



# **Cardrona River and Wanaka Basin Cardrona Gravels Aquifer**

## **Freshwater Objectives and Scenarios**



# Purpose of this meeting

To present a 'preferred option' to deliver on your values and aspirations following technical work

- Community values and aspirations were identified over 2010-2019
- We have previously sought community feedback on a range of management options
- We are not taking further feedback at this stage
- Feedback on freshwater visions through official consultation on the Regional Policy Statement in June 2021.
- Feedback on preferred options through the official Land and Water Regional Plan consultation in 2023.

# New Otago Land and Water Regional Plan

- ORC have agreed to ‘notify’ a regional land and water plan (LWRP) by December 2023
- Under the National Policy Statement for Freshwater Management (NPS-FM)
- Relates to both water quality and quantity
- Requires us to identify:
  - Freshwater Management Units (FMU)
  - ‘Long-term visions’ to be included in a ‘regional policy statement’ (RPS)
- Has both compulsory (need to do) and optional (need to consider) ‘environmental outcomes’ (compulsory and optional values)
- Requires consultation with communities and tangata whenua

# Alignment between the RPS and LWRP

**Regional Policy  
Statement**



Otago  
Regional  
Council

- Notified June 2021. Set freshwater visions for each FMU.



**Land and Water  
Regional Plan**



Otago  
Regional  
Council

- Notified end of 2023.
- Specific values and outcomes for each FMU.
- Attributes.
- Flows and Levels.
- Rules etc.

# Te Mana o te Wai

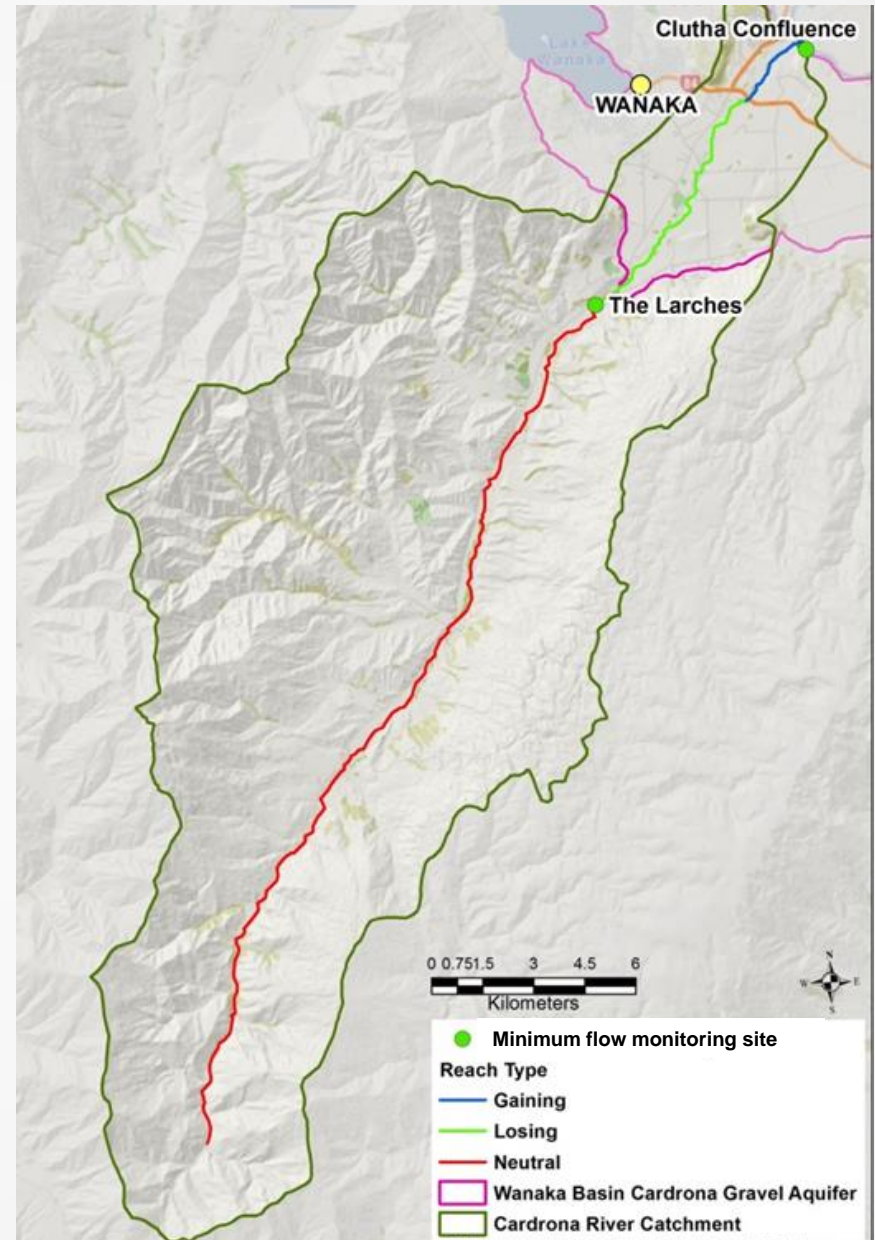
Te Mana o te Wai is central to the Essential Freshwater package

It refers to the vital importance of water and the need to ensure that freshwater is managed in a way that prioritises (in this order):

1. the health and well-being of water
2. the health needs of people
3. the ability of people and communities to provide for their social, economic and cultural well-being.

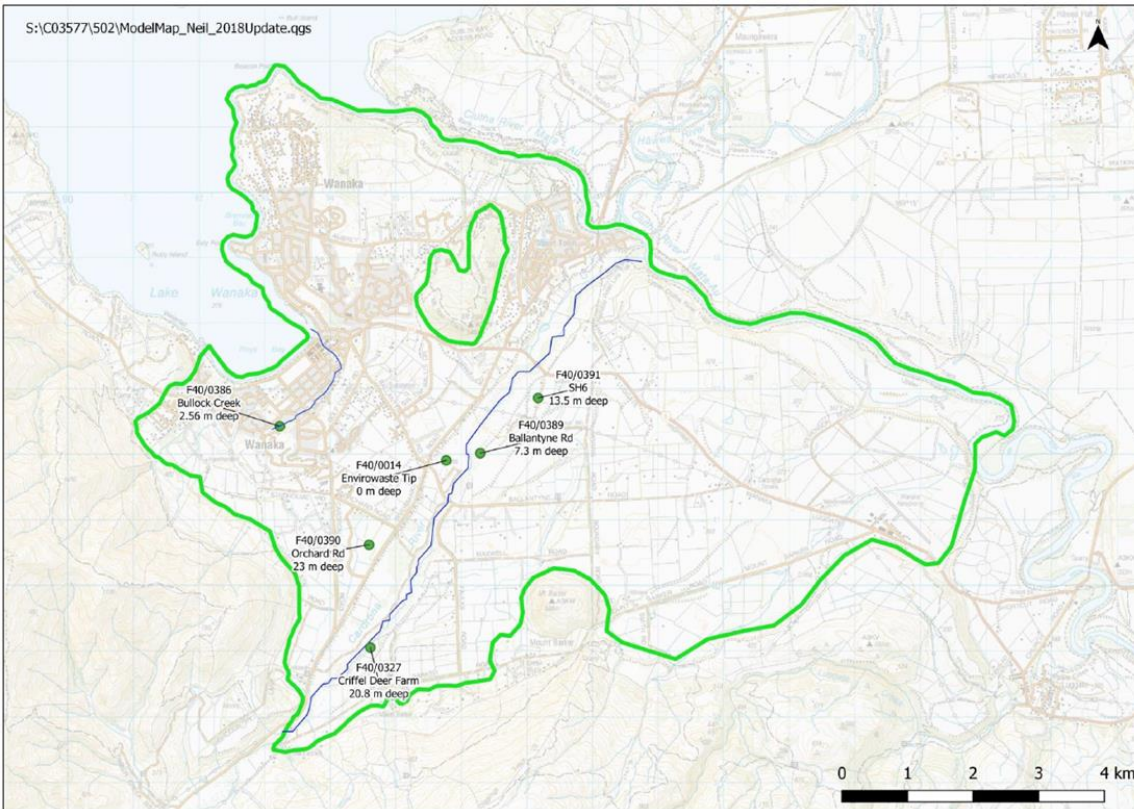
# Surface/groundwater interaction

- **Neutral reach**  
no net loss or gain of water from groundwater
- **Losing reach**  
Approx 1,200 l/s water lost to groundwater
- **Gaining reach**  
300-400 l/s water gained from groundwater



# Surface/groundwater interaction

- **2 Aquifers**
  - **Cardrona Alluvial Ribbon Aquifer**
  - **Wanaka Basin-Cardrona Gravels Aquifer**
- **Bullock Creek (spring fed)**





# NPS-FM 2020

- ☐ **Fundamental concept – Te Mana o te Wai**
- ☐ **Integrated management – Ki uta ki tai**
- ☐ **Objective: to ensure that natural and physical resources are managed in a way that prioritises:**
  - (a) first, the health and well-being of water bodies and freshwater ecosystems**
  - (b) second, the health needs of people (such as drinking water)**
  - (c) third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.**



# Ecosystem values

**Habitat for:**

**Native fish**

- **Clutha flathead galaxias**
- **Longfin eel**
- **Koaro**
- **Upland bully**

**Sports fish**

- **Rainbow trout**
- **Brown trout**

**Macroinvertebrates**

**Periphyton/Algae**

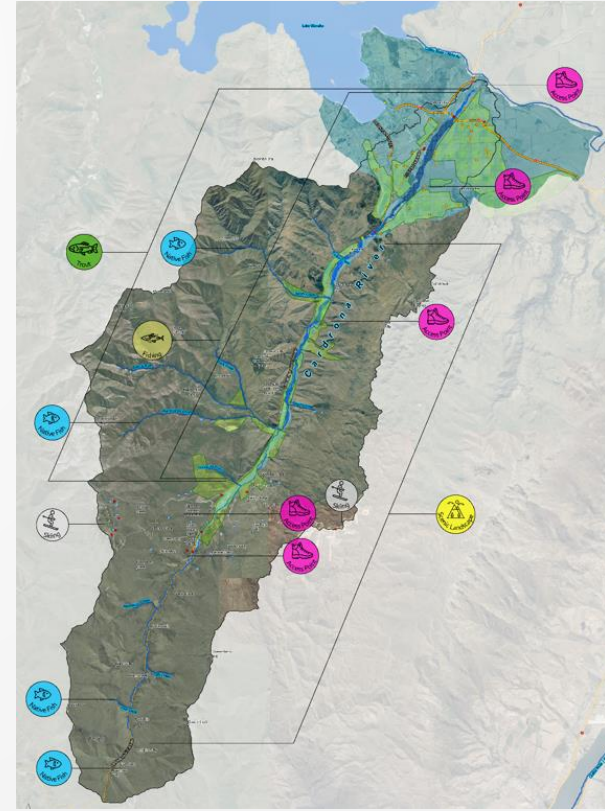


# Takata Whenua Values

- ☐ Mahika kai
- ☐ Indigenous biodiversity
- ☐ Natural character
- ☐ Landscape values
- ☐ Recreation
- ☐ Water quality and quantity and natural processes
- ☐ Trails and access

# Community Values and Aspirations

- ❑ Fish habitat and ecosystems
- ❑ Good water quality
- ❑ Natural character and landscape values
- ❑ Recreation and Tourism
- ❑ Historical and Cultural values
- ❑ Reliability of water supply
- ❑ Bullock Creek



# Economic Assessment

- ☐ Irrigation reliability
- ☐ Impacts of proposed scenarios





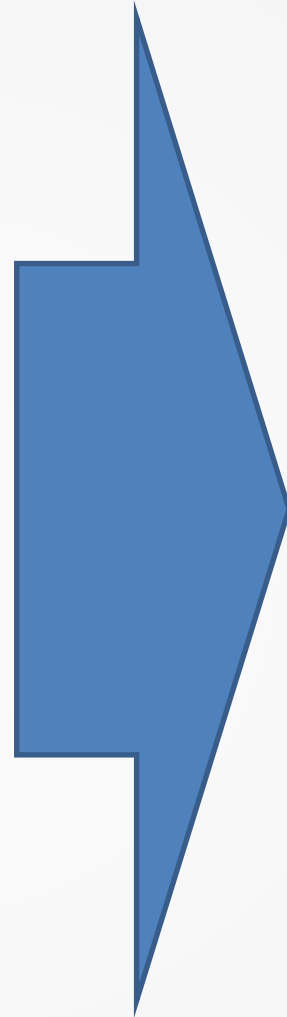
**National Direction –  
NPSFM**

**Hydrological and  
ecological analysis**

**Cultural values**

**Community values,  
concerns and aspirations**

**Economic assessment**



**Freshwater  
Objectives**

# Water Quantity Freshwater Objectives

1. Maintain at least 70% habitat compared to naturalised MALF\* in the upper reach (above Mt Barker) for native fish species and trout.
2. Improve hydrological naturalness and opportunities for safe fish passage in the middle “losing” reach by reducing the frequency and duration of drying.

# Water Quantity Freshwater Objectives

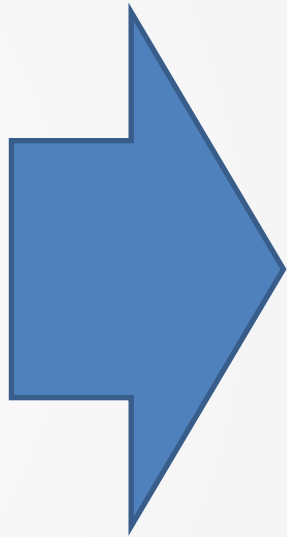
3. **Maintain natural flow characteristics and provide for habitat for native fish in the lower “gaining” reach by limiting allocation.**
4. **Identified areas of the Cardrona that are valued by the community for recreation are suitable for contact recreation. *[Areas to be identified on maps]***

# Water Quantity Freshwater Objectives

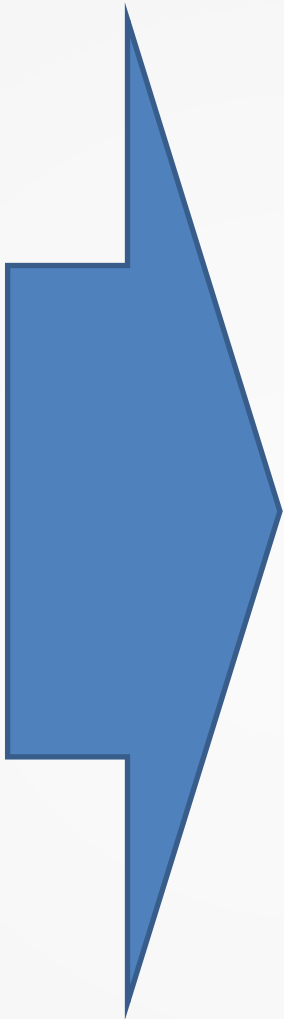
- 5. Groundwater takes are managed to maintain aquifer levels and support the flow in both the Cardrona River and Bullock Creek.**
- 6. No new water is allocated unless there is water available within the Allocation Limit.**



**Scenarios**



**Freshwater  
Objectives**



**Community  
values, concerns  
and aspirations**

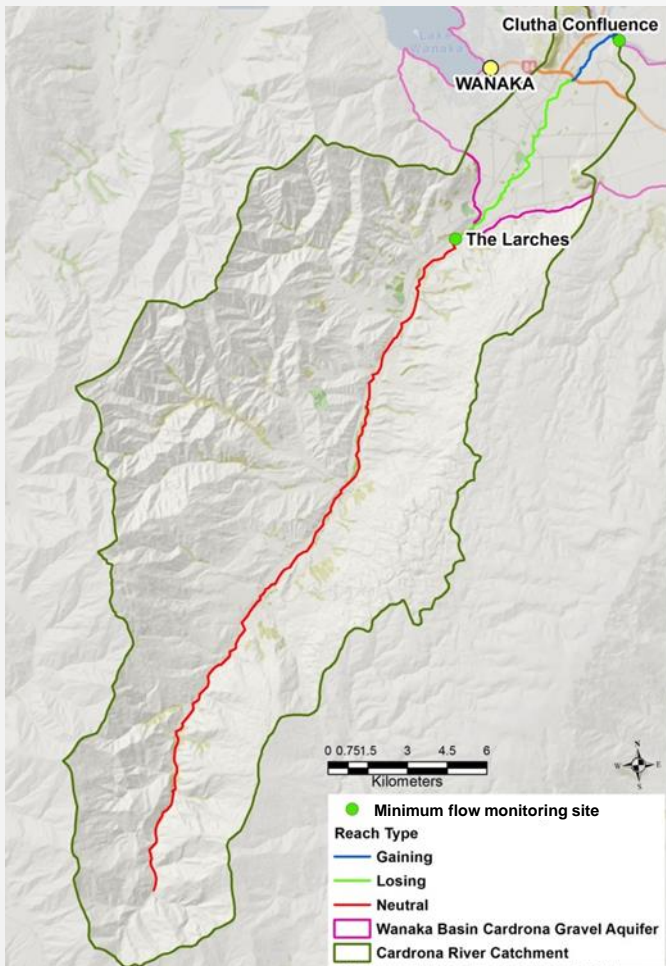
**Hydrological and  
ecological analysis**

**Cultural values**

**Economic  
assessment**

**National Direction  
– NPSFM**

# Status Quo – Upper Reach



- No Minimum Flow
- Measured MALF 850 l/s
- Nat MALF: 1,150 l/s ( $\pm 10\%$ )
- 25 consented surface water takes
- 3 consented groundwater takes
- Max consented takes above Mt Barker: 1,305 l/s
- Estimated actual rate of take: 289 l/s

# Proposed scenarios: Upper Reach

## Includes the Cardrona Alluvial Ribbon Aquifer

Scenarios	A	B	C	D
Minimum flow (l/s) 1 November – 30 April	300 (26% MALF)	600 (52% MALF)	750 (65% MALF)	900 (78% MALF)
Minimum flow (l/s) 1 May – 31 October	2,100			
Primary Allocation Limit (l/s)	600			
Max Instantaneous Rate of take (l/s)	250	250	350	350

- Minimum flow measured at Mt Barker
- Allocation Limit and Max instantaneous rate of take upstream of Mt Barker

# Proposed scenarios: Upper Reach

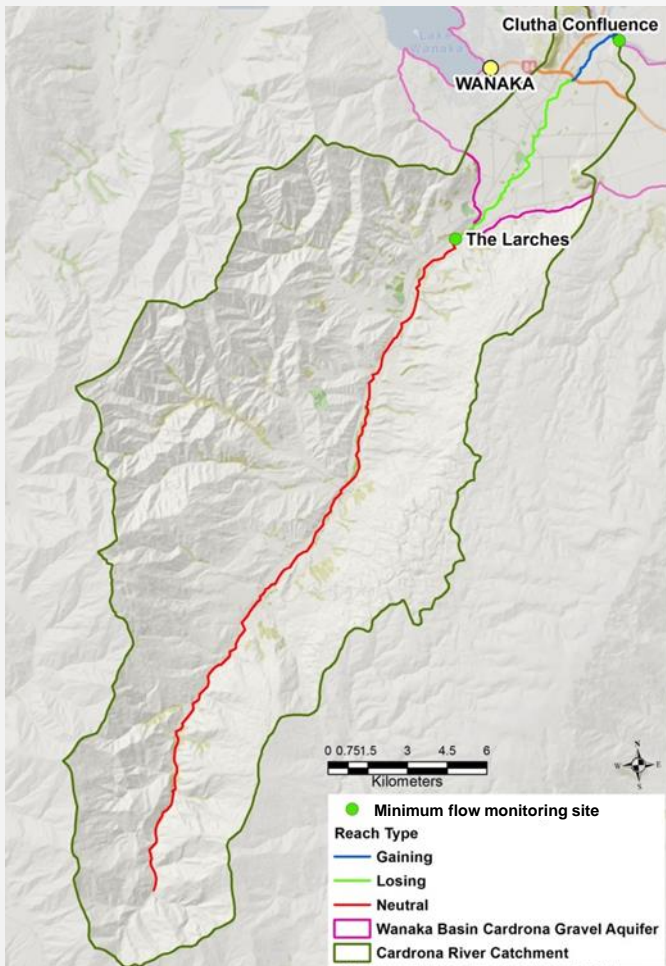
## Includes the Cardrona Alluvial Ribbon Aquifer

Scenarios	A	B	C	D
Minimum flow (l/s) 1 November – 30 April	300 (26% MALF)	600 (52% MALF)	750 (65% MALF)	900 (78% MALF)
Minimum flow (l/s) 1 May – 31 October			2,100	
Primary Allocation Limit (l/s)			600	
Max Instantaneous Rate of take (l/s)	250	250	350	350

- Minimum flow measured at Mt Barker
- Allocation Limit and Max instantaneous rate of take upstream of Mt Barker



# Status Quo – ‘Losing’ Reach Between Mt Barker and SH6 Bridge



- No Minimum Flow
- 5 consented surface water takes
- 3 consented groundwater takes\*
- Max consented takes in ‘Losing Reach’: 654.6 l/s
- Estimated actual rate of take: 400 l/s

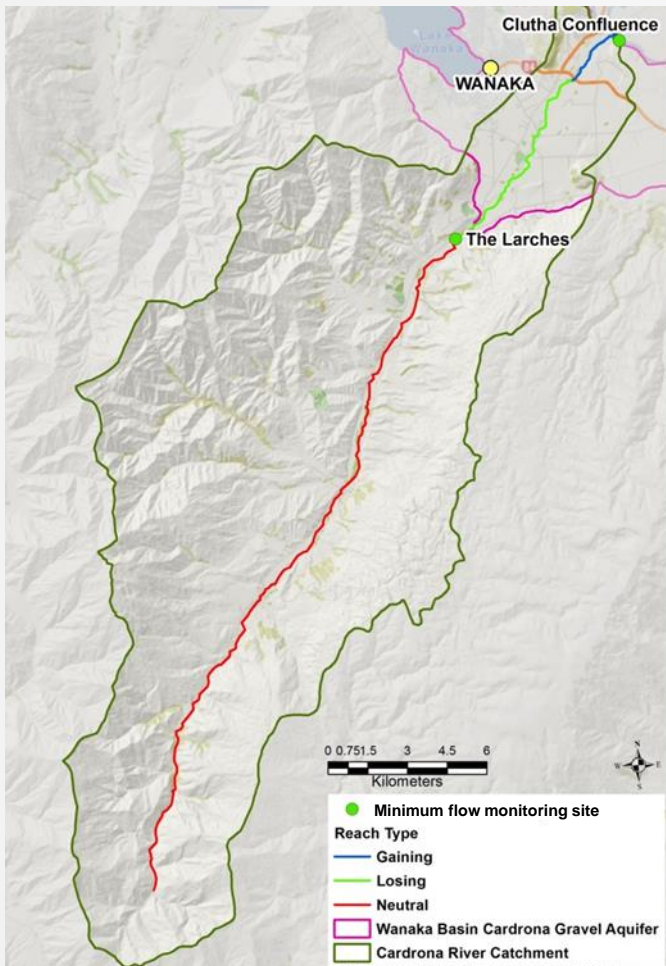
\* Groundwater takes that have been identified as having “stream depletion effects”

# Proposed scenarios: 'Losing' Reach

Scenario	A	B	C
Minimum / Residual flow (l/s)	0	400	0
Primary Allocation Limit (l/s)	Reduce to 300	No Reduction (655)	0 Surface takes replaced with groundwater takes from the Wanaka Basin Aquifer
Max Instantaneous Rate of take (l/s)	Reduce to 300	No reduction	
Transition time	Short	Short	Longer

- Minimum flow measured at Ballantyne Road

# Status Quo 'Gaining' Reach Between SH6 Bridge and Clutha Confluence



- No Minimum Flow
- Nat MALF = 400 l/s
- 2 surface water takes
- 2 groundwater takes\*
- Max consented takes in 'Gaining' Reach': 63.94 l/s
- Estimated actual rate of take: 30-35 l/s

\* Groundwater takes that have been identified as having "stream depletion effects"

# Proposed scenario: 'Gaining' Reach

Scenario	A
Minimum Flow (L/s)	340 <sup>1</sup>
Primary Allocation Limit (L/s)	35 l/s <sup>2</sup>
Instantaneous Rate of take (L/s)	35 l/s <sup>2</sup>

- <sup>1</sup> Minimum flow measured at confluence with Clutha/Mata-Au
- <sup>2</sup> Allocation Limit and Max instantaneous rate of take downstream of SH6

# Preferred scenario for whole river

Scenarios	Upper	Middle	Lower
Minimum flow (l/s) 1 November – 30 April	750	Surface takes replaced with ground water takes from the Wanaka Basin Aquifer	340
Minimum flow (l/s) 1 May – 31 October	2,100		
Primary Allocation Limit (l/s)	600		30-35
Max Instantaneous Rate of take (l/s)	350		30 – 35



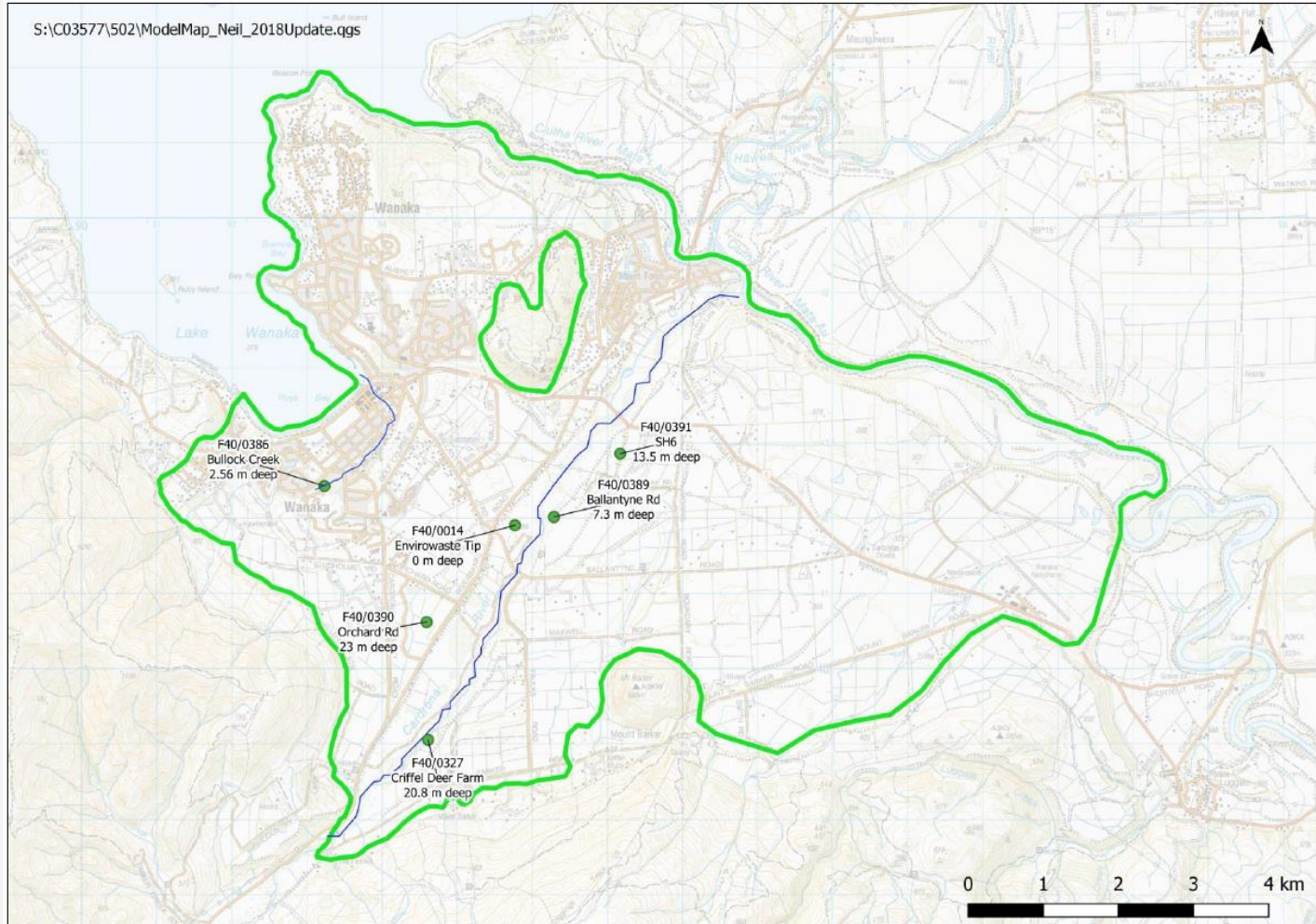
# **Proposed scenario: Supplementary allocation Includes the Cardrona Alluvial Ribbon Aquifer**

<b>Size supplementary allocation blocks (L/s)</b>	<b>250</b>
<b>Supplementary minimum flow 1<sup>st</sup> block (L/s)</b>	<b>3,100</b>
<b>Supplementary minimum flow 2nd block (L/s)</b>	<b>3,350</b>
<b>Supplementary minimum flow 3rd block (L/s)</b>	<b>3,600</b>

# Proposed scenarios: Groundwater

## Wanaka Basin-Cardrona Alluvial Gravel Aquifer

### Scenario 1: Max Allocation Limit for entire Aquifer



# Proposed scenario 1: Groundwater

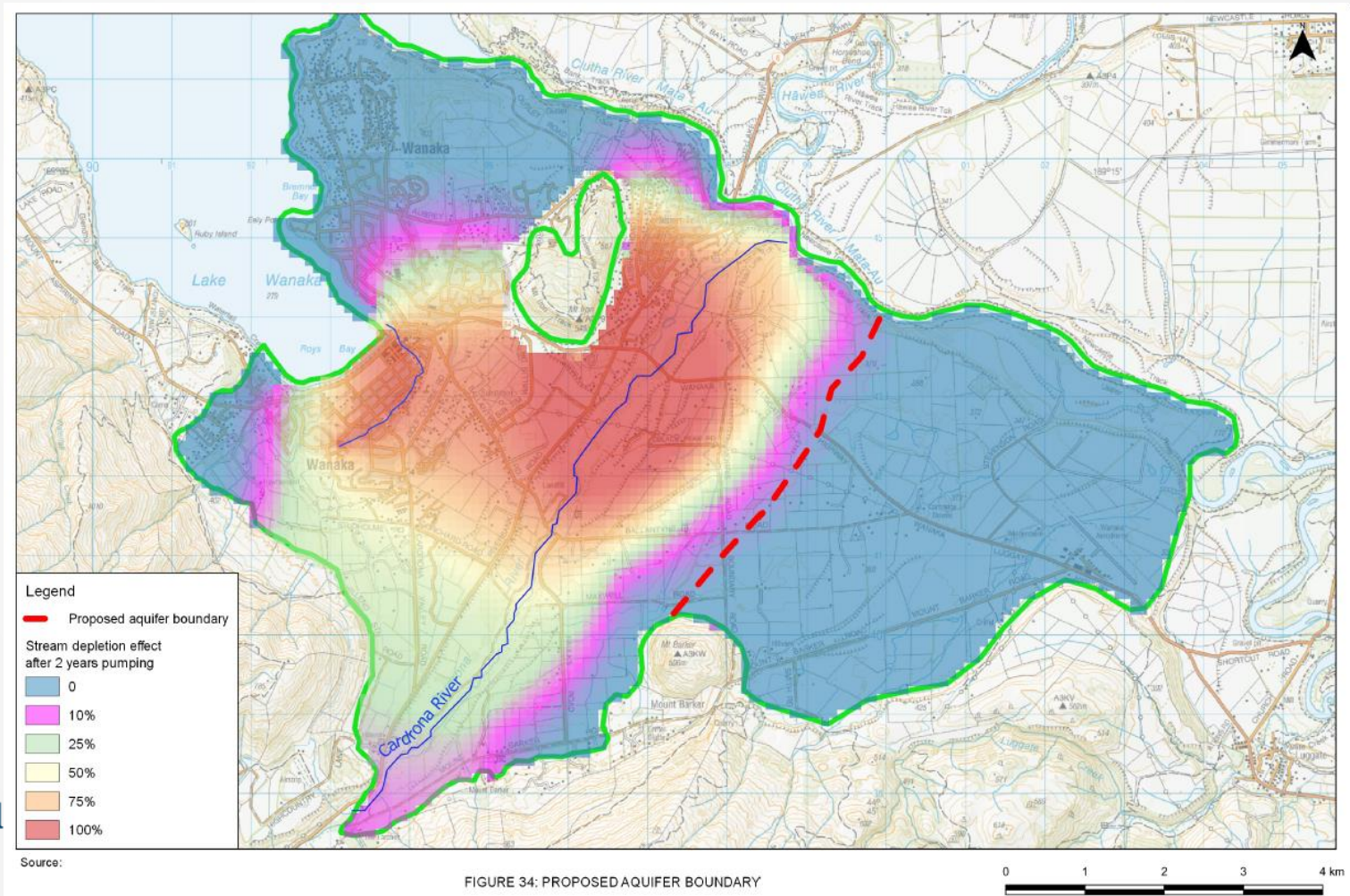
Scenario	A	B	C
Max Allocation Limit	1.3M m <sup>3</sup> /yr	1.3M m <sup>3</sup> /yr + allowance for surface water takes in losing reach going to groundwater	5M m <sup>3</sup> /yr



# Proposed scenarios: Groundwater

## Wanaka Basin-Cardrona Alluvial Gravel Aquifer

### Scenario 2: Split aquifer in eastern and western allocation zone



# Proposed scenario 2: Groundwater

Scenario	A	B
Western Zone Max Allocation Limit	Current level of actual use	Current level of actual use + allowance for surface water takes in losing reach going to groundwater
Eastern Zone Max Allocation Limit	50% Mean Annual Recharge (MAR)	50% Mean Annual Recharge (MAR)



# Proposed scenarios: Bullock Creek

Scenario	A	B
Minimum Flow (L/s)	400* (95% MALF)	400 + impacts of shift of surface watertakes below Mt Barker to groundwater)
Primary allocation limit (L/s)	20	20

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