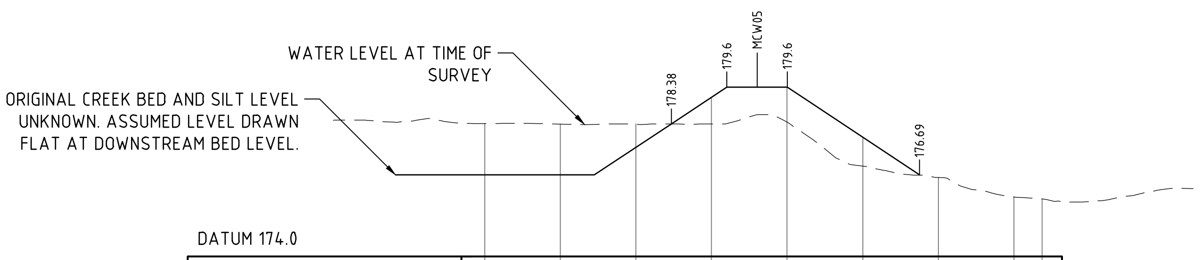

DATUM 174.0

HORIZ. DETAILS	L=36.862								
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CHAINAGES	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	36.862

CONTROL LINE MCW05 SECTION C (WEIR)
SCALE 1:250 HORZ.
SCALE 1:125 VERT.

LEGEND

- — — — EXISTING SURFACE
- ——— DESIGN SURFACE

0 1.25 2.5 3.75 5.0 6.25m
SCALE 1:125 (A1)
SCALE BEFORE REDUCTION

0 2 4 6 8 10m
SCALE 1:200 (A1)
SCALE BEFORE REDUCTION

0 2.5 5.0 7.5 10.0 12.5m
SCALE 1:250 (A1)
SCALE BEFORE REDUCTION

0 5 10 15 20 25m
SCALE 1:500 (A1)
SCALE BEFORE REDUCTION

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TYPICAL SECTIONS AND DETAILS
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ORIGINAL SIZE	DWG NO.	REV.
A1	QC2031-001-DWG-0305	A

precinct URBAN PLANNING

APPENDIX B – MINISTERIAL INFRASTRUCTURE DESIGNATION REPORT

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Prepared for the Longreach Regional Council

Ministerial Infrastructure Designation Proposal

Thomson River Weir Raising Project

Longreach, Queensland

January 2024

Project Number: 220597

nghconsulting.com.au

Document verification

Project Title:	Thomson River Weir Raising Project
Project Number:	220597
Project File Name:	220597_Thomson River Weir Raising_MID Proposal_Final V2.0

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	22/06/2023	J. Flanagan	C. Englezakis	C. Englezakis
Final V2.0	8/01/2024	J. Flanagan	C. Englezakis	C. Englezakis

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Executive summary

This Ministerial Infrastructure Designation proposal has been prepared on behalf of the Longreach Regional Council in support of a request to the Minister to make a new designation under chapter 2, part 5 of the *Planning Act 2016*. The designation will facilitate the delivery of the Thomson River Weir Raising Project.

The Project would involve raising of the existing weirs on the Thomson River by 1 metre. The Town Weir is located approximately 3.5 kilometres north-west of Longreach. Anabranch Weirs 1 to 4 are located in proximity to the Town Weir, on anabranches of the main Thomson River channel (Figure ES-1).

The Project aligns with the following infrastructure categories as described by schedule 5, part 2 of the Planning Regulation 2017:

19 water cycle management infrastructure

20 storage and works depots and similar facilities, including administrative facilities relating to the provision or maintenance of infrastructure stated in this part

Longreach Regional Council was advised via email correspondence dated 7 December 2023 that the Project had received endorsement to proceed as a Ministerial Infrastructure Designation. Accordingly, this proposal has been prepared in accordance with chapter 7 of the Minister's Guidelines and Rules.

Section 36(3) of the *Planning Act 2016* provides for the making of the Minister's Guidelines and Rules, which set out the process required to be implemented by Longreach Regional Council to ensure the environmental impacts of the proposal are appropriately considered, as well as prescribing necessary public consultation for the proposal (Planning Regulation 2017, section 14). These also identify, at schedule 3, the required material to be provided as part of a request for an infrastructure designation.

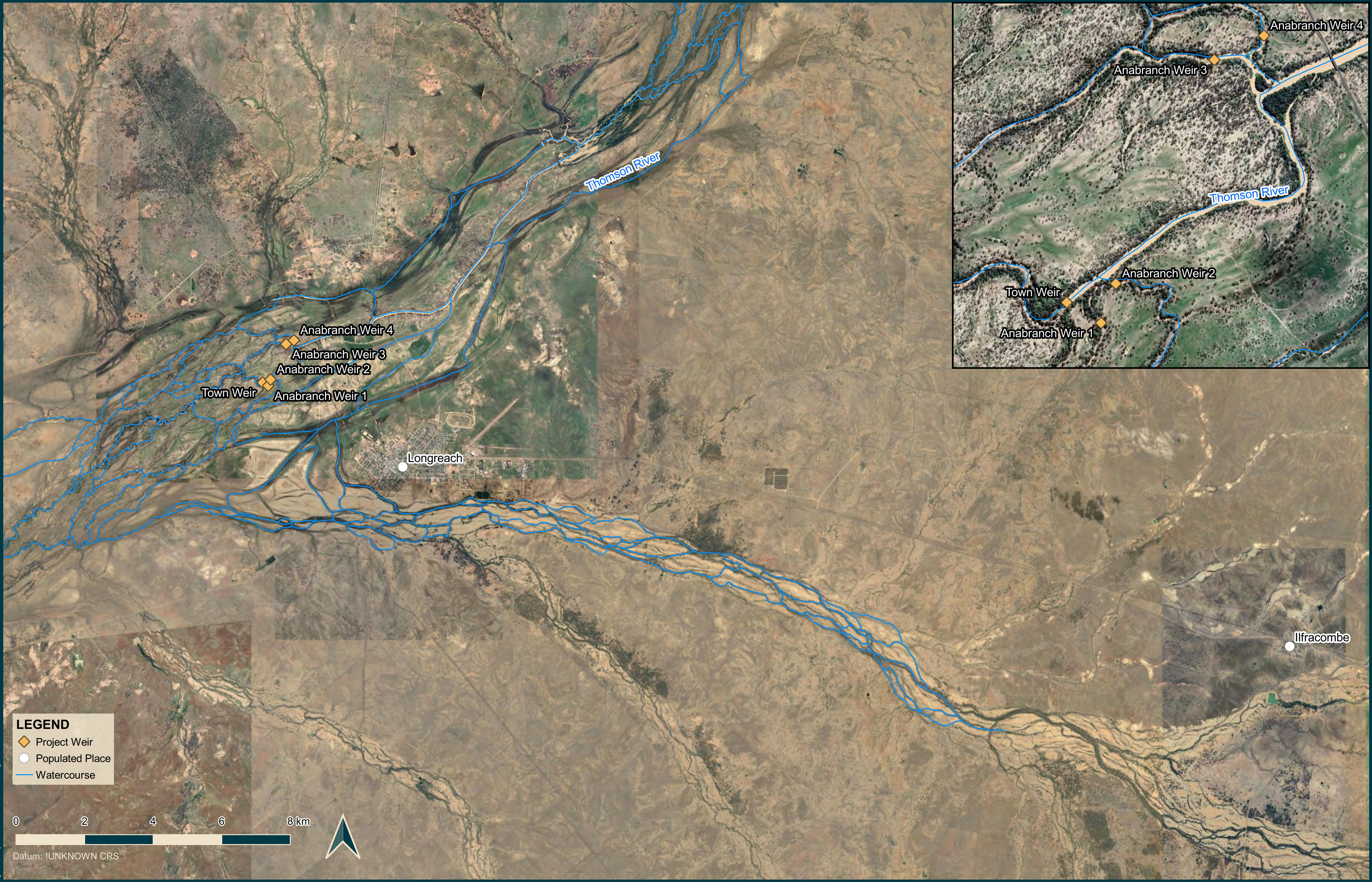
Table ES-1 summarises the required material and where it has been addressed in this proposal.

Table ES-1 Ministerial Infrastructure Designation proposal summary

Matter	Proposal details	
1. The boundary of the entity's proposal and the cadastral description of all land affected by the proposal. *2. A site and locality description of the entity's proposal.*	Address of site	Not applicable
	Real property description	Crown land Lot 2 SP123565 Lot 4 SP23218
	Registered owner/tenure	State of Queensland / Reserve Longreach Regional Council / Reserve
	Local government authority	Longreach Regional Council
3. Plans, drawing, elevations, images and perspectives of the proposal that are suitable for assessment and for communicating the scale, intensity and nature of the proposal to members of the public during consultation.	Plans and images detailing the scale, intensity and nature of the Project are provided in Section 3 and Appendix B. A detailed description of the Project is also provided in Section 3.	
4. Any existing uses on the premises that would be subject to the entity's proposal.	The subject land currently consists of the existing weirs and associated Town Storage. The Project involves raising of the weirs. The footprint of the Project construction activities is illustrated on Figure ES-2, and the Project full supply level is shown on Figure ES-3.	

Matter	Proposal details
5. Information about:	
a) Existing uses on adjoining sites	The adjoining land predominately consists of rural premises utilised for grazing activities. A tourist park and community facilities are also located adjacent to the subject land upstream from the weirs.
b) the type of uses proposed relative to the Planning Regulation 2017;	The Project aligns with the following infrastructure categories as described by schedule 5, part 2 of the Planning Regulation 2017: 19 water cycle management infrastructure 20 storage and works depots and similar facilities, including administrative facilities relating to the provision or maintenance of infrastructure stated in this part
c) approval(s) history for the site	It is understood that the weirs were first constructed in the 1950's and are not subject to current development approvals. No other known approvals are associated with the land subject of the Project.
d) The intended outcomes of any proposed amendment to uses on the site	The proposed Ministerial Infrastructure Designation would not change the uses on the subject land, in that the weirs and Town Storage are existing uses/features which will be changed as part of the Project.
6. Acknowledgement of any adverse impacts on surrounding properties and how these impacts are proposed to be managed.	Section 6 provides an assessment of the potential impacts of the Project on surrounding properties and how these impacts are proposed to be managed. None of these identified impacts are considered adverse.
7. Acknowledgement of any offsite impacts such as traffic, noise, infrastructure capacity and how these impacts are proposed to be managed.	Sections 7 and 6.7 provide an assessment of the potential impacts of the Project on traffic and noise, respectively, and how these impacts are proposed to be managed.
8. Acknowledgement of any construction impacts and how these impacts are proposed to be managed.	Section 6 provides an assessment of the potential impacts of the Project, including those associated with construction, and how these impacts are proposed to be managed.
9. Any works and land affected outside the boundary of the site that would be subject to the entity's proposal.	The proposed designation footprint includes the construction footprint for each of the weirs, as well as the new full supply level of the Town Storage.
10. Acknowledgement of relevant state interests and planning instruments and how they relate to the entity's proposal.	Section 5 discusses the relevance of the various state planning interests and instruments and how they relate to the Project, including: • State Planning Policy (Section 5.4.1) • State Development Assessment Provisions (Section 5.4.2) • Central West Regional Plan (Section 5.4.3).
11. Outcomes of any initial stakeholder engagement, highlighting if changes were made to the earlier proposal as a result of stakeholder feedback.	Pre-lodgement advice was sought from the Department of State Development, Infrastructure, Local Government and Planning. The advice received has been taken into consideration in the design of the Project and preparation of this proposal. Preliminary consultation was also undertaken with identified stakeholders including affected landowners, relevant government departments and

Matter	Proposal details
	members, the wider Longreach community, downstream communities, Indigenous groups and special interest groups. Section 10 provides a summary of the preliminary consultation undertaken to date.
12. A proposed consultation strategy.	A detailed consultation strategy is provided as Appendix K of this report.
13. Plans and technical reports to address any of the matters identified above.	This Ministerial Infrastructure Designation proposal is supported by concept design drawings at Appendix B. Supporting technical reports are provided as Appendices C to J which identify and assess the potential impacts of the Project on relevant environmental and planning matters/interests.
14. If the entity does not have acquisition powers under the Acquisition of Land Act 1967 and is proposing a MID over premises not owned by the entity, the entity must give assurance to the Minister that the entity will have access to the premises the subject of the proposed MID in order to construct and operate the infrastructure. This may include written landowner consent or a contractual agreement.	The Infrastructure Entity is the Longreach Regional Council. The subject land is currently owned by the State of Queensland and Longreach Regional Council and will not require the use of acquisition powers.
15. Sufficient information to address the requirements of section 36(1) of the Act.	The capital cost for construction of the Project will be confirmed following detailed design and engagement of a construction contractor. The LRC is seeking funding arrangements from the Queensland Government for the Project.



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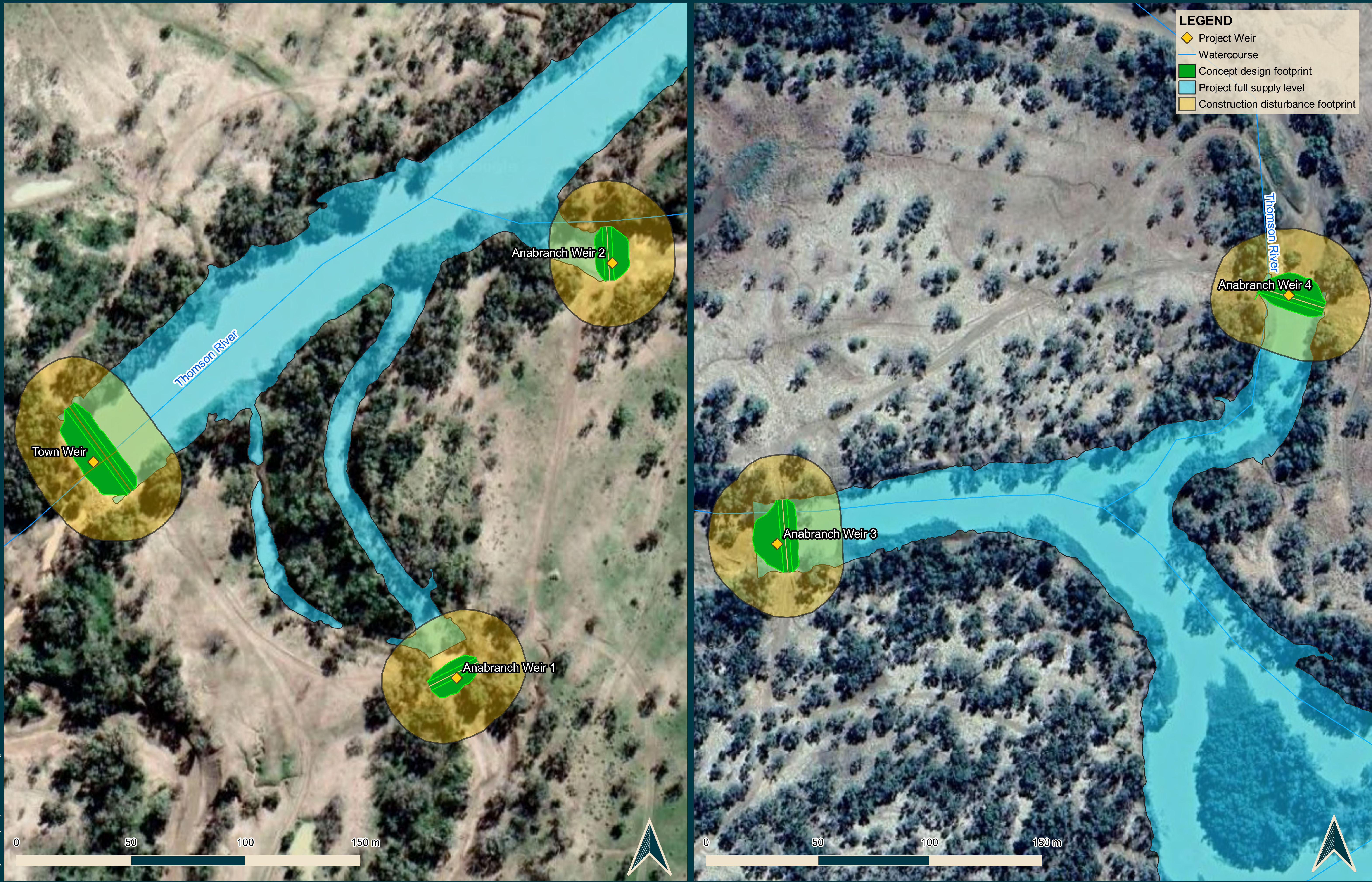
Thomson River Weir Raising Project

Figure ES-1 Project location



Thomson River Weir Raising Project

Figure ES-2 Project layout

Ref: MID Proposal Workspace \ MID Figure 1-3i Project full supply level Author: Joe Flanagan Date created: 24.10.2023 © NGH 2023 © ESRI 2022

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Thomson River Weir Raising Project

Figure ES-3 Project full supply level

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Figures

Tables

Appendices

1. Introduction

1.1. Background

The Longreach Regional Council (LRC) operates the Town Weir system on the Thomson River, located approximately 3.5 kilometres (km) north-west of Longreach. The Town Weir system comprises the Town Weir on the main channel of the Thomson River as well as four Anabranch Weirs (the weirs) (Figure 1-1).

This Ministerial Infrastructure Designation (MID) proposal has been prepared on behalf of the LRC in support of a request to establish a new designation under chapter 2, part 5 of the *Planning Act 2016* (Planning Act). The designation will facilitate the delivery of the Thomson River Weir Raising Project (the Project).

The Project would involve raising of the weirs on the Thomson River by 1 metre (m). The Town Weir is located approximately 3.5 kilometres (km) north-west of Longreach. Anabranch Weirs 1 to 4 are located in proximity to the Town Weir, on anabranches of the main Thomson River channel (Figure 1-1).

The Project aligns with the following infrastructure categories as described by Schedule 5, Part 2 of the Planning Regulation 2017 (Planning Regulation):

> *19 Water cycle management infrastructure*
>
> *20 Storage and works depots and similar facilities, including administrative facilities relating to the provision or maintenance of infrastructure stated in this part*

1.2. Proposal structure

This MID proposal comprises a main text component (this report) and supporting appendices.

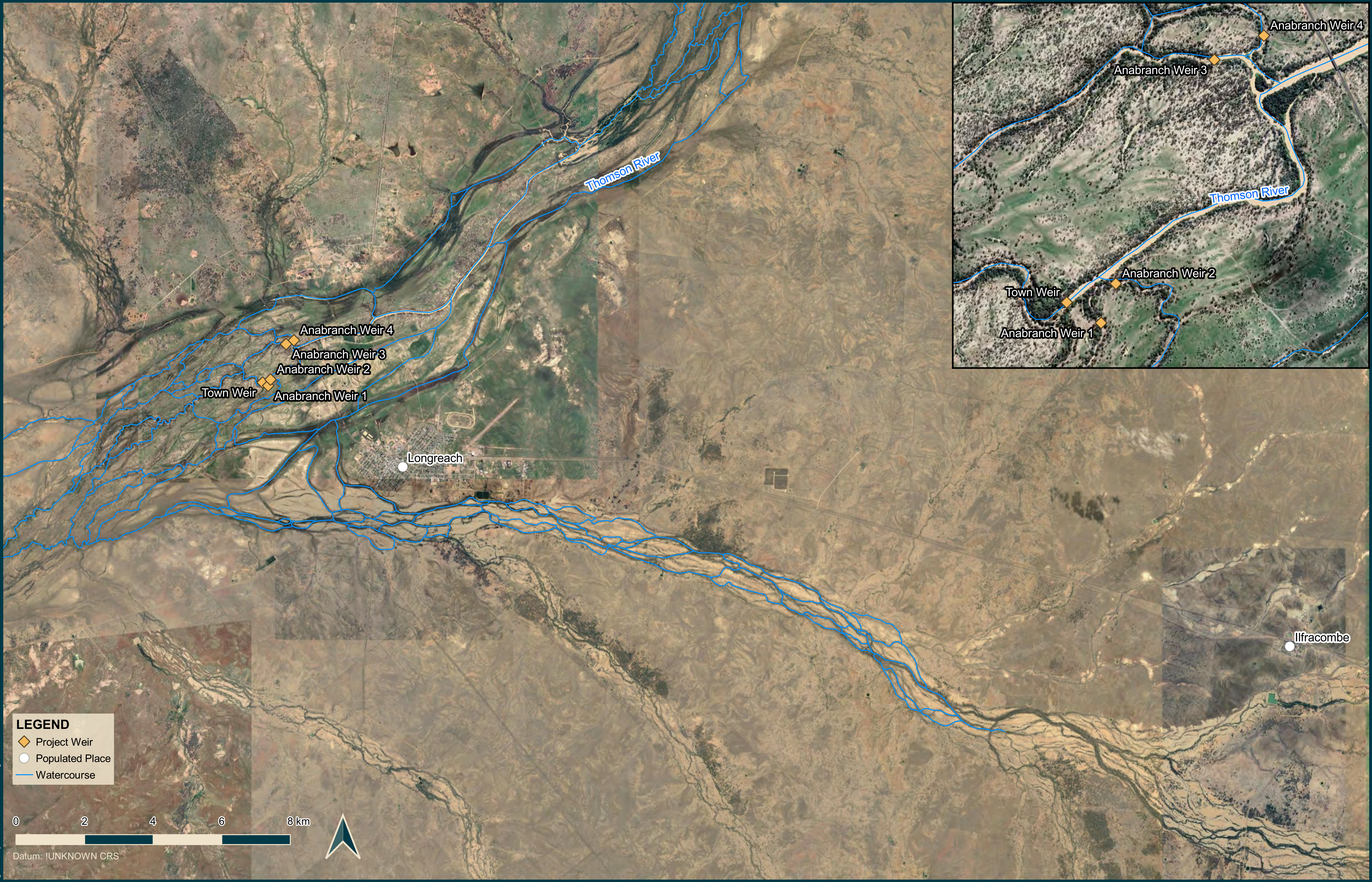
The remainder of this main text provides the following:

- Section 2 – Discusses the justification for the Project
- Section 3 – Provides a description of the Project
- Section 4 – Describes the proposed designation and associated footprint
- Section 5 – Summarises the regulatory context of the Project and proposed designation
- Section 6 – Describes the existing environment, assesses the potential environmental impacts of the Project, and details proposed avoidance and mitigation measures
- Section 7 – Assesses the potential impacts of the Project on transport networks and traffic
- Section 8 – Summarises the Aboriginal and non-indigenous cultural heritage relevant to the Project
- Section 9 – Assesses the potential socioeconomic impacts of the Project
- Section 10 – Summarises stakeholder consultation for the Project
- Section 11 – Lists the documents and guidelines referenced in Section 1 to 10.

Appendices A to N provide various supporting documentation and technical reports as follows:

- Appendix A – Water Supply Security Assessment
- Appendix B – Preliminary concept cross sections
- Appendix C – Flood Impact Assessment
- Appendix D – Aquatic Ecology Assessment

- Appendix E – Terrestrial Ecology Assessment
- Appendix F – Aboriginal Cultural Heritage Assessment
- Appendix G – Non-indigenous Cultural Heritage Assessment
- Appendix H – Traffic Impact Assessment
- Appendix I – Preliminary Bushfire Hazard Assessment
- Appendix J – Preliminary Construction Environmental Management Plan
- Appendix K – Stakeholder Consultation Plan
- Appendix L – Relevant legislative mapping
- Appendix M – State Code responses
- Appendix N - Longreach Planning Scheme strategic framework assessment.



Ref: MID Proposal Workspace \ Figure 1. Project Location Author: Joe Flanagan Date created: 01.06.2023 © NGH 2023 © ESRI 2022

NGH

Thomson River Weir Raising Project

Figure 1-1 Project location

2. Project justification

The Longreach region has a hot and dry climate; securing water supplies for municipal use over the long term is a significant challenge. A safe and resilient water supply is an essential resource for Longreach, providing for the health and wellbeing of the community, opportunities for economic and community development, as well as enhancing adaptive capacity to climate change.

Sections 2.1 to 2.3 discuss the implications of the Project with regard to water demand and security, provide an analysis of Project sustainability and consider the alternative options.

2.1. Water demand and security

The LRC and the Queensland Government, through the Department of Natural Resources, Mines and Energy (DNRME) (now the Department of Resources [DoR]), established a partnership to investigate the existing security of Longreach's urban water supply system and its capacity to support current demands and future growth. Arising from this partnership, the DNRME (2019) prepared a regional water supply security assessment (RWSSA) which has been provided as Appendix A. The following sections on water demand and security have been sourced from the RWSSA.

2.1.1. Current demand

Longreach's reticulation network extends throughout the entire township and supplies water for urban purposes to approximately 2,700 people (as of June 2018). The LRC currently holds an entitlement for 2,200 megalitres per year (ML/yr) from the Thomson River. Information reported by the LRC in the Statewide Water Information Management (SWIM) database shows that the total volume of water sourced by the LRC for the reticulation network over the eight years from 2010/2011 to 2017/2018 averaged approximately 1,800 ML/yr (ranging from approximately 1,470 ML/yr to 2,040 ML/yr).

Based on the total volume of water sourced and the serviced population for each year, the average water demand from the Town Storage during this period was approximately 1,690 litres per capita per day (L/c/d). This figure accounts for residential and non-residential (commercial, municipal and industrial) water supplied from the reticulation network, plus any system losses. It also includes water use by the transient population, such as tourists and temporary workforces. Longreach hosts in excess of 300,000 visitors per annum and many temporary workers including backpackers, short term medical staff and off-farm agricultural workers, all of which places significant demands on the water supply network.

2.1.2. Future demand

The population of Longreach has generally centred around the range of 3,000–3,500 people (averaging approximately 3,270) over the period 1933 to 2018. During this time there have only been two census dates on which the recorded population was below 3,000: in 1981 and 2016. Although the population of Longreach was recently recorded to be slightly lower than this historical average, the RWSSA assumed, for the purpose of estimating future water demand, the population would return to its historical range of 3,000–3,500 people over the period 2018–2041.

Based on the average daily water demand of approximately 1,690 L/c/d, with a future population of 3,000-3,500 people, Longreach's average future water demand is estimated to be in the range of 1,850-2,160 ML/yr.

Since the development of the RWSSA and the associated statistics summarised above, there has been a number of significant developments in Longreach, including:

- A population increase of 2% per annum over the last two years (current population 3,726)
- The establishment and growth of a kangaroo meat processing works
- The establishment of a concrete products industrial plant
- The planned construction of new housing by the Queensland Government (20 housing units) and LRC (7 housing units)
- The expansion of the Longreach Hospital to include a new renal chair unit, larger pharmacy and new nursing accommodation
- The expansion of the Longreach Tourist Park to cater for more caravans
- The establishment of a new 150 site caravan park
- The completion of a sealed bitumen road from Longreach to Townsville opening up a new drive tourism route.

There is also expected to be more general future residential, commercial and industrial growth in Longreach, including large subdivisions. It is expected these developments will create additional demand beyond that contemplated in the RWSSA.

2.1.3. Climatic variation

Queensland's future climate is projected to be warmer and drier, with increased evaporation and a potential increase in the annual and inter-annual variability. These same trends are also projected for the Longreach LGA. Additionally, under an unchanged greenhouse gas emission scenario, the projected climatic changes for Longreach indicate that by 2050 seasonal variations may include (DNRME, 2019):

- slightly wetter summers, with drier winter, autumn, and spring
- warmer temperatures for each season (average, minimum, and maximum)
- higher evaporation rates for each season.

The *Queensland State of the Environment Report 2020* (DES, 2021) states that the evaporation rate for Longreach is 3,037 mm per annum. During an extended dry season, this evaporation severely depletes the available water in the Town Storage. However, there is little understanding of the quantitative effects of evaporation on the Town Storage, particularly when considered in conjunction with future climatic variability.

Urban water demand in Longreach varies between years and within each year, depending on various factors including climatic conditions such as rainfall, with higher demand usually occurring during hotter, drier periods. During extended dry periods, water levels in the Town Storage may become low and, as a result of subsequent water restrictions, water use may be lower than it otherwise would have been. The future water demand estimation above (1,850-2,160 ML/yr) is therefore conservative, in that it adopts historical data with periods of lower water use during water restrictions, and does not account for future climatic variability, which could increase the frequency and duration of water restriction periods (DNRME, 2019).

There is some uncertainty in respect of the long-term implications of climate change on future water demand and security in Longreach. However, there is a high degree of confidence that climate variability will increase, and rural communities will experience reduced rainfall and more frequent, and prolonged, drought (Department of Regional Development, Manufacturing and Water [DRDMW], 2021; Paxton, 2021; Phelps and Kelly, 2019). This emphasises the need for the Project to ensure a secure and reliable water supply for the people of Longreach.

2.1.4. Water security

Historical modelling of the Town Storage's water supply levels was undertaken for the RWSSA to estimate the frequency at which the storage fell below its minimum operating volume, based on future water demand estimates, at the current height of the existing weirs (i.e. without the Project). This modelling found that, at a demand of 2,200 ML/yr (representing Council's current allocation from the Town Storage), with restrictions in place, the storage would have fallen below its minimum operating volume during one year (1902–1903), for approximately 4.5 months. Without restrictions in place, the Town Storage would have fallen below its minimum operating level on three occasions, with one of these lasting longer than six months (and one of the other occasions lasting longer than one month).

Given Longreach's average future water demand would be in the range of 1,850-2,160 ML/yr (Section 2.1.2), which nears the LRC's current allocation as modelled above, it is likely that without the Project, there is a high likelihood of the Town Storage falling below its minimum operating volume in the future, even with restrictions in place. Further, the frequency and duration at which the Town Storage (without the Project) falls below its minimum operating volume may be exacerbated by the potential future impacts of climate change and its effect on the severity and duration of droughts.

The Project would not only reduce the likelihood that the Town Storage will fall below its minimum operating volume in future, but also the frequency, duration and severity of water restrictions. For example, the Project would increase water security (i.e. keep the Town Storage above its minimum operating volume) for approximately 5 months beyond the existing storage volume, based on an average demand of 6 ML/day.

2.2. Sustainability

The *Longreach Regional Council Corporate Plan 2017-2027* (Corporate Plan) identifies the LRC's commitment to a quadruple bottom line approach that seeks to achieve sustainability through the protection and enhancement of social, cultural, economic and environmental matters. It is expected that the Project will have numerous benefits that support a vibrant economy, community development and enhance climate adaptability. Protecting environmental values and supporting sustainable natural resource use are also important outcomes sought for the region.

Water security provides many benefits, enabling towns and regions to become more (CRCWSC, 2021):

- Resilient – able to withstand heatwaves, drought and warming
- Sustainable – increased capacity to conserve biodiversity, public health and conservation of natural resources
- Productive – greater efficiency in the use of resources, services and distribution of benefits to the community; supporting economic development
- Liveable – protecting green and blue spaces for the community and the environment.

Reduced water supply, particularly in regional and rural areas, has many impacts on public health, the environment and the economy (DRDMW, 2021).

2.2.1. Liveability

Water security is critical to maintaining Longreach's strong and unique identity, sense of community, and social and economic development (LRC, 2017). Establishing improved water supply underpins the LRC's strategic directions in respect of community services and infrastructure provision, recognising that water reliability supports future development, social networks and the longevity of rural communities (Paxton, 2021). Lester et al (2022) characterise the social impacts of drought as:

- Employment and financial constraints

- Outmigration
- Reduced access to education and training
- Health and wellbeing
- Uncertainty
- Loss of community resources, services and support systems.

The Project would likely reduce the frequency, duration and severity of water restrictions (Section 2.1.3), particularly as drought events are expected to increase (DRDMW, 2021). Drought events have social and cultural significance, often experienced most keenly by regional communities that rely on agricultural and pastoral livelihoods (Paxton, 2021). Phelps and Kelly (2019) identify that the "cascading impacts of drought are complex, interrelated and affect the whole community." These include the loss of social networks, reduced mental health and reduced local services (Lester et al, 2022).

A large volume of Longreach's water supply provides for the ongoing maintenance of public and private 'green' spaces, such as gardens, lawns, parks, and sporting fields. Green spaces provide vital health services as well as environmental services, reducing socioeconomic health inequalities, facilitating activity and promoting better mental health and well-being (Barton and Rogerson, 2017). A secure water supply will facilitate more reliable continuation of green space maintenance and allow for the incorporation of greenspace into the design of buildings, healthcare facilities, social care settings, homes and communities. This creates shared spaces which facilitate interaction and attachment, foster well-being, and increase opportunities for green exercise (Kellert, 2016).

2.2.2. Economic

Longreach's economy and employment are closely associated with agriculture, grazing and tourism, all of which rely upon a reliable water supply (Phelps and Kelly, 2019). Regions vulnerable to water insecurity experience direct impacts on farmers, the effects of which flow on to local businesses. Outmigration from regional towns due to prolonged drought in central-western Queensland is estimated to be 20% (Phelps and Kelly, 2019).

Severe water restrictions during the most recent severe drought contributed to an additional 1.2% decrease in population annually. The economic impacts of this, if applied to the current regional economy, would result in $9.4m of lost economic output every year, costing 35 jobs yearly, and resulting in $4.4m less value-added annually.

In addition to the town water supply, there are multiple agricultural holdings that have an allocation to draw from the Thomson River at Longreach. Improving the reliability of this storage will therefore also result in productivity gains for our crucial agricultural industry.

Enhanced water security has many economic benefits, such as:

- Attracting new residents and investment to the region
- Supporting the long-term viability of existing businesses and industries and, consequently, local employment
- Increasing community confidence in the reliability of water supply, stemming outmigration.

The Project will support LRC's economic development priorities, facilitating diversity of industry, innovation and skills development. A key strategy in achieving this outcome is to address water supply and security issues (LRC, 2017).

2.2.3. Environment

Ecological sustainability, climate change resilience and respecting natural values are important elements of the strategic planning and development intent for Longreach (*Longreach Regional Planning Scheme 2015* [planning scheme]). It is acknowledged that the Project may have impacts on ecological values, which will require appropriate mitigation.

Several environmental studies have been commissioned by the LRC for the Project. The purpose of these studies is to identify the potential environmental impacts of the Project and determine the most appropriate measures to minimise these impacts. These studies include:

- Terrestrial Ecology Assessment to determine the potential impacts on riparian vegetation due to clearance for construction of the raised weirs, as well as potential changes to riparian vegetation losses due to stream bank inundation.
- Flooding and hydrology assessment to determine the changes to flooding depths and velocity, both upstream and immediately downstream of the raised weirs.
- Aquatic Ecology Assessment to determine the potential impacts to aquatic flora and fauna within the Thomson River, including impacts on fish passage due to raising of the weirs.
- Cultural Heritage Assessment to determine the potential impacts on items and places of both indigenous and non-indigenous cultural heritage that could be subject to inundation following the Project.

The findings of these studies have also been considered by the LRC to determine how the Project could result in positive environmental outcomes.

2.3. Alternative options

In order to better understand their opportunities for securing a sustainable water supply for Longreach, the LRC commissioned Cardno (2017) to undertake a feasibility study of the following options:

1. Raise the level of the existing weirs
2. Construct a new off-stream storage area (dam)
3. Construct a new in stream storage dam on Watyakan Creek
4. Install a permanent desalination plant for existing groundwater bore supply
5. Establish a new groundwater bore in an aquifer of higher quality
6. Recycle water from the sewage treatment plant.

The LRC has also considered the option of transferring water from the Ilfracombe groundwater bore to Longreach. A summary of these options is provided in Table 2-1.

Based on the analysis considered in the Cardno report, LRC has determined that raising the existing weirs by 1 m is the optimal solution to ensure that Longreach has safe, secure and reliable water supply in the long term, for the following reasons:

- No new infrastructure would be required, such as water transfer pipelines and pumping stations required for the other options. The Town Storage already contains existing intake infrastructure connected to the Longreach water treatment plant (WTP).
- The Project would only represent a change to an existing impact (being the impoundment of water in the Town Storage), rather than an introduction of a new environmental impact which would occur for other options (e.g. new impoundment of water on Watyakan Creek).
- The Project would likely provide the most reliable source of additional water, given:

  - more voluminous, reliable flows in the Thomson River compared to Watyakan Creek
  - groundwater yield, quality and licencing limitations in aquifers in the Longreach region
  - supply limitations from the sewage treatment plant.
- Fewer impacts to private landholders and the broader community, as there would be no requirement for additional infrastructure or inundation of new land not already subject to inundation, just an increase the water level within the existing Town Storage.
- Relatively lower operation and maintenance costs associated with the Project, when compared to the costs associated with the other options.

Table 2-1 Comparison of Project options

Option	Infrastructure requirements	Affected stakeholders	Limitations	Key potential impacts
Raise the height of the existing weirs	• Modification of weirs • Potential upgrades to access tracks.	• Landholders adjacent the Thomson River – inundation of already affected and additional lots • Cultural and recreational users of Thomson River banks, subject to additional inundation • Community and road users during construction phase.	• Height of raised weirs limited to height of surrounding topography to prevent spill-out • Storage volume increase to be within the limits set out in the *Water Plan (Cooper Creek) 2011.*	• Impacts on environmental flows, aquatic and terrestrial ecosystems and habitat • Changes to the extent and depth of flooding • Impacts on cultural heritage items and places subject to additional inundation.
Construction of a new off-stream storage dam adjacent to Thomson River	• New concrete dam/weir • Depending on topography, earthworks and/or pumping infrastructure.	• Landholders adjacent the Thomson River – inundation of already affected and additional lots • Cultural and recreational users of Thomson River banks, subject to additional inundation • Community and road users during construction phase.	• Construction of a new water storage on the Thomson River is not permissible under the *Regional Planning Interests Regulation 2014.*	• Impacts on environmental flows, aquatic and terrestrial ecosystems and habitat • Changes to the extent and depth of flooding • Impacts on cultural heritage items and places subject to additional inundation.
Construction of a new in-stream storage dam on Watyakan Creek	• New concrete dam/weir • New pumping infrastructure and ~4 km water transfer pipe between the storage and WTP.	• Landholders adjacent to Watyakan Creek – inundation of already affected and additional lots • Landholders along transfer pipeline route • Cultural and recreational users of Watyakan Creek banks, subject to additional inundation • Community and road users during construction phase.	• Height of new dam limited to height of surrounding topography to prevent spill-out • Storage volume to be within the limits set out in the *Water Plan (Cooper Creek) 2011.*	• Impacts on environmental flows, aquatic and terrestrial ecosystems and habitat • Changes to the extent and depth of flooding • Impacts on cultural heritage items and places subject to additional inundation.

Option	Infrastructure requirements	Affected stakeholders	Limitations	Key potential impacts
Install a permanent desalination plant for existing groundwater bore supply	• Permanent desalination plant • Brine treatment and/or disposal site/infrastructure • Power supply.	• Landholders along transfer pipeline route • Community and road users during construction phase.	• Available groundwater yield from the target aquifer • High energy consumption leading to high operating costs.	• Groundwater level drawdown on any surrounding bore users • Impacts on groundwater-dependent ecosystems • Potential noise impacts on residences located in the vicinity of desalination plant.
Establish a new groundwater bore in an aquifer of higher quality	• New bore and pump infrastructure • Transfer pipeline between new bore and WTP.	• Landholders along transfer pipeline route.	• Available groundwater yield from the target aquifer • Available water allocations under relevant Great Artesian Basin water plan.	• Groundwater level drawdown on any surrounding bore users • Impacts on groundwater-dependent ecosystems.
Recycled water from sewage treatment plant	• Transfer pipeline between sewage treatment plant and WTP • Additional water treatment infrastructure at existing WTP.	• Landholders along transfer pipeline route • Community and road users during construction phase.	• Output of sewage treatment plant • Community pushback – negative perception often associated with use of recycled sewage water for drinking and other uses	• Beneficial reuse of a waste stream
Transfer of groundwater from Ilfracombe to Longreach	• New pump infrastructure and transfer pipeline between groundwater bore and WTP.	• Landholders along transfer pipeline route • Community and road users during construction phase.	• High construction cost due to length of pipeline (approximately 30 km) • Available groundwater yield from the target aquifer • Available water allocations under relevant Great Artesian Basin water plan.	• Groundwater level drawdown on any surrounding bore users • Impacts on groundwater-dependent ecosystems • Potential noise impacts on residences located in the vicinity of pipeline construction.

3. Project description

Section 3 provides a description of the Project and its components, as well as an overview of the existing weirs and the Longreach water supply. Section 4 describes the proposed designation footprint, which will capture the entirety of the Project and the revised full supply level (FSL).

3.1. Existing weirs and water supply

The Town Weir is located approximately 3.5 km north-west of Longreach. Anabranch Weirs 1 to 4 are located in proximity to the Town Weir, on anabranches of the main Thomson River channel (Figure 1-1). Together, these existing weirs create the “Town Storage”, which is approximately 10 km long and terminates at the upstream Fairmont Weir (Figure 1-1). The Town Storage holds approximately 3,300 megalitres (ML) of water.

The existing weirs are trapezoidal structures comprised of earthen cores with rock pitching and bitumen and/or concrete capping. The existing weirs are shown on Pictures 3-1 to 3-5.

Picture 3-1 Town Weir

Picture 3-2 Anabranch Weir 1

Picture 3-3 Anabranch Weir 2

Picture 3-4 Anabranch Weir 3

Picture 3-5 Anabranch Weir 4

A review of historical information indicates that the existing weirs were likely constructed in the 1950's, following the push for the establishment of a "Thomson River Authority", as reported in the Longreach Leader on Friday 12 March 1954 (Australian Heritage Specialists [AHS], 2023a).

The Longreach reticulated water supply infrastructure was originally connected to the natural water hole in the Thomson River via an inlet and pump station in 1938. This allowed for the expansion or irrigated agriculture and the maintenance of green spaces in the Longreach township (Urbis, 2021). The current water intake in the Town Storage is in the same location as the original inlet, and is located on the footbridge adjacent Apex Park (the Old Winton Highway). The minimum operating volume of the intake is 88 ML.

The LRC holds water access licence 604058 under the *Water Plan (Cooper Creek) 2011* (Cooper Creek Water Plan) which permits it to a nominal entitlement of 2,200 ML/yr from the Thomson River system. The maximum daily volumetric limit is 12.5 ML/day and the maximum extraction rate is 300 litres per second (L/s). The LRC also holds water interference licence 609661 under the Cooper Creek Water Plan for the existing Town Storage.

River water is pumped directly from the Town Storage to the 11 ML/day Longreach WTP, where it is distributed throughout the town's reticulation system. Releases from three upstream weirs (Fairmont, Bimbah, Goodberry Hills) are used to supplement the Town Storage when necessary.

Anabranch Weirs 3 and 4 failed during flooding events in 2022 and 2020 respectively, following which the LRC was required to repair and reinforce the weirs. Given their significant age, the structural integrity of the weirs is unknown and provides additional imperative for the LRC to undertake the Project, that is, to avoid a sudden loss of Longreach's water supply in the event of a weir failure.

3.2. Location

The relevant Lot/s and Plan/s associated with each of the weirs is listed in Table 3-1. The layout of the weirs, as well as their location with respect to the cadastral boundaries available on *Qspatial* (Department of Resources [DoR], 2022) is shown on Figure 3-1. The Project would not change the location of the existing weirs, with the exception of expanding their vertical and lateral extent commensurate with the 1 m raising.

Table 3-1 Location of the weirs

Weir	Relevant Lot/s and Plan/s
Town Weir	State land (Thomson River) Lot 2 SP123565
Anabranch Weir 1	Lot 4 SP23218
Anabranch Weir 2	Lot 4 SP23218
Anabranch Weir 3	Lot 2 SP123565
Anabranch Weir 4	Lot 2 SP123565

3.3. Construction

Project construction is expected to follow the following methodology:

- Re-grading of existing access tracks within the Town Common, as necessary, to ensure safe access by heavy vehicles and mobile plant
- Removal of vegetation within the construction footprint (Figure 2-2) as required; the combined construction footprint for all five weirs is approximately 1.64 ha
- Installation of an earth fill and/or sheet pile coffer dam upstream of the Town Weir (and potentially the Anabranch Weirs) and subsequent dewatering
- Removal of existing weir surface protection (i.e. concrete/bitumen capping) and excavation of embankments to a suitable level for foundation treatment
- Confirmation of existing foundation treatment and extents
- Installation of sheet piling along the length of the weirs and into the existing bank
- Placement of earthen fill to raise the weirs to a height of 179.6 mAHD
- Placement of concrete sills upstream and downstream of the earthen embankments
- Capping the embankments with reinforced concrete surface protection
- Placing a dumped-rock apron downstream of the weir
- Construction of a fish passage structure (Town Weir only) in conjunction with the relevant steps above
- Removal of any earth fill and/or sheet pile coffer dam structures installed prior to construction.

It should be noted that a detailed construction methodology is not yet available, as the approach to construction can only be determined following geological investigations, detailed engineering design, and selection of a construction contractor. The LRC will commence these phases following the securing of funding for the Project.

Accordingly, the construction methodology described above is preliminary only, and may change pending the outcomes of the phases listed above.

A high-level summary of other the Project construction aspects has been provided in Table 3-2.

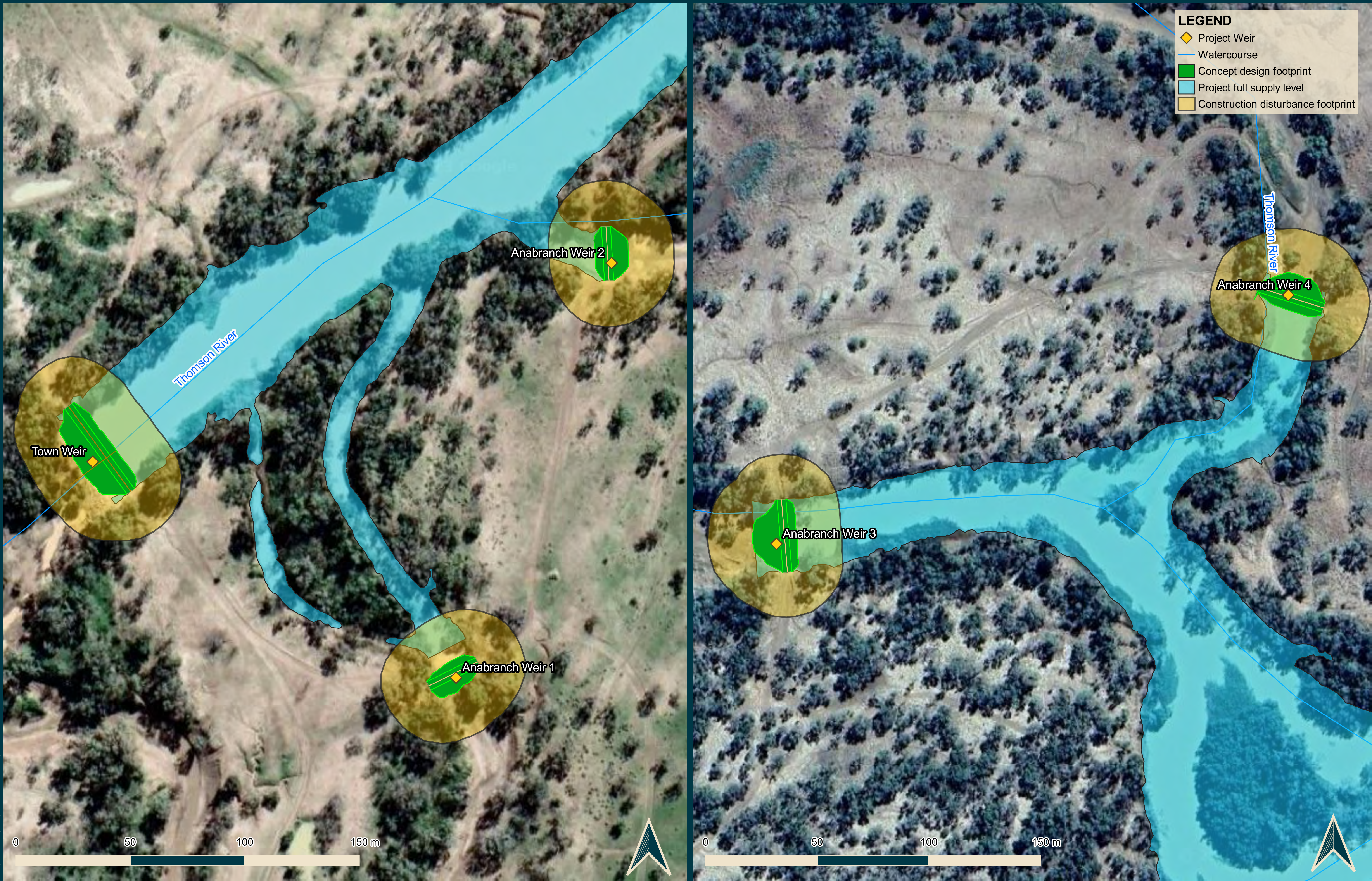
Table 3-2 Summary of Project construction aspects

Aspect	Description
Access	• Access to the Town Weir and Anabranch Weirs 1 and 2 will be via the Landsborough Highway, Apex Park Road, then via unnamed access tracks located within the Town Common • Access to Anabranch Weirs 3 and 4 will be via the Landsborough Highway, Old Winton Highway, then via unnamed access tracks located within the Town Common.
Ancillary activities	• Temporary site offices and laydown areas will be established in existing cleared areas for the duration of construction activities. It is expected that two temporary site offices will be required – one in proximity to the Town Weir and Anabranch Weirs 1 and 2, and one in proximity to Anabranch Weirs 3 and 4.
Hours	• Construction activities will occur between the standard hours of 7 am to 6 pm, Monday to Saturday.
Workforce	• It is estimated that the Project will generate a total workforce of approximately 65 workers. The LRC anticipates Project construction occurring simultaneously at three weirs at a time, with crews of between 7-10 personnel at each weir. Based on this, there would be a workforce of approximately 30 personnel at any one time.
Duration	• Project construction is expected to take no longer than 12 months.

In addition to raising of the weirs themselves, the Aquatic Ecology Assessment (Appendix D) recommended that a rock ramp style fishway (Picture 3-6) should be integrated below the Town Weir to facilitate movement of aquatic fauna. Fishways are not proposed for Anabranch Weirs 1 to 4 (Section 6.3.3). LRC will commission a detailed design of the proposed fishway structure in parallel with detailed design of the raised weirs following geological investigations, detailed engineering design, and selection of a construction contractor.

Picture 3-6 Typical rock-ramp fishway structure

Source: Andrea Prior, via DES (2023)



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Thomson River Weir Raising Project

Figure 3-1 Project layout

3.4. Operation

Being stationary structures, the operational requirements of the existing weirs is limited to periodic inspections of their structural integrity, as well as undertaking maintenance activities when required. The Project would not change these operational requirements. Additional periodic inspections may be required for the rock ramp on the Town Weir to ensure its proper functioning after high-flow events. Given the insignificant nature of Project operations, these activities have not been considered in the environmental assessment carried out in Section 6.

The Project would increase the capacity of the Town Storage from approximately 3,300 ML to 4,200 ML, equivalent to a 28% increase. The LRC will lodge a water licence amendment to the Department of Regional Development, Manufacturing and Water (DRDMW) for its existing interference licence 609661 under the Cooper Creek Water Plan to allow for this increase.

The LRC currently holds licence 604058 under the Cooper Creek Water Plan for a 2,200 ML/yr entitlement from the Thomson River system. The LRC will consider future applications to increase its entitlement under licence 604058 to accommodate future water demand increases.

4. Designation description

4.1. Footprint

The designation being sought subject of this MID proposal encompasses the construction footprint for each weir (Figure 3-1), as well as the full supply level (FSL) of the Town Storage following Project construction. The designation footprint is shown on Figure 4-1.

The designation footprint would predominantly intersect with the following Lots:

- State land (Thomson River riparian corridor)
- Lot 2 SP123565
- Lot 4 SP23218.

In addition to the above, small portions of the Project FSL (part of the designation footprint) are shown to intersect with the following lots based on GIS analysis of the 179.6 mAHD contour and the State cadastral boundaries available (DoR, 2022):

- Lot 1 RP858039
- Lot 1 SP322808
- Lot 1 PD839910
- Lot 1 POR579
- Lot 186 POR579
- Lot 2 POR579
- Lot 107 PD47
- Lot 109 PD103
- Lot 112 PD95
- Lot 2 SP134387
- Lot 23 SP117111
- Lot 33 SP117111
- Lot 35 CM95
- Lot 7 CM84.

These intersections are all very minor in nature, and due to the resolution of the LiDAR data, will not necessarily equate to inundation of a portions of these lots by the Project FSL. The LRC will continue to consult with landholders adjacent to the Town Storage during and following Project construction (Section 10).

4.2. Land use considerations

4.2.1. Easements and encumbrances

The designation footprint is not burdened by, nor does it benefit from, any easements. It is noted that Lot 4 SP232181 is burdened by an easement (Figure 4-1), however this does not impact the proposed designation footprint.

4.2.2. Transport networks

Access to the weirs is provided from the surrounding local and State road network, with final access provided by unnamed access tracks within the Town Common (Table 3-2).

There are no public passenger transport services provided to the weirs.

4.2.3. Utility services

The water intake in the Town Storage, located on the footbridge adjacent Apex Park (the Old Winton Highway) (Section 3.1), is connected to the LRC’s water supply infrastructure.

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Thomson River Weir Raising Project

Figure 4-1 Project full supply level

5. Statutory context

5.1. Planning Act 2016 and Planning Regulation 2017

Part 5 of the Planning Act establishes the process by which premises may be designated for the development of certain infrastructure. It provides an alternative assessment pathway for the delivery of important infrastructure, where standard development assessment processes may be unsuitable or less efficient.

Pursuant to section 35, a ***designator*** may designate a premises for infrastructure prescribed under schedule 5 of the Planning Regulation (part 2, ***other infrastructure***). In this instance, the LRC is seeking a MID over the subject land for:

- Item 19 – Water cycle management facilities.
- Item 20 – Storage works depot and similar facilities, including administrative facilities relating to the provision of maintenance of infrastructure state in this part.

A designator may be either the Minister, where a MID is proposed, or the relevant local government (a 'local government infrastructure designation'). In the case of the Project, as the request is for a MID, the Minister is the relevant decision-maker, or 'designator'.

Sections 36 and 37 of the Planning Act prescribe the criteria and the process for making or amending a designation. An assessment of the Project against this criteria is provided in Table 5-1. Relevantly, section 26(3) provides for the Minister to prepare guidelines for the environmental assessment and public consultation aspects of the MID process. These are the *Minister's Guidelines and Rules* (MGR) (Department of State Development, Infrastructure, Local Government and Planning [DSDILGP], 2023), given effect under sections 14 and 15 of the Planning Regulation. The process under the MGR is summarised in Section 5.3.

Table 5-1 Criteria for making and amending designations

Criteria	Response
(1) To make a designation, a designator must be satisfied that – *(a) the infrastructure will satisfy statutory requirements, or budgetary commitments, for the supply of the infrastructure; or* *(b) there is or will be needed for the efficient and timely supply of the infrastructure.*	The LRC is seeking funding arrangements from the Queensland Government for the Project. Section 2.1 of this report discusses the justification for the Project in the context of future water security and demand.
(2) To make or amend a designation, if the designator is the Minister, the Minister must also be satisfied that adequate environmental assessment, including adequate consultation, has been carried out in relation to the development that is the subject of the designation or amendment.	Section 6, as well as Appendices B to H, provide an environmental assessment of the Project. Section 10 and Appendix K describe stakeholder consultation undertaken for the Project.
(3) The Minister may, in guidelines prescribed by regulation, set out the process for the environmental assessment and consultation.	The process for carrying out environmental assessment and consultation relating to the creation or amendment of a MID is detailed within the MGR. This report has been prepared in accordance the requirements of the MGR.

Criteria	Response
(4) The Minister is taken to be satisfied of the matters in subsection (2) if the process in the guidelines is followed.	Not applicable. Refer to response at item (5).
(5) However, the Minister may be satisfied of the matters in another way.	The LRC was advised via email correspondence from DSDILGP on 7 December 2023 that the Project has been endorsed for assessment under the MID process. Accordingly, this application follows the Minister's process as per Sections 5.2 and 5.3.
(6) Sections 10 and 11 apply to the making or amendment of the guidelines as if the guidelines were a State Planning Policy.	This request does not include amendments to the MGR.
(7) To make or amend a designation, a designator must have regard to—	
(a) all planning instruments that relate to the premises; and	Section 8 of the Planning Act identifies a planning instrument as either: (a) a State planning instrument; or (b) a local planning instrument. Accordingly, this application takes into consideration all planning instruments relating to the subject land. Refer to Sections 5.3 - 5.5.
(b) any assessment benchmarks, other than in planning instruments, that relate to the development that is the subject of the designation or amendment; and	No other assessment benchmarks apply to the land subject of the Project.
(c) if the premises are in a State development area under the State Development Act—any approved development scheme for the premises under that Act; and	The land subject of the Project is not within an identified State Development Area.
(ca) if the premises are in a priority development area under the Economic Development Act 2012—any development scheme for the priority development area under that Act; and	The land subject of the Project is not within an identified Priority Development Area.
(d) any properly made submissions made as part of the consultation carried out under section 37; and	Properly made submissions will be considered following the consultation period and as part of the final assessment of the MID.
(e) the written submissions of any local government.	It is noted that the LRC (i.e. a local government) is the Infrastructure Entity in this instance. Notwithstanding, written submissions from LRC will be considered as part of the MID process.

5.2. Minister's Guidelines and Rules

Chapter 7, schedule 3 and schedule 4 of the MGR outline the process for making or amending a MID. This is supported by the information set out in *Making or Amending a Ministerial Infrastructure Designation (MID): Operational Guidance* (Operational Guidance) (DSDILGP, 2021).

Under section 36(5) of the Planning Act, the MGR are only one way of demonstrating adequate environmental assessment and consultation for a MID proposal. As LRC received endorsement for the Project to proceed as a MID on 7 December 2023, the process under Chapter 7 of the MGR applies.

5.3. Ministerial Infrastructure Designation

5.3.1. Process

The activities required to obtain a MID are outlined in the Operational Guidance and require a proponent to undertake a series of steps prior to receiving endorsement to proceed with an MID proposal. This process is illustrated in Figure 5-1.

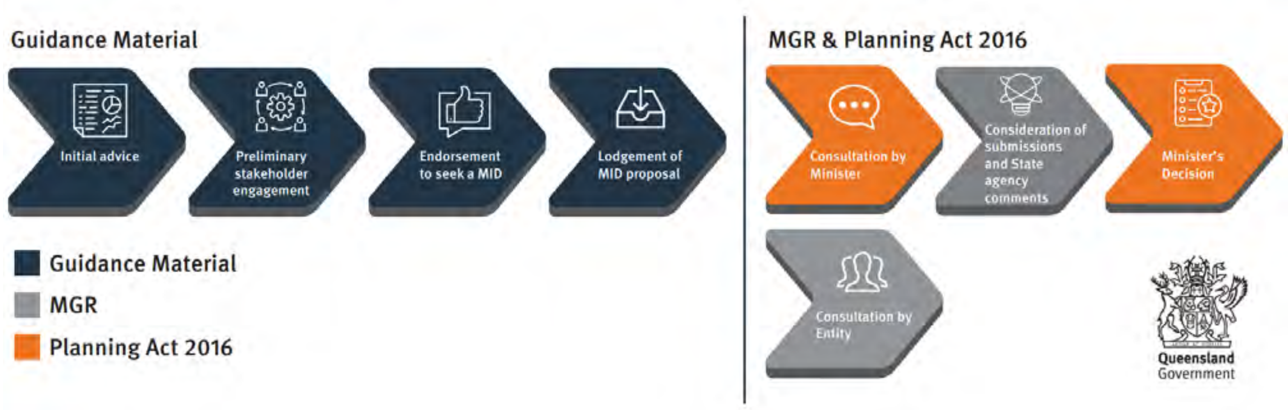

Figure 5-1 Ministerial Infrastructure Designation process.

Source: Queensland Government, CC BY-NC-ND 4.0.

Prior to lodging this proposal, LRC has sought initial advice in respect of the MID proposal from the DSDILGP, completed preliminary consultation with key stakeholders and obtained official endorsement to proceed with a MID.

Initial advice

In accordance with the MGR and section 2 of the Operational Guidance, an entity must seek initial advice from the DSDILGP to identify relevant matters for consideration in a MID proposal, as well as direction in respect of the appropriate process. LRC submitted their request for initial advice in April 2023, receiving written pre-lodgement advice from the DSDILGP on 8 May 2023.

Preliminary consultation

As described in the Operational Guidance and in compliance with the MGR, an entity must undertake preliminary consultation prior to seeking the Minister's endorsement to proceed with a MID proposal. This ensures that the MID Proposal and associated technical reports can appropriately address any concerns raised by stakeholders.

Preliminary consultation for the Project was undertaken by the LRC. Further details on the timing and scope of this engagement, as well as the feedback received from stakeholders, is provided in Section 10. The Stakeholder Consultation Plan for the Project is provided as Appendix K.

Endorsement

Chapter 7 and schedule 3 of the MGR require that an entity obtain endorsement from the Minister to submit a MID proposal. A request for endorsement must include preliminary information about the location and scale of the proposal, provide a brief description of the proposed development, detail the preliminary consultation process and outcomes, and provide a summary of the technical reports to be prepared in support of the MID proposal.

LRC lodged their endorsement request on 26 October 2023. The DSDILGP confirmed, via email correspondence dated 7 December 2023, that the Project could proceed to lodgement of the MID proposal.

Proposal lodgement

As the DSDILGP has provided endorsement to lodge the MID proposal, LRC may submit this proposal addressing the criteria set out in section 26 of the Planning Act, most relevantly, the environmental assessment and consultation requirements described in chapter 7 and schedule 3 of the MGR. The consultation, revision and decision stages proceed following receipt of the proposal.

Consultation

Public consultation is required to be undertaken in accordance with chapter 7 of the MGR. This is both proponent-driven and undertaken by the Minister, for particular entities, such as with state government agencies. Consultation is required to inform stakeholders and the public of the proposed development to allow any concerns to be addressed as part of the final MID Proposal.

An entity is required to submit a consultation strategy for the Designator's endorsement as part of the MID proposal (MGR, chapter 7, part 1, section 1.3). LRC has prepared a Stakeholder Consultation Strategy (Appendix K). A summary is also provided in Section 10.

Upon completion of the consultation process, LRC will consider any submissions and comments received in respect of the proposal (MGR, chapter 7, part 1, section 1.8). This may necessitate changes to the proposal and further consultation on any amended proposal, should the Minster direct (MGR, chapter 7, part 1, section 1.11).

Decision by the Designator

Once the Minister is satisfied that the environmental assessment and consultation undertaken for the MID has achieved the requirements of the Planning Act, Planning Regulation and MGR, the Minister will decide to either proceed with the proposal or not to proceed. Where a proposal does not proceed, a decision notice is given to the entity and any other affected parties (Planning Act, section 37(5)).

Where the Minister decides to make a designation, they will publish a gazette notice about the MID (Planning Act, section 38(1)). The entity and affected parties will also be notified of the decision and provided with a copy of the decision notice (Planning Act, section 38(2)).

5.3.2. Effect of designation

Accepted development

A MID does not authorise development; rather, the effect of a designation is to make infrastructure the subject of a designation ***accepted development***, for which a development application is not required (Planning Act, ss 44(4) and (6)). This applies to:

- making a material change of use of premises
- reconfiguring a lot
- plumbing and drainage work
- operational work.

There are exceptions to this categorisation, most relevantly is building work, which continues to be assessable under the *Building Act 1975*. LRC will be responsible for identifying and obtaining any other approvals required under legislation other than the Planning Act.

Infrastructure charges

In accordance with section 119 of the Planning Act, an infrastructure charge may only be levied and recovered where a development approval has been given. As development for which a MID has been made is accepted development, for which a development approval is not required, infrastructure charges are not applied. Additionally, where development approval is not required, and is thus not subject to development conditions, additional trunk infrastructure payment conditions may not be imposed (Planning Act, section 130).

Other development on designated premises

A MID over premises does not prevent development that is inconsistent with the infrastructure subject of the designation. However, any such development may be ***assessable development*** requiring development approval under the relevant local planning instrument and/or the Planning Act framework (Planning Act, section 44(3)).

In preparing this proposal, a review of historical information was undertaken to identify any relevant development approvals over the premises. None were identified, including for the existing weirs, which were likely constructed in the 1950s (Section 3.1).

5.3.3. Duration and extensions

A MID has effect for six years (Planning Act, section 39(1)) unless the relevant entity seeks an extension for up to a further six years. Should LRC require an extension of any MID made by the Minister, any such request would be made in writing and must be accompanied by the consent of the land owner.

5.4. State planning instruments

State Planning Instruments are identified under Section 8 of the Planning Act as follows:

> *…(2) A State planning instrument is a planning instrument made by the Minister to protect or give effect to State interests, and is either –*
>
> *(a) a State planning policy (including a temporary State planning policy); or*
>
> *(b) a regional plan.*

In this instance, the following State planning instruments apply to the land subject of the Project:

- *State Planning Policy* (SPP) (Department of Infrastructure, Local Government and Planning, 2017)
- the State Development Assessment Provisions (SDAP)
- *Central West Regional Plan* (Regional Plan) (Department of Infrastructure and Planning, 2009).

An assessment of the Project against the SPP and Regional Plan is provided in Sections 5.4.1 and 5.4.3, respectively.

5.4.1. State Planning Policy

The SPP commenced on 3 July 2017 and expresses the State's interests in land use planning and development, promoting these interests through plan-making and the development decisions of state and local government. The SPP applies in various plan-making and decision scenarios including, relevantly, when designating premises for infrastructure (SPP, part B).

Part B also identifies the relevant parts of the SPP that the Minister must consider when assessing a MID proposal. These are summarised in Table 5-2.

Table 5-2 State Planning Policy - applicable parts

Responsible entity	Part of SPP and relevancy to Project							
	Parts A and B	Part C	Part D	Part E – State Interest Policies	Part E – Assessment Benchmarks	Part F	Part G – Appendix 1	Part G – Appendix 2
DSDILGP and Designator	N/A	Yes	Yes	Yes	Yes	N/A	N/A	Yes

The sub-sections below discuss the relevancy of these parts of the SPP to the Project.

Part C – Purpose and guiding principles

Part C of the SPP outlines the purpose and guiding principles for plan-making processes and development decisions within Queensland. The guiding principles must be assessed in conjunction with each State Interest (Section 5.4.1).

Table 5-3 summarises how this MID proposal addresses the applicable guiding principles. The 'integrated' and 'positive' guiding principles are not relevant, as this application is for the creation of a MID for the Project, and does not involve plan making.

Table 5-3 Assessment against the State Planning Policy guiding principles

Outcomes focused		
Guiding principle	*Clearly focus on the delivery of outcomes.*	• *Plans and development outcomes integrate and balance the economic, environmental and social needs of current and future generations in order to achieve ecological sustainability.* • *Plans express clear performance outcomes for development, supported by a range of acceptable outcomes, where possible.*

		• *Innovative and flexible approaches to design and development are supported and encouraged when consistent with a plan's strategic intent.* • *Decision making ensures that, where acceptable, when outcomes are satisfied by development, then the relevant performance outcome is taken to be satisfied in full. Performance outcomes may still be satisfied, even though an associated acceptable outcome is not met.* • *Plans and development outcomes support stated objectives, needs and aspirations of the community at the state, regional and local level.*
Response	The Project involves the granting of a MID over the subject land to facilitate the raising and continued operation of existing water storage infrastructure associated with the Town Storage. The Project will ensure a secure and reliable water supply for the people of Longreach and considers the economic, environmental and social needs of the local community.	
Efficient		

Guiding principle	*Support the efficient determination of appropriate development.*	• *Plans and assessment processes result in development outcomes that are certain, responsive and performance-based.*
		• *Plans regulate development only to the extent necessary to address potential impacts. When applied, plans adopt the lowest appropriate level of assessment required to efficiently and effectively address those impacts.*
		• *The level of assessment for development is proportionate to the potential impacts and level of risk of the development being regulated and a plan's strategic intent and purpose of the relevant zone, local plan and/or precinct, for instance development that is:*
		  – *minor, low-risk and that is encouraged or contemplated in a zone should be identified as accepted development*
		  – *consistent and in accordance with the broad intent of a zone and able to be assessed against assessment benchmarks, should be identified as code assessable development*
		  – *contrary to the intent of a zone, requires public input or is unforeseen by a planning scheme, should be identified as impact assessable development and assessed against a broader range of matters.*

Response	This proposal involves the granting of a MID over the subject land to provide for the raising and continued operation of water storage infrastructure associated with the Town Storage. This designation will facilitate the efficient and timely delivery of water infrastructure, whilst ensuring subsequent works can proceed without the need for individual assessments against the planning scheme (except for Building Work under the *Building Act 1975*).	
Accountable		
Guiding principle	*Promote confidence in the planning system through plans and decisions that are transparent and accountable.*	• *Plans and development outcomes reflect balanced community views and aspirations based on a clear understanding of the importance of the community's involvement in plan making.* • *Plans resolve competing state and local interests through using an evidence-based approach, which balances community needs, views and aspirations.* • *Reasonable, logical and fair development decisions are supported by clear and transparent planning schemes.*

		• *Plans only seek to regulate land use and planning outcomes and do not address matters regulated outside of the planning system, for instance building work regulated under the Building Act 1975 (unless permitted).* • *Obtaining access to planning information is simple and direct, capitalising on opportunities presented by information technology.*
Response	The proposed MID will be undertaken in accordance with Chapter 2 of the Planning Act and Chapter 7 of the MGR. The Project and this MID Proposal have had due consideration of relevant State and local planning instruments, and preliminary consultation with relevant stakeholders, including State and local government representatives, and adjoining/affected landowners. It is noted that the MID process incorporates public consultation, allowing stakeholders, including members of the community, the opportunity to review and provide feedback on the proposed MID (Section 5.1.5). This establishes a transparent process, through which LRC will be accountable through giving due consideration to any submissions.	

The above assessment confirms that the proposed MID meets the requirements of the guiding principles of the SPP.

Parts D and E – State interest statements, policies and assessment benchmarks

The SPP addresses seventeen state interests categorised under the following themes:

(i) Liveable communities and housing
(ii) Economic growth
(iii) Environment and heritage
(iv) Safety and resilience to hazards
(v) Infrastructure.

A state interest is defined under schedule 2 of the Planning Act as:

(a) an interest that the Minister considers affects an economic or environmental interest of the State or a part of the State; or

(b) an interest that the Minister considers affects the interest of ensuring this Act's purpose is achieved.

Table 5-4 describes the applicability of each state interest with respect to the assessment of this MID proposal.

Table 5-4 Applicability of state interests

State interest	Applicability
Planning for liveable communities and housing	
Housing supply and diversity	Not applicable
Liveable communities	Applicable
Planning for economic growth	
Agriculture	Applicable
Development and construction	Applicable

State interest	Applicability
Mining and extractive resources	Not applicable
Tourism	Applicable
Planning for environment and heritage	
Biodiversity	Applicable
Coastal environment	Not applicable
Cultural heritage	Applicable
Water quality	Applicable
Planning for safety and resilience to hazards	
Emissions and hazardous activities	Not applicable
Natural hazards, risk and resilience	Applicable
Planning for infrastructure	
Energy and water supply	Applicable
Infrastructure integration	Applicable
Transport infrastructure	Not applicable
Strategic airports and aviation facilities	Not applicable
Strategic ports	Not applicable

Part E of the SPP contains state interest policies and where relevant, the assessment benchmarks for each state interest. For each state interest, Part E of the SPP advises when the assessment benchmarks apply and if so, what matters the development must be assessed against. The proposed MID has been assessed against the state interests included under Part E of the SPP in Table 5-5.

Table 5-5 Assessment of state interest policies and assessment benchmarks

State interest	Response
Planning for liveable communities and housing	
Liveable communities *Liveable, well-designed and serviced communities are delivered to support wellbeing and enhance quality of life.*	Water security is critical to maintaining Longreach's strong and unique identity, sense of community, and social and economic development (LRC, 2017). The Project would provide water security to the community of Longreach, along with it all of the benefits associated with community, social and economic development, which are important factors in a places liveability. Accordingly, the Project is consistent with the outcomes sought by this state interest.

State interest	Response
Planning for economic growth	
Agriculture *The resources that agriculture depend on are protected to support the long-term viability and growth of the agricultural sector.*	The Project has been designed and located to utilise existing disturbed areas to minimise impacts on the agricultural potential of the land. It is also noted that the Project will also benefit surrounding agricultural operations that have access to the Longreach water supply. Accordingly, the Project will not adversely affect the outcomes sought by this State interest.
Development and construction *Employment needs, economic growth, and a strong development and construction sector are supported by facilitating a range of residential, commercial, retail, industrial and mixed-use development opportunities.*	The Project will provide water security not only for domestic purposes, but for commercial and industrial purposes as well. There is expected to be more general future residential, commercial and industrial growth in Longreach, including large subdivisions (Section 2.1.2). Accordingly, the Project is consistent with the outcomes sought by this state interest.
Tourism *Tourism planning and development opportunities that are appropriate and sustainable are supported, and the social, cultural and natural values underpinning tourism developments are protected.*	The Project has been designed and located to protect the environmental and amenity values of the Thomson River to ensure it does not impact on the tourism potential of the area. That is, the revised FSL will not impact the tourism facilities located adjacent the Town Storage (e.g. Apex Park). Accordingly, the Project is consistent with the outcomes sought by this State interest.
Planning for environment and heritage	
Biodiversity *Matters of environmental significance are valued and protected, and the health and resilience of biodiversity is maintained or enhanced to support ecological processes.*	The Project has been designed to mitigate impacts on the environment and incorporates additional features such as a fishway on the Town Weir to improve fish movement along the Thomson River. Terrestrial and Aquatic Ecology Assessments have been prepared and are attached at Appendices E and D, respectively. These assessments set out recommendations to ensure the protection and management of environmental values. These recommendations will be implemented during the detailed design and construction phases. Accordingly, the Project is consistent with the outcomes sought by this State interest.
Cultural heritage *The cultural heritage significance of heritage places and heritage areas, including places of Aboriginal and Torres Strait Islander cultural heritage, is conserved for the benefit of the community and future generations.*	The Project has been designed to mitigate impacts on cultural heritage (Section 8). Aboriginal and Non-Aboriginal Cultural Heritage Assessments have been prepared to address this State interest and are attached at Appendices F and G, respectively. These assessments make recommendations to ensure the protection and management of cultural heritage. Accordingly, the Project is consistent with the outcomes sought by this State interest.
Water quality *The environmental values and quality of Queensland waters are protected and enhanced.*	Project construction will be undertaken in accordance with a detailed Construction Environmental Management Plan (CEMP), to be prepared following detailed design and engagement of a construction contractor. The management measures will be designed to ensure the Project does not result in the worsening of water quality within the Thomson River.

State interest	Response
	Notwithstanding the above, a Preliminary CEMP has been prepared to address this State interest and is provided as Appendix J. The Preliminary CEMP sets out recommendations to ensure the protection and management of water quality. Accordingly, the Project is consistent with the outcomes sought by this State interest.
Planning for safety and resilience to hazards	
Natural hazards, risk and resilience *The risks associated with natural hazards, including projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards.*	<u>Bushfire</u> The designation footprint contains areas identified as 'medium potential bushfire intensity' and 'potential impact buffer'. The Project involves raising existing water storage infrastructure (weirs) and accordingly will not result in additional impacts on the safety of people or property. It is also noted that the additional water storage provides increased capacity for firefighting purposes. A Preliminary Bushfire Hazard Assessment has been prepared to address this State interest and is provided as Appendix I. This assessment includes recommendations to reduce the risk of ignition from Project construction. Accordingly, the Project is consistent with the outcomes sought by this State interest. <u>Flooding</u> The designation footprint is mapped as containing 'flood hazard area' (local government flood mapping area) and is located within the 'extreme flood hazard area' under the planning scheme. Given its nature as in-stream infrastructure, the Project itself will not be impacted by flood events, with the existing weirs being subject to seasonal flooding. A Flood Impact Assessment has been prepared to address this State interest and is provided as Appendix C. This assessment found that the Project would not have significant impacts on flood depth, velocity and extent. The assessment also makes recommendations to ensure that the development does not result in increased impacts on the safety of people or property (e.g. from scour). Accordingly, the Project is consistent with the outcomes sought by this State interest.
Planning for infrastructure	
Energy and water supply *The timely, safe, affordable and reliable provision and operation of electricity and water supply infrastructure is supported and renewable energy development is enabled.*	The weirs have been operational since approximately the 1950s. As Longreach and the surrounding locality continues to grow and the demand for water increases (Section 2.1), LRC are seeking to develop the Project to secure long term water supply needs for Longreach. Accordingly, the proposed MID would facilitate the Project to increase the storage capacity within the Town Storage, helping to ensure the safe, responsive, reliable and affordable provision of water to the community. It is considered that the MID is consistent with the outcomes sought by this State interest.
Infrastructure integration *The benefits of past and ongoing investment in infrastructure and facilities are maximised through integrated land use planning.*	The Project will utilise existing connections to the LRC water supply network and WTP and seeks to provide additional water storage capacity which will benefit the Longreach township and surrounding locality. The existing infrastructure network is sufficient to capture and distribute the increased storage capacity. Accordingly, the proposed MID is consistent with the outcomes sought by this State interest.

The Project has been assessed to comply with all applicable matters of state interest included in the SPP. Individual mapping of each of the overlays affecting the subject land is included at Appendix L.

Part G – Appendix 2 Stormwater management design objectives

Part G of the SPP sets out design objectives for the management of stormwater during construction. Desired outcomes are identified for the specific aspects of stormwater management.

As the Project has not undergone detailed design, each of these outcomes are not specifically addressed at this stage of the proposal. As noted above, a Preliminary CEMP has been prepared (Appendix J), which contains general best-practice soil and water management measures. These controls will be reviewed and refined by the Project construction contractor for inclusion in a detailed CEMP, following the completion of detailed design.

Based on the above, it is considered that the Project would comply with Part G of the SPP.

5.4.2. State Development Assessment Provisions

The SDAP provide assessment benchmarks for development applications where the chief executive administering the Planning Act is the assessment manager or a referral agency. The SDAP identify state interest matters that development may require assessment against in specific state codes, as prescribed under the Planning Regulation (schedules). Although the MID proposal does not involve a development application, regard must be had for the relevant SDAP (Planning Act, section 36(7)).

The State Development Assessment Mapping System identifies that the following overlays apply to the MID footprint and premises (Appendix L):

- Fish Habitat Area
  - Queensland waterways for waterway barrier works – Major
- Water Resources
  - Water resource planning area boundaries
  - Great Artesian water resource plan area
- Native Vegetation Clearing
  - Category B area that is a least concern regional ecosystem
- State Transport
  - Areas within 25 m of a State-transport corridor (road and rail)

Based on the above, the following state codes are relevant to the Project:

- State code 1: Development in a state-controlled road environment
- State code 2: Development in a railway environment
- State code 6: Protection of state transport networks
- State code 10: Taking or interfering with water
- State code 16: Native vegetation clearance
- State code 18: Constructing or raising waterway barrier works in fish habitats.

Responses to these State codes have been provided in Appendix M.

5.4.3. Central West Regional Plan

The Regional Plan was adopted in July 2009 and encompasses the local government areas of Boula Shire, Winton Shire, Diamantina Shire, Barcoo Shire, Longreach Region, Blackall Tambo Region, Barcaldine Region and Winton Shire. It establishes the overarching framework for development within the region, providing for the management, protection and prioritisation of land uses and activities. The principles and policies set out in the Regional Plan seek to protect natural values, whilst continuing to support key regional industries, such as the resources and agricultural sectors. Liveability, infrastructure and services are also key matters for protection and enhancement under the Regional Plan.

Regional plans identify areas that are prioritised for environmental protection, urban development and industry. Relevantly, the Thomson River is mapped as a 'wetland area of high ecological significance' under the Regional Plan. The Project has been designed and will be constructed to minimise impacts on the ecological features of the Thomson River and surrounding area, as discussed in Section 6. The Project will also be subject to a Regional Interests Development Application (RIDA) (Section 5.5). Accordingly, it is considered that the Project will not compromise the outcomes sought under the Regional Plan.

5.5. Regional Planning Interests Act 2014

The *Regional Planning Interests Act 2014* (RPI Act) provides for the protection of areas of regional interest, identified under the various regional plans, from resource and other regulated activities. It also enables relevant policies about state interest matters to have effect within regional plans.

The designation footprint and MID premises are located within a strategic environmental area (SEA) – designated precinct, specifically the Channel Country SEA (Regional Planning Interests Regulation 2014, section 4 (1)(a)). The relevant part of the Channel Country SEA within which the Project is located, is generally contiguous with the 'wetland area of high ecological significance' identified under the Regional Plan, comprising the Thomson River channel and surrounding floodplain.

LRC will lodge a separate Regional Interests Development Application (RIDA), which will include a detailed assessment of the Project against the provisions of the RPI Act. The RIDA and subsequent approval will ensure compliance with the outcomes sought under the RPI Act and the protection of the Channel Country SEA.

5.6. Local planning instruments

5.6.1. Background

Local planning instruments are identified under section 8 of the Planning Act as follows:

> *…(3) A local planning instrument is a planning instrument made by a local government, and is either –*
>
> *(a) a planning scheme; or*
>
> *(b) a TLPI; or*
>
> *(c) a planning scheme policy.*

Only the planning scheme, incorporating its planning scheme policies, applies to the MID proposal, as LRC does not have a current temporary local planning instrument in place. Whilst the MID proposal makes the development being exempt from assessment against local planning instruments, the applicable provisions of the planning scheme must still be considered (Planning Act, section 36(7)). This assessment is provided in Section 5.6.2.

5.6.2. Longreach Regional Planning Scheme 2015

The planning scheme sets out the criteria (assessment benchmarks) that development within the Longreach local government area must be assessed against. Table 5-6 lists the planning scheme provisions applicable to the MID premises.

Table 5-6 Relevant planning scheme provisions

Component	Relevant provisions
Strategic framework	Rural area Waterway Floodplain Highway
Planning zone/precinct	Rural zone
Overlays	Airport Environs Overlay Flood Overlay Transport Noise Corridors

The relevant planning scheme provisions are considered below.

State Planning Policy

Section 2.1 of the planning scheme confirms that all State interests identified in the SPP are appropriately integrated within the scheme, excluding the sections not relevant to the Council region (i.e. Coastal Environment and Strategic Ports). A detailed assessment of the SPP has been undertaken in Section 5.4.1. It was determined that the Project generally complies with the outcomes sought for each State interest and thus complies with the planning scheme as it relates to these interests.

Strategic framework

Part 3 of the planning scheme provides the strategic framework for Longreach, establishing the policy direction for planning within the local government area. The strategic framework comprises an overall intent for development, supported by two themes, strategic outcomes, specific outcomes and detailed land use strategies. It is supported by mapping, relevant extracts of which are provided at Appendix L.

An assessment of the Project against the relevant elements of the strategic framework is provided at Appendix N. This assessment confirms that the development generally complies with the overall intent of the planning scheme.

Zoning and planning intent

The planning scheme establishes twelve land use zones within the local government area. The MID premises is predominately within the Rural zone, with that part of the land containing the Thomsen River unzoned. Section 1.3.4 of the planning scheme identifies that the zoning for roads, waterways and reclaimed land, where adjoined on both sides by land in the same zone, is considered to be zoned the same as the adjoining land. Accordingly, the subject site is wholly located within the Rural Zone (Figure 5-2).

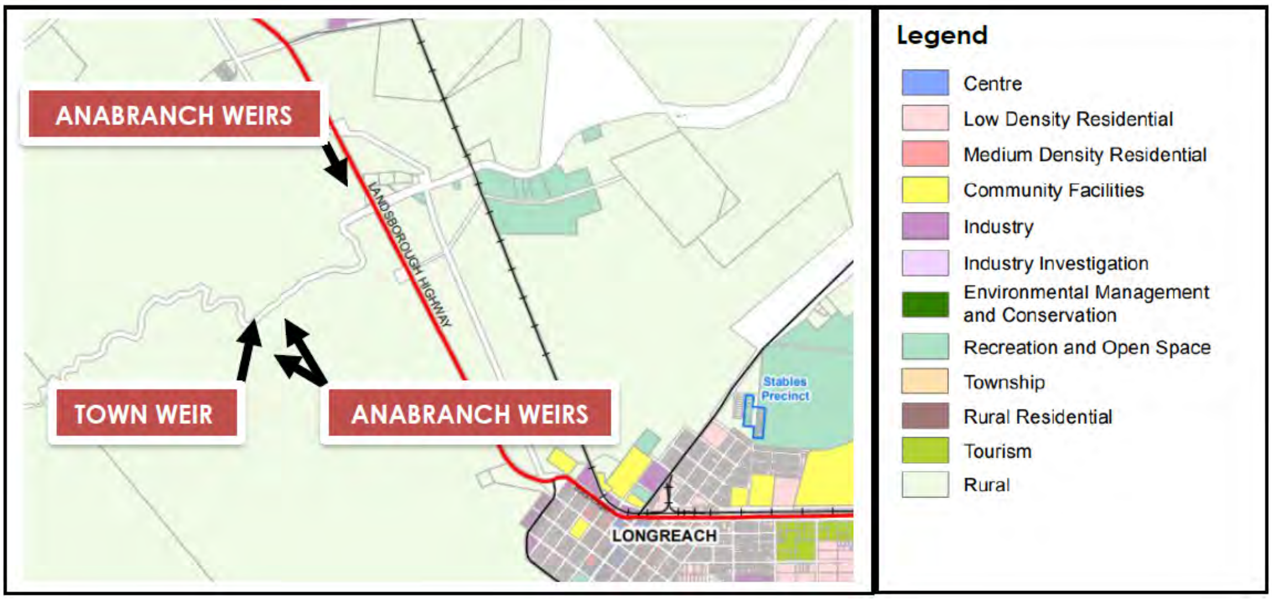

Figure 5-2 Ministerial Infrastructure Designation premises zoning

Section 6.2.9.2 of the planning scheme outlines the general intent for land within the Rural Zone through the collective identification of a purpose and overall outcomes. The purpose of the Rural Zone is to protect the productive capacity of the rural land and facilitate divers, however compatible. The protection of natural areas and processes is also an important outcome sought within the zone.

As the Project involves increasing water storage and thus water security, it will assist with the protection and growth of agriculture. It has been designed to minimise impacts on the ecological features of the area where possible. Accordingly, the proposed development is considered to comply with the intent of the Rural Zone Code.

Overlays

The planning scheme overlays identify land characterised by particular features or subject to physical constraints that may influence the use and development potential of affected areas. Overlay maps also identify those lands subject to assessment against specific area-based overlay codes.

The following overlays apply to the MID premises and Project footprint:

- Airport environs overlay
- Flood overlay
- Transport noise corridors.

Individual mapping of each of the overlays affecting the premises is included at Appendix L. The Project has also been considered against each overlay code and a summary is provided below.

Airport Environs Overlay

The designation footprint is located within Runway Buffer Area A and the Obstacle Limitation Surface of the Longreach Airport under the Airport Environs overlay. This means that section 7.2.1 of the planning scheme, the Airport environs overlay code, applies. The intent of the code is to ensure development does not impact upon the safety and efficiency of airport operations.

The Project will not result in structures or transient intrusions penetrating the obstacle limitation area or the attraction of additional wildlife to the area. Accordingly, the development will not impact on the operations of the Longreach Airport and generally complies with the outcomes sought under the Airport Environs Overlay Code.

Flood Overlay

The subject land is impacted by Extreme Flood Hazard under the Flood overlay. The relevant assessment benchmarks under the Flood overlay code (planning scheme, section 7.2.2) must therefore be addressed.

Given its nature as in-stream infrastructure, the Project itself will not be impacted by flood events, with the existing weirs being subject to seasonal flooding. Additionally, flood modelling (Appendix C) found that the Project would not result in significant impacts on flood depths and velocity, and therefore would not result in worsening flood impacts on neighbouring or downstream properties.

Accordingly, the Project is considered to comply with the general outcomes sought under the Flood overlay code.

Transport Noise Corridors Overlay

The designation footprint is located within a transport noise corridor associated with the Landsborough Highway. The planning scheme does not contain an overlay code in relation to transport noise corridors (planning scheme, section 7.1(8)), however the general intent of identifying such corridors is to avoid the development of sensitive receptors within a noise corridor.

The MID proposal does not seek to establish a noise-sensitive use. It is therefore considered that the Project is consistent with the intent of the planning scheme in respect of noise corridors.

6. Environmental assessment

Under section 36(2) of the Planning Act, the Minister must be satisfied that an adequate environmental assessment has been carried out in relation to the proposed development to make a designation.

Accordingly, the purpose of the following section is to provide an assessment of the potential environmental impacts of the Project, and has been prepared with consideration of the requirements prescribed by Schedule 3 of the MGR. This assessment also provides management measures to minimise and mitigate the potential environmental impacts of the Project.

As noted in Section 3.4, Project operations have not been considered in this environmental assessment given their insignificant nature. Accordingly, only Project construction, as well as the potential impacts of the revised FSL, have been considered in this assessment.

6.1. Identification of key issues and impacts

A review of the potential environmental impacts of the Project has been undertaken to identify the key environmental issues requiring assessment. The key environmental issues identified are summarised in Table 6-1 and are addressed in Sections 6.2 to 6.8.

Table 6-1 Summary of key environmental issues and impacts

Environmental aspect	Key potential impacts	Relevant section/appendix
Surface water	Potential impacts on the depth, velocity and frequency of flooding due to changes in hydrology along the Thomson River main channel. Potential water quality impacts during Project construction.	Section 6.2, Appendices C and J
Aquatic ecology	Potential impacts on aquatic flora and fauna associated with disturbance of the bed and banks during Project construction, as well as increased depth of inundation for bed-dwelling ecology. Potential impacts on the movement of fish past the raised weirs.	Section 6.3 and Appendix D
Terrestrial ecology	Potential impacts on terrestrial flora and fauna associated with the clearance of vegetation during construction of the Project, as well as the increased FSL.	Section 6.4 and Appendix E
Land	Potential impacts on land directly disturbed by Project construction and indirectly disturbed by the increased FSL.	Section 6.5
Air	Potential air quality impacts during Project construction.	Section 6.6
Noise	Potential noise impacts during Project construction.	Section 6.7
Waste	Generation of waste during Project construction.	Section 6.8
Groundwater	As the Project wouldn't involve the extraction or interference with any groundwater sources, no potential groundwater impacts would occur as a result of the Project.	N/A

6.2. Surface water

Section 6.2.1 provides a description of the existing environment relating to surface water, Section 6.2.2 describes the potential impacts of the Project on surface water, and Section 6.2.3 outlines the proposed management measures.

Water Technology Pty Ltd (Water Technology) has prepared a Flood Impact Assessment for the Project, which has been provided as Appendix C. NGH has prepared an Aquatic Ecology Assessment for the Project, which has been provided as Appendix D. Sections 6.2.1 to 6.2.3 include the relevant findings from these reports.

6.2.1. Background

Environmental values

The *Environmental Protection (Water and Wetland Biodiversity) Policy 2019* (EPP Water) and the EP Act provide a framework for:

- Establishing EVs and management goals for Queensland waters
- Deciding the water quality objectives (WQOs) to protect or enhance those EVs
- Listing the identified EVs, management goals and WQOs under Schedule 1 of the EPP Water.

Notwithstanding, the Project is located within the Thomson River sub-basin (0032) of the Cooper Creek basin (003). There are no defined EV's and WQO's identified under the EPP Water for the Thomson Riber sub-basin.

Accordingly, the Australian and New Zealand (ANZG, 2018) Default Guideline Values (DGVs) for slightly to moderately disturbed ecosystems in south central Australia (low rainfall areas i.e. most applicable to temporary Inland Waters of central Queensland) were considered in this MID Proposal and the Aquatic Ecology Assessment (Appendix D).

Water quality

Water sampling undertaken by NGH in the vicinity of the Project found quality was moderate to good, likely influenced to some degree by surrounding land-use and local geomorphology, which is characteristic of a moderately disturbed ecosystem. Surface water of waterways and wetlands within the vicinity of the Project was highly variable, with spatial heterogeneity in physio-chemical stressors and toxicants typical of ephemeral systems in the region (Appendix D).

Water quality spot-measurements indicate surface waters were mostly fresh (low salinity), moderately oxygenated (dissolved oxygen saturation), circum-neutral pH, highly turbid, elevated in nutrients (both nitrogen and phosphorous sources) and with background levels for dissolved Al and Cu elevated above respective ANZG (2018) DGVs (Appendix D).

Flood modelling

Water Technology developed a TUFLOW hydraulic model to assess the potential flood impacts of the Project. The extent of the TUFLOW model and modelled boundary conditions are shown on Figure 6-1.

The following scenarios were modelled for the Project:

- Existing case – representing current catchment and weir conditions

- Project case – based on the existing case scenario, with the inclusion of the Project (simulated in the TUFLOW model using civil design models developed by Engeny).

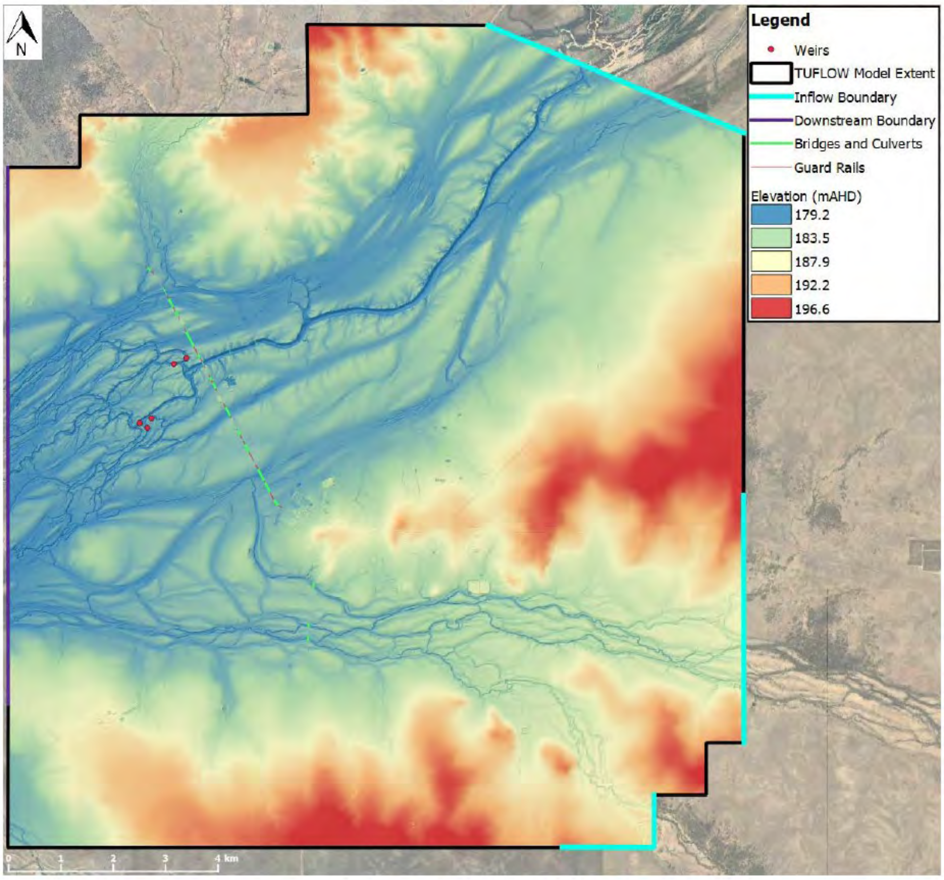

Figure 6-1 Extent of TUFLOW model and local topography

6.2.2. Potential impacts

Potential surface water impacts associated with the Project would primarily be associated with:

- The uncontrolled release of contaminants from vehicles or mobile plant operating during construction activities
- The disturbance and discharge of sediments to land and downstream waterways from construction activities
- Changes to the velocity, depth and extent of flooding events.

These potential impacts have been summarised below.

Uncontrolled release of contaminants

Uncontrolled releases could occur during Project construction as a result of plant or vehicle maintenance issues and inappropriately stored chemicals or products resulting in a release to ground. Activities which have the potential to cause uncontrolled releases include leaks, seepage or overflows from vehicle and mobile plant fuel tanks/fluids lines. These potential contaminants are outlined in Table 6-2.

Table 6-2 Potential contaminants from uncontrolled releases

Parameter	Source
BTEX	Light and heavy vehicles, mobile plant, generators and other machinery with an internal combustion engine.
Polycyclic Aromatic Hydrocarbons	
Total Petroleum Hydrocarbons	

Through the implementation of the management measures described in Section 6.2.3, the risk of uncontrolled releases occurring during Project construction is considered low. If an uncontrolled release does occur, the likelihood that contaminants mobilise off-site into the Thomson River and its anabranches is also considered unlikely through these measures.

Based on the above, it is considered unlikely that uncontrolled releases of contaminants from Project construction activities would result in an any additional exceedances of the ANZG DGV's, or a significant impact on the EVs of the Cooper Creek basin.

Sediment runoff

If uncovered excavated material or soil is exposed to heavy rainfall during Project construction, there is potential for the discharge of sediment-laden water downstream. The risk of such a discharge would be greater during the higher rainfall months (typically December to March). However, given the relatively small area of disturbance required for the Project (1.64 ha, Section 3.3), this risk is considered to have a low potential of occurring.

This risk is lowered further through the implementation of the management measures described in Section 6.2.3. If the off-site discharge of sediment laden water was to occur, it is considered unlikely to contribute to an exceedance of the ANZG DGV's for TSS given the elevated background levels of turbidity (Section 6.2.1).

Flooding impacts

Water Technology found the following with regard to the potential flooding impacts of the Project (Appendix C):

- In both the existing and Project case, the weirs are substantially overtopped.
- Very localised and minor water level increases are noted surrounding the weirs in the Project case. The increases are minor and inconsequential given the predicted depths over the structures.
- The Project does not result in adverse water level or velocity increases upstream to the Landsborough Highway corridor.
- Localised velocity increases are noted downstream of the weirs. These are likely to be inconsequential.

6.2.3. Management measures

Section 9.1 of the Preliminary CEMP (Appendix J) outlines a range of recommended management measures for implementation during Project construction to minimise the risk of impacts occurring to surface water quality.

Further to this, an Erosion and Sediment Control Plan will be prepared for the Project, following detailed design, as part of the detailed CEMP in accordance with the *Best Practice Erosion and Sediment Control* guideline (the White Book) (International Erosion Control Association Australasia [IECA], 2008). These plans, would include site-specific erosion and sedimentation controls, staging advice and stabilisation measures as well as technical notes to guide the installation, function and maintenance of ESC devices.

It is expected that the measures outlined in the Preliminary CEMP will be used to develop a more detailed CEMP by the chosen Project construction contractor following detailed design of the Project.

Given the findings of the Flood Impact Assessment (Appendix C), it is not considered any site-specific management measures are required. However, Water Technology recommends that the areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events, given the localised velocity increased modelled downstream of the weirs.

6.3. Aquatic ecology

Section 6.3.1 provides a description of the existing environment relating to aquatic ecology, Section 6.3.2 describes the potential impacts of the Project on aquatic ecology, and Section 6.3.3 outlines the proposed management measures.

NGH has prepared an Aquatic Ecology Assessment for the Project, which has been provided as Appendix D. Sections 6.3.1 to 6.3.3 include the relevant findings from this assessment.

6.3.1. Background

The surface water background provided in Section 6.2.1 describes the environmental values and water quality context of the Project area, relevant to aquatic ecology. Other relevant background information on aquatic ecology is provided below.

Surface hydrology

Longreach region receives an average of 450 mm of rainfall per year, with most rainfall occurring during summer monsoon events (DNRME, 2019). The Thomson River only flows on a seasonal basis during these wet periods; however, flows are substantial, resulting in widespread flooding throughout the region (Bunn et al., 2006). During dry periods, water evaporates, causing retreating waterways dominated by permanent and semi-permanent waterholes that serve as refuges for various species. These waterholes are characterised by low salinity, high turbidity levels, and limited visual clarity (DEHP, 2016).

Waterways for waterway barrier works

The Thomson River main channel and its anabranches associated with the Project are mapped as a “major” (purple) waterway on the Queensland waterways for waterway for waterway barrier works mapping (Appendix L). It is noted that the anabranches associated with Anabranch Weirs 1 and 2 are not mapped on the waterways for waterway for waterway barrier works mapping.

Field survey

A seven-day field survey of aquatic ecology was undertaken by suitably qualified and experienced aquatic ecologists during the late dry season from 28 July to 3 August 2023. A total of eight sites were surveyed from the riverbanks. Of those, six were located within the extent of the Town Storage. Two additional sites outside the Town Storage were surveyed, one upstream of Fairmont Weir and one downstream of the Town Weir. One analogous site was located within Oma Waterhole, located approximately 97 km south of the Town Weir on the Barcoo River. In addition, nine areas within the Town Storage were surveyed using boat-based electrofishing methods.

At the majority of sites, water quality, sediment quality, habitat and macroinvertebrates were sampled. Water quality samples were undertaken in the field using a sonde, while lab samples were collected for analysis at the NATA accredited laboratory. Fish survey methods included fyke nets, box traps, gill nets and seine nets.

Aquatic habitat

Aquatic habitat condition along the Thomson River was generally consistent, dominated by clay material with minor sand content at two sites. Aquatic habitat complexity was low, with a notable lack of macrophytes and snags in the main channel. Furthermore, riparian vegetation was sparse as is typical of inland Queensland, however, canopy cover was higher at sites in the anabranches of the Thomson River. Three emergent aquatic plant species were recorded during the survey; however, no macrophyte species were considered of conservation importance.

Waterway connectivity along the Thomson River was affected by the Town Weir, creating a deep pool reaching beyond Fairmont Weir and serving as a dry season refuge.

Aquatic species

The survey indicated that main channel Thomson River and surrounds currently supports at least 12 freshwater species of fish (from a total of 21 species in the region), comprising 11 native and one exotic. Fish communities will exhibit temporal variability associated with sampling time / season, and species richness tends to be lower in winter, increasing following flooding for several species. The overall fish community comprised nine higher level taxonomic groups (Families) including Ambassidae, Clupeidae, Eleotridae, Melanotaeniidae, Percichthyidae, Plotosidae, Retropinnidae, Terapontidae and Poeciliidae.

No fish species listed as Vulnerable and/or Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or in the state of Queensland were recorded during the survey. In general, the survey recorded localised populations considered to be a subset of the species known to inhabit nearby regional creek lines of the Barcoo / Cooper catchment.

Neither of the two freshwater turtle species recorded during the survey are listed under the EPBC Act or NC Act. The abundance and age-size class representation of Emmott's Short Neck Turtle (*Emydura macquarii emmotti*) suggests a healthy and self-sustaining population under current conditions main channel Thomson River.

The distribution of translocated Redclaw crayfish (*Cherax quadricarinatus*) showed a distinct spatial pattern, restricted to catch records upstream of Fairmont Weir (TRPE7) only. Anecdotal evidence by recreational fisherman suggests Red claw are present in the Town Storage, which in part, may account for the lack of catch records during the Survey.

Two species of decapod were recorded during the survey, river prawns (*Macrobrachium sp*.) and redclaw crayfish (*Cherax quadricarinatus*). The former species were present in large abundance at all sites, whereas the latter species were only recorded in the site upstream of Fairmont Weir. Anecdotal evidence from recreational fishers along the main channel of Thomson River suggests *C. quadricarinatus* is also present in large numbers throughout the system.

6.3.2. Potential impacts

NGH found the potential impacts to aquatic ecological values associated with the Project are expected to include (Appendix D):

- Direct impacts to riverine habitat and aquatic fauna within the construction footprint of the raised Town Weir and associated Anabranch Weirs, as well as increased inundation of the main channel and anabranches of the Thomson River (i.e. within the Project FSL)
- Indirect impacts to aquatic fauna due to changes in water quality during construction / weir raising.

These potential impacts are discussed below.

Direct impacts

Direct impacts may include direct disturbance of benthic and/or littoral habitat, as well as potential to isolate or strand fish populations during Project construction (e.g. behind coffer dam structures), requiring fish salvage / translocation prior to dewatering operations, as required.

Increased inundation within the Project FSL will result in a shift in hydrological regime from ephemeral to semi-permanent inundation of some in-stream and riparian habitats. The greatest change from current condition is expected within a minor ephemeral tributary approximately 3 km upstream of the Town Weir on the north side of the channel. This direct impact is unavoidable but not considered to be significant in a regional context. Further, there is potential for a net positive benefit for smaller bodied fish species, as increased off-channel shallow and complex habitat will help avoid predation by larger bodied piscivorous species, abundant in the main channel Thomson River.

Indirect impacts

The Project also has potential for indirect impacts, primarily affecting water, sediment quality and/or instream pollution during the construction phase. Potential water quality impacts are described in Section 6.2.2. Other indirect impacts could include disturbance of local populations of aquatic fauna and waterbirds through noise and vibration from machines and vehicles may.

Conversely however, the assessment also found that the Project would benefit fish movement and migration, through the inundation of ephemeral tributary habitat and the provision of upstream and downstream fish passage at the Town Weir through the implementation of a rock ramp style fishway (Section 3.3).

6.3.3. Management measures

The Aquatic Ecology Assessment (Appendix D) recommended the following management measures to minimise Project impacts on aquatic ecology:

- Project design should consider installation of a fish passage structure (i.e. fishway) to facilitate connectivity of fish populations in the catchment. A rock ramp fishway, like that present at Fairmont Weir, is considered most appropriate, and should be incorporated into the engineering design (i.e., partial or full width).
- LRC engage a suitably qualified ecologist specialising in fish passage design to work alongside and provide design input at the detailed design stage to the preferred engineering consultant, to ensure that the design of the raised weirs (particularly, any fish passage structure at the Town Weir) facilitates adequate fish passage.
- Following construction of the Project, a suitably qualified ecologist specialising in fish passage design should review the suitability of the existing rock ramp fishway(s) at Fairmont Weir to continue to provide for passage (i.e., fishway functionality) under the Project FSL in the Town Storage.

Section 6.2.3 describes management measures in relation to water quality, which are also relevant to aquatic ecology.

6.4. Terrestrial ecology

Section 6.4.1 provides a description of the existing environment relating to terrestrial ecology, Section 6.4.2 describes the potential impacts of the Project on terrestrial ecology, and Section 6.4.3 outlines the proposed management measures.

NGH has prepared a Terrestrial Ecology Assessment for the Project, which has been provided as Appendix E. Sections 6.4.1 to 6.4.3 include the relevant findings from this assessment.

6.4.1. Background

Desktop assessment

A desktop assessment was conducted with a 30 km buffer of central site coordinates (-23.3994, 144.2660) for the purpose of reviewing relevant environmental documents, databases, maps and legislation (Commonwealth, State and Local). The purpose of the desktop assessment was to identify ecological values that have potential to occur within the Project area and surrounding landscape, and inform the field survey.

Field survey

A field survey was conducted by two Senior Ecologists (Dr Carissa Free and Elliot Budd) over the period 7-10 November 2022. The purpose of the field survey was to:

- Determine the presence of any matters of national environmental significance (MNES) and matters of state environmental significance (MSES)
- Verify mapped vegetation communities in the Project area
- Record any observations of conservation significant flora, fauna and fauna habitat in the Project area
- Identify weed species and documentation of vegetation disturbance.

The field survey included survey points at various locations along the banks of the Thomson River and its anabranches within the Project area.

Vegetation communities

The field survey indicated that the Project area conforms to the State regional ecosystem (RE) mapping, noting that detailed floristic ground-truthing was not undertaken during the field survey. Generally, the dominant species along the edges of the river were *Eucalyptus coolabah* with *Melaleuca trichostachya*, *Lysiphyllum gilvum* and *Acacia cambagei*. This conforms with least concern RE 4.3.11b. Further away from the river the dominant species were *Eremophila bignoniiflora*, *Acacia stenophylla, Acacia cambagei* and *Atalaya hemiglauca*, conforming with REs 4.3.4 x 2e and 4.3.4 x 1. On the floodplains adjacent there were areas of RE 4.3.24a where *Chenopodium auricomum* shrubland was the dominant flora species.

No endangered or of concern REs were recorded. All vegetation within the Project area and surrounds is mapped as Category B on the regulated vegetation management map. There is no essential habitat (MSES) mapped within the Project area.

Flora and fauna

No threatened fauna species were recorded within the Project area. A total of 45 least concern fauna species were observed (of which none are exotic) within the Project area. No threatened flora species were recorded within the Project area. A total of 16 least concern native flora species were observed in the Project area.

6.4.2. Potential impacts

Table 6-3 provides a summary of the Projects potential impacts on terrestrial ecology.

Table 6-3 Potential impacts to terrestrial ecology

Nature of impact	Frequency	Duration	Potential consequence/s
Clearance of native vegetation adjacent to weirs	Construction	Permanent	• Loss of approximately 1.64 ha of native vegetation comprising least concern RE 4.3.11b • Loss of associated native fauna habitat (e.g. hollow bearing trees).
Potential loss of streamside shelter/habitat trees from increased inundation and wet feet	Operation	Long-term, until equilibrium reached	• Loss of native fauna habitat features in trees lost from increased inundation • Direct injury/mortality of fauna during tree fall/loss.
Disturbance of fauna and habitat during weir construction	Construction	Short term	• Temporary disturbance of fauna that utilise habitat surrounding construction footprint due to construction noise and other activities • Direct injury/mortality to animals during construction • Changes in surrounding environment to benefit non-native and invasive flora species (e.g. weeds).
Potential increase in bank scouring downstream	Intermittent – during weir overtopping	Permanent	• Increase in the rate of scouring downstream of the weirs during overtopping events • Increased rate of loss of fringing habitat trees and remnant vegetation into river.

Each of these potential impacts are discussed in more detail in Section 5 of the Terrestrial Ecology Assessment (Appendix E).

6.4.3. Management measures

The Terrestrial Ecology Assessment (Appendix E) recommended the management measures outlined in Table 6-4 to minimise Project impacts on terrestrial ecology.

Table 6-4 Recommended terrestrial ecology management measures

Nature of impact	Recommended management measures
Clearance of native vegetation adjacent to weirs	• Clearing works monitored by qualified fauna spotter-catcher to safely relocate any fauna and minimise the likelihood of felled trees striking fauna • Revegetation/planting of *E. coolabah* and other flora species associated with RE 4.3.11b in the construction footprint where natural recruitment does not occur in the long term.
Potential loss of streamside shelter/habitat trees from increased inundation and wet feet	• Monitoring of tree loss on the banks of the Town Storage • Control agricultural grazing to increase recruitment of *E. coolabah* and other species edging the riverbank. • Planting of *E. coolabah* and other species edging the Thomson River to where tree loss is exacerbated, and natural recruitment is not occurring • Where significant, hollow-bearing trees are lost, install artificial hollows in the surrounding unaffected vegetation patches, or; manage felled hollow trees or logs as ground hollow habitat in the adjacent vegetation patches.
Disturbance of fauna and habitat during weir construction	• Turn off heavy vehicles and mobile plant when not in use to minimise noise and vibration disturbance • Implement speed limits on access tracks within Town Common • Pre-start inspections of heavy machinery and pits/excavations for trapped animals • Undertake vehicle visual inspections and washdown as necessary to remove any weed material prior to arriving at construction site • Treatment of weeds following construction to reduce the risk of weed propagation in immediate surrounds and downstream.
Potential increase in bank scouring downstream	• Areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events • Limit public access to the banks of the Thomson River around the weirs to reduce activities (e.g. four-wheel driving) that may exacerbate riverbank destabilisation • Where scouring due to the Project is occurring and impacting fauna habitat, implement bank stability works.

6.5. Land

Section 6.5.1 provides a description of the existing environment relating to land, Section 6.5.2 describes the potential impacts of the Project on land, and Section 6.5.3 outlines the proposed management measures.

6.5.1. Background

Landforms and topography

Project construction activities will be undertaken within the banks and floodplain of the Thomson River and anabranches. The elevation of the existing weirs is approximately 178.6 mAHD. The elevation of the surrounding floodplain is generally consistent and is shown to be a height of 180 mAHD on Queensland Globe (DoR, 2023).

Geology

Mapping on Queensland Globe (DoR, 2023) indicates the weirs are all located within the “Qhab” geological unit, described as sand, gravel, silt and clay; active and abandoned stream channels and overbank deposits in braided stream systems. Geotechnical investigations will be undertaken prior to detailed design which will confirm the geology of the weir locations.

Soils

Australian soil classification mapping on Queensland Globe (DoR, 2023) indicates the weirs are all located on “Landsborough-Kendall” soil type, described as seasonally flooded alluvial plains of braided rivers and streams. Geotechnical investigations will be undertaken prior to detailed design which will confirm the soils of the weir locations.

Land class

The Project area and surrounds is mapped as agricultural land class C2, which is described as pasture land suitable for grazing native pastures, with or without the introduction of pasture, and with lower fertility soils than class C1.

Contaminated land

In consideration of the land uses surrounding the weirs (i.e. primarily undisturbed floodplain), and a desktop review of the historical aerial imagery, it is considered unlikely any contamination or historical contaminating activities are present within the Project construction footprint.

6.5.2. Potential impacts

The Project would temporarily alter the landforms and topography within the construction footprint through the clearance of 1.64 ha of vegetation, and through the creation of temporary material stockpiles as required. The construction footprint would however be returned to its natural elevation following the completion of construction.

Following completion of Project construction, the construction footprint would be allowed to rehabilitate naturally. Revegetation/planting of E. coolabah and other flora species associated with RE 4.3.11b in the construction footprint will also be undertaken where natural recruitment does not occur in the long term (Table 6-4). Accordingly, the Project will not change the existing land use of the Project area.

6.5.3. Management measures

Sections 6.2.3 and 6.4.3 describe management measures relating to sediment and erosion control and terrestrial ecology respectively, which are relevant to land.

6.6. Air

Section 6.6.1 provides a description of the existing environment relating to air, Section 6.6.2 describes the potential impacts of the Project on air quality, and Section 6.2.3 outlines the proposed management measures.

6.6.1. Background

Environmental values

The *Environmental Protection (Air) Policy 2019* (EPP Air) prescribes EVs of air which are to be protected or enhanced. These include:

a) the qualities of the air environment that are conducive to protecting the health and biodiversity of ecosystems

b) the qualities of the air environment that are conducive to human health and wellbeing

c) the qualities of the air environment that are conducive to protecting the aesthetics of the environment, including the appearance of buildings, structures, and other property

d) the qualities of the air environment that are conducive to protecting agricultural use of the environment.

Schedule 1 of the EPP (Air) outlines Air Quality Objectives (AQOs) for the protection or enhancement of these EVs.

Background air quality

Air quality in the vicinity of the weirs is characterised by a typical rural setting, with low concentrations of suspended particles and pollutants, with fluctuating levels of airborne dust depending on weather conditions and surrounding agricultural operations.

Sensitive receivers

The nearest sensitive receiver to the weirs is Apex Park, which is located approximately 2 km east of the Town Weir and Anabranch Weirs 1 and 2, and approximately 800 m east of Anabranch Weirs 3 and 4.

6.6.2. Potential impacts

Air emissions would predominantly be associated with vehicles and mobile plant during Project construction, and would include:

- Gaseous emissions (exhaust) from light and heavy vehicles, as well as mobile plant
- Dust emissions generated by vehicles and mobile plant operating within the construction footprint and along the access tracks within the Town Common.

Given the scale and duration of construction activities, it is not expected that the Project would generate significant air emissions. Further, given the distance from the nearest sensitive receiver and the isolated location of the weirs in the wider contextual rural landscape, the risk that the AQOs and EVs are exceeded, or that the surrounding air quality environment are impacted, is low.

6.6.3. Management measures

Section 9.2 of the Preliminary CEMP (Appendix J) outlines a range of recommended management measures for implementation during Project construction to minimise and manage air emissions.

It is expected that the measures outlined in the Preliminary CEMP will be used to develop a more detailed CEMP by the chosen Project construction contractor following detailed design of the Project.

6.7. Noise

Section 6.7.1 provides a description of the existing environment relating to noise, Section 6.7.2 describes the potential impacts of the Project on noise, and Section 6.7.3 outlines the proposed management measures.

6.7.1. Background

Environmental values

The *Environmental Protection (Noise) Policy 2019* (EPP Noise) details EV's which are to be protected or enhanced. These include:

a) the qualities of the acoustic environment that are conducive to protecting the health and biodiversity of ecosystems; and

b) the qualities of the acoustic environment that are conducive to human health and wellbeing, including by ensuring a suitable acoustic environment for individuals to do any of the following:

   i. sleep;

   ii. study or learn;

   iii. be involved in recreation, including relaxation and conversation; and

   iv. the qualities of the acoustic environment that are conducive to protecting the amenity of the community.

Schedule 1 of the EPP Noise, details acoustic quality objectives (NQOs) to be achieved, to protect or enhance these EVs.

Background noise levels

Noise levels in the vicinity of the weirs is characterised by a typical rural setting, with little to no noise from human activities, with the exception of intermittent noise coming from vehicles (tonal engine noise) on the Landsborough Highway during conditions that promote the propagation of sounds to the west.

Sensitive receivers

Sensitive receivers relevant to the project are described sin Section 6.6.1.

6.7.2. Potential impacts

Mobile plant (e.g. excavators) and light and heavy vehicle movements during the construction phase would be characterised by low, tonal sound. Safety alarms and loading/unloading or reversing activities may produce intermittent impulsive noise. Impulsive noises relating to the loading or unloading of materials/products during construction will be unavoidable and dependent on daily activities.

Given the scale and duration of construction activities, it is not expected that the Project would generate significant noise emissions. Further, given the distance from the nearest sensitive receiver and the isolated location of the weirs in the wider rural landscape, the risk that the NQOs and EVs are exceeded, or that the surrounding acoustic amenity are impacted, is low.

6.7.3. Management measures

Section 9.3 of the Preliminary CEMP (Appendix J) outlines a range of recommended management measures for implementation during Project construction to minimise and manage noise emissions.

It is expected that the measures outlined in the Preliminary CEMP will be used to develop a more detailed CEMP by the chosen Project construction contractor following detailed design of the Project.

6.8. Waste

Section 6.8.1 describes types of waste likely to be generated by Project construction. Section 6.8.2 provides a description of the EVs relating to waste and potential impacts and Section 6.8.3 outlines the proposed management measures.

6.8.1. Background

The DES guideline ESR/2015/1836 – Application requirements for activities with waste impacts defines waste as:

- Anything other than an end of waste resource, that is either:
  - Left over, or unwanted by-product, from an industrial, commercial, domestic or other activity; or
  - Surplus to the industrial, commercial, domestic or other activity generating the waste'.

Wastes may be in the form of a gas, liquid, solid or energy, or a combination of any of these forms. Wastes can be highly hazardous or relatively benign and something generated as a waste from one process can also be considered to be a resource of value by another process.

6.8.2. Potential impacts

Significant volumes of waste are not expected to be generated from Project construction activities (with the exception of existing weir material), and are expected to include:

- General wastes
- Recyclable materials (ferrous, aluminium and paper)
- Soft plastics (pallet wrap etc.)
- Domestic waste
- Gaseous emissions
- Green waste
- Regulated waste
- Construction waste.

General wastes are expected to be produced at low levels. A minor amount of domestic waste and recyclables are likely to be produced by construction staff through food wrappings, scraps, product containers and other consumables. Green waste will be generated through clearing vegetation within the construction footprint. Gaseous emissions from the burning of hydrocarbon fuels to power vehicles and plant are classified as waste. These gasses include compounds such as:

- Carbon dioxide ($CO2$)
- Carbon monoxide (CO)

- Nitrogen oxides (NOx)
- Hydrocarbons (HC)
- Particulate matter (PM).

Volumes of these emissions are minimal, with emissions resulting from the combustion of fuel for site plant.

Regulated wastes produced during Project construction may include spent tyres and oils and lubricants produced during machinery maintenance.

The material associated with the existing weirs comprises a mixture of earthen core, rock, concrete and bitumen, and will total approximately 3,650 m^3. This material will be transported to and disposed of at the Longreach landfill approximately 12 km south-west of the site, utilising access tracks within the Town Common.

6.8.3. Management measures

The *Waste Reduction and Recycling Act 2011* details the waste and resource management hierarchy (Figure 6-2). Management measures that are proposed should consider the hierarchy. Waste management measures to be employed by the LRC are detailed below.

Figure 6-2 Waste and resource management hierarchy

Avoid

LRC will avoid the generation of waste including gaseous waste emissions by only utilising the minimum numbers of plant and machinery required to complete the works. LRC will continue to investigate the implementation of waste avoidance measures during the detailed design phase.

Reduce

LRC will actively look to reduce the creation of gaseous waste emissions from the burning of hydrocarbon fuels. This will include:

- Ensuring all site plant is turned off when not in use
- Site plant is regularly maintained and serviced
- Procurement of new site plant will include consideration of gaseous emissions

Re-use and Recycle

Recyclable materials (paper, ferrous and aluminium) will be separated and stored in dedicated skip bins supplied by a waste transport contractor. Bins will be collected as needed by the waste transport contractor and taken to a recycling facility.

Green waste produced during clearing activities will utilised on-site during rehabilitation activities (e.g. in-site placement of logs for fauna habitat).

Disposal of Waste

General and office waste will be collected on-site using bins with appropriate lids, which will be emptied as required and transported to an approved landfill site by an approved waste transporter. Other non-regulated wastes will be collected by a waste contractor who will transport the waste to approved landfill.

Regulated waste will be appropriately contained and temporarily stored on-site in approved bins and/or storage containers. Regulated waste to be removed from site by accredited transporter to an approved disposal facility.

Construction waste including concrete, reinforcement steel, formwork off-cuts, and general industrial waste will be collected and contained in large skip-style bins. Skips will be removed and replaced on an as-needed basis, by an accredited waste transporter.

7. Transport assessment

Rytenskild Traffic Engineering (Rytenskild) has prepared a Traffic Impact Assessment for the Project, which has been provided as Appendix H. Sections 7.1 to 7.3 include the relevant findings from this report.

7.1. Background

The Project will require the transport of total volume of approximately 12,375 m^3 (or 21,038 tonnes) of material to be hauled to (construction material) and from (associated with removal of the existing weirs) the weirs. Table 7-1 provides a summary of these material quantities.

Table 7-1 Estimated material quantities summary

Material Type	Estimated quantity					Total
	Town Weir	Anabranch Weir 1	Anabranch Weir 2	Anabranch Weir 3	Anabranch Weir 4	
Existing weir embankment (earthen) (m^3)	1,215	410	245	980	800	3,650m^3
Concrete sheet pile (m^2)	225	130	115	140	150	760m^2
Embankment fill material (m^3)	2,555	675	750	2,660	2,085	8,725m^3
Concrete sill (wet) (m^3)	150	85	75	90	100	500m^3
Reinforced concrete surface protection (m^3)	280	110	110	225	205	930m^3
Dumped rock protection (D50 = 200mm) (400mm thick) (m^2)	450	260	230	280	300	1,520m^2

It is intended that material will be hauled using semi-tippers and triple road train combinations. It is anticipated that waste earthen material excavated from the existing weirs (approximately 3,650 m^3) will be transported to the Longreach landfill approximately 12 km south-west of the weirs, utilising access tracks within the Town Common. It is anticipated that construction earthen fill material (approximately 8,725 m^3) will be sourced from a quarry on Cramsie Muttaburra Road approximately 13 km north-east from the site. Notwithstanding, this assessment has conservatively assumed the material may be sourced/disposed of elsewhere, therefore all roads in the surrounding network have been considered.

Assuming that the construction phase of the Project lasts for 12 months, with a total of 312 working days and approximately 950 loaded trucks, it is estimated that the Project will generate approximately three loaded trucks per day.

Access to the Town Weir and Anabranch Weirs 1 and 2 will be via the Landsborough Highway, Apex Park Road, then via unnamed access tracks located within the Town Common. Access to Anabranch Weirs 3 and 4 will be via the Landsborough Highway, Old Winton Highway, then via unnamed access tracks located within the Town Common (Section 3.3).

7.2. Potential impacts

7.2.1. Intersections

SIDRA modelling has been carried out for the Landsborough Highway / Apex Park Road and Landsborough Highway / Old Winton highway intersections. Given that the location of material source is currently uncertain, three sensitivity models have been prepared by Rytenskild, each assuming a different traffic distribution (Appendix H).

SIDRA results indicated that there are no concerns in relation to intersection performance with the above intersections operating at a high level of service regardless of which direction traffic distributes.

7.2.2. Road link capacity

The Landsborough Highway currently carries in the order of 500 – 600 vehicles per day, and as a rural highway has capacity for over 5,000 vehicles per day. The addition of the projected Project traffic demand of three heavy vehicle movements per day will not significantly impact upon the capacity or performance of the road. This is also the case for other rural roads in the area which are currently carrying relatively low traffic volumes. Beyond the Landsborough Highway, heavy vehicle demands generated by the Project will generally not exceed five vehicle movements per day on any individual road link.

The Thomson Development Road and Cramsie – Muttaburra Road are low volume rural roads carrying less than 500 vehicles per day. It is estimated that the proposal will generate an additional demand of less than three truck movements per day on each route. This impact will have a negligible impact upon the operation of each road.

Light vehicle movements will be distributed throughout the area, depending on where workers reside, however the majority will originate from the town area and therefore use the Landsborough Highway to access the site. The overall demand of 60 light vehicle movements per day is low, and the peak period impact will be comfortably accommodated by the existing road network.

7.2.3. Mitigation (road capacity)

The key intersection of the Landsborough Highway / Apex Park Road is currently of a high standard, comprising of a passing lane for northbound traffic, and a left turn deceleration lane for traffic turning left into Apex Park Road. No mitigation works are required at this intersection.

It is noted that the Landsborough Highway / Old Winton Highway intersection does not include a dedicated turning facility for traffic to turn right into the Old Winton Highway. This is considered to be satisfactory given the temporary nature of the works and the favourable geometrical conditions at the location, with the Landsborough Highway having a straight and flat alignment. Traffic measures (signage and line marking) will need to be implemented to provide a passage through the truck parking area to the Old Winton Highway.

Other key intersections in the area such as the Landsborough Highway / Cramsie Muttaburra Road intersection and the Landsborough Highway / Duck Street / Spoonbill Street intersection are of a high standard and will comfortably accommodate Project traffic.

The surrounding road network has sufficient geometric capacity to accommodate Project traffic, without the need for mitigation works.

7.2.4. Road pavement

The Landsborough Highway pavement is generally of a high standard for a rural arterial route, and has sufficient capacity to accommodate the Project. It is considered that the impact of Project traffic upon pavement life would be well less than 5% of the base volume. For example, the highway currently carries in the order of 145 heavy vehicles per day and 53,000 heavy vehicle movements per year. The pavement design would typically be based on a higher volume, however assuming the current volume, the 20 year design volume would be in the order of 1,050,000 heavy vehicle movements.

The Project will generate a demand for approximately 1,900 heavy vehicle movements (i.e. 950 return trips to the weirs) which will distribute throughout the surrounding road network depending on the location of material sources. In broad terms, therefore, heavy vehicle traffic generated by the Project will have negligible impact on pavement life.

Pre and post conditions surveys capturing damage incurred to the running surface and shoulders, and bitumen skewing at intersections, should be carried out. Regular surveys of impacts on Apex Park Road, and at the Landsborough Highway intersection should be conducted with the Principal Contractor responsible for the repair of any damage incurred by construction vehicles.

Impacts upon the Cramsie – Muttaburra Road are expected to be low, however the suitability of some parts of the road will need to be monitored, with mitigation works (e.g. grading) carried out if required. Impacts upon pavement at the Cramsie – Muttaburra Road and Old Winton Highway intersections with the Landsborough Highway will be very low and not warrant upgrade or maintenance works.

7.2.5. Management measures

A Traffic Management Plan will need to be prepared for the Project which documents:

- Temporary traffic management measures required to facilitate the safe passage of construction vehicles along Apex Park Road, Old Winton Highway and unnamed/unsealed access tracks leading to the individual construction sites within the Town Common.
- On-site vehicle parking for workers.
- Provisions for safe pedestrian access throughout the construction site.

8. Cultural heritage assessment

8.1. Aboriginal cultural heritage

AHS has prepared an Aboriginal Cultural Heritage Inspection (CHI) report for the Project, which has been provided as Appendix F. The relevant findings are summarised below.

The *Aboriginal Cultural Heritage Act 2003* (ACHA) requires that a person must exercise due diligence and reasonable precaution before undertaking an activity which may harm Aboriginal Cultural Heritage. The ACHA Duty of Care Guidelines were gazetted in April 2004 to provide guidance on actions required to demonstrate compliance with the ACHA. Any Aboriginal cultural heritage, if found, is protected under the ACHA.

AHS undertook a field inspection of the Project area and surrounds with representative from the registered cultural heritage party, Bidjara People #7, on 24 August 2023. The inspection was designed to confirm the results of the desktop assessment and to identify any Aboriginal cultural heritage risks for the Project, through targeted and purposive techniques.

Tangible Aboriginal cultural heritage was identified during the inspection, primarily in the form of stone tools, including flakes and cores. A range of materials were observed, consisting largely of silcrete, with the addition of cherts and two basalt flakes. Raw material for the production of these artefacts is unsupported by the local geology, which consists primarily of alluvium deposits, suggesting that this raw material was likely imported in the past.

Isolated artefacts were observed along the length of the study area, however, the highest concentration of artefacts was observed towards the western extent of the area, near the weirs themselves. The scatters seen towards the western extent were in the concentration of approximately 3-4 artefacts per square metre. Two potential scar trees were observed closer to the eastern extent of the Project Area.

Monitoring of initial ground disturbance works was recommended by the Bidjara representative during the Inspection. Monitoring of ground disturbing works was suggested for activities around the weirs themselves, for the initial layers of sediment that may contain tangible (physical) cultural Heritage.

The LRC will continue to consult with Bidjara prior to and during Project construction to implement recommended mitigation measures.

8.2. Non-indigenous cultural heritage

AHS has prepared a non-indigenous CHI report for the Project, which has been provided as Appendix G. The relevant findings are summarised below.

The *Queensland Heritage Act 1992* establishes obligations to provide for the conservation of Queensland's cultural heritage for the benefit of the community and future generations. A search of the Commonwealth, National, State and local heritage databases was undertaken and did not identify any registered matters of historic heritage significance within the Project area.

A field inspection was conducted by AHS personnel using purposive pedestrian transects and visual inspection to confirm the presence of any historic cultural heritage features and archaeological material.

Four items were identified with potential historic importance, being the remnants of a previous weir, the footbridge adjacent Apex Park, a Southern Cross Windmill and a water tank footing. AHS has provided a range of recommendations in relation to these items to be considered by the LRC prior to Project construction (refer to Section 4.2 of Appendix G).

9. Socioeconomic considerations

Section 2 discusses the justification for the Project within the broader themes of liveability, economy and the environment. These sections should be read in conjunction with the following consideration of the Projects socioeconomic impacts.

It is estimated that the Project will generate a total workforce of approximately 65 workers. The LRC anticipates Project construction occurring simultaneously at three weirs at a time, with crews of between 7-10 personnel at each weir (Section 3.3). Based on this, there would be a workforce of approximately 30 personnel at any one time. It is expected the majority of this workforce will be made up by the LRC's staff and local contractors where available, therefore providing employment opportunities to Longreach and surrounding towns.

During the construction phase, the Project is unlikely to have a significant impact on the community as the construction phase is temporary and the proposed workforce is relatively small and within the background population fluctuations in Longreach (Section 2.1.2).

The operational phase of the Project (Section 3.4) would not have any material impact upon the demographic profile of local and regional populations, with any required maintenance activities expected to be undertaken by the LRC and its contractors.

Economically, Project construction costs (e.g. through payment for material and labour to local businesses, contractors and personnel) would represent a relatively significant opportunity for local employment and associated flow-on effect in the community. Beyond construction, the Project will support LRC's economic development priorities, facilitating diversity of industry, innovation and skills development. A key strategy in achieving this outcome is to address water supply and security issues (LRC, 2017) (Section 2.1.2).

If the Project were not to go ahead, there would be potential economic implications for the LRC associated with:

- Purchasing of water to meet municipal needs during times of severe drought
- Potential loss of business and agricultural productivity due to the impacts of severe water restrictions
- Cost of replacing damaged weirs during flood events (refer to Section 3.1) due to the unknown structural integrity of the existing weirs.

Overall, it is considered the Project would have an overall positive impact on the socio–economic profile of the Longreach community, both during the construction phase, and due to the benefits brought about by the additional water storage provided.

The LRC will continue to consult with the Longreach community prior to and during Project construction and implement socioeconomic management measures as required (Section 10).

10. Consultation

10.1. Preliminary consultation

The LRC has undertaken various preliminary stakeholder engagement activities for the Project to date. Table 10-1 below summarises the nature of this engagement and key outcomes.

Table 10-1 Summary of preliminary consultation

Stakeholder	Engagement undertaken	Key outcomes
Government		
Department of State Development, Infrastructure, Local Government and Planning (DSDILGP)	• Pre-lodgement meetings on 2 November 2022, 14 December 2022 and 23 January 2023 • Ad-hoc calls and email liaison with assessment officers throughout 2023.	• Key assessment issues and information requirements for MID application identified • Scope of information requirements identified in initial advice, refined with assessment officers.
Department of Environment and Science (DES)	• Pre-lodgement meeting on 23 January 2023.	• Key DES assessment issues and information requirements for MID application identified.
Department of Regional Development, Manufacturing and Water (DRDMW)		• Key DRDMW assessment issues and information requirements for MID application identified • Requirement for separate water licence amendment application/s to be lodged with DRDMW confirmed.
Local Members	• Meetings/newsletter(s) • Information on Council website.	• General support shown for the Project
State Members		
Federal Members		
Longreach Community		
Affected landholders	• Letter box drop in July 2023 • Council newsletters, information on Council's website and included in Mayor's newspaper column.	• No comments or feedback was received from affected landholders in response to the letterbox drop.
Wider community	• Council newsletters, information on Council's website and included in Mayor's newspaper column.	• No comments or feedback was received from wider community, however general support has been provided.
Downstream Communities		
Barcoo Shire Council (BSC)	• Emails and meetings in August and September 2023 • Briefing note provided in August 2023.	• BSC raised issues with the potential for downstream water availability impacts

Stakeholder	Engagement undertaken	Key outcomes
		• The LRC subsequently prepared a briefing note outlining the expected downstream impacts of the Project on the BSC's water supply. BSC has since acknowledged the information in this briefing note, and passed a resolution of Council at their September meeting endorsing the Project.
Indigenous groups/Native Title Party		
Bidjara #6 and #7	• Field survey of Project area in August 2023.	• A number of Aboriginal cultural heritage sites recorded around the Town Storage and Project weirs. • Management measures to mitigate potential impacts on these recorded sites, as well as any unrecorded sites, are being developed in consultation with Bidjara.
Special Interest Groups		
Lake Eyre Basin Advisory Committee (LEBAC)	• Meeting in July 2022.	• LRC representative informed the LEBAC of intention to raise the weirs for water supply security. Committee members understood the need for increasing our water security.
Regional Area Planning and Development Board	• General discussions at board level.	• No opposition to Project expressed by board members.

10.2. Post-lodgement consultation

The following post-lodgement consultation will be undertaken by the LRC in accordance with requirements prescribed in Schedule 4, section 7 of the MGR, and the Project will be publicly notified for a minimum of 20 business days:

1. Publish notices in local newspaper/s (online or in print, as available) stating the relevant details including:
    a. the proposal
    b. a description of the land to which the proposal applies
    c. how the proposal can be viewed or accessed
    d. how to make a submission about the proposal
    e. the day by when submissions may be made to the Minister
2. Placing a sign at an opportune location along the Town Common access roads leading to the weirs
3. Sending a notice to key stakeholders identified in the Stakeholder Consultation Strategy (Appendix K).

11. References

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Appendix A Water Supply Security Assessment

Appendix B Preliminary Concept Cross Sections

Appendix C Flood Impact Assessment

Appendix D Aquatic Ecology Assessment

Appendix E Terrestrial Ecology Assessment

Appendix F Aboriginal Cultural Heritage Assessment

Appendix G Non-indigenous Cultural Heritage Assessment

Appendix H Traffic Impact Assessment

Appendix I Preliminary Bushfire Hazard Assessment

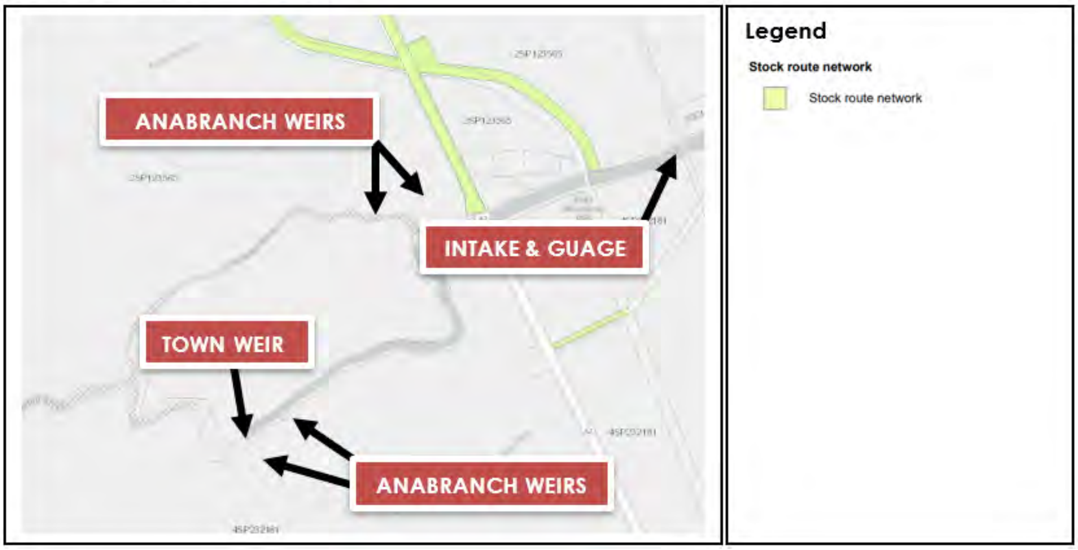
Appendix J Preliminary Construction Environmental Management Plan

Appendix K Stakeholder Consultation Plan

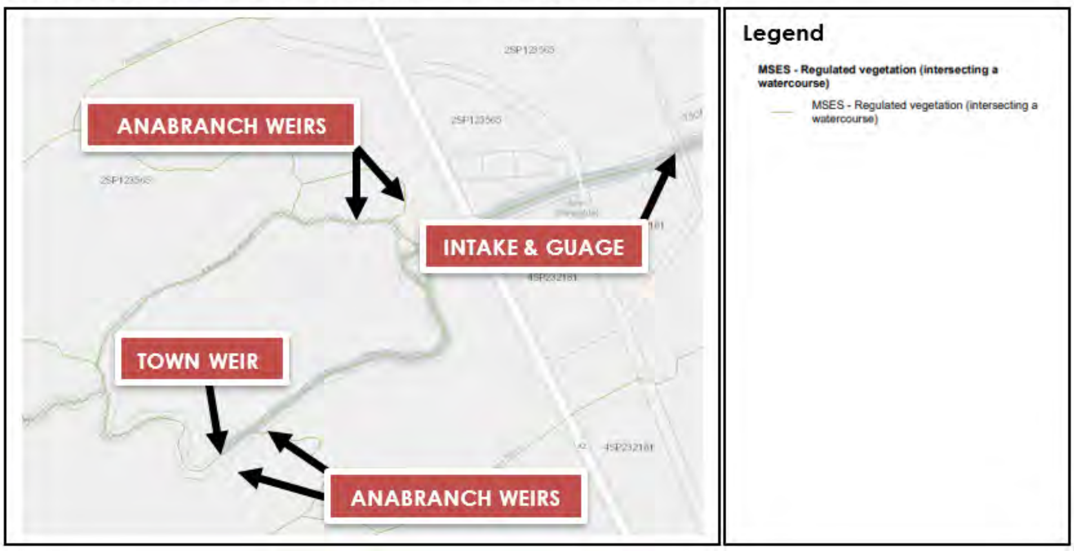
Appendix L Relevant legislative mapping

State Planning Policy Mapping

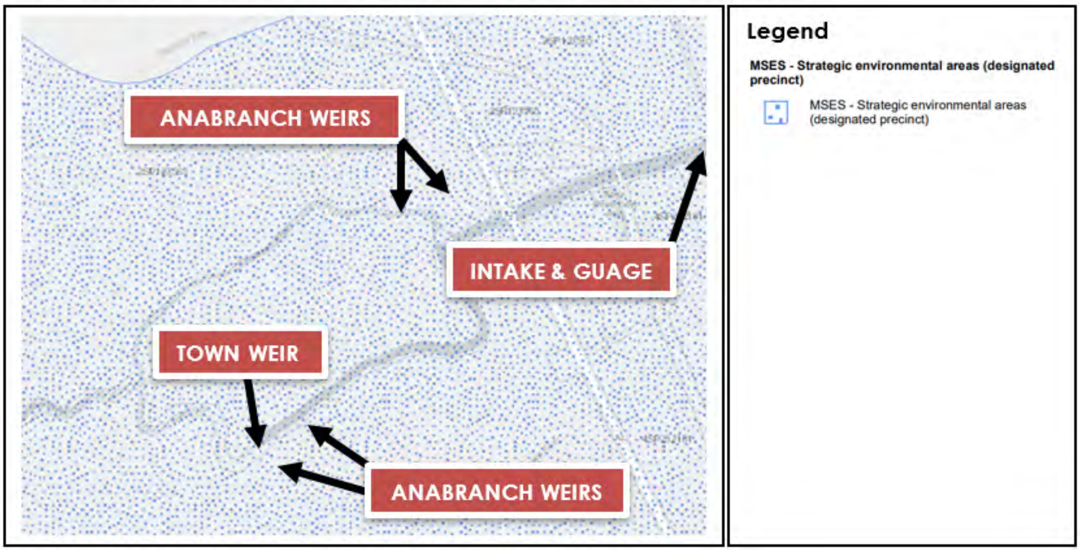
ECONOMIC GROWTH - AGRICULTURE



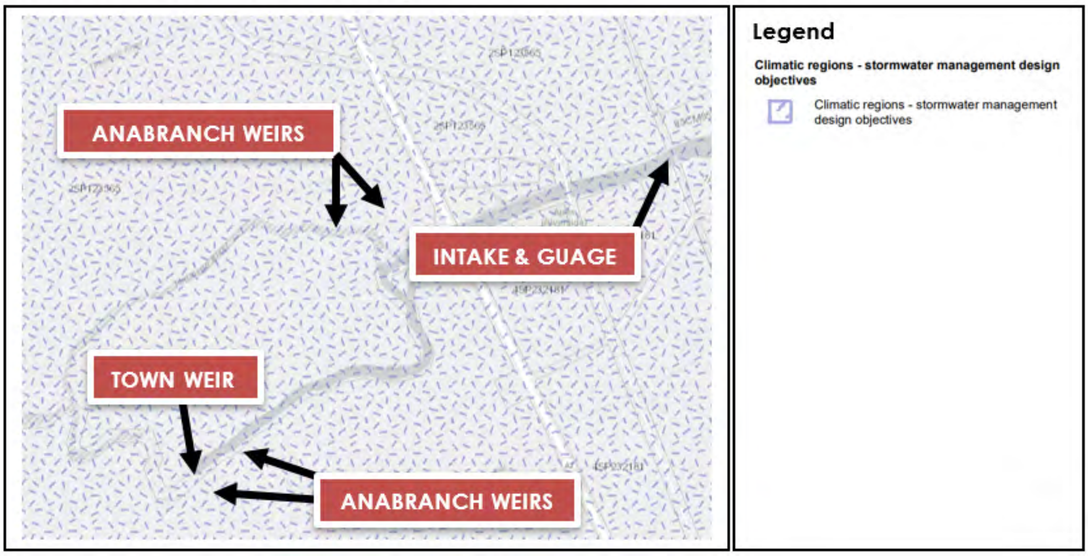
ENVIRONMENT AND HERITAGE – BIODIVERSITY – REGULATED VEGETATION



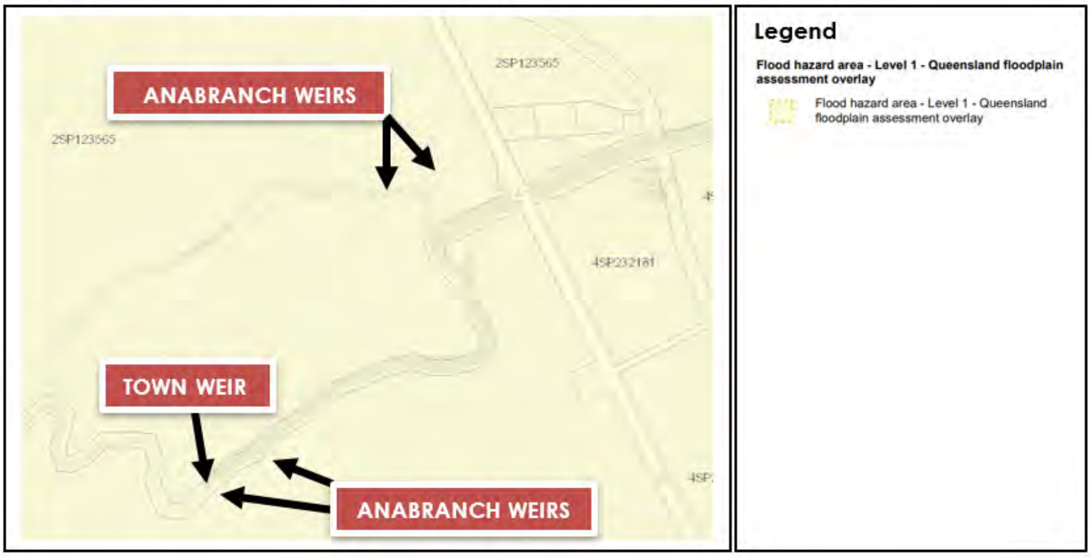
ENVIRONMENT AND HERITAGE – BIODIVERSITY – STRATEGIC ENVIRONMENTAL AREAS



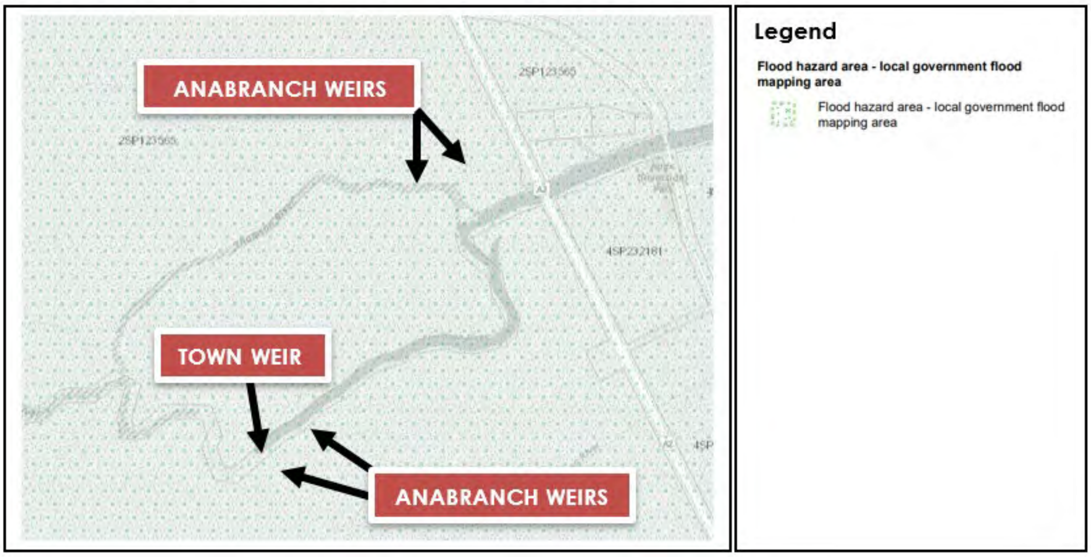
ENVIRONMENT AND HERITAGE – WATER QUALITY



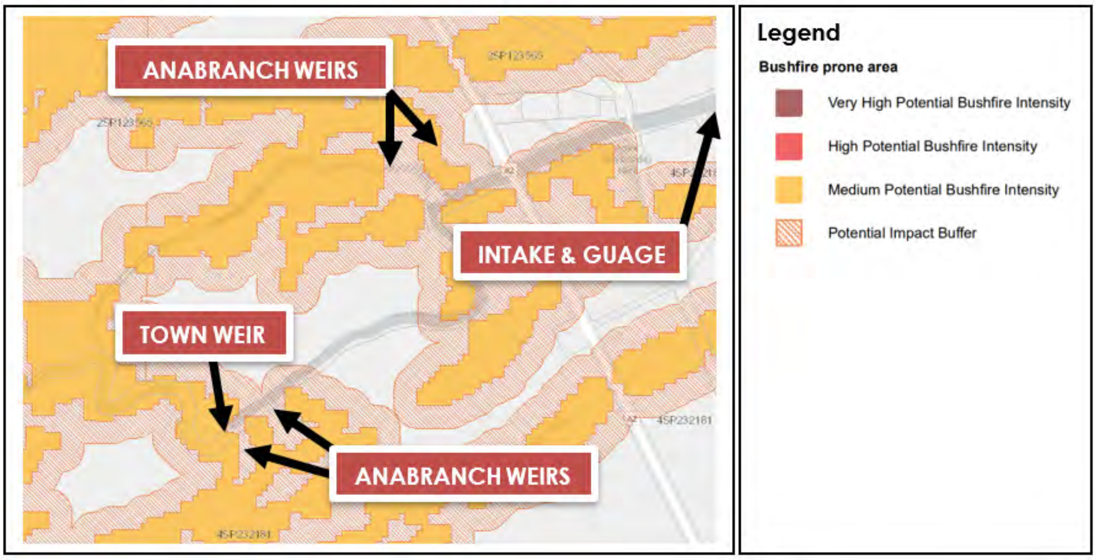
SAFETY & RESILIENCE TO HAZARDS – QUEENSLAND FLOOD HAZARD AREA



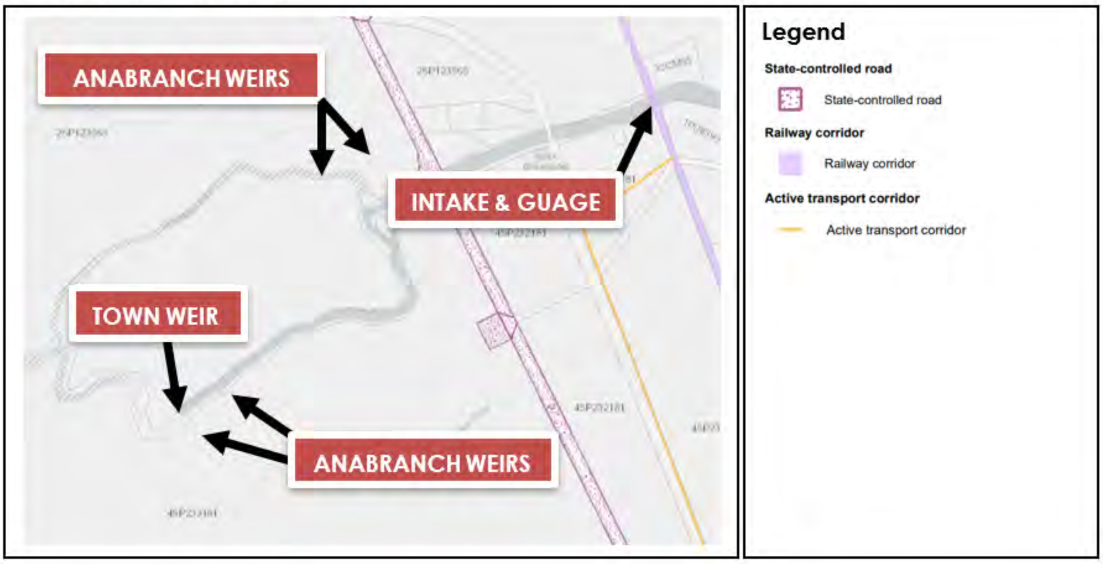
SAFETY & RESILIENCE TO HAZARDS – LOCAL GOVERNMENT FLOOD HAZARD AREA



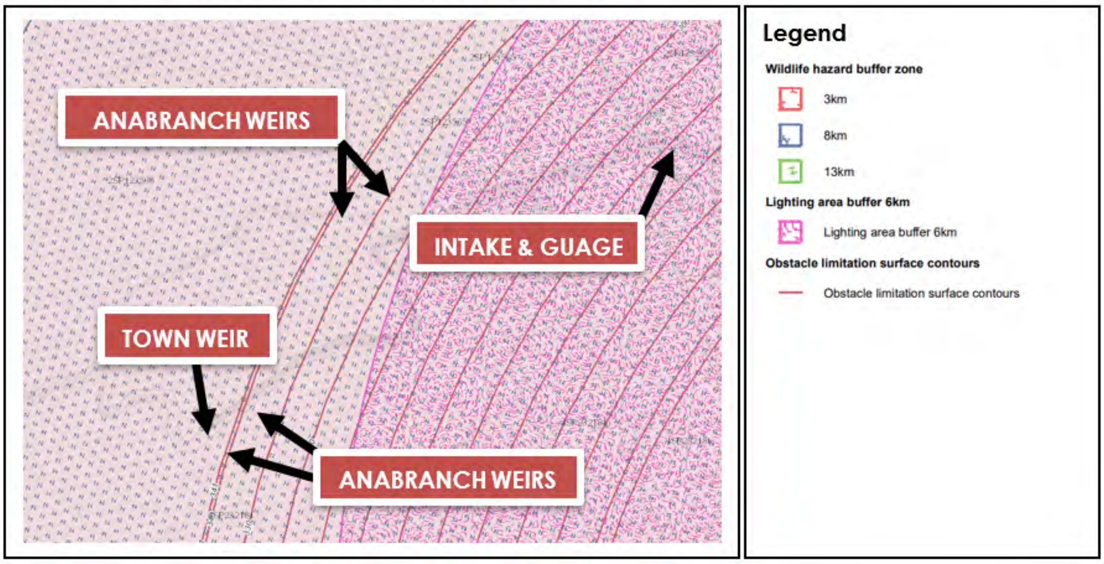
SAFETY & RESILIENCE TO HAZARDS – BUSHFIRE PRONE AREA



INFRASTRUCTURE - TRANSPORT

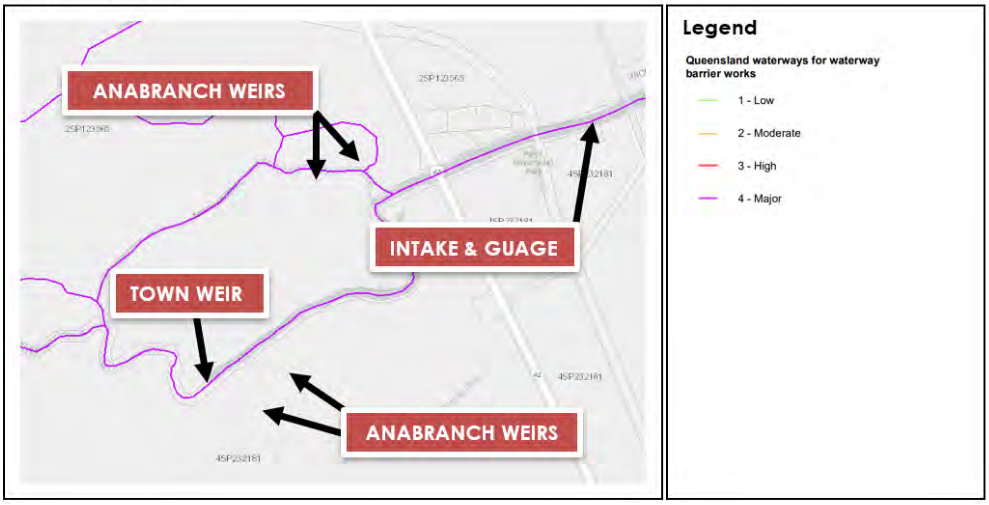


INFRASTRUCTURE – STRATEGIC AIRPORTS AND AVAIATION FACILITIES

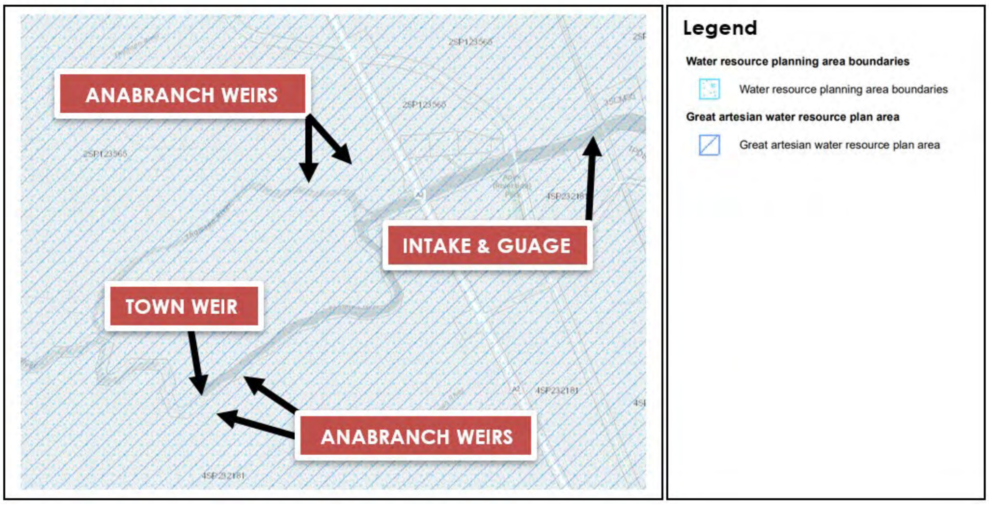


Development Assessment Mapping System Mapping

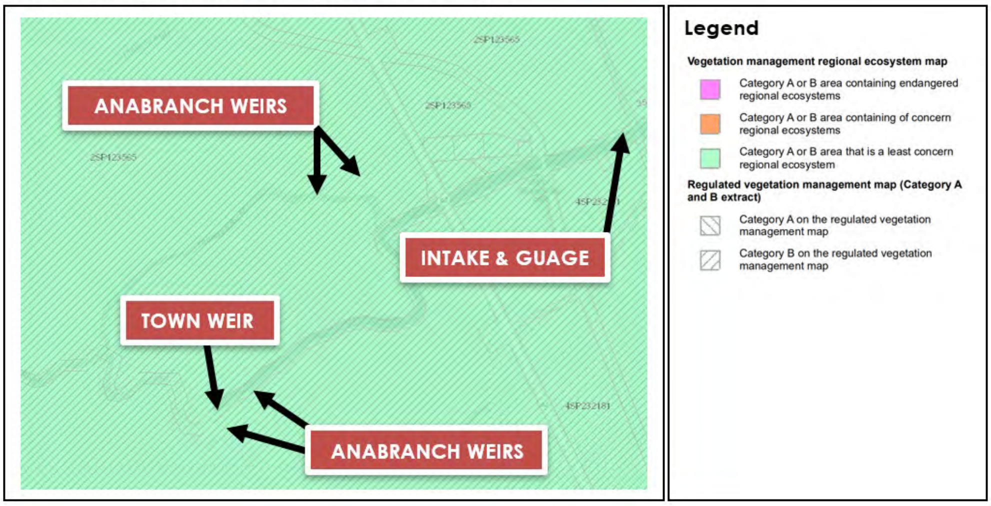
FISH HABITAT AREAS



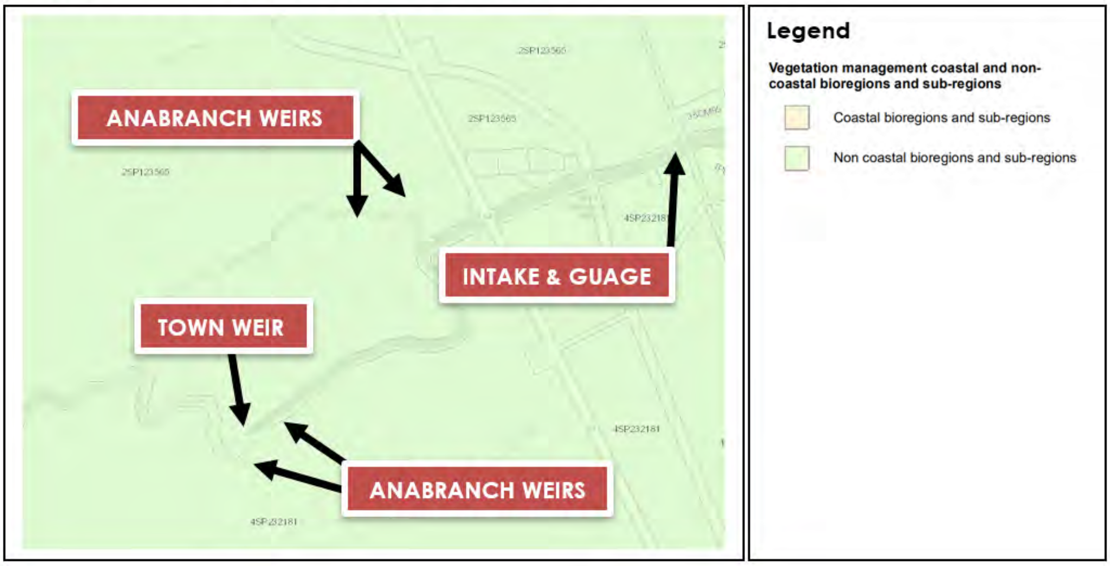
WATER RESOURCES



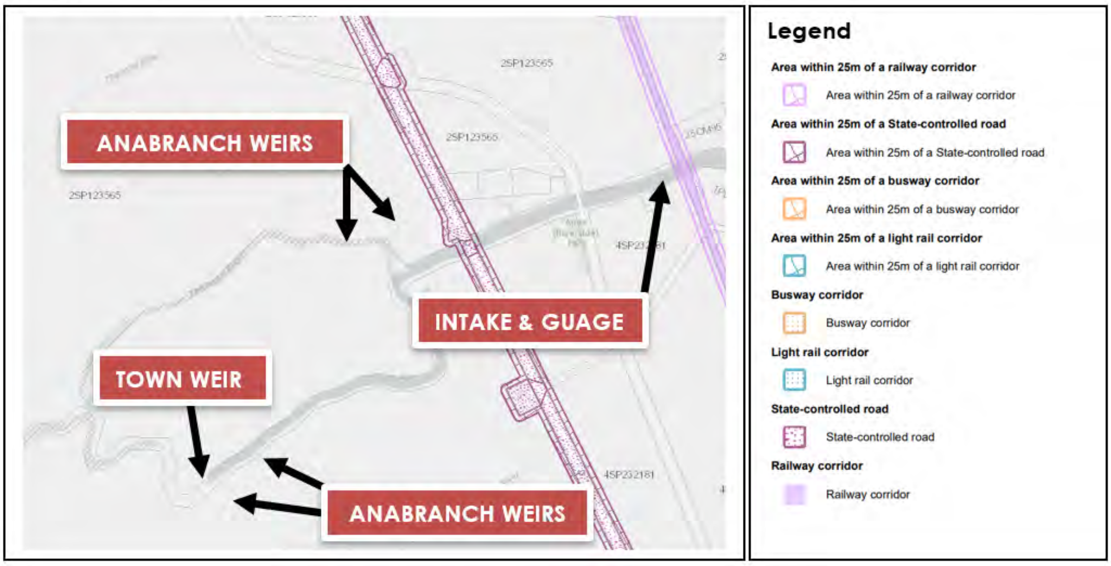
NATIVE VEGETATION CLEARING – REGULATED VEGETATION



NATIVE VEGETATION CLEARING – VEGETATION BIO-REGIONS

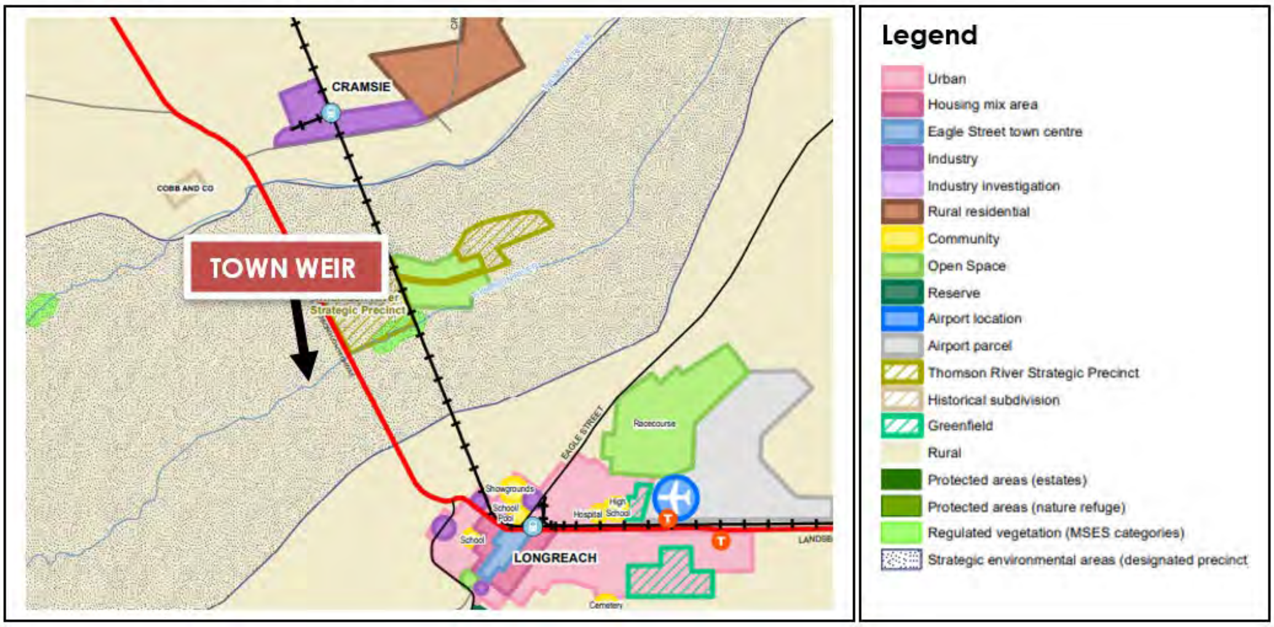


STATE TRANSPORT

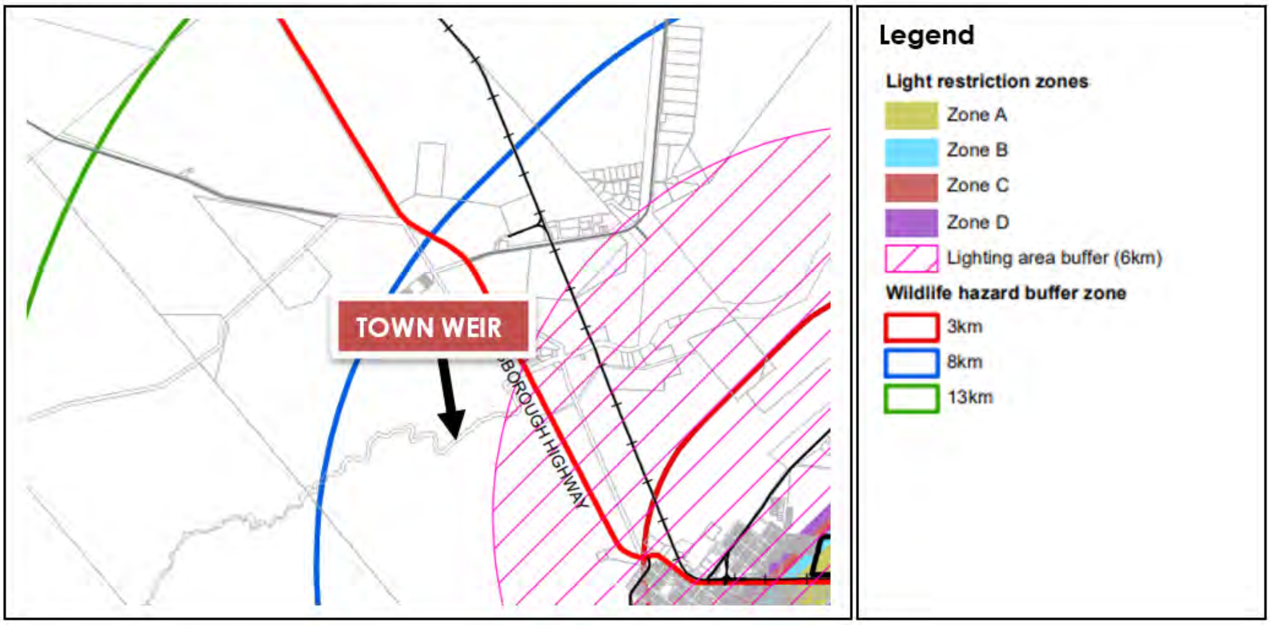


Planning Scheme mapping

STRATEGIC FRAMEWORK MAPPING

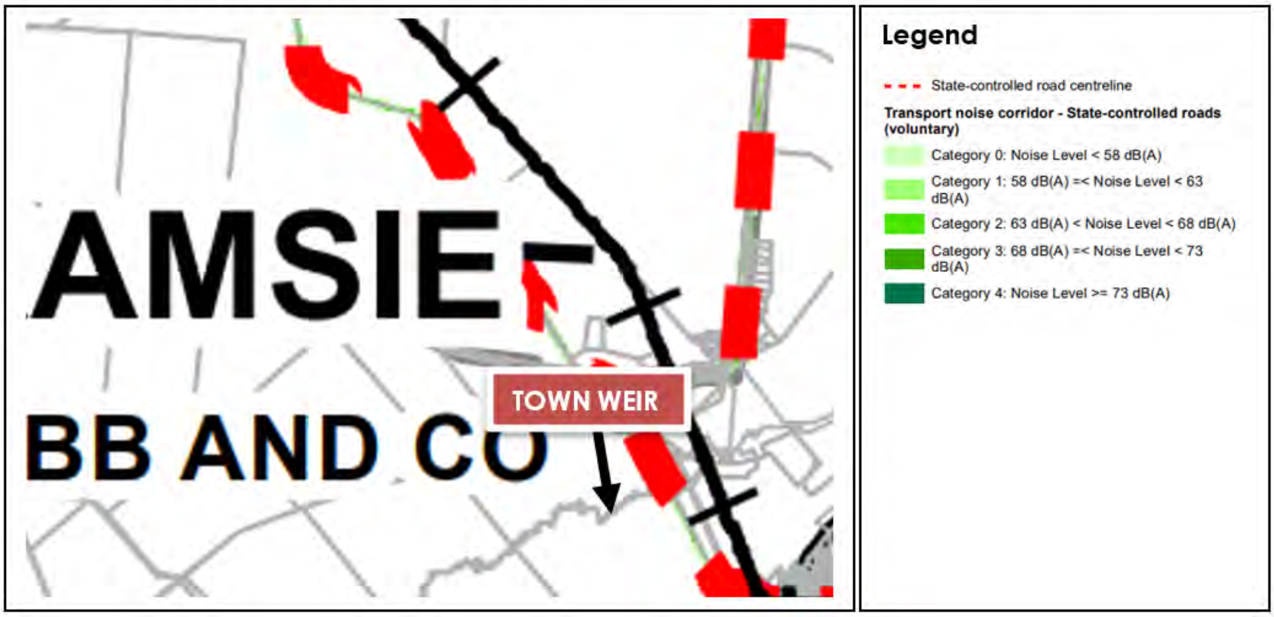


AIRPORT ENVIRONS OVERLAY MAPPING



FLOOD OVERLAY MAPPING

TRANSPORT NOISE CORRIDORS OVERLAY MAPPING



Appendix M State Code responses

The following State Codes under the *State Development Assessment Provisions* (SDAP) (version 3.0) are relevant to the Project:

- State code 1: Development in a state-controlled road environment
- State code 2: Development in a railway environment
- State code 6: Protection of state transport networks
- State code 10: Taking or interfering with water
- State code 16: Native vegetation clearance
- State code 18: Constructing or raising waterway barrier works in fish habitats.

Responses to the relevant State codes have been provided in Tables J-1 to J-5. The relevance of State Code 16 is discussed further below.

Table J-1 Response to State code 1: Development in a state-controlled road environment

Table 1.1 Development in general

Performance outcomes	Acceptable outcomes	Response
Buildings, structures, infrastructure, services and utilities		
PO1 The location of the development does not create a safety hazard for users of the **state-controlled road.**	**AO1.1** Development is not located in a **state-controlled road**. AND **AO1.2** Development can be maintained without requiring access to a **state-controlled road**.	**The Project is compliant with PO1, AO1.1 and AO1.2.** The Project is not located in state-controlled road, and the weirs can be maintained without access to a state-controlled road.
PO2 The design and construction of the development does not adversely impact the **structural integrity** or physical condition of the **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO2.** The design and construction of the Project would not adversely impact the structural integrity or physical condition of a state-controlled road.
PO3 The location of the development does not obstruct **road transport infrastructure** or adversely impact the operating performance of the **state-controlled road**.	No acceptable outcome is prescribed.	**The Project is compliant with PO3.** The Project is not located in or close to a state-controlled road, and would not adversely impact operating performance.
PO4 The location, placement, design and operation of advertising devices, visible from the **state-controlled road**, do not create a safety hazard for users of the **state-controlled road**.	No acceptable outcome is prescribed.	**Not applicable –** the Project does not include any advertising devices.
PO5 The design and construction of buildings and **structures** does not create a safety hazard by distracting users of the **state-controlled road**.	**AO5.1** Facades of buildings and **structures** fronting the **state-controlled road** are made of non-reflective materials. AND **AO5.2** Facades of buildings and **structures** do not direct or reflect point light sources into the face of oncoming traffic on the **state-controlled road**.	**The Project is compliant with PO5, AO5.1 and AO5.2.** The Project would be constructed from non-reflective materials (e.g. concrete, rock), and therefore would not reflect point light sources. The Project would not include any lighting components.

Performance outcomes	Acceptable outcomes	Response
	AND **AO5.3** External lighting of buildings and **structures** is not directed into the face of oncoming traffic on the **state-controlled road**. AND **AO5.4** External lighting of buildings and **structures** does not involve flashing or laser lights.	
PO6 Road, pedestrian and bikeway bridges over a **state-controlled road** are designed and constructed to prevent projectiles from being thrown onto the **state-controlled road**.	**AO6.1** Road, pedestrian and bikeway bridges over the **state-controlled road** include throw protection screens in accordance with section 4.11 of the Design Criteria for Bridges and Other Structures Manual, Department of Transport and Main Roads, 2020.	**Not applicable –** the Project would not include bridges.
Landscaping		
PO7 The location of landscaping does not create a safety hazard for users of the **state-controlled road**.	**AO7.1** Landscaping is not located in a **state-controlled road**. AND **AO7.2** Landscaping can be maintained without requiring access to a **state-controlled road**. AND **AO7.3** Landscaping does not block or obscure the sight lines for vehicular access to a **state-controlled road**.	**Not applicable -** the Project would not include any landscaping features.

Performance outcomes	Acceptable outcomes	Response
Stormwater and overland flow		
PO8 Stormwater run-off or overland flow from the development site does not create or exacerbate a safety hazard for users of the **state-controlled road**.	No acceptable outcome is prescribed.	**The Project is compliant with PO8.** Project construction activities will occur downstream of the Landsborough Highway, and therefore would not create stormwater run-off or overland flow that would exacerbate a safety hazard for users of the state-controlled road.
PO9 Stormwater run-off or overland flow from the development site does not result in a material worsening of the operating performance of the **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO9.** Project construction activities will occur downstream of the Landsborough Highway, and therefore would not create stormwater run-off or overland flow that would worsen the operating performance of a state-controlled road.
PO10 Stormwater run-off or overland flow from the development site does not adversely impact the **structural integrity** or physical condition of the **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with P10.** Project construction activities will occur downstream of the Landsborough Highway, and therefore would not create stormwater run-off or overland flow that would adversely impact the structural integrity or physical condition of the state-controlled road or road transport infrastructure.
PO11 Development ensures that stormwater is lawfully discharged.	**AO11.1** Development does not create any new points of discharge to a **state-controlled road.** AND **AO11.2** Development does not concentrate flows to a **state-controlled road**. AND **AO11.3** Stormwater run-off is discharged to a **lawful point of discharge**. AND	**The Project is compliant with PO11 and AO1.1 to AO1.4.** Project construction activities will occur downstream of the Landsborough Highway, and therefore would not create stormwater run-off to a state-controlled road. Further, Project construction activities will be undertaken in accordance with a detail Construction Environmental Management Plan (CEMP) which will detail stormwater, erosion and sediment control measures.

Performance outcomes	Acceptable outcomes	Response
	AO11.4 Development does not worsen the condition of an existing **lawful point of discharge** to the **state-controlled road**.	
Flooding		
PO12 Development does not result in a material worsening of flooding impacts within a **state-controlled road**.	**AO12.1** For all flood events up to 1% **annual exceedance probability**, development results in negligible impacts (within +/- 10mm) to existing flood levels within a **state-controlled road**. AND **AO12.2** For all flood events up to 1% **annual exceedance probability**, development results in negligible impacts (up to a 10% increase) to existing peak velocities within a **state-controlled road**. AND **AO12.3** For all flood events up to 1% **annual exceedance probability**, development results in negligible impacts (up to a 10% increase) to existing time of submergence of a **state-controlled road**.	**The Project is considered to comply with PO12, AO12.1-AO12.3.** Water Technology's flood assessment found that (Appendix C): • The Project does not result in adverse velocity increases upstream to the Landsborough Highway corridor. • The Project does not result in adverse water level increases upstream to the Landsborough Highway corridor. Water level increases up to 11 mm are predicted in the 39% AEP that extend up to the Landsborough Highway, however, the road level is approximately 2.5 m above the flood level in this event and the increases are therefore inconsequential. • The extent of flooding in the Thomson River in all designed events is extensive however, flooding in the 39% AEP (frequent event) is generally contained to the braided river channels.
Drainage Infrastructure		
PO13 Drainage infrastructure does not create a safety hazard for users in the **state-controlled road**.	**AO13.1** Drainage infrastructure is wholly contained within the development site, except at the **lawful point of discharge**. AND	**Not applicable –** the Project would not incorporate any drainage infrastructure.

Performance outcomes	Acceptable outcomes	Response
	AO13.2 Drainage infrastructure can be maintained without requiring access to a **state-controlled road**.	
PO14 Drainage infrastructure associated with, or within, a **state-controlled road** is constructed, and designed to ensure the **structural integrity** and physical condition of existing drainage infrastructure and the surrounding drainage network.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not incorporate any drainage infrastructure.

Table 1.2 Vehicular access, road layout and local roads

Performance outcomes	Acceptable outcomes	Response
Vehicular access to a state-controlled road or within 100 metres of a state-controlled road intersection		
PO15 The location, design and operation of a **new or changed access** to a **state-controlled road** does not compromise the safety of users of the **state-controlled road**.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a state-controlled road.
PO16 The location, design and operation of a **new or changed access** does not adversely impact the **functional requirements** of the **state-controlled road**.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a state-controlled road.
PO17 The location, design and operation of a **new or changed access** is consistent with the **future intent** of the **state-controlled road**.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a state-controlled road.
PO18 New or changed access is consistent with the access for the relevant **limited access road policy**: 1. **LAR 1** where direct access is prohibited; or 2. **LAR 2** where access may be permitted, subject to assessment.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a state-controlled road.
PO19 New or changed access to a **local road** within 100 metres of an intersection with a **state-controlled road** does not compromise the safety of users of the **state-controlled road**.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a local road.

Performance outcomes	Acceptable outcomes	Response
PO20 New or changed access to a **local road** within 100 metres of an intersection with a **state-controlled road** does not adversely impact on the operating performance of the intersection.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include a new or changed access to a local road.
Public passenger transport and active transport		
PO21 Development does not compromise the safety of users of **public passenger transport infrastructure**, **public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
PO22 Development maintains the ability for people to access **public passenger transport infrastructure, public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
PO23 Development does not adversely impact the operating performance of **public passenger transport infrastructure, public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
PO24 Development does not adversely impact the **structural integrity** or physical condition of **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.

Table 1.3 Network impacts

Performance outcomes	Acceptable outcomes	Response
PO25 Development does not compromise the safety of users of the **state-controlled road** network.	No acceptable outcome is prescribed.	**The Project complies with PO25.** The Project will generate a relatively small volume of traffic relative to background levels on the state-controlled road network and will not compromise the safety of users.
PO26 Development ensures **no net worsening** of the operating performance of the **state-controlled road** network.	No acceptable outcome is prescribed.	**The Project complies with PO26.** The Project will generate traffic for a short period and not significantly impact upon the operation of the state controlled road network.

Performance outcomes	Acceptable outcomes	Response
PO27 Traffic movements are not directed onto a **state-controlled road** where they can be accommodated on the **local road** network.	No acceptable outcome is prescribed.	**The Project complies with PO27.** Project traffic will only utilise the state-controlled where unavoidable (e.g. the Landsborough Highway and Cramsie Muttaburra Road).
PO28 Development involving haulage exceeding 10,000 tonnes per year does not adversely impact the pavement of a **state-controlled road**.	No acceptable outcome is prescribed.	**The Project complies with PO28.** As described in the Traffic Impact Assessment (Appendix H), the Project is expected to have negligible impact on the pavement of the state-controlled road network.
PO29 Development does not impede delivery of **planned upgrades** of **state-controlled roads**.	No acceptable outcome is prescribed	**The Project complies with PO29.** There are no known planned upgrades on the state-controlled road network located in the vicinity of the Project.
PO30 Development does not impede delivery of **corridor improvements** located entirely within the **state-controlled road corridor**.	No acceptable outcome is prescribed.	**The Project complies with PO30.** There are no known planned upgrades on the state-controlled road network located in the vicinity of the Project.

Table J-2 Response to State code 2: Development in a railway environment

Table 2.1 Development in general

Performance outcomes	Acceptable outcomes	Response
Building, structures, infrastructure, services and utilities		
PO1 Development does not create a safety hazard within the **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO1.** The Project is located approximately 1.3 km downstream of the Central Western System corridor, and therefore would not create a safety hazard within the corridor.
PO2 Development does not cause damage to the **railway corridor, rail transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO2.** The Project is located approximately 1.3 km downstream of the Central Western System corridor, and therefore would not cause any damage to the corridor. The additional inundation of the railway crossing piles when the Town Storage is at full capacity is considered a minor increase and within the seasonal fluctuations of water levels due to flooding in the Thomson River.
PO3 Development does not interfere with, or obstruct, the **rail transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO3.** The Project is located approximately 1.3 km downstream of the Central Western System corridor, and therefore would not interfere with, or obstruct, the rail transport infrastructure.
PO4 Development does not adversely impact the **structural integrity** or physical condition of the **railway**, **other rail infrastructure** or the **railway corridor** by adding or removing **loading**.	No acceptable outcome is prescribed.	**The Project is compliant with PO4.** The Project would not add or remove loading to the Central West System.
PO5 Development above a **railway** is designed to enable natural ventilation and smoke dispersion in the event of a fire emergency.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include any development above a railway.
PO6 Development does not adversely impact the operating performance of the **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO6.** The Project would not require the use of trains at any phase, and therefore would not impact the operating performance of the railway corridor.

Performance outcomes	Acceptable outcomes	Response
PO7 Buildings and **structures** in a **railway corridor** are designed and constructed to protect persons in the event of a derailed train.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include any buildings or structures within 10 m of the rail corridor.
PO8 Buildings and **structures** in **high risk locations** and where also located within 10 metres of the centreline of the nearest **railway** track are design and constructed to protect persons in the event of a derailed train.	**AO8.1** Buildings and **structures**, in a **railway corridor**, including foundations, retaining and other support elements, are designed and constructed in accordance with Civil Engineering Technical Requirement CIVIL-SR-012 Collision protection of supporting elements adjacent to **railways**, Queensland Rail, 2011, AS5100 Bridge design, and AS1170 Structural design actions.	**Not applicable –** the Project would not include any buildings or structures within 10 m of the rail corridor.
PO9 Buildings and **structures** are designed and constructed to protect people from electrocution.	**AO9.1** The outermost projection of development is set back horizontally a minimum of 3 metres from the outermost projection of **overhead line equipment**.	**Not applicable –** the Project would not include any buildings or structures within 10 m of the rail corridor.
PO10 Development in the **railway corridor** is designed and constructed to prevent projectiles being thrown onto the **railway**.	No acceptable outcome is prescribed.	**Not applicable –** the Project would not include any buildings or structures within 10 m of the rail corridor.
PO11 Buildings, and **structures** with publicly accessible or communal areas within 20 metres from the centreline of the nearest **railway** track are designed and constructed to prevent projectiles from being thrown onto a **railway**.	**AO11.1** Publicly accessible areas located within 20 metre from the centreline of the nearest **railway** do not overlook a **railway**. OR **AO11.2** Buildings and **structures** are designed to ensure publicly accessible areas located within 20 metres from the centreline of the nearest **railway** track and that overlook the **railway** may include throw protection screens in accordance with the relevant provisions of the Civil Engineering Technical Requirement – CIVIL-SR005 Design of buildings over or near **railways**, Queensland Rail, 2011, and the Civil	**Not applicable –** the Project would not include any buildings or structures within 20 m of the rail corridor.

Performance outcomes	Acceptable outcomes	Response
	Engineering Technical Requirement – CIVIL-SR008 Protection screens, Queensland Rail.	
Stormwater and overland flow		
PO12 Stormwater run-off or overland flow from the development site does not create or exacerbate a safety hazard in a **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO12.** Project construction activities will occur downstream of the railway corridor and therefore would not create stormwater run-off or overland flow that would exacerbate a safety hazard in a railway corridor.
PO13 Stormwater run-off or overland flow from the development site does not result in a material worsening of operating performance of the **railway corridor**, **rail transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO13.** Project construction activities will occur downstream of the railway corridor and therefore would not create stormwater run-off or overland flow that would result in a material worsening of operating performance of the railway corridor, rail transport infrastructure or other rail infrastructure.
PO14 Stormwater run-off or overland flow from the development site does not interfere with the **structural integrity** or physical condition of the **railway corridor, rail transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO14.** Project construction activities will occur downstream of the railway corridor and therefore would not interfere with the structural integrity or physical condition of the railway corridor, rail transport infrastructure or other rail infrastructure.
Flooding		
PO15 Development does not result in a material worsening of flooding impacts within a **railway corridor**.	No acceptable outcome is prescribed.	**The Project is considered to comply with PO15.** Given the Central Western System is located upstream of the Landsborough Highway, it is considered Water Technology's flood assessment findings in relation to the highway (Appendix C) are relevant for the rail corridor: • The Project does not result in adverse velocity increases upstream to the Landsborough Highway corridor. • The Project does not result in adverse water level increases upstream to the Landsborough Highway corridor. Water level increases up to 11 mm are predicted in the 39% AEP that extend up to the Landsborough Highway, however, the road level is approximately 2.5 m above the flood level in this event and the increases are therefore inconsequential.

Performance outcomes	Acceptable outcomes	Response
		• The extent of flooding in the Thomson River in all designed events is extensive however, flooding in the 39% AEP (frequent event) is generally contained to the braided river channels.
Drainage Infrastructure		
PO16 Drainage infrastructure does not create a safety hazard in a **railway corridor**.	**AO16.1** Drainage infrastructure is wholly contained within the development site. AND **AO16.2** Drainage infrastructure can be maintained without requiring access to a **railway corridor**.	**Not applicable –** the Project would not incorporate any drainage infrastructure.
Construction Impacts		
PO17 Construction activities do not cause ground movement or vibration impacts in a **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO17.** Project construction activities will occur approximately 1.3 km from the Central Western System at its closest point. Given this distance and the nature of construction activities (primarily earthworks), no vibration impacts are expected to occur at the rail corridor.
Access		
PO18 Development prevents unauthorised access to the **railway corridor**.	**AO18.1** Development abutting the **railway corridor** incorporates fencing along the property boundary with the **railway corridor** in accordance with the **railway manager's** standards. AND **AO18.2** A road barrier designed in accordance with Queensland Rail Civil Engineering Technical Requirement CIVIL-SR-007 – Design Criteria for Road Rail Barriers.	**Not applicable** – the Project would not abut the rail corridor.

Performance outcomes	Acceptable outcomes	Response
	AND **AO18.3** Vehicle manoeuvring areas, driveways, **loading** areas and carparks abutting the **railway corridor** incorporate **rail interface barriers** along the boundary to the **railway corridor**.	
PO19 Development maintains existing maintenance and authorised access to the **railway corridor**.	**AO19.1** Development does not obstruct existing authorised access points and access routes for maintenance and emergency works to the **railway corridor** at all times.	**The Project is compliant with PO19 and AO19.1.** The Project is located approximately 1.3 km from the Central Western System at its closest point, and therefore would not obstruct existing authorised access points and access routes.
PO20 Development does not impede the maintenance of a **railway bridge** or authorised access to a **railway bridge**.	**AO20.1** Buildings and other **structures** are set back horizontally a minimum of 3 metres from a **railway bridge**. AND **AO20.2** Permanent **structures** are not located below or abutting a **railway bridge**. AND **AO20.3** Temporary activities below or abutting a **railway bridge** do not impede access to a **railway corridor**.	**The Project is compliant with PO20 and AO20.1 to AO20.3.** The Project would not include any buildings or structures within 3 m of a railway bridge, or permanent structures or temporary activities below or abutting a railway bridge.
Public passenger transport and active transport		
PO21 Development does not compromise the safety of **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
PO22 Development maintains pedestrian and cycle access to a **railway** station or other **public passenger transport**	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.

Performance outcomes	Acceptable outcomes	Response
infrastructure and **active transport infrastructure** associated with the **railway**.		
PO23 Development does not adversely impact the **structural integrity** or physical condition of **public passenger transport infrastructure** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
PO24 Development does not adversely impact the operating performance of **public passenger transport infrastructure, public passenger services** and **active transport infrastructure**.	No acceptable outcome is prescribed.	**Not applicable –** there are no public passenger transport and active transport infrastructure in the vicinity of the Project.
Planned upgrades		
PO25 Development does not impede delivery of **planned upgrades** of **rail transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is expected to comply with PO25.** There are no known planned upgrades on the section of the Central Western System located in the vicinity of the Project.
Network safety		
PO26 Development involving **dangerous goods** does not adversely impact on the safety or operations of the **railway** and **rail transport infrastructure**.	**AO26.1** Development does not involve handling or storage of hazardous chemicals above the threshold quantities listed in table 5.2 of the Model Planning Scheme Development Code for Hazardous Industries and Chemicals, Office of Industrial Relations, Department of Justice and Attorney-General, 2016.	**Not applicable** – the Project does not include the use of dangerous goods.

Table J-3 Response to State code 6: Protection of state transport networks

Performance outcomes	Acceptable outcomes	Response
Network impacts		
PO1 Development does not compromise the safety of users of the **state-controlled road** network.	No acceptable outcome is prescribed.	**The Project complies with PO1.** The Project will generate a relatively small volume of traffic relative to background levels on the state-controlled road network and will not compromise the safety of users.
PO2 Development does not adversely impact the structural integrity or physical condition of a **state-controlled road** or **road transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO2.** The design and construction of the Project would not adversely impact the structural integrity or physical condition of a state-controlled road.
PO3 Development ensures **no net worsening** of the operating performance the **state-controlled road** network.	No acceptable outcome is prescribed.	**The Project complies with PO3.** The Project will generate traffic for a short period and not significantly impact upon the operation of the state-controlled road network.
PO4 Traffic movements are not directed onto a **state-controlled road** where they can be accommodated on the **local road** network.	No acceptable outcome is prescribed.	**The Project is compliant with PO4.** Access onto the unnamed access roads within the Town Common is only possible via the Landsborough Highway, i.e. no logistical local road access into the Town Common is possible for Project construction traffic.
PO5 Development involving haulage exceeding 10,000 tonnes per year does not damage the pavement of a **state-controlled road**.	No acceptable outcome is prescribed.	**The Project complies with PO5.** As described in the Traffic Impact Assessment (Appendix H), the Project is expected to have negligible impact on the pavement of the state-controlled road network.
PO6 Development does not require a new **railway** level crossing.	No acceptable outcome is prescribed.	**The Project is compliant with PO6.** The Project would not require a new railway level crossing.
PO7 Development does not adversely impact the operating performance of an existing **railway crossing**.	No acceptable outcome is prescribed.	**The Project is compliant with PO7.** There is potential for Project construction traffic to utilise the railway crossing at the Cramsie Muttaburra Road intersection. This crossing is frequently utilised by large heavy vehicles associated with the Western Queensland Livestock Exchange. It is not expected that Project-related heavy vehicles will adversely impacts the operating performance of this crossing.

Performance outcomes	Acceptable outcomes	Response
PO8 Development does not adversely impact on the safety of an existing **railway crossing**.	No acceptable outcome is prescribed.	**The Project is compliant with PO8.** There is potential for Project construction traffic to utilise the railway crossing at the Cramsie Muttaburra Road intersection. This crossing is frequently utilised by large heavy vehicles associated with the Western Queensland Livestock Exchange. It is not expected that Project-related heavy vehicles will adversely impacts the safety of this crossing.
PO9 Development is designed and constructed to allow for on-site circulation to ensure vehicles do not queue in a **railway crossing**.	No acceptable outcome is prescribed.	**The Project is compliant with PO9.** Project construction activities will occur approximately 3.4 km (by road) from the railway crossing at Cramsie Muttaburra Road at its closest point, therefore queue will not occur at this crossing.
PO10 Development does not create a safety hazard within the **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO10.** The Project is located approximately 1.3 km from the Central Western System at its closest point, and therefore would not create a safety hazard within the railway corridor.
PO11 Development does not adversely impact the operating performance of the **railway corridor**.	No acceptable outcome is prescribed.	**The Project is compliant with PO11.** The Project would not require the use of trains at any phase, and therefore would not impact the operating performance of the railway corridor.
PO12 Development does not interfere with or obstruct the **railway transport infrastructure** or **other rail infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO12.** The Project is located at least 1.3 km from the Central Western System, and therefore would not interfere with or obstruct railway transport infrastructure or other rail infrastructure.
PO13 Development does not adversely impact the structural integrity or physical condition of a **railway corridor** or **rail transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO13.** The Project is located at least 1.3 km from the Central Western System, and therefore would not adversely impact the structural integrity or physical condition of a railway corridor or rail transport infrastructure.
Stormwater and overland flow		
PO14 Stormwater run-off or overland flow from the development site does not create or exacerbate a safety	No acceptable outcome is prescribed.	**The Project is compliant with PO14.** Project construction activities will occur downstream of the state transport infrastructure and therefore would not create

Performance outcomes	Acceptable outcomes	Response
hazard for users of a **state transport corridor** or **state transport infrastructure**.		stormwater run-off or overland flow that would exacerbate a safety hazard in a state transport corridor or state transport infrastructure.
PO15 Stormwater run-off or overland flow from the development site does not result in a material worsening of operating performance of a **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO15.** Project construction activities will occur downstream of the state transport infrastructure and therefore would not create stormwater run-off or overland flow that would result in a material worsening of operating performance of a state transport corridor or state transport infrastructure.
PO16 Stormwater run-off or overland flow from the development site does not interfere with the structural integrity or physical condition of the **state transport corridor** or **state transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is compliant with PO14.** Project construction activities will occur downstream of the state transport infrastructure and therefore any stormwater runoff would not interfere with the structural integrity or physical condition of the state transport infrastructure.
PO17 Development associated with a **state-controlled road** or **road transport infrastructure** ensures that stormwater is lawfully discharged.	**AO17.1** Development does not create any new points of discharge to a **state transport corridor** or **state transport infrastructure**. AND **AO17.2** Development does not concentrate flows to a **state transport corridor**. AND **AO17.3** Stormwater run-off is discharged to a **lawful point of discharge**. AND **AO17.4** Development does not worsen the condition of an existing **lawful point of discharge** to a **state transport corridor** or **state transport infrastructure**.	**Not applicable** – The Project is not development associated with a state-controlled road or road transport infrastructure.

Performance outcomes	Acceptable outcomes	Response
Flooding		
PO18 Development does not result in a material worsening of flooding impacts within a **state transport corridor** or **state transport infrastructure**	*For a **state-controlled road** or **road transport infrastructure**, all of the following apply:* **AO18.1** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (within +/- 10mm) to existing flood levels within a **state transport corridor**. AND **AO18.2** For all flood events up to 1% **annual exceedance probability**, development ensures there are negligible impacts (up to a 10% increase) to existing peak velocities within a **state transport corridor**. AND **AO18.3** For all flood events up to 1% annual exceedance probability, development ensures there are negligible impacts (up to a 10% increase) to existing time of submergence of a **state transport corridor**. *No acceptable outcome is prescribed for a **railway corridor** or **rail transport infrastructure**.*	**The Project is considered to comply with PO18 and AO18.1 to 18.3.** Water Technology's flood assessment findings in relation to the Landsborough Highway (Appendix C) are relevant for both the highway and the Central Western System (as the Central Western System is located upstream of the Landsborough Highway), as follows: • The Project does not result in adverse velocity increases upstream to the Landsborough Highway corridor. • The Project does not result in adverse water level increases upstream to the Landsborough Highway corridor. Water level increases up to 11 mm are predicted in the 39% AEP that extend up to the Landsborough Highway, however, the road level is approximately 2.5 m above the flood level in this event and the increases are therefore inconsequential. • The extent of flooding in the Thomson River in all designed events is extensive however, flooding in the 39% AEP (frequent event) is generally contained to the braided river channels.
Drainage infrastructure		
PO19 Drainage infrastructure does not create a safety hazard in a **state transport corridor**.	*For a **state-controlled road** environment, both of the following apply:*	**Not applicable** – the Project would not include any drainage infrastructure.

Performance outcomes	Acceptable outcomes	Response
	AO19.1 Drainage infrastructure associated with, or in a **state-controlled road** is wholly contained within the development site, except at the **lawful point of discharge**. AND **AO19.2** Drainage infrastructure can be maintained without requiring access to a **state transport corridor**. *For a **railway** environment both of the following apply:* **AO19.3** Drainage infrastructure associated with a **railway corridor** or **rail transport infrastructure** is wholly contained within the development site. AND **AO19.4** Drainage infrastructure can be maintained without requiring access to a **state transport corridor**.	
PO20 Drainage infrastructure associated with, or in a **state-controlled road** or **road transport infrastructure** is constructed and designed to ensure the structural integrity and physical condition of existing drainage infrastructure and the surrounding drainage network is maintained.	No acceptable outcome is prescribed.	**Not applicable** – the Project would not include any drainage infrastructure.
Planned upgrades		
PO21 Development does not impede delivery of **planned upgrades** of **state transport infrastructure**.	No acceptable outcome is prescribed.	**The Project is expected to comply with PO21.**

Performance outcomes	Acceptable outcomes	Response
		There are no known planned upgrades on the sections of the Central Western System and Landsborough Highway in the vicinity of the Project.

Table J-4 Response to State code 10: Taking or interfering with water

Performance outcomes	Acceptable outcomes	Response
General		
PO1 Works do not cause an unacceptable impact on natural ecosystems.	No acceptable outcome is prescribed.	**The Project is compliant with PO1.** The environmental assessment undertaken in Section 6 found that the Project would not result in a significant impact on any relevant environmental values, and therefore would not cause an unacceptable impact on natural ecosystems.
PO2 Works do not cause an unacceptable impact on other users' ability to access the resource.	No acceptable outcome is prescribed.	**The Project is compliant with PO2.** The Project would increase the supply of water within the Town Storage for intake to the Longreach water treatment plant, and therefore increase the reliability of the water supply for agricultural users of the Town Storage with allocations under the *Water Plan (Cooper Creek) 2011.*
PO3 Works do not cause an unacceptable impact on the physical integrity of the **watercourse, lake or spring**.	No acceptable outcome is prescribed.	**The Project is considered to comply with PO3.** As described in Section 6.4.2, the Project may result in the loss of streamside shelter/habitat trees from increased inundation and wet feet around the fringes of the Town Storage, until a new equilibrium with the Project full supply level is reached. It is not considered the potential loss of some fringing vegetation would cause an unacceptable impact on the physical integrity of the Thomson River. Further, the extent or riparian vegetation removal required for Project construction is considered insignificant in the context of the broader Thomson River system.
PO4 Works are consistent with any of the following, to the extent they are relevant to the proposed development: 1. a **water plan**; 2. a **water management protocol**; 3. a moratorium notice issued under the *Water Act 2000*.	No acceptable outcome is prescribed.	**The Project is compliant with PO4.** The LRC will lodge the necessary water licence amendment applications under the *Water Plan (Cooper Creek) 2011* to the Department of Regional Development, Manufacturing and Water (DRDMW) in 2024.
Underground water		

Performance outcomes	Acceptable outcomes	Response
PO5 Works maintain the natural ecosystem processes of the **underground water** system.	No acceptable outcome is prescribed.	**Not applicable** – As the Project wouldn't involve the extraction or interference with any groundwater sources, no potential groundwater impacts would occur as a result of the Project.
PO6 Works do not unacceptably impact on connectivity between **underground water** and water in a **watercourse**, **lake** or **spring**.	No acceptable outcome is prescribed.	**The Project is considered to comply with PO6.** As the Project wouldn't involve the extraction or interference with any groundwater sources, it is not expected that connectivity between any underground water and the Thomson River would be unacceptably impacted by the Project.
Overland flow water		
PO7 Works to take **overland flow water** are for one of the following: 1. for an activity prescribed by regulation under the *Water Act 2000*; or 2. for reconfiguring **existing works**; or 3. in a **limited catchment area** identified in a **water plan**; or 4. for **contaminated agricultural run-off water**; or 5. part of an **environmentally relevant activity** or under an **environmental authority**; or 6. incidental to capturing **coal seam gas water**; or 7. consistent with a **water entitlement**; or 8. for the purpose of **water sensitive urban design**; for developments in urban areas.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute the take of overland flow water.
PO8 Works are located, constructed and operated in a way that do not adversely impact on neighbouring properties.	**AO8.1** Works are contained within the property boundaries. AND **AO8.2** At full supply level, the area inundated is contained within the property boundaries. AND	**Not applicable** – the Project does not constitute the take of overland flow water.

Performance outcomes	Acceptable outcomes	Response
	AO8.3 Bywash resulting from the works and any water diverted away from contaminated areas exits the property as close as practicable to the same location at which it exited the property boundary prior to construction of the works.	
Reconfiguring Existing works		
PO9 Development altering existing works do not increase the overall take of **overland flow water**.	**AO9.1** Development altering existing works must not result in an increase to any of the following: 1. the capacity of the works to store water; or 2. the rate at which the works take water; or 3. the average volume of water taken by the works.	**Not applicable** – the Project does not constitute the take of overland flow water.
PO10 Works do not involve reconfiguration of natural water bodies or bunded areas.	No acceptable outcome is prescribed.	**The Project is compliant with PO10.** The Project would involve the raising of existing weirs on the Thomson River and an associated increase in the capacity of the Town Storage. These works would not constitute the reconfiguration of a natural water body (i.e. the Thomson River).
PO11 Works do not involve reconfiguration of the storage capacity of any of the following: 1. a **lake** that was not used for irrigation or other **intensive stocking** or production; or 2. land being used for irrigated or dryland agriculture or areas surrounded by **levees** designed to prevent the land becoming inundated; or 3. naturally occurring infield storages.	No acceptable outcome is prescribed.	**Not applicable** – the Project would not involve reconfiguration of the storage capacity of any of the storages listed under PO11.
PO12 New works are located within the **same premises** as the **existing works**.	No acceptable outcome is prescribed.	**Not applicable** – the Project would not constitute "new works", as it comprises the raising of existing weirs.
Limited catchment area		
PO13 In the **limited catchment areas**, any works for storing water are:	**AO13.1** In the limited catchment areas, the **incidental take of overland flow water**:	**Not applicable** – the Project is not located in a limited catchment area.

Performance outcomes	Acceptable outcomes	Response
1. not larger than necessary for storing water other than **overland flow water**; or 2. designed to take **floodwater** overflowing from any adjacent **watercourse**.	1. is located within the sub-catchment/management area listed in table 10.3, column 2 for the relevant limited catchment area; and 2. is stored in a local catchment area that is less than or equal to the area of the limited catchment area specified in table 10.3, column 3.	
Contaminated agricultural run-off water		
PO14 Contaminated agricultural run-off water is captured and stored using existing works unless additional storage is required.	No acceptable outcome is prescribed.	**Not applicable** – the purpose of the Project is not for the capture and storage of contaminated agricultural run-off water.
PO15 Works to take **contaminated agricultural run-off water**: 1. are not be larger than required to contain **contaminated agricultural run-off water**; and 2. allow for water that is not **contaminated agricultural run-off water** to be passed through the works.	No acceptable outcome is prescribed.	**Not applicable** – the purpose of the Project is not for the take of contaminated agricultural run-off water.
Contaminated agricultural run-off water in a Queensland Murray Darling Basin catchment		
PO16 Works to contain **contaminated agricultural run-off water** in a **Queensland Murray Darling Basin catchment**: 1. do not increase the volume of **overland flow water** taken in a **water year**; and 2. allow for the release of water when an **acceptable quality of water** is achieved.	No acceptable outcome is prescribed.	**Not applicable** – the purpose of the Project is not for the containment of contaminated agricultural run-off water.
Environmentally relevant activity		
PO17 Works only capture the volume of **overland flow water** necessary for the operation of the **environmentally relevant activity** or **environmental authority** under the *Environmental Protection Act 1994.*	No acceptable outcome is prescribed.	**Not applicable** – the Project would not constitute an environmental relevant activity under the *Environmental Protection Act 1994.*
Coal seam gas water		

Performance outcomes	Acceptable outcomes	Response
PO18 Works for coal seam gas water: 1. are not larger than required to store **coal seam gas water** for the **beneficial use** of the resource under chapter 8 of the *Waste Reduction and Recycling Act 2011*; 2. are designed to take **floodwater** from any adjacent **watercourse**; 3. are designed to contain **coal seam gas water** that could be stored in an existing alternative storage.	No acceptable outcome is prescribed.	**Not applicable** – The Project would not constitute works for coal seam gas water.

State code 16: Native vegetation clearance

Schedule 21, part 1 of the Planning Regulation 2017 (Planning Regulation) lists exempt clearing work for general clearing and other activities or matters. Section 1(14)(a) of the same part lists "clearing vegetation for the construction or maintenance of infrastructure stated in schedule 5…if the clearing is on designated premises" as an exempt clearing purpose. Schedule 5, part 2(19) of the Planning Regulation lists "water cycle management infrastructure" as an infrastructure type.

It is considered that the Project meets the definition of "water cycle management infrastructure", and therefore the clearance of vegetation for the Project will be exempt development under section 1(14)(a) following designation of the Project premises under the planning scheme and *Planning Act 2016*. Accordingly, an assessment of the Project against State Code 16 is not considered required.

Table J-5 Response to State code 18: Constructing or raising waterway barrier works in fish habitats

Performance outcomes	Acceptable outcomes	Response
All development - Impacts on waterway		
PO1 Waterway barrier works do not result in adverse impacts on **waterways**.	No acceptable outcome is prescribed.	**The Project is compliant with PO1.** The Project would represent a 1 m increase in the height of existing weirs on the Thomson River. Given that the Project would not comprise the construction of new waterway barrier works, it is not considered the Project would result in adverse impacts on the waterway.
PO2 Development is designed, constructed and maintained to avoid and minimise impacts on **matters of state environmental significance**.	No acceptable outcome is prescribed.	**The Project is compliant with PO2.** No matters of state environmental significance (MSES) were recorded during the terrestrial and aquatic ecology field surveys. Notwithstanding, the construction footprint has been designed to minimise clearance of vegetation around the weirs to the greatest extent possible.
PO3 Where development impacts on **matters of state environmental significance**, development mitigates impacts and provides an **offset** for any acceptable **significant residual impact** on **matters of state environmental significance**. Statutory note: For Brisbane core port land, an offset may only be applied to development on land identified as E1 Conservation/Buffer, E2 Open Space or Buffer/Investigation in the Brisbane Port LUP precinct plan.	No acceptable outcome is prescribed.	**Not applicable** – No MSES were recorded during terrestrial and aquatic ecology surveys for the Project, therefore potential impacts to MSES have not been considered. If MSES were to occur, it is considered unlikely that the Project would result in a significant residual impact on MSES.
All development in general		
PO4 Aspects of development are only permitted within a **waterway** where there is a functional requirement and the development cannot be feasibly located elsewhere. Ancillary elements are to be located outside of the **waterway**.	No acceptable outcome is prescribed.	**The Project is compliant with PO4.** The Project would comprise the raising of existing weirs within the Thomson River main channel and anabranches, which need to be located within the waterway to meet their functional requirement as a water impoundment structure.

Performance outcomes	Acceptable outcomes	Response
PO5 For the life of the barrier, adequate **fish** passage must be provided and maintained at all **waterway barrier works** through: 1. **fish way(s)** that adequately provide for the movement of **fish**; or 2. the movement of **fish** is adequately provided for in another way.	*Acceptable outcomes AO5.1 to AO5.22 have been removed from this table.*	**The Project is considered to be compliant with PO5.** **AO5.1 to AO5.22 are not applicable to the Project and have been removed from this table.** The Project would raise the height of five existing weirs on the main Thomson River channel and four anabranches adjacent the main channel. It is proposed that a fish passage structure (e.g. rock ramp, as present in the main channel at the upstream Fairmont weir) is incorporated at the Town Weir (i.e. in the main channel), as it provides the main hydrological passage for aquatic fauna. The incorporation of fish passage structures at Anabranch Weirs 1 to 4 is not proposed, as it is considered little additional benefit would be gained given the lower hydrological connectivity to downstream habitat within the anabranches. In addition, the anabranches associated with Anabranch Weirs 1 and 2 are not mapped on the Queensland waterways for waterway barrier works mapping.
PO6 Waterway barrier works are designed, constructed, operated and maintained to provide lateral and longitudinal **fish** passage for all members of the **fish** community.	No acceptable outcome is prescribed.	**The Project does not comply with PO6.** By their nature as impoundment structures, the existing weirs do not provide lateral and longitudinal fish passage. It is proposed that a fish passage structure (e.g. rock ramp) is incorporated at the Town Weir (i.e. in the main channel), as it provides the main hydrological passage for aquatic fauna. Although fish passage structures are not proposed on all five raised weirs (i.e. Anabranch weirs 1 to 4 would continue to not provide lateral and longitudinal fish passage as per existing conditions), it is considered the Project would provide an overall benefit for fish movement along the Thomson River.
PO7 The development is designed and operated so that all components of **waterway barrier works** and pathways of potential **fish** movement provide for safe **fish** passage. Stepped spillways are not acceptable.	No acceptable outcome is prescribed.	**The Project is compliant with PO7.** The raised weirs will be designed and constructed with smooth, low gradient spillways similar to the existing weirs. In addition, it is recommended by the Aquatic

Performance outcomes	Acceptable outcomes	Response
		Ecology Assessment that the LRC engage a suitably qualified ecologist specialising in fish passage design to work alongside and provide design input at the detailed design stage to the preferred engineering consultant, to ensure that the design of the raised weirs (particularly, any fish passage structure at the Town Weir) facilitates adequate fish passage.
PO8 The **drownout** characteristics of the **waterway barrier works** are designed and constructed to not result in adverse impacts to **fish** passage.	No acceptable outcome is prescribed.	**The Project is expected to comply with PO8.** Pending detailed design, it is expected that the drownout characteristics of the raised weirs will not result in adverse impacts on fish passage due to the trapezoidal weir structure and similar upstream and downstream bed depths. These characteristics are expected to facilitate lower water velocities and relatively steady flow characteristics across the weirs during drownout.
PO9 Development does not result in adverse impacts to **fisheries resources.**	No acceptable outcome is prescribed.	**The Project is compliant with PO9.** In consideration of the impact assessment undertaken in Appendix D and summarised in Section 6.3.2, the Project is not expected to result in adverse impacts to fisheries resources.
PO10 The design, construction and maintenance of the development does not result in non-essential hardening or unnatural modification of the **main channel** of the **waterway.**	No acceptable outcome is prescribed.	**The Project is compliant with PO10.** The surface area of the weirs within the respective channels would increase commensurate with the increase in height. The final design and extent of the weirs will be determined following geotechnical investigation and detailed design. Notwithstanding, any downstream/upstream aprons or scour-reducing features are not considered 'non-essential' hardening/unnatural modification.
PO11 The development retains natural **fish habitat** and features such as shade, pools, riffles, rock outcrops and boulders, wherever possible.	No acceptable outcome is prescribed.	**The Project is compliant with PO11.** The location and extent of all natural fish habitat and features such as shade, pools, riffles, rock outcrops and boulders, outside the construction footprint of the Project, will be retained.

Performance outcomes	Acceptable outcomes	Response
PO12 The design, construction and maintenance of the development does not result in straightening of meandering **waterways**.	No acceptable outcome is prescribed.	**The Project is compliant with PO12.** The sections of the main channel and anabranches associated with the Project are primarily straight, and therefore would not result in the straightening of meandering waterways.
PO13 Where channels are to be significantly modified, the design and construction of the development replicates natural **waterways** and habitat features.	No acceptable outcome is prescribed.	**The Project is compliant with PO13.** The Project would represent a minor increase to the existing channel modification due to the existing weirs, and is therefore not considered to constitute a significant modification.
PO14 Where **waterway barrier works** will modify water levels or flow characteristics of the **waterway**, existing up and downstream structures are upgraded to provide adequate **fish** passage in accordance with the new levels or flow characteristics.	No acceptable outcome is prescribed.	**The Project is expected to comply with PO14.** The Aquatic Ecology Assessment (Appendix D) recommended that following construction of the Project, a suitably qualified ecologist specialising in fish passage design should review the suitability of the existing rock ramp fishway(s) at Fairmont Weir to continue to provide for passage (i.e., fishway functionality) under the Project FSL in the Town Storage. The LRC will review and assess the findings of this review in consultation with the suitably qualified ecologist.
PO15 The development is designed, constructed and maintained to provide water exchange sufficient to maintain or improve water quality and flow conditions on which **fisheries resources** depend.	No acceptable outcome is prescribed.	**The Project is compliant with PO15.** The Project would increase the capacity of the Town Storage from approximately 3,300 ML to 4,200 ML, equivalent to a 28% increase. An analysis of plots from the Water Monitoring Information Portal for the Thomson River (station 003202A) indicates that the majority of the time, discharge from the Town Storage does not occur, with periods of overflow primarily occurring during the wet season, where overflow volumes are significantly greater than the additional storage volume of the Town Storage due to the Project. Impacts to downstream water availability due to the Project is therefore expected to be imperceptible. Furthermore, there are a several large watercourses that flow into the Thomson River downstream of the Town Weir, being Darr River, Katherine

Performance outcomes	Acceptable outcomes	Response
		Creek and Vergemont Creek, in addition to approximately seven other relatively large "unmapped" watercourses. The flow contributions to the Thomson River from these system would be significant during the wet season.
PO16 Development likely to cause drainage or disturbance to acid sulfate soils, prevents the release of contaminants and impacts on **fisheries resources** and **fish habitats**.	No acceptable outcome is prescribed.	**The Project is compliant with PO16.** The Project would not disturb acid sulphate soils, given the local elevation of approximately 178 mAHD, and significant distance from the coast.
PO17 The development is designed, constructed and maintained to not result in adverse impacts to beds, banks and vegetation adjacent to the permanent development footprint.	No acceptable outcome is prescribed.	**The Project is compliant with PO17.** The Project construction footprint has been designed to accommodate all necessary construction activities as well as the footprint of the raised weirs. Disturbance of this footprint will be minimised as far as practicable by the construction contractor during construction. All disturbance within the bed and banks of the channels will be utilised for the raised weirs and associated scour protection etc.
PO18 After completion of works, disturbed areas of the bed and banks of the **waterway** outside the permanent development footprint are returned to their original profile and stabilised to promote regeneration of natural **fish habitats**.	No acceptable outcome is prescribed.	**The Project is compliant with PO18.** The Project construction footprint has been designed to accommodate all necessary construction activities as well as the footprint of the raised weirs. Disturbance of this footprint will be minimised as far as practicable by the construction contractor during construction. Following the completion of construction, disturbance outside of the footprint of the weirs will be stabilised and rehabilitated as necessary consistent with the pre-construction condition.
PO19 The development is designed and constructed to maintain or restore the natural substrate of the **waterway** bed.	No acceptable outcome is prescribed.	**The Project is partly compliant with PO19.** As described above, disturbance outside of the footprint of the weirs will be stabilised and rehabilitated as necessary consistent with the pre-construction condition. Further, natural substrate habitat will be maintained upstream and downstream of the weirs where it does not affect the functioning of the weirs, and the ability of

Performance outcomes	Acceptable outcomes	Response
		aprons/surface protection to minimise the possibility of scouring.
PO20 Development does not adversely impact on community access to **tidal land** and **waterways**.	No acceptable outcome is prescribed.	**The Project is compliant with PO20.** Access to the Thomson River will not be impacted by the Project.
PO21 Development does not adversely impact on community access to **fisheries resources** and **fish habitats** including recreational and indigenous **fishing** access.	No acceptable outcome is prescribed.	**The Project is compliant with PO21.** Access to the Thomson River and its fisheries resources and fish habitats will not be impacted by the Project.
PO22 Development does not adversely impact on commercial **fishing** access and linkages between a commercial **fishery** and infrastructure, services and facilities.	No acceptable outcome is prescribed.	**Not applicable** – there are no commercial fishing operations within the Town Storage.
Development involving fish ways		
PO23 Having regard to the hydrology of the site and **fish** movement characteristics, the **fish way** is capable of operating, and will operate: 1. for as long as the **waterway barrier work** is in position; and 2. whenever there are inflows into the impoundment or **waterway**, release out of the impoundment and during overtopping events; and **3.** when the impoundment is above dead storage level.	No acceptable outcome is prescribed.	**The Project is expected to comply with PO23 to PO31.** The LRC will commission a detailed design of the proposed fishway structure at the Town Weir in parallel with detailed design of the raised weirs following geological investigations, detailed engineering design, and selection of a construction contractor. The LRC will consult with the Department of Agriculture and Fisheries as necessary/requested during this process to meet the outcomes of PO23 to PO31 as reasonable and feasible.
PO24 The development is designed, constructed and maintained to ensure the hydrology allows for fish movement for the life of the **waterway barrier works**.	No acceptable outcome is prescribed.	
PO25 Fish ways are designed, constructed and maintained to not adversely impact on **fish** and **fish** movement.	No acceptable outcome is prescribed.	

Performance outcomes	Acceptable outcomes	Response
PO26 Fish ways are designed, constructed and operated to direct release water through the **fish way** as a priority over the outlet works.	No acceptable outcome is prescribed.	
PO27 Fish ways are designed, constructed and operated to ensure flows and releases of water do not result in adverse impacts to **fish** or **fish passage**.	No acceptable outcome is prescribed.	
PO28 The development is designed, constructed and operated to ensure **fishway** operational issues are promptly rectified for the life of the **fishway** including: 1. all components are designed to be durable, reliable and adequately protected from damage during high flow and flood events 2. all components can be replaced; and 3. a contingency plan ensures provision of alternate adequate **fish** passage during the **fish way** re-instatement process.	No acceptable outcome is prescribed.	
PO29 The development is designed to allow for installation of monitoring equipment and to allow access for monitoring and maintenance.	No acceptable outcome is prescribed.	
PO30 Fish ways are designed, constructed and operated to source water supply from surface water or equivalent water quality.	No acceptable outcome is prescribed.	
PO31 Tailwater control structures are designed, constructed and maintained to allow for **fish passage**.	No acceptable outcome is prescribed.	
Development involving floodgates		
PO32 The design, construction and operation of a floodgate does not result in adverse impacts on **fish**, **fish passage** or **fish habitat**.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not include a floodgate.
PO33 Floodgates are designed, constructed and maintained to ensure the invert is at bed level.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not include a floodgate.
Temporary waterway barrier works		

Performance outcomes	Acceptable outcomes	Response
PO34 The temporary **waterway barrier works** will exist only for a specified temporary period.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute temporary waterway barrier works. The weirs will continue to be permanent structures.
PO35 The temporary waterway barrier works provides adequate **fish** movement	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute temporary waterway barrier works. The weirs will continue to be permanent structures.
PO36 The development is designed, constructed and maintained to ensure temporary barriers are removed and the bed and banks are returned to their original profile and stability.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute temporary waterway barrier works. The weirs will continue to be permanent structures.
PO37 Temporary **waterway barrier works** are designed, constructed and maintained to allow for downstream movement during works, where required by species present.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute temporary waterway barrier works. The weirs will continue to be permanent structures.
PO38 The condition and value of aquatic macrophytes and other **fish habitats** is maintained.	No acceptable outcome is prescribed.	**Not applicable** – the Project does not constitute temporary waterway barrier works. The weirs will continue to be permanent structures.

Appendix N Longreach Planning Scheme strategic framework assessment

Theme/element	Relevant?	Assessment
3.3 Theme 1 – Our towns		
3.3.1 Strategic Outcomes	Yes	The Project involves upgrades to existing water storage infrastructure within the Thomson River riparian corridor, associated with the Town Storage. The Project seeks to provide additional water storage to cater for the continued growth of the Longreach township and surrounding locality, taking into account future climatic variability. The Project has been designed to minimise impacts on the ecological features of the area where possible, and will incorporate design features which improve the movement of fish along the Thomson River. Accordingly, the Project appropriately assists with supporting Longreach as the primary centre of the region and encourages future residential, commercial and agricultural growth.
3.3.2 Element 1 – The town of Longreach	Yes	Refer to response to 3.3.1.
3.3.3 Element 2 – Isisford, Ilfracombe and Yaraka	No	N/A
3.3.4 Element 3 – All towns - infrastructure	Yes	The proposed development involves upgrades to existing water storage infrastructure, to provide additional water storage to cater for the continued growth of the Longreach township and surrounding locality, taking into account future climatic variability. The Project will utilise and appropriately integrate with existing water supply infrastructure (i.e. water intake adjacent Apex Park) to minimise disruption to the community.
3.4 Theme 2 – Primary industries, natural resources and natural hazards		
3.4.1 Strategic Outcomes	Yes	The Project has been designed to appropriately respond to site constraints, including environmental features and natural hazards. Reference is made to the response at 3.4.3.
3.4.2 Element 1 – Rural resources and activities	No	The Project is located in the rural zone, on reserve land. It will support diversification of rural industry through enhanced water security. It does not involve the establishment of any use or industry that is incompatible with the existing rural environment.
3.4.3 Element 2 – Other natural assets	Yes	Various studies to assess the environmental values of the Project area have been undertaken and make recommendations for the avoidance and management of impacts. The Project has subsequently been designed to mitigate impacts on the terrestrial and aquatic environment and incorporates additional features such as a fish ladder at the Town Weir to improve fish movement along the Thomson River. The proposed MID involves the replacement/upgrade of existing water supply infrastructure to provide additional water supply to the Longreach township and

Theme/element	Relevant?	Assessment
		surrounding locality. Project construction activities will be undertaken to minimise the potential for impacts on water quality within the Thomsen River, with construction activities to be undertaken in accordance with a detailed CEMP.
3.4.4 Element 3 – Natural hazards	No	N/A

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APPENDIX C – WATER SUPPLY SECURITY ASSESSMENT

Department of Resources

Department of Natural Resources, Mines and Energy

Longreach

regional water supply security assessment

Longreach Regional Council

Queensland Government

CS9324 08/19

This publication has been compiled by the Department of Natural Resources, Mines and Energy

Introduction

The town of Longreach is located in central-western Queensland and lies adjacent to the Thomson River, approximately 700 km west of Rockhampton. It is both a regional centre for agricultural production and the administrative and commercial centre for the Longreach Regional Council area. The town is named after the 'long reach' of the Thomson River at this location.

Longreach's population is currently around 2700 (June 2018), but historically (over the past 85 years) has generally fluctuated between about 3000–3500 people. The main industries in the region are cattle and sheep production, and tourism.

Safe, secure and reliable water is an essential resource for Longreach, not only providing for the health and wellbeing of the community, but also providing opportunities for economic and community development, and supporting tourism. Longreach Regional Council is the registered water service provider for Longreach's urban water supply system, providing both water and wastewater services to Longreach.

The Queensland Government, through the Department of Natural Resources, Mines and Energy (DNRME), and Council committed to a partnership to investigate and establish a shared understanding of the existing security of Longreach's urban water supply system and its capacity to support current demands and future growth. Arising from this partnership, this regional water supply security assessment (RWSSA) provides valuable information to the community and water supply planners about Longreach's urban water supply security, thereby providing a foundation for future water supply management by Council.

This assessment has considered a number of water demand scenarios for the population of Longreach to identify the timing and magnitude of potential water supply risks. The assessment shows that Longreach's water supply, drawn from the storage of Town Weir on the Thomson River, is able to meet Longreach's current and projected urban water requirements until at least 2041 with a moderate degree of reliability—however, at current and projected future demands the system may be at risk of falling to very low water levels during extended periods of severe drought, with the potential for water supply shortfalls occurring, even with water restrictions being imposed.

It is important to note that information presented in the assessment is based on the capacity of the existing water supply system and associated infrastructure.

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland

Water supply sources

Longreach's primary water supply source is the storage provided by Town Weir, located on the Thomson River about 3.5 km northwest of the town.

Town Weir has a catchment area of approximately 57 590 km^2, which extends about 350 km north of Longreach, with land use in the catchment area being almost entirely low density cattle and sheep grazing on unimproved pastures. Upstream of Town Weir are three additional weirs on the Thomson River. Releases are made from these upstream weirs to replenish the Town Weir storage when water levels in Town Weir fall more than 1.2 meters below the crest of the weir. The three upstream weirs (in order of proximity to Town Weir) are Fairmont Weir, Bimbah Weir, and Goodberry Hills Weir, the latter of which is about 48 km upstream from Town Weir (Figure 1). All four weirs are owned and operated by Council, and together have a combined storage capacity of about 8400 megalitres (ML)—the Town Weir storage comprises around 3300 ML of this, and has a minimum operating volume of about 88 ML.

Town Weir was originally constructed to increase the storage capacity of a naturally-occurring large waterhole in the Thomson River, reported to be one of the relatively few permanent natural waterholes in central outback Queensland. References dating as far back as the early 1900s state that this waterhole has not been known to go dry since European settlement of the area (circa 1870).

Water in the Thomson River catchment area is managed under the Water Plan (Cooper Creek) 2011. Council hold a water licence to extract up to 2200 ML per annum (ML/a) for town water supply from Town Weir.

Other water supply sources

In addition to the available surface water from Thomson River, Council also hold an entitlement to extract up to 800 ML/a from the Hooray Sandstone unit of the Great Artesian Basin. Until about 10 years ago, some of this water was used to contribute to the total urban water supply for Longreach. However, due to a number of issues, including high fluoride content of the groundwater and the aged condition of the associated infrastructure, this supply source is no longer used.

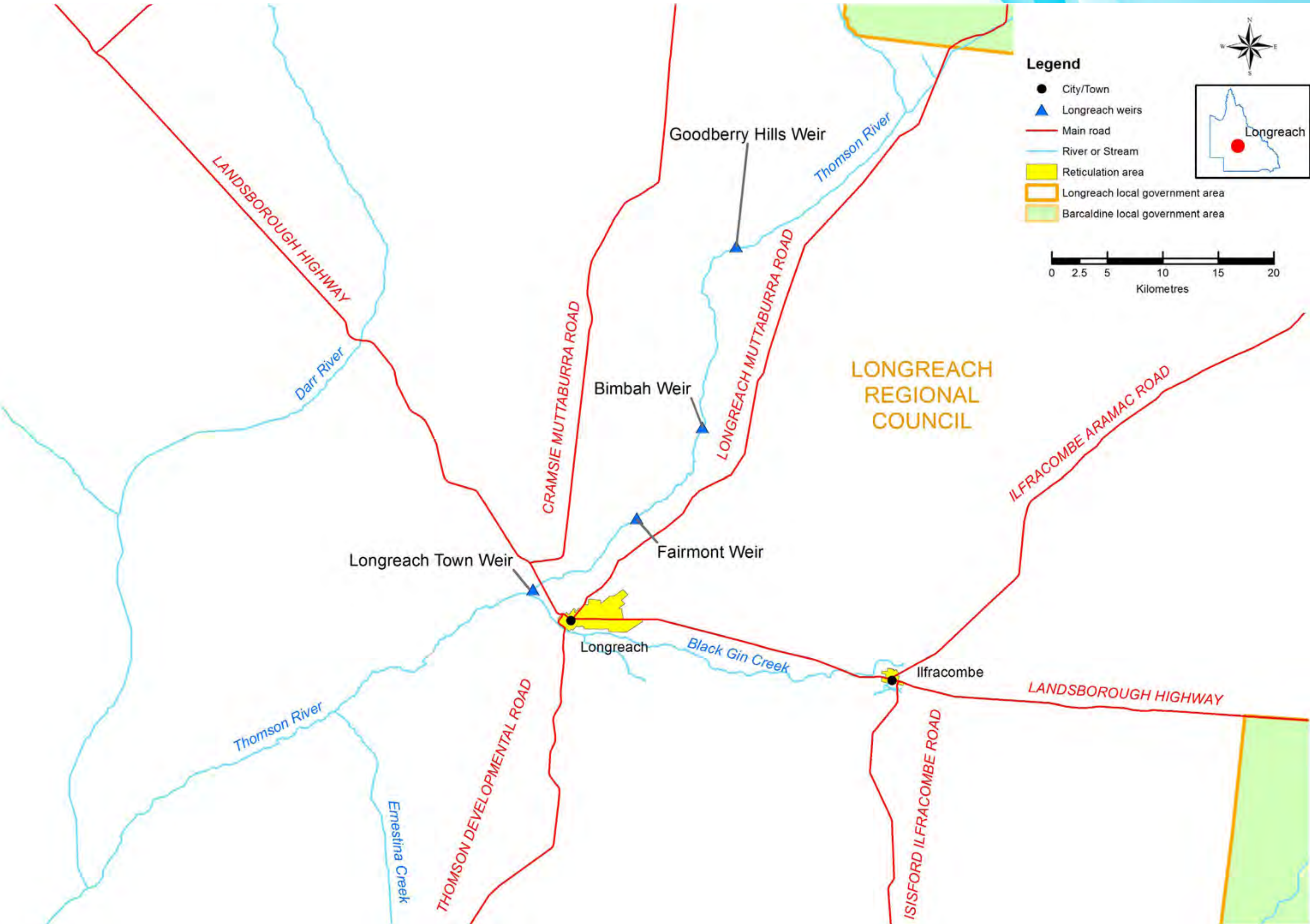


Figure 1: Location of Longreach and Council's four weirs on the Thomson River

Image courtesy of Tourism and Events Queensland

Water users and water demand

Longreach's reticulation network extends throughout the entire township and supplies water for urban purposes to about 2700 people (as at June 2018).

Longreach's reticulation network

Council currently holds an entitlement for 2200 ML/a from the Thomson River. Information reported by Council in the Statewide Water Information Management database shows that the total volume of water sourced by Council for the reticulation network over the 8 years from 2010–11 to 2017–18 averaged about 1800 ML/a (ranging from around 1470 ML/a to 2040 ML/a).

Based on the total volume of water sourced and the serviced population for each year, the average water demand from the Thomson River during this period (2010–11 to 2017–18) was approximately 1690 litres per capita per day (L/c/d). This figure accounts for residential, and non-residential (commercial, municipal and industrial) water supplied from the reticulation network, plus any system losses. It also includes water use by the transient population, such as tourists and temporary workforces. Water use by the transient population is mostly accounted for under the category of commercial use; however, the transient population is not included in the serviced population figures.

The average residential water use for this period was approximately 1355 litres per person per day (L/p/d). Non-residential water use for this period was approximately 250 L/p/d (or about 15% of Longreach's total water consumption, ranging from about 13–20%).

Recycled water

Longreach does not currently recycle water, primarily because the sewage treatment plant does not treat the water to a suitable standard for the water to be re-used.

Water demand affected by climate variations

Urban water demand varies between years and within each year, depending on various factors including climatic conditions such as rainfall, with higher demand usually occurring during hotter, drier periods. However, during extended dry periods water levels in Town Weir may become low and, as a result of water restrictions being applied, water use may be lower than it would otherwise have been.

The long-term historical rainfall data for Longreach (over the 69 year period from January 1950 to December 2018) is summarised in Table 1. Average annual rainfall for Longreach over this period was approximately 437 mm. Also shown in Table 1 is the average rainfall over the recent 2010–11 to 2017–18 period (which is about 18% lower than the average over the longer term), and the average rainfall over the climate change reference period (1986–2005), referred to in the later Climate Change section.

Table 1: Summary rainfall statistics for Longreach

Rainfall Station No: 36031 Longreach Aero	Annual rainfall (mm)			
	Lowest	Average	Median	Highest
1950 to 2018	106.8	436.6	413.2	1026.5
1986 to 2005 (Climate change reference period)	106.8	423.4	384.5	797.0
2010–11 to 2017–18	142.4	359.0	390.7	667.0

Figure 2 illustrates the relationship between the annual (July–June) rainfall recorded at Longreach (Station 36031 Longreach Aero) for the period 2010–11 to 2017–18, and Longreach's water demand (based on the total volume sourced) for each year over the same period. During this period, Longreach's annual water demand varied from year to year, ranging from 1248 L/c/d to 1928 L/c/d, with water demand generally higher in years with lower rainfall.

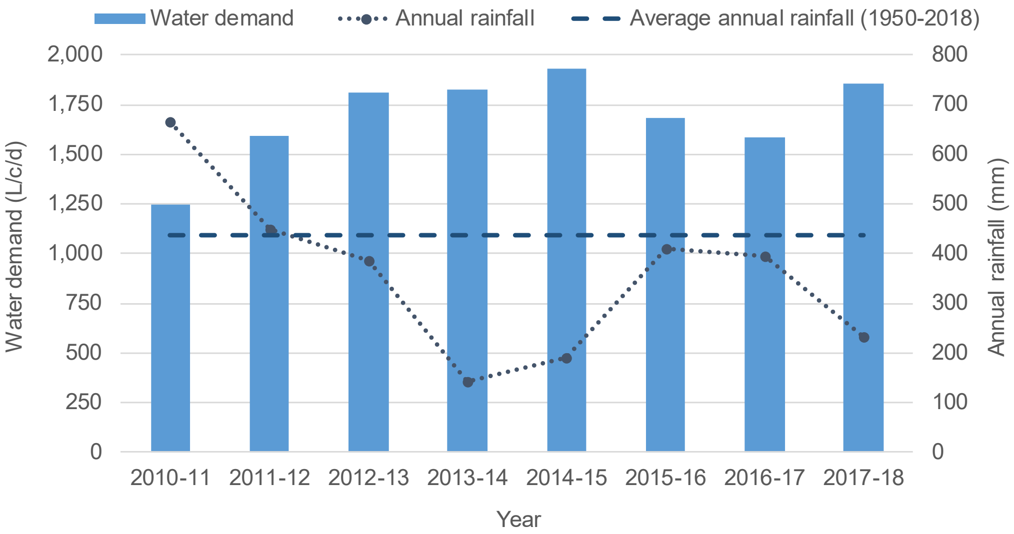


Figure 2: Total annual rainfall vs total water demand

Based on the above information, the water demand may have been higher over the drier 2010–11 to 2017–18 period than in previous wetter periods.

Climate change

The Queensland Government provides climate change projections[1] for Queensland local government areas (LGAs), which are referenced against the historical period 1986–2005 for temperature, evaporation and rainfall (among other climatic variables). The climate change projections are reviewed and revised as new data and improved methodologies become available.

In general, Queensland's future climate is projected to be warmer and drier, with increased evaporation and a potential increase in the annual and inter-annual variability. These same trends are also projected for the Longreach LGA. Additionally, under an unchanged greenhouse gas emission scenario, the projected climatic changes for Longreach indicate that by 2050 seasonal variations may include:

- slightly wetter summers, with drier winter, autumn, and spring
- warmer temperatures for each season (average, minimum, and maximum)
- higher evaporation rates for each season.

Importantly, one of the key elements of nearly all climate change projections is a change to extreme events—in terms of both frequency and magnitude. This suggests that major events, such as droughts and flooding, may become more extreme. The possibility of more extreme and longer-duration droughts than have previously been recorded for Queensland poses a unique challenge for water service providers, and highlights the need for long-term water supply planning processes to be adopted, implemented, and regularly reviewed.

As shown in Table 1, average annual rainfall during the recent period from 2010–11 to 2017–18 was about 15% below the average rainfall for the climate change reference period (1986–2005). Longreach's average water demands over the drier recent period may therefore be reflective of water demands during the drier conditions projected for the future.

Other users of the bulk water supply sources

Agriculture

The key agricultural industries in the Longreach region are cattle and sheep production. There are currently nine water licences held by agricultural water users who rely on water from the stretch of the Thomson River in which the four Longreach weirs are located. These nine water licences, combined, authorise the take of up to 940.5 ML/a of water for various agricultural purposes (almost entirely irrigation) along this stretch of the Thomson. In addition, there are five licences that, combined, permit the take of up to 47.2 ML/a for stock and domestic purposes.

To ensure there is available supply to meet Longreach's urban demand, extraction of water for irrigation ceases from this stretch of the Thomson River when the water level in Town Weir falls more than 1.3 metres below the weir crest (a storage volume of about 2330 ML). However, the five licences (47.2 ML/a) for stock and domestic purposes are not subject to this limitation.

There are also other licenced entitlements even further upstream. However, these are a significant distance from Longreach (around 200 km) and have a relatively small combined volume (234 ML/a), and are therefore not considered to have any significant impact on the availability of water supplies for Longreach.

Industry

There is no significant industrial water demand on Longreach's water supply sources from outside of Longreach's urban area. The main industries within Longreach's urban area are associated with agribusiness, construction, transport, and tourism. The water use by these businesses is accounted for within the total water demand figures for the network, generally under the category of 'non-residential' water use.

1 https://app.longpaddock.qld.gov.au/dashboard

Historical performance of Town Weir

The Thomson River generally only flows on a seasonal basis. Flows are often very significant when they do occur, and regularly result in widespread flooding. As a result of the seasonal flows in the Thomson River, combined with the extraction of water for town water and other supplies, the water level in Town Weir fluctuates significantly on an annual basis. Figure 3, below, shows the daily water level at the Thomson River gauging station (03202A) at Longreach, located about 600 metres upstream of Town Weir. It can be seen that the water level regularly drops to around 1–1.3 m below the weir crest. Also shown in Figure 3 is the frequency that water levels in the weir have historically fallen below the trigger level for various water restrictions (water restrictions are discussed further in a later section).

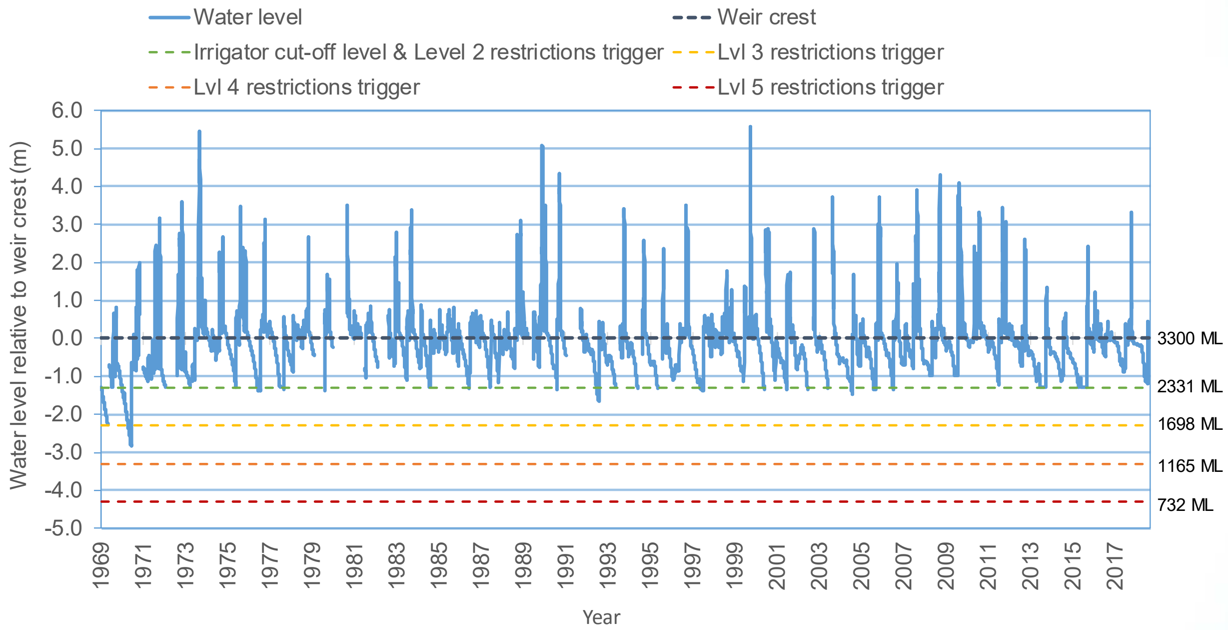


Figure 3: Town Weir—Recorded storage behaviour from 1969 to 2018

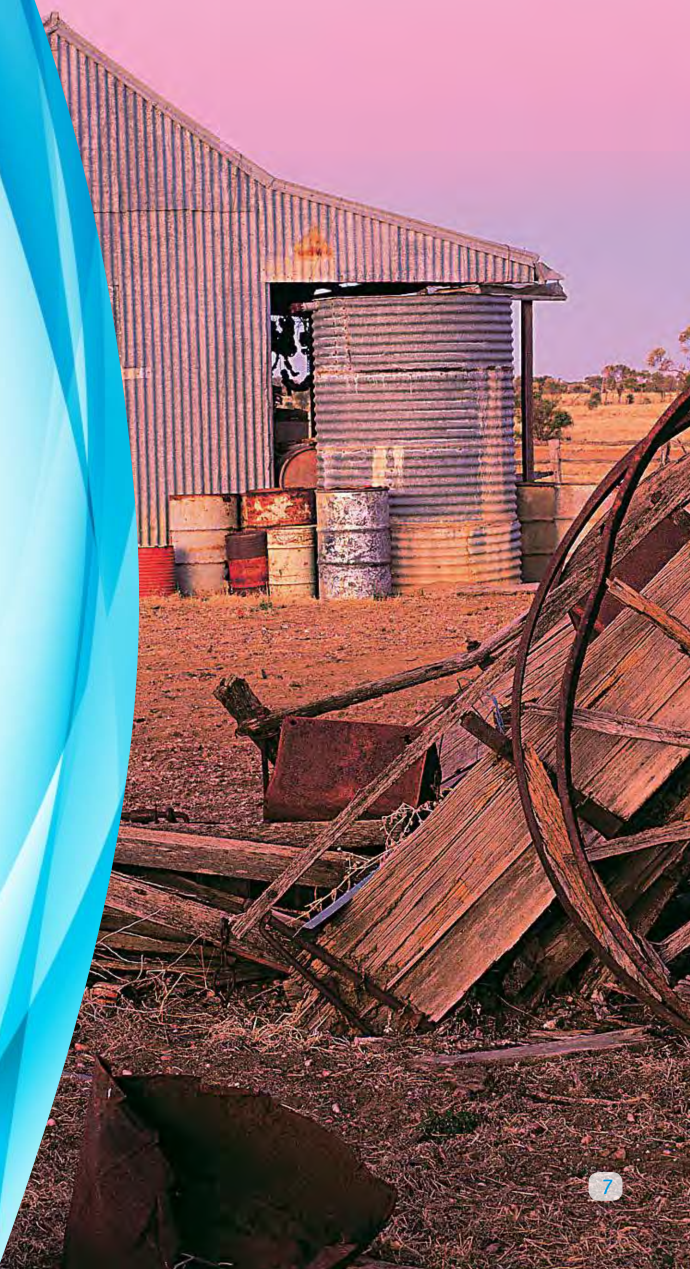


Image courtesy of Tourism and Events Queensland

Future water demand

An understanding of likely and possible changes in water demand in the future is required for well-founded water supply planning.

Council and DRNME agreed on key assumptions, such as rates of water use and population growth, in developing a projection of Longreach's future water demand. The projections will remain subject to ongoing monitoring of actual population growth and variations in water use trends (e.g. changes in water use practices may increase or decrease consumption).

Longreach's reticulation network

As mentioned earlier, over the past 85 years the population of Longreach has generally centred around the range of 3000–3500 people (averaging approximately 3270). During this historical period there have only been two census dates on which the recorded population was below 3000—in 1981 and in 2016. Although the population of Longreach is currently slightly lower than this historical average, at around 2700 people (June 2018), for the purpose of this assessment it is assumed that over the next 20 years (to around 2041) the population of Longreach may return to its historical range of around 3000–3500.

Based on Longreach's average daily water demand of approximately 1690 L/c/d over the 8-year period from 2010–11 to 2017–18, with a future population of 3000–3500 people Longreach's average future water demand would be in the range of 1850–2160 ML/a (refer to Figure 4).

It is important to note that this projection represents average demand rather than high demand, and average demand levels may often be exceeded (e.g. during hotter dry periods). However, the use of average demand figures provides a means of directly comparing future demand projections to determine when demand is likely to exceed available supply. For planning purposes, this also means an appropriate balance can be reached between the cost of water supply and the demand for available water. These demand projections are based on historical demands during a period of relatively dry climatic conditions, and are therefore likely to conservatively be representative of demands during the drier conditions projected for the future.

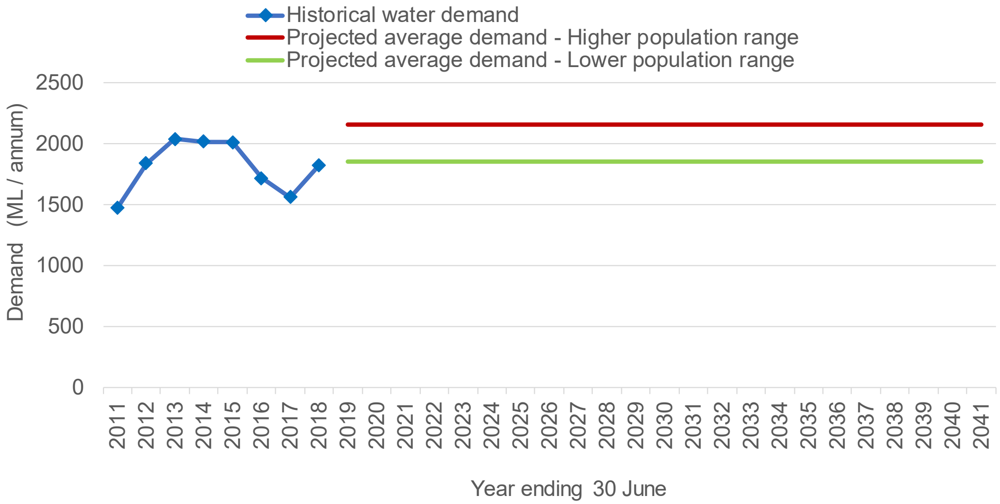


Figure 4: Longreach's projected average urban water demand

Other users of the bulk water supply sources

Agriculture

Although agriculture is a key industry for the Longreach region, the availability of surface water to support expansion of the agricultural industry in the area around Longreach is very limited (not only in terms of consistent supply, but also the number and volume of entitlements that could be permanently or seasonally traded). Any future development to expand the agricultural industry in the Longreach area is likely to require access to alternative water supply sources, such as groundwater, and therefore would have no noticeable impact on the security of Longreach's water supply. It is therefore considered that there is no real scope for any increased impact from agricultural activities on Longreach's future urban water security.

Industry

Industry in Longreach is primarily associated with its role as an administrative and commercial centre for the surrounding region, as well as tourism. Any future growth in Longreach's industry, and associated industrial water demand, is therefore expected to be largely subject to changes in population, and the continued provision of tourism facilities. These factors are considered to be relatively stable and, at this stage, there are no anticipated large-scale industrial developments or changes that are considered likely to significantly increase water demand on the water supply sources used for Longreach.

Image courtesy of Tourism and Events Queensland

Water supply system capability

Hydrologic assessments have been undertaken to assess the capability of Longreach's existing bulk water supply system to meet current and projected future water demands.

Hydrologic assessment of Longreach's water supply system

Historical modelling techniques were used to simulate the performance of Longreach's water supply from Town Weir. Historical modelling was used to demonstrate how the water supply would have performed under historical climatic conditions for a range of demand levels and operating arrangements.

Where feasible, Regional Water Supply Security Assessments (RWSSAs) have also included stochastic modelling[2]. However, due to a variety of factors (including a lack of good spatial coverage of rainfall stations and stream gauging stations, long term data availability on water extraction from the weir, and other factors), stochastic analysis was not considered appropriate for the Longreach RWSSA.

The historical hydrologic assessments assume that all existing water entitlements from the weirs or watercourses that support the system are fully developed and operational, with the exception of Council's water entitlements used to supply the Longreach community. Longreach's water demands were represented at various total annual demand levels, reflecting the impact of population growth (Table 2, page 11).

2 Stochastic modelling involves generating data sequences for much longer periods (e.g. 10 000 years) that incorporate key statistical indicators from the historical record, and can be used to demonstrate how the water supply might perform under a wider variation of potential climatic scenarios, including during more severe droughts than those in the historical period of record.

Table 2: Longreach's water restriction levels

	Water demands			
Demand modelled (ML/a)	1500	1800	2000	2200
Description	Reduced (low) average demand	Around current average annual demand	Intermediate demand	Council's full entitlement

In an effort to reduce water consumption and extend the duration of the available water supply during extended dry periods, Council has established a water restriction regime for Longreach based on the water levels (and storage volumes) in Town Weir. The water restrictions primarily target outdoor water uses including watering of gardens, washing cars, hosing or washing paved or concreted areas, and swimming pool use.

Table 3 shows the water levels and storage volumes in Town Weir that trigger the various water restrictions, and the corresponding targeted urban demand levels. The hydrologic assessment assumes that targeted savings from the water restrictions will be achieved, with the exception of the Level 2 restrictions for which it was conservatively assumed that there would be no reduction.

Table 3: Longreach's water restriction levels

Restriction Level	Volume in Town Weir (ML)	Distance below weir crest (m)	Percent of full demand	Daily demand example (L/c/d)
Level 1	Above 2,331	Less than 1.3	100.0 %	1690
Level 2	Below 2,331—Above 1,698	1.3—2.3	87.8 %	1484
Level 3	Below 1,698—Above1,165	2.3—3.3	73.5 %	1242
Level 4	Below 1,165—Above 732	3.3—4.3	61.2 %	1034
Level 5	Below 732	More than 4.3	47.0 %	794

Note: Trigger levels and targeted reductions are subject to review and amendment as determined by Longreach Regional Council from time to time. Further details on water restriction rules are available on Council's website.


Image courtesy of Tourism and Events Queensland

Frequency of water supply shortfalls and water restrictions

For this assessment, Longreach is considered to have experienced a water supply shortfall when its water supply system (the storage of Town Weir, supported by the upstream weirs) is unable to meet the water demands placed on the system by Longreach's community. This could, for example, occur as a result of the weir reaching minimum operating volume due to severe or extended drought, or as a result of the demand on the available supply source exceeding the entitlement volume.

Historical modelling assessment

The historical modelling undertaken (for the period 1890–2017) indicates that Town Weir would have met a demand of 1500 ML/a for Longreach without experiencing any supply shortfalls, assuming water restrictions were imposed and the targeted reductions in water use were achieved. Modelling results also showed that without water restrictions, Town Weir would have fallen below its minimum operating volume (resulting in a water supply shortfall) during one 'water year' (July to June, 1902–03) of the historical period for a total period of around 6 months.

At a demand of 2200 ML/a for Longreach (representing Council's current allocation from Town Weir, and exceeding Longreach's projected average 2041 demands) modelling results showed that, with restrictions in place, Town Weir would have fallen below its minimum operating volume during one year (1902–03) of the historical period, on one occasion which lasted about 4.5 months. Without restrictions in place, Town Weir would have fallen below its minimum operating level on three occasions, with one of these lasting longer than six months (and one of the other occasions lasting longer than one month).

Figure 5 shows the indicative performance of Longreach's water supply system under water restrictions, including the likelihoods that water restrictions could be triggered and water supply shortfalls experienced, for a range of annual water demands.

Figure 5 shows the extent that the frequency of reaching the water restriction trigger levels generally increases as water demand increases (i.e. the average recurrence interval reduces). For example, at an average annual demand of about 1500 ML/a, Level 3 water restrictions are estimated to occur about once every 10.5 years on average (see label 'A' on graph). At a demand of about 2200 ML/a, the frequency of Level 3 restrictions increases to about once every 6.5 years on average (see label 'B' on graph).

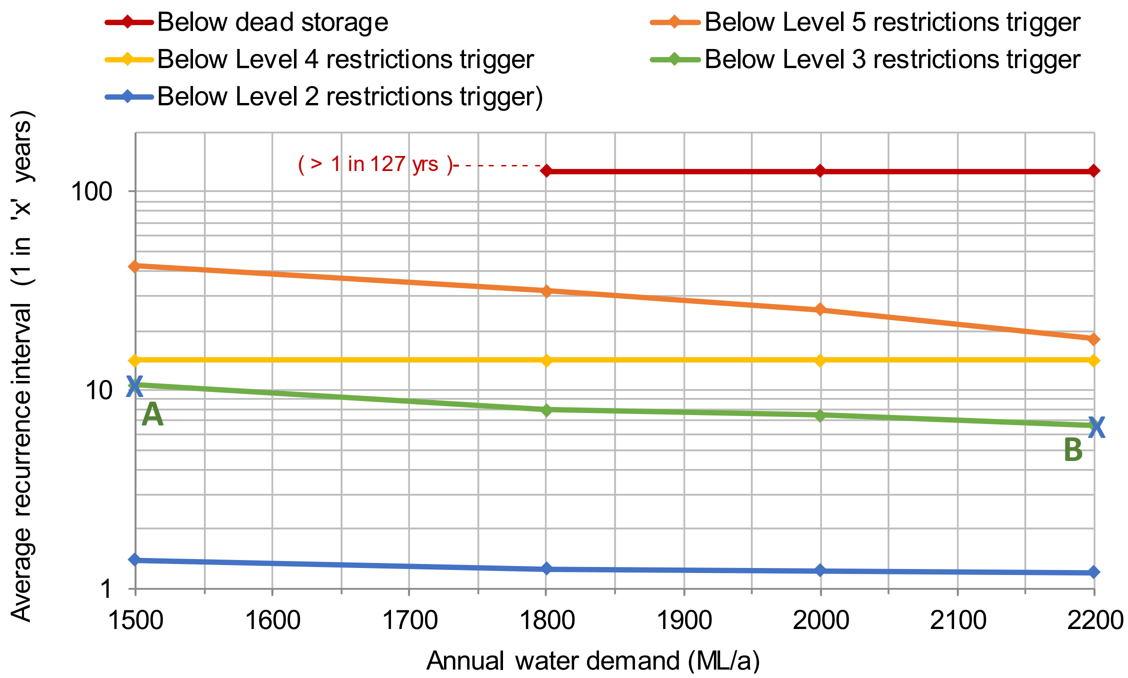


Figure 5: Frequency of water restrictions and water supply shortfalls against total annual water demand

Duration and severity of water restrictions

Although the frequency of water restrictions is an important consideration, the duration and severity of each restriction period is also important for many water users. For example, it may be more acceptable to experience less severe and shorter periods of water restrictions more frequently, than to experience more severe and longer periods of water restrictions less frequently.

Figure 6 shows the median number of occurrences of storage volumes falling below the trigger for Level 3 water restrictions and remaining below that volume for longer than 1 month, 3 months, 6 months and 12 months over the 127-year historical simulation period. Figure 6 shows that less than one-third of restrictions that last for more than one month continue for longer than 6 months. For example, over this period, at a water demand of 1800 ML/a there were 9 occurrences of the storage volumes falling below the trigger for Level 3 water restrictions and remaining below that volume for longer than 1 month, of which 6 last longer than 3 months, 2 last longer than 6 months and 1 lasts longer than 12 months. Figure 6 also shows the extent that, with an increasing level of water demand, there is an increase in the number of occurrences of water restrictions being triggered.

Figure 7 shows the number of occurrences that the storage volumes continue to fall and trigger Level 5 water restrictions, and the durations that storage volumes remain below this trigger level. Figure 7 shows that while the number of restrictions increases with increasing demand, most of these additional restriction periods last less than three months.

Together, the frequency, severity and duration of water restrictions, along with the ability to maintain a minimum supply volume during drought, are fundamental parts of water supply planning and form part of the 'level of service'. The level of service for Longreach is a matter for Council to determine, in discussion with the community.

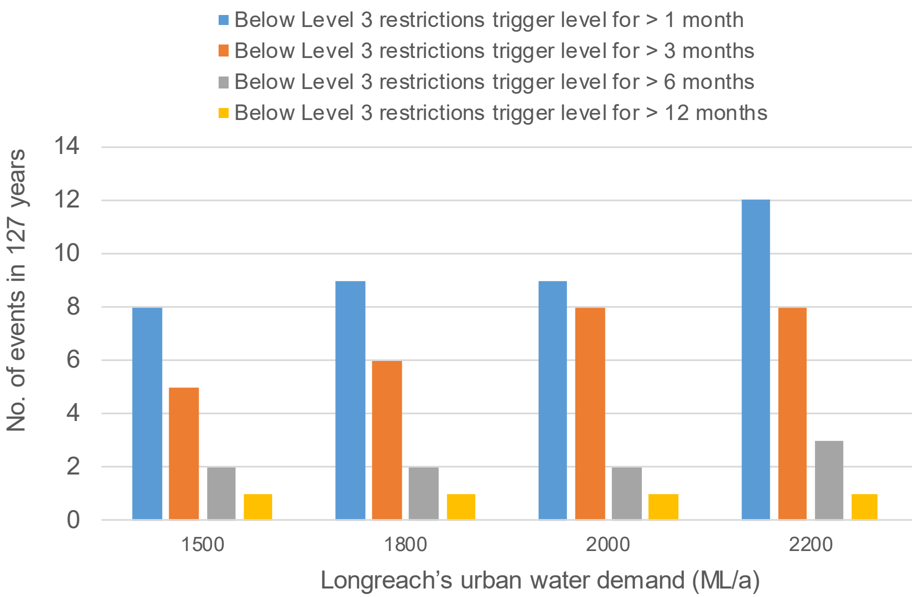
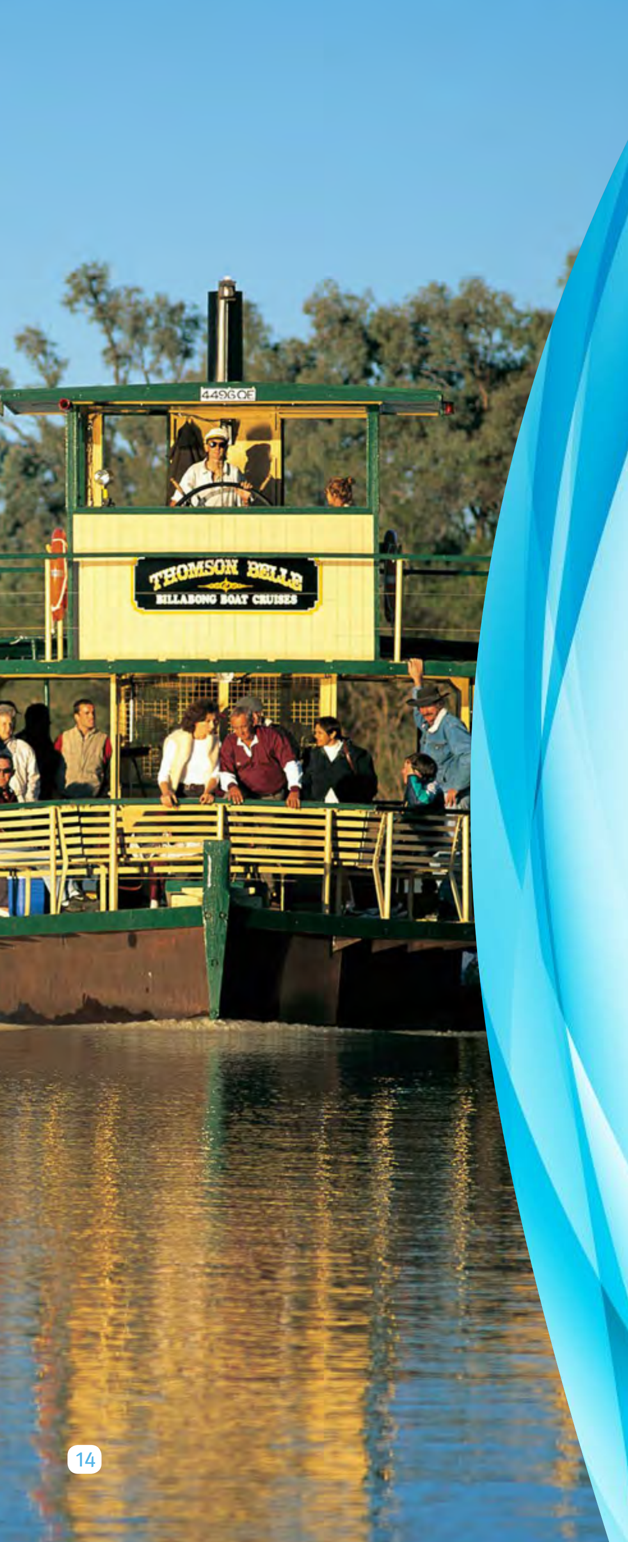


Figure 6: Number and duration of events where storage volumes fall below the trigger for Level 3 water restrictions at various annual water demands

Image courtesy of Tourism and Events Queensland

Image courtesy of Tourism and Events Queensland



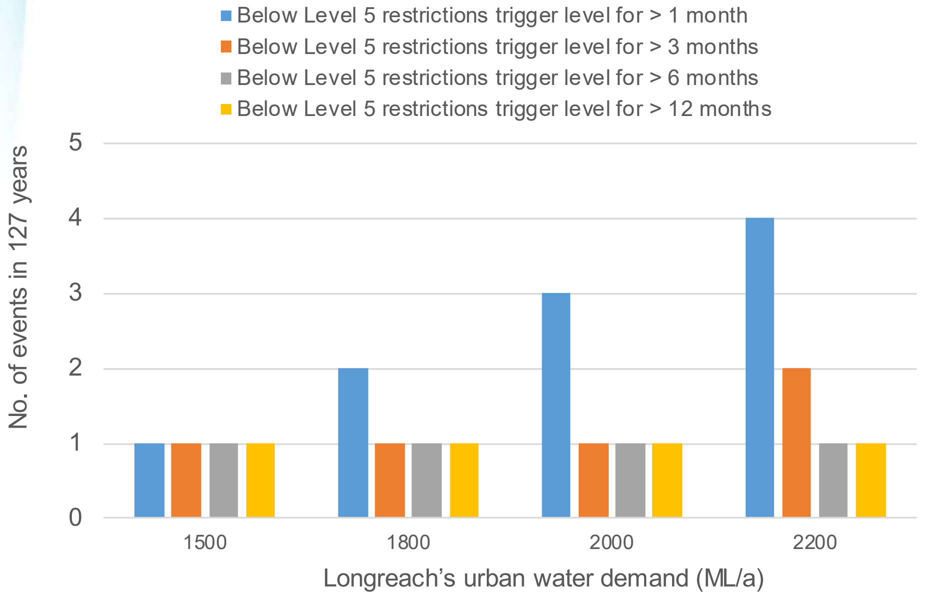


Figure 7: Number and duration of events where storage volumes fall below the trigger for Level 5 water restrictions at various annual water demands

Water supply system capability outcomes

Longreach's future urban water demand is anticipated to be in the range of 1850–2160 ML/a across the period to 2041, and may be higher during prolonged hot, dry periods.

The assessment showed that Town Weir is able meet Longreach's urban water requirements for demands up to Council's existing allocation from Town Weir of 2200 ML/a with a moderate degree of reliability—however, the system may be at risk of falling to very low water levels during extended periods of severe drought, with the potential for water supply shortfalls occurring, even with water restrictions being imposed. Based on historical performance and current average demands of about 1800 ML/a, Level 3 restrictions are expected to be triggered about once in 8 years. Modelling also shows that when there is a drought it can be extreme with extreme Level 5 restrictions lasting longer than 12 months.

Modelling showed that performance of the supply system was improved at lower demand levels, suggesting that supply security may be improved through demand management measures such as the implementation of restrictions or through voluntary reductions in water use through, for example, further community education.

Moving forward

This regional water supply security assessment represents a collaborative approach between the Queensland Government and Longreach Regional Council to establish a shared understanding of the existing security of Longreach's water supply and its capacity to support future growth.

Longreach Regional Council recognises that a secure and reliable water supply is essential for supporting Longreach's current and future population, as well as local businesses, industry and tourism. Council is committed to undertaking the steps required to achieve this outcome for the community, and is planning for the long-term water supply needs of the community.

Council has worked closely with the Queensland Government to collate detailed data and undertake hydrologic modelling based on historical records, to better ascertain the potential water supply security risks that council and the community currently face.

Council will continue to proactively investigate, develop and implement solutions to maintain water supply security for the Longreach community. Some of the areas of ongoing investigation may include:

- Potential raising and/or reconstruction of the Town Weir.
- Alternative sources of raw water supplies (e.g. groundwater, recycled water).
- Substituting some uses of potable water with alternate non-potable water supply sources; for example, the use of groundwater or recycled water for irrigation of parks and gardens.
- Continuing and improving work to monitor, detect and reduce water losses within the town's supply network.
- Demand management through optimisation of the reticulation system, maintaining and improving water efficiency for residential gardens and industry, and community education on water saving measures.

Council acknowledges that it has an important role to play in educating the community, businesses and the agricultural sector regarding water conservation and ensuring that the available water resources are effectively managed. Council will work with the community to identify an appropriate level of service for water supply security in Longreach, which will involve balancing an acceptable level of water availability with the lifestyle and expectations of residents. The viability of any water supply options will, among other things, consider the economic, environmental, hydrologic and community outcomes, as well as statutory requirements.

By continuing to pursue an appropriate level of water supply security for Longreach, Council is working to ensure that the right environment exists for the community, businesses, industry and tourism to continue to thrive in Longreach.

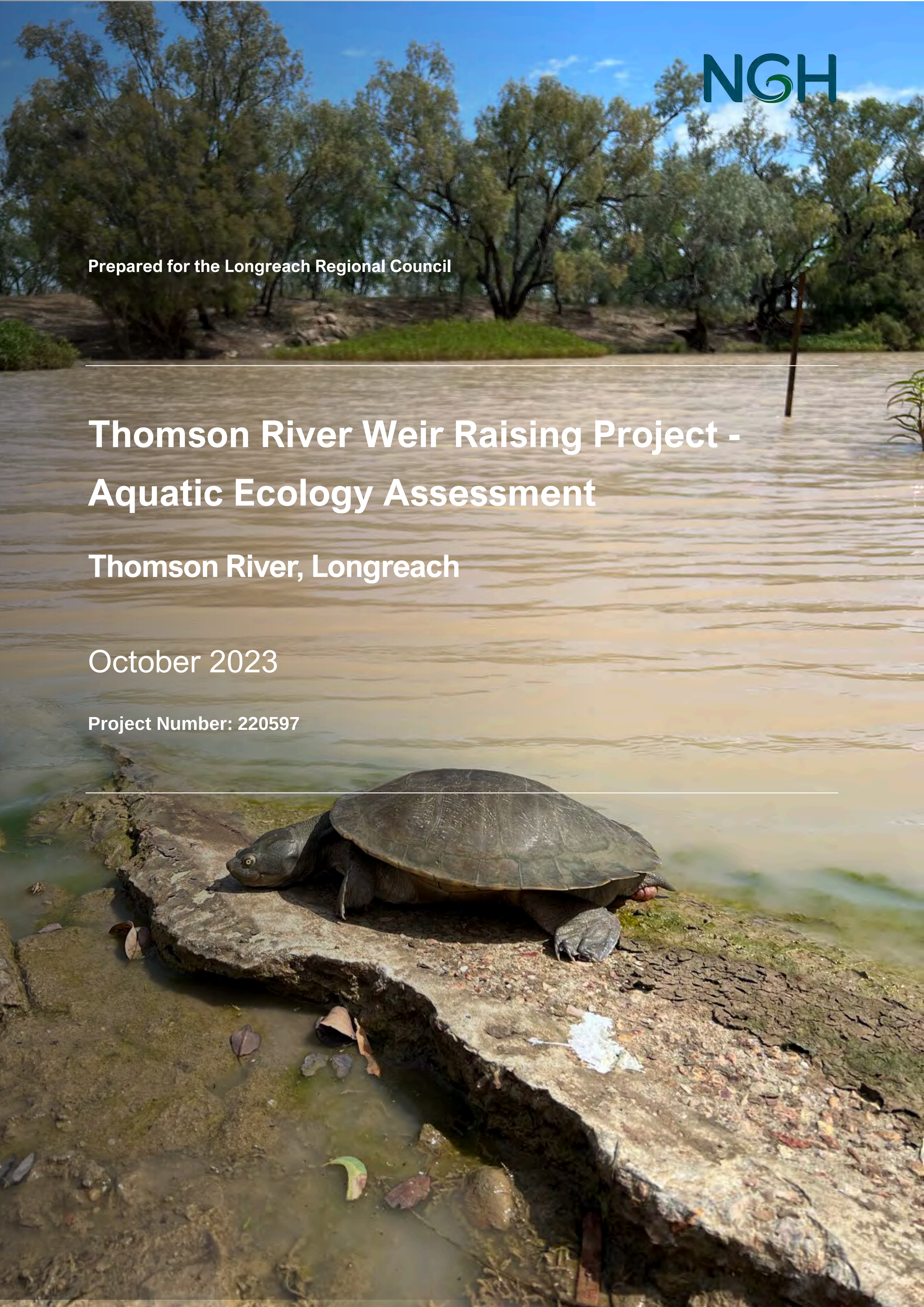
Image courtesy of Tourism and Events Queensland

For more information on the Regional Water Supply Security Assessment program please visit

dnrme.qld.gov.au

APPENDIX D – AQUATIC ECOLOGY REPORT

NGH



Prepared for the Longreach Regional Council

Thomson River Weir Raising Project - Aquatic Ecology Assessment

Thomson River, Longreach

October 2023

Project Number: 220597

Document verification

Project Title:	Thomson River, Longreach
Project Number:	220597
Project File Name:	220597_Thomson River WRP Aquatic Ecology Assessment_V2.0 (Final)

Revision	Date	Prepared by	Reviewed by	Approved by
V0.1	14/09/2023	Adam Harman Shannon Goodwin	Adam Folkers	
V0.2	19/09/2023	Adam Harman Shannon Goodwin	Adam Harman Joe Flanagan	
V1.0	29/09/2023	Adam Harman Shannon Goodwin	Adam Harman	Christy Englezakis
V2.0	13/10/2023	Adam Harman Shannon Goodwin	Adam Harman Joe Flanagan	Tammy Vesely

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1. Introduction

This Thomson River Aquatic Ecology Assessment report has been prepared by NGH Pty Ltd (NGH) and Lateral Environmental (Lateral) for the Longreach Regional Council (LRC), and forms part of the Ministerial Infrastructure Designation (MID) proposal for the Thomas River Weir Raising Project (the Project).

1.1. Project Background

Longreach, a town in Central West Queensland, relies entirely on freshwater reserves from the Thomson River to meet its water requirements. The LRC operates the Town Weir system on the Thomson River, located approximately 3.5 kilometres (km) north-west of Longreach. The Town Weir system comprises the Town Weir on the main channel of the Thomson River as well as four nearby Anabranch Weirs (referred to collectively as the existing weirs) (Figure 1-1). Together, the existing weirs create the "Town Storage", which is approximately 10 km long and has a capacity of approximately 3,300 ML, a minimum operating volume of approximately 88 ML, and a catchment area of approximately 57,590 square kilometres (km^2).

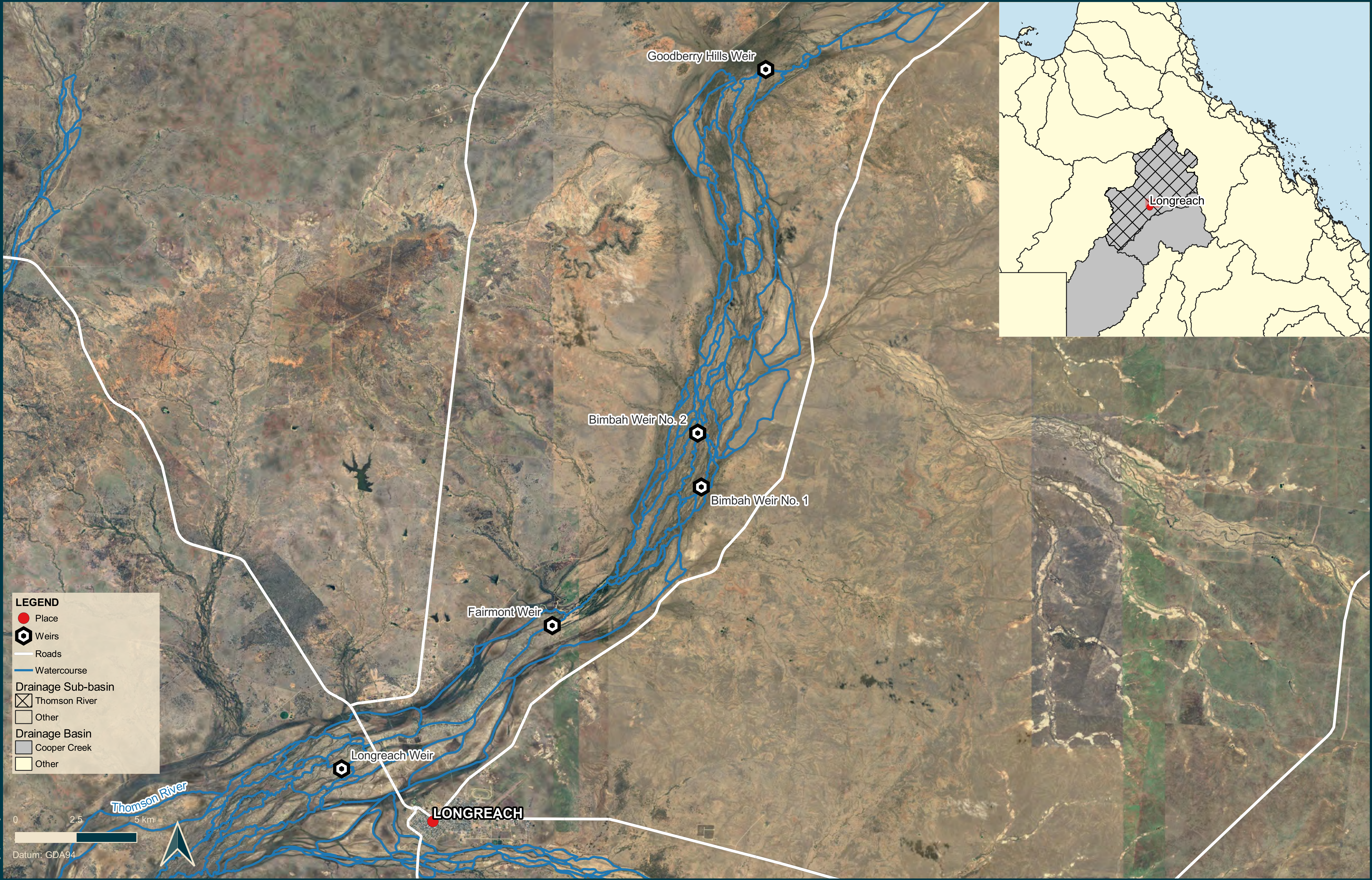
Upstream of the Town Weir are three additional weirs on the Thomson River operated by the LRC, including (in order of proximity to the Town Weir): Fairmont Weir, Bimbah Weir, and Goodberry Hills Weir, the latter of which is approximately 48 km upstream from Town Weir (Figure 1-1). The Town Weir system and the three upstream weirs have a combined storage capacity of approximately 8,400 megalitres (ML).

To achieve long-term water security for Longreach, the LRC propose to raise the existing weirs by 1 m, providing additional water storage capacity. This increase in weir height will result in additional inundation of the Thomson River channel outside of the existing full supply level (FSL) up to 10 km upstream.

1.2. Objectives and Scope

This Aquatic Ecology Assessment report outlines the current condition of the Thomson River aquatic ecosystem in proximity to the existing weirs and provides an assessment of potential impacts of the Project on aquatic ecology. This report:

- Summarises the aquatic flora and fauna known to, likely, or possibly occurring in Thomson River system in proximity to the existing weirs
- Details the current aquatic condition of the waterway and comparative sites.
- Details the water quality in the Town Storage (i.e. upstream of the Project), and below the Town Weir (i.e. downstream of the Project), and at one analogous site
- Assesses the likelihood of occurrence for any Matters of National Environmental Significance (MNES) and Matters of State Environmental Significance (MSES)
- Assesses the potential indirect, direct and cumulative impacts of the Project of aquatic ecology in accordance with appropriate guidelines
- Summarises avoidance and mitigation measures to minimise impacts as informed by current understanding of the Project
- Assesses any residual significant impacts associated with the Project in accordance with appropriate guidelines.



Ref: JW211640 - Longreach Weir Raising Aquatic \ Longreach Fish Locations Author: Shannon Goodwin Date created: 15.09.2023 © NGH 2023 © ESRI 2022

Longreach Weir Raising

Project location overview

1.3. Regulatory Framework

1.3.1. Commonwealth

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth's primary environment protection legislation in Australia and provides a comprehensive legal framework for the protection and management of Australia's nationally and internationally important flora, fauna, ecological communities and heritage places – defined as MNES.

Any action (i.e., a project, development, activity, or a series of activities) that has, will have, or is likely to have a significant impact on a MNES, or other matters protected under the EPBC Act, requires approval from the Commonwealth Minister for the Department of Climate Change, Energy, the Environment and Water (DCCEEW). Conservation significant species under the EPBC Act are considered in this Aquatic Ecology Assessment as required.

1.3.2. State

Planning Act 2016

The *Planning Act 2016* (Planning Act) is the primary piece of legislation governing development assessment and planning in Queensland. The Planning Act aims to provide a streamlined framework for land use planning, development assessment, and land management emphasising sustainable development, community engagement, and efficient decision-making in urban and regional planning.

The key purpose of an infrastructure designation is to facilitate efficient and cost-effective provision of significant infrastructure for the State. As prescribed under the Planning Act, infrastructure required for the benefit of a community can be facilitated through the infrastructure designation process. Section 36 of the Planning Act provides the criteria that the Minister must consider when making or amending a MID and chapter 2, part 6 of this section identifies the criteria for making or amending a designation. Approval for the Project is being sought by the LRC through the MID process.

An approved MID doesn't directly authorise development; instead, the effect of the MID is to make specified work 'accepted development' under the Planning Act, circumventing the need for development approvals (e.g. operational works approval for native vegetation clearance or waterway barrier works ;WWBW).

Fisheries Act 2014

The *Fisheries Act 2014* (Fisheries Act) is key piece of legislation in Queensland, governing the management, conservation, and sustainable use of the state's fisheries resources. The Fisheries Act seeks to promote ecologically sustainable development regarding fish and the aquatic environment, including habitat forming vegetation and fish passage. The Fisheries Act protects waterways for fish passage as it is an essential requirement for the survival and reproduction of many Queensland fish species. Waterways for waterway barrier works includes rivers, creeks, streams, drainage feature, watercourse or inlet of the sea and includes both freshwater and tidal waters. WWBW are regulated under the Fisheries Act and Fisheries Regulation.

The Thomson River is mapped as a purple (major impact) waterway under the Fisheries Act, and therefore development approval for operational works that is raising WWBW would typically be required. Notwithstanding, given an MID is being sought for the Project, development approval for WWBW would not be required.

Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) is a significant piece of legislation in Queensland dedicated to the conservation and protection of the state's natural environment and biodiversity. The NC Act serves a crucial role in preserving Queensland's unique ecosystems and wildlife by providing legal mechanisms to conserve and protect native flora and fauna, as well as their habitats as well as safeguarding biodiversity to maintain the health and resilience of ecosystems. The NC Act regulates environmental impacts through requirements for vegetation clearing permits, species management programs and other permits.

Conservation significant species under the NC Act are considered in this Aquatic Ecology Assessment as required.

Environmental Offsets Act 2014

The *Environmental Offsets Act 2014* (EO Act) details the framework to provide for an environmental offset to counterbalance significant residual impacts of particular activities on MSES. The EO Act has been considered in this Aquatic Ecology Assessment as required.

2. Existing Setting

The Project will raise the existing weirs by 1 m, resulting in additional inundation of the Thomson River channel outside of the existing FSL up to 10 km upstream (Figure 2-1). The study area adopted for the purposes of this Aquatic Ecology Assessment includes the Thomson River from Town Weir to Fairmont Weir, and its anabranches. The study area also included areas immediately upstream of Fairmont Weir, and immediately downstream of Town Weir and an analogue site; Oma Waterhole.

2.1. Regional Context

Thomson River is a significant waterway in eastern Australia, originating in the central-western region of Queensland and flowing southward through southward through several Australian states, passing through semi-arid and arid landscapes characterized by vast plains, red sand dunes, and sparse vegetation. The Thomson River eventually merges with the Barcoo River to form Cooper Creek; which, during periods of significant rainfall, can flow into the normally dry Lake Eyre, one of the largest salt lakes in the world.

The study area is located within the Thomson River drainage sub-basin of the Cooper Creek drainage Basin. The LRC own and operate four weirs on the Thomson River (Section 1.1), the furthest of which is approximately 48 km upstream from Town Weir.

2.2. Biogeographical Context

The Interim Biogeographic Regionalisation for Australia (IBRA7) is a bioregional framework that divides Australia into 89 biogeographic regions and 419 subregions based on climate, geology, landforms, vegetation and fauna (Thackway and Cresswell 1995). It was developed through collaboration between state and territory conservation agencies with coordination by the Commonwealth Department of the Environment, Water, Heritage and the Arts (now Department of Climate Change, the Environment, Energy and Water [DCCEEW]).

Longreach and the Thomson River drainage sub-basin are located within the Central Downs (MGD07) and Southern Wooded Downs (MGD08) subregions of the Mitchell Grass Downs (MGD) bioregion. The Mitchell Grass Downs bioregion covers 241,625.3 km^2 and is characterised by tropical and subtropical grasslands, savannas and shrublands. The Central Downs subregion and the Southern Wooded Downs subregion each cover 93,788.2 km^2 and 47,209.9 km^2, respectively.

2.3. Climate

The MGD bioregion is characterised by desert, grassland, and subtropical climatic zones. Areas within the desert climate zone are hot and characterised by a winter drought, areas within the grassland climate are hot and persistently dry, while the subtropical areas experience moderately dry winters. The Central Downs subregion encompasses both desert and grassland climate zones, whereas the Southern Wooded Downs subregion experiences desert, grassland and subtropical climatic conditions.

NGH

Longreach Weir Raising

Expected Thomson River Inundation

Ref: JW211640 - Longreach Weir Raising Aquatic \ Longreach Fish Locations Author: Shannon Goodwin Date created: 15.09.2023 © NGH 2023 © ESRI 2022

Average annual rainfall near the study area is approximately 433.4 mm (recorded at Longreach Aero, Bureau of Meteorology [BoM] Station 036031) with a record annual maximum of 1026.5 mm in 1950 and monthly maximum of 420.4 mm in January 1974 (BoM, 2023a). A summary plot of rainfall and temperature for the area is given in Figure 2-2.

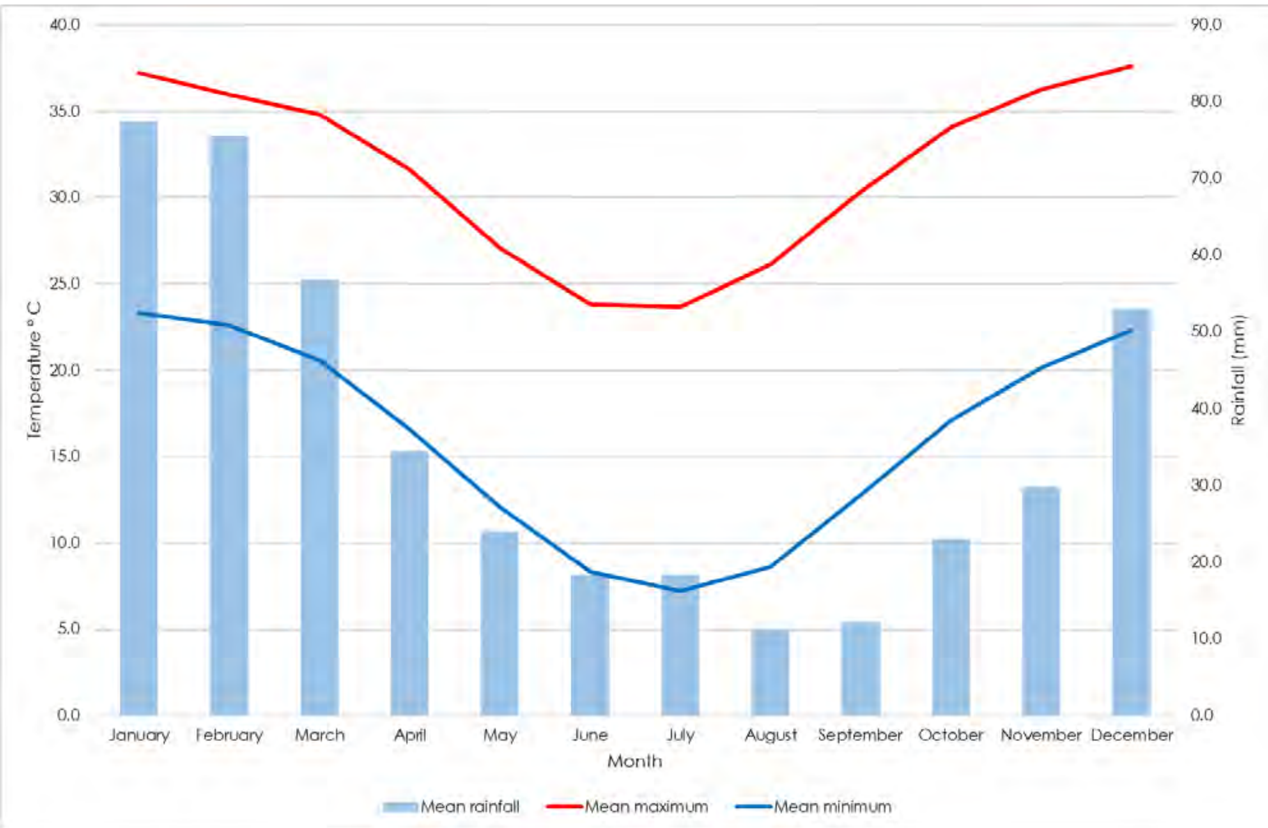


Figure 2-2 Average monthly rainfall, minimum and maximum temperatures for Longreach Aero
Source: BoM (2023a)

2.4. Waterways and Wetlands

The Thomson River is an intermittently flowing river, forming north of Muttaburra and flowing in a southerly direction. Over its length, the Thomson River is joined by 41 named tributaries before it meets the Barcoo River near Windorah and forms Cooper Creek (BoM, 2017). Flooding of Cooper Creek is common during the wet season (October - March); however, during the dry season (April – September), channels can become restricted to isolated lagoons and claypans. The Thomson-Barcoo-Cooper catchment drains towards the Lake Eyre basin; the largest endorheic basin in Australia.

The Thomson River waterways within the Copper Creek Basin are extensive dryland river systems, with consistently low gradients, internal drainage instead of flowing to the sea, wide floodplains (reaching up to 80 km in width [Cooper Creek]), anastomosing channels, significant transmission losses, and extreme flow variability (Department of Environment and Heritage Protection [DEHP], 2016).

The Thomson River is a perennial multithread anastomosing waterway that drains the Alma Range and part of the Great Dividing Range. The main channel of the Thomson River is mapped as stream order eight and a major waterway for fish passage under current spatial layers; however, the river experiences high variability in flows and water levels. Following summer monsoon rains, the Thomson River flows before water evaporates and forms a series of billabongs; although under exceptional rainfall, water can drain into Lake Eyre.

2.5. Surface Hydrology

Longreach region receives an average of 450 mm of rainfall per year, with most rainfall occurring during summer monsoon events (Department of Natural Resources, Mines and Energy [DNRME], 2019). The Thomson River only flows on a seasonal basis during these wet periods; however, flows are substantial, resulting in widespread flooding throughout the region (Bunn et al., 2006). Figure 2-3 shows water levels recorded at the “Thomson River at Longreach” monitoring station (0036031) (DRDMW, 2023a). During dry periods, water evaporates, causing retreating waterways dominated by permanent and semi-permanent waterholes that serve as refuges for various species. These waterholes are characterised by low salinity, high turbidity levels, and limited visual clarity (DEHP, 2016).

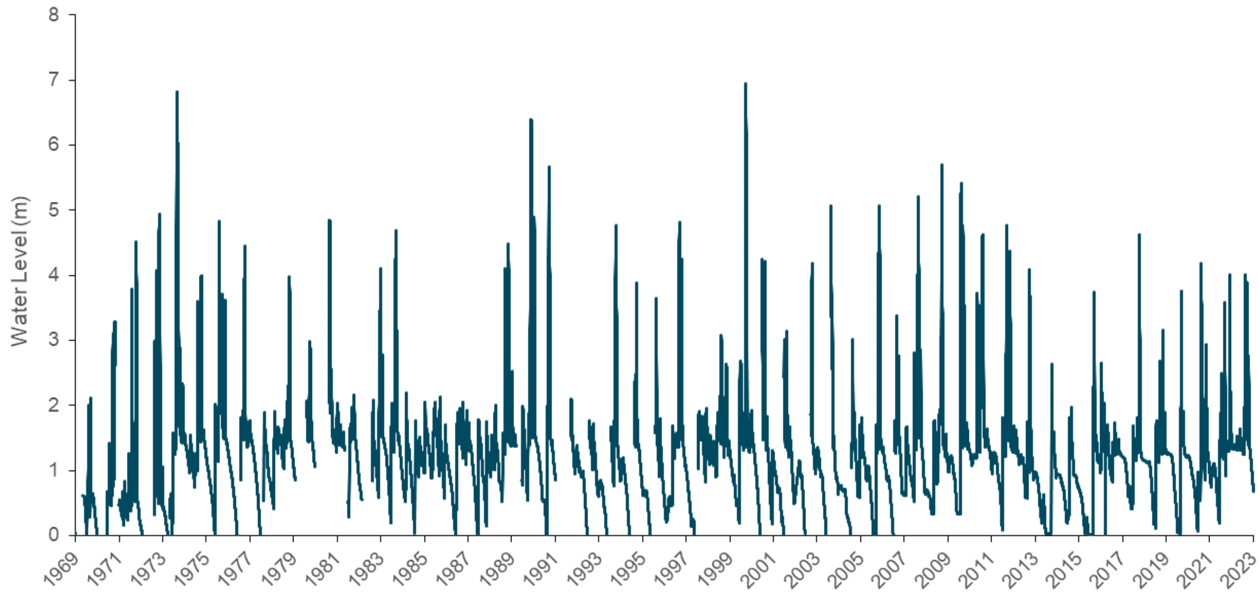


Figure 2-3 Thomson River water level at Longreach from 1969 to 2023

Source: DRDMW (2023a)

2.6. Aquatic Habitat

In dryland rivers, extreme flow variability means that spatio-temporal heterogeneity across the waterway and floodplain is also extreme and a fundamental driving force in the ecology and diversity of these systems (DEHP, 2016). Reduced flows following cessation of rainfall creates numerous shallow temporary waterholes and some deep, permanent, waterholes causing habitat fragmentation along the waterway and contributing significantly to habitat heterogeneity.

Woody debris loads within dryland river systems is relatively low compared to other waterway systems due to comparatively sparse tree cover (DEHP, 2016). Sediment loads within the Thomson River are dominated by mud aggregates, contributing to the high turbidity observed within the waterway (Wakelin-King, 2015). Some coarser sediments (primarily sand) occur in low-medium order channels, although fine sediment is more typical for inland dry rivers.

3. Methods

3.1. Desktop Review

Prior to undertaking the field survey (Section 3.2), an extensive desktop review was completed to describe the flora, fauna, and aquatic habitat of the study area. For desktop searches that required a specific area, a central coordinate of the study area (-23.3658, 144.292) was used; and where applicable, a 50 – 100 km search buffer was applied. The following resources were reviewed:

- EPBC Act Protected Matters Search Tool (DCCEEW, 2023)
- Atlas of Living Australia (2023)
- Wetland Info (Department of Environment and Science [DES], 2023a)
- WildNet (Queensland Government, 2023)
- Publicly available spatial layers:
  - Queensland waterways for waterway barrier works (DAF, 2016),
  - Watercourse identification map (DRDMW, 2023b)
  - Wetland Maps (DES, 2023b)
- Published reports of aquatic ecology surveys completed in the vicinity of the Project:
  - Aquatic productivity and food webs of desert river ecosystems (Bunn et al., 2006)
  - Temporal changes in fish abundance in response to hydrological variability in a dryland floodplain river (Balcombe and Arthington, 2009)
  - Fish larvae, growth, and biomass relationships in an Australian arid zone river: links between floodplains and waterholes (Balcombe et al., 2007)
  - Fish Distribution in Far Western Queensland, Australia: The Importance of Habitat, Connectivity and Natural Flows (Kerezsy et al., 2014)
  - Variability of fish diets between dry and flood periods in an arid zone floodplain river (Balcombe et al., 2005)
  - The Role of Hydrology in the Ecology of Cooper Creek, Central Australia: Implications for the flood pulse Concept (Puckridge, 1999; Thesis)
  - The distribution, recruitment, and movement of fish in far western Queensland (Kerezsy, 2010; Thesis)
  - Current water accounts and water quality for the Cooper subregion (Karim et al., 2015)
- DAF records (pers. comm.)
- Groundwater Dependent Ecosystem Atlas (BoM, 2023b)

3.2. Field Survey

3.2.1. Survey Timing

A seven-day field survey of aquatic ecology was undertaken by suitably qualified and experienced aquatic ecologists during the late dry season from 28 July to 3 August 2023. Weather was generally cooler overnight and early mornings (~10.8˚C) with warm sunny days (~28.3 ˚C). Rainfall preceding the survey was minimal, although 43.6 mm of rain was recorded at Longreach on 3 and 4 July. Furthermore, Isisford, a rural settlement in close proximity to Oma Waterfall (~10.5 km southwest) recorded 5.6 mm on the 2 August 2023, causing survey limitations (see Section 5).

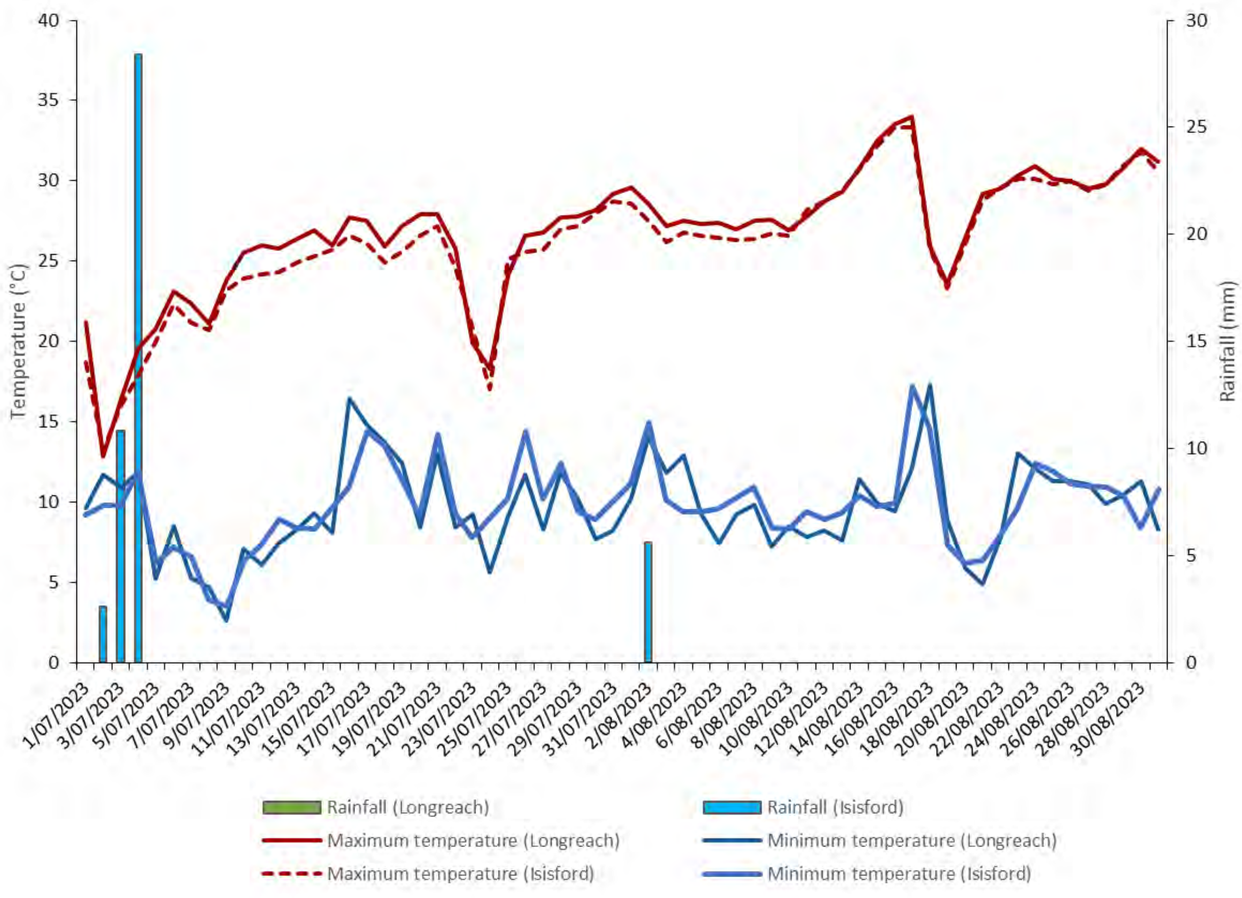


Figure 3-1 Weather conditions prior, during and after field assessment

Over the survey effort, no discharge was recorded at the streamflow monitoring point “Thomson River at Longreach” (DRDMW, 2023b). Discharge at the monitoring station ceased at the end of March 2023. Interestingly, water level on the Thomson River was rising prior to, and during the field survey and is expected to be from surface flows draining to the Thomson River.

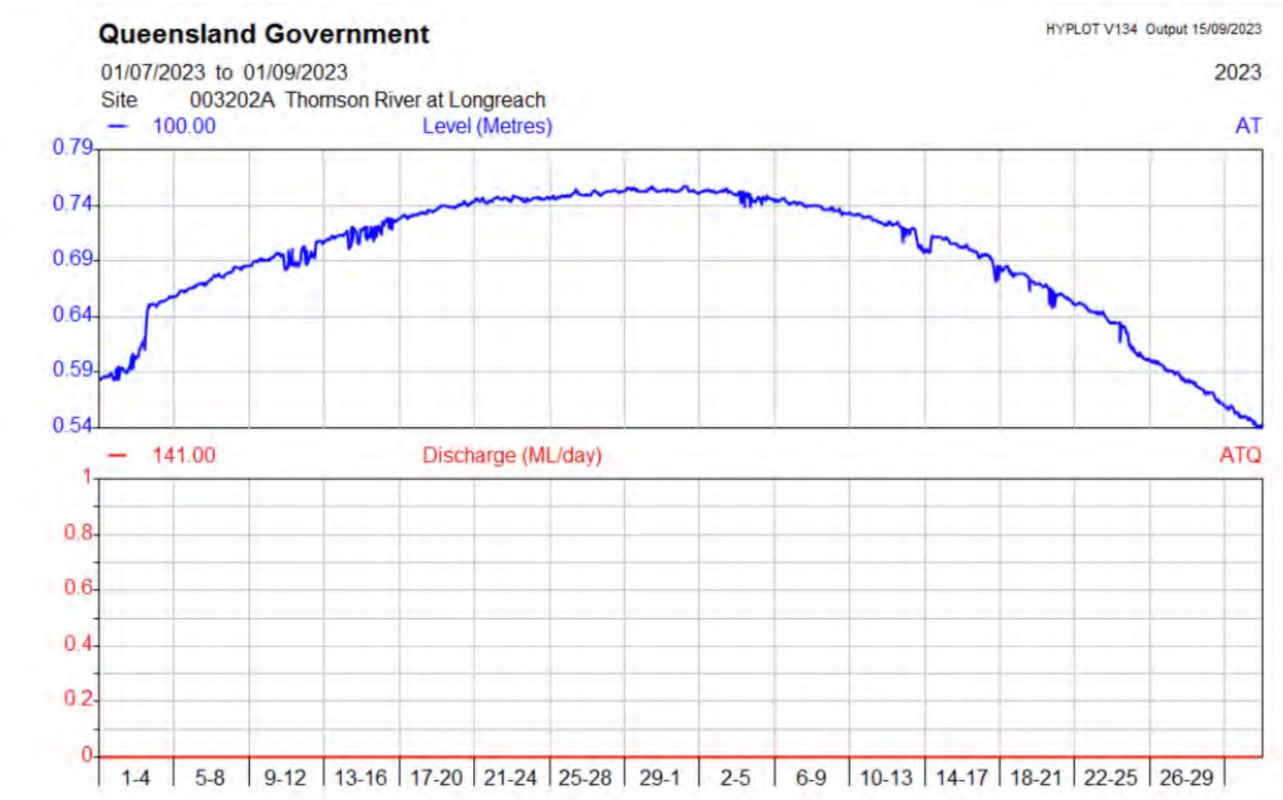


Figure 3-2 Thomson River discharge and water level at Longreach, July and August 2023

Source: DRDMW (2023a)

3.2.2. Site Locations

A total of eight sites were surveyed from the riverbanks. Of those, six were located within the study area where additional inundation is expected in sections of the main channel and anabranches. Two additional sites outside the study area were surveyed, one site was located upstream of Fairmont Weir and one site was located downstream of Town Weir. One analogous site was located within Oma Waterhole, located approximately 97 km south of the Town Weir on the Barcoo River (Figure 3-3, Table 3-1).

Due to site conditions and features, not all sites received equal survey effort (See Section 5). As such, a further nine areas along the Thomson River, from Town Weir to Fairmont Weir were surveyed from a boat, utilising boat-based electrofishing to provide as comprehensive survey as practicable.

A summary of the aquatic ecological indicators and survey effort utilised at each site is provided in Table 3-2. Further detail on each method is provided below.

Longreach Weir Raising

Survey sites and boat electrofishing areas

Ref: JW211640 - Longreach Weir Raising Aquatic | Longreach Fish Locations Author: Shannon Goodwin Date created: 15.09.2023 © NGH 2023 © ESRI 2022

Table 3-1 Survey site location and details

Site ID	Waterway	Purpose	Description	Latitude	Longitude
TRD1	Thomson River	Downstream	Downstream of the existing Town Weir	-23.42658	144.20917
TRPE1	Thomson River	Potential Exposure	Immediately upstream of the existing Town Weir	-23.42067	144.21303
TRPE2	Thomson River	Potential Exposure	Anabranch 1.6 km upstream of the Town Weir	-23.40999	144.22134
TRPE3	Thomson River	Potential Exposure	Anabranch 4.3 km upstream of Town Weir	-23.40256	144.24352
TRPE4	Thomson River	Potential Exposure	Main channel of Thomson River	-23.40000	144.26591
TRPE5	Thomson River	Potential Exposure	Main channel of Thomson River	-23.37879	144.28041
TRPE6	Thomson River	Potential Exposure	Downstream of existing Fairmont Weir	-23.36387	144.29638
TRPE7	Thomson River	Upstream	Upstream of existing Fairmont Weir	-23.36292	144.29854
Oma	Barcoo River	Analogous Site	Comparable site located in waterhole of nearby waterway	-24.28783	144.30868

Table 3-2 Survey methods and effort used

Survey Effort	TRD1	TRPE1	TRPE2	TRPE3	TRPE4	TRPE5	TRPE6	TRPE7	Oma
Water quality	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sediment quality	✓	✓	✓	✓	✓	✓	✓	✓	✓
Habitat assessment	✓	✓	✓	✓	✓	✓	✓	✓	✓
Macroinvertebrates	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fyke nets		✓ (53,700 sec; 55,200 sec)	✓ (55,800 sec; 56700 sec)	✓ (70,680 sec; 70,080 sec)	✓ (64,200 sec; 64,200 sec)	✓ (63,300 sec; 64200 sec)	✓ (68,940 sec; 67,440 sec)	✓ (65,220 sec; 61,470 sec)	✓ (71,700 sec; 73,800 sec)
Box traps		✓	✓	✓	✓	✓	✓	✓	✓
Gill nets	✓ (1,800 sec)	✓ (1,800 sec)	✓ (1,800 sec)	✓ (1,800 sec)					✓
Seine Nets		✓	✓	✓				✓	✓

3.2.3. Surface Water Quality

Surface water quality was collected at each site during the field survey and serves as a snapshot of conditions at the time of the survey. As such, the water quality survey is not comprehensive, and instead, the surface water quality provides environmental context and aids in the interpretation of biological results at the time of the survey.

In-Situ

At each site sampled from the bank (Table 3-1), physicochemical water quality (temperature, conductivity, pH, dissolved oxygen, and turbidity) was recorded from 0.2 m below the water surface using a calibrated YSI ProDSS multi-parameter water quality sonde in accordance with the Queensland Monitoring and Sampling Manual (DES, 2018). Field staff utilising the water quality meter had previous training and experience in the use and calibration of the equipment described.

Grab Samples

At each site sampled from the bank (Table 3-1), surface water quality grab samples were collected from 0.3 m below the water's surface for analysis by a nationally accredited testing authority (NATA) laboratory. Samples were collected in accordance with the appropriate quality assurance and quality control methods as described in the Monitoring and Sampling Manual (DES, 2018)[1]. Analysis of grab samples included:

- Total suspended solids (TSS) and turbidity
- Major ions (sulphate, chloride, calcium, magnesium, sodium, potassium and fluoride)
- Alkalinity (hydroxide, carbonate, bicarbonate, total alkalinity)
- Total hardness
- Dissolved metals and metalloids (aluminium, arsenic, boron, cadmium, chromium, cobalt, copper, lead, molybdenum, nickel, selenium, vanadium, and zinc),
- Nutrients (ammonia, nitrite, nitrate, total nitrogen, oxides of nitrogen (NOx), ammonia, Total Kjeldahl Nitrogen (TKN), reactive and total phosphorous).

It was not possible to filter extremely turbid samples from the Thomson River in the field using 0.45 µm Millipore nitrocellulose filters due to elevated turbidity and suspended fine sediment. The laboratory also completed quality control measures including analysis of blanks, spikes, and duplicates. A Certificate of Analysis for water quality samples is provided in Appendix B.

Data Analysis

NATA-accredited analytical water quality results were reviewed for outliers and sense checked. Parameters with values below or equal to the limit of reporting (LOR) at all sites were noted and not considered further. Where a result was less than the LOR and included for interpretation, it was converted to a value of half of the LOR prior to analyses.

[1] Use of clean disposable powder-free nitrile gloves, sample containers were triple rinsed except those with preservatives, held under appropriate conditions within the required timeframe.

Physical-chemical (PC) stressor and toxicant concentrations were compared against the Australian and New Zealand (ANZG 2018) Default Guideline Values (DGVs) for slightly to moderately disturbed ecosystems in south central Australia (low rainfall areas I.e., most applicable to temporary Inland Waters of central Queensland) at appropriate levels of protection, including:

- For PC stressors in water, including pH, electrical conductivity, dissolved oxygen, turbidity, total suspended solids and nutrients, water quality results were compared against DGVs for the protection of 95% of freshwater species in lowland rivers or lakes, reservoirs and wetlands (where considered suitable); and
- For toxicants in water, including metals and metalloids, DGVs of different levels of protection are applied; DGVs for the protection of 95% of freshwater species, except for those toxicants with potential to bioaccumulate, where 99% species protection values were applied.

Given the Thomson River is part of the Cooper Creek, and more broadly Lake Eyre drainage basin within south central Australia, there is a lack of appropriate guideline values for Queensland inland waters and a lack of water quality objectives (WQO) scheduled in the Environmental Protection (Water and Wetland Biodiversity) Policy 2019. Therefore, the above approach outlined and DGVs applied were considered the most appropriate for comparison purposes.

3.2.4. Sediment Quality

At each site (Table 3-1) a single composite sub-aqueous sediment sample was collected from the stream bank using a stainless-steel trowel. The composite sample comprised 10 sediment subsamples along the length of each site and placed into laboratory provided glass jars and bags. Sediment sampling was completed in accordance with the Monitoring and Sampling Manual (DES, 2018) and the Sediment Quality Assessment: A Practical Guide, Second Edition (Simpson and Batley, 2016).

Currently, samples are being stored under appropriate conditions for further analysis should this be required. As such, no sediment quality analysis has currently been undertaken.

3.2.5. Aquatic Habitat

At each site sampled from the riverbank, the aquatic habitat was assessed based on the Australian River Assessment System (AUSRIVAS) habitat assessment protocol (DNRM, 2001), to describe the aquatic habitat condition, connectivity, and ecosystem value of each site. Observations for aquatic habitat at each site surveyed included:

- Water body features (flow estimate, channel width and channel depth)
- Details of the riparian zone (e.g., width, canopy height, species present) and adjacent land use
- Aquatic habitat diversity based on the habitat types present and their relative percent cover
- Details of the sediment type and diversity (e.g. bed compaction, substrate size)
- Overall habitat condition and value.

At each site, the aquatic habitat was summarised and used to assist interpretation of biological indicator results.

3.2.6. Biological Indicators

Macroinvertebrates

At each site sampled from the riverbank, macroinvertebrate communities (including macrocrustaceans) were sampled to understand ecosystem health at the time of the survey. One AUSRIVAS sample was collected from a 10 m section of edge habitat type using a standard triangular AUSRIVAS dip net (250 µm) standard kick-sweep method (DNRM, 2001). Samples were transferred into triple-labelled sample jars and preserved in a 80% ethanol solution. Currently, macroinvertebrate samples are being stored under appropriate conditions for further analysis should this be required. As such, no analysis of macroinvertebrate communities has been undertaken.

Fish and Turtles

At each site sampled from the riverbank, fish and turtle communities were surveyed using a combination of methods applicable and feasible to the habitat characteristics, including fyke nets, baited box traps, seine nets and gill nets. Backpack electrofishing was attempted at the first site; however, site conditions (sediment stability and waterway depth) prohibited practicality and this method was abandoned from further sites based on unsuitable health and safety risks. Boat based electrofishing was also utilised throughout the Thomson River, from Town Weir to Fairmont Weir. Further details on each survey method are provided under the relevant heading below. Survey methods and effort used at each site during each survey are summarised in Table 3-2.

All sampling was completed in accordance with the Queensland Monitoring and Sampling Manual (DES, 2018), the Australian Code of Electrofishing Practice (Standing Committee for Fisheries and Aquaculture, 1997), the Survey Guidelines for Australia's Threatened Fish (Department of Sustainability, Environment, Water, Population and Communities [DSEWPaC], 2011a); Terrestrial Vertebrate Fauna Survey Guidelines for Queensland (Eyre et al. 2022), Survey Guidelines for Australia's Threatened Reptiles (DSEWPaC, 2011b), and relevant permits issued to Wild Environmental / NGH (General Fisheries Permit 213740, Animal Ethics Approval SUR000600 and Scientific Purposes Permit WA0040648). All pest fish were identified, counted, and euthanized in accordance with permit conditions. No native fish were injured or accidentally killed through the survey effort.

Seine Nets

At each site sampled from the riverbank with suitable habitat and site conditions (i.e., depth, bed stability, snag-free), two seine nets were deployed, with fish community data results pooled for each site. For each seine net, one end of the seine net is held at the shoreline, while the other end is extended into the water by an aquatic ecologist. The net was drawn through the water in an arc, creating a temporary enclosure and encircling fish and other aquatic organisms present in the sampled area. Once complete, the seine net ends are gathered and pulled ashore.

Captured fish were collected from the net and placed into containers for identification, enumeration, and measurement (either total length or fork length depending on species).

Gill Nets

At each site sampled from the riverbank with suitable habitat and site conditions (depth, bed stability, habitat, snag-free), gill nets were deployed and left to soak for 30 min. Upon completion of the soak period, the gill net(s) were retrieved, with fish carefully removed from the gill net.

Captured fish were identified, measured, and recorded.

Fyke Nets

At each site sampled from the riverbank with suitable habitat and site conditions, two fyke nets were deployed and anchored in the water using stakes. As Thomson River was deemed to be a closed system (i.e., not connected due to weirs and water levels during the survey), fykes were generally oriented with one fyke upstream facing and one fyke downstream facing along the banks. Fyke nets were set in shallow waters in close proximity to the banks and within habitat suitable to expected fish species. Nets were left to soak overnight and pulled in the morning.

Captured fish, turtles, and macrocrustaceans were identified, measured, and recorded.

Box Traps

At each site sampled from the riverbank with suitable habitat and site conditions, five box traps were deployed and submerged in the water throughout the reach. Box traps were baited (cat food, chicken pellets, turtle food, fish oil attractant) and soaked overnight.

Captured fish, turtles and macrocrustaceans were identified, measured, and recorded as a total for the site.

Electrofishing - Boat

Boat based electrofishing was undertaken throughout the Town Storage section of the study area, from Town Weir to Fairmont Weir using a Smith-Root 7.5 GPP electrofisher vessel under current AMSA survey; operated by Chris Pietsch (Master Electrofisher; Blue Earth Environmental). The electrical output (voltage, frequency, and duty cycle) was modified as required based on the daily water conditions and observed fish responses and modified where required. The area fished was determined as a start and end GPS location, with all fishing areas receiving approximately 1,000 seconds (1,008 - 1,080 seconds).

Captured species of fish and turtles were identified, measured, and recorded for each area. A summary of fish effort utilising boat-based electrofishing, including electrical output specifications is provided in Table 3-2.

3.3. Quality Assurance / Quality Control

Quality assurance and quality control measures were in accordance with the Queensland *Monitoring and Sampling Manual* (2018), and AS/NZS 5667.1-1998. The following specific methods were employed during field sampling to ensure QA/QC measures were suitable, including:

- Sampling was conducted by suitably qualified and experienced environmental staff who are competent in sampling and making field measurements (i.e. experienced in undertaking field sampling)
- All equipment and instrumentation was appropriately maintained and calibrated

- Samples were collected in appropriately cleaned, pre-treated (if required), and labelled sample containers provided by the analytical laboratory
- Transportation of samples occurred under an appropriate COC documentation procedure.

Samples were submitted to a NATA accredited laboratory for analysis in accordance with the relevant standards. Laboratory QA/QC procedures were conducted in accordance with the *Monitoring and Sampling Manual* 2018.

4. Results

4.1. Surface Water Quality

Water quality in the vicinity of the Project was moderate to good, likely influenced to some degree by surrounding land-use and local geomorphology, which is characteristic of a moderately disturbed ecosystem. Surface water of waterways and wetlands within the vicinity of the Project was highly variable, with spatial heterogeneity in PC stressors and toxicants typical of ephemeral systems in the region (Table 4-1).

The pH of inland waters of the Study Area and surrounds during the survey was generally considered circumneutral (6.5 to 7.5; Foged 1978), ranging from 6.58 -7.18. However, the downstream site, TRD1 was considered alkaline (>7.5; Foged 1978) with a slightly elevated pH (7.58) compared to the other sites during the survey. *In-situ* pH measurements were within ANZG (2018) DGV range (>6.5 to <9.0) for lowland rivers, noting that although the study area is considered upland rivers (>150 m), there is no DGV available. The pH of inland rivers that experience episodic high flow and limited connectivity varies due to surface runoff (which may be poorly buffered), the presence of organic matter, and local catchment geology (Boulton and Brock, 1999, Jeffree et al., 2004). Biological processes including photosynthesis, decomposition, and respiration also influence pH (Reddy and DeLaune, 2008).

Salinity, measured as specific conductivity (electrical conductivity @ 25°C) varied amongst the sites surveyed, ranging from 140.2 µs/cm (TRPE3) to 200.5 µs/cm (TRD1). Oma waterhole, the analogous site on a nearby waterway also presented similar specific conductivity (166.1 µs/cm). Although the survey was undertaken during the late dry period, specific conductivity values are indicative of fresh water (i.e., <1,500 µs/cm), under the Lower-DGV (300 µs/cm), indicating that although evaporation occurs, pools remain fresh throughout the year.

During the survey, the dominance of cation in surface waters typically followed Na>Ca>K>Mg, while anions followed HCO3>CO3>Cl>SO4. Local and regional differences in ionic dominance of temporary connected inland waters is known to occur due to varying weathering of local geology and soils within the catchment, algal growth, and carbon equilibria (Smith, Jeffree et al. 2014), Pinder, Lyons et al. 2014). Alkalinity is important for aquatic fauna as it can protected against rapid pH changes. Low alkalinity waters (<20 mg/L as CaCO3) generally have a lower buffering capacity and are therefore more susceptible to fluctuations in pH. Sites surveyed along the Thomson River and at the analogous site (Oma Waterhole) had total alkalinity greater than 20 mg/L; ranging from 50 mg/L (TRPE1) to 77 mg/L (TRD1). Although total alkalinity at sites surveyed was higher than 20mg/L, it is considered that sites have a moderate buffering capacity of surface waters.

Surface water temperature across sites surveyed were variable and largely reflected sampling time (and ambient conditions), ranging from 16.7°C (TRPE3) to 20.7°C (Oma). There are no DGV for temperature, and instead, temperature is useful in the interpretation of other surface water quality parameters.

Dissolved oxygen (DO) saturation (%) across the sites surveyed was variable, ranging from 56.4% (TRPE3) to 97.7% (TRD1). DO levels at four sites (TRPE3, TRPE1, TRPE7 and TRPE6), were below the Lower-DGV (90%) of lowland waters for south central Australia - low rainfall areas - for slightly disturbed ecosystems. All DO levels recorded *In-situ* were under the upper-DGV (110%). DO is a basic indicator of ecosystem health; however, DO concentrations vary with temperature, salinity, biological activity and rate of transfer from the atmosphere (ANZECC, 2000). Furthermore, diurnal fluctuations in DO are typically evident in waterways and are in response to biological and physiological processes (Boulton and Brock, 1999, Reddy and DeLaune, 2008). Sites with DO saturation below the DGV were generally surveyed in the early morning and are correlated with lower water temperatures (reflecting early morning). Low levels of DO are associated with anoxia conditions capable of suffocating organisms, and which can potentially lead to the release of nutrients and metals bound in sediments (Connell, Vowles et al., 2005). Although DO saturation was measured below the DGV at some sites, dissolved oxygen was above 25% (or 2 mg/L) a critically limiting saturation, and as such, variable saturation values are considered natural and within natural health of ecosystems.

Thomson River and waterways within the surrounding Cooper Creek and Diamantina Basins exhibit high turbidity with varying trends as a result of local influences. During the survey, surface water turbidity was variable, ranging from 169 NTU (TRPE6) to 498 NTU (TRD1). Generally, turbidity at sites within the Thomson River from Town Weir to Fairmont Weir was relatively comparable (TRPE 1 – TRPE6); although TRPE6 had slightly lower turbidity (169 NTU) than other sites in the reach. Substrate was dominated by large boulders and firm substrate, an artefact of the constructed fish passage which is likely reducing fine particles suspended in the water column. Furthermore, water with lower turbidity (179 NTU) in upstream Fairmont Weir (TRPE7) was observed to be flowing through the substrate and was further contributing to the observed lower turbidity. Due to isolated water holes forming during extended dry seasons in the Cooper Creek Basin, differing turbidity trends are expected to be representative of local influences than generally deteriorating water at the downstream site TRD1 compared to sites within the main reach of Thomson River (DERM, 2011b). Although turbidity is above the DGV (100 NTU), values are considered normal for the region and waterway.

Concentrations of nutrients typically fluctuate through waterways and are influenced by surrounding catchment uses, human impacts and biological inputs. Total nitrogen concentration was generally comparable at sites sampled in Thomson River from Town Weir to above Fairmont Weir (ranging from 600µg/L - 800µg/L); although total nitrogen concentration at TRPE2 was slightly elevated (1,200µg/L) and above the DGV (1,000µg/L). Total nitrogen concentration at TRD1 (downstream site) and Oma (analogous site) were also above the DGV; however, concentrations were comparable with TRPE2 (1,400 µg/L and 1,200 µg/L, respectively). Total phosphorus concentrations at all sites surveyed was above the DGV (100 µg/L). Similar to total nitrogen, total phosphorus concentrations were elevated at the downstream site (TRD1) and analogous site (Oma) compared to other sites in the Thomson River. Total phosphorus is typically derived from soil, plant, and animal materials associated with both undisturbed and agricultural land uses, including those surrounding the Study area.

Dissolved metal concentrations were relatively comparably amongst sites surveyed. Concentrations of cadmium (Cd), chromium (Ch), cobalt (Co), lead (Pb), molybdenum (Mo), selenium (Se) and vanadium (V) were below the limit of reporting (LOR) at all sites surveyed. Furthermore, arsenic (As), nickel (Ni) and boron (B) were all below the DGV for the protection of 95% of aquatic ecosystems. Due to the isolated nature of the area, minimal industrial influences upstream, limited transport pathways and location in the upper reaches of the waterway, the low concentrations are expected. However, some metal concentrations were above the DGV, including:

- Dissolved copper (Cu) was above the DGV (1.4 µg/L) at all sites except TRPE1 and TRPE3, with concentrations ranging from 1.0 µg/L to 3.0 µg/L. Concentration of dissolved copper was highest at TRD1 (3.0 µg/L) and is likely to be reflective of the isolated waterbody and local conditions. In natural waters, Cu is largely complexed by natural dissolved organic matter (DOM) such as humic, fulvic and tannic acids, or adsorbed to colloidal, humic-coated iron and/or manganese oxide particles (Mantoura et al. 1978, Florence & Batley 1980, Moore & Ramamoorthy 1984). The peak concentration recorded during the survey exceeds the DGV for 80% of species protection (2.5 µg/L). It is assumed that the resident aquatic fauna (I.e., algae, invertebrates and fish) are adapted / tolerant to the current Cu levels to some degree, and the moderate buffering capacity of surface waters might reduce some of the uptake / toxicity in low salinity conditions (Denton & Burdon-Jones 1982, 1986, Stauber 1995, Stauber et al. 1996).
- Dissolved aluminium (Al) was above the DGV (55µg/L) at all sites except TRD1 and TRPE6. Concentrations were comparable amongst sites, ranging from 40 µg/L to 100 µg/L. A freshwater moderate reliability trigger value of 55 µg/L was derived for aluminium at pH >6.5 using the statistical distribution method (Burr distribution as modified by CSIRO, ANZECC & ARMCANZ, 2000 Section 8.3.3.3) with 95% protection. Fish are generally more sensitive to aluminium than aquatic invertebrates (Gensemer & Playle, 1999). Aluminium is a gill toxicant to fish, causing both ionoregulatory and respiratory effects (Gensemer & Playle, 1999). However, aluminium is generally more toxic in acidic surface waters than recorded during the Survey, and uptake in freshwater organisms generally decreases with increasing water hardness under neutral and alkaline conditions (Folsom et al., 1986, Playle et al., 1989, Reid & McDonald, 1991, Gunderson et al., 1994).
- Dissolved zinc (Zn) was below the DGV (8 µg/L) at all sites except TRPE7, with a recorded concentration of 20 µg/L. Given that concentrations recorded at all other sites were below the NATA-accredited LOR (5 µg/L), it is considered likely this exceedance is an erroneous result due to incidental contamination of the water at TRPE7 with sunscreen.

Table 4-1 Water quality monitoring results during survey. Cells shaded grey are background exceedances of DGVs, whereas only bold text is equivalent to the DGV.

Parameter	DGV	Unit	TRD1	TRPE1	TRPE2	TRPE3	TRPE4	TRPE5	TRPE6	TRPE7	OMA
In-Situ											
Temperature		°C	20.2	16.8	19.1	16.7	18.8	18.5	16.6	17.1	20.7
Specific (Electrical) Conductivity	300[A]	μs/cm	200.5	147.4	148.2	140.2	162.5	153.3	168.0	206.1	166.1
Salinity		ppt	0.10	0.08	0.08	0.08	0.09	0.08	0.06	0.12	0.09
pH	>6.5 ; <9.0	pH	7.53	6.86	7.16	6.86	6.98	7.18	7.10	6.58	7.01
Dissolved Oxygen	≥90 ; ≤110[B]	% Sat.	97.7	**72.1**	90.8	**56.4**	96.4	94.2	**84.2**	**79.2**	95.7
Dissolved Oxygen		mg/L	8.84	6.99	8.40	5.45	8.97	8.83	8.18	7.63	8.59
Water Clarity											
Suspended Solids		mg/L	192	21	96	137	72	54	30	46	87
Turbidity	≤100[C]	NTU	**498**	**213**	**243**	**265**	**273**	**245**	**169**	**179**	**277**
Major Ions											
Bicarbonate Alkalinity		mg/L	77	50	51	58	51	53	61	64	56
Total Alkalinity		mg/L	77	50	51	58	51	53	61	64	56
Sulfate		mg/L	9	8	10	9	10	10	14	15	7
Chloride		mg/L	11	11	11	11	11	11	14	14	6
Calcium		mg/L	12	10	9	10	10	11	13	13	13
Fluoride		mg/L	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2
Magnesium		mg/L	4	3	3	3	3	3	4	4	3
Sodium		mg/L	26	20	20	20	21	21	25	26	11
Potassium		mg/L	5	5	5	6	5	5	5	5	7
Total Hardness		mg/L	46	37	35	37	37	40	49	49	45
Total Anions		meq/L	2040	1480	1540	1660	1540	1580	1900	1980	1430
Total Cations		meq/L	2190	1740	1690	1770	1790	1840	2190	2240	1550

Parameter	DGV	Unit	TRD1	TRPE1	TRPE2	TRPE3	TRPE4	TRPE5	TRPE6	TRPE7	OMA
Dissolved Metals											
Aluminium	≤55	µg/L	40	**60**	**100**	**80**	**100**	**80**	50	**60**	**60**
Arsenic	≤1[D]	µg/L	**1**	**1**	**1**	**1**	**1**	**1**	<LOR	<LOR	**1**
Copper	≤1.4	µg/L	**3**	1	**2**	1	**2**	**2**	**2**	**2**	**2**
Nickel	≤11	µg/L	1	<LOR	<LOR	1	1	1	1	1	2
Zinc	≤8	µg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	**20**	<LOR
Boron	≤940	µg/L	70	<LOR	<LOR	70	<LOR	<LOR	<LOR	<LOR	<LOR
Nutrients											
Ammonia	≤100	µg/L	90	**150**	**220**	**180**	**190**	**140**	**150**	**150**	**260**
Nitrite		µg/L	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	<LOR	10	<LOR
Nitrate		µg/L	50	60	50	20	130	140	80	60	240
Nitrogen Oxides (NOx)	≤100	µg/L	50	60	50	20	**130**	**140**	80	70	**240**
Total Kjeldahl Nitrogen		µg/L	1,300	700	1,100	600	700	600	600	700	1,000
Total Nitrogen	≤1,000	µg/L	**1,400**	800	**1,200**	600	800	700	700	800	**1,200**
Total Phosphorus	≤100	µg/L	**370**	**200**	**250**	**250**	**220**	**210**	**150**	**150**	**320**
Filterable Reactive Phosphorus	≤40	µg/L	30	**40**	**40**	**40**	**40**	**40**	10	10	**70**

Note:

A = DGV for EC is the lower limit (300 µs/cm) provided for slightly disturbed lakes, reservoirs & wetlands.

B = DGV for DO % saturation is not defined for upper limit, therefore, 110% saturation has been applied, a conservative DGV consistent with south-east Australia.

C = DGV for Turbidity is the upper limit (100 NTU) provided for slightly disturbed lakes, reservoirs & wetlands as Thomson River has highly dispersable soils, and wind induced resuspension of sediments, which results in high turbidity.

D = DGV for As III 99% species protection applied due to the potential for bioaccumulation.

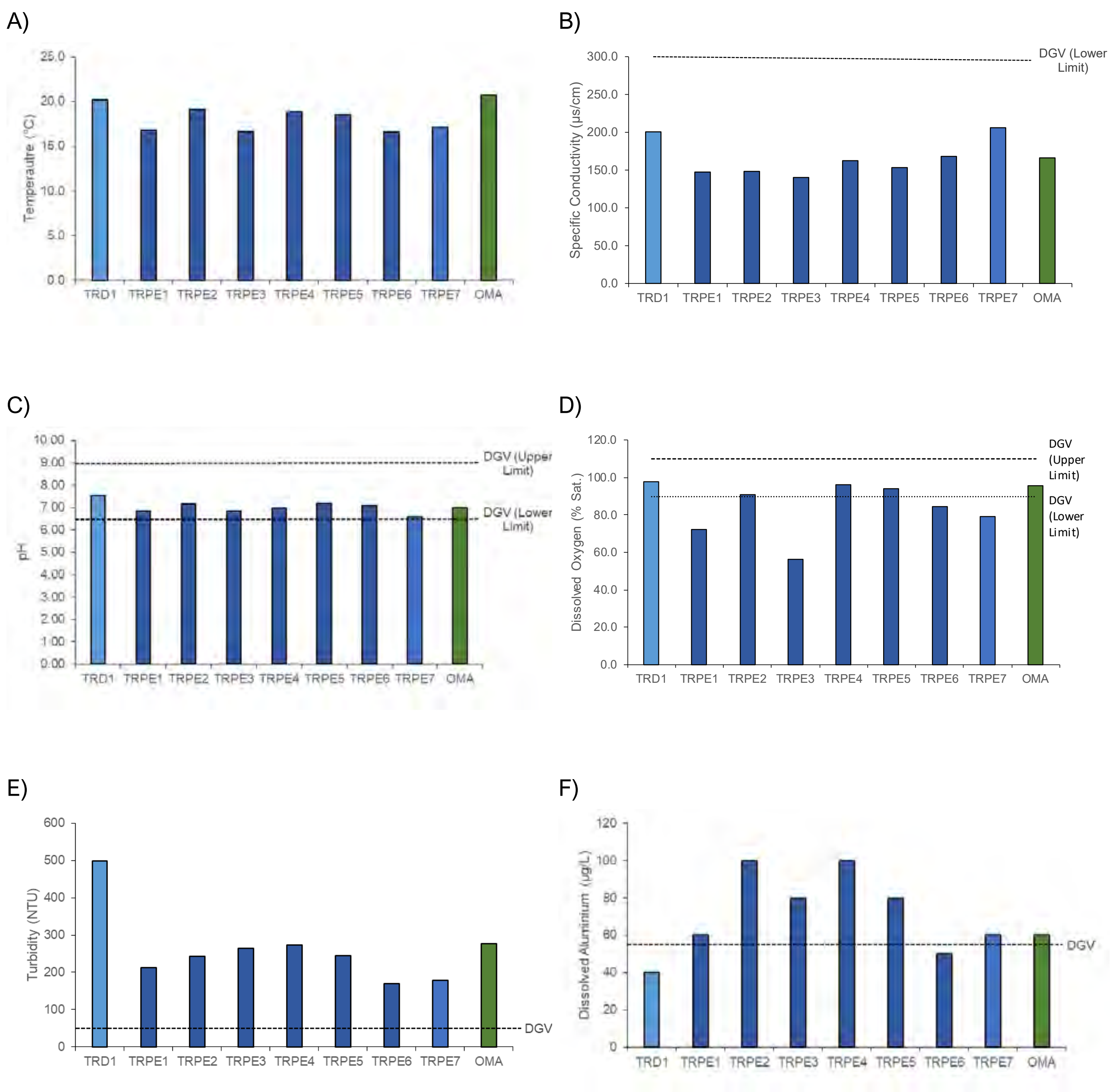


Figure 4-1 Comparison of select surface water parameters at sites surveyed. Dotted black lines show the protection of 95% of freshwater species set by ANZG (2018) where relevant.

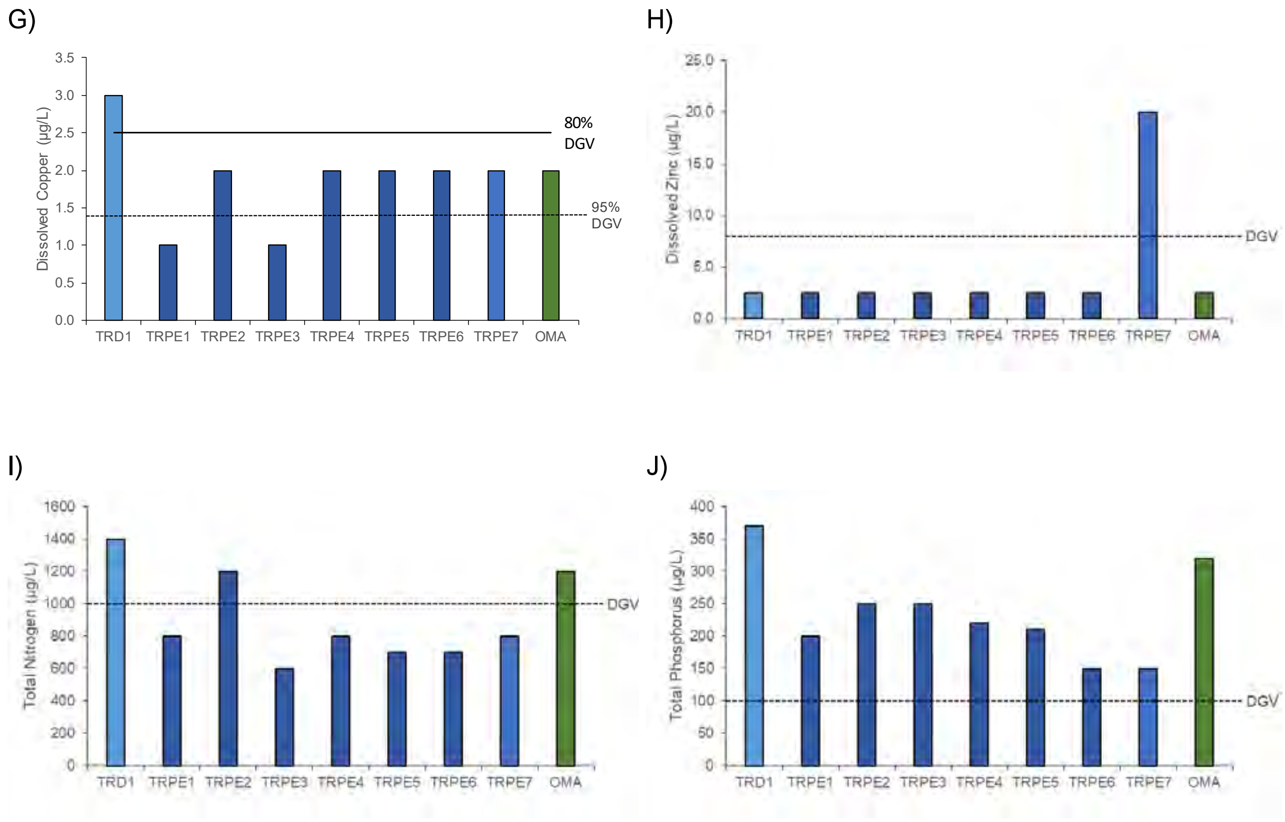


Figure 4-2 Comparison of select surface water parameters at sites surveyed. Dotted black lines show the protection of 95% of freshwater species set by ANZG (2018) where relevant.

4.2. Aquatic Habitat

Aquatic habitat condition was consistent amongst sites surveyed from the riverbank on the Thomson River. Sites were generally dominated by clay material (>98%); although, minute quantities of sand were recorded at TRPE4 and TRPE5 (2% and 1%, respectively). Aquatic habitat at TRPE6 was an anomaly, with cobbles and boulders dominating the substrate (50% and 30%, respectively); however, clay was still relatively abundant (20%). TRPE6 is immediately downstream of the Fairmont Weir and observed substrate differences attributed to the construction and operation of the double fish way installed in 2000. Furthermore, Oma Waterhole also recorded variable substrate, although the substrate was still dominated by clay (85%), as is typical of the region.

Aquatic habitat complexity was generally low throughout the Thomson River, with a general absence of macrophytes and submerged woody structure through the main channel, likely reflecting the high flows during wet season. Furthermore, riparian vegetation was predictably low and sparse along the main river channel, although canopy cover increased at anabranch sites (TRPE2 and TRPE3) and will be an important parameter for juvenile fish. Algal cover and detritus cover was consistently low throughout the Thomson River, irrespective of location although Oma Waterhole had a slightly higher abundance of algal cover than other sites.

Waterway connectivity in the Thomson River was inhibited by the Town Weir during the survey, and as such, the area upstream of the Town Weir is serving as a dry season refuge. Under high flow conditions, the Town Weir is expected to drown out and facilitate fish passage upstream. Oma Waterhole also serves as a dry season refuge, compressing to a 16 ha area pool, and connecting to the Cooper Creek in the wet season.

A summary of aquatic habitat values recorded at each of the sites is provided below in Table 4-2.

Table 4-2 Aquatic habitat values at sites assessed from riverbank during survey

Habitat Values	TRD1	TRPE1	TRPE2	TRPE3	TRPE4	TRPE5	TRPE6	TRPE7	Oma
Channel Width (m)	14.2	33.6	34.5	11.9	79.2	58.0	67.0	78.2	39.0
Velocity (m/s)	NF	NF	NF	NF	NF	NF	0.5	NF	NF
Canopy Cover (%)	10	1	20	15	1	1	1	1	15
Emergent Vegetation (%)	10	20	40	30	25	20	15	30	5
Algal Cover (%)	1	1	1	1	1	1	1	1	5
Detritus (%)	1	1	1	1	1	1	1	1	2
LWD (%)	0	1	1	5	2	1	1	1	3
Boulders (%)	0	0	0	0	0	0	30	0	0
Cobbles (%)	0	0	0	0	0	0	50	0	3
Pebbles (%)	0	0	0	0	0	0	0	0	2
Gravel (%)	0	0	0	0	0	0	0	0	10
Sand (%)	0	0	0	0	2	1	0	0	0
Clay (%)	100	100	100	100	98	99	20	100	85

4.2.1. Aquatic Plants

One hundred and fifty-two aquatic plants species are identified as ‘known to occur’ in the Thomson River sub-basin (DES 2023c; Table 9.2 Appendix D). Of these, 24 species have been recorded from the surrounding waterways (DES, 2023c); however, no species are identified as conservation significant species under the NC Act. Three species; (*Nymphaea georginae*, *Potamogeton crispus*, and *Potamogeton tricarinatus*) are identified as special least concern.

Few studies have documented aquatic macrophyte species and abundance within the Thomson River. Instead, permanent waterholes present a “bath-tub ring” of algae, although this phenomenon is generally restricted to the littoral margins of the waterholes due to high turbidity present. Although algae are relatively limited in their extent due to a shallow mean photic zone depth (<23cm), stable isotope analysis indicates algae are the main energy source for the molluscs, crustaceans, and fish throughout the dryland river systems (Bunn et al., 2006).

Only three aquatic flora species were recorded during the survey; *Persicaria lapathifolia, Persicaria attenuate, and Cyperus* sp. These species are all considered emergent (i.e., rooted to the bottom, but leaves and stems extending out of the water) and were found in the survey along the edges of the Thomson River, and Oma Waterhole. Aquatic flora abundance was variable at sites surveyed along the Thomson River, ranging from 10% at the downstream site (TRDE7) to 40% at TRPE2. Abundance of flora was comparably lower at the analogous site (Oma Waterhole; 5%) than at other sites in the Thomson River, however this may be due to site specific conditions rather than Oma Waterhole as an area.

4.3. Aquatic Fauna Values

4.3.1. Aquatic Macroinvertebrates

Generally, aquatic macroinvertebrate diversity is generally low in dryland river systems, although taxa are highly specialised and adaptable to spatial and temporal heterogeneity of water quality, flows and connectivity. Previous literature identified twenty-three zooplankton taxa and seventeen macroinvertebrate taxa in nearby waterways (Puckridge, 1999). Aquatic invertebrates are the dominant energy source for fish, with calanoid copepods the major food source (>50%) for most inland fish species although terrestrial invertebrates are important for some fish species (*Melanotaenia splendida*; average of 80% terrestrial origin) (Balcombe et al., 2005).

Two species of decapod were recorded during the survey, river prawns (*Macrobrachium* sp.) and redclaw crayfish (*Cherax quadricarinatus*) (Picture 4-1). The former species were present in large abundance at all sites, whereas the latter species were only recorded in the Thomson River upstream Fairmont Weir (eight individuals; site TRPE7). Anecdotal evidence from recreational fishers along the main channel of Thomson River suggests *C. quadricarinatus* is also present in large numbers throughout the system. The red claw crayfish is documented in areas north of Longreach to south of Jundah, although its presence is relatively new (within the last decade) and thought to have originated from the Gulf catchments. No yabbies (*Cherax destructor*) were recorded during the Survey.

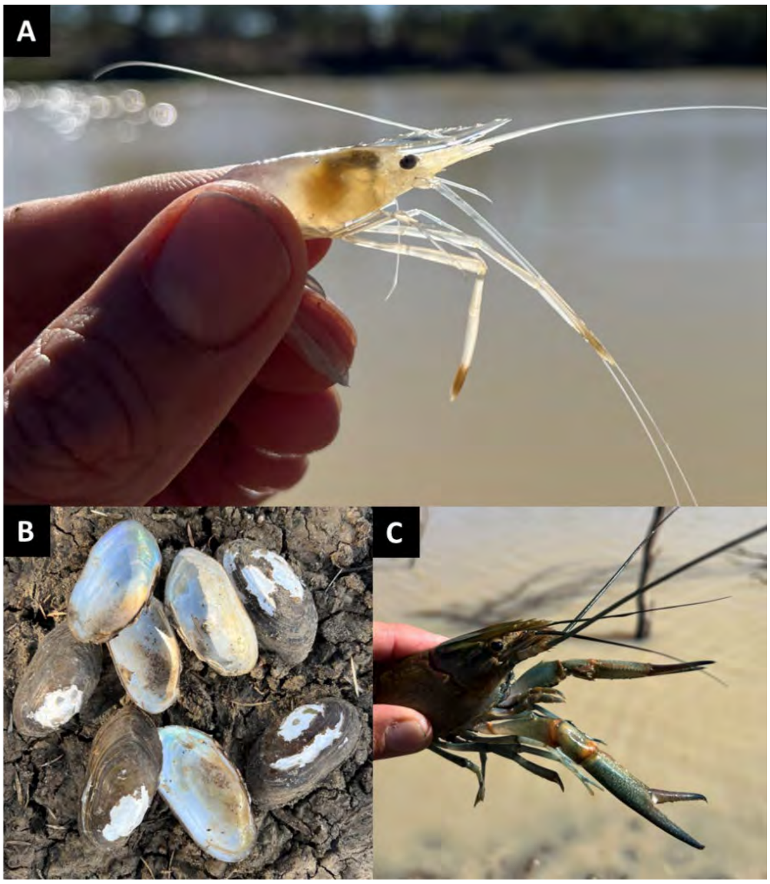
In addition, there were observations of deceased freshwater mussels (Velesunio spp.) in the main channel Thomson River (Picture 4-1), upstream Fairmont Weir (TRPE7) and downstream of Town Weir (TRD1). No live specimens were encountered during the Survey.

4.3.2. Freshwater Fish

Species Richness, Abundance and Spatial Trends

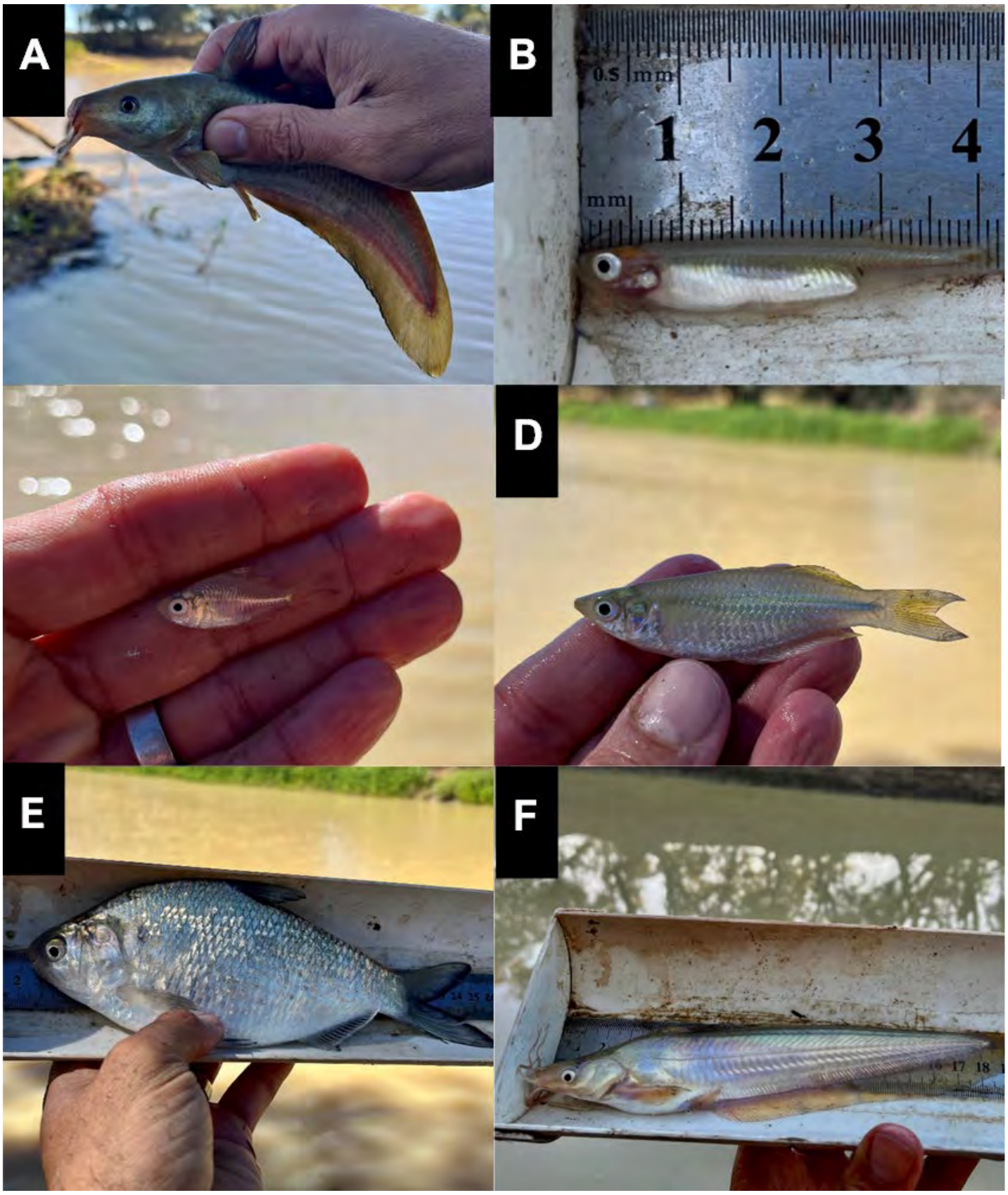
In total, sampling over seven consecutive days within the main channel Thomson River, upstream Fairmont Weir, downstream Town Weir and at Oma Waterhole recorded 12 species of fish, comprising 11 native and one exotic (Picture 4-2, Picture 4-3, Table 4-3). No species listed as vulnerable and/or endangered under the Commonwealth EPBC Act or Queensland NC Act were recorded during the Survey.

A total of 1,547 individuals were recorded (Table 4-2), with abundant species *N. erebi* (35% total catch) and *R. semoni* (31%), which together accounted for greater than 65% of total catch. Other abundant species included *Ambassis* sp., *M. ambigua*, *O. lineolata*, each accounting for approximately 7% total catch. The remaining seven species recorded during the survey were present in low numbers, typically representing less than 3% total catch (Table 4-3).



Picture 4-1 Notable invertebrate records during the survey; (A) Macrobrachium sp., (B) Deceased Velesunio spp. and (C) red claw (*Cherax quadricarinatus*)

Picture 4-2 Fish species recorded during the survey; (A) Barcoo grunter (*Scortum barcoo*), (B) Golden Perch (*Macquaria ambigua*)



Picture 4-3 Fish species recorded during the survey; (A) Hyrtl's tandan (*Neosilurus hyrtlii*), (B) Australian smelt (*Retropinna semoni*), (C) glassfish (*Ambassis sp.*) , (D) desert rainbowfish (*Melanotaenia splendida splendida*), (E) bony bream (*Nematalosa erebi*), (F) silver tandan (*Porochilus argenteu*)

Table 4-3 Summary of fish species catch records by location during the survey

Origin	Family	Genus	Species Name	Common Name	D/S Town Weir (TRD1)	Thomson River (main channel)	U/S Fairmont Weir (TRPE7)	Oma Waterhole (Barcoo River)
Freshwater	Ambassidae	Ambassis	Ambassis species	Northwest glassfish	0	28	92	1
	Clupeidae	*Nematalosa*	Nematalosa erebi	Bony bream	4	508	6	29
	Eleotridae	*Hypseleotris*	*Hypseleotris sp.*	Australian carp	0	3	1	0
		Oxyeleotris	*Oxyeleotris lineolata*	Sleepy cod	0	91	5	3
	Melanotaeniidae	*Melanotaenia*	*Melanotaenia splendida tatei*	Desert rainbowfish	0	27	27	0
	Percichthyidae	*Macquaria*	*Macquaria ambigua*	Golden perch	0	105	3	2
	Plotosidae	*Neosilurus*	*Neosilurus hyrtlii*	Hyrtl's catfish	1	9	0	6
		Porochilus	*Porochilus argenteus*	Silver catfish	14	0	0	22
	Retropinnidae	*Retropinna*	*Retropinna semoni*	Australian smelt	0	433	53	1
	Terapontidae	*Leiopotherapon*	*Leiopotherapon unicolor*	Spangled perch	2	3	1	5
		Scortum	*Scortum barcoo*	Barcoo grunter	0	23	0	0
Exotic	Poeciliidae	*Gambusia*	*Gambusia holbrooki*	Mosquitofish	0	3	35	1
				Total Fish Catch	**21**	**1233**	**223**	**70**
Decapods	Parastacidae	*Cherax*	*Cherax quadricarinatus*	Redclaw crayfish	0	0	8	0
	Palaemonidae	*Macrobrachium*	*Macrobrachium sp.*	Freshwater prawns	0	255	242	0
Freshwater turtles	Chelidae	*Chelodina*	*Chelodina (Chelodina)*	Eastern long-necked	0	1	0	0
		Emydura	*Emydura*	Emmott's Turtle	0	10	1	1

Table 4-4 Summary of fish species catch records by fishing method during the Survey, showing size range (mm)

Origin	Family	Genus	Species Name	Common Name	Integrated net sampling	Boat-based Electrofishing	Size range (mm)	
							Min	Max
Freshwater	Ambassidae	*Ambassis*	*Ambassis species*	Northwest glassfish	117	4	18	49
	Clupeidae	*Nematalosa*	Nematalosa erebi	Bony bream	220	327	14	280
	Eleotridae	*Hypseleotris*	*Hypseleotris sp.*	Australian carp gudgeon	4	0	20	28
		Oxyeleotris	*Oxyeleotris lineolata*	Sleepy cod	49	50	25	455
	Melanotaeniidae	*Melanotaenia*	*Melanotaenia splendida tatei*	Desert rainbowfish	42	12	16	75
	Percichthyidae	*Macquaria*	*Macquaria ambigua*	Golden perch	9	101	45	530
	Plotosidae	*Neosilurus*	*Neosilurus hyrtlii*	Hyrtl's catfish	16	0	155	290
		Porochilus	*Porochilus argenteus*	Silver catfish	36	0	145	230
	Retropinnidae	*Retropinna*	*Retropinna semoni*	Australian smelt	358	129	19	50
	Terapontidae	*Leiopotherapon*	*Leiopotherapon unicolor*	Spangled perch	9	2	90	185
		Scortum	*Scortum barcoo*	Barcoo grunter	0	23	135	360
Exotic	Poeciliidae	*Gambusia*	*Gambusia holbrooki*	Mosquitofish	37	2	19	35
				Total Fish Catch	**897**	**650**		
Decapods	Parastacidae	*Cherax*	*Cherax quadricarinatus*	Redclaw crayfish	8	0	Not recorded	
	Palaemonidae	*Macrobrachium*	*Macrobrachium sp.*	Freshwater prawns	497	0	Not recorded	
Freshwater turtles	Chelidae	*Chelodina*	*Chelodina (Chelodina)*	Eastern long-necked turtle	1	0	185	185
		Emydura	*Emydura*	Emmott's Turtle	8	4	55	320

Figure 4-3 Distribution of fish species captured during the Survey

Legend codes: Barcoo grunter (SCO BAR), bony bream (NEM ERE), carp gudgeon spp. (HYP SPP), desert rainbowfish (MEL SPL), eel-tail tandan catfish (NEO HYR), gambusia (GAM HOL), golden perch (MAC AMB), northwest glassfish spp. (AMB SPP), sleepy cod (OXY LIN), smelt (RET SEM), spangled perch (LEI UNI), silver tandan (POR ARG)

While most species recorded during the survey are considered widespread and/or common within Inland Waters of central Australia, notable records include:

- Barcoo grunter (*Scortum barcoo*) endemic to Central Australia, primarily the Barcoo River, Cooper Creek and surrounds, were recorded from main channel of Thomson River only. While uncommon, they may be locally abundant at times and can tolerate temperatures up to 40°C (Merick and Schmida 1984). The 23 individuals recorded during the survey were collected from boat-based electrofishing (Table 4-4, Appendix A). A population of S. *barcoo* upstream of Fairmont Weir is likely to occur, as supported by historic records (McGill and Marsden, 2001), although not confirmed during this survey (electrofishing could not be undertaken, see Section 5). Furthermore, recreational fishing records obtained during the survey indicated the presence of *S. barcoo* at Oma Waterhole (DAF pers. Comm. .).
- Silver tandan (*Porochilus argenteus*) are found in Central Australia in the Diamantina and Georgina rivers (tributaries of Cooper Creek). The 36 individuals recorded during the survey were from gill netting only, with species recorded at TRD1 and Oma Waterhole (Table 4-4, Appendix A). Absence of catch records from main channel of Thomson River during the Survey, may in part, reflect difficulty in the use of fine mesh gill nets due to the size and depth of the channel.
- Sleepy cod (*Oxyeleotris lineolata*) has been introduced to the Thomson River catchment, outside of its natural distribution, coastal drainages across northern Australia to south-east Queensland (also occurring in Papua New Guinea, Allen et al. 2002). It is a benthic species and a voracious predator. Ninety nine individuals were recorded during the survey, present in the main channel of Thomson River, upstream Fairmont Weir (TRPE7) and Oma Waterhole (Table 4-2, Appendix A). No catch was recorded downstream of the Town Weir (TRD1). The species undoubtedly increases predation pressure on small to medium bodied species (Sternberg and Cockayne, 2018) and may potentially displace large bodied species from local habitat structure like submerged woody debris, particularly during spawning periods (i.e., male guards nest from October to February).
- The species complex of carp gudgeon, *Hypseleotris* spp. were recorded in low abundance, with only four individuals recorded; three from the main channel of Thomson River and one individual upstream of Fairmont Weir (TRPE7) (Table 4-3, Appendix A).
- Eastern Gambusia (*Gambusia holbrooki*) are an invasive pest species, widespread and common in Cooper Creek as well as the Neales and Diamantina rivers. A total of 39 individuals were recorded during the survey; the majority recorded at upstream of Fairmont Weir (TRPE7), with low counts in main channel of Thomson River and a single record at Oma waterhole (Table 4-3, Appendix A).

Additionally, two species identified during the desktop review (NGH, 2023), Welch's Grunter (*Bidyanus welchi*) and Cooper Creek Catfish (*Neosiluroides cooperensis*) were not recorded during the survey. The latter species is listed as Endangered on the ICUN Redlist of Threatened Species (IUCN 2019). Both species have only been captured infrequently from the Thomson River within the last two decades (McGill and Marsden, 2001), with *N. cooperensis* endemic to the Cooper Creek catchment (Unmack, 1996).

This large species grows to at least 600 mm and has the largest egg size and lowest fecundity per unit length of any fish in central Australia, and any other Australian freshwater plotosid (Unmack, 1996). The majority of eel tailed catfish catch records (i.e., *N. hyrtlii* and *P. argenteus*) during the survey were from fine mesh gill nets (i.e., TRD1, TRPE1 and Oma Waterhole). Water depth exceeding 2 m, steep bank angles and soft / fine sediments prevented effective use at most sites at main channel of Thomson River and could be a contributing factor to lack of catch records. Further, Peter J Unmack (pers. Comm.) reports all catch records for *N. cooperensis* on rod and line, a method not employed during the survey due to time constraints. Discussion with Steve Brooks (Fisheries Biologist, Department of Agriculture Fisheries and Forestry) suggests *N. cooperensis* are likely still present in the Thomson River main channel, albeit in low density, and that the cryptic nature of the species accounts for the lack of record during the Survey. It has been recommended that deployment of fine mesh net gill nets which are weighted and sit along the benthic substrate, may increase the likelihood of catch (s. Brooks pers. comm.).

Survey timing under no flow conditions is not considered optimal for Welch's Grunter, which are known to migrate upstream during summer when the water temperature increases with an increase in water depth (sometimes due to flooding) (Allen, Midgley et al., 2002; Lintermans, 2007; Bray and Gomon, 2023).

Catch data from boat-based electrofishing (Table 4-4), of similar / standardised effort amongst shots (n=9, time on ranging from 1008 to 1080 seconds) indicated a greater total catch at either end of the main channel in the Thomson River. Electrofishing shot 5 in the reach closest to Fairmont Weir accounted for greater than 30% of total catch, while shot 4 in the reach closest to Town Weir accounted for greater than 20% of total catch. While *N. erebi* dominated catch for electrofishing shot 4 (124 individuals, 89% of total catch), three species were abundant in shot 5; the small-bodied *R. semoni* (96 individuals, 47% of total catch), large bodied *M. ambigua* (42 individuals, 20% of total catch) and *N. erebi* (36 individuals, 18% of total catch). In addition, many *R. semoni* (239 individuals) were captured at site TRPE6 in fyke nets, which in part, may be associated with leakage / loss beneath Fairmont Weir, which acts as a cue for smelt to school and migrate upstream due to surface water flows / riffles.

Fish age-size class

Abundant Species

Comparative length-frequency histograms for individual species are presented in Figure 4-4. Size ranges for each species are species are detailed in Table 4-4. Species with consistent catches throughout the main channel of Thomson River were selected for age-size class population comparison due to their ubiquitous presence during the survey. A summary of key findings is provided below:

- Bony Bream (*N. erebi*), a large bodied species, were captured in high numbers in the main channel of Thomson River, ranging from 14 mm to 280 mm. There were two dominant cohorts; new recruits (0-49 mm in length) and adults (150-199 mm in length). The species is known to mature within 1-2 years, with males and females reaching 130 mm and 104 mm in length respectively at their first maturity. Similarly, most of the cohort upstream of Fairmont Weir (TRPE7) were dominated by adults of *N. erebi,* while the Oma Waterhole population had a majority of sub-adults reaching maturity. Similar pattern was observed at downstream of the Town Weir (TRD1) with all four individual's classified as adults.

- Australian smelt (*R. semoni*) is a small bodied species mostly found between 50-60 mm in total length, but reaching up to 100 mm in rare occasions. Both males and females of *R. semoni* reach sexual maturity by 6 to 9 months. *R. semoni* were recorded in main channel of Thomson River, upstream of Fairmont Weir (TRPE7) and Oma Waterhole, although they were notably absent downstream of the Town Weir (TRD1). Records range from 19 mm to 50 mm with majority of the cohort adults with standard length varying between 30-39 mm and 40-49 mm, approximately 1+ to 2 years age. Sub-adults (reaching maturity) with a standard length between 20-29 mm were observed, albeit in fewer numbers in both the main channel of Thomson River and upstream of Fairmont Weir (TRPE7).
- Northwest glassfish (*Ambassis* sp.) lengths ranged from 18 to 49 mm, with the cohort dominated by 20-29 mm size class in the main channel of Thomson River and upstream of Fairmont Weir (TRPE7), likely representing individuals approximately one year old. Adults within the 30-39 mm were also abundant, representing 2+ year individuals.
- Golden perch (*M. ambigua*) is a large bodied species reaching a maximum total length of 760 mm although the most frequent adult total length records are between 400-500 mm (weighing <5 kg). The maturation of males commences between 2-3 years and in females by 4 years. The majority of *M. ambigua* records are from the main channel of Thomson River (reflecting boat-based electrofishing catch) with a range of life stages (based on length) from 45 to 530 mm. The cohort was dominated by sub-adults (200-249, 250-299 mm) and juveniles (100-149, 150-199 mm) followed by adults (300-459 mm, includes 5 size classes) and new recruits (0-99 mm includes 2 size classes). Recreational fishing pressure may in part account for lower abundance of adult fish encountered. A lower abundance of *M. ambigua* is reported for other sites (sampled from riverbank) due to opportunistic catch from integrated fishing methods rather than boat-based electrofishing; Oma waterhole recorded two sub-adults and upstream of Fairmont Weir (TRPE7) recorded three sub-adults.
- Sleepy cod (*O. lineolata*) is a large bodied species reaching a maximum length of 500 mm and 3 kg in weight. During the survey, the age size class records ranged from 25 to 455 mm. The majority of records came from the main channel of Thomson River with lengths ranging from >150 to <350 mm (maturity length for both male and females are 250 mm TL). Abundance declined for individuals >350 mm and may reflect local recreational fishing pressure. The presence of juvenile and sub-adults in the main channel of the Thomson River shows the translocated population of *O. lineolata* is successfully breeding with added predation pressure on native small bodied species. A similar dominant age-size class were recorded at TRPE7 and Oma waterhole, albeit with much lower abundance.

Other Species

For those species with low abundance / catch records during the survey, a limited summary of population dynamics is provided below:

- Carp gudgeon complex *Hypseleotris* sp. ranged from 20 to 28 mm in the main channel of Thomson River and upstream of Fairmont Weir (TRPE7). The maturation of these species commences at a relatively small size (females 18-22 mm SL and males 20.8-32 mm); therefore, the cohorts recorded were represented by adults with age varying between 8-12 months.
- Spangled perch (*Leiopotherapon unicolor*) ranged from 90 to 185 mm, represented by sub-adults and adult individuals at the four reaches they were recorded at. No new recruits or juveniles were recorded.

- Hyrtl's tandan catfish (*Neosilurus hyrtlii*) ranged from 150 to 290 mm, represented by adult individuals observed at the main channel of Thomson River, downstream of Town Weir (TRD1) and Oma Waterhole with no new recruits, juveniles or sub-adults recorded.
- Barcoo grunter (*Scortum barcoo*) ranged from 135 to 360 mm in length and was only captured in the main channel of Thomson River using boat-based electrofishing (and to multi-panel gill nets). The *S. barcoo* cohort was represented by adults and sub-adult individuals. New recruits and juveniles were absent in the catch.
- *Gambusia holbrooki* (Mosquitofish), an exotic species, were recorded mostly at TRPE7, followed by main channel Thompson River and Oma waterhole. The length varied from 19mm to a maximum of 30 mm. Females mature at about 18–20 mm (4–6 weeks of age), hence the cohort was represented by adult individuals across the three reaches.

Fish Disease

There were some notable disease observations in the form of red-edged open lesions on larger bodied species, also known as epizootic ulcerative syndrome (EUS) (Picture 4-4). EUS disease comprises infection with the oomycete fungus *Aphanomyces invadans*. EUS disease was observed in at least three species and varied greatly with 8.59% of disease observed in *N. erebi*, 4.35% in *S.barcoo* and 4.55% in *M. ambigua*. There were no clear spatial patterns in disease for any species within the main channel of the Thomson River. EUS was more notable in catches from boat-based electrofishing; therefore, no comparison could be made with sites outside of the main channel (i.e., upstream Fairmont Weir, downstream Town Weir, or Oma Waterhole). In smaller bodied species, it is unclear if absence of EUS is due to the smaller nature of lesions, or if species are less susceptible to this pathogen.

Picture 4-4 Epizootic Ulcerative Syndrome disease on a M. ambigua

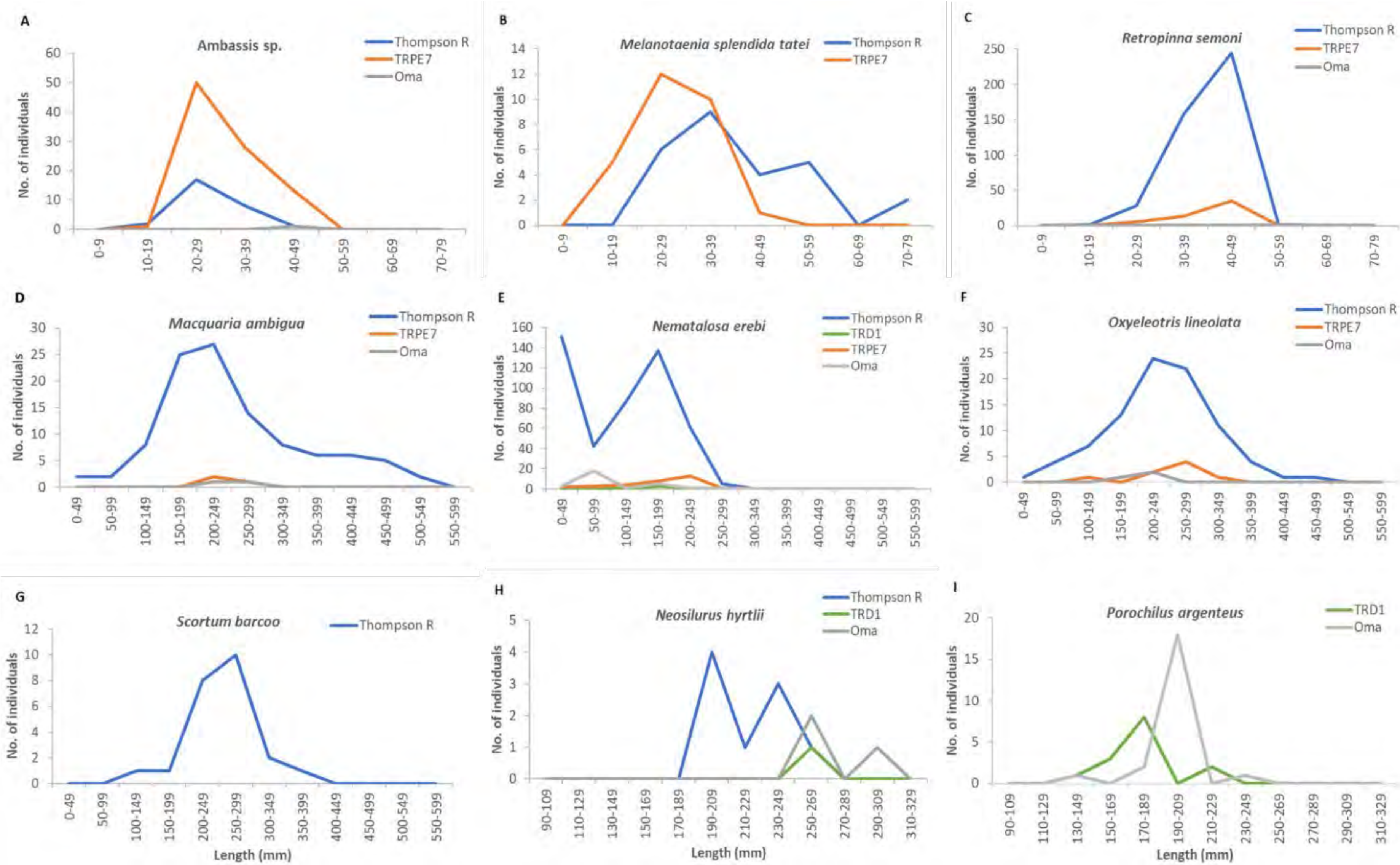


Figure 4-4 Comparative length-frequency histograms for select fish species recorded during the survey

Migratory Requirements

While no diadromous species were recorded during the survey, a summary of potamodromous species migration requirements (i.e., feeding, breeding or habitat) is summarised below:

- Ambassidae; there is a paucity of information relating to the recruitment and life history of northwest glassfish (*Ambassis* sp.). The species is awaiting description as either a single or multiple species (Allen et al. 2002). It is considered likely that the species possess adaptable reproductive strategies not reliant on flow or flood events in order to maintain their populations. However, Arthington et al. 2005 reveal that *Ambassis* sp. occur sporadically but occasionally in very large numbers in reaches of Cooper Creek following flow events. However, these populations suffer massive declines as waterholes dry and recede.
- Clupeidae; the bony bream (*Nematalosa erebi*) is one of the most widely distributed freshwater fishes of Inland Australia (Pusey et al. 2004). The reproductive strategy of the species is non-reliant on flow; however, Bony bream appear to be amongst the first species to colonise newly inundated areas (Puckridge et al. 2000). *N. erebi* have been recorded in recently inundated floodplain habitats as larvae, juveniles and adults in the Windorah area of Cooper Creek (Balcombe et al., 2007). Long term monitoring of the Burdekin River shows small and intermediate sized fish make substantial movements not associated with reproduction, likely associated with spatial / temporal availability of detrital / microalgal food resources (Pusey *et al.* in press).
- Eleotridae; it is difficult to ascertain the species (or multiple/hybrid species) of small gudgeons of the *Hypseleotris* complex recorded during the survey. As is common with Australian smelt, rainbowfish and glassfish, *Hypseleotris* gudgeons appear to be short-lived and reach maturity quickly (Pusey et al. 2004) which suggests that this species complex may utilise highly adaptive reproduction strategies within the Thomson River. The sleepy cod (*Oxyeleotris lineolata*) is a large and robust gudgeon which has been translocated to the main channel of the Thomson River. The slow-moving ambush predator is unlikely to move greatly or require substantial migrations, with spatial and temporal abundance linked to complex habitat availability (i.e., dense cover) and abundance of food resources.
- Melanotaeniidae; the ecology of local populations of the desert rainbowfish (*Melanotaenia splendida tatei*) is poorly known. Results from Cooper Creek in South Australia suggest that the desert rainbowfish demonstrates increased larval abundance following flow events (Puckridge et al., 2000). This notion is supported by a study of the closely related Eastern rainbowfish (*M. s. splendida*) which indicates that although this species is reproductively active throughout the year in the Townsville area, spawning activity increases during the wet season (Beumer, 1979).
- Percichthyidae; the yellowbelly or golden perch (*Macquaria ambigua*) populations in the Thomson River are considered to be able to maintain their populations and successfully recruit in no-flow environments. Several studies suggest that recruitment may be high following flood or flow events (Balcombe et al. 2007; Pritchard, 2004).

- Plotosidae; the widespread and common Hyrtl's tandan (*Neosilurus hyrtlii*) and the locally abundant silver tandan (*Porochilus argenteus*) are considered shoaling species with egg scattering behaviours. Hyrtl's tandan are considered to undertake localised migrations within catchments, colonising newly inundated ephemeral tributaries (Orr and Milward, 1984). However, recent genomic studies suggest juveniles in the Cooper Creek catchment do not disperse widely during periods of flood (Huey, 2003). Not much is known about the reproductive cycle of Silver Tandan (*Porochilus argenteus*). However, it is believed that this species may undertake significant migrations as either adults and/or juveniles and reproduce during periods of flooding (Bray and Gomon, 2023).
- Retropinnidae; Australian smelt (*Retropinna semoni*) is a pelagic, schooling species spawning occurring in late winter and spring (Milton and Arthington, 1985) under low-flow conditions (Pusey et al. 2004). It seems likely that this species may exhibit a similar seasonal reproductive strategy in Thomson River as evidenced by dominant age-size class 40-49 mm (Figure 4-4), suggesting most individuals were a year old (Milton and Arthington, 1985). Although facultative potamodromy appears a common feature of movement biology of *R. semoni*, large aggregations downstream of Fairmont Weir (TRPE7) were recorded during the survey. Presumably, these fish were attempting to move upstream during a period of stable low flow conditions (seepage from Fairmont Weir) in early spring.
- Terapontidae; Spangled perch (*Leiopotherapon unicolor*), like Bony Bream and Hyrtl's tandan, have an extremely wide distribution across Inland Australia. The species is considered to recruit regularly with rising water temperatures (Balcombe et al. 2007, Pusey et al. 2004) without reliance on flow or flood conditions. The Barcoo grunter (*Scortum barcoo*) is endemic to the Lake Eyre and Bulloo-Bancannia basins. Little is known of either the basic biology or reproductive behaviour in their natural environment, although they are presumed to spawn in response to flood events (Allen et al. 2002).

4.3.3. Other Aquatic Fauna

Two species of freshwater turtle were recorded during the survey, the Eastern Snake-Necked Turtle (*Chelodina longicollis*) and Emmott's Short Neck Turtle (*Emydura macquarii emmotti*) (Picture 4-5). Neither species is listed under the Commonwealth EPBC Act, Queensland's Nature Conservation Act and / or listed as a Priority species within Queensland. A single *C. longicollis* of 185 mm maximum carapace length [MCL] was recorded from a fyke net at TRPE1, main channel Thomson River.

A total of 12 *E. macquarii emmottii were* recorded during the survey, with MCL's ranging from 55mm to 320 mm. Populations were recorded from the main channel of Thomson River, upstream Fairmont Weir (TRPE7) and Oma Waterhole. Emmott's turtles breed between September and January (Judge 2001). Juveniles hatch at around 30 mm (White 2002) with the smallest MCL observed during the survey recorded as 55 mm, suggesting an individual of approximately one year. Growing up to 80 years (White 2002), the presence of a large adult (320 mm) and overall abundant population of turtles in the main channel Thomson River is a good indication of long-term waterway health.

Picture 4-5 Freshwater turtle species recorded during the survey; (A) and (B) Emmott's Short Neck Turtle (*Emydura macquarii emmotti)*; and (C) Eastern Snake-Necked Turtle (*Chelodina longicollis*)

5. Constraints and Limitations

Several constraints and/or potential limitations were encountered during the survey including:

- Limited ability to safely deploy / set fine mesh gill nets and/or undertake back-pack based electrofishing (Smith-Root LR24B unit) due to a combination of factors including soft / fine benthic sediments, steep / angle bank margins, water depth >2 m and poor water clarity (high turbidity);
- Total species richness and abundance are likely under-represented for boat-based electrofishing due to poor water clarity (high turbidity) limiting operator ability to observe and capture stunned fish;
- Boat-based electrofishing could not be undertaken upstream of Fairmont Weir due to limited water depth (Figure 5-1) at the time of survey preventing safe launch and recovery of the vessel. In addition, isolated rainfall at Isisford in the preceding 24 hours to 2nd August resulted in localised flooding of Isisford-Yaraka Road, partial bogging of the electrofishing vessel / trailer and prevented access to Oma Waterhole. Therefore, the total species richness and abundance at both sites are likely under-represented as only integrated fishing methods via vehicle/foot could be undertaken; and
- Restricted access and limited time during the survey prevented targeted sampling of isolated river pool habitats in the downstream receiving environment of main channel Thomson River (i.e., downstream Town Weir and TRD1) therefore limiting current knowledge for fish populations requiring upstream waterway connectivity.

Picture 5-1 Insufficient water depth for boat-launch upstream of Fairmont Weir (TRPE7)

6. Potential Impacts

This section summarises the potential impacts of the Project on aquatic ecology in accordance the EIS Information Guideline – Aquatic Ecology (DEHP 2019a).

6.1. Overview

The Project is modelled to increase the storage volume of the Town Storage from approximately 3,300 ML to 4,200 ML, equivalent to a 28% increase. The subsequent increase to the FSL will mostly be confined to the main channel of the Thomson River, with the exception of inundation of several minor ephemeral tributaries (Figure 2-1). As such, the potential impacts (including positive impacts) to aquatic ecological values associated with the Project are expected to include:

- Direct impacts to riverine habitat and aquatic fauna within the construction footprint of the raised Town Weir and associated Anabranch Weirs, as well as increased inundation of the main channel and anabranches of the Thomson River;
- Indirect impacts to aquatic fauna due to changes in water quality during construction / weir raising; and
- Benefits to fish movement and migration, through the inundation of ephemeral tributary habitat and the provision of upstream and downstream fish passage at the Town Weir.

Potential impacts are summarised in Sections 6.1 to 6.3.

6.2. Direct Impacts

There is potential for direct impacts to aquatic habitat and fauna values within the disturbance footprint during Project construction. This may include direct disturbance of benthic and/or littoral habitat, as well as potential to isolate or strand fish populations in a section of the main channel Thomson River, requiring fish salvage / translocation prior to dewatering operations, as required.

Further, the Project would increase inundation (and the footprint of the FSL) within the main channel Thomson River and at least three off-channel ephemeral tributaries. This will result in a shift in hydrological regime from ephemeral to semi-permanent inundation of in-stream and riparian habitats within the modelled revised FSL (Figure 2-1). The greatest change from current condition is expected within the minor ephemeral tributary to the north of site TRPE3 (see Picture 6-1 for existing condition). This direct impact is unavoidable but not considered to be significant in a regional context. Further, there is potential for a net positive benefit for smaller bodied fish species, as increased off-channel shallow and complex habitat will help avoid predation by larger bodied piscivorous species, abundant in the main channel Thomson River.

Lastly, it is expected that the Project would result in benefits to fish movement and migration upstream/downstream of the Town Weir, through the recommended provision of a fish passage structure (e.g. rock ramp, as constructed at the Fairmont Weir) at the Town Weir. Given the more hydrologically isolated nature of the streams on which Anabranch Weirs 1 to 4 are located, fish passage structures are considered not to be warranted for these structures as part of the Project.

Picture 6-1 Current condition of the ephemeral off-channel minor tributary to the north of main channel Thomson River

6.3. Indirect Impacts

The Project also has potential for indirect impacts, primarily affecting water, sediment quality and/or instream pollution during the construction phase. Where dewatering is undertaken and heavy machinery is used within main channel Thomson River (bed substrate), or adjacent along the banks in vicinity of Town Weir, there is potential for the following:

- Incidental fuel or chemical leakage or spills resulting in heavy metal / hydrocarbon pollution that can eventually bioaccumulate along the riverine food webs during inundation periods;
- Loosening of bed and bank substrate, removal / loss of fringing riparian vegetation may result in additional mobilisation of fine suspended sediments, erosion and increasing water turbidity;
- Noise and vibration from machines and vehicles may disturb local populations of aquatic fauna and waterbirds;
- Increased water velocities to the downstream receiving environment of Thomson River, through weir raising, depending on the final slope design, with potential for exacerbated scour / erosion; and
- Potential for increased sedimentation and nutrient enrichment immediately upstream Town Weir through raising water level and flow requirements to overtop, depending on final design.

6.4. Impacts to Conservation Significant Species

No aquatic flora or fauna species listed under the Commonwealth EPBC Act, Queensland NC Act and / or listed as a Priority species within Queensland were recorded during the field survey. Therefore, it is considered unlikely that the Project will have a significant impact on conservation significant species, due to a lack of known records nearby, lack of suitable habitat, and/or no observations of these species during recent targeted surveys. Accordingly, no offsets under the EPBC Act or EO Act would be required for the Project.

7. Summary and Conclusion

This Aquatic Ecology Assessment provides initial baseline data (i.e., snapshot at one point in time; July/August 2023) on the environmental conditions and the freshwater aquatic communities (diversity, composition and spatial distribution) of main channel Thomson River and surrounds near Longreach, Queensland.

A summary of the key findings is provided for each of the ecological components below.

7.1. Environmental Conditions

Water quality in the vicinity of the Project was moderate to good, likely influenced to some degree by surrounding land-use and local geomorphology, which is characteristic of a moderately disturbed ecosystem. Surface water of Thomson River main channel and surrounds within the vicinity of the Project was variable, with spatial heterogeneity in PC stressors and toxicants typical of ephemeral Inland Waters in the broader Cooper Creek catchment / region. Water quality spot-measurements indicate surface waters were mostly fresh (low salinity), moderately oxygenated (DO saturation), circum-neutral pH, highly turbid, elevated in nutrients (both nitrogen and phosphorous sources) and with background levels for dissolved Al and Cu elevated above respective ANZG (2018) DGVs. Detailed results are presented in Section 4.1.

Aquatic habitat condition along the Thomson River was generally consistent, dominated by clay material with minor sand content at two sites. Aquatic habitat complexity was low, with a notable lack of macrophytes and snags in the main channel. Furthermore, riparian vegetation was sparse as is typical of inland Queensland, however, canopy cover was higher at sites in the anabranches of the Thomson River. Three emergent aquatic plant species were recorded during the survey; however, no macrophyte species were considered of conservation importance.

Waterway connectivity along the Thomson River was affected by the Town Weir, creating a deep pool reaching beyond Fairmont Weir and serving as a dry season refuge. Similarly, Oma Waterhole serves a similar function, connecting to Cooper Creek during the wet season although during the survey, the waterhole was noticeably cut-off from any downstream or upstream fish migration.

7.2. Native Freshwater Fish

The survey indicated that main channel Thomson River and surrounds currently supports at least 12 freshwater species of fish (from a total of 21 species in the region), comprising 11 native and one exotic. Fish communities will exhibit temporal variability associated with sampling time / season, and species richness tends to be lower in winter, increasing following flooding for several species. The overall fish community comprised nine higher level taxonomic groups (Families) including Ambassidae, Clupeidae, Eleotridae, Melanotaeniidae, Percichthyidae, Plotosidae, Retropinnidae, Terapontidae and Poeciliidae.

No species listed as Vulnerable and/or Endangered under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC) and/or in the state of Queensland were recorded during the Survey. In general, the Survey recorded localised populations considered to be a subset of the species known to in-habitat nearby regional creeklines of the Barcoo / Cooper catchment.

Dominant / abundant species recorded during the Survey included Australian smelt (R. semoni), bony bream (*N. erebi*), northwest glassfish (*Ambassis* spp.), golden perch (*M. ambigua*) and sleepy cod (*O. lineolata*). The Survey also documented seven species of the overall fish community with a patchy and/or low occurrence, with each species representing less than 3% of total catch records, and cumulatively representing approximately 12% of the whole assemblage. While abundance data should be treated with some caution (see Section 5) the dominance of large bodied piscivorous species main channel Thomson River, particularly the introduction of *O. lineolata*, may in part provide reason for the low abundance of small-bodied fish species (i.e., *Ambassis* sp., *Hypseleotris* sp., *M. splendida tatei*). Predation pressure is likely exacerbated due to a lack of in-stream habitat complexity within the main channel Thomson River, except for large woody debris, which provides little cover for small and medium bodied fishes. High turbidity due to fine suspended sediments limits light penetration, and therefore growth of submerged macrophyte cover along the littoral margins of the Thomson River, which for some species like *Hypseleotris* spp. may influence / limit recruitment within the system.

The majority of species were represented in the main channel Thomson River, upstream Fairmont Weir and at Oma waterhole. However, there were some notable trends in spatial distribution for:

- Greater abundance of fish in the reach of main channel Thomson River immediately downstream Fairmont Weir (TRPE6 and Boat electrofishing shot 5), representing approximately 25% of total catch during the Survey. Catch was dominated by *R. semoni*, and to a lesser degree large bodied predators *M. ambigua* and *O. lineolata*. It is likely *R. semoni* congregations are due to environmental cues associated with surface flow / leakage from Fairmont Weir, with *M. ambigua* and *O. lineolata* associated with increased prey;
- Barcoo grunter (*S. barcoo*) were recorded from main channel Thomson River only. This is likely influenced by boat-based Electrofishing and gill net catch records. Anecdotal evidence suggests that a healthy *S. barcoo* population is present at Oma Waterhole, and presumably upstream Fairmont Weir (TRPE7); and
- Only four species of fish were recorded downstream Town Weir at TRD1, dominated by *P. argenteus*. Fish communities will exhibit spatial differences due to catchment barriers. The absence of the *P. argenteus* records main channel Thomson River and upstream of Fairmont Weir (TRPE7) may in part reflect limited upstream connectivity due to Town Weir (I.e., impermeable barrier at current) and/or a low abundance / spatially distributed population which were not detected during the Survey.

None of the species recorded during the survey are considered to require passage or migration to complete their lifecycle. However, several potamodromous species still require connectivity within the Thomson River and surrounds to support spawning migrations and access to newly inundated habitat for foraging and/or shelter from predation.

While the survey employed a robust spatial sampling design, knowledge gaps remain regarding localised populations for two notable freshwater species, *N. cooperensis* and *B. welchi*. The former species *N. cooperensis* is cryptic and naturally rare, albeit known from ~40 localities associated with the Cooper Creek system of the Lake Eyre Drainage Basin. The species area of occurrence is ~ 130 km2, affiliated with permanent riverine refugia pools such as the Thomson River main channel. N. cooperensis is potentially threatened by the translocated predatory sleepy cod O. lineolata (Sleepy Cod), which has colonised the Thomson River in high abundance as recorded during the Survey. Although not recorded during the Survey, the Thomson River may likely represent a significant permanent refugia for the species which is listed as Endangered and considered a conservation significant freshwater fish species in the local / regional area.

For the latter species at least, maintenance of flow and flood conditions is likely to be required to support self-sustaining populations, albeit little is known on the migratory / breeding requirements for the species. Survey timing was not considered optimal to detect populations for at least *B. welchi*. Further sampling which targets recessional wet season flow conditions, ideally where Fairmont Weir is partially inundated, would increase current species population knowledge within Thomson River.

7.3. Other Aquatic Taxa

Neither of the two freshwater turtle species recorded during the survey are listed under the EPBC Act or NC Act. The abundance and age-size class representation of Emmott's Short Neck Turtle (*Emydura macquarii emmotti*) suggests a healthy and self-sustaining population under current conditions main channel Thomson River.

The distribution of translocated Redclaw crayfish (*Cherax quadricarinatus*) showed a distinct spatial pattern, restricted to catch records upstream of Fairmont Weir (TRPE7) only. Anecdotal evidence by recreational fisherman suggests Red claw are present in the main channel Thomson River, which in part, may account for the lack of catch records during the Survey.

7.4. Conclusion

The main channel Thomson River provides a permanent refugia habitat of considerable size in a landscape dominated by temporary wetlands of shorter hydroperiod. The aquatic fauna recorded during the Survey are mostly considered widespread, or well represented in the local region, with none listed under State and/or Commonwealth legislation. While no truly migratory (diadromous) species were recorded during the survey, several potamodromous species are considered to require connectivity and fish passage to upstream / downstream environments for foraging, breeding and in search or colonisation of newly inundated habitats. This includes cryptic species such as *B. welchi*, which although not recorded during the Survey, have historic records within main channel Thomson River, and may still be present, albeit in low abundance.

Typically, fish assemblages in dryland river systems exhibit large variability correlated with periods of flood and drought. Town Weir in its current form presents a significant barrier to the upstream migration of fish populations, as evidenced to some extent by isolated populations of *P. argenteus.* The proposed Project has the potential to further reduce waterway connectivity and inhibit fish movement through different parts of the Thomson River catchment, which could lead to the decline or loss of some local fish populations. However, installation of a suitable fish passage structure (e.g. rock ramp) into the design of the Town Weir raising would mitigate the current effects of fragmented aquatic habitats along the Thomson River, and facilitate fish passage (i.e., opportunistic dispersal migrations) under catchment flows. Further, the proposed inundation of ephemeral tributaries under modelled FSL has potential for a net-positive impact for small bodied species through creation of additional shallow, complex and detrital / algal food dense habitat, reducing predation pressure from piscivorous fish which are abundant in the main channel Thomson River.

8. Recommendations

Project design should consider installation of a fish passage structure (i.e., fishway) to facilitate connectivity of fish populations in the catchment. There are many variations in fish passage structure, however, a rock ramp fishway, like that present at Fairmont Weir, should be incorporated into the engineering design (i.e., partial or full width). It is recommended that LRC engage a suitably qualified ecologist specialising in fish passage design (e.g., Matt Moore from Catchment Solutions, Tim Marsden from Australasian Fish Passage Services) to work alongside and provide design input at the detailed design stage to the preferred engineering consultant, to ensure that the design of the raised weirs (particularly, any fish passage structure at the Town Weir) facilitates adequate fish passage. In addition, following construction of the Project, a suitably qualified ecologist specialising in fish passage design should review the suitability of the existing rock ramp fishway(s) at Fairmont Weir to continue to provide for passage (i.e., fishway functionality) under the revised FSL in the Town Storage.

Furthermore, an expanded survey should be considered immediately post wet season flow conditions in the Thomson River and surrounds to confirm presence of conservation listed and cryptic species (i.e., Cooper Creek catfish and Welch's grunter, respectively) or age-size classes (i.e., new recruits, juveniles) not recorded during the current survey under no flow conditions. The survey should be completed by those aquatic ecologists involved for the survey herein to ensure efforts and methodologies are consistent. Options for this additional and expanded survey should consider targeted monitoring of species migration (i.e., upstream / downstream) over Fairmont weir (where suitable conditions) and ephemeral, semi-permanent and permanent refugia Thomson River downstream of Town Weir to the confluence with Barcoo River.

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Appendix A Field Survey Species Records

Table A1: Summary of fish species catch records from integrated methods during the Survey, with a breakdown by site / location.

Origin	Species	Common name	D/S Town Weir	Thomson River (Main Channel)						U/S Fairmont weir	Barcoo R. Ref	Total catch per species
			TRD1	TRPE1	TRPE2	TRPE3	TRPE4	TRPE5	TRPE6	TRPE7	Oma Waterhole	
Freshwater	*Ambassis species*	Northwest glassfish	0	5	2	12	2	1	2	92	1	**117**
	Hypseleotris sp.	Australian carp gudgeon	0	0	0	3	0	0	0	1	0	**4**
	Leiopotherapon unicolor	Spangled perch	2	0	1	0	0	0	0	1	5	**9**
	Macquaria ambigua	Golden perch	0	1	0	1	0	1	1	3	2	**9**
	Melanotaenia splendida tatei	Desert rainbowfish	0	2	5	4	3	1	0	27	0	**42**
	Nematalosa erebi	Bony bream	4	113	24	27	1	2	14	6	29	**220**
	Neosilurus hyrtlii	Hyrtl's catfish	1	6	1	1	0	1	0	0	6	**16**
	Oxyeleotris lineolata	Sleepy cod	0	8	4	11	3	10	5	5	3	**49**
	Porochilus argenteus	Silver catfish	14	0	0	0	0	0	0	0	22	**36**
	Retropinna semoni	Australian smelt	0	4	21	25	7	8	239	53	1	**358**
	Scortum barcoo	Barcoo grunter	0	0	0	0	0	0	0	0	0	**0**
Exotic	*Gambusia holbrooki*	Mosquitofish	0	0	0	1	0	0	0	35	1	**37**
Decapods	*Cherax quadricarinatus*	Redclaw crayfish	0	0	0	0	0	0	0	8	0	**8**
	Macrobrachium sp.	Freshwater prawns	0	44	122	39	30	17	3	242	0	**497**
Freshwater turtles	*Chelodina (Chelodina) longicollis*	Eastern long-necked turtle	0	1	0	0	0	0	0	0	0	**1**
	Emydura macquarii ssp. emmotti	Emmott's Turtle	0	0	2	1	0	2	1	1	1	**8**
		Total Catch	**21**	**184**	**182**	**125**	**46**	**43**	**265**	**474**	**71**	

Table A2: Summary of fish species catch records from boat-based Electrofishing during the Survey, with a breakdown by shot within main channel Thomson River.

Origin	Species	Common name	Boat-based Electrofishing - Thomson River (Main Channel) only									Total catch per species
			Boat 1	Boat 2	Boat 3	Boat 4	Boat 5	Boat 6	Boat 7	Boat 8	Boat 9	
Freshwater	*Ambassis species*	Northwest glassfish	0	0	0	3	0	1	0	0	0	**4**
	Hypseleotris sp.	Australian carp gudgeon	0	0	0	0	0	0	0	0	0	**0**
	Leiopotherapon unicolor	Spangled perch	0	0	0	0	2	0	0	0	0	**2**
	Macquaria ambigua	Golden perch	4	13	10	3	42	5	11	6	7	**101**
	Melanotaenia splendida tatei	Desert rainbowfish	0	1	2	0	2	2	1	2	2	**12**
	Nematalosa erebi	Bony bream	14	25	9	124	36	10	25	71	13	**327**
	Neosilurus hyrtlii	Hyrtl's catfish	0	0	0	0	0	0	0	0	0	**0**
	Oxyeleotris lineolata	Sleepy cod	5	1	5	1	22	10	3	2	1	**50**
	Porochilus argenteus	Silver catfish	0	0	0	0	0	0	0	0	0	**0**
	Retropinna semoni	Australian smelt	0	6	5	6	96	10	3	0	3	**129**
	Scortum barcoo	Barcoo grunter	3	2	4	1	1	1	4	3	4	**23**
Exotic	*Gambusia holbrooki*	Mosquitofish	0	0	1	0	1	0	0	0	0	**2**
Decapods	*Cherax quadricarinatus*	Redclaw crayfish	0	0	0	0	0	0	0	0	0	**0**
	Macrobrachium sp.	Freshwater prawns	0	0	0	0	0	0	0	0	0	**0**
Freshwater turtles	*Chelodina (Chelodina) longicollis*	Eastern long-necked turtle	0	0	0	0	0	0	0	0	0	**0**
	Emydura macquarii ssp. emmotti	Emmott's Turtle	0	0	2	1	1	0	0	0	0	**4**
		Total catch	**26**	**48**	**38**	**139**	**203**	**39**	**47**	**84**	**30**	

Appendix B Certificate of Analysis

CERTIFICATE OF ANALYSIS

Work Order	: **ET2303960**	Page	: 1 of 6
Client	: **WILD ENVIRONMENTAL CONSULTANTS PTY LTD**	Laboratory	: Environmental Division Townsville
Contact	: Shannon Goodwin	Contact	: Customer Services ET
Address	: Suite 1, Level 4 75 Denham Street TOWNSVILLE QLD 4810	Address	: 13 Carlton Street, Kirwan Townsville QLD Australia 4815
Telephone	: ----	Telephone	: +61 7 4773 0000
Project	: Longreach	Date Samples Received	: 04-Aug-2023 09:30
Order number	: 220597	Date Analysis Commenced	: 08-Aug-2023
C-O-C number	: ----	Issue Date	: 15-Aug-2023 17:15
Sampler	: Shannon Goodwin		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 10		
No. of samples analysed	: 10		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Beatriz Llarinas	Senior Chemist - Inorganics	Brisbane Inorganics, Stafford, QLD
Beatriz Llarinas	Senior Chemist - Inorganics	Townsville Inorganics, Townsville, QLD
Kim McCabe		Townsville Inorganics, Townsville, QLD
Kim McCabe	Senior Inorganic Chemist	Brisbane Inorganics, Stafford, QLD
Narelle Drummond	Laboratory Manager	Townsville Inorganics, Townsville, QLD

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H+ to the Cations and Nitrate, SiO2 and Fluoride to the Anions.
- EK058G, EA045, EA25H, ED037-P, ED041G, ED045G, EK040P, EK057G, EK071G conducted by ALS Townsville, NATA accreditation no. 825, (Site no. 23472 for Chemical Testing and Site no. 23313 for Biological Testing)
- All remaining analysis will be conducted by ALS Environmental, Brisbane, NATA accreditation no. 825, Site No. 818.
- Please be aware that APHA/NEPM recommends water and soil samples be chilled to less than or equal to 6°C for chemical analysis, and less than or equal to 10°C but unfrozen for Microbiological analysis. Where samples are received above this temperature, it should be taken into consideration when interpreting results.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	TRD1	TRPE1	TRPE2	TRPE3	TRPE4
			Sampling date / time	30-Jul-2023 16:45	28-Jul-2023 07:30	30-Jul-2023 13:55	30-Jul-2023 10:30	29-Jul-2023 14:45
Compound	CAS Number	LOR	Unit	ET2303960-001	ET2303960-002	ET2303960-003	ET2303960-004	ET2303960-005
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**192**	**21**	**96**	**137**	**72**
EA045: Turbidity								
Turbidity	----	0.1	NTU	**498**	**213**	**243**	**265**	**273**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**77**	**50**	**51**	**58**	**51**
Total Alkalinity as CaCO3	----	1	mg/L	**77**	**50**	**51**	**58**	**51**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**9**	**8**	**10**	**9**	**10**
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**11**	**11**	**11**	**11**	**11**
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**12**	**10**	**9**	**10**	**10**
Magnesium	7439-95-4	1	mg/L	**4**	**3**	**3**	**3**	**3**
Sodium	7440-23-5	1	mg/L	**26**	**20**	**20**	**20**	**21**
Potassium	7440-09-7	1	mg/L	**5**	**5**	**5**	**6**	**5**
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**46**	**37**	**35**	**37**	**37**
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.04**	**0.06**	**0.10**	**0.08**	**0.10**
Arsenic	7440-38-2	0.001	mg/L	**0.001**	**0.001**	**0.001**	**0.001**	**0.001**
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.003**	**0.001**	**0.002**	**0.001**	**0.002**
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	<0.001	<0.001	**0.001**	**0.001**
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L	**0.07**	<0.05	<0.05	**0.07**	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	TRD1	TRPE1	TRPE2	TRPE3	TRPE4
			Sampling date / time	30-Jul-2023 16:45	28-Jul-2023 07:30	30-Jul-2023 13:55	30-Jul-2023 10:30	29-Jul-2023 14:45
Compound	CAS Number	LOR	Unit	ET2303960-001	ET2303960-002	ET2303960-003	ET2303960-004	ET2303960-005
				Result	Result	Result	Result	Result
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.2**	**0.1**	**0.1**	**0.1**	**0.1**
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.09**	**0.15**	**0.22**	**0.18**	**0.19**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.05**	**0.06**	**0.05**	**0.02**	**0.13**
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.05**	**0.06**	**0.05**	**0.02**	**0.13**
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**1.3**	**0.7**	**1.1**	**0.6**	**0.7**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**1.4**	**0.8**	**1.2**	**0.6**	**0.8**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.37**	**0.20**	**0.25**	**0.25**	**0.22**
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.03**	**0.04**	**0.04**	**0.04**	**0.04**
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**2.04**	**1.48**	**1.54**	**1.66**	**1.54**
ø Total Cations	----	0.01	meq/L	**2.19**	**1.74**	**1.69**	**1.77**	**1.79**

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	TRPE5	TRPE6	TRPE7	OMA	QA/QC
			Sampling date / time	29-Jul-2023 15:30	28-Jul-2023 16:50	29-Jul-2023 08:00	02-Aug-2023 12:30	02-Aug-2023 00:00
Compound	CAS Number	LOR	Unit	ET2303960-006	ET2303960-007	ET2303960-008	ET2303960-009	ET2303960-010
				Result	Result	Result	Result	Result
EA025: Total Suspended Solids dried at 104 ± 2°C								
Suspended Solids (SS)	----	5	mg/L	**54**	**30**	**46**	**87**	<5
EA045: Turbidity								
Turbidity	----	0.1	NTU	**245**	**169**	**179**	**277**	**1.1**
ED037P: Alkalinity by PC Titrator								
Hydroxide Alkalinity as CaCO3	DMO-210-001	1	mg/L	<1	<1	<1	<1	<1
Carbonate Alkalinity as CaCO3	3812-32-6	1	mg/L	<1	<1	<1	<1	<1
Bicarbonate Alkalinity as CaCO3	71-52-3	1	mg/L	**53**	**61**	**64**	**56**	**4**
Total Alkalinity as CaCO3	----	1	mg/L	**53**	**61**	**64**	**56**	**4**
ED041G: Sulfate (Turbidimetric) as SO4 2- by DA								
Sulfate as SO4 - Turbidimetric	14808-79-8	1	mg/L	**10**	**14**	**15**	**7**	<1
ED045G: Chloride by Discrete Analyser								
Chloride	16887-00-6	1	mg/L	**11**	**14**	**14**	**6**	<1
ED093F: Dissolved Major Cations								
Calcium	7440-70-2	1	mg/L	**11**	**13**	**13**	**13**	<1
Magnesium	7439-95-4	1	mg/L	**3**	**4**	**4**	**3**	<1
Sodium	7440-23-5	1	mg/L	**21**	**25**	**26**	**11**	<1
Potassium	7440-09-7	1	mg/L	**5**	**5**	**5**	**7**	<1
ED093F: SAR and Hardness Calculations								
Total Hardness as CaCO3	----	1	mg/L	**40**	**49**	**49**	**45**	<1
EG020F: Dissolved Metals by ICP-MS								
Aluminium	7429-90-5	0.01	mg/L	**0.08**	**0.05**	**0.06**	**0.06**	<0.01
Arsenic	7440-38-2	0.001	mg/L	**0.001**	<0.001	<0.001	**0.001**	<0.001
Cadmium	7440-43-9	0.0001	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	7440-47-3	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Cobalt	7440-48-4	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Copper	7440-50-8	0.001	mg/L	**0.002**	**0.002**	**0.002**	**0.002**	<0.001
Lead	7439-92-1	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum	7439-98-7	0.001	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001
Nickel	7440-02-0	0.001	mg/L	**0.001**	**0.001**	**0.001**	**0.002**	<0.001
Selenium	7782-49-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Vanadium	7440-62-2	0.01	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	7440-66-6	0.005	mg/L	<0.005	<0.005	**0.020**	<0.005	<0.005
Boron	7440-42-8	0.05	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05

Analytical Results

Sub-Matrix: WATER (Matrix: WATER)			Sample ID	TRPE5	TRPE6	TRPE7	OMA	QA/QC
			Sampling date / time	29-Jul-2023 15:30	28-Jul-2023 16:50	29-Jul-2023 08:00	02-Aug-2023 12:30	02-Aug-2023 00:00
Compound	CAS Number	LOR	Unit	ET2303960-006	ET2303960-007	ET2303960-008	ET2303960-009	ET2303960-010
				Result	Result	Result	Result	Result
EK040P: Fluoride by PC Titrator								
Fluoride	16984-48-8	0.1	mg/L	**0.1**	**0.2**	**0.1**	**0.1**	<0.1
EK055G: Ammonia as N by Discrete Analyser								
Ammonia as N	7664-41-7	0.01	mg/L	**0.14**	**0.15**	**0.15**	**0.26**	**0.19**
EK057G: Nitrite as N by Discrete Analyser								
Nitrite as N	14797-65-0	0.01	mg/L	<0.01	<0.01	**0.01**	<0.01	<0.01
EK058G: Nitrate as N by Discrete Analyser								
Nitrate as N	14797-55-8	0.01	mg/L	**0.14**	**0.08**	**0.06**	**0.24**	<0.01
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser								
Nitrite + Nitrate as N	----	0.01	mg/L	**0.14**	**0.08**	**0.07**	**0.24**	<0.01
EK061G: Total Kjeldahl Nitrogen By Discrete Analyser								
Total Kjeldahl Nitrogen as N	----	0.1	mg/L	**0.6**	**0.6**	**0.7**	**1.0**	**0.2**
EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser								
^ Total Nitrogen as N	----	0.1	mg/L	**0.7**	**0.7**	**0.8**	**1.2**	**0.2**
EK067G: Total Phosphorus as P by Discrete Analyser								
Total Phosphorus as P	----	0.01	mg/L	**0.21**	**0.15**	**0.15**	**0.32**	<0.01
EK071G: Reactive Phosphorus as P by discrete analyser								
Reactive Phosphorus as P	14265-44-2	0.01	mg/L	**0.04**	**0.01**	**0.01**	**0.07**	<0.01
EN055: Ionic Balance								
ø Total Anions	----	0.01	meq/L	**1.58**	**1.90**	**1.98**	**1.43**	**0.08**
ø Total Cations	----	0.01	meq/L	**1.84**	**2.19**	**2.24**	**1.55**	<0.01

Inter-Laboratory Testing

Analysis conducted by ALS Brisbane, NATA accreditation no. 825, site no. 818 (Chemistry) 18958 (Biology).

(WATER) EK062G: Total Nitrogen as N (TKN + NOx) by Discrete Analyser

(WATER) EK055G: Ammonia as N by Discrete Analyser

(WATER) EK067G: Total Phosphorus as P by Discrete Analyser

(WATER) EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser

(WATER) EK061G: Total Kjeldahl Nitrogen By Discrete Analyser

(WATER) EG020F: Dissolved Metals by ICP-MS

(WATER) EN055: Ionic Balance

(WATER) ED093F: Dissolved Major Cations

(WATER) ED093F: SAR and Hardness Calculations

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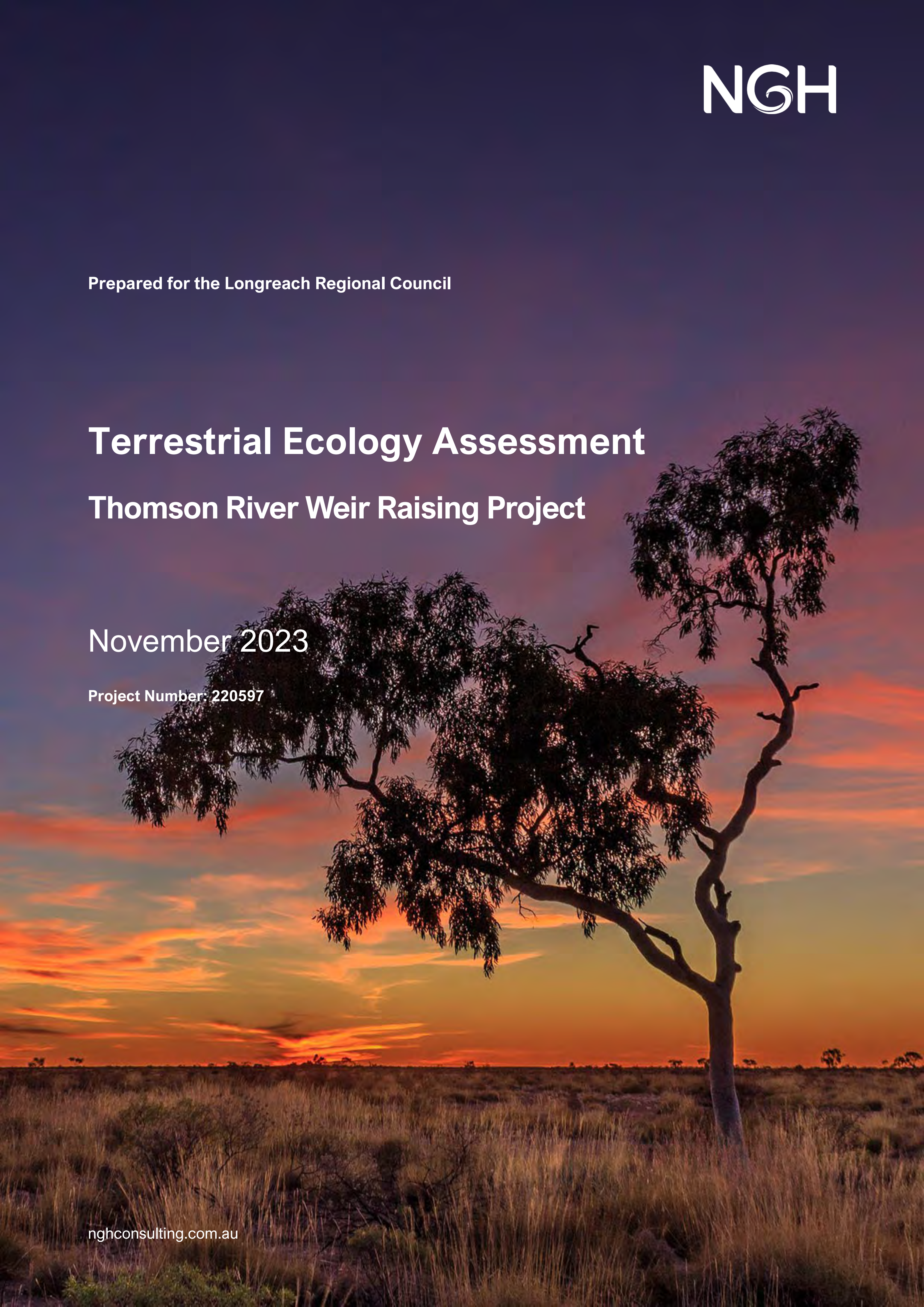
APPENDIX E – TERRESTRIAL ECOLOGY REPORT

NGH



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Prepared for the Longreach Regional Council

Terrestrial Ecology Assessment

Thomson River Weir Raising Project

November 2023

Project Number: 220597

nghconsulting.com.au

Document verification

Project Title:	Thomson River Weir Raising Project
Project Number:	220597
Project File Name:	220597_Thomson River WRP Terrestrial Ecology Assessment_Final V2.0

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	29/03/2023	Jaimee Joiner	Elliot Budd	Joe Flanagan
Final V2.0	22/11/2023	Jaimee Joiner	Joe Flanagan	Joe Flanagan

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Acronyms and abbreviations

Acronym/Abbreviation	Definition
Biosecurity Act	*Biosecurity Act 2014* (Qld)
DCCEEW	Department of Climate Change, Energy, Environment and Water (Cwth)
DES	Department of Environment and Science (Qld)
DNRME	Department of Natural Resources, Mines and Energy
DoR	Department of Resources (Qld)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
km	kilometres
m	metre/s
mAHD	metres Australian Height Datum
ML	megalitres
MNES	Matters of national environmental significance
MSES	Matters of state environmental significance
NC Act	*Nature Conservation Act 1992* (Qld)
NGH	NGH Pty Ltd
PMST	Protected matters search tool
RVM	Regulated Vegetation Management
sp/spp	Species/multiple species
TEC	Threatened Ecological Community
WoNS	Weeds of National Significance

1. Introduction

This Terrestrial Ecology Assessment report has been prepared by NGH Pty Ltd (NGH) for the Longreach Regional Council (LRC), and forms part of the Ministerial Infrastructure Designation (MID) proposal for the Thomas River Weir Raising Project (the Project).

1.1. Background

The LRC operates the Town Weir system on the Thomson River, located approximately 3.5 kilometres (km) north-west of Longreach. The Town Weir system comprises the Town Weir on the main channel of the Thomson River as well as four nearby Anabranch Weirs (referred to collectively as the weirs) (Figure 1-1). Together, the existing weirs create the “Town Storage”, which is approximately 10 km long and has a capacity of approximately 3,300 ML, a minimum operating volume of approximately 88 ML, and a catchment area of approximately 57,590 square kilometres (km^2).

Upstream of the Town Weir are three additional weirs on the Thomson River operated by the LRC, including (in order of proximity to the Town Weir): Fairmont Weir, Bimbah Weir, and Goodberry Hills Weir, the latter of which is approximately 48 km upstream from Town Weir (Figure 1-1). The Town Weir system and the three upstream weirs have a combined storage capacity of approximately 8,400 megalitres (ML).

To achieve long-term water security for Longreach, the LRC propose to raise the Town Weir system by 1 m, providing additional water storage capacity. This increase in weir height will result in additional inundation of the Thomson River channel outside of the existing full supply level (FSL) up to 10 km upstream (i.e. to the Fairmont Weir).

NGH was engaged by the LRC to undertake a terrestrial ecology assessment for the Project, the results of which are described in this report.

1.2. Scope of works

This Terrestrial Ecology Assessment provides the following information:

- Description of the Project (Section 2)
- Methodology for the desktop assessment and field survey (Section 3)
- Results of the desktop assessment and field survey, including a likelihood of occurrence assessment (Section 4)
- Assessment of the potential impacts of the Project on terrestrial ecology and associated environmental values (Section 5)
- Recommended mitigation measures (Section 6)
- List of references cited in this report (Section 7).

Thomson River Weir Raising Project

Figure 1-1 Project Location

Ref: MID Proposal Workspace\ Figure 1. Project Location Author: Joe Flanagan Date created: 01.06.2023 © NGH 2023 © ESRI 2022

2. Project details

2.1. Description

The Town Weir is located approximately 3.5 km north-west of Longreach. Anabranch Weirs 1 to 4 are located in proximity to the Town Weir, on anabranches of the main Thomson River channel (Figure 1-1). The Fairmont Weir is located approximately 10 km upstream of the Town Weir and is the upstream limit of the Town Storage.

The 'Project area' described in this report comprises the expected area of additional inundation due to the Project (i.e. the new full supply level [FSL]), as well as the 20 m construction footprint around the raised weirs. The Project construction footprint is approximately 1.64 hectares (ha) in total (i.e. for all five weirs). Figure 2-1 shows the layout of the Project. Figure 2-2 shows the modelled FSL of the Town Storage following construction of the Project.

LiDAR data analysis undertaken by Water Technology found that the height of the existing Town Weir is approximately 178.5 metres Australian Height Datum (mAHD). Based on this, FSL of the Town Storage following raising of the weirs was modelled using the 179.5 mAHD contour.

The Town Storage currently provide for the storage of approximately 3,300 megalitres (ML) of water. The Project would increase this storage capacity to approximately 4,200 ML, equivalent to a 28% increase. The minimum operating volume of the Town Storage intake is 88 ML.

2.2. Requirement

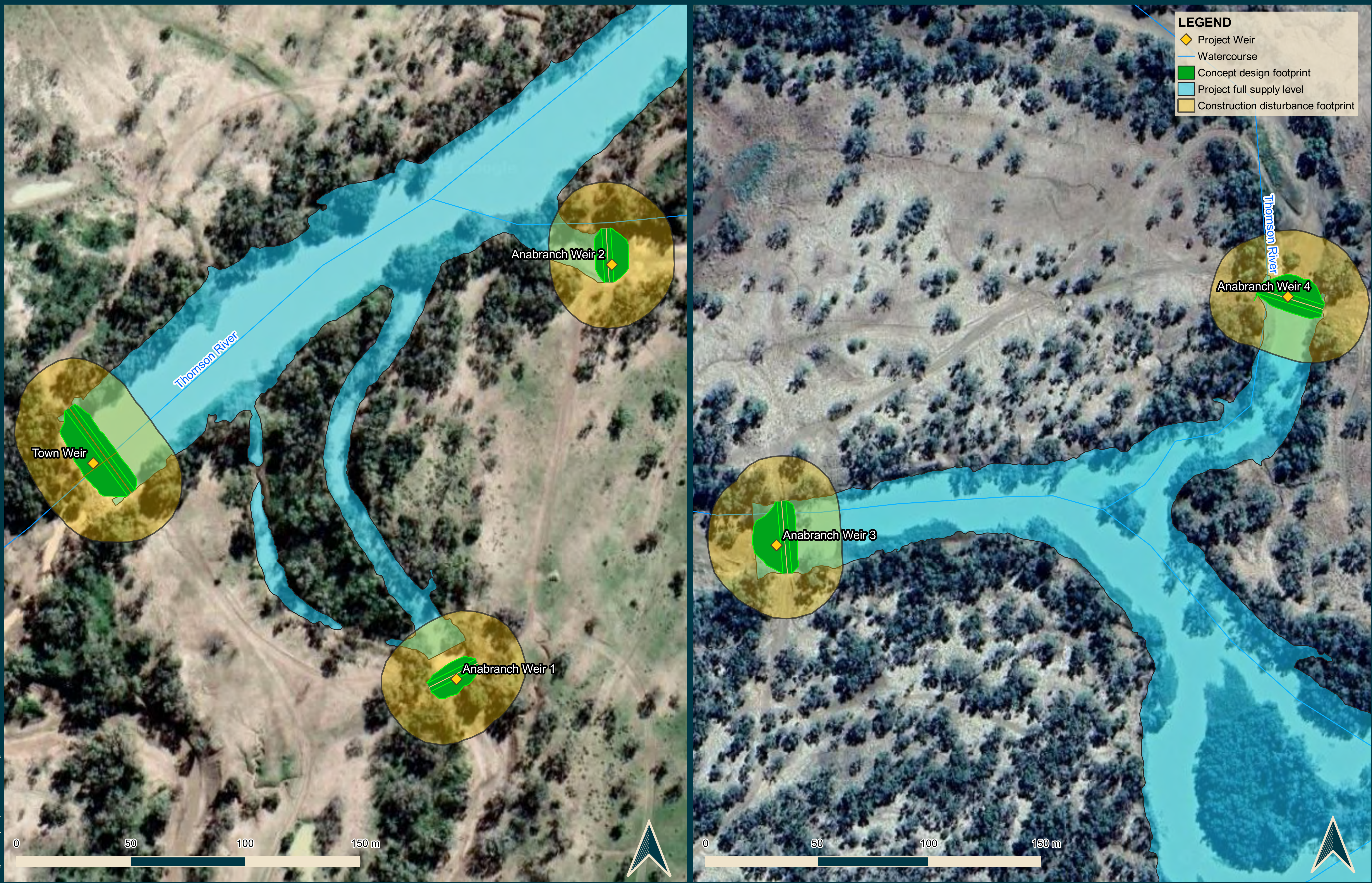
The Longreach region has a hot and dry climate, therefore securing water supplies for municipal use over the long term is a significant challenge. Safe, secure and reliable water is an essential resource for Longreach, not only providing for the health and wellbeing of the community, but also opportunities for economic and community development, as well as supporting tourism.

In 2019, the Department of Natural Resources, Mines and Energy (DNRME) (now the Department of Resources [DoR]) undertook a regional water supply security assessment (RWSSA) to investigate the security of Longreach's urban water supply system and its capacity to support current demands and future growth. The RWSSA found that Longreach's water supply, drawn from the Town Storage, is able to meet Longreach's current and projected urban water requirements until at least 2041 with a moderate degree of reliability. However, at current and projected future demands, the system may be at risk of falling to very low water levels during extended periods of severe drought, with the potential for water supply shortfalls occurring, even with the imposition of water restrictions (DNRME, 2019).

Separate to the RWSSA, Cardno (2017) undertook a feasibility study into the options for sustainable water security for Longreach. This study considered the following options for improving water security:

- Raising the level of the Town Weir and supporting Anabranch Weirs
- Construction of a new off stream storage area (dam)
- Installation of permanent desalination for existing groundwater supply
- Establishment of a new groundwater bore in an aquifer of higher quality, with transfer pipeline; and/or
- Recycling of water from the sewage treatment plant.

Of the options considered in the Cardno report, LRC has determined that raising the Project weirs by 1 m to be the optimal solution, to ensure that Longreach has safe, secure and reliable water supply in the long term.



Thomson River Weir Raising Project

Figure 2-1 Project layout

Ref: MID Proposal Workspace \ MID Figure 1-2 Project layout Author: Joe Flanagan Date created: 24.10.2023 © NGH 2023 © ESRI 2022

Ref: MID Proposal Workspace \ MID Figure 1-3i Project full supply level Author: Joe Flanagan Date created: 24.10.2023 © NGH 2023 © ESRI 2022

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Thomson River Weir Raising Project

Figure 2-2 Project full supply level

3. Methods

3.1. Desktop assessment

A desktop assessment was conducted with a 30 km buffer of central site coordinates (-23.3994, 144.2660) for the purpose of reviewing relevant environmental documents, databases, maps and legislation (Commonwealth, State and Local) to identify ecological values that have potential to occur within the Project area and surrounding landscape. The following resources were reviewed:

- Commonwealth Department of Climate Change, Energy, Environment and Water (DCCEEW) Protected Matters Search Tool (PMST)
- DCCEEW Species Profile and Threats Database (SPRAT)
- Atlas of Living Australia (ALA) database
- Queensland Department of Environment and Science (DES) WildNet database
- DES Environmental Reports
- DoR Property Maps of Assessable Vegetation Mapping (Vegetation Management report, Regulated Vegetation Management [RVM] Map including Essential Habitat Mapping, and Vegetation Management Pre-Clear Regional Ecosystem Map)
- DoR Queensland Globe, Aerial Imagery.

3.2. Field survey

A field survey was conducted by two Senior Ecologists (Dr Carissa Free and Elliot Budd) over the period 7-10 November 2022. The purpose of the field survey was to:

- Determine the presence of any matters of national environmental significance (MNES) and matters of state environmental significance (MSES)
- Verify mapped vegetation communities in the Project area
- Record any observations of conservation significant flora, fauna and fauna habitat in the Project area
- Identify weed species and documentation of vegetation disturbance.

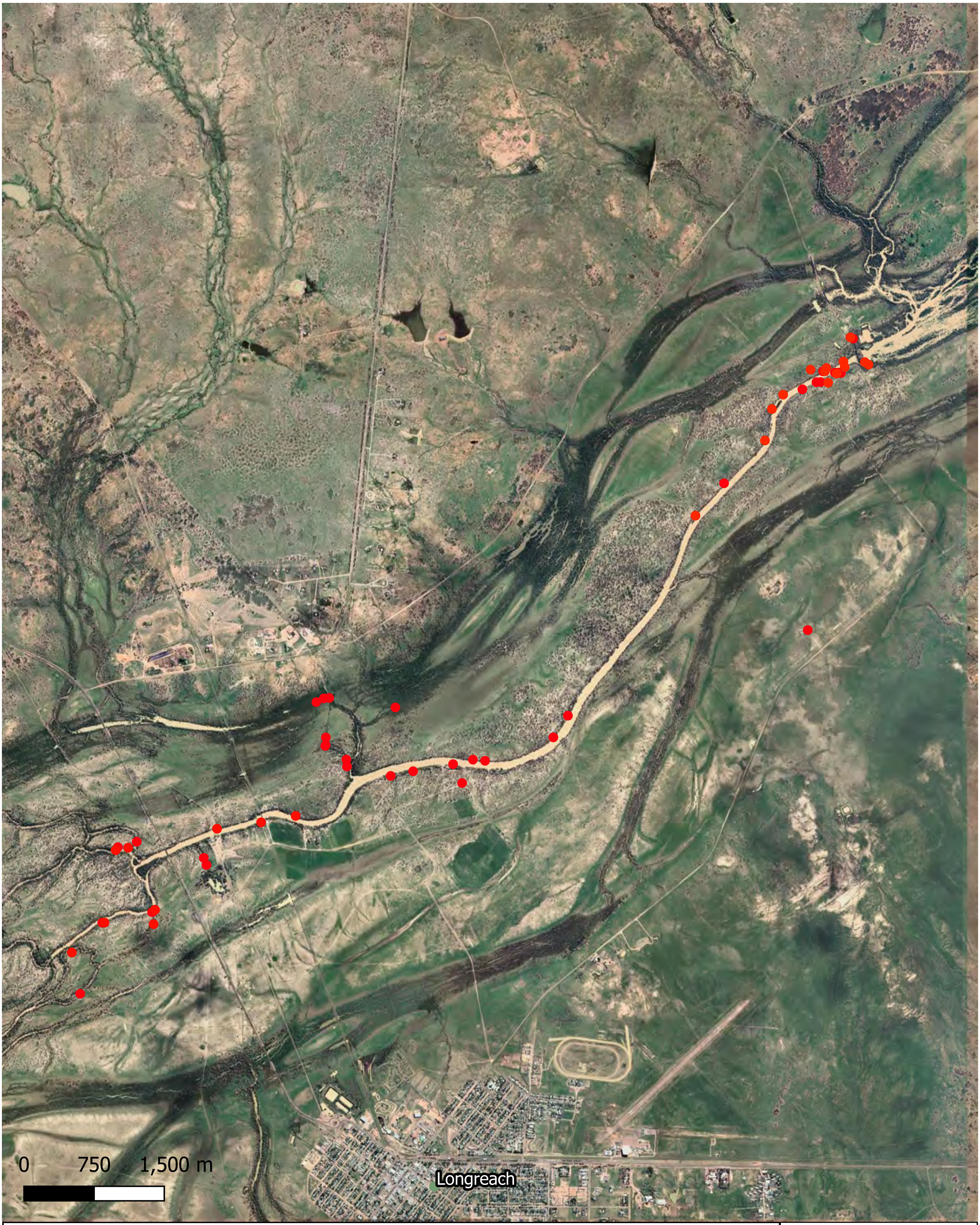
The field survey included survey points at various locations along the banks of the Thomson River and its anabranches within the Project area (Figure 3-1).

A more detailed description of the field survey methodology is provided below.

3.2.1. Flora

Flora species observed at survey points were recorded, including weeds and native species.

A general appraisal of the regional ecosystem (RE) present at each location was also undertaken for verification against the Queensland State mapping.



Longreach Regional Council

Thomson River Weir Raising Project

Figure 2. Rapid survey locations

Legend

Populated Place

Rapid Survey Location

Job number: JW211640
EPSG:3857
Date: 2023-03-29

3.2.2. Fauna

Active searches

Active searches for potentially occurring conservation significant species were undertaken at each survey point by a team of two people for up to 20 person minutes.

Spotlighting

Spotlighting for nocturnally active mammals, as well as birds and herpetofauna, was undertaken by two ecologists. Surveys commenced one hour after dusk and involved searching potential habitat on foot or from a vehicle along the riverbank and adjacent tracks. Spotlighting was also conducted on local roads surrounding the Project area. Spotlighting was undertaken over three survey nights, with the spotlighting effort totalling nine hours.

Bird surveys

Bird surveys to target threatened and migratory bird species coincided with active searches, with opportunistic records taken during the entire survey period. Birds were also recorded incidentally as ecologists traversed the Project area and surrounds.

Incidental records

Sightings of fauna were opportunistically recorded across the Project area during all surveys.

4. Results

4.1. Vegetation communities

4.1.1. State

Queensland State RE mapping available on Queensland Globe (DoR, 2023) indicates that the entire Project area and surrounds comprises a combination of REs 4.3.4x1 / 4.3.14 / 4.3.4x2e / 4.3.24a / 4.3.11b. The short description for each of these REs is provided in Table 4-1.

Table 4-1 State-mapped regional ecosystems in the Project area

RE	VM Act class	Short description
4.3.4x1	Least Concern	*Eucalyptus coolabah* low open woodland, commonly with *Acacia stenophylla, Acacia cambagei* and *Atalaya hemiglauca*. A sparse shrub layer may occur. The ground layer is tussock grasses. Occurs on channel fringes in broad, braided alluvial systems in Cretaceous mudstone and Tertiary clay landscapes. Cracking clay soils. Riverine.
4.3.4x2e	Least Concern	*Eucalyptus coolabah* woodland to low open woodland, occasionally with *Acacia cambagei, A. tephrina* and *A. stenophylla*. A shrub layer may occur, including *Eremophila bignoniiflora* and *Duma florulenta*. The ground layer is tussock grasses. Occurs on active alluvial plains associated with major watercourses in broad clay landscapes in the east of the bioregion. Cracking clay soils. Not a Wetland.
4.3.11b	Least Concern	*Eucalyptus coolabah* usually predominates forming a distinct but discontinuous upper canopy layer. *E. camaldulensis* is conspicuous in sandy or gravelly banks. Waterholes on major rivers. Riverine.
4.3.14	Least Concern	*Astrebla lappacea* tussock grassland to closed tussock grassland, commonly with *A. squarrosa*. Other species include *Aristida latifolia, Iseilema vaginiflorum, Panicum* spp. A number of forbs are present and increase in density after winter rainfall. Emergent trees are rare, including *Acacia cambagei* and *Eucalyptus coolabah*. Occurs on alluvial plains in clay landscapes dominated by *Astrebla* spp. tussock grasslands. Soils are predominately deep, red, brown or grey, cracking clays.
4.3.24a	Least Concern	Seasonal swamps. *Chenopodium auricomum* dwarf shrubland to open dwarf shrubland. Occurs in closed depressions on floodplains. Soils are very deep, moderate to strongly alkaline, grey cracking clays with self-mulching or curst surface. Soils have strong coarse structure and crack widely.

The field survey indicated that the Project area conforms to the State RE mapping, noting that detailed floristic ground-truthing was not undertaken during the field survey. Generally, the dominant species along the edges of the river were *Eucalyptus coolabah* with *Melaleuca trichostachya*, *Lysiphyllum gilvum* and *Acacia cambagei*. This conforms with RE 4.3.11b. Further away from the river the dominant species were *Eremophila bignoniiflora, Acacia stenophylla, Acacia cambagei* and *Atalaya hemiglauca*, conforming with REs 4.3.4 x 2e and 4.3.4 x 1. On the floodplains adjacent there were areas of RE 4.3.24a where *Chenopodium auricomum* shrubland was the dominant flora species.

No endangered or of concern REs were recorded.

All vegetation within the Project area and surrounds is mapped as Category B on the regulated vegetation management map (Figure 4-1).

There is no essential habitat (MSES) mapped within the Project area.

4.1.2. Commonwealth

The PMST identified no threatened ecological communities (TECs) listed under the EPBC Act that could potentially occur within 30 km of the Project area. No TEC's were recorded during the field survey.

4.2. Fauna and flora

4.2.1. State

The Wildlife Online database records identified four State listed threatened fauna species, and no flora species, within a 30 km radius of the central site coordinates (Appendix A). Namely, the *Hirundapus caudacutus* (White-throated needletail), *Grantiella picta* (Painted honeyeater), *Calidris ferruginea* (Curlew sandpiper) and *Macrotis lagotis* (Greater bilby) each have one record within 30 km of the Project. These species were considered as having either a low or moderate likelihood of occurrence in the Project area (Appendix B).

No threatened fauna species were recorded within the Project area. A total of 45 least concern fauna species were observed (of which none are exotic) within the Project area (Appendix C). No threatened flora species were recorded within the Project area. A total of 16 least concern native flora species were observed in the Project area (Appendix D).

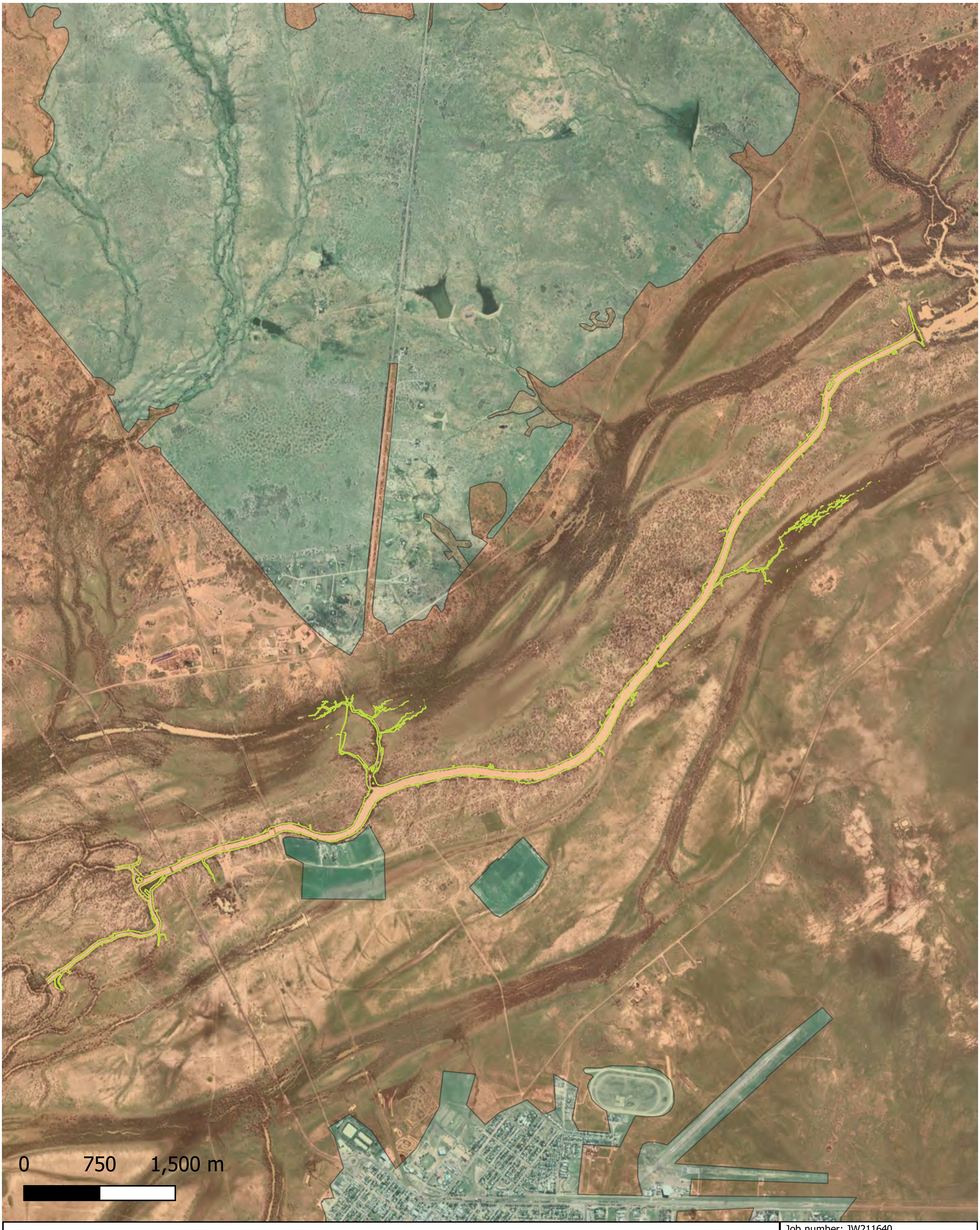
4.2.2. Commonwealth

The EPBC Act PMST results (Appendix A) identified 16 threatened fauna and flora species and seven migratory species that may occur within a 30 km radius of the Project area.

An assessment of likelihood of occurrence was conducted for each of the threatened species identified in the desktop assessment, which is provided in Appendix B. This assessment was based on field survey results as well as the known ecology of the species, including predicted species distribution (i.e. DCCEEW, 2023), likely presence of suitable habitat within the Project area and database records for each threatened species. The likelihood of occurrence methodology is also provided in Appendix B.

From this assessment, one fauna species, one flora species, and three migratory species were identified as having a high likelihood of occurrence in the broader area surrounding the Project. Namely *Sminthopsis douglasi* (Julia Creek dunnart), *Sclerolaena walker*, *Calidris acuminata* (Sharp-tailed sandpiper), *Calidris melanotos* (Pectoral sandpiper), *Gallinago hardwickii* (Latham's snipe/Japanese snipe).

Notwithstanding, no EPBC listed threatened fauna or flora species, or migratory species, were recorded within the Project area.



Longreach Regional Council

Thomson River Weir Raising Project

Figure 3. Regulated vegetation

Legend

Regulated Vegetation

Category A

Category B

Category C

Category X

LiDAR (2011)

179.5 mAHD (Project Area)

Job number: JW211640
EPSG:3857
Date: 2023-03-29

4.2.3. Weeds

A total of two exotic plant species were recorded in the Project area, both of which are listed as restricted invasive plant species under the *Biosecurity Act 2014* and are Weeds of National Significance (WoNS) (Table 4-2).

Table 4-2 Invasive plant species recorded

Scientific name	Common name	WoNS?	Biosecurity Act category
Cryptostegia grandiflora	Rubber vine	Yes	Category 3
Parkinsonia aculeata	Jerusalem thorn	Yes	Category 3

5. Potential impacts

5.1. Summary

Table 5-1 provides a summary of the Projects potential impacts on terrestrial ecology.

Table 5-1 Potential impacts to terrestrial ecology

Nature of impact	Frequency	Duration	Potential consequence/s
Clearance of native vegetation adjacent to weirs	Construction	Permanent	• Loss of approximately 1.64 ha of native vegetation comprising least concern RE 4.3.11b • Loss of associated native fauna habitat (e.g. hollow bearing trees)
Potential loss of streamside shelter/habitat trees from increased inundation and wet feet	Operation	Long-term, until equilibrium reached	• Loss of native fauna habitat features in trees lost from increased inundation • Direct injury/mortality of fauna during tree fall/loss.
Disturbance of fauna and habitat during weir construction	Construction	Short term	• Temporary disturbance of fauna that utilise habitat surrounding construction footprint due to construction noise and other activities • Direct injury/mortality to animals during construction • Changes in surrounding environment to benefit non-native and invasive flora species (e.g. weeds).
Potential increase in bank scouring downstream	Intermittent – during weir overtopping	Permanent	• Increase in the rate of scouring downstream of the weirs during overtopping events • Increased rate of loss of fringing habitat trees and remnant vegetation into river

Further discussion around each of these potential impacts is provided below.

5.2. Vegetation clearance

The Project would result in the clearance of approximately 1.64 ha of least concern RE 4.3.11b. The construction footprint is shown on Figure 2-1. This 20 m is a conservative footprint for the purpose of assessment in the MID application for the Project, however there is a high chance the actual required disturbance footprint will be less than 1.64 ha. Temporary Project components (e.g. laydown areas and temporary site offices) will be located in already cleared/sparsely vegetated areas of the Town Common without the need for any clearance.

As visible on Figure 2-1, the existing weirs and associated access tracks create a small existing break in riparian vegetation continuity. The clearance of a 20 m construction buffer around each of the weirs will slightly increase the extent of this discontinuity, however in the context of the larger Thomson River system (approximately 350 km in length), this small discontinuity is considered insignificant.

5.3. Loss of streambank vegetation

The dominant species along the banks of the Town Storage is *Eucalyptus coolabah,* a commonly resilient riparian tree that is tolerant of periods of seasonal inundation and flooding. Trees that fringe the Thomson River are naturally lost or damaged in any given year as a consequence of flooding and other high flow events. It is expected however the Project would accelerate the loss of some streambank trees on the banks of the Town Storage due to increased inundation and wet feet due to the higher FSL.

Several trees were observed during the field survey within 1 m of the current FSL showing existing natural signs of stress or destabilisation by erosive processes. Given the number of biological and geomorphological variables however, it is not possible to quantify how many individual trees would be affected by the Project.

Notwithstanding the above, the loss of streambank vegetation through fluvial geomorphological change is typically offset naturally as replacement vegetation, including riparian trees, establish and grow within the riparian corridor. This natural regeneration/equilibrating process is expected to occur, in the long-term, on the banks of the Town Storage as the riparian environment adjusts to the new FSL brought about by the Project.

5.4. Construction disturbance

Project construction is expected to take approximately 12 months. During Project construction, there is potential for indirect, temporary disturbance of fauna that utilise habitat surrounding the construction footprint. These disturbances would primarily be due to noise and vibration propagation into surrounding vegetation, which may cause some fauna to leave the area while construction activities are ongoing.

Direct injury/mortality to animals during construction is also possible due to vehicle strike and felled vegetation. However given the coarse nature of access tracks leading to the weirs and the required slow speed limits, the likelihood of vehicle strikes occurring is considered very low. Further, it is recommended that a qualified fauna spotter-catcher is present during construction footprint clearance activities to safely relocate any fauna, minimising the likelihood of felled trees striking fauna.

Lastly, it is expected that clearance of the disturbance footprint will provide the opportunity for weed species to establish immediately following the completion of construction activities. Weed control measures (Section 6) are recommended to minimise the chance of weed propagation outside of the construction footprint.

5.5. Bank scouring

The Project has the potential to increase in the rate of scouring downstream of the weirs, due to the greater velocity/energy of water flowing down the weir during overtopping events. This in turn has the potential to increase the rate of loss of fringing/streambank habitat trees and remnant vegetation.

Water Technology (2023) has undertaken a Flood Impact Assessment for the Project. This assessment found that where localised velocity increases occur, the magnitude of the post raising velocity is generally less than 1 m/s, therefore the increase is unlikely to materially affect or worsen erosion potential and it does not exceed any notable threshold for causing additional scour. The assessment noted that this finding is dependent on local conditions, and recommended that the areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events. This recommendation has been incorporated into the measures described in Section 6.

5.6. Flora and fauna

In consideration of the impacts described above, this section considers the Projects potential impacts on flora and fauna generally, including listed species considered with a high likelihood of occurring the Project area.

Fauna (mammals, birds, reptiles) may utilise habitat features in riparian trees along the Thomson River. Loss of these habitat features due to the Project (Sections 5.2 and 5.3) may impact native fauna; however, the habitat provided by riparian trees is abundant along the Thomson River system and the loss of habitat that is critical to the survival of any one species is unlikely. Further, the relative size of the construction footprint relative to the extensive presence of contiguous vegetation in the surrounding landscape of insignificant.

One fauna species, one flora species, and three migratory species listed under the EPBC Act were identified as having a high likelihood of occurrence in the Project area and surrounds; Julia Creek dunnart, *Sclerolaena walker*, Sharp-tailed sandpiper, Pectoral sandpiper) and Latham's snipe/Japanese snipe.

It is likely the three migratory bird species are well adapted to inhabiting floodplain environments and are highly mobile with a large dispersal capacity, therefore, any minor hydrological changes that would arise as a consequence of the Project (see Water Technology, 2023) are unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that these species would be likely to decline. For this reason, impacts to migratory bird species, even those regarded as having a high likelihood of occurrence, are considered unlikely to be significant and are not mentioned further herein.

The Julia Creek dunnart occurs on heavy clay soils (e.g., floodplains) across the Mitchell Grasslands (46,998,475 ha). It is not known to occur within 170 km of the Town Weir. A number of important populations have been identified in Bladensburg National Park (NP), Moorrinya NP, Toorak Research Station and Julia Creek Aerodrome (Qld DERM 20092). Although no important populations for this species have been identified in proximity to the Project, suitable and preferred habitat is present.

Sclerolaena walkeri occurs on saline river flats and is not known to occur within 140km of the Town Weir. There are no recorded important populations of *S. walker* in proximity to the Project, however suitable and preferred habitat present.

If either species did occur in proximity to the Project, they are both well adapted to inhabiting dynamic floodplain environments like that surrounding the Town Storage.

Water Technology (2023) found that the Project would not result in significant changes to the depth, velocity or extent of flooding events in the Project area. Accordingly, any potential floodplain/river flat habitat within the Project area and surrounds for the Julia Creek dunnart or *S. walkeri* is unlikely to experience novel changes outside of seasonal and annual flooding events, that would disrupt or cause declines in the quality of soils, vegetation or other habitat features utilised by both species. Therefore, the Project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that these species would be likely to decline.

6. Recommended mitigation measures

Based on the impact assessment undertaken above, the mitigation measures described in Table 6-1 are recommended to be adopted by the LRC to minimise potential impacts of the Project on terrestrial ecology.

Table 6-1 Recommended mitigation measures

Nature of impact	Recommended mitigation measures
Clearance of native vegetation adjacent to weirs	• Clearing works monitored by qualified fauna spotter-catcher to safely relocate any fauna and minimise the likelihood of felled trees striking fauna • Revegetation/planting of *E. coolabah* and other flora species associated with RE 4.3.11b in the construction footprint where natural recruitment does not occur in the long term.
Potential loss of streamside shelter/habitat trees from increased inundation and wet feet	• Monitoring of tree loss on the banks of the Town Storage • Control agricultural grazing to increase recruitment of *E. coolabah* and other species edging the riverbank • Planting of *E. coolabah* and other species edging the Thomson River to where tree loss is exacerbated, and natural recruitment is not occurring • Where significant, hollow-bearing trees are lost, install artificial hollows in the surrounding unaffected vegetation patches, or; manage felled hollow trees or logs as ground hollow habitat in the adjacent vegetation patches.
Disturbance of fauna and habitat during weir construction	• Turn off heavy vehicles and mobile plant when not in use to minimise noise and vibration disturbance • Implement speed limits on access tracks within Town Common • Pre-start inspections of heavy machinery and pits/excavations for trapped animals • Undertake vehicle visual inspections and washdown as necessary to remove any weed material prior to arriving at construction site • Treatment of weeds following construction to reduce the risk of weed propagation in immediate surrounds and downstream.
Potential increase in bank scouring downstream	• Areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events • Limit public access to the banks of the Thomson River around the weirs to reduce activities (e.g. four-wheel driving) that may exacerbate riverbank destabilisation • Where scouring due to the Project is occurring and impacting fauna habitat, implement bank stability works.

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Appendix A Desktop Assessment results

Australian Government

Department of Climate Change, Energy, the Environment and Water

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: 07-Mar-2023

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:	1
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	14
Listed Migratory Species:	8

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	5
Commonwealth Heritage Places:	None
Listed Marine Species:	13
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Historic			
QANTAS Hangar Longreach	QLD	Listed place	In feature area

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Coongie lakes	500 - 600km upstream from Ramsar site	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Vulnerable	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
Geophaps scripta scripta Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Neochmia ruficauda ruficauda Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Pezoporus occidentalis			
Night Parrot [59350]	Endangered	Species or species habitat may occur within area	In buffer area only
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
MAMMAL			
Macroderma gigas			
Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Petrogale xanthopus celeris			
Yellow-footed Rock-wallaby (central-western Queensland) [87608]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Sminthopsis douglasi			
Julia Creek Dunnart [305]	Vulnerable	Species or species habitat may occur within area	In feature area
PLANT			
Sclerolaena walkeri			
[16152]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Acanthophis hawkei			
Plains Death Adder [83821]	Vulnerable	Species or species habitat may occur within area	In feature area

Listed Migratory Species [Resource Information]

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

Scientific Name	Threatened Category	Presence Text	Buffer Status
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]		Species or species habitat likely to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

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

Commonwealth Land Name	State	Buffer Status
Defence		
Defence - JINDALEE TRANSMITTING STATION [31960]	QLD	In buffer area only
Defence - JINDALEE TRANSMITTING STATION [31962]	QLD	In buffer area only
Defence - JINDALEE TRANSMITTING STATION [31961]	QLD	In buffer area only
Defence - JINDALEE TRANSMITTING STATION [31963]	QLD	In buffer area only
Defence - JINDALEE TRANSMITTING STATION [31959]	QLD	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat likely to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat likely to occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		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 likely 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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Motacilla cinerea			
Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Ballera Lateral Gas Pipeline	2006/2563	Controlled Action	Completed	In buffer area only
Not controlled action				
Earthworks at the Stockmans Hall of Fame	2012/6502	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
Longreach Solar Farm, 50758 Landsborough Highway, Longreach	2017/7885	Not Controlled Action	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 are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

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

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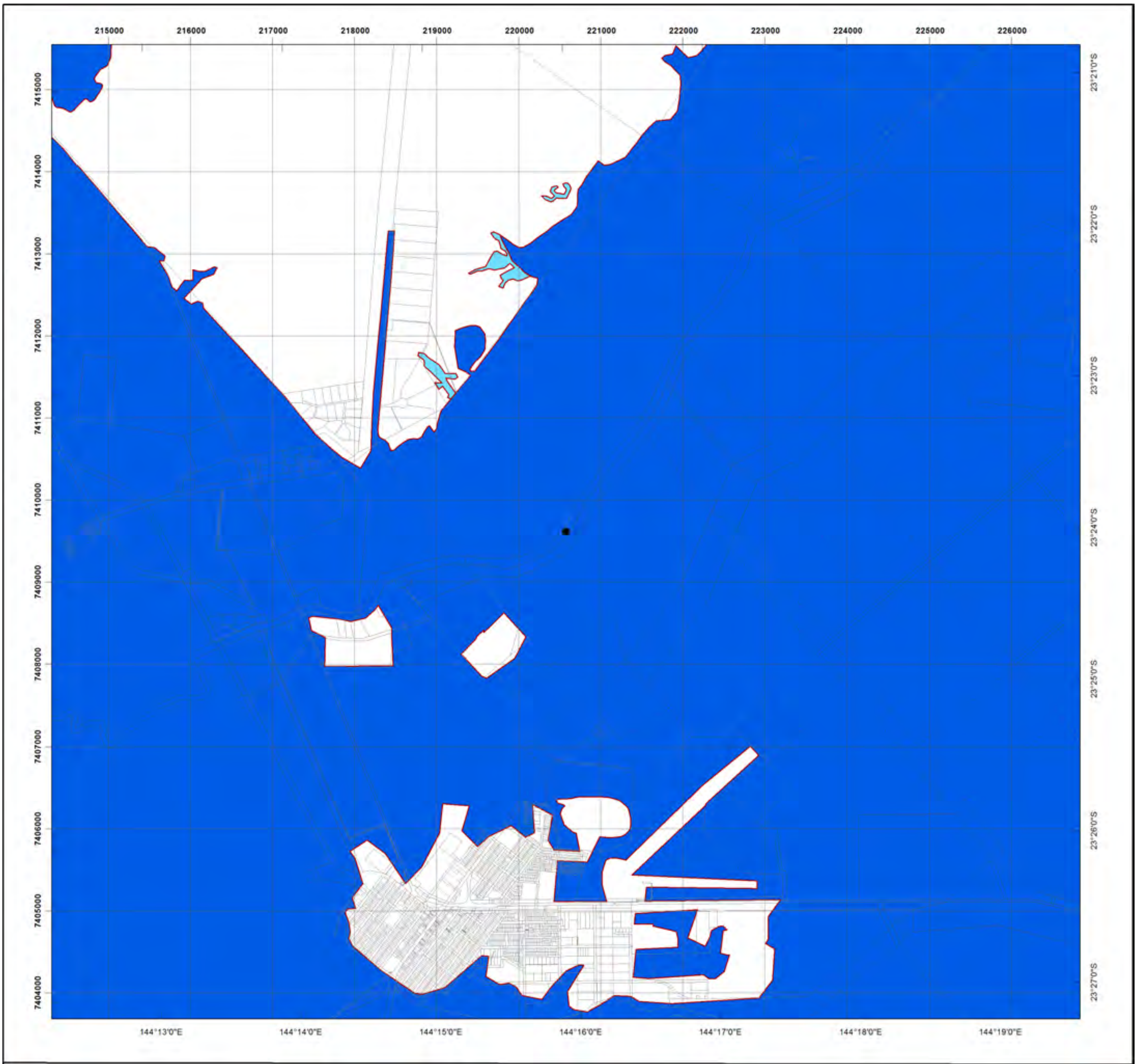
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

07/03/2023 13:30:06
Longitude: 144.266 Latitude: -23.3994



Regulated Vegetation Management Map

Legend

- Coordinates
- Category A area (Vegetation offsets/compliance notices/VDecs)
- Category B area (Remnant vegetation)
- Category C area (High-value regrowth vegetation)
- Category R area (Reef regrowth watercourse vegetation)
- Category X area (Exempt clearing work on Freehold, Indigenous and Leasehold land)
- Water
- Other land parcel boundaries

N

0 675 1,350 2,025 2,700 3,375 m

This product is projected into:
GDA 1994 MGA Zone 55

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Resources makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information required for the assessment of vegetation values is provided in the accompanying "Vegetation Management Supporting map". For further information go to the web site: www.resources.qld.gov.au or contact the Department of Resources.

Digital data for the regulated vegetation management map is available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Land parcel boundaries are provided as locational aid only.

This map is updated on a monthly basis to ensure new PMAVs are included as they are approved.

Queensland Government

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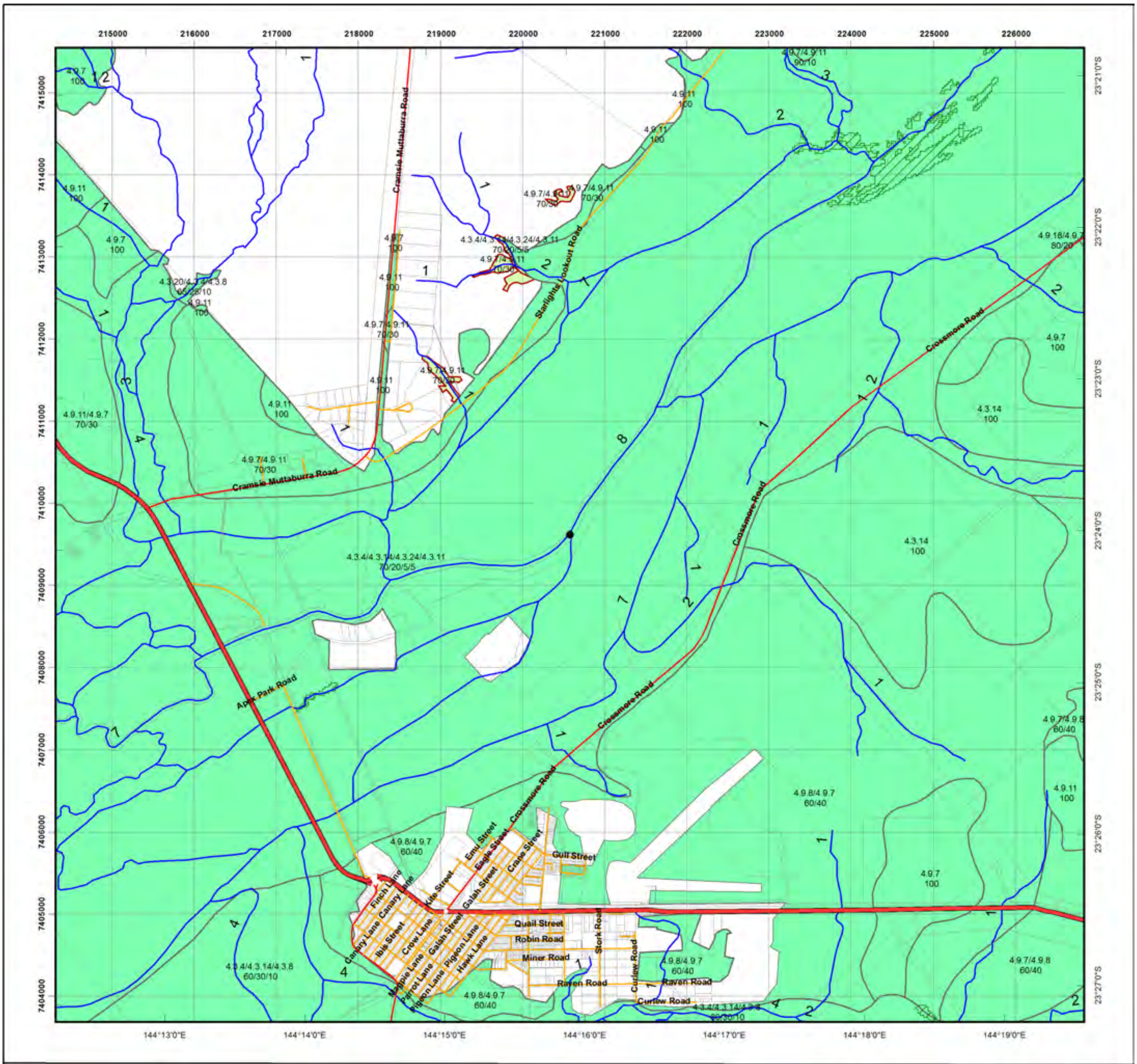
Longitude: 144.266 Latitude: -23.3994



Vegetation Management Supporting Map

Legend

- Coordinates
- Category A or B area containing endangered regional ecosystems
- Category A or B area containing of concern regional ecosystems
- Category A or B area that is a least concern regional ecosystem
- Category C or R area containing endangered regional ecosystems
- Category C or R area containing of concern regional ecosystems
- Category C or R area that is a least concern regional ecosystem
- Category X area
- Water
- Wetland on the vegetation management wetlands map
- Essential habitat on the essential habitat map
- Essential habitat species record
- Watercourses and drainage features on the vegetation management watercourse and drainage features map (Stream order shown as black number against stream where available)
- Highway
- Connector
- Street/Local Road
- National Parks, State Forest and other reserves
- Other land parcel boundaries

Queensland Government

LOCALITY DIAGRAM

N

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

This product is projected into:
GDA 1994 MGA Zone 55

Labels for Essential Habitat are centred on the area of enquiry.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/- 100 metres.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Resources makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

Additional information may be required for the purposes of land clearing or assessment of a regional ecosystem map or PMAV applications. For further information go to the web site: www.resources.qld.gov.au or contact the Department of Resources.

Digital data for the vegetation management watercourse and drainage feature map, vegetation management wetlands map, essential habitat map and the vegetation management remnant and regional ecosystem map are available from the Queensland Spatial Portal at http://www.information.qld.gov.au/

Land parcel boundaries are provided as locational aid only.

Vegetation Management Act 1999 - Extract from the essential habitat database

Essential habitat is required for assessment under the:

- State Development Assessment Provisions - State Code 16: Native vegetation clearing which sets out the matters of interest to the state for development assessment under the *Planning Act 2016*; and
- Accepted development vegetation clearing codes made under the *Vegetation Management Act 1999*

Essential habitat for one or more of the following species is found on and within 1.1 km of the identified subject lot/s on the accompanying essential habitat map.
This report identifies essential habitat in Category A, B and Category C areas.
The numeric labels on the essential habitat map can be cross referenced with the database below to determine which essential habitat factors might exist for a particular species.
Essential habitat is compiled from a combination of species habitat models and buffered species records.
The Department of Resources website (http://www.resources.qld.gov.au) has more information on how the layer is applied under the State Development Assessment Provisions - State Code 16: Native vegetation clearing and the *Vegetation Management Act 1999*.
Regional ecosystem is a mandatory essential habitat factor, unless otherwise stated.
Essential habitat, for protected wildlife, means a category A area, a category B area or category C area shown on the regulated vegetation management map-

1) that has at least 3 essential habitat factors for the protected wildlife that must include any essential habitat factors that are stated as mandatory for the protected wildlife in the essential habitat database; or
2) in which the protected wildlife, at any stage of its life cycle, is located.

Protected wildlife includes critically endangered, endangered, vulnerable or near-threatened native wildlife prescribed under the *Nature Conservation Act 1992*.

Essential habitat in Category A and/or Category B and/or Category C

No records

Queensland Government

WildNet species list

Search Criteria: Species List for a Specified Point
Species: All
Type: Native
Queensland status: Rare and threatened species
Records: All
Date: All
Latitude: -23.3994
Longitude: 144.266
Distance: 30
Email: jaimee.j@nghconsulting.com.au
Date submitted: Tuesday 07 Mar 2023 13:27:53
Date extracted: Tuesday 07 Mar 2023 13:30:03

The number of records retrieved = 4

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Apodidae	*Hirundapus caudacutus*	white-throated needletail		V	V	1
animals	birds	Meliphagidae	*Grantiella picta*	painted honeyeater		V	V	1
animals	birds	Scolopacidae	*Calidris ferruginea*	curlew sandpiper		CR	CE	1
animals	mammals	Thylacomyidae	*Macrotis lagotis*	greater bilby		E	V	1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

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

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

Records - The first number indicates the total number of records of the taxon (wildlife records and species listings for selected areas).
This number is output as 99999 if it equals or exceeds this value. A second number located after a / indicates the number of specimen records for the taxon.
This number is output as 999 if it equals or exceeds this value.

Appendix B Likelihood of occurrence

Table B-1 Categorisation of the likelihood of occurrence assessment for species

Likelihood of occurrence	Conditions
Confirmed	• The species has been recorded (either an individual or sign [e.g., scat, bone or scratch]) within the Project area during a survey by known source (by ecologists and published in a report or scientific paper).
High	• The species has been recorded in the Project area by an unknown source (i.e., a record in ALA or Wildlife Online); OR • Suitable good quality, preferred habitat is known to be present within the Project area AND the species has been recorded recently (within the last 20 years) in the locality (30 km); OR • The species has mapped habitat (e.g. essential habitat) in the Project area.
Moderate	• Preferred habitat is present in the Project area but no recent (within the last 20 years) records of the species are located within 30 km; OR • Suitable habitat is present within the Project area and the species has been recorded recently (within the last 20 years) in the locality (10 km).
Low	• Suitable habitat is not present (or if present, modified and degraded) in the Project area AND the species has not been recorded recently in the locality (30 km); OR • The species has records within 30 km but no suitable habitat or very limited, degraded or modified habitat occurs within the Project area; OR • The species may be an occasional visitor but will not have a sedentary population; OR • The species may be restricted in range to discreet populations that do not occur within the Project area; OR • The Project area is outside the current known range of the species.

Table B-2 Likelihood of occurrence assessment

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
Plants						
Sclerolaena walkeri	-	V	LC	Occurs on saline river flats. Known from the Diamantina River, Mackunda Creek channels, Paroo River area and near the Bulloo River north of Thargominda. Associated with Queensland blue bush (*Chenopodium auricomum*) and Yapunya (*Eucalyptus ochrophloia*) (DEWHA 2008).	High Species distribution is within Project area. No recent records in the Project locality. Suitable and preferred habitat present.	Low
Birds – threatened						
Calidris ferruginea	Curlew sandpiper	CE, M	CR	Curlew sandpipers prefer intertidal mudflats in sheltered coastal areas, including estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. The species are not often recorded inland however can also be found around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters (TSSC 2015).	Moderate Species distribution is within Project area with suitable habitat available. No recent records exist.	Low
Erythrotriorchis radiatus	Red goshawk	V	E	The red goshawk occurs mostly in extensive areas of coastal and subcoastal open forest and woodland that support a mosaic of vegetation types. The vegetation types include Eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. Permanent water (watercourses and wetlands) is usually present in close proximity, with tall emergent trees used for nesting. The red goshawk is thought to have a very large home range covering between 50 and 220 square kilometres. Sparsely distributed across coastal and sub-coastal Australia, from the western Kimberly to northern New South Wales. Appears to have been a contraction in range in recent years. Occasionally recorded	Low Species potential distribution is within Project area. No recent records exist. Suitable but not preferred habitat available.	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
				from gorge country in central Australia and western Queensland (DCCEEW 2023).		
Falco hypoleucos	Grey falcon	V	V	The species occurs in arid and semi-arid Australia, including the Murray-Darling Basin, Eyre Basin, central Australia and Western Australia. The species is mainly found where annual rainfall is less than 500 mm, except when wet years are followed by drought, when the species might become marginally more widespread, although it is essentially confined to the arid and semi-arid zones at all times. The species prefers the tallest trees along watercourses, particularly river red gum (*Eucalyptus camaldulensis*) and coolibah (*E. coolabah*) for breeding and timbered lowland plains, acacia shrubland crossed by tree-line watercourses, as well as treeless areas, tussock grasslands and open woodlands (TSSC 2020).	Moderate Species distribution is within Project area. Recent record exists approximately 35km east of the Project area. Preferred habitat present (*Eucalyptus* species along watercourse).	Low
Geophaps scripta scripta	Squatter pigeon (southern)	V	V	Squatter pigeon (southern) occurs in dry grassy woodland and open forest, mostly in sandy areas close to water. This species is now largely (if not wholly) restricted to Queensland, from the New South Wales border, north to the Burdekin River, west to Charleville and Longreach, and east to the coast to Townsville and Proserpine (DCCEEW 2023).	Low Species distribution not within Project area. No recent records exist. Suitable habitat is limited.	Low
Grantiella picta	Painted honeyeater	V	V	The Painted honeyeater occurs in dry forests and woodlands, where its primary food is mistletoes in the genus *Amyema*. It is also known to occur in riparian woodland communities dominated by eucalypt species such as *Eucalyptus camaldulensis*, although its breeding distribution is dictated by the presence of mistletoes which are largely restricted to older trees. The species is sparsely distributed from south-eastern Australia to north-western Queensland and eastern Northern Territory. The greatest concentrations and almost all records of breeding come from south of 26°S, on inland slopes of the Great Dividing Range between the Grampians, Victoria and Roma, Queensland (DCCEEW, 2023).	Low Species distribution within Project area and few recent records exist within Project locality. Suitable habitat present as riparian woodland however, mistletoe was not recorded during rapid field assessments. As this species relies on mistletoe	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
					as a food source it is unlikely to occur.	
Hirundapus caudacutus	White-throated needletail	V	V	Migratory, predominantly aerial species, found in Australian eastern states and territories. Recorded in all coastal regions of Queensland. Typically recorded in wooded areas, including open forest and rainforest. They have also been documented to occur over heathland and coastal cliffs. Non-breeding visitor to Australia. There are occasional records of the species roosting in dense canopy foliage and in tree hollows (DCCEEW 2023).	Moderate Project area not within species predicted distribution however, recent records exist within 1km south of the Project area. Limited habitat exists.	Low
Neochmia ruficauda ruficauda	Star finch (eastern), star finch (southern)	E	E	The star finch (eastern) occurs mainly in grasslands and grassy woodlands that are located close to bodies of fresh water. It also occurs in cleared or suburban areas such as along roadsides and in towns. Studies at nine former sites of the star finch (eastern) found that the habitat consisted mainly of woodland. These habitats are dominated by trees that are typically associated with permanent water or areas that are regularly inundated; the most common species are *Eucalyptus coolabah*, *Eucalyptus tereticornis, Eucalyptus tessellaris, Melaleuca leucadendra, Eucalyptus camaldulensis* and *Casuarina cunninghamii*. Based on the small number of accepted records, the distribution of this species formerly extended from Bowen in central Queensland, south to the Namoi River in northern New South Wales, and west to the Blackall Range. Recent records have been obtained only from scattered sites in central Queensland (i.e., between 21°S and 25°S, and 141°E and 150°E) and, consequently, the star finch (eastern) now appears to be extinct in both south-eastern Queensland and northern New South Wales (Department of the Environment, 2019). The total population of the star finch (eastern) is estimated to consist of 50 or less breeding birds (DCCEEW 2023).	Moderate Species distribution is within Project area. No recent records exist. Suitable habitat as *Eucalyptus coolabah* near permanent water sources exists.	Low
Pezoporus occidentalis	Night parrot	E	E	Night parrots prefer arid and semi-arid zone habitats with *Triodia* (Spinifex) grasslands and/or chenopod shrublands. Species sightings have also occurred in *Astrebla* spp. (mitchell grass), shrubby	Low No recent records exist, and Project area is outside of	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
				samphire and chenopod associations, scattered trees and shrubs, *Acacia aneura* (Mulga) woodland, treeless areas and bare gibber (TSSC 2016a).	species distribution. No suitable habitat present.	
Poephila cincta cincta	Southern black-throated finch	E	E	The black-throated finch's' (southern) preferred habitat is grassy open woodland/forest dominated by *Eucalyptus, Melaleuca* or *Acacia*, but they are also known from pandanus flats and scrubby plains. The black-throated finch (southern) feeds on the seed of native grasses from the ground. Three resources are required for the species to persist: water, grass seeds and trees providing suitable habitat. If any of these three resources are not available, black-throated finch (southern) is unlikely to be present. The black-throated finch's (southern) primary stronghold is the region surrounding Townsville; however it is also known to occur in scattered locations across central-eastern Queensland (DCCEEW 2023).	Low No recent records exist. No suitable habitat present.	Low
Rostratula australis	Australian painted snipe	E	E	Preferred habitat includes shallow inland wetlands, brackish or freshwater, that are permanently or temporarily inundated. Breeding habitat requirements may be quite specific: shallow wetlands with areas of bare wet mud and both upper and canopy cover nearby. Has been recorded from wetlands in all Australian states, however, is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter (DSEWPC 2013).	Moderate Suitable habitat present and within species distribution.	Low
Birds – migratory						
Actitis hypoleucos	Common sandpiper	-	-	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The common sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The	Low Recent records within 1km of Project area however, no suitable habitat present. Species distribution predicts individuals may occur.	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
				muddy margins utilised by the species are often narrow and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags (Higgins & Davies 1996)		
Apus pacificus	Fork-tailed swift	-	-	The Fork-tailed swift is almost exclusively aerial, flying from less than 1m to at least 300m above ground and probably much higher. This species mostly occurs over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand dunes. This species is generally found east of the Great Dividing Range from Cooktown to the New South Wales border, but extends further west in southern Queensland (DCCEEW 2022).	Moderate Multiple recent records exist within Project locality. Project area is within species distribution. Suitable limited habitat present as riparian woodland.	Low
Calidris acuminata	Sharp-tailed sandpiper	-	-	The species prefers the grassy edges of shallow inland freshwater wetlands. Swage farms, flooded fields, mudflats, mangroves, rocky shores and beaches also provide suitable habitat for the species (Pizzey 1991).	High Multiple recent records exist within Project locality. Project area is within species distribution. Suitable habitat present as riparian woodland.	Low
Calidris melanotos	Pectoral sandpiper	-	-	This species prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. Usually found in coastal or near coastal habitat but occasionally found further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands (Higgins & Davies 1996).	High Multiple recent records exist within Project locality. Project area is within species distribution. Suitable habitat present as riparian woodland.	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
Gallinago hardwickii	Latham's snipe, Japanese snipe	-	-	Latham's snipe occurs across various permanent and ephemeral wetlands, occurring in open, freshwater wetlands that have shelter nearby. They generally occupy flooded meadows, seasonal or semi-permanent swamps, or open waters, but various other freshwater habitats can be used including bogs, waterholes, billabongs, lagoons, lakes, creek or river margins, river pools and floodplains. The structure and composition of the vegetation that occurs around these wetlands is not important in determining the suitability of habitat. As such, snipe may be found in a variety of vegetation types or communities including tussock grasslands with rushes, reeds and sedges, coastal and alpine heathlands, lignum or tea-tree scrub, button-grass plains, alpine herbfields and open forest (DCCEEW 2023).	High Multiple recent records exist within Project locality. Project area is within species distribution. Suitable habitat present as riparian woodland.	Low
Motacilla cinerea	Grey wagtail	-	-	Occurs near flowing water with nearby rocks or surrogate rocky habitat including man-made structures such as weirs (BirdLife International 2022).	Low Project area not within species distribution. No recent records nearby.	Low
Motacilla flava	Yellow wagtail	-	-	Habitat requirements for the yellow wagtail are highly variable, but typically include open grassy flats near water. Habitats include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms: and sometimes utilise tidal mudflats and edges of mangroves. The yellow wagtail is a regular wet season visitor to northern Australia. In Queensland, this species is a regular visitor from Mossman south to Townsville. The species is a vagrant further south and on Heron Island (DCCEEW 2023).	Low Project area within species distribution however, no recent records nearby. Suitable habitat available.	Low
Mammals						

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
Macroderma gigas	Ghost bat	V	E	This species is recorded from a wide range of habitats from rainforest, monsoon and vine scrub in the tropics to open woodlands and arid areas. Maternity roost areas are deep natural caves or disused mines with a specific microclimate, which is a relatively stable temperature (23ºC to 28ºC) with moderate to high (50–90 %) relative humidity, and the ceiling at least 2m above the floor. During the nonbreeding season, ghost bats use large numbers of caves, rock shelters, overhangs, vertical cracks, and mines during the year as day roosts. In Queensland, this species is currently distributed in only 4–5 highly disjunct populations along the coast and inland from the McIlwraith Range in Cape York to Rockhampton. The major colony of ghost bat occurs at Mount Etna (TSSC 2016b).	Low Suitable habitat not present. No recent records exist nearby.	Low
Macrotis lagotis	Greater bilby	V	E	The greater bilby occurs across three habitats: open tussock grassland on uplands and hills, *Acacia aneura* (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas. The species shelters in burrows during daylight (TSSC 2016c)	Low Suitable habitat not present. No recent records exist nearby.	Low
Petrogale xanthopus celeris	Yellow-footed rock-wallaby (central-western Queensland)	V	V	The species is nocturnal and shelters in rock crevices and caves during the day. Occurs within rugged rocky areas, along the edges of low sandstone tablelands and hills, typically with low *Acacia* woodlands or shrublands (TSSC 2016d).	Low Suitable habitat not present. No recent records exist nearby.	Low
Sminthopsis douglasi	Julia Creek dunnart	V	E	Occurs in the mitchell grasslands, which are characterised by heavy clay soils (cracking clay) of two types (ashy and stony) dominated by grass (mitchell grass (*Astrebla* spp.) and flinders grass (*Iseilema* spp.). Following rain, which generally occurs in summer, the clay soil swells and there is flush of vegetative growth. As the soil dries, it contracts and forms deep cracks. The species utilises cracks in the ground as habitat when the soil is dry and ground cover is sparse. They use vegetation cover when the cracks and holes close up after rain (DCCEEW 2023).	High Suitable and preferred habitat present. No recent records exist nearby.	Low

Species	Common name	EPBC Act Status	NC Act Status	Habitat	Likelihood of occurrence	Potential to be impacted
Reptiles						
Acanthophis hawkei	Plains death adder	V	V	Occurs across flat, treeless, cracking-soil riverine floodplains. Some fragmented populations are known to occur across Mitchell Grass Downs in western Queensland (DSEWPC 2012).	Low Suitable habitat not present. No recent records exist nearby.	Low

Appendix C Fauna species list

Scientific name	Common name
Birds	
Artamus personatus	Masked woodswallow
Cacomantis pallidus	Pallid cuckoo
Chalcites basalis	Horsfield's bronze-cuckoo
Colluricincla harmonica	Grey shrike-thrush
Coracina novaehollandiae	Black-faced cuckoo-shrike
Corvus orru	Torresian crow
Elseyornis melanops	Black-fronted dotterel
Eolophus roseicapilla	Galah
Eurystomus orientalis	Dollarbird
Geopelia cuneata	Diamond dove
Geopelia placida	Peaceful dove
Geophaps plumifera	Spinifex pigeon
Grallina cyanoleuca	Magpie-lark
Haliastur sphenurus	Whistling kite
Hieraaetus morphnoides	Little eagle
Manorina flavigula	Yellow-throated miner
Melopsittacus undulatus	Budgerigar
Merops ornatus	Rainbow bee-eater
Milvus migrans	Black kite
Myiagra inquieta	Restless flycatcher
Nymphicus hollandicus	Cockatiel
Ocyphaps lophotes	Crested pigeon
Pachycephala rufiventris	Rufous whistler
Petrochelidon ariel	Fairy martin
Phalacrocorax varius	Pied cormorant

Scientific name	Common name
Philemon citreogularis	Little friarbird
Ptilotula penicillate	White-plumed honeyeater
Struthidea cinerea	Apostlebird
Taeniopygia guttata	Zebra finch
Todiramphus macleayii	Forest kingfisher
Reptiles	
Amphibolurus burnsi	Burn's dragon
Antaresia children	Children's python
Crinia deserticola	Chirping froglet
Cryptoblepharus pannosus	Ragged snake-eyed skink
Diplodactylus tessellatus	Tessellated gecko
Emydura macquarii emmotti	Emmott's short-neck turtle
Gehyra dubia	Dubious dtella

Appendix D Flora species list

Scientific name	Common name
Acacia cambagei	Gidgee
Acacia stenophylla	Belalie, black wattle
Atalaya hemiglauca	Whitewood, cattle bush
Azolla spp.	-
Chenopodium auricomum	-
Cryptostegia grandiflora	Rubber vine
Cypreus spp.	-
Datura ferox	Fierce thornapple
Eremophila bignoniiflora	Eurah
Eremophila bowmanii subsp. latifolia	-
Eucalyptus coolabah	Coolabah
Lysiphyllum gilvum	Bauhinia
Marsilea drummondii	Common nardoo
Melaleuca trichostachya	Flax-leaf paperbark
Parkinsonia aculeata	Jerusalem thorn
Persicaria attenuata	Smart weed
Santalum spp.	-
Sclerolaena muricata var. muricata	-
Scleroleana spp.	-

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APPENDIX F – FLOOD IMPACT ASSESSMENT

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WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

Thomson River Weir Raising

Flood Impact Assessment

NGH

25 October 2023

Document Status

Version	Doc type	Reviewed by	Approved by	Date issued
V01	Final	James Weidmann	James Weidmann	25/10/2023

Project Details

Project Name	Flood Impact Assessment
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Quality ISO 9001 SAI GLOBAL
Environment ISO 14001 SAI GLOBAL
OHS ISO 45001 SAI GLOBAL

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1 INTRODUCTION

1.1 Background

Water Technology has been engaged by NGH (NGH) on behalf of Longreach Regional Council to undertake a detailed flood impact assessment for the Thomson River Weir Raising project. The assessment and associated documentation will form part of the overall environment assessment in support of a Ministerial Infrastructure Designation (MID) application to the Queensland Department of State Development, Infrastructure, Local Government and Planning (DSDILGP).

The project involves the raising of the Town Weir and associated Anabranch Weirs, located on the Thomson River approximately 3.5 km northwest of Longreach, by 1 m to improve long-term water supply needs for Longreach. The location of the Town Weir and Anabranch Weirs 1 to 4 are shown in Figure 1-1 below. All these structures are proposed to be raised by 1 m.

A more detailed description of the project is provided in the MID Proposal main text prepared by NGH (2023)[1].

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[1] NGH Pty Ltd (2023) *Ministerial Infrastructure Designation Proposal Thomson River Weir Raising Project.* Report prepared for the Longreach Regional Council.

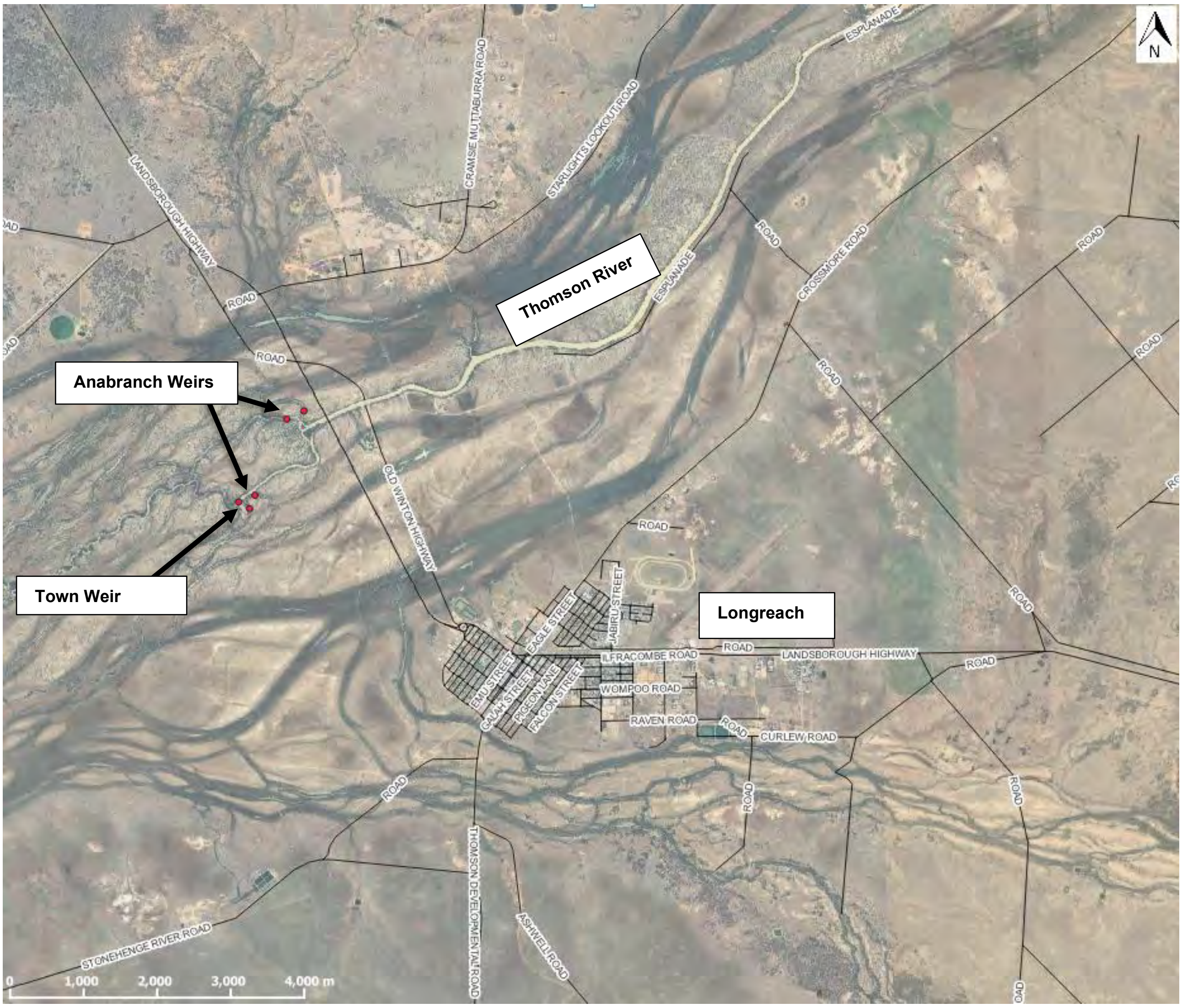


Figure 1-1 Site Locality

1.2 Purpose and Intent

Longreach is dependent on the freshwater storage from the Thomson River. The primary water supply source is the storage provided by the Town Weir and Anabranch Weirs, known as the town storage. The Longreach region has a hot and dry climate; securing water supplies for municipal use over the long term is a significant challenge. A safe and resilient water supply is an essential resource for Longreach, providing for the health and wellbeing of the community, opportunities for economic and community development, as well as enhancing adaptive capacity to climate change.

The purpose of the weir raising project is to secure a reliable water supply to support long-term needs of the community, including current and future populations, local businesses, industry and tourism. A more detailed discussion of the project justification is provided in the MID Proposal main text prepared by NGH (2023), to which this assessment is appended.

Detailed hydraulic modelling has been undertaken to establish the impacts of the proposed weir raising on flood conditions. The methodology and outcomes of the assessment undertaken is documented herein.

1.3 Available Data

The following data has been sourced and used in this assessment:

- Aerial imagery obtained from Google Earth.
- Publicly available 2011 LiDAR (1 m resolution).
- Digital civil design files for the raised weirs provided by Engeny Pty Ltd.
- Previous assessment reporting for the project, including:
  - “Feasibility Study into options for sustainable water security”, dated 16 October 2017, prepared by Cardno for Longreach Regional Council (Cardno 2017).
  - “Longreach Weir Raise Modelling – Numerical Modelling Report”, dated April 2020, prepared by DHI for Longreach Regional Council (DHI 2020).
  - “Longreach Flood Mitigation Study", dated June 2015, prepared by DHI for Longreach Regional Council (DHI 2015).
- Hydraulic model, structure and digital terrain files provided by DHI, including:
  - Previous MIKE hydraulic model files, including boundary conditions.
  - Existing weir survey.
  - River bathymetry data.
  - Bridge structure details and drawings.
- Supplementary files provided with the project brief.

2 SITE AND CATCHMENT DESCRIPTION

2.1 Topography and Drainage

The current crest level of the Town Weir and Anabranch Weirs is 178.6 mAHD. Water is impounded upstream of the weirs to the Fairmont weir which is shown in Figure 2-1 below. Upstream of the Fairmont weir on the Thomson River are two additional weirs, Bimbah and Goodberry Hills. Releases are made from the upstream weirs to replenish the town storage when water levels fall more than 1.2 m below the crest of the weir. All four weirs are owned and operated by Longreach Regional Council. The total capacity of the existing town storage is approximately 3,300 ML, and that the combined capacity of all four storages is approximately 8,400 ML. The capacity of the town storage will increase to approximately 4,200 ML following the 1 m raising.

The total catchment area upstream of the town storage is approximately 57,590 km^2, which extends approximately 350 km north of Longreach, with land use in the catchment area being almost entirely low-density cattle and sheep grazing on unimproved pastures.

Figure 2-2 shows the local topography based on LiDAR obtained in 2011 (1 m resolution). Also shown is the extent of available bathymetry survey upstream of the weir. The Landsborough Highway traverses the river approximately 1.6 km upstream of the Town Weir. A minor local crossing is located approximately 550 m farther upstream. The rail corridor and associated bridge crossings are located approximately 2.6 km upstream of the main weir. These transport corridors contain several large structures including culverts and bridges. Key structures have been represented in the hydraulic model as discussed in Section 3.3.2.

Elibank and Watyakan Creeks discharge to the Thomson River approximately 5 km downstream of the Town Weir.

Figure 2-3 shows the approximate extent of the revised full supply level (FSL) following the raising of the weirs, based on contour mapping. The extent of the revised FSL is generally contained to the river channel, however, several minor braids/branches are expected to be inundated. Existing vegetation on the banks upstream of the weir above the level of the existing structures is likely to be affected, however, the extent and period or extended flooding will be dependent on inflows, releases from upstream storage and the rate of drawdown. The map is provided for indicative purposes only. This flood study analyses flood events and does not examine potential impacts on the long-term inundation of additional land or vegetation.

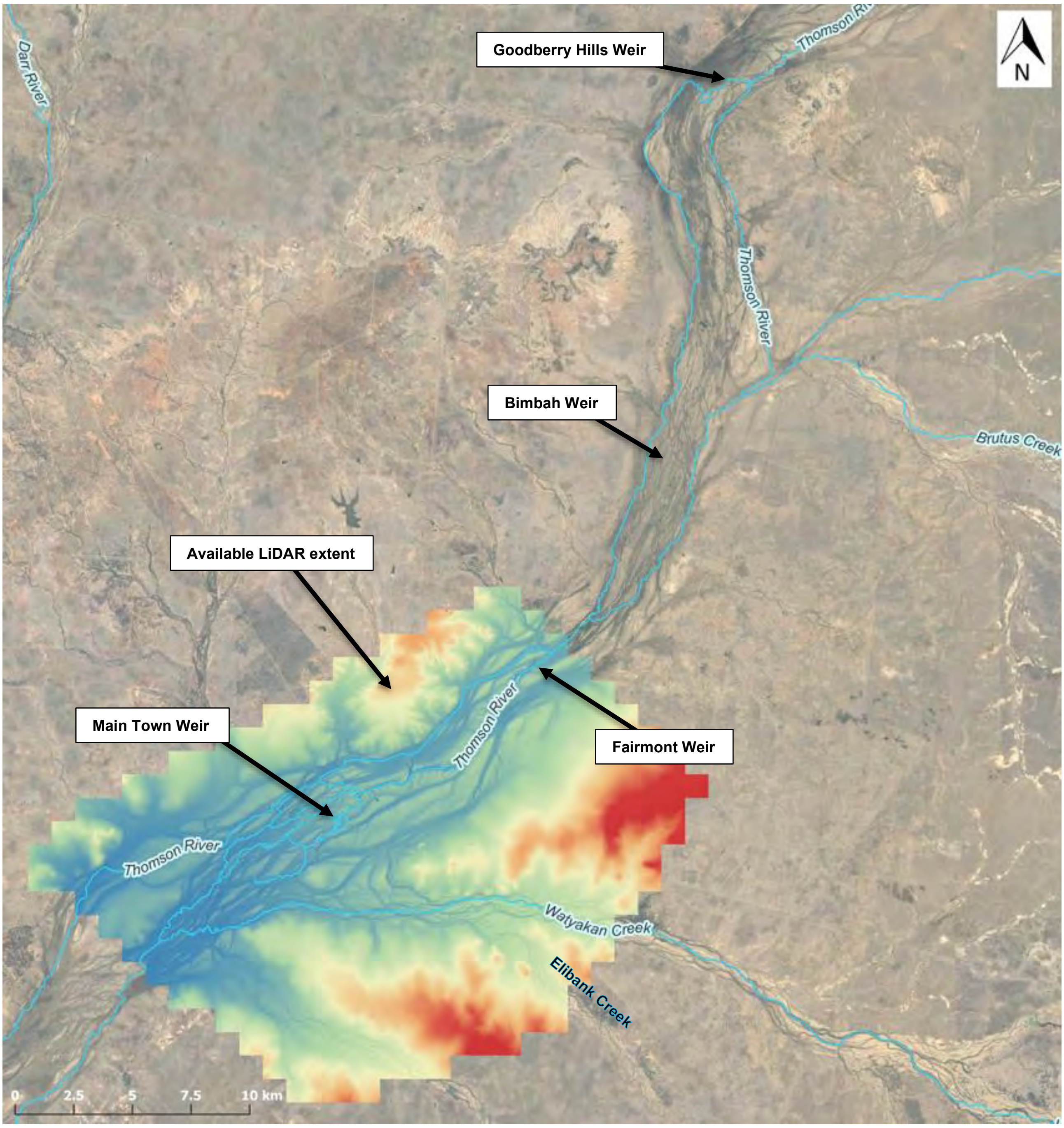


Figure 2-1 Catchment Overview

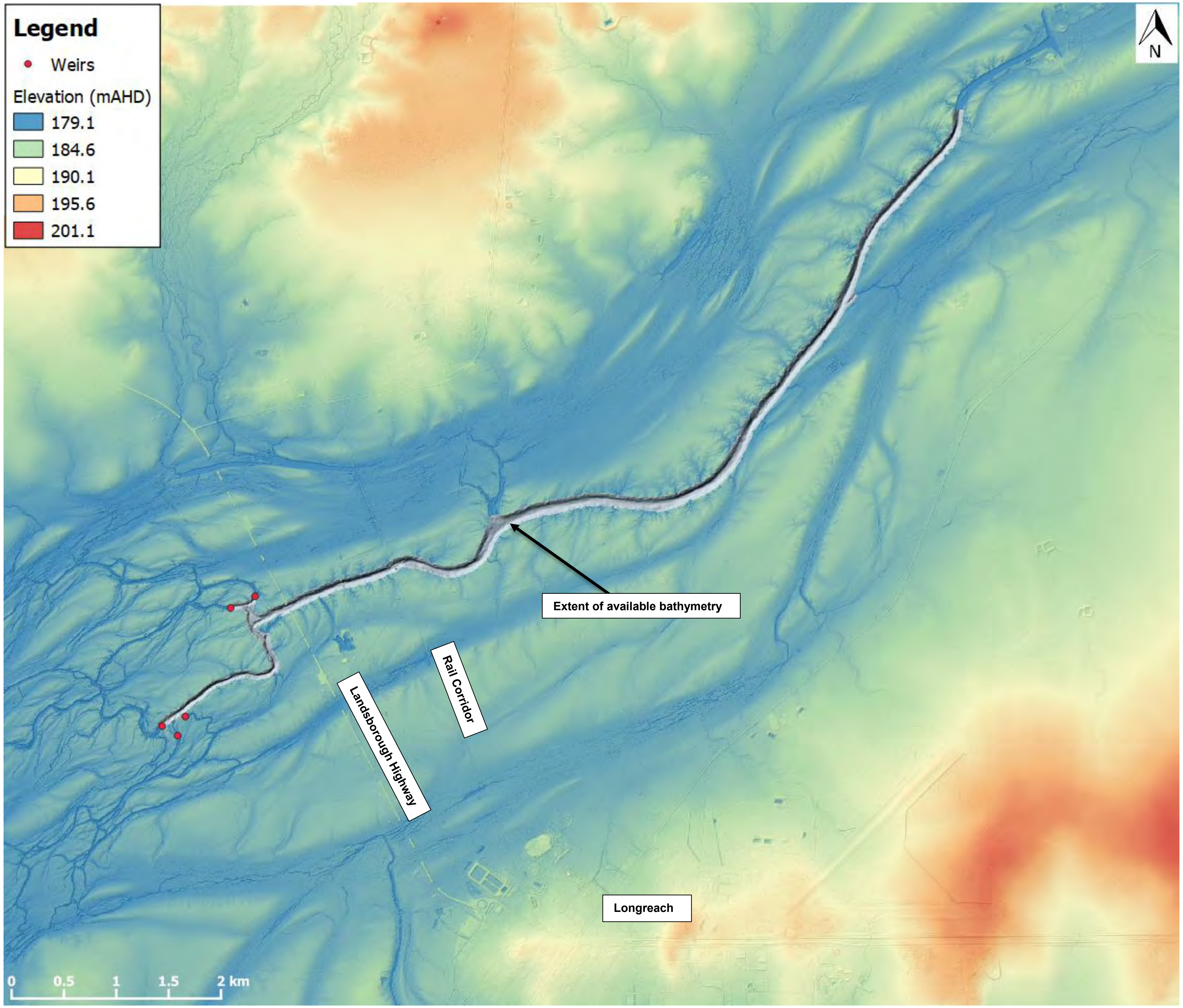


Figure 2-2 Local Topography

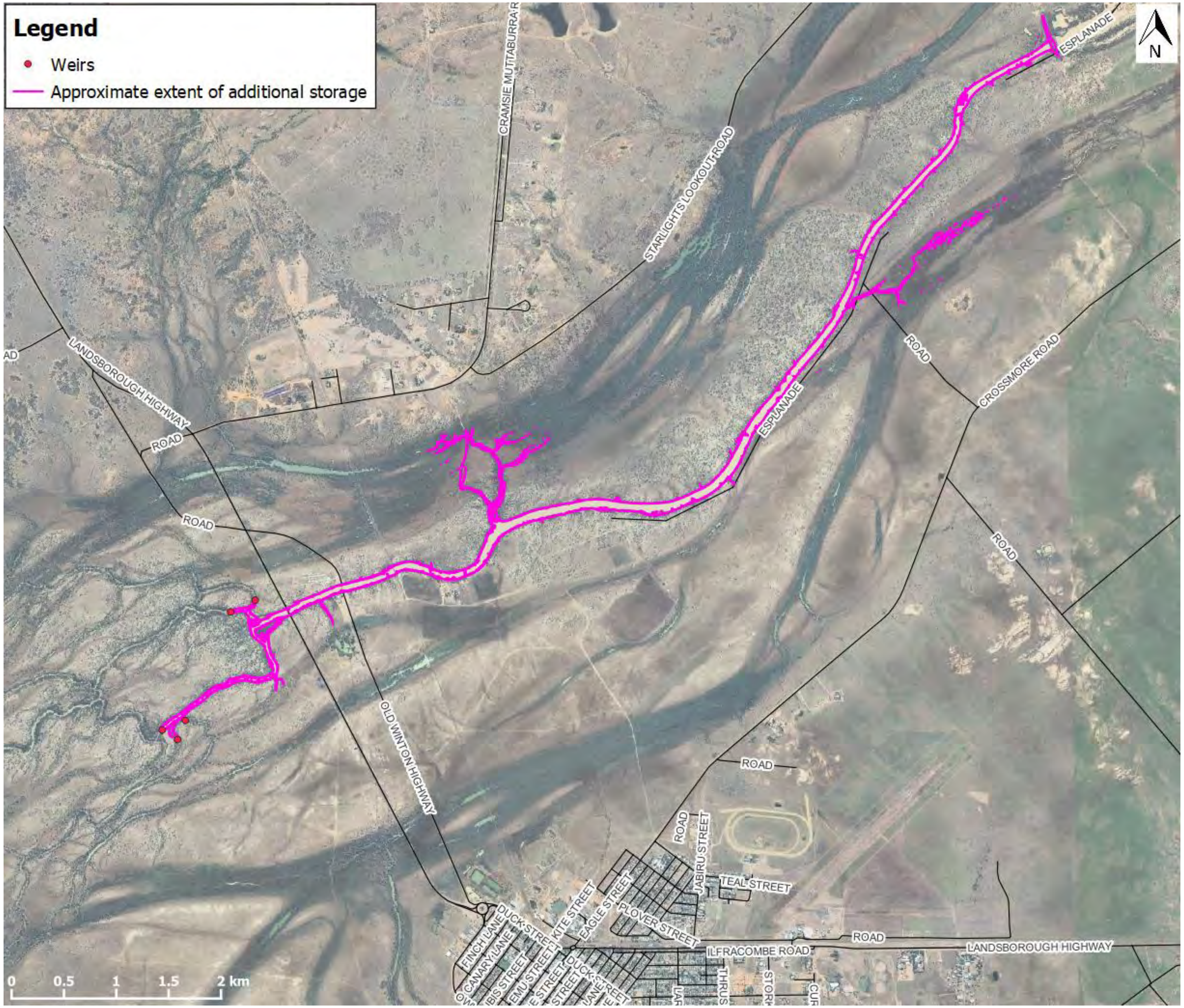


Figure 2-3 Approximate Extent of Revised FSL

3 FLOOD ASSESSMENT

3.1 Overview

A detailed hydraulic model has been developed for the purpose of assessing the impacts of raising the Town Weir and Anabranch Weirs by 1 m. Reliable hydrology information has been developed as part of previous studies and has been adopted for this assessment. This section describes the methodology and outcomes of the analyses undertaken.

3.2 Hydrology

We were provided with the hydrology developed as part of the previous flood study undertaken by DHI (2015). The same hydrology was used for previous weir raising investigations also undertaken by DHI (2020).

The hydrographs developed by DHI (2015) for the Thomson River are based on a detailed flood frequency analysis at the Longreach Gauge utilising 45 years of available streamflow data. Peak design storm flows for a range of AEPs were estimated based on the outcomes of the study. Design flows were then scaled to the recorded 2000 historical event at Longreach to derive indicative design flood hydrographs for the river. Figure 3-1 shows the design inflow hydrographs for the Thomson River. As part of this assessment, we have simulated a range of standard design events from the 39% AEP (2-year ARI) up to the 1% AEP (100-year ARI) and additionally the PMF which was estimated to have a peak flow of approximately 60,000 m^3/s.

Design hydrographs were also provided for Watyakan and Elibank Creeks and are based on rainfall-runoff hydrological models validated to the 2007 flood event at Longreach (DHI 2015).

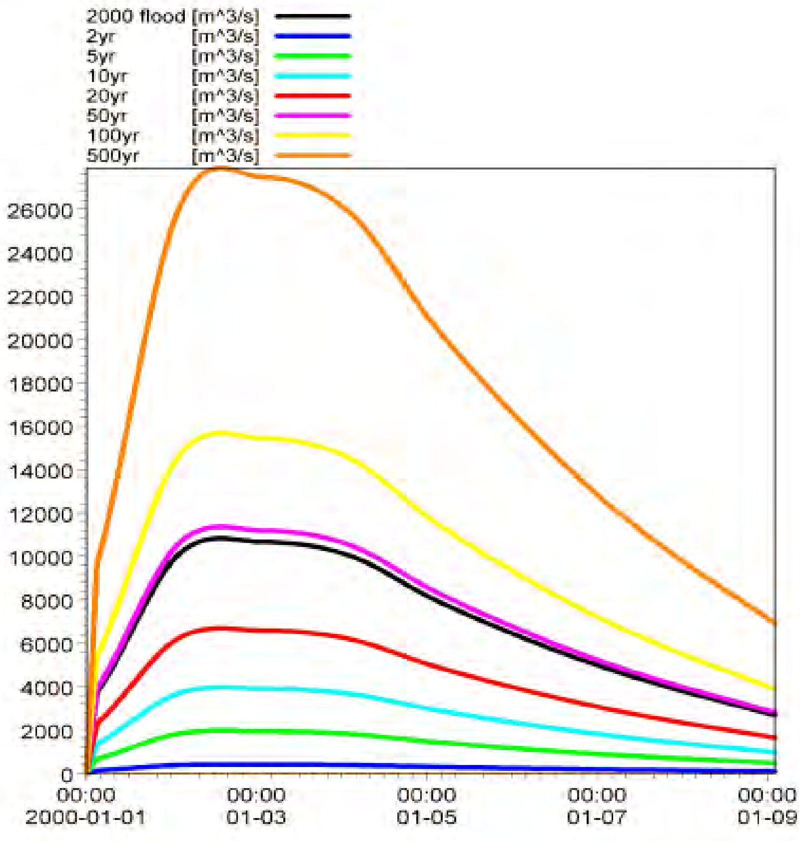


Figure 3-1 Design Inflow Hydrographs for the Thomson River (DHI 2015)

3.3 Hydraulic Modelling

A new TUFLOW hydraulic model has been developed for this assessment. TUFLOW is a 1D-2D linked hydraulic model that solves the depth-averaged shallow water equations. Specifically, the TUFLOW version applied in this study has included the most recent version at the time of the assessment (2020-10-AD_iSP_w64) which utilises the HPC solver.

We have simulated the following scenarios using the TUFLOW model:

- Existing Case – representing current catchment and weir conditions.
- Post Weir Rasing Case – based on the existing case scenario, with the inclusion of the proposed civil design models provided by Engeny (i.e. 1 m raising of the Town Weir and Anabranch Weirs).

3.3.1 Existing Case

The base case TUFLOW model layout is shown in Figure 3-2. The model topography is based on the available 2011 LiDAR (1 m resolution) and supplemented with the provided bathymetry and weir survey data. The model adopts a 10 m grid size with 2 m Sub-Grid-Sampling. Weir crests have been enforced with thin z-lines.

Bridge crossings upstream of the weir have been included as layered flow constrictions, with parameters informed by previous modelling, drawings provided and inferred from LiDAR. Given their large dimensions, major culvert crossings have also been represented as layered flow constrictions. Guard rails have been represented in the model where data was available. Some road embankments have been removed with z-shapes.

The TUFLOW model materials definition for the base case model is shown in Figure 3-3 and has been informed by aerial imagery and site photographs. Mannings 'n' values are also shown in Figure 3-3 and are consistent with previous assessments.

The downstream boundary has been positioned approximately 3 kms downstream of the Town Weir and at the limit of the available LiDAR extent. We have adopted a "HQ" type boundary with a slope of 0.045% based on the water level slope of the previous modelling results.

The town storage is assumed to be full at the start of each simulation, with an initial water level of 178.6 mAHD applied upstream of the weir.

The model has been simulated for the 39%, 18%, 10%, 5%, 2%, 1% AEP events, and additionally the PMF.

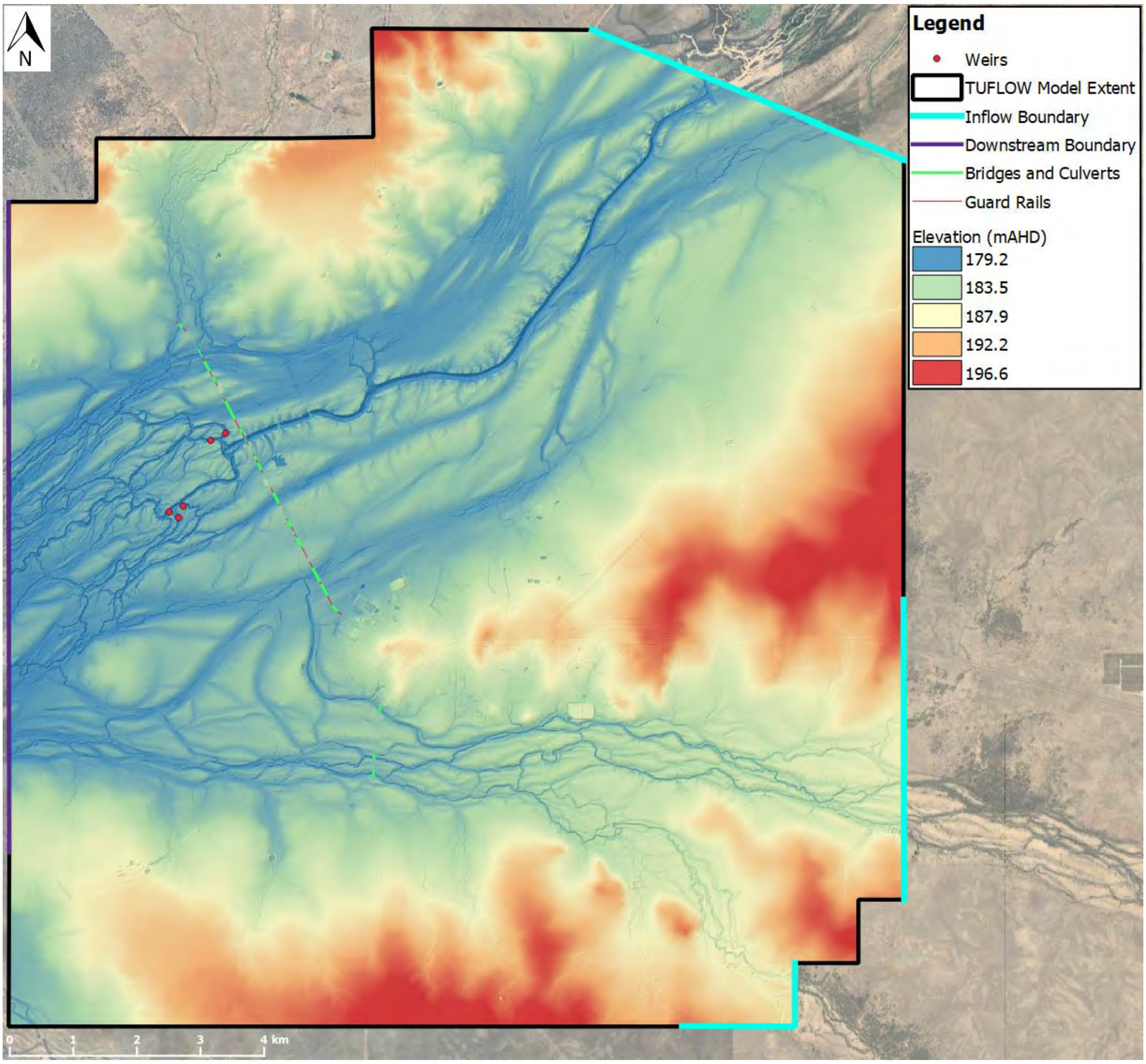


Figure 3-2 TUFLOW Model Layout – Existing Case

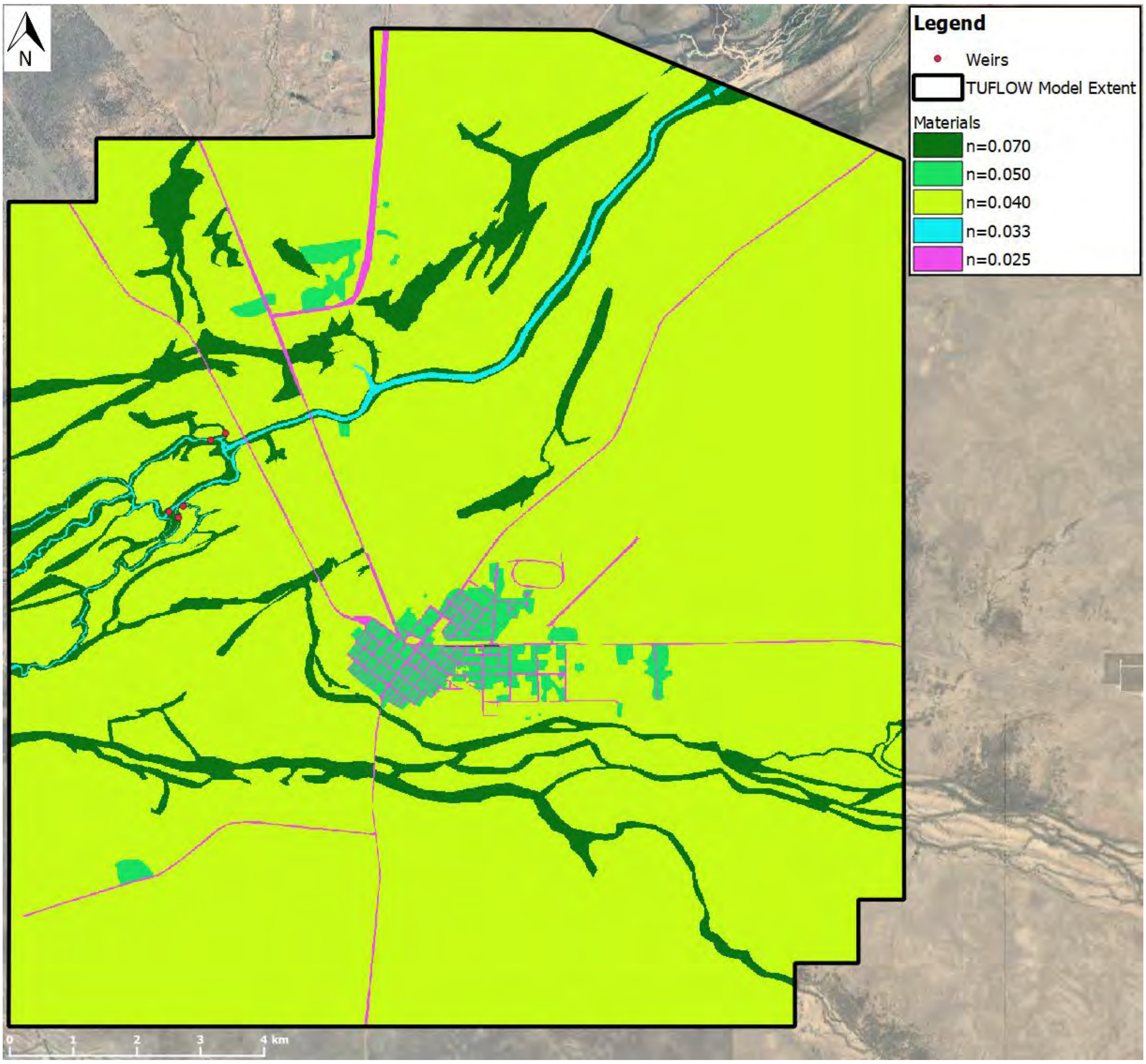


Figure 3-3 TUFLOW Materials Layout – Existing Case

3.3.2 Post Weir Raising Case

The post weir raising case model was based on the existing case model with the following modifications:

- Inclusion of the digital elevation models for the raised weirs provided by Engeny. The crest of the weirs were enforced with thin z-lines at the nominated level of 179.6 mAHD.

The provided digital elevation models are represented in Figure 3-4 below. No other changes were made to the model.

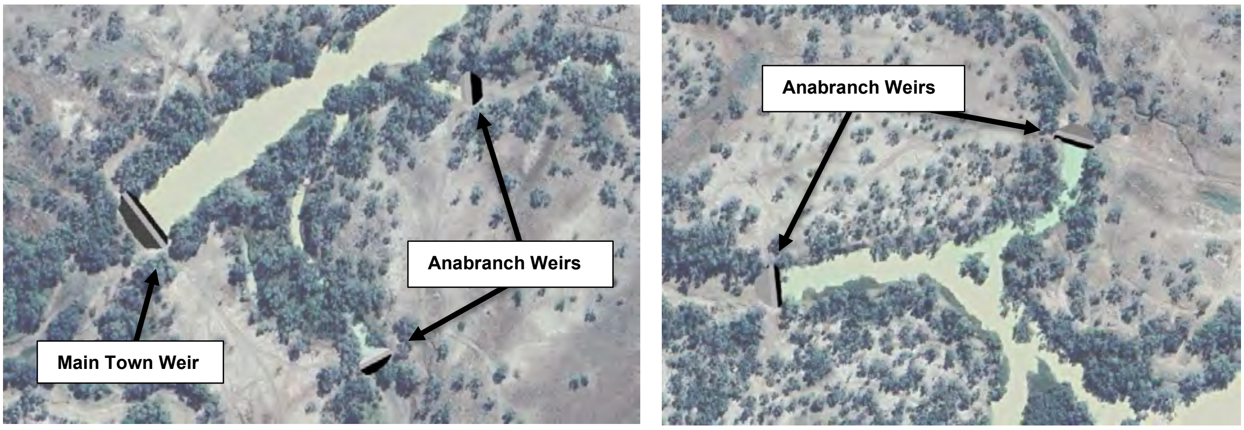


Figure 3-4 Weir Design Models – Post Raising Case

3.4 Hydraulic Modelling Results

Maximum flood depth, level and velocity maps of existing case conditions for all AEPs analysed have been included in Appendix A. Post weir raising flood maps are provided in Appendix B. Water level impact maps are contained in Appendix C. Velocity impact maps are provided in Appendix D.

The project potential impacts on flooding depth, velocity and extent are provided in Sections 3.4.1 to 3.4.3 below.

3.4.1 Depth Impacts

- In all design events analysed, the Town Weir and Anabranch Weirs are substantially overtopped. Table 3-1 contains a summary of the water levels and depth over the Town Weir in the existing case.
- In the post weir raising case, the Town Weir is substantially overtopped at a similar level and depth to the existing case.

Table 3-1 Town Weir Water Levels and Depths – Existing Case

Event AEP	Water Level (mAHD)	Depth Over Weir (m)
39%	181.0	2.4
18%	181.9	3.3
10%	182.5	3.9
5%	183.0	4.4
2%	183.6	5.0
1%	184.1	5.5
PMF	187.6	9.0

3.4.2 Velocity Impacts

- The weir raising does not result in adverse velocity increases upstream to the Landsborough Highway corridor.
- Flood velocities in the catchment are generally low in the standard design events analysed and are up to approximately 1.5 m/s in the 1% AEP, with localised higher velocities at the Landsborough Highway up to approximately 2.0 m/s.

- Localised velocity increases are noted downstream of the weirs up to approximately 0.5 m/s. Where increases occur, the magnitude of the post raising velocity is generally less than 1 m/s, therefore the increase is unlikely to materially affect or worsen erosion potential and it does not exceed any notable threshold for causing additional scour. This is, however, dependent on local conditions and we recommend that the areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events.

3.4.3 Extent and Water Level Impacts

- The extent of flooding in the Thomson River in all designed events is extensive, as shown in the maps provided, however, flooding in the 39% AEP (frequent event) is generally contained to the braided river channels.
- Very localised and minor water level increases (approximately 1 mm to 20 mm) are noted surrounding the weirs, and the water level over the Town Weir in the post raising case is essentially identical to the existing case levels contained in Table 3-1. The increases are minor given the predicted depths over the structures.
- The weir raising does not result in adverse water level increases upstream to the Landsborough Highway corridor. Water level increases up to 11 mm are predicted in the 39% AEP that extend up to the Landsborough Highway, however, the road level is approximately 2.5 m above the flood level in this event and the increases are therefore inconsequential.

4 CONCLUSION

Water Technology has been engaged by NGH on behalf of Longreach Regional Council to undertake a detailed flood impact assessment for the Thomson River Weir Raising project. The assessment and associated documentation will form part of the overall environment assessment in support of a MID application to the DSDILGP.

The project involves the raising of the Town Weir and Anabranch Weirs, located on the Thomson River approximately 3.5 km northwest of the town, by 1 m to improve long-term water supply needs.

Detailed hydraulic modelling has been undertaken to establish the impacts of the proposed weir raising on flood conditions. The methodology and outcomes of the assessment undertaken is documented herein.

The outcomes of the flood impact assessment are summarised as follows:

- In all design event analysed, the Town Weir is substantially overtopped. In the post weir raising case, the weir is similarly substantially overtopped.
- Very localised and minor water level increases are noted surrounding the weirs. The increases are minor and inconsequential given the predicted depths over the structures.
- The weir raising does not result in adverse water level or velocity increases upstream to the Landsborough Highway corridor.
- Localised velocity increases are noted downstream of the weirs. These are likely to be inconsequential, however, we recommend that the areas immediately adjacent to and downstream of the weirs are monitored for scour or erosion following overtopping events.

APPENDIX A
EXISTING FLOOD DEPTH AND VELOCITY MAPS

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:49:55.521

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

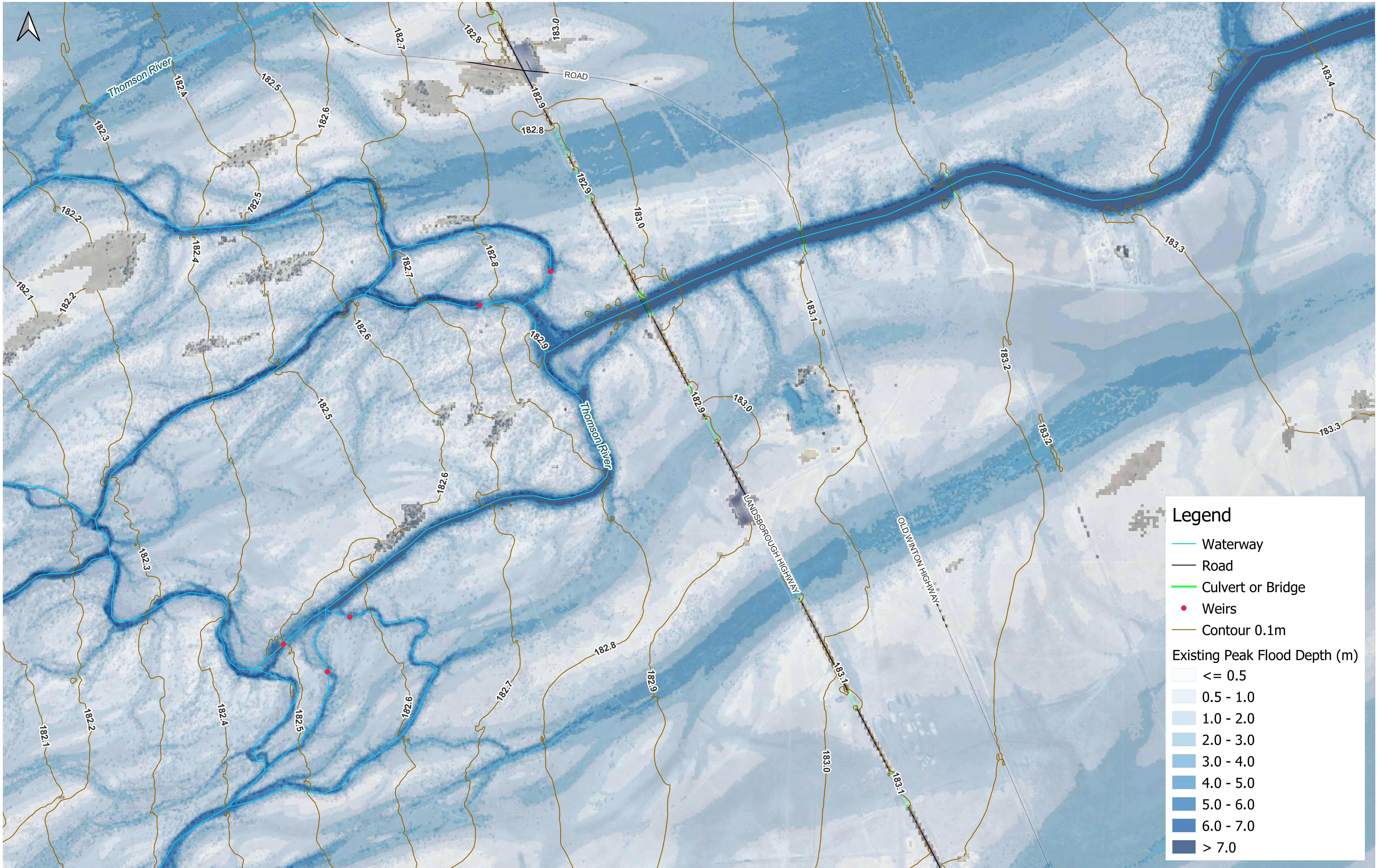
300 0 300 600 m

22020293 - Longreach Weir Raising

18% AEP - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:49:44.347



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

10% AEP - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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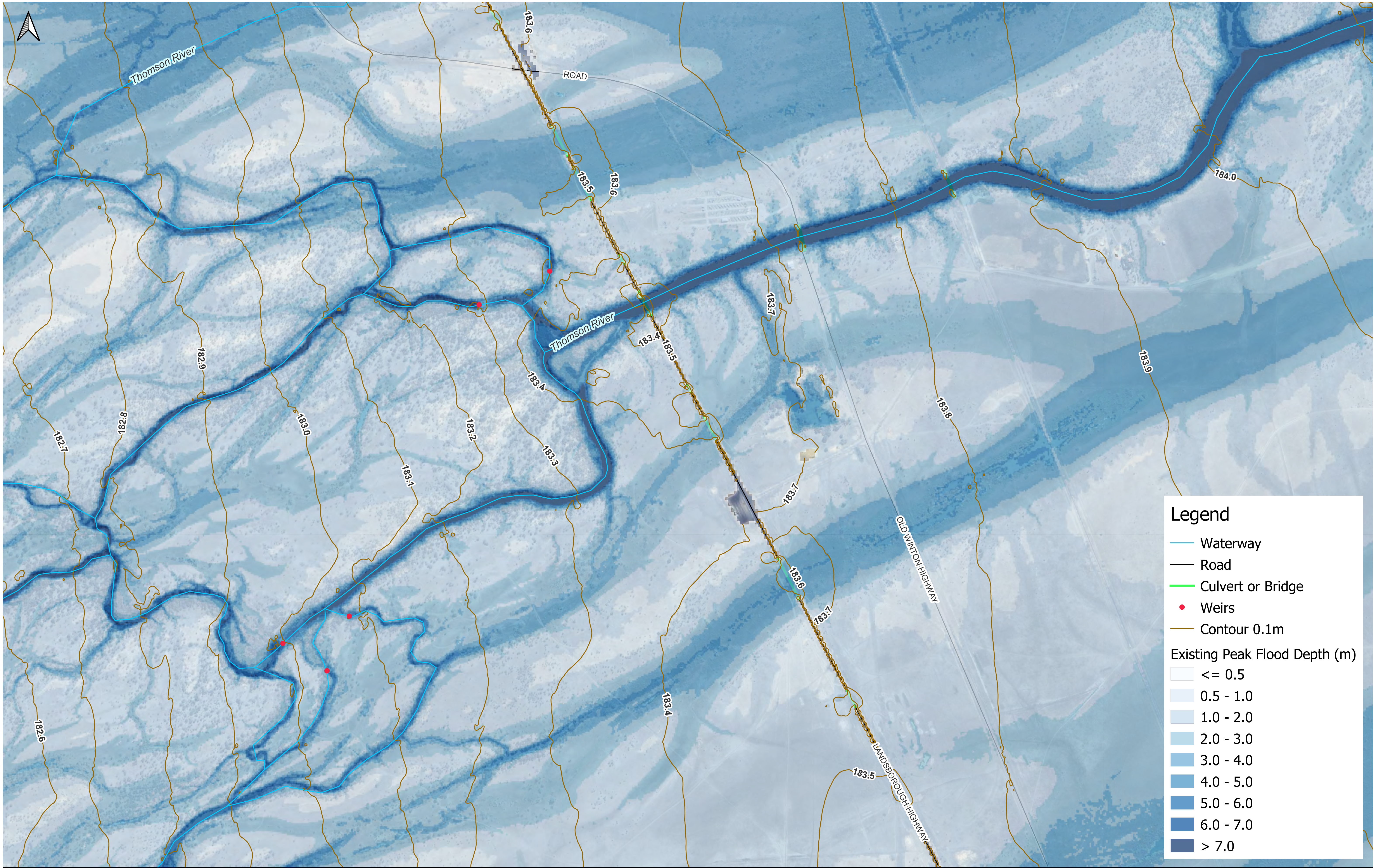

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

5% AEP - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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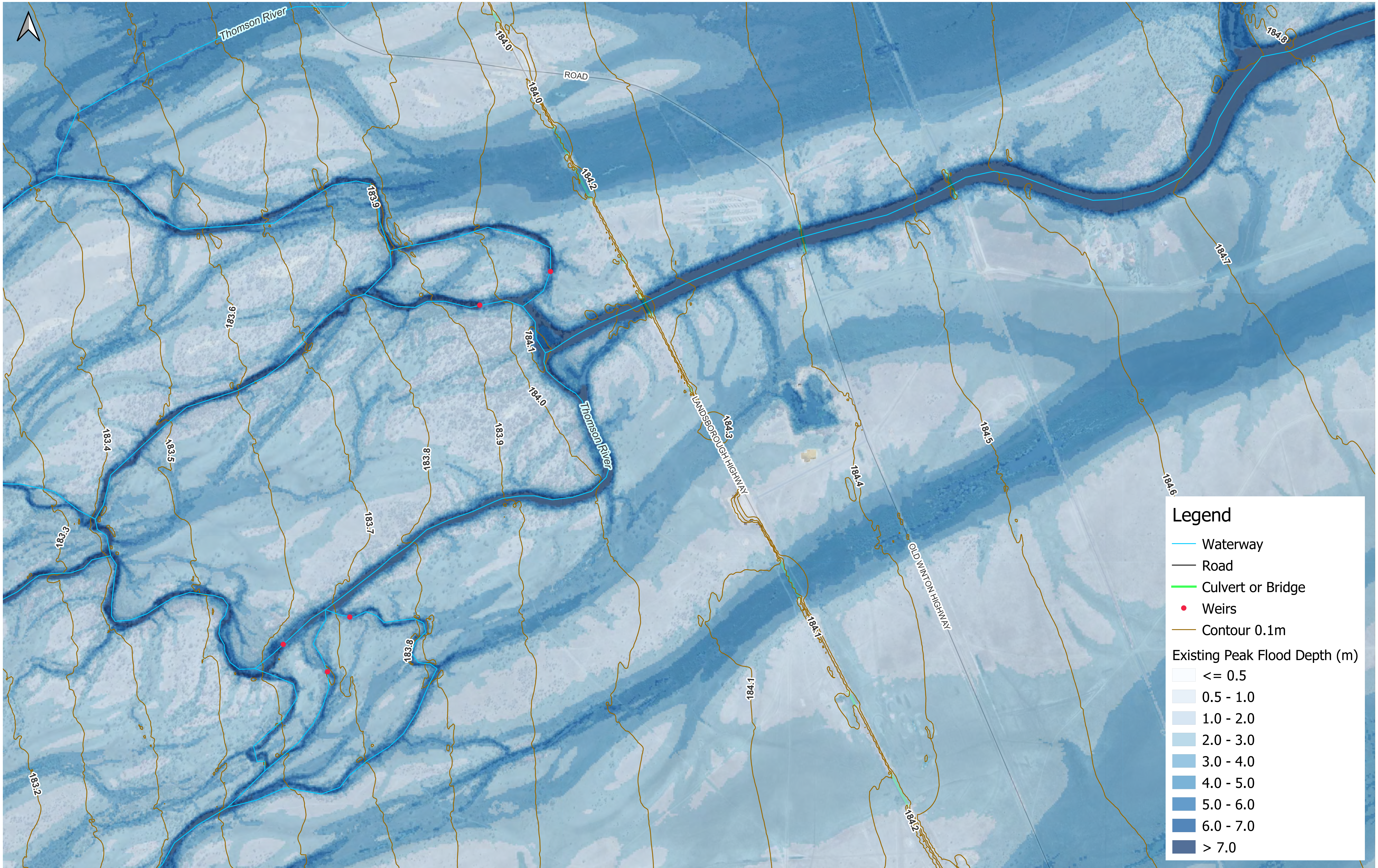


Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

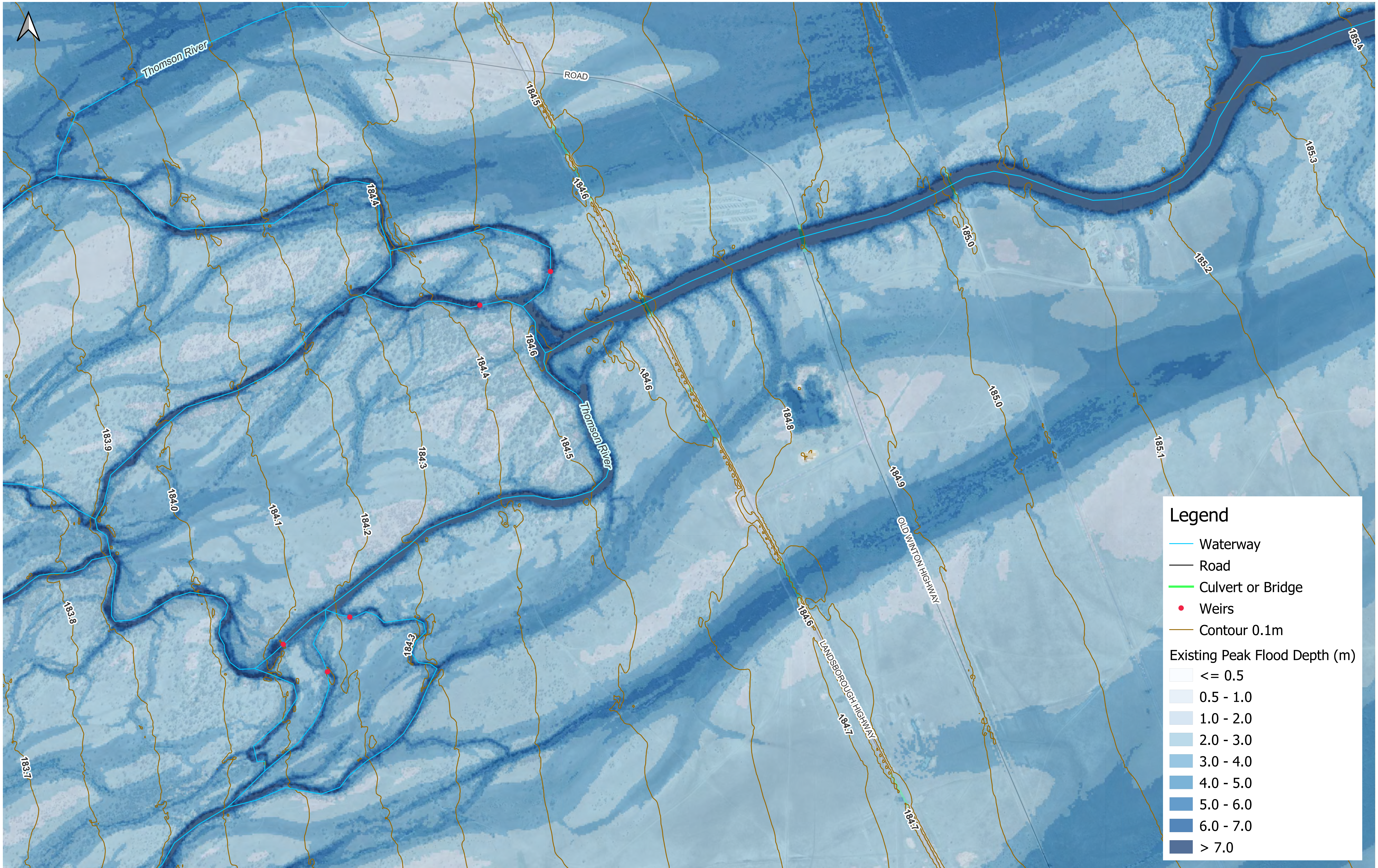
Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

2% AEP - Existing Peak Flood Depth (m)

2023-08-24T15:49:08.435



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

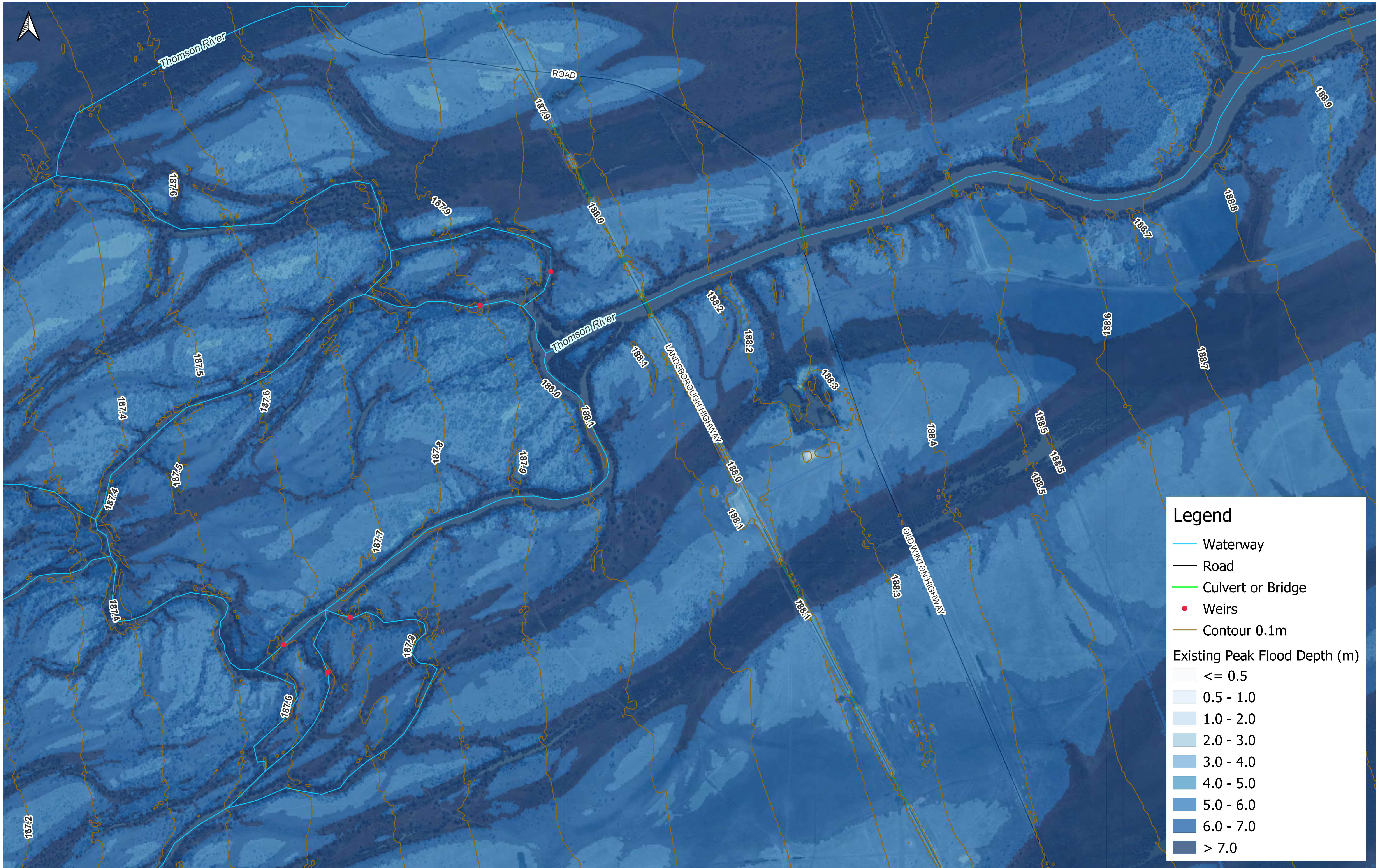
300 0 300 600 m

22020293 - Longreach Weir Raising

1% AEP - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:48:55.344



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

PMF - Existing Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:57:30.978

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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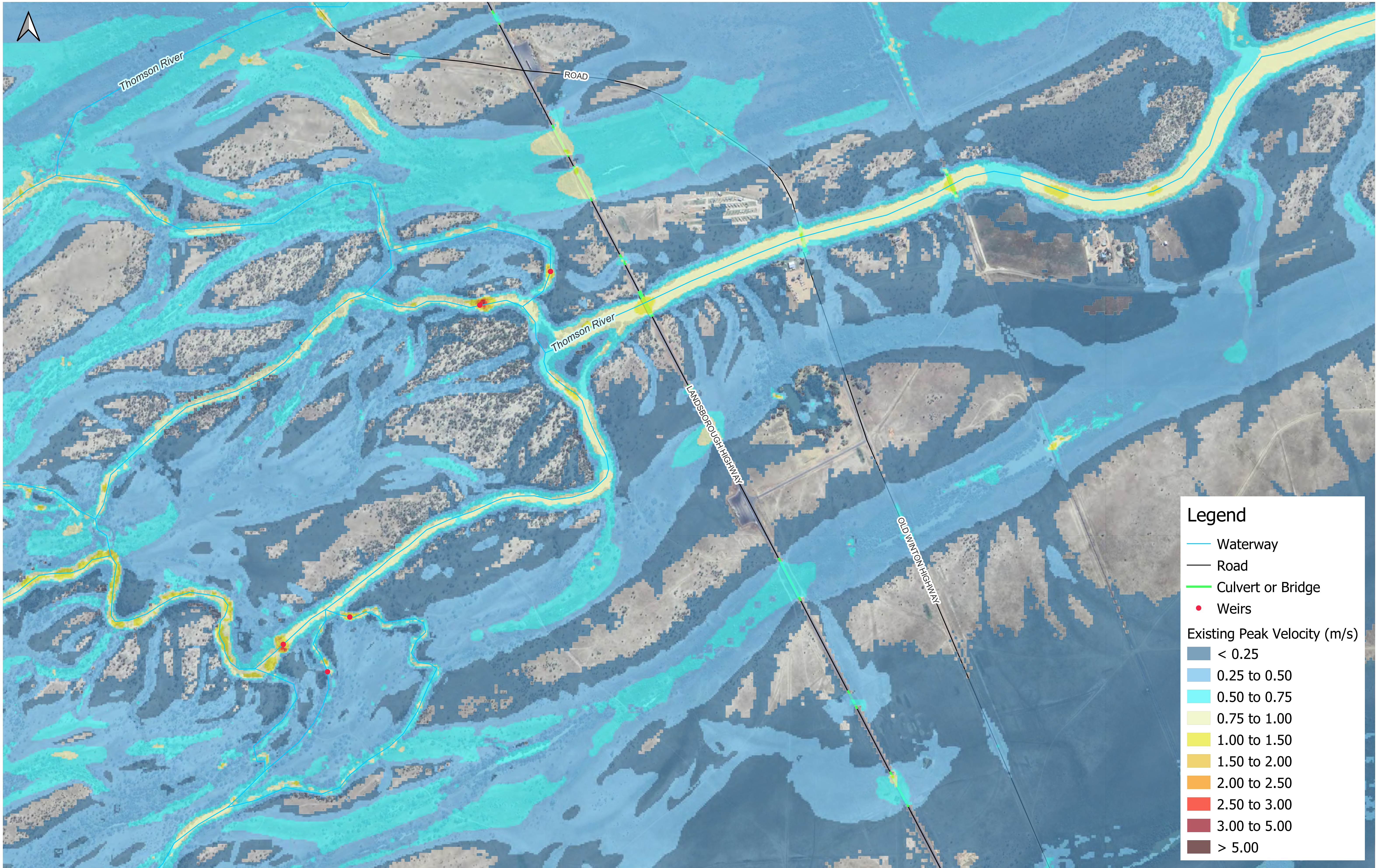

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
18% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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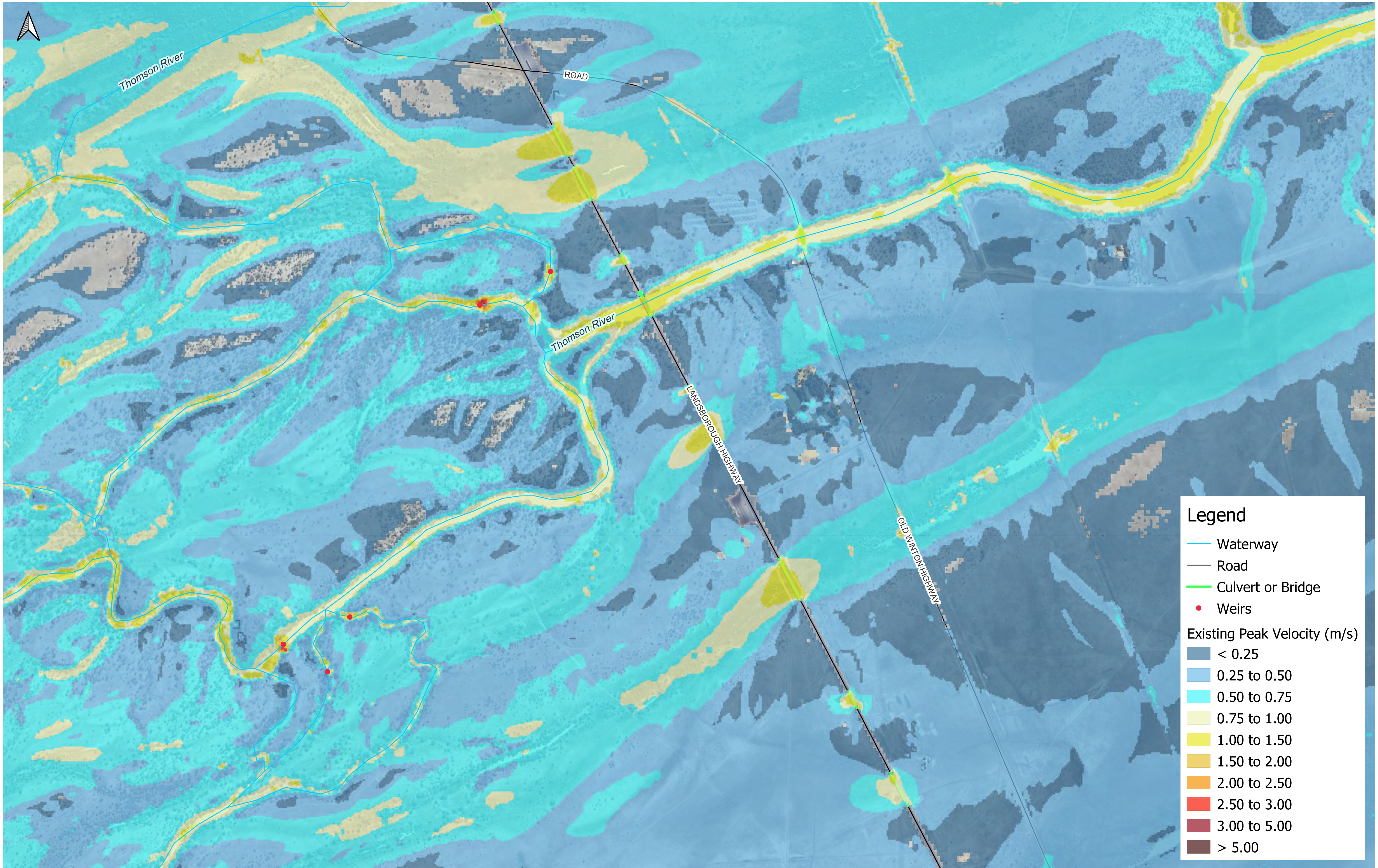

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
10% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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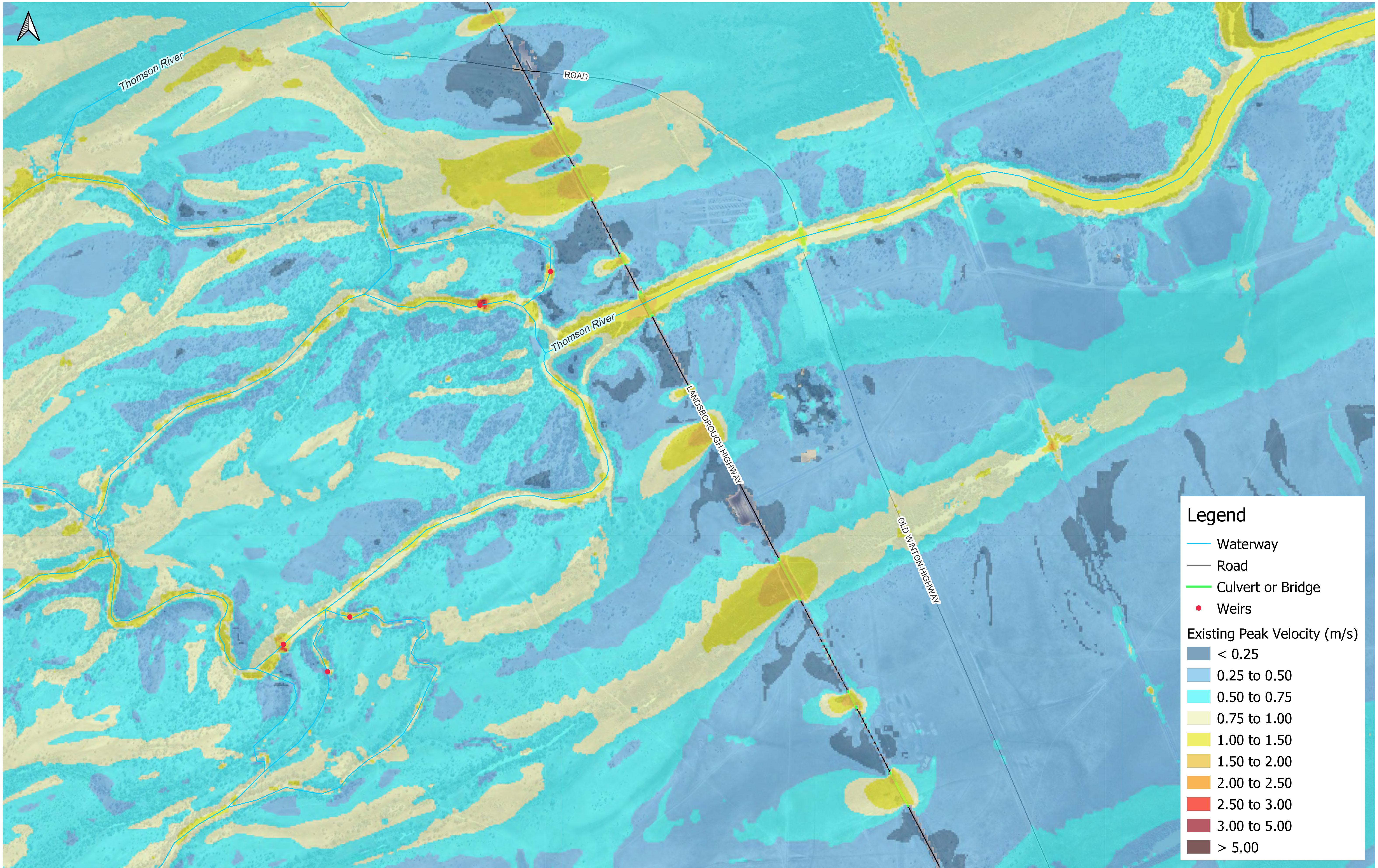

Projection: GDA / MGA94 Zone

Produced by: Water Technology Pty Ltd

Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

5% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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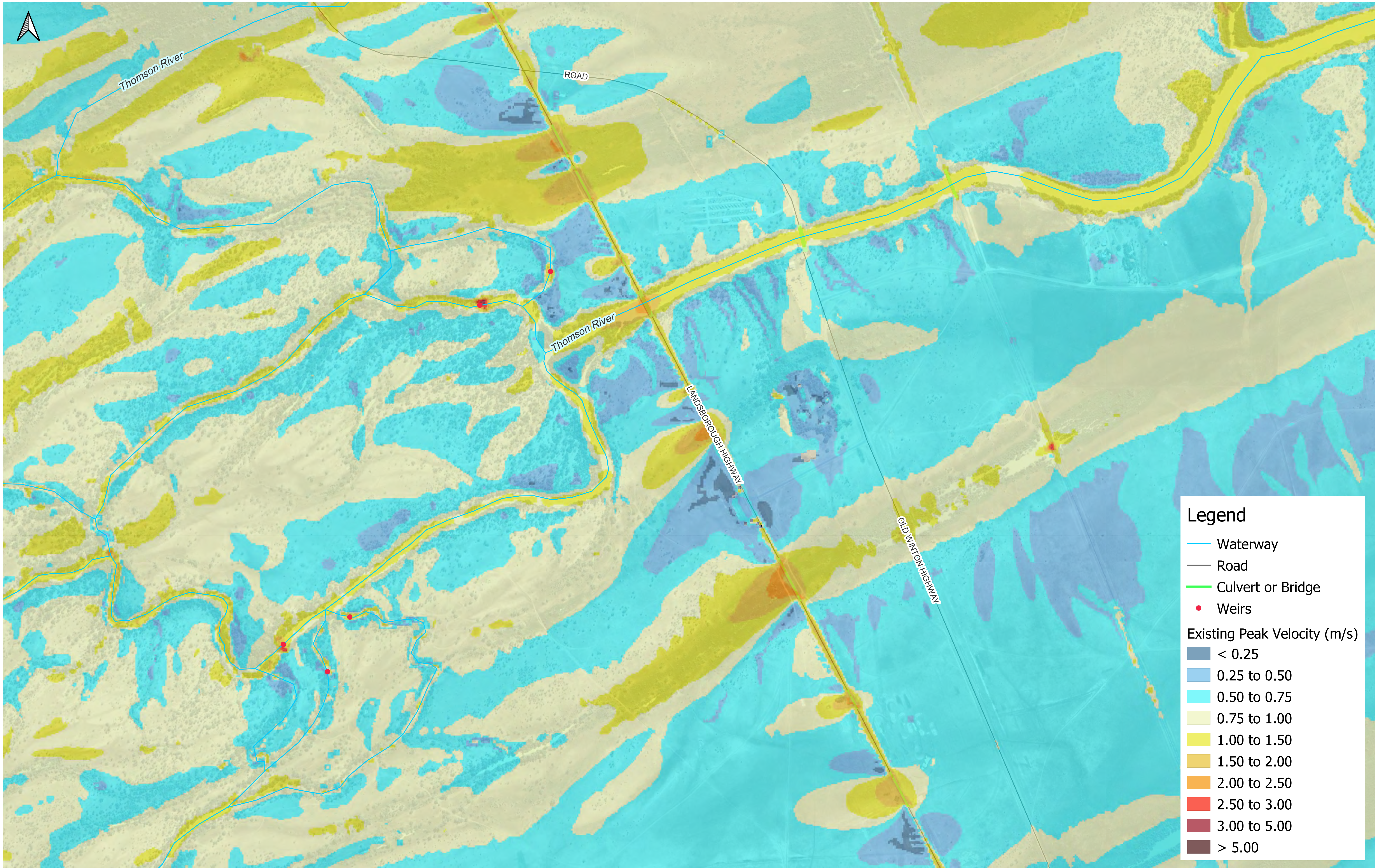

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

2% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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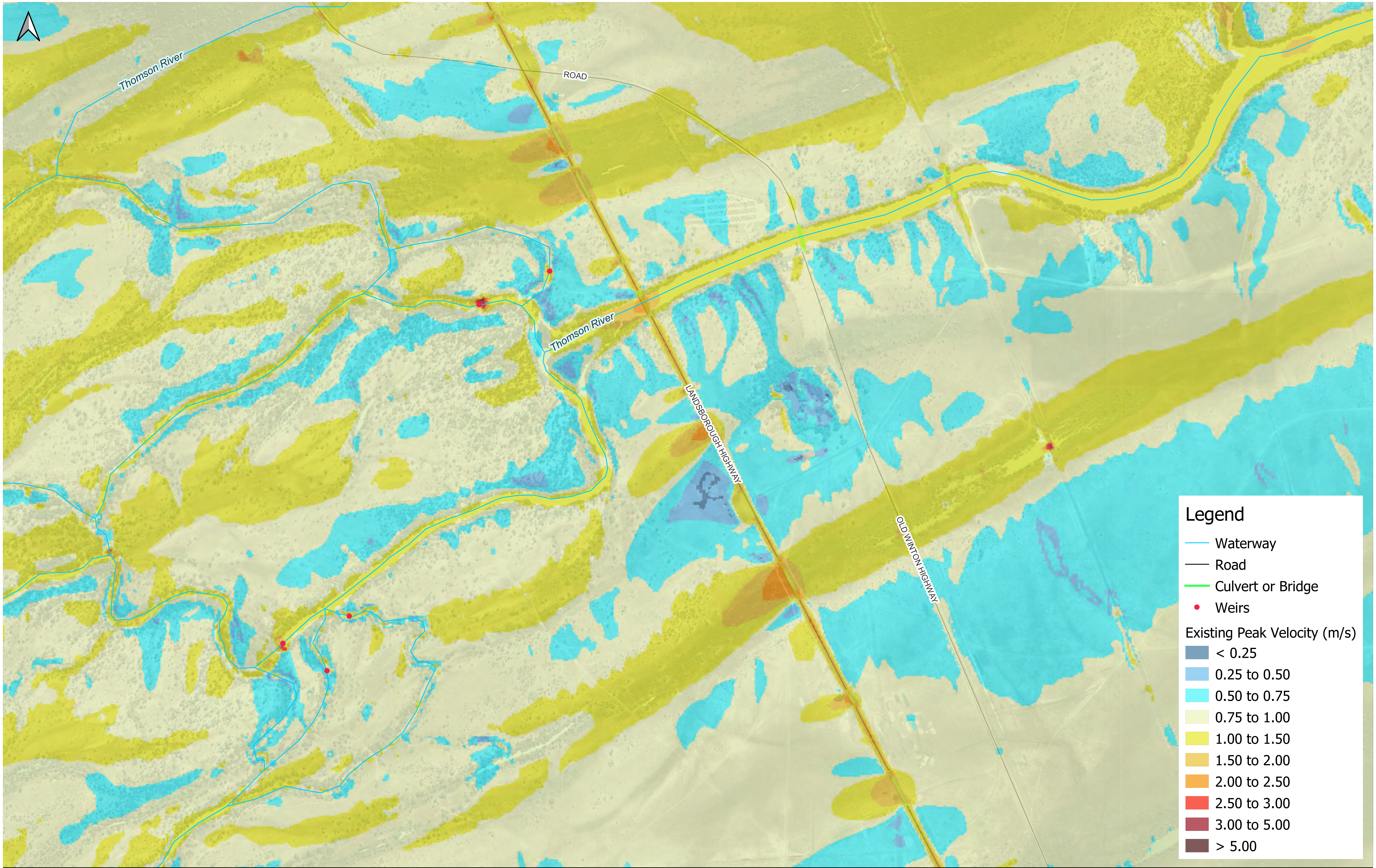

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

1% AEP - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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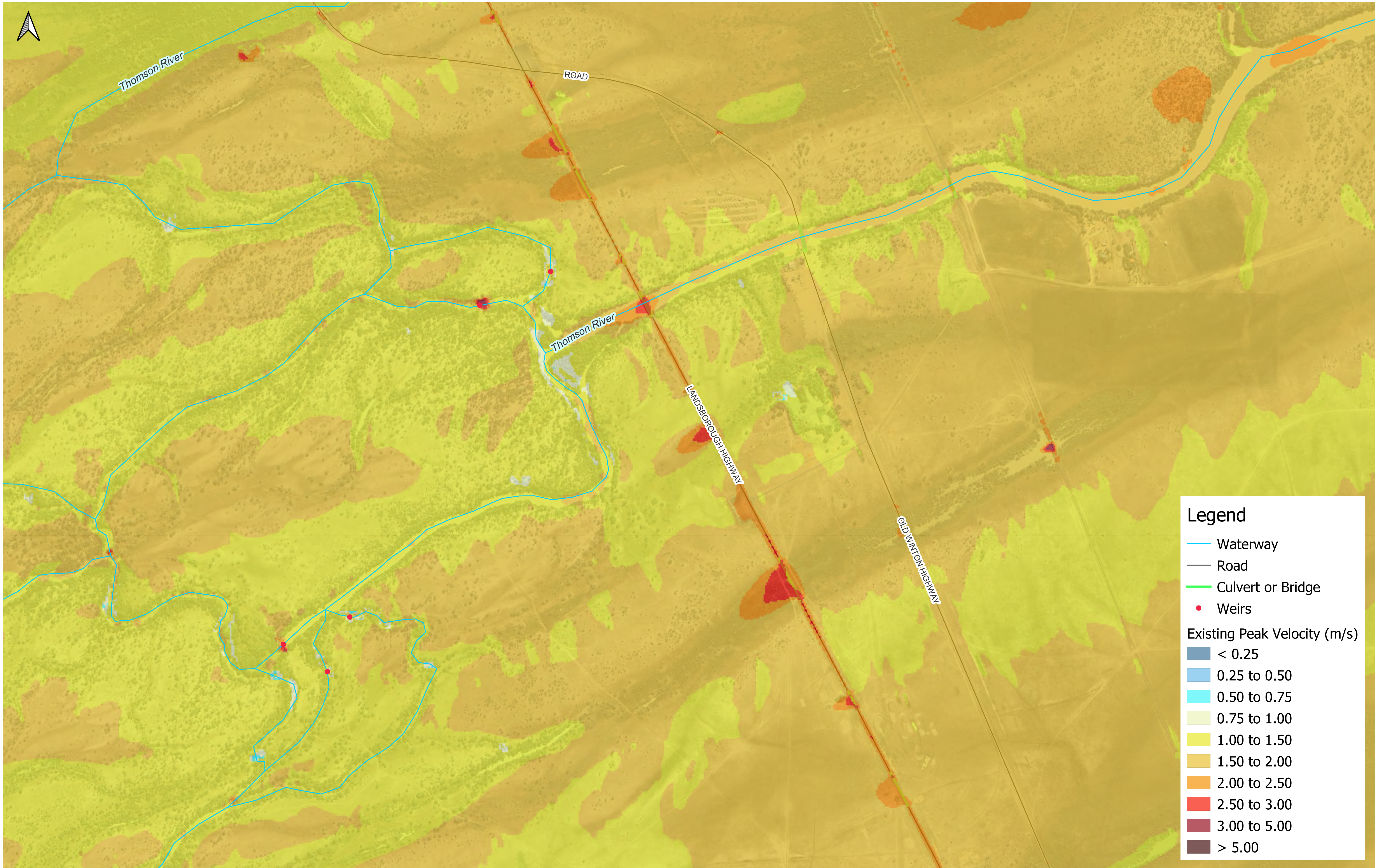

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
PMF - Existing Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:16:45.409

APPENDIX B
WEIR RAISE FLOOD DEPTH AND VELOCITY MAPS

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:45:52.059

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

18% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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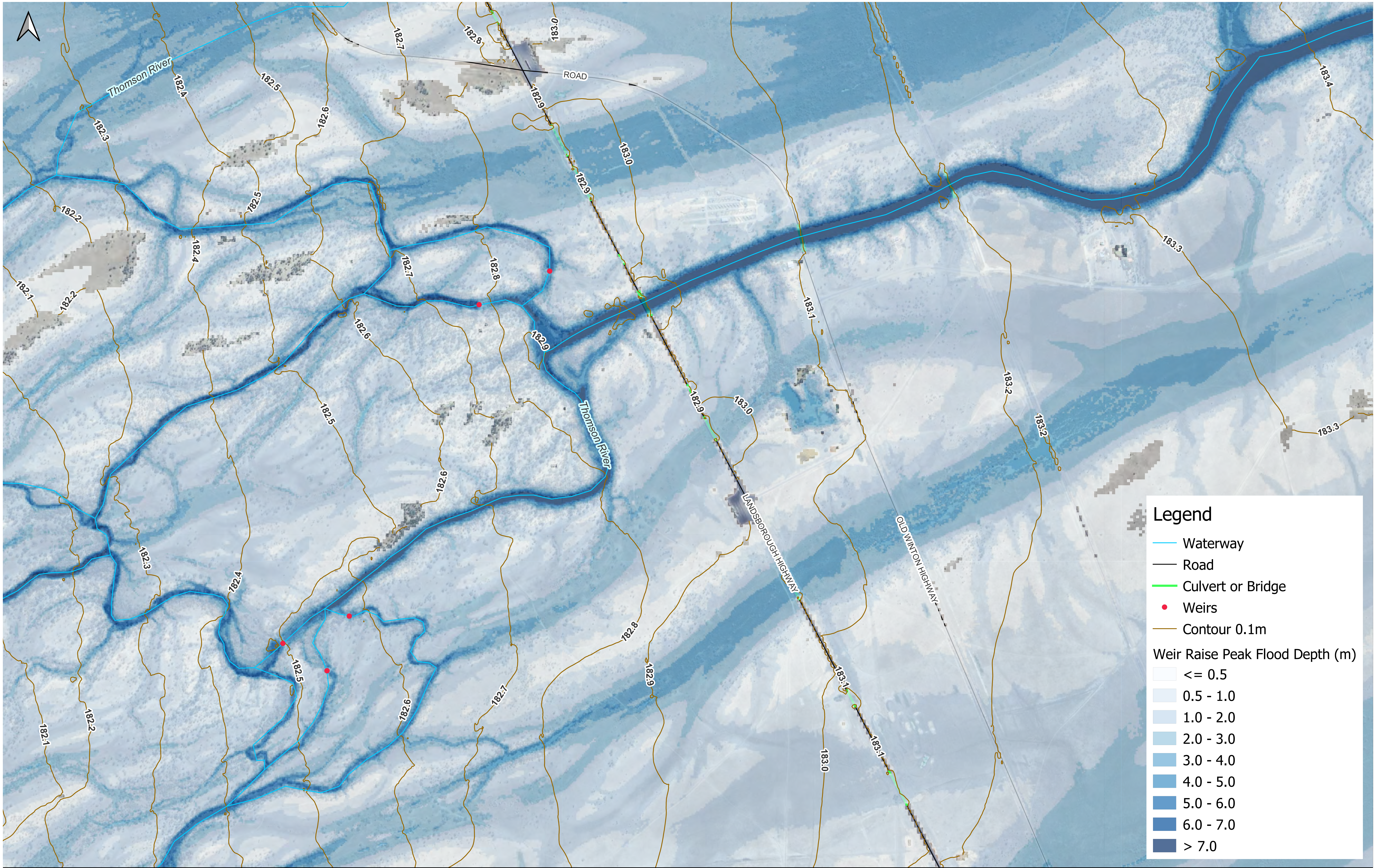


Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

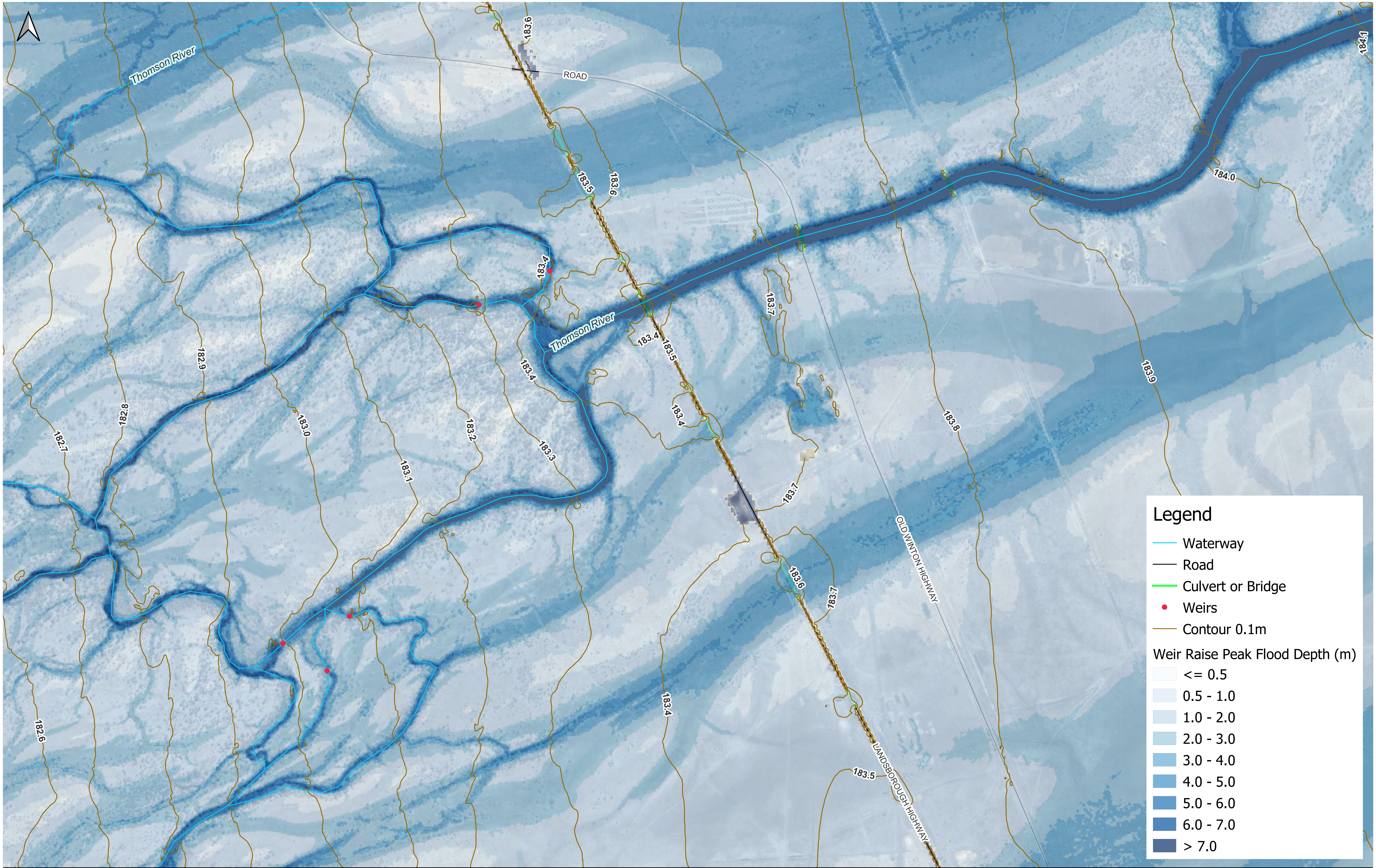
300 0 300 600 m

22020293 - Longreach Weir Raising

10% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:45:30.232



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

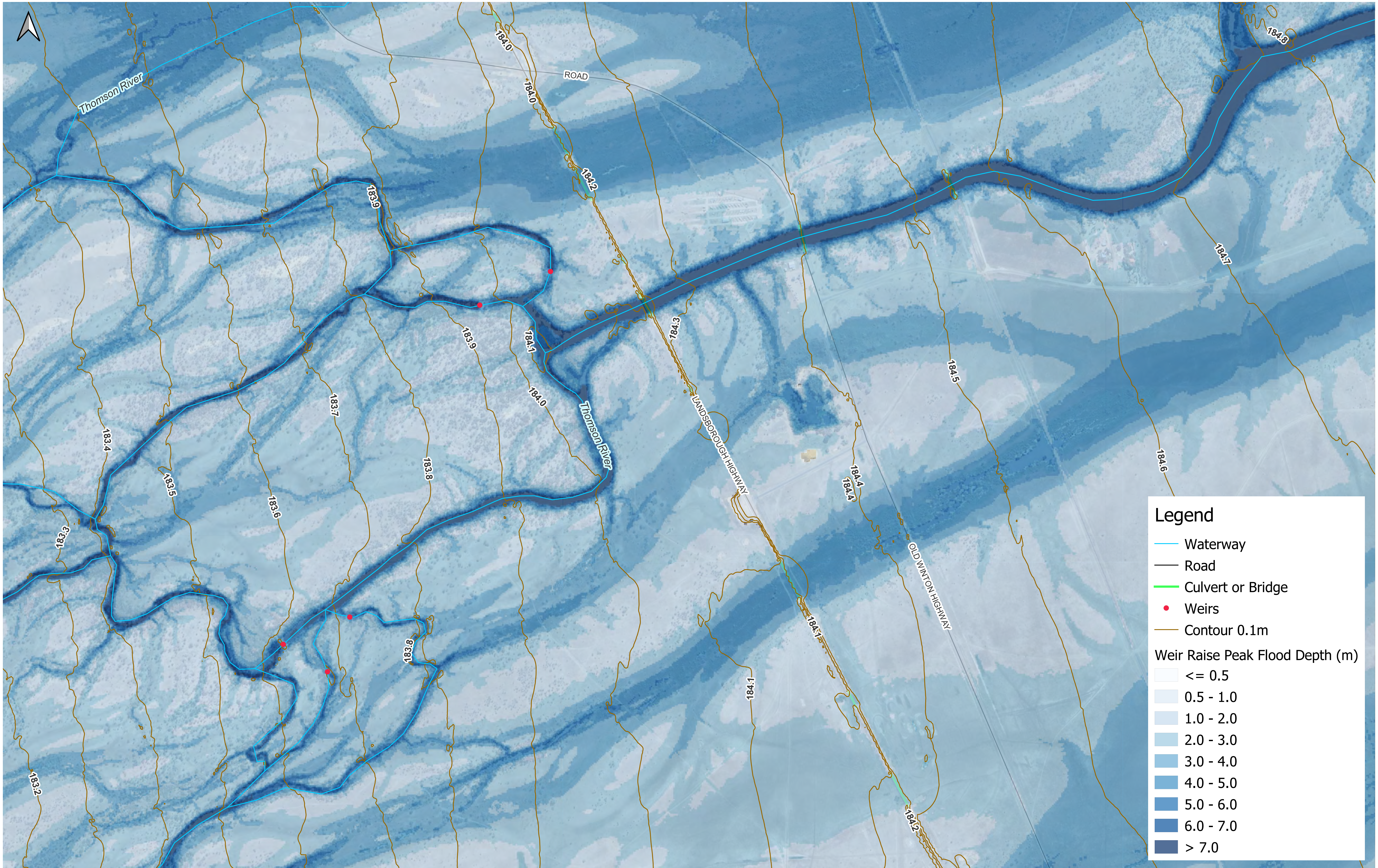
300 0 300 600 m

22020293 - Longreach Weir Raising

5% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:45:18.959



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

2% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

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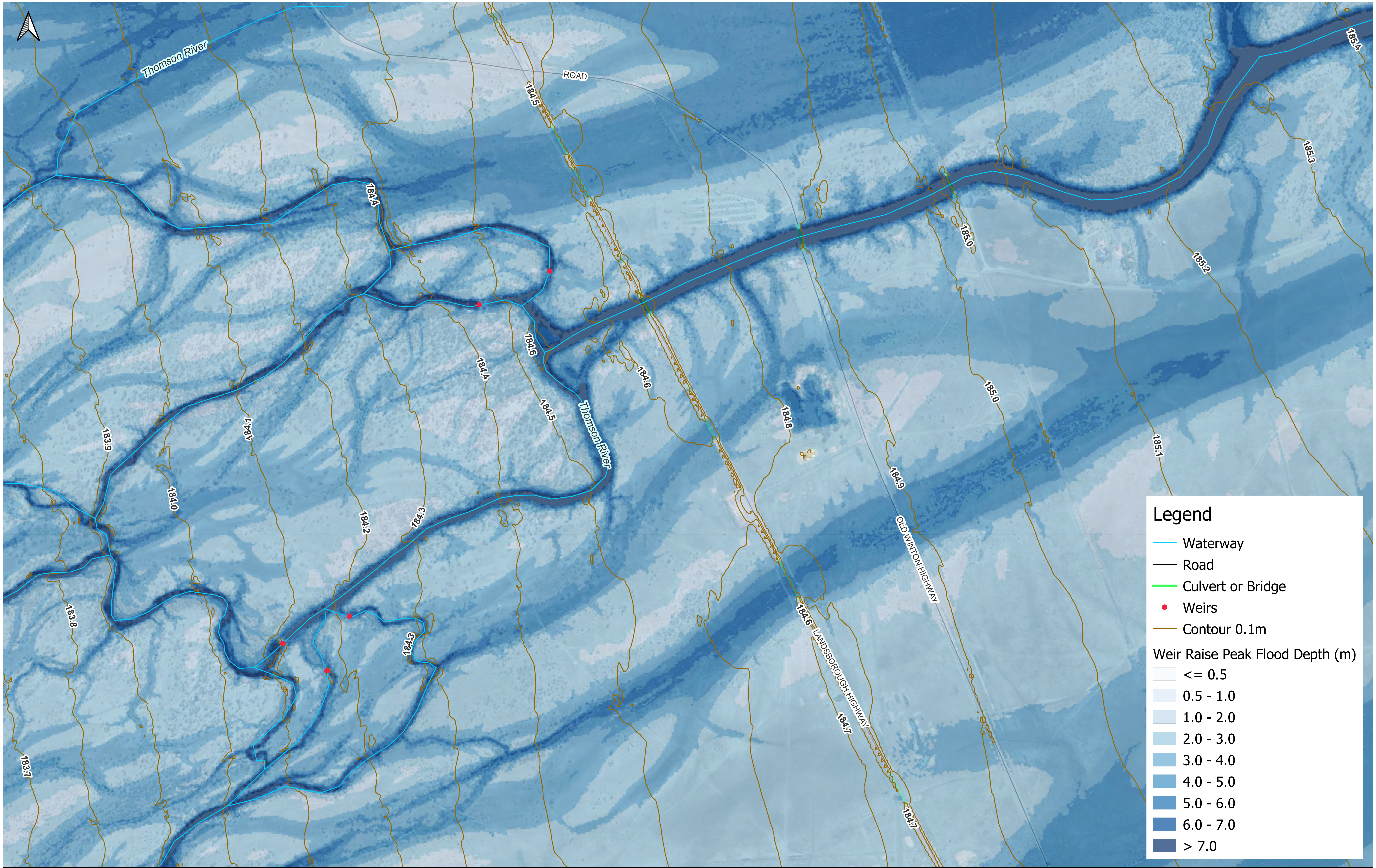


Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

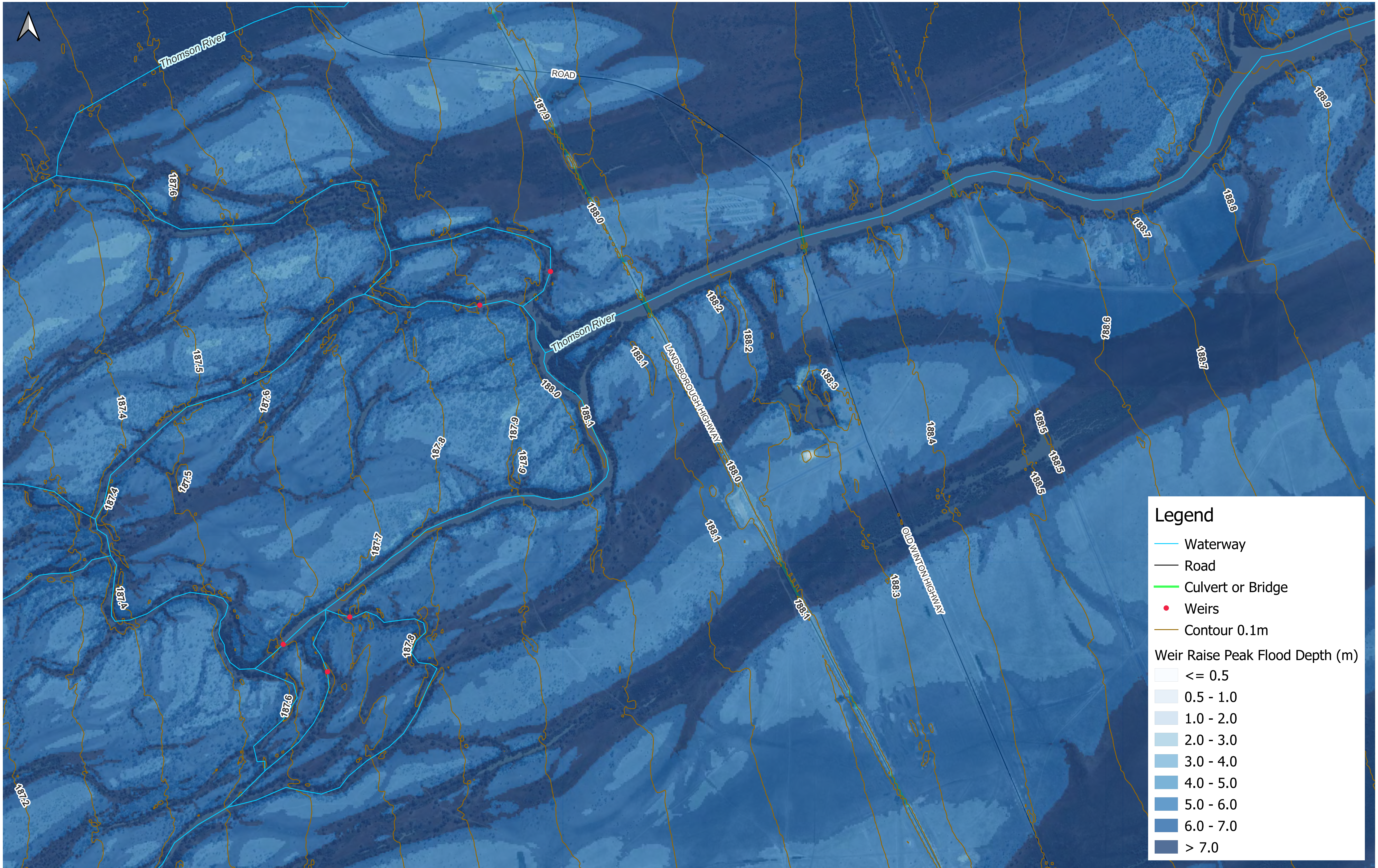
300 0 300 600 m

22020293 - Longreach Weir Raising

1% AEP - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:53:35.858



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

PMF - Weir Raise Peak Flood Depth (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:58:55.801

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

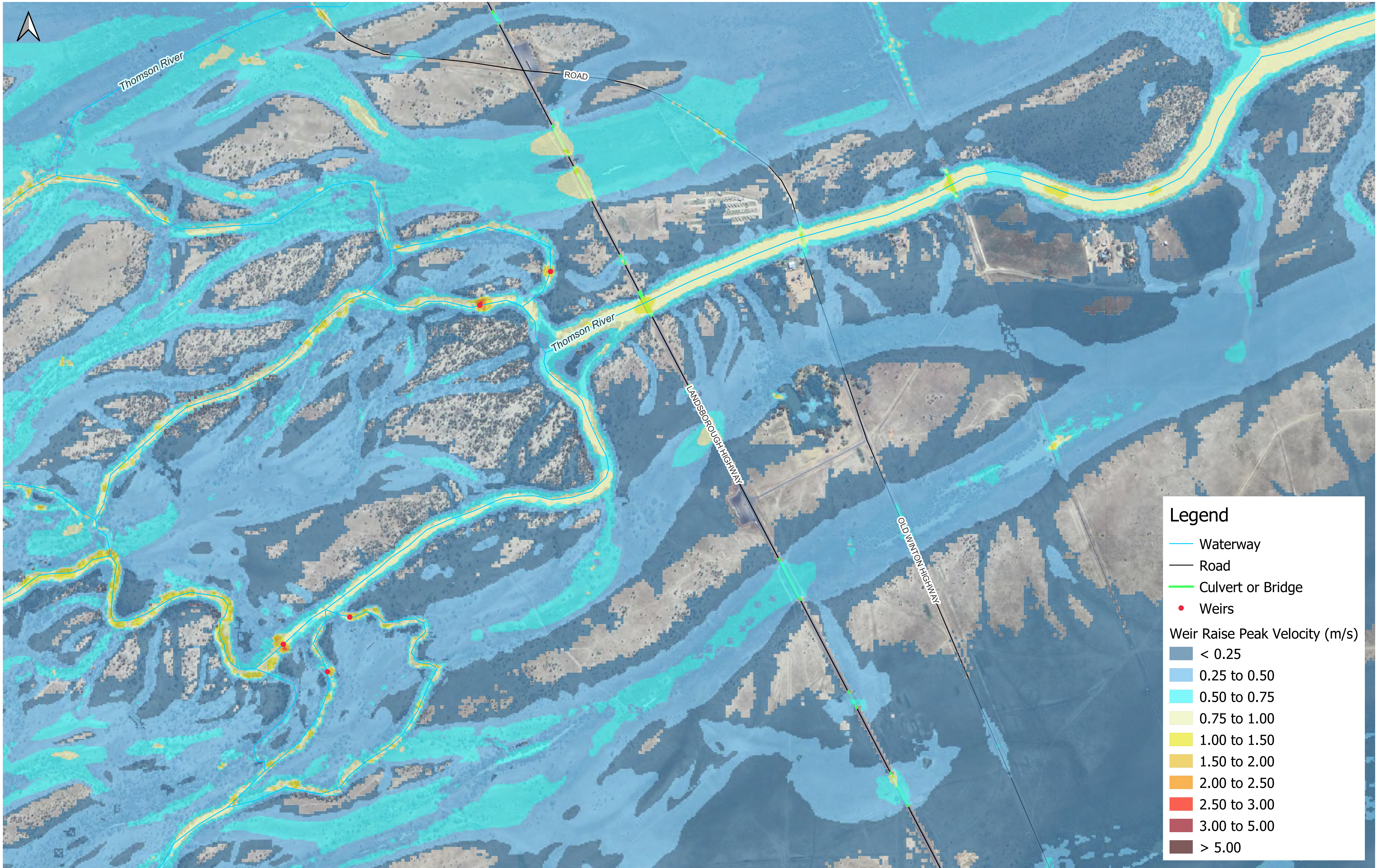
300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Weir Raise Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:47:51.221



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

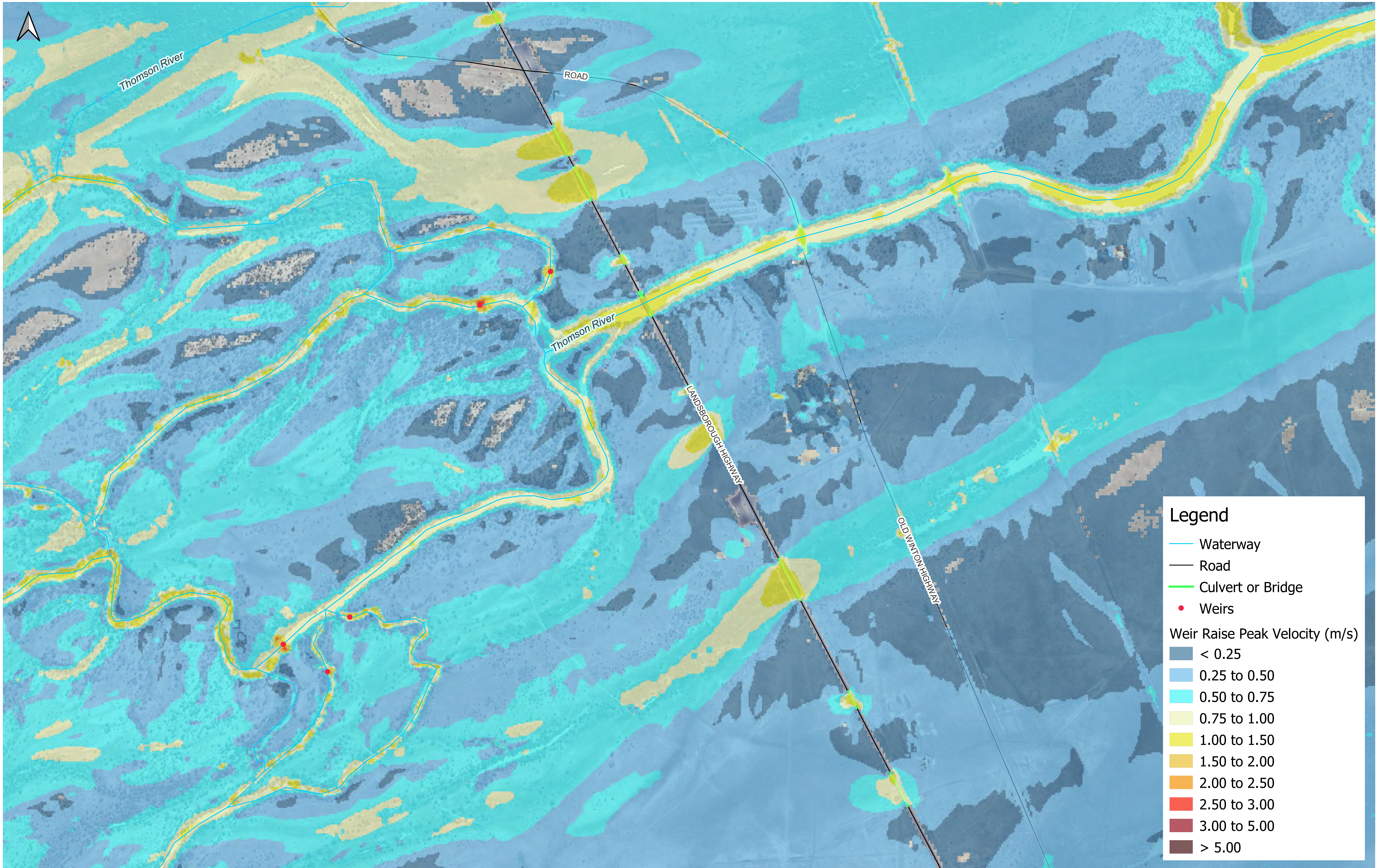
300 0 300 600 m

22020293 - Longreach Weir Raising

18% AEP - Weir Raise Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:47:39.438



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

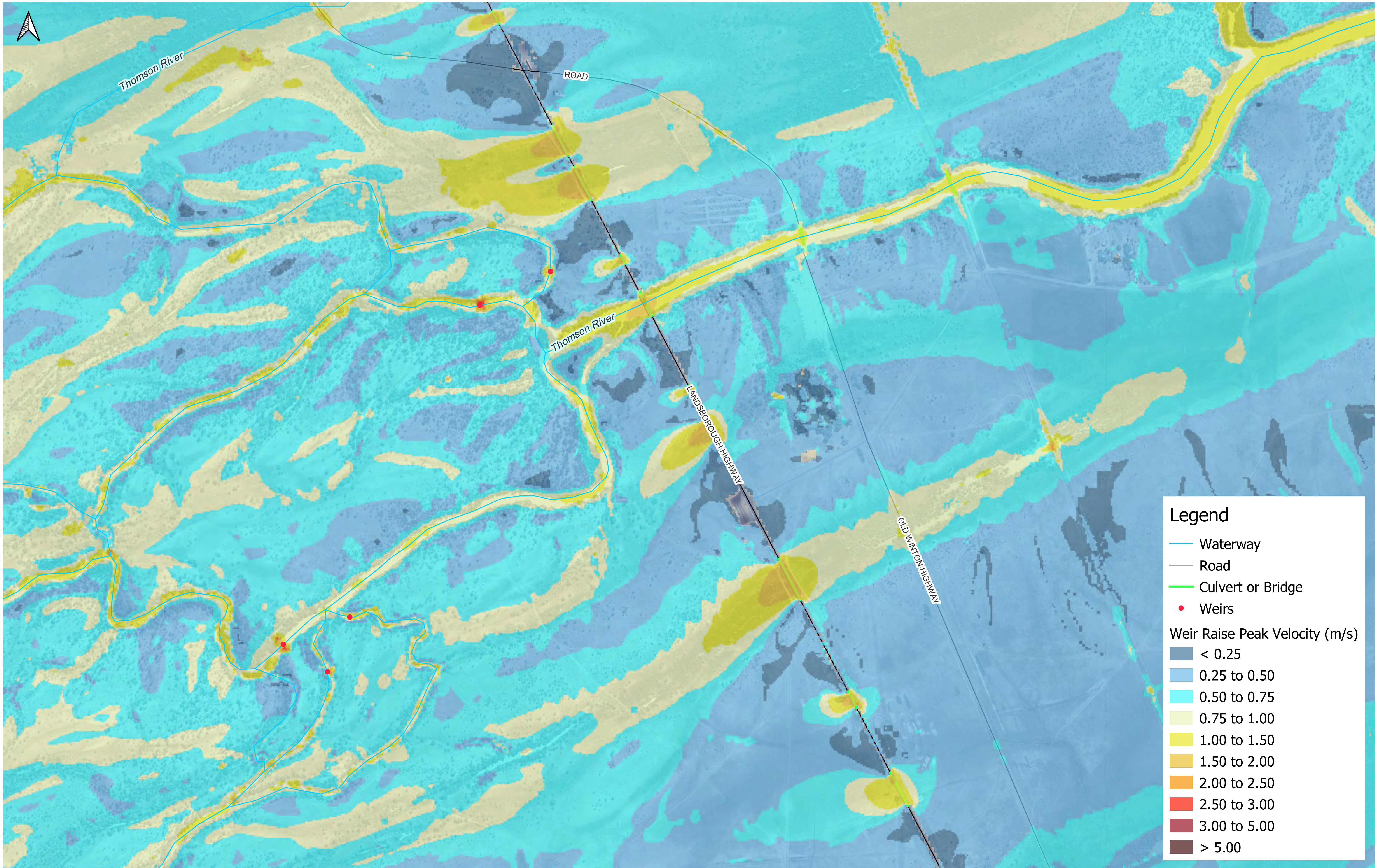
Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

10% AEP - Weir Raise Peak Velocity (m/s)

2023-08-24T15:47:28.796



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

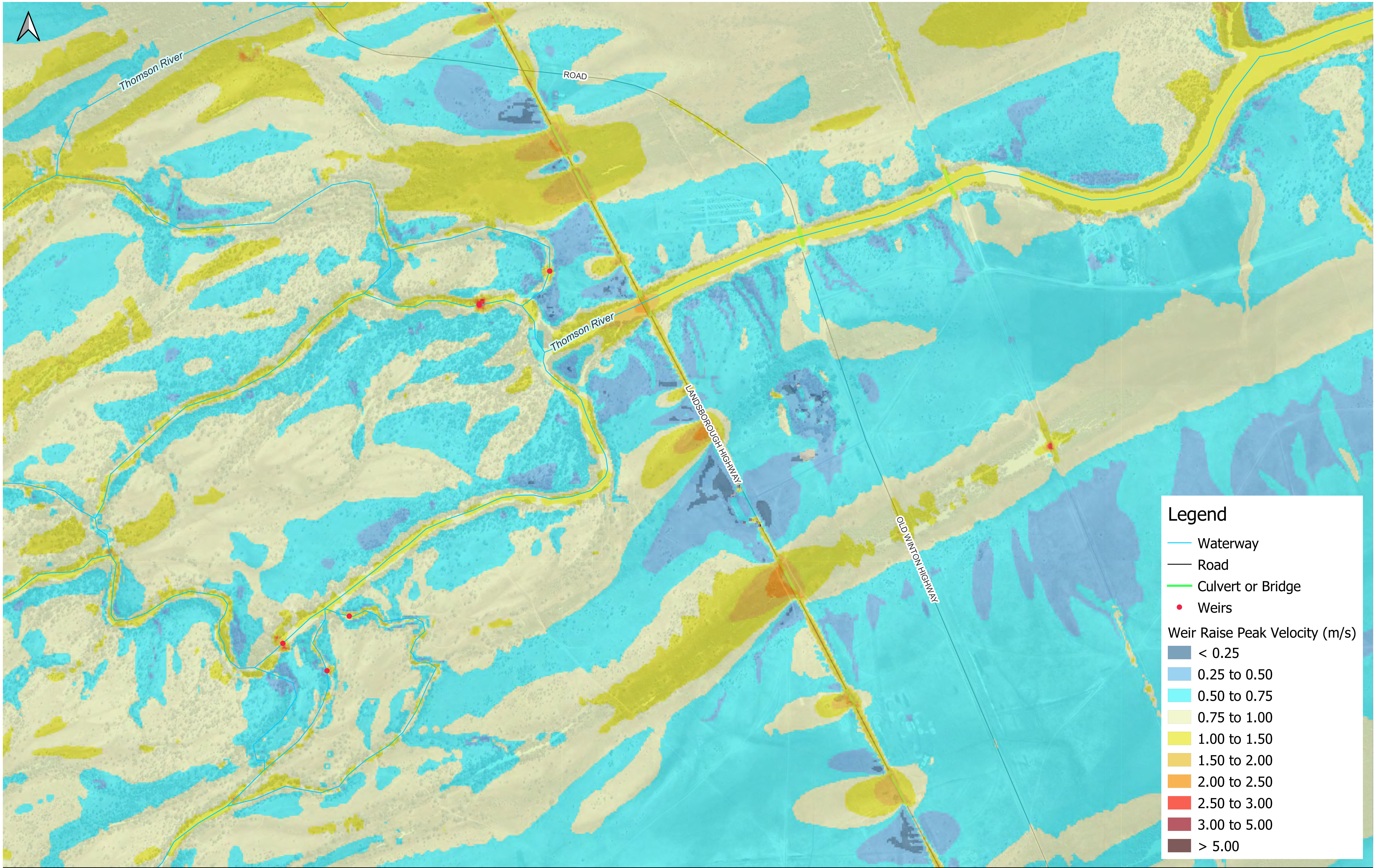
Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

5% AEP - Weir Raise Peak Velocity (m/s)

2023-08-24T16:01:54.611



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

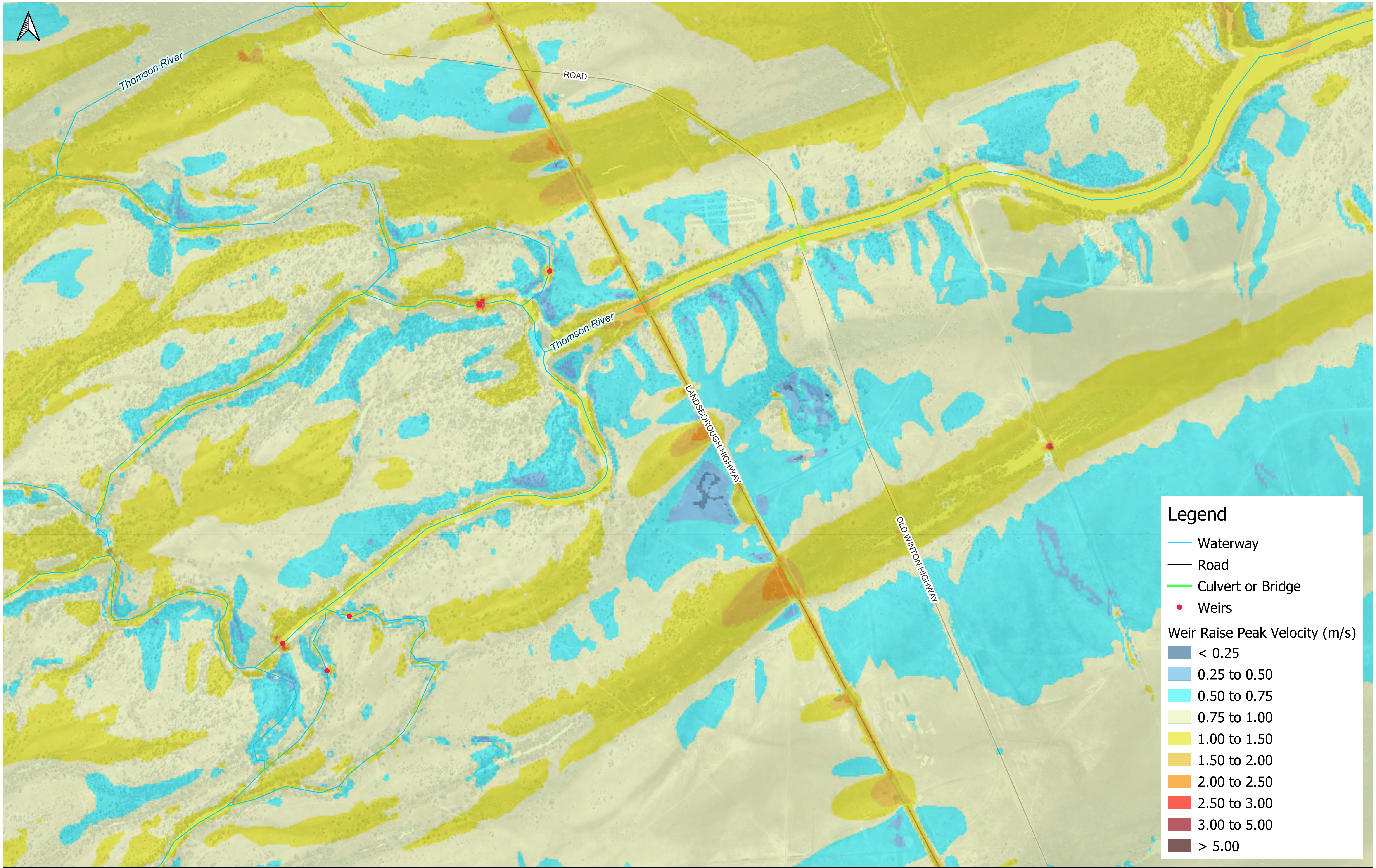
300 0 300 600 m

22020293 - Longreach Weir Raising

2% AEP - Weir Raise Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:00:57.693



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

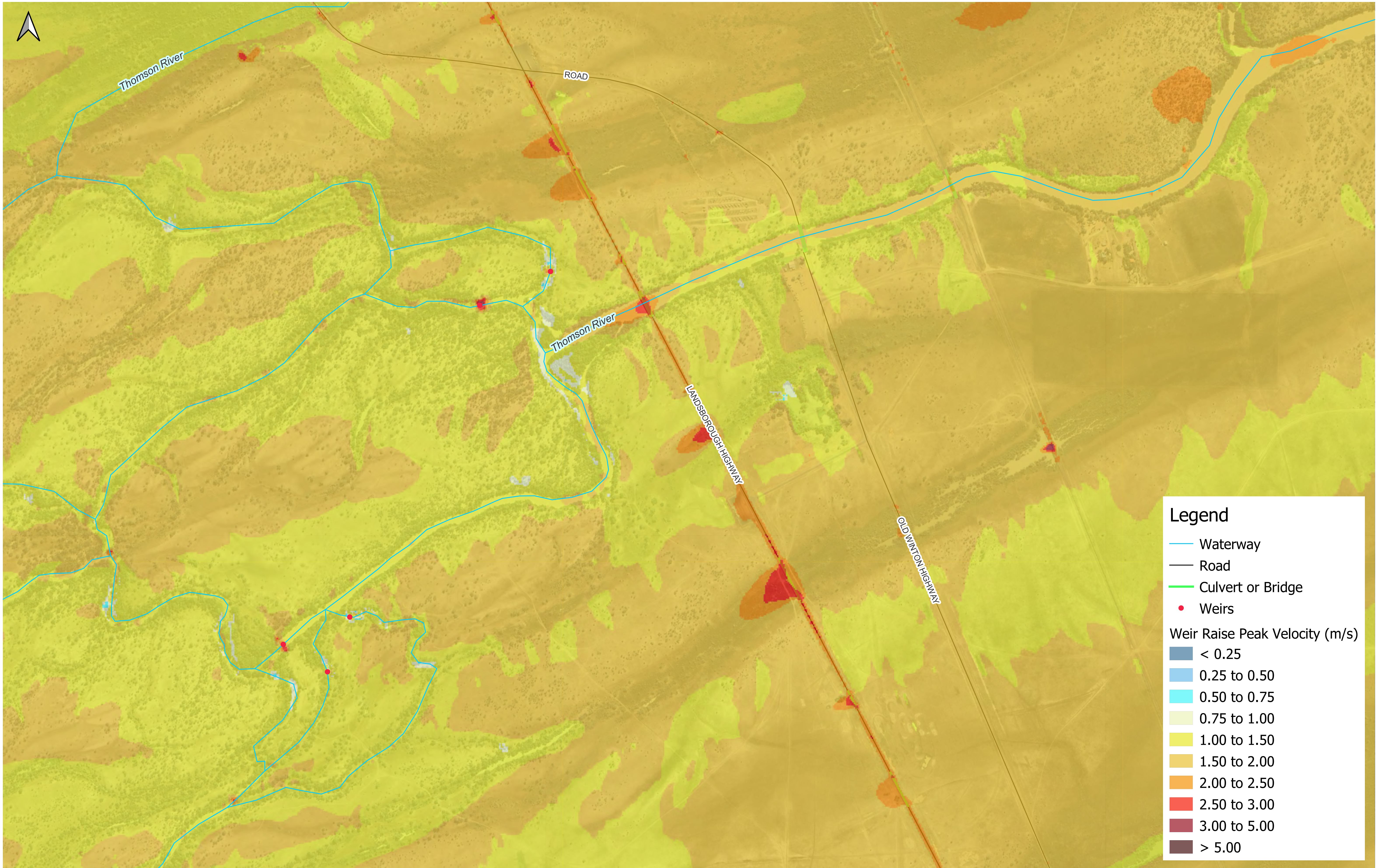
300 0 300 600 m

22020293 - Longreach Weir Raising

1% AEP - Weir Raise Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:47:08.168



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
PMF - Weir Raise Peak Velocity (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:05:30.294

APPENDIX C
WATER SUFACE LEVEL IMPACT MAPS

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Water Surface Level Impact (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:43:04.660

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

18% AEP - Water Surface Level Impact (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:09:43.797

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000
300 0 300 600 m

22020293 - Longreach Weir Raising
10% AEP - Water Surface Level Impact (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:08:52.244

2023-08-24T15:48:28.240

2023-08-24T15:46:36.225

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

1% AEP - Water Surface Level Impact (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:07:20.835

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

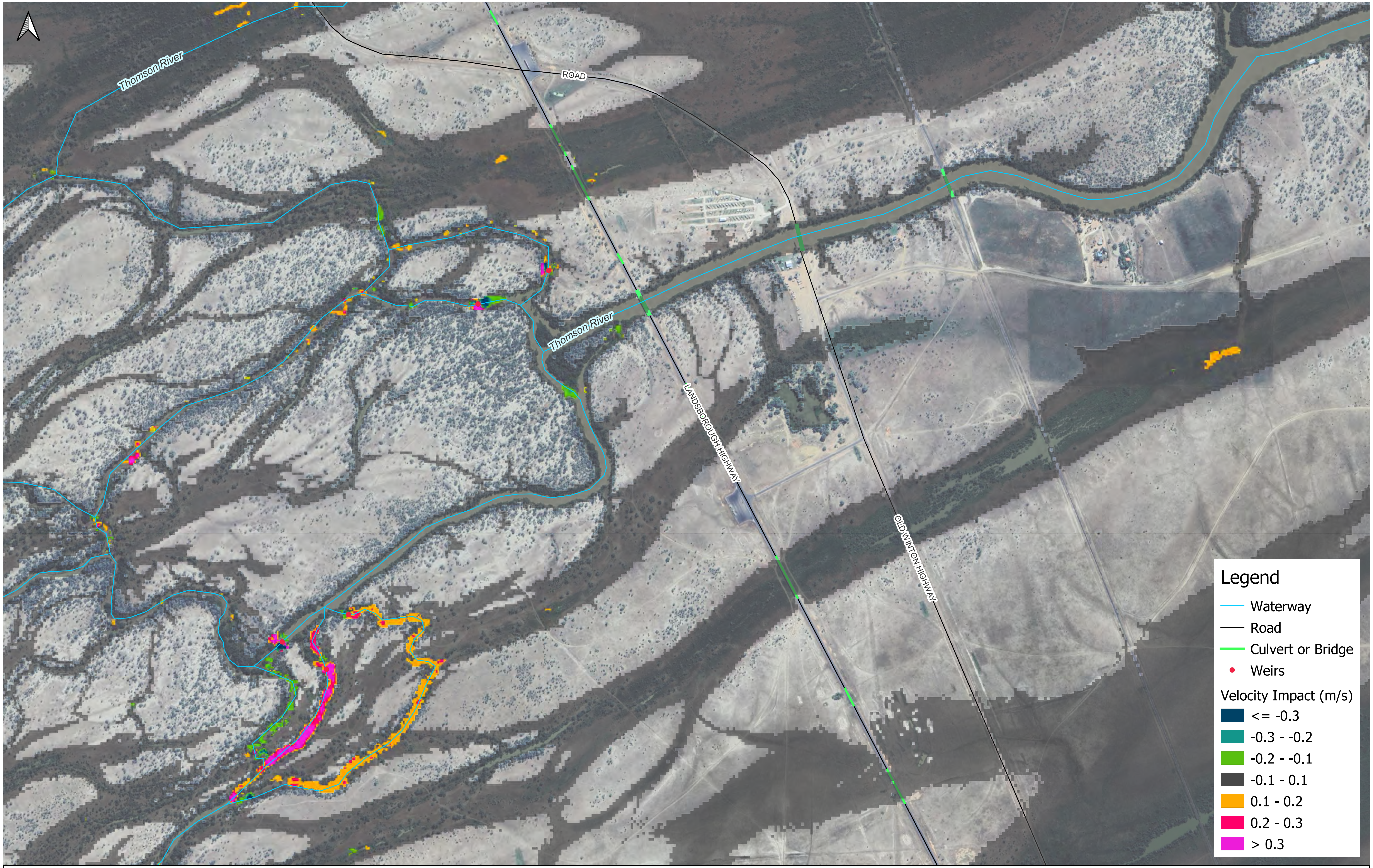
22020293 - Longreach Weir Raising

PMF - Water Surface Level Impact (m)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T16:10:31.866

APPENDIX D
VELOCITY IMPACT MAPS



Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

39% AEP - Velocity Impact (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:44:26.549

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

22020293 - Longreach Weir Raising
18% AEP - Velocity Impact (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:44:16.273

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
10% AEP - Velocity Impact (m/s)

WATER TECHNOLOGY
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

2023-08-24T15:44:05.858

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

5% AEP - Velocity Impact (m/s)

WATER TECHNOLOGY
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2023-08-24T15:43:56.294

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

2% AEP - Velocity Impact (m/s)

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2023-08-24T15:43:46.520

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising
1% AEP - Velocity Impact (m/s)

2023-08-24T16:06:33.363

Projection: GDA / MGA94 Zone
Produced by: Water Technology Pty Ltd
Imagery Source: Google

Scale 1 : 11000

300 0 300 600 m

22020293 - Longreach Weir Raising

PMF - Velocity Impact (m/s)

WATER TECHNOLOGY
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2023-08-24T15:44:47.342

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precinct URBAN PLANNING

APPENDIX G – PRELIMINARY CONSTRUCTION ENVIRONMENTAL MANAGEMNET PLAN

NGH

Prepared for Longreach Regional Council

Preliminary Construction Environmental Management Plan

Thomson River Weir Raising Project

December 2023

Project Number: 220597

Document verification

Project Title:	Thomson River Weir Raising Project
Project Number:	220597
Project File Name:	220597_Thomson River WRP Preliminary CEMP_Final V1.1

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	22/09/2023	Bishal Ghimire	Joe Flanagan	Joe Flanagan
Final V1.1	20/12/2023	Bishal Ghimire	Joe Flanagan	Joe Flanagan

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

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Acronyms and abbreviations

BOM	Australian Bureau of Meteorology
CEMP	Construction Environmental Management Plan
DAF	Department of Agriculture and Fisheries
DES	Department of Environment and Science
DTMR	Department of Transport and Main Roads
ESC	Erosion and sediment control
ESCP	Erosion and Sediment Control Plan
EP Act	*Environmental Protection Act 1994*
ha	hectares
IECA	International Erosion Control Association
km	kilometres
LGA	Local Government Area
LRC	Longreach Regional Council
m	metres
mm	millimetres
Qld	Queensland
SWMS	Safe Work Method Statement

1. Introduction

This Preliminary Construction Environmental Management Plan (CEMP) has been prepared by NGH Pty Ltd (NGH) for the Longreach Regional Council (LRC), and forms part of the Ministerial Infrastructure Designation (MID) proposal for the Thomas River Weir Raising Project (the Project).

1.1. Project background

To improve long term water security for Longreach, the LRC is seeking to upgrade weirs along Thomson River. The Project would involve raising of the LRC's Town Weir and four Anabranch Weirs (collectively referred to as the existing weirs) on the Thomson River by 1 metre (m). The Town Weir is located approximately 4.4 kilometres (km) north-west of the Longreach CBD. Anabranch Weirs 1 to 4 are located in proximity to the Town Weir, on anabranches of the main Thomson River channel.

The Project weirs currently provide for the storage of approximately 3,300 megalitres (ML) of water. The Project would increase this storage capacity to approximately 4,200 ML, equivalent to a 28% increase. The minimum operating volume of the Town Weir intake is 88 ML.

The Project weirs are trapezoidal structures comprised of earthen cores with rock pitching and bitumen and/or concrete capping. It is understood that the Project weirs were originally constructed in the 1890's and have undergone maintenance works as required since. Most recently, Anabranch Weirs 3 and 4 failed during flooding events in 2022 and 2020 respectively, following which LRC was required to repair and reinforce the weirs. Given their significant age, the structural integrity of the Project weirs is unknown and provides additional imperative for the LRC to undertake the Project.

1.2. Purpose of this document

This Preliminary CEMP has been prepared to outline preliminary environmental management measures for Project construction, in consideration of the preliminary design information available for the Project to date, and to meet the requirements of the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP).

This Preliminary CEMP also provides general guidance around the development of a more detailed CEMP by the chosen Project construction contractor following detailed design of the Project.

The CEMP has been prepared in consideration of the following concept design documents for the Project:

- Thomson River Weir Upgrade Concept Design QC2031_001-REP-001-1 Town Weir Upgrade Concept Design (Energy, 2023a)
- Memorandum - Thomson River Weir Raising Concept Design Request for Additional Design Information (Engeny, 2023b)
- Cross section drawings, file named *QC2031-001-(PRELIM SET)-Sections* (Engeny, 2023c)

Ref: MID Proposal Workspace \ Figure 1. Project Location Author: Joe Flanagan Date created: 01.06.2023 © NGH 2023 © ESRI 2022

NGH

Thomson River Weir Raising Project

Figure 1-1 Project location

2. Project description

2.1. Location

The relevant Lot/s and Plan/s associated with each of the existing weirs is listed in Table 2-1. The Project would not change the location of the existing weirs, with the exception of expanding their vertical and lateral extent commensurate with the 1 m raising.

Table 2-1 Location of the Weirs

Weir	Relevant Lot/s and Plan/s
Town Weir	State land (Thomson River) Lot 2 SP123565
Anabranch Weir 1	Lot 4 SP23218
Anabranch Weir 2	Lot 4 SP23218
Anabranch Weir 3	Lot 2 SP123565
Anabranch Weir 4	Lot 2 SP123565

2.2. Construction

The existing weirs are trapezoidal structures comprised of earthen cores with rock pitching and bitumen and/or concrete capping. The existing weirs are shown on Pictures 2-1 to 2-5.

Picture 2-1 Town Weir

Picture 2-2 Anabranch Weir 1

Picture 2-3 Anabranch Weir 2

Picture 2-4 Anabranch Weir 3

Picture 2-5 Anabranch Weir 4

Pending geological investigation and detailed design being undertaken, construction methodology for the Project is expected to include the following activities (Engeny, 2023a):

- Dewatering of the impoundment or installation of an earth fill and/or sheet pile coffer dam (at Town Weir as a minimum, possible also required at anabranch weirs)
- Removal of existing surface protection of existing weirs and excavation to a suitable level for foundation treatment
- Confirmation of existing foundation treatment and extents
- Sheet piling along the length of the weirs and into the existing creek bank
- Identifying a suitable borrow source for Zone 1 (Clay) earth fill
- Earth fill construction to raise the five weirs to a height of 179.6 m RL (Australian Height Datum [AHD]).
- Placing concrete sills upstream and downstream of the embankments.
- Capping the embankments with reinforced concrete surface protection.
- Placing a dumped-rock apron downstream of the weir.

3. Planning

3.1. Project environmental obligations

Pending development of a site-specific CEMP by the civil contractor engaged for Project construction, it is expected all personnel working on the Project will have the following general obligations:

- Construct the Project as described in final technical specification documents and comply with any prescribed contract requirements
- Minimise pollution of land, air, and water
- Use pollution control equipment maintained in working order
- Preserve the natural and cultural heritage environment
- Notify relevant state authorities of any non-Aboriginal or Aboriginal heritage discoveries
- Minimise the occurrence of offensive noise
- Be a good neighbour to surrounding land users
- Keep the community informed of Project milestones, upcoming activities, and duration of relevant aspects of the works, as required
- Use equipment with noise dampeners where available and ensure it is maintained
- Take all feasible and reasonable steps to ensure compliance with the requirements of the detailed CEMP and associated documents.

3.2. Legal and other requirement

The key pieces of environmental legislation, standards, and guidelines potentially relevant to Project construction are identified in Table 3-1 below. As this Preliminary CEMP has been developed to support a MID approval for the Project, no environmental approvals have been obtained for the Project to date.

Table 3-1 Legislation, standards and guidelines relevant to Project works

Environmental aspect	Requirement
General	*Environmental Protection Act 1994*
	Environmental Protection Regulation 2019
	Planning Act 2016
	Planning Regulation 2017
	AS/NZS 14001:2016 Environmental Management Systems
Soil and Water	Environmental Protection (Water and Wetland Biodiversity) Policy 2019
	Water Act 2000
	Water Regulation 2016
	ANZECC Water Quality Guidelines 2000
	Best Practice Erosion and Sediment Control (White Book), IECA 2008

Environmental aspect	Requirement
Biodiversity	*Biosecurity Act 2014*
	Biosecurity Regulation 2016
	Fisheries Act 1994
	Fisheries (General) Regulation 2019
	Nature Conservation Act 1994
	Nature Conservation (Animals) Regulation 2020
	Nature Conservation (Plants) Regulation 2020
	Vegetation Management Act 1999
	Vegetation Management Regulation 2012
	AS 4970:2009 Protection of trees on development sites
	AS 4373:2007 Pruning of amenity trees
Waste	*Waste Reduction and Recycling Act 2011*
	Waste Reduction and Recycling (Waste Levy) Amendment Act 2019
	Waste Management and Resource Recovery Strategy, DES 2019
Chemical Storage	AS 1940:2017 The storage and handling of flammable and combustible liquids
	Work Health and Safety Act 2011
Noise and Vibration	Environmental Protection (Noise) Policy 2019
	AS 2436-2010 Guide to noise and vibration control construction, demolition and maintenance sites
	Noise Measurement Manual, DEHP 2013
Air Quality	Environmental Protection (Air) Policy 2019
Heritage	*Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
	Aboriginal Cultural Heritage Act 2003
	Queensland Heritage Act 1992
	Duty of Care Guidelines: Aboriginal Cultural Heritage Act 2003

3.3. Objectives and targets

As a means of assessing environmental performance over the course of Project construction, environmental objectives and targets should be established in the detailed CEMP prepared by the Project construction contractor following detailed design. These objectives and targets should be developed with consideration of key issues identified through the environmental assessment prepared as part of the MID Proposal (NGH, 2024) and any subsequent investigations undertaken by the LRC and the construction contractor.

4. Project considerations

A more detailed description of the environmental values of the Project area and surrounds is provided in the MID proposal (NGH, 2024), of which this Preliminary CEMP is attached. A summary has been provided below.

4.1. Land and water

4.1.1. Surface water

The Project is located within the Thomson River sub-basin (0032) of the Cooper Creek basin (003).

Water sampling undertaken by NGH (2023) in the vicinity of the Project found quality was moderate to good, likely influenced to some degree by surrounding land-use and local geomorphology, which is characteristic of a moderately disturbed ecosystem. Surface water of waterways and wetlands within the vicinity of the Project was highly variable, with spatial heterogeneity in physio-chemical stressors and toxicants typical of ephemeral systems in the region.

4.1.2. Landforms and topography

Project construction activities will be undertaken within the banks and floodplain of the Thomson River and anabranches. The elevation of the existing weirs is approximately 178.6 mAHD. The elevation of the surrounding floodplain is generally consistent and is shown to be a height of 180 mAHD on Queensland Globe (DoR, 2023).

4.1.3. Geology

Mapping on Queensland Globe (DoR, 2023) indicates the weirs are all located within the “Qhab” geological unit, described as sand, gravel, silt and clay; active and abandoned stream channels and overbank deposits in braided stream systems. Geotechnical investigations will be undertaken prior to detailed design which will confirm the geology of the weir locations.

4.1.4. Soils

Australian soil classification mapping on Queensland Globe (DoR, 2023) indicates the weirs are all located on “Landsborough-Kendall” soil type, described as seasonally flooded alluvial plains of braided rivers and streams. Geotechnical investigations will be undertaken prior to detailed design which will confirm the soils of the weir locations.

4.2. Air quality

Air quality in the vicinity of the weirs is characterised by a typical rural setting, with low concentrations of suspended particles and pollutants, with fluctuating levels of airborne dust depending on weather conditions and surrounding agricultural operations.

The nearest sensitive receiver to the weirs is Apex Park, which is located approximately 2 km east of the Town Weir and Anabranch Weirs 1 and 2, and approximately 800 m east of Anabranch Weirs 3 and 4.

4.3. Noise and amenity

Noise levels in the vicinity of the weirs is characterised by a typical rural setting, with little to no noise from human activities, with the exception of intermittent noise coming from vehicles (tonal engine noise) on the Landsborough Highway during conditions that promote the propagation of sounds to the west.

The nearest sensitive receiver to the weirs is Apex Park, which is located approximately 2 km east of the Town Weir and Anabranch Weirs 1 and 2, and approximately 800 m east of Anabranch Weirs 3 and 4.

4.4. Waste

Significant volumes of waste are not expected to be generated from Project construction activities (with the exception of existing weir material), and are expected to include:

- General wastes
- Recyclable materials (ferrous, aluminium and paper)
- Soft plastics (pallet wrap etc.)
- Domestic waste
- Gaseous emissions
- Green waste
- Regulated waste
- Construction waste.

General wastes are expected to be produced at low levels. A minor amount of domestic waste and recyclables are likely to be produced by construction staff through food wrappings, scraps, product containers and other consumables. Green waste will be generated through clearing vegetation within the construction footprint. Gaseous emissions from the burning of hydrocarbon fuels to power vehicles and plant are classified as waste. These gasses include compounds such as:

- Carbon dioxide (CO_2)
- Carbon monoxide (CO)
- Nitrogen oxides (NO_x)
- Hydrocarbons (HC)
- Particulate matter (PM).

Volumes of these emissions are minimal, with emissions resulting from the combustion of fuel for site plant.

Regulated wastes produced during Project construction may include spent tyres and oils and lubricants produced during machinery maintenance.

The material associated with the existing weirs comprises a mixture of earthen core, rock, concrete and bitumen, and will total approximately 3,650 m3. This material will be transported to and disposed of at the Longreach landfill approximately 12 km south-west of the site, utilising access tracks within the Town Common.

4.5. Flora and fauna

4.5.1. Vegetation communities

The field survey indicated that the Project area conforms to the State regional ecosystem (RE) mapping, noting that detailed floristic ground-truthing was not undertaken during the field survey. Generally, the dominant species along the edges of the river were *Eucalyptus coolabah* with *Melaleuca trichostachya*, *Lysiphyllum gilvum* and *Acacia cambagei*. This conforms with least concern RE 4.3.11b. Further away from the river the dominant species were *Eremophila bignoniiflora*, *Acacia stenophylla, Acacia cambagei* and *Atalaya hemiglauca*, conforming with REs 4.3.4 x 2e and 4.3.4 x 1. On the floodplains adjacent there were areas of RE 4.3.24a where *Chenopodium auricomum* shrubland was the dominant flora species.

4.5.2. Flora and fauna

No threatened fauna species were recorded within the Project area. A total of 45 least concern fauna species were observed (of which none are exotic) within the Project area. No threatened flora species were recorded within the Project area. A total of 16 least concern native flora species were observed in the Project area.

4.6. Heritage matters

4.6.1. Aboriginal

AHS undertook a field inspection of the Project area and surrounds with representative from the registered cultural heritage party, Bidjara People #7, on 24 August 2023. The inspection was designed to confirm the results of the desktop assessment and to identify any Aboriginal cultural heritage risks for the Project, through targeted and purposive techniques.

Tangible Aboriginal cultural heritage was identified during the inspection, primarily in the form of stone tools, including flakes and cores. A range of materials were observed, consisting largely of silcrete, with the addition of cherts and two basalt flakes. Raw material for the production of these artefacts is unsupported by the local geology, which consists primarily of alluvium deposits, suggesting that this raw material was likely imported in the past.Isolated artefacts were observed along the length of the study area, however, the highest concentration of artefacts was observed towards the western extent of the area, near the weirs themselves. The scatters seen towards the western extent were in the concentration of approximately 3-4 artefacts per square metre. Two potential scar trees were observed closer to the eastern extent of the Project Area.

4.6.2. Non-indigenous

A field inspection was conducted by AHS personnel using purposive pedestrian transects and visual inspection to confirm the presence of any historic cultural heritage features and archaeological material.

Four items were identified with potential historic importance, being the remnants of a previous weir, the footbridge adjacent Apex Park, a Southern Cross Windmill and a water tank footing. AHS has provided a range of recommendations in relation to these items to be considered by the LRC prior to Project construction which been described outside of this Preliminary CEMP (refer to Section 4.2 of Appendix G of the MID Proposal [NGH, 2024]).

5. Resources, roles and responsibilities

5.1. Roles and responsibilities

Specific roles and environmental responsibilities for the Project should be outlined in the detailed CEMP prepared by the Project construction contractor following detailed design. Standard roles and responsibilities typical of civil construction projects have been summarised below.

5.1.1. Project Manager

The environmental responsibilities of the Project Manager typically include, but are not limited to, the following:

- Ensure all works comply with relevant regulatory and Project requirements
- Ensure the requirements of the CEMP are fully implemented and in particular, that environmental requirements are not secondary to other construction requirements
- Liaise with government authorities as required
- Participate and provide guidance in the regular review of the CEMP and supporting documentation
- Provide adequate resources (personnel, financial and technological) to ensure effective development, implementation and maintenance of the CEMP
- Ensure that all personnel receive appropriate induction training, including details of the environmental and community requirements
- Ensure that complaints are investigated to ensure effective resolution
- Take action in the event of an emergency and allocate the required resources to minimise the environmental impact
- Stop work immediately if an unacceptable impact on the environment is likely to occur.

5.1.2. Site Supervisor

The environmental responsibilities of the Site Supervisor typically include, but are not limited to, the following:

- Communicate with all personnel and sub-contractors regarding compliance with the CEMP and site-specific environmental issues
- Ensure all site workers attend an environmental induction prior to the commencement of works
- Co-ordinate implementation of the CEMP
- Co-ordinate implementation and maintenance of pollution control measures
- Identify resources required for implementation of the CEMP
- Support the Project Manager in achieving the project environmental objectives, including on ground implementation of any Erosion and Sediment Control Plan (ESCP)
- Report any activity that has resulted, or has the potential to result, in an environmental incident immediately to the Project Manager
- Co-ordinate action in emergency situations and allocate required resources
- Stop activities where there is an actual or immediate risk of harm to the environment and advise the Project Manager.

5.1.3. Wider project team

The environmental responsibilities of the wider Project team (including subcontractors) typically include, but are not limited to, the following:

- Comply with the relevant requirements of the CEMP or other environmental management guidance as instructed by a member of the Project's management
- Participate in the mandatory Project/site induction program
- Report any environmental incidents to the Supervisor immediately or as soon as practicable if reasonable steps can be adopted to control the incident
- Undertake remedial action as required to ensure environmental controls are maintained in good working order
- Stop activities where there is an actual or immediate risk of harm to the environment and advise the Project Manager or Site Supervisor.

5.2. Subcontractor management

In addition to the above, the detailed CEMP prepared by the Project construction contractor following detailed design should outline the roles and responsibilities of any subcontractors and their employees involved in Project construction.

Subcontractors working on civil construction projects are typically required to:

- Undertake environmental awareness training
- Observe subcontract and statutory requirements relating to environmental protection and other environmental legislation, and to follow instructions issued by the Project Manager and Site Supervisor
- Adhere to principal construction contractors environmental management systems as they apply to their operations on the site
- Undertake weekly environmental inspections of their work areas
- Co-operate fully with the site emergency incident procedures and consultative arrangements
- Follow procedures incorporated in the CEMP.

6. Competence, training and awareness

The detailed CEMP prepared by the Project construction contractor following detailed design should detail the competence, training and awareness protocols required to implemented prior to, during and post project construction activities. These typically include:

- Environmental site inductions
- Toolbox talks, training and awareness
- Pre-start meetings

Sections 5.1 to 5.3 provide a summary of standard protocols typical of civil construction projects.

6.1. Environmental site induction

Prior to working on site, all personnel and subcontractors should undertake an environmental induction as part of the site induction. This is done to ensure all personnel involved in the project are aware of the requirements of the CEMP and to ensure the implementation of environmental management measures.

The Project Manager is normally responsible for ensuring that all employees and contractor employees attend an induction prior to starting work. Records of all inductions and copies of relevant qualifications and or licences should be retained for the life of the Project.

Environmental site inductions typically include:

- Relevant details of the CEMP including purpose and objectives
- Requirements of due diligence and duty of care
- Conditions of environmental licences, permits and approvals
- Potential environmental emergencies on site and the emergency response procedures
- Reporting and notification requirements for pollution and other environmental incidents or reportable events, including identification of contaminated land and damage and maintenance to environmental controls
- High risk activities and associated environmental safeguards
- Controls when working in or near environmentally sensitive areas
- Specific environmental management requirements and responsibilities
- Any site environmental and sustainability policies
- Mitigation measures for the control of environmental issues
- Incident response and reporting requirements
- Information relating to the location of environmental constraints.

6.2. Toolbox talks, training and awareness

Beyond environmental site inductions, toolbox talks are an effective method of raising awareness and educating personnel on issues related to all aspects of the planned construction works, including environmental issues. Toolbox are typically short (5-10 mins) and are undertaken at the start of each day with all personnel on site. The toolbox talks are used to ensure environmental awareness continues throughout construction and should be tailored to specific environmental issues relevant to upcoming works.

Relevant environmental issues covered during toolbox talks should include:

- Exclusion areas
- Erosion and sedimentation control
- Dewatering
- Hours of work and noise controls
- Emergency and spill response including location of emergency spill kits and training in their use
- Chemical management
- Refuelling procedures
- Aboriginal and non-Aboriginal heritage
- Clearing controls and vegetation protection
- Weed management
- Dust control
- Contamination management and unexpected finds including Asbestos.

Toolbox talk attendance is typically mandatory and attendees of toolbox talks should be required to sign an attendance form and the records maintained.

6.3. Prestart

Pre-starts meetings are a tool for informing the workforce of upcoming activities, safe work practices, environmental protection practices, work area restrictions, activities that may affect the works, coordination issues with other trades, hazards and other information that may be relevant to upcoming work.

The Site Supervisor, or their nominated delegate, should conduct a pre-start meeting with the site workforce before the commencement of work each week (or shift where relevant). Weekly pre-start meetings are generally succinct in nature and take about 10–15 minutes.

The environmental component of pre-starts are typically determined by the Site Supervisor and environmental personnel and will include any environmental issues that could potentially be impacted by, or impact on, upcoming activities. All attendees will be required to sign on to the pre-start and acknowledge their understanding of the issues explained.

Pre-start topics, dates delivered and a register of attendees will be recorded and kept on site as part of the Project Quality System to demonstrate compliance with CEMP activities.

7. Incident and emergencies

7.1. Emergency contract details

Key emergency contact details for emergency services during Project construction (current as at September 2023) are listed in Table 7-1. The key Project personnel (e.g. Project Manager and Site Supervisor) should be added to the register included in the detailed CEMP prepared by the Project construction contractor.

Table 7-1 Emergency contact details for the Project

Name/organisation	Contact
Project Manager – TBA	TBC
Site Supervisor – TBA	TBC
Emergency (Police, Fire, Ambulance)	000
Longreach Fire Station	07 4658 1005
Qld SES	132 500
Longreach Shire Council	07 4658 4111
Longreach Hospital	07 4658 4700
Longreach Veterinary Service	07 4658 3838
RSPCA Qld	1300 264 625

7.2. Environmental incidents

An environmental incident is defined as an unplanned event impacting or potentially impacting the environment with consequences. Various environmental incidents may have the potential to occur on site, which may include but not be limited to the following:

- Spills of fuels, oils, chemicals and other hazardous materials
- Sewage discharge to the environment
- Unauthorised discharge from sediment basins or other containment devices
- Unauthorised clearing or clearing beyond the extent of the Project boundary or premises
- Inadequate installation and subsequent failure of temporary erosion and sediment controls
- Unauthorised damage or interference to threatened species, threatened ecological communities or critical habitat
- Unauthorised harm or desecration to Aboriginal objects and Aboriginal places
- Unauthorised damage or destruction to any State or locally significant relic or Heritage item
- Potential contamination of waterways or land
- Accidental starting of a fire or a fire breaking out of containment
- Any potential breach of legislation
- Unauthorised dumping of waste.

Should an incident occur, the Site Supervisor should ensure that work ceases in that area and that the site is not disturbed until the appropriate level of investigation is conducted to ensure that any potential evidence is preserved.

An example spill response procedure is provided in Appendix A.

7.3. Incident reporting

The detailed CEMP prepared by the Project construction contractor following detailed design should detail an incident reporting procedure, in the case of an environmental incident occurring. These typically include:

- Initial control and response measures
- Details about the incident to be recorded (e.g. time and location, photographs, control measures implemented)
- Any regulator notification requirements
- Whether a debrief is required with site personnel.

8. Communication

Procedures for maintaining communication, managing complaints, and reporting of these, should be outlined in the detailed CEMP prepared by the Project construction contractor following detailed design. Standard communication procedures typical of civil construction projects have been summarised below.

8.1. Internal communication

Clear lines of communication throughout all levels and functions (e.g., management, staff and sub-contracted service providers) is key to minimising environmental impacts and achieving continual improvements in environmental performance.

The Project team should meet regularly to discuss any issues with environmental management on-site, any amendments to plans that might be required or any new/changed construction activities (e.g. through toolbox talks, pre-start meetings).

8.2. Complaints management

External complaints are defined as complaints received from parties outside of the normal lines of communication. Complaints and enquiries regarding Project construction would likely be received through LRC. All other complaints received are reportable incidents and shall be immediately reported to appropriate LRC personnel.

Records of all complaints received should include the following details:

- Date and time of the complaint
- Method by which the complaint was made
- Any personal details of the complainant
- The nature of the complaint
- Action taken in relation to the complaint and any follow up
- Any monitoring to confirm that the complaint has been satisfactorily resolved
- If no action taken, reasons why.

An example complaints register is provided in Appendix B.

8.3. Reporting

Any environmental incidents involving non-compliance with the CEMP or relevant legislation should be recorded and provided to LRC in writing within 24 hours of the incident occurring. Environmental monitoring data, training records and relevant environmental performance information should be provided to the LRC as part of any ongoing Project reporting requirements.

9. Inspections, monitoring and auditing

Procedures for inspections, monitoring and auditing should be outlined in the detailed CEMP prepared by the Project construction contractor following detailed design. Standard procedures for these, typical of civil construction projects, have been summarised below.

9.1. Environmental inspections

9.1.1. Weekly, pre and post rainfall site inspections

Weekly, pre and post-rainfall inspections should be undertaken of the Project construction works to evaluate the effectiveness of environmental controls. Typically, pre and post-rainfall inspections should be undertaken if a specified amount is forecast (or is recorded) in a 24 hour (hr) period.

If any maintenance and/or deficiencies in environmental controls or in the standard of environmental performance are observed, they should be recorded on a pro-forma checklist prepared as part of the detailed CEMP.

9.1.2. Longreach Regional Council inspections

It is recommended that LRC staff undertake regular inspections of work site, and in particular critical activities throughout construction of the Project.

9.1.3. Pre-work inspections

Prior to the commencement of works on each shift, an inspection should be carried out and will include a check of relevant environmental controls and resources required to ensure effective operation and maintenance. Works are not to commence unless inspections are found to be satisfactory. Any comments on pre-work inspections will be recorded via photographs or comments in the Site Supervisor diary.

9.2. Environmental monitoring

The objective of any monitoring and reporting undertaken during Project works should be to measure the effectiveness of environmental controls and implementation of the detailed CEMP. Example monitoring requirements for specific environmental aspects are included in the relevant mitigation measures included in Section 10.

9.3. Auditing

It is recommended that the detailed CEMP include provision for the LRC to undertake an audit (at any time) of environmental records to confirm that work has been completed in accordance with the CEMP. In this instance, the construction contractor should provide all environmental records and information as and when requested.

10. Management and mitigation measures

A description of the key environmental matters relevant to the Project is provided in the MID Proposal (NGH, 2024) to which this Preliminary CEMP is appended. These matters have been identified through environmental surveys and assessments undertaken for the Project.

Sections 9.1 to 9.5 describe preliminary management and mitigation measures for the Project. It is expected that these preliminary measures will be reviewed and refined by the Project construction contractor for inclusion in a detailed CEMP, following the completion of detailed design.

10.1. Soil and water

An Erosion and Sediment Control Plan (ESCP) will be prepared for the Project as part of the detailed CEMP in accordance with the *Best Practice Erosion and Sediment Control* guideline (the White Book) (International Erosion Control Association Australasia [IECA], 2008). These plans, would include site-specific erosion and sedimentation controls, staging advice and stabilisation measures as well as technical notes to guide the installation, function and maintenance of ESC devices. Preliminary soil and water control measures are described below.

10.1.1. Erosion and sediment control

Drainage control

Drainage control refers to the management of both ‘clean’ stormwater runoff around and through the site; and ‘dirty’ site stormwater runoff to enable treatment of sediment prior to release offsite, as defined below:

Clean water	Water that either enters site from an external source and has not been further contaminated by sediment within site; or water that has originated from the site and is of such quality that it does not need to be treated in order to achieve the required water quality standard (IECA, 2008).
Dirty water	Site derived water not defined as clean, thereby requiring treatment with appropriate controls prior to release from site (IECA, 2008).

Drainage control measures (temporary and permanent) will enable management of stormwater within work areas, including to:

- Enable diversion of ‘clean’ up-slope, run-on water either around or through the site at non-scouring velocities
- Enable collection of ‘dirty’ runoff generated within construction areas and the delivery of this water to an appropriate sediment control measure
- Minimise the risk of soil erosion caused by site-generated flows within the Project, through the use of ‘intermediate’ flow treatment and release points

- If required, control of the flow velocity, volume and location of water passing through the Project from the Thomson River.

Erosion control

Erosion control is the primary approach for the prevention of adverse impacts associated with sedimentation. Construction activities are to be undertaken to reduce the duration of soil exposure to erosive forces (wind and water), either by holding the soil in place or by shielding it.

Erosion control measures to be adopted could include construction practices, structural controls and vegetative measures aimed at managing runoff at a non-erosive velocity, and the protection of disturbed soil surfaces. The specific measures implemented will be based on seasonal erosion risk and construction activities.

Proposed controls include:

- Promptly stabilising exposed areas once construction stage has been completed (permanent works)
- Protection of soil surface (temporary and permanent) including placement of hardstand surfaces, use of soil binder, vegetation establishment (including landscaping), and protection with mats and blankets (e.g., jute, geotextile)
- For high-risk areas during construction (areas that have been disturbed or on slopes), prior to forecast of significant rainfall, all exposed batters (excluding rock faces) are to be temporarily ground-covered using fabric, polymer or similar
- Dust suppression by wetting of exposed surfaces, application of soil binder, and/or application of soil cover.

Sediment control

Sediment control measures will be installed in combination with drainage and erosion control measures to provide effective pollution management.

Sediment control measures include systems, procedures and materials to filter, trap and/or settle sediment from sediment-laden waters. In addition to adopting measures as per the White Book (IECA, 2008) standard drawings, variations to these may be implemented where it can be demonstrated that they are equally as effective and meet the intent of best practice guidelines.

10.1.2. Stockpile management

A number of small material stockpiles are anticipated to arise during Project construction. Stockpile management indicators to be monitored during weekly environmental inspections include:

- Installation of erosion and sediment control measures prior to stockpiling material
- Location of temporary stockpiles
- Height of temporary stockpiles
- Temporary stabilisation of stockpiles
- Stockpile separation
- Weed management on stockpiles.

10.1.3. Dewatering

Dewatering of the existing weirs will likely be required for Project construction (to be confirmed following detailed design and development of construction methodology). Any water that is collected within the construction footprint will meet the minimum water discharge limits prior to discharge. Discharge limits will be developed by the construction contractor for inclusion in the detailed CEMP. Preferably, clean water should be utilised as a dust suppressant on site and approach roads to minimise discharge volumes.

10.2. Air quality

Measures to minimise wind erosion will be employed during Project construction. Site-specific measures and controls for the prevention of wind erosion will be outlined in the Project ESCP and will include but not be limited to:

- Dust mitigation and suppression measures to be implemented
- Maximising use of sealed roads during transport
- Siting access as far as practicable from residences and other sensitive uses
- Materials will be delivered with covered loads and will come from local suppliers where possible
- Methods to manage work during strong winds or other adverse weather conditions
- Monitoring of wind-blown erosion will be undertaken through visual inspections and weather condition reports
- Monitoring of BoM forecasts to anticipate and plan for windy conditions and extreme weather events
- No burning of materials will be undertaken on site
- Progressive rehabilitation (either assisted or natural) of disturbed areas.

The prevention of erosion remains the primary approach for prevention of adverse impacts relating to dust-related air quality. Reducing the time of exposure and prioritising rehabilitation, in combination with dust-suppression measures during earthworks, will minimise the impact of Project construction activities on air quality.

10.3. Noise and amenity

Measures to minimise potential noise and amenity impacts to landholders and other recreational users (e.g. Thomson River cruises) will be employed during Project construction. Site-specific measures and controls for the prevention of noise impacts will be outlined in the CEMP once heavy vehicle and mobile plant requirements are known. These will include:

- Undertake works during standard working hours. Work required to occur outside of standard hours will require written approval from the LRC
- Where feasible, lower noise producing plant and equipment of appropriate size and power will be used
- Undertake regular maintenance of plant and equipment to ensure that noise emissions do not increase over time. Servicing, refuelling and warm-up to be undertaken with engine access covers closed where possible, during standard construction hours.
- Throttle down equipment where practicable and turn vehicles and machinery off when not in use.

10.4. Waste

10.4.1. Waste management hierarchy

The waste and resource management hierarchy, as described in the *Waste Reduction and Recycling Act 2011,* is a tool used to quantify and prioritise methods of waste management, ensuring that resource management options are considered against a hierarchy of:

- Avoidance of unnecessary resource consumption
- Resource recovery (including reuse, recycling, reprocessing and energy recovery)
- Disposal.

A summary of the waste hierarchy is presented in Figure 9-1.

Figure 10-1 Waste and resource management hierarchy

Reduce or avoid

Reducing or avoiding the generation of waste will be prioritised during Project construction. The following approach will be adopted:

- Consider construction options that have a higher waste reduction capacity than other alternatives
- Order materials / goods with minimal packaging or request suppliers to remove packaging from site
- Accurately estimate materials quantities required to minimise wastage.

Reuse and recycling

Waste separation and segregation will be promoted onsite to facilitate reuse and recycling as a priority of the waste management program. Waste materials, including spoil and demolition waste associated with the existing weirs, will be separated on site into dedicated bins / areas for either reuse onsite or collection by a waste contractor and transported to offsite facilities; where reasonable and feasible, secondary waste material will be used in construction.

Waste handling and storage

Where waste is required to be handled and stored onsite prior to onsite reuse or offsite recycling / disposal, the following measures apply:

- Spoil, topsoil and mulch are to be stockpiled onsite in allocated areas, and mitigation measures for dust control and surface water management will be implemented as per the CEMP and ESCP
- Liquid wastes are to be stored in appropriate containers or area with appropriate bunding until transported offsite. Bunds will have the capacity to hold 110% of the liquid waste volume for bulk storage or 120% of the volume of the largest container for smaller packaged storage
- Regulated waste will be managed by appropriately qualified and licensed contractors, in accordance with the requirements of the Environmental Protection Regulation 2019.

All other recyclable or non-recyclable wastes are to be stored in appropriate covered receptacles (e.g., bins or skips) in compound and stockpile sites onsite. Contractors will be commissioned as required to remove/empty the bins to approved disposal or recycling facilities.

Waste disposal

The disposal of waste is to be treated as a last resort. Wastes that are unable to be reused or recycled will be disposed of offsite to an appropriately licenced waste management facility following classification. If any materials generated by Project construction are to be taken to a location other than an approved, licenced waste facility, documentation will be submitted to LRC for approval.

All waste and spoil disposal will be undertaken in accordance with the Environmental Protection Regulation 2019.

Details of waste types, transporter approvals, volumes and destinations, including asbestos and PFAS-waste, are to be recorded in the Waste Management Register Appendix C.

10.4.2. Classification of regulated waste

The Environmental Protection Regulation 2019 classifies waste produced in Qld as either:

- Category 1 regulated waste (highest risk)
- Category 2 regulated waste (moderate risk)
- Not-regulated/general waste (lowest risk).

The chosen principal construction contractor, as the Waste Generator for the Project, will be responsible for segregating, storing and disposing of waste produced in accordance with this classification system. All regulated waste must be transported by a licenced transporter and principal contractors must provide completed Waste Tracking Certificates to the DES via post or online submission in the event that regulated waste is generated onsite.

10.5. Flora and fauna

Measures to minimise potential impacts to flora and fauna will be employed during Project construction. These will include:

- All plant and equipment will be washed down prior to both arriving at and leaving site and a Weed Hygiene Declaration Form will be completed for all plant in accordance with the DAF Vehicle and Machinery Checklists
- Only suppliers that can demonstrate understanding of their general biosecurity obligation under the *Biosecurity Act 2014* will be used on site
- Records will be kept by the LRC detailing the nature, quantity and source of material imported to site
- All staff working on site will undergo an induction that includes a briefing on the limit of the areas allowed to be cleared for construction, the potential presence of threatened species and their habitat adjacent to the development footprint
- Trees that are to be removed will be clearly differentiated, with flagging, paint or similar, from those to be retained
- A fauna spotter/catcher will be present during vegetation clearing activities
- In the event that encountered fauna does not relocate of its own accord, capture and relocation will only be undertaken by a fauna spotter/catcher
  If any wildlife is injured during construction, LRC is to be notified and, if required, the injured animal will be taken to the nearest veterinary surgery. Alternatively, the RSPCA (1300 264 62, Longreach Veterinary Service (07 4658 3838) or Central Veterinary Surgery (07 4092 2311) will be contacted.

10.6. Aboriginal heritage

Monitoring of initial ground disturbance works was recommended by the Bidjara representative during the Inspection. Monitoring of ground disturbing works was suggested for activities around the weirs themselves, for the initial layers of sediment that may contain tangible (physical) cultural Heritage.

The LRC will continue to consult with Bidjara prior to and during Project construction to implement recommended mitigation measures.

11. References

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Engeny (2023c) Cross section drawings (PDF), file named "QC2031-001-(PRELIM SET)-Sections".

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NGH Pty Ltd (2024) *Ministerial Infrastructure Designation Proposal – Thomson River Weir Raising Project*. Prepared for the Longreach Regional Council.

NGH Pty Ltd (2023) *Thomson River Weir Raising Project Aquatic Ecology Assessment. Prepared for the Longreach Regional Council.*

Redleaf Environmental (2020) *An Impact Assessment on the Thomson River Flora from Raising the Town Weir by 1m*. Prepared for the Longreach Regional Council.

Appendix A Spill response procedure

Pollution Incidents that are to be notified

A pollution incident is required to be notified to the Department of Environment and Science (DES) if it causes or threatens to cause 'serious environmental harm' or 'material environmental harm', which are defined in Sections 16 and 17 the *Environmental Protection Act 1994* as:

(1) **Material environmental harm** is environmental harm (other than environmental nuisance) –

(a) that is not trivial or negligible in nature, extent or context; or

(b) that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount but less than the maximum amount; or

(c) that results in costs of more than the threshold amount but less than the maximum amount being incurred in taking appropriate action to –

(i) prevent or minimise the harm; and

(ii) rehabilitate or restore the environment to its condition before the harm.

The threshold amount means $10,000 as per the Environmental Protection and Other Legislation Amendment Bill 2022.

(2) **Serious environmental harm** is environmental harm (other than environmental nuisance) –

(a) that is irreversible, of a high impact or widespread; or

(b) caused to –

(i) an area of high conservation value; or

(ii) an area of special significance, such as the Great Barrier Reef World Heritage Area; or

(c) that causes actual or potential loss or damage to property of an amount of, or amounts totalling, more than the threshold amount; or

(d) that results in costs of more than the threshold amount being incurred in taking appropriate action to –

(i) prevent or minimise the harm; and

(ii) rehabilitate or restore the environment to its condition before the harm.

The threshold amount means $100,000 as per the Environmental Protection and Other Legislation Amendment Bill 2022.

Where spills or pollution incidents have far reach or consequences incident notification may be required to:

- DES Pollution Hotline – 1300 130 372 (option 2)
- Queensland Fire and Emergency Services - 000
- Qld Workplace Health and Safety – 1300 362 128
- Longreach Shire Council 07 4658 4111
- Longreach Hospital 07 4658 4700

Types of pollution incidents that are to be notified

Spills and pollution incidents that could potentially occur at a construction site include:

- Material, such as waste materials, fuel etc.
- Discharge to waters from site.

Small spills that do not leave the site boundary and are cleaned up without material environmental harm or residual environmental impact are most likely not required to be notified to the DES or other authorities. However, all such incidents are to be recorded and reported in accordance with client and/or organisational requirements.

An environmental incident may include a major spillage or leak, failure of a pollution control device such as a bund or basin, major settlement, collapse of a bank or embankment, or catastrophic events.

Spill Response Procedure

Pollution incidents caused by spills of chemicals and oils will be managed in accordance with the following:

1. Identify incident has occurred
2. Stop work immediately
3. Delegation: The senior member of the team present when a pollution incident occurs is to take charge and become the Emergency Controller; this person will delegate the main assisting roles of the emergency response i.e., Safety controller, information controller, combat assistant, communications clean up and waste management
4. Control the source of the incident, e.g., stop the fuel leaking
5. Contain the incident using appropriate spill kits and adequate measures
6. Site staff to report to environment team and all other relevant personnel including AIMS personnel
7. **NOTIFY** the agencies **immediately** if material or serious environmental harm has occurred. Where the public has been, or could potentially be, impacted the public will be notified
8. Plan clean up and implement strategy, this may involve specialist external spill subcontractors
9. Undertake incident investigation to determine cause and include measures to minimise potential for incident reoccurring
10. Findings of the incident investigation to be briefed to all relevant staff.

Principal contractor will provide all records of the environmental incidents and regulatory action to the LRC Project team.

Principal contractor will induct all staff and subcontractors working on the Site about potential environmental emergencies and provide training in implementing the relevant environmental safeguards and risk mitigation measures.

Appendix B Complaints register

Date	Time	Mode of complaint	Complainant’s details	Complaint comments	Action taken

Appendix C Waste register

Collection date	Transporter	Transporter EA no.	Waste Transport Certificate no.	Waste destination	Waste type (regulated/non-regulated)	Quantity and unit	Comments

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APPENDIX H – STAKEHOLDER ENGAGEMENT STRATEGY

IAP2

Stakeholder Engagement Strategy
Thomson River Weir Raising Project

Longreach Regional Council
December 2023

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1. Introduction

The Longreach region is subject to climate extremes that are typical of outback Australia. Climate change projections indicate that extreme events such as droughts and flooding will become more frequent and intense, posing an increasing risk for regional towns like Longreach.

Securing water supplies for domestic use over the long term is a significant challenge. The region experiences some of the highest evaporation rates in the state. Water security, and sustainability, has been a major focus and priority for the Longreach Regional Council (Council). Longreach has recently experienced a ten-year drought, resulting in level 3 water restrictions that have affected the town's liveability, mental health, tourism industry, processing and manufacturing opportunities, as well as irrigation for two large farming operations.

In response to the recommendations of a feasibility study into options for sustainable water security, Council is seeking to raise five weirs on the Thomson River by one metre. This important project is now Council's top strategic priority for our region. It will increase the storage of the waterhole by approximately 28 percent, which will address significant risks posed by climate change and improve water security for Longreach. As the town is wholly dependent on surface water for its water supply, it is crucial to act now.

This Stakeholder Engagement Strategy (hereafter referred to as the Strategy) outlines Council's commitment to engaging with all relevant stakeholders of the Thomson River Weir Project (hereafter referred to as the Project) and involving them in relevant decision-making and engagement activities to ensure their perspectives are considered and their interests are addressed.

1.1 Engagement Strategy Objectives

The objectives of this Strategy are to:

- Share information by providing timely, accurate, and relevant information to relevant landholders and other stakeholders
- Understand the views of all stakeholders and provide opportunities for them to share feedback on the project and the MID process
- Identify and mitigate potential risks
- Build understanding of the project process and outcomes to gain support amongst the community and stakeholders

1.2 Engagement Opportunities and Considerations

The Longreach community stands to gain substantial environmental and social benefits from the Projects successful implementation. In light of the Longreach community's recent challenges, including the impact of COVID-19, drought, and population decline, it is crucial to achieve specific Project milestones before involving select stakeholders to avoid exacerbating uncertainty and potentially dampening community sentiment.

As part of the environmental impact assessment, no significant environmental impact has been identified and the raising of the Weirs will not break the banks of the Thomson River.

1.3 Project Process

Council is submitting a Ministerial Infrastructure Designation (MID) application and a Regional Interests Development Approval (RIDA) application for the Project. Past and anticipated key Project milestones are identified below:

- Apr, 2020 – Preliminary Hydrodynamic Modelling report completed
- Oct, 2020 - Preliminary Flora assessment completed
- Sep, 2021 - Project Environmental Approval Process commenced
- Dec, 2022 - MID process identified as optimal approval process for the Project
- Mar, 2023 - Lodged MID request for initial advice from DSDILGP
- Apr, 2023 - Received initial advice from DSDILGP
- May, 2023 - Preliminary consultation commenced
- Oct, 2023 – Request for endorsement to lodge MID submitted to DSDILGP
- Jan, 2024 - Lodge MID/RIDA proposal
- Mar, 2024 - Receive MID and RIDA responses from DSDILGP
- Mar, 2024 onwards - one to two-year timeframe for planning, approval, design and construction

1.4 Stakeholder Engagement Framework

Stakeholder engagement for this Project utilises the engagement framework developed by the International Association of Public Participation (IAP2) and the principles of the *Local Government Act 2009* (QLD). By adopting the IAP2 best practice framework, in alignment with the minimum standards set by the Act, Council is in the best position to achieve the engagement strategy objectives set out for this Project.

Council is informing, consulting and involving stakeholders, in accordance with the IAP2 Spectrum of Public Participation, which defines how stakeholders should be engaged based on the level of impact and influence on decision making.

IAP2 Spectrum of Public Participation

IAP2's Spectrum of Public Participation was designed to assist with the selection of the level of participation that defines the public's role in any public participation process. The Spectrum is used internationally, and it is found in public participation plans around the world.

INCREASING IMPACT ON THE DECISION

	INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
PUBLIC PARTICIPATION GOAL	To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision making in the hands of the public.
PROMISE TO THE PUBLIC	We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public input influenced the decision.	We will look to you for advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.

2. Context Analysis

2.1 Global factors

The Longreach Region is currently affected by global trends including widespread urbanisation, ageing populations, climate change and social cohesion issues. Secure and reliable water supply is closely interlinked with the sustainability outcomes that respond to these factors.

2.1.1 Economic Development

Reliable supply of quality water underpins the Longreach region's future prosperity. The enhancement of water security will not only improve the liveability of Longreach but also give confidence to investors and foster growth. The economic benefits of water security are crucial to supporting key education, health, and community services in Longreach. This Project is strongly linked to the recently adopted Longreach Regional Council Corporate Plan 2024-2028 – which identifies the economy as a key focus area for Council, as well as articulating three key environmental outcomes related to the environment and climate resilience.

2.1.2 Future Proofing for Climate Change

The impacts of climate change are amplifying the need for Longreach to secure its water supply. It is expected that climate change will lead to an increase in the frequency and intensity of extreme weather events, including droughts. Furthermore, Longreach has been subject to frequent heat waves, which further exacerbate the impacts of drought.

It is essential to consider the risks associated with reduced water flows and non-flow events, which could significantly impact the town's water supply. In the worst-case scenario, the water supply could drop to a level where pumping is not possible, and water would need to be freighted in at a significant cost.

Given these challenges, Longreach must act now to ensure a reliable and sustainable water supply. It is crucial to implement measures to mitigate the impacts of climate change, including additional water storage infrastructure by raising the level of the weirs.

2.1.3 Enhancing Longreach's Liveability

Water security contributes to housing outcomes, in addition to supporting the services and general liveability of the town. Longreach's population declined during the previous drought by 13% between 2011 and 2016. This decline in population growth is a key issue for the Longreach region to address in order to recover and prosper into the future. The Longreach Water

Conservation and Drought Management Plan is focused on ensuring future generations have a cost effective and sustainable water supply system (source). This Project will contribute significantly to achieving the objectives of the Plan.

2.2 Condition of the Current Infrastructure

The current five anabranch weirs on the Thomson River were last upgraded in the 1970s, capping an earth core that dates back to the turn of the century. Their condition is deteriorating and this is exacerbated by the impact of flooding and strong flows in the river during recent La Nina cycles. Two of the five weirs have failed in the past two years during sustained runs in the river, requiring emergency repairs. This adds a further imperative to upgrade the current infrastructure.

2.3 Longreach Community Demographics

According to the Australian Bureau of Statistics, Longreach has a population of 3,726 living in 1,342 dwellings. The average age of residents was 40, and 50.6% of the population female, and 49.4% male. Most households were couples without children (45.6%), followed by couples with children (37.4%) and one parent households (15.4%). Most of the dwellings were separate houses (88.2%), with townhouses, apartments and other dwellings making up the remaining 11.8%.

Population	Household	Home Life	Finance
Population 3,726 **Indigenous Population** 6.08% **Average age** 40.0 **Dwellings** 1,342 **Average Household size** 2.3 **Dependency Ratio (0-14 and over 65)** 29.5%	**Families with children** 323 **Single Families** 133 **Top Country of Birth** Australia 79.7% New Zealand 2.0% England 1.5% Kiribati 0.5% Philippines 0.5% South Africa 0.5%	**Separate Houses** 1,184 **Townhouses** 62 **Apartments** 34 **Owned Outright** 32.5% **Owned with a Mortgage** 23.1% **Rented** 35.5%	**Average Personal Income** $48,776 **Average Household Income** $81,172 **Average Mortgage Repayment (monthly)** $1,083 **Average Rent (weekly)** $200

2.3 Previous Engagement Activities and Community Opinion

The Thomson River is part of the identity of the Longreach Community and is a cherished recreational playground. Residents enjoy boating, fishing and annual fishing competitions, swimming and water sports. Council has independently conducted community engagement exploring the recreational and cultural value of the Thomson River.

Water security is a widely understood priority for the community, dating back to water supply distress experienced by the region during the most recent drought, peaking in 2015 with a supply crisis in Ilfracombe. It was this supply crisis that triggered the development of a feasibility study into options for sustainable water security that identified this Project as a response.

3. Stakeholder Analysis

The following table details the stakeholders of this Project, segmented by Government, Community, Indigenous and Special Interest groups.

Stakeholder	Interest/ concerns/ issues	Level of interest (low/ mod/ high)	Level of influence (low/ mod/ high)	Potential engagement activity	Indicative Timing
Government Agencies					
DSDGILGP	Administering authority of the Planning Act 2016 and Assessing authority for MIDs			• Pre-lodgement meetings to help understand key issues and information requirements for subsequent stages of MID (complete) • Endorsement of preliminary stakeholder and community engagement strategy • Ad-hoc liaison with assessment officers as necessary	Q1 2023 to Q2 2024
DES	Referral agency for the MID proposal			• Pre-lodgement meeting to help understand key issues and information requirements for subsequent stages of MID (complete)	Q1 2023 to Q2 2024
DRDMW/ DoR	Referral agency for the MID proposal			• Pre-lodgement meeting to help understand key issues and information requirements for subsequent stages of MID (complete)	Q1 2023 to Q2 2024
Local Members	Interest in the Project, including outcomes and impact			• Meetings/newsletter(s) • Council website	Q2/Q3 2023
State Members	Interest in the Project, including outcomes and impact			• Meetings/newsletter(s) • Council website	Q2/Q3 2023
Federal Members	Interest in the Project, including outcomes and impact			• Meetings/newsletter(s) • Council website	Q2/Q3 2023
Longreach Community					
Affected landholders	Potential for land to be impacted by the Project			• Letter box drop (see Appendix 1) • Meetings/newsletter(s) • Council website	Q2/Q3 2023 - construction
Wider Community	Community members may have social and			• Workshop • Meetings/newsletter(s)	Q2/Q3 2023 –

	environmental interest in the Project and will have specialised insights and knowledge regarding the local area			• Council website	construction
Downstream Communities					
Barcoo Shire Council	Subject to assessment, downstream communities to be engaged if their water supply is affected by the Project			• Meetings as necessary, further engagement to be determined subject to the impact assessment	To be determined
Upstream Communities					
Barcaldine Regional Council	Subject to assessment, upstream communities to be engaged if their water supply is affected by the Project			• Meetings as necessary, further engagement to be determined subject to the impact assessment	To be determined
Indigenous groups/Native Title Party					
Relevant Aboriginal Parties	Potential impacts on items and/or places of cultural heritage significance			• Letters and meetings as necessary to establish an appropriate cultural heritage management agreement • Draft consultation (see Appendix 2)	Q2 – Q4 2023
Special Interest Groups					
Lake Eyre Basin Advisory Committee	Interest in the Project, including outcomes and impact			• Letters and meetings as necessary	Q2/Q3 2023
RAPAD Board	Interest in the Project, including outcomes and impact			• Letters and meetings as necessary	Q2/Q3 2023

4. Engagement Strategy

The following engagement strategy methods are suggested for the stakeholder groups. Successful stakeholder engagement can be achieved through various methods. It is crucial to determine the most suitable approach for each stakeholder group by evaluating their level of interest, level of influence, Council's risk tolerance, the group's ability to influence other stakeholders, project timelines and available resources.

4.1 Engagement Roles

The key engagement personnel for this Project will involve Council engagement staff, project decision-makers and support from an external community engagement consultant.

4.2 Longreach Community Engagement

The following engagement tools will be used for engaging with the Longreach Community:

Tool	Description
Public meetings	• Meetings involving key engagement personnel, decision-makers, and the Longreach community. • Attendance can be open or require registration, held at a neutral location. • The meetings will follow a structured and facilitated agenda, where participants are encouraged to provide comments and ask questions.
Letterbox drop	• Engaging, positive letter to be sent to the Longreach Community describing the benefits of the project, how to find out more information about the Project and ongoing engagement activities. • See sample letter in Appendix 1
Workshops	• A small, representative group of the Longreach community that undertakes facilitated activities to resolve issues and guide project direction at a high-level • Opportunity for single focus groups or several, held simultaneously or at different times • Specific focus groups may be created to address specific issues or represent different stakeholder cohorts
Council Website	• Dedicated page on the Council website for the Project and stakeholder engagement activities, feedback and communication
Printed Materials: Newsletter	• Written and graphic information about the Project made available to the Longreach community including ○ Introduction and project process ○ Context analysis ○ Key messages

Social Media	• The Council Facebook page can be used as required to update stakeholders, specifically the Longreach Community, on the progress of, and information about, the Project

5. Key Messages

The following key messages are relevant to different stakeholders and will be used throughout the engagement in activities and materials.

5.1 A sustainable water supply means better outcomes for the entire Longreach Region

Improved water infrastructure will help support the sustainability and resilience of Longreach including its businesses, industries, and services. It will support attraction and retention outcomes across the region, give confidence to investors, and improve climate resilience.

5.2 Improved liveability for everyone in the Longreach community

The Longreach community will benefit from a secure and sustainable water supply for years to come. Liveability means:

- Greater health outcomes including mental health and health problems related to low water flows, poor water quality and dust during times of drought
- Reliable and safe drinking water
- Improved economic outcomes from fewer days under severe water restrictions
- Reliable water supply for beautification of schools, childcare centres, parks and other facilities for a safe, accessible and healthy outdoor environment
- Improved social infrastructure and recreation opportunities enabled by a more consistent and reliable Longreach Waterhole on the Thomson River

5.3 RAPAD Region's development is dependent on Longreach's development

Longreach is a significant contributor to the economic and social development of the region and a crucial partner in RAPAD's efforts to support the growth and sustainability of the broader community. Longreach is an important regional hub for services throughout the central-west and outback Queensland.

5.4 Longreach will be prepared for climate change in the future

By taking decisive action to safeguard its water supply, Longreach is fortifying itself against the perils of a changing climate. This strategic move not only addresses immediate challenges but also lays the foundation for long-term climate resilience. In a region where droughts cast a long shadow, Council's proactive measures aim to ensure a steady and sustainable water source, providing a shield against the uncertainties of the future.

Other Considerations

The detailed design phase will allow the economic benefits of the project to be identified. Economic benefits will include employment, construction costs, vehicles and equipment used, and other supply-chain and consumption benefits during construction.

Stakeholders' influence on construction operations will be determined in the detailed design phase which is subject to the approval of the MID. The construction phase will include a stakeholder management component.

The Project will seek to enhance the public image of the Thomson River – already seen as a strong part of the Longreach Community's identity. The Program must be delivered in such a way as to continue this positive view towards the Project.

Council is determined to see the Project succeed. The Longreach Community has endured difficult times since drought was last declared in 2013. Clear, timely and regular communication including positive messaging is crucial to avoid increasing uncertainty and negative sentiment.

At this stage in the project, environmental impact appears to be low. Early phase environmental assessments suggest limited environmental impact to the Project area. Further assessments to be conducted after the MID response in 2024.

6. Risks and Mitigation Strategies

Risks associated with the implementation of this stakeholder engagement strategy should be addressed in a manner that will enable Council to maximise outcomes associated with the Project.

6.1 Rating Risk

This stakeholder engagement strategy has identified and analysed potential risks associated with proposed stakeholder engagement activities.

Identified risks have been assigned a risk rating, according to the risk rating matrix shown below.

	Insignificant	Minor	Moderate	Major	Catastrophic
Frequent	5	10	15	20	25
Likely	4	8	12	16	20
Possible	5	6	9	12	15
Unlikely	2	4	6	8	10
Rare	1	2	3	4	5

Risk ratings take into consideration each risk's frequency (i.e. likelihood) and severity (i.e. degree of consequences). A risk rating is assigned to each risk according to its position on the risk rating matrix, whereby risks in a grey square are lower, risks in a green square are moderate, risks in a yellow square are high and risks in a red square are extreme, as per the legend below.

Low Risk	**Medium Risk**	**High Risk**	**Extreme Risk**
Managed by routine procedures	Specific risk management strategies	Requires immediate attention	Requires URGENT action

6.2 Stakeholder Engagement Risk Assessment

Identified Risk	Risk Rating	Mitigation Strategies
Local media not supportive of the Project	4/25	Council direct promotion of project
General community reacts negatively to the Project	12/25	Further engagement to understand response, communication to address concerns
Unforeseen delays in stakeholder engagement program implementation	9/25	Proactive communication with stakeholders
Not meeting MID requirements	15/25	Further engagement to understand outcome
Misinterpretation of project outcomes and process by stakeholders	6/25	Proactive communication with stakeholders to correct misinterpretation
Poor community engagement turnout	8/25	Wide promotion of engagement opportunities, blanket communication via letterbox drop
Personal safety issues with engagement activities	6/25	Risk assessment completed for each activity

6.3 Monitoring and Review

Monitoring the effectiveness of risk mitigation strategies and the ongoing identification of new risks is vital to the success of any stakeholder engagement strategy.

The risk management action tables above should be monitored regularly during implementation of this stakeholder engagement strategy.

6. Results of Preliminary Engagement

Council has undertaken various preliminary stakeholder engagement activities for the Project to date. The table below summarises the nature of this engagement and key outcomes. Relevant consultation material is provided in Appendix A.

Stakeholder	Engagement undertaken	Key outcomes
Government		
Department of State Development, Infrastructure, Local Government and Planning (DSDILGP)	Pre-lodgement meetings on 2 November 2022, 14 December 2022 and 23 January 2023 Ad-hoc calls and email liaison with assessment officers throughout 2023.	Key assessment issues and information requirements for MID application identified Scope of information requirements identified in initial advice refined with assessment officers.
Department of Environment and Science (DES)	Pre-lodgement meeting on 23 January 2023.	Key DES assessment issues and information requirements for MID application identified.
Department of Regional Development, Manufacturing and Water (DRDMW)		Key DRDMW assessment issues and information requirements for MID application identified Requirement for separate water licence amendment application to be lodged with DRDMW confirmed.
Local Members	Meetings/newsletter(s) Information on Council website.	General support shown for the Project
State Members		
Federal Members		
Longreach Community		
Affected landholders	Letter box drop (see below) in July 2023 Council newsletters, information on Council's website and included in Mayor's newspaper column.	No comments or feedback was received from affected landholders in response to the letterbox drop.
Wider community	Council newsletters, information on Council's website and included in Mayor's newspaper column.	No comments or feedback was received from wider community, however general support has been provided.
Downstream Communities		
Barcoo Shire Council (BSC)	Emails and meetings in August and September 2023 Briefing note provided in August 2023.	BSC raised issues with the potential for downstream water availability impacts The LRC subsequently prepared a briefing note (see below) outlining the expected downstream impacts of the Project on the BSC's water

Stakeholder	Engagement undertaken	Key outcomes
		supply. BSC has since acknowledged the information in this briefing note, and passed a resolution of Council at their September meeting endorsing the Project.
Indigenous groups/Native Title Party		
Bidjara #6 and #7	Field survey of Project area in August 2023.	A number of Aboriginal cultural heritage sites recorded around the Town Storage and Project weirs. Management measures to mitigate potential impacts on these recorded sites, as well as any unrecorded sites, are being developed in consultation with Bidjara.
Special Interest Groups		
Lake Eyre Basin Advisory Committee (LEBAC)	Meeting in July 2022.	LRC representative informed the LEBAC of intention to raise the weirs for water supply security. Committee members understood the need for increasing our water security.
Regional Area Planning and Development Board	General discussions at board level.	No opposition to Project expressed by board members.

Appendix A Consultation Material

Longreach Regional Council
Ilfracombe Isisford Longreach Yaraka

Address all correspondence to:
Chief Executive Officer
PO Box 144, Ilfracombe QLD 4727
Tel: (07) 4658 4111 | **Fax:** (07) 4658 4116
Email: assist@longreach.qld.gov.au
ABN: 16 834 804 112

21 July 2023

Dear Sir/Madam,

Re: Longreach Water Security Project

Council is embarking on a major project to increase our water storage capacity at the Thomson River, the primary water source for Longreach. The project stems from a report in 2017 when Council engaged Cardno Consulting Engineers to carry out a feasibility study into options for sustainable water security. Water security is Council's top strategic priority for our region. This project involves raising the five weirs south of the Landsborough Highway by one metre (Attachment 1), to increase storage in the Longreach waterhole by approximately 28 percent. This will build resilience to future drought and climate impacts.

Council is now ready to commence a formal development application process with the Department of State Development, Infrastructure, Local Government and Planning (DSDILGP). Development approval for the proposed works is provided through a regulated process known as a *Ministerial Infrastructure Designation* (MID) under the *Planning Act 2016* (Attachment 2).

Two key opportunities are provided for community engagement. The first, is pre-engagement and is focused on the immediate surrounding and adjacent neighbours of the proposed works. This letter marks the commencement of this period and invites you to make preliminary comments on this development proposal. You may make comments during this phase up to Friday 11 August 2023.

All comments received will be considered and assessed by Council. These may or may not result in changes to the works. However, Council must demonstrate to the Minister how the matters raised have been considered and/or addressed.

The second public engagement phase occurs at a later stage and is identifiable in Attachment 2 as the 'formal consultation period'. This consultation is with the whole community.

This advice provides an opportunity for you as a key stakeholder to provide preliminary comments on the proposal. Please note that you will also be provided further opportunities to make comments on the proposal. You can get in touch with us via email to assist@longreach.qld.gov.au or alternatively we are happy to meet in person to discuss the project with you. To arrange a meeting please do not hesitate to contact Elizabeth Neal, Executive Assistant to the CEO and Mayor on 4658 4111.

Yours faithfully,

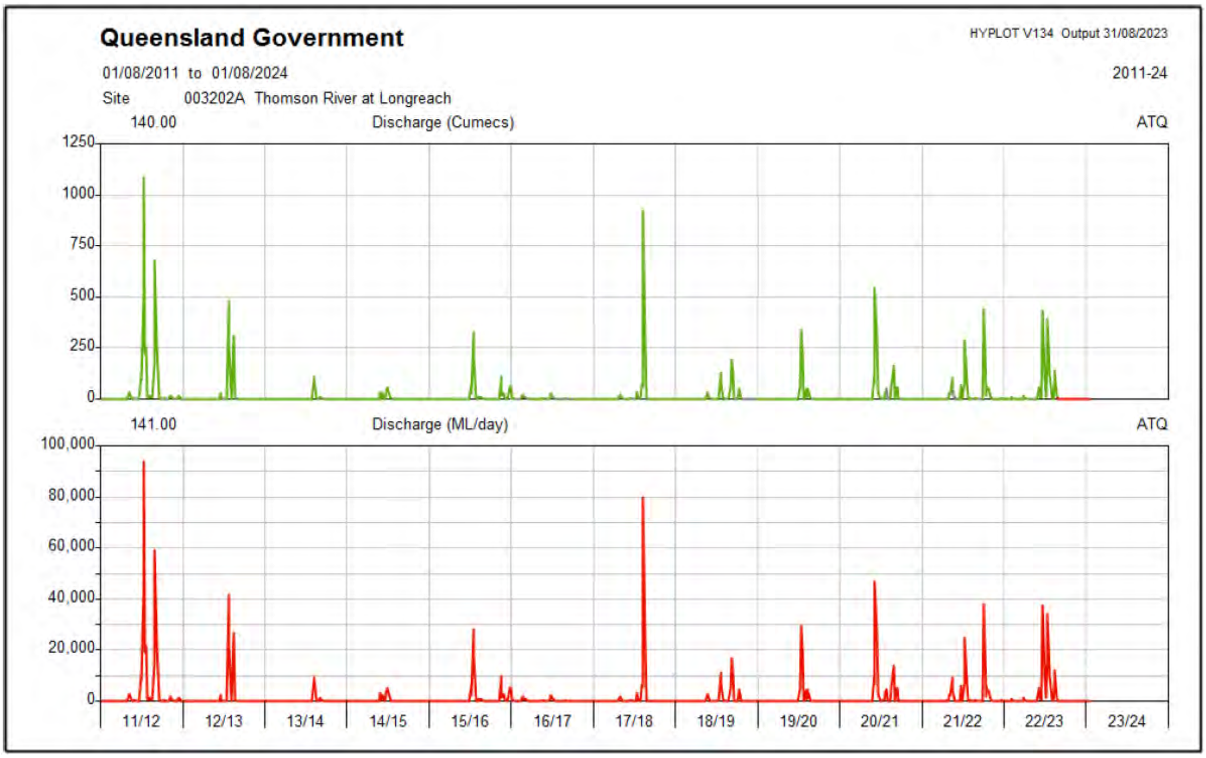
Brett Walsh
Chief Executive Officer

Longreach Regional Council

Ilfracombe Isisford Longreach Yaraka

Briefing Note

Downstream impacts of the Longreach Water Security Project



The Thomson River is a vital water source for both the Longreach community and communities downstream. Over the past decade there have been nine significant flow events on the Thomson River at Longreach, varying between 300 to 1100 cubic meters per second (cumecs). A cumec is a measure of how much water passes through a point every second. This flow rate can change due to various factors like rainfall, runoff, and weather conditions.

River flows at the lower range of 300 cumecs (as per the top graph in green), adds up to a significant volume of water over time. In fact, this flow rate, is equivalent to approximately 25,920 mega-litres (ML) of water every day passing over the weirs.

The proposal to raise the weirs on the Thomson River by one metre will increase the storage of the Longreach waterhole by an additional 900 ML of water. The extra 900 ML impounded by raising the weirs is actually equivalent to just under 1/28th of the Thomson River's daily output (less than one hour's water flow) during a lower range flow event at 300 cumecs. This means that the direct impact on water availability to downstream communities would be minimal. The river will continue to flow and provide water to those downstream who rely on it.

Additionally, it is important to note that downstream of Longreach, the Thomson River receives inflows from several significant watercourses. These designated watercourses include the Darr River, Katherine Creek, Watyakan Creek, and Vergemont Creek, along with around seven other relatively large but unmapped watercourses. Especially during the wet season, these systems can bring substantial flow volumes to the Thomson River. This dynamic interaction further emphasises the intricate nature of the river's flow and reinforces the understanding that the proposed weir raising, which is a fraction of the Thomson River's output in a flow event, would not have a substantial impact on downstream communities' water resources.

This can be seen in the attachments comparing water flows at Longreach and Stonehenge. There were significant flows at Stonehenge in 2016, 2019 and 2022 that were not reflected in the water flows at Longreach. Obviously this water came from these alternative catchments.

In conclusion, the Longreach Water Security Project aligns harmoniously with the river's adaptable character. The proposal secures the delicate balance of the river's flow, safeguarding access to this vital resource for all dependent parties.

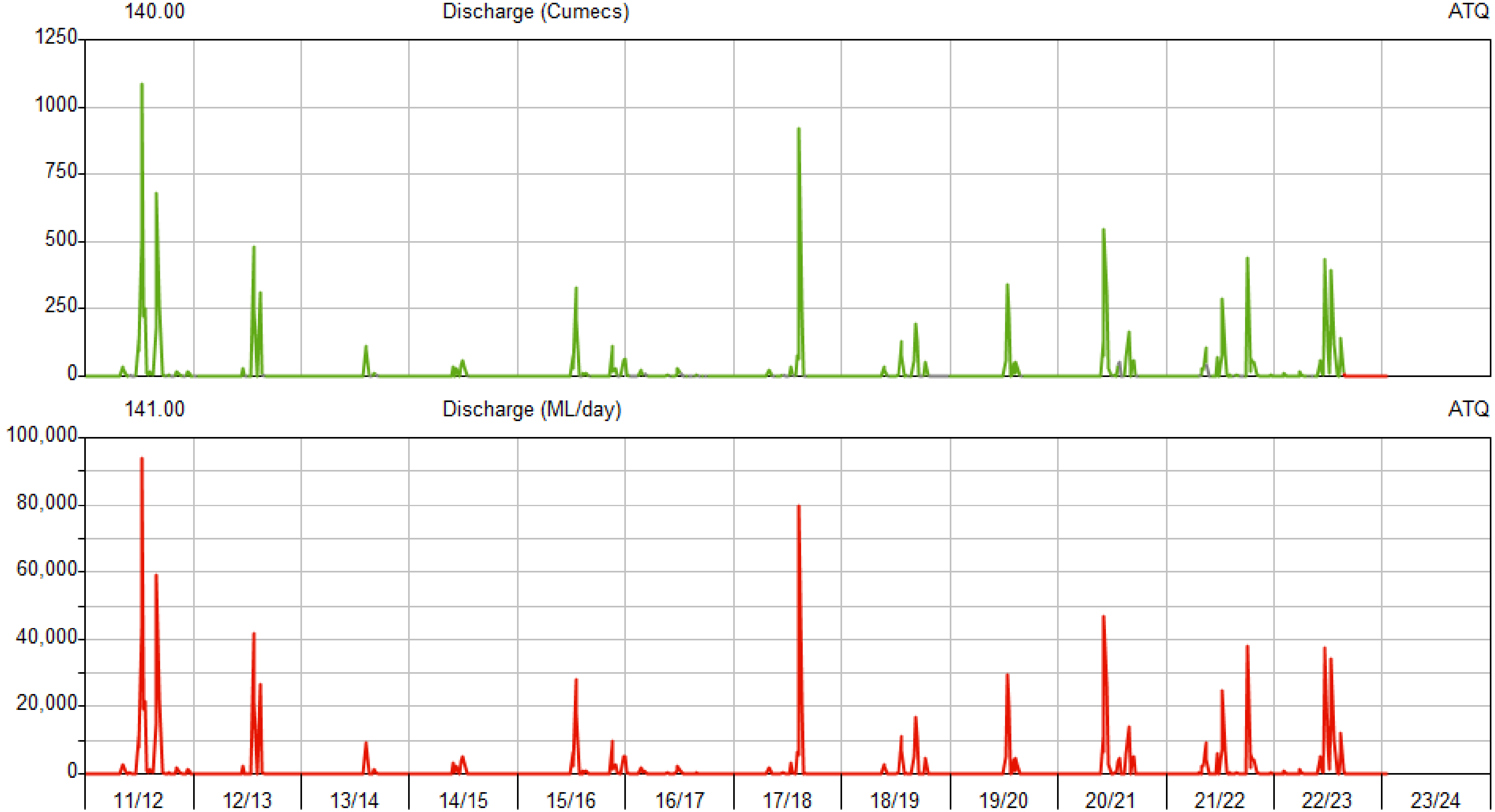
Queensland Government

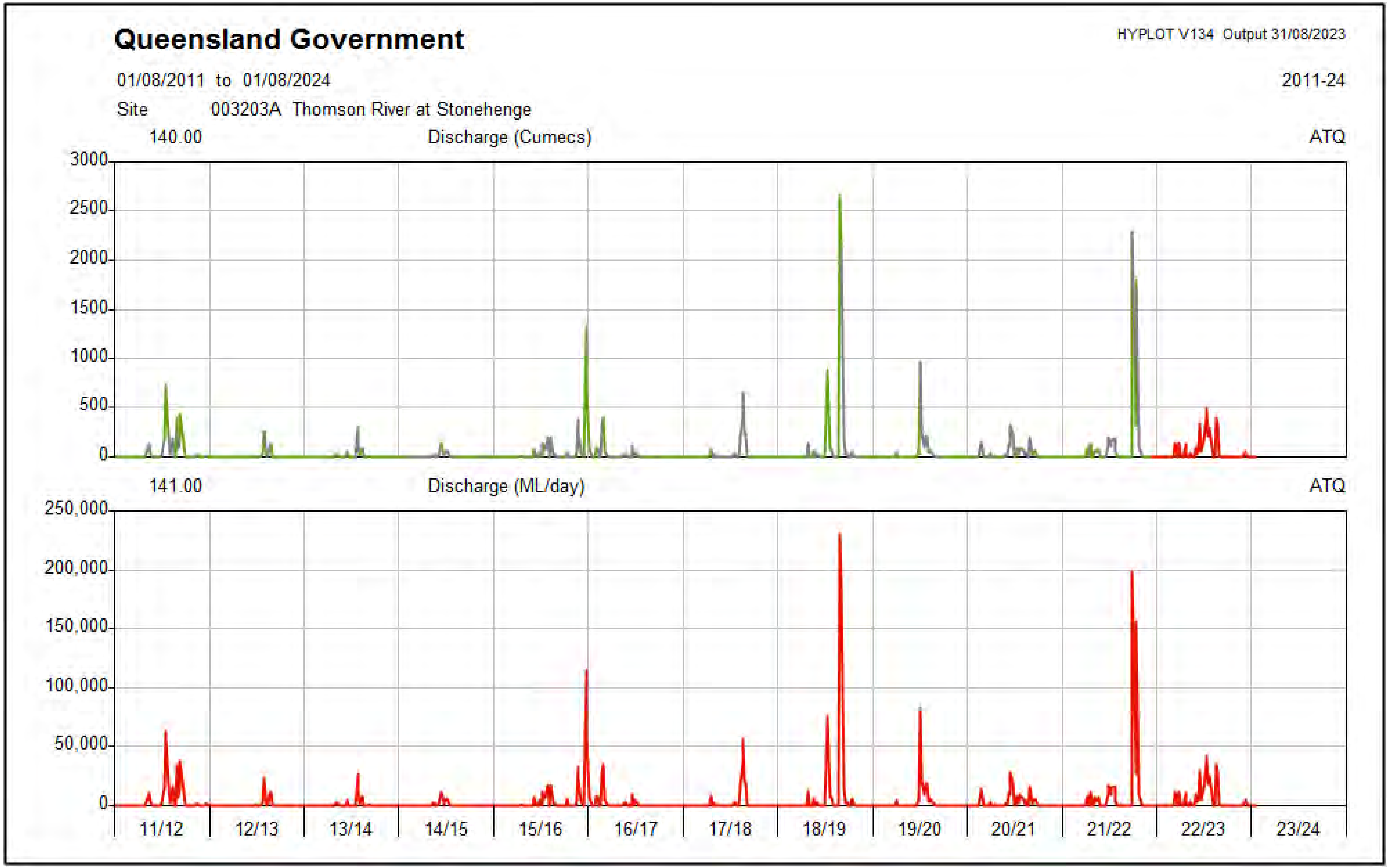
HYPLOT V134 Output 31/08/2023

01/08/2011 to 01/08/2024

2011-24

Site 003202A Thomson River at Longreach




Queensland Government
HYPLOT V134 Output 31/08/2023
01/08/2011 to 01/08/2024
2011-24
Site 003203A Thomson River at Stonehenge
140.00
Discharge (Cumecs)
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Your heritage partners

June 2023

Bidjara People #7
Trevor Robinson
0414 459 624

Email: trobinson@southwestprojects.com.au

Re: Notification of Cultural Heritage Inspection – Thomson River Weir, Longreach QLD 4730

Dear Trevor Robinson,

We would like to provide a works notice regarding a proposed project on the Thomson River near Longreach, QLD, whereby Longreach Regional Council (LRC) are intending to raise the height of the Town Weir and associated Anabrach Weirs. LRC has engaged Australian Heritage Specialists Pty Ltd (AHS) to assist in facilitating Cultural Heritage matters for the Project.

The town of Longreach is solely dependent on the freshwater storage from the Thomson River. Longreach's primary water supply source is the storage provided by the Town Weir located on the Thomson River about 3.5 km northwest of town. Upstream of the Town Weir on the Thomson River are three additional weirs (in order of proximity to the Town Weir) are the Fairmont Weir, the Bimbah Weir, and the Goodberry Hills Weir, the latter of which is approximately 48 km upstream from Town Weir.

The Longreach Regional Council has committed to determining the feasibility of raising the Town Weir and the Tributary Weirs on the Thomson River to augment the town water supply. The weir heights would be increased by 1 m and would potentially affect approximately 10 km of the Thomson River channel upstream to the Fairmont Weir. Based on preliminary water modelling results, it is expected that following raising of the weirs, the inundation area will remain within the high banks of the Thomson River channel.

A desktop assessment for the Project Area has been undertaken which has concluded that there is high potential for Aboriginal cultural heritage to be present. We request your assistance to undertake a Cultural Heritage Inspection, to identify the potential and significance of Aboriginal cultural heritage within the Project Area in accordance with the *Aboriginal Cultural Heritage Act 2003* and the *Aboriginal Cultural Heritage Duty of Care Guidelines 2004*.

It is currently proposed that the Cultural Heritage Inspection will take place in July 2023 – we would be pleased to discuss a suitable date. We welcome Bidjara representatives, and a technical advisor (if required), to undertake the Cultural Heritage Inspection with LRC representatives.