Wilcannia Weir Replacement

Landscape Design Report

Final

05 July 2022

Water Infrastructure NSW

Wilcannia Weir Replacement

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Project Manager:	Simon Cornell
Author:	Rebecca Lee
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Jacobs Group (Australia) Pty Limited
ABN 37 001 024 095
Level 7, 177 Pacific Highway
North Sydney NSW 2060 Australia
PO Box 632 North Sydney
NSW 2059 Australia
T +61 2 9928 2100
F +61 2 9928 2444
www.jacobs.com

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Executive summary

Water Infrastructure NSW proposes to replace the existing Wilcannia Weir on the Darling River (Baaka) with a new weir located about five river kilometres downstream of the existing weir (the proposal). This would provide a more reliable long-term town water supply for Wilcannia to meet community needs. The existing weir would also be partially removed and decommissioned as part of the proposal. An existing recreation area near to the new weir would also be upgraded as part of the proposal. The recreation area is located on the Darling River (Baaka) upstream of the new weir and is known as a community river place.

The proposal is located in the Central Darling local government area and is declared State significant infrastructure under section 2.13 and Schedule 3 of the State Environmental Planning Policy (Planning Systems) 2021. The proposal is subject to assessment in accordance with Part 5 Division 5.2 of the *Environmental Planning and Assessment Act 1979* and the environmental assessment requirements of the Secretary of the NSW Department of Planning and Environment (the SEARs) (SSI-10050), dated 28 August 2020.

This landscape design report has been prepared on behalf of Water Infrastructure NSW to provide details of the proposed landscaping associated with the new weir and existing weir sites following construction of the proposal including the number of trees to be removed and the number of trees to be planted. It also identifies how the proposal would address the crime prevention through environmental design principles.

Key features of the existing environment

The proposal is located within the Darling Riverine Plains Bioregion, which lies in the semi-arid climatic zone and is hot and persistently dry. The Darling River (Baaka) flows through Wilcannia in a deep incised channel, with ephemeral flood-runners, lakes, and oxbow lakes bordering it. Local soils are sandy and comprise quaternary sediments that have mostly been alluvially deposited.

The Darling River (Baaka) is the key landscape feature at the new weir, existing weir and community river place sites. Very large River Red Gum (*Eucalyptus camaldulensis* subsp. *camaldulensis*) trees line the top of the river embankments and are culturally significant to the local Aboriginal community, with some trees featuring scars where bark has been removed for the creation of bark canoes, shelters, containers (such as coolamons) or other artefacts. The new weir and community river place are located just outside the Wilcannia township and feature natural woodland that becomes sparse away from the river. The existing weir is located within the township and is surrounded by dwellings on the right riverbank and Victory Park Caravan Park on the left riverbank.

Landscape impacts of the proposal

The construction of the proposal would require removal of vegetation at the new and existing weir sites. This includes the removal of 28 River Red Gum trees and trimming of 10 River Red Gum at the new weir site. One River Red Gum trees would be removed at the existing weir site. No vegetation removal other than weed removal is proposed at the community river place.

At the new weir site, the proposal would transform about 120 metres of the river from a largely natural river channel surrounded by native vegetation to a landscape characterised by water infrastructure including a concrete fixed weir crest about 26 metres wide, large metal weir gates that when open discharge water into a concrete lined plunge pool and a fishway about 10.5 metres wide and 120 metres long. The fishway would comprise a series of 27 shallow pools each four metres wide separated by 28 baffles. When operational, water would cascade through these pools to enable fish to migrate upstream past the weir crest.

New weir site

The new weir would create a weir pool that would extend for many kilometres upstream. About 4.92-river-kilometres of the Darling River (Baaka) between the new and existing weirs would change from a naturally flowing riverscape to a weir pool, referred to as the new town pool.

Flows of water from the new town pool past the new weir would be an important but varying contributor to the landscape. During normal operation water would flow down the fishway and, in some circumstances also through the open weir gates, and this flowing water would be the primary visual and acoustic feature of the new weir. However, during droughts, the weir gates and fishway gates would be closed and the absence of flowing water would result in a more serene setting. At the other end of the spectrum, when the Darling River (Baaka) is in flood, water would flow over the crest of the new weir, visually obscuring the weir and creating a loud and dynamic landscape.

Existing weir site

The existing weir site would also be transformed by the proposal. The existing weir comprises rocks and timber piles and these would be partially removed as part of its decommissioning, so that it ceases to function as a weir and as a barrier to fish passage. Once the decommissioning works are complete, this section of the river would be inundated by the weir pool that extends upstream from the new weir. Where once the existing weir was a scene characterised by flows from a weir pool over a weir crest into a near natural river channel it would become a much quieter and less dynamic riverscape with pooled water that changes in depth gradually except when the river is in flood.

Community river place

The community river place is proposed at Union Bend, where the Darling River (Baaka) bends sharply to create a narrow peninsula. The steep banks that characterise the river upstream, downstream and opposite Union Bend are absent, which makes this a relatively easy location to access the river.

The location is currently used as a recreation area by the local community. There is no recreational infrastructure or facilities at the location, and it is not signposted or known to be a recreational area outside of the local community. Recreational activities that currently occur at the site include fishing and swimming.

Water Infrastructure NSW would upgrade the existing recreational area at Union Bend by providing an informal car parking area for up to about 12 vehicles, walking trails, picnic tables and seating, informal seating and low maintenance landscaping. Other potential features could include artwork, interpretive signage and commemorative plaques. An existing track along the top of the right riverbank would enable people to walk between the community river place and the new weir.

The community river place is expected to make Union Bend more readily identifiable as a recreation area and increase its appeal to the local community.

Glossary of terms and abbreviations

Acronym/term	Definition
Crime Prevention Guidelines	*Crime Prevention and the Assessment of Development Applications – Guidelines under section 79C of the* Environmental Planning and Assessment Act 1979 (Department of Urban Affairs and Planning, 2001)
CPTED	Crime prevention through environmental design
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
Jacobs	Jacobs Group (Australia) Pty Ltd
Left and right	Reference to 'left' and 'right' is with respect to the view in the downstream direction, in accordance with industry practice
New town pool	The weir pool that would be created along the about 4.92-kilometre section of the Darling River (Baaka) between the new and existing weirs
SEARs	Secretary's environmental assessment requirements

1. Introduction

Water Infrastructure NSW proposes to replace the existing Wilcannia Weir on the Darling River (Baaka) at Wilcannia, with a new weir located about five river kilometres downstream of the existing weir (the proposal) (refer to **Figure 1-1**). The existing weir would also be decommissioned and partially removed as part of the proposal. The proposal is located in the Central Darling local government area and would provide a more reliable town water supply for Wilcannia to meet long-term community needs. The proposal is funded by a $30 million commitment from both NSW and Commonwealth governments.

1.1 Approval and assessment requirements

The proposal involves the construction and operation of a new weir and the decommissioning of the existing weir at Wilcannia and is declared State significant infrastructure under section 2.13 and Schedule 3 of the State Environmental Planning Policy (Planning Systems) 2021. The proposal is subject to assessment in accordance with Part 5 Division 5.2 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and the environmental assessment requirements of the Secretary of the NSW Department of Planning and Environment (the SEARs) (SSI-10050), dated 28 August 2020.

The Minister for Planning (the Minister) approves State significant infrastructure projects in accordance with section 5.14 of the EP&A Act.

This landscape design report has been prepared by Jacobs Group (Australia) Pty Ltd (Jacobs) as part of the environmental impact statement for the proposal. The environmental impact statement has been prepared to support the application for approval of the proposal, and address the SEARs.

The proposal was originally proposed by WaterNSW as the proponent. The proposal's proponent changed to Water Infrastructure NSW as of 1 September 2021. This report includes the work undertaken for the proposal by WaterNSW prior to this change, that informs the preparation of this document.

1.2 Proposal description

The proposed new weir would be located about two kilometres south of the Wilcannia township, and about five river kilometres downstream of the existing weir. The key design features of the proposal are shown in **Figure** 1-2 and include:

- A new weir with storage capacity of about 7,832 megalitres of water when the weir gates and fishway gates are closed
- A fixed crest portion of the weir about five metres high and 21.5 metres wide, next to the left bank (southern side) of the river
- A fishway about 120 metres long and 10.5 metres wide, next to the right bank (northern side) of the river to provide fish passage past the weir
- Remotely operated weir gates (with a manual function) to manage the storage, release and quality of water within the weir pool
- A small recreation area, known as a community river place, at Union Bend
- An upgraded unsealed access track about three kilometres long, between the Barrier Highway and the left side of the new weir (southern side)
- A new unsealed access track about 270 metres long, between Union Bend Road and the right side of the new weir (northern side)
- A permanent access track about 120 metres long, from the top of the right riverbank extending along the length of the fishway

- An electricity easement about 360 metres long and 20 metres wide, from the existing overhead powerlines on Union Bend Road to a substation on the right side of the new weir. The substation would connect to a main switchboard installed within a prefabricated concrete switch room at the top of the right riverbank near the weir gates
- Conversion of an existing flow gauging station, located between the new and existing weirs, into a weir pool height gauging station
- Partial removal and decommissioning of the existing weir on the Darling River (Baaka) in the Wilcannia township, situated between Victory Park Caravan Park (left riverbank) and Field Street (right riverbank).

Construction of the new weir would create a new section of weir pool of about 4.92 river kilometres between the new and existing weirs that includes Union Bend, known as the new town pool.

The key construction features proposed at the new weir and existing weir are shown in **Figure 1-3** and **Figure 1-4** respectively.

1.3 Purpose and scope of this report

The purpose of this landscape design report is to assess SEAR no. 16 as shown in **Table 1-1**. The methodology for the assessment is described in **Section 3**.

This landscape design report includes preliminary rehabilitation plans for the new weir site (refer to **Section 4** and **Appendix A**) and the existing weir site (refer to **Section 6** and **Appendix C**) and a concept plan for the community river place (refer to **Section 5** and **Appendix B**).

Table 1-1 SEARs relevant to this assessment

Requirements	Where addressed in this report
Key issue 16: Design	
Address the scale and design of the proposed development, considering the impacts upon the visual amenity of the site, including:	
▪ Provide details of any proposed landscaping, including the number of trees to be removed and the number of trees to be planted	Details of the number of trees to be removed and the number of trees to be planted are provided in **Section 7**. Landscape plans for the new weir, community river place and existing weir are provided in **Appendix A**, **Appendix B** and **Appendix C** respectively.
▪ Address crime prevention through environmental design (CPTED) principles.	CPTED principles are addressed in **Sections 4.4, 5.5** and **6.3**.

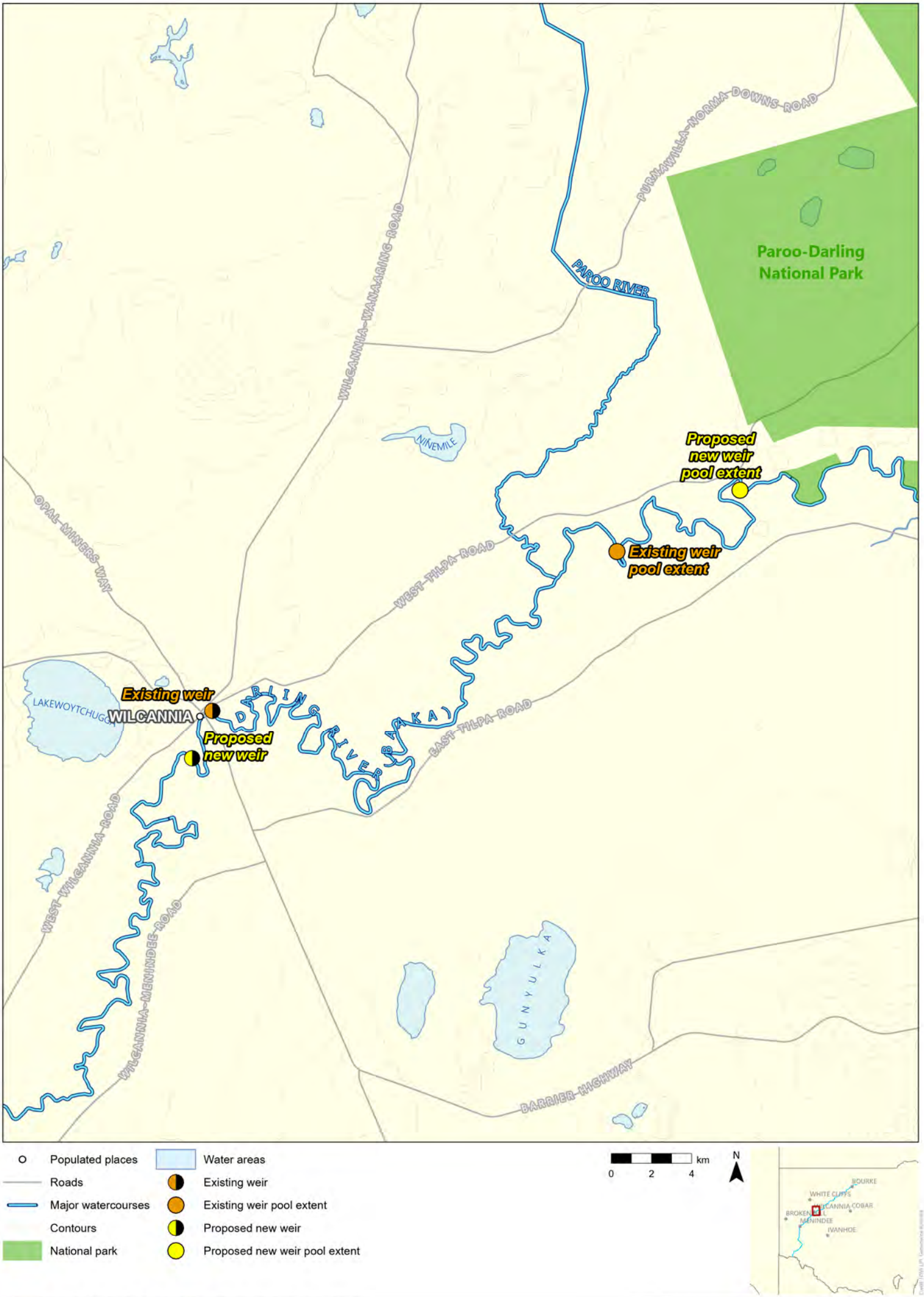

Figure 1-1: Proposal location and regional context

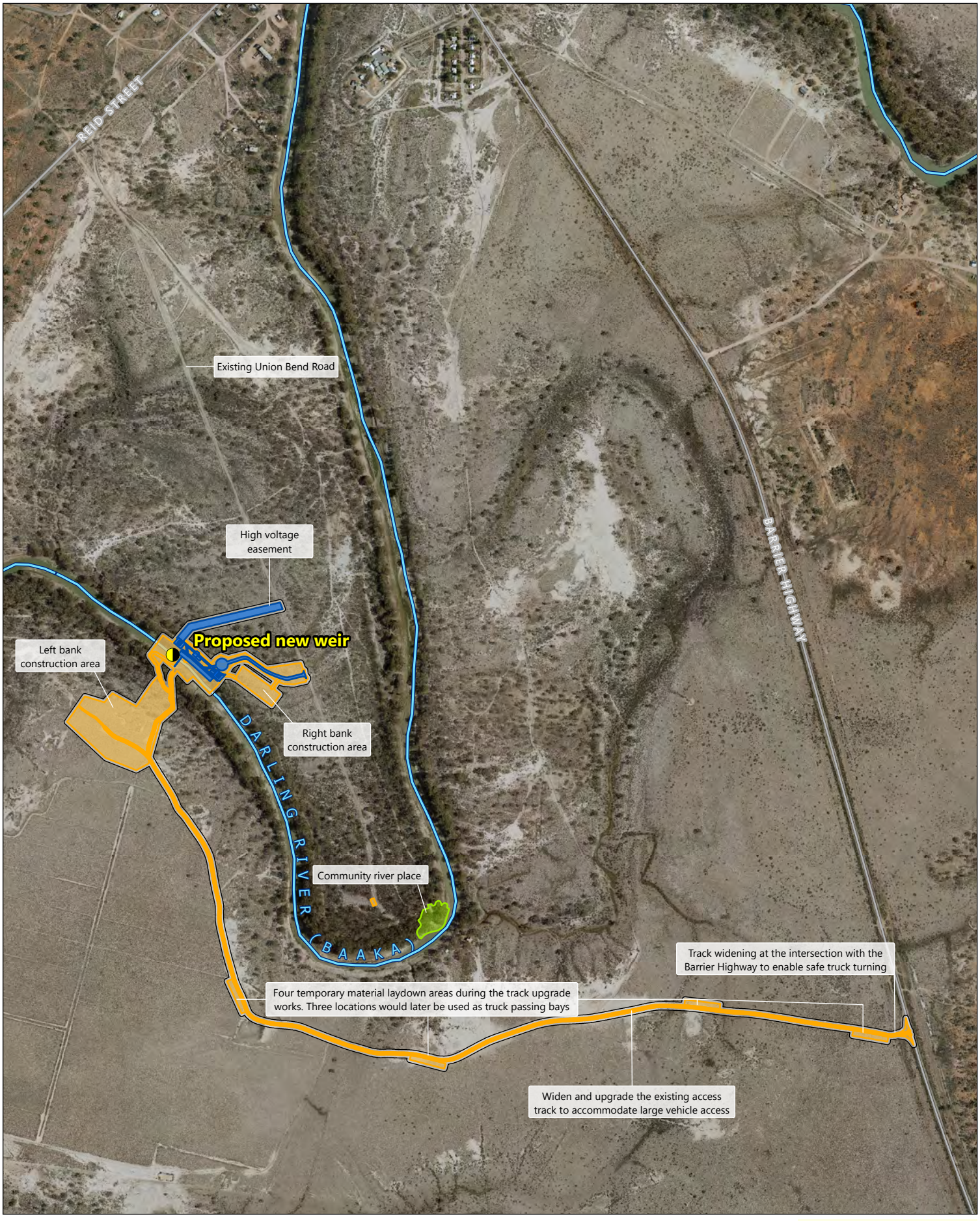

Figure 1-2: Key design features of the proposal – new weir site (overview)

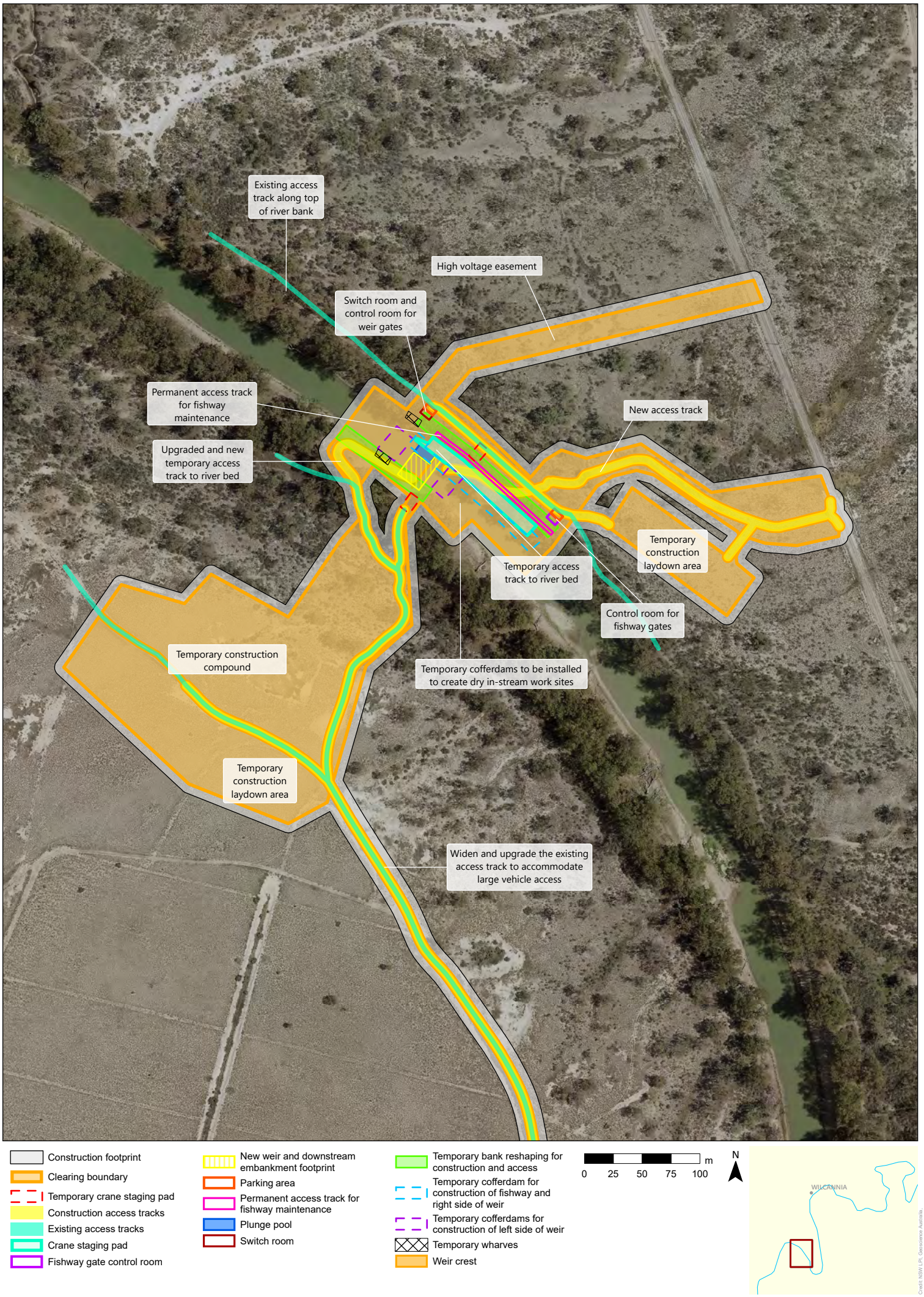

Figure 1-3: Key construction features – new weir site (detail)

Figure 1-4: Key construction features - existing weir site

2. Legislative and policy context

Relevant planning framework, guidelines and policies are summarised in **Table 2-1**.

Table 2-1 Planning framework, guidelines and policies

<table>
<tr><th>Policy or guidelines</th><th>Relevance to the proposal</th></tr>
<tr><td>Environmental Planning and Assessment Act 1979</td><td>

As State significant infrastructure, the proposal requires approval from the NSW Minister for Planning and the application for approval must be support by an environmental impact statement. The environmental impact statement is prepared in accordance with the SEARs which have been issued by the Secretary of the Department of Planning and Environment.
Land use planning, including zoning and development control, is governed primarily by local environmental plans made under the EP&A Act. Local environmental plans include lists of local heritage items and local heritage precincts, and provide controls on development which may affect those items or be located in those precincts. Although local environmental plan controls do not apply to State significant infrastructure, the relevant local environmental plan was reviewed for the purpose of preparing this report.

</td></tr>
<tr><td>Central Darling Local Environmental Plan 2012</td><td>

The proposal is located within the Central Darling local government area and the relevant local environmental plan is the Central Darling Local Environmental Plan 2012, which identifies land use zones and local heritage items.
The proposal is located on land zoned W1 along the Darling River (Baaka), RU1 on the riverbanks at the new weir site and the community river place, R1 and RE2 at the riverbanks at the existing weir site
The primary objectives of these zones are detailed below:

<table>
<tr><th>Land use zone</th><th>Objectives</th></tr>
<tr><td>▪ W1 Natural Waterways</td><td>▪ To protect the ecological and scenic values of natural waterways.
▪ To prevent development that would have an adverse effect on the natural values of waterways in this zone.
▪ To provide for sustainable fishing industries and recreational fishing.</td></tr>
<tr><td>▪ RU1 Primary Production</td><td>▪ To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.
▪ To encourage diversity in primary industry enterprises and systems appropriate for the area.
▪ To minimise the fragmentation and alienation of resource lands.
▪ To minimise conflict between land uses within this zone and land uses within adjoining zones.</td></tr>
<tr><td>▪ R1 General Residential</td><td>▪ To provide for the housing needs of the community.
▪ To provide for a variety of housing types and densities.
▪ To enable other land uses that provide facilities or services to meet the day to day needs of residents.
▪ To minimise land use conflict between land uses on land within the zone and land uses on land within adjoining zones.</td></tr>
<tr><td>▪ RE2 Private Recreation</td><td>▪ To enable land to be used for private open space or recreational purposes.</td></tr>
</table>
</td></tr>
</table>

Policy or guidelines	Relevance to the proposal
	▪ To provide a range of recreational settings and activities and compatible land uses. ▪ To protect and enhance the natural environment for recreational purposes. ▪ Clause 6.3 (Development on river front areas) of the Central Darling Local Environmental Plan 2012 contains objectives as follows: a) to support the natural migration of the river channel, including riverine processes, b) to protect and improve the bed and bank stability of rivers, c) to maintain or improve the water quality of rivers, d) to protect the amenity, scenic landscape values and cultural heritage of rivers, e) to protect public access to riverine corridors, f) to conserve and protect riverine corridors, including wildlife habitat. ▪ Clause 5.10 (Heritage conservation) of the Central Darling Local Environmental Plan 2012 contains objectives as follows: g) to conserve the environmental heritage of Central Darling, h) to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views, i) to conserve archaeological sites, j) to conserve Aboriginal objects and Aboriginal places of heritage significance. ▪ Clause 6.1 (Earthworks) states that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.
Crime Prevention and the Assessment of Development Applications – Guidelines under section 79C of the *Environmental Planning and Assessment Act 1979* (Crime Prevention Guidelines) (Department of Urban Affairs and Planning, 2001)	The Crime Prevention Guidelines are intended to assist councils identify crime risk and minimise opportunities for crime through the appropriate assessment of development proposals. The Crime Prevention Guidelines describe several basic CPTED principles to assess development applications including surveillance (both direct and indirect), access control, territorial reinforcement and space management. These principles apply to both the construction and operation phases of the proposal. The community river place, existing weir site and parts of the new weir site would all be publicly accessible and need to consider the CPTED principles.

3. Methodology

The need for a community river place was identified during consultation with the local community about the proposal and the kind of facilities they would like delivered as part of the proposal. Many members of the local community expressed a desire for a passive recreational area in the vicinity of the new weir that provided access to the new town pool.

The concept landscape plan for the community river place and rehabilitation plans for the new and existing weir sites that are appended to this report were created with the following inputs:

- Community and stakeholder consultation carried out by Water Infrastructure NSW on a suitable location for the community river place
- Feedback from community consultation and stakeholder consultation carried out by Water Infrastructure NSW on preliminary designs for the community river place, including feedback on access, potential usage and design elements
- Review of the overarching proposal objectives
- Consideration of the existing environment near the new weir and existing weir sites and assessment of vegetation clearing requirements and opportunities for replanting.

3.1.1 Proposal objectives

The proposal would secure existing and future water supply for the township of Wilcannia and also create opportunities for new recreational uses of the Darling River (Baaka) where it passes through the township. The proposal aims to sustain Wilcannia through a reoccurrence of the worst historical drought on record (the Federation drought) inclusive of the consideration of the future impact of climate change. The proposal also seeks to benefit the local community by enhancing water quality, socio-economic opportunities and cultural connections to the Darling River (Baaka).

The specific objectives of the proposal are to:

- Improve water security for Wilcannia
- Enhance cultural connection to the river
- Improve water management of the weir pool
- Indirectly increase tourism opportunities and investment
- Provide better recreational amenity to walk and picnic
- Remove current barriers to native fish migration.

3.1.2 Community consultation

In response to community requests, the proposal includes the development of a small recreation area, known as a community river place, on the right riverbank at Union Bend. A concept landscape plan for the community river place is shown in **Appendix B** and its key features are described in **Section 5.2**. An extract of the concept landscape plan is provided in **Figure 3-1**.

Union Bend was selected in consultation with the local community and Central Darling Shire Council as it is a place with cultural significance to the Barkandji and is already a popular fishing location. The site is Crown land over which non-exclusive native title is held by the Barkandji Native Title Group Aboriginal Corporation. Importantly, the site is gazetted for recreational use (refer to **Section 5.1.1**). An alternative location for the community river place was initially proposed on the right side of the new weir, however this site is on the Wilcannia commons and changing its use to recreational would require legislative amendments that would take considerable time to enact and are not justifiable given the availability and suitability of the proposed location.

The community river place is located within the Wilcannia Mission Camps and Cultural Places Aboriginal Place. Water Infrastructure NSW has consulted with Heritage NSW about this location, which has established that Heritage NSW has no objections as long as the Aboriginal community are consulted, supportive and there are no impacts to Aboriginal archaeological sites. The provision of low key amenities (seating and interpretive signage and walking trails) would support and enhance local cultural practices and recreational activities at this site.

The community river place is subject to further consultation with the local Aboriginal community, Barkandji Native Title Group Aboriginal Corporation and Central Darling Shire Council.

Details on the local community's involvement in the development of the landscape plan for the community river place are provided in Section 5 of the environmental impact statement.

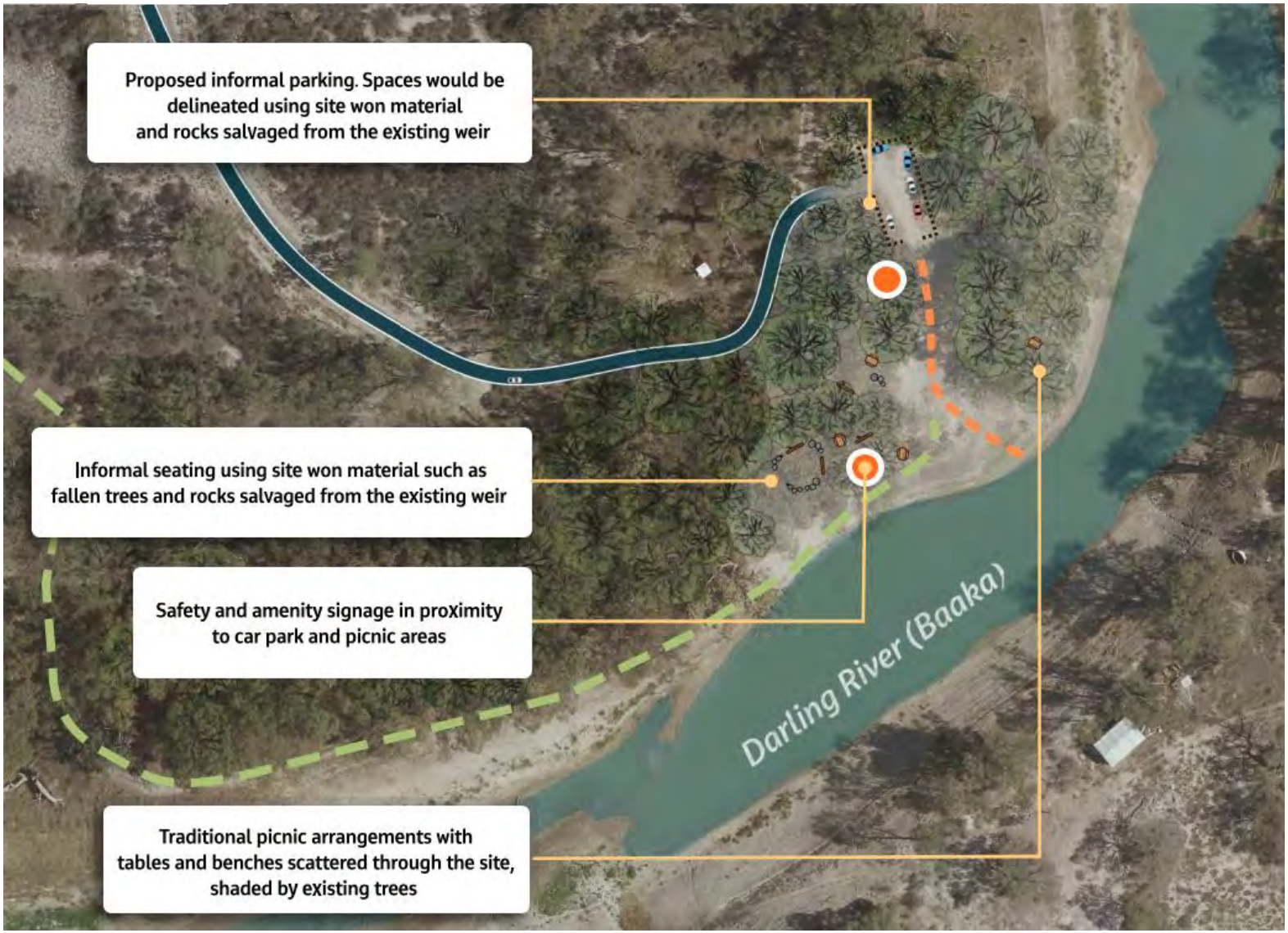

Figure 3-1 Concept landscape plan for the community river place

4. New weir site

4.1 Existing environment

The new weir is proposed along a straight section of the Darling River (Baaka) downstream of Union Bend. The section of the river at the new weir site is typical of the riverscapes in the area and is characterised by steep bare riverbanks that are topped with large *Eucalyptus camaldulensis* subsp. *camaldulensis* (River Red Gum) that often lean out towards the river (refer to Photo 4-1 to **Photo 4-5**). The trunks and limbs of fallen dead trees are commonly seen lying part way down the riverbanks or submerged in the river and provide important habitat for local fauna. Presently, there is an absence of mid-storey planting in some areas and a moderate cover of exotic groundcover is common.

A significant canoe tree is located on the right riverbank (refer to **Photo 4-6**).

Photo 4-1 View from the right riverbank looking upstream, with a dead scar tree (AHIMS 24-5-208) on the riverbank in the foreground, at the new weir site. The fishway would be located along this riverbank within the river channel, with a permanent access track for fishway maintenance on the right riverbank

Away from the river the vegetation quickly becomes low and sparse, which reflects the hot and semi-arid conditions. Canopy cover of *Eucalyptus coolabah* (Coolabah) and *Eucalyptus camaldulensis* (River Red Gum) and *Eucalyptus largiflorens* (Black Box) vary in abundance and cover depending on distance from the Darling River (Baaka) and previous disturbance. About 200 metres from the river edge, the landscape character changes to mixed chenopod shrubland and is dominated by *Atriplex nummularia* (Old Man Saltbush). There is an existing access track along the right riverbank that would link the new weir site to the proposed community river place.

Photo 4-2 View from the right riverbank looking upstream; the five trees in the foreground on the left riverbank visible in this photo would be removed

Photo 4-3 View from the right riverbank looking downstream and towards the left riverbank, the tree with foliage overhanging the river in the centre of the photo would be removed and the cleared areas on the left riverbank would be part of the construction clearing boundary to accommodate a crane staging pad and machinery. The new weir would be built across the river channel near the centre of this photo (Jacobs, 2021)

Photo 4-4 View from the left riverbank looking downstream and towards the right riverbank. The trees along the top of the right riverbank would be cleared during construction of the proposal. The tree branches in the foreground of the photo on the left riverbank would also be cleared (Jacobs, 2020)

Photo 4-5 The Darling River (Baaka) facing downstream from the right riverbank; the crest of the new weir would align with the clearing on the left riverbank visible on the right of the photo

Photo 4-6 Significant canoe tree on the right riverbank (Jacobs, 2021)

4.2 Construction impact

The proposal would result in the direct removal of native vegetation to gain access to the river and facilitate construction of the new weir across the river channel. This includes new and upgraded access tracks leading to the construction site, removal of a narrow area of riparian vegetation on both the right and left riverbanks, and construction compounds and laydown areas for equipment and materials. Laydown areas and construction compounds are proposed in areas that are currently cleared or sparsely covered in native vegetation to reduce ecological impacts. A detailed description of construction activities and phasing is provided in the environmental impact statement.

There would be temporary visual impacts during construction due to the clearing of vegetation, stockpiling of materials, temporary construction buildings, building of new infrastructure including within the river at the new weir site, and construction plant, equipment and vehicles. There are no sensitive receivers with views of the construction footprint for the new weir site.

4.3 Operational impact

The main visual impacts during operation of the new weir would be:

- The section of the Darling River (Baaka) between the new and existing weirs would change from a naturally flowing riverscape to a weir pool, referred to as the new town pool
- There would be water infrastructure in the river where there is currently a flowing river
- The right riverbank at the new weir site would be reshaped to include the fishway maintenance track
- There would be ancillary structures on the right riverbank where there is currently native vegetation.

Design strategies that screen and sensitively integrate the weir and fishway to the surrounding landscape will be considered as part of the rehabilitation plan and are further detailed in **Section 4.4.1** and **Appendix A**. Safety in design principles should also be considered for the constructed weir that discourage people from accessing the fishway.

Due to the presence of new permanent infrastructure and the need for bushfire asset protection zones around some of this new infrastructure, revegetation of the right riverbank at the new weir site would be largely limited to low groundcovers and sedges. Re-establishment of the existing Red River Gums (*Eucalpytus camaldulensis*) along the top of the right riverbank is not feasible.

Flows of water from the new town pool past the new weir would be an important but varying contributor to the landscape. During normal operation, water would flow down the fishway and, in some circumstances also through the open weir gates, and this flowing water would be the primary visual and acoustic feature of the new weir. However, during droughts, the weir gates and fishway gates would be closed and the absence of flowing water would result in a more serene setting. At the other end of the spectrum, when the Darling River (Baaka) is in flood, water would flow over the crest of the new weir, visually obscuring the weir and creating a loud and dynamic landscape.

4.4 Application of the CPTED principles

The Crime Prevention Guidelines identify four CPTED principles:

- *Passive surveillance* – Design strategies for passive surveillance often include:
  - Clear sightlines between public and private places
  - Effective lighting of public places
  - Landscaping that makes places attractive but does not provide offenders with a place to hide or entrap victims
- *Access control* – Effective access control can be achieved by creating:
  - Landscapes and physical locations that channel and group pedestrians into target areas
  - Public spaces which attract, rather than discourage people from gathering
  - Restrict access to internal or high-risk areas (usually with physical barriers)
- *Territorial reinforcement* – Design strategies to facilitate community ownership of public space that are comfortable to spend time in, feel owned and cared for may include:
  - Design that encourages people to gather in public space and to feel some responsibility for its use and condition
  - Community engagement throughout the design process
  - Clear design cues on who is to use space and what is to be used for
  - Clear transitions between public and private space

- *Space management* – Space management is linked to the concept of territorial reinforcement and ensures that space is appropriately utilised and well cared for. Design strategies may include:
  - Appropriate management plan that ensures site cleanliness
  - Rapid repair of vandalism and graffiti
  - Swift refurbishment of decayed physical elements.

The followings sections describe how each of the CPTED principles have been applied to the proposal.

4.4.1 Passive surveillance

The new weir site and community river place have limited surveillance opportunities due to their remoteness. However, several design strategies are proposed in **Table 4-1** that maximises surveillance by encouraging site activation.

Table 4-1 Landscape design strategies to maximise surveillance – new weir site

Design strategy	Detailed description	Aim/purpose
Linking the new weir site with the proposed community river place	An existing walking track would link the community river place to the new weir site. This would encourage foot traffic from the community river place to the new weir for increased surveillance opportunities.	Encourage foot traffic to the new weir site
Painted mural on the downstream face of the new weir wall	The downstream face of the new weir wall would be activated with place sensitive artwork. This would encourage visitation to the new weir site.	Encourage visitors to the new weir site
Painted murals along control room walls and new weir signage	The switch room and weir gate control room, fishway gate control room and new weir signage would be activated with place sensitive artworks to encourage longer stay time by visitors, resulting in improved passive surveillance of the site.	Encourage visitors to spend more time at the new weir site
Celebration of the canoe tree	The celebration of the existing canoe tree through endemic planting design, murals or artwork (to be undertaken in consultation with the local Aboriginal community) would support local Aboriginal leaders taking visitors to this site, resulting in improved passive surveillance of the site.	Encourage visitors to spend time at the new weir site
Maintaining key sight lines	Key sight lines from the existing walking track along the Darling River (Baaka), and new access track from Union Bend Road would be maintained via low to medium height endemic plant species that retain sight of the new weir and minimise opportunity for hidden activity. The new weir signage would also be a visual marker for visitors that can be seen from both new and existing access tracks.	Maintain an attractive site but minimise opportunity for offenders to hide or entrap victims

4.4.2 Access control

The new weir site needs to clearly delineate between public and private access to protect visitor safety. It is expected that visitors would visually interact with the wall murals on the downstream face of the weir crest, gate control rooms and any artwork installed near the canoe tree. However, public access to the fishway maintenance track needs to be prevented to protect visitor safety and passively enforce the exclusion zone. **Table 4-2** identifies landscape strategies that are proposed to achieve these objectives.

Table 4-2 Landscape design strategies to provide access control – new weir site

Design strategy	Detailed description	Aim/purpose
Access gate	An access gate or other physical barrier is proposed to restrict public access to the fishway maintenance track.	Physical barrier to restrict access to weir infrastructure and maintenance track
Recycled rock and gravel edge on right riverbank interspersed with endemic riparian grass species	A loose rock and gravel edge with interspersed planting discourages foot traffic to the fishway infrastructure. Low riparian grasses would ensure a sight line to the fishway is maintained for further passive surveillance to discourage illegal access.	Soft landscape strategy to discourage access to fishway
Dense planting edge on left side of existing access track	A denser planting edge is proposed on the left side of the existing access track (on the right riverbank) to discourage access to the fishway and weir gate control rooms.	Soft landscape strategy to discourage access to control rooms

4.4.3 Territorial reinforcement

The landscape strategies identified in **Table 4-3** respond to the CPTED principle of territorial reinforcement by encouraging community ownership and place attachment.

Table 4-3 Landscape design strategies to provide territorial reinforcement – new weir site

Design strategy	Detailed description	Aim/Purpose
Engagement with the local community for design interventions	Engagement with the local community and key stakeholders for the murals and artworks proposed on the weir wall, control rooms and weir signage and in the vicinity of the canoe tree would provide opportunities to foster community ownership and place attachment of the site. The draft rehabilitation plan for the new weir proposes artworks by local school children as murals but further consultation is required before the final design is confirmed.	Foster community ownership and place attachment
Use of recycled material from the existing weir	The existing weir has special significance for the Wilcannia community because some local residents were involved in its construction. Recycling and re-using material from the decommissioned weir aims to sensitively integrate the town's historical context into the new weir design while being environmentally responsible and reducing material costs.	Foster community ownership and place attachment

4.4.4 Space management

Due to the remote location of the community river place and new weir site, a frequent maintenance program is not cost effective. Therefore, the landscape strategies identified in **Table 4-4** to provide space management aim for a 'hands off' approach that reduces the need for frequent repair and maintenance. This is also fitting for the site's naturalistic landscape character.

As this principle is an extension of territorial reinforcement, it is expected that fostering a sense of community ownership and place attachment to the site would also contribute to the lower likelihood of graffiti and vandalism.

Table 4-4 Landscape design strategies to provide space management – new weir site

Design strategy	Detailed description	Aim/purpose
Endemic planting species in a naturalistic planting design	All proposed planting species are endemic species that are already found onsite. Therefore, once established, a maintenance program is not required.	'Hands off' maintenance approach
Use murals to make a feature of the control rooms and discourage vandalism/graffiti	Engaging the local community to create murals on the exterior control room walls would foster community ownership of the site and place attachment and reduce the instances of vandalism/graffiti.	Reduce likelihood of vandalism/graffiti
Access gate	An access gate or other physical barrier is proposed to restrict public access to weir infrastructure to discourage vandalism.	Reduce likelihood of vandalism/graffiti

4.5 Site rehabilitation measures

Table 4-5 identifies proposed site rehabilitation measures at the new weir site. This table should be read in conjunction with **Appendix A** which spatially presents the rehabilitation plan for the new weir site.

Table 4-5 Site rehabilitation measures – new weir site

Rehabilitation measure	Detailed description	Addressed impact/purpose
Stabilisation of the left riverbank with River Red Gum Woodland	The re-establishment of the River Red Gum Woodland will address the site's sparse mid storey and weedy ground layer while stabilising the left riverbank by controlling erosion and reducing the velocity of runoff. It will also rehabilitate the sensitive river ecology to support its function as a habitat and foraging site for native fauna. Twelve new River Red Gum (*Eucalpytus camaldulensis*) trees are proposed to replace those removed during construction. Once fully established, the site would be in a 'better than before construction' condition compared to the existing environment.	Addresses the impact of clearing native vegetation during the construction phase Water pollution and riverbank erosion

Rehabilitation measure	Detailed description	Addressed impact/purpose
Planting of instream aquatic species downstream of weir and along exposed sand bars	Revegetation of instream aquatic species to replace those lost during the construction of the new weir. It will also rehabilitate the sensitive river ecology to support its function as a habitat and foraging site for native fauna.	Addresses the impact of clearing native aquatic vegetation during the construction phase
Re-instatement of large woody debris instream and on the riverbanks	Reinstate the logs and other natural debris removed from the riverbanks during the clearing carried out at the start of construction. These logs provide critical refuge sites for local fish species and other native fauna.	Addresses the impact of clearing native vegetation during the construction phase
Recycled rock and gravel edge on right riverbank interspersed with endemic riparian grass species	The rock and gravel edge would discourage public access to the fishway while ensuring overland flow is not impeded. Endemic riparian grass would screen the fishway and integrate it into the surrounding landscape character while adhering to clearing requirements for bushfire asset protection zone.	Safety in design (discouraging public access to the fishway) Addresses the impact of clearing native vegetation during the construction phase while adhering to bushfire asset protection zone requirements Reduces visual impact of new infrastructure
Revegetation of Coolabah-River Coobah-Lignum Woodland	Revegetate land cleared for construction laydown areas and access requirements that is not required for operation of the proposal. Revegetation will involve rehabilitating the sensitive river ecology to support its function as habitat and a foraging site for native fauna. There is an opportunity to leave the site in a 'better than before construction' condition where existing vegetation cover is disturbed or largely cleared. Four new trees (mix of *Eucalyptus coolabah* and *E. camaldulensis*) are proposed to replace those removed during construction. Weed management is also proposed to reduce competition with newly planted native species and improve the appearance of the site.	Addresses the impact of clearing native vegetation during the construction phase
Revegetation of Oldman Saltbush	Revegetates land cleared for construction laydown areas and access requirements. This will support its use as habitat and a foraging site for native fauna. There is an opportunity to leave the site in a 'better than before construction' condition where existing vegetation cover is disturbed or largely cleared.	Addresses the impact of clearing native vegetation during the construction phase
Hydroseeding of endemic grass species along the power easement corridor	Re-establishment of the canopy layer along the power easement corridor is not feasible due to powerline clearance requirements.	Addresses the impact of clearing native vegetation during the construction phase

Rehabilitation measure	Detailed description	Addressed impact/purpose
	However, the rehabilitation of the mid storey and ground layer is proposed via hydroseeding. It will mitigate some but not all of the abiotic impacts.	
Painted wall murals along control room walls	The new weir site has cultural significance for the local Aboriginal community including the canoe tree on the right riverbank and scar tree on the left riverbank. Wall murals that have been designed with input from the local community may help to minimise conflict between the intrusive weir and fishway infrastructure with existing socio-cultural activities.	CPTED
Celebrate canoe tree	A celebration of the canoe tree with input from the local Aboriginal community.	Minimises conflict between the intrusive weir and fishway infrastructure and existing socio-cultural activities.

5. Community river place

In response to community requests, the proposal includes the development of a small recreation area, known as a community river place, on the right riverbank at Union Bend. Union Bend was selected in consultation with the local community and Central Darling Shire Council as it is a place with cultural significance to the Barkandji and is already a popular fishing location. It is located with the Wilcannia Mission Camps and Cultural Places Aboriginal Place. The community expressed a desire for a largely natural space with low key amenities (such as seating, picnic tables and walking trails) that would support and enhance local cultural practices and recreational activities.

5.1 Existing environment

The Darling River (Baaka) bends sharply to create the narrow peninsula known as Union Bend. The steep banks that characterise the river upstream, downstream and opposite Union Bend are absent, which makes this a relatively easy location to access the river (refer to **Photo 5-1**). The site is a short drive from Wilcannia, with access provided by Union Bend Road, an unsealed track that follows an almost straight alignment down the centre of the Union Bend peninsula. The north-western end of Union Bend Road connects to Reid Street.

The site of the proposed community river place is currently used as a recreation area by the local community. However, there is no recreational infrastructure or facilities at the location, it is not signposted and is very unlikely to be known to be a recreational area outside of the local community. Recreational activities that currently occur at the site include fishing and swimming.

Photo 5-1 View from the proposed community river place at Union Bend, looking towards the river and the left riverbank. No vegetation removal would be required at this site

There is an existing access track along the top of the right riverbank between Union Bend and the proposed new weir site (refer to **Photo 5-2**).

Photo 5-2 Existing access track alongside the river at the community river place looking from the right riverbank downstream towards the left riverbank

5.1.1 Site ownership

The community river place is located in Lot 7315 DP1181235 and has an area of about 17.4 hectares. The site is Crown land, with Central Darling Shire Council appointed as the Crown Land Manager for the purposes of public recreation. The site was gazetted as a recreation reserve in 1965 and is named Wilcannia Public Recreation (Union Bend).

5.1.2 Aboriginal cultural heritage

Union Bend is registered as an Aboriginal site on the Aboriginal Heritage Information Management System (AHIMS): AHIMS site 24-05-159 – Union Bend Ngatji Waterhole.

The waterhole at Union Bend is associated with one or more stories relating to the Ngatji (or Rainbow Serpent), a creature involved in the creation of the Darling River (Baaka). The stretch of the river along the whole of Union Bend is associated with the intangible cultural heritage relating to the concept of the Ngatji (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council, 2018). The association between waterholes such as the one at Union Bend with the Ngatji is that these deeper areas of the river are known to the Barkandji people as areas in which the Ngatji lives (Department of Premier and Cabinet, 2020: 6).

There are a number of archaeological sites in the landscape around Union Bend, including culturally modified trees, stone artefact scatters, historical Aboriginal houses and associated artefacts (Central Darling Shire Council and Wilcannia Local Aboriginal Land Council, 2018). A site of particular importance to the local Aboriginal community is the Granny Moysey canoe tree (AHIMS site no. 24-05-158), which is located between the community river place and the new weir site.

5.2 Key features of the concept landscape plan

A concept landscape plan for the community river place is shown in **Appendix B** and includes:

- An informal car parking area for up to about 12 vehicles
- Walking trails
- Picnic tables and seating
- Informal seating that uses materials won during the construction of the proposal e.g. log from felled trees and rocks from the partial removal of the existing weir
- Low maintenance landscaping including planting of native trees, shrubs and groundcovers and reuse of materials won during the construction of the proposal including logs and rocks
- Opportunity for interpretive signage that could provide information about the new weir and fishway, the history of the existing weir, the history of the area including the canoe tree within the community river place and others nearby, and the natural features of the area including the river red gum trees and the native fish species that would benefit from the fishway
- Other potential features, including artwork and commemorative plaques.

'The community river place is subject to further consultation with the local Aboriginal community, Barkandji Native Title Group Aboriginal Corporation and Central Darling Shire Council.'

5.3 Construction impact

The community river place at Union Bend would be constructed after the decommissioning of the existing weir. Rocks salvaged from the partial removal of the existing weir would be transported to the proposed community river place. The rocks together with site won materials would be used to:

- Delineate spacing at the informal parking area
- Delineate walking tracks
- Delineate recreational areas from vegetated areas
- Provide informal seating.

The construction impacts of the proposal at the community river place would be minimal. The car park is proposed within an existing cleared area and the landscaping works would be sympathetic to the existing landscape, with picnic tables, seating, walking trails and signage being positioned to avoid the need for removal of existing native vegetation. Some weed removal would occur as part of the works as would planting of suitable endemic species to improve the amenity of the site.

There would be temporary visual impact during construction due to the presence of construction workers, vehicles, construction machinery and equipment and some small material laydown and storage areas. There are two sensitive receivers on the left riverbank opposite the community river place that would potentially have views of the works.

5.4 Operational impact

The operation of the proposal is expected to result in more visitors to Union Bend than are currently experienced. The community river place would provide a space where cultural teachings could be conducted, a place for relaxation and recreational activities and also offers opportunities to celebrate cultural connections to the Darling River (Baaka). The community river place would also be used by visitors to the new weir as a place to park their vehicles and then walk alongside the river to the new weir site.

The community river place would be visible to the two sensitive receivers opposite the site on the left riverbank. However, given the car park is located away from the river, no trees would be removed and no new structures

would be built, the appearance of the site from these receivers would be similar to its existing appearance, and the main change would be an increase in the amount of activity at the site.

5.5 Application of the CPTED principles

This section identifies the landscape rehabilitation response to the four CPTED principles outlined in the Crime Prevention Guidelines at the community river place. It should be read in conjunction with the concept landscape plan for the community river place (refer to **Appendix B**).

5.5.1 Passive surveillance

Union Bend is currently used for recreation purposes, however, the absence of facilities and any identification as a recreation area as well as being beyond walking distance from the Wilcannia township means it has low usage.

Union Bend has a low level of natural surveillance, being at the end of a no through track in a remote location. The site is visible from the opposite (left) bank of the river, however the limited development of this part of the Wilcannia Mission Camp means that any surveillance from this location is likely to be very irregular.

However, several design strategies are proposed in **Table 5-1** that maximises surveillance by encouraging site activation.

Table 5-1 Landscape design strategies to maximise surveillance – community river place

Design strategy	Detailed description	Purpose
Linking the new weir site with the proposed community river place	The proposed community river place is linked via an existing walking track to the new weir site. This encourages foot traffic from the river place to the new weir for increased surveillance opportunities.	Encourage visitors to the community river place
Informal amenity including seating and picnic areas	Several informal amenities are proposed to encourage longer stay time by visitors and passive surveillance of the site. These include: ▪ Informal carparking ▪ Informal seating and picnic tables. Development of the site as a community river place builds on its existing use where the Ngatji waterhole is used for cultural and recreational purposes and facilitates further connection to country.	Encourage visitors to spend time at the site
Maintaining key sight lines	Key sight lines from Union Bend Road, the left riverbank and new carpark will be maintained and minimise opportunity for hidden activity. The new signage will also be a visual marker for visitors that can be seen from the carpark.	Maintain an attractive site but minimise opportunity for offenders to hide or entrap victims
Greater affordability of recreational activities via the new town pool	The new town pool would make the water at Union Bend very accessible from the riverbank and could lead to the use of this section of the river for a wider range of recreational activities such as canoeing or boating. The site could become a desired destination for gatherings of townspeople seeking a convenient and peaceful location alongside the river for passive recreational activities.	Encourage visitors to spend time at the site

5.5.2 Access control

The community river place would be a public recreational space that needs to welcome entry to all members of the community and other visitors. The landscape design strategies in **Table 5-2** are proposed to achieve this objective.

Table 5-2 Landscape design strategies to provide access control – community river place

Design strategy	Detailed description	Purpose
New carpark and Union Bend Road upgrade	Clear entry routes and improves site accessibility will be provided by: ▪ The separate proposal by Water Infrastructure NSW to upgrade Union Bend Road to provide all weather access. This proposal is the subject of a separate environmental impact assessment ▪ The proposed provision of car parking at the community river place.	Encourage utilisation of the community river place
Existing walking track from the community river place to the new weir	Provides a convenient and pleasant way for visitors to get to the new weir from the community river place using an existing track.	Encourage use of the community river place as the entry point to the new weir
New signage	Clear wayfinding and entry signages convey that the community river place is for public use.	Communication to user groups

5.5.3 Territorial reinforcement

The proposed site for the community river place already has strong attachment and ownership by the community due to the intangible cultural values of the Ngatji waterhole to the Barkandji people. The landscape strategies in **Table 5-3** aim to further facilitate place attachment and community ownership.

Table 5-3 Landscape design strategies to provide territorial reinforcement – community river place

Design strategy	Detailed description	Purpose
Engagement with the local community for artworks and entry signages	Engagement with the local community and key stakeholders for the proposed artworks and entry signages brings them into the design process and helps to foster a sense of ownership towards the site.	Foster community ownership and place attachment
Interpretive signage	Interpretive signage that provides information about the history of the area including the oral histories relating to the Ngatji, the natural features of the area including the river red gum trees and other intangible cultural heritage values associated with the site reinforces the land's significance to the Barkandji people and the Wilcannia community.	Foster community ownership and place attachment
Use of recycled material from the existing weir	The existing weir has special significance for the Wilcannia community because some local residents were involved with its construction. Recycling and re-using material from the decommissioned weir aims to sensitively integrate the town's historical	Foster community ownership and place attachment

Design strategy	Detailed description	Purpose
	context into the community river place while being environmentally responsible and reducing material costs.	

5.5.4 Space management

The landscape strategies identified in **Table 5-4** aim for a 'hands off' approach that reduces the need for frequent repair and maintenance of the community river place. This is also fitting for the site's naturalistic landscape character.

As this principle is an extension of territorial reinforcement, it is expected that fostering a sense of community ownership and place attachment to the community river place will also contribute to the lower likelihood of graffiti and vandalism.

Table 5-4 Landscape design strategies to provide space management – community river place

Design strategy	Detailed description	Purpose
Endemic planting species in a naturalistic planting design	All proposed planting species are endemic species found already onsite. Therefore, once established, a maintenance program is not required.	'Hands off' maintenance approach
Low maintenance amenities	The provided seating and picnic tables will be constructed from site won materials (e.g. fallen trees/logs) and rocks salvaged from the existing weir that require little to no maintenance.	'Hands off' maintenance approach

5.6 Landscaping initiatives

Table 5-5 outlines the landscaping initiatives that will be implemented to achieve the design outcomes described in **Section 5.2**. This table should be read in conjunction with the concept landscape plan for the community river place (refer to **Appendix B**).

Table 5-5 Landscaping initiatives – community river place

Landscaping initiative	Detailed description	Purpose
Low maintenance endemic landscaping	Low maintenance endemic landscaping of the existing plant community type will further strengthen the site's river ecology and support its function as habitat and foraging site for native fauna.	Reinforce ecology of the site
Removal of noxious weeds	Removal of noxious weeds, particularly along the end of Union Bend Road, picnic areas and carparking space will leave the site in a 'better than before construction' condition.	Reinforce ecology of the site
Minimise clearing	Site construction will be sympathetic to the existing landscape condition and areas that would typically require clearing (such as the carpark, walking trails and picnic area) will utilise existing cleared areas of the site to avoid the need for removal of existing native vegetation.	Minimise clearing of native vegetation during the construction phase

Landscaping initiative	Detailed description	Purpose
Usage of site won materials in construction	Site won materials including logs, stones from the existing weir and endemic planting will sensitively integrate the new community river place into the existing scenic Darling River (Baaka) landscape character.	Ensures landscape character of the community river place complements the scenic values of the river.

6. Existing weir

6.1 Existing environment

The existing weir is located within Wilcannia township, between Victory Park Caravan Park (left riverbank) and Field Street (right riverbank). The right side of the river at the existing weir is characterised by a steep, eroded riverbank that is bare of vegetation (refer to **Photo 6-1**). The left riverbank at the existing weir has a much gentler slope towards the river and this bank features low grasses. (refer to Photo 6-2). An informal walking track provides access from Victory Park Caravan Park to the left riverbank at the existing weir (refer to Photo 6-3).

There is no vehicle access to the existing weir. The closest a vehicle can get to the existing weir is near the start of the informal walking track to the river (refer to Photo 6-4).

Victory Park Caravan Park comprises a loop road with grassed areas either side. Basic amenities are provided in a building located at the centre of the loop and caravan parking spaces are provided along the outside of the loop. Large trees are dotted around the caravan park, particularly nearer to the river (refer to Photo 6-4).

Photo 6-1 View of the existing weir looking towards the right riverbank

Photo 6-2 View of the existing weir looking towards the left riverbank

Photo 6-3 View along the informal walking track from Victory Park Caravan Park to the Darling River (Baaka) showing the seat alongside the river

Photo 6-4 Victory Park Caravan Park, looking towards where the informal walking track to the Darling River (Baaka) starts

6.2 Construction impact

The existing weir would be partially removed and decommissioning during construction of the proposal and this would involve minor disturbance/removal of native vegetation on the left riverbank. An excavator would need to access the bed of the river to remove the central section of the existing weir. Trucks would be used to transport demolition waste from the river to offsite reuse or disposal locations.

To minimise construction impacts, it is proposed to access the existing weir from Victory Park Caravan Park to carry out the work. Water Infrastructure NSW would lease the caravan park during the work. An access route would be cleared between Victory Park Caravan Park and the river in the vicinity of the existing informal walking track (refer to **Figure 1-3**). Clearing would only occur between the existing trees i.e. no trees would be removed.

The partial removal and decommissioning of the existing weir is not expected to have a significant visual impact. The existing weir is not visible from any sensitive receivers or public spaces. Although it is in close proximity to the Wilcannia Hospital and several private properties, dense vegetation along the top of the riverbank screens the weir from these viewpoints.

6.3 Application of the CPTED principles

This section identifies the landscape rehabilitation response to the four CPTED principles outlined in the Crime Prevention Guidelines at the existing weir site. It should be read in conjunction with the rehabilitation plan for the existing weir (refer to **Appendix C).**

6.3.1 Passive surveillance

Landscape design strategies are presented in **Table 6-1** to maintain key viewsheds from Victory Park Caravan Park and the hospital while increasing surveillance opportunities by facilitating site activation.

Table 6-1 Landscape design strategies to maximise surveillance – existing weir site

Design strategy	Detailed description	Aim/purpose
Informal amenity including seating and picnic areas	Informal seating and picnic areas encourage longer stay time by visitors and passive surveillance of the site.	Encourage visitors to spend time at the site
Maintaining key sight lines	Key sight lines from Victory Park Caravan Park and the hospital will be maintained by a minimum canopy clearance height of 2.5m for any proposed tree planting. The new signage will also be a visual marker for visitors that can be seen from the carpark.	Maintain an attractive site but minimise opportunity for offenders to hide or entrap victims
Provide access to the recreational activity opportunities created by the new town pool	The new town pool could lead to the use of this section of the river for a wider range of recreational activities such as canoeing, fishing and boating. The site could become a desired destination for gatherings of caravan park guests seeking a convenient and peaceful location alongside the river for passive recreational activities.	Encourage caravan park guests to spend time at the site

6.3.2 Access control

Landscape design strategies are presented in **Table 6-2** to improve and promote pedestrian access to the river from Victory Park Caravan Park.

Table 6-2 Landscape design strategies to provide access control – existing weir site

Design strategy	Detailed description	Aim/purpose
Upgraded walking track	An upgraded walking track from the caravan park will provide better access to the proposed informal seating and picnic area.	Encourage utilisation of the existing weir site
New signage	Clear wayfinding and directional signage to convey that the track provides access to the river for caravan park guests.	Communication to user groups

6.3.3 Territorial reinforcement

There is already strong attachment towards the existing weir site due to its long-term use as a fish trap. These values would be impacted by the partial removal and decommissioning of the existing weir and its inundation by the new town pool. The landscape strategies identified in **Table 6-3** aim to provide a rehabilitated recreational space that is capable of supporting intangible cultural heritage values and activities to foster a sense of community ownership and attachment.

Table 6-3 Landscape design strategies to provide territorial reinforcement – existing weir site

Design strategy	Detailed description	Aim/purpose
Engagement with the local community for artworks and entry signages	Engagement with the local community and key stakeholders for the proposed artworks and entry signages them into the design process and helps to foster a sense of ownership towards the site.	Foster community ownership and place attachment

Design strategy	Detailed description	Aim/purpose
Interpretive signage	Interpretive signage that provides information about the history of the area including the history of the decommissioned weir, its legacy as a long-term fish trap and the natural features of the area that reinforces the land's significance to the Barkandji people and the Wilcannia community.	Foster community ownership and place attachment
Use of recycled material from the existing weir	The existing weir has special significance for the Wilcannia township because some local residents were involved in with its construction. Recycling and re-using material from the decommissioned weir aims to sensitively integrate the town's historical context into the rehabilitated site while being environmentally responsible and reducing material costs.	Foster community ownership and place attachment

6.3.4 Space management

The landscape strategies identified in **Table 6-4** aim for a 'hands off' approach that reduces the need for frequent repair and maintenance. This is also fitting for the site's naturalistic landscape character.

As this principle is an extension of territorial reinforcement, it is expected that fostering a sense of community ownership and place attachment to the site will also contribute to the lower likelihood of graffiti and vandalism.

Table 6-4 Landscape design strategies to provide space management – existing weir site

Design strategy	Detailed description	Aim/purpose
Endemic planting species in a naturalistic planting design	All proposed planting species are endemic species found already onsite. Therefore, once established, a maintenance program is not required.	'Hands off' maintenance approach
Low maintenance amenities	The provided seating and picnic tables will be constructed from site won materials (e.g. fallen trees/logs) and rocks salvaged from the existing weir that require little to no maintenance.	'Hands off' maintenance approach

6.4 Site rehabilitation measures

Table 6-5 identifies proposed site rehabilitation at the existing weir site. This table should also be read in conjunction with **Appendix C** which spatially presents the rehabilitation plan for the existing weir site.

Table 6-5 Site rehabilitation measures – existing weir site

Rehabilitation measure	Detailed description	Addressed impact/purpose
Low maintenance endemic landscaping	Low maintenance endemic landscaping of the existing plant community type will further strengthen the site's river ecology and support its function as habitat and foraging site for native fauna.	Reinforce ecology of the site

Rehabilitation measure	Detailed description	Addressed impact/purpose
Informal seating and picnic area	The new town pool could lead to the use of this section of the river for a wider range of recreational activities such as canoeing, fishing and boating. The river could become a desirable location for guests at Victory Park Caravan Park for gatherings and passive recreational activities.	A new recreational space for guests of Victory Park Caravan Park
Additional trees at the riverbank to provide shade	Additional River Red Gum trees are proposed at the edge of rehabilitated weir site to provide shade for the new picnic areas and to support local ecology.	Provide shade and amenity for recreational activity
Usage of site won materials in rehabilitation	Site won materials including logs, stones from the existing weir and endemic planting will sensitively rehabilitate the existing weir site to give it a uniquely local landscape character.	Reduces waste

7. Proposed tree removal and planting

7.1 New weir

Twenty-one trees on the right riverbank and seven trees on the left riverbank that are greater than about 30 centimetres diameter at breast height would be removed at the new weir site. Ten trees of that size would also be trimmed including one culturally significant River Red Gum on the left riverbank (refer to **Figure 7-1**).

River Red Gums (*Eucalpytus camaldulensis*) are particularly sensitive to works that impact their structural root zone and this was a consideration in defining the project's construction footprint and identifying trees that would need to be removed. This would also need to be considered if any refinements are proposed to the construction footprint during detailed design.

Tree trimming would be done in accordance with *AS4373 Pruning of amenity trees.*

Figure 7-1: Proposed tree removal and trimming - new weir site

7.2 Community river place

No trees would be removed for the construction of the community river place.

7.3 Existing weir

One River Red Gums (*Eucalpytus camaldulensis*) tree would be removed to enable the partial removal and decommissioning of the existing weir (refer to **Figure 7-2**). Tree canopy may also be trimmed to enable access of construction equipment and activities.

Figure 7-2: Proposed tree removal - existing weir site

7.4 Tree to be retained

All trees to be retained that are located within or near to the construction footprint would be protected prior to the commencement of construction by clearly delineating the clearing boundaries and designating areas outside of the clearing boundary as 'no go' areas. Protection would also be provided for trimmed trees once the trimming has been completed.

7.5 Proposed trees

Mature River Red Gums are generally not available in nurseries, so the proposed tree replanting would be reliant on tubestock. Immature trees are prone to failing and therefore a ratio greater than one to one is recommended when planting replacement trees if there is sufficient space. As a guide, a replanting ratio of three tubestock trees for every one tree removed is recommended to improve the likelihood of ultimately reinstating the existing number of trees.

The only opportunity to plant River Red Gum trees along the river at the new weir site is on the left riverbank due to the new permanent infrastructure proposed on the right riverbank and the need to maintain bushfire asset protection zones around some of this new infrastructure. River Red Gums would be planted along the top of the right riverbank as shown in the rehabilitation plan in **Appendix A**.

No trees are proposed to be planted at the community river place.

River Red Gum trees would be planted on the left riverbank at the existing weir site to provide shade at the picnic area and to rehabilitate the riverbank into its pre-weir, naturalistic setting.

Tubestock should be prepared and reserved in advance of installation in accordance with *NATSPEC Guide – Specifying Trees: A Guide to Assessment of Tree Quality*. Chosen tubestock should be free from any significant injury, wounds and bleeding areas, cracks and fungal fruiting bodies. Until established, the trees would need to be watered regularly to ensure continuous healthy growth. Ideally, tubestock would be planted during the seasonally wetter months and just prior to rainfall to optimise survival rates. Any rubbish or weed growth that may occur in the contact area should be removed at regular intervals.

8. Conclusion

This landscape design report has provided details of the proposed landscaping rehabilitation of the new weir and existing weir sites following construction and a concept landscape plan of the new community river place. It addresses how these plans meet the requirements of SEAR no. 16 and the CPTED principles. It also identifies impacts during construction and operation of the new weir and community river place and decommissioning of the existing weir and proposes mitigation and rehabilitation strategies.

New weir

Key visual and landscaping impacts of the construction and operation of the new weir would be the extent of native vegetation clearing, the visual impact of the fishway against the existing natural character of the Darling River (Baaka), and the need to prevent public access to the fishway maintenance track.

The rehabilitation plan addresses these key issues by:

- Retaining as much existing vegetation as possible and locating laydown areas for construction on already cleared land where possible to minimise vegetation clearing
- Revegetating disturbed/cleared areas with new trees proposed to replace those removed during construction on the left riverbank – additional trees have also been proposed to stabilise the riverbank and provide additional habitat and foraging for fauna
- Appropriate endemic species that already exist onsite have been selected to revegetate disturbed areas and seed mixes have been utilised to retain open views where needed as per the CPTED principles
- Including a rock and gravel edge to the fishway to discourage public access while providing interspersed riparian grasses to visually screen the infrastructure and integrate it sensitively to the landscape character.

Engagement with the local community and stakeholder groups has been undertaken including a community and school arts workshop held in early November 2020. Participants created artworks that could be incorporated into the proposal and the rehabilitation plan for the new weir has referenced these artworks in wayfinding/entry markers and wall murals. It is strongly recommended that consultation with the community is continued throughout the design process, particularly regarding culturally sensitive areas onsite such as potential celebration of the canoe tree on the right riverbank.

Community river place

The site of the community river place was selected after consultation with the local community and Central Darling Shire Council due to its cultural significance to the Barkandji and already being a popular fishing location. During consultation, the community expressed a desire for a largely natural space with low key amenities that would support and enhance local cultural practices and recreational activities. In response, the concept landscape plan has incorporated the following design interventions:

- Low key amenities using site won materials from the existing weir supports recreational activities, sensitively integrates the town's historical context and ensures the new recreational space aligns with the natural landscape character of the Darling River (Baaka)
- Interpretive signage that provides information about the history of the area including the oral histories relating to the Ngatji with opportunities to use artworks from the November 2020 community workshop
- An informal carparking area on already cleared land (to reduce disturbance to native vegetation) would support recreational activities such as fishing and canoeing and facilitate walking to the new weir site via the existing track along the top of the right riverbank.

Existing weir

The existing weir holds significant cultural value due to its long-term use as a fish trap. These values will be diminished with the partial removal and decommissioning of the existing weir and its inundation by the new town pool. The proposal has identified that the site needs to be capable of supporting these intangible cultural heritage values and activities. Other key issues and objectives include minimising any environmental impact during construction (clearing of native vegetation), integrating the site into the river setting and maintaining clear sight lines to ensure safety and surveillance.

The rehabilitation plan for the existing weir has addressed these issues and objectives by:

- Installing low maintenance amenities (picnic tables and seating) using site won materials from the existing weir that sensitively integrate the town's historical context and ensures the new recreational space aligns with the natural landscape character of the Darling River (Baaka)
- Including interpretive signage that provides information about the significance of the decommissioned weir and its importance as a fish trap for the local Aboriginal community
- Using the Victoria Park Caravan Park carpark for construction laydown areas and access to minimise clearing and disturbance to native vegetation
- Planting additional trees that provide shade and amenity
- Maintaining a minimum canopy clearance height of 2.5 metres for clear sight lines and surveillance according to the CPTED principles.

9. References

Australian Standards (2009), *Protection of trees on development sites* (AS 4970-2009). SAI Global

Australian Standards (2007), *Pruning of amenity trees* (AS 4970-2007). SAI Global

Central Darling Shire Council and Wilcannia Local Aboriginal Land Council (2018), *Wilcannia Aboriginal Community Heritage Study*

Department of Premier and Cabinet (2020), *Wilcannia Mission Camps and Cultural Places Aboriginal Place Assessment Report*. Department of Premier and Cabinet, NSW Government, Sydney

Department of Urban Affairs and Planning (2001), *Crime prevention and the assessment of development applications – guidelines under section 79C of the* Environmental Planning and Assessment Act 1979. NSW Department of Urban Affairs and Planning, Sydney, April 2001, https://www.police.nsw.gov.au/__data/assets/pdf_file/0003/9390/duapguide_s79c.pdf

Clark, Ross (2018), *Specifying trees – A guide to assessment of tree quality*. NATSPEC

Appendix A. Rehabilitation plan for the new weir site

Landscape Rehabilitation - Recommended Species

Legend	PCT ID	PCT Description	Recommended Species	
			Scientific Name	**Common Name**
	36	River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion	**Trees**	
			Eucalyptus camaldulensis	River Red Gum
			Shrubs	
			Acacia stenophylla	River Cooba
			Chenopodium nitrariaceum	
			Top-mid bank groundcovers	
			Atriplex leptocarpa	Creeping Saltbush
			Cynodon dactylon	Bermuda Grass
			Goodenia glauca	Pale Goodenia
			Paspalidium jubiflorum	Warrego Summer Grass
			Ephemeral zone (aquatic) groundcovers	
			Bolboschoenus caldwellii	Marsh Club Rush
			Cyperus gymnocaulos	Spiny Flat Sedge
			Lachnagrostis filiformis	Fairy Grass
			Eleocharis pallens	Pale Spikerush
			Juncus bufonius	Toad Rush
			Persicaria lapathifolia	Pale Smartweed
			Pseudognaphlium luteoalbum	Jersey Cudweed
			Tetragonia tetragonioides	Warrigal Greens
			Aquatic groundcovers (instream bars)	
			Cyperus gymnocaulos	Spiny Flat Sedge
			Ludwigia peploides	Floating primrose-willow
	36A	River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion (groundcovers only near weir operational infrastructure)	**Top-mid bank groundcovers**	
			Atriplex leptocarpa	Creeping Saltbush
			Cynodon dactylon	Bermuda Grass
			Goodenia glauca	Pale Goodenia
			Ephemeral zone groundcovers	
			Cyperus gymnocaulos	Spiny Flat Sedge
			Lachnagrostis filiformis	Fairy Grass
			Eleocharis pallens	Pale Spikerush
	39	Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion	**Trees**	
			Eucalyptus coolabah	Coolabah
			Eucalyptus camaldulensis	River Red Gum
			Shrubs	
			Acacia stenophylla	River Cooba
			Chenopodium nitrariaceum	Nitre Goosefoot
			Myoporum montanum	Boobialla
			Groundcovers	
			Chloris truncata	Windmill Grass
			Eriochloa crebra	Spring Grass
			Leiocarpa websteri	Leiocarpa
			Plantago turrifera	Small Sago
	39A	Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion (Groundcovers only under power easement corridor)	**Groundcovers**	
			Chloris truncata	Windmill Grass
			Eriochloa crebra	Spring Grass
			Leiocarpa websteri	Leiocarpa
			Plantago turrifera	Small Sago
	158	Old Man Saltbush - mixed chenopod shrubland of the semi-arid hot (persistently dry) and arid climate zones	**Shrubs**	
			Atriplex nummularia	Old Man Saltbush
			Chenopodium nitrariaceum	Nitre Goosefoot
			Groundcovers	
			Atriplex leptocarpa	Creeping Saltbush
			Sclerolaena tricuspis	Three-Spined Bassia
			Plantago turrifera	Small Sago

Legend

Landscaping Treatments

- Existing trees retained on site
- Culturally significant tree
- Proposed tree (*refer Recommended Species list*)
- Large woody debris
- Bushfire Asset Protection Zone
- Revegetation - Old Man Saltbush (PCT ID 158)
- Revegetation - Coolabah - River Coobah - Lignum woodland (PCT ID 39)
- Revegetation - Coolabah - River Coobah - Lignum Woodland (PCT ID 39A) - hydroseeding (endemic grass species only)
- Revegetation - River Red Gum Woodland (PCT ID 36)
- Revegetation - River Red Gum Woodland (PCT ID 36A) (endemic grass species only)
- Rock and gravel edge interspersed with endemic riparian grass species
- Recreational exclusion zone

Proposed Weir

- Construction footprint
- 1 Fishway
- 2 New weir and downstream embankment footprint
- 3 Plunge pool
- 4 Fishway gate control room
- 5 Switch room and weir gate control room
- 6 Crane pad and laydown area for weir gate maintenance
- 7 Crane pad and laydown area for fishway gate maintenance
- 8 Fishway maintenance track
- 9 Location for potential future maintenance of the new weir using a crane

Darling River (Baaka)

Union Bend Road

Opportunity for painted wall murals and artworks by local artists and community members to the switch room and weir gate control room

Artworks by Bama Johnson

Hydroseeding with endemic grass species along power line easement

Soft endemic grasses reduce visual impact to canoe tree

Aquatic plant species are revegetated up to the high water mark, instream and on instream exposed bars. Refer recommended species list

Recreational exclusion zone. The boundaries of this zone will be determined in a safety in design process during detailed design

Opportunity to celebrate canoe tree. Further consultation with local Indigenous stakeholders required

Public access to the fishway maintenance track to be restricted

Recycled rocks and gravel from existing weir site interspersed with endemic riparian grass species integrate weir infrastructure sensitively into the surrounding landscape, forms an organic edge and reduces visual impact of fishway

Restablisation of left riverbank with River Red Gum Woodland plant community

New trees to replace those removed during weir construction

Revegetation of existing plant community (Coolabah - River Coobah - Lignum Woodland)

New access track

New trees to replace those removed during weir construction

Woody debris on the river banks and instream are reinstated to replace those removed during construction

Revegetation of existing plant community (Coolabah - River Coobah - Lignum Woodland)

Recreational exclusion zone. The boundaries of this zone will be determined in a safety in design process during detailed design

Proposed weir signage to feature artworks by members of the community and painted wall treatments for fishway gate control room

Shell by Katrina Johnson

Flower by Tammy King

Seeds by Belinda King

Revegetation of existing plant community (Oldman Saltbush)

Jacobs

WATER NSW
WILCANNIA PROPOSED WEIR - REHABILITATION PLAN
DATE: 24/11/2021

WILCANNIA WEIR: PROPOSED WEIR REHABILITATION PLAN

0 20 40 80 120 160 Metres

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Appendix B. Concept landscape plan for the community river place

Darling River (Baaka)

Existing Union Bend Road

ree

New weir location

Proposed weir signage to feature artworks by members of the community

Shell by Katrina Johnson

Flower by Tammy King

Seeds by Belinda King

Existing walking track

Potential interpretive signage installation along existing walking track. Signage to be developed in consultation with community

Artworks by Bama Johnson

Goanna by Bama Johnson

Wayfinding signage directs visitors to the weir

Proposed informal parking. Spaces would be delineated using site won material and rocks salvaged from the existing weir

Informal seating using site won material such as fallen trees and rocks salvaged from the existing weir

Safety and amenity signage in proximity to car park and picnic areas

Traditional picnic arrangements with tables and benches scattered through the site, shaded by existing trees

Darling River (Baaka)

ENLARGEMENT A

ENLARGEMENT A

N

Scale: 1:2500 at A1

Legend

- Property boundaries
- Existing walking track
- Existing access to water
- Existing road
- Proposed signage location
- New weir location
- Proposed bollards
- Existing trees
- Salvaged Log & rock seats
- Picnic table

Jacobs

WATER NSW
WILCANNIA COMMUNITY RIVER PLACE
DATE: 29/07/2021

WILCANNIA WEIR - COMMUNITY RIVER PLACE: CONCEPT LANDSCAPE PLAN

Appendix C. Rehabilitation plan for the existing weir site

Landscape Rehabilitation - Recommended Species

Legend	PCT ID	PCT Description	Recommended Species	
			Scientific Name	Common Name
			Trees	
	36 & 36A	River Red Gum tall to very tall open forest / woodland wetland on rivers on floodplains mainly in the Darling Riverine Plains Bioregion	*Eucalyptus camaldulensis*	River Red Gum
			Shrubs	
			Acacia stenophylla	River Cooba
			Chenopodium nitrariaceum	
			Top-mid bank groundcovers	
			Atriplex leptocarpa	Creeping Saltbush
			Cynodon dactylon	Bermuda Grass
			Goodenia glauca	Pale Goodenia
			Paspalidium jubiflorum	Warrego Summer Grass
			Ephemeral zone groundcovers	
			Cyperus gymnocaulos	Spiny Flat Sedge
			Lachnagrostis filiformis	Fairy Grass
			Eleocharis pallens	Pale Spikerush

Additional trees improve biodiversity at riverbank and provide shade for new picnic and seating area.
Trees should have a minimum canopy clearance of 2.5m to maintain sight lines

Higher density revegetation of existing plant community to replace those removed during clearing along access track

Proposed landmark signage to celebrate the history of the existing weir and describe its partial removal. The signage will feature artworks by community members


Shell by Katrina Johnson


Seeds by Belinda King


Flower by Tammy King

Informal seating and picnic area using reclaimed site material from the existing weir and cleared trees

Upgraded walking track

Replace lawn impacted during construction works

Darling River (Baaka)

1

2

Legend

Landscaping Treatments

- Existing trees retained on site
- Culturally significant tree
- Proposed tree (*refer Recommended Species list*)
- New informal seating and picnic area
- Revegetation - River Red Gum Woodland (PCT ID 36) (higher density revegetation within clearing boundary)
- Revegetation - River Red Gum Woodland (PCT ID 36A) (lower density revegetation within construction footprint)
- New lawn

Boundaries

- Extent of construction footprint
- Clearing boundary
- 1 Existing access to caravan park
- 2 Upgraded walking track

Jacobs

WATER NSW
WILCANNIA EXISTING WEIR - REHABILITATION PLAN
DATE: 28/11/2021

WILCANNIA WEIR: EXISTING WEIR REHABILITATION PLAN

0 12.5 25 50 75 100 Metres

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