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TECHNICAL MEMORANDUM: WATERWAYS AND STORMWATER QUALITY

North Lakes Anglican College

July 2026

Prepared by Alan Hoban FIEAust CPEng RPEQ
Bligh Tanner ref: 2020.0524.2

SUMMARY

Two drainage lines traverse the site, each draining an upstream catchment of approximately 50 ha: one flowing northward to Saltwater Creek and the other flowing eastward through Lake Eden.

Waterways within the site are mapped as low-risk ('Green') Waterways for Waterway Barrier Works. Any waterway works must reflect natural channel design principles to enhance fish habitat, and all crossings must comply with the Accepted Development Requirements for fish passage.

The stormwater quality strategy for the site is to apply a water sensitive urban design approach that distributes localised raingardens throughout the development in a manner that helps deliver a green campus with passively irrigated garden beds. Raingardens will be sized based on the deemed to comply sizing as specified in the State Planning Policy.

There are two existing stormwater treatment wetlands located within the site boundary that treat runoff from external catchments. These are degraded and devoid of beneficial vegetation. These are to be reconfigured while preserving the same functional footprint and extended detention depth.

Unitywater has provided in-principle support to reestablish the recycled water supply to the site and confirmed that the recycled water main is in service. While not a yet a formal part of the overall water quality strategy, the use of recycled water for sportsfield irrigation is would reduce nutrient discharges to the North Pine River and deliver tangible environmental benefits.

OVERVIEW

An overview of the site with a description of key features from a stormwater, flooding and waterways perspective is provided below.



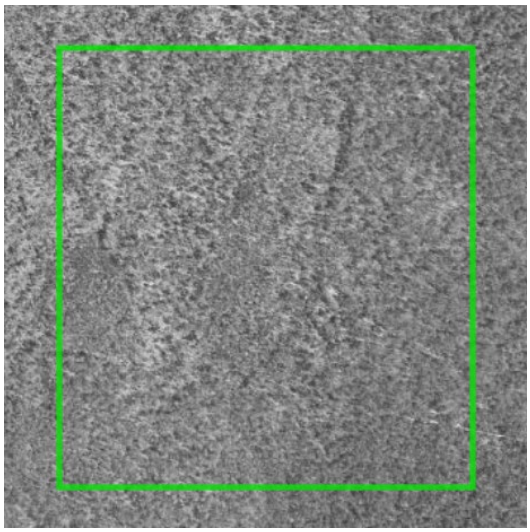
Figure 1 Site Overview

WATERWAY BARRIER WORKS

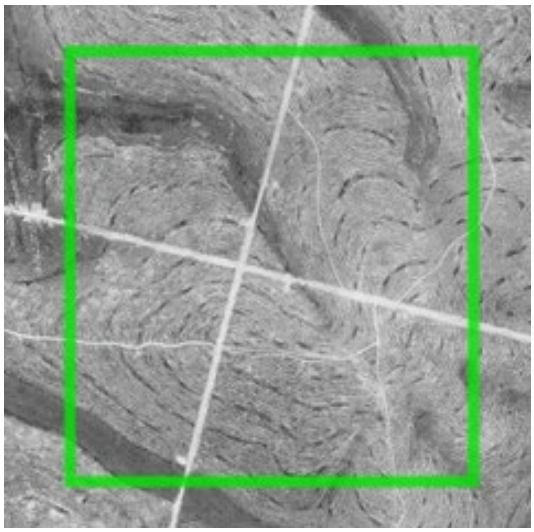
Waterways within the site are mapped as low-risk ('Green') Waterways for Waterway Barrier Works. This section addresses this issue by describing the proposed impacts to waterways within the proposed North Lakes Anglican College and outlines the proposed mitigation measures, with regard to the State Development Assessment Provisions (SDAP) State Code 18: Constructing or raising waterway barrier works in fish habitats and the Accepted Development Requirements (ADR) Operational Works which are constructing or raising waterway barriers (DPI, September 2025).

HISTORICAL CONTEXT

Historical aerial images (sourced through QImagery) are provided in Figure 2 below. The images show the area was forested up to at least 1955, with no defined waterways (likely due to the lower runoff coefficient of forested land). The area was cleared by 1971 and used for plantation forestry through the 1980s and 1990s. By the 1990s a drainage line to the east becomes evident and in the 1997 image the vegetation signifies wetter soil conditions along the drainage lines. By 2002 the North Lakes Golf Course has been constructed and the waterways and waterbodies in the site have been constructed.



1955



1971



1981



1991



1997



2002

Figure 2: Historical Aerial Imager (QImagery)

Downstream of the site, the waterways have significant existing impediments to fish passage, including major culverts and weirs, and the beneficial fish habitat upstream of the site is limited. An overview of existing waterway barriers is provided as Attachment 1. Because of these existing barriers, even if all barriers within the site were removed waterways fully rehabilitated, the potential for significant native fish populations is limited.

All waterway works will reflect natural channel design principles to enhance fish habitat (see Figure 4). Riffles and grade-control structures will be designed no steeper than 1:20 All crossings to comply with the September 2025 updates to the Accepted Development Requirements for fish passage, including fish-friendly culvert design (Figure 5).



Figure 3 Reference imagery –natural channel design works in SEQ

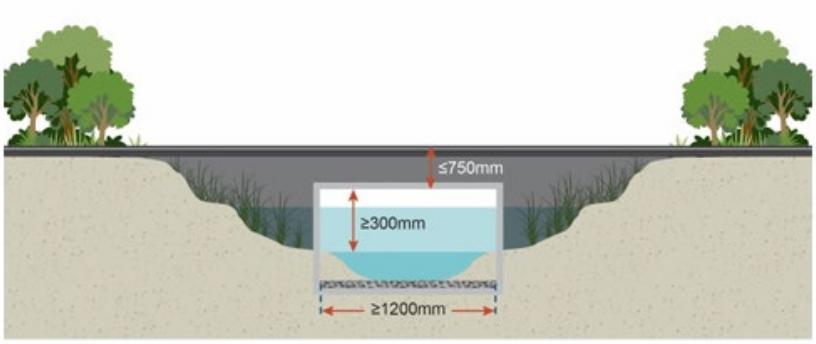


Figure 16. Culvert crossing (cross-section of waterway) – green waterway

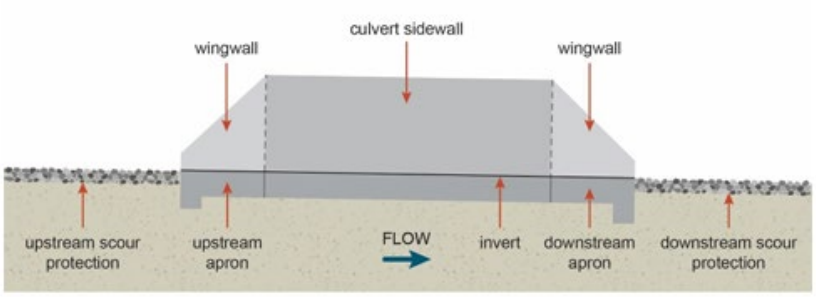


Figure 17. Culvert crossing scour protection (long-section of waterway)

Figure 4 All waterway crossings will reflect the Accepted Development Requirements

Following a site inspection with DAF in March 2026, the strategy was refined to include removal of a significant pre-existing fish barrier as shown in **Figure 3**



Figure 5: Instream weir across the southern waterway forms a significant fish barrier and is to be removed.

EXISTING WETLANDS

Council has provided advice regarding the function and status of waterbodies throughout the former golf course (Figure 6). Red-circled waterbodies are irrigation or landscape features and may be removed. Yellow-circled waterbodies provide stormwater quality treatment for surrounding residential catchments.



Figure 6 Waterbody classification: Yellow = stormwater quality. Red = irrigation pond or landscape feature. Source: City of Moreton Bay

These wetlands are to be reconfigured while preserving the same functional footprint and extended detention depth, as shown in Figure 7 and Figure 8.

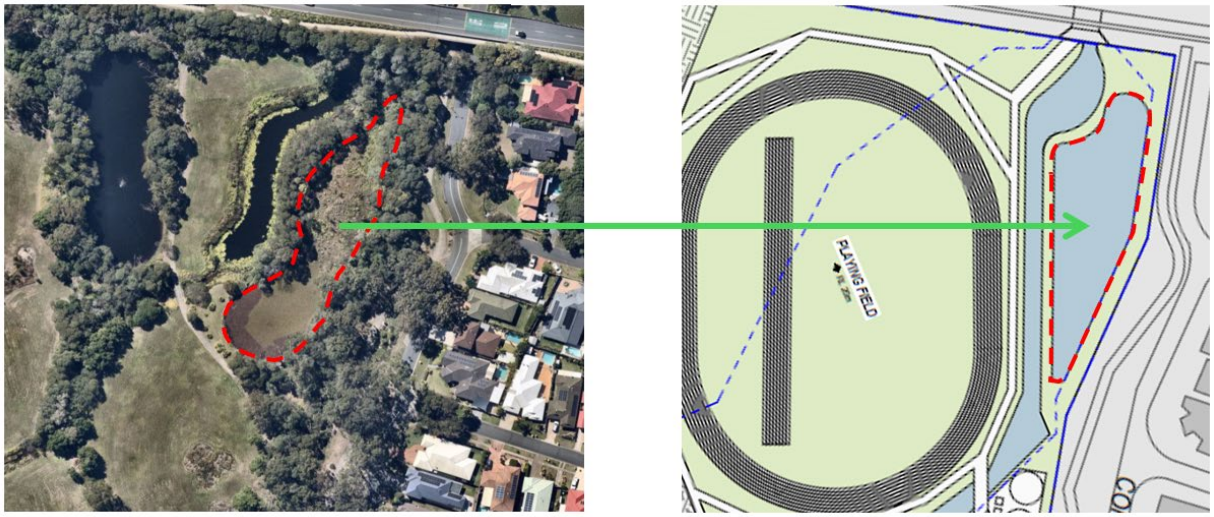


Figure 7 Northern wetland to be reconfigured. Existing shown left, proposed shown right



Figure 8 Eastern wetland to be reconfigured. Existing shown left, proposed shown right

STORMWATER QUALITY

The land-use change from golf course to school inherently improves stormwater quality due to reduced chemical application. This is evident given the annual chemical inputs for the former golf course included:

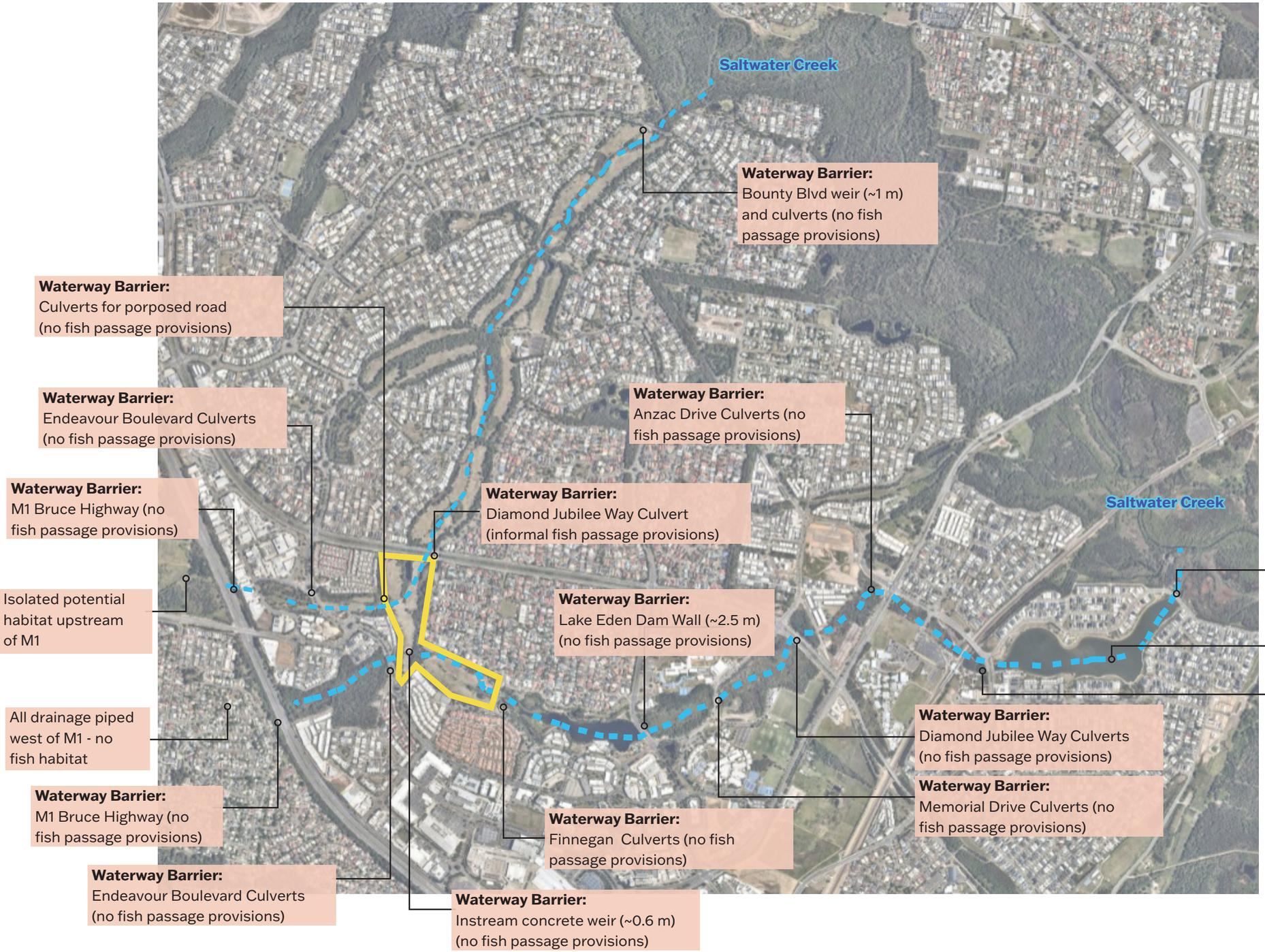
+ 375 L of herbicide
+ 57 L of fungicide
+ 185 L of surfactants
+ 8300 kg of fertiliser.

The changed land use from golf course to school therefore presents a significant improvement in water quality outcomes. Furthermore, extensive recent research indicates urban stormwater pollutant loads are significantly lower than suggested by earlier guidelines (Queensland MUSIC Modelling Guidelines, Healthy Land and Water, InPress).

Stormwater runoff from developed areas will be managed using water sensitive urban design principles using raingardens integrated into site landscaping to meet best practice storm water quality management targets. These are proposed to be sized at 1.5% of contributing catchment area (for catchments exceeding 25% imperviousness) in accordance with the Deemed to Comply provisions outlined in the State Planning Policy Water Quality State Interest. Benefits of this distributed approach are:

- that stormwater treatment devices are easier to integrate into the site design, compared with a large end of pipe system
- stormwater helps support a greener and cooler campus through passive irrigation, while minimising demands on potable water.
- The raingardens can be used as a learning opportunity to educate students about the water cycle.

The former golf course was irrigated with recycled water, and opportunities to irrigate sports fields with recycled water will be explored. This helps conserve water supplies while also helping Unitywater minimise discharge of wastewater into the Lower Pine River. The use of recycled water may constitute a full or partial offset for stormwater quality purposes.



The two drainage lines passing through the proposed school site are significantly compromised in their ability to provide breeding habitat for migratory native fish species in support of the Saltwater Creek estuary and its downstream environs.

Most of these barriers exist on land not subject to this application and outside the control of the proponent.

None of the waterway barrier structures owned by City of Moreton Bay are listed in the LGIP and so there is no prospect of removing/ameliorating these barriers in the forseeable future.

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Attachment 1: Existing waterway barriers

Impact:

Existing online constructed waterbody (0.19 ha 260 m perimeter) and channel (200 m) to be removed.

Mitigation:

Creation of ~220 m of new channel using best practice Natural Channel Design Principles. Existing mangrove fern to be translocated into new channel.

Mitigation:

Waterway crossings in accordance with accepted development requirements.

Mitigation:

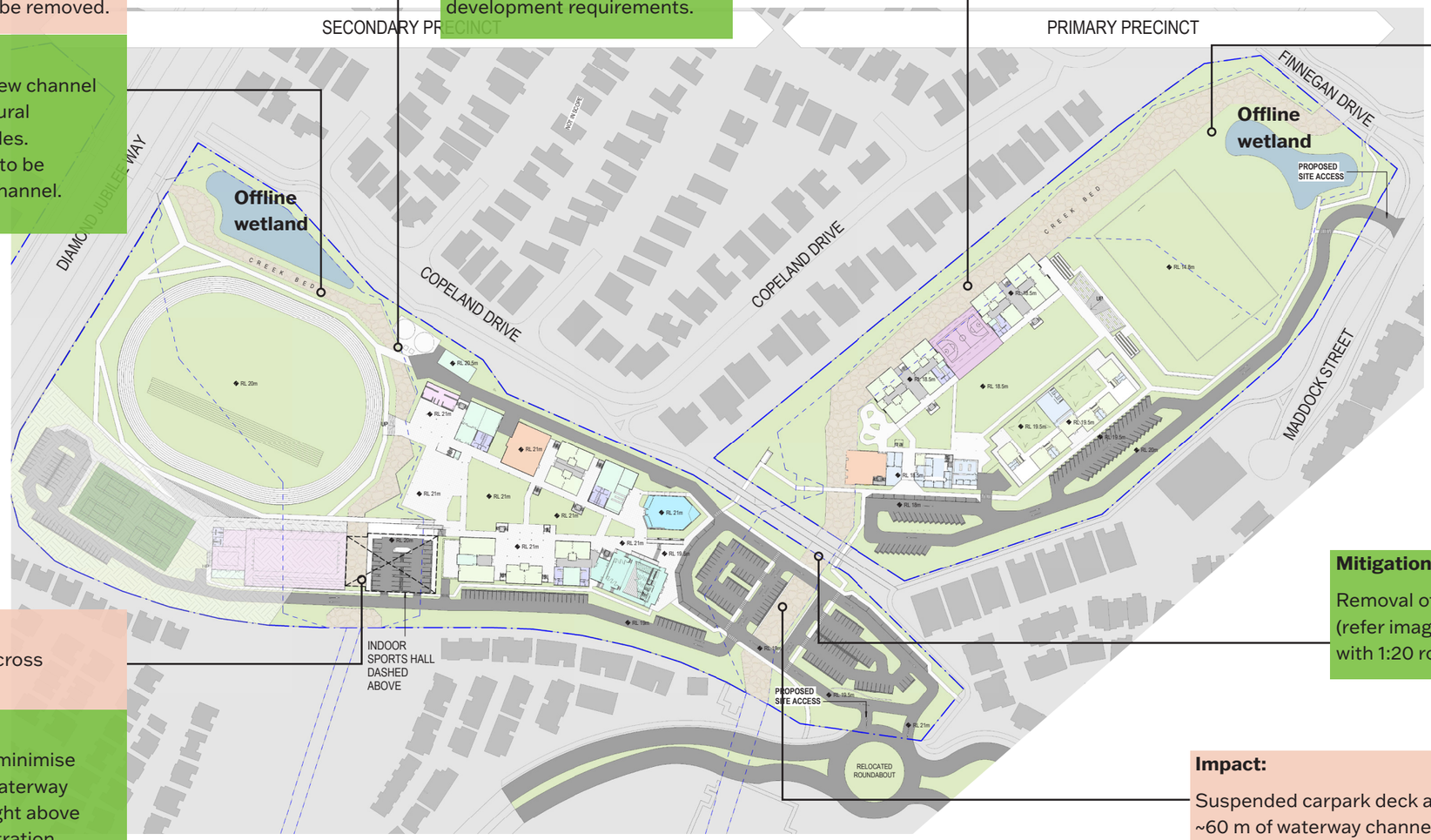
Add instream habitat structure (boulders, root balls and large woody debris) to existing channel to create greater variability in channel velocity. Add small instream refugia pools where practicable.

Impact:

Existing online constructed waterbody (~0.15 ha ~230 m perimeter) and channel (~50 m) to be removed.

Mitigation:

~160 m of new waterway designed with best practice natural channel design principles, including smooth transition into Finnegan Drive culverts.



Impact:

Suspended structure across waterway channel

Mitigation:

Building redesigned to minimise length of span across waterway and maximise clear height above waterway for light penetration.

Mitigation:

Removal of insteam weir (refer image) and replacement with 1:20 rock ramp.

Impact:

Suspended carpark deck across ~60 m of waterway channel.

Mitigation:

Suspended carpark deck redesigned to provide significant ‘open sky’ and rock-lined low flow channel.

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Attachment 2: Proposed waterway barriers design response



Small Creek, Ipswich



Hanlon Park, Stones Corner



Bundamba Creek, Raceview



Small Creek, Ipswich



Hanlon Park, Stones Corner



Lilac Park Waterway, Inala



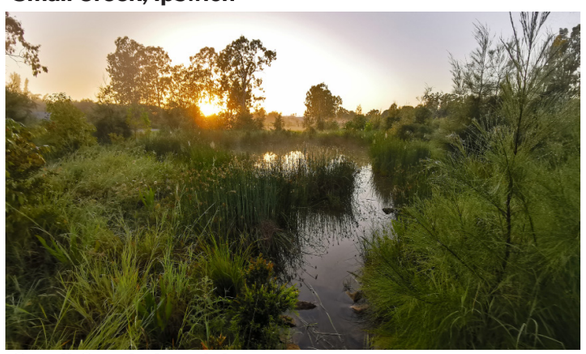
Small Creek, Ipswich



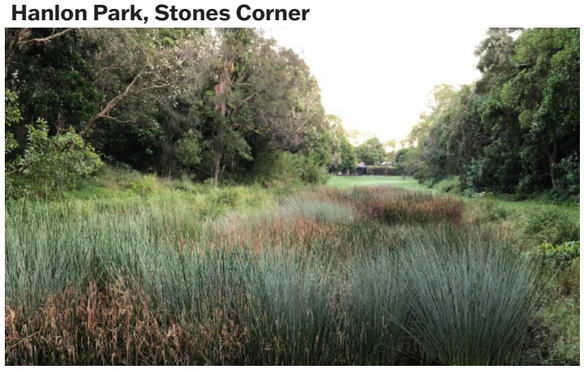
Hanlon Park, Stones Corner



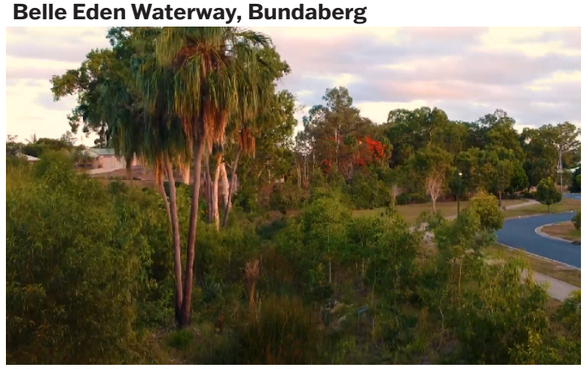
Belle Eden Waterway, Bundaberg



Small Creek, Ipswich



Stumers Creek, Coolum



Little McCreadys Creek, Mackay

Natural Channel Design Credentials:

Bligh Tanner is a national leader in Natural Channel Design. Our design approach is based on replicating natural waterway templates with an emphasis on hydrologic and ecological context, maximising biodiversity and promoting community interaction.

Post-construction fish surveys of Hanlon Park found a three-fold increase in overall abundance, a seven-fold increase in native fish (PONSE) and four-fold increase in native freshwater species.

Selected Project Awards

Bligh Tanner has received over 30 state and national awards for waterway projects in the past decade. Highlights include:

2024 - River Basin Management Society: Highly Commended Outstanding Waterway Management Project - Hanlon Park Bur'uda

2024 - Ministers Urban Design Awards: Highly Commended - Hanlon Park Bur'uda

2023 - AILA National Landscape Architecture Award and Qld Award of Excellence: Land Management - Hanlon Park Bur'uda

2023 - Stormwater Australia Excellence Award, Integrated Stormwater Design - Hanlon Park Bur'uda Redevelopment

2022 - Landscape Queensland Landscape Rehabilitation Award - Belle Eden Waterway Naturalisation

2020 - AILA National Awards, Award of Excellence in Land Management, for Small Creek Naturalisation

2019 - River Basin Management Society Finalist - Outstanding Waterway Management Project, for Small Creek Naturalisation

2018 - Minister's Award for Urban Design, Commendation, Excellence in Urban Design, for Small Creek Naturalisation

2017 - AILA National Awards, Landscape Architecture Award in Land Management, for Small Creek Naturalisation

All images are natural channel design projects designed by Bligh Tanner

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Attachment 3: Natural Channel Design Approach