

I hereby give notice that a meeting of Horizons Regional Council will be held on:

**Date:** Tuesday, 27 March 2018  
**Time:** 10.00am  
**Venue:** Tararua Room Horizons Regional Council  
11-15 Victoria Avenue  
Palmerston North

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## **REGIONAL COUNCIL**

### **AGENDA**

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#### **MEMBERSHIP**

<b>Chair</b>	Cr EB Gordon JP
<b>Deputy Chair</b>	Cr PW Rieger, QSO JP
<b>Councillors</b>	Cr JJ Barrow
	Cr LR Burnell, QSM
	Cr DB Cotton
	Cr RJ Keedwell
	Cr PJ Kelly, JP
	Cr GM McKellar
	Cr NJ Patrick
	Cr BE Rollinson
	Cr CI Sheldon
	Cr WK Te Awe Awe

**Michael McCartney**  
**Chief Executive**

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**Full Agendas are available on Horizons Regional Council website**  
**[www.horizons.govt.nz](http://www.horizons.govt.nz)**

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for further information regarding this agenda, please contact:  
Julie Kennedy, 06 9522 800

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<b>SERVICE CENTRES</b>	<b>Kairanga</b> Cnr Rongotea & Kairanga-Bunnythorpe Rds, Palmerston North	<b>Marton</b> Hammond Street	<b>Taumarunui</b> 34 Maata Street	<b>Woodville</b> Cnr Vogel (SH2) & Tay Sts
<b>REGIONAL HOUSES</b>	<b>Palmerston North</b> 11-15 Victoria Avenue	<b>Whanganui</b> 181 Guyton Street		
<b>DEPOTS</b>	<b>Levin</b> 11 Bruce Road	<b>Taihape</b> Torere Road Ohotu		
<b>POSTAL ADDRESS</b>	Horizons Regional Council, Private Bag 11025, Manawatu Mail Centre, Palmerston North 4442			
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## AGENDA

### 1 WELCOME / KARAKIA

### 2 APOLOGIES AND LEAVE OF ABSENCE

At the close of the Agenda no apologies had been received.

### 3 PUBLIC FORUMS: Are designed to enable members of the public to bring matters, not on that meeting's agenda, to the attention of the local authority.

**DEPUTATIONS:** Are designed to enable a person, group or organisation to speak to an item on the agenda of a particular meeting.

Requests for Public Forums / Deputations must be made to the meeting secretary by 12 noon on the working day before the meeting. The person applying for a Public Forum or a Deputation must provide a clear explanation for the request which is subsequently approved by the Chairperson.

**PETITIONS:** Can be presented to the local authority or any of its committees, so long as the subject matter falls within the terms of reference of the council or committee meeting being presented to.

Written notice to the Chief Executive is required at least 5 working days before the date of the meeting. Petitions must contain at least 20 signatures and consist of fewer than 150 words (not including signatories).

Further information is available by phoning 0508 800 800.

### 4 SUPPLEMENTARY ITEMS

To consider, and if thought fit, to pass a resolution to permit the Committee/Council to consider any further items relating to items following below which do not appear on the Order Paper of this meeting and/or the meeting to be held with the public excluded.

Such resolution is required to be made pursuant to Section 46A(7) of the Local Government Official Information and Meetings Act 1987 (as amended), and the Chairperson must advise:

- (i) The reason why the item was not on the Order Paper, and
- (ii) The reason why the discussion of this item cannot be delayed until a subsequent meeting.

### 5 MEMBER'S CONFLICT OF INTEREST

Members are reminded of their obligation to declare any conflicts of interest they might have in respect of the items on this Agenda.



Minutes of the thirteenth meeting of the tenth triennium of Horizons Regional Council held at 2.23pm on Wednesday 14 February 2018, in the Tararua Room Horizons Regional Council, 11-15 Victoria Avenue, Palmerston North.

**PRESENT** Crs PW Rieger QSO JP (Chair), JJ Barrow, DB Cotton, RJ Keedwell, PJ Kelly JP, GM McKellar, NJ Patrick, BE Rollinson, CI Sheldon

**IN ATTENDANCE** Chief Executive Mr MJ McCartney  
Group Manager  
Corporate and Governance Mr C Grant  
Committee Secretary Ms K Booth

**ALSO PRESENT** At various times during the meeting:  
Dr J Roygard (Group Manager Natural Resources & Partnerships), Mr R Strong (Group Manager River Management), Ms C Morrison (Media & Communications Manager), Mrs L Macdonald (Chief Financial Officer), Mrs K Robinson (Rates Coordinator), Mr R Standish (Management Accountant), and a member of the Press.

Cr Rieger assumed the chair for the meeting, welcomed everyone, and explained Chair Gordon had put forward his apology for the meeting.

## **APOLOGIES**

**18-190**

**Moved**

**Rieger/Rollinson**

*That apologies be received from Cr Burnell, Chair Gordon, and Cr Te Awe Awe.*

**CARRIED**

## **PUBLIC SPEAKING RIGHTS**

There were no requests for public speaking rights.

## **SUPPLEMENTARY ITEMS**

There were no supplementary items to be considered.

## **MEMBERS' CONFLICTS OF INTEREST**

There were no conflicts of interest declared.

## **PETITIONS / DEPUTATIONS**

There were no petitions/deputations.

## CONFIRMATION OF MINUTES

**18-191**                **Moved**    **Sheldon/Kelly**

*That the minutes of the Regional Council meeting held on 19 December 2017 as circulated, be confirmed as a correct record.*

**CARRIED**

## CHIEF EXECUTIVE'S REPORT

The Chief Executive's (CE) report had been distributed to Members prior to the meeting. The CE took his report as read and responded to questions about the Swimmability Task Force Group, and sensitivity around supplying information on prosecutions.

**18-192**                **Moved**    **Rieger/Kelly**

*That the Chief Executive's report be received.*

**CARRIED**

## CONSIDERATION OF THE CONSULTATION DOCUMENT FOR THE 2018-28 LONG-TERM PLAN AND SUPPORTING INFORMATION FOR ADOPTION TO GO TO AUDIT

*Report No 18-09*

This report sought adoption of the Supporting Information to the Long-term Plan 2018-28, and Long-term Plan 2018-28 Consultation Document to go to Audit New Zealand. The Chair referred to the recommendations from the Strategy and Policy Committee meeting held earlier in the day, for Council to send the documents to Audit New Zealand.

**18-193**                **Moved**    **Rollinson/Keedwell**

*It is recommended that Council:*

- a. receives the information contained in Report No. 18-09.*
- b. adopts the Supporting Information to the Long-term Plan 2018-28 as amended, to go to Audit New Zealand;*
- c. adopts the Long-term Plan 2018-28 Consultation Document as amended, to go to Audit New Zealand.*

**CARRIED**

At the Strategy and Policy Committee meeting held earlier in the day, a new recommendation was proposed and put to the meeting.

**18-194**                      **Moved**    **Barrow/Rieger**

*The Council wishes to seek feedback from you, the ratepayers as to whether Horizons should support a regional wide facilities rate as part of the differentiated UAC rate.*

*An example may be the Whanganui Velodrome which is seeking \$500,000 per annum which equates to approximately \$5 per ratepayer per year.*

*Regional facilities, that benefit the region, could be anything from a regional park to a sporting facility*

**For the Motion: Seven Councillors**

**CARRIED**

### **COUNCILLORS' WORKSHOP ATTENDANCE - 13 DECEMBER 2017 TO 5 FEBRUARY 2018**

*Report No 18-10*

This item noted the Councillors' Workshop attendance from 13 December 2017 to 5 February 2018.

**18-195**                      **Moved**    **Rieger/Rollinson**

*It is recommended that Council:*

- a. *receives the information contained in Report No. 18-10 and Annex.*

**CARRIED**

### **AFFIXING OF THE COMMON SEAL**

*Report No 18-11*

This paper reported on documents to which Horizons Regional Council's Common Seal had been affixed.

**18-196**                      **Moved**    **Rieger/Rollinson**

*That the Council:*

- a. *acknowledges the affixing of the Common Seal to the below mentioned documents.*

**CARRIED**

**RECEIPT AND ADOPTION OF COMMITTEE RESOLUTIONS AND RECOMMENDATIONS**

**REPORT OF AUDIT, RISK & INVESTMENT (TENDERS) SUB-COMMITTEE - RECEIVE AND ADOPT RESOLUTIONS AND RECOMMENDATIONS - 23 JANUARY 2018**

**18-197**

**Moved**

**Rollinson/Kelly**

*That the Council receives and adopts the resolutions and recommendations of the Audit, Risk & Investment (Tenders) Sub-Committee meeting held on 23 January 2018.*

**CARRIED**

**MEMBER'S QUESTIONS**

There were no Members' questions.

**PROCEDURAL MOTION TO EXCLUDE THE PUBLIC**

**18-198**

**Moved**

**Kelly/Rollinson**

*THAT the public be excluded from the following part(s) of the proceedings of this meeting. The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution follows.*

*This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 and section 7 of that Act which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public, as follows:*

**CARRIED**

General subject of each matter to be considered	Reason for passing this resolution	Ground(s) under section 48(1) for the passing of this resolution
PX1 Confirmation of Public Excluded Meeting held on 19 December 2017	s7(2)(h) - the withholding of the information is necessary to enable the local authority to carry out, without prejudice or disadvantage, commercial activities.	s48(1)(a)  The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX2 Report of Audit, Risk & Investment (Tenders) Sub-Committee - Receive and Adopt Resolutions and Recommendations - 23 January 2018	s7(2)(h) - the withholding of the information is necessary to enable the local authority to carry out, without prejudice or disadvantage, commercial activities.	s48(1)(a)  The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.

PX3

Council / Committee to consider whether any item in the Public Excluded minutes can be moved into the public domain and define the extent of the release

PX4

Members' Questions

The meeting adjourned to the Public Excluded part of the meeting at 2.39pm and resumed at 2.43pm.

In the Public Excluded part of the meeting, the following resolutions were passed.

#### **CONFIRMATION OF PUBLIC EXCLUDED MEETING HELD ON 19 DECEMBER 2017**

**PX 18-69**

**Moved**

**Keedwell/Patrick**

*That the minutes of the confidential part of the Council meeting held on 19 December 2017, as circulated, be confirmed as a correct record.*

**CARRIED**

#### **REPORT OF AUDIT, RISK & INVESTMENT (TENDERS) SUB-COMMITTEE - RECEIVE AND ADOPT RESOLUTIONS AND RECOMMENDATIONS - 23 JANUARY 2018**

**PX 18-70**

**Moved**

**Rieger/Sheldon**

*That the Council receives and adopts the resolutions and recommendations of the Audit, Risk & Investment (Tenders) Sub-Committee meeting held on 23 January 2018.*

**CARRIED**

The Chair said there was no information to be released into the public domain.

**PX 18-71**

**Moved**

**Rieger/Sheldon**

*That the Council moves out of Public Excluded.*

**CARRIED**

The Public Excluded section of the meeting concluded at 2.43pm.

The meeting closed at 2.44pm.

Confirmed

\_\_\_\_\_  
CHIEF EXECUTIVE

\_\_\_\_\_  
CHAIR



## CHIEF EXECUTIVE'S REPORT TO COUNCIL

Wednesday, 14 February 2018

Michael McCartney – Chief Executive

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### Introduction

1. Attached, at Annex A, is a more detailed round-up of the main organisational activities. Members are asked to view the upcoming events and advise us of any meetings or events of interest.

### Planning and Policy

2. Council is about to reach a key milestone with the Long-term Plan process. Very soon the 2018-28 Consultation Document and Supporting Information for the 2018-28 Consultation Document will be referred to Audit New Zealand ahead of Council formally adopting the documents for public consultation in March. The process has been very thorough with over 15 workshops on policy, funding and activity topics over the past seven months. Despite the extensive management and political conversations about the Long-term Plan, the key process to inform the final outcome will be the public consultation.
3. Work continues around the piece of work to inform a Plan Change to the One Plan. A separate item will be presented on that process. Recently Cr Barrow, Dr Peet and myself met with Tararua District Council elected members to talk about the current state and future plans related to One Plan challenges as they relate to that district. The meeting was well received and the Council expressed a desire to meet with us on a more regular basis.

### Transport

4. This portfolio is extremely busy with work around Accessing Central New Zealand (Acc25), Manawatu Gorge, Otaki to north of Levin, Palmerston North City Ring Road and Capital Connection promoting numerous conversations and meetings with the New Zealand Transport Agency, Government officials and Ministers. Last week the Region's Mayors and Chair met with Minister Twyford to talk about the broad roading challenges and opportunities for the Region.
5. Council Chair spoke about the need for Government to lend support for the popular Capital Connection.
6. Funding for the Capital Connection train service ceases on 30 June this year. In preparation for that date, the Transport team have been working with key stakeholders and partner councils to retain the existing service for another three years so that work can be completed on a longer term rail option(s) connecting the Horizons and Wellington regions.
7. For the past three years Horizons has contributed \$500,000 to the existing service and through the Long-term Plan we are proposing to not contribute further funding, instead requesting that the Crown fund the operational shortfall (\$6.2M for three years). A business case has been completed to support this request which concluded that the BCR of a long term rail service (40 years) was 9.4. It is hoped that the Minister sees the benefit of a greater



rail connectivity between the two regions and grants this request to allow for the investigation of and planning for a long term option.

8. Staff have been in contact with Ministry officials who met with the Minister on 23 January 2018 to discuss funding this service amongst other transport sector Budget initiatives. They will be seeking his decision on which initiatives he wishes to support for Budget 2018. The Budget proposals were due to the Treasury and the Minister of Finance by 26 January 2018. While Budget announcements are expected in May I have asked staff to keep me informed of any updates on this matter. Concurrent with this, I have asked staff to set aside funding for a possible bus contingency connecting Palmerston North to Waikane in the event the Capital Connection service ceases.

### **Regulatory**

9. One major issue we are engaged with, both from a regulatory response and community support perspective, has been the Ohakea water contamination issue. The most recent testing has identified some contamination of ground and surface water. On 2 February 2018 a meeting of lead Government agencies, Ministry of Health, New Zealand Defence Force, Horizons Chair and Mayors from Manawatu and Rangitikei District Councils was held. Minister Lees-Galloway also attended. The objective of the meeting was for our political leadership to convey to Government the concerns they have heard from the community as well as aligning the response effort and all important communications. The Ministry for the Environment, as lead for the whole of Government response, has engaged an experienced Civil Defence and Emergency Management Recovery Manager which is a useful step in formulating a more “process/project management” approach to the response and recovery effort. Regular meetings have been set up with key technical advisors and communication staff. Parallel with the important response/recovery effort, Horizons has initiated its investigation into the contamination from a RMA perspective. A decision around what, if any, RMA response is appropriate is some time away.

### **River Management**

10. The past two months have been a busy period for the River Management team. The works programme has included annual spraying as well as planned construction and maintenance works. The high profile works at Ashhurst Domain are due to commence this month with installation of rock and groynes. There will be the need to carefully manage public safety and site access during the works period as the site is very popular for river users. Rock works at the Palmerston North Esplanade is also due to begin this month with the contract having recently been awarded.
11. On the back of Minister Jones’ visit to the Whanganui Port last year, the River Management team are embarking on some design and costing works for lower river flood and erosion protection. The focus will be on community safety and also assistance to port resilience. As was expressed to the Minister during his visit, we are very interested in advancing a business case for Government support for lower river protection works.

### **Freshwater**

12. As Council is aware we recently hosted officials from the Office of the Auditor General (OAG) in the Region. The OAG has been tasked with doing audits into Regional Council freshwater management. In 2011 Horizons was subject to a similar (more forensic) audit along with three

other regional councils. In many respects the recent audit is in part looking at how those councils have responded to the 2011 findings. The Auditors experienced a very comprehensive set of briefings from key stakeholders over a three to four day period. This also included viewing “on ground” efforts aimed at water quality improvement. The initial draft findings are likely to be completed over the next few months with a final report release around June/July.

13. Initial work from the Swimmability Taskforce Group (Dr Roygard being a member) is likely to be presented to Council within the next month or so. This work has been undertaken under the direction of the previous Minister and will look at what levels of improvement (towards the 80% target) will be achieved with current or confirmed interventions. These findings will be indicative only with the final report due later this year. The intention being one that gives some guidance around how close or far away each council will be from the national target and therefore what measures/costs would be needed region-by-region to meet those targets.

### **National Issues**

14. Later this week the Regional Sector Chairs and Mayors will meet. That meeting also includes audiences with Minister O'Connor (Primary Industries) and Minister Parker (Environment). A copy of the cover agenda for the Regional Sector meeting is attached at Annex B.
15. The day prior to the Regional Sector meeting the Chief Executives' Environment and Economy Forum (CEEEF) will be held. Minister Parker is scheduled to also address the Regional Sector and Natural Resources Chief Executives as part of that meeting. A copy of the cover agenda for the CEEEFs meeting is attached at Annex C.
16. Last week the annual Special Interest Group Convenor Plenary was held in Wellington. The event was attended by approximately 65 professional leads from across the Regional Sector – representing several thousand staff that work in the Sector. A copy of the Plenary cover agenda and background information is provided at Annex D.

### **Attachments**

- Annex A Council Update
- Annex B Regional Sector February Meeting Agenda
- Annex C CEEEF February Meeting Agenda
- Annex D Special Interest Group Convenor Plenary Agenda and Background Material



## COUNCIL UPDATE

From 01 January 2018 to 28 February 2018

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### ACTIVITIES

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#### Ruapehu

##### Natural Resources & Partnerships

1. Staff joined the Taumarunui Sustainable Land Management group on 7 February 2018 to present on freshwater management and swimmability.

##### River Management

2. Environmental Grant work clearing vegetation on Makotuku River for Ruapehu District Council completed.

##### Strategy & Regulation

3. Staff from Ruapehu District Council have attended compliance training hosted by Horizons due to the recently signed MoU.

#### Whanganui

##### River Management

4. Whangaehu/Mangawhero aerial spraying programme being undertaken during February and March 2018. Public notices advertised in local newspapers.
5. Meeting with Ngā Tāngata Tiaki on 25 January 2018.

##### Regional Services & Information

6. 10 February 2018 – Whanganui Mobility Scooter Education Day.
7. 14 February 2018 – Whanganui National Go By Bike Day.

##### Strategy & Regulation

8. Interviews for appointment of the recreation, tourism and environmental & conservation community group representatives on Te Kōpuka were held 16 January 2018. Interviews for the primary sector community group representative are planned for 9 February 2018.
9. Meeting with Tamaūpoko to discuss their Tamaūpoko Community Led Development Programme and how Horizons can help with implementation.
10. Compliance staff attended an induction programme for Downer contractors and provided a presentation on environmental management.

#### Manawatu

##### River Management

11. Pohangina/Oroua Scheme aerial spraying programme being undertaken during February and March 2018. Public notices advertised in local newspapers.
12. Contract for the placement of rock at the Ashhurst Domain has been awarded and work scheduled to start in February 2018.
13. Meeting with Foxton Community Board 12 February 2018 to discuss erosion protection at Hartley Street.

## **Tararua**

### River Management

14. Aerial spraying programme for a number of schemes about to commence.

### Regional Services & Information

15. 2 February 2018 – Dannevirke A&P Show – Child restraint activity.

16. 13 February 2018 – Tararua Road Safety Action Plan meeting.

17. 13 February 2018 – Tararua Road Safety Group meeting.

### Strategy & Regulation

18. Compliance staff attended an induction course being run by Downers and the Tararua Alliance. They presented a module on environmental management. The induction course was delivered to over 100 contractors.

## **Palmerston North City**

### River Management

19. Contract awarded for the Esplanade rock lining, with work scheduled to start in February 2018. Works for He Ara Kotahi and the PowerCo cable are expected to commence at the same time.

### Regional Services & Information

20. 1 February 2018 – PN Urban Bus advisory group meeting with Palmerston North City Council.

21. 17 February 2018 – Corrections Road Safety Education Day.

### Strategy & Regulation

22. Meeting with Rangitāne Tū Mai Rā (the post settlement governance entity for Rangitāne o Tamaki Nui a Rua and Rangitāne o Wairarapa) to discuss relationships.

## **Horowhenua**

### Natural Resources & Partnerships

23. Attended a Te Mana O Te Wai meeting in Levin on 29 January 2018.

## **Rangitikei**

### Natural Resources & Partnerships

24. Staff attended the Ngā Puna Rau Governance Group meeting on 2 February 2018.

### River Management

25. Rangitikei Scheme aerial spraying programme being undertaken during February and March 2018. Public notices advertised in local newspapers.

### Regional Services & Information

26. 20 January 2018 – Mangaweka Fatigue Stop.

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## CORPORATE & GOVERNANCE UPDATE

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27. Councillors' Workshop on the Office of the Auditor General Freshwater Review, Quality Audit Interview with Council, LTP and Process for Catchment Planning held 30 January 2018.
28. Environment Committee meeting held 13 February 2018.
29. Catchment Operations Committee meeting held 13 February 2018.
30. Strategy & Policy Committee meeting held 14 February 2018.
31. Council meeting to adopt Supporting Information and Consultation document for Audit NZ and other business held 14 February 2018.
32. Audit, Risk and Investment Financial Briefing held 14 February 2018.
33. Passenger Transport Committee meeting held 20 February 2018.
34. Councillors' Workshop on Representation Review held 28 February 2018.

### Number of FTEs

35. The total number of FTEs is: 233.

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## COMMUNICATIONS UPDATE

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36. 24 January 2018 – attended site visits to Woodville water supply and Ferry Reserve as part of OAG tour.
37. 25 January 2018 – Media and communications manager visited ECan to discuss and plan sector communication with peers.
38. 30 January 2018 – Council workshop on LTP consultation document and communication plan.
39. 8 February 2018 – Media and communications manager attending and presenting at Special Interest Group (SIG) Conveners' plenary session.
40. 8 February 2018 – Senior Communications Advisor attended He Ara Kotahi groundbreaking ceremony.

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## UPCOMING COMMUNITY ENGAGEMENT EVENTS

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### Events and Activities

#### Natural Resources & Partnerships

41. The Ngā Puna Rau Governance Group will meet in Palmerston North on 16 March 2018.

#### River Management

42. Foxton Natural Hazards presentation to Foxton Community Board on 19 February 2018.

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## GENERAL

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### Natural Resources & Partnerships

- 43. Attended a Freshwater Taskforce meeting in Wellington on 1 February 2018.
- 44. DairyNZ held a Dairy Leaders' meeting at Whararata on 2 February 2018 and was attended by NRP staff.
- 45. Attended a Land and Water Forum meeting in Wellington on 9 February 2018.
- 46. Attended Freshwater Technical Advisory Group meeting at MfE on 23 February 2018.
- 47. Hosted the Office of the Auditor General for three days while they carried out an audit on progress made and changes experienced in managing impacts on freshwater quality.

### River Management

- 48. Meeting with Massey University Head of School of Engineering and Advanced Technology 13 February 2018 to discuss river management sector resourcing.
- 49. GM attending the SOLGM Risk Management Forum, Wellington, 15 and 16 February 2018.

### Regional Services & Information

- 50. 20 February 2018 – Accessing Central New Zealand Governance Group Meeting.
- 51. 21/22 February 2018 – Regional Land Transport Plan Hearings.

Report No.	18-35
Decision Required	

## CONSIDERATION OF THE CONSULTATION DOCUMENT FOR THE 2018-28 LONG-TERM PLAN AND SUPPORTING INFORMATION FOR ADOPTION

### 1. PURPOSE

- 1.1. The purpose of this report is to seek the adoption of the **Supporting Information to the Consultation Document (Supporting Information)** and **2018-28 Long-term Plan Consultation Document (Consultation Document)** for consultation with the public under Sections 93A (use of special consultative procedure in relation to the Long-term Plan) and 93B (purpose of consultation document for the Long-term Plan) of the **Local Government Act (LGA) 2002**.

### 2. RECOMMENDATION

It is recommended that Council:

- a. receives the information contained in Report No. 18-35;
- b. adopts the Supporting Information to the Consultation Document;
- c. adopts the Consultation Document for public consultation.

### 3. FINANCIAL IMPACT

- 3.1. The financial impact to Council is the cost of consultation which has been allowed for in the Long-term Plan 2015-25 budgets.
- 3.2. Rate increases will not be uniform over all ratepayers. The proposed average rate increase is 7.44%. Sample ratepayers are provided on pages 20 to 21 of the Consultation Document which will be tabled on the day.

### 4. SIGNIFICANT BUSINESS RISK IMPACT

- 4.1. There is a significant business risk to **Horizons Regional Council (Horizons)** if the Consultation Document is not approved to go to consultation. This process has a tight timeframe and any delays may impact our ability to complete a full democratic process.

### 5. COMMUNITY ENGAGEMENT

- 5.1. Horizons has a communications plan for consultation which Council has already approved. Horizons will be undertaking a consultation process for the purpose of the Consultation Document for the Long-term Plan, with public notices and media releases. In addition Horizons will:
- make the Consultation Document available on our website on a dedicated page
  - make the Consultation Document available at our service centres and Regional House
  - send River Management fact sheets direct to key rate payers affected by the proposed scheme changes and also hand out at community meetings
  - highlight the Long-term Plan in the Chief Executive's column in the River City Press
  - run social media advertising
  - invite Councillors to attend public events
  - run full page newspaper advertising
  - run radio advertising

## 6. BACKGROUND

- 6.1. The Long-term Plan has been in development for eight months. Councillors have worked through a programme of fifteen workshops which have reviewed all the outputs and associated costs of each activity. The Consultation Document and Supporting Documentation is a culmination of those activities to date.
- 6.2. The Consultation Document proposes a rate increase of 7.44% for the regions' rates for the 2018-19 financial year when compared with the current 2017-18 Annual Plan.
- 6.3. Additional Supporting Information has been created under a separate cover that details all the key activities, any proposed changes and associated costs across the years for the ten year period.
- 6.4. The Supporting Information also states Horizons key assumptions, all policies, including proposed changes to any of the revenue and funding policies, including new policies required as a result of the decisions made over the last eight months.
- 6.5. It should be noted that, for simplicity of reading and locating the Supporting Information, Horizons have kept it in four separate segments:
  - i) Setting the Scene
  - ii) Introducing the Activities
  - iii) 30-year Infrastructure Strategy
  - iv) Introducing the Finances

## 7. CONSULTATION

- 7.1. Consultation will be carried out as specified under Sections 93 and 93A of the LGA.

## 8. TIMELINE / NEXT STEPS

- 8.1. The Consultation Document will be printed and made available to the public online on Wednesday, 28 March 2018. The submission period ends 5.00pm Monday, 30 April 2018 and Council propose to hear submissions between 21 to 24 May 2018. The final Long-term Plan will be adopted 20 June 2018.

## 9. SIGNIFICANCE

- 9.1. Adoption of this Supporting Information and Consultation Document for consultation is not a significant decision as it remains a proposal document.

Leanne Macdonald  
**CHIEF FINANCIAL OFFICER**

Chrissie Morrison  
**MEDIA AND COMMUNICATIONS MANAGER**

## ANNEXES

There are no attachments to this report.



Report No.	18-36
Decision Required	

## REPRESENTATION REVIEW 2018

### 1. PURPOSE

- 1.1. This report supports Council's adoption of an 'initial proposal' for consultation, the next stage of Horizons' six-yearly review of its representation arrangements. The representation review is required by the **Local Electoral Act 2001 (LEA)**.

### 2. RECOMMENDATION

It is recommended that Council:

- a. receives the information contained in Report No. 18-36, and
- b. resolves to adopt the existing representation arrangements as the initial proposal for public consultation, and
- c. instructs officers to publicly notify the initial proposal by 10 April 2018.

### 3. FINANCIAL IMPACT

- 3.1. There is no impact on existing budgets as a result of this report.

### 4. COMMUNITY ENGAGEMENT

- 4.1. Community engagement will be undertaken through the consultation process referred to in paragraph 10.1 below. There will be a number of methods used to encourage community engagement with this process, including: public notices and a press release; information and an online submission form in the 'current consultation' section of Horizons' website; radio advertising; and possibly newspaper columns by the Chief Executive and elected members.

### 5. SIGNIFICANT BUSINESS RISK IMPACT

- 5.1. Horizons has a legal obligation to complete a representation review in 2018 prior to a determination by the **Local Government Commission (LGC)** no later than April 2019, under the LEA. There could be a significant business risk if the organisation were found not to comply with the requirements of the LEA.

### 6. BACKGROUND

- 6.1. All local authorities are required to review their representation arrangements every six years. Horizons' current review must be completed and determined by the LGC by 10 April 2019 and will apply to the 2019 and 2022 local body elections. The process for this review is set out in the LEA.
- 6.2. Council has already resolved to retain the first past the post voting system (June 2017 Regional Council meeting) and not to establish Maori constituencies (August 2017 Regional Council meeting) as the first steps in the current review. There was no petition received by 21 February 2018 from the region's voters, demanding a poll to reverse these

decisions. Members will now consider the number of elected members and constituencies and their arrangement, and adopt an initial proposal for public consultation.

#### Local Electoral Act requirements

- 6.3. The LEA requires three factors to be balanced in deciding on the initial proposal: communities of interest; effective representation of communities of interest; and fair representation of electors.
- 6.4. 'Communities of interest' is not defined in the LEA. Guidance from the **Local Government Commission (LGC)** describes the concept of communities of interest as being based on perceptual (belonging to a clearly defined area or locality), functional (ability to meet with reasonable economy the community's requirements for comprehensive physical and human services) and political (the ability of the elected body to represent the interests and reconcile the conflicts of all its members) attributes.
- 6.5. The effective representation requirement provides for regional councils to have between six and fourteen elected members. Arrangements to create barriers to participation must be avoided, as must splitting recognised communities of interest or grouping together those with few common interests. Accessibility, size and configuration of an area must also be considered, to ensure that all residents can access its members and that elected members can effectively represent views and attend meetings.
- 6.6. The fair representation requirement (often referred to as '+/- 10 percent') seeks to ensure each elected member represents a similar number of constituents. It is based on the difference between the average population per councillor across the whole region, and the actual population each councillor represents in their constituency, as a percentage. If the percentage is greater than +/- 10 percent, the arrangement does not meet this criteria and the final decision on the review will be made by the LGC.
- 6.7. The LEA also requires that constituency boundaries coincide with territorial authority district / city or ward boundaries as much as practicable.

## **7. THE CURRENT ARRANGEMENT**

- 7.1. The Horizons Region is currently divided into six constituencies, represented by twelve elected members). This arrangement has been in place since the 2006 review, when significant changes were made by the LGC.
- 7.2. Under the current arrangement, constituency boundaries are generally aligned with the territorial authority boundaries, except that Manawatu District is divided between the Manawatu-Rangitikei and Horowhenua-Kairanga Constituencies. The small areas from Stratford and Waitomo Districts are incorporated into the Ruapehu Constituency, and Taupō District into Manawatu-Rangitikei (refer to the map attached as **ANNEX A**).
- 7.3. The current arrangement has never met the fair representation criteria; in particular, the Ruapehu Constituency has had a considerably greater deviation from average than 10%. However, LGC acknowledged that the large area, the small rural communities that identify with Ruapehu District, and remoteness from Horizons' main offices in Palmerston North mean a separate constituency is desirable to ensure effective representation.
- 7.4. Table 1 shows the current difference from the average population that each member represents (based on Statistics New Zealand June 2017 population estimates) with the difference in 2012 when arrangements were last reviewed.
- 7.5. The proportion of population that the member for Ruapehu represents has continued to decrease. Neither the Wanganui and Tararua Constituencies now meet the fair representation threshold of +/- 10 percent, but are only marginally outside it; Wanganui has come closer since the 2012 review.

**Table 1: ‘fair representation’ under the current constituency arrangements.**

Constituency	No. of Crs (12)	2012	2017
Ruapehu	1	-29.50%	-35.58%
Wanganui	2	12.40%	11.11%
Manawatu-Rangitikei	2	-9.60%	-6.62%
Palmerston North	4	9%	8.99%
Horowhenua-Kairanga	2	-1.60%	0.62%
Tararua	1	-8.50%	-11.11%

## 8. DISCUSSION

- 8.1. At a workshop on 28 February, Council considered the region’s communities of interest. It is acknowledged that, in practice, the attributes described in paragraph 6.4 above are very difficult to apply meaningfully on a regional scale.
- 8.2. Officers presented ten scenarios (including the existing arrangement) with different constituency boundaries, including variations based on altering the number of elected members, for Council to consider. These scenarios used either the current constituency boundaries or territorial authority boundaries as their starting point. None of the scenarios complied fully with the fair representation criteria; this is unsurprising given that the region is a large area and parts of it are sparsely populated.
- 8.3. Of the ten scenarios, the following alternatives to the current arrangements were given the most attention:
- i. Seven constituencies, based on the seven territorial authorities (incorporating the areas from Stratford and Waitomo Districts into Ruapehu, and Taupō District into Rangitikei);
  - ii. Changes to the arrangements for Manawatu-Rangitikei and Horowhenua-Kairanga, to avoid separating Manawatu District’s area;
  - iii. Changes to the arrangements for Ruapehu and Wanganui Constituencies, merging part or all of Whanganui District’s area with the existing Ruapehu Constituency.
- 8.4. While each of these scenarios may improve an aspect of the current arrangements, there were also significant difficulties associated with them. The first two would have addressed the awkwardness associated with the dividing Manawatu District between two constituencies. However, they increased the number of and/or degree to which constituencies could not meet the +/- 10 percent fair representation criteria.
- 8.5. Alternative arrangements for Ruapehu and Wanganui Constituencies included:
- a. combining Whanganui District’s three rural subdivisions with the existing Ruapehu Constituency (one elected representative), with Whanganui City as a separate constituency (two elected representatives);
  - b. combining the Wanganui and Ruapehu Constituencies into a single constituency, with three elected representatives.
- 8.6. While both of these arrangements would meet the fair representation criteria, they could be viewed as an unnatural grouping of communities of interest and would have serious implications for effective representation. The partial merger would create a constituency of approximately 10,000 square kilometres with only one representative, which is unreasonable. While combining all of Wanganui and Ruapehu into one constituency with

three representatives would address this difficulty, the risk of all the representatives coming from, for example, Whanganui City, would compromise the representation of other areas and disadvantage the other communities of interest.

## 9. COUNCIL'S PREFERRED OPTION

- 9.1. At the conclusion of the workshop, Members indicated that on balance they generally preferred to retain the existing electoral arrangements. It is considered that this option recognises the region's communities of interest, and generally provides a balance between fair and effective representation. Accordingly, members requested that this report focus primarily on the existing arrangements.

## 10. CONSULTATION

- 10.1. Formal consultation will be carried out as required by the LEA. This will include a one month submission period (10 April to 10 May) and a hearing if any submitter wishes to be heard (scheduled for 30 or 31 May).

## 11. TIMELINE / NEXT STEPS

- 11.1. Following Council's adoption of an initial proposal, the proposal must be publicly notified within 14 working days (by 10 April). This opens the consultation process. After Council has deliberated and adopted a final decision, submitters will have the opportunity to appeal; any person can object if there is a change to the initial proposal. The final decision will be made by the Local Government Commission, regardless of whether we receive any appeals or objections, because it is unlikely the final proposal will be able to meet the LEA 'fair representation' requirement.

## 12. SIGNIFICANCE

- 12.1. While this may be regarded as a significant decision, it is not considered in the context of the Council's Policy on Significance and Engagement because the community engagement process is prescribed by legislation other than the Local Government Act 2002.

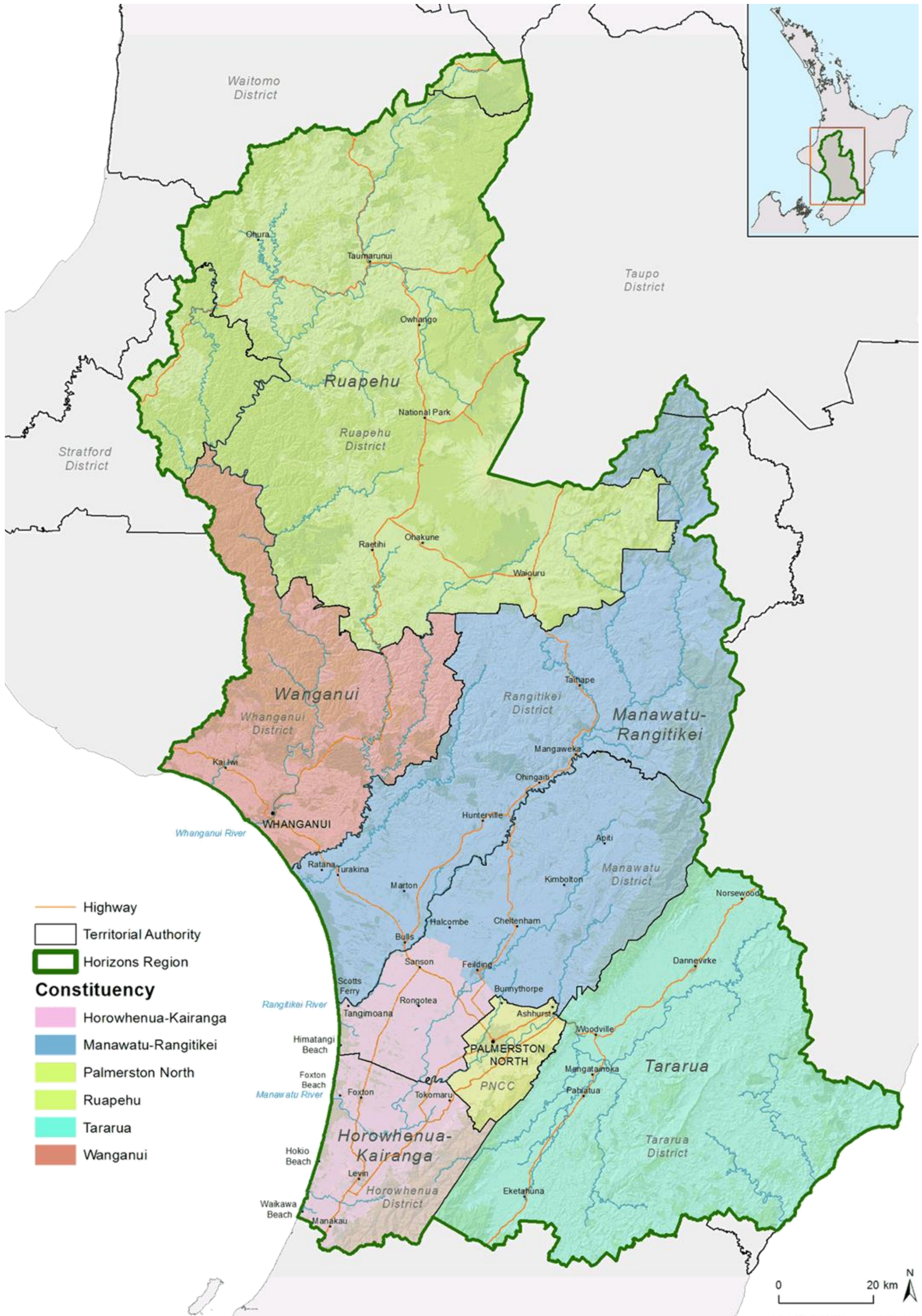
Pen Tucker  
**POLICY ANALYST**

Craig Grant  
**GROUP MANAGER CORPORATE & GOVERNANCE**

## ANNEXES

- A Map of Horizons' existing constituencies









Report No.	18-37
Decision Required	

## LOCAL GOVERNMENT NEW ZEALAND CONFERENCE 2018

### 1. PURPOSE

- 1.1. This report is to determine Members' attendance at the 2018 **Local Government New Zealand (LGNZ)** Conference.

### 2. RECOMMENDATION

It is recommended that Council:

- a. receives the information contained in Report No. 18-37.
- b. approves the attendance of the Chairman of Council and up to three Councillors (to be named) with expenses paid, and the Chief Executive, at the 2018 Local Government New Zealand Conference at Christchurch from 15-17 July 2018, and includes any regional pre tour.

### 3. FINANCIAL IMPACT

- 3.1. Funding for this activity has been included in the 2017-18 training budget.

### 4. COMMUNITY ENGAGEMENT

- 4.1. There is no requirement to communicate this activity to the public.

### 5. SIGNIFICANT BUSINESS RISK

- 5.1. There is no significant business risk associated with this item.

### 6. BACKGROUND

- 6.1. A resolution was passed at the Council meeting on 22 March 2011 that "...the Chair and up to three Councillors attend each annual LGNZ conference within budget".
- 6.2. The *Councillors' Allowances and Reimbursements Policy* includes the following paragraph under clause 10.1:

*Attendance at the LGNZ Annual Conference will be considered and resolved by the Council. Every attempt will be made for each Councillor to attend an LGNZ conference during the triennium.*

### 7. COMMENT

- 7.1. The LGNZ Conference is being held in Christchurch from Sunday, 15 July to Tuesday, 17 July 2018. It is being hosted by Christchurch City Council and will take place in and around Christ's College. LGNZ have advised that earlybird registrations will close on 25 May 2018.
- 7.2. The proposed programme for the LGNZ Conference is available on the LGNZ website – <http://www.lgnz.co.nz/about-lgnz/lgnz-conference-2/>.

- 7.3. A regional pre-tour will be hosted by Environment Canterbury from Thursday, 12 July to Saturday, 14 July, prior to the LGNZ conference. An itinerary is currently being prepared for the regional pre-tour.
- 7.4. Elected Members who have attended the LGNZ Conference in this triennium, include Crs Kelly, McKellar, Sheldon and Te Awe Awe.

## 8. SIGNIFICANCE

- 8.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Craig Grant  
**GROUP MANAGER CORPORATE & GOVERNANCE**

Kay Booth  
**GOVERNANCE COORDINATOR**

## ANNEXES

There are no attachments to this report.



Report No.	18-38
Decision Required	

## DRAFT REGIONAL TARGETS FOR SWIMMABLE LAKES AND RIVERS

### 1. PURPOSE

- 1.1. This paper provides an update on work towards setting regional and national targets for primary contact in rivers and lakes under **the National Policy Statement for Freshwater Management (NPSFM)**. Commitments to improving water quality have already been made across the Horizons Region and their effect on water quality has been modelled.
- 1.2. The draft target set in this paper meets a requirement set under the NPSFM and has been calculated via a collaborative process being run between government and the regional sector.
- 1.3. The draft target is based on work already committed by Horizons. Council can choose to be more ambitious in setting its final target which it has to do by December 2018.
- 1.4. This paper seeks your agreement to set a draft target for the Horizons Region based on these existing commitments, of 60 percent of rivers (that are fourth order or larger) and lakes (with perimeters greater than 1.5km) to be “swimmable” (i.e., in the blue, green or yellow category in terms of *E. coli*) by 2030. This represents an increase of around 20% from the estimate of 40% currently meeting NPSFM targets.
- 1.5. These numbers are based on the definition of swimmable in the NPSFM.
- 1.6. The Labour – New Zealand First Coalition has indicated that it may revise the approach to swimmability in the NPSFM.

### 2. EXECUTIVE SUMMARY

- 2.1. The NPSFM requires regional councils to prepare draft regional targets to improve the quality of freshwater (Policy A6). These targets must contribute to achieving the national target for 90 percent swimmable lakes and rivers by 2040. The draft regional targets must be made publicly available by 31 March 2018, with final regional targets publicly available by 31 December 2018. These targets are distinct from the limits and targets required by Policies A1 and A2 of the NPSFM.
- 2.2. A governance group and taskforce comprising **Ministry for the Environment (MfE)** and **Ministry for Primary Industries (MPI)** officials and staff from regional councils were set up to help councils meet this obligation. The taskforce has compiled information on work committed or underway in each region, to improve water quality for swimming, and the likely associated costs. The information for each region is presented in a report (**Annex A**) that will be made publicly available before 31 March 2018 (a draft was reviewed by Councils in January 2018).
- 2.3. Councils have not had the opportunity to consult with their communities about what rivers and lakes they should focus on for improvements and within what timeframes. Some intend to use the results in the above report as their draft targets and as a starting point for discussion. The taskforce supports this approach.
- 2.4. The information in the taskforce report indicates that a draft regional target for the Horizons Region of 60 percent of rivers and lakes swimmable by 2030, is realistic and achievable given current work programmes. These rates are below the average that is required nationally (80 percent). There is an opportunity for Horizons to be more ambitious when

final targets are set in December noting that the cost of more ambitious targets may be hard to quantify accurately.

- 2.5. The current estimate is that approximately 40% of rivers meet the NPSFM swimmability targets as of 2017/2018.
- 2.6. Swimmability targets are currently set year round rather than reflecting the seasonal use of rivers. The current government is looking at this and whether the approach to swimmability should reflect seasonal use.
- 2.7. The current Government's examination of the NPSFM and swimmability may influence the final targets to be set by Council in December 2018.
- 2.8. The information sheet in **Annex B** fulfils the reporting requirements under the NPSFM.

### 3. RECOMMENDATION

It is recommended that Council:

- a. receives the information contained in Report No. 18-38 and Annexes.
- b. notes that the NPSFM has set a national target "to increase the proportion of specified rivers and lakes that are suitable for primary contact ... to at least 80 percent by 2030 and 90 percent no later than 2040";
- c. notes that the NPSFM requires regional councils to make draft regional targets to improve the quality of fresh water, that will contribute to achieving the national target, and to make these draft regional targets publicly available by 31 March 2018, with final regional targets publicly available by 31 December 2018;
- d. notes that the Government has indicated it may further amend the NPSFM in respect of "swimmability" and that these amendments may impact on developing our final regional targets;
- e. notes that a report on existing commitments for work underway in each region to improve water quality for swimming has been prepared in a partnership between central government and the Regional Sector and is attached (**Annex A**). The MfE will make this publicly available before 31 March 2018;
- f. notes that the modelling undertaken for the report forms the basis for the draft targets;
- g. agrees to set a draft target for the Horizons Region of 60 percent of rivers and lakes swimmable by 2030, and make this target publicly available with the information sheet (**Annex B**);
- h. notes that staff will be required to undertake further work, which may include community consultation, before reporting back to Council with a recommendation for a final regional target in December 2018;
- i. agrees to recommend that the Regional Sector works collaboratively with the Government on any amendments to the NPSFM and requirements to set final regional targets.

### 4. FINANCIAL IMPACT

- 4.1. Work already committed to is reflected in the 60% target. A higher target would likely mean additional costs. However Council could set a more ambitious target by December and deal with potential costs via the cycle of long term plans between now and 2040.

## 5. COMMUNITY ENGAGEMENT

- 5.1. Council may deem this report sufficient to inform the public of the draft swimmability targets. The forthcoming catchment review programme, Our Freshwater Future, will involve significant community engagement and will update the formal consultation processes used through the development of existing One Plan targets.

## 6. SIGNIFICANT BUSINESS RISK IMPACT

- 6.1. While failing to meet the timeframes within the NPSFM to set swimmability targets does not have any legislative consequences, the significant public and Ministerial interest in this matter could impact on Horizons' reputation. The Minister for the Environment has the power to investigate the reasons for such a failure, and to make recommendations and appoint commissioners.

## 7. BACKGROUND

- 7.1. The term "specified rivers and lakes" is defined in the NPSFM as rivers that are fourth order or above and lakes with a perimeter greater than 1,500 metres<sup>1</sup> Primary contact is defined as people's contact with water that involves immersion, including swimming.
- 7.2. To achieve the national targets (80 percent by 2030, 90 percent by 2040), the NPSFM directs councils to set regional targets. Draft regional targets must be made available to the public by 31 March 2018 and final targets made available by 31 December 2018. The NPSFM does not specify whether these regional targets should be for the 2030 or 2040 timeframe.
- 7.3. To help councils to respond to the requests for information and develop their regional targets as directed in the NPSFM, central and local government established a governance group and taskforce comprising MfE and MPI officials and staff from regional councils and territorial authorities. The governance group has been responsible for coordinating the sector's response to the policy proposals more generally and overseeing the work of the taskforce. The taskforce has focused on a programme of work to collect the information needed to achieve the deadlines set by government.
- 7.4. Some regional councils have raised concerns with the taskforce about the national targets. Their concerns include:
- The target's focus on *E. coli* and cyanobacteria (human health attributes in the NPSFM) as measures of suitability for swimming. In some regions, the community outcomes sought will mean other contaminants such as nitrogen, phosphorus and sediment may be a higher priority.
  - There is a risk that prioritising actions to achieve the national targets for swimming will affect the process of identifying other community values (such as irrigation or mahinga kai) and setting freshwater objectives and limits for those values as required under the NPSFM.
  - The method of assessing and reporting *E. coli* takes no account of seasonal effects that influence when people swim, or whether there is any public access to the rivers and lakes that are part of the target.
- 7.5. The taskforce will continue to discuss these wider issues related to the setting and achieving of targets, and work with government officials to resolve them.
- 7.6. Developing regional targets is a challenging process because of the delays and uncertainties relating to the Government regulation on stock exclusion, and the work committed to by the coalition Government on seasonality for swimming. Furthermore,

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<sup>1</sup> A first order stream is the smallest of the streams and has no tributaries. First order streams, which may not be permanently flowing, flow into second order streams, which flow into third order streams and so on.

while there are areas where the science can be improved (for example, the ability to model all four criteria for *E. coli* results in rivers) it is unlikely these matters will be resolved over the next six months. These uncertainties should not prevent us from making estimations with the tools and knowledge available to meet the deadline set in the NPSFM.

## 8. DISCUSSION

### Draft regional targets for swimmable lakes and rivers

- 8.1. The governance group has interpreted the NPSFM direction as being that the draft targets should be set for the 2030 target date, with the final targets, which must be available by 31 December 2018, to be for both 2030 and 2040. This reflects that there has been insufficient time for a wider community consultation on where water quality improvements should be focussed and how quickly any mitigations works should be implemented. Because of the timing issue, the taskforce modelled the impact on water quality of commitments that have already been made, most of which have already been through a public consultation phase and investment allocated. These existing regional commitments do not add up to 80 percent swimmable by 2030 required nationally – though they do come close. 71 percent of lakes and rivers nationally are currently assessed as being swimmable; modelling suggests that programmed works will see an improvement of around 7 percent for rivers, to around 78 percent.
- 8.2. Council could carry out consultation throughout 2018 to establish what additional work programmes may be necessary to set realistic final targets for 2030 and 2040 or it could decide to set higher final targets and work through community consultation processes in subsequent long term plans and via Our Freshwater Future.
- 8.3. The taskforce used the “water quality for swimming map” on the MfE website as a basis for establishing the extent of water quality improvements that will be required region by region, and the associated costs. Regional councils provided information on areas where the maps were inaccurate; the maps were adjusted accordingly and taken as a baseline of national river “swimmability”.
- 8.4. Councils also provided the taskforce with information about the commitments to water quality mitigation work in their region in regional plans, long term plans, annual plans and asset management plans – the “committed work”. The committed work included investment in infrastructure and was assumed to include the stock exclusion requirements proposed by the Government in *Clean Water* in February 2017, though these have not yet been promulgated as national regulations.
- 8.5. The **National Institute of Water and Atmosphere (NIWA)** used the regional information to model the water quality improvements in rivers that should be achieved. The modelled improvements relate only to improvements in *E. coli* concentrations (a measure of the risk to human health) in rivers. They do not relate to improvements in lake water quality (due to modelling limitations) which are also required as part of achieving the swimmable lakes and rivers target, or to associated water quality improvements (such as nutrient levels or water clarity).
- 8.6. Estimations of the costs of the committed work have been modelled by Professor Graeme Doole of Waikato University.
- 8.7. The modelled water quality improvements in rivers and their associated costs are presented in the taskforce’s report “Regional information for setting draft targets for swimmable lakes and rivers”.
- 8.8. The draft regional targets for the Horizons Region are set out in an information sheet in **Annex B**. Supporting information in the information sheet sets out our focus, and how our

work on the targets fits with our wider programme of freshwater management, including our consultation programme for setting freshwater objectives for all water bodies.

### Regional information for setting draft targets for swimmable lakes and rivers

- 8.9. The taskforce's report, "Regional Information For Setting Draft Targets For Swimmable Lakes And Rivers" provides information on progress towards the national targets as a result of committed work programmes. It will be released publicly when draft targets are published on 31 March 2018. The report identifies the work committed in each region, and gives an indication of the expected improvement in water quality for swimming and the associated costs arising from that committed work. The improvements and costs have been calculated both regionally and nationally.
- 8.10. The report relies on scientific modelling by NIWA using a national version of the **Catchment Land Use for Environmental Sustainability (CLUES)** water quality model, which is relevant to rivers only. Water-quality improvements related to point-source discharge upgrades were included in the modelled estimations. For improvements that will arise from non-point source discharges, relevant information was provided to a mitigation expert panel that worked with NIWA to determine the effectiveness of mitigations in our region. The mitigation interventions largely fell into three categories: stock exclusion, riparian planting and management of farm dairy effluent.
- 8.11. The report also modelled the economic impacts of the committed work programmes. To establish the cost data, all capital costs were converted into an annual cost, using a discount rate of 6 percent and a 25-year payback period. Included in the cost calculations were:
- Cost of establishing 2-wire electric fences on both sides of waterways
  - Fence maintenance costs (1 percent of total material costs on flat and rolling land and 2 percent on steep land)
  - Three metre wide riparian buffer comprising pasture and one row of native plants on both sides of rivers
  - Opportunity cost of land within each buffer
  - Cost of additional water reticulation (excluding dairy farms where this normally occurs)
  - Remediation of wastewater systems (in Auckland only).
- 8.12. The water quality and economic modelling provides an estimate of how far each council's existing work programmes will go to meet the national targets and provides an informed interim (draft) target.
- 8.13. The assumptions and limitations of the modelling approaches taken are described in the report. The report was distributed to all regional councils in December 2017, for their review and comments. Councils' feedback has further refined the report content.

### Our Region

- 8.14. The taskforce report predicts that work already planned in this Region will significantly improve water quality (in terms of *E. coli*). While the modelling inevitably contains assumptions, the indicated improvement is in line with what we have seen in recent years. In February, Strategy and Policy Committee received a report (18-15) outlining work by Ton Snelder that estimated we had made about a 5 to 8 percent improvement over the past 10 years. The modelling suggests we will achieve another 14 percent over the next 22 years. This is double the modelled improvement from programmed works nationally, which sits around 7 percent.



- 8.15. Nonetheless, the modelled results – and the draft regional targets – fall below the rates expected nationally. There is no expectation that all regions will contribute equally, since each region’s situation is different. We can, however, expect pressure to adopt more ambitious final targets in December.
- 8.16. We understand that some councils may be considering using the intervening period to consult with their communities on regional swimmability targets. At this point in time, we believe consultation would be unnecessary and potentially counterproductive.
- 8.17. We believe consultation on swimmability targets is unnecessary because the One Plan already contains clear policy to maintain or enhance the suitability of all rivers and lakes in the Region for contact recreation. Methodologically, the One Plan’s *E. coli* targets are different to the new national targets; the One Plan’s targets are also not time-bound. Nonetheless, the intent is clear.
- 8.18. We believe consultation this year may be counterproductive because we will also be engaging with the community on collaborative catchment planning (“Our Freshwater Future”; reports 17-220 and 18-14 refer) and, subject to Council direction, may also notify changes to the One Plan’s nutrient management rules. Setting swimmability targets in advance of a community process to set other targets perplexes many practitioners; *consulting* with the community on swimmability targets at the same time as we signal an intent to *collaborate* on freshwater management makes for confused messaging.
- 8.19. While regional targets must be set by December 2018 (and are then considered “final”), in practice our Freshwater Future programme will provide an opportunity to review progress and adjust our plans for each catchment as more information becomes available over the next few years.
- 8.20. Should further information come to light that modifies this assessment, we will advise Council accordingly.
- 8.21. Officers will bring back a recommendation to members on final targets in December 2018.

## 9. OPTIONS

Council may set draft regional targets, or choose not to do so. This section provides advice on both scenarios.

Option One – Accept the recommended draft targets (recommended)	
<b>Description of option</b>	
Council sets draft targets of 60 percent of rivers and lakes swimmable by 2030 and makes these publicly available by 31 March 2018, meeting the requirements of the NPSFM.	
<b>Impact assessment</b>	
Legal Implications	The NPSFM does not require the regional targets to be included in regional plans therefore they do not have legal standing in the way plan provisions do. However, achieving the national target will be relevant for catchment limit setting processes. The NPSFM requires regional councils to set freshwater objectives in every catchment, and these must include objectives for the compulsory values of ecosystem health and ‘human health for recreation’. Objectives must use the specified attribute tables, including for <i>E. coli</i> . There are no legal repercussions for not achieving targets by the required dates.
Risk	There is a risk that the limitations of the modelling which informed the 60 percent target may mean that the committed work programme in our region is not sufficient to achieve the target by 2030. It is also unlikely that land use will remain static and it is not clear what impact that may have on the achievement of the target.

Policy Implications / Strategic Links	<p>Catchment planning, through Our Freshwater Future programme, will confirm the community’s freshwater values and objectives, and the interventions required to achieve them. Swimmability targets, if approved at this time, will predetermine parts of that discussion. We will not, in any case, be starting from a blank slate: the One Plan’s existing freshwater values and objectives provide a baseline.</p> <p>The One Plan already identifies contact recreation as a freshwater value – and sets <i>E. coli</i> targets – throughout the Region.</p>
Regional costs and benefits	<p>The draft target for 2030 is based on implementing work programmes already planned and budgeted for in the Horizons Region. The report states that the annual cost of this work is \$12.6 million and an overall increase in swimmability of 14 percent by 2030.</p>
Financial Implications	<p>There are no financial implications arising from setting the 2030 target.</p>
Annual Plan / LTP Implications	<p>The regional targets are not specified in the current Annual Plan or for inclusion in the forthcoming 2018-28 Long Term Plan. The work programme is provided for through these planning documents, and its role in improving freshwater quality explained. The community has the opportunity to make their views known through the forthcoming Long Term Plan consultation.</p>
Community Outcomes	<p>The targets contribute to the current community outcome for Water Quality: clean and healthy rivers and lakes (and more particularly the social goal, “Maintenance of, and access to, clean healthy water for recreation, and to build a sense of pride in the Region’s rivers”). They contribute to the draft community outcomes Healthy ecosystems (healthy and diverse ecosystems that provide for community needs now and in the future), and human health and wellbeing (natural and built environments that support healthy people and communities) particularly ensuring there are a range of recreational opportunities accessible to the whole community, both in urban and rural areas.</p>
Community Views	<p>Existing One Plan targets were developed through an extensive, public process. Catchment planning, through Our Freshwater Future programme, will provide further opportunities for the community to express their views as targets are confirmed. The costs and risks (such as financial cost to ratepayers and opportunity cost impacts on staff and community capacity, and risk of ‘consultation fatigue’ and confusion about the purpose of the consultation) associated render an additional consultation process before the end of 2018 counterproductive.</p>
Customer impact	<p>The targets are considered to be realistic and achievable within current work programmes and resourcing. Customers likely to feel significant impacts from setting targets will be invited to participate in Our Freshwater Future programme, which will provide an opportunity to convey potential impacts to Council and others with an interest.</p>

<b>Option Two – Reject the recommended draft targets (not recommended)</b>	
<b>Description of option</b>	
Council does not set the recommended draft regional targets and does not provide an alternative draft regional targets by 31 March 2018.	
<b>Impact assessment</b>	
Legal Implications	Council will be non-compliant with the NPSFM and failing to provide the information requested by the then Minister for the Environment in February 2017. There are no legal repercussions for not achieving targets by the required dates or failing to provide information when requested to do so by the Minister for the Environment, but the Minister for the Environment has powers to investigate councils and either make recommendations or appoint commissioners.
Risk	There are reputational risks in not setting a draft regional target. Improving the quality of fresh water became an election issue last year and continues to attract media interest. The new Government has indicated a strong focus on improving water quality, and non-compliance with the NPSFM is likely to attract attention from community members, Ministers and the media, particularly if the Horizons Region is the only region not to make a draft target publicly available.
Policy Implications / Strategic Links	Were Council to choose not to set regional targets at this time, they could be worked through as part of Our Freshwater Future programme. This might provide more latitude for community deliberation – though, as noted above, the Region already has values and objectives (including contact recreation) in the One Plan, and changes will need to be clearly reasoned.  Our Freshwater Future will take several years to produce catchment plans across the Region. Not setting these targets in the meantime may generate concern about our commitment to improving water quality. This perception could potentially complicate the community process more than having another set of standards to accommodate.
Regional costs and benefits	Not setting a draft regional target does not change existing commitments, therefore the costs and benefits outlined for Option 1 are the same as for Option 2.
Financial Implications	There are no financial implications arising from not setting the 2030 target.
Annual Plan / LTP Implications	Not applicable
Community Outcomes	Not applicable
Community Views	Existing One Plan targets were developed through an extensive, public process. Catchment planning, through Our Freshwater Future programme, will provide further opportunities for the community to express their views as targets are confirmed. The costs and risks (such as financial cost to ratepayers and opportunity cost impacts on staff and community capacity, and risk of ‘consultation fatigue’ and confusion about the purpose of the consultation) associated render an additional consultation process before the end of 2018 counterproductive.
Customer impact	Not applicable.



## 10. CONSULTATION

- 10.1. Formal consultation on the draft targets is not advised at present; it is considered preferable to engage with the community further through Our Freshwater Future catchment review process. Should this process lead to proposals to change One Plan targets, a formal consultation process will be undertaken as is required by the Resource Management Act 1991.

## 11. TIMELINE / NEXT STEPS

- 11.1. Officers expect to bring final targets back to Council for adoption in December 2018.

## 12. SIGNIFICANCE

- 12.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.
- 12.2. Setting the 2030 draft targets is not considered significant in accordance with Horizons Regional Council's Significance and Engagement Policy because it based on committed work which has met the consultation requirements of the Local Government Act 2002. Developing the 2040 target may be considered significant. Further advice on this will be provided before December 2018.

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## ANNEXES

- A Regional Information for Setting Draft Targets For Swimmable Lakes and Rivers  
B Draft Regional Targets for the Horizons Region



## **Regional information for setting draft targets for swimmable lakes and rivers**

**A report on work underway to improve water quality in  
terms of effects on human health**

**Draft 1 March 2018**

**This report may be cited as:**

*Regional information for setting draft targets for swimmable lakes and rivers* (March 2018). A report compiled by a joint taskforce of central and local government representatives.

**Acknowledgements:**

We would like to acknowledge those who contributed to this work, especially those in the following five groups:

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## Background

The driver for this report is the national targets relating to swimming for New Zealand's rivers and lakes that have been added to the National Policy Statement for Freshwater Management 2014, updated August 2017 (NPS-FM).

The targets relating to swimmable lakes and rivers are that:

- 90 per cent of rivers and lakes are suitable for primary contact (i.e. in the blue, green or yellow categories) by 2040 with 80 per cent swimmable by 2030
- Water quality is improved across all categories.

These targets only apply to rivers above Strahler Order 4, and to lakes with a perimeter greater than 1,500 meters. (Strahler Order is determined by the tributaries of the river – a first order stream has no tributaries, a second order stream has only first order tributaries, a third order stream has at least one second order tributary and so on.)

To fulfil these targets, regional councils and unitary authorities (collectively called regional councils) were asked to report to the former government on a proposed regional target by October 2017. On 28 February 2017 the then Minister for the Environment requested information on the:

- rivers and lakes where interventions are planned or in place that will improve water quality so that it is swimmable
- rivers and lakes where additional interventions will improve water quality so that they are swimmable more often, the level of improvement those interventions would achieve, and the timeframes to achieve them
- likely costs of the interventions described above, and the parties on whom those costs would fall.

Since the request, the NPS-FM has been amended. Policy A6 requires that regional councils make draft regional targets available to the public by 31 March 2018, and final targets available to the public by December 2018.

To respond to the previous government's request, regional councils, the Ministry for the Environment, and the Ministry for Primary Industries created a governance group and taskforce to manage and oversee the response. This report contains information on the planned interventions, and the indicative costs of that work. Work on what further interventions may be required is currently on hold pending advice from the current Minister for the Environment, Hon David Parker.

## What is a swimmable lake or river?

In the NPS-FM, the approach for measuring water quality for swimming is determined by *E. coli* concentrations in rivers and toxic algae biovolume in lakes. *E. coli* is used as an indicator of the risk to human health presented when swimming in that river. *E. coli* represents the presence of likely faecal contamination, although under some environmental conditions *E. coli* can self-replicate in water ways and this is more common in the north of New Zealand.

*E. coli* has been adopted in Appendix 2 of the NPS-FM as an attribute for the compulsory value - human health for recreation. The *E. coli* attribute table has five attribute states (i.e. A, B, C, D and E

or excellent, good, fair, intermittent and poor respectively). Each attribute state has four criteria, or 'statistical tests', that need to be satisfied for water quality to be in that attribute state. All four criteria are necessary to establish an attribute state. If one or more criteria can't be satisfied, a lower attribute state must apply.

For example, for a river to be in the A state, the water quality of that river must:

- not exceed 540 *E. coli*/100ml more than 5% of the time; and
- not exceed 260 *E. coli*/100ml more than 20% of the time; and
- have a median of  $\leq 130$  *E. coli*/100ml; and
- have a 95th percentile of  $\leq 540$  *E. coli*/100ml.

If any of those criteria are not satisfied, water quality is in a lower state (e.g. B, or lower, as long as all criteria can be satisfied).

The New Zealand public were the driving force behind establishing national targets for swimming. While *E. coli* is only one measure of water quality, it is an important one with respect to human health. However, it is important to acknowledge that regional councils around the country will be responding to the specific pressures in their region, and may have programmes in place to address other concerns that their communities want to prioritise, such as weeds, access, sediment, clarity nitrogen, or phosphorus.

There is also work happening around the country relating to swimming that could not be modelled in this report. For example, Fonterra has announced its intention to improve water quality for swimming in 50 priority catchments, and successful applicants for the Freshwater Improvement Fund have received provisional funding for *E. coli*-related clean-up projects (including infrastructure projects).

## Overview of the approach

The taskforce managing delivery of this work agreed on the approach and deliverable in response to the specific request contained in the background. More specific detail on the approach, limitations and assumptions taken to the water quality for swimming modelling are included in Appendix A. More specific detail on the approach, limitations and assumptions underpinning the economics analysis are included in Appendix B.

The purpose of this report is to identify the work committed to in each region (planning, policy or infrastructure improvements), and provide an indication of the expected improvement in water quality for swimming and the associated cost. This improvement, and the cost, has been calculated both regionally and nationally.

### Approach to scientific modelling

The approach taken to produce this report is broadly outlined below:

- the taskforce used the Ministry for the Environment's water quality for swimming map as the baseline for this work. Information was requested from regional councils on whether the maps had any discrepancies (based on local knowledge) and the swimming map was adjusted accordingly. The adjusted swimming map was then taken as the baseline (i.e. national river swimmability as of 2017). This map is attached as Appendix C.

- the taskforce requested and received information from councils that described commitments to water quality mitigation work in each region (the 'committed work'). It was assumed the committed works included stock exclusion proposals associated with the Clean Water Proposals at that time (just after consultation on the Clean Water Package). The committed works also included regional initiatives. Councils were also asked to provide information describing the expected impact of that work based on research that had been completed or commissioned, and cost data (where it was available).
- NIWA was commissioned to model improvements in water quality associated with the committed work and assess how much this would improve water quality for swimming. To do this, NIWA used a national version of the Catchment Land Use for Environmental Sustainability (CLUES, Elliott et al, 2016) water quality model<sup>1</sup> to estimate changes to water quality due to the interventions. More specific information on the water quality modelling is in Appendix A.
- regional councils provided information on planned point source upgrades, and NIWA used this information to model the impact of the upgrades on water quality. A table of the point source upgrades that were modelled, with their current and revised concentrations is attached as Appendix E.
- the information on non-point source committed work was provided to a mitigation expert panel. The mitigation expert panel worked with NIWA to determine the effectiveness of these mitigations. The rural mitigations around the country fell into three broad categories:
  - Excluding stock from waterways;
  - Riparian planting; and
  - Management of Farm Dairy effluent.
- The model was used to predict how the current baseline water quality represented by the swimming map would change in response to the committed work. It is important to note that the modelling only relates to *E. coli*, and therefore only shows the projected improvement in rivers. These predictions for rivers were combined with information describing the current state of lakes to provide projections of swimmability by region and nationally.

While there are areas where the science can be improved, for example, the ability to model all four criteria for *E. coli* results in rivers, it is unlikely these matters will be resolved over the next six months. The Taskforce felt that these uncertainties should not prevent councils making the best estimations possible with the tools and knowledge available to meet the deadline set in the NPS-FM.

### Reliability of modelling potential water quality improvements

In parallel to this work, the Ministry for the Environment and Horizons Regional Council completed a project to better understand improvements in water quality in the Manawatu-Whanganui region (focused on pathogens and sediment). The region has seen a regional improvement in water quality in the past 7 - 10 years. This includes improvements in suspended sediment, water clarity, turbidity

<sup>1</sup> Elliott, A.H., Semadeni-Davies, A.F., Shankar, U., Zeldis, J.R., Wheeler, D.M., Plew, D.R., Rys, G.J. and Harris, S.R. (2016) A national-scale GIS-based system for modelling impacts of land use on water quality. *Environmental Modelling & Software*, 86: 131-144.

<sup>8</sup> Regional information for setting draft targets for swimmable lakes and rivers

and *E. coli*. The study found a 5 - 8% improvement in the swimmability of rivers in the decade ending 2016. Horizons' report was published in February 2018.<sup>2</sup>

The key findings provide evidence that a coordinated approach can have improvements in water quality, and show an association between water quality improvements and the proportion of farms in each catchment where interventions have occurred to reduce hill country erosion. It also demonstrates improvements related to the upgrade of 17 point source discharges.

The key difference between the scientific approach taken to the case-study, and the approach to scientific modelling described above is that the case-study looks back at actual data on water quality improvements which have been measured over time. The scientific approach for the creation of this report takes planned interventions and projects an improvement based on modelling. Read together, the Horizons case-study and this report support the hypothesis that the right interventions can have positive impacts on water quality.

### Approach to economic modelling

To model the cost of the committed work, the following methodology was used. For further information, please see Appendix B.

The economic assessment of stream fencing loosely follows the work conducted by the Ministry of Primary Industries (MPI) for the stock-exclusion study. **There is an explanation coming from Professor Graeme Doole about the differences between the CBA costs and these costs.** The total cost of committed work is represented as the difference between the current state and that associated with committed work.

New fencing involves the exclusion of stock from both sides of the waterway and is assumed to consist of 2-wire electric fences, constructed to exclude cattle only.

To provide the cost data, all capital costs are converted into an annual cost using a discount rate of 6% and a 25-year payback period. Included in the calculation of costs is:

- The cost of establishing fences, which varies by region as set out by Agribusiness Group (2016, p. 18). Material costs for fencing are presented by Agribusiness Group (2016, p. 18).
- Maintenance costs for fencing (1% of total material costs in flat and rolling land, and 2% in steep land) .
- A riparian buffer of three metres width on each side of the waterway is assumed, where riparian buffers are part of committed work. This riparian buffer is assumed to consist of pasture and one row of native plants (flax or sedges) with 1.5 metre spacing.
- The opportunity cost of land within each buffer is considered, based on average national levels of Earnings before Interest, Tax, Depreciation, and Amortisation (EBITDA) computed for each land use (see Appendix B). No opportunity cost of lost land is represented for lifestyle blocks, given their diversity and the central importance of off-farm income to most of these units (Andrew and Dymond, 2012).
- The cost of additional water reticulation is considered for all land uses, except dairy farms for which troughs are typically already well distributed. The method used to include water-

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<sup>2</sup> Snelder, Ton (2018). Assessment of recent reductions in *E. coli* and sediment in rivers of the Manawatū-Whanganui Region.

reticulation costs follows that of Grinter and White (2016); these include annual maintenance costs of 5% of total capital costs.

- In the hydrological modelling of committed work, the remediation of wastewater systems is represented in the Auckland region only. Limited information is available with respect to the cost of such activity. Therefore, replacement cost is used to determine the expense incurred with preventing overflows and fixing leaks. Overall, this can be expected to provide a conservative estimate of the cost of wastewater-system remediation. Costs are based on data presented in Watercare (2016) (see Appendix B). The total annual cost of this remediation is computed as \$82.15 m.<sup>3</sup>

### Key assumptions informing the results of scientific and economic modelling

Specific assumptions relating to the scientific and economic modelling are set out in Appendix A and B. However, key things to note about the approach to doing this work are:

- It was based on the stock exclusion proposals in the Clean Water Package launched in February 2017. These have not been finalised.
- The model used to undertake the work (CLUES) only considers rivers, and therefore only improvement to rivers has been modelled.
- The modelling assumes current stocking and land use stay static; that is, it does not factor in any changes in land use.
- When modelling stock exclusion on beef and sheep land, only cows are excluded (in line with the policy). Our economics assessment has therefore been based on two-wire fencing (to exclude cows but not sheep).
- The baseline information includes the criteria relating to the 95<sup>th</sup> percentile where adequate monitoring data is available as directed by Appendix 6 of the NPS-FM. The modelled information does not include the 95<sup>th</sup> percentile unless there is sufficient monitoring data.
- It does not take into account climate change impacts.
- Due to the way swimmability is measured, improvements in rural communities will have more of an impact on the overall number. This is because there are more kilometres of rivers running through rural areas.

## Summary of results

The baseline level of swimming, as published on the Ministry for the Environment's website, shows that 71.2 per cent of our rivers and lakes combined are currently swimmable (C, B or A categories). For rivers only, this is slightly lower at 68.6 per cent of rivers being currently swimmable.

<sup>3</sup> The Department of Internal Affairs is working on some more detailed costing of infrastructure upgrades as part the review into how to improve the management of drinking water, storm water and waste water (three waters) to better support New Zealand's prosperity, health, safety and environment.



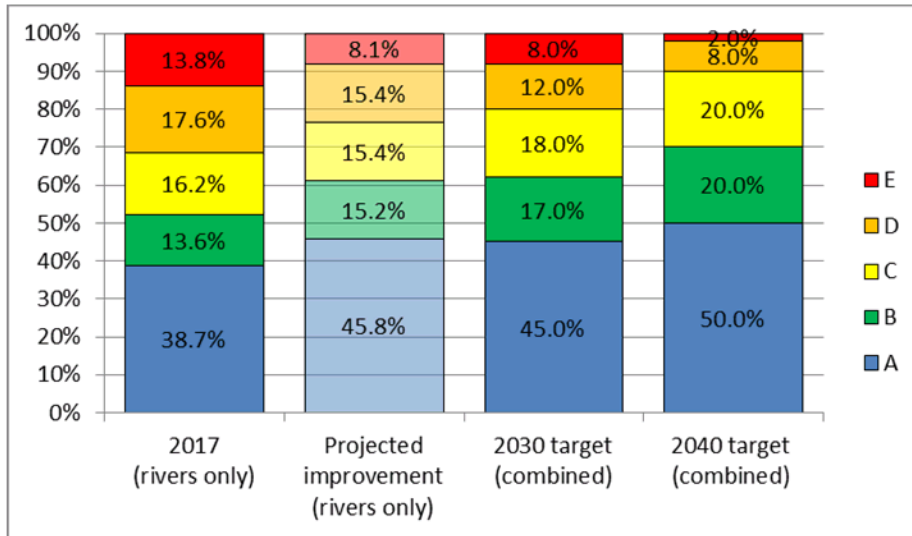


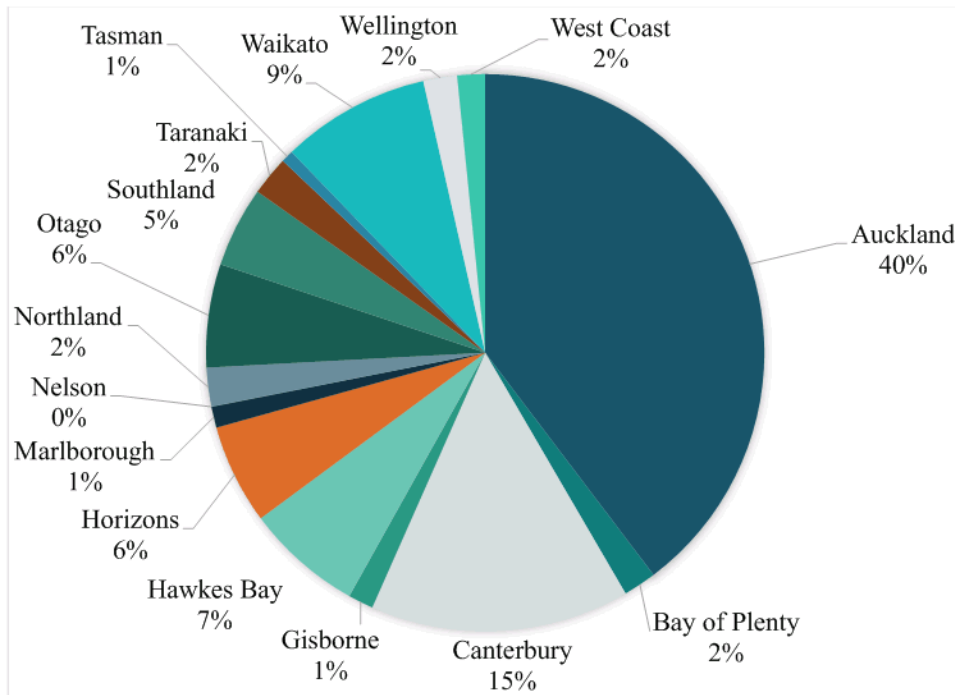
Figure 1: Projected improvement in water quality for swimming

The modelling can only project the improvement in rivers, as it models *E. coli*. Swimmability in rivers will improve 7.9 per cent overall, as shown in Figure 1. This raises the swimmability of rivers to 76.5%. The analysis of how far committed work (including proposals for stock exclusion) will improve water quality for swimming shows an **overall improvement to swimmability of 6.9 per cent**. This is the improvement in rivers and lakes combined. This brings overall swimmability to 78.1%.

Our economics assessment indicates that this improvement from committed work will come at a **cost of \$217.23 million per annum**. \$135.08 million will be borne by the rural sector (based on two-wire fencing), and \$82.15 million to the urban sector.

This cost represents the difference between the current state and the committed work. Figures 2 and 3 provide more information on how it will be distributed between regions, and between land uses.

Figure 2 shows the distribution of the total costs of committed work across New Zealand. The top three regions are Auckland (40% of total cost), Canterbury (15% of total cost), and Waikato (9% of total cost). Auckland's costs represent the large proportion of New Zealand's population that live there, and their significant commitment to improve wastewater infrastructure. For Canterbury and Waikato, the scale and intensity of agriculture leads to their significant contribution to total cost. Both of these regions also possess substantial areas of land allocated to lifestyle farming.



**Figure 2: The distribution of the total cost of committed work across the different regions of New Zealand**

Figure 3 (below) shows the distribution of the *rural costs* in each region. The rural mitigation costs associated with committed work in the Canterbury and Waikato regions is significant. The allocation of cost across the different sectors at the national scale is dairy (16%), dairy grazing (3%), sheep and beef (59%), deer (3%), and lifestyle farms (19%). The cost for sheep and beef farming is driven by the low level of stream fencing currently on this land, the expense of stream fencing on steep land where much of this land use is located, the need to invest in water reticulation following stream fencing to provide livestock access to water, and the large area used for sheep and beef farming in New Zealand. This cost does not include additional measures to exclude sheep from streams as well. If this became the proposal, there would be significant additional cost. Sheep and beef fencing is the dominant cost in all regions, except in the Waikato where, overall, there is a larger proportion of land used for dairy farming.



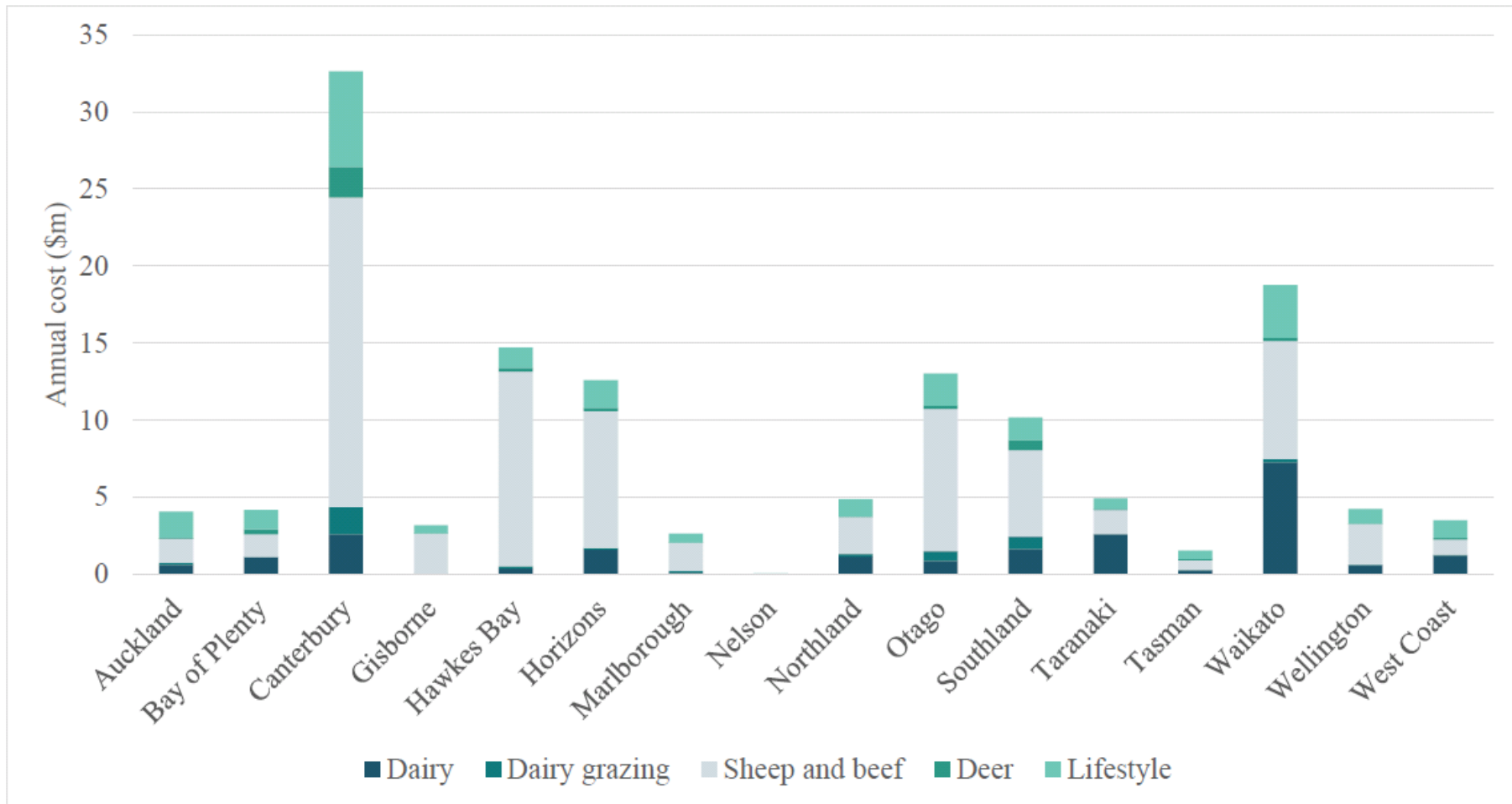


Figure 3: The total annual cost of rural mitigation in each region, shown by land use category

## Information gaps

Information we believe would better inform this type of work in the future includes greater understanding of:

- the links between *E. coli*, phosphorus and sediment mitigation
- other contributors to *E. coli* mitigation (for example, sheep)
- the efficacy of certain mitigations
- baseline data on the extent of current fencing across the country.

There is no regional summary for the Chatham Islands because there is currently insufficient water quality information.

## Regional summaries

### Northland

#### Overview of swimmability now

##### Main activities

The Northland region covers nearly 13,300 square kilometres of mostly rolling hill country, narrow river valleys, and long stretches of coast. About 46 per cent of the land is covered by pasture, 32 per cent is native forest, and 14 per cent is exotic forestry, with the remainder divided among horticulture, urban areas and other uses.<sup>4</sup>

The region is characterised by hundreds of short, slow-flowing rivers that drain relatively small catchment areas. A notable exception is the northern Wairoa River, which drains nearly 30 per cent of the region. Northland also contains hundreds of lakes, including more than 280 dune lakes with high ecological importance and complex dynamic hydrology. Most of these are found in clusters on the Aupōuri, Karikari and Poutō peninsulas, and in the Dargaville area.<sup>5</sup>

For rivers, *E. coli* and sediment are typically higher priorities than nitrogen and phosphorus. *E. coli* levels in many Northland rivers periodically exceed safe levels for swimming and other primary contact recreation, particularly after rainfall. All but two of the freshwater sites monitored for recreation exceeded guideline *E. coli* levels for safe swimming at least once during the 2015/16 summer season.<sup>6</sup> This is an issue even in some catchments of unmodified native bush, indicating that natural processes are a contributing factor. According to the Council, many Northland water bodies are unlikely to meet the standards for primary contact, even with optimal mitigation practices.<sup>7</sup>

Lakes Waiparera, Parawanui, Mokeno, Karaka, Kanono, Rotootauru and Omapere have all experienced potentially toxic algae blooms. In Lakes Rotootauru and Omapere algae blooms were frequent after the release of grass carp to control hortwort.<sup>8</sup>

In 2016, there were approximately 965 dairy farms in Northland. Of these, 255 discharge farm dairy effluent only to land (two-pond system); 285 discharge only to water; and 425 have resource consents that authorise discharges to water when land application is not possible.<sup>9</sup>

There are two main types of point-source discharges – treated municipal wastewater from wastewater treatment plants, and treated trade wastewater from an Affco NZ Ltd processing

<sup>4</sup> Northland Regional Council. 2012. *State of the Environment Report 2012*. Whangārei: Northland Regional Council.

<sup>5</sup> Land Air Water Aotearoa. [www.lawa.org.nz/explore-data/northland-region](http://www.lawa.org.nz/explore-data/northland-region)

<sup>6</sup> Northland Regional Council. 2016. *Recreational Swimming Water Quality in Northland*. Whangārei: Northland Regional Council.

<sup>7</sup> Ministry for the Environment, NPS-FM. Implementation Review Northland chapter

<sup>8</sup> Survey response

<sup>9</sup> Implementation Review

plant. The trade wastewater contains a potentially large *E. coli* load, although its consent stipulates that the discharge must not significantly change the *E. coli* concentrations.<sup>10</sup>

### Main sources of *E. coli*

The main sources of *E. coli* in the region are (in order of dominance):

- ruminants
- wildfowl
- people
- plants.

Research also suggests that some types of *E. coli* may be the result of naturalised *E. coli*, which refers to *E. coli* that (with or without faecal inputs) may be capable of persisting in the environment.<sup>11</sup>

### Planned work

Four wastewater treatment plants have recently undergone upgrades. One is currently non-compliant but no upgrade is planned due to affordability issues. There is an ongoing process to determine what, if any, upgrades are needed for another treatment plant. There are no upgrades for *E. coli* removal planned for the remaining five treatment plants.<sup>12</sup>

While the length of rivers that have been fenced in Northland has increased over the last 10 years and there have been major improvements in the management of farm dairy effluent, *E. coli* concentrations have not changed at 33 of the 36 river water quality monitoring network sites.<sup>13</sup>

The draft regional plan for Northland (notification planned for late 2017) contains rules for the access of livestock (dairy cattle, dairy support, beef, deer, and pigs) to freshwater bodies. In summary, they require that:

- dairy cattle and pigs are excluded from all permanently flowing rivers and drains, lakes and natural wetlands
- dairy support, beef cattle and deer must be excluded from permanently flowing rivers and drains in lowland areas (<15 degrees), and all natural wetlands and lakes by certain dates (up to 10 years from operative date of plan or circa. 15 years).<sup>14</sup>

Northland Regional Council expects these rules to result in a 60 per cent reduction in *E. coli* load. The council has assumed that dairy farmers have completed the fencing requirements as per the Sustainable Dairying Water Accord, which is very similar to the Council's proposed

<sup>10</sup> Information provided by Northland Regional Council in response to swimming survey

<sup>11</sup> Northland Regional Council response to swimming survey

<sup>12</sup> Response to survey

<sup>13</sup> Response to survey

<sup>14</sup> Response to survey

<sup>16</sup> Regional information for setting draft targets for swimmable lakes and rivers

rules. They assume that 20–30 per cent of permanently flowing streams in lowland areas used for drystock farming are fenced.<sup>15</sup>

These are default region-wide rules. Individual catchments may have different rules in catchment-specific chapters of the regional plan. Catchment-specific rules have been developed for several priority catchments:<sup>16</sup>

- Doubtless Bay – defaults to proposed regional plan stock exclusion rules
- Mangere – the draft catchment plan rules vary from the default regional requirements by extending stock exclusion rules to include beef cattle, dairy support cattle and deer in hill country rivers (not only in lowland rivers as per the draft regional plan)
- Waitangi – defaults to stock exclusion rules
- Whangārei Harbour – the catchment plan varies from the default regional requirements by:
  - setting an objective for primary contact recreation during the summer swimming season in regionally significant swimming sites within 10 years
  - requiring that all dairy cows, pigs, beef cattle, dairy support cattle and deer be excluded from all waterways upstream of swimming sites mapped in the plan within two years from the date the regional plan becomes operative.

Because of the relatively low productivity of Northland farms, the costs of stock exclusion and other measures are relatively more burdensome on land owners than in other regions. Northland Regional Council has attempted to address land-owner capacity by offering farm environment plans free of charge, and providing subsidies for fencing and riparian planting for those farms with completed plans.

### State of swimming in Northland

Overall swimmability for Northland is 24 per cent of rivers and 67 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Northland is represented below.

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<sup>15</sup> Response to survey

<sup>16</sup> Implementation Review

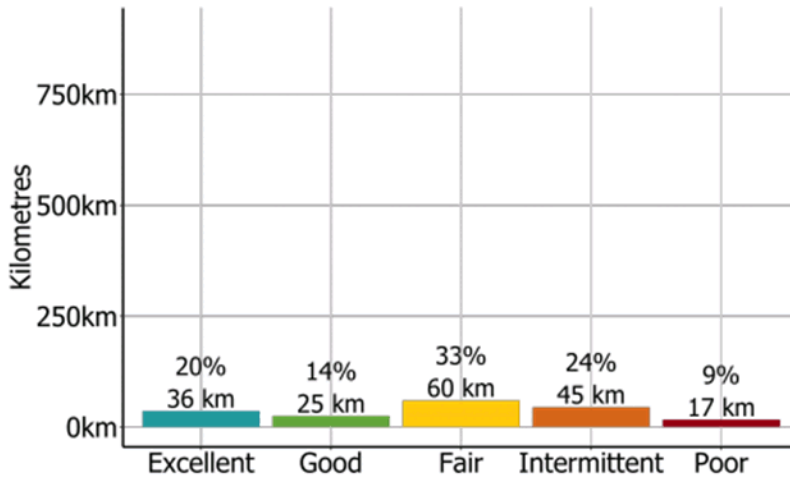


Figure 4: Percentage of Northland lakes currently in each swimming category

Rivers

The modelling indicates that there will be improvement in the overall swimmability of rivers of 1.5 per cent, to 25.5 per cent of rivers being swimmable.

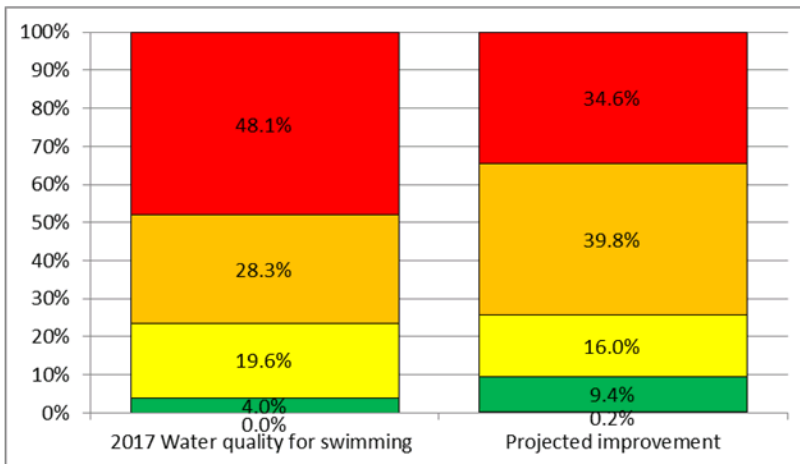


Figure 5: Projected improvement in water quality for swimming of Northland’s rivers

The total annual cost of committed work in the rural area of the Northland region is \$4.86 m. The rural costs of committed work are spread across the dairy (24%), dairy grazing (4%), sheep and beef (50%), and lifestyle (22%) sectors.

### Region-specific modelling considerations

Northland's planning provisions largely reflect the Sustainable Dairy Accord, and the proposed Stock Exclusion Regulations. We have not modelled this because the proposed Stock Exclusion Regulations are already modelled and this would therefore result in double counting the reduction.

### Northland Regional Council Reservations about the modelled results in this report

Text to come



## Auckland

### Overview of swimmability now

#### Main activities

Although Auckland is most known for its urban centre, this only represents about 11 per cent of the region's land area.<sup>17</sup> Nearly half the region is farmland, and the rich soils around Pukekohe and Franklin are among the nation's most productive for agriculture. Another quarter of Auckland is covered by native vegetation, with the remainder being exotic forests and other uses.<sup>18</sup>

Catchments are generally small, with short first- or second-order rivers, and intermittent streams. Fewer than 10 per cent of these drain urban areas. Most come from rural farmland, native bush or exotic forests.<sup>19</sup>

Despite covering less than 2 per cent of New Zealand's total land area, the Auckland region contains over a third of the population and is growing at a very high rate. The resulting housing and infrastructure development, increasing vehicle numbers and delivery of wastewater services places severe pressures on freshwater quality, particularly with regard to sediment, metals and other contaminants associated with urban areas.<sup>20</sup>

*E. coli* levels do not meet guidelines for swimming or other primary contact recreation in many Auckland rivers, often creating health risks at popular beaches. In urban areas, this is typically the result of wastewater overflows and contaminated stormwater during rainstorms. Rural streams generally have better water quality, although they also face problems with elevated levels of nutrients, sediment and *E. coli* in some areas of more intensive agriculture and towns with aging or improperly maintained septic systems.

Groundwater quality varies considerably according to land use, age, and degree of confinement. Some aquifers, particularly in the central and southern volcanic zones, have levels of nitrates, *E. coli*, metals or other contaminants above guideline standards for drinking water.<sup>21</sup>

The two main point sources of *E. coli* in fresh water are the Wellsford and Warkworth wastewater treatment plants.<sup>22</sup>

<sup>17</sup> Ministry for the Environment. n.d. *Environmental Reporting: Area of land cover 1996–2012*. Retrieved from <https://data.mfe.govt.nz/table/2478-land-cover-area-of-land-cover-1996-2001-2008-and-2012/data/> (10 July 2017).

<sup>18</sup> Land Air Water Aotearoa [www.lawa.org.nz/explore-data/auckland-region/](http://www.lawa.org.nz/explore-data/auckland-region/)

<sup>19</sup> LAWA

<sup>20</sup> Implementation Review, Auckland Chapter

<sup>21</sup> Implementation Review

<sup>22</sup> Survey response

<sup>20</sup> Regional information for setting draft targets for swimmable lakes and rivers

### Main sources of *E. coli*

Auckland Council is carrying out work to identify and mitigate sources of faecal pollution for swimming in several coastal locations. The same principles and lessons are now to be applied for freshwater reaches. Sources of contamination in these coastal locations include human, dog, and avian, with some ruminant in the Te Henga catchment.<sup>23</sup>

### Planned work

#### Point sources

Upgrades are planned for both major point sources. The Warkworth wastewater treatment plant will stop discharging treated wastewater to the receiving water body. Instead, wastewater will be transferred to an upgraded treatment plant at Snells Beach and discharged into coastal waters.<sup>24</sup> The Wellsford wastewater treatment plant will be upgraded to an advanced wetland treatment process.<sup>25</sup>

#### Urban

In developing greenfield sites, the Council has made a philosophical change from big pipe infrastructure to water-sensitive design, which aims at preserving and enhancing freshwater systems and mitigating effects at source, if possible, which leads to a more decentralised management approach. Mitigation measures include a range of devices, including rain gardens and rainwater tanks. The goal is to provide for growth in a way that will not only prevent further degradation but improve conditions.<sup>26</sup>

Brownfield development has historically proven more challenging for the Council, in particular in areas with combined wastewater and stormwater networks. In these areas, the Council says it has placed emphasis on the use of enlarged interceptor systems to manage wastewater overflows, combined with localised sewer separation as part of long-term infrastructure upgrades. The Council expects these required infrastructure interventions to cost upwards of \$2 billion.<sup>27</sup>

Several specific projects are planned or under way for Henderson Creek:<sup>28</sup>

- Project Twin Streams, involving the planting of 750,000 riparian trees
- restoration of Epping wetland

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<sup>23</sup> Survey response

<sup>24</sup> [www.watercare.co.nz/about-watercare/Projects%20around%20Auckland/Warkworth\\_Snells\\_Algies/Pages/Warkworth-Snells-Algies-wastewater-services.aspx](http://www.watercare.co.nz/about-watercare/Projects%20around%20Auckland/Warkworth_Snells_Algies/Pages/Warkworth-Snells-Algies-wastewater-services.aspx)

<sup>25</sup> [www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/consents/getinvolved/Documents/Wellsford4.pdf](http://www.aucklandcouncil.govt.nz/EN/ratesbuildingproperty/consents/getinvolved/Documents/Wellsford4.pdf)

<sup>26</sup> Implementation Review

<sup>27</sup> Implementation Review

<sup>28</sup> Survey response

- ongoing work by Auckland Council to ensure the integrity of the stormwater network and therefore reduce wastewater spills
- ongoing work by Watercare to ensure the integrity of the wastewater network and reduce spills from the wastewater network, and cross-transfer of wastewater into the stormwater network.

### Rural

The Council reports that almost all dairy land in the Auckland region is fenced from stock. Farmers in the region face peer pressure to achieve environmental standards.<sup>29</sup>

There are a number of projects planned or under way to work with communities to fence and plant riparian areas throughout Auckland.<sup>30</sup>

- Funding is provided to rural land managers through Auckland Council's Waterway Protection Fund for fencing and planting to prevent livestock having free access to waterways. This funding will match up to 50 per cent of the project costs. Funding will be given to projects with the greatest positive environmental impact in the Hoteo, Henderson, Wairoa, Papakura, and Kaipara catchments.
- Funding for stock exclusion through fencing and planting will also be available through Rodney Local Board's Healthy Harbours and Waterways Fund. This scheme is aimed at increasing swimmability in at-risk catchments (Mahurangi, Hoteo, Rangitopuni, Kaukapakapa).
- The Lower Kaipara River Land Owner Collective Project aims to start the process of rehabilitating the Kaipara River. The project supports land owners to implement strategies such as planting and fencing so that the river banks can be managed in the long term. Stock exclusion and planting may occur at all or some of the reaches throughout the catchment. The project has already led to 2 kilometres of fencing and 500 metres of planting.<sup>31</sup>
- Development of a community catchment management plan (Wairoa River Catchment management strategy). This will utilise the Wairoa landcare community group to work with land owners to implement improvements to the river catchment including through planting and fencing to exclude stock.
- The Forest Bridge Trust is working with land owners to increase planting and fencing in Kaipara and Hoteo catchments.
- The Mahurangi Action Plan includes actions around planting trees and riparian retirement.<sup>32</sup>

<sup>29</sup> Implementation Review

<sup>30</sup> Survey response

<sup>31</sup>

[http://infocouncil.aucklandcouncil.govt.nz/Open/2017/05/RD\\_20170518\\_AGN\\_7140\\_AT\\_files/RD\\_20170518\\_AGN\\_7140\\_AT\\_Attachment\\_53186\\_2.PDF](http://infocouncil.aucklandcouncil.govt.nz/Open/2017/05/RD_20170518_AGN_7140_AT_files/RD_20170518_AGN_7140_AT_Attachment_53186_2.PDF)

<sup>32</sup> [www.mahurangi.org.nz/Action-Plan/PDF/Mahurangi-Action-Plan.pdf](http://www.mahurangi.org.nz/Action-Plan/PDF/Mahurangi-Action-Plan.pdf)

<sup>22</sup> Regional information for setting draft targets for swimmable lakes and rivers

- The Auckland Unitary Plan requires stock exclusion from water sources on intensively grazed farm land (where a stocking rate is equal or more than 18 stock units throughout the region) five years after the plan becomes operative; from intermittent streams 10 years after the plan becomes operative. The Auckland Unitary Plan also introduces new rules for farm effluent storage and disposal. The measures and behaviours required by the plan should reduce levels of *E. coli* being discharged from farms.

### State of swimming in Auckland

Overall swimmability for Auckland is 23 per cent of rivers (by length) and 97 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Auckland is represented below.

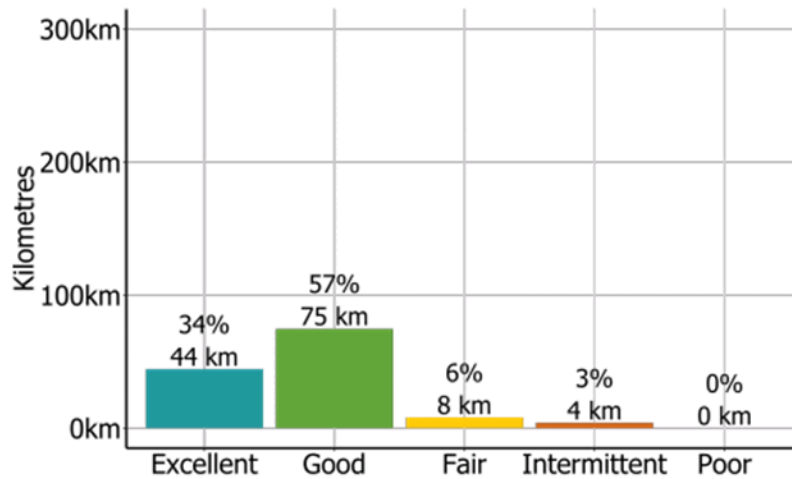


Figure 6: Percentage of Auckland lakes currently in each swimming category

### Rivers

The modelling indicates that there will be improvement of 7.5 per cent, to 30.5 per cent of rivers being swimmable.

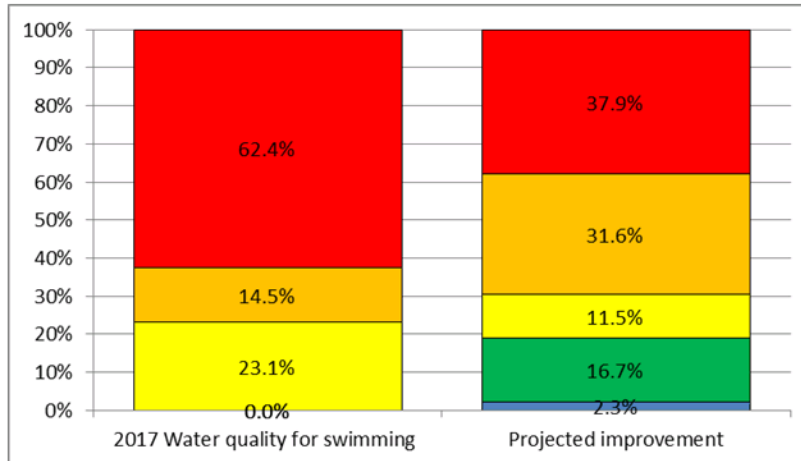


Figure 7: Projected improvement in water quality for swimming for Auckland's rivers

The total annual cost of committed work in the Auckland region is \$86.22 m. Only \$4.07 m of this occurs on rural land, with the majority (\$82.15 m) associated with the improvement of urban wastewater infrastructure. The rural costs of committed work are spread across the dairy (15%), dairy grazing (3%), sheep and beef (39%), deer (1%), and lifestyle (42%) sectors.

### Region-specific modelling considerations

When modelling the impact of Auckland's committed work, assumptions about the level of implementation of planning rules were made. Specifically:

- where there was a focus on co-funding for fencing and planting, the modelling has assumed 50 per cent of streams with order 3 or more will be planted (Hoteo, Henderson Creek, Wairoa and Kaipara)
- the Mahurangi Action Plan also assumes 50 per cent of streams with order 3 or more are planted
- where community catchment management is planned, the modelling approach taken to stock exclusion has been extended to all streams in that catchment (Wairoa, Kaipara and Hoteo)
- where there is a focus on stock exclusion or an extension to the Sustainable Dairy Accord, the modelling approach taken is to extend the stock exclusion provisions to all streams in that catchment (Mahurangi, Hoteo, Rangitopuni, Kaukapakapa, Wairoa, Makarau, Kaipara, Henderson Creek).

The modelling has excluded double counting where applicable.

All initiatives involving riparian planting in Auckland assume a minimum width of 3 metres.

## Waikato

### Overview of swimmability now

#### Main activities

The Waikato has three major river systems, the Waikato (including the Waipa sub-catchment), the Waihou, and the Piako/Waitoa; and in the southwest of the region, bordering the Taranaki region, the Mokau River. In the Waikato, groundwater makes up approximately two-thirds of the total freshwater resource. The groundwater resource is strongly connected to the surface water resource.

The Waikato River is the longest river in New Zealand. Its catchment covers 14,260 square kilometres, or 12 per cent of the area of the North Island. The river starts its journey to the sea from high in the central North Island volcanic zone, 2797 metres above sea level. Leaving Lake Taupo, the river cuts through the volcanic plateau flowing north, passing through eight hydro-electric dams, and onto the lowlands from Cambridge to Mercer. The river finally flows into the Tasman Sea at Port Waikato, after a journey of 425 kilometres from Lake Taupo. Significant amounts of fresh water leave the Waikato in the north, providing water for the Auckland region municipal water supply. *Te Ture Whaimana O Te Awa O Waikato: the Vision and Strategy for the Waikato River*, is the primary direction-setting document for the Waikato and Waipa Rivers and their catchments. Where there is inconsistency between a national policy statement and the vision and strategy, the vision and strategy prevails.

The region has more than 100 lakes, including New Zealand's largest Lake Taupo. Twenty per cent of the water entering Lake Taupo at Tokaanu comes via the Tongariro Power Development. The other lakes can be grouped in the following manner:

- Taupo Volcanic Zone lakes
- Waikato River Hydro lakes
- peat lakes
- riverine lakes
- west coast sand dune lakes.

Demand for farmland means that Waikato lakes are now smaller and shallower, with some completely drained. More than 95 per cent of Waikato wetlands have been converted to pasture.

The Waikato region covers 25,000km<sup>2</sup> of land; just over half of the region's land area is used for pastoral farming; over a quarter is native forest and vegetation, particularly in the Coromandel, with plantation forestry accounting for around 15 per cent of land areas. The remaining land area is used for horticulture, predominantly in the fertile Northern Waikato area, and also supports a large of urban communities including the regional centre of Hamilton.<sup>33</sup>

<sup>33</sup> LAWA [www.lawa.org.nz/explore-data/waikato-region/](http://www.lawa.org.nz/explore-data/waikato-region/)



In regard to *E. coli* in the Waikato River hydro lakes, routine monitoring has continued in conjunction with several other agencies since late 2003.

In regard to other Waikato lakes, routine monitoring of levels of blue-green algae in several of the smaller lakes continues. Hamilton City Council provides the results for Lake Rotoroa (Hamilton Lake) and Lake Rotokeao.

### Main sources of *E. coli*

Human sources from sewage are a minor portion of the total impact on the rivers. In the Waipa River the influence of farm animals is the likely dominant source. *E. coli* levels are very low in the upper Waikato because bacteria die off in the hydro lakes. Downstream of Karapiro, and once the undammed Waipa River joins the Waikato, the levels in the river rise.

Levels of *E. coli* exceed Australian and New Zealand guidelines for fresh and marine water quality in most water bodies.<sup>34</sup> Lakes Hakanoa, Ngaroto, Waahi, Waikare and Whangape all have histories of toxic algae blooms.<sup>35</sup>

There are a variety of point-source discharges in the Waikato including wastewater treatment plants (25), stormwater discharge (1), meatworks (6) and dairy factories (8), power station cooling water (1), a pulp and paper mill and a gold mine.<sup>36</sup>

In a study of water quality in five Waikato streams, ruminant and wildfowl pollution was detected in almost all samples. No human pollution was detected at any of the sites.

**Table 1: Sources of faecal contamination in Waikato rivers<sup>37</sup>**

Water body	Sources of <i>E. coli</i>	Contribution to total <i>E. coli</i> load
Karapiro Stream	Ruminant, both cow and sheep	Ruminant generally 50–100%
Komakorau Stream	Ruminant, some wildfowl	Ruminant up to 50% (but could be minor)
Mangaone Stream	Wildfowl (all flows), ruminant (high flows)	Varied over time
Mangaonua Stream	Ruminant, wildfowl	Ruminant often up to 100%
Mangawhero Stream	Wildfowl (low flows), ruminant (some high flows)	Varied over time

<sup>34</sup> *E. coli, nitrogen, phosphorus and sediment in the Waikato and Waipa Rivers*  
[www.waikatoregion.govt.nz/assets/PageFiles/28959/1/15%20-%202728663.pdf](http://www.waikatoregion.govt.nz/assets/PageFiles/28959/1/15%20-%202728663.pdf)

<sup>35</sup> Survey response

<sup>36</sup> Waikato survey response

<sup>37</sup> Sources of Faecal pollution in selected Waikato Rivers – July 2015  
[www.waikatoregion.govt.nz/assets/PageFiles/40444/3469090.pdf](http://www.waikatoregion.govt.nz/assets/PageFiles/40444/3469090.pdf)

<sup>26</sup> Regional information for setting draft targets for swimmable lakes and rivers



## Planned work

### Point sources

The majority of wastewater treatment plants either have planned upgrades, options for upgrades, or have recently undergone upgrades.<sup>38</sup>

Wastewater treatment plant upgrades are planned for Pukete, Tuakau/Pukekohe, Te Awamutu, Cambridge, Te Kauwhata, Waihi and Turua.

Options are being considered for upgrading several other wastewater treatment plants (Tokoroa, Putaruru, Tirau, Huntly) or piping wastewater to another plant (Te Kauwhata, Meremere). Consent renewals for the Raglan wastewater treatment plan are in the formative stages. A number of other treatment plants have recently undergone significant upgrades (Te Kuiti, Benneydale, Thames, Morrinsville, Te Aroha, Matamata, Waihou, Tahuna).

Should a government decision be made to proceed with the Waikeria Corrections Facility then both the existing Waikeria and Tokanui plants will become redundant and the reticulation will need to be connected to the Te Awamutu wastewater treatment plant. In the Waitomo district a new treatment plant is to be constructed and commissioned for Piopio

Upgrades are also planned for dairy factories and meatworks. The Te Rapa and Te Awamutu dairy factories are proposing to upgrade to tertiary treatment within six years, as part of current consent applications. There are also plans to upgrade the current wastewater treatment plant for Waitomo Village, cater for 600,000 annually.

From 1 April 2021, the *E. coli* concentration in the wastewater discharge from Waitoa meatworks shall not exceed the following (estimated from all test results over the winter period): a median of 300 cfu/100ml, and a 95th percentile of 5,000 cfu/100ml. The type of upgrade that will achieve this is not yet specified.

### Urban

All district councils within the Waikato Region have Comprehensive Stormwater Discharge Consents (CSDCs) that authorise their urban stormwater discharges. All CSDCs have comprehensive conditions of consent that provide direction or compliance requirements to manage specific contaminants within their stormwater discharges. These contaminants include suspended solids, hazardous substances, micro-organisms, etc. All CSDCs must have Stormwater Management Plans that provide direction on how the district councils will manage their urban stormwater systems to mitigate and prevent these contaminants from entering the environment.<sup>39</sup>

### Rural

Waikato Regional Council works closely with farmers and land owners to reduce the impact of their activities through ongoing programme or erosion protection, fencing and planning, and lake and wetland protection. Council is implementing the Waipa Catchment Plan to achieve

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<sup>38</sup> Survey response

<sup>39</sup> Survey response

20-year aspirational goals, and is the first in an ongoing programme of integrating catchment planning. In 2016/17 the implementation of the Waipā Catchment Plan includes works of approximately \$1 million for soil conservation in priority catchments. In addition, there has been continued implementation of the large Waipā Rerenoa and Mangaotama Wetland restoration projects, partly funded by Waikato River Authority, including working with land owners, iwi and the community.

The Whangapoua Harbour and Catchment Plan has been signed off by the Department of Conservation, Thames Coromandel District Council, industry, iwi, land owners, and Council. Council is also partnering with the Waikato River Authority, the administering authority for \$220 million Treaty settlement funding for the improvement of the Waikato and Waipa Rivers, and DairyNZ in the development of a Restoration Strategy. The Restoration Strategy takes a strategic catchment approach to prioritising areas of non-regulatory interventions and mitigations.

In 2016/17 Upper Waikato catchment 63 land owner maintenance programmes have been progressed. The new works established 12,593 metres of fencing (including 3500 metres of riparian protection). Across the Waihou/Piako and Lower Waikato zones catchment, new works were completed and included 29,714 metres of fencing and 212,161 plantings. Fifty rural land owners worked with Council to complete environmental protection agreements, and a total of 50.56 hectares of land was retired from pasture.

### Lakes

The Waikato Regional Council is currently reviewing its lakes' water quality and toxic cyanobacteria monitoring programme, with the intention of expanding the current monitoring efforts and improving representativeness.<sup>40</sup> *Huntly Domain and Lake Hakanoa Reserve Management Plan* by Waikato District Council (2012) lists and prioritises a range of actions to "progressively improve Lake Hakanoa's water quality". These include actions to reduce nutrient inputs to the lake.<sup>41</sup>

Landcare Trust have developed a community-led Catchment Action Plan (2014) for Lake Ngaroto that resulted in whole-farm management plans developed as part of the process and end of drain treatment systems (that is, silt traps and infiltration wetland) on two inflows. Waipa District Council has diverted a major inflow to the lake, which will reduce nutrients entering the lake. Waipa District Council has consent to construct a drain treatment system that will mitigate nutrients from a 100 hectare sub-catchment.<sup>42</sup>

Waahi Whaanui Trust have undertaken work at Lake Waahi to improve water quality (mostly riparian fencing and planting). Waikato Regional Council have also been involved in fencing and planting the lake margin. The lake is not yet fully fenced.<sup>43</sup>

A catchment management plan is currently being drafted to look at options for improving lake water quality at Lake Waikare. Most of the lake has been fenced; however, not all of the fencing keeps stock out of the lake at high-water levels. The main stem of the largest inflow

<sup>40</sup> [www.waikatoregion.govt.nz/assets/PageFiles/37521/TR201459.pdf](http://www.waikatoregion.govt.nz/assets/PageFiles/37521/TR201459.pdf)

<sup>41</sup> Survey response

<sup>42</sup> Survey response

<sup>43</sup> Survey response

has mostly been fenced, along with several other tributaries. Fencing and riparian planting has occurred in other contributing catchments. Riparian planting has occurred in some of the fenced areas. A small silt trap/infiltration wetland has been constructed at the southern end of the lake. The two lakes (Ohinewai and Rotokawau) that feed into Lake Waikare are fenced. Considerable riparian planting has occurred around Lake Ohinewai. Lake Rotokawau is surrounded by a large wetland.

Lake Whangape is approximately 50 per cent fenced, but not all fences keep stock out of the lake at high-water levels. Riparian planting has occurred in conjunction with fencing where required. There have been a number of riparian planting and fencing projects in the upper catchment, however these would not total more than 10 per cent of the waterways within the catchment.<sup>44</sup>

### Healthy Rivers Wai Ora Waikato and Waipa Plan Change 1

The Waikato community has consistently identified water quality as the top issue for the Waikato region for the past two decades. Healthy Rivers/Wai Ora Proposed Waikato Regional Plan Change 1 is the bold response to addressing the complex problem of water quality facing our Waipa and Waikato Rivers. The proposed plan change gives effect to Government legislation on the management of fresh water (passed in 2014) and *Te Ture Whaimana o Te Awa o Waikato (The Vision and Strategy for the Waikato and Waipa rivers)*, which was adopted by Government as part of Treaty Settlement legislation. The proposed plan has been developed using a collaborative process involving community and sector representation, which has ensured that those who are most affected by the changes have been at the table developing the policy and providing input and feedback from their communities and sectors over a two-and-a-half-year period.

The proposed plan aims to encompass or include all land owners over 2 hectares within the Waikato River and Waipa River catchments. New rules will complement existing rules in the Waikato Regional Plan. Existing rules in the Waikato Regional Plan will continue to apply, for example, farm dairy effluent rules, earthwork rules and point-source discharge rules.

The approach taken to reducing contaminant losses from land use activities requires:

- stock exclusion from water bodies
- registration of all properties over 2 hectares within the catchment
- Farm Environment Plans, including for commercial vegetable growers, that ensure industry-specific good management practices, identify additional mitigation actions to reduce diffuse discharges by specified dates
- a property-scale nitrogen reference point to be established by modelling current nutrient losses from each property, with no property being allowed to exceed its reference point in the future and higher discharges being required to reduce their nutrient losses
- an accreditation system to be set up for people who will assist farmers to prepare their Farm Environment Plan, and to certify agricultural industry schemes

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<sup>44</sup> Survey response

- Waikato Regional Council to development approaches outside the rule framework that allow contaminant loss risk factors to be assessed at a sub-catchment level, and implement mitigations that look beyond individual farm boundaries to identify the most cost-effective solutions.

It will have implications for all rural land owners in the catchments who are on land over 2 hectares. The Proposed Plan is presently progressing through the submissions process.

### State of swimming in Waikato

Overall swimmability for Waikato is 37 per cent of rivers and 79 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of *E.coli* for lakes in Waikato is represented below.

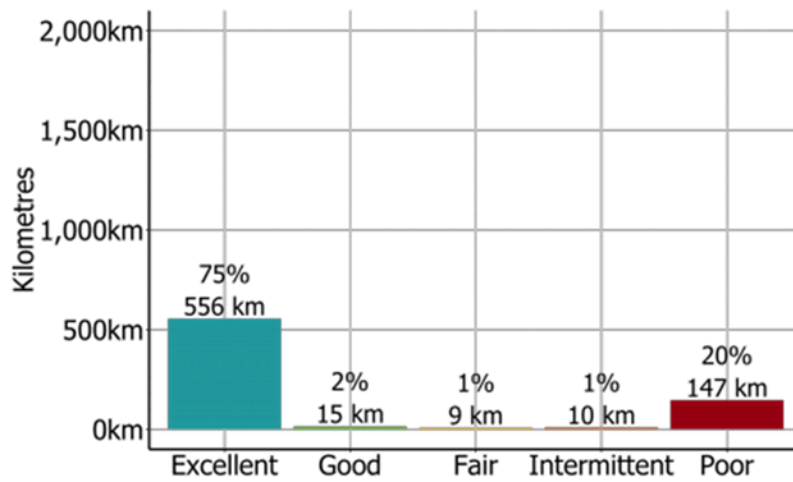
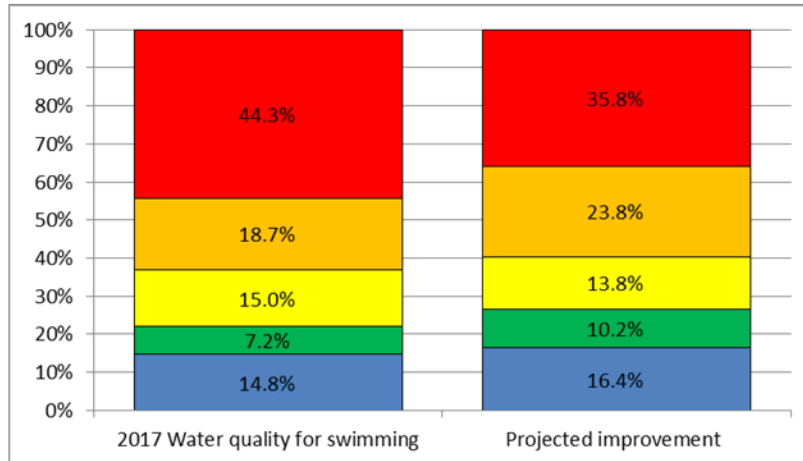


Figure 8: Percentage of Waikato lakes currently in each swimming category

**Rivers**

Modelling indicates an improvement in swimmability of rivers from 37 per cent to 40.4 per cent.



**Figure 9: Projected improvement in water quality for swimming for Waikato's rivers**

The total annual cost of committed work in the rural area of the Waikato region is \$18.76 m. The rural costs of committed work are spread across the dairy (39%), dairy grazing (1%), sheep and beef (41%), deer (1%), and lifestyle (18%) sectors.

**Region-specific modelling considerations**

Nothing specific.

## Bay of Plenty

### Overview of swimmability now

#### Main activities

About half of the region is covered by native vegetation, a quarter in exotic plantation forestry, and 20 per cent in pasture, with the remainder divided among horticulture and urban areas. While there has been relatively little land-use change in recent years, intensification and urban growth in the Western Bay have placed increasing pressure on both water quality and quantity.<sup>45</sup>

Rivers in the region typically flow along fault lines northward from headwaters in the mountains and volcanic plateaus into the sea. The largest of these are the Wairoa, Kaituna, Tarawera, Rangitāiki, Whakatāne, Waioeka, Motu and Raukokore rivers. The 12 Rotorua Te Arawa lakes are the largest in the region and have cultural, recreational and economic significance. Hydro-electric dams on the Rangitāiki River have created two additional lakes. Wetlands were historically drained and destroyed to a greater extent than in other parts of the country, meaning only 3 per cent of the region's wetlands remain today. The region also encompasses all or part of 10 geothermal systems, including those around Kawerau, Rotorua, Tauranga and the Waimangu valley.<sup>46</sup>

Several regional rivers have elevated microbial levels that do not meet the minimum acceptable standard for swimming or other primary recreation.<sup>47</sup> As is common nationwide, quality is highest in catchments dominated by native forest and poorest in lower river reaches and areas of more intensive agriculture or urban development.

Lakes Rotoehu and Okaro have histories of algae blooms since the early 1990s. A combination of in-lake interventions, such as alum dosing, weed harvesting and land-use change have contributed to water quality improvements. However, the past two summer seasons have seen blooms that have resulted in health warnings.<sup>48</sup>

Point-source discharges in the region include stormwater and waste-water discharges, treated abattoir waste water, and discharges from wood-processing plants, a dairy factory and distillery.<sup>49</sup>

<sup>45</sup> Implementation Review

<sup>46</sup> Implementation Review

<sup>47</sup> Bay of Plenty Regional Council. 2015. *Freshwater in the Bay of Plenty – Comparison against the National Objectives Framework*. Environmental Publication 2015/04. Retrieved from [www.boprc.govt.nz/media/433845/freshwater-in-the-bay-of-plenty-comparsion-against-the-national-objectives-framework.pdf](http://www.boprc.govt.nz/media/433845/freshwater-in-the-bay-of-plenty-comparsion-against-the-national-objectives-framework.pdf) (30 June 2017).

<sup>48</sup> Survey response

<sup>49</sup> Survey response



### Main sources of *E. coli*

Microbial source tracking has been conducted for some bathing sites with high bacteria concentrations. Tracking information for the Kaiate Stream showed the dominant source of *E. coli* is from ruminants with some from avian sources.<sup>50</sup> In the Ngongotahā Stream, ruminant sources were identified.<sup>51</sup> Updated information for further sites (including Waiōtahe and Uretara, where ruminant and avian sources have been identified) will be provided in the next recreational water report.

### Planned work

#### Point sources/urban

Upgrades are planned for the following:

- Western Bay of Plenty Council – discharge of treated effluent to Waiari Stream
- Rotorua Lakes Council – stormwater discharge (to water and land)
- Rotorua Lakes Council – discharge of treated effluent from wastewater treatment plant to land.

#### Rural

Bay of Plenty Regional Council has placed a focus on riparian management, providing financial assistance with fencing, planting and alternative stock water sources for many years. The Council's investment in fencing waterways has resulted in over 75 per cent protection along stream margins so far, and even more in our most vulnerable catchments.

Riparian fencing and planting, and providing general technical advice (in regard to water quality) are business-as-usual activities for the Council. The Council has information for each catchment about:

- how much more fencing is required
- areas where repairs are needed
- crossings and detention bunds required
- areas that may require land use changes.<sup>52</sup>

#### Lakes

Both Lake Rotoehu and Lake Okaro have had a raft of interventions to attempt to improve water quality. Interventions at Lake Rotoehu included land use and land management change, floating wetlands, weed harvesting, alum dosing and aeration. At Lake Okaro interventions have included land-use change and land management change, riparian planting, and stock

<sup>50</sup> [www.boprc.govt.nz/media/596365/recreational-waters-surveillance-report-2015\\_2016.pdf](http://www.boprc.govt.nz/media/596365/recreational-waters-surveillance-report-2015_2016.pdf)

<sup>51</sup> [www.boprc.govt.nz/media/596365/recreational-waters-surveillance-report-2015\\_2016.pdf](http://www.boprc.govt.nz/media/596365/recreational-waters-surveillance-report-2015_2016.pdf)

<sup>52</sup> Survey response



exclusion, development of a catchment wetland, interception of water flows to settle sediment, and phosphorus and alum dosing.

The main focus of the Rotorua Lakes Programme is reducing nutrients that drive harmful algal blooms. To date the large investment in improving water quality has resulted in substantial improvements for the 12 lakes that are under active management. There are ongoing interventions in all the 12 lakes; however even with a range of interventions, Lake Rotoehu and Lake Ōkaro are not meeting the swimmability targets. The action plans for the lakes capture the list of interventions agreed with the local communities, and these are regularly reviewed.

### State of swimming in Bay of Plenty

Overall swimmability for the Bay of Plenty is 95 per cent of rivers and 85 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in the Bay of Plenty is represented below.

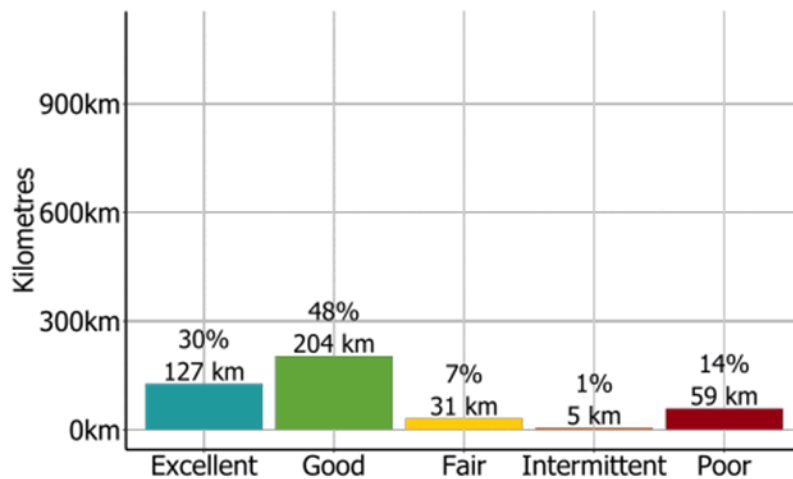
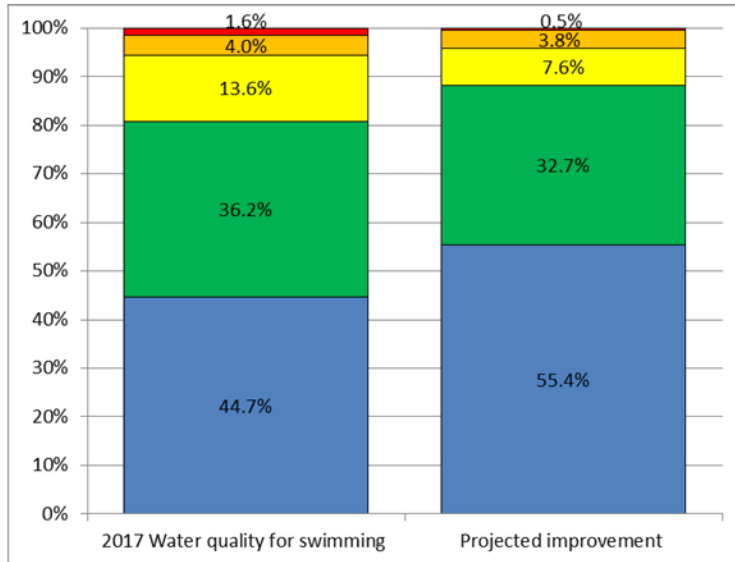


Figure 10: Percentage of Bay of Plenty lakes currently in each swimming category

**Rivers**

The modelling shows an increase in the overall swimmability of rivers of 1.2 per cent, to 95.7 per cent of rivers being swimmable.



**Figure 11: Projected improvement in water quality for swimming for Bay of Plenty's rivers**

The total annual cost of committed work in the rural area of the Bay of Plenty region is \$4.17 m. The rural costs of committed work are spread across the dairy (26%), dairy grazing (1%), sheep and beef (35%), deer (8%), and lifestyle (30%) sectors.

**Region-specific modelling consideration**

In modelling the planting and restoration activities planned by Bay of Plenty, we have assumed 50 per cent uptake of the activities from the current state of planting.

Approximately 40 per cent of riparian fencing in the region is set back more than 3 metres from the edge of the river or lake.

## Gisborne

### Overview of swimmability now

#### Main activities

Pastoral land and crops (42 per cent), plantation forest (20 per cent) and indigenous forest (22 per cent) account for most of the land cover within the region.<sup>53</sup> The region has two major river catchments:

- the Waipaoa, which feeds the Poverty Bay Flats where Gisborne City is located
- the Waiapu, which flows northeast from the Raukūmara Range and enters the Pacific Ocean north of Ruatoria, near the northern tip of the East Cape.

There is also an extensive groundwater system under the Poverty Bay Flats.

Gisborne's topography is naturally steep. Approximately 3 per cent of the land area is classified as flat, and this land is mainly used for horticulture. A lot of the hill country is steep land. There are five dairy farms in the region, with the balance of farming being 50/50 beef and sheep farming. Due to the topography, there is little water reticulation, and stock access streams and use stream gullies for shade.<sup>54</sup>

Sediment and *E. coli* are the main pressures for both urban and rural areas. *E. coli* levels frequently fail national bottom lines for both primary and secondary contact recreation, including at the popular Rere Falls and Rere Rockslide.<sup>55</sup> Both sediment and *E. coli* levels are strongly affected by rainfall events: rainfall flushes high levels of suspended solids and bacteria into local rivers.

Point-source discharges in Gisborne are mainly stormwater discharges from urban and rural activities to the estuarine areas in Gisborne City and the Gisborne plains. Emergency wastewater overflows currently occur several times a year in Gisborne City, usually as a result of heavy rain events. Council is working to minimise these overflows through wastewater pipe renewals and improvements, and other stormwater drainage solutions.

There is also a wastewater discharge into the Waipaoa River at Te Karaka.

#### Main sources of *E. coli*

The majority of *E. coli* in Gisborne's rivers is from ruminants. For the Wharekopae,<sup>56</sup> Te Arai,<sup>57</sup> and Waipaoa<sup>58</sup> rivers, ruminants contribute 100 per cent of the *E. coli* load. The Waimata has

<sup>53</sup> Gisborne District Council. 2016. *The State of Our Environment: Land and Soil 2013–2015*. Gisborne District Council: Gisborne

<sup>54</sup> Emails Lois Easton to Sara Clarke, 5 and 12 September 2017

<sup>55</sup> Gisborne District Council. 2016. *The State of Our Environment: Fresh Water Resources 2013–2015*. Gisborne District Council: Gisborne.

<sup>56</sup> Faecal source tracking studies, Gilpin et al 2011, Devane et al 2014

<sup>57</sup> Faecal source tracking studies, Devane et al 2014

<sup>58</sup> Faecal source tracking studies, Devane et al 2014

<sup>36</sup> Regional information for setting draft targets for swimmable lakes and rivers

ruminant and avian sources.<sup>59</sup> For the Taruheru<sup>60</sup> and Wainui<sup>61</sup> rivers, the ruminants are the main source in rural areas with avian and dog contributions in urban areas. In the Waikanae catchment almost all the *E. coli* is from unknown sources, and could be naturalised *E. coli*.<sup>62</sup>

### Planned work

There are planned upgrades for Te Karaka Wastewater Treatment Plant, including tertiary treatment and land disposal. These will have a minimal impact on *E. coli* loads.<sup>63</sup>

The Council opened a new domestic wastewater treatment plant for Gisborne City in 2010 and is in the process of deciding how to approach further upgrades. Options include expansion of the new treatment facility and a proposed wetland treatment system; however, all of the proposed options will strain the council's budget. Simultaneously, the Council is overhauling regional stormwater to separate it from domestic wastewater and reduce strain on treatment facilities.<sup>64</sup>

The Proposed Regional Freshwater Plan (notified October 2015) establishes regional objectives, policies and rules to address water quality and quantity, include new rules for urban sewage and stormwater, stock exclusion and setbacks from waterways, and requirements for farm environment plans.<sup>65</sup>

Rural mitigations include plans to fence main stem rivers (Wharekopae and Totangi rivers).<sup>66</sup>

### State of swimming in Gisborne

Overall swimmability for the Gisborne region is 77 per cent of rivers and 83 per cent of lakes.

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<sup>59</sup> Faecal source tracking studies, Devane et al 2014

<sup>60</sup> Faecal source tracking studies, Devane et al 2014

<sup>61</sup> Faecal source tracking studies 2016

<sup>62</sup> Faecal source tracking studies, Devane et al 2014

<sup>63</sup> Survey response

<sup>64</sup> Implementation Review

<sup>65</sup> Implementation Review

<sup>66</sup> Survey response

**Lakes**

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Gisborne is represented below.

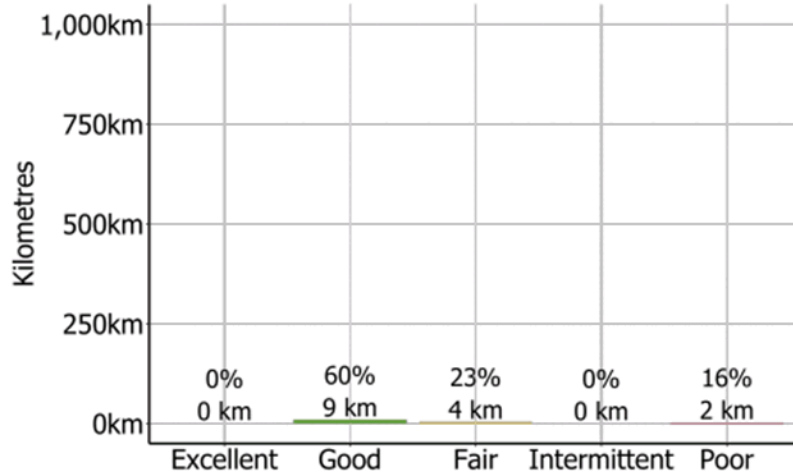


Figure 12: Percentage of Gisborne lakes currently in each swimming category

**Rivers**

The modelling shows an increase in the overall swimmability of rivers of 8 per cent, to 85 per cent of rivers being swimmable.

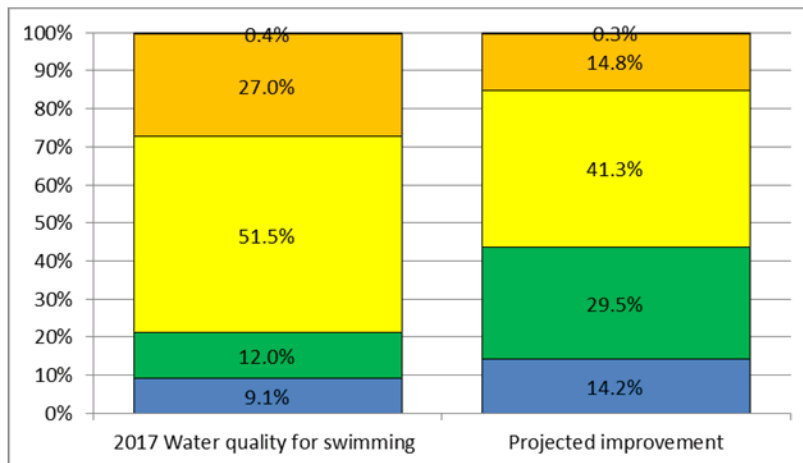


Figure 13: Projected improvement in water quality for swimming for Gisborne’s rivers

The total annual cost of committed work in the rural area of the Gisborne region is \$3.18 m. The rural costs of committed work are spread across the dairy grazing (1%), sheep and beef (82%), and lifestyle (17%) sectors.

### Region-specific modelling considerations

Gisborne's planning provisions largely reflect the Sustainable Dairy Accord, and the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this as it would result in double counting the reduction. It is worth noting that the stock exclusion rules will be limited in their application due to the topography of Gisborne (very little flat land).

## Hawke's Bay

### Overview of swimmability now

#### Main activities

Nearly half of the land area is used for pastoral farming, primarily sheep and beef with some dairy farms and deer.<sup>67</sup> One-third of the land cover is native vegetation, around 12 per cent is exotic forestry and the remainder is divided among horticulture, urban and industrial and other uses. Although they represent a relatively small proportion of the land area, the highly productive Heretaunga and Ruataniwha plains are essential to the region's strong horticulture industry, known for its orchards, vegetable growing and viticulture. Agriculture is the largest employer in the region, and also the basis of much related industry, including fruit and vegetable processing, wine production, and transport of produce.<sup>68</sup>

Hawke's Bay has several major river catchments, generally with headwaters in the inland mountains and hills, leading to fast-flowing gravel-bottomed rivers with braided lower reaches. The Wairoa and Mōhaka rivers drain catchments from the northern and western hills into northern Hawke's Bay. The Tūtaekurī and Ngaruroro rivers flow from the Kaweka and upper Ruahine ranges through the Heretaunga Plains, merging just before their mouth near Clive; and the Tukituki flows from the Ruahine Range across the Ruataniwha Plains towards Cape Kidnappers.

Lakes Whakaki, Rahui, Oingo, Runanga, Horseshoe, Tutira, Whatuma and Poukawa all have histories of algal blooms.

The main point-source discharges are sewage (Wairoa District Council and Central Hawke's Bay District Council (Waipukurau, Waipawa)) and waste water from an Affco meat works.

#### Main sources of *E. coli*

The main source of *E. coli* throughout the region is ruminant. The following table provides more detail on the sources of *E. coli* in different catchments.

<sup>67</sup> Ministry for the Environment. n.d. *Environmental Reporting: Area of land cover 1996–2012*. Retrieved from <https://data.mfe.govt.nz/table/2478-land-cover-area-of-land-cover-1996-2001-2008-and-2012/data/> (10 July 2017).

<sup>68</sup> [www.lawa.org.nz/explore-data/hawkes-bay-region/river-quality/](http://www.lawa.org.nz/explore-data/hawkes-bay-region/river-quality/)



**Table 2: Sources of *E. coli* in different catchments**

Catchment	Sources of <i>E. coli</i>
Karamu	ruminant (up to 10%), plant, avian <sup>69</sup>
Porangahau	ruminant up to 100% <sup>70</sup>
Kairakau	ruminant (up to 100%), some dog <sup>71</sup>
Wairoa	ruminant (10–50%), plant, avian <sup>72</sup>
Kopuawhara (Maungawhio)	ruminant 10–50% <sup>73</sup>
Kopuawhara (Te Mahia)	ruminant (up to 100%), avian <sup>74</sup>
Kopuawhara (Opoutama)	ruminant up to 100% <sup>75</sup>
Southern Coast (Waipuka stream)	ruminant (up to 50%), avian <sup>76</sup>
Waipatiki	ruminant (up to 10%), plant, wildfowl <sup>77</sup>

## Planned work

### Point sources

Ongoing upgrades at Waipukurau and Waipawa are expected to overcome existing problems around capacity and design issues. Takapau Waste Water Treatment Plant is looking to discharge to land, and upgrades are currently occurring at Otane, which will involve ultra-violet treatment. Consent renewal discussions are currently under way for the Wairoa Affco discharge.

### Urban

Stormwater treatment wetlands for the Napier watershed (Ahuriri estuary, Purimu Stream) could reduce *E. coli* load by 80 per cent, depending on design.

Napier City is investigating options to increase capacity within the sewerage network to prevent blowouts during high-flow events.

<sup>69</sup> ESR\_CMB140853/0844

<sup>70</sup> ESR\_CMB140853/0844

<sup>71</sup> ESR\_CMB152236

<sup>72</sup> ESR\_CMB160304/0305 & ESR\_CMB160142\_0143\_0144

<sup>73</sup> ESR\_CMB160142\_0143\_0144

<sup>74</sup> ESR\_CMB160142\_0143\_0144

<sup>75</sup> ESR\_CMB140059

<sup>76</sup> ESR\_CMB130680

<sup>77</sup> ESR\_CMB120996

### Rural

Attention on dairy effluent management will continue, with measures in place to ensure effective storage and deferred irrigation measures are in place (using effluent pond storage calculator). Appropriate conditions are placed on all dairy consents, and each farm is visited and checked every year by compliance officers.

The Tukituki Plan is currently being implemented (from Plan Change 6), and includes a requirement for 1100 Farm Environmental Management Plans to be completed (240 done so far). Farm plans include designation of critical source areas, with appropriate mitigation measures identified and a plan of implementation outlined. Stock exclusion rules (excluding sheep) essentially apply to any flowing waterways that have formed beds, if stocking rate is above 18 stock units, or slope is less than 15 degrees. The Tukituki Plan is the region's first to give effect to the National Policy Statement for Freshwater Management (NPS-FM), but expectations are that some form of Farm Environmental Management Plan, as well as compulsory stock exclusion rules, will be developed and apply to the rest of the region.

Hawke's Bay have an ongoing soil conservation control programme which, among other things, has included 2.4 million poles being planted, resulting in the protection of 46,000 hectares of highly erodible land. This includes stream bank stabilisation by protecting about 50 kilometres of gullies with willow poles each year. Up to 20,000 native plants are planted along streams each year, with fencing subsidies available outside of the Tukituki (where stock exclusion is not mandatory and so no longer subsidised).

There is currently a major focus on five 'hotspots' in Hawke's Bay, which include initiatives to improve overall water quality, including swimmability. The hotspots include the Ahuriri, Tutira Lakes, Whakaki and Wairoa, Tukituki River and Lake Whatuma and the Karamu. Wide-scale stock exclusion and riparian planting will be a component of each workstream. Council have committed \$1 million across these hotspots, and the Tutira Lakes and Whakaki Lake have received additional money from the Ministry for the Environment's Freshwater Improvement Fund.

### Lakes

There is a project for Lake Tutira to develop an Integrated Catchment Management Plan, develop and implement farm environmental management plans throughout the catchment, reconnect Papakiri Stream to Lake Tūtira, install an oxygenation system, and implement a mauri monitoring programme.<sup>78</sup>

Work at Lake Whakaki will include a recirculating wetland, the establishment of 80 hectares of mānuka plantation, and complete stock exclusion from the lagoon's perimeter.<sup>79</sup>

<sup>78</sup> Survey response; [www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects](http://www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects)

<sup>79</sup> Survey response; [www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects](http://www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects)

42 Regional information for setting draft targets for swimmable lakes and rivers

### State of swimming in Hawke’s Bay

Overall swimmability for the Hawke’s Bay is 63 per cent of rivers and 68 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Hawke’s Bay is represented below.

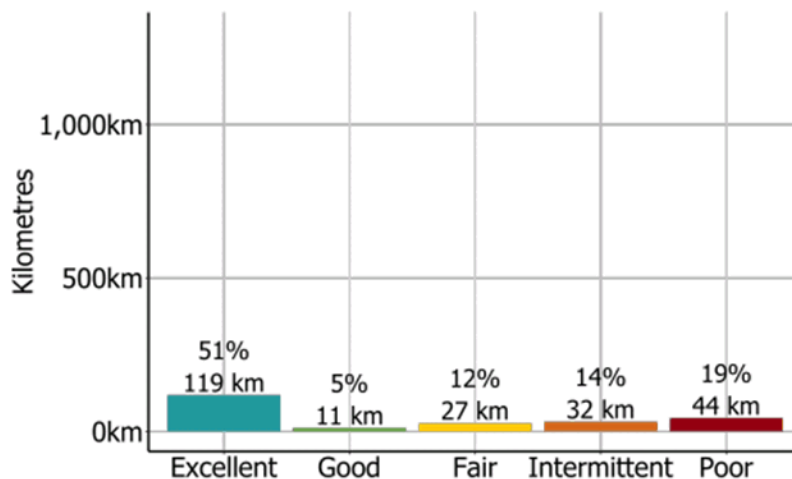


Figure 14: Percentage of Hawke’s Bay lakes currently in each swimming category

#### Rivers

The modelling indicates an increase in the overall swimmability of rivers of 17 per cent, to 90 per cent of rivers being swimmable.

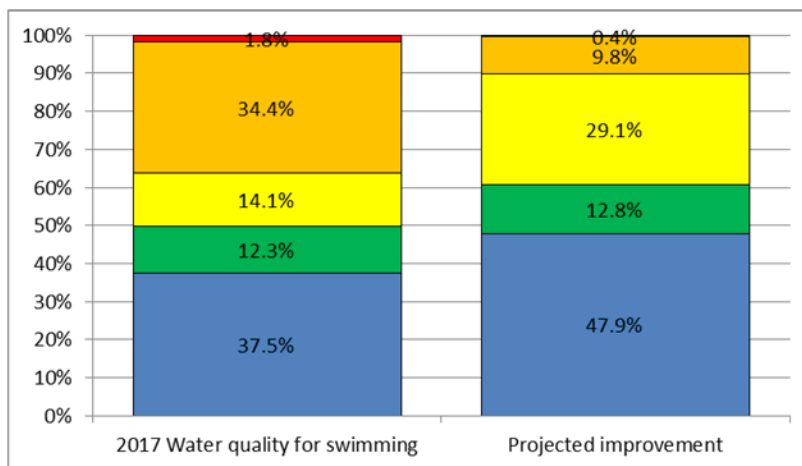


Figure 15: Projected improvement in water quality for swimming in Hawke’s Bay rivers

The total annual cost of committed work in the rural area of the Hawkes Bay region is \$14.72 m. The rural costs of committed work are spread across the dairy (3%), dairy grazing (1%), sheep and beef (85%), deer (2%), and lifestyle (9%) sectors.

### **Region-specific modelling considerations**

For modelling the implementation of activities in the Ahuriri catchment, the modelling has assumed uptake of 15–20 per cent riparian planting.

Fencing on slopes greater than 20 degrees will have a >3 metre setback. Eighty per cent of fencing on dairy farms have <3 metre setback, and 90 per cent of fencing on cropping land will have a <3 metre setback.

Where the regional plan focuses on stock exclusion or an extension to the Sustainable Dairy Accord, the modelling approach taken is to extend the stock exclusion provisions to all streams in that catchment.

## Taranaki

### Overview of swimmability now

#### Main activities

Around 60 per cent of the land is used for high-intensity farming – primarily dairying on the ring plains with sheep and beef farming in the eastern hill country.<sup>80</sup> Because the Taranaki region has had intensive dairying for a long time, the Taranaki Regional Council reports that the region is not seeing the same level of new conversion to, and intensification of, dairying that many other regions are.<sup>81</sup> Most of the remaining 40 per cent is indigenous vegetation with small pockets of urban and industrial land.

The ring plain is characterised by hundreds of short, steep, fast-flowing streams and rivers radiating from the native bush on Mount Taranaki, which flush comparatively quickly to the sea. The Pātea River is the longest of these. In the eastern hill country, rivers are generally longer and slower flowing, with short tributaries contained in narrow valleys.

Surface water quality in the upper reaches is generally very good; however, lowland rivers in catchments with urban areas or more intensive agriculture use are often degraded. Microbial levels sometimes exceed guidelines for swimming and other primary recreation in several sites, although Taranaki Regional Council reports this is often due to bird life.<sup>82</sup> Lakes Rotokare and Rotomanu are the only lakes that have had significant toxic blooms.<sup>83</sup> Lake Rotokare lies in a shallow basin that is entirely bush-clad, with no pastoral activity in its catchment.

The main remaining point-source discharges in the region are all wastewater treatment plants at Stratford, Kaponga, Patea and Waverley. The downstream *E. coli* loads of these treatment plants are:

- Stratford: 337 c.f. units/100mL
- Kaponga: 60 c.f. units/100mL
- Patea: 225 c.f. units/100mL
- Waverley: 1,833 c.f. units/100mL.

Other, larger wastewater plants (and associated sewer networks), together with large industrial facilities formerly discharging to fresh water, have already been upgraded and points of discharge altered to marine outfalls or to land.

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<sup>80</sup> Land, Air, Water Aotearoa. n.d. *Taranaki region*. Retrieved from [www.lawa.org.nz/explore-data/taranaki-region](http://www.lawa.org.nz/explore-data/taranaki-region) (28 June 2017).

<sup>81</sup> Implementation Review

<sup>82</sup> Implementation Review

<sup>83</sup> Survey response

### Main sources of *E. coli*

The main sources of *E. coli* in Taranaki are cattle and birds. In the Waimoku<sup>84</sup> and Wawhakaiho<sup>85</sup> catchments the main sources are birds – pukeko and seagulls respectively. The predominant source for the Waingongoro River, Timaru Stream and Kaipokonui River is cattle.<sup>86</sup>

### Planned work

#### Point sources

Planned work on sewage pump stations includes providing emergency storage at all pump stations and some diversions and relocations to service new development and reduce the risks of overflows.

The load from Inglewood will be diverted to a new pump station to take load off the Mangati Stream pump station. The Connett Road pump station will be abandoned and the load diverted to a new pump station to service new residential development. The West Quay pump station will be relocated to reduce risk of overflow.

Kurapete Street will have a planned upgrade to reduce risk of overflow to Waionganaiti and Ngatoro Streams.

#### Rural

Riparian plan holders have planted 70 per cent of their waterways. Waterways planted in this scheme include drains, wetlands and waterways that are smaller and less significant than are required by the proposed stock exclusion regulations. The voluntary riparian management programme has resulted in around 4.3 million plants being supplied to land owners, 99.5 per cent of dairy farms having a riparian plan, and 84.4 per cent of plan holders fencing their streams. The programme covers 14,500 kilometres of stream bank. Completion of fencing and planting is set for around the end of the decade, when it is intended that a compliance regime will be put in place to ensure the completion and security of the programme into the future is maintained.<sup>87</sup> It should be noted that this is on the back of a substantial amount of collaborative work with the region's stakeholders to determine an appropriate and achievable completion and compliance regime that embraces the wide diversity of circumstances and landscapes. These expectations are already being driven through Council publications and communication plans.

Taranaki Regional Council released a draft *Freshwater and Land Management Plan for the Taranaki region* for pre-notification comment in 2016. The draft plan would establish freshwater management units and set objectives and maximum in-stream concentrations for water quality attributes. It also contained rules requiring stock exclusion and riparian planting on land used for intensive pastoral farming, effluent discharge to land, and forestry setback

<sup>84</sup> *Taranaki as One*, 2015 State of the Environment report, pg 77

<sup>85</sup> Annual recreational water quality monitoring reports, eg doc 1671518

<sup>86</sup> Annual recreational water quality monitoring reports, eg doc 1671518

<sup>87</sup> Implementation Review; survey response

<sup>46</sup> Regional information for setting draft targets for swimmable lakes and rivers

distances from waterways. Following comments received on the draft, the council is now carrying out further consultation and investigations, with the intention of notifying a proposed plan within five years.<sup>88</sup>

The transition from discharge of treated farm dairy to water, to discharges to land will occur over a 17-year period, ending in 2031. This requirement starts as consents are renewed or there are compliance issues.<sup>89</sup>

### State of swimming in Taranaki

Overall swimmability for the Taranaki is 39 per cent of rivers and 97 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Taranaki is represented below.

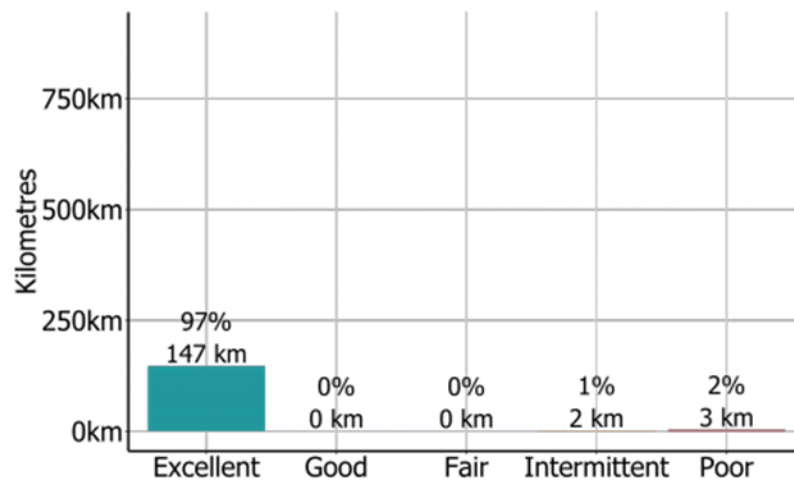


Figure 16: Percentage of Taranaki lakes currently in each swimming category

<sup>88</sup> Implementation Review

<sup>89</sup> Implementation Review; survey response



### Rivers

The modelling shows an increase in the overall swimmability of rivers of 16.5 per cent, to 65.5 per cent of rivers being swimmable.

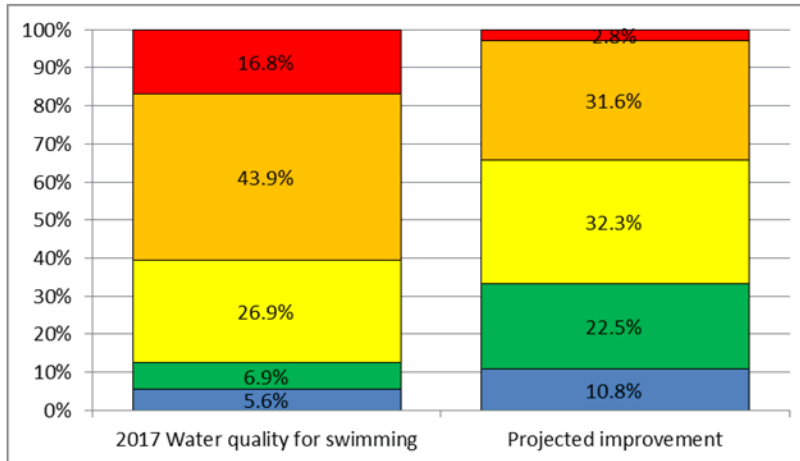


Figure 17: Projected improvement in water quality for swimming for Taranaki's rivers

The total annual cost of committed work in the rural area of the Taranaki region is \$4.94 m. The rural costs of committed work are spread across the dairy (53%), sheep and beef (31%), deer (1%), and lifestyle (15%) sectors.

### Region-specific modelling considerations

Taranaki has remaining two-pond effluent systems, essentially all of which are expected to be phased out by 2040. To model this, we have assumed that 40 per cent of farms currently use this method. For that percentage of farms we have applied a reduction of *E. coli* of 60 per cent in rivers (stream order 4 and above).

Seventy-six per cent of fencing on flat land in the region is set back greater than 3 metres. In steeper land this is approximately 2 per cent.

### Taranaki Regional Council Reservations about the modelled results in this report

Text to come

## Manawatū–Whanganui

### Overview of swimmability now

#### Main activities

About half of the region is used for sheep and beef farming, and a third is covered with native vegetation. The remainder is divided among dairy farming, exotic forestry, horticulture, urban areas and other land uses.<sup>90</sup> All dairy farms in the region have land-based effluent systems and none discharge to water.<sup>91</sup>

The Horizons region has 226 lakes, including volcanic, riverine, landslide, wetland-formed, beach lagoons, dune lakes and man-made reservoirs.<sup>92</sup> Major rivers include the Whanganui, Whangaehu, Turakina, Rangitikei and Manawatū. Groundwater is often unconfined, meaning that it is closely connected with surface water.

Many areas, such as the Upper Rangitikei River and Manganui o te Ao River, which are protected under Water Conservation Orders, have excellent quality across most measured attributes. However, water quality and ecosystem health decline as water flows towards the coast, largely because of diffuse discharges from agricultural and urban land uses. There are also some rivers affected by direct discharges from industrial sites or wastewater treatment plants.<sup>93</sup> High bacterial levels and occasional blooms of toxic algae are found in some lakes and in the middle and lower reaches of many rivers, making them unsafe for swimming or other primary recreation.<sup>94</sup>

Recent analysis carried out in the region shows there has been an improvement in *E. coli* levels in the decade ending 2016. This has resulted in an improvement in swimmability of rivers of between 5 – 8%.

The major point-source discharges in the region come from wastewater treatment plants, three meat-processing plants, and a wood-processing plant.<sup>95</sup>

#### Main sources of *E. coli*

Where faecal source tracking has been carried out, the main identified sources of *E. coli* are ruminants. The regional council measures the concentration of *E. coli* in the main point source discharges, and also upstream and downstream of these sources monthly to determine the relative input of point source discharges and to monitor changes over time.

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<sup>90</sup> [www.lawa.org.nz/explore-data/manawatu-Whanganui-region/](http://www.lawa.org.nz/explore-data/manawatu-Whanganui-region/)

<sup>91</sup> Implementation Review

<sup>92</sup> [www.lawa.org.nz/explore-data/manawatu-Whanganui-region/lakes/](http://www.lawa.org.nz/explore-data/manawatu-Whanganui-region/lakes/)

<sup>93</sup> Horizons Regional Council. 2013. *2013 State of the Environment*. Palmerston North: Horizons Regional Council. Retrieved from [www.horizons.govt.nz/CMSPages/GetFile.aspx?guid=725c8a67-ff40-4962-b728-62430f38e82c&disposition=attachment](http://www.horizons.govt.nz/CMSPages/GetFile.aspx?guid=725c8a67-ff40-4962-b728-62430f38e82c&disposition=attachment) (11 July 2017).

<sup>94</sup> Implementation Review

<sup>95</sup> Survey response

At Waikawa (Horowhenua) ruminants (cows) make up 50–100 per cent (greater at the top of catchment, up to 50 per cent at the bottom of catchment) of the *E. coli* source with some avian sources. Ruminants make up 10–50 per cent of the *E. coli* load in the Makotuku River (Raetihi), 1–10 per cent at Mowhanau (Whanganui) and 50–100 per cent in the Whanganui River at Town Bridge.<sup>96</sup>

### Planned work

The Manawatū River Leaders' Accord, signed in 2010, galvanised leaders from local government, iwi and stakeholders after significant publicity about the poor quality of the river. Horizons Regional Council reports that six years after establishment "it is still going strong" and a second action plan was released in March 2016. It has been effective in motivating actions to improve water quality in the catchment – more than \$46 million has been spent on sewage treatment improvements and farm management in this catchment, and around 120 farms consented for land use and discharges.<sup>97</sup>

### Point sources

Upgrades are planned for a number of wastewater treatment plants. Upgrades (planned and potential) include wetland treatment systems (Eketahuna, Pahiatua, Raetihi,<sup>98</sup> Ohakune<sup>99</sup>), infrastructure upgrades (Palmerston North<sup>100</sup>), ultra-violet treatment (Pahiatua, Raetihi<sup>101</sup>), removing discharges from water and discharging to land (Shannon, Tokomaru,<sup>102</sup> Bulls,<sup>103</sup> Feilding,<sup>104</sup> Dannevirke, Foxton, Foxton Beach, Ratana<sup>105</sup>), and piping to other treatment plants (Marton,<sup>106</sup> Awahuri, Halcombe, Kimbolton, Rongotea, Sanson).

The Horizons Regional Council is working with territorial authorities to identify opportunities to improve stormwater discharges.<sup>107</sup>

Riverlands Industrial wastewater may join Bulls/Marton upgrades if the Freshwater Improvement Fund application is successful, and discharge to land at times.

<sup>96</sup> Survey response

<sup>97</sup> Implementation Review

<sup>98</sup> Overview of the Nga Ora o te Whangaehu Freshwater Improvement Project (2017)

<sup>99</sup> Overview of the Nga Ora o te Whangaehu Freshwater Improvement Project (2017)

<sup>100</sup> Overview of the Manawatu Awa: Freshwater Improvement Project (2017)

<sup>101</sup> Overview of the Nga Ora o te Whangaehu Freshwater Improvement Project (2017)

<sup>102</sup> Overview of the Manawatu Awa: Freshwater Improvement Project (2017)

<sup>103</sup> Overview of the Rangitikei Awa: Freshwater Improvement Project (2017)

<sup>104</sup>

[www.mdc.govt.nz/Services\\_Information/Council\\_Projects/Infrastructure/Feilding\\_Waste\\_Water\\_Treatment\\_Plant\\_Upgrade](http://www.mdc.govt.nz/Services_Information/Council_Projects/Infrastructure/Feilding_Waste_Water_Treatment_Plant_Upgrade)

<sup>105</sup> Overview of Lake Waipu Freshwater Improvement Fund Project Ratana (2017)

<sup>106</sup> Overview of the Rangitikei Awa: Freshwater Improvement Project (2017)

<sup>107</sup> Survey response

<sup>50</sup> Regional information for setting draft targets for swimmable lakes and rivers

### Urban

In 2013, the Muaūpoko owners and four other governing partners developed and signed the Lake Horowhenua Accord. The parties agreed to work together to provide leadership, halt the degradation of the water body, and put in place remedial measures. This will involve riparian fencing and planting, improvements to stormwater, mechanically removing the weeds and installing a sediment trap and fish pass.<sup>108</sup> This project has been granted co-funding from the Fresh Start for Freshwater, Te Mana o to Wai and Freshwater Improvement Fund. The Freshwater Improvement Fund will have a large focus on stormwater remediation.

At Lake Waipu, and Tokomaru, there is planned work to remove the direct discharge of treated wastewater to the lake and apply wastewater to land. Monitoring will enable assessment of whether additional interventions are required to restore lake health.<sup>109</sup>

### Rural

A number of mitigation measures are under way or planned for rural areas, including:<sup>110</sup>

- dairy effluent pond upgrades
- land use consents in target catchments identified in the One Plan
- stream fencing
- riparian planting
- best/good practice effluent management
- education/awareness programmes
- sustainable land use initiative – this was established after the 2004 floods and uses non-regulatory methods to incentivise paddock-scale best land management to minimise hill country erosion. These measures include voluntary land retirement and revegetation. This project has planted over 13.6 million trees over 11 years and is projected by Landcare Research to be on track to deliver a 27 per cent improvement in sediment loads in the region by 2043.<sup>111</sup>

### State of swimming in Manawatū–Whanganui

Overall swimmability for the Manawatū–Whanganui region is 43 per cent of rivers and 55 per cent of lakes.

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<sup>108</sup> Implementation Review

<sup>109</sup> Survey response; [www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects](http://www.mfe.govt.nz/more/funding/freshwater-improvement-fund/freshwater-improvement-fund-projects)

<sup>110</sup> Survey response

<sup>111</sup> Implementation Review

Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Manawatū–Whanganui is represented below.

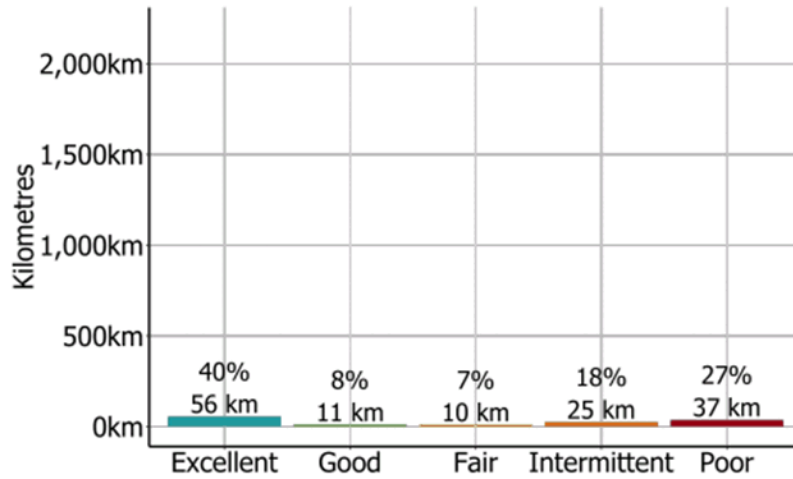


Figure 18: Percentage of Manawatū–Whanganui lakes currently in each swimming category

The modelling indicates an increase in the overall swimmability of rivers of 14 per cent, to 59 per cent of rivers being swimmable.

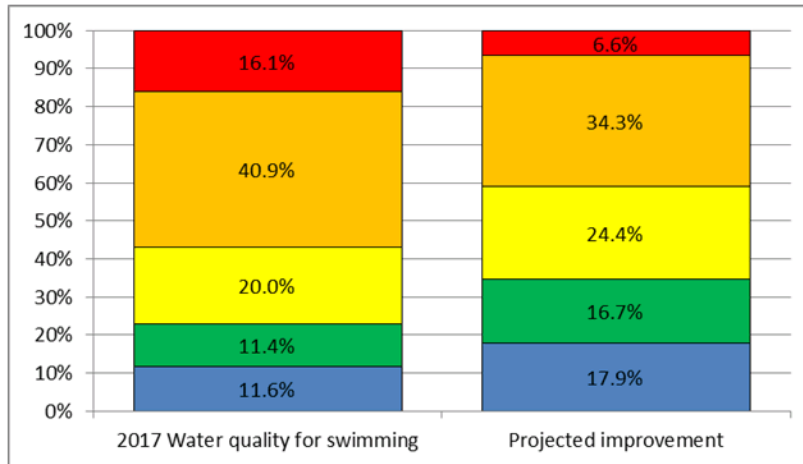


Figure 19: Projected improvement of water quality for swimming in Manawatū–Whanganui rivers

The total annual cost of committed work in the rural area of the Horizons Manawatu-Whanganui region is \$12.59 m. The rural costs of committed work are spread across the dairy (13%), dairy grazing (1%), sheep and beef (70%), deer (2%), and lifestyle (14%) sectors.

### Region-specific modelling considerations

Planning provisions for excluding stock largely reflect the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this, as it would result in double counting the reduction.

We have no data on the proportion of fencing in the region likely to be set back greater than 3 metres.

## Wellington

### Overview of swimmability now

#### Main activities

Around half of the region's land is used for pastoral sheep and beef farming, one-third is native vegetation, around 8 per cent is exotic plantation forestry, 5 per cent is dairy farming, and the remainder is urban, industrial and other uses.<sup>112</sup>

Of the 14 lakes in the region, by far the largest is Lake Wairarapa and the surrounding wetlands. A major flood control project in the 1960s and 1970s diverted the Ruamāhanga River away from the lake and drained much of the surrounding wetland system for farmland. Other major lakes include Lake Waitawa on the Kāpiti Coast, lakes Kohangapiripiri and Kohangatera on the south coast, and lakes Pounui and Ōnoke in the Wairarapa. The region also contains several human-made reservoirs.<sup>113</sup>

Wellington water quality and ecosystem health are best in the upper reaches of catchments and in areas with native vegetation or forestry.<sup>114</sup> However, quality tends to decline in lower river reaches, in urban and town areas, or catchments dominated by intensive farming. High levels of nutrients, sediment and bacteria, and poor clarity are common issues in these areas.<sup>115</sup>

Most Wellington rivers are considered safe for swimming and other primary recreation most of the time.<sup>116</sup> However, urban stormwater or wastewater overflows and run-off from agricultural areas have increased microbial levels in several rivers, particularly following rain and flooding events. As a result, a number of river sites monitored for recreational health often do not meet guidelines for primary recreation. In addition, toxic algal blooms are common in the lower Hutt, Ruamāhanga, Wainuiomata and Waipoua rivers, particularly during the late summer when temperatures are higher and water levels are low.<sup>117</sup>

Water quality in lakes Wairarapa, Ōnoke and Waitawa is degraded, with high levels of nutrients, poor clarity, poor ecological health, and occasional toxic algal blooms.<sup>118</sup> In contrast,

<sup>112</sup> [www.lawa.org.nz/explore-data/wellington-region/](http://www.lawa.org.nz/explore-data/wellington-region/)

<sup>113</sup> Implementation Review; [www.lawa.org.nz/explore-data/wellington-region/lakes/](http://www.lawa.org.nz/explore-data/wellington-region/lakes/)

<sup>114</sup> Greater Wellington Regional Council. 2016. *Rivers State of the Environment monitoring programme: Annual data report 2015/16*. Retrieved from [www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Rivers-State-of-the-Environment-monitoring-programme-Annual-data-report-2015-16.pdf](http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Rivers-State-of-the-Environment-monitoring-programme-Annual-data-report-2015-16.pdf) (30 June 2017).

<sup>115</sup> Implementation Review

<sup>116</sup> Greater Wellington Regional Council. 2016. *Is it safe to swim? Recreational water quality monitoring results for the 2015/16 summer*. Retrieved from [www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Recreational-Water-Quality-Annual-Report-2016-web.pdf](http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Recreational-Water-Quality-Annual-Report-2016-web.pdf) (30 June 2017).

<sup>117</sup> Implementation Review

<sup>118</sup> Greater Wellington Regional Council. 2012. *Lake Water Quality and Ecology in the Wellington Region*. Retrieved from [www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Lake-water-quality-and-ecology-SoE-report.pdf](http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Lake-water-quality-and-ecology-SoE-report.pdf) (30 June 2017); Greater Wellington Regional



lakes Kohangapiripiri and Kohangaterai, which draw from catchments covered mostly in native forest, have much better water quality and ecological health.<sup>119</sup>

Point-source discharges include stormwater in Kāpiti and Masterton, wastewater treatment plants (Paraparaumu, Martinborough, Featherston, Greytown, Carterton and Homebush), and discharges from human-made lakes (Henley Lake, Queen Elizabeth II Park Lake).<sup>120</sup> In Wairarapa-Ruamahunga and the Kāpiti Coast all dairy farms discharge to land.<sup>121</sup>

### Main sources of *E. coli*

*E. coli* is predominantly from agriculture in the rural areas, and human sources in the urban areas, including the Porirua, Karori, Kaiwharawhara, Waiwhetu, Taupo, Onepoto, Owhiro and Wainuiomata streams.<sup>122</sup>

## Planned work

### Point sources

Most of the wastewater treatment plants have planned upgrades. The Featherston, Martinborough, Greytown and Carterton wastewater treatment plants all have plans for a series of staged upgrades through to 2035, to increase the proportion of wastewater discharged to land. At Martinborough and Greytown this will see 100 per cent discharge to land. The Homebush wastewater treatment plant has already undergone upgrades under the existing consent, and additional upgrades may be undertaken through review of discharge to land options.<sup>123</sup>

Stormwater discharges are currently or soon to be re-consented. These consents will be for five-year durations. More targeted monitoring of stormwater effects is required under the new Proposed Natural Resources Plan, and remediating or mitigating any acute effects discovered through monitoring.<sup>124</sup>

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Council. 2016. *Lakes Water Quality and Ecology monitoring programme: Annual data report 2015/16*. Retrieved from [www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Lakes-Water-Quality-and-Ecology-monitoring-programme-Annual-data-report-2015-16.pdf](http://www.gw.govt.nz/assets/Our-Environment/Environmental-monitoring/Environmental-Reporting/Lakes-Water-Quality-and-Ecology-monitoring-programme-Annual-data-report-2015-16.pdf) (30 June 2017).

<sup>119</sup> Implementation Review

<sup>120</sup> Survey response

<sup>121</sup> Survey response

<sup>122</sup> Survey response

<sup>123</sup> Survey response

<sup>124</sup> Survey response

### Rural

The Proposed Natural Resources Plan includes provisions for stock exclusion. Stock must be excluded from:<sup>125</sup>

- waterways classified as containing sites of significance; there are 210 sites throughout the region incorporating 1,050 kilometres of waterway, and current projections are that half will require fencing
- waterways classified as lowland streams greater than 1 metre wide (Category 2)
- on land that carries stock; 3,365,060 metres of fencing is required for these waterways: 2,103,162 metres is completed and 1,261,897 metres of fencing remains to be completed – the target date for completion is July 2022.

An investigation is planned for Lake Waitawa, which will investigate the effects of cyanobacteria blooms, establish or confirm causality, and develop an appropriate remediation and/or containment programme.<sup>126</sup>

### State of swimming in Wellington

Overall swimmability for the Wellington region is 65 per cent of rivers and 75 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Wellington is represented below.

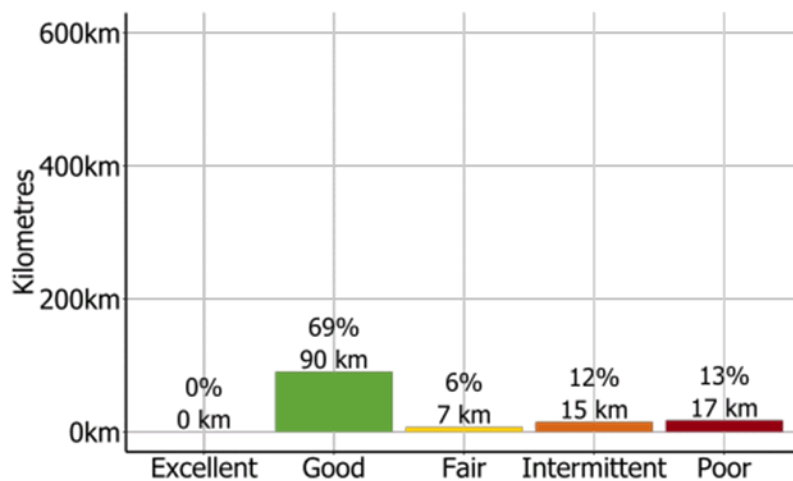


Figure 20: Percentage of Wellington lakes currently in each swimming category

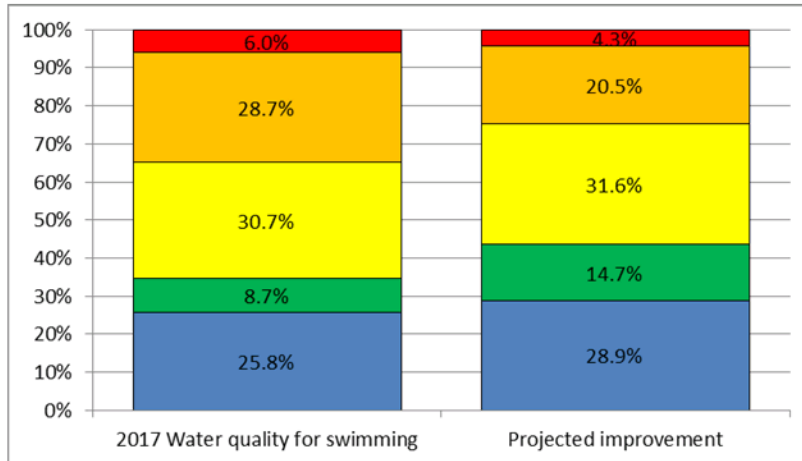
<sup>125</sup> Survey response

<sup>126</sup> Survey response

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**Rivers**

The modelling shows an increase in the overall swimmability of rivers of 10 per cent, to 75 per cent of rivers being swimmable.



**Figure 21: Projected improvement in water quality for swimming for Wellington’s rivers**

The total annual cost of committed work in the rural area of the Wellington region is \$4.24 m. The rural costs of committed work are spread across the dairy (14%), dairy grazing (1%), sheep and beef (62%), deer (1%), and lifestyle (22%) sectors.

**Region-specific modelling considerations**

Planning provisions for excluding stock largely reflect the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this, as it would result in double counting the reduction.

## Tasman

### Overview of swimmability now

#### Main activities

Land cover consists primarily of native forest (60 per cent), pasture (17 per cent) and exotic forest (9 per cent).<sup>127</sup> Around 70 per cent of the district is protected conservation land, including the Abel Tasman, Kahurangi, and Nelson Lakes national parks. Most pasture land and horticulture, as well as most of the population, is found in the Moutere, Aorere and Tākaka valleys.<sup>128</sup>

The district has five major river catchments:

- Aorere and Tākaka in the northwest
- Motueka
- Waimea on the border with Nelson City
- headwaters of the Buller River, which flows westward to the West Coast.

Nearly two-thirds of the Tākaka catchment lies within the Kahurangi National Park. The catchment is also home to the famous Te Waikoropupū Springs, the largest cold-water spring in the southern hemisphere.

The largest lakes in the district are:

- Lake Rotoiti and Lake Rotoroa in Nelson Lakes National Park
- Cobb Reservoir
- Lake Otuhie
- Lake Matiri
- Lake Stanley in Kahurangi National Park.

Because such a large portion of the district is covered in protected native vegetation, water quality is generally high and most monitored sites are in the excellent or good (A or B bands) for most measures of water quality and ecosystem health.<sup>129</sup> Moreover, monitoring indicates water quality is being maintained or improved at most sites. However, quality decreases in lower river reaches and in lowland stream catchments with more intensive agriculture or

<sup>127</sup> James T, McCallum J. 2015. *State of the Environment Report: River Water Quality in the Tasman Region 2015*. Prepared for Tasman District Council. Nelson: Tasman District Council. Retrieved from [www.tasman.govt.nz/policy/reports/environmental/river-water-quality-reports](http://www.tasman.govt.nz/policy/reports/environmental/river-water-quality-reports) (30 June 2017).

<sup>128</sup> Implementation Review

<sup>129</sup> James T, McCallum J. 2015. *State of the Environment Report: River Water Quality in the Tasman Region 2015*. Prepared for Tasman District Council. Nelson: Tasman District Council. Retrieved from [www.tasman.govt.nz/policy/reports/environmental/environmental-monitoring-reports/?path=/EDMS/Public/Other/Environment/EnvironmentalMonitoring/WaterMonitoring](http://www.tasman.govt.nz/policy/reports/environmental/environmental-monitoring-reports/?path=/EDMS/Public/Other/Environment/EnvironmentalMonitoring/WaterMonitoring) (30 June 2017).

urban areas.<sup>130</sup> There are no longer any dairy shed effluent discharges direct to water and so the current significant point sources that are known are all municipal wastewater discharges. Septic tank discharges are all supposed to be to land but from time to time some have been found to be failing, with a resulting discharge to water. However, owners of failing septic tanks have been required to upgrade their system when these situations are discovered. Assessments of environmental effects at wastewater treatment plants show downstream *E. coli* levels are either usually or always no different to upstream levels (depending on the site).<sup>131</sup>

### Main sources of *E. coli*

The council has undertaken microbial source tracking at all monitoring sites, and some investigation sites, where they have found high *E. coli* concentrations.<sup>132</sup>

About 85 per cent of these had ruminant animals as a significant source. Ruminant sources of *E. coli* in rural areas include effluent from:

- dairy sheds
- around stock drinking troughs sited close to streams
- feed pads and stand-off pads
- water cropping
- raceways/laneways.

All regular dairy farm stock crossings in the district have been bridged since about 2012, and stock are excluded from almost all waterways over 1 metres wide and 300 millimetres deep. Humans are a significant source currently at only one catchment that they know of (Tasman Valley Stream, south-east of Motueka). While the council has known about this risk for some time, and individual sites as they are identified are fixed, it has not been a priority to undertake a full septic tank survey of the catchment. As the catchment increasingly urbanises it will become a higher priority.

A human source was found in Murchison (Ned's) Creek, Little Sydney Creek, and Tukurua Stream, but this source is no longer present due to a septic tank survey and upgrades to failing septic tanks.

Wildfowl are a significant source in the following waterways:

- Jimmy-Lee Creek
- Reservoir Creek
- Seaton Valley Stream
- Tasman Valley Stream
- Powell Creek/Lower Motupipi

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<sup>130</sup> Implementation Review

<sup>131</sup> Survey response

<sup>132</sup> Survey response

- occasionally at Tukuru Stream and Murchison Creek.

In-line ponds in the catchment (particularly the Moutere Hill country and urban streams) are often frequented by ducks.

### Planned work

Implementation of the National Policy Statement for Freshwater Management (NPS-FM) will involve establishing non-point-source discharge allocation limits by 2018, and urban catchment management plans by 2020. A review of rules for contamination discharges will also be carried out in 2017 for completion in 2019.<sup>133</sup>

### Point sources

No significant upgrades are planned for wastewater treatment plants, these having been progressively upgraded in recent years.<sup>134</sup>

### Urban

Stormwater upgrades across the district are planned over the next 10 years. The Council supports urban riparian initiatives and supports the Waimaori project, which provides educational awareness at the streamside in urban areas.<sup>135</sup> An application for a resource consent to discharge of contaminants from urban stormwater is likely to be lodged in 2018.

### Rural

Each year there is an expectation that a minimum of 20 kilometres of fencing materials are provided to prevent stock access to waterways. Historically the fund has provided 27 kilometres per year on average.<sup>136</sup> A project has been initiated with Landcare Trust and other parties to support farmers in the Sherry and Aorere/Kaituna valleys to refresh their farm environmental plans.

Compliance action undertaken includes:<sup>137</sup>

- assessed compliance with effluent rules at almost every dairy farm
- two prosecutions are in process for dairy effluent discharges
- prior to the bathing season a feed-pad on a dairy run-off block was moved well away from Tukuru Stream (a swimming hole in the lower reaches); *E. coli* results show a marked improvement on previous years
- a fly-over of the region has identified some areas, such as winter cropping, standoff and feed pads, that need attention

<sup>133</sup> Implementation Review

<sup>134</sup> Survey response

<sup>135</sup> Survey response

<sup>136</sup> Survey response

<sup>137</sup> Survey response

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- wastewater treatment plant monitoring reports have been audited.

### State of swimming in Tasman

Overall swimmability for the Tasman region is 97.5 per cent of rivers and 100 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Tasman is represented below.

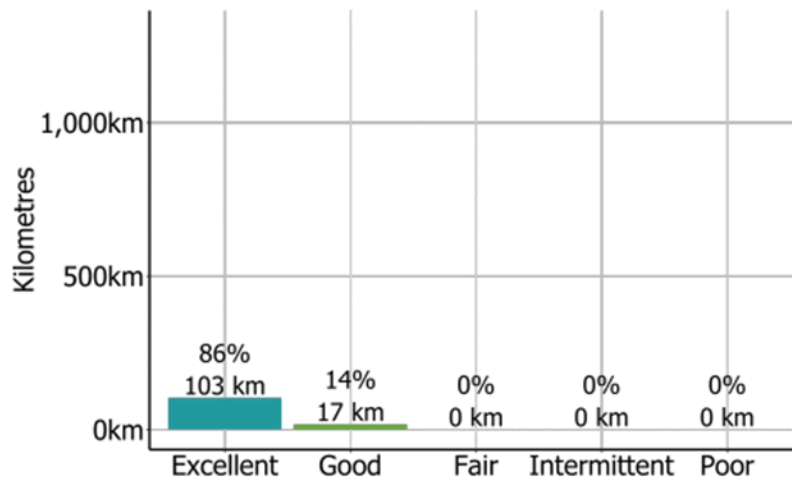
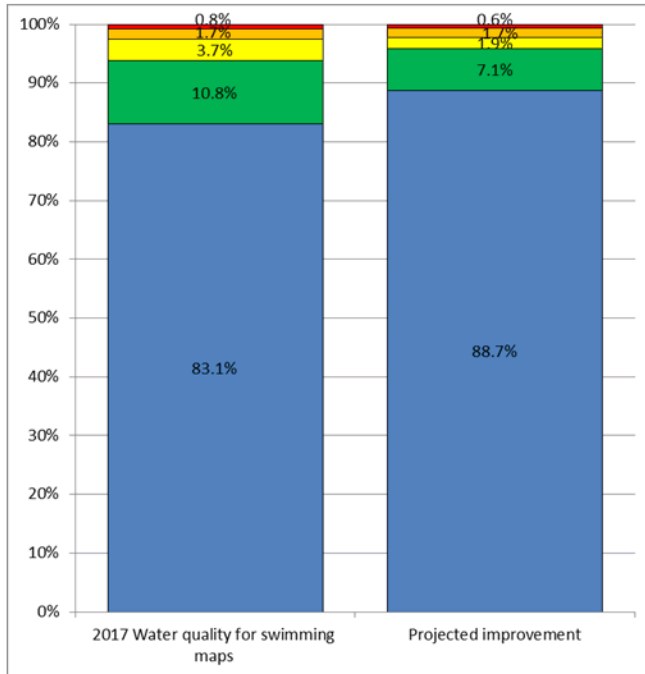


Figure 22: Percentage of Tasman lakes currently in each swimming category



### Rivers

The modelling shows a marginal increase in overall swimmability of rivers in Tasman (0.2 per cent).



**Figure 23: Projected improvement in water quality for swimming for Tasman's rivers**

The total annual cost of committed work in the rural area of the Tasman region is \$1.54 m. The rural costs of committed work are spread across the dairy (18%), dairy grazing (2%), sheep and beef (40%), deer (5%), and lifestyle (35%) sectors.

### Region-specific modelling considerations

Planning provisions for excluding stock largely reflect the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this, as it would result in double counting the reduction.

We have no data on the proportion of fencing set back by greater than 3 metres.

## Nelson

### Overview of swimmability now

#### Main activities

Nelson City Council is a Unitary Authority, with the Nelson City urban area making up just 6 per cent of land, concentrated towards the southern end of the territory. Most of the area is sparsely populated and covered in protected native forests and regenerating bush (42 per cent), exotic plantation forestry (22 per cent) or farm land (13 per cent).<sup>138</sup>

The largest rivers, the Whangamoia, Wakapuaka, Maitai and Roding, have their headwaters in the Bryant Range, which is largely in conservation land or plantation forestry. The first three of these catchments drain directly into Tasman Bay, while the Roding drains into Tasman District and joins the Waimea River. Several smaller streams drain catchments in the coastal hills and flats. Most aquifers are unconfined and connected hydrologically to surface water.<sup>139</sup> There are no major point-source discharges to rivers.<sup>140</sup>

Water quality and ecosystem health are best in the upper river reaches and in catchments with less urban area or intensive agriculture, such as the Whangamoia catchment. Most river monitoring sites have microbial levels that are generally safe for swimming and other primary contact recreation, and the overall swimmability for the Nelson region is 100 per cent of rivers based on the criteria used for this report.

#### Main sources of *E. coli*

The sources of *E. coli* vary over time and have included ruminant, human, wildfowl, gull, possum and dog.<sup>141</sup>

**Table 3: Sources of *E. coli* in the Maitai catchment**

Report date	Sources of <i>E. coli</i>
April 2008 <sup>142</sup>	Ruminant &/or possum, human
March 2011	Ruminant, wildfowl, gull, human
November 2014	Wildfowl, gull, human
March 2015	Ruminant, wildfowl, human, possum, gull, dog
October 2016	Human/possum, wildfowl, faint traces dog, faint traces ruminant

<sup>138</sup> [www.lawa.org.nz/explore-data/nelson-region/river-quality/](http://www.lawa.org.nz/explore-data/nelson-region/river-quality/)

<sup>139</sup> The Catalyst Group. 2015. *Aquatic Sites of Significance: Document in support of the Nelson Plan water management framework*. Report No 2015/031. Retrieved from <https://drive.google.com/file/d/0B8uhqenEodmicnFEc21rMGHJeLU/view?usp=sharing> (30 June 2017).

<sup>140</sup> Survey response

<sup>141</sup> Survey response

<sup>142</sup> Cawthron Report 1447

Table 4: Sources of *E. coli* in the Wakapuaka catchment

Report date	Sources of <i>E. coli</i>
March 2011	Ruminant, wildfowl
March 2015	Ruminant, wildfowl, possum, sheep, human (inconclusive)

## Planned work

### Urban

Renewal of wastewater infrastructure is planned for the next one to three years. This is primarily driven by the need to maintain a level of service, and to reduce stormwater infiltration to allow capacity for urban growth, but will also reduce exfiltration.<sup>143</sup>

There is an inflow and infiltration project to reduce stormwater and groundwater ingress into the piped network. The work programme is broken into two components:

- for investigations and some small spot repairs
- to advise a more extensive programme of relining or replacement of aging services.

In addition to inflow and infiltration, a further project has been established to evaluate the storage capacity of the current network and identify areas where either larger inline detention tanks can be installed or network reticulation upgrades undertaken, to address in part the current wet weather overflows experienced by the city. As the integrity of the network is improved it will also prevent wastewater escaping. There is also an exfiltration project to investigate specific areas where sampling identifies high counts of *E. coli* that may be attributed to the wastewater network.<sup>144</sup>

There are planned wastewater network fixes as a result of CCTV work in Bishopdale, driven by high State of the Environment *E. coli* readings at the York at Bishopdale site. This will happen in the next one to two years.<sup>145</sup>

The Nelson Nature and Project Maitai/Mahitahi urban streams projects have included public education campaigns to reduce dog poo in streams since 2015. The 10-year Nelson Nature programme uses an extensive and targeted approach to care for the region's natural environment, boosting the conservation and ecological work carried out on both public and private land. In relation to fresh water, Nelson Nature aims to protect and enhance the aquatic biodiversity of Nelson's freshwater streams and rivers, through:

- protecting and enhancing riparian margins and habitat for fish spawning
- removing fish barriers
- facilitating stock exclusion from waterways
- advocating for reduction in contaminants and sediments into freshwater.<sup>146</sup>

<sup>143</sup> Survey response

<sup>144</sup> Survey response

<sup>145</sup> Survey response

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Project Maitai/Mahitahi has seen Nelson City Council work in partnership with iwi, the community and other regional agencies, on a four-year project to improve the water quality of the Maitai River. This will be achieved through several initiatives, including extensive riparian planting, removing barriers to fish movement, and identifying and addressing pollution, nutrient and sediment sources.<sup>147</sup>

There is also ongoing low-level public education regarding not putting wipes and other materials down the toilet, where they can cause blockages and wastewater overflows.<sup>148</sup>

### Rural

The Nelson Nature rural streams project includes planned work with land owners to revegetate riparian margins, increase stock fencing, and reduce cattle crossings. Land Management Plans are being progressed where appropriate, and work with land owners will identify a range of issues, including:

- stock exclusion
- erosion issues
- cattle crossings
- riparian management
- contamination through fertiliser use
- septic tank maintenance.<sup>149</sup>

A rural waterways project specifically focused on enhancing the Wakapuaka River is beginning in the 2017/18 year, in partnership with Landcare Trust, land owners, community and iwi.

Nelson Nature is also planning programmes to control browsers and predators, to protect native vegetation and wildlife, which as a by-product may reduce *E. coli* from ungulates and possums entering waterways.

A project to identify 'good management practices' in a Nelson context is near completion, including development of a good management plan template, supported by an example plan in a catchment with high *E. coli*. This will be used to inform the Nelson Plan freshwater management framework, including plan methods.<sup>150</sup>

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<sup>146</sup> Survey response, Implementation Review

<sup>147</sup> Survey response, implementation review

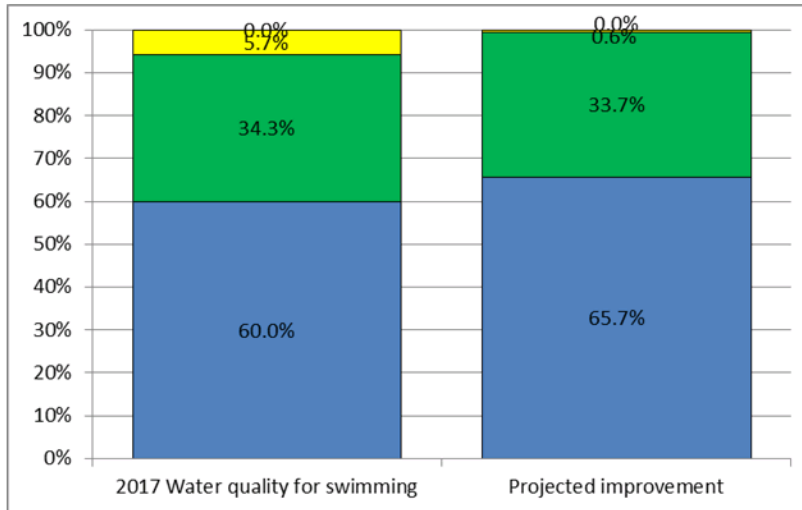
<sup>148</sup> Survey response

<sup>149</sup> Survey response

<sup>150</sup> Survey response

### State of swimming in Nelson

Overall swimmability for the Nelson region is 100 per cent of rivers. Swimmability of rivers stays at 100 per cent.



**Figure 24: Projected improvement in water quality for swimming of Nelson's rivers**

The total annual cost of committed work in the rural area of the Nelson region is \$0.05 m. The rural costs of committed work are spread across the dairy (6%), dairy grazing (1%), sheep and beef (25%), and lifestyle (68%) sectors.

### Region-specific modelling considerations

Nothing specific.

## Marlborough

### Overview of swimmability now

#### Main activities

Northwest of the Wairau Fault is hill country around the Richmond and Bryant ranges, and the Marlborough Sounds with their glacial mountain valleys and short, steep rivers and streams. The hill country is largely covered in native and exotic forests, while the valleys are mostly dairy farms and other agriculture.

To the southeast of the Wairau Fault lies a mixture of valleys, mountain ranges, and complicated fault systems. This area includes the Wairau Plains and Wairau Valley, with Marlborough's famous viticulture industry, as well as the Blenheim urban area. Over the past few decades, the growing viticulture industry has taken over from sheep and beef farming and horticulture to be the dominant land use in the plains area.<sup>151</sup>

The two main rivers in the region are the Wairau and Awatere. Both flow along faults and down from headwaters in the western mountains to the Cook Strait at Cloudy Bay, west of Blenheim.

While most regional rivers are safe for recreation most of the time, bacterial contamination occasionally exceeds guideline values for safe swimming and other primary contact recreation in some rivers.<sup>152</sup> The worst of these is the Taylor River in Blenheim, which often has high bacteria levels even during dry periods.<sup>153</sup>

Only one urban wastewater treatment plant discharges to fresh water. The Seddon treatment plant discharges into Starborough Creek, a tributary of the Awatere River. However, the creek is often dry so actual discharges into the river are only occurring occasionally.<sup>154</sup> All dairy effluent in the region is applied to land.<sup>155</sup>

#### Main sources of *E. coli*

In the Rai and Brown rivers, ruminants are the dominant source of *E. coli*, making up 50–100 per cent of the total *E. coli* load. In both rivers contamination corresponds with rainfall. Detection of the bovine marker in the Rai River indicates cows may be the main ruminant source. In the Taylor River and tributaries the *E. coli* sources include wildfowl, ruminants,

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<sup>151</sup> Implementation Review

<sup>152</sup> Marlborough District Council. 2016. *Recreational Water Quality Report 2015–16*. MDC Technical Report No: 16-003. Blenheim: Marlborough District Council. Retrieved from [www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Recreation/Swimming%26Boating%26Recreational%26Water%26List/A2015-16 Recreational Water Quality Report.pdf](http://www.marlborough.govt.nz/repository/libraries/id:1w1mps0ir17q9sgxanf9/hierarchy/Documents/Recreation/Swimming%26Boating%26Recreational%26Water%26List/A2015-16%26Recreational%26Water%26Quality%26Report.pdf) (12 July 2017).

<sup>153</sup> Implementation Review

<sup>154</sup> Survey response

<sup>155</sup> Survey response

human and dog. In Doctors Creek and tributaries the sources are wildfowl, ruminants and human.<sup>156</sup>

### Planned work

#### Point source

An application for a short-term (five-year) consent has been submitted for the Seddon sewage treatment plant, with a proposal to investigate land disposal options.<sup>157</sup>

#### Urban

There is a planned upgrade of Blenheim sewerage infrastructure to increase capacity and reduce and better control wet weather overflows to surface water.<sup>158</sup>

#### Rural

Catchment enhancement plans are to be developed and implemented in co-operation with affected land owners in the Doctors Creek, Tuamarina River, Cullen Creek, and Ada Creek areas. Investigation of contamination sources is planned to begin this year, with the aim of developing a catchment enhancement plan in the Flaxbourne River catchment.<sup>159</sup>

### State of swimming in Marlborough

Overall swimmability for the Marlborough region is 98 per cent of rivers and 100 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Marlborough is represented below.

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<sup>156</sup> Survey response

<sup>157</sup> Survey response

<sup>158</sup> Survey response

<sup>159</sup> Survey response



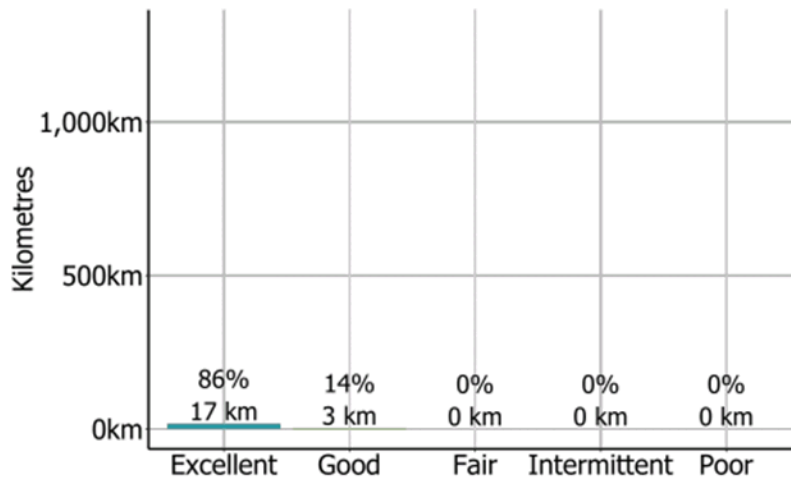


Figure 25: Percentage of Marlborough lakes currently in each swimming category

### Rivers

The modelling shows an increase in the overall swimmability of rivers of 0.5 per cent, to 98.5 per cent of rivers being swimmable.

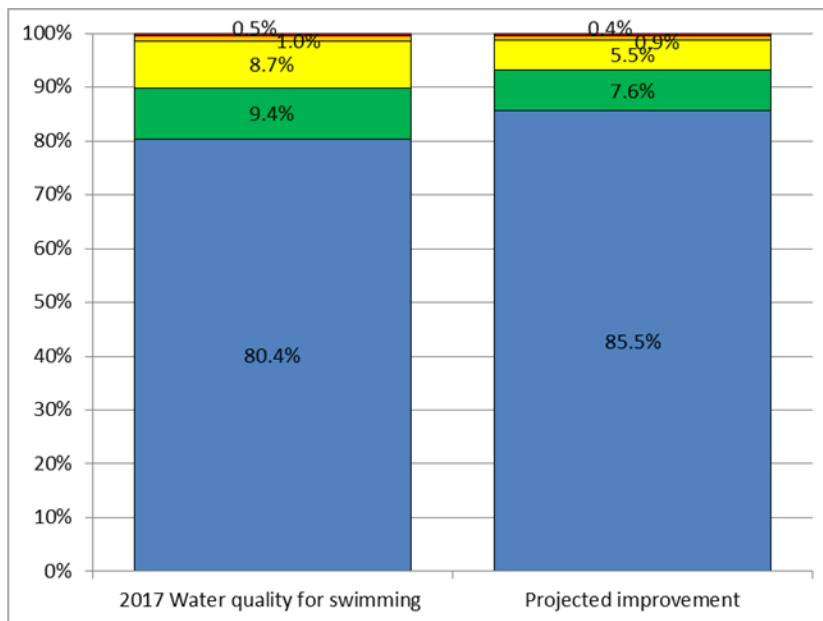


Figure 26: Projected improvement in water quality for swimming for Marlborough's rivers

The total annual cost of committed work in the rural area of the Marlborough region is \$2.64 m. The rural costs of committed work are spread across the dairy (4%), dairy grazing (4%), sheep and beef (68%), deer (1%), and lifestyle (23%) sectors.

### **Region-specific modelling considerations**

Planning provisions for excluding stock largely reflect the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this, as it would result in double counting the reduction.

We have no data on the proportion of fencing set back by greater than 3 metres.

## West Coast

### Overview of swimmability now

#### Main activities

The southern half of the West Coast forms a narrow strip of land falling westward from the Southern Alps down to the coast. This strip alternates between alluvial plains and low moraine formed hill country. The northern half of the West Coast is more complicated geographically with multiple ranges, valleys, and catchments from east to west.

Indigenous cover including forest, shrub, tussock, and rock, makes up 87% of the region's total cover.<sup>160</sup> Both exotic pasture and forests account for 7% and 2%, respectively.

More than 80 per cent of the region is held in public trust, including all or part of five national parks (Arthur's Pass, Mount Aspiring, Kahurangi, Paparoa, and Westland Tai Poutini) and part of the Te Wāhipounamu – South West New Zealand World Heritage Area.

Most medium to large rivers in the region have headwaters originating in hill and mountain country, covered by indigenous vegetation. The largest rivers are the Karamea, Buller, Grey, Hokitika, and Haast. The West Coast region also has multiple lakes, which are highly valued for recreation of which most have catchments dominated by native forest.

Most monitored sites score in the A band for microbiota and are considered excellent quality for swimming and other primary immersion recreational activities. However, a few are in bands C and D for *E. coli*.<sup>161</sup>

Problem cyanobacterial blooms in rivers and lakes have not been observed by the Council to date, and there is no formal monitoring of cyanobacterial abundance. The following conditions are typical and beneficial for improving swimmability:

- low inorganic nutrient status
- high-coloured dissolved organic carbon loads leading to reduced light penetration
- cool temperatures.<sup>162</sup>

Point-source discharges in the region include:<sup>163</sup>

- treated dairy effluent
- stormwater
- treated sewage from wastewater treatment plants

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<sup>160</sup> See Statistics New Zealand. n.d. Agricultural area in hectares by usage and region. Retrieved from <http://stats.govt.nz/~media/Statistics/browse-categories/industry-sectors/agriculture-horticulture-forestry/ag-census-2012/ag-areas-hect-by-usage-region.xls> (22 June 2017).

<sup>161</sup> Implementation Review

<sup>162</sup> Survey response

<sup>163</sup> Survey response

- untreated sewage during storm overflow events
- wastewater from hydro-electric power generation
- treated wastewater from meat processing plant and a dairy factory

### Main sources of *E. coli*

There has been little in the way of conclusive investigations that pinpoint the main sources of *E. coli* in specific catchments. Specific studies have identified human and ruminant *E. coli* in the Orowaiti River<sup>164</sup>, and a drain adjacent to the Hokitika River, beside Hokitika township.<sup>165</sup> Pastoral agriculture is the obvious source of elevated *E. coli*, where this occurs intensively, but birds also have potential as a significant source in certain areas and at certain times.

## Planned work

### Point source

Improvements are being made to the Runanga sewerage scheme. Historically stormwater has been entering the system causing frequent overflows into Raleigh Creek, which flows into Seven Mile Creek. This is used for contact recreation. A new pump is going in, which has more capacity than the old one, to direct discharges to the treatment plant. There will be fewer overflows of sewerage to Raleigh Creek/Seven Mile Creek in future and these measures will reduce *E. coli* levels in this catchment.<sup>166</sup>

In Greymouth, *E. coli* readings in Sawyer's Creek are within the National Objectives Framework D band. The Grey District Council is implementing a \$48 million sewerage system upgrade, which should reduce *E. coli* levels sufficiently to climb above the national bottom line within two years.<sup>167</sup>

Marrs and Shingle beaches near the Buller river mouth at Westport are popular for recreational use and have had regular exceedances of *E. coli* for a number of years. Source/s of the raised contaminant levels have been difficult to identify. A working group of community and organisation representatives is being formed to investigate the issues and options for managing water quality at these swimming beaches.<sup>168</sup>

### Rural

A lot of work has been done in the Lake Brunner catchment in the last ten years. This work was not designed to address problems with *E. coli* specifically, but many of the initiatives undertaken will result in a reduction in *E. coli*. Work is still ongoing in the Lake Brunner catchment and further improvements are anticipated. Initiatives include:

<sup>164</sup> Survey response, ESR analysed sample from 4 Dec 2015

<sup>165</sup> Survey response, ESR analysed sample from 28 November 2006. WCRC Hokitika Beach faecal source investigation reports.

<sup>166</sup> Survey response

<sup>167</sup> Implementation Review

<sup>168</sup> Implementation Review

- stock exclusion
- dairy effluent storage and low rate application
- riparian fencing and planting
- requirements for consents for stock crossings without bridges or culverts.<sup>169</sup>

### State of swimming in West Coast

Overall swimmability for the West Coast region is 99 per cent of rivers and 99 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in the West Coast is represented below.

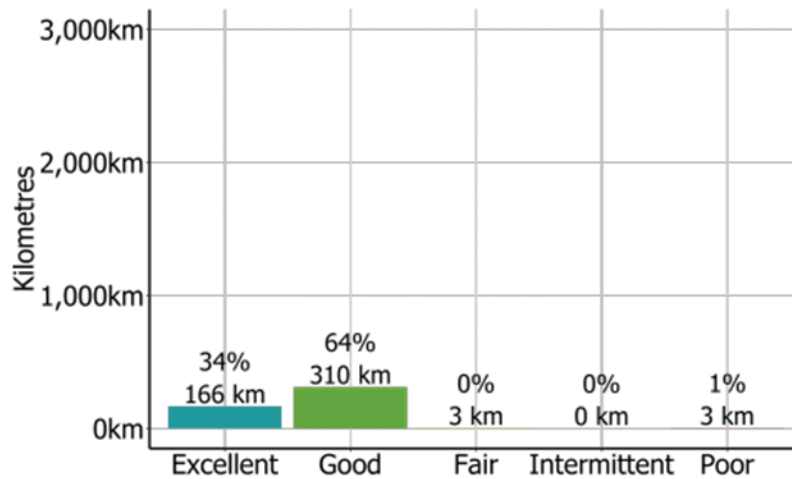
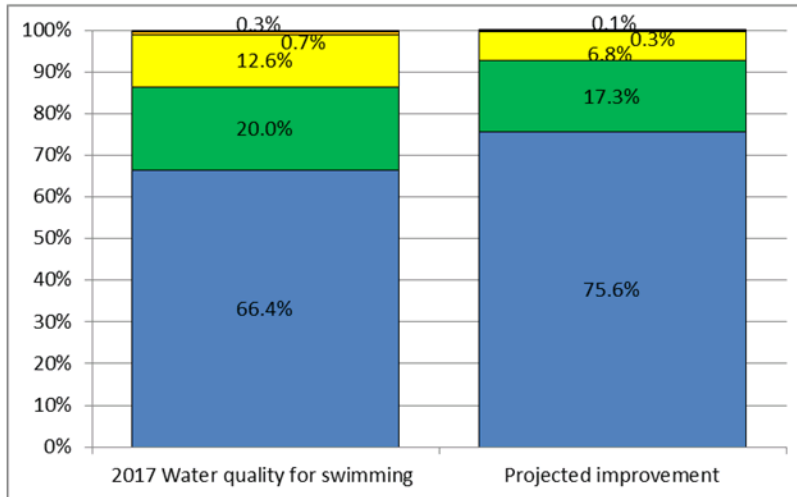


Figure 27: Percentage of West Coast lakes currently in each swimming category

<sup>169</sup> Survey response

### Rivers

The modelling shows an increase in the overall swimmability of rivers of 0.5 per cent, to 99.5 per cent of rivers being swimmable.



**Figure 28: Projected improvement in water quality for swimming for West Coast rivers**

The total annual cost of committed work in the rural area of the West Coast region is \$3.5 m. The rural costs of committed work are spread across the dairy (35%), dairy grazing (2%), sheep and beef (28%), deer (3%), and lifestyle (32%) sectors.

### Region-specific modelling considerations

Planning provisions for excluding stock largely reflect the proposed Stock Exclusion Regulations. As the Stock Exclusion Regulations are already modelled, we have not modelled this as it would result in double counting the reduction.

We have no data on the proportion of fencing set back by greater than 3 metres.

## Canterbury

### Overview of swimmability now

#### Main activities

Canterbury includes large areas of productive farmland, more than 4,700 lakes and tarns, and over 78,000 kilometres of rivers and streams. The region ranges from the Southern Alps and foothills in the west to the wide Canterbury plains to the east in the middle of the region; in the north and south of the region the foothills have only a narrow coastal plain. Around half of Canterbury land is pasture, a third is native forest and vegetation, and the remainder is divided among horticulture, exotic forestry, urban area and other land uses.<sup>170</sup>

In recent years, the productive flatter areas in the region have undergone agricultural intensification, with widespread dairy conversion. Between 2006 and 2016, the estimated number of dairy cattle in Canterbury nearly doubled from 656,000 to 1,271,000 while numbers of sheep and beef have fallen.<sup>171</sup>

Microbial levels in the lower reaches of many streams and rivers frequently do not meet standards for swimming and other primary contact recreation.<sup>172</sup> Water quality and ecosystem health in the majority of lakes is very good but lowland and coastal lakes suffer from degradation with elevated levels of nutrients, poor water clarity, and toxic cyanobacteria blooms. Te Waihora/Lake Ellesmere and Waierewa/Lake Forsyth are both severely degraded and routinely have blooms of toxic cyanobacteria.

The majority of problems around primary contact recreation are derived from diffuse sources but there are some areas where substantial improvements have been made (e.g. Pahau River winner of 2017 national Most Improved River). The main point-source discharges are storm- and wastewater. Over the past 20 years there has been a concerted effort to remove discharges from wastewater treatment plants into rivers (for example, the Lower Waimakariri, Otukaikino, Temuka and Opihi rivers), which has led to water quality improvements (for example, Otukaikino River winner of 2014 national Most Improved River<sup>173</sup>).

<sup>170</sup> Ministry for the Environment. n.d. *Environmental Reporting: Area of land cover 1996–2012*. Retrieved from <https://data.mfe.govt.nz/table/2478-land-cover-area-of-land-cover-1996-2001-2008-and-2012/data/> (10 July 2017).

<sup>171</sup> Statistics New Zealand. 2017. *Agricultural Production Statistics: June 2016*. Retrieved from [www.stats.govt.nz/browse\\_for\\_stats/industry\\_sectors/agriculture-horticulture-forestry/AgriculturalProduction\\_final\\_HOTPJun16final.aspx](http://www.stats.govt.nz/browse_for_stats/industry_sectors/agriculture-horticulture-forestry/AgriculturalProduction_final_HOTPJun16final.aspx) (10 July 2017).

<sup>172</sup> Environment Canterbury. 2016. *Water Quality Monitoring for Contact Recreation: Summary of the 2015–2016 Season*. Retrieved from [www.ecan.govt.nz/document/download?uri=3060272](http://www.ecan.govt.nz/document/download?uri=3060272) (10 July 2017).

<sup>173</sup> Morgan Foundation Awards, 2014. [www.lawa.org.nz/get-involved/news-and-stories/otago-regional-council/2015/november/the-new-zealand-river-awards/#improved](http://www.lawa.org.nz/get-involved/news-and-stories/otago-regional-council/2015/november/the-new-zealand-river-awards/#improved)



### Main sources of *E. coli*

There are two significant studies of animal sources of faecal matter in Canterbury. In the urban environment the sources of *E. coli* in the Avon River were found to be human, bird, and dog.<sup>174</sup> In a predominantly rural catchment (the Jed River) sources were cow, sheep, and human.<sup>175</sup>

### Planned work

#### Point source

In the past 20 years many wastewater treatment plants have been consolidated into larger, upgraded plants. For example, the Belfast sewage and separate abattoir wastewater treatment plants used to discharge into rivers. These have been closed and waste is treated at the larger Bromley treatment plant, which has better treatment and an ocean discharge. This leaves the two issues of point-source discharge being small urban settlements and overflow wastewater discharges during storm events (that is, sewage system overloaded with stormwater).

In terms of smaller urban settlements:

- The primary point-source discharge from the Otematata Wastewater treatment plant was removed through upgrades a few years ago when subsurface infiltration trenches were installed. The discharge now is only during extreme rainfall events.
- There is an upgrade planned for Omarama stream to remove point discharge by December 2019. The upgrade involves installing sub-surface irrigation on an adjoining piece of land.

In terms of overflow discharges in Christchurch, four projects are currently under way at the wastewater overflow points to the Avon River, Heathcote River and Avon/Heathcote Estuary to reduce wet weather overflows. These are the Riccarton Road, lower Riccarton Interceptor, Colombo Street and Beckenham Street wastewater network upgrades.

#### Urban stormwater

While stormwater treatment devices are being installed across Christchurch, the ability of these to reduce faecal contamination is unknown. Starting in 2019 the city and regional councils will undertake a long-term education programme about valuing water. It will include public education about measures to reduce faecal contamination of waterways.

The Christchurch City Council Dog Control Bylaw 2016 requires dog owners to carry plastic bags or other effective means to remove and dispose of any fouling (dog faeces) when in public places with their dog, and must remove and appropriately dispose of any fouling (dog faeces) produced by their dog in public places or on land that is not their own land.

#### Rural

The Land and Water Regional Plan has new rules for farming activities relating to nutrient management. All farmers in Canterbury need to operate within the farming activity rules

<sup>174</sup> Moriarty & Gilpin, ECan report R09/67; Gilpin & Moriarty (2015) ESR Client report: CSC15022

<sup>175</sup> Done by ESR as part of their Ministry of Business, Innovation and Employment work (Elaine Moriarty)

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unless sub-regional plan changes establish different rules. In general, farms are required to operate at Good Management Practice (GMP).

Under the Land and Water Regional Plan rules introduced in 2015, farmed cattle, deer and pigs are prohibited from:

- all access to spring-fed streams (mainly lowland)
- using and disturbing the bed and banks of other waterbodies.

Under Plan change 4 (Stock in Waterways), non-intensively farmed stock can stand in some high country lakes without requiring a resource consent. This change limits the application of the rule with respect to the type of lakes that non-intensively farmed cattle are to be excluded from. The stock exclusion rules now define braided riverbeds, to make it easier to understand how to comply with the rules. Rules prohibit farmed cattle, deer and pigs from inanga-spawning habitat (more lowland waterbodies than is currently the case).

Overall the current stock exclusion rules in Canterbury, although expressed in different ways, achieve all of the 2017 stock exclusion rules proposals for the National Policy Statement on Freshwater Management (NPS-FM).

To continue to farm within nutrient management rules, most intensive agriculture farms will require a:

- farming activity resource consent
- nitrogen baseline
- farm environment plan.

Plan Change 5 proposes new rules that restrict (as a permitted activity) the area of a property that may be irrigated or used for winter grazing of cattle.

In addition, permitted farming activities will be required to prepare a Management Plan and register with their farming activity on the Farm Portal. Where these requirements are not met, a resource consent will be required, and farming activities will be restricted to nitrogen loss limits that represent Good Management Practice.

Farming activities that require a resource consent will need to include with their application for resource consent a Farm Environment Plan that describes the practices to be implemented on farm, and include a report from the Farm Portal, a web-based tool that estimates the nitrogen loss rate for a farming activity if operated at Good Management Practice.

### **State of swimming in Canterbury**

Overall grading of primary contact recreation for the Canterbury region shows 77 per cent of rivers and 81 per cent of lakes are considered swimmable.

**Lakes**

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Canterbury is represented below.

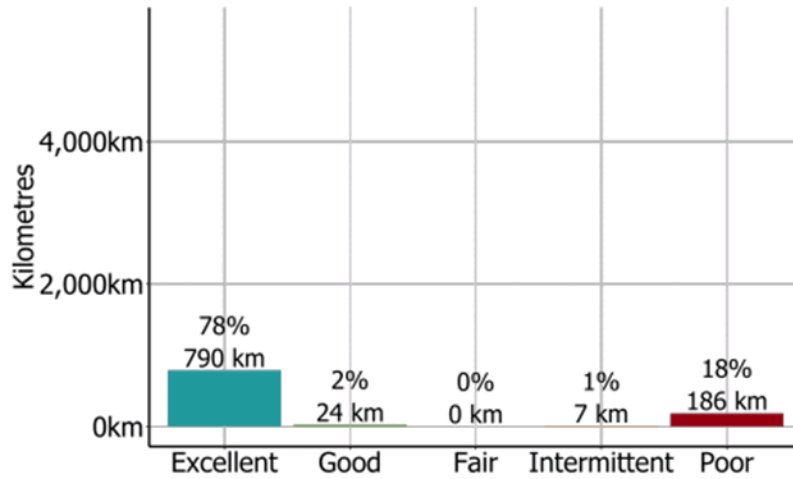
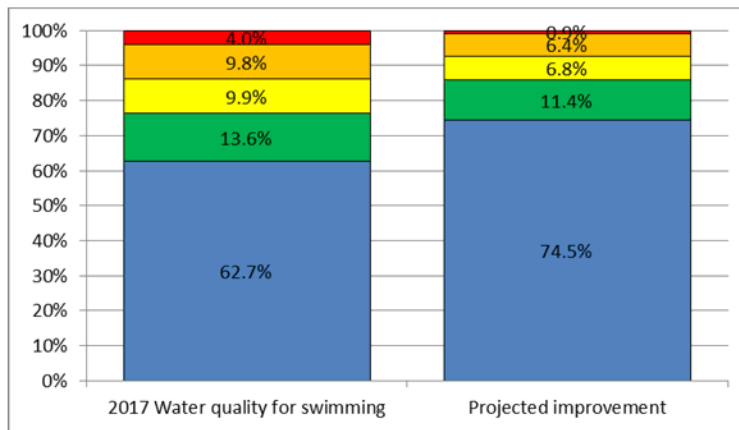


Figure 29: Percentage of Canterbury lakes currently in each primary contact recreation category

**Rivers**

The modelling shows an increase in the overall swimmability of rivers of 5.5 per cent, to 92.5 per cent of rivers being swimmable.

Figure 30: Projected improvement in water quality for swimming for Canterbury's rivers



The total annual cost of committed work in the rural area of the Canterbury region is \$32.62 m. The rural costs of committed work are spread across the dairy (8%), dairy grazing (5%), sheep and beef (62%), deer (6%), and lifestyle (19%) sectors.

### **Region-specific modelling considerations**

The modelling approach taken for planning provisions in Canterbury is to extend the stock exclusion provisions to all streams in the relevant catchments.

We have no data on the proportion of fencing set back by greater than 3 metres.

## Otago

### Overview of swimmability now

#### Main activities

Otago covers around 32,000 square kilometres from the south-eastern coastland to the iconic dry central areas, and includes alpine landscapes and large lakes. The great majority of the land is used for pastoral farming. Fresh water is a feature of western Otago, where its many lakes are valued for their recreational uses, including fishing.

Water quality and ecosystem health are high in many parts of Otago, such as the upper Clutha and Taieri river catchments and Lake Wakatipu, Lake Wānaka and Lake Hāwea.<sup>176</sup> However, stormwater contamination in urban areas and intensive farming are putting pressure on water quality and aquatic ecosystems, particularly in the lower river reaches. Lower reaches of rivers towards the coast tend to have higher *E. coli* levels, with many sites exceeding the national bottom line for *E. coli* in the National Policy Statement for Freshwater Management (NPS-FM).<sup>177</sup> Lake Waihola and Tomahawk Lagoon have sporadic cyanobacteria blooms.<sup>178</sup>

The main point-source discharges in the region are wastewater treatment plants and the Mt Cooee Landfill.<sup>179</sup>

### Planned work

#### Point sources

A number of upgrades are planned for wastewater treatment plants. These include:<sup>180</sup>

- emergency overflow and high-flow management
- overflow mitigation
- nutrient removal
- sludge processing upgrade
- treatment and disposal improvements
- storage
- electrical and instrumentation renewals, mechanical plant renewals

<sup>176</sup> Otago Regional Council. 2016. *Water Quality and Ecosystem Health in Otago*. Retrieved from [www.orc.govt.nz/Documents/Publications/Research%20And%20Technical/surface-water-quality/2016/2016%20SOE%20report%20card.pdf](http://www.orc.govt.nz/Documents/Publications/Research%20And%20Technical/surface-water-quality/2016/2016%20SOE%20report%20card.pdf) (13 July 2017).

<sup>177</sup> Implementation Review; [www.lawa.org.nz/explore-data/otago-region/](http://www.lawa.org.nz/explore-data/otago-region/)

<sup>178</sup> Survey response

<sup>179</sup> Survey response

<sup>180</sup> Survey response

<sup>80</sup> Regional information for setting draft targets for swimmable lakes and rivers

- extensions
- new wastewater schemes
- capacity upgrades
- new pump stations.

Planned work at Mt Cooee Landfill includes pipeline remediation.<sup>181</sup>

### Urban

Work planned for urban areas includes:<sup>182</sup>

- road drainage renewals
- stormwater renewals, extensions and upgrades
- trade waste bylaws
- waste minimisation education and initiatives
- household hazardous waste amnesty
- management of all waste at transfer stations
- closed landfill maintenance monitoring.

### Rural

Otago Regional Council has set targets for *E. coli* for the region in their Regional Plan: Water under Schedule 15. Comparison of Schedule 15 limits of *E. coli* data collected throughout the region from the State of Environment monitoring network to the 4 separate statistical tests within the NPSFM has shown:

- That the *E. coli* limits set in Schedule 15 for Receiving Water Group 3 (Upper Clutha upstream of the Southern Great Lakes) provides compliance against the four separate statistical tests in the NPSFM and as a minimum, will provide a blue (A grade) or green (B grade) swimmability category. The minimum requirement is an orange or C grade.
- With the exception of some catchments in the Pomahaka catchment, the *E. coli* limits set in Schedule 15 for Receiving Water Group 1 and 2 (that covers the remainder of the Otago region), will provide good compliance against the four separate statistical tests in the NPSFM, and as a minimum, will provide a blue (A grade), green (B grade) or in some cases an orange (C grade) category. The Orange, C grade category being the minimum requirement.
- In the case of the Pomahaka catchment, monitoring sites in some catchments return high 95<sup>th</sup> percentiles at all flows, even though they may be compliant with the Schedule 15 limit. This is believed to be due to effluent storage issues and a prevalence of mole and tile drains through areas of the catchment resulting in very high *E. coli* peaks under high flow

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<sup>181</sup> Survey response

<sup>182</sup> Survey response

conditions. ORC are working actively throughout the Pomahaka catchment with groups such as the Pomahaka Watercare Trust, the Landcare Trust and the Clutha Development Trust to address water quality issues. A large part of this effort is focused on improving bacterial water quality.

### State of swimming in Otago

Overall swimmability for the Otago region is 79 per cent of rivers and 70 per cent of lakes.

#### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Otago is represented below.

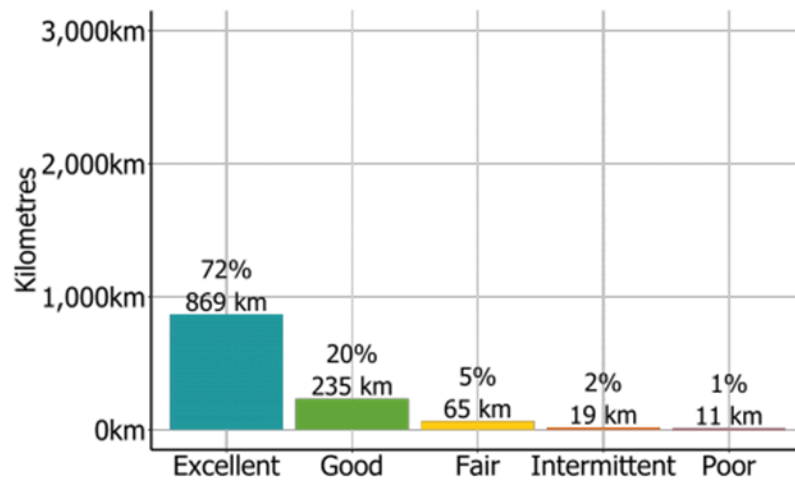
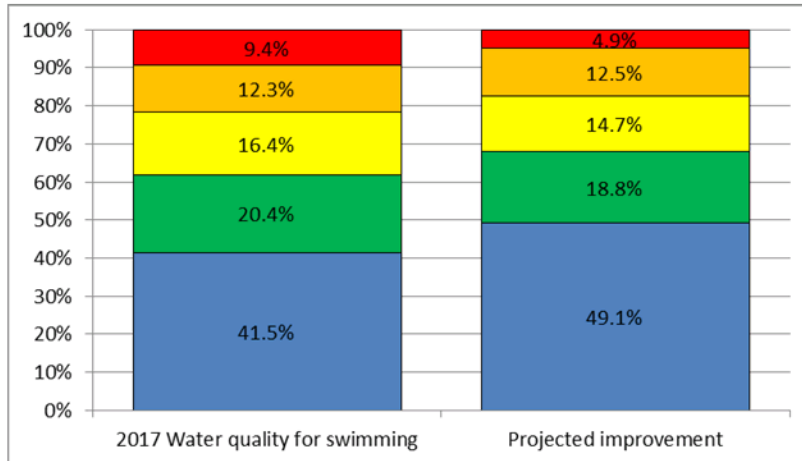


Figure 31: Percentage of Otago lakes currently in each swimming category



**Rivers**

The modelling shows an increase in the overall swimmability of rivers of 3.5 per cent, to 82.5 per cent of rivers being swimmable.



**Figure 32: Projected improvement in water quality for swimming of Otago's rivers**

The total annual cost of committed work in the rural area of the Otago region is \$13.03 m. The rural costs of committed work are spread across the dairy (7%), dairy grazing (5%), sheep and beef (71%), deer (2%), and lifestyle (15%) sectors.

**Region-specific modelling considerations**

Nothing specific

We have no data on the proportion of fencing set back by greater than 3 metres.

## Southland

### Overview of swimmability now

#### Main activities

The Southland region covers an area of approximately 2.3 million hectares, with just over half that area in conservation estate (including Fiordland and the Catlins). The western portion is largely indigenous forest and the east is alpine areas and rolling farmland. There are five main catchments, which all drain into the lowland, highly modified southern part of Southland. Primary production has long been a major contributor to the region's economy, and pasture accounts for 85 per cent of the non-conservation land.<sup>183</sup> Sheep and beef farming remain the dominant form of farming, but the introduction of irrigation and high milk prices have seen a rapid change in land use to dairying and dairy support over the past 25 years.

Water quality and ecosystem health in most of Fiordland and Stewart Island/Rakiura are exceptionally high.<sup>184</sup> Although there is localised pressure from tourism, the high volume of water flowing through the system and minimal human development minimises the overall impact. Water quality is also generally high in the upper reaches of catchments across the region. Overall, most monitored sites are within the A band for most attributes listed in Appendix 2 of the National Policy Statement for Freshwater Management (NPS-FM).<sup>185</sup> All monitored lakes and 80 per cent of monitored rivers are in the A or B bands for *E. coli*, and considered generally safe for swimming or other primary contact recreation.<sup>186</sup>

In some parts of the region, however, water quality and ecosystem health are under pressure, primarily due to diffuse discharges from intensive agricultural run-off and ageing urban stormwater and sewage systems. As a result, water quality and ecosystem health generally decrease as water flows from the northern and western hills to the eastern and southern lowlands, particularly in the lower Ōreti and Mataura rivers. *E. coli* levels measured at 10 river sites do not meet the minimum acceptable state for primary contact recreation; six of these are below the national bottom line set in Appendix 2 of the NPS-FM, and do not meet the minimum acceptable state for secondary contact recreation.<sup>187</sup>

<sup>183</sup> [www.lawa.org.nz/explore-data/southland-region/](http://www.lawa.org.nz/explore-data/southland-region/)

<sup>184</sup> Environment Southland. 2015. *Water and Land 2020 and Beyond: Water Quality in Southland 2014*. Retrieved from [www.es.govt.nz/Document Library/Factsheets/Other factsheets/Water Quality in Southland web.pdf](http://www.es.govt.nz/Document Library/Factsheets/Other factsheets/Water Quality in Southland web.pdf) (14 June 2017).

<sup>185</sup> Environment Southland. 2017. *Water Quality in Southland: Current State and Trends – Technical Report*. Publication No 2017-04. Dunedin: Environment Southland. Retrieved from [www.es.govt.nz/Document Library/Consultations/2016/Proposed Southland Water and Land Plan/Supporting Documents/7 - Water Quality in Southland - Current State and Trends - April 2017.pdf](http://www.es.govt.nz/Document Library/Consultations/2016/Proposed Southland Water and Land Plan/Supporting Documents/7 - Water Quality in Southland - Current State and Trends - April 2017.pdf) (14 June 2017).

<sup>186</sup> Implementation Review

<sup>187</sup> Environment Southland. 2017. *Water Quality in Southland: Current State and Trends – Technical Report*. Publication No 2017-04. Dunedin: Environment Southland. Retrieved from [www.es.govt.nz/Document Library/Consultations/2016/Proposed Southland Water and Land Plan/Supporting Documents/7 - Water Quality in Southland - Current State and Trends - April 2017.pdf](http://www.es.govt.nz/Document Library/Consultations/2016/Proposed Southland Water and Land Plan/Supporting Documents/7 - Water Quality in Southland - Current State and Trends - April 2017.pdf) (14 June 2017).

The main point-source discharges in the region are from industry, including meat- and milk-processing operations, sewage and stormwater systems.<sup>188</sup>

### Main sources of *E. coli*

As a case study, sampling in the Aparima catchment detected ruminant faecal pollution in most samplings, generally dominated by sheep signature though cow markers were also detected. Wildfowl markers were consistently present, with intermittent detection of human indicative markers. However, occurrence varies with time and space.<sup>189</sup>

In the Mataura catchment ruminant faecal pollution was also present in most samplings, mostly dominated by sheep signature but cow markers were often detected, with possible deer sources at times. Wildfowl markers were consistently present, with intermittent detection of human indicative markers. Occurrence varies with time and space.<sup>190</sup>

Ruminants are the dominant source in the upper Otepunī catchment above the Otepunī Dam. Human source *E. coli* was the dominant source in the lower Otepunī catchment below the dam, with no human contamination present above the dam. The catchment below Otepunī is predominantly urban.<sup>191</sup>

### Planned work

#### Point source and urban

Upgrades are planned to meat-processing operations as part of a new consent to reduce the discharge contaminants including *E. coli* over time. Wastewater for the Te Anau area is currently authorised to be discharged to the Upukerora River, but work is under way to look at alternatives as part of the consent process.

Investigations will be undertaken to remove cross-contamination of stormwater in Gore and Invercargill, and very old stormwater and sewer pipes in Invercargill will be replaced.<sup>192</sup>

An urban 'Three Waters' work programme has started with Environment Southland, Gore District Council, Southland District Council, and Invercargill City Council, to coordinate, programme and improve the maintenance and upgrading of all wastewater, stormwater and potable water supplies. This work programme seeks to improve consent compliance, streamline the re-consenting process, and create a forum to explore how the urban environment can comply with its NPS-FM obligations.<sup>193</sup>

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<sup>188</sup> Survey response

<sup>189</sup> *Sources of Microbial Pollution in the Aparima Freshwater Management Unit*. 2017. Prepared by ESR for Environment Southland.

<sup>190</sup> *Sources of Microbial Pollution in the Matuara Freshwater Management Unit*. 2017. Prepared by ESR for Environment Southland.

<sup>191</sup> Otepunī Faecal Source Investigation 2012

<sup>192</sup> Survey response

<sup>193</sup> Implementation Review

### Rural

Under the Proposed Land and Water Plan, all farmers will need to complete a farm environment plan and implement good management practices. Once these are complete, however, most would not need a resource consent to farm. Further dairy conversion and intensification is strongly discouraged and is a non-complying activity in some physiographic zones.<sup>194</sup>

The Proposed Land and Water Plan also includes several provisions around the exclusion of stock from waterways:

- All stock except sheep and deer must be excluded from waterbodies (including artificial water courses) by 1 May 2018. Deer must be excluded by 1 May 2020. No exclusion for sheep, or for any stock on slopes greater than 16 degrees in the bedrock/hill country physiographic zone.<sup>195</sup>
- Intensive winter grazing provisions: all stock types covered by these rules, all stock excluded from waterways when on forage crops from May to September, buffer widths determined by slope immediately adjacent to waterways, consent requirement considers a number of criteria including area grazed and physiographic zone.<sup>196</sup>
- Cultivation on sloping ground rule: all stock types, cultivation has specific definition, buffers and good management practices required, otherwise consent needed.<sup>197</sup>
- Wetlands: rule relating to modification of any wetlands, grazing not allowed without consent, intent is to maintain integrity of wetlands.<sup>198</sup>
- Farming rules: a suite of rules to manage existing and new farming practices, primarily via a Farm Environment Plan (details specified in Appendix N of plan, but includes riparian management plan and wintering plan and nutrient budget. Specific criteria outlined for who requires a farm plan (most farms), and by when.<sup>199</sup>
- Installed subsurface drains (nova flow, tile and mole drains): for existing drains and associated discharge, must not cause significant erosion/deposition/flooding. No visible difference in colour/clarity 20 metres downstream, or make water unsuitable for stock to drink (etc).<sup>200</sup>

### State of swimming in Southland

Overall swimmability for the Southland region is 62 per cent of rivers and 98 per cent of lakes.

<sup>194</sup> Implementation Review

<sup>195</sup> Rule 70 Proposed Southland Water and Land Plan

<sup>196</sup> Rule 23 Proposed Water and Land Plan

<sup>197</sup> Rule 25 Proposed Water and Land Plan

<sup>198</sup> Rule 74 Proposed Water and Land Plan

<sup>199</sup> Rules 20, 21, 22 Proposed Water and Land Plan

<sup>200</sup> Rule 13 Proposed Water and Land Plan

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### Lakes

This work has not modelled the projected improvement in water quality for swimming in lakes, but the current state of water quality for lakes in Southland is represented below.

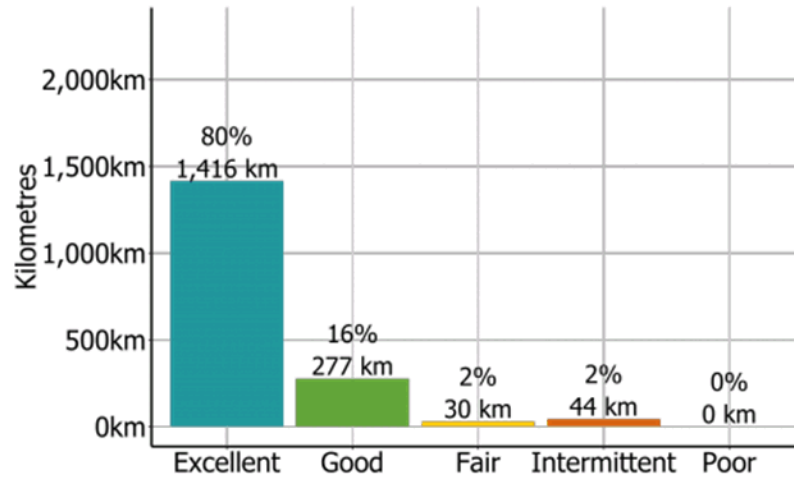


Figure 33: Percentage of Southland lakes currently in each swimming category

### Rivers

The modelling shows an increase in the overall swimmability of rivers of 5.5 per cent, to 67.5 per cent of rivers being swimmable.

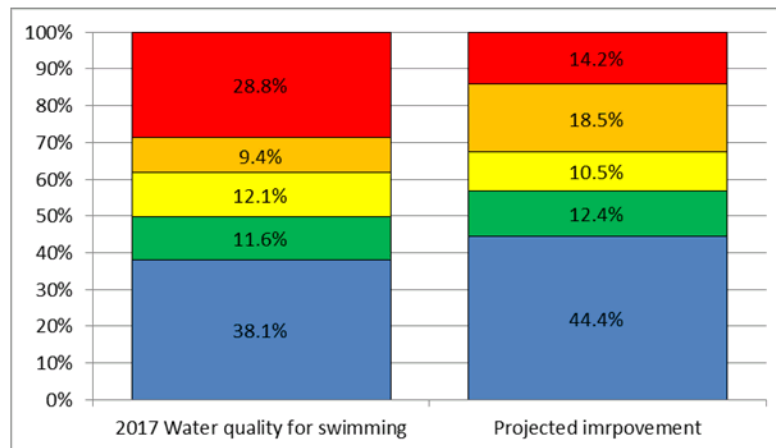


Figure 34: Projected improvement in water quality for swimming of Southland's rivers

The total annual cost of committed work in the rural area of the Southland region is \$10.16 m. The rural costs of committed work are spread across the dairy (16%), dairy grazing (8%), sheep and beef (55%), deer (6%), and lifestyle (15%) sectors.

**Region-specific modelling considerations**

Nothing specific.

We have no data on the proportion of fencing set back by greater than 3 metres.

## Appendix A: Approach to scientific modelling, assumptions and limitations

### Approach

#### Definition of national swimming maps

The water quality for swimming maps for *E. coli* in rivers are based on the regression modelling approach outlined in Snelder et al (2016).<sup>201</sup> A separate model was constructed for each of the four statistics outlined in the National Policy Statement for Freshwater Management 2014 updated August 2017 (NPS-FM) *E. coli* attribute table human health:

- percentage of exceedances over 540 *E. coli*/100ml
- percentage of exceedances over 260 *E. coli*/100ml
- median *E. coli*/100ml
- 95<sup>th</sup> Percentile *E. coli*/100ml.

The models were used to predict the values of each statistic for each segment of a digital representation of the national river network.<sup>202</sup> These predictions are the basis for the river water quality for swimming maps. However, the 95<sup>th</sup> percentile model was excluded from the swimming maps because subsequent analysis showed that these predictions were unreliable. The uncertainty of the 95<sup>th</sup> percentile predictions is associated with the imprecision of values of the 95<sup>th</sup> percentile calculated from monitoring site data.<sup>203</sup> This imprecision cannot be reduced because it is inherent to the available data and varies between sites in association with the level of variability in the individual *E. coli* measurements. The grades shown on the swimming maps were derived by applying the criteria (tests) defined by the NPS-FM *E. coli* attribute table to the predicted values of the three retained statistics.

The final step adjusted the mapped grades to account for areas where the predicted *E. coli* statistics were not providing accurate swimming grades, and to ensure that grades at network segments that represent monitoring sites were brought into line with the 95<sup>th</sup> percentile values calculated for those sites.

Adjustments were made based on:

- expert opinion from freshwater scientists
- fact-checking with regional councils
- actual data at a monitoring site.

<sup>201</sup> [www.mfe.govt.nz/publications/fresh-water/strategic-assessment-of-new-zealand%E2%80%99s-freshwaters-recreational-use-human](http://www.mfe.govt.nz/publications/fresh-water/strategic-assessment-of-new-zealand%E2%80%99s-freshwaters-recreational-use-human)

<sup>202</sup> River Environment Classification version 1

<sup>203</sup> <https://data.mfe.govt.nz/document/12871-stats-nz-2017-technical-note-on-initial-assessment-of-modelled-e-coli-data/>



River network segments were adjusted to be consistent with all four *E. coli* statistics calculated from monitoring site data. Changes were made at and upstream of the monitoring site if a category was incorrectly assigned (that is, a grade had been assigned based on the three retained predicted statistics compared to the grade implied by the calculated values of the four statistics for the monitoring site). The calculated value of the 95<sup>th</sup> percentile was included in the grade assignment for segments representing monitoring sites, provided the site had five years of data. The maps were adjusted to match the monitoring site category.

The values for network segments adjacent to monitoring sites. If one segment was surrounded by segments with higher or lower category, the reach was changed to the predominant category to account for model error (that is, the reach was only just over or under a category threshold).

It was necessary to adjust the modelled data in places before making the information public, because the statistics calculated for a site from the monitoring data are the best measure of the swimming grade at that site and are a more accurate assessment than the model predictions. Since the map is a public health indicator, it is important that they communicate the most reliable information. The modelled data provides the best estimate of the broad scale pattern of water quality for swimming. However, monitoring site data should always be relied on as a first preference for understanding local-scale water quality.

### Modelling effect of mitigation on *E. coli* statistics

Modelling the effect of mitigation on *E. coli* statistics undertaken using a national standalone version of the *E. coli* sub-model from the Catchment Land Use for Environmental Sustainability model (CLUES; Elliott et al, 2016). CLUES comprises several models that together predict the mean annual loads of total nitrogen, total phosphorus, sediments and *E. coli* throughout New Zealand at a spatial resolution of 0.5 square kilometres. The details of CLUES differ according to the water quality variable being considered. For *E. coli*, the key underlying model is SPARROW (SPATIally-Referenced Regression On Watershed attributes) (Elliott et al, 2005, 2016). It was the SPARROW model that was used to model the effect of mitigation on *E. coli* statistics in this study, and we refer to the model as SPARROW for the remainder of this section.

SPARROW is an annual steady state model that predicts annual *E. coli* loads for every reach in the River Environments Classification version network. While dynamic models are able to predict a time series of *E. coli* concentrations by representing the temporal dynamics of transport and attenuation in more detail (for example, Collins and Rutherford, 2004; Muirhead et al, 2011; Wilkinson et al, 2011), this type of modelling is not feasible for the present study within the given timeframe, the available national datasets, and the models readily available.<sup>204</sup>

<sup>204</sup> A more detailed explanation is that firstly, most of the available data for model calibration are monthly observations at state of environment monitoring sites. These data are sufficient to estimate annual loads of *E. coli* but are insufficiently frequent to calibrate dynamic models. Second, dynamic models require data describing the input of *E. coli* at a frequency that is consistent with the temporal dynamics represented by the model. However, the temporal dynamics of *E. coli* production from land areas has not been described with sufficient detail or accuracy in New Zealand. Third, such calculations would entail considerable setup effort and computational cost to run nationally. Therefore, *E. coli* production at the

SPARROW was calibrated to loads of *E. coli* (number of organisms per year) observed at state-of-environment (SoE) water quality monitoring sites distributed throughout New Zealand. The SPARROW model calibrates several parameters that represent key processes involved in the production, transport and attenuation of *E. coli* (see section on **SPARROW calibration results**). A key calibration parameter represents the diffuse source yields of *E. coli* generated by different types of land use per year (see section on **Representation of the drainage network**). The contributions from individual land areas are accumulated downstream to calculate the total *E. coli* at any point in the catchment drainage system. In addition to representing the accumulation and transport of *E. coli* loads, a SPARROW parameter represents attenuation (by die off and sequestration) in the drainage network.

For the current project, SPARROW was modified to represent loading occurring in base-flow conditions only, calibrating the model parameters to loads determined from the measured median concentration times the measured median flow. This was to avoid the influence of storm flows, which can carry a large proportion of *E. coli* loads. The calibration used the same data and calibration method adopted for the Ministry for Primary Industries (MPI) stock exclusion study (Semadeni-Davies and Elliot, 2016); however, the earlier work used a different set of calibrated parameters and yields. There were 204 SoE monitoring sites located throughout the country with suitable data available for baseflow load calculation, but the number of sites regionally is variable and some regions are better represented in the national calibration dataset than others.

As noted above, the primary contact ('swimming') grades are based on four statistics: the annual median and 95<sup>th</sup> percentile concentrations ( $Q_{50}$ ,  $Q_{95}$ ), and the proportion of time concentration thresholds of 260 and 540 *E. coli* 100mL<sup>-1</sup> are exceeded ( $G_{260}$ ,  $G_{540}$ ). However, the SPARROW model predicts annual loads of *E. coli*. Therefore, the changes in the SPARROW annual load predictions were used to adjust the four statistics their current, or baseline, values in the following manner. The values of the four statistics representing the current baseline conditions for sites that have monitoring data are derived from available monitoring site concentration data. For a scenario, it is assumed the values of  $Q_{50}$  and  $Q_{95}$  at the monitoring sites change by the same factor as the change in the current baseline and scenario loads. Scenario values of  $G_{260}$  and  $G_{540}$  are calculated by assuming the full range of concentrations at a site change by the same factor as the change in the current baseline and scenario loads. The values of  $G_{260}$  and  $G_{540}$  for the new scenario are recalculated from the modified concentrations.

For locations that do not have monitoring data, the current baseline values of all four statistics are predicted using regression models fitted to monitoring site data (for example, Larned et al (2016)). The scenario values of  $Q_{50}$  and  $Q_{95}$  at these locations are calculated in the same manner as described above for monitoring sites (Semadeni-Davies and Elliot, 2016). The calculation of scenario values of  $G_{260}$  and  $G_{540}$  for locations without data is more complicated. This calculation uses predicted values of an additional statistic, the standard deviation of the concentrations, so that the full range of concentrations (that is, the distribution) can be modelled for every location (see Elliot and Whitehead (2016) for details).

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land unit level has to be inferred from the annual loads at monitoring sites, and this is carried out by the SPARROW calibration process.

## Model scenarios

The model was used to predict *E. coli* loads for two scenarios. Scenario 0 represents the baseline (i.e. 2017) including the current level of on-farm fencing and land use. Scenario 1 represents the future after rules for stock exclusion have been implemented nationally in tandem with other regional committed works (Scenario 1).

### Scenario 0

The current level of fencing was estimated on the basis of industry evaluations (for example, Dairy NZ) and the Landcare Research Survey of Rural Decision Makers 2015 (SRDM 2015 [www.landcareresearch.co.nz/science/portfolios/enhancing-policy-effectiveness/srdm/srdm2015](http://www.landcareresearch.co.nz/science/portfolios/enhancing-policy-effectiveness/srdm/srdm2015)). Since the SRDM 2015 data was provided by super regions (that is, northern North Island, southern North Island, South Island), the current estimates were applied at this level. It is assumed that only stream reaches that meet the dairy accord are fenced, that is, with an estimated width of 1 metre and a sub-catchment slope of < 15 degrees. The estimated width has been taken from Booker and Hicks (2013). The current level of fencing for accord streams by super region and stock type is given in A.1.

**Table A.1: Current level of stock exclusion (% of accord stream length fenced) estimated by super region and stock type**

Stock type	Northern North Island	Southern North Island	South Island
Dairy	97%	93%	94%
Sheep and beef	60%	44%	49%
Deer	65%	54%	46%

While there may be other mitigations in place, such as riparian planting, since the aim of the modelling is to capture future changes in loads due to planned increases in mitigation, these mitigations are not included in the scenario, and are assumed to be implicit within the swimmability model.

### Scenario 1

Scenario 1 represents the level of stock exclusion and riparian planting for the nominal year 2030 when the proposed national Clean Water Package (CWP) (Ministry for the Environment, 2017) has been implemented. Scenario 1 also includes the impact of regional committed work (that is, work already committed to by councils in their policy plans, or planned infrastructure investment) in regions that have committed to mitigation beyond the CWP.

Scenario 1 represents the CWP as all stock types excluded from all:

- reaches with an estimated width of 1 metre or more where the reach sub-catchment has a slope of 3 degrees or less
- water ways for reaches with a sub-catchment slope of 3 degrees or less.

The programmes for regional committed work were provided to the Ministry for the Environment by the regional councils, and generally follow one of three general strategies:

- extension of the CWP to all reaches irrespective of slope

- riparian planting in addition to fencing
- land disposal of farm dairy effluent (FDE).

The regional committed work for each regional council is summarised for fencing, planting and FDE in tables A.2, A.3 and A.4.

**Table A.2: Summary of committed fencing work for each regional council**

Region	Rivers	Scenario 1 proposed response
Northland	All	None (covered by Clean Water Package)
Auckland	All	Extend Clean Water Package to all streams
Waikato	All	None (covered by Clean Water Package)
Bay of Plenty	All	Extend Clean Water Package to all streams
Gisborne	All	None (covered by Clean Water Package)
Taranaki	All	None
Horizons	All	None (covered by Clean Water Package)
Hawke's Bay	All	Extend Clean Water Package to all streams
Wellington	All	None (covered by Clean Water Package)
Nelson	All	None (covered by Clean Water Package)
Marlborough	All	None (covered by Clean Water Package)
Tasman	All	None
West Coast	All	None (covered by Clean Water Package)
Canterbury	All	Extend Clean Water Package to all streams
Otago	All	None
Southland	All	None (covered by Clean Water Package)

Table A.3: Summary of committed riparian planting work for each regional council

Region	Rivers	Scenario 1 proposed response	Council information on setbacks	Comment
Northland	All	None		
Auckland	Hotoe, Henderson Creek (upper), Kaipara, Mahurangi, Wairoa	Assume that 50% of streams with order 3 or more are planted	Assuming a minimum of 3m and an average of 5m is okay	Assume all planted streams have a minimum 3m setback
Waikato	All	None		
Bay of Plenty	All	Assume an additional 10% of streams with order 3 or more are planted	Approximately 40% of fences in the region are set back more than 3m from the river. Council are actively encouraging land owners to increase both the margin and percentage.	This represents an additional 10% from existing planting to bring the total up to our proposed response of 50% of streams with order 3 or more planted. Assume all planted streams have a minimum 3m setback.
Gisborne	All	None	Dairy farms and break-feeding farms have a 5m setback requirement. Deer have no setback requirements. Council has no riparian planting requirements, but estimate 25% of pastoral-farmed streams have riparian cover in the hill country but none on flat land.	No effect as proposed response assumes no additional riparian planting
Taranaki	All	Assume an additional 5% of streams on plains with order 3 or more are planted	Estimate 75.6% of total riparian streambank length on the ringplain is 3m or wider. Maybe an increase to 80% over the next 10 years.	Assume all planted streams have a minimum 3m setback.
Horizons	All	None		
Hawke's Bay	Third order streams feeding into Ahuriri Estuary	Assume that 15% of streams of order 3 or more are planted		Assume all planted streams have a minimum 3m setback.
Wellington	All	10% new planting on lowland streams of	Programme to incentivise riparian	Assume all planted streams have a minimum

Region	Rivers	Scenario 1 proposed response	Council information on setbacks	Comment
		order 3 or more	planting with a recommended 5m setback on high value sites and lowland streams. Generally most riparian setbacks on dairy farms would be 3m or less. Other land uses would be variable but probably average out to 3m.	3m setback.
Nelson	All	None		
Marlborough	All	None		
Tasman	All	None		
West Coast	All	None	Regional Land and Water Plan only requires stock exclusion in the Lake Brunner catchment. Estimated that 73% of streams fenced on dairy farms. Lake Brunner catchment requires a minimum 1m setback. Proportion of intensely farmed area in the region managed by Landcorp who have fenced the majority of waterways with a minimum 3m setback requirement.	No effect as proposed response does not include riparian planting.
Canterbury	All	None		
Otago	All	None	Council does not require specific setback distances	No effect as proposed response does not include riparian planting.
Southland	All	None		

Table A.4: Summary of committed FDE management for each regional council

Region	Rivers	Scenario 1 proposed response	Comment
Northland	All	None	
Auckland	Mahurangi, Hotoe, Rangitopuni, Kaukapakapa, Wairoa, Makarau, Kaipara, Henderson Creek	Apply land surface disposal of FDE to 75% of all dairy land use in these streams	This represents a 75% increase in uptake of FDE controls (assuming 25% already in place). For Auckland, assume FDE controls are 50% as effective as in Taranaki and Horizons, due to low dairy density in the region.
Waikato	All	None	
Bay of Plenty	All	None	
Gisborne	All	None	
Taranaki	All	Apply land surface disposal of FDE to 75% of all dairy land use in region	This represents a 75% increase in uptake of FDE controls (assuming 25% already in place).
Horizons	All	Apply land surface disposal of FDE to 75% of all dairy land use in region	This represents a 75% increase in uptake of FDE controls (assuming 25% already in place).
Hawke's Bay	All	None	
Wellington	All	None	
Nelson	All	None	
Marlborough	All	None	
Tasman	All	None	
West Coast	All	None	
Canterbury	All	None	
Otago	All	None	
Southland	All	None	



## Model uncertainty

The uncertainty of model predictions is characterised by the results of the model calibration (see section **SPARROW calibration results**). The calibration results indicate that the characteristic error of predictions made for individual reaches (that is, site-scale) is a factor of 2.3 (that is, predicted value  $\times/_{\pm} 2.3$ , meaning the modelled value can be more than twice or half of the true value). Thus, load prediction for individual segments should be considered indicative only. However, if the modelling is unbiased (that is, no systematic error), the model errors for individual segments cancel out so that the aggregated predictions will be reliable. For example, the proportion of rivers of a given swimming grade within a region will be accurately represented. The models underlying the swimming maps were shown to have low bias (Snelder et al, 2016) and the SPARROW calibration also indicated low bias. Therefore, it is reasonable to assume that the model predictions aggregated over large areas (that is, regions or nationally) are reliable. The assumptions (see section on **Assumptions**) and limitations (see section on **Limitations**) are additional sources of uncertainty in the absolute values of predictions.

Importantly, the swimmability metrics for each site were adjusted to match the values underlying the Ministry for the Environment swimmability maps, and the changes in these metrics was determined from changes in loading.

The predicted change in load made for different scenarios can be considered more reliable than the absolute load because many assumptions and limitations apply to all scenarios. Thus, changes between scenarios of the proportion of rivers in a given swimming grade can be considered more reliable than estimates of the absolute values of load. Assumptions that apply, for example, to a future scenario but not to the current scenario (such as the mitigation efficiency) are a source of uncertainty that impacts on the estimates of changes between scenarios. The uncertainties associated with these assumptions have not been quantified in this study.

## Assumptions

### SPARROW model

The assumptions and sources of uncertainty associated with estimating annual *E. coli* loads using the SPARROW model are discussed in detail in Semadeni-Davies and Elliot (2016). These included scaling issues in the representation of catchment characteristics (soil, rainfall, slope, land use), errors inherent in the input spatial data sets and the use of the use of non-purpose collected SOE data for calibration. The processes represented by the SPARROW model are simplifications of reality. A key simplification is that production rates of *E. coli* (that is, source yields) are homogeneous within three land use/cover categories (pastoral land use (all stock types); urban; and all other land uses). In addition, the SPARROW model represents attenuation as an exponential decay rate, which is a function of the estimated travel time in the river network.

### Mitigation removal efficiencies

Mitigation is represented by a percentage removal based on removal efficiencies for stock-exclusion by fencing or riparian planting reported in the literature. These values have largely been obtained at the paddock or farm scale, rather than at the catchment scale. The mitigation efficiencies for stock exclusion by fencing and stock exclusion with an assumed 3-metre-wide

riparian planting set-back are given in table A.5. Note that since sheep are not required to be fenced in the clean water package (CWP), the mitigation efficiencies for sheep and beef are fairly low compared to dairy and deer. This is because the SPARROW model does not distinguish between sheep and beef.

**Table A.5: Percentage removal efficiencies for stock exclusion by modelled stock type and super region**

Stock type	Northern North Island		Southern North Island		South Island	
	Fencing	Riparian	Fencing	Riparian	Fencing	Riparian
Dairy	62%	72%	62%	72%	62%	72%
Sheep and beef	53%	63%	44%	54%	40%	50%
Deer	62%	72%	62%	72%	62%	72%

### Land use data

Land use has been taken from the Ministry for Primary Industries' Farms Online dataset that has been developed for biosecurity purposes and relates to the time period 2010–15. This dataset was used in preference to the CLUES default land use, which has a baseline of 2008 as it is more representative of current land use. The land uses included are:

- dairy (platform, runoff and third party grazing)
- sheep and beef (lowland intensive, hill and high country)
- deer
- other stock
- horticulture and crops
- urban areas
- forest and scrub
- tussock
- other, non-specified, land uses.

A description of the dataset and how it was adapted for modelling is given in Semadeni-Davies and Elliot (2016).

The SPARROW model does not distinguish between types of urban land use (that is, residential, industrial or commercial), sewer network (that is, separate or combined) or stormwater treatment. It is noted that the main sources of *E. coli* in urban runoff are sanitary sewer overflows during high intensity rainfall events, or wash-off of animal excrement (e.g., dogs, water fowl). There are several options for stormwater treatment to remove *E. coli* including bioretention in raingardens and grassed swales and in ponds and wetlands. The removal efficiencies reported in the literature for these options ranges between 10 and 80%. Here, Scenario 0 assumed no current urban *E. coli* removal; a flat removal efficiency of 50% was used for Scenario 1.

More information about representing *E. coli* from urban sources in CLUES is given in Appendix E.

The implications of using this land use data set were also discussed in Semadeni-Davies and Elliot (2016), and include uncertainties in the disaggregation of pastoral land uses into the model land-use classes and scaling issues due to the spatial disaggregation of the data into REC 1 sub-catchments.

### Representation of the drainage network

Unlike Semadeni-Davies and Elliot (2016), the first version of the River Environments Classification (REC1) is used to represent the drainage network in order to be compatible with the national swimmability maps. The data set represents the national drainage network as a series of nodes or confluences linked by network reaches. Each reach has a contributing area, referred to in the model as the segment sub-catchment. The median reach length is 530 metres, and sub-catchments have a median area of 30 hectares. There are some 600,000 reaches nationally.

### Point sources information

Point sources included in this SPARROW implementation represent annual *E. coli* discharges from around 150 sources, which include sewage treatment plants in larger towns, dairy factories, piggeries and freezing works. The discharge point data were provided to the Ministry for the Environment for this study by regional councils, and data included were the type of source, the location, consented loads or concentrations, and, where available, estimates of average loads concentrations and flow rates. For sewage treatment plants, where loads could not be estimated from the provided information, loads were estimated on the basis of population and the type of treatment.

For the future scenarios, changes to loads due to planned changes at the sources (for example, upgrades to sewage treatment plants) were taken into account. The point sources and current and future loads are listed in Appendix E.

It is assumed that all other smaller point sources are adequately accounted for by land cover description in the underlying models (that is, both the RF models used to define the Swimmability maps and the SPARROW model).

### Limitations

The SPARROW model predicts the steady state mean annual load that would occur once equilibrium conditions have been achieved. Thus, a limitation of the study is that it cannot show how *E. coli* statistics would change through time if implementation was progressive, or if the effects took some time to be fully realised. Also, the modelling can only project the improvement in rivers; it does not project improvements in lakes.

The SPARROW model is primarily concerned with water quality in rural catchments. The available calibration dataset included comparatively few urban calibration sites and therefore the predictions may be less reliable for urban catchments or catchments with a significant urban component.

The SPARROW model is based on a representation of the surface water drainage network and does not explicitly include aquifer systems. Thus, the effect of groundwater storage or transport on *E. coli* loads is not explicitly represented.

## SPARROW calibration results

Calibration minimised the root mean square error (RMSE) calculated for the residuals between the modelled and measured *E. coli* log-transformed base-flow loads for the 204 water quality monitoring sites for which *E. coli* loads could be determined (Semadeni-Davies and Elliot (2016)). The RMSE (0.823; table A.6) represents the standard deviation of the differences between the natural log of predicted and natural log of observed values (that is, model residuals in log space). The coefficient of determination ( $R^2$ ) for loads was 0.82. The loads normalised by catchment area (that is, load divided by catchment area) is referred to as the yield, and had a lower  $R^2$  of 0.64. The calibration results indicates substantial uncertainty in the model. This uncertainty reflects unknown and unquantified sources of spatial variation in *E. coli* and also the imprecision associated with calculating *E. coli* loads.

**Table A.6: Calibration results for the CLUES *E. coli* model used in this study**

Number of observations	Number of calibrated parameters	RMSE	Load R <sup>2</sup>	Yield R <sup>2</sup>
204	8	0.823	0.82	0.64

The RMSE, and  $R^2$  values were calculated in log space.

The parameters and source yields are shown, along with their standard errors, in table A.7. This model configuration has three source yields, relating to pastoral land use (all stock types), urban, and all other land uses. Other combinations of land use, including separate yields for different stock types, were trialled but these did not significantly improve model fit.

**Table A.7: SPARROW calibrated parameters and their associated standard errors**

Parameters optimised	Unit	Calibrated value	Standard error
Source yield $Y_i$ : Pasture	1015 organisms/km <sup>2</sup> /year	0.0091	0.0025
Source yield $Y_i$ : Urban	1015 organisms/km <sup>2</sup> /year	0.0166	0.0075
Source yield $Y_i$ : Other land uses	1015 organisms/km <sup>2</sup> /year	0.0002	0.0001
Rainfall delivery coefficient $k_{rain}$	dimensionless	0.4906	0.1408
Temperature delivery coefficient $k_{rain}$	dimensionless	0.1269	0.0271
Decay coefficient $k_{stream}$	/year	0.1190	0.0268
Flow coefficient $k_{flow}$	/year	-0.6681	0.0727
Reservoir attenuation coefficient $k_{res}$	/year	75.226	58.54

The calibration uses the CLUES default land use data for the baseline year of 2008, while the Farms Online data used in this study was collected between 2010 and 2015 with a nominal baseline of 2012. For this reason, the yields from pastoral land uses were adjusted to the change in the level of fencing estimated between 2008 and 2012. The adjustment method is described in detail in Semadeni-Davies and Elliot (2016). The adjusted pastoral yields for each stock type and for fenced and unfenced streams are given in table A.8.

**Table A.8: Adjusted yields determined for each stock type modelled**

Land use	Yield (peta/km <sup>2</sup> /yr)
Dairy – Platform (milking cows on dairy farms)	0.015217588
Dairy – Runoff (non-milking dairy cattle, e.g., calves, grazing on dairy farms)	0.015217588
Dairy - Third (grazing of non-milking dairy cattle on non-dairy farms)	0.015217588

Land use	Yield (peta/km <sup>2</sup> /yr)
Sheep and Beef Intensive	0.010814713
Sheep and Beef Hill	0.010814713
Sheep and Beef High Country	0.010814713
Deer	0.012492987
Other Animals	0.0001795

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## Appendix B: Economic assessment of committed work to reduce *E. coli* loads to New Zealand streams and rivers

Graeme Doole (19/10/2017)

The total cost of committed work is represented as the difference between the current state and that associated with committed work (Doole et al, 2016). Overall, a conservative approach is taken. This is justified because there is broad data uncertainty, especially given that modelling is undertaken at a national scale (Woodward and Shaw, 2008). The assessment uses a variety of methods to ascertain the cost of each committed action.

The economic assessment of stream fencing loosely follows the work conducted by the Ministry of Primary Industries (MPI) for the stock exclusion study (Grinter and White, 2016; Agribusiness Group, 2017; Semadini-Davies and Elliott, 2017). Various assumptions are central to this application; these are described below.

All capital costs are converted into an annual amount using a discount rate of 6 per cent (New Zealand Treasury, 2016) and a 25-year payback period (Grinter and White, 2016). Conceptually, this is comparable to converting large capital costs into annual payback equivalents, akin to determining the annual payments required to service a loan (Damodaran, 2014). This method is used to reduce bias associated with representing large costs in individual years.

New fencing involves the exclusion of stock from both sides of the waterway (Semadini-Davies and Elliott, 2017).

Stream length present in each land use is weighted according to the proportion of the catchment that consists of that land use (Semadini-Davies and Elliott, 2017). This assumption is driven by a lack of alternative information.

Stream fencing is assumed to consist of two-wire electric fences, constructed to exclude cattle only (Muirhead, 2017). There appears to be no policies currently that seek to exclude sheep as well (R Muirhead, AgResearch, pers. comm., 16 October 2017). Two-wire electric fences are represented on flat, rolling, and steep land. Grinter and White (2016, p 20) assume that eight-wire conventional fencing is chiefly utilised on steep land for beef and dairy cattle. Two-wire electric fences are represented here given their cost-effectiveness, their reduced cost if damaged through erosion and/or flood, and no need to exclude sheep.

The cost of fencing varies by region, as set out by Agribusiness Group (2016, p 18). Maintenance costs are 1 per cent of total material costs in flat and rolling land, and 2 per cent in steep land (Grinter and White, 2016). Material costs are presented by Agribusiness Group (2016, p 18).

A riparian buffer of 3 metres width on each side of the waterway is assumed, where riparian buffers are part of committed work (Muirhead, 2017). This is assumed to consist of pasture and one row of native plants (flax or sedges) with 1.5 metre spacing; the cost is \$3.67/m of waterway (Agribusiness Group, 2017).

The opportunity cost of land within each buffer is considered. Earnings before Interest, Tax, Depreciation, and Amortisation (EBITDA) is determined for each land use. EBITDA is determined for New Zealand dairy farms using data from DairyNZ (2017). Values for 2011/12 to 2015/16 are adjusted for inflation using data from Statistics NZ (2017). The mean EBITDA is

\$2,274/ha. There is a pertinent lack of information pertaining to the national profitability of dairy grazing. Farm accounts presented for the Waikato by Olubode-Awasola (2015) are used to determine EBITDA for dairy grazing activity. This value is adjusted for inflation using data from Statistics NZ. The EBITDA value is \$385/ha.

EBITDA is determined for New Zealand sheep and beef farms using data from Beef and Lamb New Zealand (2017). Values for 2011/12 to 2015/16 are adjusted for inflation using data from Statistics NZ (2017). The mean EBITDA is \$305/ha.

A lack of historical information related to profit of deer land means that an average of several point estimates of deer farm profit in the North Island and South Island in 2014 are utilised. EBITDA is determined from Thompson (2014), and then adjusted for inflation using CPI figures from Statistics NZ (2017). The mean EBITDA is \$614/ha.

No opportunity cost of lost land is represented for lifestyle blocks, given their diversity and the central importance of off-farm income to most of these units (Andrew and Dymond, 2012).

Excluding stock from streams can motivate a need for providing water troughs and reticulating water to these structures. The cost of water reticulation varies greatly across New Zealand due to high diversity in landscape, land use, and regional costs (Journeaux and van Reenan, 2016). Agribusiness Group (2017) assess the potential infrastructure costs of adding water reticulation to a 50-hectare block as \$13,574.25. Annual maintenance costs of 5 per cent of total capital costs (\$678.71) are also assumed. This is converted to a per-metre cost by Grinter and White (2016). It is done so through assuming that each 50-hectare block extends 350 metres on either side of the waterway, and 7,143 metres along it. The cost of additional water reticulation with more stream fencing is not represented on dairy farms because of the presence of intensive rotational grazing on these farms, which requires a high number of troughs under standard management (Doole and Romera, 2013).

The total length of stream under each classification in the committed work scenario are presented in table B.1. The “fencing” and “fencing and riparian buffer” partitions represent additional activities that are predicted to occur because of committed work. A total stream length of 168,592 kilometres is represented. Sixty per cent of this is present in sheep and beef land, while around 20 per cent of this is present on dairy land. Around 80, 68, 61, 77, and 77 per cent of streams will be fenced under committed work in the dairy, dairy grazing, sheep and beef, deer, and lifestyle sectors, respectively.

**Table B.1: Length of stream (km) in each classification under the committed work scenario**

Classification	Dairy	Dairy grazing	Sheep and beef	Deer	Lifestyle
No fencing	7,093	1,716	39,822	366	5,649
Fencing	27,540	3,664	61,834	1,228	19,363
Fencing and riparian buffer	112	5	92	2	106
Total	34,745	5,385	101,748	1,596	25,118

The annual cost of stream fencing in each land use is presented in table B.2. These figures include maintenance costs.

**Table B.2: Annual cost of stream fencing (\$/m) in each land use**

Classification	Dairy	Dairy grazing	Sheep and beef	Deer	Lifestyle
Fencing	0.43	0.43	0.43	1.71	0.43
Water reticulation	-	0.24	0.24	0.24	0.24
Fencing total	0.43	0.67	0.67	1.95	0.67



Classification	Dairy	Dairy grazing	Sheep and beef	Deer	Lifestyle
Riparian vegetation	0.29	0.29	0.29	0.29	0.29
Opportunity cost	0.11	0.02	0.01	0.03	-
Fencing + riparian total	0.83	0.97	0.98	2.27	0.96

Establishment costs are annualised at a rate of 6 per cent over a period of 25 years. The fencing cost is a national average given that it varies by region and slope class (Agribusiness Group, 2016)

Table B.3 presents the annual cost of stream fencing in the committed-work scenario. The annual cost is projected to be \$135 million, with 59 per cent of that occurring in the sheep and beef industry, 20 per cent in the dairy industry, and around 15 per cent in the lifestyle sector.

**Table B.3: Annual cost of stream fencing (\$m) under committed-work scenario**

Land use	Cost (\$m)
Dairy	22.03
Dairy grazing	4.3
Sheep and beef	79.76
Deer	4.17
Lifestyle	24.82
Total	135.08

Several regions plan to move away from the pond treatment of farm dairy effluent (FDE) to land application in the committed-work scenario. This is planned to occur on 230,167 hectares of land across the Auckland, Manawatū, Taranaki, and Whanganui regions. Using regional average stocking rates from LIC/DairyNZ (2017), this would stand to affect land containing around 641,090 cows or around 12 per cent of the national herd. No cost is represented for this transition from pond treatment to land discharge in the assessment. This is because the total cost of labour and extra infrastructure required for land-based application of FDE is closely equivalent to the money saved through not having to apply additional nutrients through fertiliser application (Doole, 2015).

Some remediation of wastewater systems is planned in several regions. This is focused on reducing leaks and overflows from wastewater systems. Limited information is available with respect to the cost of such remediation. Indeed, little suitable data has been identified in the council responses, published literature, and unpublished literature. A conservative approach is justified given the level of uncertainty that exists with respect to this facet of the data. Accordingly, a replacement cost is determined per square kilometre, using data from Watercare (2016). These assumptions involve 25 kilometres of wastewater pipe per square kilometre of urban land use and a replacement cost of \$595,346 per kilometre. The cost of improved wastewater infrastructure is annualised at a discount rate of 6 per cent over a 50-year period. This yields an annual cost of \$37,771 per kilometre of pipe or \$944,275 per square kilometre. Wastewater systems are improved over 87 square kilometres of urban land in committed work. Thus, the total annual cost of this remediation is computed as \$82.15 million.

The annual costs of the committed work therefore consist of \$135.08 million to the rural sector and \$82.15 million to the urban sector. This yields a total annual cost of \$217.23 million.

It is accepted that several key limitations exist with regards to these estimates.

A certain type of stream fencing and riparian buffer has been assumed to be feasible across each sub-catchment, though this is often limited by existing infrastructure and difficult terrain (for example, hard subsoil layers, slope).

A key assumption is that stream density has been assumed to be the same across each land use, with stream length weighted proportionally according to the incidence of land-use coverage across each sub-catchment. This may underestimate the cost on sheep and beef farms given their placement on more highly-dissected landscapes, relative to dairy farms. Conversely, it may also elevate the cost on dairy farms, given their location typically on flatter parts of a catchment.

Poor information exists with relation to the current location and cost of fencing streams on lifestyle blocks.

A standard, stylised form of water reticulation has been assumed to exist across all landscapes. This is based on the best information available, but does not reflect the heterogeneity between land uses and landscapes across New Zealand's rural sector.

The cost of reducing wastewater overflows and leaks is likely overestimated. It is accepted that this estimate is based on poor data, so it would be particularly useful to ask regional council staff how it can be improved.

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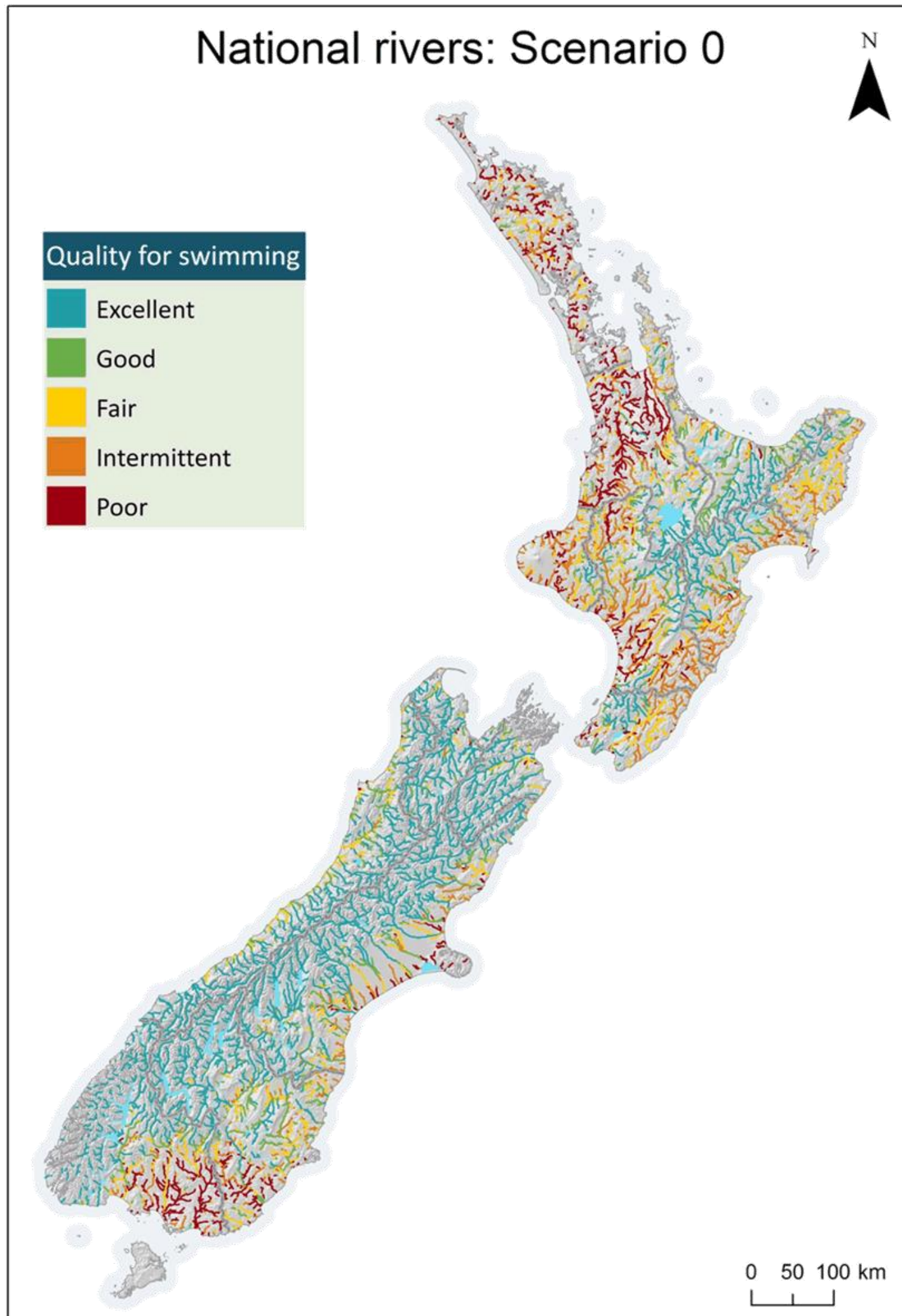
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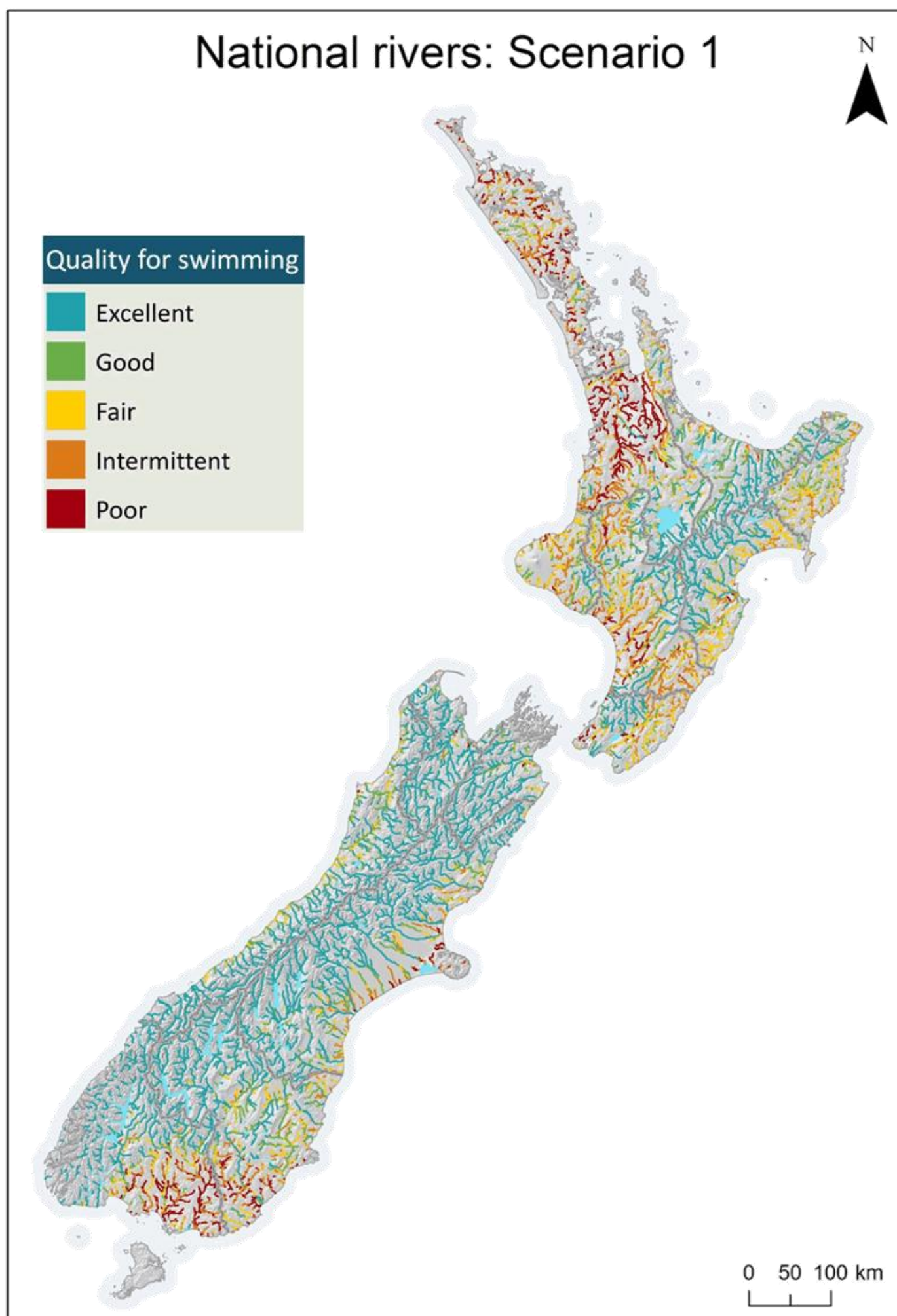
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## Appendix C: Current swimmability maps





### Appendix D: Projected swimmability maps



## Appendix E: Summary of point sources modelled for rivers

ID1	NAME	Region	NZReach_1	Scenario 0 peta	Scenario 1 peta Combined	Scenario 2 peta
1	Alliance: Lorneville	Southland	15057697	0.00682	0.00682	0.000938378
2	Alliance: Mataura	Southland	15053089	7.9617888	7.9617888	0.009271584
3	Mataura WWTP	Southland	15054037	0.0039347	0.0039347	0.00128772
4	Gore	Southland	15050094	0.051246	0.051246	0.00579474
5	Waikaka WWTP	Southland	15041725	9.91888E-05	9.91888E-05	1.60965E-05
7	Nightcaps	Southland	15047085	0.00407778	0.00407778	3.7859E-05
9	Tokanui WWTP	Southland	15062094	0.000695599	0.000695599	0.000280145
10	Gorge Road WWTP	Southland	15061101	1.54943E-05	1.54943E-05	9.6579E-06
11	Wyndham and Edendale WWTP	Southland	15057604	0.0009636	0.0009636	0.000339958
12	Balfour WWTP	Southland	15038420	0.114023263	0.114023263	0.000160965
13	Winton WWTP	Southland	15052712	0.00328427	0.00328427	4.63E-06
14	Browns WWTP	Southland	15051292	9.21364E-06	9.21364E-06	5.40842E-06
15	Tuatapere WWTP	Southland	15052799	0.00012709	0.00012709	7.18548E-05
16	Manapouri oxidation pond	Southland	15028200	7.45958E-05	7.45958E-05	2.57544E-05
17	Te Anau WWTP	Southland	15020633	0.001665666	0.001665666	0.000246083
18	Riversdale	Southland	15039756	0.000425458	0.000425458	5.06074E-05
19	Ohai WWTP	Southland	15044161	3.6333E-05	3.6333E-05	
21	Alexandra	Otago	14039789	0.01214136	0.001214136	0.000618106
22	Bannockburn WWTP	Otago	14030647	0.000318711	0.000318711	1.62253E-05
23	Cromwell	Otago	14029808	0.0104871	0.00104871	0.000533889
25	Omakau	Otago	14031506	0.000632363	0.000316181	0.000032193
26	Ranfurlly WWTP	Otago	14034973	0.000232535	0.000232535	0.000136498

29	Balclutha	Otago	14070611	0.009910385	0.000859501	0.000504529
30	Clinton	Otago	14069681	0.000743658	0.000371829	3.7859E-05
31	Heriot	Otago	14062859	0.000252945	0.000126473	1.28772E-05
32	Kaitangata WWTP	Otago	14070966	0.002048855	0.001024427	0.000104305
34	Lawrence	Otago	14063118	5.36979E-05	5.36979E-05	
35	Milton	Otago	14067846	0.000248401	0.000124201	
36	Owaka WWTP	Otago	14072618	0.000822071	0.000822071	4.18509E-05
37	Stirling WWTP	Otago	14070514	0.00101178	0.00101178	5.15088E-05
38	Tapanui	Otago	14064004	0.0057	0.00285	0.001672956
39	Waihola WWTP	Otago	14064699	0.000629833	0.000314917	0.000184857
42	Middlemarch WWTP	Otago	14049235	0.000758835	0.000758835	3.86316E-05
48	Queenstown /Frankton	Otago	14027443	0.00292292	0.000292292	
53	Moeraki WWTP	Otago	14042764	5.49325E-05	5.49325E-05	0.000032193
54	Oamaru	Otago	14026122	0	0	0
55	Palmerston	Otago	14047610	0	0	0
56	Hanmer Springs	Canterbury	13012766	0.000184573	0.000184573	0.000108168
57	Hummocks RRLAKECOLERIDGE	Canterbury	13040971	0.000252945	0.000252945	1.28772E-05
63	Hawarden	Canterbury	13024411	0.000632363	0.000632363	0.000032193
64	Greta Valley	Canterbury	13026345	0.000252945	0.000252945	1.28772E-05
69	Stratford	Taranaki	6008178	0.0666	0.0666	0.003390545
70	Kaponga	Taranaki	6009745	0.00059879	0.00059879	4.79032E-05
72	Waverley	Taranaki	6015843	0.007243425	0.007243425	0.000289737
73	Affco NZ Ltd	Northland	1010200	0.044121513	0.044121513	0.002246186
74	Kawakawa WWTP	Northland	1009625	0.00088476	0.00088476	0.000156072
75	Kaikohe WWTP	Northland	1010804	0.009667558	0.009667558	0.000492167
76	Kaero WWTP	Northland	1003906	9.60851E-05	5.64021E-05	5.64021E-05
77	Taipa WWTP	Northland	1002562	0.004636482	0.004636482	0.000236039
78	Dargaville WWTP	Northland	1022582	0.00094374	0.00094374	0.000553977



79	Te Koporu WWTP	Northland	1024278	0.001145841	0.001145841	5.83337E-05
80	Kaiwaka WWTP	Northland	1026102	0.001487317	0.001487317	7.57179E-05
81	Maungaturoto WWTP	Northland	1025525	0.0005475	0.00005475	0.000096579
82	Kaitaia WWTP	Northland	1004102	0.012444894	0.012444894	0.000633558
83	Hikurangi WWTP	Northland	1015523	0.000305366	3.05366E-05	0.000179251
84	Wairoa District Council CD940404W	HBRC	8014558	0.010138036	0.007603527	0.000516118
85	AFFCO DP070670Wb	HBRC	8013530	0.044121513	0.044121513	0.002246186
86	Waipukurau	HBRC	8013209	0.0146	0.00146	0.000743273
87	Waipawa	HBRC	8030676	0.0071	0.00071	0.000361455
89	Affco Rangiruru	Bay of Plenty	4002830	0.0033215	0.0033215	0.001949727
97	Murupara WWTP	Bay of Plenty	4022385	0.000936225	0.000936225	4.76624E-05
98	Taneaua	Bay of Plenty	4010794	0.000174251	0.000174251	8.87096E-06
99	Edgecumbe WWTP	Bay of Plenty	4006554	0.00399675	0.00399675	0.000203471
100	Te Puke WWTP	Bay of Plenty	4002596	0.00657	0.00657	
101	Fonterra Edgecumbe	Bay of Plenty	4006879	0.000313262	0.000219284	0.00012872
103	Feilding Meatworks	Horizons	7036806	0.021524125	0.016143094	0.001196614
104	Awahuri Wastewater Treatment Plant	Horizons	7038167	0.000625676	0	
105	Bulls Wastewater Treatment Plant	Horizons	7035710	0.001342207	0.001342207	0.000209898
106	Dannevirke Wastewater Treatment Plant	Horizons	7036883	0.000206219	0	0
107	Eketahuna	Horizons	7047175	0.000412392	0	
108	Feilding WWTP	Horizons	7037436	0.001947742	0.000973871	0.000954394
109	Foxton	Horizons	7042502	0.002592548	0	
110	Halcombe Wastewater Treatment Plant	Horizons	7034546	0.002734868	0	
111	Huntermville Wastewater Treatment Plant	Horizons	7030743	0.000118065	0.000118065	5.52432E-05
112	Kimbolton Wastewater Treatment Plant	Horizons	7033139	0.00009855	0	
113	Mangaweka Wastewater Treatment Plant	Horizons	7027525	0.000508419	0.000508419	2.58832E-05
114	Marton Wastewater Treatment Plant	Horizons	7033767	0.012464604	0.012464604	0.000591063
115	National Park Wastewater Treatment Plant	Horizons	7008712	6.4029E-05	6.4029E-05	

116	Norsewood Wastewater Treatment Plant	Horizons	7033682	0.00017658	0.00017658	4.24948E-05
117	Ohakune Wastewater Treatment Plant	Horizons	7016830	1.60199E-05	1.60199E-05	
118	Ormondville Wastewater Treatment Plant	Horizons	7034342	4.65375E-05	4.65375E-05	1.60965E-05
119	Pahiatua	Horizons	7041617	0.000357434	3.57434E-05	0.000310598
120	Palmerston North Wastewater Treatment Plant	Horizons	7040210	0.011866907	0.011866907	0.010311933
121	Pongaroa Wastewater Treatment Plant	Horizons	7044816	0.000041537	0.000041537	1.28772E-05
123	Raetihi Wastewater Treatment Plant	Horizons	7017619	0.002534509	0.002534509	0.00012903
124	Rangataua Wastewater Treatment Plant	Horizons	7017318	0.001677869	0.001677869	0.000148732
125	Ratana Wastewater Treatment Plant	Horizons	7032364	0.000411536	0	0
126	Riverlands Industrial wastewater	Horizons	7035710	0.000391462	0.000293596	1.27007E-05
127	Rongotea Wastewater Treatment Plant	Horizons	7038035	0.000605296	0	0
128	Sanson Wastewater Treatment Plant	Horizons	7036362	0.002300691	0	0
129	Taihape	Horizons	7024391	0.007336456	0.007336456	0.000194317
130	Taumarunui	Horizons	7005367	0.001180101	0.001180101	0.00057986
131	Tokomaru WWTP	Horizons	7042204	0.000121291	0.000121291	7.10821E-05
132	Waiouru	Horizons	7018474	1.93946E-05	1.93946E-05	
134	Woodville Wastewater Treatment Plant	Horizons	7039335	0.000635915	0.000635915	0.000176933
148	Kapiti Coast Paraparaumu Wastewater Treatment PI*	Wellington	9004327	7.86153E-05	7.86153E-05	
150	Martinborough	Wellington	9012599	0.000206035	0	
151	Featherston	Wellington	9010254	0.00515088	0.000309053	
158	Hamilton	Waikato	3016614	0.74314	0.557355	
159	Tuakau/PP	Waikato	3006510	0.083959768	0.062969826	0.03696342
160	Te Awamutu	Waikato	3022460	0.049510981	0.049510981	0.002520559
161	Cambridge	Waikato	3020349	0.0780735	0.058555125	0.003974651
162	Te Kuiti	Waikato	3030722	0.815153709	0.815153709	0.041498734
163	Tokoroa	Waikato	3027829	0.000351249	0.000351249	1.78817E-05
164	Huntly	Waikato	3012631	0.032603344	0.032603344	0.001659807

165	Ngāruawāhia	Waikato	3014648	0.078461866	0.078461866	0.003994422
166	Otorohanga	Waikato	3026044	0.26437945	0.26437945	0.013459317
167	Te Kauwhata	Waikato	3010099	0.000839493	0	
168	Meremere	Waikato	3007650	0.005054056	0.005054056	0
170	Kinleith	Waikato	3032654	0.001825	0.001825	9.29091E-05
171	Te Rapa dairy	Waikato	3016182	0.0876	0.051421384	0.051421384
172	Te Awamutu dairy	Waikato	3022604	0.000151148	8.87241E-05	8.87241E-05
174	Horotiu meatworks	Waikato	3015715	0.010251994	0.010251994	2.36767E-05
175	Hautapu dairy	Waikato	3020349	0.000567087	0.000567087	0.000332881
176	Tuakau rendering	Waikato	3007039	0.008056873	0.008056873	1.86071E-05
177	Morrinsville	Waikato	3015051	0.002185607	0.002185607	0.000111267
178	Thames	Waikato	3004855	0.023298624	0.023298624	0.001186112
179	Te Aroha	Waikato	3012421	0.04494597	0.04494597	0.002288158
180	Paeroa	Waikato	3009393	0.000670253	0.000670253	3.4122E-05
181	Matamata	Waikato	3018774	0.011326042	0.011326042	0.000576598
182	Waihi	Waikato	3010378	0.000126938	0.000126938	6.46227E-06
183	Putaruru	Waikato	3023358	0.00106169	0.00106169	5.40497E-05
184	Ngatea	Waikato	3007167	0.005791967	0.005791967	0.000294864
185	Tirau	Waikato	3022101	1.61749E-05	1.61749E-05	8.23448E-07
186	Kerepehi	Waikato	3007748	0.000471596	0.000471596	2.40085E-05
187	Turua	Waikato	3006257	0.00109438	0.00109438	5.57139E-05
188	Waihou	Waikato	3013292	0.032964825	0.032964825	0.001678209
189	Tahuna	Waikato	3011917	0.000361176	0.000361176	1.83871E-05
190	Waitakaruru	Waikato	3005937	0.00036113	0.00036113	1.83848E-05
192	Waitoa dairy	Waikato	3014083	0.000365	0.000365	0.000214256
193	Tirau dairy	Waikato	3022141	0.000365	0.000365	0.000214256
194	Te Aroha meat	Waikato	3013367	0.124084756	0.124084756	0.000286571
195	Waitoa poultry	Waikato	3014297	3.15204E-05	3.15204E-05	7.27955E-08

196	Waitoa meatwork	Waikato	3014540	0.077745	0.000305357	0.00017955
197	Morrinsville dairy	Waikato	3015245	0.000365	0.000365	0.000214256
198	Tatuanui dairy	Waikato	3014083	0.000365	0.000365	0.000214256
199	Paeroa meatworks	Waikato	3010020	0.00046894	0.00046894	1.08301E-06
200	Waharoa dairy	Waikato	3017357	0.0000146	0.0000146	8.57023E-06
201	Wellsford WWTW	Auckland	2001055	0.000432163	0.000432163	0.000253681
202	Warkworth WWTW	Auckland	2001734	0.000392511	0	0
204	Outlet of Seddon Sewage Treatment plant	Marlborough	11023219	0.000119777	0.000119777	6.09775E-06
216	Contaminants to Water (other than CMA)	West Coast	12010411	0.000929919	0.000929919	4.73413E-05
222	Contaminants to Water (other than CMA)	West Coast	12020164	0.002678688	0.002678688	0.00013637
234	Contaminants to WW	West Coast	12026261	0.000632363	0.000632363	0.000032193
273	Contaminants to WW	West Coast	12027966	0.024662138	0.024662138	0.001255527
310	Contaminants to Water (other than CMA)	West Coast	12028515	0.975767594	0.975767594	0.00225351
327	Contaminants to WW	West Coast	12033274	0.000313262	0.000313262	0.000183886
352	Contaminants to Water (other than CMA)	West Coast	12051382	0.001092722	0.001092722	5.56295E-05
354	Collingwood wastewater treatment plant	Tasman	10000596	5.15525E-05	5.15525E-05	3.02614E-05
355	Takaka wastewater treatment plant	Tasman	10002421	0.000252059	0.000252059	0.000147959
356	Tapawera wastewater treatment plant	Tasman	10014462	8.88458E-05	8.88458E-05	5.21527E-05
357	Murchison wastewater treatment plant	Tasman	12011296	0.000108809	0.000108809	6.38709E-05
358	St Arnaud wastewater treatment plant	Tasman	12010792	9.69626E-05	9.69626E-05	5.69172E-05

## Draft Regional Targets for the Horizons Region

### Introduction

The National Policy Statement for Freshwater Management (as amended in August 2017) directs all regional councils to set draft regional targets to improve the quality of fresh water, so they are suitable for primary contact more often. This information sheet has been prepared to meet this requirement. “Primary contact” includes swimming, and means people’s contact with fresh water that involves immersion in the water. Being suitable for primary contact more often includes improvements in water quality from one state to another (for example, orange to yellow, yellow to green, or green to blue).

All regional councils have worked together to use the best information available, to identify:

- The improvements that will be made to water quality in rivers and lakes, in the Horizons Region, under programmes that are planned or underway
- When the anticipated water quality improvements will be achieved
- The likely costs of all interventions, and where these costs will fall

A report on these theoretical improvements and costs, presented region by region, is available [here](#). The assumptions and limitations of the modelling approaches taken are described in the report.

### Regional context and focus

The overall swimmable state of the Horizons Region’s rivers is 43 percent swimmable (that is, 43 percent of rivers that are fourth order, or larger are in the blue, green or yellow category in terms of *E. coli*). For lakes with perimeters greater than 1500 metres, 55 percent are in the blue, green or yellow category in terms of cyanobacteria based on the status quo.

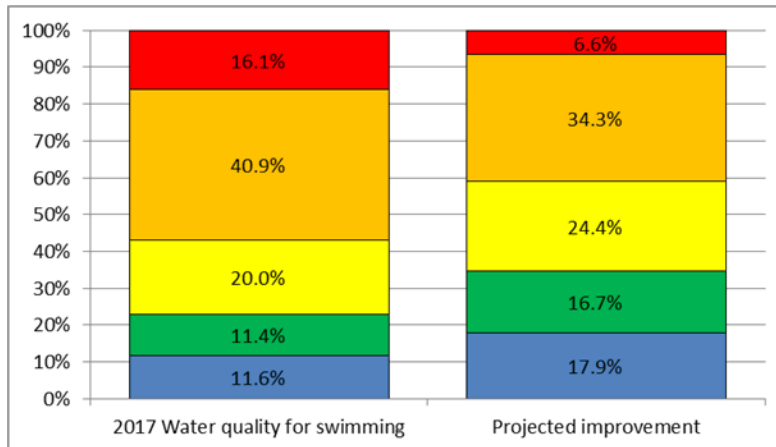
The One Plan already contains swimmability targets. Our existing policy is that the suitability our rivers and lakes for contact recreation be maintained or enhanced. There are methodological differences in how “swimmability” is measured, and the One Plan’s targets are not tied to specific dates – but they do apply to *all* rivers and lakes across the Region.

We also monitor 80 swim spots for bacteria (such as *E. Coli* and Cyanobacteria for lakes and rivers) each summer, from 1 November until 30 April. The swim spot results help us identify areas that need some extra work and where improvements are happening. Water quality trends across the Region for January 2007 to December 2016 show an improvement in *E. coli* trends at 17 percent of sites (for which there was ten years of data). No site showed a deteriorating trend. The Manawatu River, which is often thrust into negative limelight, is showing a 19 percent improvement for *E. coli*. Horizons was also recently awarded with a New Zealand River Award for the Whangaehu River due to improving *E. coli* trends. For more information on swim spots, [click here](#).

Measures like supporting farm plans, targeting action on highly erodible land, upgrading point source discharges, reducing the impacts of intensive land use, and fencing and planting stream margins, can effectively improve water quality. Horizons’ Sustainable Land Use Initiative (SLUI), jointly funded by central government, ratepayers and landowners, aims to reduce erosion, improve water quality, and increase the resilience of the regional economy. This initiative includes tree planting and ‘retiring’ erosion prone land by fencing it off and letting it revert to shrub or native forest.

### Draft regional targets

The primary contact draft regional targets for the Horizons Region, based on the modelling of programmes underway, are for 60 percent of rivers and lakes to be swimmable by 2030. It has not been possible to model, on a regional scale, the impact of programmes already underway to improve the swimmability of our lakes. For rivers, this target is an improvement of 14 percent from the current state, and reflects an annual commitment of around \$12.6 million by the community.



Projected improvement of water quality for swimming in Manawatū–Whanganui rivers

### Regional process from here

Freshwater management is a high priority for our communities, central government, and Horizons Regional Council. We are seeing improvement in water quality in our Region – and the programmes we have in place will continue to deliver improvements, as these swimmability projections show.

Improving water quality is a result of the collective efforts of many parties, both voluntarily and through regulation. We believe that continued improvement is to be achieved by working together with local communities, in each of our catchments, to develop a broad-based action plan.

Our next phase of work will focus on the outcomes we all want, the changes that will be needed, and actions we can take to achieve both. It won't be focused on regulation – however will, in time, inform amendments to the One Plan and address the requirements of the National Policy Statement for Freshwater Management (NPS-FM).

We need broad-based plans that communities and stakeholders stand behind. And we need to be able to adjust our plans as we learn more about our freshwater systems and which interventions work best. That means working together.

Work is underway to plan for Our Freshwater Future. The first of the catchment processes will start in the second half of 2018. To find out more, [click here](#).



Report No.	18-39
Information Only - No Decision Required	

## **COUNCILLORS' WORKSHOP ATTENDANCE - 6 FEBRUARY 2018 TO 21 MARCH 2018**

### **1. PURPOSE**

- 1.1. This item is to note the Councillors' Workshop Attendance from 6 February 2018 to 21 March 2018.

### **2. RECOMMENDATION**

It is recommended that Council:

- a. receives the information contained in Report No. 18-39 and Annex.

### **3. SIGNIFICANCE**

- 3.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Craig Grant  
**GROUP MANAGER CORPORATE & GOVERNANCE**

### **ANNEXES**

- A Councillors' Workshop Attendance



**HORIZONS REGIONAL COUNCIL**  
**COUNCILLORS' WORKSHOP ATTENDANCE**  
(for the period)  
**6 February 2018 to 21 March 2018**

Date / Time	Details	Councillor Attendance
10.00am 28 February 18	<ul style="list-style-type: none"> <li>- Explaining Impact of Revaluation on Rates</li> <li>- Representation Review</li> <li>- Scheme reserves funding / debt</li> </ul>	Present: Cr J Barrow Cr D Cotton (via audio visual) Cr EB Gordon Cr R Keedwell Cr P Kelly Cr G McKellar Cr NJ Patrick Cr P Rieger Cr B Rollinson Cr C Sheldon Cr WK Te Awe Awe  Apologies: Cr L Burnell
10.00am 7 March 18	<ul style="list-style-type: none"> <li>- HRC land ownership / leased land</li> <li>- Issues of artesian bores and access to water</li> <li>- TA expired consents – policy development</li> </ul>	Present: Cr J Barrow Cr L Burnell Cr D Cotton Cr EB Gordon Cr R Keedwell (via audio visual) Cr G McKellar Cr NJ Patrick (via audio visual) Cr P Rieger Cr B Rollinson Cr C Sheldon Cr WK Te Awe Awe  Apologies: Cr P Kelly

Report No.	18-40
<b>Information Only - No Decision Required</b>	

## AFFIXING OF THE COMMON SEAL

### 1. PURPOSE

- 1.1. This paper reports on documents to which Horizons Regional Council's Common Seal has been affixed.

### 2. RECOMMENDATION

That the Council:

- a. **acknowledges** the affixing of the Common Seal to the below mentioned documents.

### 3. FINANCIAL IMPACT

- 3.1. There is no additional financial impact.

### 4. COMMUNITY ENGAGEMENT

- 4.1. The community is able to see this information either in the agenda or on the Council's website.

### 5. COMMENT

- 5.1. The Common Seal has been affixed to the following documents:

a. **Under Chief Executive's Delegated Authority:**

- Warrant Card - Authorised Officer / Enforcement Officer  
- Sarah Carswell
- Warrant Card - Enforcement Officer  
- Jesse Mackayla Brennan
- Caveator Consent  
Surrender of FR 9197423.1  
Manawatu-Whanganui Regional Council (the Caveator)  
Caveat registered 9164527.1  
Refer seal – 506365 - 506369
- Forestry Right  
Grantor: Robert David Silk, Joan Evelyn Silk, and Feildmart Trustee Co Ltd  
Grantee: Manawatu-Whanganui Regional Council
- Term Loan Agreement  
Lender: Manawatu-Whanganui Regional Council  
Borrowers: Robert David Silk, Joan Evelyn Silk, and Feildmart Trustee Co Ltd

- Deed of Variation of General Security Agreement  
The Debtor: Robert David Silk, Joan Evelyn Silk, and  
Feildmart Trustee Co Ltd  
The Secured Party: Manawatu-Whanganui Regional Council
- Warrant Card - Enforcement Officer
  - Andrew David Howard
- Warrant Card – Enforcement Officer
  - Jeffrey Stuart Graham

b. **Under Urgency:**

Nil

c. **To be Approved:**

Nil

## 6. SIGNIFICANCE

- 6.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Craig Grant  
**GROUP MANAGER CORPORATE & GOVERNANCE**

## ANNEXES

There are no attachments to this report.

Report of the seventh meeting of the tenth triennium of the Environment Committee held from 9.00am to 9.04am and from 10.10am on Tuesday 13 February 2018, in the Tararua Room, Horizons Regional Council, 11-15 Victoria Avenue, Palmerston North.

**PRESENT** Crs GM McKellar (Chair), JJ Barrow, LR Burnell QSM, DB Cotton, EB Gordon JP (ex officio), RJ Keedwell, PJ Kelly JP, NJ Patrick (via audio visual link from 9am to 12pm and from 1.20pm to 1.58pm), PW Rieger QSO JP, CI Sheldon, and WK Te Awe Awe.

**IN ATTENDANCE** Chief Executive Mr MJ McCartney  
Committee Secretary Mrs B Gillespie

**ALSO PRESENT** At various times during the meeting:  
Mr R Strong (Group Manager River Management), Ms A Matthews (Science & Innovation Manager), Dr N Peet (Group Manager Strategy & Regulation), Mr G Bevin (Regulatory Manager), Mr R Smillie (Biodiversity, Biosecurity & Partnerships Manager), Dr J Roygard (Group Manager Natural Resources & Partnerships), Mr C Davey (Environmental Programme Coordinator-Plants), Ms C Morrison (Media & Communications Manager), Ms J Kamke (Scientist Water Quality), Dr A MacDiarmid (National Institute of Water and Atmospheric Research), and a member of the press.

The Chair opened the meeting and explained that the meeting would adjourn for approximately an hour to allow for the Catchment Operations Committee to open and address several items.

The Chair invited Cr Te Awe Awe to say a Karakia.

## **APOLOGIES**

**ENV 18-55 Moved Keedwell/Cotton**  
*that the Committee receives an apology from Cr Rollinson.*  
**CARRIED**

## **PUBLIC FORUMS / DEPUTATIONS / PETITIONS**

There were no requests for public speaking rights.

*The meeting adjourned at 9.04am.*

*The meeting reconvened at 10.10am.*

The Chair advised that due to severe weather conditions at Auckland Airport, Ms Saunderson, Chief Executive of Keeping New Zealand Beautiful, would be unable to attend the meeting. Therefore, the presentation at Item 7 of the Agenda would be re-scheduled to the April 2018 Environment Committee meeting.



**ENV 18-57**      **Moved**      **Patrick/Barrow**

*That the Committee recommends that Council:*

- a. *receives the information contained in Report No. 18-05 and Annex.*
- b. *acknowledges the services of Mr Joe Martin to Horizons Regional Council and predecessor organisations over the past 46 years, thanks him for his contribution to the community, and passes on their very best wishes for his retirement.*

**CARRIED**

## **SCIENCE & INNOVATION PROGRESS REPORT**

*Report No 18-06*

This item introduced the Science and Innovation Progress report for the period 1 November to 31 December 2017. Ms Matthews (Science & Innovation Manager) introduced the report and provided an overview of the Monitoring and Research programmes. She noted that the Swimmability Campaign had been very successful this year, communication had been good and public enquiries were up on last year. There had been some issues around signage, and comments and feedback provided by the public would be taken on board. There had been some pressure on staff with unexpected events such as the fire at the Levin depot, and the Ohakea water contamination. Dr Roygard (Group Manager Natural Resources & Partnerships) responded to Members' questions about concerns relating to the potential contamination risk to water supplies, and food contamination, as a result of foam used in firefighting exercises at the Ohakea air force base. He said signage about the health risks associated with the harvesting of watercress from the area would be raised with health officials. The Environmental Protection Authority was investigating whether other sites had been contaminated by the use of firefighting foam. The Chief Executive commented on the details of a government communication plan to set up a call centre where the community could access information about the Ohakea contamination.

Dr Roygard responded to questions about the water metering model used by Horizons whereby equipment for the water meters was purchased by the farmer, with the telemetry equipment purchased and owned by Horizons. Investment would be made into replacing some older equipment which would reduce time spent on breakdown and repairs.

Ms Matthews responded to Members' questions about the promotion of water safety in association with the Summer Swimmability Campaign. She said water safety was a high priority for Council, and said staff worked closely with relevant partners around water safety. Dr Roygard said sites across the Region were assessed for any risks. Where a high risk had been identified, the swim spot signage had been moved to a safer swim area. Signage at swim spots had been updated and the Horizons website promoted good water safety practices.

Ms Matthews introduced Dr Alison MacDiarmid from the National Institute of Water and Atmospheric Research who spoke to a presentation about the Coastal Work Programme. She highlighted the large coastline of the Region and the lack of seabed mapping. She said ocean acidification was one of the biggest threats along with global warming to all Horizons catchments. Sixteen information gaps had been identified and the report suggested a two phase approach to filling those gaps.

In response to questions regarding phosphorous leaching from land to rivers and ocean, Dr MacDiarmid advised that wind and tidal flows would help disperse large concentrations. Dr MacDiarmid responded to questions around funding sources available for future research.

Dr Roygard advised that the research into sediment tracing should provide results by the end of the financial year, and would provide a good baseline for future programmes.









Report of the eighth meeting of the tenth triennium of the Catchment Operations Committee held from 9.05am to 10.07am and from 2.05pm on Tuesday 13 February 2018, in the Tararua Room, Horizons Regional Council, 11-15 Victoria Avenue, Palmerston North.

**PRESENT** Crs DB Cotton (Chair), JJ Barrow, LR Burnell QSM, EB Gordon JP (ex officio), RJ Keedwell, PJ Kelly JP, GM McKellar, NJ Patrick (via audio visual), PW Rieger QSO JP, CI Sheldon, and WK Te Awe Awe.

**IN ATTENDANCE** Chief Executive Mr M McCartney  
Committee Secretary Mrs JA Kennedy

**ALSO PRESENT** At various times during the meeting:  
Mr R Strong (Group Manager Operations), Dr J Roygard (Group Manager Natural Resources and Partnerships), Mr P Joseph (Area Engineer Central), Mr G Cooper (Environment Manager Land), Mr M Guy (Land Management Co-ordinator Whanganui), Ms C Morrison (Media & Communications Manager), Mrs C Hesselin (Senior Communications Advisor), and a member of the press.

The Chair welcomed everyone to the meeting and thanked Cr McKellar (Chair, Environment Committee) for adjourning the meeting to accommodate the Catchment Operations Committee meeting.

#### **APOLOGIES**

**COP 18-57** *Moved* **Rollinson/McKellar**  
*that the Committee receives an apology from Cr Rollinson.*  
**CARRIED**

#### **PUBLIC FORUMS / DEPUTATIONS / PETITIONS**

There were no requests for public speaking rights.

#### **SUPPLEMENTARY ITEMS**

The Chair noted the Supplementary Item "Lower Manawatu Scheme Reserves" which had been distributed separately to Members.

#### **MEMBERS' CONFLICTS OF INTEREST**

There were no conflicts of interest declared.

#### **CONFIRMATION OF MINUTES**

**COP 18-58** *Moved* **Keedwell/Gordon**  
*That the Committee:*  
**confirms** the minutes of the Catchment Operations Committee meeting held on 12 December 2017 as a correct record, and notes that the recommendations were adopted by the Council on 19 December 2017.  
**CARRIED**





## MEMBERS' QUESTIONS

In response to questions and comments about the findings of a report commissioned by the Waikato Regional Council which found that large numbers of native eels were being killed while swimming through Council-run pumping stations, Dr Roygard (Group Manager Natural Resources & Partnerships), indicated that a report on the impacts to fish species in the Horizons Regional Council's pumping systems, including possible solutions, would be prepared.

The meeting closed at 2.45pm.

Confirmed

\_\_\_\_\_  
CHAIR

\_\_\_\_\_  
GROUP MANAGER RIVER MANAGEMENT

\_\_\_\_\_  
GROUP MANAGER NATURAL RESOURCES  
AND PARTNERSHIP

Report of the fourth meeting of the tenth triennium of the Passenger Transport Committee held at 10.00am on Tuesday 20 February 2018, in the Tararua Room, Horizons Regional Council, 11-15 Victoria Avenue, Palmerston North.

**PRESENT** Crs RJ Keedwell (Chair), EB Gordon JP (ex officio), PJ Kelly, NJ Patrick (via audiovisual link), PW Rieger, QSO JP, CI Sheldon, N Gimblett (Horowhenua District Council), B Barrett (Palmerston North City Council), C Ash (Rangitikei District Council), G Young (Whanganui District Council).

**IN ATTENDANCE** Manager Transport Services Mr P Hindrup  
Group Manager Regional Services and Information Mr G Shirley  
Committee Secretary Mrs JA Kennedy

**ALSO PRESENT** At various times during the meeting:  
Mrs K Curry (Senior Transport Planner), Mrs D Webber (Transport Officer), Ms L Shirley (Senior Transport Planner), Mrs D Monks (Total Mobility Coordinator), Ms J Anderson (Transport Planner), Mrs M Smith (Communications Advisor), Mr L Rohloff and Mrs M Williams (Horowhenua GreyPower), Mr J Godfrey (member of the public), members of the public, and a member of the Press.

The Chair welcomed everyone to the meeting.

#### **APOLOGIES**

**PT 18-27** *Moved* **Keedwell/Kelly**  
*that the Committee receives an apology from Ms T Hunt (Manawatu District Council).*  
**CARRIED**

#### **PUBLIC FORUMS / DEPUTATIONS / PETITIONS**

The Chair had approved two requests for a deputation: one from Mr Jonathan Godfrey, and one from Mr Lew Rohloff and Mrs Margaret Williams (Horowhenua Grey Power).

#### **SUPPLEMENTARY ITEMS**

There were no supplementary items to be considered.

#### **MEMBERS' CONFLICTS OF INTEREST**

There were no conflicts of interest declared.



## DEPUTATIONS

**Mr Jonathan Godfrey** introduced himself, and explained he was the National President for Blind Citizens New Zealand. On a personal basis he wished to voice his frustration, and also share information based on interactions with other disabled people, who were equally frustrated, in regard to the Total Mobility (TM) Scheme. He said he felt 'blocked' from addressing the Passenger Transport Committee, and believed prior to any decisions being made in regard to TM issues, the voice of disabled people, or their representative organisation, be heard in future consultation processes. Mr Godfrey believed that the public transport systems across New Zealand did not cater for the needs of disabled people, commented on the inadequacy of the TM subsidy, and outlined several anomalies and limitations to TM users with the current voucher book system. He commented positively on the introduction of the new electronic card system.

The Chair thanked Mr Godfrey for his deputation.

**Horowhenua Grey Power Association, Mr Lew Rohloff and Mrs Margaret Williams.** Mr Rohloff read out his deputation which had been distributed to Members. He explained Grey Power's recommendations to explore enhancements for the remainder of the Levin to Waikanae trial bus service, and to introduce an 'off-peak' Levin to Palmerston North bus service.

The Chair thanked Mr Godfrey for his deputation.

## CONFIRMATION OF MINUTES

**PT 18-28**                      **Moved**    **Gordon/Rieger**

*That the Committee:*

**confirms** the minutes of the Passenger Transport Committee meeting held on 17 October 2017 as a correct record, and notes that the recommendations were adopted by the Council on 25 October 2017.

**CARRIED**

## WHANGANUI URBAN BUS SERVICE REVIEW - UPDATE

*Report No 18-19*

This item updated the Committee on progress of the Whanganui Urban Bus Service Review, sought approval for the changes and improvements to the Whanganui Urban Bus Service to be included in the request for tender, sought agreement to implement public holiday services from 1 July 2018 (prior to contract renewal), and sought approval for an extension to the current contract to 6 October 2019, following the New Zealand Transport Agency's (NZTA) announcement extending the completion date for the National Land Transport Plan (NLTP) to 31 August 2018. Ms Shirley (Senior Transport Planner) introduced the report. She summarised the changes recommended for the Whanganui Urban Service (Para 7.2), referred Members to the updated timetables for both weekdays and Saturdays (para 7.6), and said the approximate cost of implementing all options was \$88,483, less the 51% subsidy from NZTA. She explained that the commencement of public holiday services was an improvement that could be implemented under the current contract. She elaborated on the recommendation to extend the current contract to October 2019, and the timeline outlining the tender process and key steps leading up to the commencement of the new contract. Transport staff responded to Members' questions about the communications strategy to keep the Whanganui community aware of the timeline, provided clarification on the NZTA subsidy, and explained the mechanisms in place for bus operators to target increased patronage.

**PT 18-29**

**Moved**

**Gordon/Rieger**

*Gordon/Rieger*

*That the Committee recommends that Council:*

- a. receives the information contained in Report No. 18-19 and Annex.*
- b. approves the recommended changes and/or improvements to the Whanganui urban bus service and associated costs included in this item and directs staff to commence the tender process.*
- c. approves the commencement of public holiday services (aligning with the current Saturday timetable and excluding Good Friday, Easter Sunday, ANZAC day and Christmas day) from 1 July 2018.*
- d. approves a further extension to the current contract to 6 October 2019, to enable sufficient time for any changes approved under b. to be incorporated into all relevant strategic documents prior to the tender process commencing and to provide for the recommended nine month lead in time prior to the new contract starting.*

**CARRIED**

## **PASSENGER TRANSPORT ACTIVITIES REPORT 1 JULY - 31 DECEMBER 2017**

*Report No 18-20*

This item updated Members on the performance of contracted public transport services for the period 1 July to 31 December 2017. Mrs Curry (Senior Transport Planner) took Members through the service improvements made to the Palmerston North bus services and explained the impact of those improvements on expenditure. Although there was a decline in the fare box due to the gross cost of the service increasing, she explained that this was expected to recover over time. Mrs Curry guided Members through the tables in the report outlining the performance of the various bus services and noted that the rate of decline in patronage was slowing. She commented on the pleasing success of the Unlimited Access Scheme for the Institute of the Pacific United New Zealand, with participation secured for the 2018 calendar year. She took Members through the graphs detailing performance for the Palmerston North bus service Improvements, and other contracted bus services throughout the region. Mrs Curry said SuperGold Card usage remained strong across all services, and she noted the marketing and promotional activities focused on raising public awareness for a number of services and improvements across the network. Members provided their comments on the various contracted transport services and questions were responded to by the Transport Team. A suggestion was made to include reporting of data on any complaints / issues received from the public in regard to the bus services provided.

The Chair thanked Transport staff for their useful and detailed report.

**PT 18-30**

**Moved**

**Gordon/Kelly**

*That the Committee recommends that Council:*

- a. receives the information contained in Report No. 18-20.*

**CARRIED**

**REPORT ON TOTAL MOBILITY AND HEALTH SHUTTLE ACTIVITIES FOR 1 JULY – 31 DECEMBER 2017**

*Report No 18-21*

This report informed Members of the performance of Total Mobility (TM) and Health Shuttle services from 1 July to 31 December 2017, and also received information on a review of the maximum subsidies for Total Mobility. Mr Hindrup (Manager Transport Services) introduced Mrs Monks (Total Mobility Coordinator) who guided Members through the content of the report. She referred to paragraph 7.1 which detailed the TM passenger figures for the first six months of the financial year. She commented on the Small Passenger Services (SPS) contracts and applications currently being worked through, and explained the In-vehicle camera requirements for SPS. Mrs Monks explained the planning considerations currently underway for the transition to the Ridewise electronic card system which was expected to 'go live' on 1 September 2018. She commented on expenditure for Health Shuttles which remained steady. Mr Hindrup commented on the TM subsidies provided in each area in our Region, as well as subsidies offered in other regions. He signalled that with the implementation of Ridewise, a more comprehensive review of the subsidies could be undertaken. Members' questions and comments in regard to anomalies with the current TM subsidy rate and voucher book system, raised during Mr Godfrey's earlier deputation, were responded to by the Transport Team. To reflect the discussion, Members agreed to amend recommendation (b).

**PT 18-31**                      **Moved**    **Rieger/Sheldon**

*That the Committee recommends that Council:*

- a. *receives the information contained in Report No. 18-21.*
- b. *notes the information received on the maximum fare subsidy will be reviewed once six months of data has been received from the new ticketing system.*

**CARRIED**

**PASSENGER TRANSPORT WORK PROGRAMME 2018**

*Report No 18-22*

This item update Members on the Passenger Transport Work Programme for 2018. Mrs Curry (Senior Transport Planner) introduced the item. She explained that with the number of retenders during the year, an additional Passenger Transport Committee meeting had been scheduled for August 2018. She commented on the discussion points outlined for the Public Transport Services Advisory Group for Palmerston North (para 5.7). In response to Members' questions, Mrs Curry explained the transition / communications marketing plan for the Regional Integrated Ticketing System.

**PT 18-32**                      **Moved**    **Gordon/Kelly**

*That the Committee recommends that Council:*

- a. *receives the information contained in Report No. 18-22.*

**CARRIED**

**MEMBERS' QUESTIONS**

There were no Members' questions.

The meeting closed at 11.43am.

Confirmed

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MANAGER TRANSPORT SERVICES

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CHAIR



## Public Excluded Section

### RECOMMENDATION

That the public be excluded from the remainder of the Council meeting as the general subject matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48 (1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution follows.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public, as follows:

General subject of each matter to be considered	Reason for passing this resolution	Ground(s) under section 48(1) for the passing of this resolution
PX1 Confirmation of Public Excluded Meeting held on 14 March 2018	s7(2)(h) - the withholding of the information is necessary to enable the local authority to carry out, without prejudice or disadvantage, commercial activities.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX2 Potential use of s.24A of the Resource Management Act	s7(2)(g) – the withholding of the information is necessary to maintain legal professional privilege.  s7(2)(i) – the withholding of the information is necessary to enable the local authority to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations).  This paper covers material that could be the subject of legal action / discussion and could prejudice negotiations.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX3 Lake Horowhenua Restoration Update	s7(2)(h) - the withholding of the information is necessary to enable the local authority to carry out, without prejudice or disadvantage, commercial activities.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7
PX4 Council / Committee to consider whether any item in the Public Excluded minutes can be moved into the public domain and define the extent of the release		
PX5 Members' Questions		