Stantec New Zealand
Building 2 Hazeldean Business Park
Level 3, 2 Hazeldean Road
Addington, Christchurch 8024
NEW ZEALAND
Mail to: PO Box 13052, Christchurch 8140

29 October 2026

Enquiries: Jarred Arthur
Project No: 310206381

Carter Group
Level 7, The Crossing Car Park
166 Cashel Street, Christchurch 8011
P O Box 2726 Christchurch, New Zealand 8140

Attention: Tim Carter

Reference: Westhaven Residential Development Fast-track Substantive Application - Aquatic Ecology Assessment

1 Introduction

1.1 Background

Carter Group Limited has engaged Stantec to provide an assessment of aquatic ecological values and potential effects for the proposed Westhaven residential development. This is to inform the substantive application for approvals under the Fast-track Approvals Act 2024 (FTAA or the Act). The Westhaven development is a listed project in Schedule 2 of the FTAA. The project listing reference is 'Rolleston West Residential Development' and it is otherwise now known as 'Westhaven'.

The proposed development is located across several land parcels to the west of Dunns Crossing Road, Rolleston (Figure 1). The proposal includes subdividing 263 ha of land for the construction of approximately 4,134 residential dwellings, three commercial centres, and associated infrastructure. Stage 1 of the development area (Figure 1) has resource consents[1] and construction has already commenced. It is, therefore, not considered part of the FTAA application.

Appendix A contains landscape designs that provide further context on the proposed location and design elements of the Westhaven development.

[1] Selwyn District Council consents RC265048 and RC265049; and Canterbury Regional Council consents CRC263616 and CRC270049.

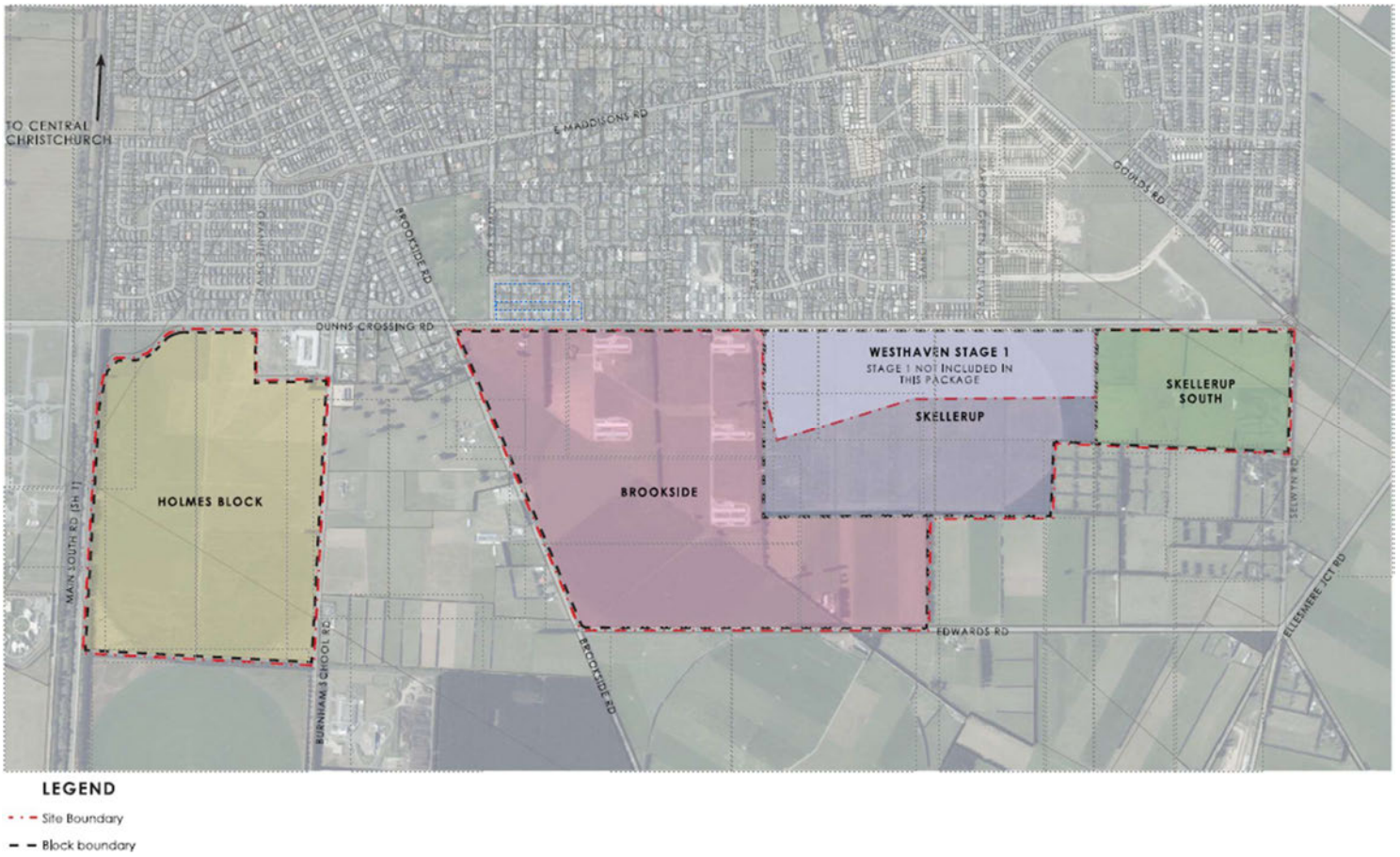


Figure 1: Westhaven residential development site including named land blocks (DCM Urban, 2026).

1.2 Previous Assessments

A large portion of the proposed development site was previously assessed for aquatic ecological values as part of private plan requests to the Selwyn District Plan (e.g., PC73 and PC81). The plan changes were to rezone the area and allow for urban residential and commercial land uses (i.e., General Residential Zone).

Previous ecological assessments have evaluated the following areas:

- Holmes and Skellerup blocks for PC73 by Aquatic Ecology Limited (Taylor, 2020; Appendix B).
- Skellerup South Block for PC81 by Aquatic Ecology Limited (Taylor, 2021; Appendix C).

Each of the Taylor (2020 & 2021) assessments were based on desktop evaluations of publicly available information and site photographs. These covered most of the areas within the proposed Westhaven development site except for the Brookside Block (Figure 1). Waterways within the Brookside Block were considered during the PC82 evaluation to rezone the land, but no desktop or field assessments for ecological values were undertaken as part of the process.

EOS Ecology also previously undertook a catchment-scale field study of aquatic fauna and habitat in the Paparua Water Race Scheme network (Demchick & McMurtrie, 2022[2]). This investigation was for purposes unrelated to the plan changes and did not focus on the proposed Westhaven site.

1.3 Scope and Purpose

The scope and purpose of this report is to:

- review previous aquatic ecology assessments for the proposed Westhaven development area;
- provide an updated assessment of aquatic values;
- assess the potential effects of development activities on aquatic ecological values; and
- inform the substantive application for the development under the FTAA.

This assessment has been prepared in accordance with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. The authors have complied with that Code in preparing this report and confirm that the opinions expressed are within their respective areas of expertise, except where reliance has been placed on information or opinions provided by others.

The qualifications and experience of the author of this report are outlined in Appendix D.

---

[2] *Demchick & McMurtrie (2022):* *https://ccc.govt.nz/assets/Documents/Environment/Water/Monitoring-Reports/2022-reports/Paparua_water_race_surveys_sent_2022-09-23.pdf*

2 Desktop Assessment

2.1 Methods

Previous ecological assessments associated with the site and wider Paparua Water Race Scheme network (see Section 1.2) were reviewed for relevant information and background context on ecosystem values. A desktop review of relevant databases and geospatial layers, as listed below, has also been conducted.

- Aerial imagery and site photographs
- Canterbury Maps geospatial layers, including Black Maps
- SDC water race layers
- New Zealand Freshwater Fish Database (NZFFD)
- Wilderlab eDNA database

Using the above information sources, aquatic ecological features and species likely to inhabit the site have been considered when determining the potential effects from the proposed development.

2.2 Site Overview

The previous Taylor (2020 & 2021) assessments confirmed that the only aquatic habitat within the development site is a branch of the Paparua Water Race Scheme (hereon referred to as 'the Water Race'). For the most part, the Water Race flows along the western boundary of the Holmes Block and through the Brookside, Skellerup, and Skellerup South blocks (Figure 2).

The Paparua Water Race Scheme at the Westhaven development location is operated by Selwyn District Council. The race network was constructed over 100 years ago, primarily to serve as a supply of stock drinking water. It also serves secondary purposes including for irrigation, firefighting services, and amenity values. The race system sources high quality, alpine-fed Waimakariri River water from over 20 km away at Intake Road. Both Council and private landowners have responsibilities to ensure that the race is clean and functional.

At the northern extent of the development site, the Water Race enters the Holmes Block from the southern side of State Highway One (Figure 2). It then continues through the northwest portion of the block for approximately 475 m before it crosses the western Holmes Block boundary and enters land owned by Selwyn District Council.

The Water Race flows through the centre of the Brookside Block, and mostly along the western extent of the Skellerup Block. In its lower reach, the Water Race exits Westhaven land at the southwest corner of the Skellerup Block. Here it flows into a property at 984 Selwyn Road (Lot 2 DP 74801), which is

subject to Variation 5 of the Partially Operative Selwyn District Plan[3]. It then re-enters the Skellerup South Block where it eventually terminates at a soakpit (Figure 2).

Appendix E contains representative photographs of the Water Race within and adjacent to the proposed development site. A summary of the waterway's characteristics and habitat is outlined in Section 3.

2.3 Aquatic Fauna

Taylor (2021) considered that fish diversity and abundance was likely to be low in the Water Race near the development site due to its distance from the screened intake from the Waimakariri River. The report also expected that invertebrate biodiversity would be compromised due to existing race management practises (e.g., vegetation and sediment clearance). Taylor (2021) concluded that, given a 10 m land use setback from the Water Race, the likelihood of negative impacts to water race values be low.

As part of this revised ecological assessment, the NZFFD was reviewed for water race fish catch records within 10 km upstream of the site (Table 1). The records show that the Paparua Water Race Network supports a variety of indigenous freshwater fish species, including those that are classified as At Risk or Threatened. Brown trout (*Salmo trutta*) are also present, while kākahi/freshwater mussels (*Echyridella menziesi*; At Risk - declining) are located in some reaches.

Table 1: NZFFD results for the Paparua Water Race network with 10 km of Westhaven site.

Scientific Name	Common Name	Threat Classification (Dunn et al., 2025; Grainger et al., 2018)
Anguilla australis	Shortfin eel	Not Threatened
Anguilla dieffenbachii	Longfin eel	At Risk, Declining
Echyridella menziesi	Freshwater mussel	At Risk, Declining
Galaxias maculatus	Inanga	Threatened, Nationally Vulnerable
Gobiomorphus	Unidentified bully	N/A
Gobiomorphus breviceps	Upland bully	At Risk, Naturally Uncommon
Gobiomorphus cotidianus	Common bully	Not Threatened
Gobiomorphus hubbsi	Bluegill bully	At Risk, Naturally Uncommon
Salmo trutta	Brown trout	Introduced and Naturalised

[3] Request to change the Partially Operative Selwyn District Plan by rezoning approx. 66ha of land at the corner of Edwards & Selwyn Roads, Rolleston from General Rural Zone to Medium Density Residential Zone. Hearing occurred October 14th & 15th 2026.

Reaches of the wider Paparua Water Race Network were ecologically surveyed in 2022 by EOS Ecology (Demchick & McMurtrie, 2022), with the nearest connected sampling site to the Westhaven site located approximately 7 km upstream (ES16, Newtons Road). The sampling indicated soft-bottomed substrates, with a Macroinvertebrate Community Index (MCI) score of 72 and percent Ephemeroptera, Plecoptera, Trichoptera (%EPT) richness of 23%. Fish recorded at the ES16 site using electric fishing and trapping techniques were limited to upland bully (*Gobiomorphus breviceps*) and common bully (*G. cotidianus*).

Environmental DNA (eDNA) samples taken by Demchick & McMurtrie (2022) indicated upland bully presence at 14 out of 15 sites sampled in the Paparua water race catchment. Shortfin eel (*Anguilla australis*; 11 sites), longfin eel (*A. dieffenbachia*; nine sites), and brown trout (10 sites) were widespread. Torrentfish (*Cheimarrichthys fosteri*), common bully and rainbow trout (*Oncorhynchus mykiss*) were only detected at single site.

It is likely that the upland bully is one of the few indigenous fish species with a self-sustaining population within the water races, as the majority of other species present have a migratory, oceanic life-stage. This is reflected in the comparatively high occurrence of upland bully in the EOS sampling and NZFFD records.



Figure 2: Water Race alignment near Westhaven land include proposed reach closure

Project Code: 310003520

Date: 2026-10-09

Legend

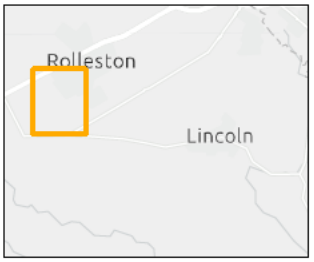
- eDNA Sample Location
- Water Race Lines
- Development Block

Notes:
1. Map displayed in NZGD 2000 New Zealand Transverse Mercator

References:
1. Aerial imagery provided by LINZ Data Service.
2. All other layers sourced by Stantec.

0 150 300 450 600 Metres

Scale at A4: 1:17,500



Stantec

U:\310003520\technical\GIS\Westhaven\Westhaven.aprx | A4 Portrait | Last updated 2026-10-09 By: mleith

This document has been prepared based on information provided by others as cited in the data sources. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.

3 Site Assessment

3.1 Methods

A site walkover of the Westhaven development site was undertaken on 2 July 2026. The full extent of the Water Race was visually inspected to characterise aquatic values, race condition, and identify opportunities for management interventions (see Appendix E for site photographs).

eDNA sampling was undertaken within the site at the downstream extent of the water race (Figure 2). Sampling was undertaken in accordance with best practice methodologies using a six-replicate, syringe sampling kit (Melchior & Baker, 2023). Samples were processed by the Wilderlab laboratory using a comprehensive suite of analytical primers.

3.2 Results

The Water Race, within the upper reaches of the site (the Holmes Block), was predominantly soft-bottomed, with areas of gravel underlying fine sediment within the main channel of flow (Appendix E). Submerged and emergent macrophytes were common and the Water Race was fenced. Average wetted width was between 1.5 m and 2 m, and riparian vegetation was representative of the modified race conditions, with predominantly exotic weed cover and some *Carex* and *Juncus* species present along the banks. It is likely that surface water flows permanently, but it is possible that the channel dries occasionally.

In the lower reach of the Water Race (i.e., at the Brookside, Skellerup, and Skellerup South Blocks), there were unfenced sections with much shallower, wider channel characteristics conditions than those present upstream. Adjacent to the chicken yards in the Brookside Block, areas of pugging from stock were evident. Substrates were predominantly soft-bottomed, with some areas of gravel present. Riparian vegetation was limited and dominated by exotic weeds, with some hydrophytic vegetation present.

eDNA results indicated the presence of three fish species within the upstream race (Table 2), with no freshwater mussels/kākahi or freshwater crayfish/koura (*Paranephrops zealandicus*). While shortfin eel and upland bully were detected, as expected in this race network, torrentfish presence is less common (see Section 2.3). Torrentfish eDNA was recorded in only one of the six sampling replicates, so it is likely that numbers of this species are very low.

The sites Taxon-Independent Community Index (TICI) score was 96.06. This is representative of ‘Average’ stream conditions (Wilkinson et al, 2024).

Table 2: Summarised eDNA results from sampling of the Water Race on the Westhaven site.

Scientific Name	Common Name	Threat Classification (Dunn et al., 2025)
Anguilla australis	Shortfin eel	Not Threatened
Cheimarrichthys fosteri	Torrentfish	At Risk, Naturally Uncommon
Gobiomorphus breviceps	Upland bully	At Risk, Naturally Uncommon
Gobiomorphuss spp.	Unidentified bully	N/A
Salmo spp.	Unidentified salmonid	N/A

4 Assessment of Effects

4.1 Proposed Activities

A section of the Water Race is proposed to be infilled and closed as part of the construction of urban lots and supporting infrastructure including roads, paths and subsurface pipework.

The affected waterway reach is located downstream of where the race branches and enters the Westhaven Site at the northwestern corner of the Brookside Block (Figure 2). Residual flow will be redirected and conveyed down the retained water race channel on neighbouring land adjacent to the western boundary of the Brookside Block. The Water Race upstream of the branching node will also be retained with exception of the realigned, enhanced reach in the northern Holmes Block as described in Section 4.4 (Figure 3).

In addition to water race realignments and closures, approximately 7 m of water race will require culverting (Figure 3). The location of the culvert installation will be in a section of realigned water race in the north of the Holmes Block and adjacent to State Highway One. This reach of water race has permanent (or near-permanent) flow, is narrow (generally 1.5-2 m wide), slow to moderate velocities, and a soft bed overlying gravels (see photos 1 and 2 in Appendix E). Culverting is required to enable passage of the waterway channel through a landscaped and planted bund. This is a visual, sound and amenity requirement for properties to be constructed within proximity of the highway[4].

[4] Landscape plans from DCM Urban (2026) contain more information on bund designs and requirements.

4.2 Regulatory Context

Under Policy 7 of the National Policy Statement for Freshwater Management (NPSFM 2020[5]), loss of river extent and values is to be avoided to the extent practicable. However, under the Canterbury Land and Water Regional Plan (CLWRP[6]), water races are defined as: "*a type of artificial watercourse used for the managed conveyance of water often, but not exclusively, for stockwater or irrigation purposes and excludes any drain*".

The Paparua Water Race Network was established over 100 years ago. Its primary purpose is the supply of stock drinking water, but it has secondary purposes including use for irrigation. It was artificially constructed and sources water from a manufactured water take at the Waimakariri River. The Water Race within the vicinity of the Westhaven development is therefore defined as an 'artificial watercourse'.

Despite this classification, an assessment of aquatic ecological effects for the Westhaven development has been undertaken given the proposed loss of waterway extent. This includes the provision of recommendations for management measures to avoid, remedy and minimise potential adverse effects on habitat and fauna.

4.3 Ecological Value and Effects

The Paparua Water Race Network is known to support high ecological values in some reaches, despite being an artificial watercourse system (see Sections 2 and 3). The ecological value of the Water Race flowing through the Westhaven site is considered to be 'moderate'. This is despite the low species diversity of the waterway, and based on its habitat condition, 'average' TICI score, and presence of two At Risk – naturally uncommon fish taxa.

The proposed development will result in the closure of the lower reach of the water race (Figure 2), with the enhancement of the upper reach proposed to improve ecological and riparian values (Figure 3). A short length (approx. 7 m) of race will also be culverted; however this will be designed to ensure fish passage is maintained (see Section below). While some loss of an extent of this artificial waterway will occur (loss of approximately 2.8 km of race), there are no known users of this section of race, and the termination point of the race is within the Skellerup South Block on the site.

The magnitude of effect of closure of this c.2.8 km terminal reach of race is considered to be moderate in the absence of the management measures set out in Section 4.4. This is due to the resulting loss of aquatic habitat and potential impacts on resident fauna, although it is noted this is an artificial channel.

---

[5] NPSFM-2020-amended-December-2025
[6] Canterbury Land and Water Regional Plan | Environment Canterbury

4.4 Proposed Management

To provide ecological betterment to the site's waterways and manage for the loss of the closed water race reach, it is proposed that the upper reach of water race is realigned and enhanced to improve its current ecological value (both instream and in adjacent riparian areas). The area of water race proposed for enhancement is approximately 475 m in linear length and situated in the northern extent of the Holmes Block.

A conceptual design of the proposed realignment and enhancement is contained in Figure 3, with more detail outlined in Appendix A. The realignment will include the introduction of increased meanders to increase the extent of aquatic habitat within this reach, as well as sections of benched and gently sloped banks to provide indigenous riparian wetland habitat. A detailed Waterway Enhancement Plan, proposed as a condition of consent, will include provisions for native plantings, instream design features, and riparian buffers to improve waterway habitat quality and amenity values. The enhancement will also adjoin neighbouring lizard habitat enhancements and bund plantings to improve connectivity with adjacent indigenous habitats to be created.

In summary, the complete suite of recommendations to manage any potential adverse effects of the proposed development are included below:

- Consultation with Selwyn District Council on water race closure including requirement for creation of a soak pit (if required). It is noted this consultation has started.
- Fish salvage of the reach of race proposed to be closed, by a suitably qualified freshwater ecologist in accordance with the conditions of consent. This also applies to upper reaches of water race proposed to be realigned and/or culverted (if required).
- Any surface water dewatering should occur with appropriate screens in place on pump intakes to avoid adverse effects to fish. Screens with a mesh size of 3 mm should be used to prevent fish from being sucked into any pumps.
- Realignment and enhancement of the upper reach of water race to improve ecological values of the waterway and adjacent riparian habitat, including provision of benched or gently sloping banks to create riparian wetland habitat, and the addition of meanders and riffles to provide an increase in length and ecological value. Enhancement measures should be included in a conditioned Waterway Enhancement Plan.
- Planting of eco-sourced native riparian vegetation along the realigned reach of water race, with a focus on hydrophytic vegetation in close proximity to the waterway to provide for wetland values. A planted setback of up to 5 m is recommended, with greater buffers where opportunities to create improved connectivity with lizard habitats and landscaped bunds.
- Maintenance and monitoring of riparian planting areas to ensure planting success and condition.
- Culvert designs and instalment should be reviewed by a suitably qualified freshwater ecologist to evaluate consistency with the latest version of the New Zealand Fish Passage Guidelines (Franklin et al., 2024). Considerations should include that the culvert must:

  - provide for the same passage of fish upstream and downstream as would exist without the culvert, except as required to carry out the works to place, alter, extend, or reconstruct the culvert.
  - be at least 1.3 times the bed width at bed level.
  - be laid parallel to the slope of the bed of the waterway or connected area.
  - have a mean cross-sectional water velocity no greater than that in immediately adjoining water race reaches.
  - be open-bottomed, or its invert must be placed so that at least 25% of the culvert's diameter is below the level of the bed.
  - have stable bed substrate along its full length.
- Implementation of erosion and sediment control procedures (including implementation of an Erosion and Sediment Control Plan) for construction works.
- Avoidance of discharge of contaminants, such as fuel, grease, and oil, through appropriate control and containment procedures.

With the proposed enhancement of the waterway reach, planting of adjacent land areas, and adoption of other recommendations outlined above, it is considered that adverse effects of the Westhaven development can be adequately managed.

5 Summary

As part of the proposed Westhaven development, an approximately 2.8 km section of the artificial water race is proposed to be closed. To manage the loss of this aquatic habitat, it is proposed that the upper reach of water race (within the Holmes Block) is enhanced to improve its current ecological value. Fish from the closed water race will be salvaged and relocated, and extensive planting will be undertaken to promote habitat connectivity between the waterway and adjacent enhanced areas (e.g., lizard habitat).

A culvert installation, where the water race will cross a proposed bund installation adjacent to State Highway One, is also required. Proposed conditions of consent include requirements that the culvert design will meet minimum standards to enable fish passage, ecologist review prior to installation, and as-built confirmation after installation. The proposed culvert is considered a standard freshwater fisheries activity (see Fast-track application's planning assessment).

If recommendations outlined in this assessment are followed (see Section 4.4), it is considered that potential adverse effects associated with the loss of part of the artificial water race can be adequately managed.

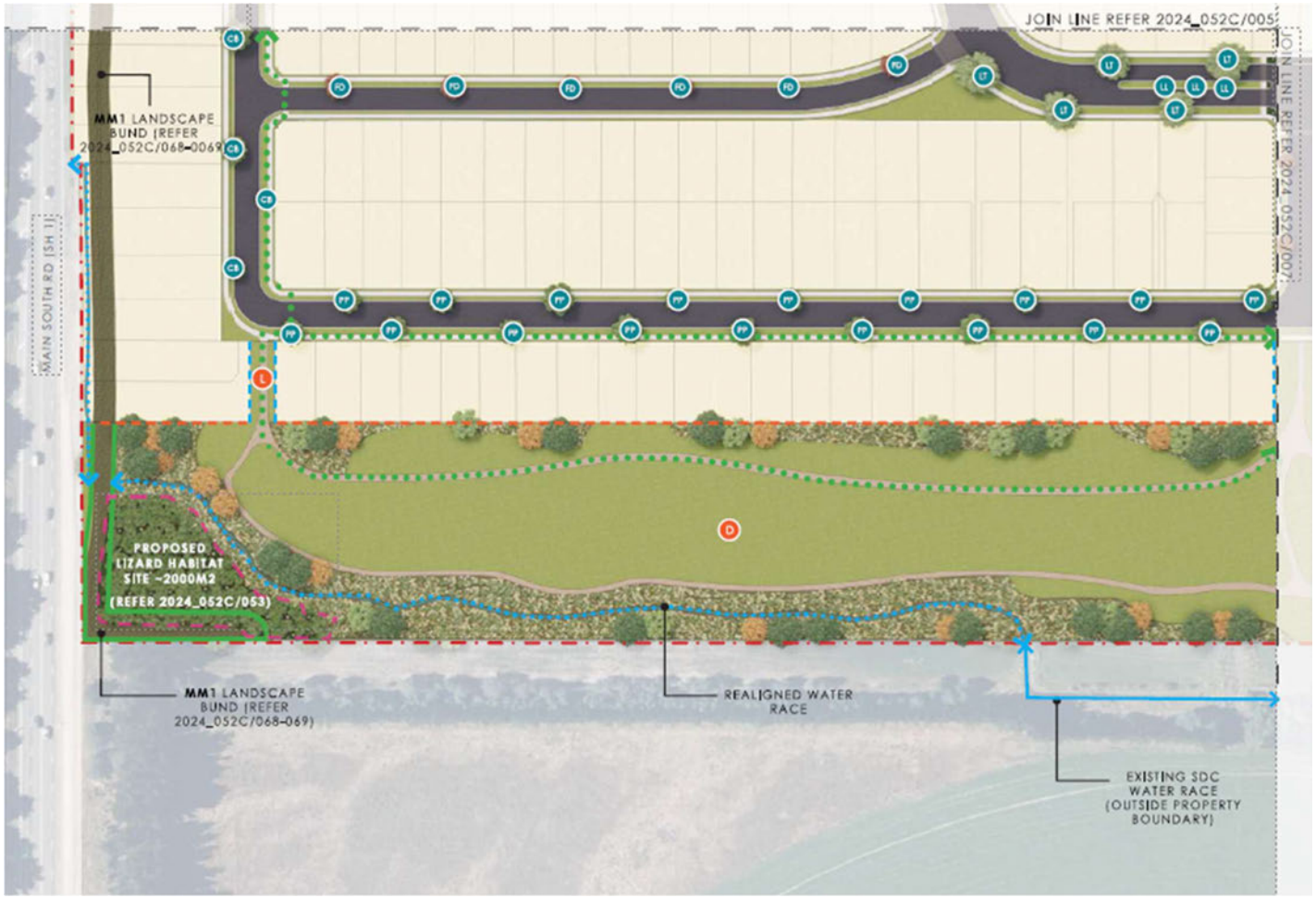


Figure 3 Landscape concept plan of proposed realignment and enhancement planting of the Water Race in the Holmes Block (DCM Urban, 2026). The green outlined area indicates the location of a bund and landscape buffer through which a culvert will be installed.

6 References

DCM Urban (2026). Westhaven Residential Development: urban design and landscape graphic attachment, revision B. Project no. 2024_052C. Prepared for Carter Group Limited, 22 October 2026.

Demchick, E. & McMurtrie, S. (2022). Paparua Water Race Scheme: 2022 ecological surveys. EOS Ecology report no. CHR01-21052-01 prepared for Christchurch City Council and Selwyn District Council, May 2022.

Dunn, N.R., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Hicks, A.S., Hickford, M.J.H., Jack, D.C., Kitson, J.C., Ling, N., Waters, J.M., Wylie, M.J., Hitchmough, R.A., & Makan, T. (2025). Conservation status of New Zealand freshwater fishes, 2023. New Zealand Threat Classification Series 46. Department of Conservation, Wellington. 66 p.

Franklin, P., Baker, C., Gee, E., Bowie, S., Melchior, M., Egan, E., Aghazadegan, L. & Vodjansky, E. (2024). New Zealand fish passage guidelines (2nd ed.). National Institute of Water and Atmospheric Research. https://niwa.co.nz/freshwater/fish-passage-home/new-zealand-fish-passage-guidelines

Grainger, N., Harding, J., Drinan, T., Collier, K., Smith, B., Death, R., Makan, T., & Rolfe, J. (2018). Conservation status of New Zealand freshwater invertebrates, 2018. New Zealand Threat Classification Series 28. Department of Conservation, Wellington. 25 p.

Melchior, M. & Baker, C. (2023). eDNA guidelines and field protocols for lotic systems. NIWA client report no. 2023279HN, December 2023.

Taylor, M. (2020). Ecological values in two Rolleston Blocks. Technical letter prepared by Aquatic Ecology Limited for Rolleston West Residential Limited, 12 November 2020.

Taylor, M. (2021). Ecological values in the Skellerup South Block. Technical letter prepared by Aquatic Ecology Limited for Rolleston Industrial Developments Limited, 29 September 2021.

Wilkinson, S. P., Gault, A. A., Welsh, S. A., Smith, J. P., David, B. O., Hicks, A. S., Fake, D. R., Suren, A. M., Shaffer, M. R., Jarman, S. N., & Bunce, M. (2024). TICI: A taxon-independent community index for eDNA-based ecological health assessment. *Peer J*, **12**, e16963. doi.org

Please do not hesitate to contact the undersigned if you have any queries.

Yours sincerely

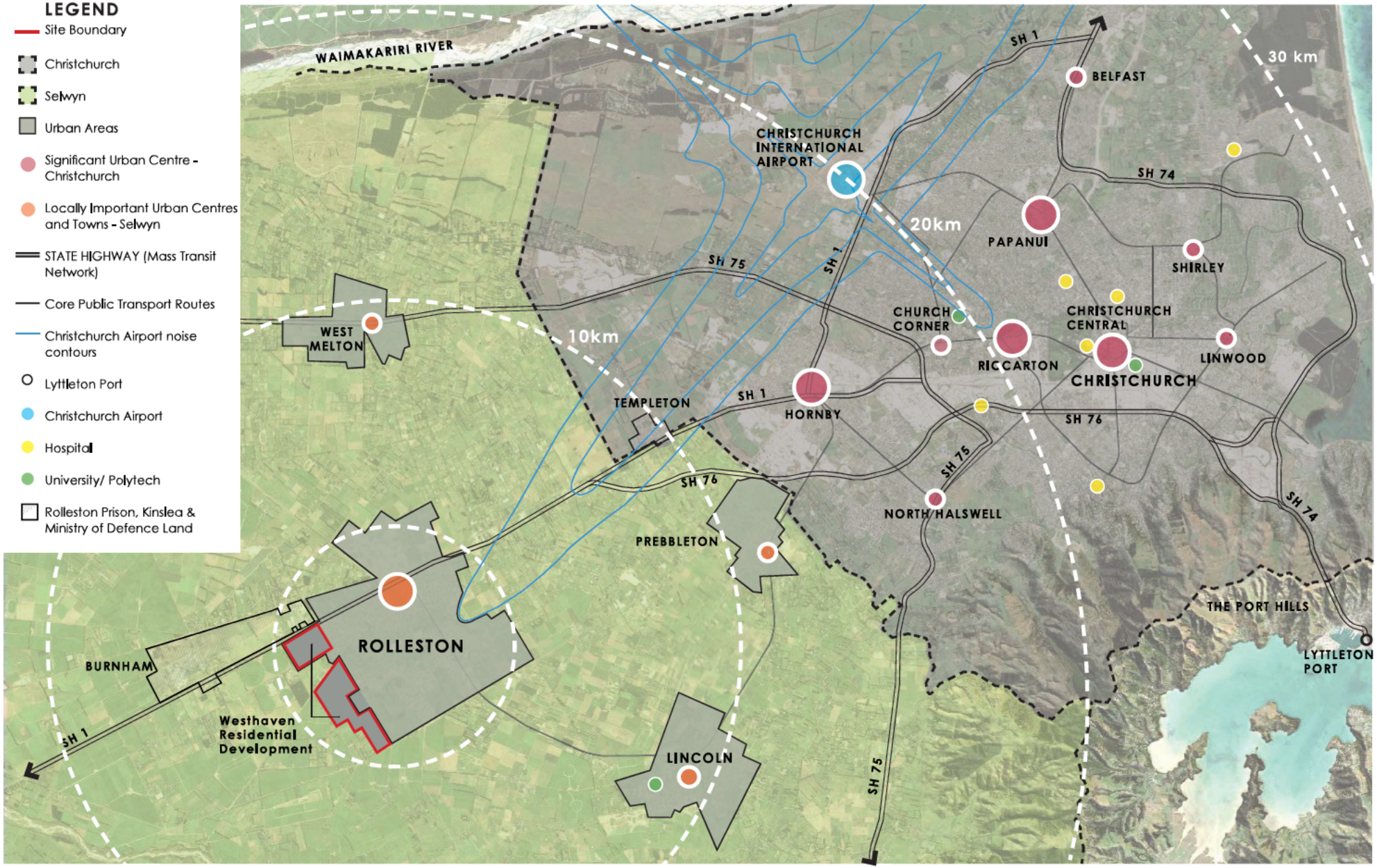
Stantec New Zealand



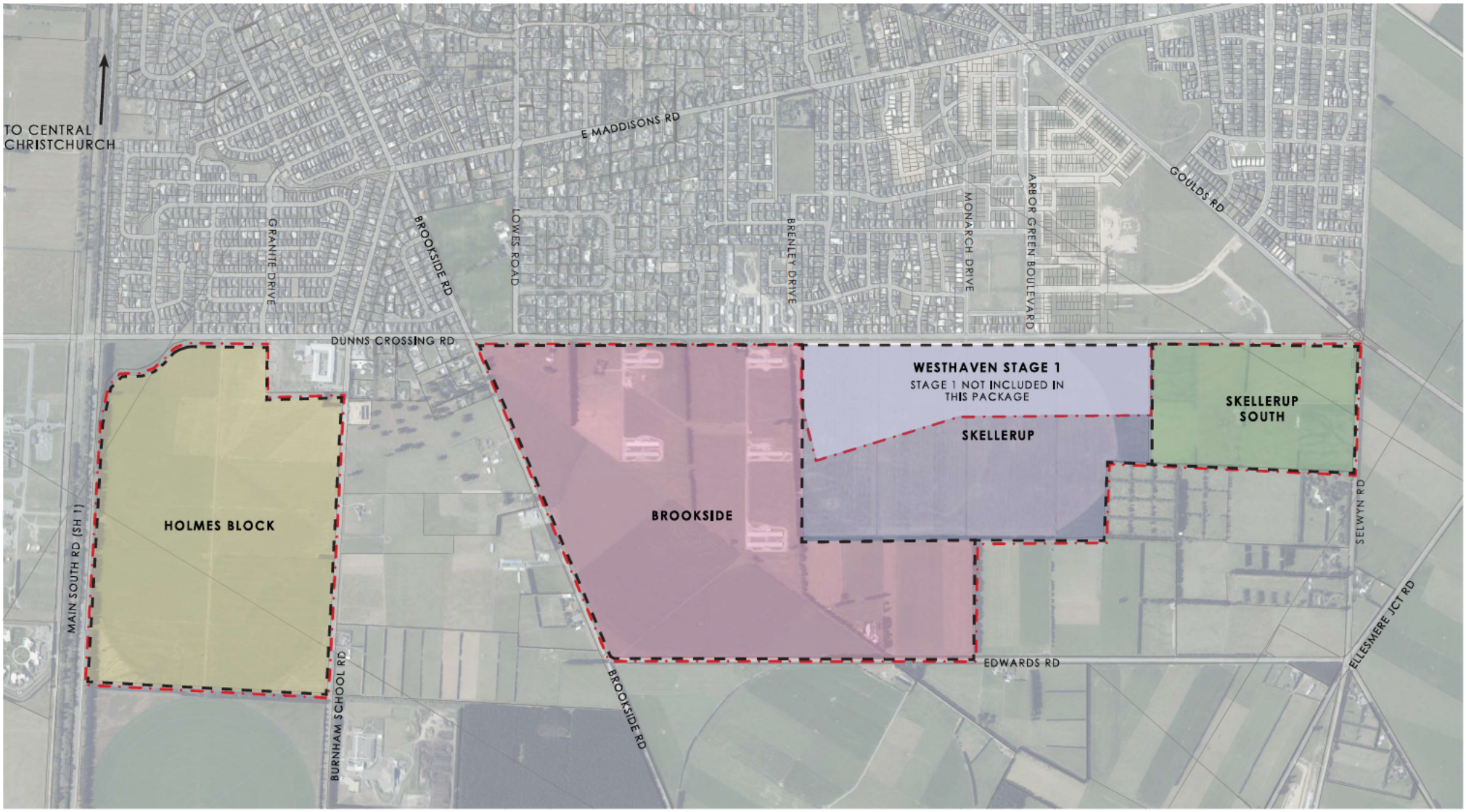
Jarred Arthur MSc
Principal Ecologist/Team Leader
[redacted]

stantec.com/nz

Appendix A Landscape Designs



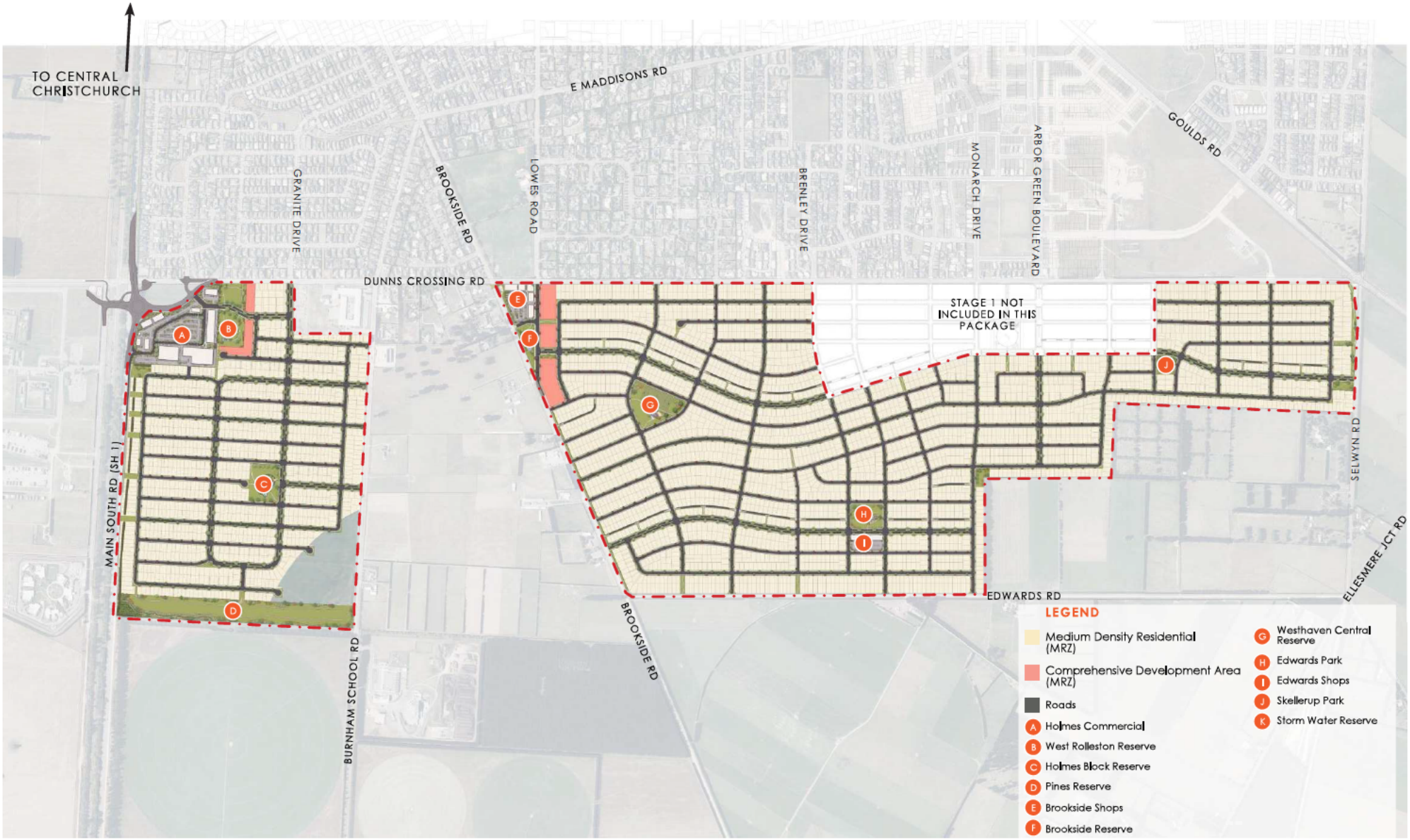
CONTEXT - STRATEGIC CONTEXT AND SPATIAL PLAN (SCALE: 1:100,000 @A3)



LEGEND

- Site Boundary
- Block boundary

PROPOSAL - NAMING CONVENTIONS REFERRED TO IN PREVIOUS PLAN CHANGE PROCESSES



A. OVERALL LANDSCAPE CONCEPT PLAN (1:12,000@A3)

PROPOSAL - LANDSCAPE MASTER PLAN

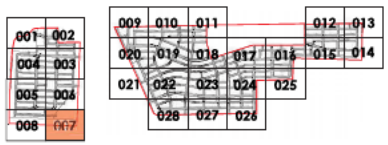
LEGEND

- Site Boundary
- Join Line
- A Holmes Commercial (Refer 2024_052C/041)
- B West Rolleston Reserve (Refer 2024_052C/047)
- C Holmes Block Reserve (Refer 2024_052C/049)
- D Pines Reserve (Refer 2024_052C/051)
- E Brookside Shops (Refer 2024_052C/043)
- F Brookside Reserve (Refer 2024_052C/054)
- G Westhaven Central Reserve (Refer 2024_052C/056)
- H Edwards Park (Refer 2024_052C/058)
- I Edwards Shops (Refer 2024_052C/045)
- J Skellerup Park (Refer 2024_052C/060)
- K Playground
- L Green Link

- 1.2m High Open-style Fence
- 1.8m High Open-style Fence
- Acoustic Fence
- Bollards
- Shared Path
- Medium Density Residential (MRZ)
- Comprehensive Development Area (MRZ)
- Commercial Hub
- Street Plant Mix (Refer 2024_042C/069)
- Reserve Plant & Playground Mix (Refer 2024_042C/069)

TREES

- AF Acer 'Jeffersred'
- CB Carpinus 'Fastigiata' / Upright European Hornbeam
- FD Fagus 'Dawyck Purple' / European Beech
- LL Liquidambar 'Lane Roberts'/Sweet Gum
- LT Liriodendron 'Fastigiatum' / Upright Tulip
- PP Parrotia persica/ Persian Ironwood





A. LANDSCAPE CONCEPT PLAN 007 (SCALE: 1:1,500@A3)

client / project name: WESTHAVEN RESIDENTIAL DEVELOPMENT
drawing name: **LANDSCAPE CONCEPT PLAN 007**
designed by: HB, JR
drawn by: JR
original issue date: 30 JULY 2026
scale: AS SHOWN

revision no:	amendment:	approved	date
A	Issue for Comment	HB	30/07/2026
B	Design Changes	HB	22/10/2026

DCM URBAN DESIGN LIMITED
10/245 ST ASAPH STREET, ŌTAUTAHI / CHRISTCHURCH, 8011
LEVEL 1, 17 GARRETT STREET, TE WHANGANUI-A-TARA / WELLINGTON, 6011
1F HOUSE 1/1 UMBERS STREET, THREE PARKS, WĀNAKA 9305
WWW.DCMURBAN.COM

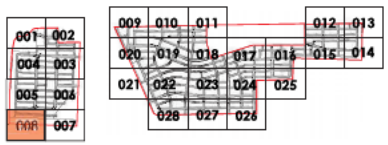
project no / drawing no: **2024_052C** revision: **B**

LEGEND

- Site Boundary
- Join Line
- A Holmes Commercial (Refer 2024_052C/041)
- B West Rolleston Reserve (Refer 2024_052C/047)
- C Holmes Block Reserve (Refer 2024_052C/049)
- D Pines Reserve (Refer 2024_052C/051)
- E Brookside Shops (Refer 2024_052C/043)
- F Brookside Reserve (Refer 2024_052C/054)
- G Westhaven Central Reserve (Refer 2024_052C/056)
- H Edwards Park (Refer 2024_052C/058)
- I Edwards Shops (Refer 2024_052C/045)
- J Skellerup Park (Refer 2024_052C/060)
- K Playground
- L Green Link
- 1.2m High Open-style Fence
- 1.8m High Open-style Fence
- Acoustic Fence
- Bollards
- Shared Path
- Medium Density Residential (MRZ)
- Comprehensive Development Area (MRZ)
- Commercial Hub
- Street Plant Mix (Refer 2024_042C/069)
- Reserve Plant & Playground Mix (Refer 2024_042C/069)

TREES

- AF Acer 'Jeffersred'
- CB Carpinus 'Fastigiata' / Upright European Hornbeam
- FD Fagus 'Dawyck Purple' / European Beech
- LL Liquidambar 'Lane Roberts'/Sweet Gum
- LT Liriodendron 'Fastigiatum' / Upright Tulip
- PP Parrotia persica/ Persian Ironwood





A. LANDSCAPE CONCEPT PLAN 008 (SCALE: 1:1,500@A3)

client / project name: WESTHAVEN RESIDENTIAL DEVELOPMENT
drawing name: **LANDSCAPE CONCEPT PLAN 008**
designed by: HB, JR
drawn by: JR
original issue date: 30 JULY 2026
scale: AS SHOWN

revision no:	amendment:	approved	date
A	Issue for Comment	HB	30/07/2026
B	Design Changes	HB	22/10/2026

DCM URBAN DESIGN LIMITED
10/245 ST ASAPH STREET, ŌTAUTAHI / CHRISTCHURCH, 8011
LEVEL 1, 17 GARRETT STREET, TE WHANGANUI-A-TARA / WELLINGTON, 6011
F HOUSE 1/1 UMBERS STREET, THREE PARKS, WĀNAKA 9305
WWW.DCMURBAN.COM

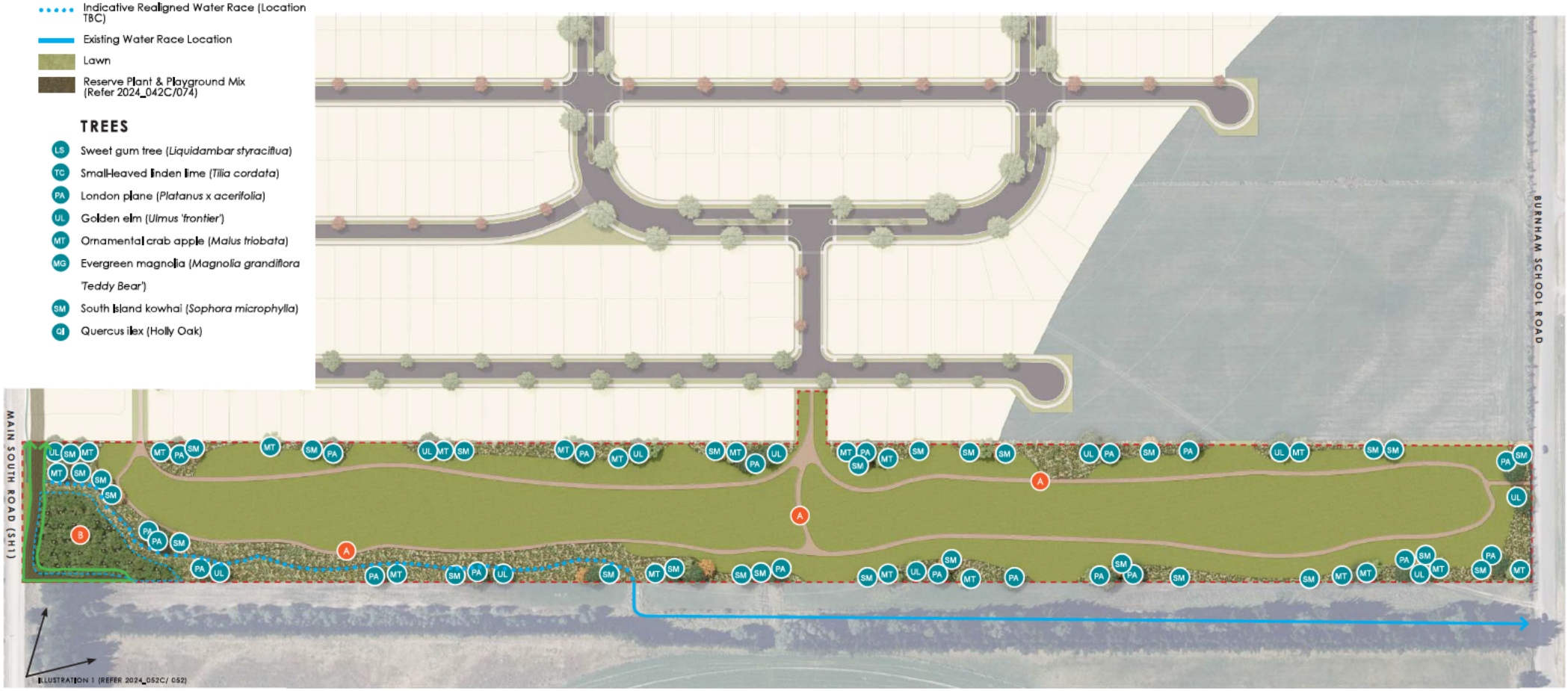
project no / drawing no: **2024_052C** revision: **B**

LEGEND

- A — Gravel Track
- B — Lizard Habitat (Refer 2024_042C/053)
- Reserve Boundary
- **MM1 -** Bund and landscape buffer along state highway 1 interface (Refer 2024_042C/068-069)
- Indicative Realigned Water Race (Location TBC)
- Existing Water Race Location
- Lawn
- Reserve Plant & Playground Mix (Refer 2024_042C/074)

TREES

- LS — Sweet gum tree (*Liquidambar styraciflua*)
- TC — Small-Heaved linden lime (*Tilia cordata*)
- PA — London plane (*Platanus x acerifolia*)
- UL — Golden elm (*Ulmus 'frontier'*)
- MT — Ornamental crab apple (*Malus triobata*)
- MG — Evergreen magnolia (*Magnolia grandiflora 'Teddy Bear'*)
- SM — South Island kowhai (*Sophora microphylla*)
- QI — Quercus ilex (Holly Oak)



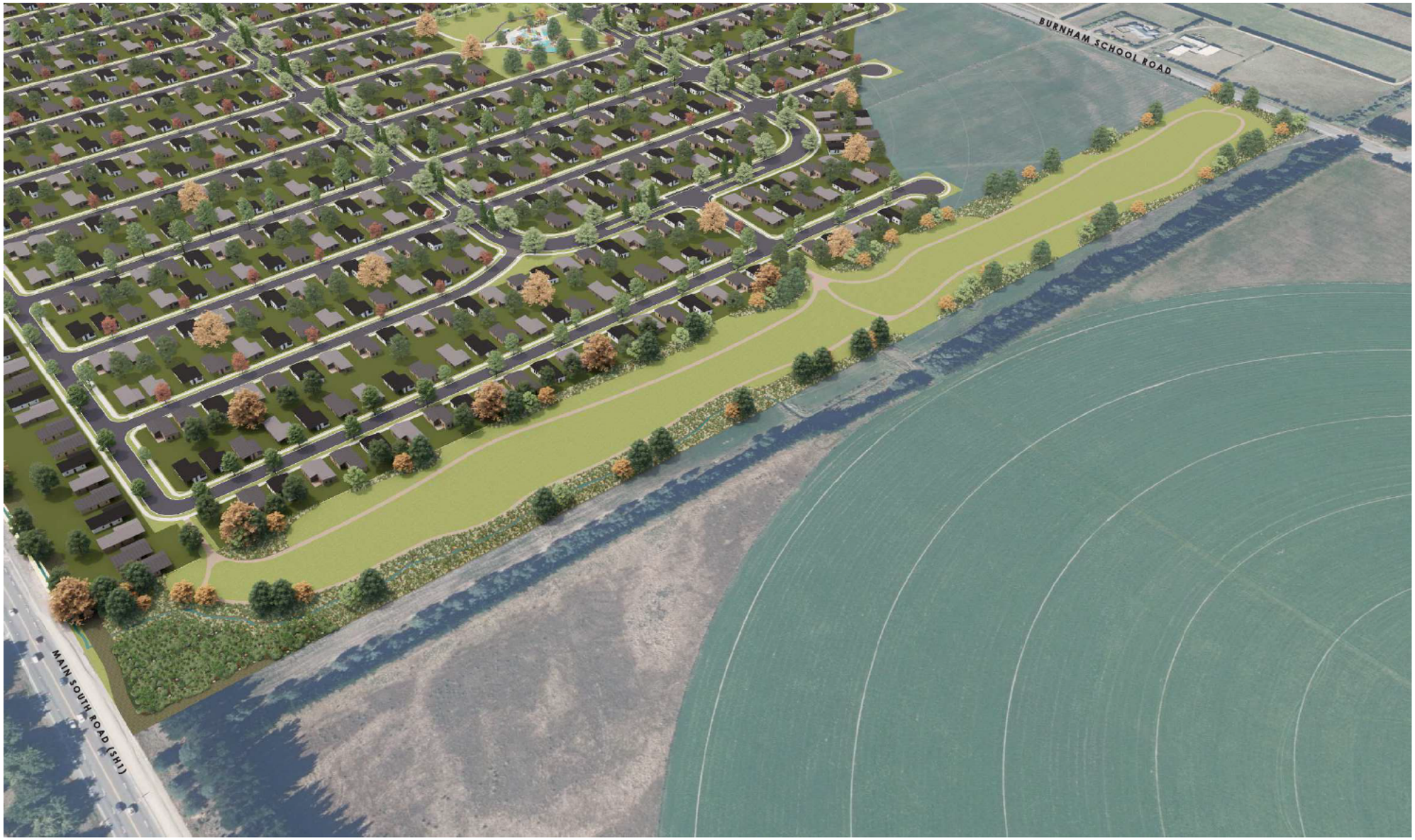
A. PINES RESERVE PLAN (1:2,000@A3)

client / project name: WESTHAVEN RESIDENTIAL DEVELOPMENT
drawing name: **PINES RESERVE PLAN**
designed by: HB, JR
drawn by: JR
original issue date: 30 JULY 2026
scale: AS SHOWN

revision no:	amendment:	approved	date
A	Issue for Comment	HB	30/07/2026
B	Design Changes	HB	22/10/2026

DCM URBAN DESIGN LIMITED
10/245 ST ASAPH STREET, ŌTAUTAHI / CHRISTCHURCH, 8011
LEVEL 1, 17 GARRETT STREET, TE WHANGANUI-A-TARA / WELLINGTON, 6011
F HOUSE 1/1 UMBERS STREET, THREE PARKS, WĀNAKA 9305
WWW.DCMURBAN.COM

project no / drawing no: **2024_052C** revision: **B**



A. PINES RESERVE PERSPECTIVE (NTS)

client / project name: WESTHAVEN RESIDENTIAL DEVELOPMENT
drawing name: **PINES RESERVE PERSPECTIVE**
designed by: HB, JR
drawn by: JR
original issue date: 30 JULY 2026
scale: AS SHOWN

revision no:	amendment:	approved	date
A	Issue for Comment	HB	30/07/2026
B	Design Changes	HB	22/10/2026

DCM URBAN DESIGN LIMITED
10/245 ST ASAPH STREET, ŌTAUTAHI / CHRISTCHURCH, 8011
LEVEL 1, 17 GARRETT STREET, TE WHANGANUI-A-TARA / WELLINGTON, 6011
1F HOUSE 1/1 UMBERS STREET, THREE PARKS, WĀNAKA 9305
WWW.DCMURBAN.COM

project no / drawing no: **2024_052C** revision: **B**

LEGEND

- Reserve Boundary
- Lizard planting area (2000m²)
- Habitat aggregate/wood piles
- Lizard exclusion fence

LIZARD PLANTING



Mingimingi
(Coprosma propinqua)



Silver tussock
(Poa cita)



Shrubby Toraro
(Muehlenbeckia astonii)



Harekeke/NZ Flax
(Phormium tenax)



Round Leaved Coprosma



Creeping pōhuehue
(Muehlenbeckia axil-



LIZARD HABITAT AGGREGATE PILE



LIZARD HABITAT WOOD PILE



LIZARD EXCLUSION FENCE



A. LIZARD PLANTING PLAN (1:600 @ A3)

client / project name:	WESTHAVEN RESIDENTIAL DEVELOPMENT
drawing name:	**PINES RESERVE LIZARD PLANING PLAN**
designed by:	HB, JR
drawn by:	JR
original issue date:	30 JULY 2026
scale:	AS SHOWN

revision no:	amendment:	approved	date
A	Issue for Comment	HB	30/07/2026
B	Design Changes	HB	22/10/2026

DCM URBAN DESIGN LIMITED
10/245 ST ASAPH STREET, ŌTAUTAHI / CHRISTCHURCH, 8011
LEVEL 1, 17 GARRETT STREET, TE WHANGANUI-A-TARA / WELLINGTON, 6011
1F HOUSE 1/1 UMBERS STREET, THREE PARKS, WĀNAKA 9305
WWW.DCMURBAN.COM

project no / drawing no: **2024_052C** revision: **B**

SHRUBS, GRASSES & GROUNDCOVERS - STREET PLANT MIX



Carex
(Carex flagellifera)

Grade: 1.5L
Spacing: 400mm



Dianella
(Dianella 'Little Rev')

Grade: 1.5L
Spacing: 400mm



Creeping Wire Vine
(Muehlenbeckia axillaris)

Grade: 2L
Spacing: 600mm



Hebe
(Hebe 'Sutherlandii')

Grade: 2.5L
Spacing: 500mm



Lomandra
('Little lime')

Grade: 1.5L
Spacing: 700mm



Hebe
(Hebe 'emerald gem')

Grade: 2.5L
Spacing: 600mm



NZ Daphne
(Pimelea prostrata)

Grade: 2L
Spacing: 600mm



English Lavender
(Lavendula angustifolia 'Hidcote')

Grade: 1.5L
Spacing: 600mm



Hebe
(Hebe cupressoides 'Nana')

Grade: 2.5L
Spacing: 600mm



Hard Tussock
(Festuca novae-zelandiae)

Grade: 1.5L
Spacing: 600mm



Chilean Iris
(Libertia formosa)

Grade: 1.5L
Spacing: 700mm



Marlborough Rock Daisy
(Pachystegia 'rufa')

Grade: 1.5L
Spacing: 700mm



Groundcover Coprosma
(Coprosma acerosa 'Red Rocks')

Grade: 1.5L
Spacing: 700mm

SHRUBS, GRASSES AND GROUNDCOVERS - RESERVES AND PLAYGROUNDS



Dwarf Flax
(Phormium cookianum 'Emerald Green')

Grade: 2.5L
Spacing: 1m



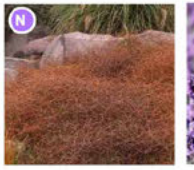
NZ daphne
(Pimelia prostrata)

Grade: 1L
Spacing: 600mm



'Midget'
(Pittosporum 'Midget')

Grade: 2.5L
Spacing: 800mm



Groundcover coprosma
(Coprosma acerosa 'Red Rocks')
Grade: 2.5L
Spacing: 600mm



English Lavender
(Lavendula angustifolia 'Hidcote')

Grade: 1.9L
Spacing: 600mm



Fairy Iris
(Dietes Grandiflora)

Grade: 1.5L
Spacing: 900mm



Hebe
(Hebe 'Sutherlandii')

Grade: 2.5L
Spacing: 500mm



Marlborough Rock Daisy
(Pachystegia 'rufa')
Grade: 2.5L
Spacing: 800mm



Lomandra
('Little lime')

Grade: 1.5L
Spacing: 700mm



Pink-Flowering Hebe
(Hebe 'Oratia beauty')

Grade: 2L
Spacing: 500mm



Groundcover coprosma
(Coprosma acerosa 'Hawera')
Grade: 2.5L
Spacing: 600mm



Chilean Iris
(Libertia formosa)

Grade: 2.5L
Spacing: 700mm



Miniature toetoe
(Chionochloa flavicans)

Grade: 1L
Spacing: 1.2m



Indian Hawthorn
(Rhaphiolepis 'Oriental Pearl')

Grade: 2.5L
Spacing: 800mm



Hard Tussock
(Festuca novae-zelandiae)

Grade: 1.5L
Spacing: 600mm



NZ Grass/Sedge
(Carex flagellifera)

Grade: RX 90
Spacing: 600mm



Creeping Wire Vine
(Muehlenbeckia axillaris)

Grade: 2L
Spacing: 600mm



Dianella
(Dianella 'Revelation')

Grade: 2.5L
Spacing: 600mm



Hebe
(Hebe topiaria)

Grade: 2.5L
Spacing: 900mm



Dwarf Pittosporum
(Pittosporum 'Golf Ball')

Grade: 2.5L
Spacing: 1m

KEY
N Native

PLANT PALETTE

Appendix B PC73 Ecological Assessment

Aquatic Ecology

Phone: (03) 366-4070
Cell: 021 022-62517
Email: mark@ael.org.nz
Internet: www.ael.org.nz

12 November 2020

Bruce Van Duyn
Carter Group
PO Box 2726
Christchurch

Dear Bruce

Ecological values in two Rolleston Blocks (Rolleston West Residential Ltd.)

Thank you for your email dated 3rd November.

I have undertaken a desktop consideration of ecological values, as it pertains to aquatic values, in the vicinity of the two described lots, described below as the Holmes Block and the Skellerup Block. Both are currently zoned as Rural Residential and are proposed to be rezoned to Living Z. I have accessed the New Freshwater Fish Database, the Paparoa Irrigation raceway network (Agriculture N.Z. Ltd 1997), and our own recent ecological investigations in the vicinity.

Waterways in both blocks are fed by a large (43000 Ha) constructed historic (1887) irrigation system originally for stock water, and more recently for irrigation (Agriculture N.Z. Ltd 1997). The water rises from a large, screened intake fed from the mainstem of the Waimakariri River at the end of Intake Road. In turn, these 2 blocks, and the raceway along Tennyson Street, Rolleston, are fed by a major irrigation race with flows southwards along Sandy Knolls Road (App. I. Fig. i).

Holmes Block

The irrigation raceway passes through the Holmes Block in the west corner of the property before it turns west and crosses into land owned by Selwyn District Council (App. I. Fig. ii). The raceway has recent (March 2020) Google Streetview® photos available, looking downstream from SH1 (Main South Road) (App. I. Fig. iii), and another recent Streetview® photo is available looking upstream from Burnham School Road (App. I. Fig. iv). In addition, a recent site visit provided photos presented in App. II. The raceway appears to be within the swinging arc of a pivot irrigator. To prevent impediment of the irrigator the waterway appears to be unfenced and has a buffer of a few metres of grassy vegetation (App. II, Fig. i). The raceway is shallow and has a gravel base in most reaches (App. II, Fig. ii), and culverted where it corners by 90° within the Block.

This raceway is likely to have similar water chemistry as the parallel raceway which flows along the roadside of Tennyson Street, 3.5 km to the north-east, and appears to be of a similar width and nature of flow. A c. 340 m reach of the Tennyson St raceway was subjected to fish removal in February 2020, prior to piping (Downer contract). The fish catch over this reach is tabulated below (Table 1). I have digitally measured the length of channel which flows through the west corner of the Holmes Block (c. 458 m). I would expect the fish fauna to be similar to that in the Tennyson Street raceway and may be composed of as many as 151 fish, none of which have a significant conservation status. The shallow stony nature would particularly suit upland bully, which would spawn on the local cover substrate, and use them for refuge (Jowett & Boustead 2001). The lack of overhanging bank cover would restrict numbers of juvenile brown trout to a possibly lower catch projection than in Table 1.

Of these fish, the shortfin eel is a sea migrant, with juveniles which will be entrained through the fish screen at Intake Road, on the Waimakariri River. The upland bully probably the most common and well-distributed freshwater fish in New Zealand (McDowall 1990), and does not require sea access or therefore passage through the Waimakariri intake. Instead, it will spawn on cobbles and other hard items in its resident habitat. The common bully can adopt either a sea-migratory life-stage, or within inland ponds and lakes, a non-migratory lifecycle. Based on my experience, brown trout are well-distributed in the Paparua Irrigation Raceway network, especially where there is fast flow and hard substrates. It is likely the fish spawn in gravel reaches where these are available. The maximum size of brown trout in the raceway complex will be limited by the small size of available habitats.

Ecological values centred around aquatic invertebrates, certainly in terms of biodiversity, are likely to be already compromised by existing issues related to the habitats use as a raceway. These include dispersal issues caused by road culverts, the lack of riparian vegetation to support flighted lifestages, excessive weed removal and bed dredging, adjacent herbicide and pesticide use, and lack of physical habitat variation (Hudson & Harding 2004).

Table 1. Fish census in a nearby raceway, and approximate numbers in a selected reach in the Holmes Block (yellow ring in App. I. Fig. ii).

Fish Species	Conservation Status (Dunn *et al.* 2017)	No. caught	Population estimate for Holmes Block west corner
Upland bully	Not threatened	89	120
Brown trout	introduced	20	27
Shortfin eel	Not threatened	2	3
Common bully	Not threatened	1	1
		112	**151**

Skellerup Block

This block is at the terminus of a minor irrigation feed, with a pathway depicted in App. I. Fig. v. I understand this waterway is beyond the western boundary of the block but will provide comments anyway. There is a Google Streetview® photo where the waterway diverts away from Edwards Road (App. I. Fig. vi), which depicts a perennial channel with good fish cover elements. Based on the latest Google aerial imagery, the channel adjacent to the Skellerup Block is well fenced from dairying land use, with a vegetated buffer strip on the west bank of approximately 7 m. The raceway departs away from the Skellerup Block in the south-west corner, and apparently, goes to ground before it reaches Selwyn Road.

I would expect the fish fauna to be similar to that for the Holmes Block, with a potentially higher total fish abundance due to greater depth and fish refuge. Shortfin eel habitat, in particular, is higher, but recruitment into the reach is severely restricted by the Waimakariri intake screen. Eel recruitment to the Skellerup Block is also restricted by its location far from the intake, where entrained juveniles have adopted resident habitats further upstream and closer to the intake. If present at all, shortfin eel numbers would be greater in reaches with sluggish flow and where there is marked depth of soft sediment (Jellyman *et al.* 2003). This waterway has stable banks, and it is possible freshwater crayfish (koura) are also present.

It is my understanding that this waterway would be protected by the District Plan's 10m waterbody setback for earthworks and development and would be largely undisturbed by any potential residential development of the adjacent land.

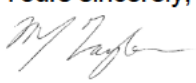
Summary

The only aquatic habitat with potentially some ecological value is the raceway which passes through the western corner of the Holmes Block. Due to the screening of the inflow at the Waimakariri River intake, and the distance from the sea, fish diversity and abundance is expected to be low. Invertebrate biodiversity is already likely to be compromised for multiple reasons associated with the existing raceway management.

It is likely that there is a number of common fish species in the raceway reach through the Holmes Block, but these are likely to have little or no conservation value.

Overall, from a plan change/rezoning perspective, if the development adheres to the 10m waterbody setback rules the likelihood of negative ecological impacts are low.

Yours sincerely, Mark Taylor



References:

Agriculture N.Z. Ltd, G. P. L., Pattle Delamore Partners Ltd 1997. Paparua Water Race; system review. Christchurch. *No*. 83 p.

Dunn, N. R.; Allibone, R. M.; Closs, G. P.; Crow, S.; David, B. O.; Goodman, J. M.; Griffiths, M.; Jack, D.; Ling, N.; Waters, J. M.; Rolfe, J. R. 2017. Conservation Status of New Zealand freshwater fishes, 2017. Department of Conservation, Wellington. *No*. 15 p.

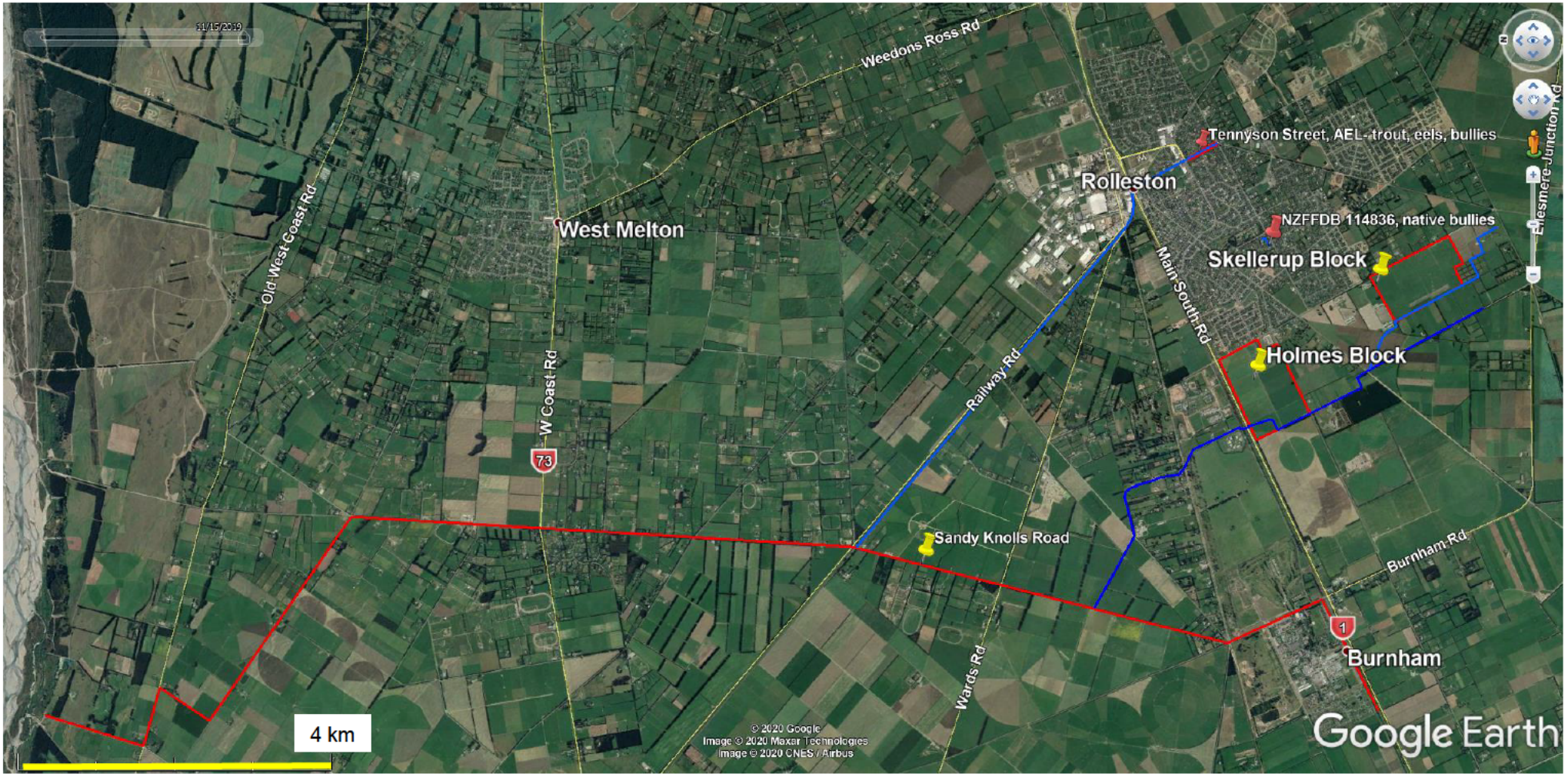
Hudson, H. R.; Harding, J. S. 2004. Drainage Management in New Zealand. Department of Conservation, *Science for Conservation No*. *No. 235*. 39 p.

Jellyman, D. J.; Bonnett, M. L.; Sykes, J. R. E.; Johnstone, P. (2003): Contrasting use of daytime habitat by two species of freshwater eel Anguilla spp. in New Zealand rivers. *In:* American Fisheries Society Symposium. Pp. 63-78.

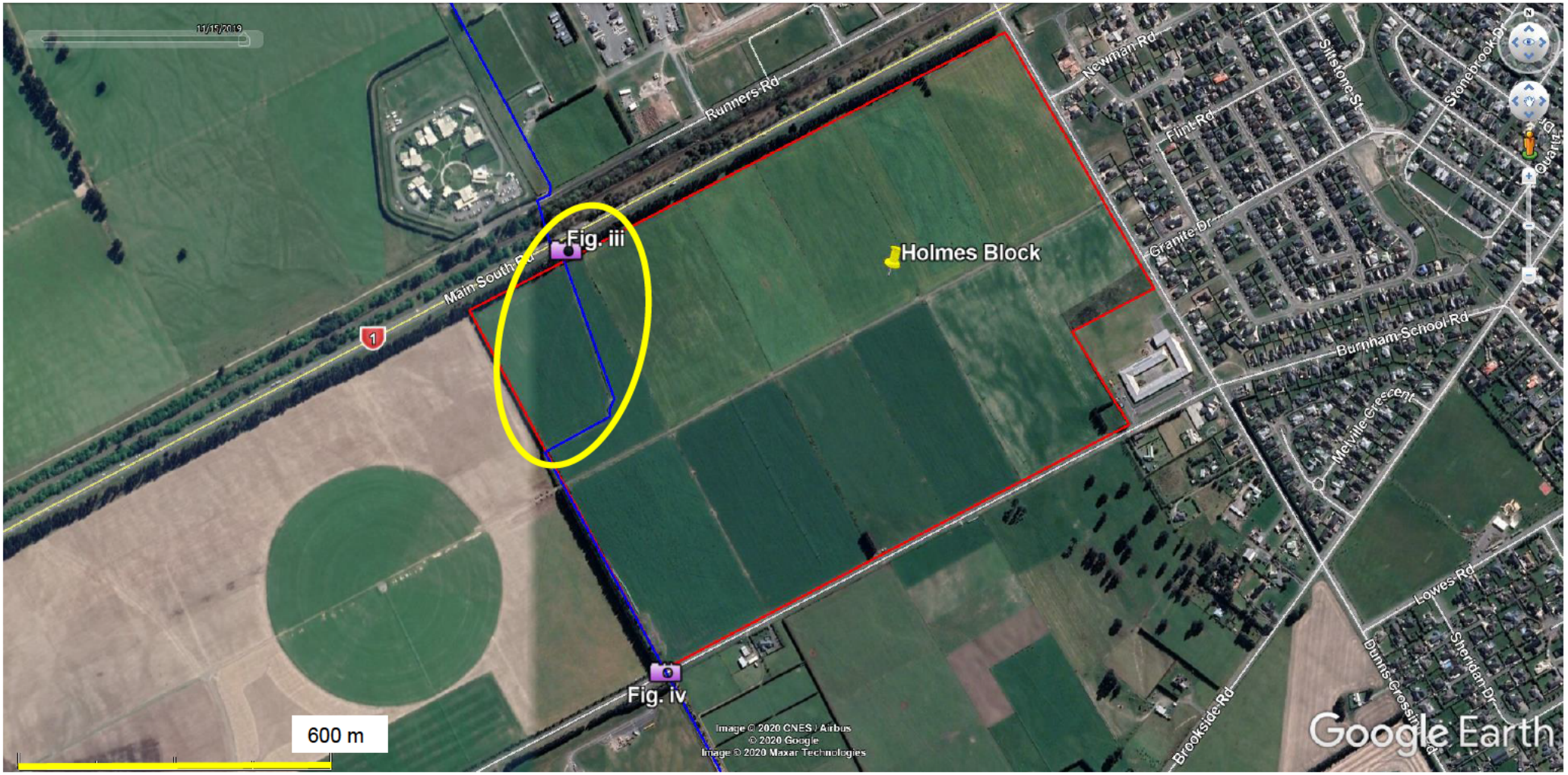
Jowett, I. G.; Boustead, N. C. 2001: Effects of substrate and sedimentation on the abundance of upland bullies (*Gobiomorphus breviceps*). *New Zealand Journal of Marine and Freshwater Research 35*: 605-613.

McDowall, R. M. 1990: New Zealand Freshwater Fishes: A Natural History and Guide. Auckland, Heinemann Reed. 553 p.

Appendix I. Recent Google Earth imagery from the Holmes and Skellerup Blocks.



App. I. Figure i. Paparua Race Irrigation scheme in relation to waterways in the Holmes and Skellerup Blocks.



App. I. Figure ii. Paparua Race Irrigation scheme in relation to waterways in the Holmes and Skellerup Blocks. An approximate fish census is conducted on the channel reach in the yellow ring.



App. I. Figure iii. Looking south and downstream from SH1 at the irrigation raceway entering the north boundary of the Holmes Block, March 2020.



App. I. Figure iv. Water race at Burnham School Road, (September 2019), looking upstream (north) into the Selwyn District Council land, at the SW corner of the Holmes Block.



App. I. Figure v. The raceway network path (blue line) along the west boundary of the Skellerup Block (red line).



App. I. Figure vi. Looking east at the weedy raceway channel which further down borders the Skellerup Block (September 2019). While the broom and/or gorse appears sprayed, introduced emergent macrophytes provide a significant amount of instream cover for koura and fish, especially shortfin eels and trout.

Appendix II. Recent field photographs from the Holmes Block (Bruce Van Duyn, Carter Group).



Figure i. The raceway through the west corner of the Holmes Block.



Figure ii. Shallow gravel reaches of the raceway through the west corner of the Holmes Block.

Appendix C PC81 Ecological Assessment

Aquatic Ecology

Phone: (03) 366-4070
Cell: 021 022-62517
Email: mark@ael.org.nz
Internet: www.ael.org.nz

29 September 2021

Bruce Van Duyn
Rolleston Industrial Developments Ltd
PO Box 2726
Christchurch

Dear Bruce

Ecological values in the Skellerup South Block (Rolleston Industrial Developments Ltd.)

Thank you for your email dated 20th August 2021.

I have undertaken a desktop consideration of ecological values, as it pertains to aquatic habitats, in the vicinity of a rural lot South of Rolleston. The Skellerup South Block is located on the corner of Selwyn Road and Dunns Crossing Road, with an approximate development area of 28 Ha (Fig. 1).

This rural section is traversed by a water race which forms part of the Paparua irrigation network (blue line in Fig.1). This historic (1887) water race network, administered by the Selwyn District Council, draws from the main stem of the Waimakariri River, at the end of Intake Road (Fig. 2)(Agriculture N.Z. Ltd 1997). This raceway network was originally for stock water purposes, but more recently it has been used for irrigation where agriculture has become more intensified. The water source is also required for the freezing works at Islington. Branches of the water race network approach residential developments west of Christchurch, which have been naturalised and receive treated residential stormwater. This particular race way terminates (i.e., flows into the ground) within the 28 Ha subsection of the proposed development area (termed a soak pool in Fig. 1).

Information for this report has been gathered from the New Zealand Freshwater Fish Database (NZFFD), the Paparua irrigation raceway network (Agriculture N.Z. Ltd 1997), and AEL recent ecological investigations in the vicinity.

Possible ecology of the Skellerup South Block

A site visit has not been undertaken at this early stage, largely due to the recent Level 4 Covid lockdown. However, recent images suggest the waterway upstream (at the corner of Brookside and Edwards Roads) possessed stable fenced bank structure with the selective spraying of bankside gorse and broom (Fig. 3). The channel has floating rafts of (probably) water cress and/or monkey musk, common herbs in the Paparua Network. The hydraulic drag of these rafts enhances flow depth and provides fish refuge, and a grazing substrate for aquatic snails and other aquatic fauna.

Within the Skellerup block, the channel was well shaded by trees, except for the terminal 500 m, but appeared to be fenced from stock. The water race goes to ground in a soak pit, approximately 74 m north-west of Selwyn Road (Fig. 1).

There is evidence of an old fluvial channel, possibly an old course of the Waimakariri River when it discharged through to Te Waihora/Lake Ellesmere, but there was no large pond present prior to 2011 (Fig. 4a). After 2013, the water race appears to have been deliberately diverted into an area where the area of the old fluvial channel and consequently produced a distinct larger water body depicted in the most recent image (2019, Fig. 4b). There is also another smaller widened area, arrowed in Figs. 4a, b, which is present in all the Google aerials since imagery was available in 2008.

Inferences can be made on aquatic macroinvertebrate and fish fauna in the impacted reach, based on NZFFD entries and previous AEL ecological surveys in other parts of the Paparua network. This is because the habitats share a common Waimakariri River water source, and the physical habitats and geology are broadly similar.

AEL also has reliable data on aquatic macroinvertebrates in similar habitats from two past surveys of the Paparua Irrigation Network. These samples showed an abundance of two snail species, *Potamopyrgus antipodarum* and *Physa acuta*. The 2019 sample also identified a number of riffle beetles (*Hydora*) in both the hard and soft substrate samples. In stony habitat, this species is considered sensitive to pollutants (MCI ≥ 7.0). The macroinvertebrate community index (MCI) is used to make inferences on stream health, based on the aquatic macroinvertebrates present in a sample. The overall MCI values from all samples in the Paparua Irrigation Network were between 60 and 80. An MCI of < 80 is considered "poor" stream health (Stark & Maxted 2007). This is consistent with the limited habitat availability and likely high nutrient levels associated with waterways that flow through stock farms. Based on this, the waterway within the Skellerup South boundary is unlikely to contain invertebrates of importance or exhibit good stream health.

A recent (February 2020) fish translocation of the Rolleston Raceway along Tennyson Street (c. 400 m) was carried out by AEL. During this translocation, a total of four species were identified (Table 1), the most numerous being the introduced (brown trout) and three others native species. None of these species had a significant conservation status (Dunn *et al.* 2017).

However, the NZFFD contains entries pertaining to this tributary of the Paparua Irrigation Network, although further upstream. These recent entries, all from 2018 and 2019 (NZFFD cards 103027, 103049, 115169), confirm the presence of upland bullies and shortfin eels in the irrigation network, but also the presence of longfin eels (*Anguilla dieffenbachii*). Longfin eels have a New Zealand conservation status of "at risk-declining" (Dunn *et al.* 2017).

Table 1. Possible fishes in the Skellerup South Block based on a census from a nearby Rolleston Raceway, Feb 2020, and data on the NZFFDB, (in red).

Fish Species	Conservation Status (Dunn *et al.* 2017)
Shortfin eel (*Anguilla australis*)	Not threatened
Longfin eel (Anguilla dieffenbachii)	(national population) Declining
Brown trout (*Salmo trutta*)	Introduced
Common bully (*Gobiomorphus cotidianus*)	Not threatened
Upland bully (*Gobiomorphus breviceps*)	Not threatened
Total	

Discussion

The aquatic habitat is situated nearly approximately 24 km from the Paparua Race inlet on the Waimakariri River inlet near Kirwee, (see Figure 2) and goes to ground within the development area. It is significantly further from the Waimakariri River than the Rolleston Raceway (mentioned above), but also significantly further downstream from the NZFFDB record entries. Therefore, I consider that sea-migrating fish, like eels and common bullies, will be rare, if not totally absent, as juvenile eels (elvers) will adopt habitats closer to the intake, or eaten by larger fish, particularly trout which are resident in many waterways in the Paparua network. Moreover, mature eels cannot migrate downstream to the sea, as the flow enters a soak hole (see Fig. 1). Only upland bullies are likely to be present in the Skellerup South Block waterway, as they breed and rear in the raceways, and may be locally abundant if cobbles are present.

There are three ponded habitats in the 28 Ha block; the soak hole mentioned above, and two constructed habitats; the smaller one possibly representing a historic soak hole, and the more recent one of currently unknown function. These are likely to collects fines and because the sunlit water will contain dissolved nutrients from the upstream catchment of irrigation race, they are likely to be weedy, at least in the margins. The habitats are artificial, and not of natural origin. As such, they are not defined as wetlands under the LWRP (Definitions p. 45).

Summary

In summary, I expect that there will be limited aquatic ecological value in the waterway through this land block, and that aquatic values present are also available further upstream. I also expect there is abundant habitat space upstream of the land block because of poor fish access, and sufficient food for any translocated fish. These expectations could be verified by means of a brief ecological field survey. If these expectations are verified by the field survey, then I consider it acceptable to translocate the fauna, except for eels, and decommission the waterway through the land block prior to or as part of subdivision works. However, if any eels are to be found, it is recommended they should be translocated into the neighbouring Te Waihora/Lake Ellesmere catchment so they can access the sea and complete their life cycles. To accommodate the raceway terminal flow, I recommend that a new soak hole be located in or near the location depicted in Fig. 1.

Therefore, from a plan change/rezoning perspective, if the above recommended actions are implemented, the likelihood of negative ecological impacts is low.

Yours sincerely, Mark Taylor



References:

Agriculture N.Z. Ltd, G. P. L., Pattle Delamore Partners Ltd 1997. Paparua Water Race; system review. Christchurch. *No*. 83 p.

Dunn, N. R.; Allibone, R. M.; Closs, G. P.; Crow, S.; David, B. O.; Goodman, J. M.; Griffiths, M.; Jack, D.; Ling, N.; Waters, J. M.; Rolfe, J. R. 2017. Conservation Status of New Zealand freshwater fishes, 2017. Department of Conservation, Wellington. *No*. 15 p.

Stark, J. D.; Maxted, J. R. 2007. A User Guide for the Macroinvertebrate Community Index. Cawthron Institute, Nelson. *Cawthron Report No*. *No. 1166*.p.



Figure 1. The Skellerup South Block (c. 28 Ha), illustrating the waterway reach for faunal translocation and decommissioning (red), and the proposed relocation of the terminal soak pit.

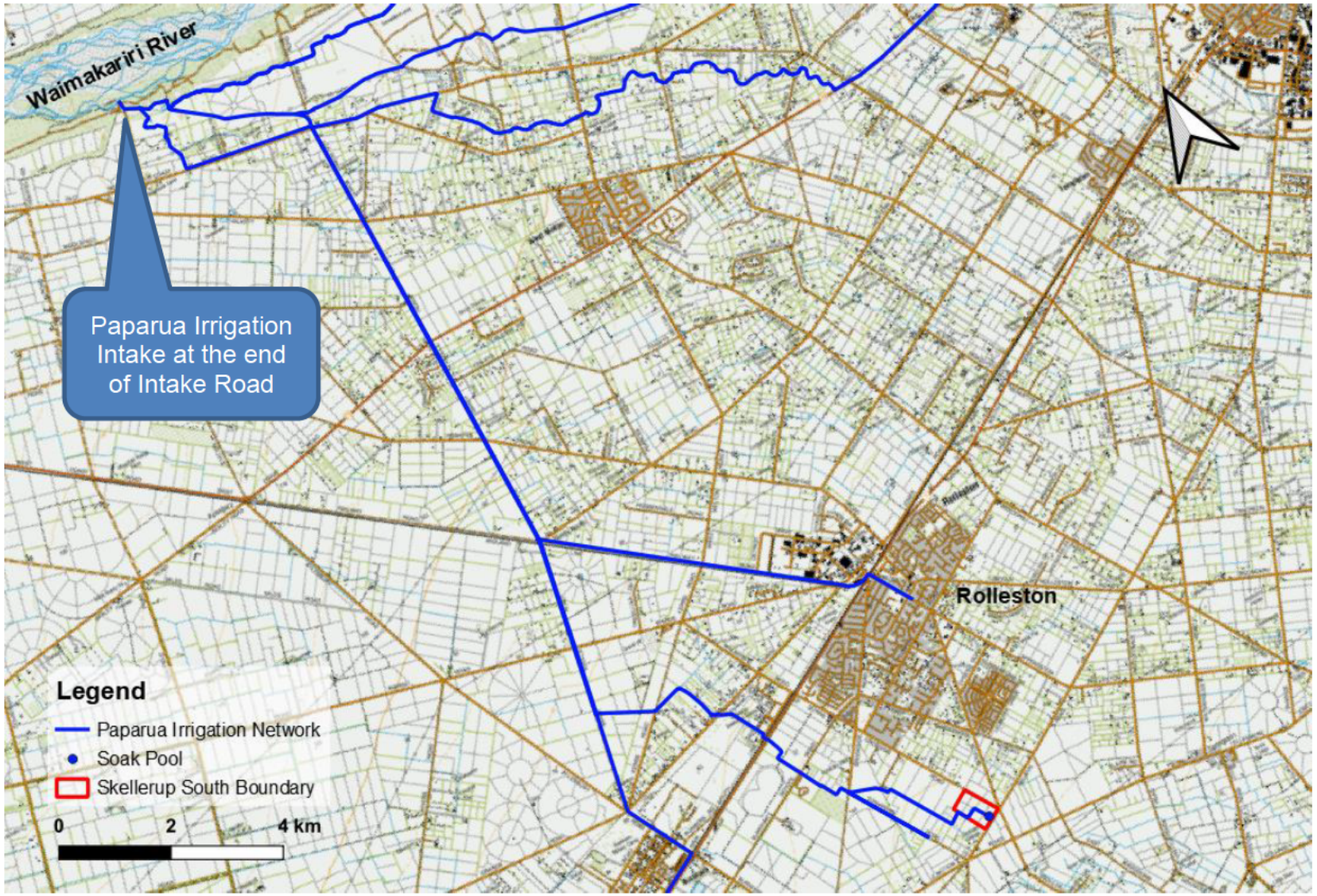


Figure 2. The connectivity of the waterway in the Skellerup South Block (bottom right) with the Paparua Irrigation Network, and ultimately the Waimakariri River.



Figure 3. The Skellerup waterway (further upstream) on eastern side of Edwards Road near Brookside Road corner (source Google Earth Street View, 2019).



Figure 4a. Prior to April 2011, no large pond was present in the land parcel (photo: 28 March 2011). The small waterbody (red arrowed), always seems to have been present from at least 2008.



Figure 4b. Ponded area, (yellow pin central to property) was constructed after April 2011 (image 13 June 2020). The small waterbody (red arrowed) was present prior to 2008.

Appendix D Qualifications

The assessments outlined in this memorandum were undertaken by the following qualified ecologist:

Jarred Arthur (Principal Ecologist/Team Leader, Stantec)

Jarred is a freshwater ecologist with over fifteen years' experience working in both the public and private sectors. He graduated from the University of Canterbury with a Master of Science (Ecology) in 2010. He is a member of the New Zealand Freshwater Sciences Society (NZFSS).

His previous work as a Regional Council scientist (Environment Canterbury, 2016-2023) involved providing technical support to policy and planning processes, governance and community groups, iwi, and other technical specialists. He has extensive experience informing consent application processes associated with a range of land and water use activities.

Jarred is well-versed in the monitoring of river ecosystems including water quality and habitat parameters, and macroinvertebrate and fish communities. He has analysed and interpreted ecological datasets, written and peer-reviewed numerous technical reports, and prepared and presented evidence at hearings. His recent work consulting has involved assessing the environmental effects of construction- and operational-phase activities associated with residential and industrial developments. This has included working on several Fast-track applications, and addressing mitigation and offsetting for waterway and wetland ecosystems.

Appendix E Site Photographs



Photo 1: Water race in Holmes Block.



Photo 2: Holmes Block water race riparian zone.



Photo 3: Disturbed area adjacent to water race



Photo 4: Water race in lower Holmes Block.

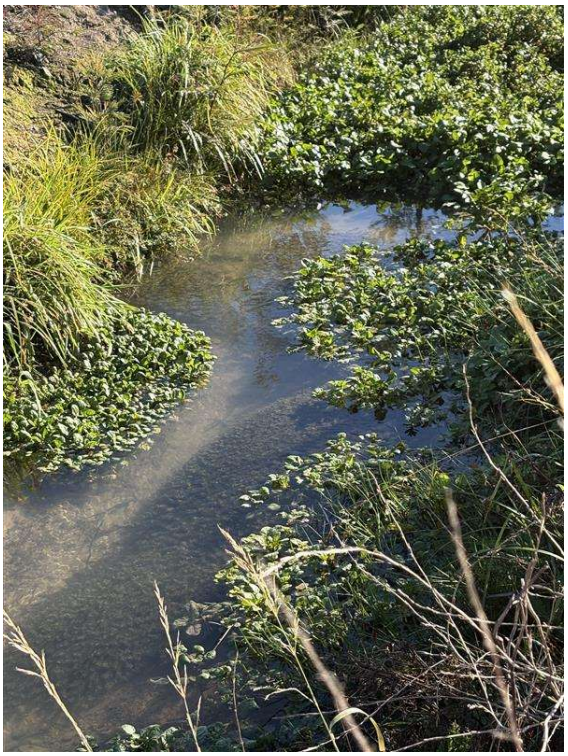


Photo 5: Emergent and submergent macrophytes.



Photo 6: Gravel substrate section.





Photos 7 & 8: Widened channel section in Skellerup Block by Tegal sheds.



Photo 9: Disturbed reach of water race, with rubbish debris present.