Consents Hearing
17 September 2024

Meridian Energy Limited - APP-20233670

Appendices

Table of Contents

Attachment 1

TECHNICAL REPORT OF RAMON STRONG

Before the Decision Marker(s) appointed by the Southland Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF The application by Meridian Energy Limited to undertake works at the Mararoa Weir described as the Manapōuri Lake Control Improvement Project

Section 42A Officer's Report

Report of: Ramon Blair Strong

Date of Report: 10 August 2024

INTRODUCTION

Background

1. This report forms part of the Southland Regional Council's (Environment Southland's) assessment of the application by Meridian Energy Limited (the applicant or MEL) to excavate a channel immediately upstream of the Mararoa Weir to improve Lake Manapōuri (the Lake or Lake) flushing of the Waiau River (referred to as the Manapōuri Lake Control Improvement Project).
2. This report provides the decision-makers with advice related to information provided by the applicant in regard to the likely physical effects associated with the proposed activity.
3. My name is Ramon Strong and I have been engaged by Environment Southland (ES) to provide evidence related to the physical environment and the potential effects associated with the works proposed. I am currently employed as Technical Director Water Resources by environmental engineering consultancy Pattle Delamore Partners Limited (PDP) based in Invercargill, a position I have held since March 2022.
4. I hold a Batchelor's Degree in Civil Engineering from the University of Canterbury, conferred in May 1994. My area of expertise is primarily in the areas of river engineering and flood management, with secondary skills in geotechnical engineering and general civil engineering.
5. That experience encompasses both regional sector (operational management/ leadership roles with Environment Southland, Horizons and Otago Regional Councils) and consulting environments. I have previously been co-lead for the River Managers Special Interest Group (regional sector SIG) and currently am an elected member of the NZ Society On Large Dams (NZSOLD) management committee.
6. In March of this year PDP provided Emergency Management Southland with advice related to the State of Emergency declaration for the Bluecliffs settlement immediately west of the Waiau River mouth; the apparent impacts to that community associated with river mouth offsetting to the west.
7. That advice specifically addressed the question of whether further attempts to 'open' the mouth (cut the gravel bar with earthmoving machinery to relocate the mouth from it's offset

position to the west to one in line with the lower reach of the river) were likely to be successful. The advice concluded that the likelihood of success was low.

8. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with the code when giving evidence to the decision-makers in this matter. All of my evidence is within my area of expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.
9. I visited the site on 3 May 2024 and am familiar with the site and surrounding environment. I also participated in a workshop with the applicant and their technical advisors held at the applicants Christchurch offices on 16 February 2024 and attended the relevant parts of the pre-hearing meetings that took place on 19 June 2024.

SCOPE OF THIS REPORT

10. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer or consultant to provide a report to the decision-maker(s) that summarises an assessment of a resource consent application and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A of the RMA "*any information or advice that is relevant and reasonably necessary to determine the application*".
11. This report is supplementary to the Section 42A report prepared by Bianca Sullivan for ES in relation to the application. In preparing this report I have considered the following information provided by the applicant including:
    a. Tonkin and Taylor Limited report titled “Proposed Manapōuri Lake Control Improvement Project – Resource Consent Applications and Assessment of Effects on the Environment” dated December 2023 (reference 1019502 v.1).
    b. DamWatch Engineering Limited report titled “Proposed Manapōuri Lake Control Improvement Project – Construction Planning – Proposed Methodology” dated 19 December 2023 (reference E2243, Issue # 3).
    c. Land Water People Limited report titled Manapōuri Lake Control Improvement Project – Groundwater Assessment dated October 2023.
    d. Tonkin and Taylor letter titled “APP-20233670 – Manapōuri Lake Control Improvement Project Response to post-lodgement queries” dated 15 March 2024 (reference 1019502).
    e. Shore Processes and Management Limited memorandum titled “Manapōuri Lake Control Flow Improvement Project (MLCIP)- c s92 information” dated May 2024.
12. In this report I will address:
    a. The context and physical environment as it relates to the application.
    b. The information provided by the applicant.
    c. The likely physical impacts of the works proposed.
    d. Submissions.

DRIVERS FOR THE WORKS PROPOSED

13. The application fully describes the context as it applies to both the Manapōuri Power Scheme (MPS) and the activity proposed (the Manapōuri Lake Control Improvement Project) and this is not repeated here.
14. The Mararoa River effectively forms part of the MPS with the construction of the Mararoa Weir (the Manapōuri Lake Control Structure or MLC), enabling both the level of the Lake to

be controlled and Mararoa River flow to be partly or fully (depending on a range of dynamic factors relating to MPS operation) captured for generation purposes.

15. Construction of the MLC was not, at the time, accompanied by other measures to direct bed load (the coarser fraction of the sediment load entrained by the Mararoa River when in flood) through the MLC. Accordingly, most if not all of that bed load has accumulated in the Waiau Arm immediately upstream of the MLC, evident both visually on site and with the survey data contained in the application.
16. Presumably the implications of that deposition (reduction in Lake outflow via the MLC, particularly at low flows) has become apparent over time and accordingly Meridian have progressively constructed measures (a rock rip-rap training line along the true right margin of the Mararoa River immediately upstream of the MLC, referred to as the training line) to improve the conveyance of that bedload directly to the Waiau River.
17. The Mararoa River derived gravel and other sediment deposited in front/ immediately upstream of the MLC prior to the construction of the full training line continues to impede outflow from Lake Manapōuri particularly at low lake levels.
18. MEL are proposing to excavate a channel along the true (when facing downstream) left margin of the Waiau River immediately upstream of the MLC to improve the conveyance between the Lake and the MLC to improve that low lake level conveyance, rather than remove the deposited material, largely on the basis of both cost and environmental effects (sediment discharge – the limited ability to control that discharge while excavating in flowing water).

ASSESSMENT OF ADVERSE EFFECTS

19. Points of clarification in regard to the Assessment of Effects contained in the application (the AEE) are contained in letter from ES to MEL dated 13 May 2024. My opinions on the application and the AEE are also informed by the discussion with MEL and their advisors that took place on 16 February 2024.
20. The application does not articulate the quantitative argument for the works as well as it could have eg a more detailed analysis of the recorded lake level dataset, sensitivity analysis that demonstrates that the channel dimensions proposed are optimised, but I don't consider those matters are material in evaluating the overall efficacy of the works proposed ie the modelling work and qualitative arguments contained in the application sufficiently outline the case for the works proposed.
21. In regard to specific/ identifiable gaps in the application in regard to physical effects/ processes those are as follows.
22. Potential for the excavated channel to be impacted by flood flow breakout from the lower reach of the Mararoa River. The postulated mechanism for that was flood flow breakout on the true right of the Mararoa River immediately downstream of Weir Road following an old river course. Impacts would be potentially most pronounced if that occurred when Lake levels were low.
23. MEL's technical advisers confirm that modelling indicates that this is possible but that the proposed channel dimensions are such that it was "not expected to cause significant scour erosion damage to the new channel"[1]. MEL and advisers were also of the view (16 February workshop) that the likelihood of an extreme event in the Mararoa River occurring when lake levels were low was unlikely given the nature of the respective catchments.

[1] Third paragraph, Section 9, Tonkin and Taylor letter dated 15 March 2024 titled APP-20233670 - Manapōuri Lake Control Improvement Project Response to post-lodgement queries

24. Contouring of the fill deposition area could address this matter definitively but in my opinion the particular set of circumstances required have a sufficiently low probability and consequential impacts sufficiently small for this to be discounted as a consideration with the application.
25. Note that I don't consider possible backwater effects on the lower reach of the Mararoa River to be a potential effect warranting consideration.
26. The second matter (related to physical effects) contained in the Request for Further Information covered the assumptions made in relation to excavation material type and contingency plans if this differs from that assumed. MEL were of the view that substantial variation from that assumed was unlikely and sufficient flexibility existed with the stockpile area to cater for such variances (in particular less 'alluvium' and more 'clay'). In my opinion both are reasonable assumptions based on the sediment composition likely to be encountered with the excavation and the size of the stockpile area.

SUBMISSIONS

27. 14 submission on the application were received by ES with a number received from Bluecliffs residents or parties acting on their behalf. Bluecliffs is a small settlement located beside the mouth of the Waiau River at Te Waewae Bay. The properties are located on a terrace edge adjoining the hāpua[2] west of the coastal reach of the Waiau River. River mouth offsetting to the west has the potential to result in erosion of that terrace edge through a combination of coastal and fluvial processes.
28. The main contention in those submissions relates to that mouth offsetting – that the Manapōuri Lake Control Improvement Project has the potential to exacerbate that erosion.
29. While not in agreeance with all of the content provided by Dr Martin Single (adviser to MEL around river and coastal processes – Appendix A of the MEL Request for Further Information response dated 4 June 2024) I generally agree with the following excerpt from his memorandum: "In my opinion this [the more reliable Waiau River flushing regime that will result from the Manapōuri Lake Control Improvement Project] will not contribute to erosion at the coast".
30. In my opinion those effects will be minimal, given the nature of the flushing flows, the likely conditions that will prevail when the effects will be most pronounced (dry/ low flow) and the attenuation between the MLC and the coast.

OTHER MATTERS

31. The 16 February 2024 workshop also covered the stability of the cut slopes with the channel proposed and the basis for those. The impression conveyed at the workshop was that cut slope angle hadn't been subject to specific consideration through stability analyses but that 3 horizontal to 1 vertical (3H:1V – equivalent to 18.4 degrees) was sufficiently conservative.
32. This consideration relates to assumptions around soil type encountered with the excavation – a greater presence of clay has potential implications but the impacts (slumping of the excavation sides) are unlikely to have any significant impacts (reduction in conveyance or sediment discharge).
33. The pre-hearing discussion also traversed sill height as a means for achieving greater conveyance at low lake levels. MEL contends that conveyance between the Lake and the

[2] A hapua is a river-mouth lagoon on a mixed sand and gravel beach, formed at the river-coast interface where a typically braided, although sometimes meandering, river interacts with a coastal environment that is significantly affected by longshore drift [Wikipedia].

MLC is the critical consideration and that matters related to sill height are secondary; sill height only warrants consideration once the channel enlargement work has been completed and has been in operation for a reasonable length of time to determine it's effectiveness (notwithstanding the likely accuracy of the modelling work completed by the applicant[3]). I concur with that view/ approach.

SUMMARY

34. Although the supporting technical work perhaps does not spell out clearly enough the rationale for the specifics of the activity proposed (eg hydraulically the rationale for the particular channel dimensions proposed) the high-level narrative contained in the application is in my view sufficient to justify both the approach proposed and the consideration of alternatives. I see no alternative in regard to the option proposed in improving river conveyance to enable flushing flows for the Waiau River downstream of the MLC when the Lake level is low and in my opinion potential physical effects are both relatively limited and small scale.

[3] Appendix C, Assessment of Effects on the Environment – DamWatch Report dated 19 December 2023 titled Proposed Manapōuri Lake Control Improvement Project Construction Planning – Proposed Methodology.

Attachment 2

TECHNICAL REPORT OF DR MIKE THORSEN

Before the Decision Marker(s) appointed by the Southland Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF The application by Meridian Energy Limited to undertake works at the Mararoa Weir described as the Manapōuri Lake Control Improvement Project

Section 42A Officer's Report

Report of: Michael James Thorsen

Date of Report: 13 August 2024

INTRODUCTION

Background

1. This report forms part of the Southland Regional Council's (Environment Southland's) assessment of the application by Meridian Energy Limited (the applicant or MEL) to excavate a channel immediately upstream of the Mararoa Weir to improve Lake Manapōuri (the Lake or Lake) flushing of the Waiau River (referred to as the Manapōuri Lake Control Improvement Project).
2. This report provides the decision-makers with advice related to information provided by the applicant in regard to the likely physical effects associated with the proposed activity.
3. My name is Michael Thorsen and I have been engaged by Environment Southland (ES) to provide evidence related to the physical environment and the potential effects associated with the works proposed. I am currently employed as Director and Principal ecologist by sustainability consultancy Whirika Consulting Ltd based in Dunedin, a position I have held since March 2019.
4. I hold a PhD in Ecology from the University of Otago, conferred in 2010. My area of expertise is primarily in the areas of biodiversity management.
5. My experience encompasses both central government (including 17 years working for the Department of Conservation) and consulting environments (both in New Zealand and overseas). Recent relevant experience includes providing expert evidence to Oceana Gold NZ Ltd and Meridian Energy (and other commercial clients) on changes to regional and district plans and management of environmental effects of projects, scoping Nature-based solutions to help protect Westport from flooding for the West Coast Regional Council, advising the Hawke's Bay Regional Council on management of river berms, advice to Otago Regional Council, Auckland Council, Bay of Plenty Regional Council on biodiversity management, particularly in regards to Threatened species requirements of the National Policy Statement Freshwater Management, working with various Iwi/Hapu on biodiversity management in their rohe, and working with community groups including providing science advice to Predator-Free projects.

6. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with the code when giving evidence to the decision-makers in this matter. All of my evidence is within my area of expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.
7. I visited the site on 21 June 2024 and am familiar with the site and surrounding environment. I also participated in a workshop with the applicant and their technical advisors held at the applicant's Christchurch offices on 16 February 2024 and attended the relevant parts of the pre-hearing meetings that took place on 19 June and 24 July 2024.

SCOPE OF THIS REPORT

8. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer or consultant to provide a report to the decision-maker(s) that summarises an assessment of a resource consent application and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A of the RMA "*any information or advice that is relevant and reasonably necessary to determine the application*".
9. This report is supplementary to the Section 42A report prepared by Bianca Sullivan for ES in relation to the application. In preparing this report I have considered the following information provided by the applicant including:
    a. Tonkin and Taylor Limited report titled "Proposed Manapōuri Lake Control Improvement Project – Resource Consent Applications and Assessment of Effects on the Environment" dated December 2023 (reference 1019502 v.1).
    b. Tonkin and Taylor letter titled "APP-20233670 - Manapōuri Lake Control Improvement Project Response to post-lodgement queries" dated 15 March 2024 (reference 1019502).
    c. Blue Green Ecology Memo "Manapōuri Lake Control Improvement Project – pre-hearing avifauna information dated 16 July 2024.
    d. Various items tabled during pre-hearing meetings.
10. In this report I will address:
    a. The context and physical environment as it relates to the application.
    b. The information provided by the applicant.
    c. The likely physical impacts of the works proposed.
    d. Submissions.

DRIVERS FOR THE WORKS PROPOSED

11. The application fully describes the context as it applies to both the Manapōuri Power Scheme (MPS) and the activity proposed (the Manapōuri Lake Control Improvement Project) and this is not repeated here.
12. The Mararoa River effectively forms part of the MPS with the construction of the Mararoa Weir (the Manapōuri Lake Control Structure or MLC), enabling both the level of the Lake to be controlled and Mararoa River flow to be partly or fully (depending on a range of dynamic factors relating to MPS operation) captured for generation purposes.
13. Construction of the MLC was not, at the time, accompanied by other measures to direct bed load (the coarser fraction of the sediment load entrained by the Mararoa River when in flood) through the MLC. Accordingly, most if not all of that bed load has accumulated in the Waiau Arm immediately upstream of the MLC, evident both visually on site and with the survey data contained in the application.

14. Presumably the implications of that deposition (reduction in Lake outflow via the MLC, particularly at low flows) has become apparent over time and accordingly Meridian have progressively constructed measures (a rock rip-rap training line along the true right margin of the Mararoa River immediately upstream of the MLC, referred to as the training line) to improve the conveyance of that bedload directly to the Waiau River.
15. The Mararoa River derived gravel and other sediment deposited in front/ immediately upstream of the MLC prior to the construction of the full training line continues to impede outflow from Lake Manapōuri particularly at low lake levels.
16. MEL are proposing to excavate a channel along the true (when facing downstream) left margin of the Waiau River immediately upstream of the MLC to improve the conveyance between the Lake and the MLC to improve that low lake level conveyance, rather than remove the deposited material, largely on the basis of both cost and environmental effects (sediment discharge – the limited ability to control that discharge while excavating in flowing water).

ASSESSMENT OF ADVERSE EFFECTS RELATING TO AVIFAUNA AND WETLANDS

17. Points of clarification in regard to the Assessment of Effects contained in the application (the AEE) are contained in a letter from ES to MEL dated 8 February 2024 and in s92 RFI dated 13 May 2024. My opinions on the application and the AEE are also informed by the discussion with MEL and their advisors that took place on 16 February 2024 and in the pre-hearing meetings on 19 June and 24 July 2024.
18. The original application contained some deficiencies which I outlined in parts of the 8 February and a subsequent s92 RFI to MEL.
19. My concerns with regards to wetlands were addressed by the Boffa response within the Tonkin and Taylor letter titled “APP-20233670 - Manapōuri Lake Control Improvement Project Response to post-lodgement queries” dated 15 March 2024 (reference 1019502).
20. At a site visit with MEL and Blue Green Ecology on 21 June 2024 the effects of the project on birds was discussed.
21. Subsequent to this visit Blue Green Ecology produced the memo “Manapōuri Lake Control Improvement Project – pre-hearing avifauna information dated 16 July 2024” at the pre-hearing meeting on 24 July 2024 which updated their previous response to the s92 RFI 4 June 2024.
22. The Blue Green Ecology memo addresses my residual concerns on the effects of the project on bird species.
23. I am of the opinion that the draft wetland consent conditions proposed by MEL in the 24 July 2024 pre-hearing meeting are adequate to address the project’s effects on the site’s wetlands.
24. I support the draft additional wording a) & b) included in the Blue Green Ecology Memo to proposed consent condition (5) and am of the opinion that this will allow effects on bird species of importance to be managed.
25. I do not believe that further consent conditions are required to address the project effects on vegetation or avifauna.

SUBMISSIONS

26. 14 submission on the application were received by ES with a number received from Bluecliffs residents or parties acting on their behalf.

27. The main contention in submissions from residents of Bluecliffs relates to that mouth offsetting – that the Manapōuri Lake Control Improvement Project has the potential to exacerbate that erosion. This matter is outside my area of expertise.
28. Of the submissions on other matters relating to vegetation and avifauna, most have now been resolved in the pre-hearing meetings.
29. The exception is the proposal to create and maintain the river-side embankment to create habitat for river birds which is considered unresolved by the Waiau Groups. In this matter I am in agreement with Blue Green Ecology in that, while this is a worthy proposal, it is not necessary for addressing the project's effects on birds. I also note that there is considerable time and expense required to design such a habitat suitable for the local conditions and that ongoing maintenance, particularly to keep it clear of vegetation, would be required. MEL have indicated that they are not prepared to progress this proposal and I see no reason to challenge that view. In addition the MCLIP Landscape Assessment by Boffa Miskell Ltd included in the AEE states that the final form be finished in sinuous organic shapes which reflect natural elements and these are likely to be used at times by some bird species (when not inundated) - a view supported by Blue Green Ecology.

OTHER MATTERS

30. There are no other matters I am aware of.

SUMMARY

31. The initial AEE did not fully explore the potential effects on the site and surrounding area's vegetation and avifauna. The proposed MEL project occurs in a setting where there are highly important ecological values in the surrounding area and therefore additional information and clarification was requested. Subsequent amendments to the application have resulted in satisfying me that the potential effects of the project on vegetation and avifauna have been adequately evaluated and that the non-trivial effects can be managed by way of the proposed consent conditions.

Attachment 3

TECHNICAL REPORT OF DR GREG BURRELL

Before the Decisions Makers appointed by the Southland Regional Council

IN THE MATTER OF The Resource Management Act 1991

AND

IN THE MATTER OF The application by Meridian Energy Limited to undertake works at the Mararoa Weir, described as the Manapōuri Lake Control Improvement Project

Section 42A Officer's Report (Ecology)

Report of: Dr Greg Burrell

Date of Report: 16 August 2024

INTRODUCTION

1. This report forms part of Southland Regional Council's (Environment Southland's) assessment of the application by Meridian Energy Limited (the applicant or MEL) to excavate a channel immediately upstream of the Mararoa Weir to improve Lake Manapōuri flushing of the Waiau River (referred to as the Manapōuri Lake Control Improvement Project).

2. My name is Gregory Peter Burrell and I have been engaged by Environment Southland (ES) to provide freshwater ecology and water quality expertise for this hearing. I am a freshwater ecologist with 26 years of professional experience in freshwater management, aquatic resource surveys, restoration, and applied research. I hold the following university qualifications: Bachelor of Science, Post Graduate Diploma of Science, and Doctor of Philosophy (PhD) in science, all majoring in ecology and all obtained from Canterbury University. I am the owner and director of Instream Consulting and have been since 2014. Prior to that I worked at Golder Associates in New Zealand and Canada for 10 years, and prior to that I worked at other consultancies and NIWA.

3. Examples of my professional experience relevant to this hearing include: S42A reporting for Canterbury Regional Council in relation to consent applications by Meridian for the 260 MW North Bank Tunnel project (for Canterbury Regional Council); freshwater ecology lead for assessment of the proposed 1,100 MW Site C Dam on the Peace River, Canada (for BC Hydro); ecology and water quality input to appeals of the Proposed Southland Water and Land Plan (for ES); and managing fish capture and relocation prior to in-river construction activities for approximately 100 projects of varying size (mainly for GSL and CityCare).

4. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with the code when giving evidence to the decision-makers in this matter. All my evidence is within my area of expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

5. I visited the site on 3 May 2024 and am familiar with the site and surrounding environment. I also participated in a workshop with the applicant and their technical advisors held at the applicant's Christchurch offices on 16 February 2024 and attended the relevant parts of the pre-hearing meetings that took place on 19 June 2024.

SCOPE OF EVIDENCE

6. This report is prepared under the provisions of Section 42A of the Resource Management Act 1991 (RMA). This section allows a Council officer or consultant to provide a report to the decision-maker(s) that summarises an assessment of a resource consent application and allows the decision-maker to consider the report at the hearing. Section 41(4) of the RMA allows the decision-maker to request and receive from any person who makes a report under Section 42A of the RMA "any information or advice that is relevant and reasonably necessary to determine the application". This report covers lake and river ecology and water quality matters. Wetlands, birds, and plants are addressed in the S42A report of Dr Mike Thorsen.

7. This report is supplementary to the Section 42A report prepared by Bianca Sullivan for ES in relation to the application. In preparing this report I have considered the following information provided by the applicant including:

a. Tonkin and Taylor Limited report titled “Proposed Manapōuri Lake Control Improvement Project – Resource Consent Applications and Assessment of Effects on the Environment” dated December 2023 [“the AEE”].

b. NIWA report titled “Manapōuri Lake Control Flow Improvement Project. Assessment of Environmental Effects: Freshwater Ecology” dated December 2023 [Appendix D to the AEE].

c. NIWA report titled “Assessment of risk of phytoplankton blooms in the Waiau Arm immediately upstream of the MLC following excavation of a new parallel channel” dated December 2023 [Appendix E to the AEE].

d. Tonkin and Taylor letter titled “APP-20233670 - Manapōuri Lake Control Improvement Project Response to post-lodgement queries” dated 15 March 2024.

e. Meridian Energy Ltd letter titled “Manapouri Lake Control Structure Improvement Project (MLC:IP) - s 92 Response” dated 4 June 2024.

f. NIWA memo titled "Manapōuri Lake Control Improvement Project – RFI Native fish” dated 4 June 2024 [Appendix B to the Meridian letter of the same date].

g. Meridian Energy Ltd revised draft conditions dated 15 July 2024.

h. NIWA draft phytoplankton monitoring condition [Appendix B of the Session 1 Pre-Hearing report of Louise Taylor, dated 22 July 2024].

i. NIWA memo titled "Manapōuri Lake Control Improvement Project - Mid-winter fish survey and impact on fish from project construction lighting.” dated 23 July 2024 [Appendix D of the Session 1 Pre-Hearing report of Louise Taylor].

j. Meridian Energy Ltd draft Freshwater Fauna Management Plan (FFMP), received 12 August 2024.

8. This report includes the following:

a. Summary

b. Review of the applicant’s assessment

c. Submissions

SUMMARY

9. The proposed activity involves excavating a new channel in the river delta upstream of the Manapōuri Lake Control Structure (MLC), to increase water conveyance through the MLC. The goal of the proposed activity is to increase the frequency of flushing flows that can pass down the Lower Waiau River. I consider it is a reasonable assumption that this goal will be achieved, as it relies on straightforward physical principals, supported by the evidence of relevant experts.

10. Increasing the frequency of flushing flows will help improve ecological health downstream, by removing built-up fine sediment and periphyton (algae growing on the riverbed). The key question from an ecological perspective is whether the potential positive effects of the activity outweigh the associated negative effects. I agree with the applicant's experts that there will be an overall positive effect, provided various mitigation measures are put in place.

11. Overall, I consider that the draft conditions provided by the applicant give sufficient certainty that potential negative effects on water quality and aquatic ecology can be avoided, minimised, or mitigated. I also consider that the proposed conditions adequately address relevant water quality and ecological issues raised in submissions. I have indicated some areas where altered wording to the conditions would help further improve the level of certainty regarding effects.

12. I suggest an additional condition to those proposed by the applicant. The condition would state that any future maintenance works carried out under the consent can only occur if monitoring shows the initial excavation works have achieved the intended environmental goal. The intended environmental goal is reduced frequency and extent of nuisance periphyton blooms and fine sediment deposition in the Lower Waiau River.

REVIEW OF THE APPLICANT'S ASSESSMENT

Description of the Environment

13. The applicant provided a detailed description of the environment in the original application and I will not paraphrase it here. With one exception, I found their description of the existing environment to be sufficient to

understand the significance of ecological values present and the sensitivity of the receiving environment to the proposed activities. The only exception was the reliance on fish database records and recent fish sampling that targeted larger eels, rather than the full range of potential species and life stages present.

14. Up to lodging consent, there was a lack of recent comprehensive fish sampling records upstream of the MLC, near the proposed channel excavation area, or downstream, between the MLC and Excelsior Creek (i.e., the proposed mixing zone). Since lodging the consent, the applicant provided further information on 4 June 2024 to address this matter[1]. The further information included additional description of the likely fish fauna upstream and downstream of the MLC, including consideration of the potential species present, based on the type of habitat and previous fish records.

15. The applicant has since commissioned a fish survey upstream of the MLC, to better characterise the fish fauna, prior to commencing any physical works. The fish survey was conducted by NIWA in early July 2024 and a memo summarising the survey results was completed later that month[2]. In summary, the survey found four native fish species, including several juvenile lamprey (kanakana), which have conservation status of Threatened – Nationally Vulnerable. Overall, I agree with the memo author that potential effects on the fish community can be minimised by undertaking fish "salvage" (i.e., capture and relocation) prior to undertaking in-river works. Based on this additional information, I agree that there is a low likelihood of significant adverse effects on fish or other fauna, such as kākahi (freshwater mussels).

16. The applicant has volunteered a condition requiring the preparation of a Freshwater Fauna Management Plan (FFMP) prior to commencing excavation works in the water[3]. I consider that the proposed condition would result in a FFMP sufficiently robust to minimise harm to freshwater fish and other fauna.

[1] NIWA memo titled "Manapōuri Lake Control Improvement Project – RFI Native fish" dated 4 June 2024 [Appendix B to the Meridian letter of the same date].
[2] NIWA memo titled "Manapōuri Lake Control Improvement Project - Mid-winter fish survey and impact on fish from project construction lighting." dated 23 July 2024 [Appendix D of the Session 1 Pre-Hearing report of Louise Taylor].
[3] Meridian Energy Ltd draft Freshwater Fauna Management Plan (FFMP), received 12 August 2024.

17. In summary, with the supplementary information provided after lodging consent, I consider that the applicant has adequately described the freshwater environment that could be affected by the proposed activity.

Assessment of Effects

Description of the Activity

18. The proposed activity is described in full in the AEE documents. Relevant text from the executive summary of the AEE are quoted below:

    a. *The proposal involves the construction of a new channel which is parallel to, and outside the permanently active bed of, the current main channel in the Waiau Arm. Approximately 225,000 m3 of gravel and bed material, over a length of approximately 1 km, will be excavated and disposed of on Meridian-owned land near the new channel.*

    b. *The overall construction period within the January to October window is envisaged to be approximately 4 – 5 months. Within the normal operating range of the lake, the up and downstream cuts to connect the parallel channel to the current permanent bed and channel are the only excavation works which require activities in water. These are anticipated to take approximately 5 weeks if undertaken simultaneously. Out of channel excavation works are anticipated to take approximately 10 weeks. The remainder of the construction window is required for establishment, disestablishment, and rehabilitation activities. Works are proposed on a 7-days per week and up to 24 hours per day basis.*

19. Overall, I consider that the activity has been adequately described to assess effects, based on information provided in the AEE, its appendices, and further information provided by the applicant.

Positive Effects

20. The key positive effect of the proposed works will be to increase flushing flow frequency and associated removal of fine sediment and periphyton downstream. Page 8 of the AEE notes that existing flow management protocols require Meridian to provide between four and five flushing flows per summer. On the same page it states that the proposed new channel would *"…improve flushing flow reliability to approximately 70% from the existing 30% reliability."* Further detail is provided in the Appendix D of the

AEE, which notes on page 34 that over the last seven years an average of 1.5 flushing flows have been released per summer. Thus, the proposal is expected to increase the number of flushing from 1.5 to approximately 3.5 per summer. I agree with the applicant that this is clearly a positive effect that will benefit aquatic ecosystems downstream. This has the potential to be a medium to long-term benefit, with additional maintenance-level sediment removal expected by Meridian to be required in the order of 10-15 years after the original works.

Negative Effects

21. In my opinion, the key negative effect of the proposed activity is increased turbidity and fine sediment deposition during construction. Turbidity levels will be high but restricted to the relatively short period (5 weeks) when the new channel is broken through into the flowing water. Elevated turbidity can have a wide range of effects, from reduced visual amenity at low levels, to wide-ranging ecosystem effects at high levels. The applicant has proposed a range of monitoring conditions and limits for turbidity and deposited fine sediment <2 mm diameter (DFS). As outlined in the following paragraphs, I consider that the proposed turbidity and DFS limits are overly complex and may be difficult to implement, plus I am unsure they are based on valid assumptions. However, having reviewed the available information, I consider that the “long term gain” of increased flushing flow frequency outweighs the “short term pain” of increased turbidity and DFS downstream.

22. The proposed turbidity limits have been benchmarked against historic measurements in the river, with the justification that ecosystems are adapted to those values. However, as written, it appears that the proposed turbidity limits could result in more than double the historic measured values. For example, if 150 FNU was measured upstream, the consent would allow for an increase in 150 FNU, giving a total of 300 FNU, for a long period (504 hours maximum). While this derogates the scientific justification for the limits (i.e., that they are naturally occurring), I am unsure that it is of any practical significance. That is because the works will be of short duration, and it is my experience that it is very difficult to avoid large turbidity increases during in-river works in larger rivers. In my opinion, it may be more effective and practical to restrict the total amount of time in-river works can occur, as well as the number of consecutive days work can be done in the river.

23. The proposed DFS limits for the discharge consent include the requirement to establish a pre-construction baseline (condition 10), and to compare the baseline DFS with monitoring post construction (condition 11). I consider this is an appropriate, effects-based approach. However, condition 12 requires that departure from the baseline condition shall be *"…assessed proportionately between those changes occurring from turbidity generated from flows in the Mararoa River and those occurring from turbidity generated by parallel channel excavation works. This proportionality shall be calculated by subtracting the mean hourly turbidity at the UMS [upstream monitoring site] from the same mean hourly turbidity at the DMS [downstream monitoring site], and then collating all those records together into rolling periods of four weeks in accordance with Condition [11]"*. I suspect that this "proportionality" condition may be impractical. While there is a link between turbidity and fine sediment deposition, the relationship has considerable variability, or "noise". Hence, I think it better to simply compare baseline DFS data with that collected during and after the construction period. In my opinion, if there is any concern that the DFS baseline is inadequate, then the length of the baseline monitoring period should be extended.

24. A non-key negative effect is the "footprint" effect of channel excavation on fish and other freshwater fauna, due to direct physical damage or altered habitat. I consider this is not a key effect because the effect is largely avoided, by constructing most of the channel "in the dry", outside the flowing channel. In addition, effects will be minimised by capturing fish and other fauna (e.g., kākahi) within the construction footprint and relocating them upstream of the construction activities. Relocation of fish and other freshwater fauna has become standard practice for minimising construction project effects in recent years and it is appropriate in this instance. As stated in paragraph 16 above, I consider that the proposed condition would result in a FFMP sufficiently robust to minimise harm to freshwater fish and other fauna.

25. Another non-key negative effect is the increased potential for phytoplankton blooms upstream of the MLC. This risk is discussed in detail in the AEE and I agree with the applicant's assessment that it is a low probability and that it can be addressed via monitoring and flow releases, if necessary. I have

reviewed the applicant's proposed phytoplankton monitoring condition[4] and consider it adequately addresses the potential environmental risk.

Proposed Conditions

26. I have reviewed the applicant's proposed consent conditions. As indicated above, I consider that the effects of the proposed consent can be managed via conditions, subject to some refinement. Key areas that need attention are outlined in the following paragraphs.

27. Proposed condition 1 for both the water and discharge permits includes reference to the original AEE, its appendices, and responses to further information requests in its description of the activity. In my opinion, this approach makes it very difficult to track what has been consented, especially when further changes will happen through the hearing process. It would be more helpful if the design, operation, and maintenance programme are updated and attached to the consent. I appreciate that this would require some more work for the applicant, but it would provide more certainty to the decision maker and stakeholders that effects will be adequately managed.

28. I have already expressed my reservations regarding the proposed turbidity and DFS limits. As stated in paragraphs 21 to 23 above, I consider that turbidity and DFS effects can be best managed by imposing limits on the duration of instream works. The applicant will need to work with their construction experts to establish time limits that are both practical and acceptable to stakeholders.

29. The applicant has requested that the proposed consents will cover both the initial physical works and any future maintenance works. Given the level of physical disturbance caused by the physical works, I suggest that any future works under any new consents should be subject to a condition requiring evidence of the success of the original physical works, in terms of increased flushing flow frequency and reduced frequency of nuisance periphyton and fine sediment accumulations in the Lower Waiau River.

[4] NIWA draft phytoplankton monitoring condition [Appendix B of the Session 1 Pre-Hearing report of Louise Taylor, dated 22 July 2024].

SUBMISSIONS

30. Key ecology and water quality issues raised in submissions[5] included lack of information on native fish distributions, potential construction impacts on turbidity and fine sediment deposition, construction footprint impacts on threatened species (e.g., lamprey and non-diadromous native fish), and operational impacts on phytoplankton blooms in the Waiau Arm of Lake Manapōuri. As discussed above, I consider that all of these potential adverse effects have been addressed via conditions proposed by the applicant, or can be addressed via suggested changes to the proposed conditions.

[5] Relevant submissions include those from:

- Director-General of Conservation (reference APP-20233670);
- Guardians of Lakes Manapouri, Monowai and Te Anau (APP-20233670);
- Waiau Fisheries and Wildlife Habitat Enhancement Trust (APP-20203670);
- Waiau Rivercare Group (APP-20233670); and
- Waiau Working Party (APP-20233670)

Attachment 4

Reports of pre-hearing meeting 1 on 19 June 2024 (sessions 1 and 2) and pre-hearing meeting 2 on 24 July 2024, along with supporting information from Meridian

s99 Pre-Hearing Meeting Report APP-20233670 - SESSION 1

Report on pre-hearing meeting

Section 99 of the Resource Management Act 1991

From: Louise Taylor, Independent Meeting Chair

To: Sharon McGarry and Lyndal Ludlow to hear and determine the application

Application: APP-20233670 Meridian Energy Limited, Manapōuri Lake Control Improvement Project

Date: 22 July 2024

Pre-hearing meeting

1. On 19 June 2024 the Environment Southland (ES), conducting its function as consent authority under the Resource Management Act 1991 invited Meridian Energy Limited, who has applied for resource consent, and submitters on the application, to meet.

2. At that stage the application had been notified on 18 March 2024, submissions closed 17 April 2024, 14 submissions received, and submitters opposing the application indicated they wished to be heard at a hearing. The requested meeting was therefore a pre-hearing meeting held under section 99 of the RMA.

3. The meeting was held by ES at the request of Meridian Energy Limited for the purpose of clarifying a matter and facilitating resolution of a matter or issue. The meeting agenda, circulated on 13 June 2024 by ES, outlined the matters for clarification or resolution as:
   a. Terrestrial vegetation (Buchanan Sedge, Stonecrop and Wetlands)
   b. Phytoplankton Blooms
   c. Water quality – sediment
   d. Birds
   e. Fish / inverts
   f. Cultural values
   g. Other issues

4. Additional matters discussed during the meeting were:
   a. Scope of the application and associated effects
   b. Consent term
   c. The need for draft management plans

5. The meeting was held on 19 June 2024 between 9 am to 12.30 pm as follows:
   a. Location: 25 Don St, Invercargill 9810
   b. Present:
      Louise Taylor, Chair

      Applicant in-person
      Andrew Feierabend – Meridian Energy Limited (Meridian)
      Daniel Murray – Planner, expert for Meridian Energy Limited (Meridian)
      Hamish Cuthbert – Meridian Energy Limited (Meridian)
      Kate Berkett – Meridian Energy Limited (Meridian)
      Martin Single – Coastal Scientist, expert for Meridian Energy Limited (Meridian)

Submitters in-person
Paul Marshall – Waiau Rivercare Group
Claire Jordan – Waiau Fisheries, Wildlife Habitat Enhancement Trust, Waiau Working Party, and the Waiau Rivercare Group Inc.
Roger Hodson on behalf of Maurice Rodway – Waiau Working Party, Waiau Fisheries and Wildlife Habitat Enhancement Trust
Kasmira Peterson – Te Ao Marama Inc. on behalf of Oraka Aparima Rūnaka (Te Ao Marama)
Riria Hakiwai – Te Ao Marama Inc. on behalf of Oraka Aparima Rūnaka (Te Ao Marama)
Margie Ferguson - Te Ao Marama Inc. on behalf of Oraka Aparima Rūnaka (Te Ao Marama)

Note: Claire and Roger are both involved in the Waiau Fisheries and Wildlife Habitat Enhancement Trust and Waiau Working Party. Waiau Rivercare Group has similar interests. For the purposes of this meeting record, all three groups are referred to the "Waiau Groups" unless otherwise specified.

Submitters accessing remotely
Ceri Warnock – Legal Counsel, Department of Conservation (DOC)
Geoff Deavoll – Planner, Department of Conservation (DOC)
Jane Bowen – Ecologist, Department of Conservation (DOC)

Environment Southland
Bianca Sullivan – External Processing Officer (in person)
Greg Burrell – Instream Consulting (online)
Mike Thorsen – Whirika Consulting (online)
Ramon Strong – Pattle Delamore Partner (online)
Catherine Ongko – Panel Assistant

The meeting concluded at 12.30pm.

Statutory and procedural matters

Requesting attendance

6. Section 99(2) allows consent authorities to request an applicant, a submitter or any other person it considers appropriate to attend a pre-hearing meeting. This can be either at the request of the applicant or submitters or on its own initiative.

7. In this case the applicant requested the meeting to be held and for submitters to attend. ES agreed this was appropriate and advised by email on 4 June 2024 that a meeting was to be held and requested attendance to the parties listed above.

Attendance of those delegated to make decisions

8. Section 99(4) states that an officer of the authority who has the power to make the decision on the application may attend, subject to the agreement of all the parties attending and participating, and if the consent authority is satisfied their presence is appropriate.

9. No officers with delegation to determine the application were present at the meeting.

Chairperson to prepare this report

10. Section 99(5) and (6) require the chairperson of the meeting to prepare a report outlining particular matters, and to circulate that report to all of the parties and the consent authority (meaning, the commissioners or hearings panel that will hear and determine the application) no less than 5 working days before the hearing.

11. The report must, for the parties who attended the meeting:
    a. set out the issues that were agreed; and
    b. set out the issues that are outstanding

12. However, the report must not include anything communicated or made available at the meeting on a without prejudice basis.

13. In addition, the report may, for all the parties:
    a. set out the nature of the evidence that the parties are to call at the hearing; and
    b. set out the order in which the parties are to call the evidence at the hearing; and
    c. set out a proposed timetable for the hearing.

Status of this report and next steps

14. Section 99(6) requires the chairperson to send this report to the consent authority and all the parties so that they have it at least 5 working days before the hearing. At the time of writing, no parties have advised that they no longer wish to be heard, and the application has not yet been scheduled to be heard.

15. Section 99(7) **requires** the consent authority (meaning, the commissioners delegated power of the consent authority by to determine the application) to **have regard to** this report in making the decision on the application.

Matters Discussed

Scope of Consent and Associated Effects

16. Mr Feierabend presented to the group to provide context regarding the need for the works, the goals of the project and the consents sought. The presentation is attached at **Appendix A**.

17. Slide 9 listed issues that Meridian considers to be not in scope of the application and not applied for. These issues were discussed in turn:

A. Use of Lake Manapouri water to manage turbidity events in the Mararoa River

18. Concern raised by Waiau Groups that the need for the works are due to sediment present in the waterways, therefore there is a risk of deposition from these works exacerbating the issue.

19. Meridian has advised that currently, when the Mararoa is too turbid to enter Lake Manapouri, i.e. greater than 10 NTU, there is a flow released from the lake of approximately 5 cumecs to ensure the turbid Mararoa water goes through the MLC, rather than flowing into the Lower Waiau upstream of the MLC (Waiau Arm). Meridian has advised that after the works are completed, the flow in the Lower Waiau upstream of the MLC will be split, with approximately 2/3 through the new channel, and 1/3 through the existing channel.

20. Meridian noted the design of the new channel was based on the flow having a more direct alignment with the gate structure therefore reducing risks associated with sediment deposition into either the existing channels or the new channel. Meridian also explained current consent requirements relating to turbidity management meant any Mararoa River water which had a NTU of greater than 30 is required to be discharged directly to the Lower Waiau River (in accordance with MPS Consent 96022 condition 7). Operationally Meridian manages this threshold conservatively by discharging turbid Mararoa water through the MLC to ensure the 30 NTU threshold is not breached. The risk identified by the Waiau Groups was considered low and the works required to maintain the channels close to the structure will be infrequent. Meridian to produce evidence on this matter.

21. The WWP is concerned that this would see the current 5 cumecs of lake water split, with approximately 3.5 cumecs going through the new channel, and 1.5 cumecs through the existing channel when the Mararoa exceeds 10 NTU. The WWP's concern is that this reduced flow of lake water through the existing channel (1.5 cumecs rather than the current 5 cumecs) may be insufficient to ensure that the turbid Mararoa water does not enter the Lower Waiau upstream of the MLC, which may cause effects, such as sediment deposition, in the existing channel. Consequently, that the current 5 cumec flow of lake water may need to be revised. Meridian agreed to address this submission point.

Conclusion

22. It was agreed this matter is in scope and that Meridian will produce evidence on this matter.

B. Expansion of flushing flow regime to manage other issues impacting river health

23. Meridian advised there is a Protocol regarding flushing flows in place via the 2010 consents (updated in 2018). The Protocol is not being reviewed as part of this consent.

24. Waiau Groups noted that the 2010 consent required the Protocol, and the current consent provides a good opportunity to see if the Protocol is fit for purpose. The Waiau Groups seek a condition requiring a review of the Protocol, and they consider this to be within scope of this application.

25. Meridian advised they are happy to go back to the Waiau Working Party to discuss the Protocol, but it is not connected to the current application.

Conclusion

26. No agreement regarding scope although ES planner and Meridian agree not within scope.
The Council Planner commented that it was difficult to see how (and whether it would be appropriate to) apply a condition for that in this consent, as the flushing flow protocol was described under a different consent. Meridian agreed.

C. Financial Contributions when flushing flows are not provided

27. Concern from Waiau Rivercare Group, claim that Meridian gain $9m of generation revenue when flushing flows are foregone.

28. Links to point B above.

Conclusion

29. No agreement regarding scope although ES planner and Meridian agree not within scope. Council Planner commented that it was difficult to see how (and whether it would be appropriate to) apply a condition for that in this consent, as the flushing flow protocol was described under a different consent. Meridian agreed.

D. Alignment of consent expiry date with 2010 consent (i.e. 2031)

30. Waiau Groups seeks to align the expiry of the diversion consent being sought with the 2010 consents for the main scheme so all effects can be reviewed together. DOC sought a reduced term.

31. Meridian notes that the current application mainly relates to construction effects, with an ongoing diversion consent. Does not see need to align consent terms.

Conclusion

32. All parties agreed consent term is within scope of current application. No agreement as to what term the current application should be.

E. MLC Sill Height Reconstruction

33. Meridian advised that no change to the sill height is sought as part of this application.

34. Waiau Rivercare noted that Meridian could achieve higher than 70% of being able to provide flushing flow if the sill height was changed.

Conclusion

35. All parties agreed a change to the sill height is not within scope of this application.

F. Coastal Erosion

36. Potential impacts on coastal erosion from the proposed activity is a concern for Mana Whenua and other submitters.

37. Meridian (relying on Martin Single, coastal expert) considers there will be no effect on coastal processes from the proposal. Meridian do not accept coastal processes effects are within scope of this application.

Conclusion

38. Agreement by all parties that for this matter to be in scope, a submitter would need to establish that the activity being consented had a causative effect with respect to coastal erosion.

Fish Survey

39. DOC wished to confirm there will be a fish survey prior to the hearing.

40. Meridian confirmed a fish survey is planned by NIWA in early July.

41. DOC ecologist explained that a winter survey is not ideal, as fish are less active and less likely to be captured.

42. Meridian explained that the purpose of the survey is to address turbidity and sediment above the lake control structure (not below).

43. Meridian advised that a response to ES further information request covers impacts, and fish management plan.

Conclusion

44. DOC to review FI response and revert to Meridian (and ES).

45. Waiau groups happy with NIWA undertaking survey.

46. Mana whenua – may provide comment.

Draft Conditions in Response to Submissions

47. Draft conditions relating to the topics discussed below were circulated to the parties by Meridian prior to the meeting. Attached as **Appendix B.**

A. Phytoplankton Blooms

48. DOC do not take issue with the proposals to manage phytoplankton blooms.

49. Meridian noted that a review of the Waiau Arm Water Quality Monitoring programme is currently underway, and that the results will be brought back to the WWP.

50. NIWA (Appendix E) of application assesses this effects and concludes a low risk.

51. The parties discussed the condition wording.

Conclusion

52. Meridian to seek advice from NIWA regarding how to design monitoring to account for wet and dry years, and report back to the parties.

53. Waiau Groups supportive of the condition subject to accounting for wet/dry years.

B. Buchanan's Sedge

54. The parties discussed the condition wording.

Conclusion

55. All parties happy with draft condition.

C. Wetland 1

56. The parties discussed the condition wording.

Conclusion

57. All parties happy with intent – Meridian refine wording regarding Wetland Remediation Report (noted 65% is an enhancement from status quo).

Sediment

58. A key issue for many submitters:
    a. Deposited fine sediments below the Lake Control Structure
    b. Suspended sediments

59. Meridian noted there are a range of conditions proposed to manage these two aspects, including triggers if breached:
    a. Stop work
    b. Use flows from Lake Manapouri to dilute or flush sediment as required
    c. Most likely to happen when break out occurs
    d. Conditions C6-9 – turbidity (discharge permit)

e. Conditions 10 – 13 – deposited fine sediment (discharge permit)

60. Waiau Groups queried how effective the measures would be in C13, when close to break out, Meridian would need to make sure enough water is in the Lake to undertake a flush (agreed doesn't need to be a condition of consent).

61. Waiau Groups noted a subsequent deposition risk, suggested that a trigger at the existing monitoring device at Tuatapere be added

62. Meridian noted that if comply with levels set in the mixing zone, won't have a downstream risk.

Conclusion

63. No agreements reached.

Cultural Values

64. Te Ao Marama explained they have not had time to file a fulsome submission, nor have they had time to undertake a cultural impact assessment or understand impacts on cultural values from the proposal.

65. Currently they are neutral to the application.

Conclusion

66. Dialogue now underway between Meridian and Te Ao Marama with the goal to identify and resolve any impacts on mana whenua values.

Management Plans

67. Additional matters raised in DOC submission including Management Plans. Would like to see draft Management Plans prior to hearing.

68. Meridian – Management Plan are not yet drafted. They will relate primarily to construction activities which are fairly standard, and will follow a standard preparation process.

69. Te Ao Marama and Waiau Groups interested in viewing draft management plans.

Conclusion

70. Meridian consider whether to prepare draft management plans for comment prior to the hearing. ES planner advised this would be useful to ensure all required conditions are in place for ensuring mitigation measures are achieved.

Agreed Next Steps

71. Meridian circulate updated set of proposed conditions to all parties.

72. Meridian consider whether to draft management plans prior to hearing.

73. Meridian provide Memo from Dam Watch regarding hydraulic Modelling to parties.

Louise Taylor
Independent Chair of Pre hearing Meeting

Manapōuri Lake Control Improvement Project (MLC:IP)

Pre-Hearing Meeting

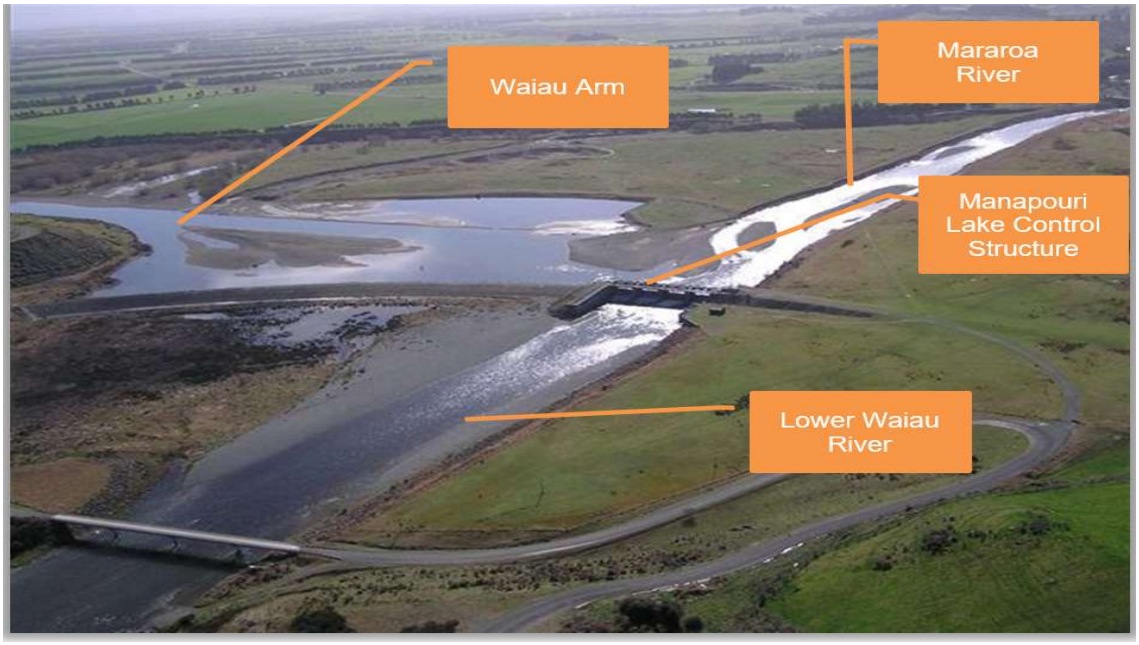
Wednesday 19 June 2024

1

Outline

- Project overview
  - Project setting
  - Flow conveyance and reliability
  - Channel constraints and preferred option
  - Construction methodology
- Resource consents and consenting scope boundaries
- Issues that are addressed via consent conditions
- Issues that are outside the scope of the application
- Questions & discussion

2



3

Flow conveyance & reliability

- Manapouri Power Scheme (MPS) operating consents contain consent conditions for the Lower Waiau River which require:
  a) seasonal minimum flows (12W -14SH -16SM cumecs)
  b) recreational flows (35 cumecs Oct – April)
  c) flushing flows delivery via a Protocol last updated in 2018
- Flushing flow protocol is focused on managing nuisance periphyton.
- Flushing flow delivery is sub-optimal; achieves approximately 30% of flushing flow protocol reliability.
- The Protocol recognises flushing flows assist with additional values that support river health.

4

Channel constraint and preferred option

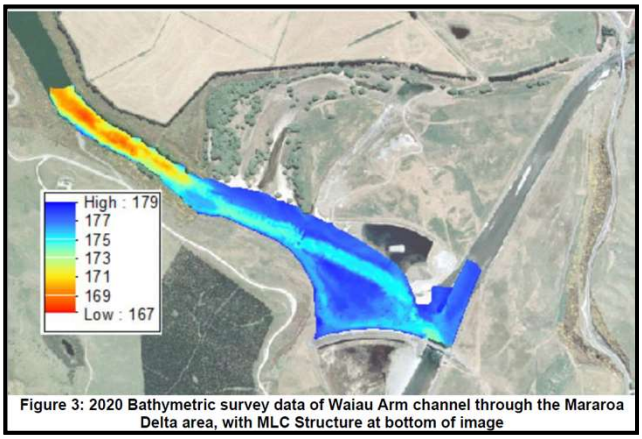
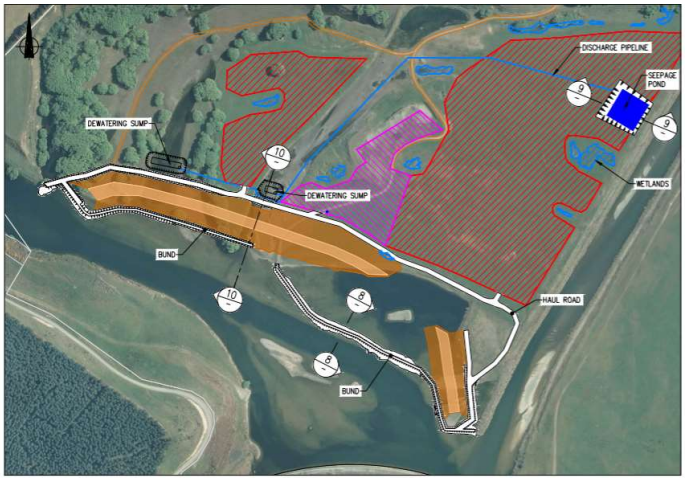


Figure 3: 2020 Bathymetric survey data of Waiau Arm channel through the Mararoa Delta area, with MLC Structure at bottom of image

- The MLC and the Waiau Arm were investigated to identify constraints to flushing flow delivery in 2020.
- Bathymetric survey confirmed that channel depth and alignment constrain flow delivery.
- Best option to remove the constraint is to construct a new parallel channel, via a permanent diversion.

Construction methodology



- Preferred methodology is based on minimising the duration of works within the wetted channel and construction impact on the environment.
- Excavation requires removal of 225,000 m^3 of material from the existing bed.
- Overall construction period of approximately 4-5 months.

Resource consents sought and consenting scope boundaries

- Project purpose: Improve the reliability of flow conveyance through the Manapouri Lake Control structure (MLC) to the lower Waiau River.
- Resource consents are sought to:
  - Permanently divert surface water into the parallel channel.
  - Temporarily take, divert, and use water for the purposes of facilitating construction and maintenance activities.
  - Temporarily discharge water and suspended sediment to enable construction and maintenance activities.
- Scope to impose conditions is restricted to the matters consent has been applied for.
  - Lake level operations are governed under MTADA.
  - Manapouri scheme consents are not affected by the MLC:IP consent application.
- The consents sought do not seek to change water allocation or flow parameters contained within the existing MPS operating consents.

7

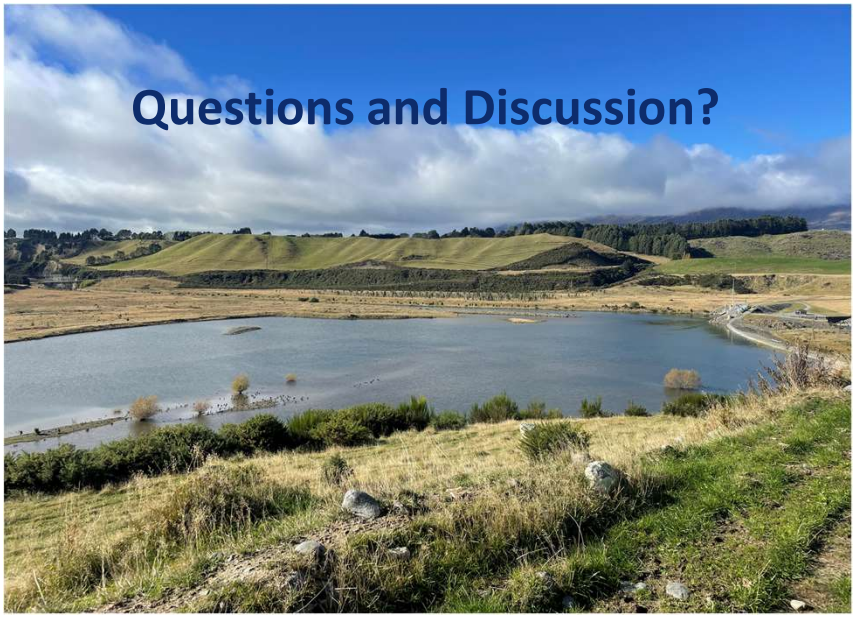
Proposed consent conditions to resolve issues requested by submitters

- General Conditions contained in the AEE (including sediment controls)
- Phytoplankton Bloom Risk Condition (new condition circulated)
- Buchanan Sedge translocation and planting (new condition circulated)
- Wetland remediation (new condition circulated)
- Stonecrop: Meridian agree to notify parties as requested and include procedures in the CEMP to ensure issue is not exported from the site.
- Avifauna: Meridian is awaiting further expert advice, and we will confirm our position on this matter via evidence. No new islands proposed as part of these consents.
- Fish: Survey to be conducted in the Waiau Arm prior to the consent hearing. Findings to be captured in expert evidence and where appropriate in the Freshwater Fauna Management Plan.

8

Issues that are not in scope or not applied for

- Use of Lake Manapōuri water to manage turbidity events in the Mararoa River
- Expansion of flushing flow regime to manage other issues impacting river health
- Financial contributions when flushing flows are not provided
- Lake level management to create flushing flows
- Alignment of consent expiry date with 2031 consent
- MLC sill height reconstruction
- Coastal erosion



Buchanan's Sedge

1. The consent holder shall undertake translocation and planting of Buchanan's sedge plants within the Project Site. The objective of translocation and planting shall be to ensure no net loss of Buchanan's sedge plants within the Project site.

   Prior to the commencement of parallel channel excavation works:

   a) Buchanan's sedge plants within the construction footprint will be transplanted into suitable habitat within the Project site but outside the construction footprint. Translocation shall follow best practice methods for transplanting sedges.

   b) Seed shall be collected from Buchanan's sedge plants within the Project site, if practicable, (or else within the Upukeroroa Ecological District) and provided to a commercial nursery to raise a minimum of 100 plants.

   Within 12 months of the completion of parallel channel excavation works, a minimum of 100 nursery-raised plants shall be planted into suitable habitats within the Project site. The number of translocated and nursery-raised Buchanan's sedge plants shall be recorded and their locations marked using a handheld GPS.

   The consent holder shall monitor the survival of translocated and nursery-raised Buchanan's sedge plants 12 months after the nursery-raised plants have been planted. Within 2 weeks of completion of the monitoring, a brief report shall be prepared by a suitably qualified and experienced ecologist with the results being provided to the Southland Regional Council Compliance Manager. The monitoring report will include:

   a) The number of surviving translocated and nursery raised Buchanan's sedge plants.

   b) A map of the locations of the translocated and nursery raised Buchanan's sedge plants.

Wetland 1

2. To remediate the removal of Wetland 1, within 12 months of the completion date of the parallel channel excavation works, the consent holder shall implement wetland remediation. The objective of wetland remediation shall be no net loss of indigenous *Juncus* rushland marsh within the Project site.

   Wetland remediation shall be achieved by:

   a) Planting *Juncus sarophorus, Juncus edgariae* and *Carex virgata* into an identified wetland remediation site with a minimum area of 200m^2.

   b) Plants shall be planted at spacings that, when mature, will achieve an overall cover of indigenous wetland plants that exceeds 65 percent vegetation cover across the wetland remediation site.

   c) The site into which these species shall be planted must meet the following criteria:

      i. Be within the area mapped as Wetland 3 (shown on Attachment XXX).

      ii. Have hydrological conditions appropriate for the long-term survival of the three plant species.

      iii. Be generally comprised of exotic grasses or herbs.

3. At a period not exceeding three years following implementation of Condition (XXX), the consent holder shall provide to the Southland Regional Council Compliance Manager a report from a suitably qualified and experienced ecologist setting out the extent to which the wetland remediation is achieving the objective in Condition (XXX) including confirmation that the overall percentage cover of indigenous wetland plant species within the wetland remediation site

exceeds 65 percent. Within three years of implementing Condition (XXX), the consent holder shall submit a Wetland Remediation report to the Southland Regional Council Compliance Manager. This report shall be prepared by a qualified ecologist and detail the progress of the wetland remediation efforts towards meeting the objectives outlined in Condition (XXX). It should specifically verify that indigenous wetland plant species cover at least 65 percent of the remediation site.

Phytoplankton blooms

1. In the first summer period (1 January to 31 March) following the completion of the parallel channel construction, the consent holder will implement a water quality monitoring programme for the detection of phytoplankton blooms in the new and existing channels. , The monitoring programme will consist of fortnightly measurements of water temperature, dissolved oxygen, water clarity, pH and chlorophyll *a* at two Representative Sites in the lower Waiau Arm over three consecutive summer periods (the 'Overall Monitoring Period'). The protocol for the monitoring programme shall be prepared by a suitably qualified expert and provided to the consent authority for its records prior to the implementation of the monitoring programme.

2. 'Representative Sites' means one site in the new channel and one site in the existing channel. The location of the Representative Sites must be agreed in writing with the consent authority prior to the implementation of the monitoring programme.

3. Within three working days of receiving notice that chlorophyll *a* has been detected in a sample at or above 5 mg/m^3, the consent holder will release a flow of 35–45 cumecs for 24 hours across the Manapouri Lake Control Structure into the Lower Waiau River.

4. If two or more chlorophyll *a* readings are detected at levels at or above 5 mg/m^3 across the Overall Monitoring Period, a review will be undertaken by a suitably qualified expert to consider whether further monitoring is required, and whether the flow release management response specified in condition [3] needs to be changed to manage an increased risk of phytoplankton blooms in the Waiau Arm which might be being caused by the new channel. If a review is required under this condition, the consent holder will provide the report to the consent authority within 6 months of the last fortnightly measurement in the monitoring programme being taken.

   Advice Note: For the avoidance of doubt, if fewer than two chlorophyll *a* readings are detected at levels at or above 5 mg/m^3 across the Overall Monitoring Period, the monitoring programme required by Conditions 1 to 3 shall cease.

s99 Pre-Hearing Meeting Report APP-20233670 - SESSION 2

Report on pre-hearing meeting

Section 99 of the Resource Management Act 1991

From: Louise Taylor, Independent Meeting Chair

To: Sharon McGarry and Lyndal Ludlow to hear and determine the application

Application: APP-20233670 Meridian Energy Limited, Manapōuri Lake Control Improvement Project

Date: 22 July 2024

Pre-hearing meeting

1. On 19 June 2024 the Environment Southland (ES), conducting its function as consent authority under the Resource Management Act 1991 invited Meridian Energy Limited, who has applied for resource consent, and submitters on the application, to meet.

2. At that stage the application had been notified on 18 March 2024, submissions closed 17 April 2024, 14 submissions received, and submitters opposing the application indicated they wished to be heard at a hearing. The requested meeting was therefore a pre-hearing meeting held under section 99 of the RMA.

3. The meeting was held by ES at the request of Meridian Energy Limited for the purpose of clarifying a matter and facilitating resolution of a matter or issue. The meeting agenda, circulated on 13 June 2024 by ES, outlined the matters for clarification or resolution as:
   a. MLCIP project effects on Bluecliffs
   b. Presentation from Martin Single

4. Additional matters discussed during the meeting were:
   a. Dialogue with Southland District Council (SDC) and ES regarding solutions to impacts of erosion at Bluecliffs

5. The meeting was held on 19 June 2024 between 1 pm to 3.30 pm as follows:
   a. Location: 25 Don St, Invercargill 9810
   b. Present:
      Louise Taylor, Chair

      Applicant in-person
      Andrew Feierabend – Meridian Energy Limited (Meridian)
      Daniel Murray – Planner, expert for Meridian Energy Limited (Meridian)
      Hamish Cuthbert – Meridian Energy Limited (Meridian)
      Kate Berkett – Meridian Energy Limited (Meridian)
      Martin Single – Coastal Geomorphologist, expert for Meridian Energy Limited (Meridian)

      Submitters in-person
      Bill Chisholm – Bluecliffs Beach Landowners Group, Environmental Consultant
      Rex Chapman – Legal Counsel
      Ian Redpath – Bluecliffs resident
      Joan Redpath – Bluecliffs resident

Kevin Stevenson on behalf of Wood, C – Bluecliffs resident
Glenn Puna – Bluecliffs resident
Uli Sirch – Bluecliffs resident
Dean Thompson – Bluecliffs resident

Environment Southland
Bianca Sullivan – External Processing Officer (in person)
Greg Burrell – Instream Consulting (online)
Mike Thorsen – Whirika Consulting (online)
Ramon Strong – Pattle Delamore Partner (in person)
Catherine Ongko – Panel Assistant (in person)

c. Apologies:
Submitter:
Richard Agnew – Bluecliffs resident
Isobel Agnew – Bluecliffs resident

The meeting concluded at 3.30pm.

Statutory and procedural matters

Requesting attendance

6. Section 99(2) allows consent authorities to request an applicant, a submitter or any other person it considers appropriate to attend a pre-hearing meeting. This can be either at the request of the applicant or submitters or on its own initiative.

7. In this case the applicant requested the meeting to be held and for submitters to attend. ES agreed this was appropriate and advised by email on 4 June 2024 that a meeting was to be held and requested attendance to the parties listed above.

Attendance of those delegated to make decisions

8. Section 99(4) states that an officer of the authority who has the power to make the decision on the application may attend, subject to the agreement of all the parties attending and participating, and if the consent authority is satisfied their presence is appropriate.

9. No officers with delegation to determine the application were present at the meeting.

Chairperson to prepare this report

10. Section 99(5) and (6) require the chairperson of the meeting to prepare a report outlining particular matters, and to circulate that report to all of the parties and the consent authority (meaning, the commissioners or hearings panel that will hear and determine the application) no less than 5 working days before the hearing.

11. The report must, for the parties who attended the meeting:
    a. set out the issues that were agreed; and
    b. set out the issues that are outstanding

12. However, the report must not include anything communicated or made available at the meeting on a without prejudice basis.

13. In addition, the report may, for all the parties:
    a. set out the nature of the evidence that the parties are to call at the hearing; and
    b. set out the order in which the parties are to call the evidence at the hearing; and
    c. set out a proposed timetable for the hearing.

Status of this report and next steps

14. Section 99(6) requires the chairperson to send this report to the consent authority and all the parties so that they have it at least 5 working days before the hearing. At the time of writing, no parties have advised that they no longer wish to be heard, and the application has not yet been scheduled to be heard.

15. Section 99(7) **requires** the consent authority (meaning, the commissioners delegated power of the consent authority by to determine the application) to **have regard to** this report in making the decision on the application.

Matters Discussed

16. Mr Feierabend presented to the group to provide context regarding the need for the works, the goals of the project and the consents sought. The presentation is attached at **Appendix A**.

17. Mr Feierabend noted that the scheme's existing consents expire in 2031, and there is currently a Regional Plan Process – the Tuatahi Plan Change which will set a flow regime and allocation. These are two important processes for the scheme, and the current application is separate.

18. Concerns were raised by Bluecliffs residents about a risk of greater number of flushes and potential effects this could have on coastal erosion.

19. Concerns were raised by Bluecliffs residents about considerably reduced flows, insufficient flushes, and sand bar closing or changing, thus impacting coast.

20. Meridian advised that the 2013 Protocol came out of the 2010 consents, and has voluntary aspects. It was always acknowledged that there will be times when the flushing flows won't be as set out in the Protocol. Comments from Bluecliffs residents that Merdian have consistently failed to achieve flushing flows in the Protocol.

21. In response to a question, Meridian advised the cost of the project is in the order of $5-7m.

22. A concern was raised about a delay in getting Meridian's response to ES's further information request to submitters.

23. Dr Single, a Coastal Geomorphologist presented on the coastal processes in play at Bluecliffs. The presentation is attached at **Appendix B**.

24. The submitters asked various questions regarding evidence of the river mouth changing location, and generally about coastal erosion and potential causes. Some residents expressed scepticism whether the examples provided by Dr Single have relevance to this situation, and whether his work has validity.

25. Meridian advised that they provide monitoring reports to ES in accordance with 2010 consents. These reports are publicly available.

26. Some but not all submitters acknowledged there is unlikely to be impacts from the proposed works on erosion processes at Bluecliffs.

27. Some submitters felt that the proposed work will have impact on the erosion process as it will allow Meridian to have more control over the flows, which they consider are a major factor in the coastal erosion process.

28. Legal Counsel, Rex Chapman, asked Meridian to consider its social licence in this location, and asked they support they work with the community regarding protection/mitigation. Options being considered are:
    a. Management retreat (estimated cost approximately $2-3m)
    b. Rock reinforcement (various costs depending on nature of structure). Dr Single and River Engineer Ramon Strong advised unless a very expensive option was designed, this solution was unlikely to last and may have significant other adverse effects on the locality.

29. All parties noted that SDC/ES are the lead agencies regarding the issues facing the Bluecliffs batches.

30. Some submitters consider that Meridian's activities are the cause of the erosion, and therefore Meridian should be required to fix the problem.

31. Meridian agreed to support the discussion where they can.

Agreed Next Steps

32. Meridian to come back to Rex Chapman (for the residents) regarding working with SDC/ES.

33. Bluecliffs submitters to consider whether they still wish to be heard at a hearing in relation to the current application. [Following the meeting, Uli Sirch confirmed she still wishes to be heard (email to ES dated 4.7.24)]

Louise Taylor
Independent Chair of Pre hearing Meeting

Manapōuri Lake Control Improvement Project (MLC:IP)

Pre-Hearing Meeting

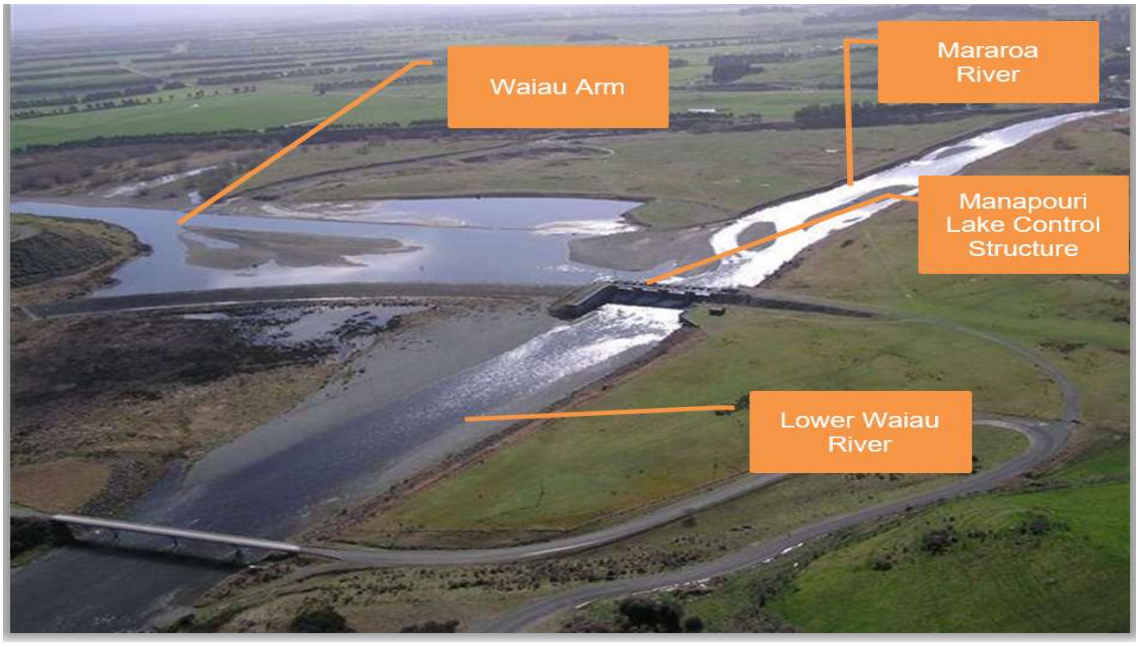
Wednesday 19 June 2024

1

Outline

- Project overview
  - Project setting
  - Flow conveyance and reliability
  - Channel constraints and preferred option
  - Construction methodology
- Resource consents and consenting scope boundaries
- Issues that are addressed via consent conditions
- Issues that are outside the scope of the application
- Questions & discussion

2



3

Flow conveyance & reliability

- Manapouri Power Scheme (MPS) operating consents contain consent conditions for the Lower Waiau River which require:
  a) seasonal minimum flows (12W -14SH -16SM cumecs)
  b) recreational flows (35 cumecs Oct – April)
  c) flushing flows delivery via a Protocol last updated in 2018
- Flushing flow protocol is focused on managing nuisance periphyton.
- Flushing flow delivery is sub-optimal; achieves approximately 30% of flushing flow protocol reliability.
- The Protocol recognises flushing flows assist with additional values that support river health.

4

Channel constraint and preferred option

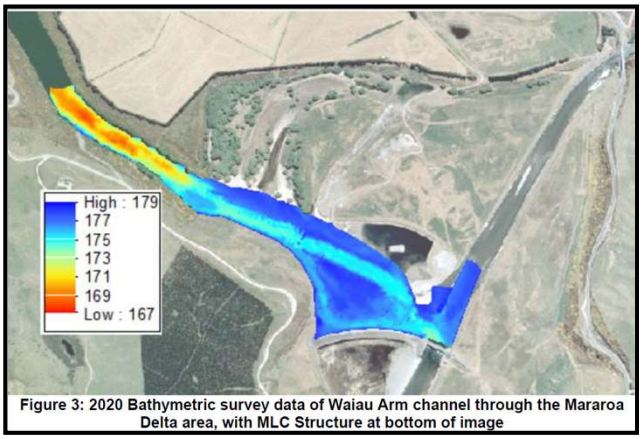
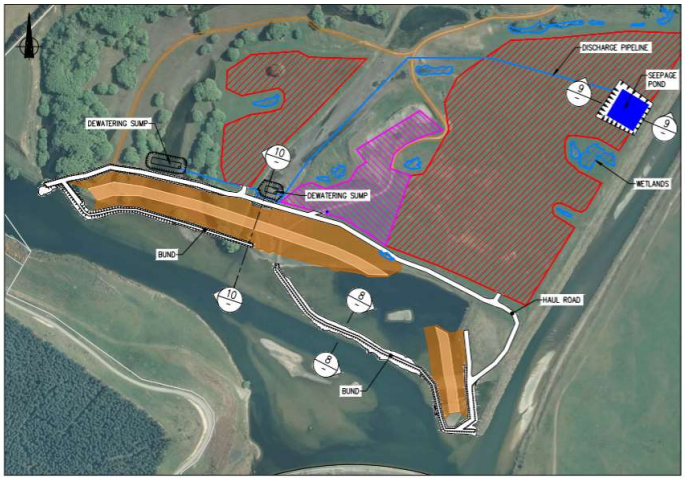


Figure 3: 2020 Bathymetric survey data of Waiau Arm channel through the Mararoa Delta area, with MLC Structure at bottom of image

- The MLC and the Waiau Arm were investigated to identify constraints to flushing flow delivery in 2020.
- Bathymetric survey confirmed that channel depth and alignment constrain flow delivery.
- Best option to remove the constraint is to construct a new parallel channel, via a permanent diversion.

Construction methodology

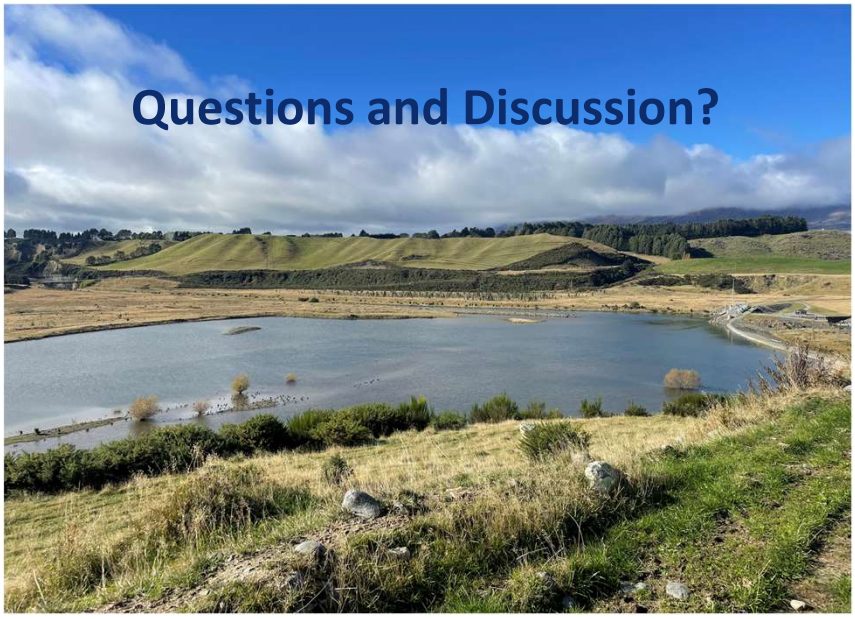


- Preferred methodology is based on minimising the duration of works within the wetted channel and construction impact on the environment.
- Excavation requires removal of 225,000 m^3 of material from the existing bed.
- Overall construction period of approximately 4-5 months.

Resource consents sought and consenting scope boundaries

- Project purpose: Improve the reliability of flow conveyance through the Manapouri Lake Control structure (MLC) to the lower Waiau River.
- Resource consents are sought to:
  - Permanently divert surface water into the parallel channel.
  - Temporarily take, divert, and use water for the purposes of facilitating construction and maintenance activities.
  - Temporarily discharge water and suspended sediment to enable construction and maintenance activities.
- Scope to impose conditions is restricted to the matters consent has been applied for.
  - Lake level operations are governed under MTADA.
  - Manapouri scheme consents are not affected by the MLC:IP consent application.
- The consents sought do not seek to change water allocation or flow parameters contained within the existing MPS operating consents.

7



8

Manapouri Lake Control Improvement Project

Waiau River mouth – physical processes

Waiau River mouth

- complex system containing two types of coastal lagoons
- waituna type lagoon to the southeast (true left of the river valley)
- hāpua type lagoon to the northwest (true right of the river valley)

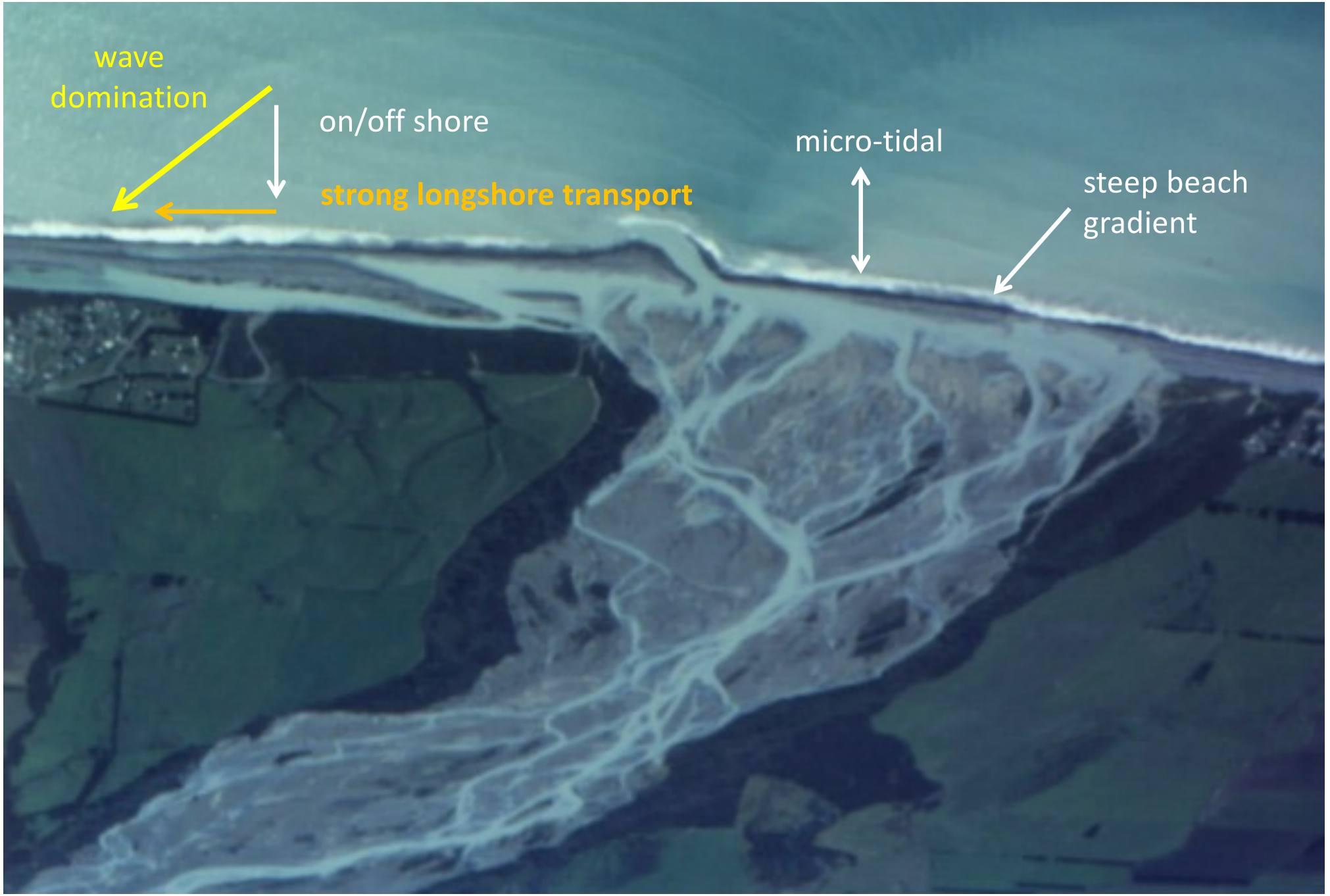
Hāpua lagoon characteristics

- barrier beach enclosed water body
- predominantly freshwater, backwater effect, no tidal prism / not estuarine
- associated with ecologically significant wetlands and human uses
- found on mixed sand & gravel, micro-tidal coasts
- ‘small’ rivers, regarding coastal sediment delivery
- high-energy coastal processes

Hāpua lagoon characteristics

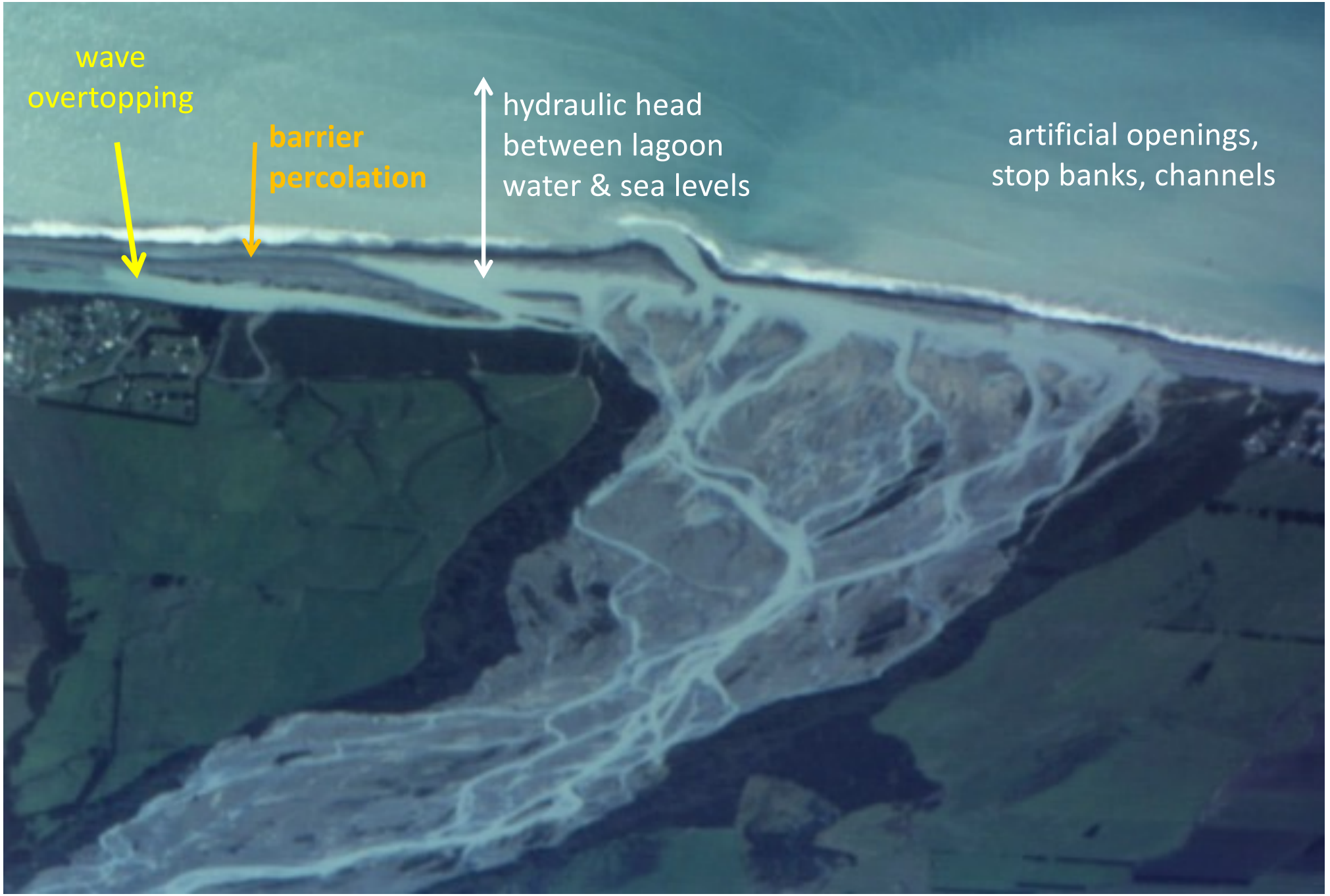
- wave dominated, except during river floods
- longshore transport builds a barrier across the river, so the river carves out a lagoon between beach & hinterland (often a cliff, or raised beach ridges)
- long-lived single outlets, short-lived multiple outlets
- naturally long-lived (able to retreat with coastal erosion and sea level rise) but change with water abstractions & dams

- Range of hāpua examples in Canterbury and Westland of various sizes and dynamic variability

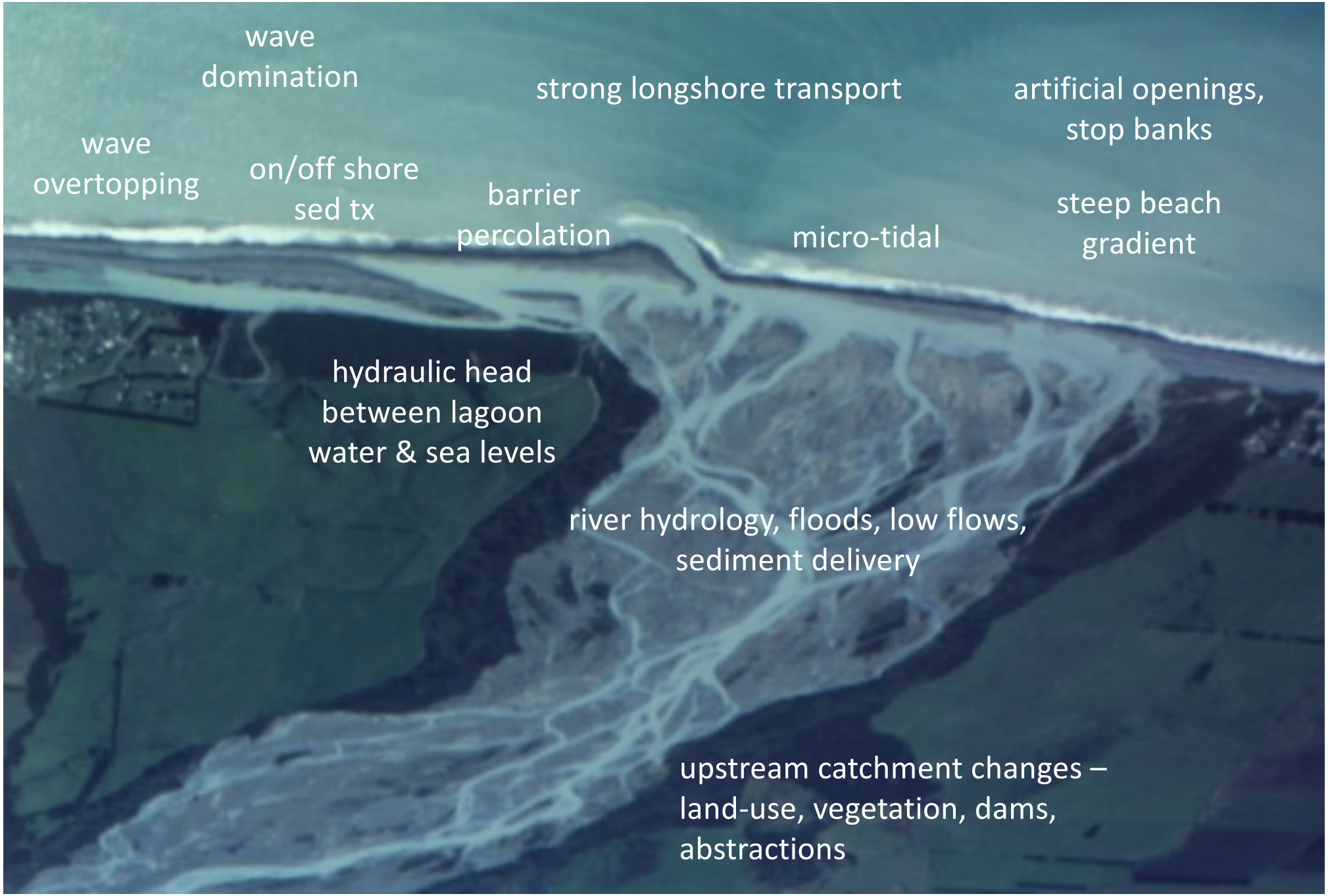


Hāpua process environment: **marine**

Hāpua process environment: **fluvial**



Hāpua process environment: **lagoonal**



Hāpua process environment = **complex balance**

- Mouth morphology is controlled by wave vs fluvial processes
- Different river flow scenarios see the mouth either being:
    1. Closed
    2. Open but offset
    3. Breaching - open during floods and often with multiple channels.

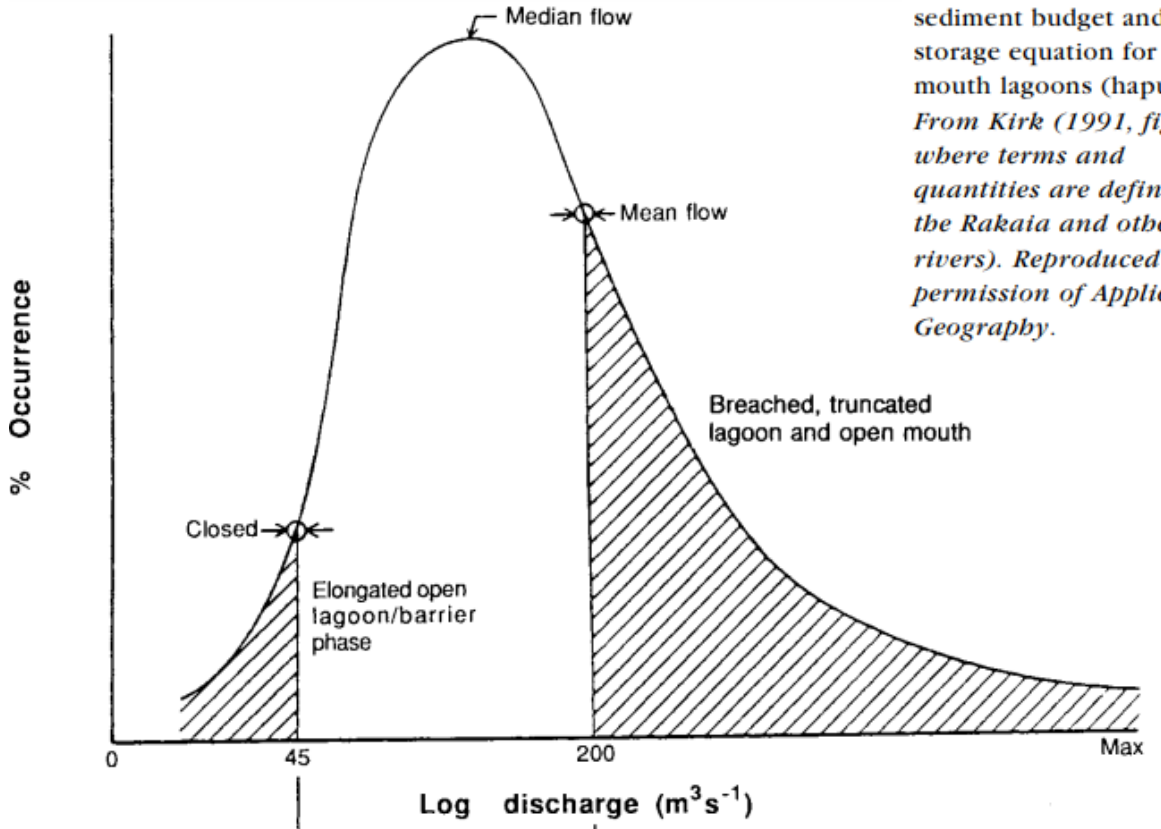
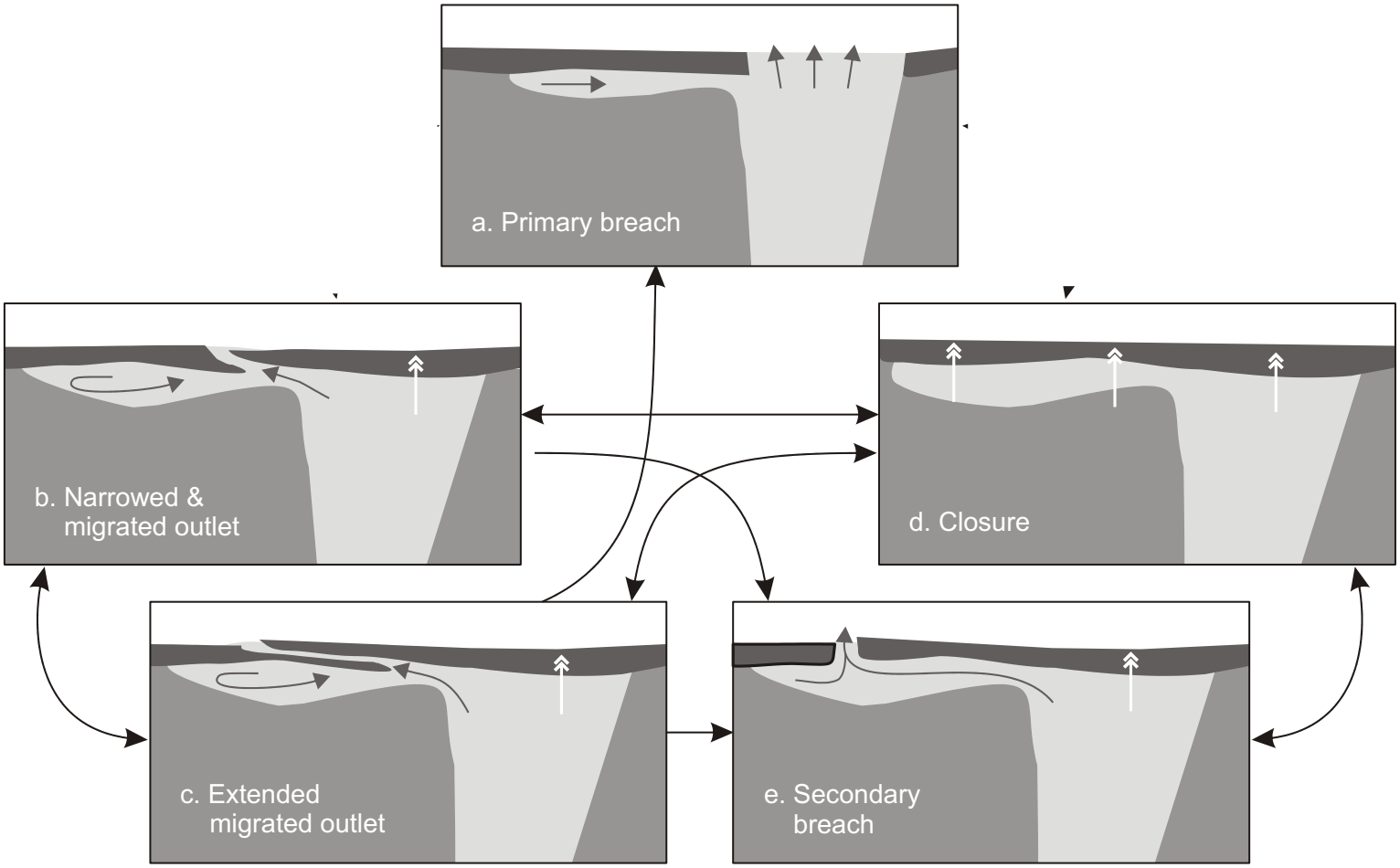


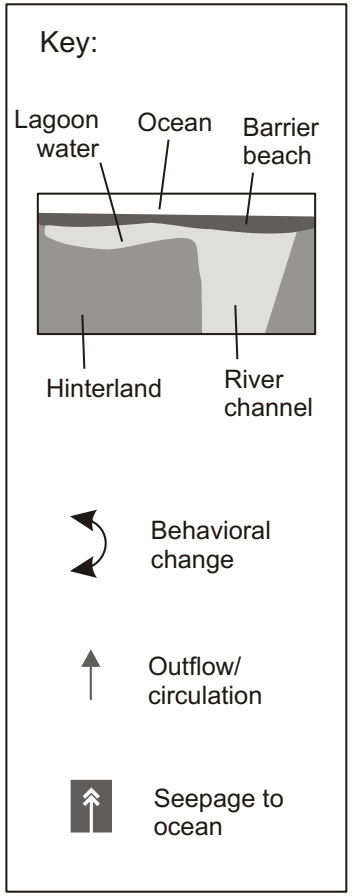
Figure 3. Schematic sediment budget and storage equation for river mouth lagoons (hapua). *From Kirk (1991, fig. 5, where terms and quantities are defined for the Rakaia and other rivers). Reproduced by permission of Applied Geography.*

River flow	Low	Moderate	High (floods)
Throughflow	Minimal	Low	High in breach phase
Mouth stability	Closed	Open to sea. Mouth migrates northward	New mouth formed by breaching. Sometimes multiple mouths
		Offset either south or north, usually to north	Deltas formed to seaward by injection of gravels to lagoon
Lagoon	Closed	Open to sea; elongates northward	Truncated. Much of low flow lagoon becomes backwater
Sedimentation	Siltation in closed lagoon (sink)	Reworking of fines sink for coarse sediments	Active source of coarse sediments to lagoon and beach
		Source/sink of fines	Scour of land adjacent to channels

Kirk and Lauder (2000)

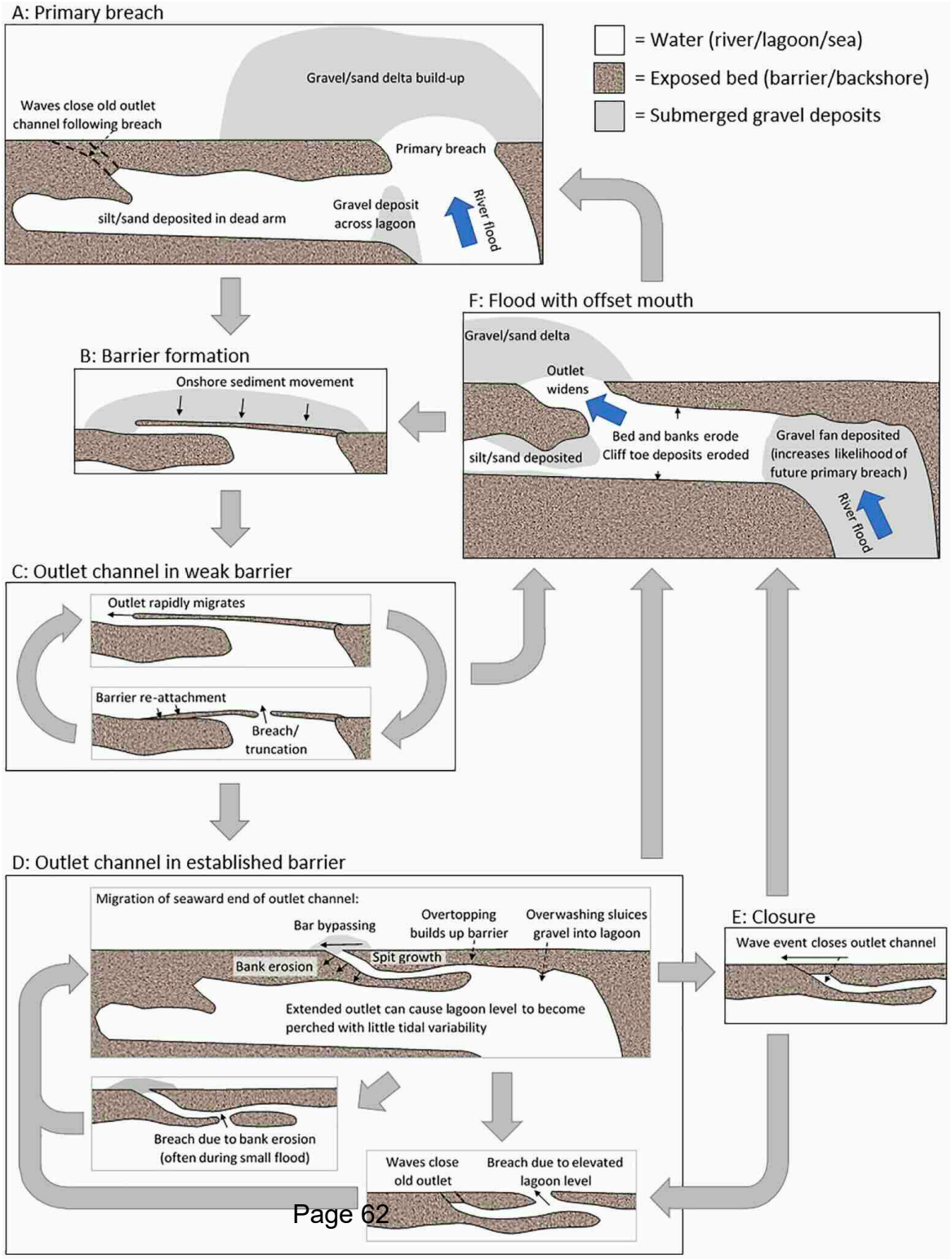
Hāpua behaviours



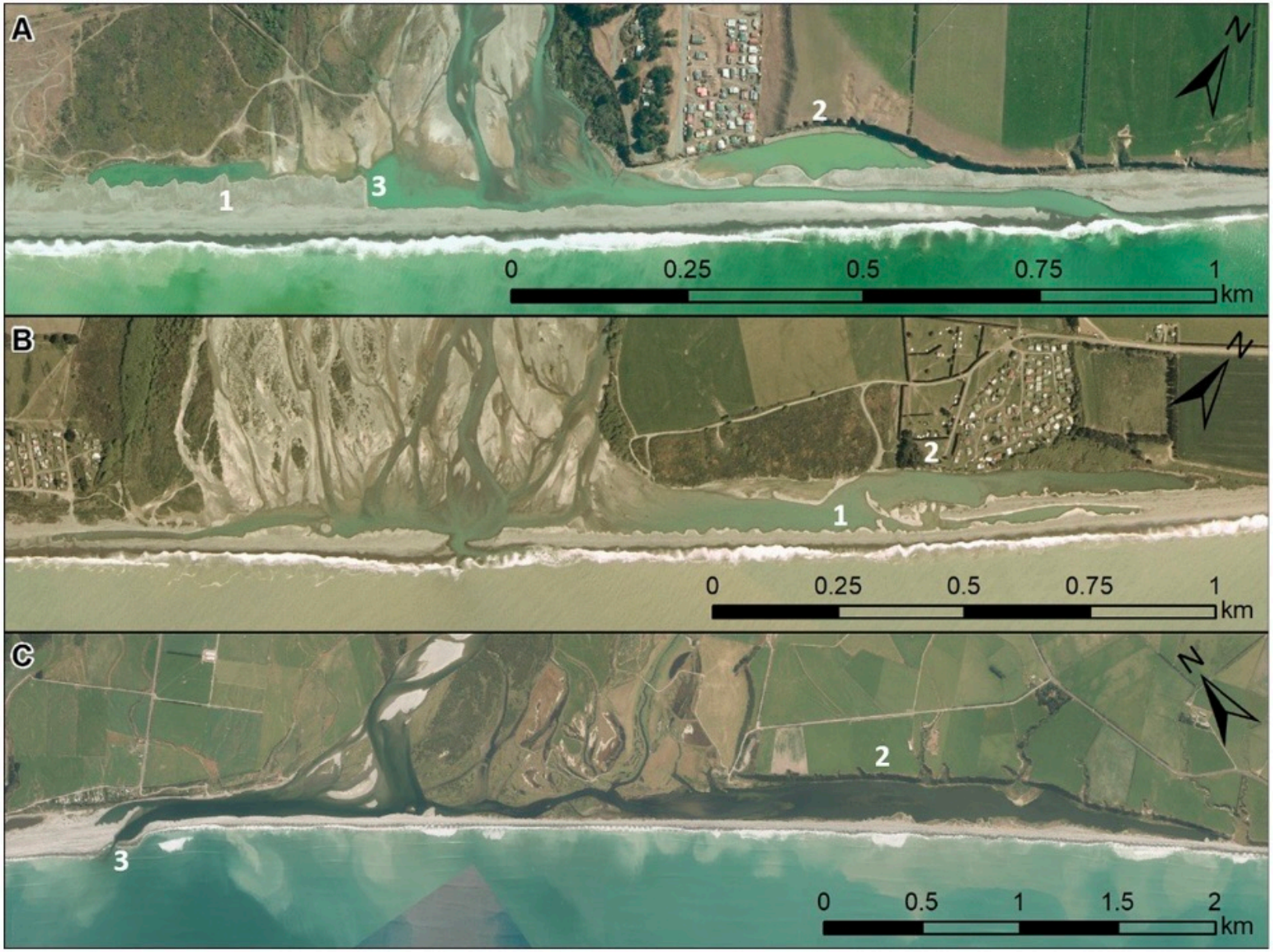


Hart 2009

Hāpua conceptual morphodynamics



Source: Measures, Hart, Cochrane, Hicks 2020, Processes controlling river mouth lagoon dynamics on high-energy mixed sand and gravel beaches *Marine Geology*, 420



A) Ashburton hāpua; B) Rangitata hāpua; C) Waiau lagoon and hāpua
1) Wave overwash gravel lobes; 2) lagoon backshore cliffs set back relative to open coast cliffs;
3) differences in lagoon width as a result of barrier re-setting caused by outlet migration
(Source: Measures et al. 2020)

Waiau River hāpua

Fluvial

Waiau River is “small” geomorphologically

- Glacial lakes moderate flood events
- Modified catchment through vegetation change and flow control
- The river sediment carrying capacity exceeds the sediment available for transport
- ~ 50,000 m^3/yr sediment bedload, mainly gravels

Marine

- Micro-tidal (spring ~2.25 m, neap ~1.4 m)
- High-energy waves from west-southwest
- Waves shoal and refract into the bay – range of breaking angles possible and variable energy along the shore
- Wave and current driven sediment transport along and across the shore

Historical changes

- Pre 1850 Orchiston* SE 3.5 km Maori sources report mouth had been at SE end of lagoon for hundreds of years
- 1852 Walter Mantell NW 2.6 km Sketch map. Mouth opposite Waimotu Creek
- 1862 ODT 5/5/1863 James McKerrow NW 2 km? Waiau River enters the ocean after running 0.8 km along the inside of a 'narrow spit' and about 0.5 km from the mouth of a small stream. Between Kowhai and Waimotu Creeks is consistent with this description
- 1890s Tapper* NW 3.3 km Under the sandstone cliffs near Cameron Creek
- 1893 June SO 2840 NW 3.0 km? Shows "Waiau River" extending beyond Waimotu Creek so the mouth may have been further to the northwest.
- 1896 Feb, J. Orchiston finds 'the old mouth completely closed with granite boulders piled six or eight feet above water level'. He concluded 'it is therefore remarkable that a river of this dimension should have its mouth closed up by the action of the breakers within a few days after the opening of a new outlet'
- 1896 March WS 12/2/1986 0.0 km "The Waiau River has broken through the spit at the mouth and water flows in a direct line to the sea." Mr Tapper reports this occurred in a flood.
- 1897 Jan SO 3065 0.0 km Shows "Waiau River" to northwest of Holly Burn mouth and "Waiau Lagoon"
- 1899 May 0.0 km "… the river … runs straight into the sea with the speed of a mill race"
- 1899 Dec Opposite Waimotu Creek
- 1900 – 1912 (A. McCracken) The river had shifted 2 miles westward by 1900 creating a tidal island just up the river. Moves eastward circa 1910 but by 1912 has moved close to previous outlet. Locals had to move fishing cribs closer to the new mouth.
- 1934 Jan Tapper NW 3.3 km Under the sandstone cliffs, the track only accessible at low tide
- 1935 Jan Tapper NW 3.7 km The mouth "had travelled nearly a mile to the westward … since our visit the previous year". Thus, it was presumably near Cameron Creek.
- 1941 Feb Tapper* NW 3.1 km? Mouth west of Waimotu Creek in the 1940 –1941 fishing season. It then moved to southeast ~1.6 km by the next fishing season (1941 – 1942).

Source: Mainly from D. Day, 19193 *Historical review of the Waiau River and coastal area* Written for the Waiau River Working Party

March 1946

February 1955

March 1963

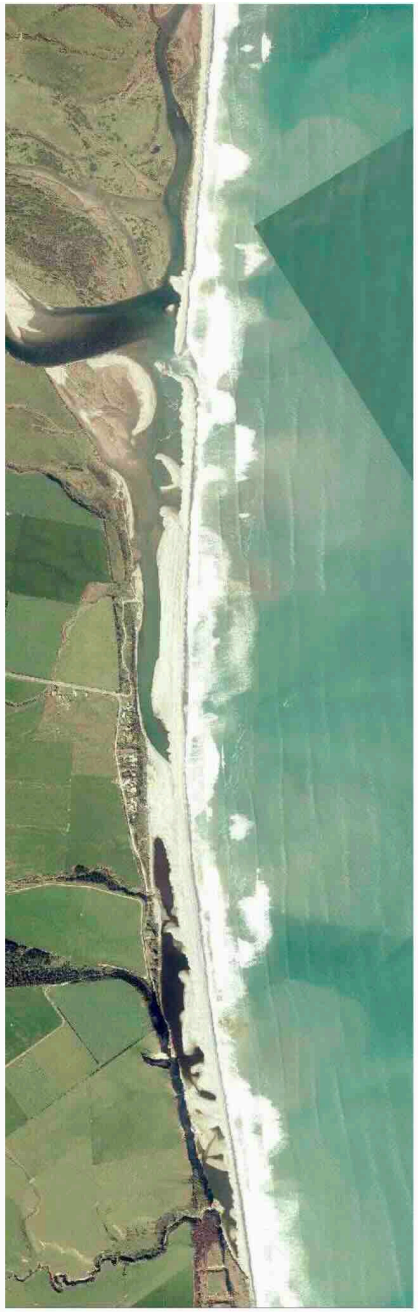
February 1969

February 2002

Sept 2007

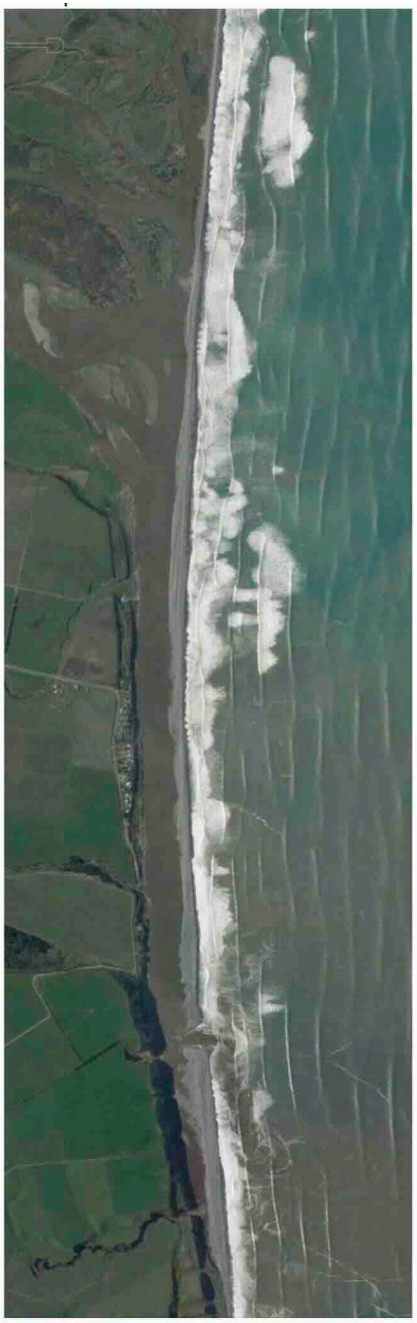
February 2008

February 2009



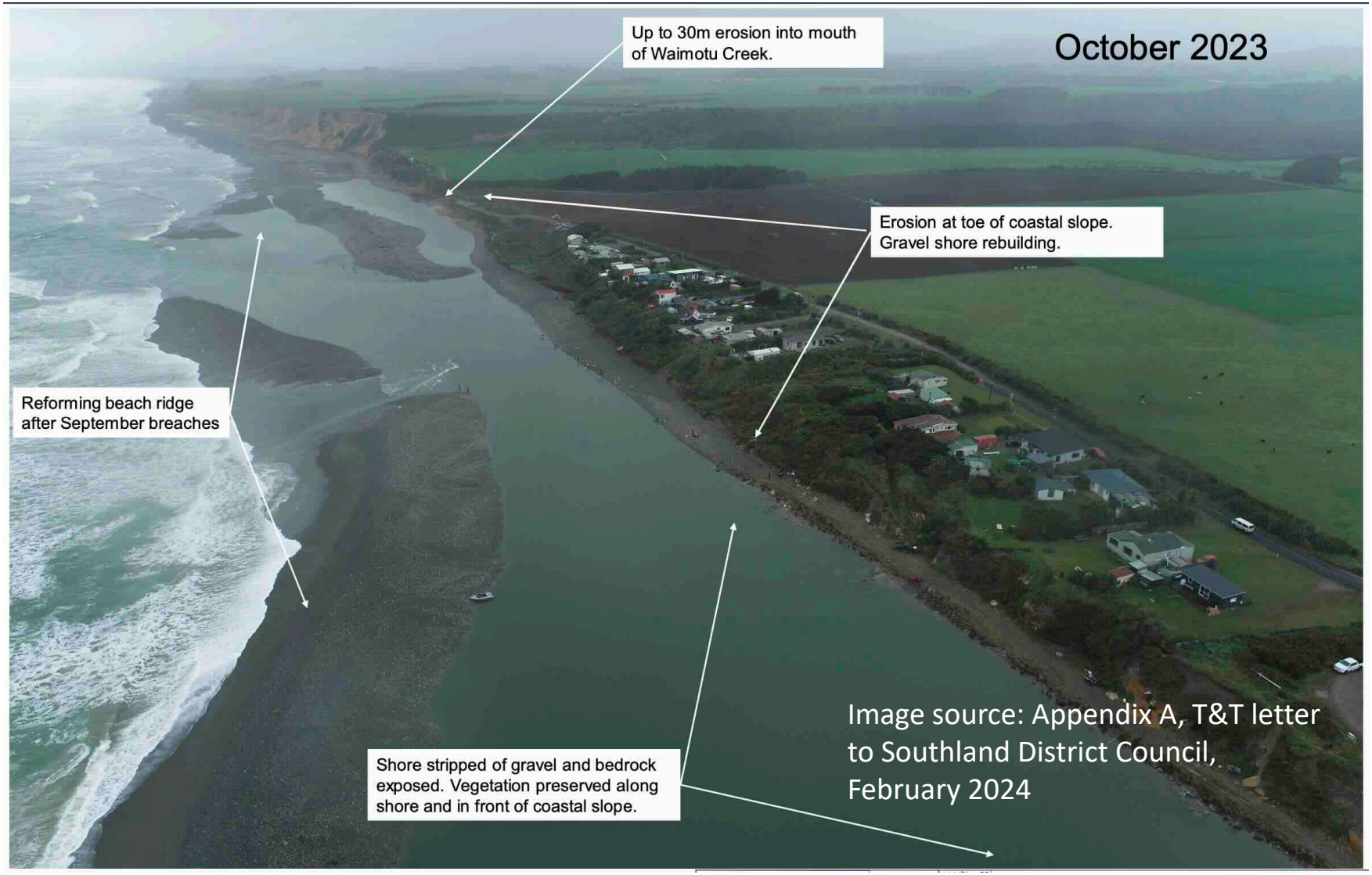
March 2011

January 2015



13th Sept 2019

March 2020


October 2023
Up to 30m erosion into mouth of Waimotu Creek.
Erosion at toe of coastal slope. Gravel shore rebuilding.
Reforming beach ridge after September breaches
Shore stripped of gravel and bedrock exposed. Vegetation preserved along shore and in front of coastal slope.
Image source: Appendix A, T&T letter to Southland District Council, February 2024

Conclusions on Waiau River hāpua

• Observed long-term variability in the position of the Waiau River outlet channel through the barrier beach – Snapshots described by Day, aerial photos, maps as noted in the PDP review of the T&T letter (March 2024).

• The position of the outlet along the barrier includes directly adjacent to the river channel to different positions to the west seaward of Bluecliffs Beach Road and further west.

• These types of changes to the hāpua and outlet channel position pre-date the MPS and other catchment changes

• Variability is consistent long-term variability for hāpua systems on the Canterbury coast and with models.

• Monitoring carried out for MEL consents confirms the dynamic nature of the Te Waewae Bay shoreline resulting from the range of high-energy coastal processes, including sediment transport along the barrier and over the barrier into the lagoon and hāpua waterbody, and occasional floods down the Waiau River delivering “pulses” of sediment to the coast.

• Monitoring concludes that changes measured between 2009 and 2017 showed no evidence of the flow regulation through MLC having a detectable effect on shoreline behaviour at the coast.

• Recent erosion of the shore along Bluecliffs Beach Road (in 2023 and early 2024) fits into long-term snapshots of outlet position, hāpua behaviour and coastal change, and is consistent with historical behaviour and erosion of the landward shore of the hāpua of the Ashburton, Hurunui and Waitaki Rivers.

Effects of the Manapouri Lake Control Improvement Project on the Waiau River hāpua

- Focus of the project is for greater efficiency in the provision of flushing flows
  - These flows are required under the existing consents for the purpose of management of nuisance periphyton
  - Up to 5 flows per season in generally drier hydrology periods – summer flows
  - 3 to 5 additional events per year each running approximately for a 30 hour period

- The parallel channel provides better management opportunities for flushing flows at lower lake levels
  - The flow regime will remain within consented parameters

- The type and nature of the flow provides for 160 cumecs peak flow and a 24-hour average of 120 cumecs
  - The flow attenuates down the river and is not out of character with historical flows

Effects of the Manapouri Lake Control Improvement Project on the Waiau River hāpua

• Potential for better permeability of the barrier opposite the main channel and may reduce potential for closure of the hāpua outlet during dry (inflow) years

•Unlikely to change the variability in outlet position

•Unlikely to change flood behaviour of the hāpua

•The method of construction of the parallel channel will minimise additional suspended sediment input to the Lower Waiau River during construction

- No change to the supply of bedload sediment to the Lower Waiau River from the project
- The bedload carrying capacity of the river will continue to transport all available sediment

• Will not result in an effect on the coastal and hāpua processes at the Waiau River mouth that is distinguishable from the historical observed dynamic changes to this system

Supporting information from Meridian for the 2nd pre-hearing meeting
17 July 2024

17 July 2024

Meridian Energy Limited
P O Box 2128 Christchurch,
New Zealand
0800 496 496
Kate.berkett@meridianenergy.co.nz
meridian.co.nz

Catherine Ongko
Catherine.Ongko@es.govt.nz

Louise Taylor
louise.taylor@taylorplanning.co.nz

Kia ora Catherine and Louise,

Your reference APP-20233670: Meridian Energy Limited (Meridian) – Manapōuri Lake Control Structure Improvement Project (MLC:IP) - Material for pre-hearing meeting.

Meridian has agreed to provide material ahead of a second pre-hearing meeting on the MLC:IP to be held via Teams on 24 July 2024. We enclose:

- A summary document detailing key submission points, Meridian's response and where relevant, references to the supporting documentation listed below.
- An updated set of proffered consent conditions following discussions with submitters. Where amendments have been made, an explanation has been provided.
- A hydrology report prepared by Dr Dougal Clunie, Damwatch Engineering Limited, MLC Waiau Arm Excavation – Hydraulic Modelling of Alternative Channel, dated June 2023. This report was requested and offered to be provided at the first pre-hearing meeting.
- A memorandum prepared by Dr Mike Hickford detailing the results of the fish survey undertaken at the project site in July 2024. This memorandum also includes NIWA's rational for undertaking the fish survey in winter and addresses the impact on fish from construction lighting. **Please note: Due to sickness**, **Dr Mike Hickford's memorandum will be provided separately as soon as we receive it.**
- A memorandum prepared by Dr Leigh Bull, BlueGreen Ecology Limited, Manapōuri Lake Control Improvement Project – Pre-hearing avifauna information, dated July 2024.
- A memorandum prepared by Stephen Christensen, Project Barrister, responding to the duration of the consents applied for by Meridian, dated July 2024. This memorandum was prepared due to the number of submissions received on consent duration.

Please confirm receipt of this letter, and the information provided.

Ngā Mihi |Kind regards,

Kate Berkett

Enclosed

- **Appendix A: Key submission points and MEL response, July 2024**
- **Appendix B: MLC:IP Revised consent conditions**
- **Appendix C: Hydrology report by Dr Dougal Clunie, Damwatch Engineering Limited, June 2023**
- **Appendix D: Memorandum by Dr Mike Hickford, NIWA, July 2024**
- **Appendix E: Memorandum by Dr Leigh Bull, BlueGreen Ecology Limited, July 2024**
- **Appendix F: Memorandum by Stephen Christensen, Project Barrister, July 2024**

Appendix C: Hydrology report by Dr Dougal Clunie, Damwatch Engineering Limited, June 2023

Manapōuri Lake Control: Improvement Project - Information for Pre-hearing meeting #2

Overview of key submission points and Meridian's response

#	Issue / concern raised	Meridian's response and document reference
1	Concern from submitters at the pre-hearing meeting - Post construction, sediment from the Mararoa will in time build up in the old channels and reduce flow reliability.	Sands and gravels are transported by the Mararoa River during high flows and have historically deposited around the Mararoa confluence with the Waiau River. For this reason, the Mararoa River was realigned directly toward the MLC gates in the 1980s. Operation of the Manapōuri Power Scheme allows flow from the Mararoa River to be diverted into the Waiau Arm and onward to Lake Manapōuri during low flow periods when the water is 'clean', without any significant sediment transported. During high Mararoa River flows, Meridian has an operational procedure to ensure that all inflow is passed directly through the MLC gates to prevent turbid Mararoa inflows from travelling up the Waiau Arm toward Lake Manapōuri. The Mararoa flow rate is monitored at the Mararoa at Cliffs gauging station, and this rate plus a nominal 5 m^3/s is released from the MLC gates. Gravels do aggrade at the lower end of the Mararoa River immediately upstream of the MLC gates. This material is periodically removed by Meridian, and this maintenance activity will continue after the proposed MLC Improvement Project works. Maintenance activities are defined under Condition 5(b) of the enclosed revised consent condition document. It is considered unlikely that sediments will be transported into and settle within the Waiau Arm to the extent that sediment aggradation could affect flow capacity of the Arm, given: • The operational regime which ensures Mararoa sediments are discharged directly through the MLC gates, and, • The ongoing periodic removal of gravel buildup from the area upstream of the MLC gates.
2	Expansion of flushing flow regime to manage other issues impacting river health	Environment Southland (ES) planner and MEL agreed that this issue is not within scope.

3	Financial Contributions when flushing flows are not provided	ES planner and MEL agreed that financial contributions are not within scope.
4	Alignment of consent expiry date with 2010 consent (i.e. 2031)	Addressed in the enclosed memorandum from Stephen Christensen.
5	MLC Sill Height Reconstruction	All parties agreed that a change to the sill height is not within scope of this application. Refer to Pre-hearing Meeting Report – Session One.
6	Coastal erosion	Agreement by all parties that for this matter to be in scope, a submitter would need to establish that the activity being consented had a causative effect with respect to coastal erosion.
7	Fish: Insufficient information and timing of additional fish surveys	An additional fish survey was completed by NIWA in July. Results of survey and rational for timing are detailed in the enclosed memorandum by Dr Mike Hickford. **Please note: Due to sickness, NIWA's memorandum will be provided separately as soon as we are able.**
8	Phytoplankton Blooms: Design of monitoring programme to account for wet and dry years.	Phytoplankton monitoring programme (PMP) consent condition has been amended because of feedback received at the 1st pre-hearing meeting. This will ensure the monitoring period is sufficiently long enough to understand if there is a risk of Phytoplankton blooms in the Waiau Arm.
9	Buchanan's Sedge	Condition amended and expanded in response to discussions at the 1st pre-hearing meeting and submissions.
10	Wetland 1	Further amendments made to consent condition as a response to discussions at the 1st pre-hearing meeting.
11	Water quality: Suspended sediment and deposited fine sediment	Existing conditions updated to ensure clarity with monitoring obligations.
12	Cultural values	MEL will continue to engage with TAMI.
13	Management Plans	Management plan conditions have been updated.
14	Birds: Insufficient information in AEE.	Addressed in the enclosed memorandum from Dr Leigh Bull.
15	Birds: Request for conditions for daily and weekly breaks from construction activities.	Addressed in the enclosed memorandum from Dr Leigh Bull.
16	Birds: Impacts from construction noise and lighting.	Addressed in enclosed memorandum from Dr Leigh Bull and updated consent conditions.
17	Fish: Entrainment and impacts on fish passage.	New condition introduced to ensure fish passage is provided on new culverts.
18	Stonecrop	Addressed in Schedule 1: General conditions, Condition #5.

19	Support for recommendation in AEE re. Landscape – *"The final form of any exposed islands created within the Waiau Arm shall be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes."*	Addressed in enclosed memorandum from Dr Leigh Bull and via consent condition 14 (Landscape and rehabilitation).
20	Request for a condition that any exposed islands created within the Waiau Arm be made suitable and maintained to provide nesting habitat for black billed gulls and that the design of these be discussed and agreed with the Waiau Habitat Trust, and any other interested stakeholders, prior to their construction	Addressed in enclosed memorandum from Dr Leigh Bull.
21	Noise and dust impacts on people: Landcorp Submission	MTADA considerations to be managed outside the RMA process and progressed via discussions and agreement with impacted landowners.
22	Slipway ramp needs to stay in scope.	MEL has an agreement with the submitter on this matter.
23	Fish: Construction timing start date after mid-March to avoid upstream migrating elvers.	Given our compliance obligations with respect to the Trap and Transfer programme are intended to be complied with, Stage three works will not commence until after mid-March.
24	Fish: transfer permits	A permit will be required from the Minister of Fisheries under s 26ZM (2)(a) of the Conservation Act 1987 and NIWA is currently progressing this authorisation on behalf of MEL. Given that the fish will be transferred to a place where they already exist, a permit from DOC under section 26ZM of the Conservation Act 1987 is not required.
25	Fish: Requests that the trap and transfer programme be extended to all migratory fish species.	Out of scope, no change to proposed consent conditions.
26	Fish: Requests fish, including eels that are accidentally removed from the river be returned to the water of the Waiau arm.	The Freshwater Fauna consent condition has been updated to better reflect the intended approach and provide certainty over the timing of surveys and subsequent relocation.
27	Fish: Salvage prior to construction start	The Freshwater Fauna consent condition has been updated to better reflect the intended approach and provide certainty over the timing of surveys and subsequent relocation.

28	Spawning: Construction should be avoided during spawning periods for threatened and at-risk species, including non-migratory galaxiid and lamprey due to impacts of disturbance and sediment.	Additional fish surveys were completed by NIWA in July 2024. No threatened and at-risk species were identified. Please refer to the memorandum prepared by Dr Mike Hickford. **Please note: Due to sickness, NIWA's memorandum will be provided separately as soon as we are able.**
29	Kākahi: pre-construction salvage programme for this species.	The Freshwater Fauna Management Plan condition has been updated and includes relocating freshwater fauna (including kākahi) which may be affected by construction works.
30	Condition(s) to require a higher flow of Lake Manapōuri water be released through the MLC when the Mararoa is turbid.	Out of scope, no changes to proposed consent conditions.
31	Shift the DFS monitoring site downstream of Excelsior Creek for the duration of the project.	It is not considered appropriate to shift DFS site to downstream of Excelsior Creek due to potential sediment input from Excelsior Creek.
32	Water quality: sediment Turbidity level should be re-set to protect the threatened and at-risk indigenous freshwater fauna that will be impacted and / or other conditions imposed to avoid, remedy, or mitigate adverse effects, on indigenous fish species.	Turbidity and exceedance levels were first explored based on a literature review of research on known relationships between given levels of suspended sediment or DFS and documented adverse effects on all biota particularly where specific levels of SSC or DFS linked to an adverse effect were specified (i.e., we haven't ignored threatened/at risk species). The literature best covered effects on salmonids, and also showed salmonids to be particularly sensitive to elevated SSC (it is a conservative approach). The evidence for native fish is much more sparce but overwhelmingly indicates that they are more tolerant of SS than salmonids. This aside, thresholds for each specified level are based on what occurs naturally in the system so all biota should be adapted to deal with these levels at least occasionally.
33	Water quality: sediment Conditions should address what actions must occur in the event that turbidity levels, and deposited fine sediment levels, are exceeded.	Condition 7b and 13 includes reasonably practicable measures to avoid, remedy or mitigate impacts from suspended sediment and DFS.

Water permit (Section 14 RMA)

Purpose: To take, use, and divert water Duration: 35 years		Explanation for proposed revisions
General		
1.	a. Except as provided for in the conditions below and subject to any final design, the Manapōuri Lake Control Improvement Project (MLCIP) shall be constructed, operated and maintained in general accordance with: i) the Assessment of Effects on the Environment prepared by Tonkin + Taylor Limited dated December 2023 including all reports and drawings contained therein and the methodology detailed in "Construction Planning – Proposed Methodology" prepared by Damwatch Engineering Limited dated December 2023, and • The further information response under Meridian Energy Limited letterhead dated 4 June 2024 and appendices contained therein. ~~a.~~b. Where there may be an inconsistency between the documents referred to in clause (a) above and the requirements of these conditions, these conditions shall prevail.	Updated to refer to further information response, under Section 92 of the RMA, dated 4 June 2024.
2.	This resource consent authorises the take, use, and diversion of water as required to construct, operate and maintain the MLCIP, including for the purposes of: a. On a temporary basis, facilitating construction and maintenance activities, including within and in proximity to wetlands and for dewatering, dust suppression, and erosion and sediment control activities, and b. On a permanent basis, diverting some of the surface water in the Waiau Arm into the parallel channel.	
3.	This resource consent shall be exercised in conjunction with Discharge Permit [consent reference] (or any subsequent variation versions).	
4.	The Consent Holder shall comply with Schedule 1: General Conditions attached to and forming part of this consent.	

Discharge permit (Section 15 RMA)

Purpose: To discharge contaminants to water and to land in circumstances where contaminants may enter water. **Duration: 35 years**		**Explanation for proposed revisions**
General		
1.	a. Except as provided for in the conditions below and subject to any final design, the Manapōuri Lake Control Improvement Project (MLCIP) shall be constructed, operated and maintained in general accordance with: i) the Assessment of Effects on the Environment prepared by Tonkin + Taylor Limited dated December 2023 including all reports and drawings contained therein, and the methodology detailed in "Construction Planning – Proposed Methodology" prepared by Damwatch Engineering Limited dated December 2023, and ii) The further information response under Meridian Energy Limited letterhead dated 4 June 2024 and appendices contained therein. ~~a.~~b. Where there may be an inconsistency between the documents referred to in clause (a) above and the requirements of these conditions, these conditions shall prevail.	Updated to refer to further information response, under Section 92 of the RMA, dated 4 June 2024.
2.	This resource consent authorises the discharge of water, suspended sediment, and deposited fine sediment to land and water as required to construct, operate and maintain the MLCIP.	
3.	This resource consent shall be exercised in conjunction with Water Permit [consent reference] (or any subsequent variation versions).	
4.	The Consent Holder shall comply with Schedule 1: General Conditions attached to and forming part of this consent.	
Definitions used in this resource consent		
5.	In the conditions of this resource consent: a. "Parallel channel excavation works" means the construction of the parallel channel. b. "Maintenance activities" means those activities, including removal of gravel and bed material, as necessary to maintain the parallel channel, and the existing channels of the Waiau Arm upstream of and around the confluence with the Mararoa River at MLC, in general accordance with their constructed dimensions. c. "Duration of the parallel channel excavation works" means from the commencement of excavation works in the parallel channel to the conclusion of excavation works on the parallel	

<table>
<tr><th colspan="2">Purpose: To discharge contaminants to water and to land in circumstances where contaminants may enter water.
Duration: 35 years</th><th>Explanation for proposed revisions</th></tr>
<tr><td></td><td>channel including a period ending 5 days (120 hours) after the parallel channel is made fully open to the Waiau Arm.
d. The “upstream monitoring site” (UMS) means the existing site monitored by Meridian Energy Limited in the Maraora River at the Cliffs [map reference TBC – as per Figure 5.5 of this AEE],
e. The “downstream monitoring site” (DMS) means the existing site monitored by the Southland Regional Council upstream of the confluence of the Excelsior Stream with the Lower Waiau River [map reference TBC – as per Figure 5.5 of this AEE],
f. “Total turbidity” shall be calculated by subtracting the mean hourly turbidity reading at the UMS from the same mean hourly turbidity reading at the DMS,
g. “Deposited fine sediment” (DFS) means sediment less than 2 mm in diameter, and
h. “Baseline DFS” is to be determined in accordance with condition [10].</td><td></td></tr>
<tr><td colspan="2">Parallel channel excavation works: Turbidity thresholds for the Lower Waiau River</td><td></td></tr>
<tr><td>6.</td><td>Total turbidity generated for the duration of the parallel channel excavation works, as attributable to the works, shall not exceed the maximum total hours for any of the following Formazin Nephelometric Units (FNU) thresholds:
FNU threshold — Maximum total hours
>330 — 36
>160 to ≤330 — 95
>30 to ≤160 — 504
>12.4 to ≤30 — 945</td><td></td></tr>
<tr><td>7.</td><td>a. To the extent reasonably practicable, total turbidity for the duration of the parallel channel excavation works, as attributable to the works, shall not exceed the maximum consecutive hours for any of the following Formazin Nephelometric Units (FNU) thresholds:
FNU threshold — Maximum consecutive hours
>330 — 12
>160 to ≤330 — 32
>30 to ≤160 — 168
>12.4 to ≤30 — 315

b. In clause (a), measures which are reasonably practicable may include but are not limited to:
i. Temporarily suspending work on the parallel channel excavation works, and</td><td></td></tr>
</table>

Purpose: To discharge contaminants to water and to land in circumstances where contaminants may enter water. Duration: 35 years		Explanation for proposed revisions
	ii. Increasing the duration of the initial first flush discharge from the parallel channel as it is opened to the Waiau Arm.	
8.	In condition [6], an FNU threshold may be exceeded for more than the total maximum hours stated, provided that there is a concomitant reduction in the total maximum hours provided for in the next highest FNU threshold.	
9.	In the event that total turbidity does not exceed 160 FNU for a period of at least 180 consecutive days, the turbidity thresholds set out in Condition [6] will be reset to their original maximum total hours.	
Parallel channel excavation works: Deposited fine sediment (DFS)		
10.	The Consent Holder shall measure DFS at the DMS weekly for a period of at least six weeks prior to commencing the parallel channel excavation works. The mean average DFS recorded during this period will be the "baseline DFS".	
11.	The Consent Holder shall measure DFS weekly at the DMS for the duration of the parallel channel excavation works and eight weeks thereafter, and document any changes to DFS relative to the baseline DFS. These changes shall be determined by using a rolling average of DFS measurements at the DMS over a ~~six~~ four week period.	Rolling average period updated from 6 weeks to 4 weeks to be consistent with NIWA Freshwater Assessment Report (Appendix D of AEE).
12.	Any changes to the baseline DFS at the DMS shall be assessed proportionately between those changes occurring from turbidity generated from flows in the Mararoa River and those occurring from turbidity generated by parallel channel excavation works. This proportionality shall be calculated by subtracting the mean hourly turbidity at the UMS from the same mean hourly turbidity at the DMS, and then collating all those records together into rolling periods of ~~six~~ four weeks in accordance with Condition [11].	Rolling average period updated from 6 weeks to 4 weeks to be consistent with NIWA Freshwater Assessment Report (Appendix D of AEE).
13.	If an additive increase of more than 20% cover in DFS ~~relative to~~above the baseline DFS at the DMS is observed which is attributable to fine sediment generated by parallel channel excavation works, the Consent Holder shall adopt reasonably practicable measures to avoid, remedy or mitigate this effect. This includes but is not limited to: a. Releasing sufficient flow through the Manapōuri Lake Control Structure to mobilise DFS at the downstream monitoring site; ~~and~~ b. Temporarily suspending work on the parallel channel excavation works; and~~;~~ c. Increasing the duration of the initial first flush discharge from the parallel channel as it is opened to the Waiau Arm.	Wording updated for clarity and certainty (any change in DFS to be assessed additively rather than proportionally).

Purpose: To discharge contaminants to water and to land in circumstances where contaminants may enter water. Duration: 35 years		Explanation for proposed revisions
Maintenance activities		
14.	Throughout the term of this consent, the Consent Holder shall ensure the parallel channel is maintained in general accordance with its as-built dimensions by periodically removing any build-up of gravel or other material within the parallel channel.	New condition to address submissions and provide increased certainty regarding parallel channel maintenance.
~~14.~~15	When undertaking maintenance activities, the Consent Holder shall: a. Adopt all practicable measures to minimise the use of any machinery in flowing water and minimise generation of suspended sediment; and b. Deposit any excavated material in the existing spoil stockpile area.	
~~15.~~16	Any increase in turbidity in the Lower Waiau River, as measured at the DMS, as a result of maintenance activities shall not exceed 160 FNU for more than 12 consecutive hours, and must not exceed 330 FNU at any time.	

Schedule 1: General Conditions

General		Explanation for proposed revisions
1.	~~a. Except as provided for in the conditions below and subject to any final design, the Manapōuri Lake Control Improvement Project (MLCIP) shall be constructed, operated and maintained in general accordance with the Assessment of Effects on the Environment prepared by Tonkin + Taylor Limited dated December 2023 including all reports and drawings contained therein, including the methodology detailed in "Construction Planning – Preferred Methodology" prepared by Damwatch Engineering Limited dated December 2023.~~ ~~b.~~a. ~~Where there may be an inconsistency between the documents referred to in clause (a) above and the requirements of these conditions, these conditions shall prevail.~~	Deleted as this condition is already included as condition 1 on both the water permit and discharge permit.
2.	All monitoring, management plan, and reporting actions required by the conditions of Water Permit [consent reference], Discharge Permit [consent reference], and the general conditions in ~~this s~~Schedule 1: General Conditions, shall be undertaken by a Suitably Qualified Person. A Suitably Qualified Person means a person (or persons) who can provide sufficient evidence to demonstrate their suitability and competence in the relevant field of expertise.	Wording updated for clarity and certainty.
3.	At least 10 working days before implementation of the management plans referred to in conditions 8 and 12, a copy shall be provided to the following parties for their information:	New condition which responds to submissions seeking further information regarding

General		Explanation for proposed revisions
	a. Southland Regional Council Compliance Manager, b. Department of Conservation, c. Guardians of Lakes Manapōouri, Monowai and Te Anau, d. Te Ao Marama Inc, e. Waiau Fisheries and Wildlife Habitat Enhancement Trust, f. Waiau Rivercare Group, and g. Waiau Working Party.	management plans. Please also see amended conditions 8 and 12 below which provide greater clarity and certainty on the content of the management plans.
Ecology (general)		
~~3.~~4.	Except where authorised by Water Permit [consent reference] and Discharge Permit [consent reference], activities within flowing water are to be minimised as far as reasonably practicable.	
~~4.~~5.	a. All fuel storage or machinery refuelling shall occur outside the bed of the lake or river, b. All equipment, machinery, or operating plant shall be cleaned before entering, and leaving the site, in accordance with Biosecurity New Zealand's "Clean, check, dry" hygiene procedures for machinery, and c. All equipment, machinery, operating plant and debris associated with the structure or bed disturbance activity shall be removed from the site following completion of the parallel channel excavation works. *Advice Note: Biosecurity New Zealand's hygiene procedures are available at www.biosecurity.co.nz and are intended to prevent the spread of pests and unwanted organisms as defined in the Biosecurity Act 1993, including didymosphemia geminate.*	
Avifauna		
~~5.~~6.	~~Any works in the period commencing 15th September and ending 31st January (inclusive) shall not disturb roosting and nesting areas of the black fronted tern, black billed gull, banded dotterel or black fronted dotterel.~~ a) Within 10 days prior to the commencement of construction works (including establishment works) occurring during the period commencing 15th September and ending 31st January (inclusive), a survey shall be undertaken by a Suitably Qualified Person to determine if any black fronted tern, black billed gull, banded dotterel, black fronted dotterel, or New Zealand pipit are nesting within the footprint to be disturbed by the works during that period.	Updated condition which responds to submissions made and affords a greater level of protection to Threatened and At Risk bird species.

General		Explanation for proposed revisions
	b) No works shall occur within 50 m of a nesting bird identified in the survey in clause (a). Once nesting is complete, the 50 m exclusion zone at that nest no longer applies.	
Buchanan's sedge		
~~6.~~7.	~~Prior to the commencement of parallel channel excavation works, any Buchanan's sedge plants within the construction footprint shall be transplanted to a suitable area of lacustrine habitat within the Project site.~~ ~~Prior to the commencement of parallel channel excavation works,~~ T~~t~~he Consent Holder shall undertake translocation and planting of Buchanan's sedge plants located within the Project Site, in accordance with clauses (a) to (e) below, to achieve no net loss of Buchanan's sedge plants within the Project site. a. Prior to the commencement of parallel channel excavation works, Buchanan's sedge plants within the construction footprint shall be transplanted into suitable habitat within the Project site but outside the construction footprint. Translocation shall follow best practice methods for transplanting sedges. b. Seed shall be collected from Buchanan's sedge plants within the Project site, if practicable, (or else within the Upukeroroa Ecological District) and provided to a commercial nursery to raise a minimum of 100 plants. c. Within 12 months of the completion of parallel channel excavation works, a minimum of 100 nursery-raised plants shall be planted into suitable habitats within the Project site. The number of translocated and nursery-raised Buchanan's sedge plants shall be recorded and their locations marked using a handheld GPS. d. The Consent Holder shall monitor the survival of translocated and nursery-raised Buchanan's sedge plants for 12 months after the nursery-raised plants have been planted. e. Within 10 working days of completion of the monitoring in clause (d), a brief report shall be prepared by a Suitably Qualified Person and provided to the Consent Authority. The monitoring report will include: i. The number of surviving translocated and nursery raised Buchanan's sedge plants. ii. A map of the locations of the translocated and nursery raised Buchanan's sedge plants. ~~i.~~iii. An overall statement on compliance with this condition (condition 6).	Amended and expanded in response to submissions made. This condition was broadly supported at the pre-hearing; further amendments made as a result of feedback received at the pre-hearing. Additional redrafting made for clarity and certainty.
Freshwater Fauna		
~~7.~~8.	~~Prior to commencement of parallel channel excavation works a Freshwater Fauna Management Plan shall be prepared, and subsequently implemented, by a suitably qualified person, and shall include:~~	Condition updated to better reflect the intended approach and provide certainty over the timing of surveys and subsequent relocation.

General		Explanation for proposed revisions
	~~a. Measures to avoid and minimise adverse effects on freshwater fauna in areas where surface water is present at the time of construction works, and~~ ~~b. Measures to avoid or minimise adverse effects on kākahi, including a survey for this species prior to the parallel channel excavation works commencing. The findings of this survey will inform the appropriate avoidance or minimisation measures, such as kākahi re-location, and~~ ~~c. Methods to capture and relocate fish and other fauna that may be affected by parallel channel excavation works, including in the lacustrine channels, and~~ a. ~~Advice around the timing of construction works to occur outside of critical periods, where practicable.~~ Prior to commencement of parallel channel excavation works, a Freshwater Fauna Management Plan (FFMP) shall be prepared, and subsequently implemented, by a Suitably Qualified Person. The FFMP shall identify industry best practice methods for surveying, and where subsequently recommended by the Suitably Qualified Person, relocating freshwater fauna (including kākahi) which may be affected by construction works (including by bed disturbance works and lighting) to suitable equivalent habitat which is not affected by construction works. A survey, and any subsequent relocation, shall occur at the following times during the construction works: a. Immediately prior to any disturbance work in the lacustrine channels of the Waiau Arm, and ~~a.~~b. Immediately prior to establishing the Stage 3 breakouts during parallel channel excavation works.	
9.	The Consent Holder shall provide written confirmation to the Consent Authority from a Suitably Qualified Person: a. At least 10 working days prior to the commencement of parallel channel excavation works, that the design of any permanent culverts within the lacustrine channels of the Waiau Arm is generally consistent with the principles of good fish passage design in Section 3.4 of the 'New Zealand Fish Passage Guidelines: For structures up to 4 metres, 2018'; and b. Within 6 months of the completion of the parallel channel excavation works, that the culverts have been installed accordance with the designs referred to in condition [9](a).	New condition introduced to ensure fish passage is provided on new culverts.
Wetland remediation		
10.	To remediate the removal of Wetland 1, within 12 months of the completion date of the parallel channel excavation works, the Consent Holder shall implement wetland remediation, in accordance with clauses (a) to (c) below, to achieve no net loss of indigenous Juncus rushland marsh within the Project site.	New condition introduced in response to submissions made. This condition was broadly supported at the pre-hearing; further amendments made as a result of feedback

General		Explanation for proposed revisions
	a. Juncus sarophorus, Juncus edgariae and Carex virgata shall be planted over a minimum area of 200m^2, with that area meeting the following further criteria: i. Located within the area mapped as Wetland 3 (shown on Attachment XXX). ii. Have hydrological conditions appropriate for the long-term survival of the three plant species. iii. Be generally comprised of exotic grasses or herbs. b. Plants shall be planted at spacings that, when mature, will achieve an overall cover of indigenous wetland plants that exceeds 65 percent vegetation cover across the wetland remediation site. c. At a period not exceeding three years following the completion date of the parallel channel excavation works, the Consent Holder shall provide to the Consent Authority a report from a Suitably Qualified Person setting out the extent to which the wetland remediation is achieving compliance with this condition, including confirmation that the overall percentage cover of indigenous wetland plant species within the wetland remediation site exceeds 65 percent.	received at the pre-hearing. Additional redrafting made for clarity and certainty.
Water quality monitoring programme (WQMP)		
11.	a. In the first summer period (1 January to 31 March) following the completion of the parallel channel excavation works, the Consent Holder will prepare and implement a water quality monitoring programme (WQMP) for the detection of phytoplankton blooms in the parallel channel and existing channels (adjacent to the parallel channel). b. The protocol for the WQMP shall be prepared by a Suitably Qualified Person and provided to the Consent Authority for its records prior to the implementation of the WQMP. c. The WQMP will consist of fortnightly measurements of water temperature, dissolved oxygen, water clarity, pH and chlorophyll *a* at two Representative Sites over three consecutive summer periods (the 'Overall Monitoring Period'). In the event fewer than five fortnightly measurements are taken in any given summer period, the Overall Monitoring Period shall be extended for one further summer period. d. For the purposes of clause (c), 'Representative Sites' means one site in the parallel channel and one site in the existing channel. The location of the Representative Sites shall be agreed in writing with the Consent Authority prior to the implementation of the WQMP. e. Within three working days of receiving notice that chlorophyll *a* has been detected in a sample at or above 5 mg/m3, the Consent Holder will release a flow of 35–45 cumecs for 24 hours across the Manapōuri Lake Control Structure into the Lower Waiau River.	New condition introduced in response to submissions made. This condition was broadly supported at the pre-hearing; further amendments made as a result of feedback received at the pre-hearing. Additional redrafting made for clarity and certainty.

General		Explanation for proposed revisions
	f. If two or more chlorophyll *a* readings are detected at levels at or above 5 mg/m3 across the Overall Monitoring Period, a review (in the form of a written report) will be undertaken by a Suitably Qualified Person to consider whether further monitoring is required, and whether the flow release management response specified in clause [e] needs to be amended. The Consent Holder will provide the report to the Consent Authority within 6 months of the last fortnightly measurement in the WQMP being taken. *Advice Note: For the avoidance of doubt, if fewer than two chlorophyll a readings are detected at levels at or above 5 mg/m3 across the Overall Monitoring Period, the WQMP under this condition shall cease.*	
Erosion and sediment control		
~~8.~~12.	Land-based activities associated with these consents~~Parallel channel excavation works~~ shall be undertaken in accordance with an Erosion and Sediment Control Plan (ESCP). The~~The~~ ESCP shall be prepared by a Suitably Qualified Person and at minimum ~~shall~~ include details of: a. Appropriate structural and non-structural erosion and sediment control measures to be installed before and during all construction works to minimise the potential for sediment to enter surface water: b. Key environmental risks, particularly in relation to topography, soil type and form, and the receiving environment, including proximity to any sensitive receivers: c. The approach and procedures for ensuring advance warning of a rainfall event: d. Procedures for decommissioning the erosion and sediment control measures: e. Procedures for determining the staging and sequencing of earthworks: f. Methods for amending and updating the ESCP as required. ~~a.~~g. ~~the best practicable control measures that will be implemented to minimise the potential for sediment to enter surface water.~~	Amended condition to address issues raised in submissions regarding proposed content of management plans.
~~**Noise and vibration**~~		
	~~A construction noise management plan (CNMP) for the parallel channel excavation works shall be developed in accordance with the requirements of NZS 6803:1999 Acoustics – Construction Noise. The CNMP shall address matters in Annex E of the Standard, in particular:~~ ~~a. Consultation~~ ~~b. Responsible Persons~~ ~~c. Complaints Procedure~~	MTADA considerations to be managed outside the RMA process, and progressed via discussions and agreement with landowners.

General		Explanation for proposed revisions
	~~d. Noise performance standards~~ ~~e. Practicable control measures~~ ~~f. Noise monitoring (if required)~~ ~~g. Training and supervision of workers on site~~ ~~h. Other mitigation options~~ ~~b.~~c. ~~Other matters as deemed appropriate.~~	
Landscape and rehabilitation		
~~9.~~13.	During parallel channel excavation works, all work areas shall be maintained in a tidy state. Following the completion of the parallel channel excavation works, all temporary buildings and structures, plant, machinery and equipment shall be removed (except machinery required for the works in conditions ~~11~~ 14 and ~~12~~ 15 below) and the site left in a tidy state.	
~~10.~~14	Following the completion of parallel channel excavation works, the spoil disposal area, contractors establishment area, and any construction area in the Waiau Arm no longer required for permanent structures, shall be shaped and profiled to be sympathetic to the contours of the surrounding landscape and piles or humps shall be avoided.	
~~11.~~15	The spoil disposal area and contractors' establishment area shall be rehabilitated within the next available planting season following the completion of the parallel channel excavation works. This rehabilitation shall achieve a final cover of pasture or similar vegetation.	
Future gravel extraction from gravel stockpile cell		
~~12.~~16	Any future removal of gravel from the spoil disposal area shall be limited to within the defined 'gravel stockpile cell' as shown on map X in ~~Aapendix~~Appendix X and shall be completed in sequential stages moving from south to north to facilitate progressive rehabilitation.	Updated for certainty and clarity.
~~13.~~17	Once any future gravel removal from within the 'gravel stockpile cell' is complete, the resultant surface shall be scarified to promote plant growth and rehabilitated within the next available planting season. This rehabilitation shall achieve a final cover of pasture or similar vegetation.	
Advice note for Conditions ~~13~~ 16 and ~~14~~17: Any future gravel removal and processing from the gravel stockpile cell may be subject to requirements of additional resource consents.		
Notifications, records and reporting		
~~14.~~18	The Consent Holder shall notify the Consent Authority in writing: a. No less than ten working days prior to commencing any works under these resource consents; and b. No less than ten working days after completion of the works under these resource consents.	

General		Explanation for proposed revisions
~~15.~~19	The Consent Holder shall maintain a record of the following activities, and shall ~~all activities carried out under these resource consents and~~ supply this record to the Consent Authority upon request:~~.~~ ~~The record of activities shall include:~~ a. Turbidity and deposited fine sediment monitoring during the parallel channel excavation works under Discharge Permit [consent reference]; and~~,~~ ~~b. Dates and times of when key activities are undertaken, and~~ ~~c.~~b. A record of any incidents or complaints.	Updated for certainty and clarity.
Accidental discovery protocol		
~~16.~~20	In the event of a discovery, or suspected discovery, of a site of cultural importance (Waahi Taonga/Tapu) during the exercise of this consent, the Consent Holder shall immediately cease operations in that location and inform the local iwi authority (Te Ao Marama Inc, ~~phone 03 931 6032~~office@tami.maori.nz). Operations may recommence at a time as agreed upon in writing with the Consent Authority. The discovery of Koiwi (human skeletal remains) or Taonga or artefact material (e.g. pounamu/greenstone) would indicate a site of cultural importance. [Appendix 1] outlines the process that is to be followed in the event of such a discovery.	Updated contact details.
Review		
~~17.~~21	The Consent Authority may, in accordance with Sections 128 and 129 of the Resource Management Act 1991, serve notice on the Consent Holder of its intention to review the conditions of these resource consents at five year intervals , or within two months of any enforcement action being taken by the Consent Authority in relation to the exercise of this consent, for the purposes of: a. Determining whether the conditions of these resource consents are adequate to deal with any adverse effect on the environment, including cumulative effects, which may arise from the exercise of the resource consents, and which it is appropriate to deal with at a later stage, or which become evident after the date of commencement of these resource consents; b. Ensuring the conditions of these resource consents are consistent with any National Environmental Standards Regulations, relevant plans and/or the Environment Southland Regional Policy Statement; c. Requiring the Consent Holder to adopt the best practicable option to remove or reduce any adverse effect on the environment arising as a result of the exercise of these resource consents.	

Memo

To:	Andrew Feierabend (Meridian Energy (MEL)), Cathy Kilroy (NIWA)
From:	Dougal Clunie
CC:	Chris Thompson, Catherine Williams (MEL), Jo Hoyle (NIWA)
Date:	23 June 2023
Subject:	**MLC Waiau Arm Excavation – Hydraulic Modelling of Alternative Channel**

Summary

This memo presents the results of computational hydraulic modelling of low flowrates through the historical Mararoa delta area of the Waiau Arm, immediately upstream of Manapōuri Lake Control Structure (MLC).

Excavation of the channel is being planned to allow increased discharge from MLC at low Lake Manapōuri levels, with two alternatives being considered - in-stream excavation or a parallel channel excavated on the left bank (see Figure 1).

Figure 1: Waiau Arm channel through the Mararoa delta area upstream of MLC, with the outlined arrangements of two alternative excavation options shown.

Both arrangements will have the effect of reducing flow velocities in the area for a given flow rate, with concerns raised that very low velocities may create conditions for excessive algal growth or similar environmental issues.

Flow rates of 10 m^3/s and -10 m^3/s (negative values indicating flow 'upstream' toward Lake Manapōuri) in the Waiau Arm have been modelled at the maximum and minimum levels of the lake's normal operating

range. In addition, flowrates of 5 m^3/s and -5 m^3/s have been modelled at intermediate Lake Manapōuri levels.

With the existing channel arrangement flow splits into two channels through the delta, with the majority of flow passed in the 'main channel', with some 15% (rising to 25-30% at high lake levels) passed through the 'south channel' between the gravel island and the MLC overflow weir. The instream channel excavation option concentrates this flow in the main channel (90+% at low lake levels). For the new parallel channel excavation option, the majority of 'downstream' flow toward MLC is passed down the new channel (50-75%), while upstream flows toward Lake Manapōuri remain more in the existing main channel, especially at low flow rates.

For the modelled flow cases, velocities in the channels are low. In the existing case with a 10 m^3/s discharge, velocities range from around 0.18 m/s at low lake levels to 0.04 m/s at high lake levels. This reduces to around 0.06 m/s to 0.03 m/s for both of the excavated cases. These velocities for the excavated cases are similar to, or slightly higher than the velocities in the deeper reach of the Waiau Arm upstream of the delta. Indicative channel velocities are tabulated, and colourmap plots of velocity throughout the modelled domain are included in this memo.

1 Introduction

Excavation of the Waiau Arm channel upstream of Manapōuri Lake Control Structure (MLC) is being planned, to increase flow conveyance through the relatively shallow reach associated with the historical Mararoa River delta. The increased conveyance will allow effective flushing flows of 160 m^3/s to be released from MLC at lower Lake Manapouri levels than are currently possible. Such flushing flows assist in managing nuisance periphyton growth in the Lower Waiau River and in promoting river health.

Two alternative excavation arrangements are currently being considered:

- Deepening of the existing channel.
- Excavation of a parallel channel on the true-left riverbank.

Both arrangements will have the effect of reducing flow velocities through the river reach for a given flow discharge condition. The quantitative change in velocity has been queried in a Project Control Group meeting[1], with the concern raised that very low velocities may create conditions for excessive algal growth or similar environmental issues.

This memo presents and compares flow velocities for the existing case and the two excavation arrangements, based on a two-dimensional computational hydraulic model.

2 Hydrology

The flow rate and water level in the river reach being investigated, and the level of Lake Manapōuri, are controlled by flow releases from the MLC gates.

The level of Lake Manapōuri is generally maintained within the main operating range of RL 176.80 m to RL 178.60 m. When water levels in Lake Manapōuri are within this range, flow releases from MLC are generally at Meridian's discretion, and optimised for energy production subject to Lower Waiau minimum flow and other environmental release requirements.

In general, flow in the Waiau Arm may be from Lake Manapōuri to the Lower Waiau River, or from the Mararoa River to Lake Manapōuri, depending on Mararoa River inflow rates and MLC release requirements.

[1] A Feierabend (chair), *PGC Excavation Waiau ARM MLC Meeting*, 9 May 2023

Figure 2 shows historical Waiau Arm flow rates over the period 1996-2022, when the current minimum flow requirements have been in place. High inflows to the Lake Manapōuri system, increasing the lake level to the top of its main range and requiring high releases at MLC, can occur at any time of year as shown in Figure 2. At other times, flow in the Waiau Arm is generally low, between +10 m³/s and -10 m³/s (negative values indicating flow 'upstream' toward Lake Manapōuri) for around 60% of the time, and between +5 m³/s and -5 m³/s for around 30% of the time.

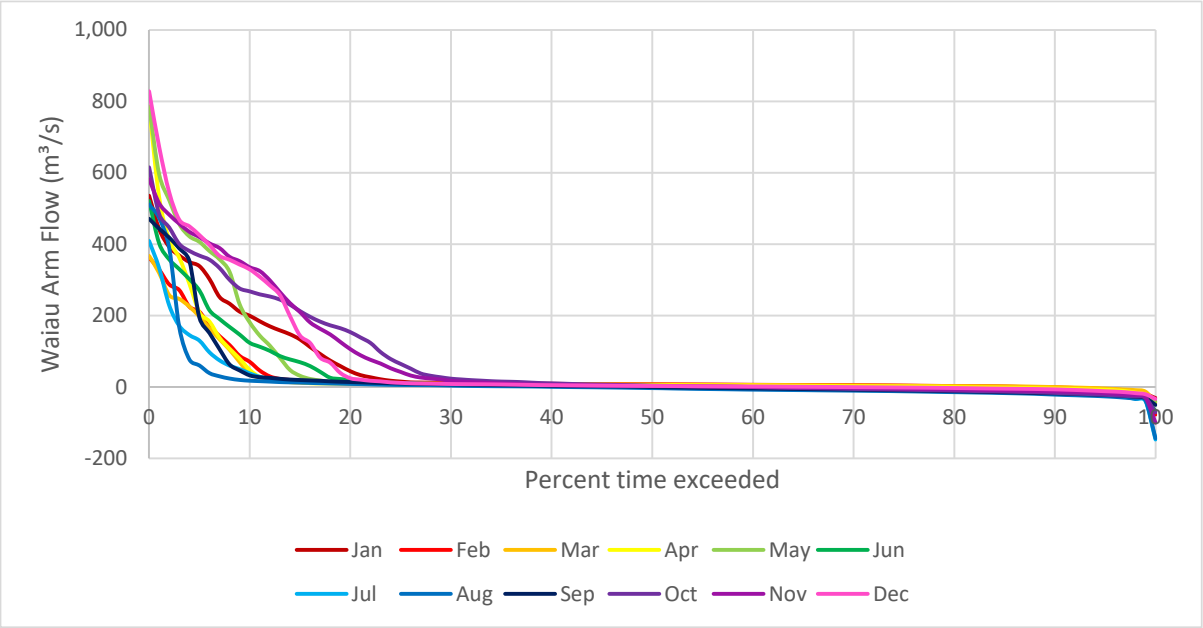


Figure 2: Historical Waiau Arm flowrates (1996-2022) duration curves by month-of-year. Positive from Lake Manapōuri to MLC, negative from MLC (Mararoa) to Lake Manapōuri.

Historical water levels measured immediately upstream of MLC are typically lowest February-April (median RL 177.35 m) and highest October-November (median RL 178.03 m), as shown in Figure 3. MLC headwater levels were within the main operating range of RL 176.80 to 178.60 m for 89% of the period from 1996-2002[2]

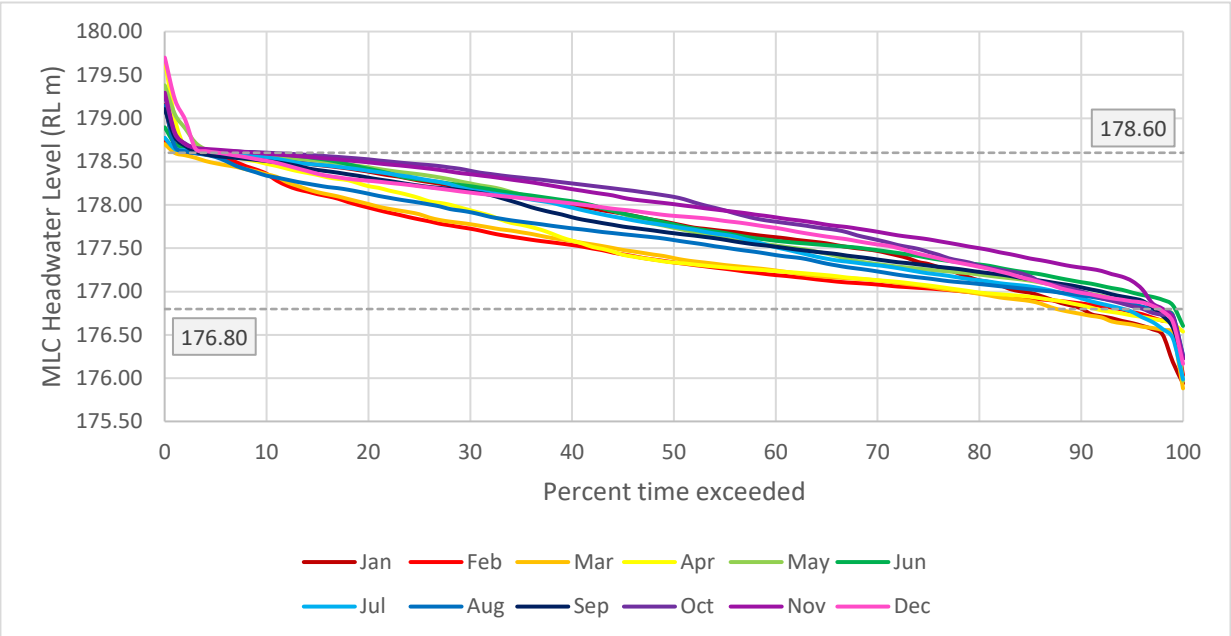


Figure 3: Historical MLC headwater level (1996-2022) duration curves by month-of-year

[2] Noting that there is a small water level gradient between MLC and Lake Manapōuri proper, where the lake range operating rules apply.

3 Model Setup

A two-dimensional computational hydraulic model was setup using HEC-RAS[3] software, with the modelled domain shown in Figure 4.

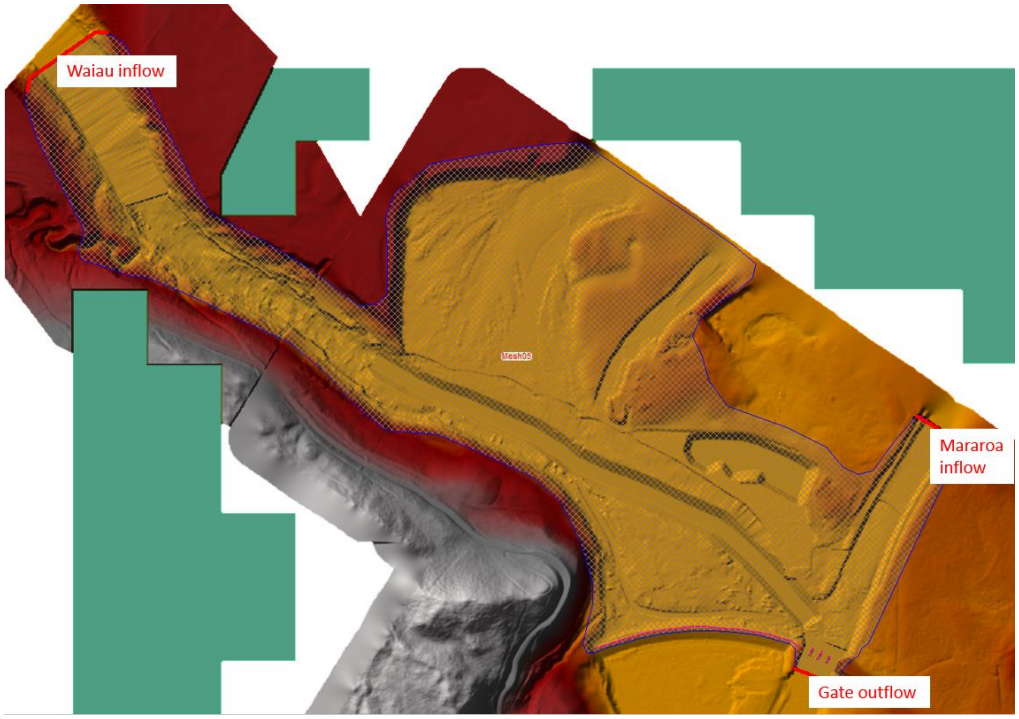


Figure 4: HEC-RAS model domain and boundaries. Bathymetry of in-stream excavation arrangement shown.

The modelled geometric data was based on a composite of:

- Bathymetry from WSP (2020).
- Lidar from Environment Southland (Landpro, 2020).
- Representation of MLC gate piers from drawing L6227/19.
- 'Dummy' river bathymetry upstream of available bathymetric survey on Waiau Arm, to allow flow streamlines to develop and ensure boundary conditions do not affect flow patterns in the areas of interest.
- Bathymetry of 'bird island lagoon' from MLC construction drawing L6320/1 and interpretation of extent of subsequent sediment deposition from aerial imagery.
- Conceptual excavation arrangements by Damwatch.

The model used a Manning's n roughness coefficient of 0.035 throughout, based on standard hydraulic references (e.g. Chow (1959)).

The boundary conditions constituting each flow case, modelled for each of the three 'geometries' (Existing, in-stream excavation, parallel channel excavation) are given in Table 1. At both minimum lake control level and maximum lake control level, +/- 10 m^3/s in the Waiau Arm was modelled, with 16 m^3/s (November-March minimum flow release) being released at MLC.

At intermediate lake levels of RL 177.2 m and 178.0 m, +/- 5 m^3/s in the Waiau Arm was modelled.

[3] HEC-RAS is a computer program developed by the US Army Corps of Engineers that models the hydraulics of water flow through natural rivers and other channels.

Table 1: Boundary conditions for modelled flow cases (resultant boundary inflows in parentheses)

Flow Case	Waiau Inflow	Mararoa Inflow	Gate Outflow
F01	10 m^3/s	6 m^3/s	176.8 m RL (16 m^3/s)
F02	10 m^3/s	6 m^3/s	178.6 m RL (16 m^3/s)
F03	176.8 m RL (- 10 m^3/s)	26 m^3/s	16 m^3/s
F04	178.6 m RL (- 10 m^3/s)	26 m^3/s	16 m^3/s
F05	5 m^3/s	11 m^3/s	177.2 m RL (16 m^3/s)
F06	5 m^3/s	11 m^3/s	178.0 m RL (16 m^3/s)
F07	177.2 m RL (- 5 m^3/s)	21 m^3/s	16 m^3/s
F08	178.0 m RL (- 5 m^3/s)	21 m^3/s	16 m^3/s

4 Results

A key result is the split in flow rates between the defined channels through the reach immediately upstream of MLC. The existing case includes two defined channels – 'Main' and 'South'. For the in-stream excavation alternative, these two channels are deepened. For the parallel channel alternative, a third 'New channel' is constructed, as shown in Figure 5.

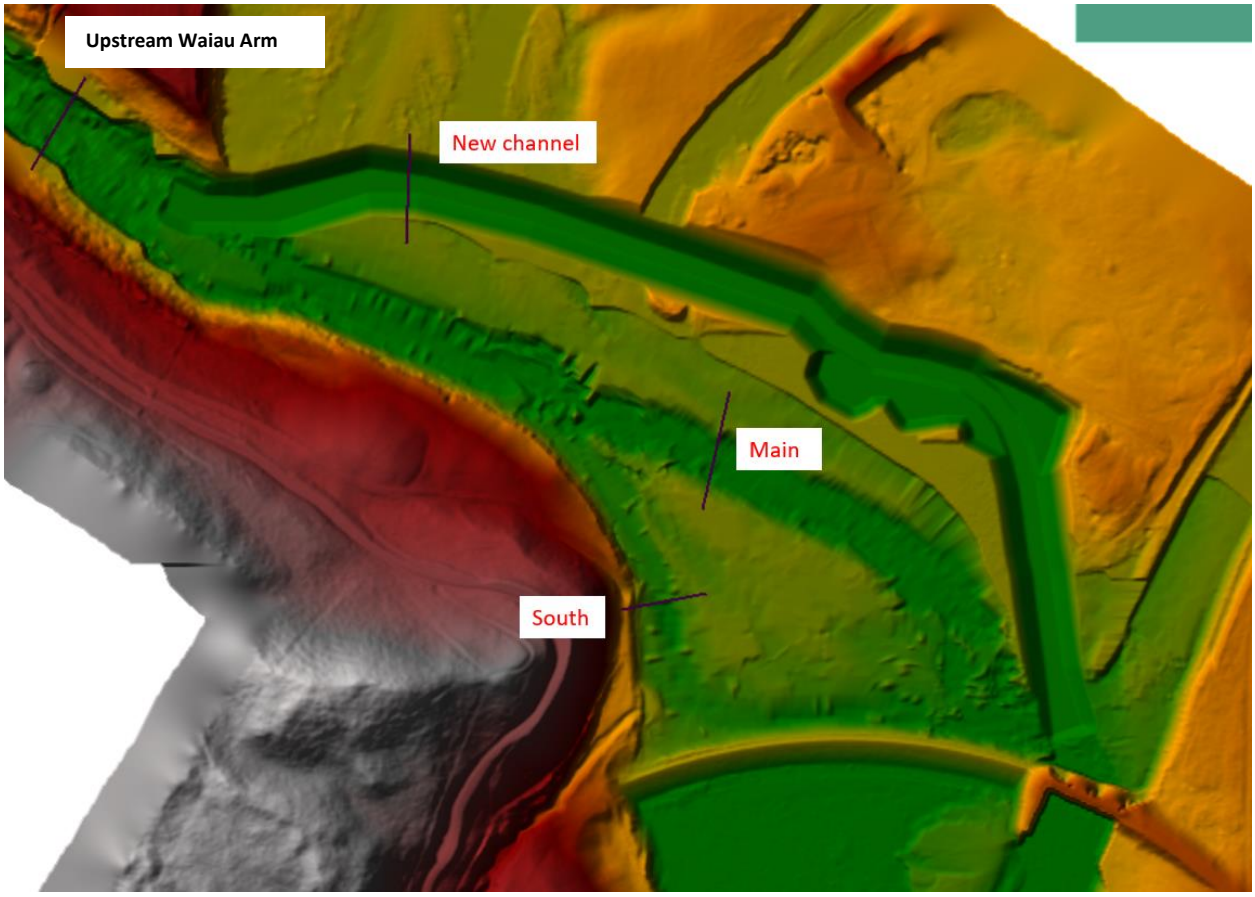


Figure 5: Three defined channels for the 'Parallel channel' excavation alternative, for which flow rates have been extracted from the model.

The modelled split in flow rates for the three models is presented in Table 2 for the four modelled flow cases.

Table 2: Flow split between channels. Negative flowrate denotes flow from MLC toward Lake Manapōuri.

Flow Case	Existing	In-stream Excavation	Parallel Channel Excavation
F01	8.6 m³/s (main) 1.4 m³/s (south)	9.4 m³/s (main) 0.6 m³/s (south)	2.0 m³/s (main) 0.3 m³/s (south) 7.7 m³/s (new channel)
F02 [a]	6.2 m³/s (main) 2.3 m³/s (south)	7.8 m³/s (main) 1.6 m³/s (south)	3.0 m³/s (main) 1.2 m³/s (south) 5.2 m³/s (new channel)
F03	-8.6 m³/s (main) -1.4 m³/s (south)	-8.7 m³/s (main) -1.3 m³/s (south)	-4.5 m³/s (main) -0.7 m³/s (south) -4.8 m³/s (new channel)
F04 [a]	-5.7 m³/s (main) -3.2 m³/s (south)	-6.3 m³/s (main) -2.8 m³/s (south)	-4.0 m³/s (main) -2.1 m³/s (south) -3.6 m³/s (new channel)
F05	4.0 m³/s (main) 1.0 m³/s (south)	4.6 m³/s (main) 0.4 m³/s (south)	1.3 m³/s (main) 0.3 m³/s (south) 3 4³/s (new channel)
F06 [a]	3.4 m³/s (main) 1.3³/s (south)	4.2 m³/s (main) 0.7 m³/s (south)	1.5 m³/s (main) 0.5 m³/s (south) 2.9 m³/s (new channel)
F07	-4.1 m³/s (main) -0.9 m³/s (south)	-4.9 m³/s (main) -0.1 m³/s (south)	-3.4 m³/s (main) -0.7 m³/s (south) -0.9 m³/s (new channel)
F08 [a]	-3.7 m³/s (main) -1.1 m³/s (south)	-3.9 m³/s (main) -1.0 m³/s (south)	-3.3 m³/s (main) -0.9 m³/s (south) -0.6 m³/s (new channel)

[a] At high lake levels the sum of flow in the defined channels does not sum to 10 m³/s as there is some flow over the riverbanks and over the central island.

At the channel cross-section locations shown in Figure 5, average mid-channel velocities from the model are given in

Table 3. For comparison, in the deeper Waiau Arm upstream of the delta area, average velocities for a 10 m^3/s flow rate are around 0.02 to 0.04 m/s over the lake range, and 0.01 to 0.02 m/s for a 5 m^3/s flow rate.

Table 3: Channel velocities modelled. Negative velocities denote velocity in the direction toward Lake Manapōuri.

Flow Case	Existing	In-stream Excavation	Parallel Channel Excavation
F01	0.18 m/s (main) 0.14 m/s (south)	0.06 m/s (main) 0.03 m/s (south)	0.03 m/s (main) 0.04 m/s (south) 0.06 m/s (new channel)
F02	0.04 m/s (main) 0.04 m/s (south)	0.03 m/s (main) 0.02 m/s (south)	0.02 m/s (main) 0.02 m/s (south) 0.03 m/s (new channel)
F03	-0.16 m/s (main) -0.11 m/s (south)	-0.05 m/s (main) -0.06 m/s (south)	-0.09 m/s (main) -0.06 m/s (south) -0.04 m/s (new channel)
F04	-0.04 m/s (main) -0.04 m/s (south)	-0.02 m/s (main) -0.03 m/s (south)	-0.03 m/s (main) -0.03 m/s (south) -0.02 m/s (new channel)
F05	0.07 m/s (main) 0.05 m/s (south)	0.03 m/s (main) 0.01 m/s (south)	0.02 m/s (main) 0.01 m/s (south) 0.02 m/s (new channel)
F06	0.04 m/s (main) 0.03 m/s (south)	0.02 m/s (main) 0.01 m/s (south)	0.01 m/s (main) 0.01 m/s (south) 0.02 m/s (new channel)
F07	-0.06 m/s (main) -0.04 m/s (south)	-0.03 m/s (main) -0.003 m/s (south)	-0.05 m/s (main) -0.03 m/s (south) -0.01 m/s (new channel)
F08	-0.03 m/s (main) -0.02 m/s (south)	-0.02 m/s (main) -0.02 m/s (south)	-0.03 m/s (main) -0.02 m/s (south) -0.004 m/s (new channel)

For each modelled case, colourmap plots of velocity with particle tracking arrows superimposed are presented in the series of figures below.

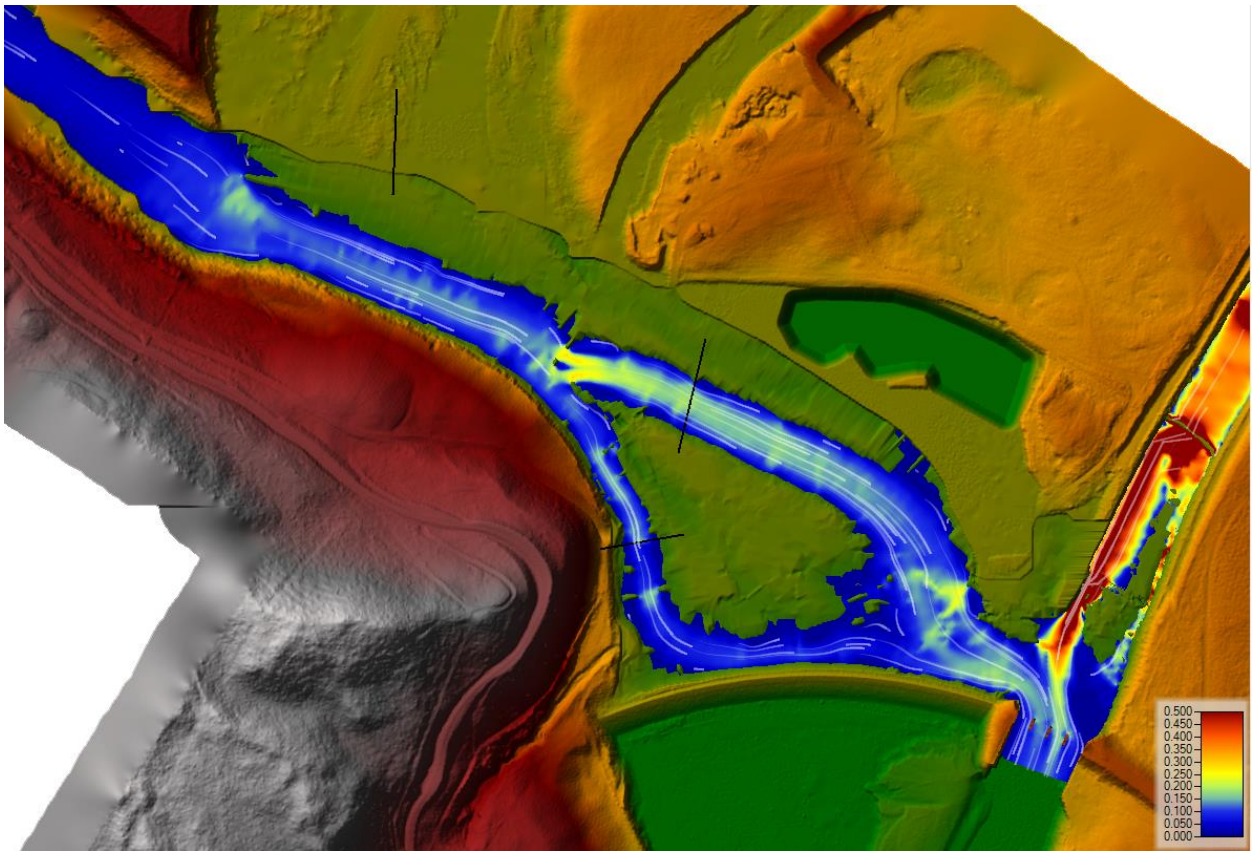


Figure 6: Existing Case. F01 – Q_{ARM}= 10 m³/s, WL=176.8 mRL

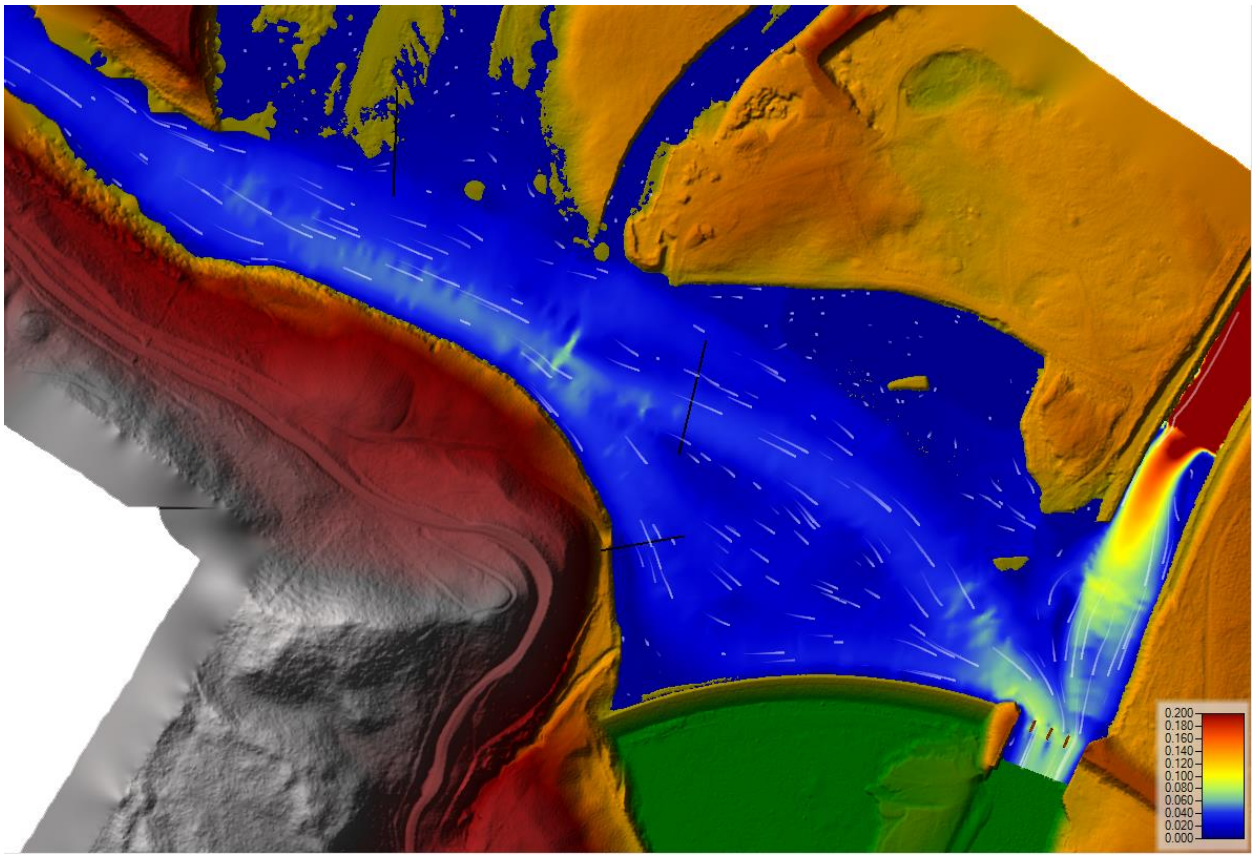


Figure 7: Existing Case. F02 – Q_{ARM}= 10 m³/s, WL=178.6 mRL

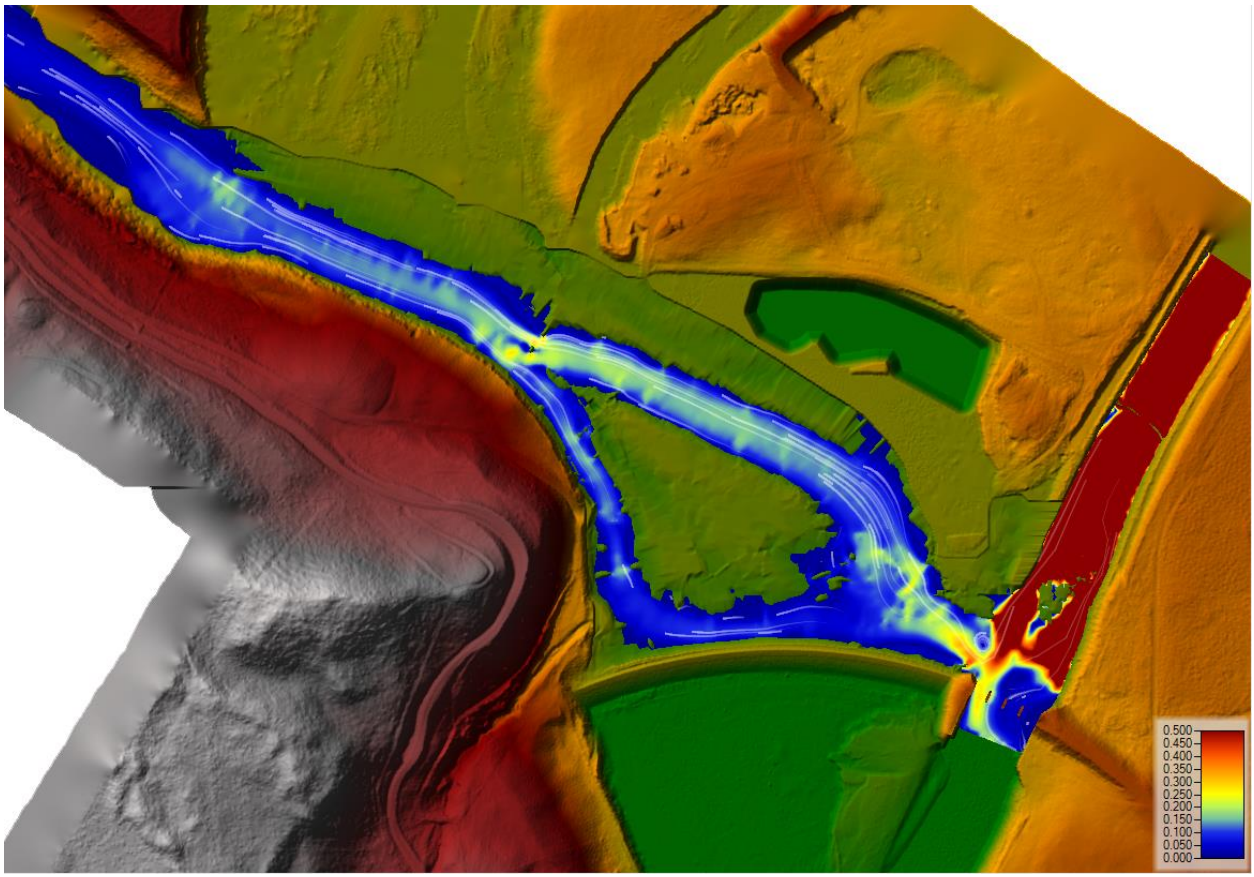


Figure 8: Existing Case. F03 – Q_{ARM}= -10 m³/s, WL=176.8 mRL

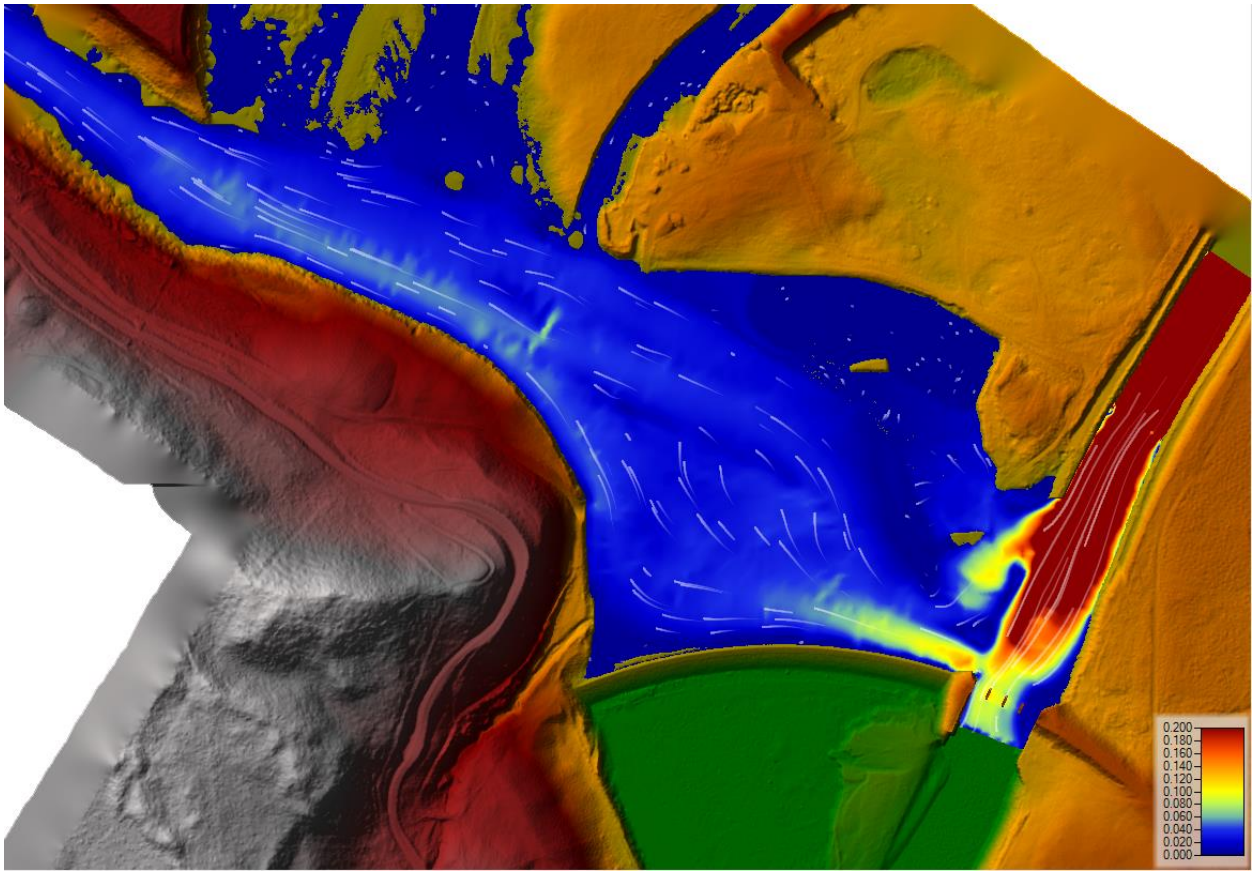


Figure 9: Existing Case. F04 – Q_{ARM}= -10 m³/s, WL=178.6 mRL

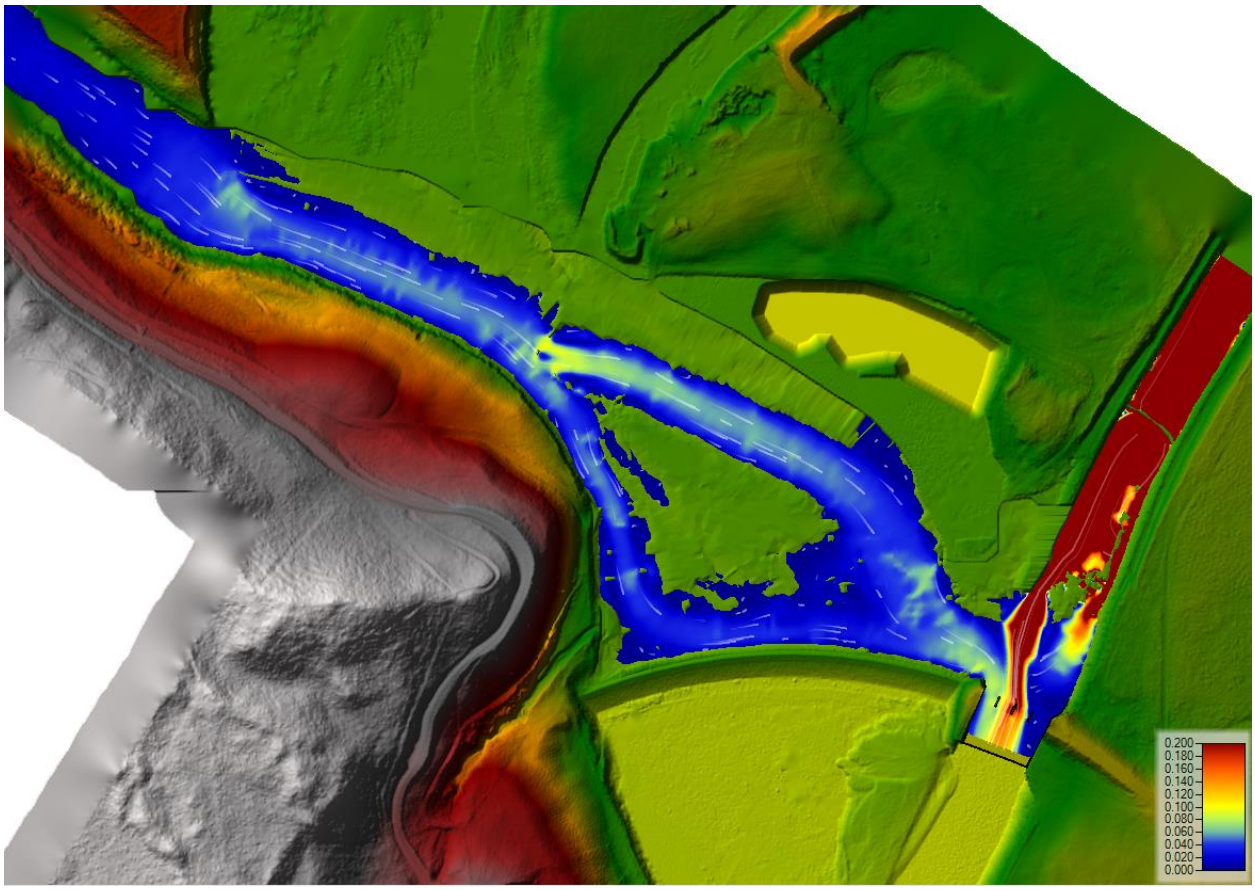


Figure 10: Existing Case. F05 – Q_{ARM}= 5 m³/s, WL=177.2 mRL

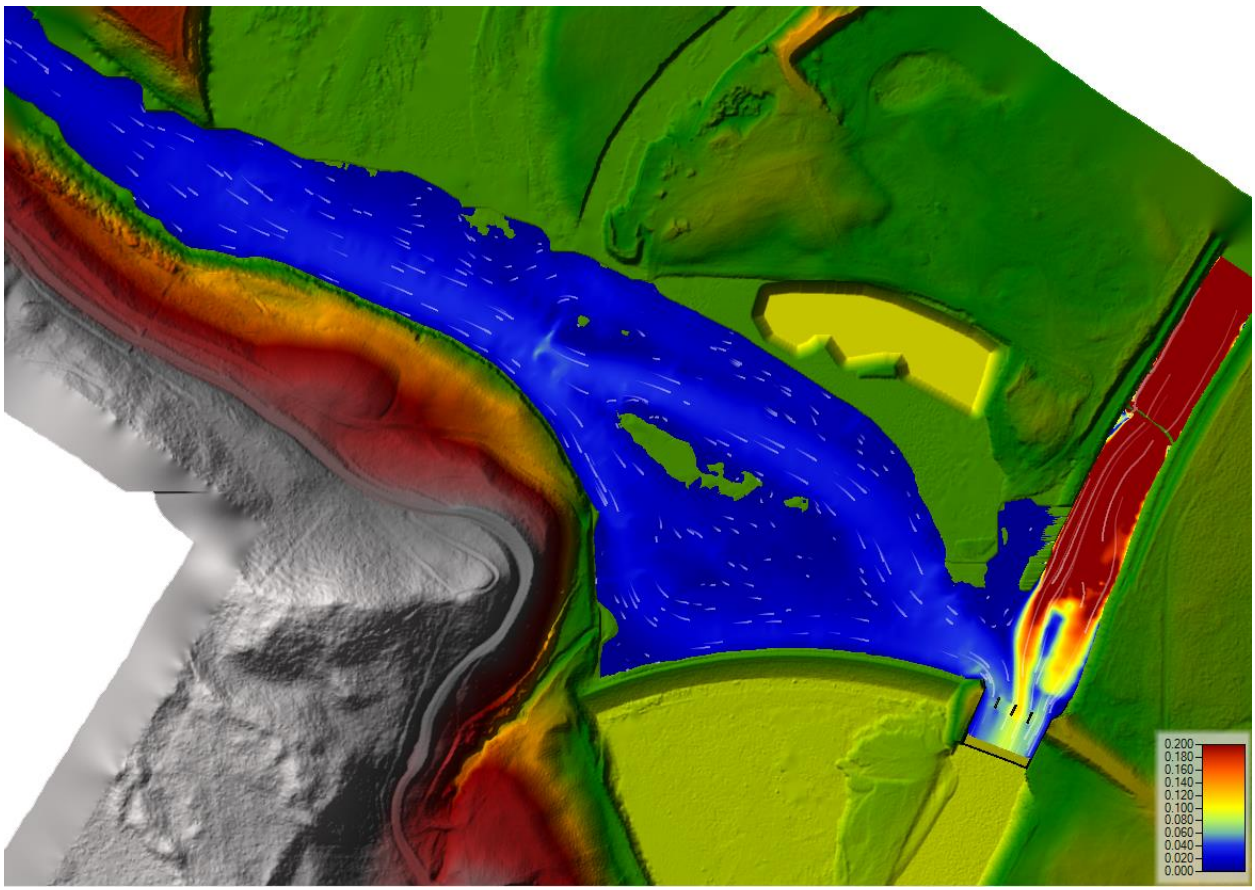


Figure 11: Existing Case. F06 – Q_{ARM}= 5 m³/s, WL=178.0 mRL

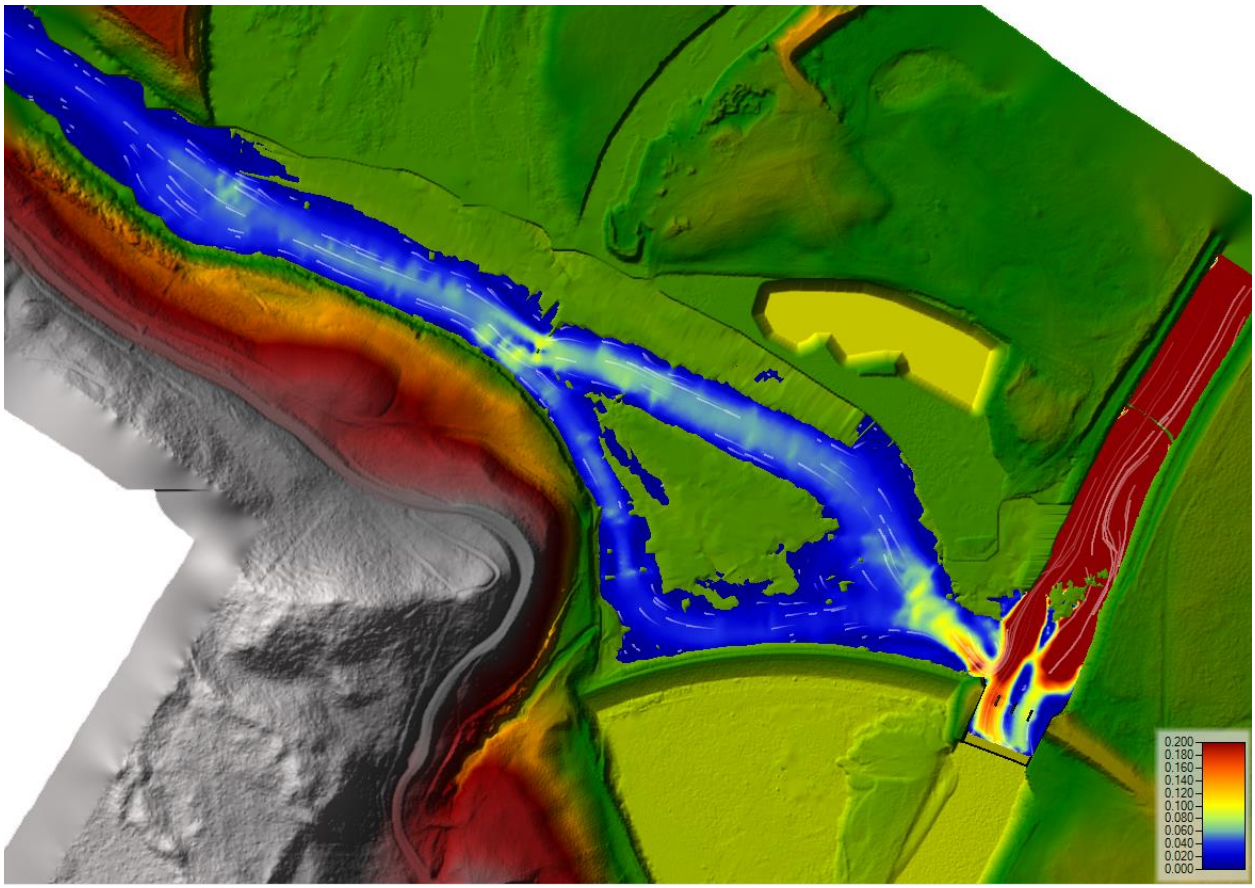


Figure 12: Existing Case. F07 – Q_{ARM}= -5 m³/s, WL=177.2 mRL

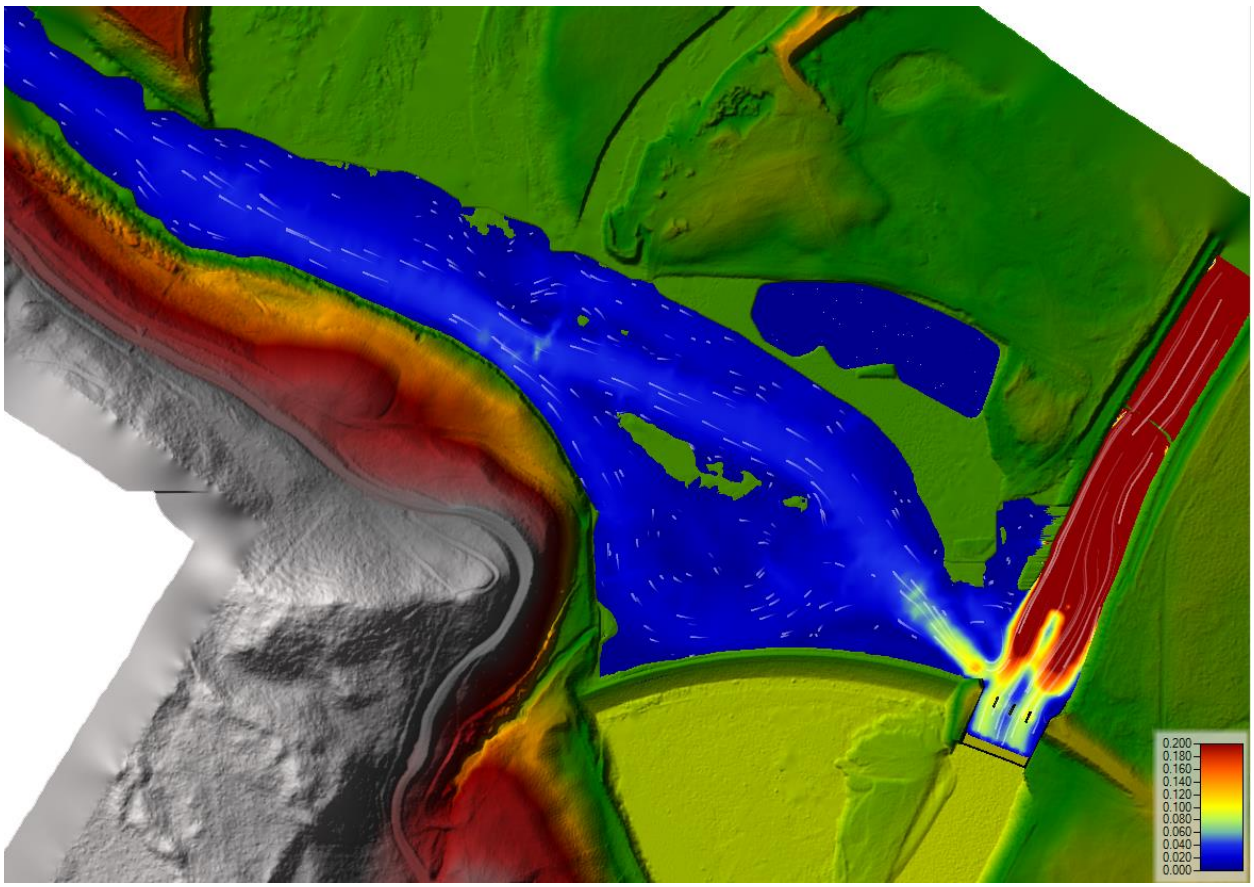


Figure 13: Existing Case. F08 – Q_{ARM}= -5 m³/s, WL=178.0 mRL

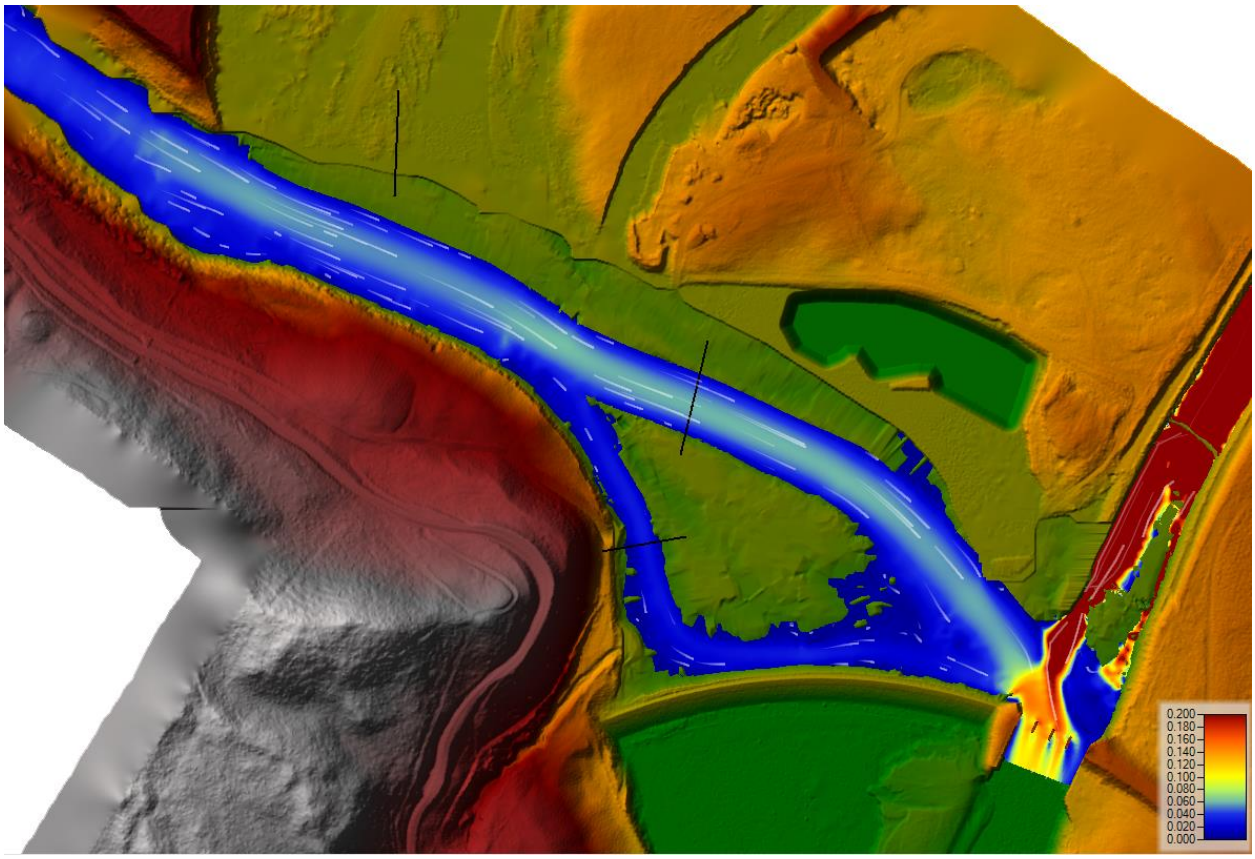


Figure 14: In-stream Excavation Case. F01 – Q_{ARM}= 10 m³/s, WL=176.8 mRL

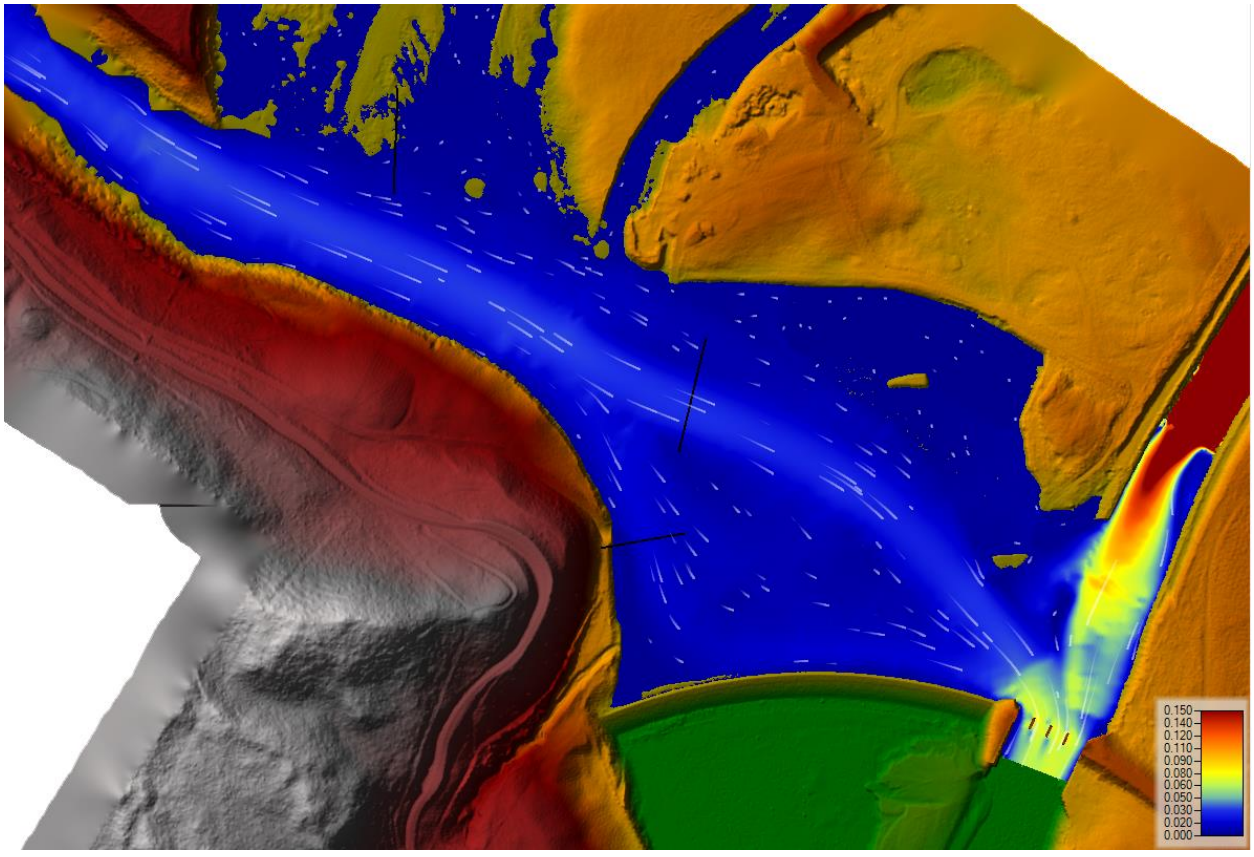


Figure 15: In-stream Excavation Case. F02 – Q_{ARM}= 10 m³/s, WL=178.6 mRL

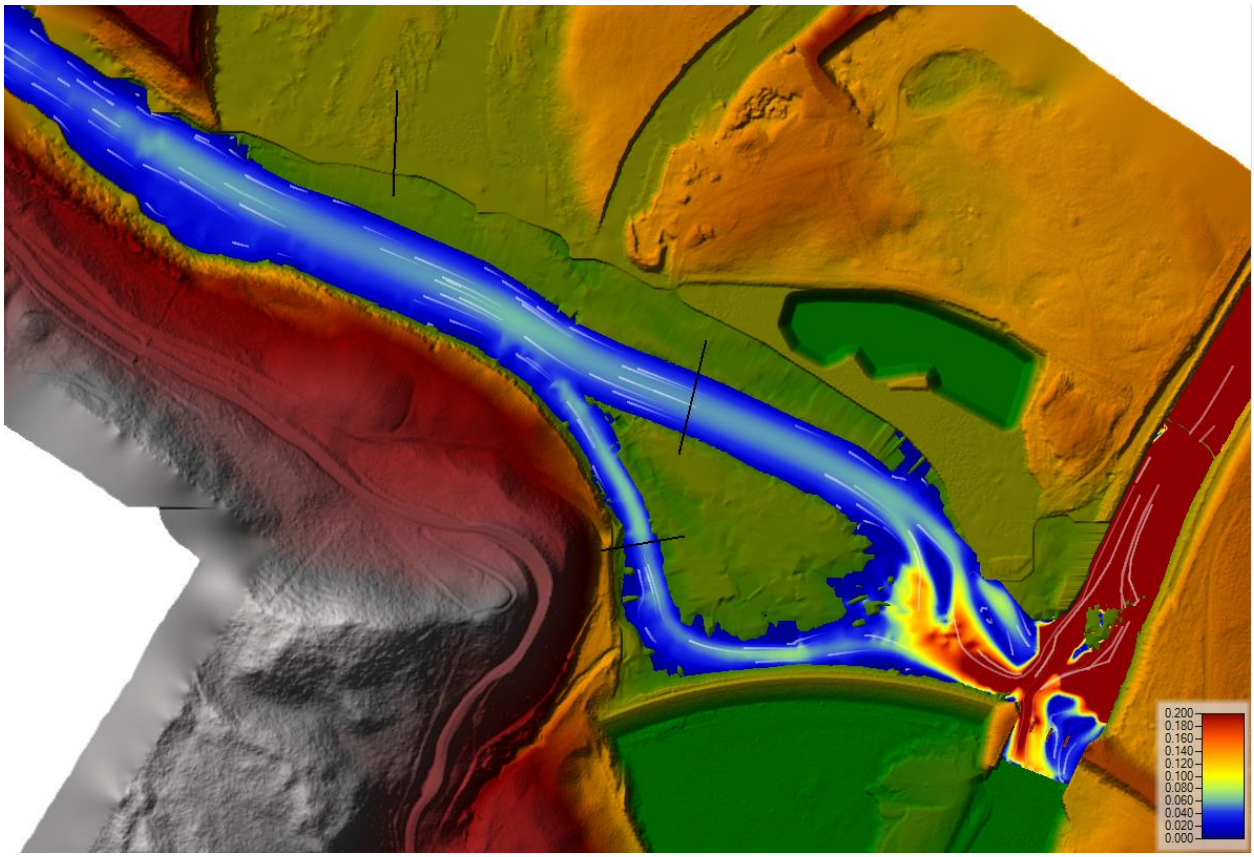


Figure 16: In-stream Excavation Case. F03 – Q_{ARM}= -10 m³/s, WL=176.8 mRL

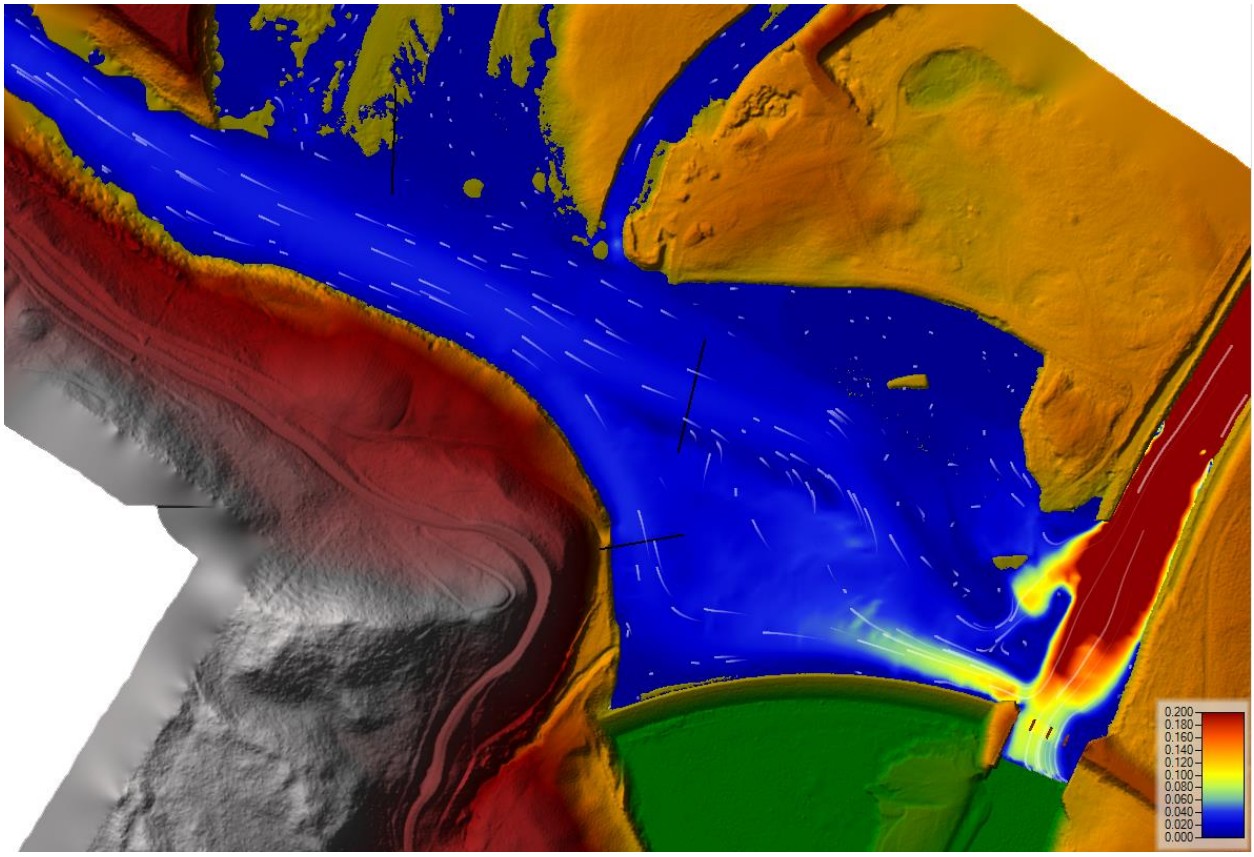


Figure 17: In-stream Excavation Case. F04 – Q_{ARM}= -10 m³/s, WL=178.6 mRL

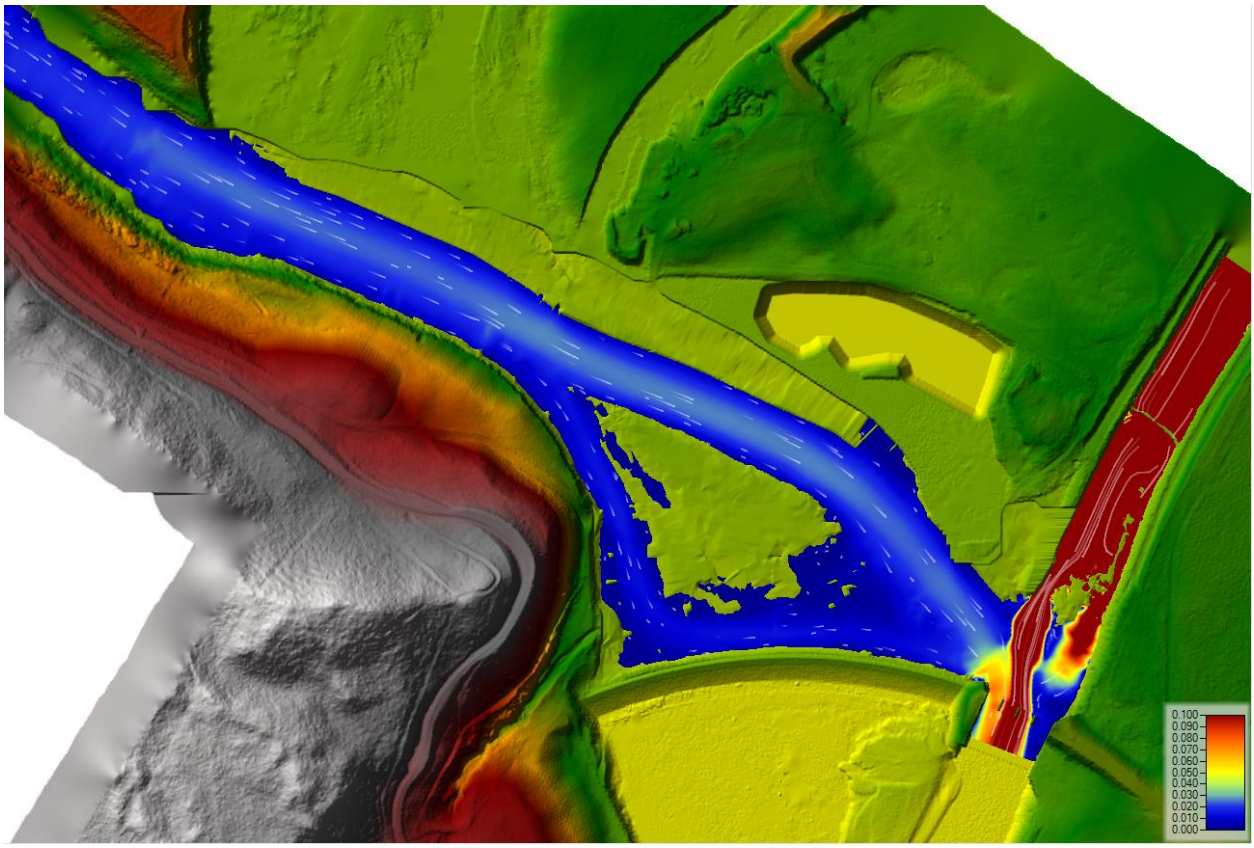


Figure 18: In-stream Excavation Case. F05 – Q_{ARM}= 5 m³/s, WL=177.2 mRL

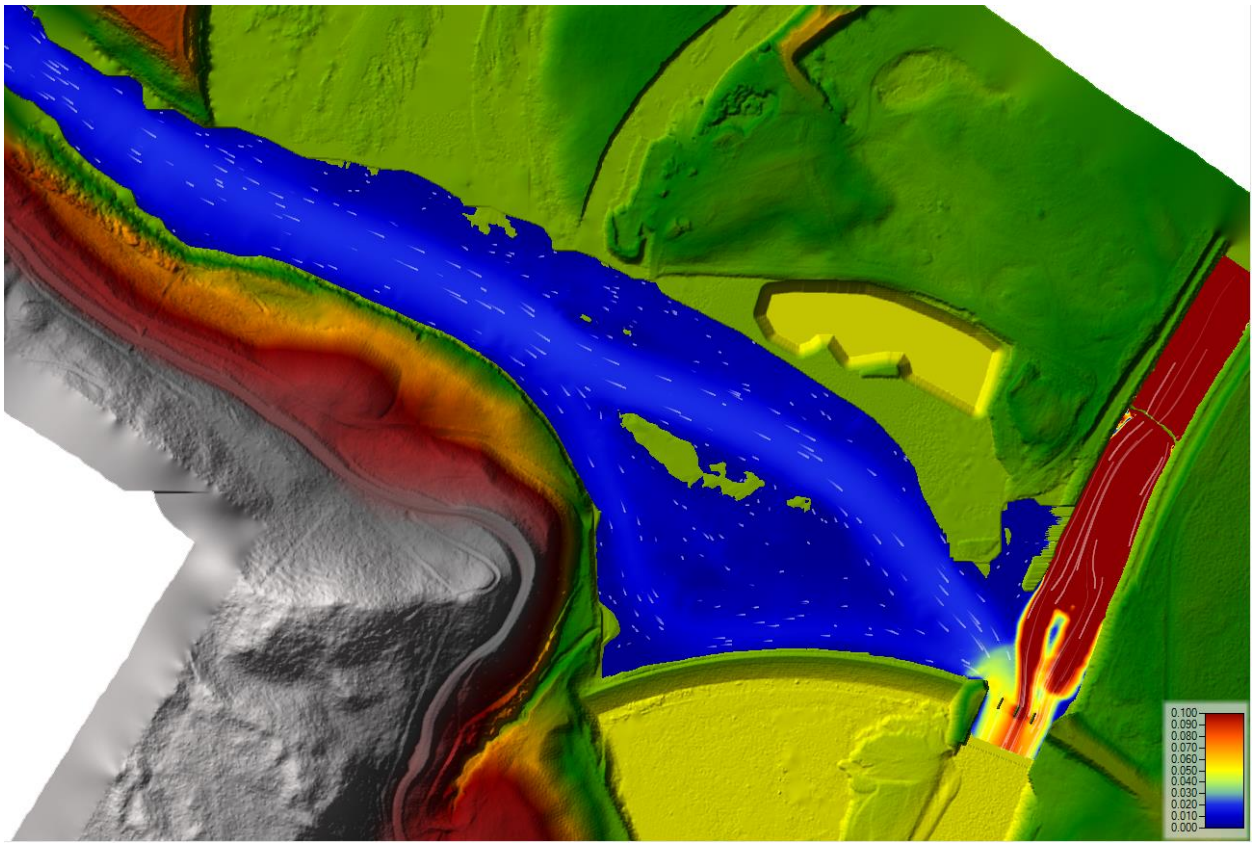


Figure 19: In-stream Excavation Case. F06 – Q_{ARM}= 5 m³/s, WL=178.0 mRL

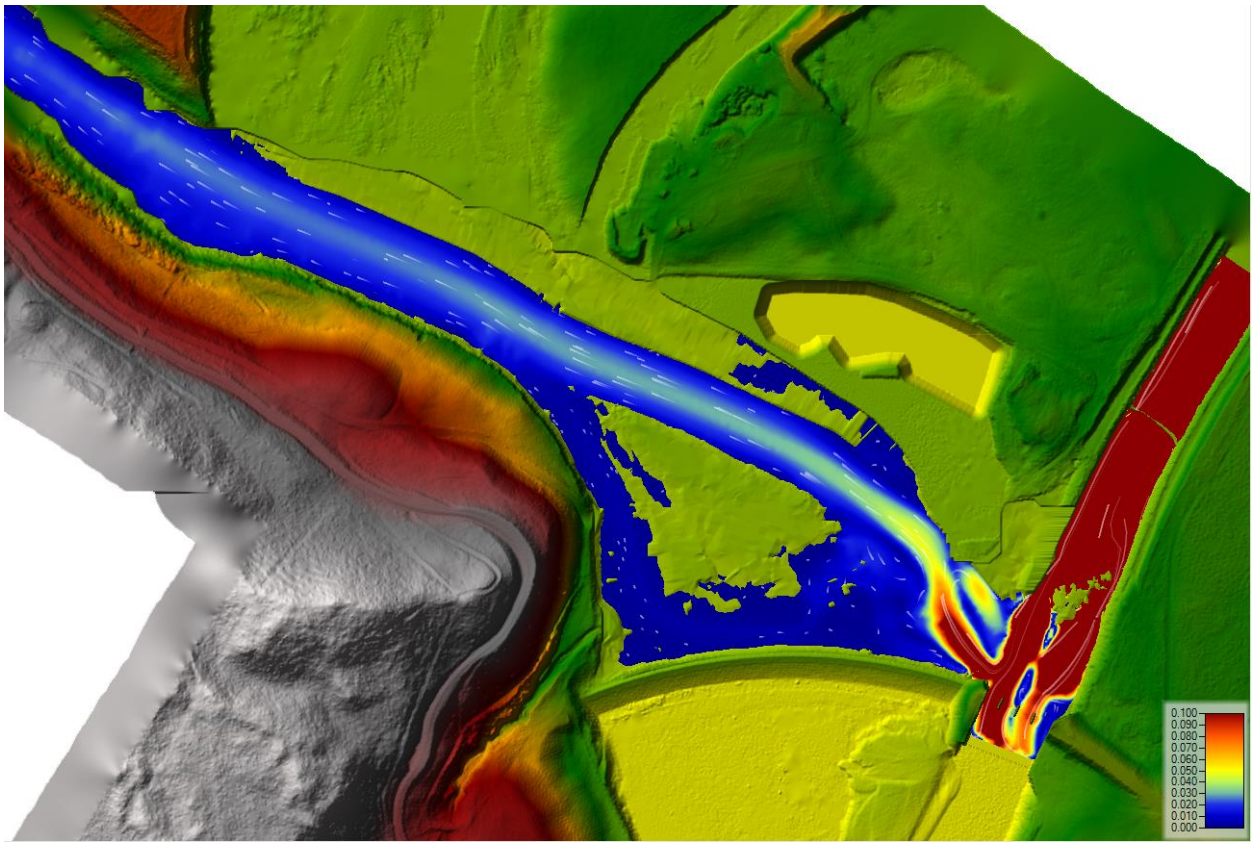


Figure 20: In-stream Excavation Case. F07 – Q_{ARM}= -5 m³/s, WL=177.2 mRL

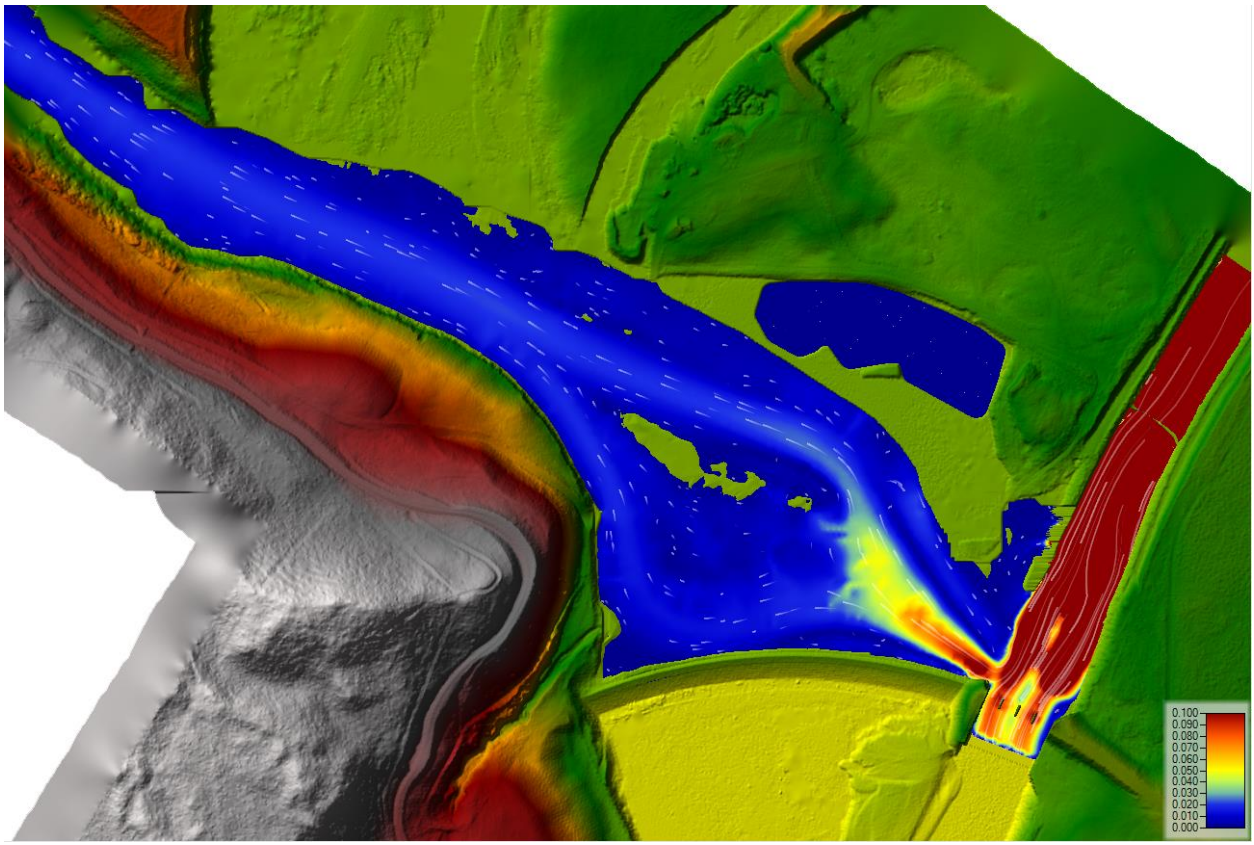


Figure 21: In-stream Excavation Case. F08 – Q_{ARM}= -5 m³/s, WL=178.0 mRL

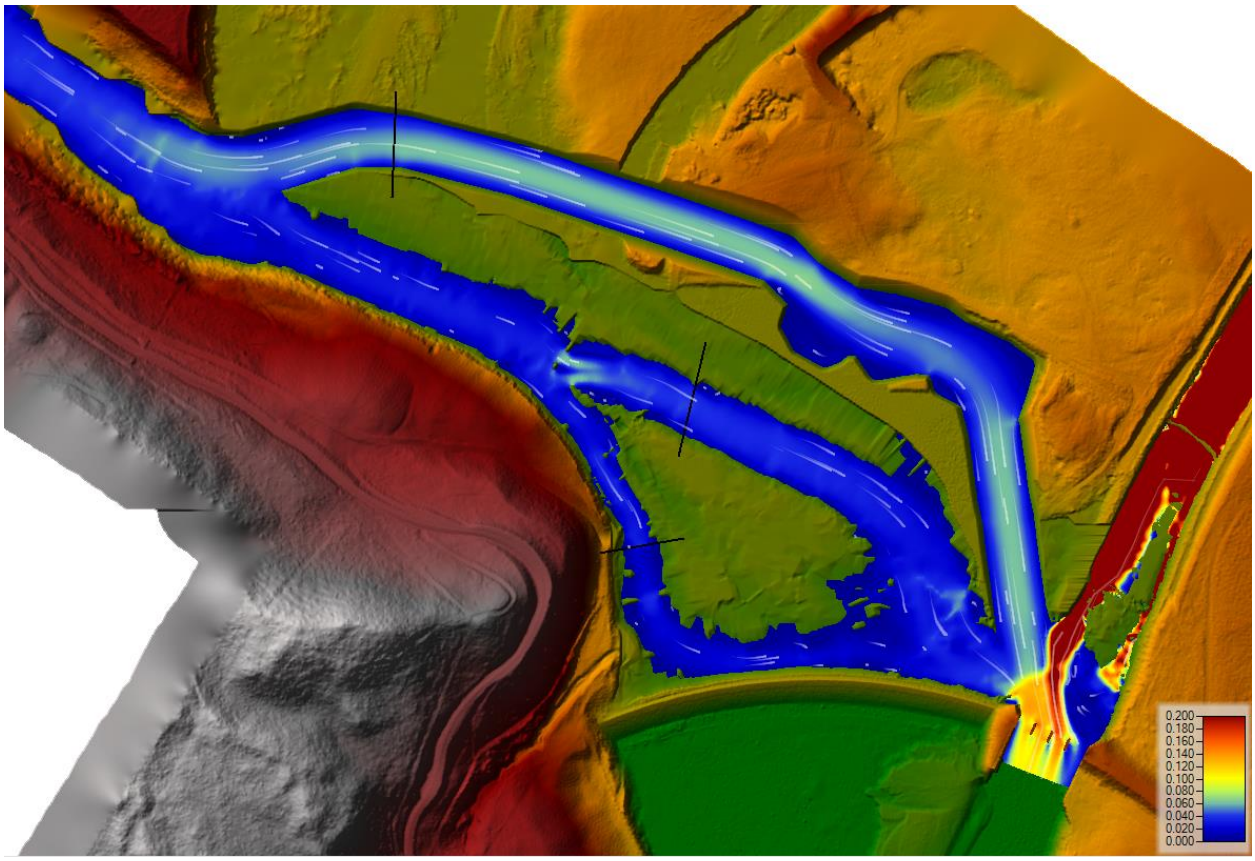


Figure 22: Parallel Channel Excavation Case. F01 – Q_{ARM}= 10 m³/s, WL=176.8 mRL

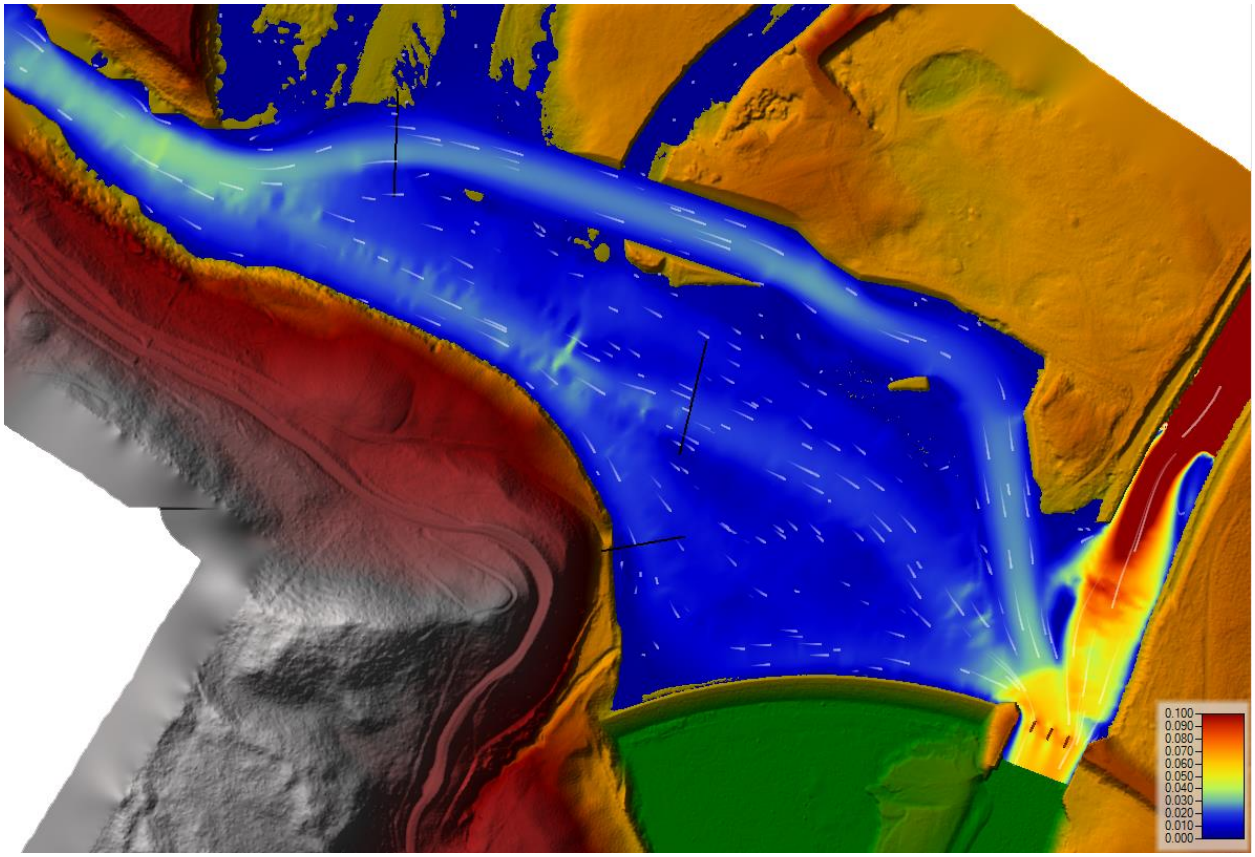


Figure 23: Parallel Channel Excavation Case. F02 – Q_{ARM}= 10 m³/s, WL=178.6 mRL

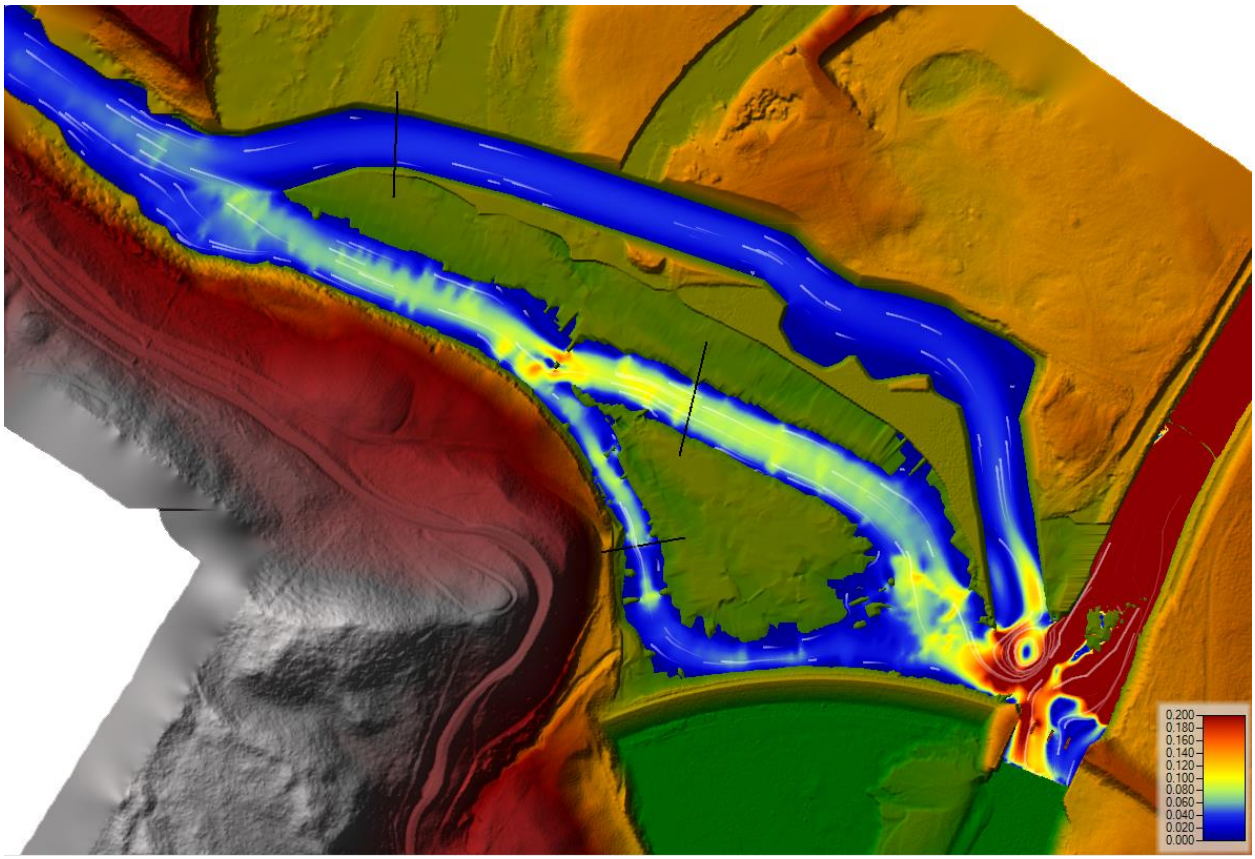


Figure 24: Parallel Channel Excavation Case. F03 – Q_{ARM}= -10 m³/s, WL=176.8 mRL

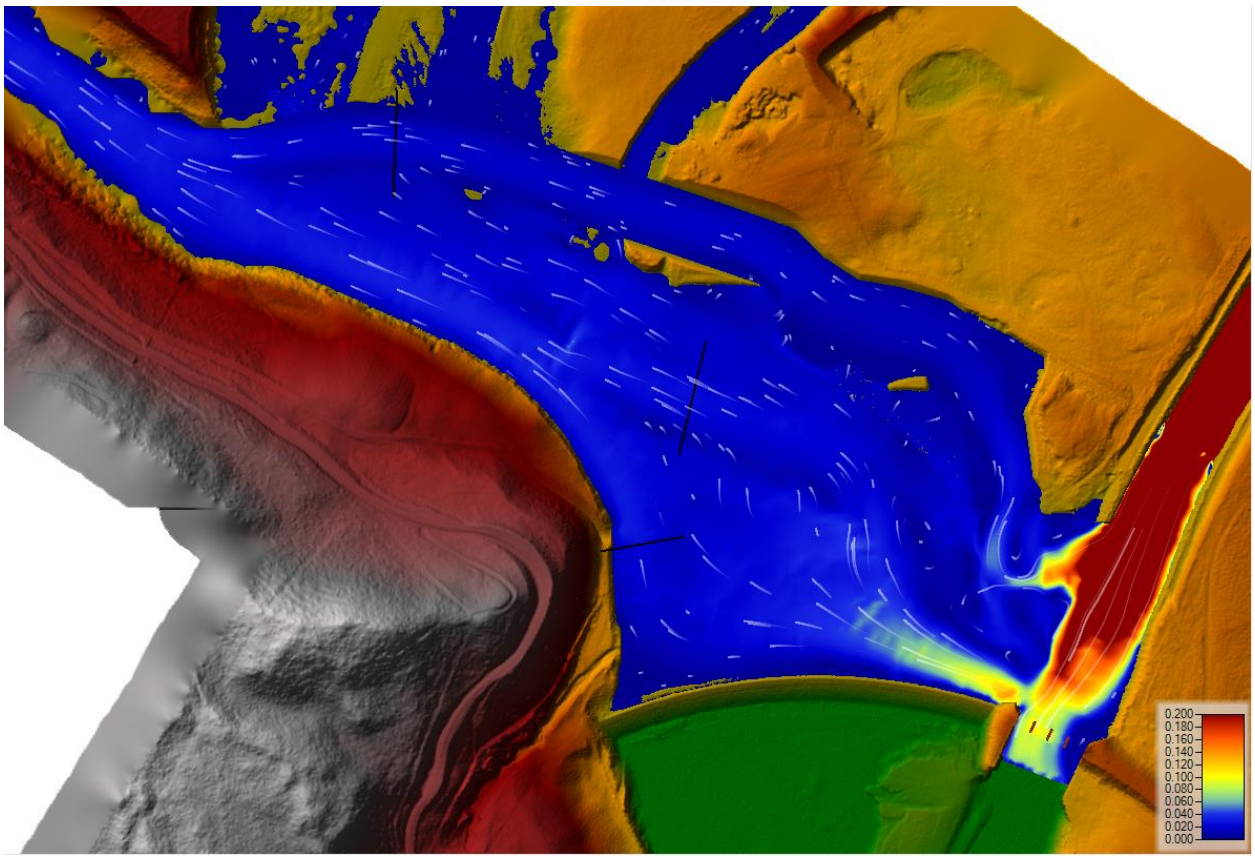


Figure 25: Parallel Channel Excavation Case. F04 – Q_{ARM}= -10 m³/s, WL=178.6 mRL

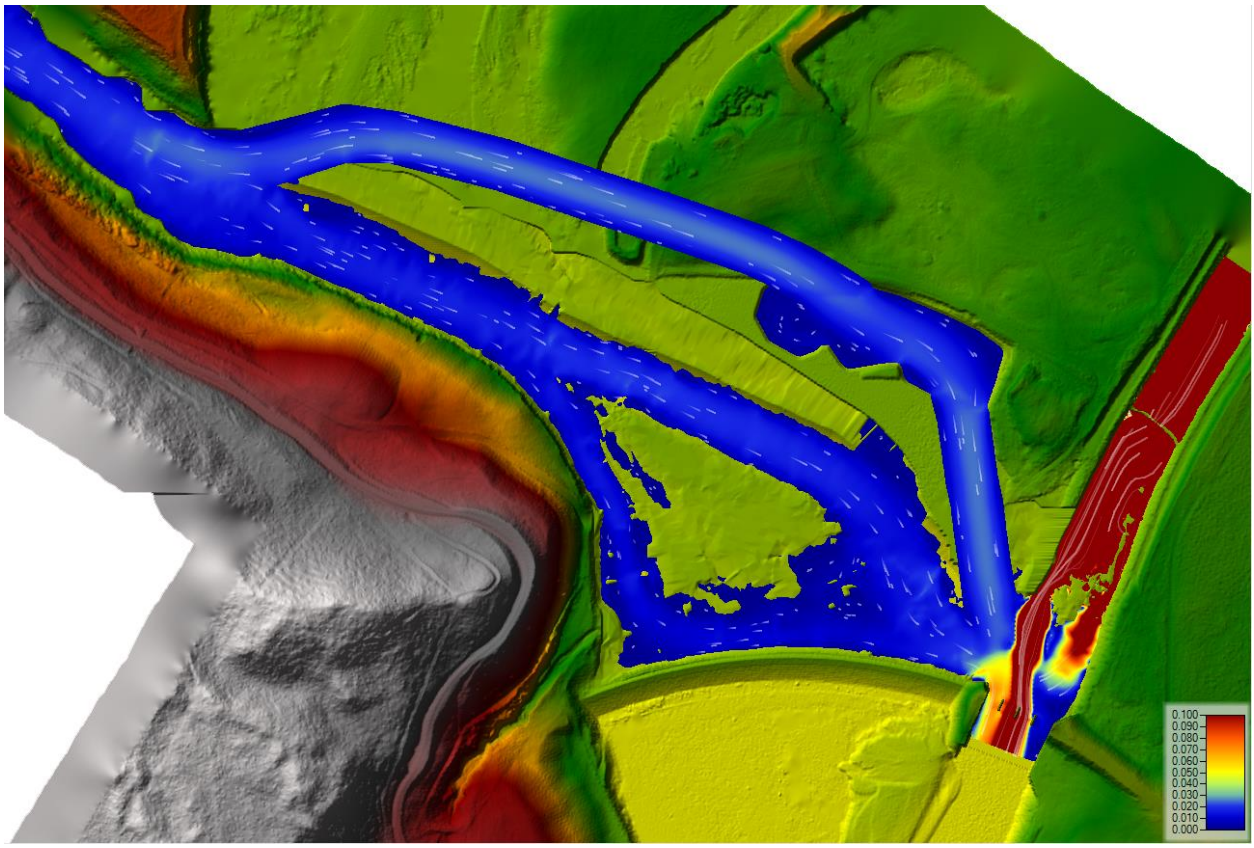


Figure 26: Parallel Channel Excavation Case. F05 – Q_{ARM}= 5 m³/s, WL=177.2 mRL

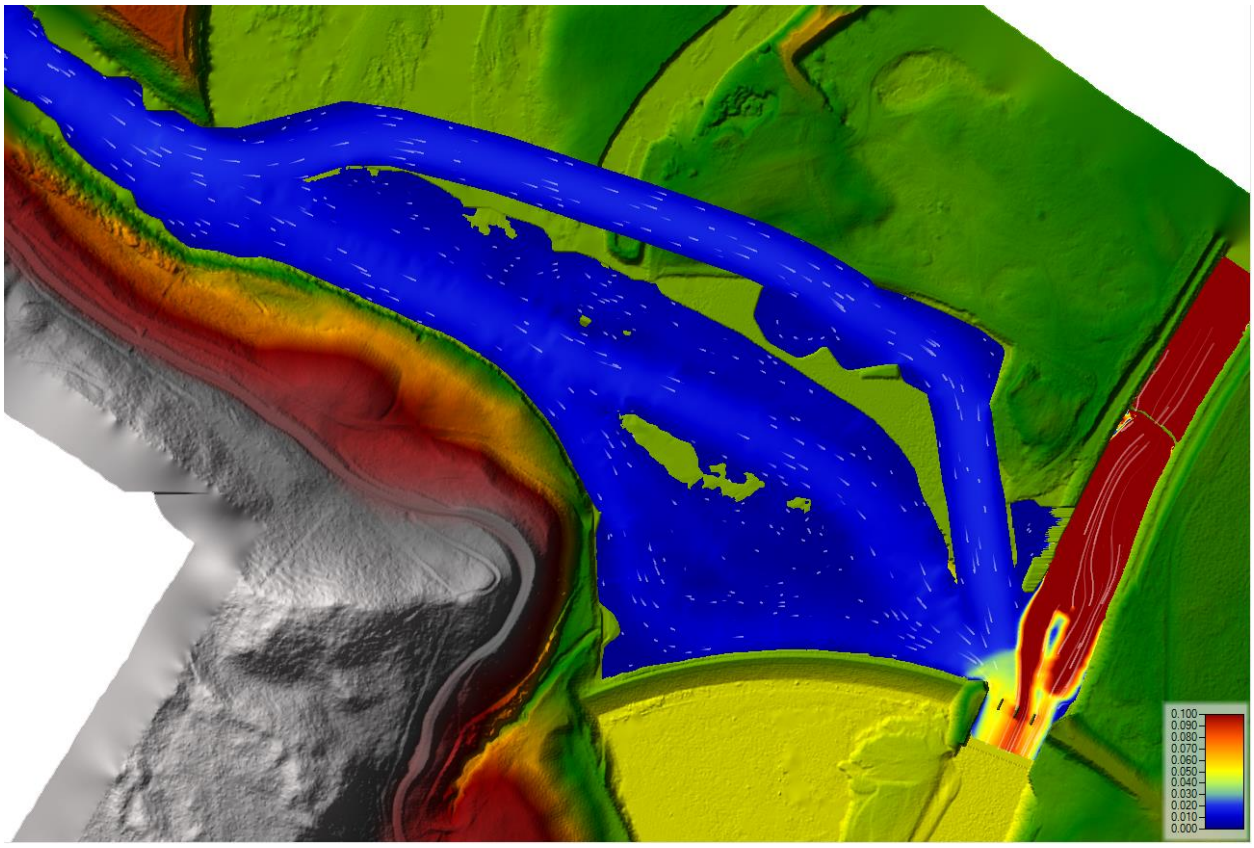


Figure 27: Parallel Channel Excavation Case. F06 – Q_{ARM}= 5 m³/s, WL=178.0 mRL

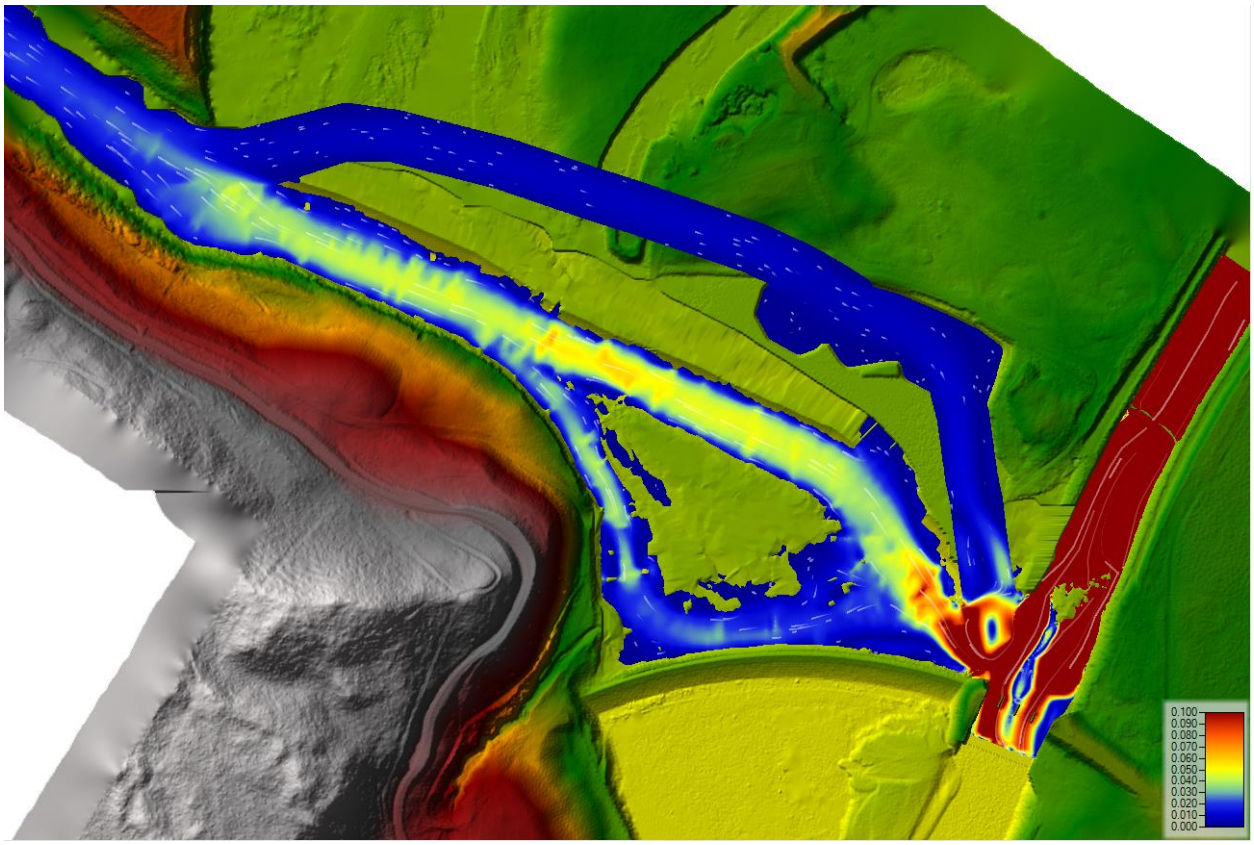


Figure 28: Parallel Channel Excavation Case. F07 – Q_{ARM}= -5 m³/s, WL=177.2 mRL

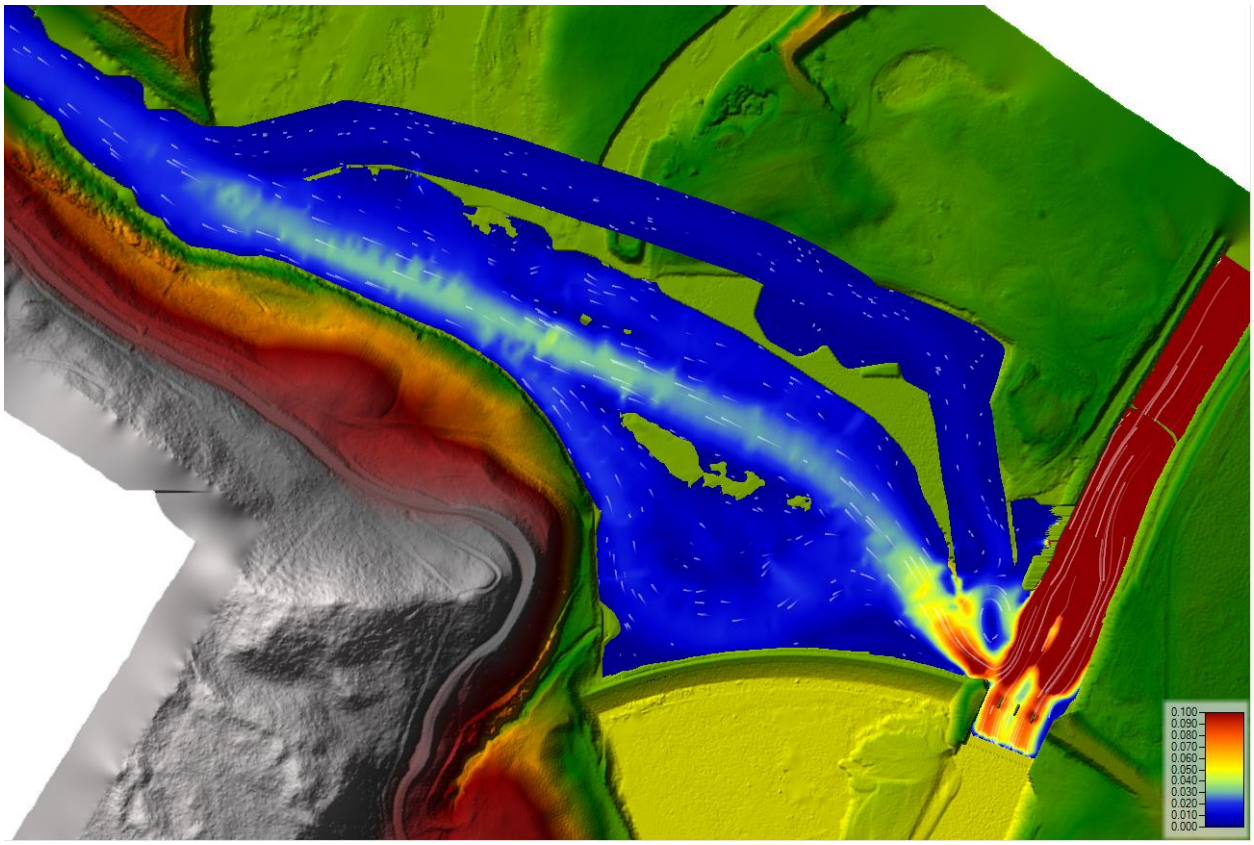


Figure 29: Parallel Channel Excavation Case. F08 – Q_{ARM}= -5 m³/s, WL=178.0 mRL

For each model run, simulated water depths and velocities were averaged across the delta area, as shown in the red outline of Figure 30. The wetted flow area within this region, and the average depth and velocity. are tabulated in Table 4.

Figure 30: Delta area (red outline) within which depth and velocity have been averaged to give indicative parameters for each model run. Example of cropped model result shown in blue.

Table 4: Modelled wetted area, average water depth, and average velocity within delta area

Flow Case		Existing	In-stream Excavation	Parallel Channel Excavation
F01	Wetted Area	69,100 m²	77,500 m²	115,400 m²
	Av Depth	1.25 m	2.52 m	2.16 m
	Av. Velocity	0.09 m/s	0.03 m/s	0.03 m/s
F02	Wetted Area	213,800 m²	213,700 m²	228,700 m²
	Av Depth	1.70 m	2.24 m	2.37 m
	Av. Velocity	0.02 m/s	0.01 m/s	0.01 m/s
F03	Wetted Area	69,300 m²	77,600 m²	115,600 m²
	Av Depth	1.24 m	2.52 m	2.16 m
	Av. Velocity	0.09 m/s	0.05 m/s	0.04 m/s
F04	Wetted Area	213,700 m²	213,800 m²	228,800 m²
	Av Depth	1.70 m	2.24 m	2.37 m
	Av. Velocity	0.02 m/s	0.02 m/s	0.02 m/s

F05	Wetted Area Av Depth Av. Velocity	81,100 m² 1.42 m 0.03 m/s	87,000 m² 2.63 m 0.01 m/s	129,500 m² 2.30 m 0.01 m/s
F06	Wetted Area Av Depth Av. Velocity	133,100 m² 1.52 m 0.02 m/s	133,700 m² 2.37 m 0.01 m/s	181,500 m² 2.33 m 0.01 m/s
F07	Wetted Area Av Depth Av. Velocity	81,300 m² 1.42 m 0.03 m/s	89,000 m² 2.57 m 0.02 m/s	129,600 m² 2.30 m 0.02 m/s
F08	Wetted Area Av Depth Av. Velocity	133,00 m² 1.52 m 0.02 m/s	133,800 m² 2.37 m 0.01 m/s	181,500 m² 2.33 m 0.01 m/s

5 Observations

Observations from the above include:

- Modelled cases of flow from the Mararoa River up the Waiau Arm toward Lake Manapouri (i.e., F03, F04, F07 and F08) show flow recirculation patterns at the Waiau Arm confluence behind the Mararoa groyne. Gravel deposition is apparent in this area, and this deposition can be expected to continue with either excavation arrangement, and require maintenance.
- Very shallow bathymetry was recorded in the Mararoa River, such that at low modelled water levels an island is formed within the channel constricting the flow approach to the gates. This is considered unrealistic, as the gravel bed is mobile and is likely to be rearranged to a more uniform level across the channel width by the relatively high velocities through this area. The unrealistic flow patterns modelled at the gate approach and across the gate bays are not expected to significantly affect flow patterns modelled in the Waiau Arm.
- A shallow spot in the measured bathymetry in the main channel, on the left bank just upstream of the central island, was not observed on site. The modelled flow constriction (and significantly increased velocities) through this area is not considered accurate.
- Velocities in the main flow channels are of a similar magnitude for the two excavation options.
- These velocities for the excavated channel cases are similar to, or slightly higher than the velocities in the deeper reach of the Waiau Arm upstream of the delta.
- For all cases modelled there is a discernible flowrate in each of the defined channels, that is they do not stagnate.

6 References

Chow, V.T. (1959) *Open Channel Hydraulics*.

Landpro (2020) *Waiau River LiDAR and Imagery Metadata*

WSP (2020) *MLC Bathymetric Survey November 2020*, Project reference: 6-XE101.00

Document history and status

Issue no.	Issue date	Description	Prepared by	Reviewed by	Approved by
4	2023-06-23	Minor amendments	DC	DCE	DCE
3	2023-05-31	Table 4 added	DC / JS	DCE	DCE
2	2023-05-29	Flow conditions F05-F08 added	DC / JS	DCE	DCE
1	2023-05-16	First Issue	DC / JS	DCE	DCE

Memo

From	**Mike Hickford**
To	Kate Berkett
CC	Andrew Feierabend
Date	23 July 2024
Subject	Manapōuri Lake Control Improvement Project - Mid-winter fish survey and impact on fish from project construction lighting
Document No.	2024238CH

Meridian Energy Ltd (Meridian) has requested several pieces of additional information relating to fish in the Waiau Arm, to help inform the consent application for the Manapōuri Lake Control Flow Improvement Project (the Project). The purpose of this memo is to provide this information. Specifically, this memo provides:

1. The rationale supporting a survey of the fish community near the proposed site of the Project in mid-winter;
2. A high-level summary of the survey results; and
3. My opinion regarding the impact on fish from the Project construction lighting.

Timing of the additional fish survey

I proposed an additional fish survey in the immediate area of the Project as a result of drafting my evidence in anticipation of a hearing in August. During this process, it became apparent that knowledge of the existing environment in the Waiau Arm was limited by the methodology of the only previous survey near the Project area[1]. This is explained in more detail in the further information response dated 4 June 2024. The earliest the additional survey could be completed was in the second week of July (i.e. mid-winter), which prompted The Department of Conservation to express concerns as to the survey's validity. However:

1. There is no reason to believe that any of the potential resident species that we were specifically targeting (e.g., bullies, non-migratory galaxiids, lamprey ammocoetes) would be less abundant or less catchable in winter. Surface water temperature in the Lower Waiau Arm decreases to around 7 °C in July[2]. This is not unusually cold and is like nighttime temperatures in other seasons in other environments that many of the above species occupy; and
2. It is likely that any fish salvage operations prior to the break-out excavations will occur around this time of the year, so although we do not expect any seasonal differences, the results of a mid-winter survey will be more transferrable to developing a salvage plan than a survey at another time of the year.

[1] Egan, E., Sinton, A., Crow, S., Jellyman, P., Rose, A., Williams, P., Hickford, M. (2023) Native freshwater fish distribution and abundance in the Waiau catchment. Client report prepared for Meridian Energy Limited. 2021329CH: 144p.

[2] Data collected by Environment Southland for Meridian Energy Ltd.

Given the above, I felt confident to proceed with the survey and a summary of the results is provided in the next section. No additional surveys are required to supplement the above work.

Survey results

The freshwater fish community in the area near the Project was surveyed between 9 – 10 July 2024 using three methods (Figure 1):

1. Eighteen fine mesh (4 mm) fyke nets were placed approximately 50 m apart at the upstream break-out area (3 nets), along the main channel (9 nets) and around the lagoon (6 nets) and left in place for 24 hours.
2. Five Gee minnow traps were placed at each of four sites: the upstream break-out area, in two of the old Mararoa River delta channels, and at the downstream break-out area.
3. All areas of Type I and Type II larval lamprey (ammocoete) habitat in or near the construction footprint area were fished using the standardised electric fishing method[3].

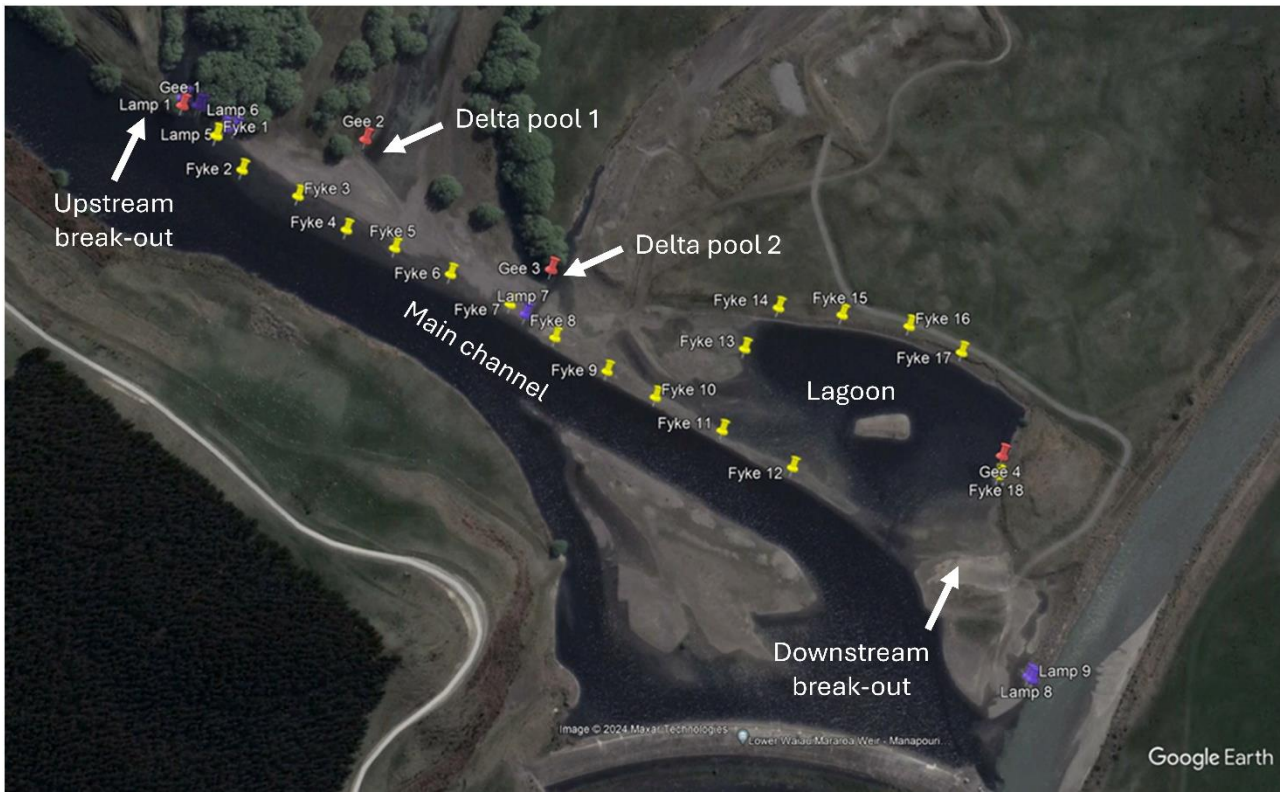


Figure 1: The Manapōuri Lake Control Improvement Project site with the sampling sites for the three fish survey methods used in July 2024. Yellow pins are fine mesh (4 mm) fyke nets, red pins are clusters of five Gee minnow traps and purple pins are areas of Type I and II larval lamprey habitat that were electrofished; there are six sites in relatively close proximity at the upstream break-out area. Note that the background imagery (Oct 2018) has been selected to mimic similar water levels to those at the time of the survey.

[3] Baker, C (2021) Standardised electric fishing method for lamprey. NIWA Internal Report: 12p.

Four species of fish were caught with the three survey methods (see Table 1 at end of document): longfin eel (*Anguilla dieffenbachii*), common bully (*Gobiomorphus cotidianus*) and upland bully (*Gobiomorphus breviceps*) in the fyke nets; common and upland bully in the Gee minnow traps; and two ammocoetes (*Geotria australis*) were caught using electric fishing.

Fifty-one fish were caught in the fyke nets. Most of these (45) were common bully, but the nets also caught five longfin eels and a single upland bully. Catches from the nets (and traps) were standardised to catch per unit effort (CPUE)[4]. Most common bully (mean ± SE = 5.7 ± 1.4 fish net^{-1} night^{-1}) were caught in the lagoon area with lower abundances in the upstream break-out (2.3 ± 0.9 fish net^{-1} night^{-1}) and channel areas (0.4 ± 0.2 fish net^{-1} night^{-1}). Longfin eel abundances were low through the sampling areas, but most (0.7 ± 0.2 fish net^{-1} night^{-1}) were caught in the lagoon area. Very few longfin eels were caught in the channel area (0.1 ± 0.1 fish net^{-1} night^{-1}) and none were caught in the upstream break-out area.

Only five fish were caught in the Gee minnow traps; three upland bully and two common bully. Catches of upland bully were low and equal across the upstream break-out (0.2 ± 0.2 fish trap^{-1} night^{-1}) and old delta channel (0.2 ± 0.1 fish trap^{-1} night^{-1}) areas. No upland bully were caught in traps set in the downstream break-out area. Catches of common bully were higher in the upstream break-out area (0.2 ± 0.2 fish trap^{-1} night^{-1}) than in the old delta channels (0.1 ± 0.1 fish trap^{-1} night^{-1}).

The mean (± SE) size (total length) of the 47 common bully caught in the fyke nets and Gee minnow traps was 53.8 ± 3.7 mm. The mean size of the five eels caught in the fyke nets was 735.0 ± 59.8 mm. The mean size of the four upland bully caught in the fyke nets and Gee minnow traps was 61.0 ± 2.8 mm.

Nine small areas (each < 3 m^2) of habitat that was potentially suitable for ammocoetes were found in the Project area. The seven potential habitat patches in the upstream break-out and channel areas were all Type IIB - a mix of fine (silt and sand) and coarse (gravel and cobbles) substrate, but with significantly less fine than coarse substrate. No ammocoetes were found in the Type IIB habitat. Two patches of Type I habitat were found in the downstream break-out area in the depositional zone immediately downstream of the rip rap armoured true right bank of the Mararoa River as marked on Figure 1. Type I habitat is regarded as 'optimal' and is preferred by ammocoetes; this association has been shown elsewhere in the Waiau catchment[1]. Type I habitat consists of a mixture of sand and fine organic matter. Two ammocoetes, one in each patch, were captured in the downstream break-out area; they were 110 and 105 mm (total length). Despite extensive electrofishing in and around the downstream break-out area, no further ammocoetes were observed.

Assessment from survey

The survey targeted smaller fish by using fine mesh fyke nets and Gee minnow traps. These are the only methods suitable for the habitats found in the lower Waiau Arm in the area near the project footprint. Backpack electrofishing is more effective for capturing species that utilise fast flowing habitats such as non-migratory galaxiids (e.g., southern flathead galaxias (*Galaxias 'southern'*), Gollum galaxias (*Galaxias gollumoides*)) or torrentfish (*Cheimarrichthys fosteri*). However, backpack electrofishing is much less effective in deep (> 0.6 m), slow-flowing habitats[5] like that those found in the lower Waiau Arm. Fyke nets and Gee minnow traps are more suited to mobile and cover-seeking species. They will capture non-migratory galaxiids and torrentfish, if they are present, but they will underestimate their abundance[5].

[4] Catch per unit effort is fish per net per night (net^{-1} night^{-1}) or fish per trap per night (trap^{-1} night^{-1}).

[5] Joy, M.K., David, B.O., Lake, M.D. (2013) New Zealand freshwater fish sampling protocols: part 1- wadeable rivers and streams. Massey University: 56p.

We observed no habitat that appeared suitable for southern flathead galaxias, Gollum galaxias or torrentfish in the Project area; there were obvious deficiencies in suitable flows and cover. Flows are very slow throughout the area and do not match what is known of the preferred habitats of these species. In the 'main channel' area, the bank slopes steeply towards the deeper channel. At higher water levels there would be extensive areas of shallow water, but at the time of the survey these areas were exposed and dry. The mainly cobble substrate has a moderate cover of periphyton and is embedded into finer sediment (i.e., interstices are clogged). In the shallower areas, there was no cover available from aquatic plants, woody debris or overhanging riparian vegetation.

The survey identified one additional species than had been previously surveyed (lamprey) with a 'Threatened' conservation status (i.e. Nationally Vulnerable) as being resident in the immediate area of the Project. The larval stage of lamprey preferentially occupies fine sediment substrate and is unlikely to be affected by increased levels of suspended sediment or deposited fine sediment that may temporarily result from the Project. However, the two ammocoetes caught were in the downstream break-out area and, as such, will be directly at risk at the time of the break-out. The downstream break-out area, and this species in this area, will need to be a focus of the proposed Freshwater Fauna Management Plan (e.g., a fish salvage plan).

Conversely, the fish community in the upstream break-out area was unremarkable. However, low abundances of common and upland bully, and most likely longfin eels, will require salvage immediately prior to the break-out commencing.

The abundance of eels in this survey was low when compared with the previous survey[1]. This was not unexpected given a) the timing of the survey and b) the change in fishing gear used. The previous survey was competed in mid-summer, when eels are known to be more active[6], and used larger commercial fyke nets. More noteworthy, however, is the relatively high abundance of large longfin eels in the lagoon area. This area will require a significant fish salvage programme immediately prior to the lagoon area being isolated from the existing channel by bunding.

In conclusion, I believe that the results of the most recent survey do not change the assessment of effects or general management approach. Using fish salvage in the affected areas (see below) will ensure that any direct effects are no more than minor.

Fish salvage

It is my opinion that targeted fish salvage programmes in the lagoon area (prior to bunding) and at the upstream and downstream break-out areas (immediately prior to break-out) will satisfactorily mitigate any direct effects of the Project on Threatened fish species. Longfin eels in the lagoon area can be captured effectively with fyke nets and transferred upstream in the Waiau Arm and away from the Project area. Likewise, a salvage programme using fyke nets at the upstream break-out area will be effective for the capture and relocation of any resident fish, including longfin eels which were not captured there during this survey, but were abundant in the previous nearby survey[1]. Effective salvage of lamprey ammocoetes from the downstream break-out area can be completed using targeted electrofishing. Any ammocoetes that are salvaged could be relocated into known nearby Type I habitat in the Mararoa River.

[6] Jellyman, D.J., Unwin, M.J. (2017) Diel and seasonal movements of silver eels, *Anguilla dieffenbachii*, emigrating from a lake subject to hydro-electric control. Journal of Fish Biology, 91(1): 219-241.

Impacts of construction lighting

The proposed construction window allows for a seven day per week, 24 hour per day working period. This will require artificial floodlighting for works out of daylight hours. Lighting requirements will be determined by the contractor based on the site configuration and requirements. It is anticipated that the lighting sources will be moveable and designed to direct lighting downward and away from potential viewpoints to minimise disturbance to people.

It is my understanding that for most of the Project construction period, there will be no lighting on the river-side of the bunding. The exception might be during the Stage 3 'break-out' excavation phase when the excavation face will be at the river edge. However, by this stage, any resident fish near the excavation site will have been relocated by the fish salvage programme detailed in the Freshwater Fauna Management Plan. Generally, lighting will be used in the establishment area (nearest edge >110 m from the Waiau Arm), the spoil area (nearest edge >35 m from the Mararoa River) and the Haul Road (remote from the Waiau Arm). Given this, it is my opinion that lighting will pose little risk to the predation/feeding and migratory cues of threatened fish species in the Project area.

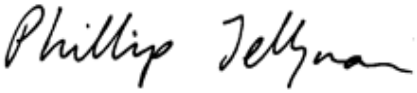
Table 1: Number of each fish species caught in fine mesh fyke nets and Gee minnow traps set near the Project area. See Figure 1 for site locations. Nets and traps were unbaited and set for a 24 hr period.

Site	Method	Common bully	Upland bully	Longfin eel
Upstream break-out	Fyke 1	4		
	Fyke 2	2		
	Fyke 3	1		
	Gee 1a			
	Gee 1b			
	Gee 1c	1	1	
	Gee 1d			
	Gee 1e			
Main Channel	Fyke 4			
	Fyke 5			
	Fyke 6			1
	Fyke 7	2		
	Fyke 8			
	Fyke 9			
	Fyke 10			
	Fyke 11	1		
	Fyke 12			
Delta pool 1	Gee 2a		1	
	Gee 2b			
	Gee 2c		1	
	Gee 2d			
	Gee 2e			
Delta pool 2	Gee 3a			
	Gee 3b	1		
	Gee 3c			
	Gee 3d			
	Gee 3e			
Lagoon	Fyke 13	8		
	Fyke 14	8		1
	Fyke 15	1		1

Site	Method	Common bully	Upland bully	Longfin eel
	Fyke 16	4		
	Fyke 17	3		1
	Fyke 18	10	1	1
Downstream break-out	Gee 4a			
	Gee 4b			
	Gee 4c			
	Gee 4d			
	Gee 4e			

Client Report No: 2024238CH
Report date: July 2024
NIWA Project: MEL23523

Revision	Description	Date
Version 1.0	Final Report	23 July 2024

Quality Assurance Statement		
	Reviewed by:	Jo Hoyle
	Formatting checked by:	Rachel Wright
	Approved for release by:	Phillip Jellyman

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Memo.

Manapōuri Lake Control Improvement Project – Pre-hearing avifauna information	**To:** Meridian Energy Ltd
	From: Dr Leigh Bull
Date: 16 July 2024	**Project No.:** BG2407

Introduction

Hoye et al. (2023) authored the "*Assessment of Environmental Effects: Freshwater*" that accompanied Meridian Energy Limited (MEL) resource consent application for the Manapōuri Lake Control Flow Improvement Project (MLCIP). That report included an assessment of effects on freshwater avifauna. The avifauna specialist from NIWA who informed this assessment has since changed employers, and I understand is no longer available to assist with the MLCIP application. MEL has therefore engaged the services of BlueGreen Ecology Ltd (BlueGreen) to provide avifauna expertise for the MLCIP. To date, BlueGreen have prepared a response[1] pertaining to Environment Southland's (ES) s92 request for further information on avifauna matters.

BlueGreen have reviewed the avifauna components of the Freshwater Assessment (and the supporting information on which it was based) and have prepared this current memo to provide information to assist with the pre-hearing discussion with ES and submitters (refer to Table 1 for a summary of the avifauna-related submission matters).

Table 1: MCLIP avifauna-related submissions

SUBMITTER	SUBMISSION POINT(S)
Waiau Working Party	• Request for a condition that any exposed islands created within the Waiau Arm be made suitable and maintained to provide nesting habitat for black billed gulls. • Supports the recommendation in the AEE in relation to landscape that "The final form of any exposed islands created within the Waiau Arm shall be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes." The final form could be agreed prior to construction.
Waiau Fisheries and Wildlife Habitat Enhancement Trust (Waiau Habitat Trust)	• Request for a condition that any exposed islands created within the Waiau Arm be made suitable and maintained to provide nesting habitat for black billed gulls and that the design of these be discussed and agreed with the Waiau Habitat Trust, and any other interested stakeholders, prior to their construction.

[1] Bull (2024)

SUBMITTER	SUBMISSION POINT(S)
Department of Conservation (DOC)	• Applicant provided insufficient information and did not identify and address the potential adverse effects on Threatened and At Risk indigenous terrestrial biodiversity, including black-fronted tern, black-billed gulls and banded dotterel. • Request for provision in conditions for daily and weekly breaks from construction activities to provide respite for threatened and at-risk species in order to minimise impacts on their behaviour, predation, and migratory cues (etc.).

Relevant Qualifications

The author of this memo holds the relevant qualifications and experience appropriate to undertake this work:

- Bachelor of Science (Zoology), MSc with Honours (Ecology) and PhD (Ecology).
- 20 years of working as a practicing ecologist / ornithologist, including within the Biodiversity Recovery Unit of the Department of Conservation (DOC).
- Co-authoring the DOC New Zealand threat classification list (Hitchmough et al., 2007) as well as reviewing and production of a number of DOC threatened species recovery plans.
- Preparation of numerous ecological assessments and provision of expert avifauna advice for the consenting for large scale infrastructure projects (e.g. Tekapo and Wataki Power Scheme reconsenting, NorthPort expansion, Christchurch Airport, East-West Link, Harapaki Wind Farm).
- Appeared as an expert witness at Council, Environment Court, Board of Inquiry and Marine Consent hearings for nationally and regionally significant projects.

The author undertook a site visit on 21 June 2024 to familiarise themselves with the MLC site and surrounding area, as well as the proposed works.

Existing Environment

The Waiau River catchment is comprised of freshwater habitats including:

- Lakes Te Anau and Manapōuri are dominated by open water habitat, most of which is extremely deep, with beaches in areas of sufficient sediment supply.
- The Upper Waiau River is a fast-flowing meandering channel with small areas of alluvial gravel and cobble bars.
- The Waiau Arm is a hydrologically modified outflow channel consisting of both shallow and deep open water habitats with extensive beds of macrophytes. On the riverbanks are scattered willow trees with gorse, broom, and manuka scrubland communities, within a wider agriculturally-developed landscape.
- The Lower Waiau River is approximately 101 km in length, comprising approximately 55 km and 46 km of confined and unconfined reaches respectively. The most valuable sections of the Lower Waiau River, as bird habitat, are found in the wider, 'unconfined' reaches of the river, especially below major tributaries, where the supply of sediment has allowed gravel and cobble bars and islands to form (which in turn provide suitable nesting habitat for various gulls, terns, and waders) (Boffa Miskell Ltd, 2009).

Manapōuri Lake Control Species

Lists of the freshwater and terrestrial avifauna species that have been recorded in the wider area and associated with the Manapōuri Lake Control site (MLC) are provided in Table 2 and Table 3 respectively. These species were identified through desktop and formal survey data collected in and around the Project

area (Whitehead, 2021), as well as species I observed during my site visit but not recorded by Whitehead (2021).

Further information on the Threatened and At Risk species that were recorded is provided in the proceeding paragraphs.

Table 2: List of freshwater avifauna species recorded in and around the Project area (denotes species not recorded in Whitehead 2021)*

SPECIES	CLASSIFICATION	GUILD	MLC
Black-billed gull	At Risk - Declining	Aerial gulls & terns	x
Southern black-backed gull	Not Threatened	Aerial gulls & terns	x
Black-fronted tern	Threatened – Nationally Endangered	Aerial gulls & terns	
Banded dotterel	At Risk - Declining	Shallow water wader	x
White-faced heron	Not Threatened	Deep water wader	
Spur-winged plover	Not Threatened	Deep water wader	x
South Island pied oystercatcher	At Risk – Declining	Deep water wader	x
Pied stilt	Not Threatened	Deep water wader	x
NZ scaup*	Not Threatened	Open water diver	
Black shag	At Risk - Relict	Open water diver	x
Little shag	At Risk - Relict	Open water diver	x
Australasian shoveler*	Not Threatened	Dabbling waterfowl	
Black swan	Not Threatened	Dabbling waterfowl	x
Grey teal	Not Threatened	Dabbling waterfowl	x
Paradise shelduck	Not Threatened	Dabbling waterfowl	
Canada goose*	Introduced & Naturalised	Dabbling waterfowl	
Mallard	Introduced & Naturalised	Dabbling waterfowl	x
Swamp harrier	Not Threatened	Riparian wetland	x
Welcome swallow	Not Threatened	Riparian wetland	x

Table 3: List of terrestrial avifauna species recorded in the wider area (denotes species not recorded in Whitehead 2021)*

SPECIES	CLASSIFICATION
NZ pipit* [2]	At Risk - Declining
Grey warbler	Not Threatened
South Island fantail	Not Threatened
Skylark	Introduced & Naturalised
Australian magpie	Introduced & Naturalised
Yellow hammer	Introduced & Naturalised
Chaffinch	Introduced & Naturalised
Goldfinch	Introduced & Naturalised
Redpoll	Introduced & Naturalised

[2] Observed by author at Mararoa Weir Lookout (Weir Road) during site visit on 21 June 2024.

SPECIES	CLASSIFICATION
Dunnock	Introduced & Naturalised
Starling	Introduced & Naturalised
Blackbird	Introduced & Naturalised
Song thrush	Introduced & Naturalised

Black-billed gull

Black-billed gulls utilise braided river habitats for feeding and breeding during the summer. They typically feed on invertebrates in riverine habitats and adjacent paddocks during the breeding season, migrating to coastal areas in the winter. Black-billed gulls are colonial nesters that primarily breed on sparsely vegetated gravel bars on inland rivers. However, colonies often change location and densities from year to year[3].

Black-billed gull have been reported at numerous locations within the wider Waiau catchment both during informal (e.g. eBird) and formal surveys (Boffa Miskell Ltd, 2009; McClellan, 2006, 2009; McClelland, 1997, 1999, 2002; Sagar, 1994). Whitehead (2021) reported black-billed gulls as the most abundant freshwater bird species observed at the MLC, with colonies of up to 3250 adult birds present (refer to Appendix 1 for survey data). Whitehead (2021) suggested the low number of black-billed gulls observed in 2020 was likely the result of high lake levels and river flows in the Waiau catchment which meant that breeding habitat at the MLC was submerged at the beginning of the nesting period. Potential breeding habitat at MLC include the artificial constructed "bird island", as well as the exposed gravel areas, particularly the bars. These areas can also be used by roosting birds.

Black-fronted tern

Black-fronted tern are colonial breeders that predominantly breed on river terraces and gravel bars of braided riverbeds of the eastern South Island. They feed by taking aquatic and terrestrial invertebrates and fish on the wing over riverine habitats, as well as from terrestrial habitats adjacent to the river.

At MLC, black-fronted terns have been recorded in low numbers (i.e. ≤20 birds observed at a time), in the eBird database, but have not been recorded during formal surveys. A 'probable' record[4] of black-fronted tern nesting at MLC was recorded in 2015, however this was not confirmed. Breeding colonies have been recorded at downstream sites in the Lower Waiau River (Boffa Miskell Ltd, 2009; McClelland, 2002; Sagar, 1994). Thus, MLC provides roosting and foraging habitat for black-fronted tern, and potentially (but limited) nesting habitat.

Banded dotterel

Banded dotterel breed predominantly in riparian areas, river terraces and gravel bars of braided rivers. They preferentially feed in shallow pools and riffles associated with minor channels, typically on sand and fine gravel substrates in water less than 10 mm deep, but also feed in terrestrial habitats.

At MLC, banded dotterels have been recorded in low numbers (≤6) in the eBird database but have not been recorded during formal surveys. A 'probable' record[4] of banded dotterel nesting at MLC was recorded in 2015, however this was not confirmed. They are also present in the Lower Waiau river. Thus, at MLC the exposed gravel areas provides roosting and potentially nesting habitat for banded dotterel, while the shallow pools and riffles associated with minor channels provide foraging habitat.

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[3] McClellan, R.K., Habraken, A. (2019) Black-billed gull. Miskelly, C.M. (Ed). *New Zealand Birds Online*. www.nzbirdsonline.org.nz/species/black-billed-gull

[4] eBird record for 'Waiau Wier' 25/10/15

South Island pied oystercatcher

South Island pied oystercatcher feed in habitats associated with minor channels and lake margins, but also forage in terrestrial habitats on river terraces. They breed in riverine and coastal microhabitats, including riparian areas, river terraces, gravel bars and wetlands. South Island pied oystercatchers also frequently nest in adjacent farmland.

South Island pied oystercatcher (SIPO) have been recorded at MLC (refer Appendix 1). Breeding activity has been confirmed[5] at MLC, while roosting has been observed on the exposed gravel areas (pers. obs.) and adjacent ploughed paddocks[6]. The minor channels, river margins and adjacent farmland provide foraging habitat.

Shag species

Shag are open water divers that forage on fish and utilise riparian trees for nesting and roosting. Black and little shag were recorded in and around the Project site (refer to Table 2 above and Appendix 1). The riparian trees and exposed gravel beds at MLC may provide roosting habitat for shags, while the deeper open waters of the Waiau Arm will provide foraging habitat.

NZ pipit

While not observed on the MLC site, the spoil disposal site may provide habitat for NZ pipit. This species is widespread in rough open habitats and are often seen along coastlines and rivers, in alpine areas in the South Island. They are common in farmland, open shrublands, in tussock grasslands and around wetlands. Their nest is a grass woven cup found in rank grass, under tussocks and ferns. Their diet consists of grains, seeds and small invertebrates.

Summary of avifauna habitats

Most avifauna species have the following habitat needs:

- Roosting habitat - When birds roost, they go somewhere to rest or sleep. These sites may be used for varying lengths of time by individual birds, from minutes to hours, and birds are free to leave these habitats at any time. This habitat may be the same or different to that used for nesting.
- Nesting habitat – A nest site is the physical location of the nest. Over the breeding season this will contain eggs and chicks. Breeding birds have an ongoing association with the nesting habitat throughout the breeding season as they incubate the eggs and generally feed the young until they fledge.
- Foraging habitat – A location or resource where birds obtain food from.

A summary of the available habitats and potential species that may associate with these at and adjacent to the MLC site is provided in Table 4 below. When viewing the wider landscape, these habitats are also available elsewhere and are not solely confined to the project site. For instance, braided rivers systems which include areas of exposed gravels, as well as major and minor river channels are available nearby both upstream (Mararoa River) and downstream (lower Waiau River) of the MLC which can be utilised for foraging and roosting by SIPO, black-billed gulls, banded dotterel and black-fronted tern. With regards to riparian trees, the Waiau Arm is lined with willow trees that can be used by roosting shag species, while ungrazed exotic grasslands are located nearby between Weir Road and the Mararoa River and which may be utilised by nesting NZ pipit and spur-winged plover.

[5] eBird records for 'Waiau Wier' – 2 chicks on 21/10/18 and 2 chicks on 25/10/15
[6] eBird record for 'Waiau Wier' 8/9/17

Thus, the habitats utilised by avifauna at MLC are not limited within the wider landscape, and nor are they likely to be at their carrying capacity.

Table 4: MLC available avifauna habitats and associated species

HABIAT	SPECIES
Exposed gravel areas	• Roosting / nesting habitat for SIPO, black-billed gulls, banded dotterel.
Major and minor river channels	• Shallow river edges provide foraging habitat for banded dotterel, SIPO, pied stilt, black-fronted tern, black-billed gulls. • Deeper river edges provide foraging habitat for SIPO, pied stilt, black-fronted tern, black-billed gulls. • Deeper channels providing foraging habitat for black-fronted tern and shags.
Riparian trees (willow)	• Roosting / nesting habitat for shag species
Ungrazed exotic grassland and young planted Eucalyptus trees	• Nesting habitat for NZ pipit and spur-winged plover • Foraging habitat for native and introduced passerine species
Wetlands	• Foraging habitat for pukeko and NZ pipit
Grazed pasture	• Foraging habitat for NZ pipit • Foraging / nesting / roosting habitat for SIPO • Roosting / foraging habitat for black-billed gull and black-fronted tern

Assessment Methodology

The Freshwater Assessment (Hoyle et al., 2023) considered the following potential effects on freshwater avifauna from the project:

- Disturbance associated with the movement of heavy machinery associated with the project.
- Impacts of high levels of suspended sediments contaminants (SSC) through:
  - reducing food availability for pursuit and plunge-diving species (e.g., black-billed gulls, black-fronted terns, shags) by reducing their ability to see prey items, and
  - altering prey communities (e.g., changes to macrophyte, macroinvertebrate and fish community composition and/or abundance).
- Impacts of deposited fine sediments (DFS) on wading species (e.g., dotterels, pied stilts, South Island pied oystercatcher, white-fronted herons) that forage in slow-flowing shallow water if prey availability is affected.

As noted in Section 6.6 of the Freshwater Assessment (Hoyle et al., 2023), the determination of these effects on freshwater birds was based largely on expert opinion. While the level of potential effects was not explained or defined in the assessment, as outlined in the s92 response (Bull, 2024), based on the terminology used in that report I have assumed that it aligns with the standard understanding of these terms as follows (Source: Quality Planning website[7]):

- Nil Effects - No effects at all.
- Less than Minor Adverse Effects - Adverse effects that are discernible day-to-day effects, but too small to adversely affect other persons.
- Minor Adverse Effects - Adverse effects that are noticeable but will not cause any significant adverse impacts.

[7] https://www.qualityplanning.org.nz/node/837

- More than Minor Adverse Effects - Adverse effects that are noticeable that may cause an adverse impact but could be potentially mitigated or remedied.
- Significant Adverse Effects that could be remedied or mitigated -
  An effect that is noticeable and will have a serious adverse impact on the environment but could potentially be mitigated or remedied.
- Unacceptable Adverse Effects - Extensive adverse effects that cannot be avoided, remedied or mitigated.

In comparison, I have used Environmental Institute of Australia and New Zealand (EIANZ) ecological impact assessments guidelines (Roper-Lindsay et al., 2018) to determine the potential level of effects of the Project on avifauna. This approach uses a matrix to determine the overall level of ecological effect by combining the magnitude of the effect in association with the ecological values (refer to Appendix 2 for EIANZ method details, criteria and matrix).

Table 5 and Table 6 below identify the ecological value assigned to freshwater and terrestrial species recorded at MLC, with the addition of black-fronted tern and NZ pipit, based on the EIANZ criteria (refer to Table 12 on page 19 in Appendix 2).

Table 5: Freshwater avifauna ecological values

SPECIES	NZ THREAT CLASSIFICATION	ECOLOGICAL VALUE
Black-fronted tern	Threatened – Nationally Endangered	Very High
Black-billed gull	At Risk - Declining	High
Banded dotterel	At Risk - Declining	High
SIPO	At Risk - Declining	High
Black shag	At Risk - Relict	Moderate
Little shag	At Risk - Relict	Moderate
Australasian shoveler	Not Threatened	Low
Black swan	Not Threatened	Low
Grey teal	Not Threatened	Low
NZ scaup	Not Threatened	Low
Pied stilt	Not Threatened	Low
Spur-winged plover	Not Threatened	Low
Southern black-backed gull	Not Threatened	Low
Swamp harrier	Not Threatened	Low
Welcome swallow	Not Threatened	Low
Canada goose	Introduced & Naturalised	Negligible
Mallard	Introduced & Naturalised	Negligible

Table 6: Terrestrial avifauna values.

SPECIES	CLASSIFICATION	ECOLOGICAL VALUE
NZ pipit	At Risk – Declining	High
Grey warbler	Not Threatened	Low
South Island fantail	Not Threatened	Low
Skylark	Introduced & Naturalised	Negligible

SPECIES	CLASSIFICATION	ECOLOGICAL VALUE
NZ pipit	At Risk – Declining	High
Australian magpie	Introduced & Naturalised	Negligible
Yellow hammer	Introduced & Naturalised	Negligible
Chaffinch	Introduced & Naturalised	Negligible
Goldfinch	Introduced & Naturalised	Negligible
Redpoll	Introduced & Naturalised	Negligible
Dunnock	Introduced & Naturalised	Negligible
Starling	Introduced & Naturalised	Negligible
Blackbird	Introduced & Naturalised	Negligible
Song thrush	Introduced & Naturalised	Negligible

Assessment of Effects on Avifauna Values

The following assessment was undertaken to address the submission points raised by DOC as outlined in Table 1.

As outlined in the AEE (Tonkin & Taylor Ltd, 2023), the Project will involve the following:

- Construction of a new channel which is parallel to, and outside the permanently active bed of the current main channel in the Waiau Arm.
- Excavation of approximately 225,000 m^3 of gravel and bed material, over a length of approximately 1 km.
- Elevated levels of suspended sediment generated by the Project will flow into the LWR, affecting both SSC and DFS.
- Temporary loss of a 14.5 ha area which will be used as a spoil disposal site, as well as an area of approximately 20,000 m^2 is identified as the Contractor's establishment area.
- Upgrade of existing access tracks.
- Works proposed to be undertaken within a 10-month window of January to October 2025. The overall construction period within the 10-month window is envisaged to be 4-5 months based on work occurring on a 7-days per week and up to 24 hours per day basis. The 24-hour operation will require artificial flood lighting outside of daylight hours.

Following completion of the channel excavation within Waiau Arm, rehabilitation activities will include:

- Removal of temporary bunding by spreading material on riverbank flats.
- Contouring of spoil areas to allow runoff to be appropriately directed.
- Replacement of topsoil cover on spoil areas.
- Re-grassing or planting of spoil areas.

The Freshwater Assessment (Hoyle et al., 2023) concluded that the effects of disturbance and changes in suspended sediment and/or DFS outside the breeding season (i.e., avoiding the period from September to January) are likely to be minimal, with many of the freshwater species observed at the MLC, including the Threatened species (i.e. black-fronted tern), largely being absent during that period due to their migrating outside of the Waiau catchment. On the basis that the works would avoid the breeding season (September to January), it was determined that the effects would be less than minor on freshwater birds. However, if works were to occur during the breeding season, then the effects were considered to be Minor.

Further to that, I note while most individuals of these migratory species (e.g. black-fronted tern, banded dotterel, SIPO) will move away during the non-breeding season, some birds will remain resident throughout the year. For those individuals, likely to be relatively low numbers, they may be exposed to disturbance, elevated levels of suspended sediment and/or DFS. Nevertheless, I consider that there is suitable foraging and roosting habitat for these species nearby (e.g. Mararoa River), and that those locations have sufficient capacity to accommodate these additional birds during that period.

It should be noted that disturbance to avifauna may be as a result of noise, vibration, movement or light and can result in displacement, decreased feeding rates, unattended nests (leading to incubation failure and increased opportunities for predators), and energy and time costs (Borgmann, 2010; Bowles, 1995; Kaldor, 2019; Lord et al., 2001; Price, 2008; Walls, 1999). Numerous studies have reported various distances at which different bird species are disturbed by human activities (Glover et al., 2011; Goss-Custard et al., 2006; Haase, 1995; Rodgers & Schwikert, 2002; Rodgers & Smith, 1995; Thomas et al., 2003; Weston et al., 2012). The distance at which a bird flees from perceived danger is referred to as the flight initiation distance (FID). Weston et al.'s (2012) review of FIDs included several species recorded within or adjacent to the MCLIP, thus providing the most relevant measures for this project on which to base potential disturbance distances (

Table 7). Pied stilt was recorded as having the highest mean FID distance (36.9 m), and NZ pipit the lowest (12.4 m).

Table 7: Mean flight initiation distances (FID; as reported in Weston et al. (2012)) for species within and adjacent to the Project site

SPECIES		MEAN FID (m)
Pied stilt	*Himantopus himantopus*	36.9
Black shag	*Phalacrocorax carbo*	32.3
White-faced heron	*Egretta novaehollandiae*	31.2
Southern black-backed gull	*Larus dominicanus*	24.4
Black-fronted dotterel	*Elseyornis melanops*	23.3
Banded dotterel	*Charadrius bicinctus*	23.0
Little shag	*Phalacrocorax melanoleucos*	19.8
Pipit	*Anthus novaeseelandiae*	12.4

McVeagh & John (2019) undertook a trial to test the effectiveness of implementing vehicle and machinery exclusion zones around shorebird nests, including banded dotterel and pied stilt. Several key findings of that study included:

- Incubating birds were more tolerant of moving vehicles than ones which stopped near to a nest.
- A human alighting from a stationary vehicle was more likely to elicit a disturbance reaction than a stationary vehicle alone.
- The greatest "flush" distances were recorded for vehicles driving straight at the nest (rather than oblique) as well as humans walking straight at the nest (rather than oblique).

McVeagh & John (2019) recommended a 50 m exclusion zone around banded dotterel based on responses elicited from birds on nests (very small sample size) that were directly approached by vehicles / machinery and people. Whereas responses elicited from birds on nests that were approached obliquely by vehicles / machinery and people was reduced to <20m.

As such, I consider that the magnitude of effect associated project-related disturbance, changes in suspended sediment and/or DFS and disturbance outside the breeding season will be Negligible, resulting in an overall Low to Very Low level of effect on freshwater avifauna (refer to Table 8 below).

Table 8: Potential levels of effect on freshwater avifauna as a result of project-related disturbance, changes in suspended sediment and/or DFS outside the breeding season

SPECIES	ECOLOGICAL VALUE[8]	MAGNITDUE OF EFFECT[9]	LEVEL OF EFFECT[10]
Black-fronted tern	Very High	Negligible	Low
Black-billed gull	High	Negligible	Very Low
Banded dotterel	High	Negligible	Very Low
SIPO	High	Negligible	Very Low
Black shag	Moderate	Negligible	Very Low
Little shag	Moderate	Negligible	Very Low
Australasian shoveler	Low	Negligible	Very Low
Black swan	Low	Negligible	Very Low
Grey teal	Low	Negligible	Very Low
NZ scaup	Low	Negligible	Very Low
Pied stilt	Low	Negligible	Very Low
Spur-winged plover	Low	Negligible	Very Low
Southern black-backed gull	Low	Negligible	Very Low
Swamp harrier	Low	Negligible	Very Low
Welcome swallow	Low	Negligible	Very Low
Canada goose	Negligible	Negligible	Very Low
Mallard	Negligible	Negligible	Very Low

In the s92 response (Bull, 2024), I considered the potential effects on the indigenous avifauna occupying the spoil disposal site and the potential effects of the Project on species that use the wider area to roost.

In terms of the spoil disposal site, this is a relatively flat area of exotic grassland (e.g. Yorkshire fog, sweet vernal, perennial ryegrass, crested dogstail, and cocksfoot) and young planted Eucalyptus sp. trees. A number of wetlands were identified on the site by Boffa Miskell (2023b), however the construction footprint now avoids all but one of these, which in and of itself was assessed as having Low ecological value from a terrestrial vegetation perspective.

In relation to the avifauna, I consider the spoil disposal area to provide limited and marginal opportunities for:

- Roosting habitat for South Island pied oystercatcher (SIPO), pied stilt, southern black-backed gull.
- Foraging habitat for banded dotterel, most likely in association with the wetlands.
- Breeding habitat for spur-winged plover and NZ pipit.

[8] As per EIANZ criteria in Table 13 on page 15
[9] As per EIANZ criteria in Table 14 on page 15
[10] As per EIANZ matrix provided in Table 12 on page 14

I noted that over time, such potential habitat use will decrease due to the growth of the planted Eucalyptus trees which will not be conducive to these species' requirements. Nevertheless, even the loss of this area in its current state will result in a Negligible magnitude of effect due to it providing only marginal habitat for the species identified, with higher value habitat available elsewhere, and all but one of the wetlands being avoided. When combining this magnitude of effect with High (banded dotterel, SIPO and NZ pipit) or Low (pied stilt, southern black-backed gull, spur-winged plover) ecological value, the overall level of effect of the project on species potentially utilising spoil disposal site will be Low to Very Low (refer to Table 9 below).

Table 9: Potential levels of effect on avifauna as a result of loss of habitat within the spoil disposal site

SPECIES	ECOLOGICAL VALUE[8]	MAGNITDUE OF EFFECT[9]	LEVEL OF EFFECT[10]
Banded dotterel	High	Negligible	Very Low
NZ pipit	High	Negligible	Very Low
SIPO	High	Negligible	Very Low
Pied stilt	Low	Negligible	Very Low
Spur-winged plover	Low	Negligible	Very Low
Southern black-backed gull	Low	Negligible	Very Low

In terms of the potential effects of the Project on species that use the wider area to roost, I considered the freshwater species that were identified in Table 2 above (page 3).

- Swamp specialist and riparian wetland species (e.g. swamp harrier and welcome swallow) are associated with wetland vegetation along the Te Anau and Manapōuri lakes and margins, while tall trees adjacent to these freshwater habitats provide roosting habitat for some open water divers (e.g. shags). In the s92 response, I stated that these habitats will not be impacted, however based on my site visit I observed that several willow trees are located within the Project footprint and as such will be lost. Nevertheless, the loss of a small number of exotic willow trees will not impact these species as there is an abundance of willow trees along the Waiau Arm that can be used for roosting.
- Open water divers, dabbling waterfowl, waders, and aerial gulls and terns utilise shallow edge and shoreline habitats for roosting (and foraging). The channel excavation will result in the loss of several areas of potential roosting habitat for these species (refer to areas circled yellow in Figure 1 below), however similar habitat remains available nearby, including the gravel bank to the immediately below the MLC structure, as well as in the wider landscape (e.g. nearby Lower Waiau and Mararoa rivers). Furthermore, as assessed by Damwatch (2023) and shown in the visual simulations by Boffa Miskell (2023a) included in the resource consent application, the operation of the new channel will result in lower flow rates through the existing channels under normal operation. As such, this may result in an increase in exposed areas of gravels (including the area to the south of the existing channel shown in Figure 1 below), thereby providing more shallow edge and shoreline habitats for roosting and open water divers, dabbling waterfowl, waders, and aerial gulls and terns to utilise. However, as with existing gravels, these areas will be inundated as part of normal lake control operations.

Overall, I consider the magnitude of effect of the project on roosting birds will be Negligible. When combining this magnitude of effect with Very High (black-fronted tern) to Low ecological value, the level of effect of the project on roosting species will be Low to Very Low (refer to Table 10 below).

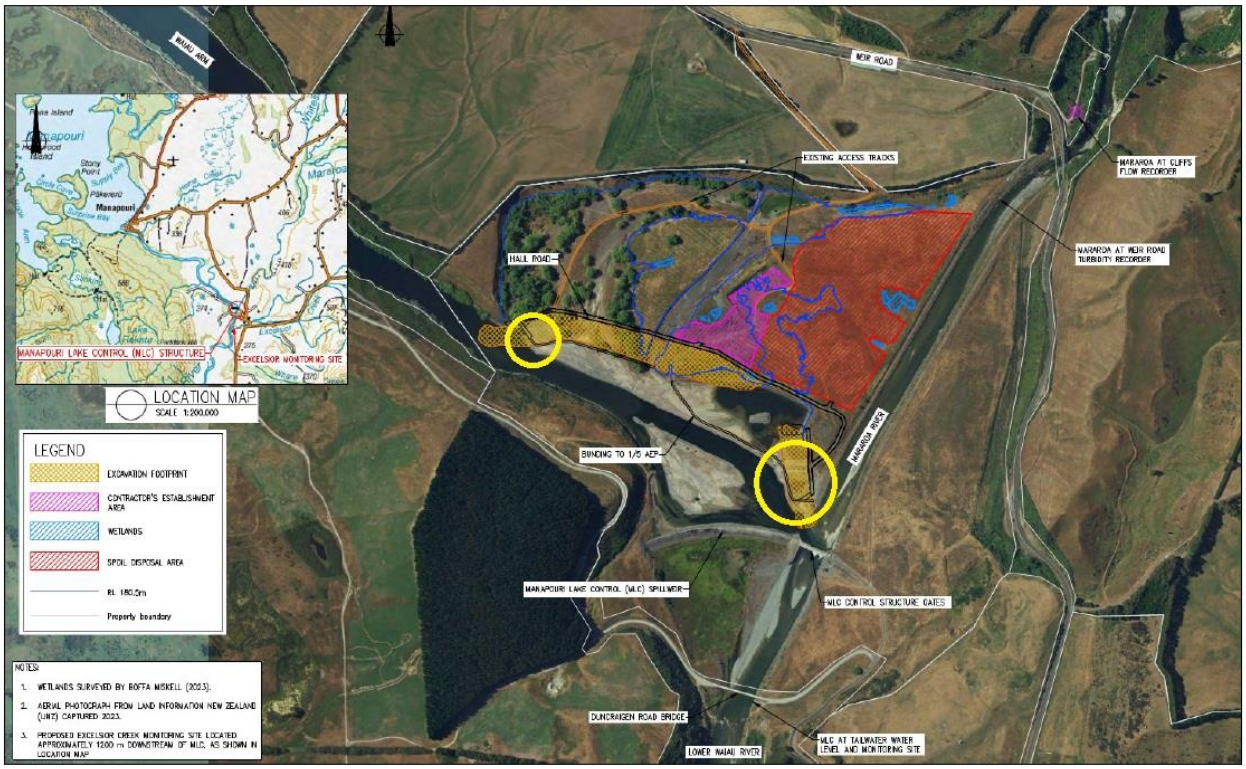

Figure 1: Project overview. Yellow circles denote area of potential roosting habitat that will be lost under the footprint

Table 10: Potential levels of effect on freshwater avifauna as a result of loss of roosting habitat within the project footprint

SPECIES	ECOLOGICAL VALUE[8]	MAGNITDUE OF EFFECT[9]	LEVEL OF EFFECT[10]
Black-fronted tern	Very High	Negligible	Low
Black-billed gull	High	Negligible	Very Low
Banded dotterel	High	Negligible	Very Low
SIPO	High	Negligible	Very Low
Black shag	Moderate	Negligible	Very Low
Little shag	Moderate	Negligible	Very Low
Australasian shoveler	Low	Negligible	Very Low
Black swan	Low	Negligible	Very Low
Grey teal	Low	Negligible	Very Low
NZ scaup	Low	Negligible	Very Low
Pied stilt	Low	Negligible	Very Low
Spur-winged plover	Low	Negligible	Very Low
Southern black-backed gull	Low	Negligible	Very Low
Swamp harrier	Low	Negligible	Very Low
Welcome swallow	Low	Negligible	Very Low
Canada goose	Negligible	Negligible	Very Low
Mallard	Negligible	Negligible	Very Low

A further potential effect not previously considered relates to the potential effects of the use of artificial lights on avifauna if construction works are to occur 24 hours a day, seven days a week. As noted in Section 7.9.2 of the AEE, it is anticipated that lighting sources will be moveable and not fixed and designed to direct lighting downward. In addition, as identified by Damwatch (2023) (Section 6.3.3), two generator sets will be required to operate the lighting.

Thus, if lighting were to be used for the duration of the estimated construction programme (i.e. 4-5 months), there is the potential to impact avifauna that may roost nearby as a result of noise-related disturbance and increased visibility to predators.

Nocturnal avifauna surveys have not been conducted, and as such there is no data available regarding which species might be roosting in and adjacent to the project site at night. As such, I have used the diurnal roosting / resting behaviours as a proxy to assess the impact on nocturnal activities.

On the basis, I consider it highly likely that any birds disturbed by the generator noise or artificial light would move to nearby available roosting habitat (identified in the above section 'Summary of avifauna habitats' on page 5) to avoid these impacts. Furthermore, given the low number of birds that this is likely affect, I determined that the magnitude of effect on the species will be Negligible, resulting in a Low to Very Low level of effect (refer to Table 11 below).

Table 11: Potential levels of effect on avifauna as a result of the operation of artificial lighting during construction.

SPECIES	ECOLOGICAL VALUE[8]	MAGNITDUE OF EFFECT[9]	LEVEL OF EFFECT[10]
Black-fronted tern	Very High	Negligible	Low
Black-billed gull	High	Negligible	Very Low
Banded dotterel	High	Negligible	Very Low
NZ pipit	High	Negligible	Very Low
SIPO	High	Negligible	Very Low
Black shag	Moderate	Negligible	Very Low
Little shag	Moderate	Negligible	Very Low
Australasian shoveler	Low	Negligible	Very Low
Black swan	Low	Negligible	Very Low
Grey teal	Low	Negligible	Very Low
NZ scaup	Low	Negligible	Very Low
Pied stilt	Low	Negligible	Very Low
Spur-winged plover	Low	Negligible	Very Low
Southern black-backed gull	Low	Negligible	Very Low
Swamp harrier	Low	Negligible	Very Low
Welcome swallow	Low	Negligible	Very Low
Canada goose	Negligible	Negligible	Very Low
Mallard	Negligible	Negligible	Very Low

Avifauna assessment summary

Using the EIANZ methodology, the overall effects of the Project on avifauna are considered to be Low to Very Low (refer to Table 8, Table 9, Table 10 and Table 11). According to Roper-Lindsay et al. (2018), the overall

level of effect can then be used to guide the extent and nature of the ecological management response required as follows:

- Very High adverse effects require a net biodiversity gain.
- High and Moderate adverse effects require no net loss of biodiversity values.
- Low and Very Low effects should not normally be a concern. If effects are assessed taking impact management developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure Low or Very Low effects.

Recommended consent conditions are provided below that are required to ensure the overall levels of effect remain Low to Very Low for avifauna.

Consent Conditions

Section 8.4 (Schedule 1: General Conditions) of the AEE outlined the proposed consent conditions, which included the following for condition (5) for avifauna:

> *Any works in the period commencing 15th September and ending 31st January (inclusive) shall not disturb roosting and nesting areas of the black fronted tern, black billed gull, banded dotterel or black fronted dotterel*

It is my opinion that this proposed condition needs to be revised to more accurately reflect the potential effects for which it was developed to manage. For instance, it is unclear about what constitutes disturbance, particularly in the context of an "area" rather than the birds themselves. Furthermore, given the ability of roosting birds to find alternative roost sites, it is my opinion that any such consent condition should relate to breeding activity, not roosting. Thus, based on the researched disturbance distances discussed earlier in this memo, I recommend that proposed consent condition 5 be revised as follows:

> *a) Within 10 days prior to the commencement of construction works (including establishment works) occurring during the period commencing 15th September and ending 31st January (inclusive), a survey shall be undertaken by a Suitably Qualified Person to determine if any black fronted tern, black-billed gull, banded dotterel, black fronted dotterel or NZ pipit are nesting within the footprint to be disturbed by the works during that period.*
> *b) No works shall occur within 50 m of a nesting bird identified in the survey in clause (a). Once nesting is complete, the 50 m exclusion zone at that nest no longer applies.*

In terms of DOC's request for provision in conditions for daily and weekly breaks from construction activities to provide respite for Threatened and At Risk species, as assessed above, I consider it highly likely that any birds disturbed by the generator noise or artificial light would move to nearby available roosting habitat (identified in the above section 'Summary of avifauna habitats' on page 5) to avoid these impacts, and that the overall level of such an effect on will be Low to Very Low (refer to Table 11 above). Given the temporary and short term nature of such an effect, I do not consider it necessary to make a provision in conditions for daily and weekly breaks from construction activities.

With regards to exposed islands that are created within the Waiau Arm as part of the works, I am supportive of the recommendation in the MCLIP Landscape Assessment (Boffa Miskell Ltd, 2023a) that the final form of these be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes. This could be done in a manner that provides nesting habitat for species such as black-billed gulls, as requested in the Waiau Working Party and Waiau Habitat

Trust submission points, and as such I support a consent condition requiring this. However, given the nature of this waterbody in terms of the controlled flows, these areas will be inundated as part of normal lake control operations, and for that reason, along with the overall Very Low level of effect of the project on black-billed gull, I do not consider it necessary that such islands be maintained as nesting habitat by the Applicant.

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Appendix 1: Freshwater species recorded during formal surveys at MLC (Source: Whitehead 2021)

Table 3: Abundance of freshwater bird species observed during formal surveys at the Manapōuri Lake Control. Columns represent data from the individual surveys identified in Table 1. Note that the McClelland surveys (2000, 2001) only recorded black-billed gulls at the MLC and it is unknown whether other species were present.

Species	October 2000	October 2001	December 2009	November 2020	December 2020
Black-billed gull	1435	1255	3250	37	107
Black shag			1	0	0
Grey teal			5	0	0
Little shag			0	0	0
Mallard			0	0	30
Pied stilt			2	0	10
South Island pied oystercatcher			54	0	0
Southern black-backed gull			2	0	0
Spur-winged plover			4	0	0
Swamp harrier			1	0	0

Appendix 2: EIANZ Method

The EIANZ guidelines (Roper-Lindsay et al., 2018) use the New Zealand threat classification as a criteria for assigning ecological value as outlined in Table 13. Robertson et al. (2021) provides the most recent threat classifications for avifauna and as such has been used to assign values to individual species.

Table 14 lists the criteria and descriptions for determining the magnitude of effect as described in the EIANZ guidelines (Roper-Lindsay et al., 2018). For this assessment, we have taken a species, rather than habitat, focus and applied the criteria or proportion thresholds below, to assist with determining the magnitude of effect (text italicised and bolded in Table 14):

- Very High: >50% of the population[11] affected or habitat lost.
- High: 20-50% of the population affected or habitat lost.
- Moderate: 10-20% of the population affected or habitat lost.
- Low: 1-10% of the population affected or habitat lost.
- Negligible: <1% of the population affected or habitat lost.

For the purposes of this assessment, in determining overall effects of the proposal, the Ecological District (Upukerora) scale is considered most appropriate.

According to Roper-Lindsay et al. (2018), the overall level of effect (Table 12 below) can then be used to guide the extent and nature of the ecological management response required (including the need for biodiversity offsetting):

- Very High adverse effects require a net biodiversity gain.
- High and Moderate adverse effects require no net loss of biodiversity values.
- Low and Very Low effects should not normally be a concern. If effects are assessed taking impact management developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure Low or Very Low effects.

Table 12: Criteria for describing the level of effect (Roper-Lindsay et al., 2018)

LEVEL OF EFFECT		ECOLOGICAL AND / OR CONSERVATION VALUE				
		Very High	**High**	**Moderate**	**Low**	**Negligible**
MAGNITUDE	**Very High**	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain

[11] At the scale of the Upukerora Ecological District

Table 13: Criteria for assigning ecological value to species (Roper-Lindsay et al., 2018).

ECOLOGICAL VALUE	SPECIES CLASSIFICATION
Very High	*Nationally Threatened* (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing[12]) species found in the ZOI[13] either permanently or seasonally
High	Species listed as *At Risk – Declining* found in the ZOI either permanently or seasonally.
Moderate	Regionally Recovering or Naturally Uncommon species found in the ZOI either permanently or seasonally; or Locally (ED) uncommon or distinctive species.
Low	Regionally Not Threatened
Negligible	Exotic species, including pests, species having recreational value.

Table 14: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018)

MAGNITUDE	DESCRIPTION
Very High	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR ***Loss***[14] ***of a very high proportion of the known population*** or range of the element / feature.
High	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR ***Loss***[14] ***of a high proportion of the known population*** or range of the element / feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR ***Loss***[14] ***of a moderate proportion of the known population*** or range of the element / feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR ***Having a minor effect on the known population*** or range of the element / feature.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR ***Having a negligible effect on the known population*** or range of the element / feature.

[12] Nationally Increasing is category that was devised by DOC (Michel, 2021) in 2021 to resolve a problem that would arise if the population of a taxon assessed as At Risk Recovering A should stabilise. Threatened – Nationally Increasing is assigned to "Small population that have experienced a previous decline (or for which it is uncertain whether it has experienced a previous decline) and that is forecast to increase >10% over the next 10 years or 3 generations, whichever is longer" (Rolfe et al., 2021). Thus, while such a threat category is not identified in Roper-Lindsay et al. (2018), we have included it along with all other *Threatened* classifications in to the Very High ecological value category.

[13] Roper-Lindsay et al. (2018) define the Zone of Influence (ZOI) as "the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities."

[14] In the context of mobile fauna, the term "loss" can include displacement from an area.

Appendix 3: McVeagh & John (2019) FIDs

Table 5.1: Flight initiation distance (tolerance) testing August – December 2019

	100m	50m	25m	Oblique	Direct	Comments	Date
			20m flush	√		Early in season	8/08/2019
			16m flush	√		Tractor drilling adjacent paddock	18/09/2019
			19m flush		√	Stopped dozer at 25m and two people walked another six metres toward the nest before the bird flushed	3/12/2019
		40m flush	18m flush		√ √	Nest 2 drive straight at nest Nest 1 drive straight at nest	18/09/2019
		30m flush 33m flush 32m flush 27m flush			√ √ √ √	Tests carried out within 10 minutes of each other, drive straight at nest Test carried out within 15 minutes of each other, drive straight at nest	19/09/2019 31/10/2019
		30m flush			√	Drive straight at nest	18/09/2019
			5.8m flush 5.8m flush	√ √		First time stopped opposite nest and and person alighted from vehicle; bird flushed. Second time drive straight past nest, bird alert but did not flush	15/11/2019
			12m flush		√	Early in season	8/08/2019
		41m flush	16m flush	√	√	Bird facing away, wind covering approach Walk straight at nest	16/09/2019

Draft Code of Practice
75m from nests during activities causing continuous disturbance
50m from chicks during activities causing continuous disturbance

Current Code of Practice (V21 October 2019)
100m from nests
50m from chicks during activities causing continuous disturbance to hab
25m vehicles must not be operated within 25m of any nests and chicks

Stephen Christensen
Project Barrister

Memorandum

Date	14 July 2024
Matter	MLC:IP
To	Andrew Feierabend
Copy	
From	Stephen Christensen
Subject	Consent Duration

Background

1 Meridian Energy Ltd (**Meridian**) has applied for consents to construct, operate and maintain a diversion channel in the Waiau Arm of Lake Manapōuri, immediately upstream of Manapōuri Lake Control (MLC). I understand the intended outcome of the consents is to improve the reliability of the delivery of flushing flows from Lake Manapōuri into the Lower Waiau River. The purpose of these flows is in turn to improve the ecological health of the river immediately downstream of MLC by removing excessive didymo growth, particularly at times when the level of Lake Manapōuri is in the lower half of the main operating range as established in the Lake Operating Guidelines.

2 The application has been publicly notified and submissions have been received from various parties.

3 Through pre-hearing meeting processes Meridian is seeking to clarify and resolve the issues and questions raised by submitters, with a view to seeking agreement on appropriate conditions of consent and eliminating the need for a hearing, or at least reducing the matters that will need to be traversed at a hearing.

4 One of the matters raised in submissions is the appropriate term or duration of the consents Meridian has applied for. I understand that the application seeks the maximum 35 year term allowed under the RMA for water and discharge permits, but some submitters have suggested the term should expire at the same time as the main operating consents for the Manapōuri Power Scheme in 2031.

5 Once constructed, the diversion will effectively become a permanent part of the environment. If submitters are proposing that the diversion should expire in 2031, with the intent that the diverted channel is either removed at that point (and flows reinstated to the existing channel) or replacement consents sought to retain it, I am not sure that this would result in a sensible resource management outcome. Reinstatement works would themselves result in adverse effects and require resource consents to be applied for and granted. I understand that reinstatement of the existing channel would reintroduce the current flow release issues over the MLC which would seem a suboptimal outcome. I am not sure why Meridian would elect to apply for reinstatement consents, and having regard to that I question whether granting short term consents for this diversion would stand scrutiny. As set out below, I understand from you that Meridian would likely not exercise consents granted on a short term basis.

6 You have advised me that while it is not clear from the submissions, you think submitters probably see the benefits that the diversion channel will bring and somehow see the submission on duration as a way to address the topic of ongoing maintenance of the channel and related matters.

7 If that is indeed the position I recommend that you seek clarity on that point from submitters at the upcoming pre-hearing meeting.

8 You have asked for my brief comments on consent duration in this context.

My comments

9 You have advised me that the MLC:IP is a major engineering project that has a multi-million dollar construction cost. Given the scale of that investment you have advised that Meridian would be unlikely to commit to the project without the security of knowing that it will also be able to maintain the new channel to effectively deliver flows into the future, and well beyond 2031.

10 In my view it is important that Meridian conveys this fact to submitters, and to the Commissioners considering the application. Ultimately if the Commissioners were to determine that the consents to use and maintain the new channel should only be granted until 2031 there would be little point in granting consents at all, since Meridian is indicating it would be very unlikely to exercise the consents at all on that basis.

11 It is a well-accepted principle that consent holders should be entitled to as much security of consent term as is consistent with sustainable management. The question that arises is whether there is a compelling resource management reason why only short term consents should be granted for the operation and maintenance of the MLC:IP.

12 I assume that the argument in support of short term consents for the MLC:IP to expire at the same time as the main operating consents for the MPS in 2031 is that somehow this will ensure that all aspects and effects of the post-2031 operation of the MPS are able to be considered when the MPS is reconsented.

13 I am not sure that this argument is sound for the following reasons:

(a) Meridian will likely not construct the diversion channel if the authorising resource consents do not allow it to maintain the new channel beyond approximately 7 years (i.e., beyond 2031 when the main operating consents will need to be replaced).

(b) I understand that maintenance of the diversion works is unlikely to be required until well after 2031.

(c) Prior to the reconsenting of the MPS Environment Southland will need to implement the NPSFM's national objectives framework in the Waiau FMU. That will require Environment Southland to, amongst other things, set flow requirements in the Lower Waiau River that are consistent with achieving the outcomes set for all the values identified in the FMU including ecological health and hydro generation. To the extent that ecological health in the upper reaches of the Lower Waiau River is impacted by didymo, the regional planning process will want to be informed by an understanding of what flows are physically able to be delivered into the Lower Waiau River from Lake Manapōuri to address didymo proliferation while still protecting the hydro scheme's nationally significant energy contributions, having regard to the need to maintain the levels of Lake Manapōuri in accordance with the Lake Operating Guidelines, and having regard to the bathymetry and engineering constraints in the Waiau Arm and at MLC.

(d) My understanding is that the presence of the MLC:IP and its ongoing maintenance to retain the channel profile so that effective flows can be more reliably delivered over the MLC will increase the options available to improve the ecological health of the Lower Waiau River when lake levels are in the lower part of the main operating range, while still

maintaining the nationally significant energy contributions of the MPS. That being the case it is hard to understand what benefit would be gained by granting a short consent term which effectively undermines the ability to realise the improvements the MLC:IP will be able to provide over the long term.

(e) The required flows that Meridian must deliver into the Lower Waiau River are set in the existing operating consents that expire in 2031 and will need to be replaced. The MLC:IP consents do not impact on or in any way replace or supersede those requirements (but the flow requirements set in the replacement consents in accordance with the requirements of the regional plan process described above will be able to be informed by the existence of the constructed diversion channel and the flows it is able to deliver).

14 Assuming that Meridian was in fact prepared to commit to the project even if consents to maintain the channel were only granted to 2031, it begs the question as to the basis upon which Environment Southland might decide not to grant replacement consents for the ongoing maintenance of the MLC:IP. As I understand it, once the diversion construction period and its associated effects are completed the effects of the operation of the MLC:IP on the Lower Waiau River could only be considered positive relative to the current position, and sediment discharge effects associated with as-required maintenance would be significantly less than those associated with initial channel construction. If that is indeed the position it is hard to understand why replacement consents would not be granted, and it follows that short term consents are not justified.

15 On that basis (and leaving to one side the likelihood that Meridian would abandon the project if short term consents were granted) it is not clear to me what benefit submitters feel would be gained by having only short term consents granted for maintenance of the MLC:IP. The use and the operation of the channel will need to be consistent with the flow regime established through the regional plan process and then reflected in the replacement operating consents for the MPS. If the concern is that post-2031 the MLC:IP consent conditions might need to be altered to ensure flows in the Lower Waiau River conform with the expectations of the regime that could be achieved by a section 128 condition review process.

s99 2nd Pre-Hearing Meeting Report APP-20233670

Report on pre-hearing meeting

Section 99 of the Resource Management Act 1991

From: Louise Taylor, Independent Meeting Chair

To: Sharon McGarry and Lyndal Ludlow to hear and determine the application

Date: 2 August 2024

Pre-hearing meeting

1. On 19 June 2024 the Environment Southland (ES), conducting its function as consent authority under the Resource Management Act 1991 held a pre-hearing meeting in terms of section 99 of the RMA. Due to good progress at that meeting, a further pre-hearing meeting was considered worthwhile, and held on 24 July 2024 with the goal to further refine matters of concern by submitters.

2. The meeting was held by ES at the request of Meridian Energy Limited for the purpose of clarifying a matter and facilitating resolution of a matter or issue. A pack of information was pre-circulated to the attending parties (particularly in response to actions for the first meeting) on 17 July 2024 by Kate Berkett, Meridian Energy Limited. An additional report from Mike Hickford (Aquatic ecologist) was circulated on 23 July 2024.

3. Maurice Rodway on behalf of Waiau Working Party (WWP) provided a written response to the Meridian pack on 23 July.

4. The meeting was held on 24 July 2024 between 10 am to 1 pm as follows:
   a. Meeting platform: Teams meeting
   b. Present:
      Louise Taylor, Chair

      Applicant in-person
      Andrew Feierabend – Meridian Energy Limited (Meridian)
      Daniel Murray – Planner, expert for Meridian Energy Limited (Meridian)
      Hamish Cuthbert – Meridian Energy Limited (Meridian)
      Kate Berkett – Meridian Energy Limited (Meridian)
      Ellie Taffs – Meridian Energy Limited (Meridian)

      Submitters accessing remotely
      Maurice Rodway – Chair Waiau Working Party (left early)
      Claire Jordan – Waiau Fisheries and Wildlife Habitat Enhancement Trust, Waiau Working Party, and the Waiau Rivercare Group Inc.
      Stevie-Rae Blair – Te Ao Marama Inc. on behalf of Oraka Aparima Rūnaka (Te Ao Marama)
      Kasmira Peterson – Te Ao Marama Inc. on behalf of Oraka Aparima Rūnaka (Te Ao Marama)

      Note: Claire and Maurice are both involved in the Waiau Fisheries and Wildlife Habitat Enhancement Trust and Waiau Working Party. Waiau Rivercare Group has similar interests. For the purposes of this meeting record, all three groups are referred to the "Waiau Groups" unless otherwise specified.

Geoff Deavoll – Planner, Department of Conservation (DOC)

Environment Southland
Mike Thorsen – Whirika Consulting (from 11 am to 12 pm)
Melanie Wilson – Team Leader Consents

Apologies
Bianca Sullivan – External Processing Officer
Greg Burrell – Instream Consulting
Roger Hodson – Waiau Working Party, Waiau Fisheries and Wildlife Habitat Enhancement Trust
Paul Marshall – Waiau Rivercare Group

5. At the meeting the parties agreed the following agenda:
    a. Update from meeting #1 actions
    b. Te Ao Marama updated position
    c. Consent Term
    d. Effects on Black Billed Gulls
    e. Sediment
    f. Rock lining of channel
    g. Monitoring conditions
    h. Freshwater Management Plan

6. Other matters which were discussed are:
    a. Status of Guardians of the Lake as a submitter
    b. Condition relating to circulation of management plan to stakeholders

Statutory and procedural matters

Requesting attendance

7. Section 99(2) allows consent authorities to request an applicant, a submitter or any other person it considers appropriate to attend a pre-hearing meeting. This can be either at the request of the applicant or submitters or on its own initiative.

8. In this case the applicant requested the second pre-hearing meeting to be held and for relevant submitters to attend. ES agreed this was appropriate and advised by email that a meeting was to be held and requested attendance to the parties listed above.

Attendance of those delegated to make decisions

9. Section 99(4) states that an officer of the authority who has the power to make the decision on the application may attend, subject to the agreement of all the parties attending and participating, and if the consent authority is satisfied their presence is appropriate.

10. No officers with delegation to determine the application were present at the meeting.

Chairperson to prepare this report

11. Section 99(5) and (6) require the chairperson of the meeting to prepare a report outlining particular matters, and to circulate that report to all of the parties and the consent authority (meaning, the

commissioners or hearings panel that will hear and determine the application) no less than 5 working days before the hearing.

12. The report must, for the parties who attended the meeting:
    a. set out the issues that were agreed; and
    b. set out the issues that are outstanding

13. However, the report must not include anything communicated or made available at the meeting on a without prejudice basis.

14. In addition, the report may, for all the parties:
    a. set out the nature of the evidence that the parties are to call at the hearing; and
    b. set out the order in which the parties are to call the evidence at the hearing; and
    c. set out a proposed timetable for the hearing.

Status of this report and next steps

15. Section 99(6) requires the chairperson to send this report to the consent authority and all the parties so that they have it at least 5 working days before the hearing. At the time of writing, no parties have advised that they no longer wish to be heard, and the application has been scheduled to be heard.

16. Section 99(7) **requires** the consent authority (meaning, the commissioners delegated power of the consent authority by to determine the application) to **have regard to** this report in making the decision on the application.

Matters Discussed

Actions from previous meeting

17. Meridian circulate updated set of proposed conditions to all parties. **Complete**

18. Meridian consider whether to draft management plans prior to hearing. **Meridian** - **Difficult to prepare management plans in advance of knowing who will be doing the work (contractor). Have refined conditions to be more explicit around expectations of Management Plans. Agree to circulate Management Plans (prepared by suitably qualified person) to parties 10WD before construction commences, with no certification process.**

19. Meridian provide Memo from Dam Watch regarding hydraulic Modelling to parties. **Complete**

Te Ao Marama update

20. Some dialogue has occurred with Meridian to understand cultural impacts from the project works
21. Hui scheduled 4 August with Te Ao Marama Board – will present draft cultural impact statement
22. Committed to keep collaborating with Meridian to understand, and if needed to resolve, any cultural impacts

Consent Term

23. Meridian advice received (Stephen Christensen, circulated in pack) is that there is no justification to align consent term with main scheme (6 years):

a. multimillion dollar project, therefore need to provide as much certainty as possible for the investment;
b. providing improvements to the existing consented system, therefore positive outcomes;
c. other processes address the flow regime and other aspects of the main scheme;
d. continue to seek a 35 year term.
e. note that adverse effects will only occur during construction. Once in place, effects only positive and works are permanent.

24. Waiau Groups – ask whether Meridian would consider a lesser term – between 6 and 35.
25. Te Ao Marama – Without Prejudice: would only support up to 25 years as matter of policy, and only if they are satisfied effects are no more than minor over that term. Potential solution: if consent is for 25 years, include a condition which has a trigger to review this consent to ensure it aligns with (for example) flushing flows conditions that come out of 2031 consent review. Waiau Groups supportive of this approach.
26. DOC – sought 15-year duration in submission due to changes in the environment during that timeframe could be taken into account at reconsenting time. DOC would abide by Council's decision regarding term. Unlikely to raise at hearing.
27. Meridian - Review condition – draft general condition includes a review condition which largely reflects the obligations in the RMA. Meridian happy with this condition and does not consider that a review condition which aligns with 2031 is required. Happy to keep up dialogue with Te Ao Marama regarding general cultural matters and whether a review provision is useful to ensure cultural impacts are suitably controlled. Noted that Meridian will be required to give effect to any future consents for the scheme regardless of this consent.

Conclusion

28. DOC no longer pursuing '15-year term'
29. Waiau Groups – seek shorter than 35-year term; interested in a review clause to align with scheme consent review
30. Te Ao Marama – likely to be comfortable with no more than 25-year term; also suggest a review clause as per paragraph 25
31. Meridian – pursuing 35-year term; discuss review concept with Te Ao Marama

Black Billed Gulls (Waiau Groups)

32. Waiau Groups - Bird Islands have been used by Black-billed Gulls in the past successfully. The Waiau Groups would like to see a new island built to provide additional Black-billed Gull nesting habitat The Waiau Groups referred to the WWP memo referred to at paragraph 3 of this report. The consider that such an Island would be in accordance with the MCLIP Landscape Assessment (Boffa Miskell Ltd, 2023).
33. Meridian – following advice from Leigh Bull (Ornithologist) which includes providing some habitat, but not interested in providing a specific island as space is used by Meridian in this location. Once work complete, and recontouring is undertaken it will be undertaken in a way that will provide additional habitat. Leigh Bull's advice is that there is no need for offset for compensation given the low level of effect.
34. Mike Thorsen – for Council – agreed with Leigh Bull's effects assessment. Works proposed will address impact on birds, no need for Island (discretionary); also, not as simple as creating a shallow sand bar – would require engineering and regular weed and pest control. Comfortable with Meridian's proposed solution.

35. Waiau Groups – queried the design of the culverts to link the lagoons/wetlands that were distributary channels of the Mararoa River before it was diverted by Meridian to discharge directly at the MLC structure to the main channel. This relates to the final form of the channel and how it links to the old channels of the Mararoa. Noted that culverts can be barrier to fish passage if not designed

correctly and that natural channels are preferred.

36. Meridian - agreed that this should be natural as recommended by Boffa Miskell.

Conclusion

37. Matter not agreed with Waiau Groups.
38. Meridian and Council expert in agreement.
39. DOC not concerned.

Sediment Issues (Waiau Groups)

40. Waiau Groups - When the Mararoa is too turbid to enter Lake Manapouri, i.e. greater than 30 NTU there is a flow released from the lake of approximately 5 cumecs to ensure the turbid Mararoa water goes through the MLC, rather than flowing into the Lower Waiau upstream of the MLC (Waiau Arm). Meridian has advised that after the works are completed, the flow in the Lower Waiau upstream of the MLC will be split, with approximately 2/3 through the new channel, and 1/3 through the existing channel.
41. The Waiau Groups are concerned that this would see the current 5 cumecs of lake water split, with approximately 3.5 cumecs going through the new channel, and 1.5 cumecs through the existing channel when the Mararoa exceeds 10 NTU. The Waiau Groups' concern is that this reduced flow of lake water through the existing channel (1.5 cumecs rather than the current 5 cumecs) may be insufficient to ensure that the turbid Mararoa water does not enter the Lower Waiau upstream of the MLC, which may cause effects, such as sediment deposition, in the existing channel. Consequently, that the current 5 cumecs flow of lake water may need to be revised. Meridian agreed to address this submission point.
42. Meridian – in part this issue is addressed by Dam Watch memo dated June 2023 (pre-circulated in pack) – all three channels will continue to function post works; turbidity obligations already under the MPS operating consents (also Gazetted Operating Guidelines of Lakes Manapouri and Te Anau under the Manapouri Te Anau Development Act – requires bypassing flows from the Mararoa River in such a manner as to prevent dirty debris-laden water from entering Lake Manapouri; water with more than 30 NTU must be diverted down the Waiau River as per MPS operating consents. Meridian has turbidity monitoring in place to ensure this situation won't occur (is in no one's interest for this to happen) – two monitoring locations (Waiau Arm upstream of the existing channel, new channel and MLC, and in the Mararoa River upstream of MLC near Weir Road bridge).
43. Waiau Groups – Dam Watch memo didn't reflect the conditions that Waiau Groups are concerned about.
44. Meridian – current practice will manage the concern raised by Waiau Groups.
45. Waiau Groups – querying whether the reduced flow will be enough for Meridian to still be able to comply with their 30 NTU requirements (which are under the scheme consents). Note that the Dam Watch model is just a model and may not play out that way.
46. Meridian – confident that they will be able to comply; if not this is Meridian's issue as it would cause a compliance matter for its existing scheme consent. In practice if this was an issue, more water would need to be released from the lake down the arm to resolve. To add in a requirement for a certain amount of flow would not assist.
47. Waiau Groups – Meridian don't have ability to monitor turbidity in the existing channel. Concerned that this situation hasn't been modelled.
48. Meridian – the existing monitoring devices (together) will provide sufficient certainty, to continue to ensure compliance with scheme consent. Don't see a need to model, as solution is clear if the concern arises.

Conclusion

49. Waiau Groups – don't feel Meridian have answered the question: what are the effects of this project on the existing channel in terms of turbidity; as the monitoring is upstream of the location where the effect would occur.
50. Meridian – will endeavour to answer this question through evidence; don't think modelling is needed.
51. Matter not agreed.

Rock Lining of Channel (Waiau Groups)

52. Waiau Groups – where channel makes sharp turn to right close to MLC, concerned that rip rap/lining would be needed
53. Meridian – Engineering advice is that this isn't necessary

Conclusion

54. All agreed - issue resolved

Monitoring Conditions (Waiau Groups)

55. Waiau Groups – general condition 11 – water quality monitoring programme; Inadequate at the moment as should occur annually and not be time limited.
56. Meridian
    a. NIWA advice – Memo from Cathy Kilroy (Appendix E to application) – risk is low from phytoplankton bloom;
    b. condition has been reworked in attempt to resolve concerns from Waiau Groups; is time limited due to wider programme in place; this monitoring is required only due to effects from works from this consent. Condition provides for three complete years of records.
    c. condition has been informed and drafting undertaken by NIWA expert.

Conclusion

57. Waiau Groups – to seek advice from Dr Sue Bennett to confirm comfortable with condition as drafted (on basis of outcomes of review of Waiau water quality programme, embedded with existing scheme consents); provide updated position to parties.
58. Waiau Groups – happy with other monitoring conditions
59. DOC – comfortable with all monitoring conditions

Freshwater Management Plan (DOC)

60. DOC - Fish survey has occurred; has provided some data and has provided evidence of species that would be expected to be there; timing of survey not ideal. DOC no longer pursuing matter.
61. DOC - Concerned about lack of detail in survey and relocation of species means that DOC are unsure about what effects there might be.
62. DOC - General Condition 8 – Freshwater Fauna – requires a Freshwater Fauna Management Plan
    a. DOC – no clear objective, purpose, outcomes to be achieved of the FFMP in the condition
    b. DOC - Information to come – timing, monitoring would be appropriate to include in condition
63. Meridian - purpose of condition is to require that where disturbance is to occur, fish are relocated to avoid effect
64. Meridian – expert Mike Hickford (Aquatic ecologist) – species that are likely to be affected are well understood; therefore, don't need "avoid or minimise effects" clauses; will relocate species out of harms way. Therefore, the purpose of the condition is to ensure this occurs in accordance with industry methods.

65. DOC – relocating long fin eels from the Lagoon Area – which condition applies
66. Meridian – Answer: clause a

Conclusion

67. Action – Geoff seek input from Jane Bowen (DOC freshwater ecologist) and discuss with Mike and Daniel with intention to agree wording; circulate to parties.

Other Matters

68. No other issues from DOC – all other matters raised in submission no longer pursuing.

69. "Guardians of the Lake" submission – at request of Meridian, Geoff to consider how DOC to respond to/support Guardians of the Lake in terms of status and ability to engage in this process. Geoff to report back to Meridian and Council.

70. Te Ao Marama – management plans timing – refer General Condition 3 – requires management plans to be provided to parties at least 10 working days before construction commences for their information. No process for comment/changes or Council certification.

71. Meridian – effects are well understood; management plans purpose in this case is to ensure industry standards are met during construction; no certification process proposed as not considered necessary.

72. Waiau Groups and DOC – comfortable with condition General 3 as worded.

73. Te Ao Marama – consider further and discuss with Meridian.

Conclusions

74. Outstanding matters are:
    a. Ongoing dialogue with Te Ao Marama (including general condition 3 timeframe)
    b. Consent term
    c. Black Billed Gulls
    d. Sediment Issues
    e. Water Quality Monitoring condition (general condition 11)
    f. Fresh Water Management Plan (general condition 8).

75. Refer each topic above regarding agreed actions.

76. Confirmed that all parties attended this pre-hearing meeting have no other outstanding issues that were listed in the Meridian summary table (pre-circulated).

77. DOC no longer pursuing matters in submission apart from Fresh Water Management Plan condition 8.

78. Waiau Groups – comfortable with matters aside from items listed in paragraph 72 (b) – (f).

79. Te Ao Marama continues to reserve its position.

80. Hearing set down for 17 and 18 September 2024.

Louise Taylor
Independent Chair of Pre hearing Meeting

Attachment 5

Further information provided by Meridian dated 15 March 2024 and 4 June 2024, including revised proposed consent conditions

Further information provided by Meridian dated 15 March 2024

15 March 2024

Job No: 1019502

Environment Southland
Private Bag 90116
Invercargill 9840

Attention: Bianca Sullivan

Dear Bianca

APP-20233670 - Manapōuri Lake Control Improvement Project
Response to post-lodgement queries

Introduction

Following formal acceptance of the resource consent applications made by Meridian Energy Limited (Meridian) for the Manapōuri Lake Control Improvement Project (MLCIP) on 20 February 2024 (your reference: APP-20233670), and the workshop between Environment Southland's and Meridian's experts on 16 February 2024, this letter provides a response to the queries raised through subsequent correspondence.

Responses

1. How are Meridian proposing to monitor whether the project is successful?

As part of identifying constraints associated with delivering consented flows at the Manapōuri Lake Control Structure (MLC), Damwatch modelled different flow scenarios based on a new channel excavated through the Mararoa delta area.

The modelling work had a particular a focus on flushing flows to manage nuisance periphyton given that high lake levels are required to produce these flows, and so are the most constrained hydrologically. Modelling has confirmed an expectation that a new channel with a base width of 16 m at RL 172.0 m, would allow 160 m^3/s to be released at a Lake Manapōuri level of approximately RL 177.28 m. This is predicted to increase flushing flow reliability to approximately 70% from the existing approximately 30% reliability.

Meridian is required to comply with existing conditions of consent in relation to flows through the MLC, which are set out in Table 1 overleaf.

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PO Box 13055, Christchurch 8141 P +64-3-363 2440 F +64-9-307 0265 E chc@tonkintaylor.co.nz

Table 1: Existing consent conditions relevant to flows

Consent	Condition
Water Permit 96022	Condition 2 – Minimum Flows
	Condition 5 – Mararoa Turbid Water
	Condition 8 – Recreational Flows
	Condition 9 – Other Flows
Water Permit 206156	Conditions 3-5 of Water Permit 96022
	Condition 6 - Waiau Arm Water Quality
	Condition 7 - Lower Waiau River Voluntary Supplementary Flows

Annual compliance reporting to Environment Southland is required in relation to the flow-related conditions listed above. Particularly, Condition 7 of Water Permit 206156 requires extensive reporting on supplementary flows for nuisance periphyton biomass management, including the number of flows provided and the effectiveness of the same. Whether the MLCIP has delivered the anticipated improvements in flow conveyance and reliability will be readily apparent through this reporting.

In referencing the same, it is accepted there will still be times when supplementary flows will not be able to be provided, for instance when there are adverse hydrological conditions, or because of lake level management requirements in accordance with the Lake Manapōuri and Lake Te Anau Operating Guidelines.

2. You indicated that you would provide a table with MTADA v RMA and which effects apply where – this would be helpful.

Please refer to Table A1 in **Appendix A**.

3. What are the effects in the mixing zone, particularly on fish and bird species?

<u>Mixing zone</u>

For clarification, the effects of sediment upstream of the monitoring point at Excelsior have been considered, and have been assessed as minor and temporary, subject to the monitoring and trigger level regime proposed in draft conditions. Effects have been considered along the entire LWR, from the MLC to the coast, and the trigger levels have been chosen to manage effects along that whole stretch.

Excelsior has been chosen because practically it is the best point for safe and reliable access to monitor turbidity, and because it is upstream of further any tributaries which have their own inputs (e.g. the Excelsior itself). The management responses (stopping work or providing flushing flows) will address effects within the mixing zone as well as downstream of it.

In relation to section 107, Meridian accepts that there may be times where the criteria in that section (e.g. visual clarity) cannot be complied with after reasonable mixing. Instead, the temporary effects and exceptional circumstances exceptions apply, and a decision maker is not barred from granting consent.

The definition of "reasonable mixing zone" in the proposed Southland Water and Land Plan (the PSWLP) applies in relation to the water quality standards set out in Appendix E (here, for lake fed waterbodies), which Meridian accepts may not be able to be met at all times during construction of the MLCIP. The standards within Appendix E of the PSWLP are intended to apply to the assessment of effects after reasonable mixing. However, there is a specific exception to the standards for the MPS within Appendix E, where:

> *"…an ancillary activity associated with the maintenance of the Manapōuri hydro-electric generation scheme is proposed. This exception only applies where the activity requires a resource consent pursuant to a rule in this plan and will only result in a temporary change in the state of the water".*

This exception for temporary effects associated with maintenance of the Manapōuri Power Scheme was included via mediation in the plan review process. Evidence presented on behalf of Meridian pointed to the MLCIP as an example of the type of project to which the exception was intended to apply.

This exception affects how the rules and policies of the PSWLP apply to the Application, but does not preclude consideration of the effects of a proposed activity on water quality through a resource consent process, which the Appendix specifically notes. To reiterate the above, such effects have been considered along the length of the LWR from the MLC to the coast, and have been found to be temporary and minor, subject to the monitoring and trigger level response regime.

Effects on fish and bird species

Please refer to the memorandum prepared by NIWA in **Appendix B**.

4. What are the risks of fish stranding in the existing channel?

The Project area is located upstream of the MLC gates. The gates control the flow rate released into the Lower Waiau River, and in doing so control the flow rate and water level within the Project area.

In contrast to a typical river setting, the water level in the project area reduces as discharge increases. The level depends on the prevailing upstream lake level and energy losses as the flow passes through the relatively shallow channels in the Project area.

This phenomenon is illustrated by data recorded at site during a flushing flow release (Figure 1 overleaf). During a flushing flow release in May 2021, the headwater level immediately upstream of MLC dropped by some 800 mm over 9 hours as the flow release was ramped up. This is close to the highest drawdown currently experienced – where a large discharge is released at a relatively low lake level.

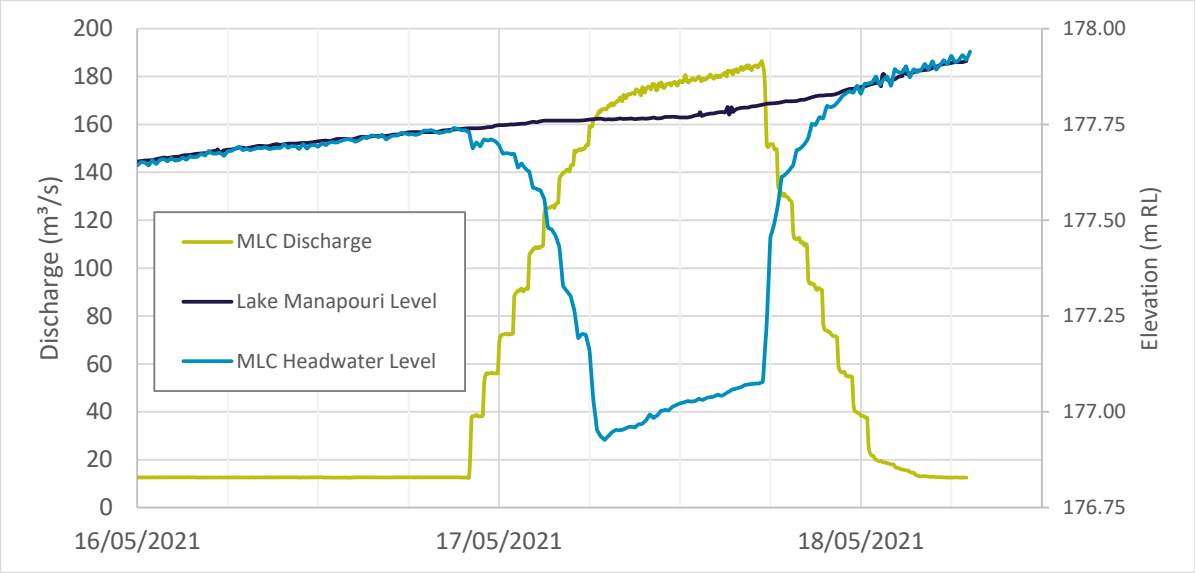


Figure 1: Water level recorded at Lake Manapōuri and at MLC during flushing flow release, May 2021

The Project aims to provide greater flow conveyance in the approach to the MLC control gates, which will reduce this drawdown effect. Post construction, in the same conditions as the May 2021 flushing flow release the water level in the new and existing channels is expected to draw down only some 200-300 mm. Meridian will retain procedures for slowly ramping up changes in such flow releases to prevent rapid changes in water level within the river.

The potential risk of fish stranding upstream of MLC is minimised with reduced water level drawdown rates and magnitude occurring during flow releases and is no greater than currently exists. There have been no fish strandings in the existing channels reported to Meridian.

5. Table D1 of the freshwater appendix contains the bird species that are present. Could the additional memos that were discussed be provided please – we understand that these contain information on frequency and types of visits.

Please refer to the memorandum prepared by NIWA in **Appendix B**.

6. An error was acknowledged in table 7-2 of the freshwater appendix. Could a corrected table be provided?

The error in Table 7-2 of Appendix D to the AEE was that the expected magnitude of effect of the Project for periphyton in the Lower Waiau River was listed as Minor. Given the existing state of periphyton in the LWR (i.e., frequent nuisance growths in summer) and the relatively short duration of potentially elevated sediment inputs, these effects should instead be considered less than minor. A replacement Table 7-2 is provided in **Appendix C**.

7. Could a statement be provided on the overall impact on biodiversity, ie loss, maintain or gain?

The Project's primary purpose is to improve the conveyance and reliability of flows through the MLC. The Project will have temporary adverse effects of a short duration on both terrestrial and aquatic ecology during the construction period, and will result in the permanent removal of one very small low value wetland area. However, biodiversity values, including aquatic ecology below the MLC are expected to recover quickly post construction to the same or similar levels prior to the work being undertaken. There may also be effects during future maintenance activities, but these are

anticipated to be of a lesser degree. These effects are comprehensively described in the technical reports attached to the Assessment of Effects on the Environment (AEE) and are summarised within the AEE.

The Project is expected to result in improved flow management as per existing resource consent requirements, and an ability to provide flushing flows more regularly than is currently achievable. This will lead to enhanced river health outcomes for the LWR and for freshwater ecosystems, particularly with respect to periphyton biomass management. The Project is expected to enable release of a higher proportion of the flushing flows as stated in the 'Controlled Releases of Voluntary Supplementary Flows from the Manapōuri Lake Control Structure (MLC) to the Lower Waiau River' (flushing flow protocol). Individual flushing flows almost always have a beneficial effect by reducing periphyton cover and thickness to some extent (depending on the characteristics of the flushing flow and the state of periphyton growth prior to the flush). When Microcoleus (nuisance cyanobacteria) is present the flushing flows almost always remove much of the cover. Reducing cover of thick periphyton (particularly didymo) exposes better habitat for macroinvertebrates and the food web in general.

Overall, the Project is expected to lead to a net gain in river health, particularly from an aquatic ecology perspective.

8. Could additional information be provided on the expected maintenance requirements of the channel – what is expected to be needed, where, how often and what will the triggers be?

Maintenance of the new channel refers to the removal of gravels that deposit within the channel footprint, to maintain the flow conveyance of the channels.

There is expected to be minimal maintenance required along most of the new excavated channel, given that there is negligible sediment load transported from Lake Manapōuri via the Waiau Arm, and that a significant portion of the new channel area would need to be blocked to have a noticeable effect on flow conveyance, i.e. the need for maintenance would be triggered after there has been significant deposition within the new channel.

Gravels transported by the Mararoa River currently deposit upstream of the MLC gates and will require periodic removal. It is expected that there will also be some need for ongoing channel maintenance with some transported gravel material depositing in the Waiau Arm channels within the Waiau Arm delta area, including the new channel. The alignment of the new parallel channel directing large flow releases more directly toward the gates can, however, be expected to have a positive influence in re-entraining and 'flushing' deposited material.

Expected post-construction maintenance work will involve excavating deposited material using a long-reach excavator working from a low-level temporary gravel bund within the existing Waiau Arm channels and Mararoa River above the MLC gates. The work would aim to maintain the flow areas of the existing and new channels and Mararoa River.

It is expected that the maintenance would be undertaken as required and at approximately 5-10 year intervals.

9. In an extreme flood event in the Mararoa flow might run around the old river course and presumably drop into the new diversion channel. What scour/ erosion might result from that?

In an extreme flood event from the Mararoa River, flow may overtop the right-hand bank of the 'Mararoa Cut' and spill into the historical Mararoa channels. This is not known to have occurred in the 35 years since the Mararoa was diverted.

In such an event, the MLC gates will be opened to pass the incoming floodwaters as effectively as possible, and most of the flow will remain in the Mararoa cut and will flow directly toward the gates. Water that overtops the right bank and spills into the historical Mararoa channels will flow into the new Waiau Arm channel.

Flows spilling into the historical Mararoa channels may mobilise sediment and debris within the area, but are not expected to cause significant scour/erosion damage to the new channel due to:

- The wide area over which the historical Mararoa channels intersect the new excavated Waiau Arm channel;
- The likely high concurrent water level within the Waiau Arm; and
- The gentle 1V:3H side slopes of the new excavated channel.

In an extreme Mararoa flood such as would be required to result in overtopping of this nature, a significant sediment load will be transported down the Mararoa River, and cleanup/maintenance work in the Mararoa cut, upstream of the gates, and generally throughout the catchment will be inevitable.

10. Do Meridian have a plan if there is a lot more of the grey pug and a lot less of the river gravels than has been assumed?

Given the geomorphological origin of the area, being an alluvial fan, there is reasonable certainty that the ground material, to some level below the natural Waiau water level, will be alluvial sediments (gravels and sands). This was confirmed by test pitting and trial excavations undertaken.

If the underlying clay is encountered at a higher elevation than expected, no issues are foreseen in constructability of the Project. The channel will still be excavated to the same plan and dimensions. The clay is consolidated and cohesive, and is not expected to settle with earthmoving machinery working above. Trial excavations did not reveal any issue with excavators working from gravel bunds built atop underlying clays.

The trial excavations showed the *in situ* clay material to be very cohesive and it remained largely intact when excavated, producing lower levels of suspended sediment than construction and removal of bunds from gravelly material (refer Figure 2 below). The proposed suspended sediment monitoring and mitigation will ensure that downstream effects are managed regardless of material encountered.

Figure 2: Clay material excavated from Waiau Arm in 2023 trial excavation

The main effect of a greater-than-expected proportion of clay compared to alluvium within the excavated volume is expected to be in the spoil area. The clay will likely need blending with alluvial materials and partial drying to allow it to be trafficked and compacted without becoming sludgy.

11. What types of wetlands are present, e.g are they rainfall fed, connected to groundwater (or seasonally so), on original land surfaces? Will there be a prolonged period of low flows that will impact on downstream wetlands by removing their water source?

Table D1 (**Appendix D**) provides information on the type of wetland present (hydrosystem and wetland class), hydrological drivers and whether they are on original land surfaces for each wetland within the Project site.

Figure D1 (**Appendix D**) below shows an aerial image of Project site in 1974 (during construction of the MLC) with the current location of wetlands within the Project site. This illustrates which wetlands are on original or modified / constructed land surfaces.

Table D2 (**Appendix D**) provides the same information for each downstream riparian wetland that could potentially be affected by the Project. All downstream riparian wetlands are on original land surfaces.

Flows over the MLC will continue to be managed in accordance with all existing consent conditions, which include environmental flow requirements. The Project will not change the already consented flow rates, and flows will be maintained at or above the environmental flow requirements at all times during construction.

12. Ecological significance – provide clarification on effects framework used, and how a conclusion of minor effects was arrived at (and an evaluation of ecological significance).

<u>Wetlands Assessment</u>

To determine the level of ecological effects on wetlands and terrestrial habitats we used the Environmental Institute of Australia and New Zealand's (EIANZ) Ecological Impact Assessment (EcIA) Guidelines (Roper-Lindsay et al. 2018). In summary, these guidelines require assessments of the values of communities, habitats / ecosystems and species, the magnitude of impact and the level of ecological effect based on ecological value and magnitude of impact.

The ecological significance of terrestrial vegetation and habitats, including wetlands, was also assessed against the criteria for determining significant indigenous vegetation and significant habitats of indigenous biodiversity listed in Appendix 3 of the Southland Regional Policy Statement (SRPS, Environment Southland 2017). Following Appendix 3 of the SRPS, areas or habitats were significant if they meet one or more of the criteria.

With regard to the level of residual effects (following implementation of Project shaping and recommended effects management measures) the level of effect for all actual or potential effects on wetlands and terrestrial habitats was Very Low, Low or No Effect - slight Net Gain.

The EIANZ EcIA guidelines note that the level of effect can be used as a guide to the extent and nature of the ecological management response required. For example:

- '**Low'** and '**Very Low'** should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. If effects are assessed taking impact management measures developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure low or very low-level effects.
- **'Very Low'** level effects can generally be classed as 'not more than minor' effects.

Freshwater Assessment

Please refer to the memorandum prepared by NIWA in **Appendix B**.

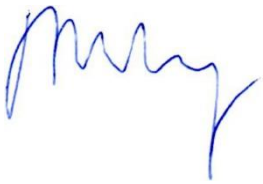
13. Avifauna assessment - provide further information on the species which are present, and the frequency and types of visit, if this information is known. Assess the effect of birds avoiding the areas during construction, i.e. are there other suitable locations nearby which they could go to?

Please refer to the memorandum prepared by NIWA in **Appendix B**.

Closing

We trust these responses satisfactorily address the queries raised. If there are any further queries please do not hesitate to contact the writer (email: dmurray@tonkintaylor.co.nz) or Andrew Feierabend at Meridian Energy (email: andrew.feierabend@meridiannergy.co.nz).

Yours sincerely



Daniel Murray
Technical Director - Planning

15-Mar-24
document1

Appendix A: RMA vs MTADA effects (Query 2)

Table A1: RMA vs MTADA effects

Activity	Location	Potential effect	Governing Legislation
Excavation / disturbance of bed of a lake, and removal of plants within the bed of a lake (section 13).	New channel within the Waiau Arm, and construction of bunds and haul roads, and contractor's establishment area as per Figures 5.1 to 5.3 of the AEE. The bunding and the footprint for the new channel is the 'bed of a lake' as per the definition in the RMA. Parts of this area may also be wetland and natural inland wetland (see below).	Landscape and visual effects. Construction-related effects – Noise, light, vibration, vegetation removal.	MTADA
Deposition of substances (excavated material) on the bed of a lake, and reclamation of bed of a lake (s 13).	Spoil area to the east of the Project site, some of which is below the maximum operating level of Lake Manapōuri, and so is the 'bed of a lake' as per the definition in the RMA.	Landscape and visual effects. Construction-related effects - Noise, light, vibration, vegetation removal. Any ecological effects.	MTADA
Discharges of contaminants to air (s 15(2) or (2A))	Generally across the Project site, where construction activities take place.	Construction-related dust effects	MTADA (noting that this would not contravene a regional rule or NES, and so is also not restricted under s 15(2) or (2A) of the RMA)
Section 9 construction-related activities	Generally across the Project site, where construction activities take place.	Construction Effects – Earthworks, noise, lighting, vibration, vegetation clearance. Related landscape and visual effects.	MTADA (nothing that these effects are also largely permitted under the Southland District Plan)
Use and erection of structures (culverts) within the bed of a lake (s 13), and associated bed disturbance.	As per plans provided in the AEE.	Construction-related effects - Noise, light, vibration, vegetation removal. NB: these are also within a natural inland wetland, so will engage the RMA as per Regulation 47 of the NES-F.	MTADA
Vegetation clearance, earthworks / land disturbance, and the take, use diversion and discharge of water in and near a natural inland wetland (Regulation 47 of the NES-F)	Removal of Wetland 1 (palustrine wetland) and disturbance of small parts of the lacustrine wetlands over which the haul road and culverts will be placed.	All effects relating to the vegetation clearance, earthworks / land disturbance within a natural inland wetland, and the take, use, diversion and discharge of water near a natural inland wetland.	RMA

Activity	Location	Potential effect	Governing Legislation
Diversion of water into the new channel (s 14)	New channel within the Waiau Arm	Hydrology and hydrogeology Ecological effects	RMA
Discharge of contaminants (sediment) and water into water and onto land where it might enter water (s 15(1))	Construction of the new channel within the Waiau Arm, and entering the LWR downstream of the MLC.	Hydrology and hydrogeology Ecological effects	RMA
Discharge of contaminants (sediment) and water onto land where it might enter water (s 15(1))	Construction areas and runoff from spoil disposal area.	Hydrology and hydrogeology Ecological effects	RMA
Take of water and use (for dust suppression) (s 14)	From the Waiau Arm, Mararoa River or seepage pond.	Hydrology and hydrogeology effects Ecological effects	RMA
Discharge of water to land (for dust suppression) in circumstances where it might enter water (s 15(1)).	On dust-prone areas on the Project site, as required for dust suppression.	Hydrology and hydrogeology effects Ecological effects	RMA
Take and use of water (for dewatering of excavated material) (s 14)	From the new excavated channel.	Hydrology and hydrogeology effects Ecological effects	RMA
Discharge of water (taken for dewatering) to land in circumstances where it might enter water (s 15(1))	Discharge into dewatering ponds, and into groundwater and surface water (Mararoa River and Waiau Arm).	Hydrology and hydrogeology effects Ecological effects	RMA

Appendix B: NIWA memorandum

Responses to:

- Query 3: What are the effects in the mixing zone, particularly on fish and bird species?
- Query 5: Table D1 of the freshwater appendix contains the bird species that are present. Could the additional memos that were discussed be provided please - we understand that these contain information on frequency and types of visits.
- Query 12: Ecological significance – provide clarification on effects framework used, and how a conclusion of minor effects was arrived at (and an evaluation of ecological significance).
- Query 13: Avifauna assessment - provide further information on the species which are present, and the frequency and types of visit, if this information is known. Assess the effect of birds avoiding the areas during construction, i.e. are there other suitable locations nearby which they could go to?

Memo

From	**Jo Hoyle**
To	Andrew Feierabend
CC	Ellie Taffs Daniel Murray
Date	15 March 2024
Subject	Manapōuri Lake Control Flow Improvement Project - Response to questions from Environment Southland Technical Experts
File path *(right click to update)*	*O:\MEL23523\Working\ES_AEE response\Memo Re MLC Flow Improvement AEE - Further information from NIWA.docx*
Report Number	*2024061CH*

This memo relates to Meridian Energy Limited's proposed Manapōuri Flow Improvement Project (hereafter 'the Project') and provides responses to questions from Environment Southland's Technical Experts regarding the Assessment of Environmental Effects (AEE) and in particular Appendix D to the AEE, which provides NIWA's assessment of effects on freshwater ecology.

Environment Southland Questions

What are the effects in the mixing zone, particularly on fish and bird species?

We have considered the effects in the mixing zone as part of the downstream effects of the Project in the Lower Waiau River (LWR), i.e., we have not separated out the effects in the mixing zone. See Section 6 in Appendix D to the AEE for discussion of effects within the Project Area and downstream of the Project Area in the LWR. See Table 7-1 for a list of key ecological values in the Waiau Arm and LWR and Table 7-2 for an assessment of the expected magnitude of effects of the Project on ecological values in the Project Area and downstream in the Lower Waiau River.

Fish potentially found in the mixing zone (LWR) are listed in Table 5-5 of Appendix D to the AEE. Minor and temporary effects relating to elevated suspended sediment concentration (SSC) or deposited fine sediment (DFS) are expected for salmonids, longfin and shortfin eels and non-migratory galaxiids. We note that whilst non-migratory galaxiids may be present in the mixing zone, they are unlikely to be present in high numbers as they are predated by salmonids. They are more typically found in the tributaries.

The mixing zone is not a known roosting or nesting area for freshwater birds, so effects in the mixing zone relate to the effects of elevated SSC on feeding. We anticipate that birds will move to better feeding areas during periods when SSC is elevated, such as may be found in the Mararoa River. Therefore, the effects on feeding are expected to be less than minor.

Birds Effects Assessment - Provide information on species present, frequency and type of visit.

Species present – Information on freshwater birds present in the Waiau catchment is based on bird observation data which were obtained from the Department of Conservation, the eBird website (Sullivan et al. 2009) and the grey literature, as summarised by Whitehead (2021). There are three key datasets containing abundance data from formal freshwater bird surveys at the Manapōuri Lake Control structure (MLC) between 2000 and 2020 (Table 1).

Table 1: Summary of available freshwater bird survey data for the Manapōuri Lake Control structure. Survey type: site surveys = ground-based surveys at a localised site; walk-through surveys = longitudinal transects along the river corridor (e.g., O'Donnell and Moore 1983). Table from Whitehead (2021).

Location	Period	Survey type	Source
Key sites in Lower Waiau River	2000 – 2001 2020	Site surveys	McClelland (2001, 2002) NIWA (Amy Whitehead, *Personal observation*)
Upper and Lower Waiau River	2009	Walk-through surveys	Department of Conservation (Colin O`Donnell, *Personal communication*)

As outlined in Section 5.7 in Appendix D of the AEE, the bird fauna observed at the MLC is characteristic of South Island freshwater habitats, with 20 freshwater bird species identified (Table D-2 in Appendix D of the AEE). Three species are listed as threatened (black-billed gull - critically endangered; black-fronted tern - nationally endangered; banded dotterel - nationally vulnerable) on the New Zealand Threat Classification System. Twelve bird species not dependent on freshwater habitats have also been recorded at the MLC. Coastal waders, aerial gulls and terns are most prevalent in the lower reaches of the river, while dabbling waterfowl and open water divers are present in areas of deeper, slow-flowing water.

The abundance of freshwater bird species observed during formal surveys at the MLC is summarised in Table 2. These formal surveys were all completed within the primary breeding season for most freshwater bird species associated with the MLC (Figure 1).

Table 2: Abundance of freshwater bird species observed during formal surveys at the Manapōuri Lake Control structure (MLC). Columns represent data from the individual surveys identified in Table 1. Note that the McClelland surveys (2000, 2001) only recorded black-billed gulls at the MLC and it is unknown whether other species were present. Table from Whitehead (2021).

Species	October 2000	October 2001	December 2009	November 2020	December 2020
Black-billed gull	1435	1255	3250	37	107
Black shag			1	0	0
Grey teal			5	0	0
Little shag[1]			0	0	0
Mallard			0	0	30
Pied stilt			2	0	10
South Island pied oystercatcher			54	0	0
Southern black-backed gull			2	0	0
Spur-winged plover			4	0	0
Swamp harrier			1	0	0

[1] We note that the recorded numbers for Little shag are all zeros, but this is how they are reported in Whitehead (2021).

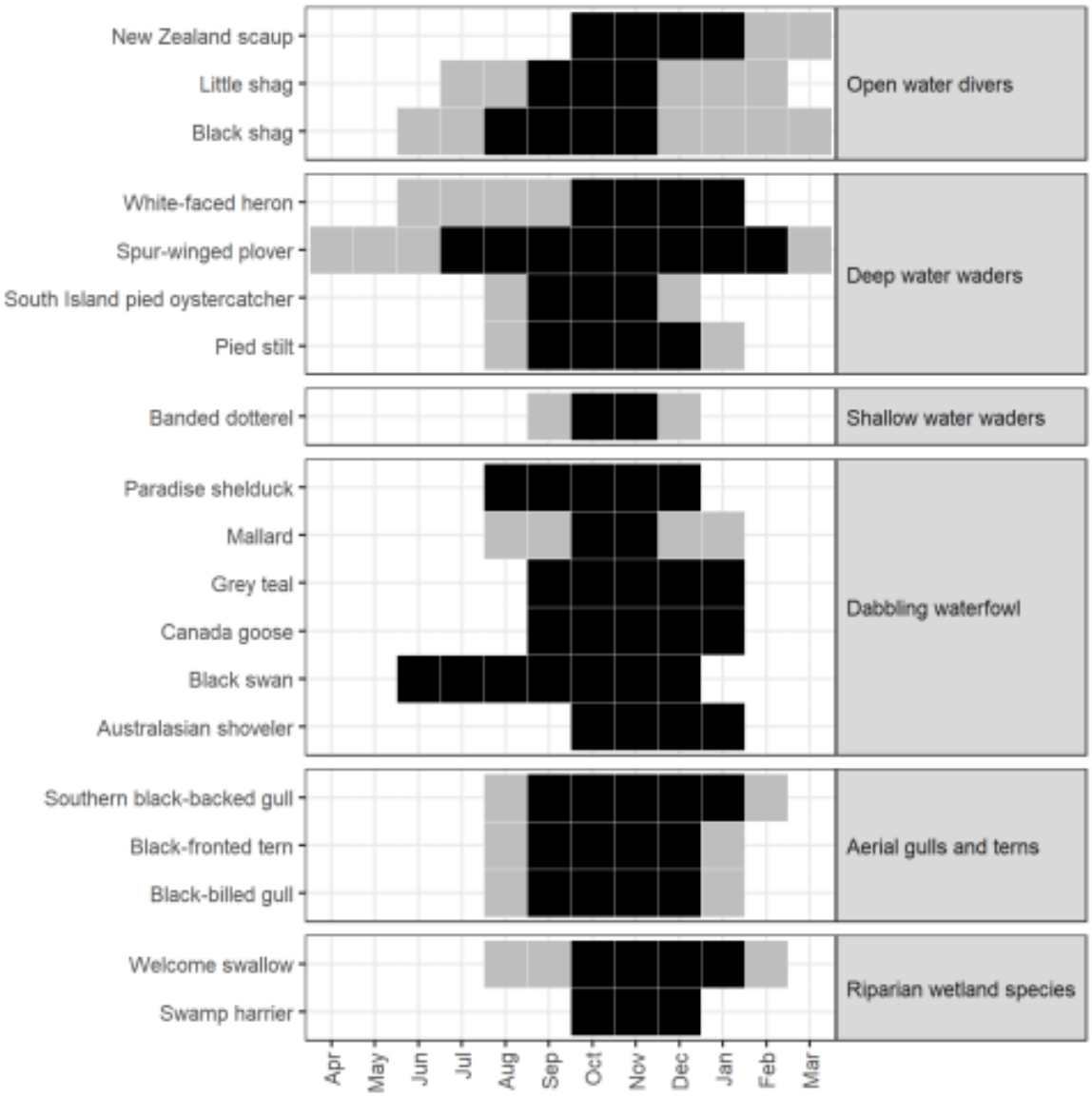


Figure 1: Breeding season of freshwater bird species associated with the Manapōuri Lake Control. Black squares indicate primary breeding season, while grey squares represent months in which some breeding occurs in most years. Adapted from O'Donnell (2000) by Whitehead (2021).

Frequency and type of visit – We can infer the type of visit for different species based on the type of habitat present. Table 3 outlines the types of microhabitats associated with the Waiau River catchment that are likely to be used by freshwater birds. The Project Area includes all the river microhabitats listed, however, downstream in the Lower Waiau River from the MLC to Excelsior Creek (i.e., mixing zone) generally only comprises a major channel with narrow riparian areas. Key feeding and breeding microhabitat for freshwater bird species recorded in formal surveys of the Waiau River catchment are outlined in Figure 2. For example, Figure 2 shows that the three species of concern (black-billed gull, black-fronted tern and banded dotterel) only use river habitats for feeding during the summer breeding season.

Table 3: Key microhabitats associated with the Waiau River catchment that are likely to be used by freshwater birds. Definitions from O'Donnell (2000).

Rivers	Lakes and estuaries
Riparian areas: Terrestrial habitat adjacent to rivers and lakes that are used by freshwater birds. Includes paddocks, riparian willows and riverbanks.	**Open water:** The open water of lakes, ponds, bar-type lagoons and estuaries at high tide.
River terraces: Raised level areas immediately adjacent to the river floodplain resulting from successive down-cuttings by the river. Younger, low-level terraces may develop mid-channel.	**Edge water:** The shallow waters (<200 mm) along the margins of lakes, lagoons and ponds. May be overhung by riparian vegetation.
Shingle bars and flats: Areas of mud, sand, gravel or cobbles on the active riverbed. May be surrounded by water.	**Mud and sand flats:** Open areas of mud or sand that are usually saturated or covered in a surface water film after being exposed following the receding of open water.
Major channels: Runs and riffles of major channels, which carry a high proportion of the river flow. Generally >160 mm deep, and may be slow or swift, with broken or unbroken water.	**Wetland turf or vegetated saltmarsh:** Saturated wetland flats covered in a prostrate vegetation. Sometimes flats are covered in a shallow surface film.
Shallow channels, backwaters and seeps: Runs and riffles of minor channels, which carry a small proportion of the river flow (generally <5%). Less than 160 mm deep and often <80 mm. Usually slow or moderate water speeds. These sometimes arise from, or shrink into, seeps where water level becomes shallower until disappearing underground.	**Swamplands:** Emergent wetland vegetation, usually in standing shallow water, dominated by sedges and rushes.

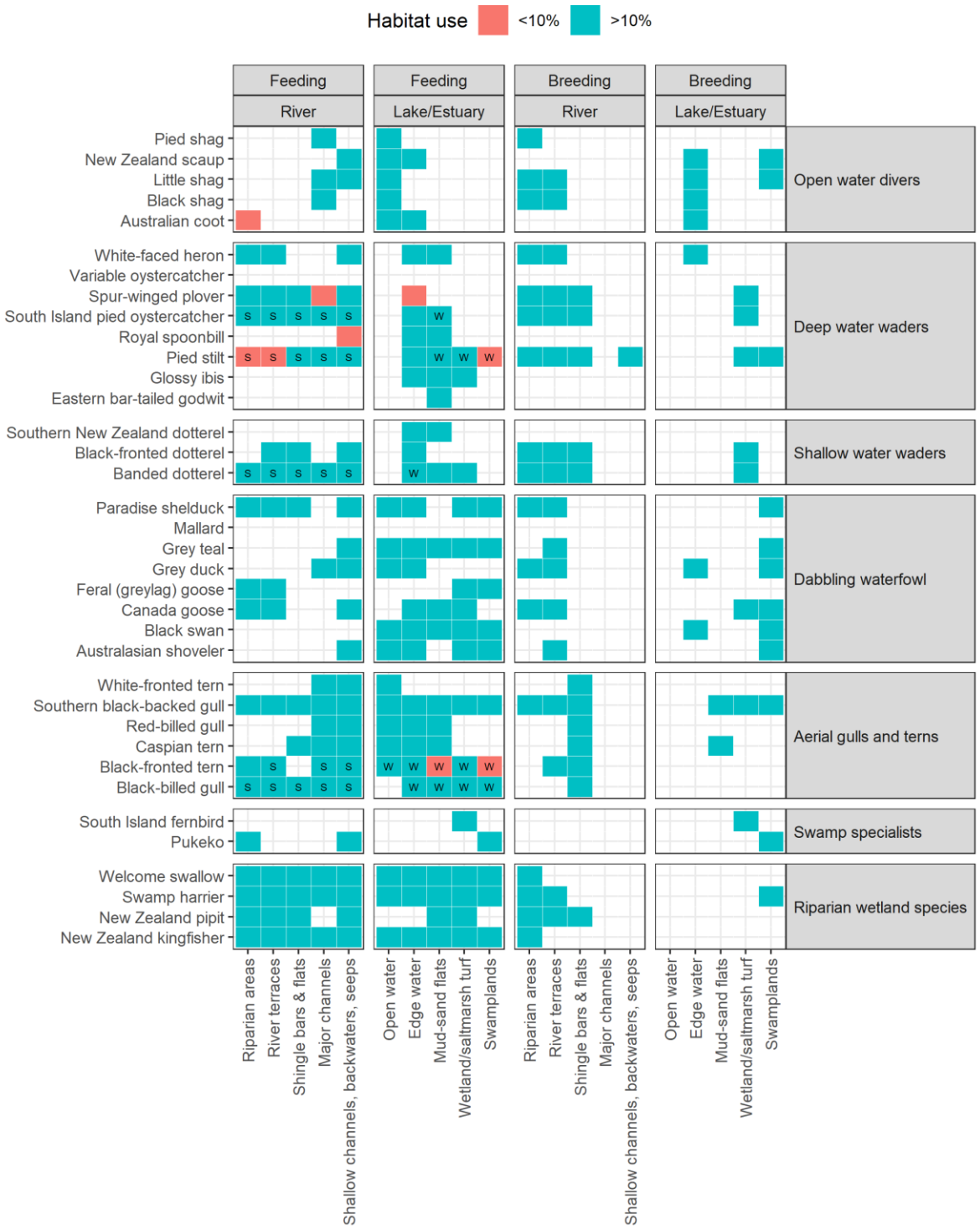


Figure 2: Key feeding and breeding microhabitats for freshwater bird species recorded in formal surveys of the Waiau River catchment. Coloured cells indicate microhabitat use >10% (blue) or <10% (red) of the time, while letters show seasonal habitat use patterns (S = summer breeding season habitat use; W = winter habitat use). Panel rows represent bird species grouped by feeding guild (O'Donnell 2000), while panel columns represent river and lake or estuary microhabitats nested within feeding and breeding. Adapted from O'Donnell (2000) by NIWA.

Birds Effects Assessment - Include effects of birds avoiding the areas during construction. Are there other suitable locations they could go?

Figure 1 tells us that if the Project site establishment does not begin until after the end of January then the species that could be affected are Spur-winged plover (end of primary breeding season), Welcome swallow, Southern black-backed gull, Black shag, Little Shag and New Zealand Scaup (all outside of primary breeding season). There have been few observations of any of these species at the MLC (Table 2) and none of these species are threatened (Robertson et al. 2021). Therefore, as long as the Project construction does not commence until after January, the effect on roosting and breeding of freshwater birds is considered less than minor.

As construction will be timed to avoid the breeding season, the effect of the Project during construction is limited to potential disturbance of bird feeding. The feeding habitat for species associated with the Waiau River catchment is outlined in Figure 2. All of these habitats can be found nearby in the Mararoa River and further downstream in the Lower Waiau River. Therefore, we consider that birds have nearby alternative options if disturbed, leaving the effect on feeding as also less than minor.

Ecological significance – provide clarification on effects framework. How did you get to 'minor'?

NIWA's assessment of level of effect did not use a formal framework but is based on expert opinion combining the ecological value in question (i.e., does the value have special status, are there threatened species) with type and duration of effect. We outline our approach below.

The assessments for each component of the ecosystem (i.e., macrophytes, periphyton, macroinvertebrates, fish and birds) were made relative to the existing ecosystem. This approach generally followed that set out in the EIANZ guidelines on Ecological Impact Assessment (Roper-Lindsay et al. 2018). We relied on measured information from relevant sites in the river.

Each description of existing conditions describes the habitat conditions (in the Waiau Arm and Lower Waiau River), names taxa that are of special ecological value (i.e., Nationally Threatened, At Risk or uncommon species), and, where applicable, specifies gradings of sites against attributes in the National Policy Statement for Freshwater Management (NPS-FM).

We concluded that the current ecological status of macrophytes, periphyton, phytoplankton and macroinvertebrates in the Waiau Arm and Lower Waiau River was relatively low and the communities and habitats had few special ecological values (summarised in Table 7.1 of Appendix D to the AEE).

While the fish and bird communities include several species with conservation status of At Risk – Declining, Threatened – Nationally Vulnerable or Nationally Endangered (also summarised in Table 7.1 of Appendix D to the AEE), any direct effects of the Project on these species are mitigated by their mobility, and/or by their preference for locations (e.g., tributaries) not affected by the Project, or by timing the Project to avoid critical times (e.g., bird breeding season).

The assessments of minor effects or less (as summarised in Table 7-2 Appendix D to the AEE, and updated above) were considered appropriate in view of:

A. the relatively low ecological values of the Lower Waiau River currently (particularly in terms of macrophytes, periphyton, and macroinvertebrates);

B. mitigating factors that will enable avoidance of effects on fish and birds;

C. the relatively small effects expected from the Project (<u>provided that</u> the monitoring and mitigation of fine sediment inputs is carried out as proposed);

D. the temporary nature of the effects (for the duration of the project) with expected rapid recovery afterwards).

In summary, the effects are assessed as minor because they are small effects, for a small amount of time, on an ecosystem that is already relatively low quality. We note that the purpose of the Project is to improve ecological conditions in the Lower Waiau River.

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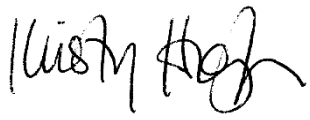
Quality Assurance Statement		
	Reviewed by:	Kristy Hogsden
	Formatting checked by:	Rachel Wright
	Approved for release by:	Phillip Jellyman

Appendix C: Corrected Table 7-2 (Query 6)

Community	Location	Sub-community	Expected magnitude of effects	Details
Water quality	Waiau Arm, Lower Waiau River	n/a	Minor	Potential temporary increase in water temperature and change in DO due to increased turbidity. Possible minor change to pH depending on sediment chemistry. Likely increase in TP and DRP associated with an increase in sediment input. Effects temporary (while sediment levels are elevated) and within natural variability.
Plant communities	Waiau Arm	Macrophytes	Minor	Temporary destruction in a small area; recovery expected after Project ends
		Periphyton	Minor	Temporary destruction in a small area; recovery expected after Project ends
		Phytoplankton	Minor	Potential small increased risk of blooms upstream in the Waiau Arm during the Project, but this will be monitored and mitigated under the existing summer programme. Post-Project effect of slightly increased risk of blooms in area upstream of MLC, but largely mitigated by extra flushing flows facilitated by the Project
	Lower Waiau River	Periphyton	Less than minor	Temporary exacerbation of an existing DFS problem. No discernible effect of additional DFS or SSC if thresholds are adhered to. Recovery from effects expected over time and after high flow events
Macro-invertebrates	Waiau Arm	n/a	Minor	Temporary destruction in a small area, with recovery (recolonisation) expected following the Project
	Lower Waiau River	n/a	Minor	Most effects from DFS expected in reaches closest to MLC. DFS kept within thresholds likely covers natural variability. Recovery expected (recolonisation) following the Project
Freshwater fish	Waiau Arm, Lower Waiau River	Salmonids	Minor	Minimal direct effects of elevated SSC as fish are mobile, especially if thresholds are adhered to. Minimal risk to spawning habitat as little is available in affected area. Timing of Project may partly coincide with migration times (April to September) but negligible effect in context of whole catchment if sediment release is concentrated into 5–7-week period.
		Longfin and shortfin eels	Minor	Potential effects of SSC and DFS, but can be mitigated by adhering to thresholds, modifying migrant trap-and-transfer programme, developing fish salvage programme during breakout channel excavation phase (where practicable and can be accommodated within the excavation methodology), and ensuring breakout channel excavation does not commence until after mid-March.
		Non migratory galaxiids.	Minor	Species considered to be highly sensitive to elevated SSC, but effect likely to be mitigated if SSC thresholds adhered to.
		Lamprey	Less than minor	Juveniles prefer fine sediment habitat
		Other fish species (e.g., perch)	Nil	n/a
Freshwater birds	Waiau Arm	n/a	Less than minor or Minor	Potential effect of elevated SSC on feeding, but birds will move to better feeding areas. Less than minor effect

Community	Location	Sub-community	Expected magnitude of effects	Details
			(timing dependent)	only if breeding season for valued species is avoided (September to January), otherwise minor.
	Lower Waiau River	n/a	Nil	No adverse effects predicted"

Appendix D: Wetland information (Query 11)

Figure D1: 1974 aerial image of the Project site
(sourced from http://retrolens.co.nz and licensed by LINZ CC-BY 3.0)

Table D1: Wetlands within the Project site

Wetland No. / Location	Wetland hydosystem	Wetland class	Hydrological drivers	Original Land Surface?
Wetland 1	Palustrine	Marsh	• Rainfall	No
Wetland 2	Palustrine	Marsh	• Rainfall	No
Wetland 3	Palustrine	Marsh	• Rainfall	No
Wetland 4	Palustrine	Marsh	• Rainfall (primary) • Groundwater, very infrequently during high lake levels and Mararoa River flood flows) • Terrace toe seepage?	Former Mararoa River bed
Wetland 5	Palustrine	Marsh	• Rainfall (primary) • Groundwater (very infrequently during high lake levels and Mararoa River flood flows) • Terrace toe seepage?	Former Mararoa River bed
Wetland 6	Palustrine	Marsh	• Rainfall (primary) • Groundwater (very infrequently during high lake levels and Mararoa River flood flows) • Terrace toe seepage?	Former Mararoa River bed
Wetland 7	Palustrine	Marsh	• Rainfall (primary) • Groundwater (very infrequently during high lake levels and Mararoa River flood flows) • Terrace toe seepage?	Former Mararoa River bed
Wetland 8	Palustrine	Marsh	• Rainfall (primary) • Groundwater (very infrequently during high lake levels and Mararoa River flood flows) • Potential lake inundation when Lake Manapōuri near maximum permitted operating level	No
Wetland 9	Palustrine	Marsh	• Rainfall (primary) • Groundwater (very infrequently during high lake levels and Mararoa River flood flows) • Potential lake inundation when Lake Manapōuri near maximum permitted operating level	No
Wetland 10	Palustrine	Marsh	• Rainfall	No
Wetland 11	Palustrine	Marsh	• Rainfall	No
Wetland 12	Palustrine	Marsh	• Rainfall	No
Eastern Lacustrine Channel	Lacustrine	Marsh	• Lake inundation	No (constructed cut)
Central Lacustrine Channel	Lacustrine	Marsh	• Lake inundation	Former Mararoa River delta
Western Lacustrine Channel	Lacustrine	Marsh, swamp	• Lake inundation (primary) • Terrace toe seepage	Former Mararoa River delta

Table D2: Downstream Riparian Wetlands

Wetland No. / Name	Wetland hydrosystem	Wetland class	Hydrological drivers
Mararoa Weir Wetland (13)	Riverine	Marsh, shallow water	• Groundwater (likely primary) • River inundation important during high flood flows due to overtopping of the weir and / or elevated water levels. • Terrace seepage (minor)
Tower Peak Terrace Toe Wetland	Riverine and palustrine	Swamp, marsh	• Terrace seepage (likely primary). • Not strongly connected with the LWR. • Lower wetland possibly influenced by flood inflows
North of Redcliff Wetland	Riverine	Shallow water	• River groundwater • Occasional river inundation • Terrace seepage (minor)
Rakatu Riparian Wetland	Riverine	Marsh / shallow water	• River groundwater • Flood inflows • Southern extent influenced by surface and groundwater outflow from the Rakatu wetland
Opposite Redcliff Creek Wetland	Riverine and palustrine	Shallow water, swamp	• River groundwater • Flood inflows • Surface water outflows
Redcliff Side Braid Wetland	Riverine	Marsh, shallow water	• River groundwater • Flood inflows • Surface water outflows
Jericho Road Island Wetland	Riverine	Marsh	• River groundwater • Flood inflows

Further information provided by Meridian dated 4 June 2024

4 June 2024

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Kia ora Bianca

Your reference APP-20233670: Meridian Energy Limited (Meridian) – Manapouri Lake Control Structure Improvement Project (MLC:IP) - s 92 Response

This letter provides a response to the matters raised in your further information request dated 13 May 2024.

Effects on Bluecliffs

1. You have asked whether Meridian considers the effects of 'the altered flow' in the Lower Waiau River on coastal geomorphology at the Waiau River mouth, including effects of coastal erosion on the Bluecliffs community, are within the scope of the applications for consent to authorise the MLC:IP.

2. Meridian does not consider that the matters raised within the Bluecliffs submissions on coastal processes are relevant to the effects of the MLC:IP application. The MLC:IP will not alter the consented environment, under which Meridian is authorised to discharge various flows through the MLC structure. Although the MLC:IP works are expected to improve the reliability and conveyance of flows across the MLC, Meridian will be managing lake levels and releasing these flows under its existing consents, and under the existing voluntary flushing flow protocol. Any effects from already consented discharges into the Lower Waiau River are not effects arising from this Project, and in our view are not relevant to the assessment of the effects of the MLC:IP under s 104 of the RMA.

3. Although these effects are not relevant to the assessment of the effects of the MLCIP, Meridian nonetheless provides a memorandum prepared by Dr Martin Single as **Appendix A** to this letter**.** Dr Single concludes that:

> *I do not consider that flows in the Lower Waiau River within the existing consented flow regime can cause any measurable effects on the river mouth behaviour or coastal erosion on the Bluecliffs community which are distinguishable from natural processes. It is my understanding that the MLCIP project purpose amongst other things is to provide a more reliable flushing flow regime to the Lower Waiau River to manage nuisance periphyton, and that the size and timing of such flows are well attenuated by the time they reach the coast. In my opinion this will not contribute to erosion at the coast.*

4. Subject to his availability, Dr Single has indicated that he would be happy to attend the pre-hearing meeting which is being arranged for this matter, so that he can discuss the above with the submitters from Bluecliffs.

Effects on native fish

5. You have asked for further information to support our assessment of effects on At Risk and Threatened native fish. We attach a memorandum prepared by Dr Mike Hickford (NIWA) in response to this question as **Appendix B** and note that he has recommended two further measures which will both confirm whether any smaller fish species might be present around the breakout area in the Waiau Arm, and will require fish relocation through specific integration into the Freshwater Fauna Management Plan if there are. With these measures in place, Dr Hickford concludes that the risk to Threatened native fish species around the MLCIP area is **low**, and the direct effects on these species will be **minor**. Meridian is comfortable with these recommended measures being brought through into conditions of consent.

6. Dr Hickford also concludes that there are sufficient data in relation to fish communities in the Lower Waiau River to assess the effects of the MLCIP. Subject to adherence to suspended sediment and DFS thresholds that are designed to limit indirect effects to within the natural range fish communities in the LWR are already adapted to, and instream excavation occurring outside of key spawning and migration periods, he considers the risk to Threatened native fish species in the LWR is **low**, and the indirect effects on these species will be **minor**.

Effects on native birds

7. We attach a memorandum from Dr Leigh Bull (BlueGreen Ecology Limited) in response to the further information requests relating to effects on native birds as **Appendix C**.

8. The first three parts of this request are set out in the table below, along with the key conclusions from Dr Bull's memorandum. The source documents requested in part four of this request will follow shortly by separate email.

Question	**Summary of conclusion by Dr Bull**	**Additional comment from Meridian**
Please provide an evaluation of the indigenous avifauna occupying the sediment deposition sites for nesting, feeding or roosting and the effects of the project on these species.	*Terrestrial bird species* Given the abundant availability of habitat for these [terrestrial bird] species in the wider area, the magnitude of the effect of the project on these species will be Negligible, resulting in a **Very Low** effect overall. *Freshwater bird species* When combining this [negligible] magnitude of effect with High (banded dotterel and SIPO) or Low (pied stilt, southern black-backed gull, spur-winged plover) ecological value, the overall level of effect of the project on species potentially utilising spoil disposal site will be **Low** to **Very Low**.	We note for completeness that the deposition of fill on the proposed spoil site is an activity which is authorised under the Manapouri - Te Anau Development Act 1963 (MTADA), and is not subject to this resource consent process except to the extent that effects are described by the applicant.
Please provide an evaluation of the use of the wider area affected by the project by bird species for roosting and the effects of the project on this activity.	Overall, the magnitude of effect of the project on roosting birds will likely be Negligible given the location of such areas in relation to the project footprint. When combining this magnitude of effect with High (banded dotterel, SIPO) to Low ecological value, the level of effect of the project on roosting species will be **Low** to **Very Low**.	
Can you provide further explanation for why the effects on bird species of conservation concern (Data Deficient, At Risk or Threatened species) is considered minor and a description of what "minor" means in the context of the evaluation.	Dr Bull has considered the potential effects identified both within the ecological assessment (Hoyle et al., 2023), and in the above s92 questions, using the EIANZ method and considers the magnitude of these to be Negligible in the context of the species at the scale of the Ecological District. When combined with Very High (e.g. black-fronted tern) to Low (e.g. pied stilt) ecological values, the overall level of effect will be **Low** to **Very Low**.	

Please confirm receipt of this letter, and the information provided.

Ngā Mihi |Kind regards,

Ellie Taffs
Senior Legal Counsel - RMA
Meridian Energy Limited

Enclosed:

- Appendix A: Memorandum by Dr Martin Single, Shore Processes and Management Ltd dated May 2024
- Appendix B: Memorandum by Dr Mike Hickford, NIWA, dated 4 June 2024
- Appendix C: Memorandum by Dr Leigh Bull, BlueGreen Ecology Limited, dated 31 May 2024

Appendix A: Memorandum by Dr Martin Single, Shore Processes and Management Ltd dated May 2024

Appendix B: Memorandum by Dr Mike Hickford, NIWA, dated 4 June 2024

Appendix C: Memorandum by Dr Leigh Bull, BlueGreen Ecology Limited, dated 31 May 2024

Shore Processes and Management Ltd
Address: 1/15a Lothian St Christchurch, New Zealand
Phone: (021) 790797 or (03) 351 4041
E-mail: beachdr@slingshot.co.nz

Memorandum

To Meridian Energy Limited

Subject **Manapōuri Lake Control Flow Improvement Project (MLCIP)-** c s92 information

From Dr Martin Single - Coastal Geomorphologist

Date May 2024

MLCIP project effects on Bluecliffs

This memorandum provides context and comment on coastal erosion at Bluecliffs, Southland and addresses the request for further information by Environment Southland with regard to the Meridian Energy Limited (MEL) application for resource consents to construct a new channel to enable a permanent diversion of part of the flow of the Waiau Arm above the Manapouri Lake Control structure (the MLC Flow Improvement Project, or the MLCIP).

The section 92 request from Environment Southland, dated 13 May 2024, asked whether MEL considers that the effects of the altered flow in the Lower Waiau River from the operation of the MPS on coastal geomorphology at the Waiau River mouth, including effects of coastal erosion on the Bluecliffs community, are within the scope of the MLCIP applications.

I understand that these effects are not legally within scope of the application given that the consented flow regime is not being changed as a result of the MLCIP (see letter from Meridian dated 4 June 2024). However, for clarity I have been asked to consider what, if any, effect the consented flow regime is having on coastal geomorphology and coastal erosion at the Waiau river mouth.

Conclusion

I do not consider that flows in the Lower Waiau River, within the existing consented flow regime can cause any measurable effects on the river mouth behaviour or coastal erosion on the Bluecliffs community which are distinguishable from natural processes. It is my understanding that the MLCIP project purpose amongst other things is to provide a more reliable flushing flow regime to the Lower Waiau River to manage nuisance periphyton, and that the size and timing of such flows are well attenuated by the time they reach the coast. In my opinion this will not contribute to erosion at the coast.

Background & Analysis

92 request for information

The consent application for channel construction above the MLC does not contain an assessment of the effects of the proposal on the Bluecliffs community and surrounding coastal environment. From my reading of the application documents and AEE, the effects on flows in the Waiau River are within the

existing consented flow regime and are consistent with the flows considered and assessed in detail for the Manapouri Tailrace Amended Discharge (MTAD) project and presented at a hearing in August 2009. Based on Dr Mabin's evidence, the Decision of Consents Committee decision (July 2010) stated:

> Sediment transport and the impact on the Te Waewae Lagoon and the coast were of concern to a number of parties, including the Beach Road Land Owners & Occupiers Association that believed their properties were under threat due to the existence of the MPS, and any additional changes that MTAD would bring. The Panel accepts that there have been changes to the shoreline and the lagoon in the vicinity of their properties but has preferred the evidence of Dr Mabin and Dr Hicks in regard to the reasons for the changes.
> The historical aerial photos of the area pre-MLC clearly show a dynamic environment that went through a number of physical changes, mostly due to natural causes. While the construction of the MLC will have had some influence, the Panel accepts that natural events are likely to have been more significant. Geomorphological changes to the river will occur over a long timeframe and the Panel is satisfied that the impact of MTAD on this aspect will be minor. (p48 M289-0440)

I do not consider that the project will cause any measurable effects distinguishable from natural processes on the river mouth behaviour or coastal erosion on the Bluecliffs community.

My reasoning is based on the results of studies on comparable hāpua systems including and post-dating the 1994 work by Kirk and Shulmeister that investigated and described the lagoon system and coastal processes at the Waiau River mouth (see the reference list attached). These studies note the retreat of coastal cliffs backing hāpua, the erosional effects of the river currents, oceanic waves and waves propagated across the hāpua due to overtopping of the barrier beach or penetration through the river/hāpua outlet as part of the coastal geomorphological environment.

The changes recently observed at Bluecliffs, as described in the Tonkin and Taylor and PDP reports, fit the pattern of hāpua process dynamics and are also consistent with historical observations of "snapshots" of the river mouth condition described by observers from the 1850s through to the 1940s as presented by Day (1993) and in Mabin's 2009 MTAD evidence and technical report. There have been periods when the outlet of the river through the barrier beach has been opposite and to the west of Bluecliffs Beach Road, for example in 1851-2, 1900 , 1912, 1934 and 1935, all prior to the MLC construction. The recent changes are not out of character with the long-term observations of coastal change, before and after the MPS and MLC.

Existing environment

The Waiau River historically and prior to the establishment of the Manapouri Power Scheme can be considered a "small" river geomorphologically as the flows and sediment supply to the coast are not enough to maintain a stable river mouth and to totally offset coastal erosion from wave processes. As a result of the lake fed catchment, and the hinterland that the Waiau River and catchment tributaries flow through, the river also has a greater sediment carrying capacity than the amount of sediment in the river.

The river mouth system is a result of the relative energies of the river and the high-energy coastal system of Te Waewae Bay. The river mouth comprises a lagoon system fronting an eroding cliffed shore and enclosed by a long, narrow barrier beach.

The waterbody to the true left of the river channel is relatively stable in form but fluctuates in size and volume depending on terrestrial fluvial inputs and episodic wave overtopping barrier beach. To the true

right of the river channel, the water body changes in form and volume in response to variations in the river flow volume and the oceanic wave environment and sediment transport along the barrier beach.

These changes are typical of a hāpua process environment resulting from a complex balance of marine, fluvial and lagoonal process factors. The shore of Te Waewae Bay is also subject to measured downward vertical land movement and sea level rise[1] and is projected to be exposed to increased wave storminess and flood events due to climate change.[2] There has been observed long-term variability in the position of the Waiau River outlet channel through the barrier beach as recorded by Day (1993) and shown in the PDP review of the Tonkin and Taylor report (March 2024). The observed locations of the outlet of the river through the barrier beach include being directly seaward of the river channel and varying positions to the west, seaward of Bluecliffs Beach Road and less often, to the east of the river channel. These types of changes to the hāpua and outlet channel position pre-date the MPS and other catchment changes and are consistent with observations of long-term variability for hāpua systems on the Canterbury coast.

Models derived from Canterbury rivers show that the interaction and significance of river floods, periods of low flows, oceanic storms and combinations of fluvial and oceanic events result in variations to the hāpua process environment, the outlet position, the barrier beach geomorphology and erosion of the land backing the hāpua waterbody over time.

Geomorphic monitoring of the channel of the lower Waiau River and the lagoon and beach at the Waiau River mouth carried out by URS and AECOM in 2009 and 2017 as part of conditions in *Appendix 1* to the 1996 Manapouri Power Scheme (MPS) operational resource consents and in *Appendix A* to the 2010 Manapouri Amended Tailrace Discharge (MTAD) resource consents confirms the dynamic nature of the Te Waewae Bay shoreline resulting from the range of high-energy coastal processes, including sediment transport along the barrier and over the barrier into the lagoon and hāpua waterbody, and occasional floods down the Waiau River delivering “pulses” of sediment to the coast (URS 2011; AECOM 2018). The 2018 AECOM report concludes that changes measured between 2009 and 2017 showed no evidence of the flow regulation through MLC having a detectable effect on shoreline behaviour at the coast.

Recent erosion of the shore along Bluecliffs Beach Road (in 2023 and early 2024) fits into long-term snapshots of outlet position, hāpua behaviour and coastal change, and is consistent with historical behaviour and erosion of the landward shore of the hāpua of the Ashburton, Hurunui and Waitaki Rivers.

MLC project effects

The hāpua dynamics are not well related to the mean flow in the river, but are driven by extremes of river flow and in wave action at the coast. The projected changes to the reliability of passing flushing flows from the MLCIP are unlikely to result in significant effects on the river mouth and hāpua dynamics. In my opinion, the Lower Waiau River consented flow regime does not have an effect on the coastal and hāpua processes at the Waiau River mouth and Te Waewae Bay shoreline that is distinguishable from the natural changes and processes of this system.

[1] NZ SeaRise Project https://www.searise.nz/maps-2

[2] (Ministry for the Environment 2018, *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*; Albuquerque, J.; Antolínez, J.A.A.; Méndez, F.J.; Coco, G. 2022, On the projected changes in New Zealand’s wave climate and its main drivers *New Zealand Journal of Marine and Freshwater Research*).

From my understanding of the MLCIP, the project purpose amongst other things is to provide a more reliable flushing flow regime to the Lower Waiau River to assist in the management of nuisance periphyton. The size (< 160 cumec peak) and timing (during summer months) of such flows are well attenuated into the base flow by the time they reach the coast and in their own right could not in my opinion contribute to erosion at the coast.

My Background to the MPS and the Waiau River

I am familiar with the Manapōuri Power Scheme (MPS) and previous consent applications relevant to Waiau River flows and potential effects, having provided technical information for MEL for the MTAD consent process (2006 to 2009) and for lakeshore management of Lakes Manapōuri and Te Anau (from 1987 to present day). My coastal geomorphology and process background includes extensive study on the shore type and hāpua river mouth forms as found at Bluecliffs. I have supervised studies on these river mouth types in the Canterbury and West Coast regions. I am familiar with research carried out at Bluecliffs (Kirk and Schulmeister 1994 Geomorphic processes and coastal change in the lagoon system, Lower Waiau River, Southland) and at the Hurunui, Rakaia, Ashburton, Opihi and Waitaki River mouths and smaller hāpua such as the Waikoriri Lagoon, Westland.

In providing comment on the hāpua and river mouth processes at Bluecliffs, I have read the submissions relating to the MEL MLCIP project. I have also read the recent reports prepared for the Southland District Council by Tonkin and Taylor (Bluecliffs Beach Road Papatotara, Preliminary hazard and geotechnical assessment - October 2023, letter dated 8 February 2024) and Pattle Delamore Partners (Waiau River mouth opening, memorandum dated 25 March 2024). I have also refamiliarised myself with the report to the Waiau River Working Party by Delwyn Day (1993 Historical review of the Waiau River and coastal area), and the statements of evidence of Dr Mark Mabin and Dr Murray Hicks with regard to the geomorphology and river sediment transport (respectively) of the Waiau River and Te Waewae Bay shore presented at the hearing for resource consents for the MTAD in August 2009. I have also re-read the comments relating to submissions by the Bluecliffs Beach Landowners Group in the MTAD consent decision. I have also read the AECOM report on changes in the Lower Waiau River between 2009 and 2017 (Lower Waiau River geomorphic monitoring 2009/ 2016/2017, May 2018) to provide insight as to sediment supply changes in the Waiau River.

Although I have looked at air photographs of the Waiau River mouth area from the 1940s through to 2023, I have not carried out a detailed assessment of "snapshots" of change in the mouth, lagoon and outlet configuration.

Hāpua and river mouth process references:

Hicks, D.M.; Baynes, E.R.C.; Measures, R.; Stecca, G.; Tunnicliffe, J.; Friedrich, H. 2021 Morphodynamic research challenges for braided river environments: Lessons from the iconic case of New Zealand. *Earth Surface Processes and Landforms* 46, 188-204

Measures, R. 2020. *HapuaModel*. GitHub Repository, https://github. com/RegMeasures/HapuaModel

Measures, R.J.; Hart, D.E.; Cochrane, T.A.; Hicks, D.M. 2020 Processes con- trolling river-mouth lagoon dynamics on high-energy mixed sand and gravel coasts. *Marine Geology* 420: 106082

McSweeney, S.L.; Hart, D.E.; Todd, D.J.; Kennedy, D.M. 2016 Changes in the Frequency and Duration of Closures of the Opihi Hapua Following Construction of the Opuha Dam. *Journal of Coastal Research* 75: 88–92.

Hume, T.; Gerbeaux, P.; Hart, D.; Kettles, H.; Neale, D. 2016 *A classification of New Zealand's coastal hydrosystems*. National Institute of Water & Atmospheric Research Ltd, Prepared for Ministry of the Environment.

Hart, D.E. 2009 Morphodynamics of non-estuarine rivermouth lagoons on high-energy coasts. *Journal of Coastal Research* 56: 1355–1359

Paterson, A.; Hume, T.; Healy, T. 2001 River mouth morphodynamics on a mixed sand-gravel coast. *Journal of Coastal Research* (Special Issue 34): 288–294.

Kirk, R.; Lauder, G. 1994 *Guidelines for managing lagoon mouth closure on significant coastal/wetland lagoon systems - coastal processes investigation*. Wellington: Department of Conservation

Kirk, R.; Shulmeister, J. 1994 *Geomorphic processes and coastal change in the lagoon system, Lower Waiau River, Southland*. Coastal Research Group, Department of Geography, University of Canterbury, May 1994: 77p

Other reports referenced:

NIWA 2023 *Manapouri Lake Control Flow Improvement Project - Assessment of environmental effects: Freshwater Ecology* Report prepared for Meridian Energy Limited, December 2023, 92p

URS New Zealand Limited 2011 *Lower Wauiau River cross section surveys 1992 - 2009* Report to Meridian Energy Ltd, 19 August 2011, 95p

AECOM New Zealand Limited 2018 *Lower Waiau River geomorphic monitoring 2016/17* Report to Meridian Energy Ltd, 30-May-2018, 140p

NZ SeaRise Project https://www.searise.nz/maps-2 (accessed 23 May 2024)

Ministry for the Environment 2018, *Climate Change Projections for New Zealand: Atmosphere Projections Based on Simulations from the IPCC Fifth Assessment, 2nd Edition*

Albuquerque, J.; Antolínez, J.A.A.; Méndez, F.J.; Coco, G. 2022, On the projected changes in New Zealand's wave climate and its main drivers *New Zealand Journal of Marine and Freshwater Research* Published online: 03 November 2022: https://doi.org/10.1080/00288330.2022.2135116

Memo

From	**Mike Hickford**
To	Meridian Energy Limited
Date	4 June 2024
Subject	Manapōuri Lake Control Improvement Project – RFI Native fish

Meridian Energy Ltd (Meridian) requested assistance with the Request for Further Information (RFI) from Environment Southland for the Manapōuri Lake Control Improvement Project (**MLCIP**) resource consents application as related to native fish. Specifically, this memo addresses the following RFI: RFI 2 dated 13 May 2024:

Please provide further information to support your assessment of effects on At Risk and Threatened native fish, given the lack of recent fish records in the area, the acknowledged significant values present, and the sensitivity of these species to sediment effects.

To support the following response, I have reviewed the documents listed in footnotes throughout this memo.

1 Summary

The assessment of environmental effects: freshwater ecology made by Hoyle et al. (2023)[1] (attached as Appendix D to the AEE for the MLCIP) concluded that *"if the suspended sediment and DFS [deposited fine sediment] thresholds are adhered to, the effects of the Project will be less than minor for lamprey and minor for other fish species*".

Potential effects of the MLCIP on fish species can be separated into:

- 'direct' effects on species in and immediately around the MLCIP Area (i.e., the lower Waiau Arm and the Mararoa confluence) from excavation works; and
- 'indirect' effects of increased suspended sediment and DFS in the Lower Waiau River (LWR) downstream of the Manapōuri Lake Control structure (MLC).

The species present, and the management response in relation to MLCIP effects, are different depending on whether effects are direct or indirect, as explained below.

There are sufficient data available in relation to larger fish species in the Waiau Arm to assess the effects of the MLCIP. Although there are no records of Threatened smaller fish species in the Waiau Arm, I consider it unlikely that they are present given the available habitat and food sources. If these species are present, an appropriate response would be to undertake a pre-construction fish survey and specify that they are included in the Freshwater Fauna Management Plan (FFMP).

[1] Hoyle, J., Kilroy, C., Haddadchi, A., Hogsden, K., Hickford, M., Egan, E. (2023) Manapōuri Lake Control Flow Improvement Project - Assessment of Environmental Effects: Freshwater Ecology. *NIWA Client Report*, 2023293CH: 92p.

Subject to my recommendations in relation to an additional fish survey and FFMP response that is tailored to smaller fish species (see Section 2.1), I consider that the risk to Threatened native fish species around the MLCIP area is low, and the direct effects on these species will be minor.

There are sufficient data in relation to fish communities in the Lower Waiau River to assess the effects of the MLCIP. Subject to adherence to suspended sediment and DFS thresholds that are designed to limit indirect effects to within the natural range fish communities in the LWR are already adapted to, and instream excavation occurring outside of key spawning and migration periods, I consider the risk to Threatened native fish species in the LWR is low, and the indirect effects on these species will be minor.

2 Direct effects

2.1 Analysis

In considering the direct effects of the MLCIP on fish species in the lower Waiau Arm, Hoyle et al. (2023)[1] relied on existing datasets, and a fish survey carried out in 2021 by Egan et al. (2023)[2]. The detail of this is set out below, and in Hoyle et al. (2023)[1].

Of note, the Egan et al. (2023) methodology was designed to target adult eels, rather than the entire fish community. The larger mesh size of the fyke nets used would not have caught any smaller fish species. If smaller fish are present in this area, species of concern would be Threatened – Nationally Vulnerable non-migratory galaxiids that are known from elsewhere in the catchment (i.e., southern flathead galaxias and Gollum galaxias). However, it is highly unlikely that either of these species is present in the Waiau Arm because of the habitats[2] and food sources[3] that are available.

For fish communities in and around the MLCIP area, it is likely that the greatest risk from increased suspended sediment loads and DFS will be during the final phase of the excavation when the two 'breakout' areas are completed, joining the new parallel channel to the current Waiau Arm. This risk will be minimised if the two breakout areas are completed concurrently, minimising the duration over which suspended sediment is released.

However, the excavation itself may directly impact resident fish near the two breakout areas. If Threatened smaller fish species are present in the Waiau Arm, then this risk could be addressed through:

- an additional fish survey near the MLCIP breakout areas using fine-mesh (4 mm) fyke nets;
- integrating a salvage programme for resident fish in these areas into the FFMP. I recommend that this is implemented immediately prior to the 'breakout' phase.

I recommend that these measures are included in the conditions of consent for the MLCIP, and with these measures in place I consider that direct effects on Threatened native fish species in and around the MLCIP areas will be minor.

2.2 Background information

Hoyle et al. (2023)[1] relied on three data sources to characterise the fish community near the MLCIP Area:

[2] Egan, E., Sinton, A., Crow, S., Jellyman, P., Rose, A., Williams, P., Charsley, A., Hickford, M. (2023) Native freshwater fish distribution and abundance in the Waiau catchment. *NIWA Client Report*, 2021329CH: 140p.

[3] de Winton, M., Hoyle, J., Smith B., Hogsden, K., Lambert, P. (2022) Benthic ecological survey of the lower Waiau Arm. *NIWA Client Report* 2022057CH.

1. 2021 survey data from Egan et al. (2023)[2];
2. Searches of the New Zealand Freshwater Fish Database (NZFFD), which contained data from Egan et al. (2023), but no other records for the Waiau Arm;
3. Searches for publicly available eDNA data on the Wilderlab website, which returned no records from the Waiau Arm.

The 2021 surveys targeted adult eels in Waiau Arm, and mainly used large-mesh (12 mm) fyke nets from the migrant eel trap-and-transfer programme. Any smaller-bodied fish species that might have been present (e.g., bullies) are much less likely to have been captured by these large-mesh nets.

The 2021 surveys only identified three fish species near the proposed MLCIP Area. Large-mesh fyke nets set adjacent to the proposed MLCIP Area captured longfin eels (size range 319–983 mm), shortfin eels (512–940mm) and perch (54–64mm). Closer to Lake Manapōuri in the Waiau Arm, large-mesh fyke nets also captured longfin eels (296–991 mm), shortfin eels (446–864 mm) and perch (60-250 mm), as well as brown trout (364–530 mm), rainbow trout (222 mm) and common bully (56–112 mm). Fine-mesh fyke nets (4 mm mesh size), which were only set in the middle reach of Waiau Arm, caught noticeably more common bully (33–83 mm), as well as longfin eels (371–647 mm), shortfin eels (523–792 mm), perch (29–57 mm) and brown trout (59–109 mm).

Of the species captured in large-mesh fyke nets adjacent to the MLCIP Area, only longfin eels have a 'Threatened' conservation status[4] (At Risk -Declining). Other species found at this site, or elsewhere in Waiau Arm, are either 'Not Threatened' (i.e., shortfin eels and common bully) or 'Introduced and naturalised' (i.e., perch, brown trout, and rainbow trout).

Longfin eels are thought to have low sensitivity to increases in suspended sediment loading in rivers because:

- Survey data showed there was no relationship between the duration of turbid conditions in rivers and their occurrence[5]
- their feeding is not greatly dependent on sight, and they can feed actively in turbid flood conditions[6]
- the survival of juveniles is not affected by long-term (21 days) exposure to very high turbidity[7].

Longfin eels are thought to be more sensitive to increases in DFS than suspended sediments because:

- longfin eels are more common in areas with stony substrates[8]

[4] Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M., Rolfe, J.R. (2018) Conservation status of New Zealand freshwater fishes, 2017. *New Zealand Threat Classification Series*, 24: 1-15.

[5] Rowe, D.K., D.M. Hicks, and J. Richardson (2000). Reduced abundance of banded kokopu (*Galaxias fasciatus*) and other native fish in turbid rivers of the North Island of New Zealand. *New Zealand Journal of Marine and Freshwater Research* 34(3): 547-558.

[6] Jellyman, D.J. (1989). Diet of two species of freshwater eel (*Anguilla* spp.) in Lake Pounui, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 23(1): 1-10.

[7] Cavanagh, J.E., K.L. Hogsden, and J.S. Harding (2014). Effects of suspended sediment on freshwater fish, in *Landcare Research Contract Report* No. LC1986, 2p.

[8] Glova, G.J., D.J. Jellyman, and M.L. Bonnett (1998). Factors associated with the distribution and habitat of eels (*Anguilla* spp.) in three New Zealand lowland streams. *New Zealand Journal of Marine and Freshwater Research* 32(2): 255-269.

- significant reductions in biomass of resident eels were found because of increased DFS in a New Zealand stream[9]
- when deposited sediments are decreased, longfin eel densities increase substantially[10].

However, although longfin eels have relatively small home ranges, they are capable of more extensive movements to occupy more beneficial habitat[11].

3 Indirect effects

3.1 Analysis

In considering the indirect effects of the MLCIP on fish species in the LWR, Hoyle et al. (2023)[1] relied on existing datasets, and a fish survey carried out in 2021. The detail of this is set out below, and in Hoyle et al. (2023)[1].

For fish communities in the LWR, it is likely that the greatest risk from increased suspended sediment loads and DFS will be during the final phase of the excavation when the two 'breakout' areas are completed. This risk will be minimised if the two breakout areas are completed concurrently minimising the duration over which suspended sediment is released.

Indirect risks to fish species in the LWR from the MLCIP are minimised through:

- Adherence to specified suspended sediment and DFS thresholds that are designed to limit the effects to be like those already experienced naturally by fish communities in the LWR, and
- Instream excavation, particularly the breakout phase, occurring outside of key spawning and migration periods for sensitive species.

With these measures in place I consider that the indirect effects of the MLCIP on Threatened native fish species in the LWR will be minor.

3.2 Background information

Hoyle et al. (2023)[1] relied on three data sources characterise the fish community in the LWR:

4. 2021 survey data from Egan et al. (2023)[2];
5. Searches of the NZFFD;
6. Searches of publicly available eDNA data on the Wilderlab website.

These data sources identified 13 native fish species (beyond those found in the Waiau Arm) in the LWR. Of these species, several have a 'Threatened' conservation status[3], but some (īnanga and giant kōkopu) are only known from the lower reaches of the LWR. Of the 'Threatened' species known, or expected, to occur

[9] Holmes, R.J.P., Hayes, J.W., Closs, G.P., Beech, M., Jary, M., Matthaei, C.D. (2019) Mechanically reshaping stream banks alters fish community composition. *River Research and Applications*, 35(3): 247-258.

[10] Ramezani, J., L. Rennebeck, G.P. Closs, and C.D. Matthaei (2014). Effects of fine sediment addition and removal on stream invertebrates and fish: a reach-scale experiment. *Freshwater Biology* 59(12): 2584-2604.

[11] Jellyman, D.J. and J.R.E. Sykes (2003). Diel and seasonal movements of radio-tagged freshwater eels, *Anguilla* spp., in two New Zealand streams. *Environmental Biology of Fishes* 66: 143-154.

within the upper reaches of the LWR (where elevated suspended sediment and DFS from the MLCIP are likely to be greatest - downstream of MLC to Excelsior Creek), only torrentfish and non-migratory galaxiids are considered to have high sensitivity to elevated DFS[12]; longfin eels are thought to have low sensitivity to elevated suspended sediments but are more sensitive to DFS (see above).

Torrentfish (At Risk – Declining) are widely distributed in the Lower Waiau catchment (below the MLC) including in the LWR mainstem. Torrentfish shelter between and beneath loose gravels and cobbles during the day in shallow, fast-flowing riffles, and rapids[13]. At night they move to slower-flowing areas to feed on aquatic insects[14]. Elevated levels of DFS will reduce their habitat quality and quantity (although least likely impacts in fast-flowing riffles and rapids) and impact their food supply by infilling the interstitial spaces (gaps) between rocks in the river bed[12]. However, the turbidity and DFS thresholds proposed by Hoyle et al. (2023)[1] are based on naturally occurring levels and durations in the Mararoa River. Adherence to the thresholds is designed to limit the effects to be like those already experienced naturally by fish communities in the LWR during large flood events. As such, in my opinion, the effects of the MLCIP on torrentfish in the LWR should be minor.

Two species of non-migratory galaxiids may be present within the upper reaches of the LWR: Southern flathead galaxias (Threatened – Nationally Vulnerable) and Gollum galaxias (Threatened – Nationally Vulnerable). Southern flathead galaxias occur in stony streams and rivers and show some preference for cobble and boulder habitats[15]. They are most abundant in smaller tributaries in the Lower Waiau catchment[2]. However, they have been found in the upper reaches of the LWR mainstem (near Whare Creek), but in low numbers because they struggle to co-exist with predatory trout. Southern flathead galaxias are generally site-attached with little movement[16]. They spawn in spring (October to November) laying their eggs in saucer-shaped depressions beneath large cobbles or boulders in fast-flowing riffles. Deposited fine sediment may clog that microhabitat or smother the eggs themselves (although DFS is least likely in fast-flowing riffles). Again, adherence to turbidity and DFS thresholds will limit DFS to naturally occurring levels that fish in the LWR could be exposed to. Furthermore, it is expected that instream excavation associated with the MLCIP will have been completed before the spring spawning period of southern flathead galaxias. As such, in my opinion, the effects of the MLCIP on southern flathead galaxias in the LWR should be minor.

Gollum galaxias (Threatened – Nationally Vulnerable) are not known from the mainstem of the LWR but have a disjointed distribution in low gradient tributaries and wetland habitats associated with the LWR. They are found in a wide range of habitats but are usually found in the slower margins of waterways. They are generally site-attached with little movement[16]. Spawning takes place in late winter and early spring (late August to October) with eggs being deposited under boulders in streams and on plants in wetlands[17].

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[12] Franklin, P.A., Stoffels, R.J., Clapcott, J.E., Booker, D.J., Wagenhoff, A., Hickey, C.W. (2019) Deriving potential fine sediment attribute thresholds for the National Objectives Framework. *NIWA Client Report* 2019039HN: 290p.

[13] Glova, G.J., Bonnett, M.L., Docherty, C.R. (1985) Comparison of fish populations in riffles of three braided rivers of Canterbury, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 19(2): 157-165.

[14] Glova, G.J., Sagar, P.M., Docherty, C.R. (1987) Diel feeding periodicity of torrentfish (*Cheimarrichthys fosteri*) in two braided rivers of Canterbury, New Zealand. *New Zealand Journal of Marine and Freshwater Research* 21(4): 555-561.

[15] Sinton, A.M.R., Crow, S.K, Dunn, N.R. (2016) Habitat preference of southern flathead galaxias (Galaxias "southern"). *NIWA Client Report* CHC2016-063 17p.

[16] Crow, S.K., Waters, J.M., Closs, G.P., Wallis, G.P. (2009) Morphological and genetic analysis of *Galaxias* 'southern' and *G. gollumoides*: interspecific differentiation and intraspecific structuring, *Journal of the Royal Society of New Zealand* 39:2-3, 43-62.

[17] Gollum galaxias: Non-migratory galaxiids (doc.govt.nz)

The location and extent of their spawning habitats in the Waiau catchment are unknown. Deposited fine sediments may clog spawning habitats under boulders or smother eggs. However, adherence to the turbidity and DFS thresholds, particularly during their spawning season, will likely limit the MLCIP effects on Gollum galaxias to minor.

Longfin eels (At Risk – Declining) are present in the LWR. Elvers (longfin and shortfin eel) are collected immediately downstream of the MLC structure between December and March (as part of the trap-and-transfer programme) and are transferred to the Mararoa River, Lakes Manapōuri and Te Anau and selected tributaries of Lake Te Anau. No elvers are transferred into the Waiau Arm.

Longfin elvers are thought to have low sensitivity to increases in suspended sediment loading in rivers because:

- Elvers do not avoid even extremely high turbidities in experiments[18]
- In some situations, migrating elvers appear to be attracted towards turbid tributaries[19].

Adult eels migrate via the MLC and down the LWR and out to sea for reproduction. The Waiau eel trap-and-transfer programme also transfers adult migrant eels from Lake Manapōuri to immediately below the MLC at Duncraigen Road. This programme will not be impacted by the works given the proposed management controls that are promoted to manage turbidity and DFS below the MLC if thresholds are exceeded.

[18] Boubée, J.A.T., T.L. Dean, D.W. West, and R.F.G. Barrier (1997). Avoidance of suspended sediment by the juvenile migratory stage of six New Zealand native fish species. *New Zealand Journal of Marine and Freshwater Research* 31(1): 61-69.

[19] Schicker, K.P., J.A. Boubée, A.G. Stancliff, and C.P. Mitchell (1990). Distribution of small migratory fish and shrimps in the Waikato River at Ngāruawāhia, *New Zealand Freshwater Fisheries Miscellaneous Report* No. 63: Hamilton 21p.

Client Report No: 2024136CH
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Revision	Description	Date
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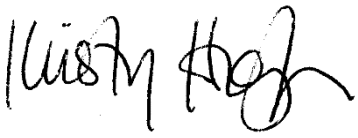
Quality Assurance Statement		
	Reviewed by:	Kristy Hogsden
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Memo.

Manapōuri Lake Control Improvement Project – Response to avifauna S92 requests	**To:** Meridian Energy Ltd
	From: Dr Leigh Bull
Date: 31 May 2024	**Project No.:** BG2407

Introduction

Hoye et al. (2023) authored the "*Assessment of Environmental Effects: Freshwater*" that accompanied Meridian Energy Limited (MEL) resource consent application for the Manapōuri Lake Control Flow Improvement Project (MLCIP). That report included an assessment of effects on freshwater avifauna. The avifauna specialist from NIWA who informed this assessment has since changed employers, and I understand is no longer available to assist with the MLCIP application.

MEL has therefore engaged BlueGreen Ecology to respond to Environment Southland's s92 request (dated 13 May 2024), in relation to question 3 of the request. This relates to potential effects on native birds, and contains four components, each of which is addressed below.

Effects on native birds:

3. *Please provide an evaluation of the indigenous avifauna occupying the sediment deposition sites for nesting, feeding or roosting and the effects of the project on these species.*

   Please provide an evaluation of the use of the wider area affected by the project by bird species for roosting and the effects of the project on this activity.

   Can you provide further explanation for why the effects on bird species of conservation concern (Data Deficient, At Risk or Threatened species) is considered minor and a description of what "minor" means in the context of the evaluation.

   Please also provide the source documents that support your assessment, in particular McClellan 2001, McClellan 2002 and Whitehead 2021.

Relevant Qualifications

The author of this memo holds the relevant qualifications and experience appropriate to undertake this work:

- Bachelor of Science (Zoology), MSc with Honours (Ecology) and PhD (Ecology).

- 20 years of working as a practicing ecologist / ornithologist, including within the Biodiversity Recovery Unit of the Department of Conservation (DOC).
- Co-authoring the DOC New Zealand threat classification list (Hitchmough et al., 2007) as well as reviewing and production of a number of DOC threatened species recovery plans.
- Preparation of ecological assessments and provision of expert avifauna advice for the consenting for large scale infrastructure projects (e.g. Tekapo Power Scheme reconsenting, Waitaki Power Scheme reconsenting, Lyttelton Port development, Christchurch Airport, Harapaki Wind Farm).

Assessment Method

Given the s92 requests information pertaining to the effects on avifauna, we have used the EIANZ ecological impact assessments guidelines (Roper-Lindsay et al., 2018), whereby a matrix was used to determine the overall level of ecological effect (Table 1) which combines the magnitude of the effect in association with the ecological values.

The EIANZ guidelines (Roper-Lindsay et al., 2018) use the New Zealand threat classification as a criteria for assigning ecological value as outlined in Table 2. Robertson et al. (2021) provides the most recent threat classifications for avifauna and as such has been used to assign values to individual species.

Table 3 lists the criteria and descriptions for determining the magnitude of effect as described in the EIANZ guidelines (Roper-Lindsay et al., 2018). For this assessment, we have taken a species, rather than habitat, focus and applied the criteria or proportion thresholds below, to assist with determining the magnitude of effect (text italicised and bolded in Table 3):

- Very High: >50% of the population[1] affected or habitat lost.
- High: 20-50% of the population affected or habitat lost.
- Moderate: 10-20% of the population affected or habitat lost.
- Low: 1-10% of the population affected or habitat lost.
- Negligible: <1% of the population affected or habitat lost.

For the purposes of this assessment, in determining overall effects of the proposal, the Ecological District (Upukerora) scale is considered most appropriate.

According to Roper-Lindsay et al. (2018), the overall level of effect (Table 1 below) can then be used to guide the extent and nature of the ecological management response required (including the need for biodiversity offsetting):

- Very High adverse effects require a net biodiversity gain.
- High and Moderate adverse effects require no net loss of biodiversity values.
- Low and Very Low effects should not normally be a concern. If effects are assessed taking impact management developed during project shaping into consideration, then it is essential that prescribed impact management is carried out to ensure Low or Very Low effects.

[1] At the scale of the Upukerora Ecological District

Table 1: Criteria for describing the level of effect (Roper-Lindsay et al., 2018)

LEVEL OF EFFECT		ECOLOGICAL AND / OR CONSERVATION VALUE				
		Very High	**High**	**Moderate**	**Low**	**Negligible**
MAGNITUDE	**Very High**	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain

Table 2: Criteria for assigning ecological value to species (Roper-Lindsay et al., 2018).

ECOLOGICAL VALUE	SPECIES CLASSIFICATION
Very High	*Nationally Threatened* (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing[2]) species found in the ZOI[3] either permanently or seasonally
High	Species listed as *At Risk – Declining* found in the ZOI either permanently or seasonally.
Moderate	Regionally Recovering or Naturally Uncommon species found in the ZOI either permanently or seasonally; or Locally (ED) uncommon or distinctive species.
Low	Regionally Not Threatened
Negligible	Exotic species, including pests, species having recreational value.

Table 3: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018)

MAGNITUDE	DESCRIPTION
Very High	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR ***Loss***[4] ***of a very high proportion of the known population*** or range of the element / feature.
High	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR ***Loss***[4] ***of a high proportion of the known population*** or range of the element / feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR ***Loss***[4] ***of a moderate proportion of the known population*** or range of the element / feature.
Low	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR ***Having a minor effect on the known population*** or range of the element / feature.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR ***Having a negligible effect on the known population*** or range of the element / feature.

[2] Nationally Increasing is category that was devised by DOC (Michel, 2021) in 2021 to resolve a problem that would arise if the population of a taxon assessed as At Risk Recovering A should stabilise. Threatened – Nationally Increasing is assigned to "Small population that have experienced a previous decline (or for which it is uncertain whether it has experienced a previous decline) and that is forecast to increase >10% over the next 10 years or 3 generations, whichever is longer" (Rolfe et al., 2021). Thus, while such a threat category is not identified in Roper-Lindsay et al. (2018), we have included it along with all other *Threatened* classifications in to the Very High ecological value category.

[3] Roper-Lindsay et al. (2018) define the Zone of Influence (ZOI) as "the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities."

[4] In the context of mobile fauna, the term "loss" can include displacement from an area.

Further Information Requests

QUESTION: *Please provide an evaluation of the indigenous avifauna occupying the sediment deposition sites for nesting, feeding or roosting and the effects of the project on these species.*

RESPONSE:

We have interpreted the "sediment deposition sites" referred to in this question to be the 14.5 ha spoil disposal site identified in Figure 1.1 and Section 5.6 of the AEE (Tonkin & Taylor Ltd, 2023). Boffa Miskell (2023) describe the spoil disposal site as a relatively flat area of exotic grassland (e.g. Yorkshire fog, sweet vernal, perennial ryegrass, crested dogstail, and cocksfoot) and young planted Eucalyptus sp. trees. A number of wetlands were identified on the site by Boffa Miskell (2023), however the construction footprint now avoids all but one of these, which in and of itself was assessed as having Low ecological value from a terrestrial vegetation perspective (refer to Figure 7 in Boffa Miskell (2023)).

A list of the freshwater and terrestrial avifauna species that have been recorded in the wider area, and associated with the Manapouri Lake Control site (MLC), is provided in Table 4 and Table 5 respectively.

Based on the above description of the terrestrial vegetation at the disposal site, the species most likely to be present will be the introduced terrestrial species listed in Table 5. If left as is, the eucalyptus trees would grow and the native grey warbler and fantail may also utilise the site. All these species are common and widespread, and are assigned Negligible to Low ecological value. Given the abundant availability of habitat for these species in the wider area, the magnitude of the effect of the project on these species will be Negligible, resulting in a **Very Low** effect overall.

With regards to freshwater species, the disposal site may provide limited and marginal habitat opportunities, including:

- Roosting habitat for South Island pied oystercatcher (SIPO), pied stilt, southern black-backed gull.
- Foraging habitat for banded dotterel, most likely in association with the wetlands.
- Breeding habitat for spur-winged plover.

However, it should be noted that over time, such potential habitat use will decrease due to the growth of the planted Eucalyptus trees which will not be conducive to these species' requirements. Nevertheless, even the loss of this area in its current state will result in a Negligible magnitude of effect due to it providing only marginal habitat for the species identified, with higher value habitat available elsewhere, and all but one of the wetlands being avoided. When combining this magnitude of effect with High (banded dotterel and SIPO) or Low (pied stilt, southern black-backed gull, spur-winged plover) ecological value, the overall level of effect of the project on species potentially utilising spoil disposal site will be Low to Very Low.

Table 4: List of freshwater avifauna species recorded in the wider area, and associated with MLC (Source: Whitehead (2021)).

SPECIES	CLASSIFICATION	ECOLOGICAL VALUE[5]	GUILD	MLC
NZ scaup	Not Threatened	Low	Open water diver	
Black shag	At Risk - Relict	Moderate	Open water diver	x
Little shag	At Risk Relict	Moderate	Open water diver	x
Australasian shoveler	Not Threatened	Low	Dabbling waterfowl	
Black swan	Not Threatened	Low	Dabbling waterfowl	x
Grey teal	Not Threatened	Low	Dabbling waterfowl	x
Paradise shelduck	Not Threatened	Low	Dabbling waterfowl	
Canada goose	Introduced & Naturalised	Negligible	Dabbling waterfowl	
Mallard	Introduced & Naturalised	Negligible	Dabbling waterfowl	x
White-faced heron	Not Threatened	Low	Deep water wader	
Spur-winged plover	Not Threatened	Low	Deep water wader	x
SIPO	At Risk – Declining	High	Deep water wader	x
Pied stilt	Not Threatened	Low	Deep water wader	x
Banded dotterel	At Risk - Declining	High	Shallow water wader	x
Swamp harrier	Not Threatened	Low	Riparian wetland	x
Welcome swallow	Not Threatened	Low	Riparian wetland	x
Black-billed gull	At Risk - Declining	High	Aerial gulls & terns	x
Southern black-backed gull	Not Threatened	Low	Aerial gulls & terns	x
Black-fronted tern	Threatened – Nationally Endangered	Very High	Aerial gulls & terns	

Table 5: List of terrestrial avifauna species recorded in the wider area (Source: Whitehead (2021)).

SPECIES	CLASSIFICATION	ECOLOGICAL VALUE[5]
Grey warbler	Not Threatened	Low
Skylark	Introduced & Naturalised	Negligible
Australian magpie	Introduced & Naturalised	Negligible
Yellow hammer	Introduced & Naturalised	Negligible
Chaffinch	Introduced & Naturalised	Negligible
Goldfinch	Introduced & Naturalised	Negligible
Redpoll	Introduced & Naturalised	Negligible
Dunnock	Introduced & Naturalised	Negligible
South Island fantail	Not Threatened	Low
Starling	Introduced & Naturalised	Negligible
Blackbird	Introduced & Naturalised	Negligible
Song thrush	Introduced & Naturalised	Negligible

[5] As per Table 2

QUESTION: *Please provide an evaluation of the use of the wider area affected by the project by bird species for roosting and the effects of the project on this activity.*

RESPONSE:

The freshwater species found in the wider area are listed in Table 4 above, along with their relative guild.

Swamp specialist and riparian wetland species (e.g. swamp harrier and welcome swallow) are associated with wetland vegetation along the lake and margins, while tall trees adjacent to these freshwater habitats provide roosting habitat for some open water divers (e.g. shags). Given that these habitats will not be impacted by the project, there will be no impact on roosting by these species. This matter will be further confirmed after I have undertaken a site visit and before the hearing.

Open water divers, dabbling waterfowl, waders, and aerials gulls and terns utilise shallow edge and shoreline habitats for roosting (and foraging). The channel excavation will result in the loss of several areas of potential roosting habitat for these species (refer to areas circled yellow in Figure 1 below), however similar habitat remains available nearby.

Overall, we consider the magnitude of effect of the project on roosting birds will be Negligible. When combining this magnitude of effect with High (banded dotterel, SIPO) to Low ecological value, the level of effect of the project on roosting species will be **Low** to **Very Low**.

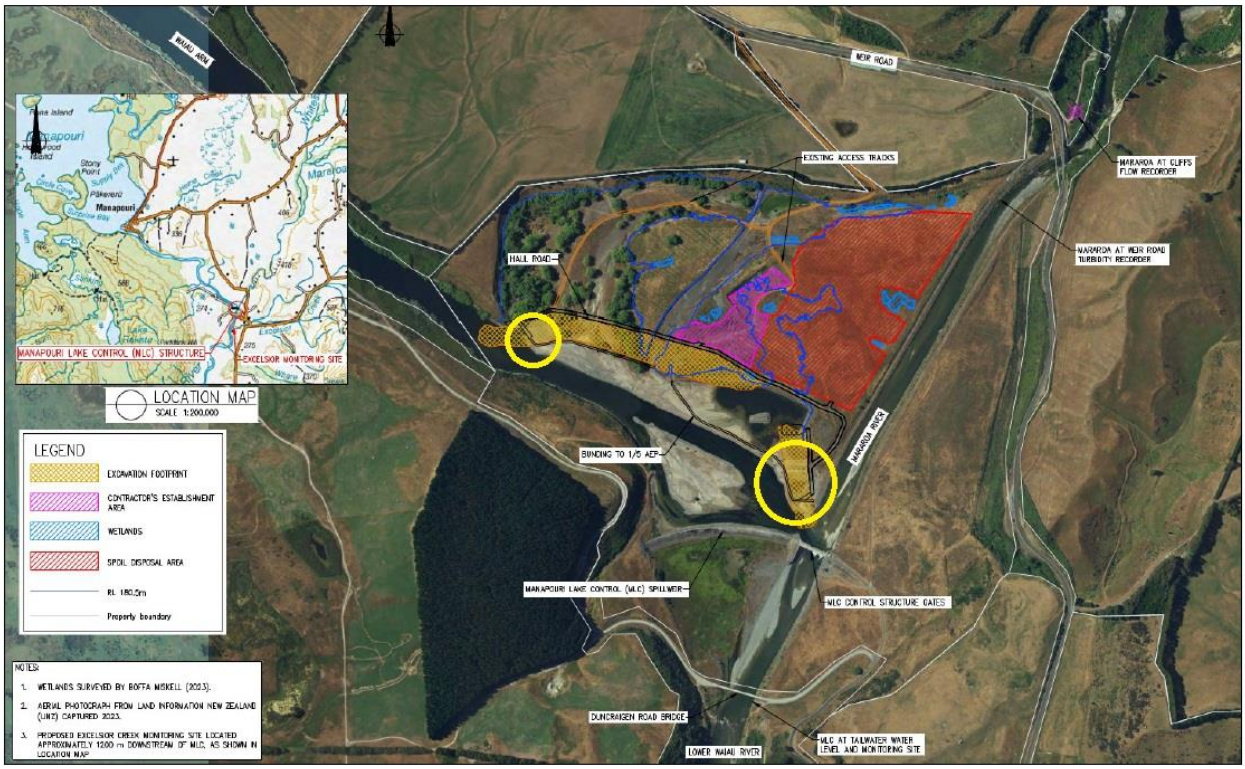

Figure 1: Project overview. Yellow circles denote area of potential roosting habitat that will be lost under the footprint

QUESTION: *Can you provide further explanation for why the effects on bird species of conservation concern (Data Deficient, At Risk or Threatened species) is considered minor and a description of what "minor" means in the context of the evaluation.*

RESPONSE:

As noted by NIWA (2024), their assessment of effects (Hoyle et al., 2023), including for birds, did not use a formal framework but was based on expert opinion combining the ecological value in question (i.e., does the value have special status, are there threatened species) with type and duration of effect. Hoyle et al. (2023) considered the effects of the project on birds would be minor in the view of:

- Mitigating factors that will enable avoidance of effects on birds (e.g. construction outside of the breeding season of Threatened and At Risk species as well as their mobility across the catchment);
- The relatively small effects expected from the Project of fine sediment inputs, and therefore not impacting the foraging ability and food supply of birds, including Threatened and At Risk species;
- The temporary nature of the effects (for the duration of the Project) with expected rapid recovery afterwards.

NIWA (2024) concluded that the effects are assessed as minor because they are small effects, for a small amount of time, on an ecosystem that is already relatively low quality.

We have considered the potential effects identified both within the ecological assessment (Hoyle et al., 2023), and in the above s92 questions, using the EIANZ method and consider the magnitude of these to be Negligible in the context of the species at the scale of the Ecological District. When combined with Very High (e.g. black-fronted tern) to Low (e.g. pied stilt) ecological values, the overall level of effect will be **Low** to **Very Low**.

In the RMA context, minor adverse effects are defined as being "*noticeable but will not cause any significant adverse impacts*"[6]. Therefore, based on our assessment using the EIANZ method, we consider that the minor effect identified by NIWA (Hoyle et al., 2023; NIWA, 2024) is correct and appropriate, even in the context of the RMA definition.

QUESTION: *Please also provide the source documents that support your assessment, in particular McClellan 2001, McClellan 2002 and Whitehead 2021.*

RESPONSE:

A copy of the requested documents will be provided.

[6] Quality Planning website https://www.qualityplanning.org.nz/node/837

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Memo

From	Amy Whitehead, NIWA
To	Dave Herrick, Meridian Energy Ltd
Date	12 May 2021
Subject	Freshwater birds at the Manapōuri Lake Control
Report No:	2021113CH
NIWA Project No:	MEL21506

This memo provides a summary of the freshwater bird community present at the Manapōuri Lake Control (MLC) Structure in the Lower Waiau River, along with the existing bird mitigations and consent conditions linked to structural maintenance, gravel removal and river protection works at the MLC (Consent No: 204160).

1. Approach

Bird observation data were obtained from the Department of Conservation, the eBird website (Sullivan et al. 2009) and the grey literature. We identified three key datasets containing abundance data from formal freshwater bird surveys at the MLC between 2000 and 2020 (Table 1). Geo-located observations were obtained from eBird (GBIF.org 2021; Sullivan et al. 2009) and include records collected by members of Birds New Zealand (Scofield et al. 2012) and the general public. We downloaded all available bird observations for New Zealand and clipped the dataset to within a 1.5 km radius of the MLC. All available bird observation data, including formal surveys and eBird data, were pooled to identify bird species recorded as present at the MLC.

Table 1: Summary of available freshwater bird survey data for the Manapōuri Lake Control. Survey type: site surveys = ground-based surveys at a localised site; walk-through surveys = longitudinal transects along the river corridor (e.g., O'Donnell and Moore 1983).

Location	Period	Survey type	Source
Key sites in Lower Waiau River	2000 – 2001 2020	Site surveys	McClelland (2001, 2002) NIWA (Amy Whitehead, *Pers. comm.)*
Upper and Lower Waiau River	2009	Walk-through surveys	Department of Conservation (Colin O`Donnell, *Pers. comm.*)

2. Freshwater birds associated with the Manapōuri Lake Control

The bird fauna observed at the MLC is characteristic of South Island freshwater habitats, with 20 freshwater bird species identified (Table 2). Three species are listed as threatened (black-billed gull - critically endangered; black-fronted tern - nationally endangered; banded dotterel - nationally vulnerable) on the New Zealand Threat Classification (Robertson et al. 2017). Twelve bird species not dependent on freshwater habitats have also been recorded at the MLC.

Black-billed gulls are the world's most threatened gull and are listed as critically endangered (Robertson et al. 2017). An intensive national survey in 2016-17 found approximately 60,000 nests, with the majority of these in Southland and Canterbury (Mischler 2018). Black-billed gulls utilise braided river habitats for feeding and breeding during the summer, with lake habitats more commonly used in the winter. They typically feed on invertebrates in riverine habitats and adjacent paddocks during the breeding season, migrating to coastal areas in the winter. Black-billed gulls are colonial nesters that primarily breed on sparsely-vegetated gravel bars on inland rivers, and their nests are typically shallow scrapes in coarse gravel (McClellan 2009). However, they will sometimes nest in adjacent farmland after flood events. Colonies often change location and densities from year to year (McClellan and Habraken 2019). Declines of black-billed gulls have been attributed to mammalian predation, habitat loss and human disturbance. Black-billed gulls are the most abundant freshwater birds species observed at the MLC, with large breeding colonies of up to 3250 adult birds present (Table 3).

Black-fronted terns are endemic and listed as nationally endangered (Robertson et al. 2017), with an estimated population of 5,000 to 10,000 individuals (Bell 2013). They feed by taking aquatic and terrestrial invertebrates and fish on the wing over riverine habitats, as well as from terrestrial habitats adjacent to the river. They are colonial breeders that predominantly breed on river terraces and gravel bars of braided riverbeds of the eastern South Island. Colonies typically form on non-vegetated, gravel bars, and nests are scrapes in the sand or between river stones and may be lined with fine twigs. Black-fronted terns migrate to the coast after the breeding season, where they roost in sheltered harbours, estuaries and lagoons (Bell 2013). Black-fronted terns have been recorded in low numbers at the MLC, with typically 20 or fewer individuals observed at a time in the eBird database, but have not been recorded during formal surveys. However, breeding colonies have been recorded at downstream sites in the Lower Waiau River (e.g., McClelland 2001, 2002).

Banded dotterels are listed as nationally vulnerable (Robertson et al. 2017), with a total declining population of approximately 50,000 birds (Pierce 2013). They only breed in New Zealand, with breeding habitat predominantly in riparian areas, river terraces and gravel bars of braided rivers. After breeding, most birds flock together and migrate to coastal New Zealand or Australia for the winter. Banded dotterels preferentially feed in shallow pools and riffles associated with minor channels, typically on sand and fine gravel substrates in water less than 10 mm deep. They also feed in terrestrial habitats. Banded dotterels have been recorded at the MLC in low numbers (six or fewer) in the eBird database but have not been recorded during formal surveys. They are also present elsewhere in the Lower Waiau river in low numbers (e.g., McClelland 1996; Sagar 1994).

Ten freshwater bird species have been recorded at the MLC during formal surveys conducted over the breeding season (October – December). Black-billed gulls were the most abundant species, with large breeding colonies present in most surveyed years (Table 3). The low number of black-billed gulls observed in 2020 is likely the result of high lake levels and river flows in the Waiau catchment which meant that key breeding habitat (e.g., the artificial bird island) at the MLC was submerged at the beginning of the nesting period.

Table 2: Bird species observed at the Manapōuri Lake Control. Species are ordered by family, threat status and common name, with data based on a compilation of observations from eBird and formal surveys undertaken by the Department of Conservation, McClelland (McClelland 2001, 2002) and NIWA (Table 1). Nomenclature and threat status from Robertson et al. (2017). Species typically associated with freshwater habitats (Storey et al. 2018) and those observed at the MLC during formal surveys are indicated in the two right hand columns.

Family	Common Name	Species	Threat Status	Freshwater	Survey
Acanthizidae	Grey warbler	*Gerygone igata*	Not threatened		
Accipitridae	Swamp harrier	*Circus approximans*	Not threatened	X	X
Alaudidae	Skylark	*Alauda arvensis*	Introduced & Naturalised		
Anatidae	Australasian shoveler	*Anas rhynchotis*	Not threatened	X	
	Black swan	*Cygnus atratus*	Not threatened	X	
	Grey teal	*Anas gracilis*	Not threatened	X	X
	New Zealand scaup	*Aythya novaeseelandiae*	Not threatened	X	
	Paradise shelduck	*Tadorna variegata*	Not threatened	X	
	Canada goose	*Branta canadensis*	Introduced & Naturalised	X	
	Mallard	*Anas platyrhynchos*	Introduced & Naturalised	X	X
Ardeidae	White-faced heron	*Egretta novaehollandiae*	Not threatened	X	
Artamidae	Australian magpie	*Gymnorhina tibicen*	Introduced & Naturalised		
Charadriidae	Banded dotterel	*Charadrius bicinctus bicinctus*	Nationally vulnerable	X	X
	Spur-winged plover	*Vanellus miles novaehollandiae*	Not threatened	X	X
Emberizidae	Yellowhammer	*Emberiza citrinella*	Introduced & Naturalised		
Fringillidae	Chaffinch	*Fringilla coelebs*	Introduced & Naturalised		
	Goldfinch	*Carduelis carduelis*	Introduced & Naturalised		
	Redpoll	*Carduelis flammea*	Introduced & Naturalised		
Haematopodidae	South Island pied oystercatcher	*Haematopus finschi*	Declining	X	X
Hirundinidae	Welcome swallow	*Hirundo neoxena neoxena*	Not threatened	X	
Laridae	Black-billed gull	*Larus bulleri*	Critically endangered	X	X
	Southern black-backed gull	*Larus dominicanus dominicanus*	Not threatened	X	X
Phalacrocoracidae	Black shag	*Phalacrocorax carbo novaehollandiae*	Naturally uncommon	X	X
	Little shag	*Phalacrocorax melanoleucos brevirostris*	Not threatened	X	X
Prunellidae	Dunnock	*Prunella modularis*	Introduced & Naturalised		
Recurvirostridae	Pied stilt	*Himantopus himantopus leucocephalus*	Not threatened	X	X
Rhipiduridae	South Island fantail	*Rhipidura fuliginosa fuliginosa*	Not threatened		
Sternidae	Black-fronted tern	*Chlidonias albostriatus*	Nationally endangered	X	
Sturnidae	Starling	*Sturnus vulgaris*	Introduced & Naturalised		
Turdidae	Blackbird	*Turdus merula*	Introduced & Naturalised		
	Song thrush	*Turdus philomelos*	Introduced & Naturalised		

Table 3: Abundance of freshwater bird species observed during formal surveys at the Manapōuri Lake Control. Columns represent data from the individual surveys identified in Table 1. Note that the McClelland surveys (2000, 2001) only recorded black-billed gulls at the MLC and it is unknown whether other species were present.

Species	October 2000	October 2001	December 2009	November 2020	December 2020
Black-billed gull	1435	1255	3250	37	107
Black shag			1	0	0
Grey teal			5	0	0
Little shag			0	0	0
Mallard			0	0	30
Pied stilt			2	0	10
South Island pied oystercatcher			54	0	0
Southern black-backed gull			2	0	0
Spur-winged plover			4	0	0
Swamp harrier			1	0	0

The breeding season for most freshwater birds present at the MLC occurs from September – December (Figure 1, O'Donnell 2000). Freshwater birds are susceptible to disturbance by human activities within the riverbed during the breeding season. Highly camouflaged nests and chicks may be crushed by people walking or driving vehicles on the riverbed and birds may abandon nests or colonies if disturbed. Also, chicks may become separated from adults and breeding success can decline if brooding adults frequently leave the nest for extended periods of time (O'Donnell et al. 2016). Hydrological alterations during the breeding season may also reduce nesting success. For example, floods or high lake levels may drown nests or chicks, while periods of low flow may allow mammalian predators to access nesting sites on islands. The effects of disturbance and hydrological fluctuations outside the breeding season are likely to be minimal, with many of the freshwater species observed at the MLC, including the threatened species, migrating outside the Waiau catchment.

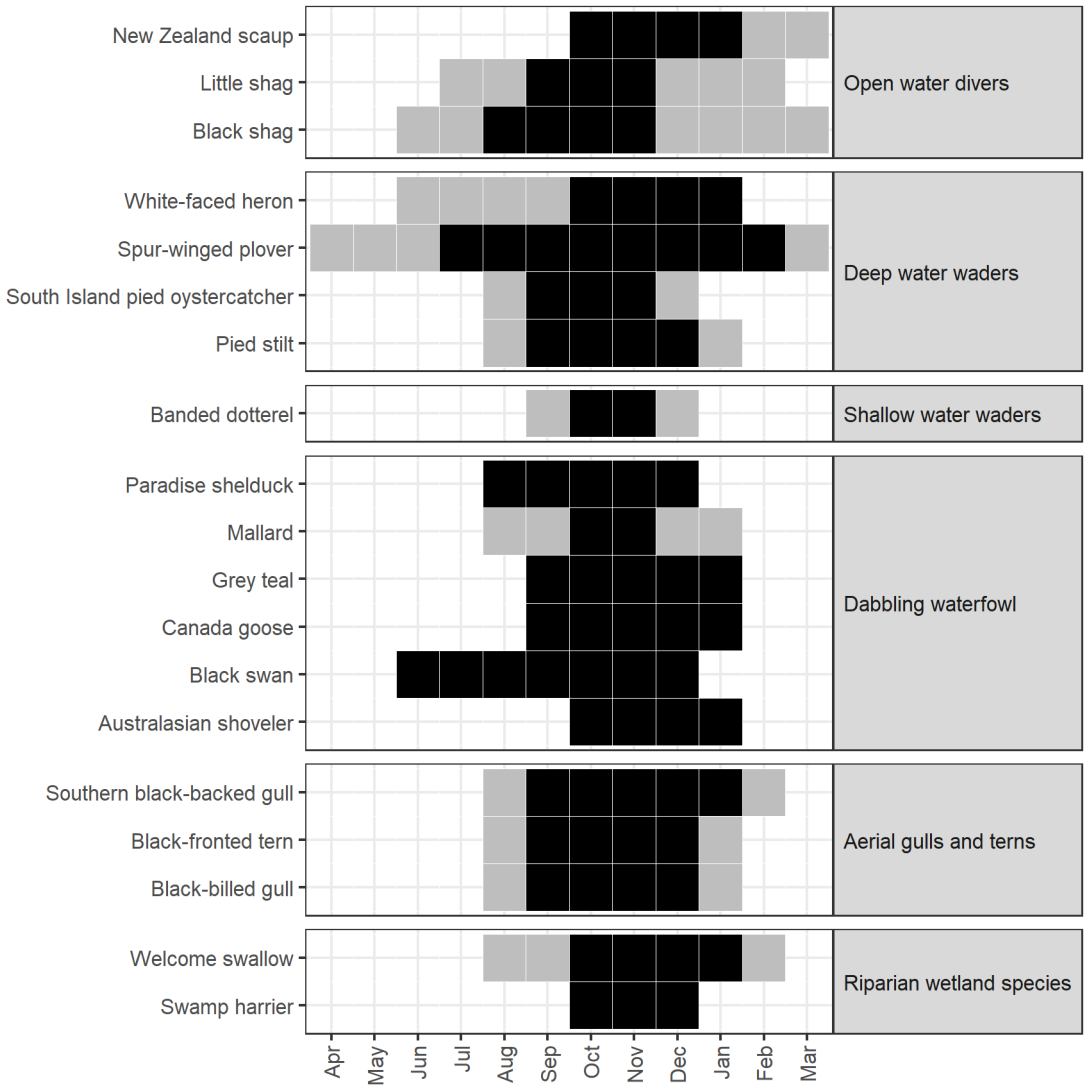

Figure 1: Breeding seasons of freshwater birds associated with the Manapōuri Lake Control. Black squares indicate primary breeding season, while grey squares represent months in which some breeding occurs in most years. Adapted from O'Donnell (2000).

3. Existing consent conditions and mitigations

The existing consent (Consent No: 204160) allows for gravel excavation, dam safety protection works, general maintenance, rock rip rap, vegetation clearance and construction and maintenance of a gravel island to provide bird habitat. Consent conditions specifically relevant to birds include:

> *7(a). To avoid disturbance of the roosting and nesting areas of the black-fronted tern, black-billed gull, the works specified in Conditions 2(a), 2(b), 2(c)[1] shall not occur during the period 15 September to January, if that works would disturb any colonies of the above birds.*

[1] 2(a) the reclamation of Mararoa Diversion Cut, including the use of bunds, to narrow the channel to an average width of 50 m; 2(b) placement of riprap revetment, up to the average annual flood level, alon both banks of the Mararoa Diversion Cut; 2(c) construction of a 150 m long rock groyne out from the true right bank of the Mararoa Diversion Cut; 2(d) extraction of gravel and other sediments from the bed of the Waiau River.

7(b). Other than the works specified in Conditions 2(a), 2(b), 2(c) and 2(d), there shall be no disturbance of the roosting and nesting sites of the black-fronted tern, black-billed gull, and banded and black-fronted dotterel, or the feeding areas of the banded and black-fronted dotterel, during excavation works.

These two conditions ensure that works avoid potential disturbance of freshwater bird species, particularly during the breeding season. The species named in the consent conditions include the three threatened species known to occur at the MLC, along with the black-fronted dotterel (*Elseyornis melanops* - naturally uncommon; Robertson et al. 2017). Based on the available data, no black-fronted dotterels have been observed at the MLC. However, two individuals were recorded on the Lower Waiau River somewhere between the MLC and the confluence with the Wairaki River in the 2009 Department of Conservation survey, although the exact location was not recorded. The named species are unlikely to be present in significant numbers at the MLC between February – August as they typically migrate to coastal regions. Potential disturbances to other freshwater bird species (e.g., waterfowl) present during periods of consented works are likely to be minor, with individuals expected to temporarily move to nearby habitat. No impacts of works are anticipated outside the works period.

A bird habitat island was created as mitigation under the existing consent to provide vegetation-free gravel habitat for roosting and nesting freshwater birds. The physical characteristics of the island were designed in conjunction with the Department of Conservation, with the surface of the island maintained at least 0.5 m above Lake Manapōuri's highest operating level (RL 180.5 masl). Works to maintain and enhance this island habitat, including removal of vegetation, will benefit freshwater birds provided that they are undertaken with consideration to the existing consent conditions 7(a) and 7(b).

Based on the available evidence, I believe that Conditions 7(a) and 7(b) in the existing consent are appropriate for avoiding and/or mitigating any potential effects of works on the freshwater bird community at the MLC and should be transferred to the replacement consent.

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Bird Monitoring Programme
Waiau River (Southland)

Report for Meridian Energy
January 2001

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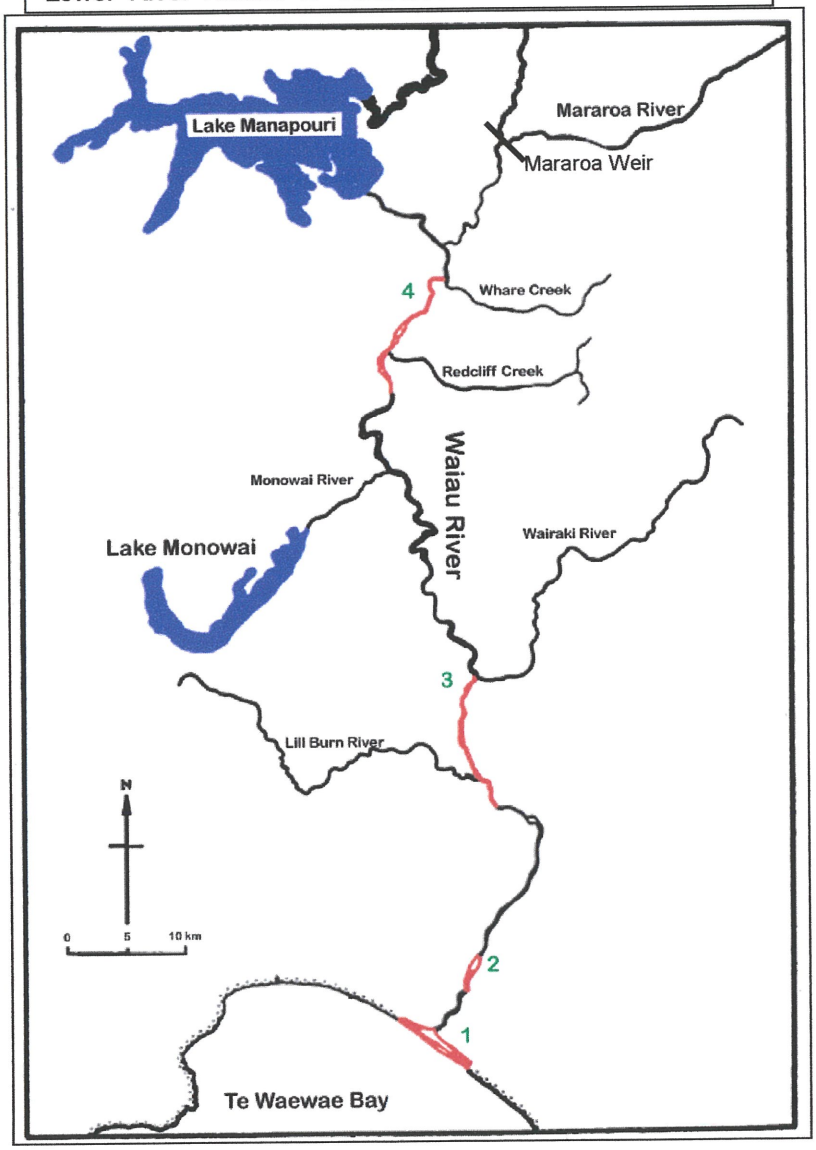
SURVEY BACKGROUND

The aquatic birds of the mainstem Waiau River, Southland, have been monitored for absence/presence and relative abundance since November 1993 (Sagar 1994). During this time four reaches were surveyed (Figure 1) with surveys originally being undertaken during breeding and post-breeding (November and March) and latterly including the winter season as well (July). The results of these surveys have been written up and are available from Meridian Energy, or the Project Manager for the Waiau River Working Party.

At its May 2000 meeting the Waiau Working Party (which includes Meridian Energy, Department of Conservation, Iwi, Fish and Game Southland, and Environment Southland as members) reviewed the findings of previous monitoring and discussed recommendations from Teri McClelland, Environmental Resources, for changes to the monitoring regime. The Waiau Working Party agreed upon the recommendations and Meridian Energy then undertook formal notification and approval procedures with Environment Southland. A synopsis of the new monitoring programme for birds on the Waiau River is attached as Appendix 1.

Figure 1. River Reaches Surveyed: 1) Lagoon Reach; 2) Lower River Reach: 3) Clifden/Wairaki Reach: 4) Redcliffs



SPECIES MONITORED

It was decided to focus the Waiau River bird monitoring programme on the rarer and most likely affected species found on the river. These species were identified as:

- Black-fronted terns *(Sterna albostriata)* – a category B threatened species (Molloy and Davis 1992);
- Black-billed gulls *(larus bullerii)*, which although not listed as a threatened species are of concern because of their decreasing numbers.

Although there are other "rare" species which utilise the river,

most notably black-fronted Dotterel *(Charadrius melanops)* which breed on the river, a relevant monitoring programme for these species would be unjustifiably expensive as they are solitary nesters, e.g. the previous monitoring programme which covered in excess of 30km of river bed only ever included one pair of black-fronted dotterel at the Lower River Reach (number 2 on Figure 1).

Two other species of concern were the red-billed gulls *(Larus novaehollandiae)* and white-fronted terns *(Sterna striata)*, although not listed as rare, they are recognised as being significantly affected by river levels. Since both of these species are frequently found in the same areas as the 2 primary species it was decided to include them in the monitoring regime.

All the species selected for the new programme are colonial breeders which usually nest on gravel bars and islands and are therefore susceptible to large numbers of nests being wiped out by increased river levels during the breeding season. White-fronted terns and red-billed gulls are both predominantly coastal species and are widespread around the NZ coast, although they can at times be found well inland. These species are often found breeding in close vicinity to each other.

Black-fronted terns and black-billed gulls on the other hand are generally inland species, although the latter frequently breed on the coast e.g. Waiau Bar, as well as on islands further upstream. These birds are both believed to be decreasing in numbers through out Southland. The Southland Branch of the OSNZ has been carrying out regional counts for black-billed gulls, largely using aerial photos. While there is some question over the accuracy of photo monitoring of colonies, i.e. how many birds per nest present, there is no doubt that this species has had a significant decline in past years. Of particular concern was the high number of black-backed gulls that were hit on Southland roads where they were finding some respite from the big freeze that saw most of Southland covered in snow for up to 10 days in July 1996. Other possible reasons for the decline in black-backed gulls include:

- Increased predation
- Nesting attempts being wiped out by high river flows
- Illegal killing
- Loss of habitat/food through competition/pollution and invasive weeds.

Black-fronted terns that feed both over land and water also appear to be declining. The reasons for which are unknown.

It has been an issue for many years that the breeding attempts of entire colonies, sometimes numbering several thousand can be wiped out by high river flows – particularly during September through November. High river flows occurring in the months of October and November are likely to have the greatest impact on these species. These are the initial nesting months and, although the birds will routinely re-nest if their first attempt is destroyed, having to re-nest increases the chances of the chicks not being recruited into the population, i.e. the chicks may fledge but not be prepared to survive the winter.

TIMING

It is planned to carry out the surveys in the middle of each month programmed, as this allows a safety margin in case surveys are delayed due to weather or river conditions. Unlike the previous survey technique, the time of day at which this survey is carried out should have little effect, unless there is to be an attempt to monitor the total number of birds present. Timing of the surveys will generally, for reasons of practicality, be based around the high tides at the lagoon.

SITE DESCRIPTIONS

Mararoa Weir

This site is a triangular gravel spit at the confluence of the Mararoa and Waiau Rivers at NZMS 260 D44 955976. It is approximately 500m upstream from the Manapouri Lake Control Structure (commonly known as the Mararoa Weir, Figure 1) which is operated by Meridian Energy to manage the water level in Lake Manapouri. The point of the spit rises up from the river in several gentle steps to the base that is approximately 3m above the river.

Access – this area is easily accessed through a locked gate, controlled by Meridian Energy. Access for the survey is co-ordinated through Colin Sinclair of Meridian Energy.

Lillburn

This site consists of several gravel islands in the Waiau River adjacent to the mouth of the Lillburn Stream at NZMS 260 D45 988534 (Figure 1). None of these islands can be safely reached on foot, even at the current minimum flows, however through access from adjacent farmland; an overview of the islands can be had. Therefore, this site was checked through the use of a spotting scope. If a colony had been observed on the islands, an attempt to access the island by boat would have been made. Black-billed gulls have regularly been recorded congregating/breeding at this site although there are no current exact counts known.

Access – is via a farm track/gravel pit accessway and across paddocks owned by Mr Nick Robertson. There is unlikely to be any problem with ongoing access to this site.

Lagoon

The lagoon colony is situated towards the western end of the Waiau bar at NZMS 260 D46 930330 (Figure 1 – Western end of Reach 1). It is approximately 300m South west of the township of Papatotara on the seaward side of the lagoon.

Access - the current position of the river mouth, west of the colony, means that the only practical access to this colony is by boat. The best site for launching is at the boat ramp

on the eastern lagoon, which means that access is restricted to a couple of hours either side of high tide in order to get safely through the channel.

SURVEY RESULTS

▪ OCTOBER 2000

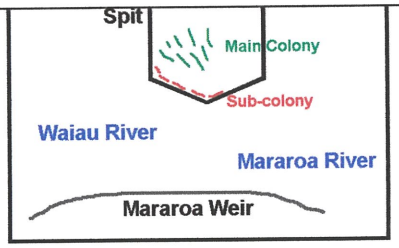
Mararoa Weir

It was apparent that black-billed gull nesting at this site is spread over several months as one nest had small chicks present and the eggs in many other nests (<5%) had starred or pipped (chick starting to break out of the shell). While, at the same time, there were a large number of nest scrapes, which are indications of areas to be laid in the near future. Given the incubation period of 20 – 24 days, for this species, this means that eggs laid at this time will not hatch for another 4-5 weeks at least.

There were large numbers of birds roosting around the periphery of the colony – possibly non-nesters or off duty birds.

Earliest nesting attempts were at the lower site nearer to the weir (sub-colony in Figure 2), however later nesting attempts were higher up the spit, above the water level. The location of the main colony in this area is attributed to a rise in lake/river levels early in the nesting season (Colin Sinclair, pers comm).

Figure 2. Location of main colony and sub-colony at Mararoa Weir site.



Findings:

Number of eggs per nest	Number of nests
0	254
1	409
2	663
3	108
Chicks	1

Totals:

Nest with Eggs	1180
Nests with chicks	1
Operational nests	1181
Nests scrapes without eggs	254
Total number of nests	1435

Lillburn

During this count, no gulls were seen in this area and although five black-fronted terns were seen feeding on one of the smaller branches, there was no evidence of them breeding.

As this colony is the most vulnerable to high river flows, there may be merit in undertaking an earlier survey (i.e. in September) to monitor whether birds have attempted to breed at this site, in order to gauge the effect of any temporary increase in water flows. Given that this site frequently contains a breeding colony, it is possible that nesting attempts were foiled due to high river levels and that birds moved to other sites. On 6 November a visit was paid to a large (>2000 birds) black-billed gull colony on the Whitestone River. Nesting in this colony was obviously spread over a long time and was considerably later than at either of the Waiau colonies with some small chicks present but many birds were still laying. It is possible that at least some of these birds were from a washed out colony at the Lillburn site on the Waiau.

Lagoon

Like the Mararoa Weir colony, this colony had many more birds present than nests. These "extra birds" are likely to be a mix of non-sitting birds of a breeding pair, pairs of birds that have not laid and non-breeders. There was also a significant group – 100+ of white-fronted terns, but there was so sign of this species breeding at this location at this time. The December survey in previous years had recorded significant numbers of this species breeding near the black-billed gull colony.

Prior to this season, the mouth of the river has been east of the colony, however following very high flows in November 1999, the river burst out at the very western end of the lagoon and has remained there ever since. This does not appear to have had any obvious effect on the colony.

Findings:

Number of eggs per nests	Number of nests
0	175
1	349
2	1363
3	599
4	3
Chicks 1	3
Chicks 2	11
Chicks 3	1

Totals:

Nests with Eggs	2314
Nests with chicks	15
Operational nests	2329
Nests scrapes without eggs	175
Total number of nests	2504

▪ NOVEMBER 2000

Mararoa Weir

The nests in the weir colony were at a wide range of stages in the breeding cycle. A large number of well-feathered chicks were present in the colony with an estimated 15-20% of birds still on eggs.

Lillburn

As with the October count, the only birds present in this vicinity were approximately six black-fronted terns feeding on a small reach on the true left of the river.

Lagoon

It was not possible to count the number of chicks or birds still on nests due to the detrimental effect that people walking through the black-billed gull colony could have. When disturbed at this stage of the breeding cycle, i.e. with chicks present, the chicks frequently run into the water and can be swept downstream, at the very least risking a lengthy separation from their parents and at worst being swept out to sea.

In order to minimise disturbance, the colony was observed from a boat and from the bar to the west of the colony. This enabled the colony to be observed with only minimal effect, i.e. at times the adults nearest the observers took off briefly but they quickly settled down again with no noticeable effect on the chicks.

While it was not possible to do a count of the chicks/nests, it is estimated that 5-10% of adult birds present were still on nests – presumably still with eggs or small chicks. The chicks in the colony ranged from a couple of days old to a few that had started to feather-out.

A group of 12 red-billed gull nests had been built in the middle of the black-billed gull colony. These appeared to all be on eggs and were the only red-billed gulls in the vicinity.

During this survey a large number of white-fronted terns were found on nests (an accurate count was not possible at this time given the effect on the adjoining gull colony and the indistinctive nests of the terns, making locating a nest without an adult present very difficult). The breeding terns were divided approximately in half on either side of the gulls. A count of the terns was carried out during the December survey, when the impact on breeding gulls was significantly reduced.

▪ AERIAL SURVEY of WAIAU RIVER

On 13 November an aerial survey of the Waiau was carried out from the lagoon to the weir to check for any additional gull and tern colonies. No additional colonies were located confirming that if there had been a colony at the Lillburn early in the season which had been washed out, the birds had joined other existing colonies either on the Waiau or nearby. This exercise proved invaluable for both confirming the choice of the survey sites and ensuring no at-risk colonies were omitted.

▪ DECEMBER 2000

Mararoa Weir

The majority of the nests had fledged their chicks and those that remained had congregated towards the head of the spit (close to the weir) close to the river. There were only four nests still active and as they all still had eggs, it is likely that they are re-nesting attempts. There were quite a few dead chicks present in the colony but not sufficient to raise undue alarm when compared with the number of live chicks.

Lillburn

Once again there was no sign of any gull or tern colonies at the Lillburn. As noted above, it appears that, if there was a colony this breeding season, it was washed out early on (e.g. September) and all the birds then moved to other colonies either on the Waiau or nearby rivers.

Lagoon

Black-billed gull nesting at the lagoon appears to spread out over a much greater time than at the other sites. During this survey there were chicks present, ranging from < one week old to fully feathered, along with approximately 1200 nests with eggs - which appeared to be re-nesting attempts, as most of the new nests were not at the same sites as earlier nests.

The red-billed gull nests present in November appeared to have all fledged and there was another nest along with eight adults present at another site.

The white-fronted tern nests that had been present during the November count had fledged chicks that were mostly creching around the outside of the gull colony.

In addition there were another approximately 300 new white-fronted tern nests with eggs, mostly at the west end of the gull colony.

Observation – during the surveys no black-fronted tern nesting attempts were observed at any of the survey sites, nor was any colony found during the November aerial survey.

THREATS

While high river levels can seriously impact upon the Mararoa Weir and Lillburn colonies in particular, during this survey river levels were not seen to adversely impact upon the species monitored. The possible loss of a nesting colony at the Lillburn site and the movement of the Weir colony to a higher point on the spit, may be attributable to high river/lake levels prior to this survey commencing (i.e. September). All three sites do face very real threats from vegetation, predator and human interference. These threats, and possibilities for protecting the colonies from them, are summarised below.

Mararoa Weir

Meridian Energy cleared most of the vegetation from this site during the previous year, mainly by bulldozing lupins from the spit (Colin Sinclair, pers comm, see Photo 1). This action has certainly benefited the colony as cover such as lupins encourages predators – stoats, ferrets and cats, to live in the area.

Photo 1. Lupins at Mararoa Site pre control work *(photo taken by Colin Sinclair)*.

The controlled grazing of the pasture that borders the spit is probably also of benefit as it increases the open buffer around the colony, making it less attractive to predators. However, some planned plantings in this area may be beneficial.

During the November survey there was a noticeable increase in weeds on the spit, however the disturbance to the colony from carrying out a weed control programme while chicks are present in the colony, would far outweigh the benefits of removing the weeds. This is largely due to the fact that birds with chicks are very susceptible to disturbance and abandonment and the scattered nature of the plants gives only limited cover for predators. However, it will be important that a weed control programme is carried out once the colony is no longer active this season *(this has been carried out by Meridian Energy following advice from T. McClelland, Colin Sinclair pers comm)*. It would be beneficial if a weed programme could include spraying of the lupins on the edge of the spit.

Predators are a real threat to this colony and a predator control programme on the edge of the colony, especially at the base of the spit, would be of benefit. A suggested control programme is outlined in the Recommendations section below. Assistance/advice for predator control could possibly come from the Southern Institute of Technology's Pest Control (Predator) programme, Environment Southland or the Department of Conservation.

Lillburn

There is a varying amount of vegetation on the "Lillburn Islands" and it would be beneficial to remove this vegetation, ideally by spraying or hand pulling, so as to reduce any cover for predators and make the site more attractive to birds.

Lagoon

This colony is at greatest risk from humans and/or associated dogs, especially during the whitebaiting season (15 August to 30 November) when there can be large numbers of people in the area. The current location of the mouth probably reduces this disturbance as access is now largely restricted to boats which generally go straight past the colony, compared with previously when access from the west end was usually by 4 wheel bike which had to go past/through the colony.

Other than via boat from the lagoon, access to the mouth from the east end is along a reasonably well defined, if temporary, 4 wheel bike track which runs mainly along the crest of the spit. During the November survey a 4-wheel bike drove past the colony on this track – the effect was minimal and only temporary, possibly in part at least due to the bike travelling at a slow speed.

Another possible source of disturbance to the colony is the presence of whitebaiters fishing in the vicinity, especially a temporary (hopefully) hut that has been built within 50 m of the colony. The effect of these whitebaiters appeared to also be minimal as they did not walk through the colony and did not rush around.

An additional, although not obvious, risk is the presence of fishermen fishing in the lagoon, especially in boats. During the November survey a single boat with two lines out was observed catching two gulls on shiny lures, both gulls were released apparently unharmed.

The location of the new river mouth should provide increased protection to the colony from predators as they now have to travel a greater distance from the base of the spit. While there is considerable cover for predators along much of the spit, the colony is distanced from the nearest significant cover.

RECOMMENDATIONS

Based on the 2000/2001 survey, the following recommendations are made:

- River information, similar to that provided to the Guardians of the Lakes – but made available on a monthly, rather than six-monthly basis (as six-monthly does not meet the time requirements of these surveys), would be of benefit when trying to determine whether river flows attribute to nesting attempt losses or locations.

- That an aerial survey be carried out for the length of the Waiau River and ideally up the tributaries, i.e., Whitestone, Mararoa and Eglinton, to identify the breeding colonies early on in the season, i.e., Sept/Oct. This would be particularly useful for locating black-fronted tern breeding sites as none were observed on the main river this season.

- To carry out additional checks on the colonies in:
  - September to check colony locations to see if colonies are lost due to high river levels etc, early in the season and monitor where these birds may re-nest.
  - January to check the final status of late breeding birds, e.g., the lagoon colony this year.

- That all spraying at the weir be carried out before September and then again after December to avoid disturbing nesting birds.

- That the colonies, especially the weir colony, not be entered when chicks are present as they will frequently go into the river and may be lost downstream.

- That the site of the weir colony continues to be subject to an intensive weed control programme – removing all vegetation on the gravel spit so as to remove cover for predators.

- That a trapping programme be put in place at the weir colony to reduce losses to predators/ monitor the potential impact of predators. This would need to be kill traps, i.e. Fenns for mustelids and Conibars for feral cats, so as to minimise the resources required to check them, i.e., kill traps need only be checked weekly while non-lethal traps need to be checked daily.

ACKNOWLEDGEMENTS:

Thanks to Colin Sinclair, Meridian Energy, for access to Mararoa Weir survey site and for his information and comments regarding the weir colony and to Nick Robertson for access to Lillburn survey site, and to the survey team of Pete McClelland and Gary Morgan.

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APPENDIX 1

Synopsis of the New Monitoring Programme for Birds on the Waiau River

1. Surveys to be held during October, November, December - to cover the time when birds are most vulnerable to changes in waterflow (i.e. breeding) - the post breeding (March) and winter (July) surveys to be discontinued, as the data usefulness is limited to relative presence/absence of species (and there is ample data on this now from previous surveys) and does not incorporate impacts of changes in waterflow (given birds are very mobile at these times).

2. Surveys to focus on high-priority species (in terms of national/regional significance and potential for impact upon breeding success due to changes in waterflow) such as black-billed gulls; white-fronted terns; dotterels (both banded and black-capped); black-fronted terns, rather than low-priority species such as feral geese; paradise shelduck; black-backed gull; etc.

3. Survey sites to be the known nesting sites at: Te Waewae Lagoon (both eastern and western ends); Clifden/Wairaki Reach; and the gravel areas above the Mararoa Weir, as these are the predominant breeding sites for high-priority species.

4. October survey to focus on nesting attempts (e.g. location, density, and number of nests); November survey to focus on nesting pairs (e.g. how many nests being utilised); December survey to focus on nesting success (e.g. presence of chicks).

This refinement will provide Meridian Energy and the Waiau Working Party with more specific, relevant information as to the possible impacts of activities (both natural, such as flooding; and man-induced, such as flow releases, shingle extraction, and weed encroachment and removal) on specific, high-priority avian species.

Bird Monitoring Programme
Waiau River (Southland)

Report for Meridian Energy
January 2002

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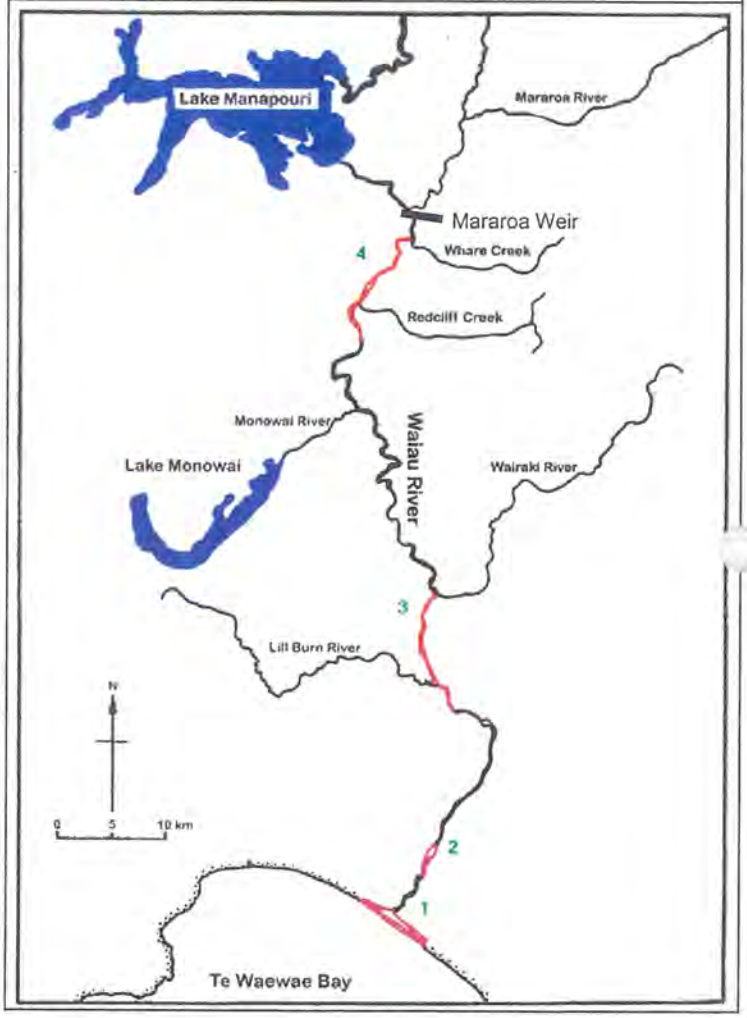
Figure 1. River Reaches Surveyed Prior to 2000: 1) Lagoon Reach; 2) Lower River Reach; 3) Clifden/Wairaki Reach; 4) Redcliffs Reach



This is the second report since the establishment of the new monitoring programme.

SPECIES MONITORED

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Two other species of concern were the red-billed gulls *(Larus novaehollandiae)* and white-fronted terns *(Sterna striata)*, although not listed as rare, they are recognised as being significantly affected by river levels. Since both of these species are frequently found in the same areas as the 2 primary species, these species were included in the monitoring regime.

All the species selected for the new programme are colonial breeders which usually nest on gravel bars and islands and are therefore susceptible to large numbersof nests being wiped out by increased river levels during the breeding season. White-fronted terns and red-billed gulls are both predominantly coastal species and are widespread around the NZ coast, although they can at times be found well inland. These species are often found breeding in close vicinity to each other.

Black-fronted terns and black-billed gulls on the other hand are generally inland species, although the latter frequently breed on the coast e.g. Waiau Bar, as well as on islands further upstream. These birds are both believed to be decreasing in numbers through out Southland. The Southland Branch of the OSNZ has been carrying out regional counts for black-billed gulls, largely using aerial photos. While there is some question over the accuracy of photo monitoring of colonies, i.e. how many birds per nest present, there is no doubt that this species has had a significant decline in past years (pers. comm. Lloyd Esler, Southland Branch, New Zealand Ornithological Society). Possible reasons for the decline in black-backed gulls include:

- Increased predation
- Nesting attempts being wiped out by high river flows
- Illegal killing
- Loss of habitat/food through competition/pollution and invasive weeds.

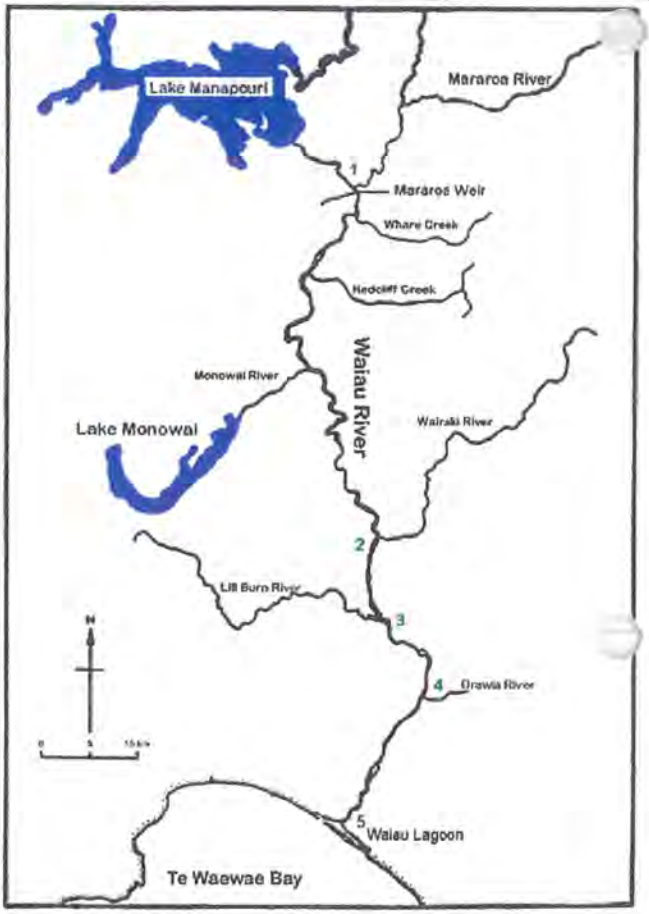
Black-fronted terns that feed both over land and water also appear to be declining. The reasons for which are unknown.

It has been an issue for many years that the breeding attempts of entire colonies, sometimes numbering several thousand can be wiped out by high river flows – particularly during September through November. High river flows occurring in the months of October and November are likely to have the greatest impact on these species. These are the initial nesting months and, although the birds will routinely re nest if their first attempt is destroyed, having to re-nest increases the chances of the chicks not being recruited into the population, i.e. the chicks may fledge but not be prepared to survive the winter.

TIMING

The surveys were all undertaken early in the months of October, November and December, to record as much of the breeding cycle as possible and note any disruptions to the breeding cycle (i.e. high water flows) as soon as possible during the period when the nests are most vulnerable. This timing also allows a safety margin in case surveys are delayed due to weather or river conditions. The time of day at which the surveys are carried out should have little effect as monitoring only records number of breeding attempts, rather than adult birds present. Timing of the surveys was generally based around the high tides at the lagoon for reasons of practicality.

Figure 2. River Reaches Surveyed 2001: 1) Upstream of Mararoa Weir; 2) Downstream of Wairaki River confluence; 3) Lillburn River confluence; 4) Orawea River confluence; 5) Waiau Lagoon Spit



SITE DESCRIPTIONS

An aerial survey of the Waiau River from the Lagoon to just upstream of the Mararoa Weir was undertaken on 3 October 2001. The purpose of the aerial survey was to determine the location of all black-billed gull and black-fronted tern colonies on the river. An additional colony was discovered during this aerial survey at the confluence of the Orawea and Waiau Rivers (Number 4 on Figure 2) and is included in this report.

Mararoa Weir

This site is a triangular gravel spit at the confluence of the Mararoa and Waiau Rivers at NZMS 260 D44 961 974. It is approximately 500m upstream from the Manapouri Lake Control Structure (commonly known as the Mararoa Weir, Number 1 on Figure 2) which is operated by Meridian Energy to manage the water level in Lake Manapouri. The point of the spit rises up from the river in several gentle steps to the base that is approximately 3m above the river. This season, due to prolonged low river flows, an additional shingle bar at NZMS 260 D44 957 974 was exposed parallel to the Upper Waiau. This bar was utilised by a small breeding colony of black-billed gulls.

Access – this area is easily accessed through a locked gate, controlled by Meridian Energy. Access for the survey is co-ordinated through Colin Sinclair of Meridian Energy.

Downstream of Wairaki Confluence

This site consists of an island in the mainstream of the Waiau River approximately 1 kilometre downstream of its confluence with the Wairaki River and a gravel beach on the true right bank of the Waiau River approximately 50 metres further downstream at NZMS 260 D45 967 601 (Number 2 on Figure 2). During the aerial survey of 3 October a colony of birds was observed at the gravel beach and further ground survey noted a few terns on the island, hence this site's inclusion in the 2001 survey.

Access – is via the Wairaki River public accessway to the Waiau River and then walking downstream. Crossing to the colony is hazardous in allbut low flows.

Lillburn Stream

This site consists of several gravel islands in the Waiau River adjacent to the mouth of the Lillburn Stream at NZMS 260 D45 988 534 (Number 3 on Figure 2). None of these islands can be safely reached on foot, even at the current minimum flows, however through access from adjacent farmland; an overview of the islands can be had. The aerial survey of 3 October showed no evidence of nesting being attempted at this site.

Access – is via a farm track/gravel pit accessway and across paddocks owned by Mr Nick Robertson. There is unlikely to be any problem with ongoing access to this site.

Orawea Stream (other spellings found for this stream are Orawia and Orauea)

This site consists of a small gravel beach on the true left bank of the Waiau River 300 metres upstream of the Orawea Stream at NZMS 260 D45 028 444 and a large gravel island in the mainstream of the Waiau River at its confluence with the Orawea Stream at NZMS 260 D45 013 429 (Number 4 on Figure 2). The majority of the birds were observed on the upstream end of the gravel island, with only a few nesting pairs on the gravel beach.

Access – to the main colony is by boat only, while the sub-colony could be accessed down the true right bank of the Orawea Stream. Both colonies can be observed with a spotting scope or binoculars from the farm property on the true right bank of the Waiau River directly opposite.

Lagoon

The lagoon colony is situated towards the western end of the Waiau bar at NZMS 260 D46 930 330 (Number 5 on Figure 2). It is approximately 300m South west of the township of Papatotara on the seaward side of the lagoon. Between the November and December surveys the Waiau River mouth moved approximately 300m east.

Access - the current position of the river mouth means that the only practical access to this colony is by boat. The best site for launching is at the boat ramp on the eastern lagoon, which means that access is restricted to a couple of hours either side of high

tide in order to get safely through the channel. Alternatively a small boat can be launched at Papatotara.

SURVEY RESULTS

▪ OCTOBER 2001

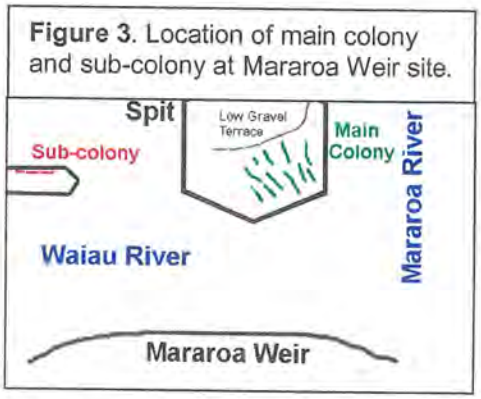


Figure 3. Location of main colony and sub-colony at Mararoa Weir site.

Mararoa Weir

It appeared that black-billed gull nesting at this site was delayed as compared to the 2000 survey as there were no chicks in the colony and the majority of the clutches were still in the process of being laid (in the 2000 survey, chicks were present at the October survey).

There were a large number of nest scrapes, which are indications of areas to be laid in the near future. Given the incubation period of 20 – 24 days, for this species, this means that eggs laid at this time would not hatch for another 4-5 weeks at least.

The main colony was observed on the lower level of the low gravel terrace on the Mararoa River side of the spit (Figure 3). This site was extremely vulnerable to high river flows as approximately 0.5m increase in river level would have flooded most of the nests present.

Findings: 3/10/01
Black-billed gulls

Number of eggs per nest	Number of nests
0	474
1	406
2	332
3	43

Totals:

Nest with Eggs	781
Nests scrapes without eggs	474
Total number of nests	1255

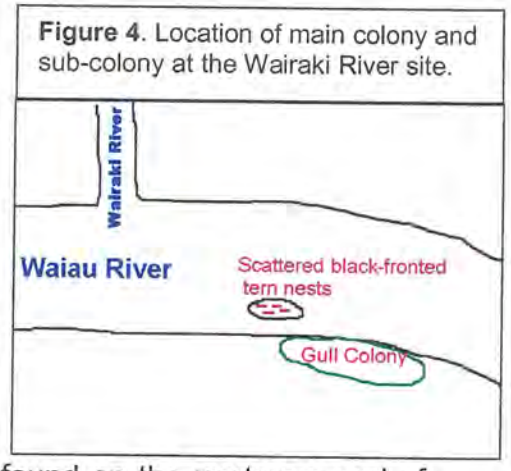


Figure 4. Location of main colony and sub-colony at the Wairaki River site.

Wairaki

This is the first time this site has been recorded in the new monitoring regime, although presence of birds had been noted here during previous surveys. A colony of black-billed gulls was observed at the top of the gravel beach on the true right bank of the Waiau River (Figure 4). Additionally, scattered black-fronted tern nests were found on the upstream end of the black-backed gull colony and on a small gravel island in the Waiau River (Figure 4). This site was vulnerable to high river flows as approximately 1.0m increase in river level would have flooded most of the nests present.

Findings: 3/10/01
Black-billed gulls

Number of eggs per nest	Number of nests
0	41
1	109
2	16
3	1

Totals:

Nest with Eggs	126
Nests scrapes without eggs	41
Total number of nests	167

Black-fronted Terns
Approximately 12 nests total, spread between the black-billed gull colony and on the gravel island.

Lillburn

During the aerial survey no nesting was observed at this site. This is the second year in a row that this site has not been utilised and it may be possible that this site has been abandoned.

Orawea

During the aerial survey, a colony was observed on an island in the main Waiau River opposite the mouth of the Orawea River. There was no safe foot access to this site, so on 13 October 2002 a small boat was used to gain access. At this time an additional, small colony was discovered on the true left bank of the Waiau River approximately 300m upstream of the Orawea confluence (Figure 5).

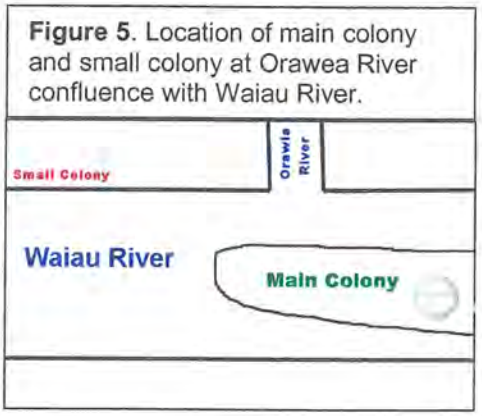


Figure 5. Location of main colony and small colony at Orawea River confluence with Waiau River.

Findings: 13/10/01
Main Colony – Black-billed gulls
In the main colony 1000+ nests were found with approximately 85% having 1 or 2 eggs (access difficulties encountered at the site did not enable more accurate counting to be carried out).

Small Colony – Black-billed gulls

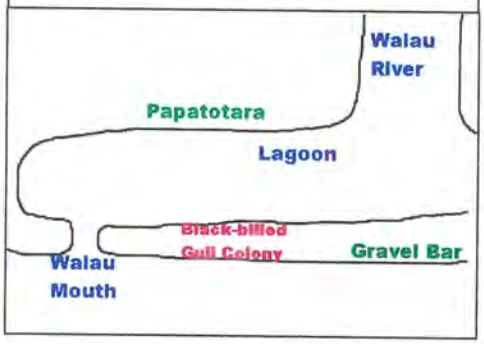
Number of eggs per nests	Number of nests
0	2
1	4
2	7

Additionally, six black-fronted tern nests were found at the small colony of black-billed gulls.

Lagoon

During this survey, the Waiau River mouth was at the very western end of the Lagoon (Figure 6). While a small number of white-fronted terns was observed at this time, no evidence of breeding was seen.

Figure 6. Location of black-billed gull colony at the Waiau Lagoon.



Findings: 3/10/01
Black-billed gulls

Number of eggs per nests	Number of nests
0	175
1	147
2	171
3	34

Totals:

Nests with Eggs	352
Nests scrapes without eggs	175
Total number of nests	527

NOVEMBER 2001

All the November surveys were carried out on 8 November 2001.

Mararoa Weir

Less than 5% of the birds were still on eggs, with most chicks 2 to 3 weeks old. The water level was the same as during the October survey and the observers did not enter the colony due to the likely disturbance to the birds.

Wairaki

Due to the hazard of crossing the river, this colony was counted from the true left bank of the Waiau River. There were approximately 136 nests with no chicks observed. The black-fronted tern chicks had hatched by this time and parents were observed feeding chicks.

Orawea

The small colony was observed from river level and the main colony was observed from an elevated river terrace on the true right bank of the Waiau River. The small colony had 6 chicks approximately 2 to 3 weeks old and no black-fronted terns were observed. At the main colony approximately 50% of the birds were still on eggs, while the remainder had chicks up to 3 weeks old.

Lagoon

The black-billed gull colony at the Lagoon had been washed out due to heavy seas which had rolled a substantial amount of gravel over the top of the bar. A white-fronted tern colony had established approximately 200 metres west of the previous gull colony. In the white-fronted tern colony, 516 nests were observed. Approximately 90% of these nests contained 1 egg and the remainder had 2 eggs.

DECEMBER 2000

All December surveys were carried out on 5 December 2001.

Mararoa Weir

The Waiau River level continued to be low with the main gravel nesting area not covered by water. Approximately 1,000 new nests were observed during the December survey in addition to several hundred fully feathered chicks observed at the edge of the colony and on the Weir. Eggs and chicks of all ages were present in the colony with many birds yet to commence laying. These could either be the original birds renesting after their first chicks had fledged or they could be birds from other colonies which had been flooded out. There were approximately 500 nests on an island 200 metres up the Waiau River. These appeared to be at the same stage as those of the main colony.

Wairaki

No gulls were present at this site. It appeared that all nesting attempts had been washed out by high river levels. The fact that this colony was washed out coupled with the continued low river levels at the Mararoa Weir indicates that the high river level at this site was caused by high Wairaki River levels coming into the Waiau. One black fronted tern was observed on a nest, but there was no sign of the chicks observed during the previous survey.

Orawea

Both of these colonies had been flooded out, presumably by the same factors which caused the flooding of the Wairaki colony.

Lagoon

The Waiau River Mouth had moved approximately 300 metres east, destroying the white-fronted tern colony which had been observed in November. No black-billed gulls or white-fronted terns were observed in the vicinity.

COMPARISON 2000 Survey and 2001 Survey

During the 2000 survey the Lagoon site was the most important for black-billed gulls, with the Mararoa Weir site ranking a close second. The Mararoa Weir site continued to be important to black-billed gulls in the 2001 with over 2000 nesting attempts observed over the entire survey period. Due to heavy seas at the Lagoon site in 2001, the black billed nesting attempts were destroyed and no further black-billed nesting attempts were recorded in this area. However, a substantial colony of white-fronted terns was observed nesting in this vicinity (an area where they have a past history of nesting). Unfortunately this colony was destroyed due to movements in the Waiau River mouth between the November and December surveys.

The newly recorded black-billed gull nesting sites at the Wairaki and Orawea River confluences with the Waiau River are of importance. The Wairaki site is probably of less importance given it had fewer than 150 nests. However, the main colony at the Orawea site was a substantial one with over 1000 nests. Unfortunately, flooding caused this site to be washed out between the November and December surveys.

In contrast to the total lack of black-fronted tern nesting attempts observed at any of the survey sites in 2000, during this survey black-fronted terns were found nesting at both the Wairaki and Orawea sites. Unfortunately, the chicks noted during the November survey were not observed in December (after the flooding event mentioned above), although one adult on a nest was observed at the Wairaki site in December.

OBSERVATIONS

The weed management regime put in place by Meridian Energy at the Mararoa Weir site appears to have been beneficial to the blackbilled gulls nesting at this site. The removal of vegetation from the site, removes cover for predators and increases the amount of available nesting habitat for the birds. Additionally, by timing the work outside the breeding season, the potential for disturbing nesting birds and reducing nesting success is minimised.

The low flows at the start of the season allowed the Mararoa Weir colony to establish on the lower levels of the spit, which created a real potential for the colony to be flooded out at any stage during the season. However, the consistent, low flows at the Mararoa Weir enabled nesting to extend throughout the entire survey period. Notably, there were nearly as many new nesting attempts recorded in December as there were in the beginning of the season in October. These new attempts may have been the result of birds moving to the Mararoa Weir site after being flooded out from other sites.

The loss of the colonies at the Wairaki and Orawea sites did not appear to be due to flow releases from the Mararoa Weir. The flooding of these colonies coincided with extremely high flows in the Wairaki and adjacent catchments flowing into the Waiau River.

The loss of all nests at the Lagoon site in November and December was due to natural events that were unrelated to flows originating at the Mararoa Weir.

The aerial survey prior to the ground monitoring was instrumental in locating colonies. Without the aerial survey the newly recorded colonies at the Wairaki and Orawea sites could well have been missed. These sites are especially important given that they were the only ones with black-fronted terns present.

RECOMMENDATIONS

Based on the 2001 survey, the following recommendations are made:

- River flow information from the Mararoa Weir and river levels from all recording sites on the Lower Waiau River would be of benefit when trying to determine whether river flows attribute to nesting attempt losses.

- A cross-sectional survey of the river at the colony sites be carried out and this information be related to the river level at standard river flows in order to determine the river flows and levels which would place the colonies at risk.

- That an aerial survey be carried out for the length of the Waiau River to identify the breeding colonies early on in the season, i.e., Sept/Oct. This was particularly useful in locating previously unrecorded colonies, including blackfronted tern breeding sites in the 2001 survey.

- To carry out additional checks on the colonies in:
  - September to check colony locations to see if colonies are lost due to high river levels etc, early in the season and monitor where these birds may re-nest.
  - January to check the final status of late breeding birds, e.g., the lagoon colony this year.

- That all spraying at the weir continue to be carried out before September and then again after December to avoid disturbing nesting birds.

- That the colonies, especially the weir colony, not be entered when chicks are present as they will frequently go into the river and may be lost downstream.

- That the site of the weir colony continues to be subject to an intensive weed control programme – removing all vegetation on the gravel spit so as to remove cover for predators.

- That the feasibility of a trapping programme at the weir colony to reduce losses to predators/monitor the potential impact of predators be investigated.

ACKNOWLEDGEMENTS:

Thanks to Colin Sinclair, Meridian Energy, for access to Mararoa Weir survey site and for his information and comments regarding the weir colony, and to P Rowley for access to the Orawea site, and to the survey team of Pete McClelland and Gary Morgan.

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APPENDIX 1

Synopsis of the New Monitoring Programme for Birds on the Waiau River

1. Surveys to be held during October, November, December - to cover the time when birds are most vulnerable to changes in waterflow (i.e. breeding)- the post breeding (March) and winter (July) surveys to be discontinued, as the data usefulness is limited to relative presence/absence of species (and there is ample data on this now from previous surveys) and does not incorporate impacts of changes in waterflow (given birds are very mobile at these times).

2. Surveys to focus on high-priority species (in terms of national/regional significance and potential for impact upon breeding success due to changes in waterflow) such as black-billed gulls; white-fronted terns; dotterels (both banded and black-capped); black-fronted terns, rather than low-priority species such as feral geese; paradise shelduck; black-backed gull; etc.

3. Survey sites to be the known nesting sites at: Te Waewae Lagoon (both eastern and western ends); Clifden/Wairaki Reach; and the gravel areas above the Mararoa Weir, as these are the predominant breeding sites for high-priority species.

4. October survey to focus on nesting attempts (e.g. location, density, and number of nests); November survey to focus on nesting pairs (e.g. how many nests being utilised); December survey to focus on nesting success (e.g. presence of chicks).

This refinement will provide Meridian Energy and the Waiau Working Party with more specific, relevant information as to the possible impacts of activities (both natural, such as flooding; and man-induced, such as flow releases, shingle extraction, and weed encroachment and removal) on specific, high-priority avian species.

Appendix 17

Waiau River Aquatic Birds
Survey Summary
May 1999

T J McClelland

prepared for Meridian Energy

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EXECUTIVE SUMMARY

This report compiles the data collected during bird surveys in the Waiau River from (and including) November 1993 to March 1999. During this period climatic events in the Region have influenced the Waiau River causing prolong periods of very high levels. This natural event has played a significant role in the birds' ability to use the River environment. Emerging trends are discussed and recommendations made for the future review of the monitoring regime.

INTRODUCTION

Surveys have been undertaken of the breeding, post-breeding and winter aquatic bird populations of the Waiau River for several years as part of the requirements of ECNZ's resource consent for use of water for the Manapouri hydro-scheme. This report compiles the findings of all surveys from November 1993 (Sagar 1994) through to March 1999. All surveys have utilised similar methodology and have been carried out during comparative seasons (breeding surveys in November, winter surveys in July and post-breeding surveys in March).

The objective of these surveys is to assist in the development of a long-term monitoring plan and determine the effect of the new hydrology regime on the aquatic bird population of the Lower Waiau River through the development of yearly indices of relative abundance.

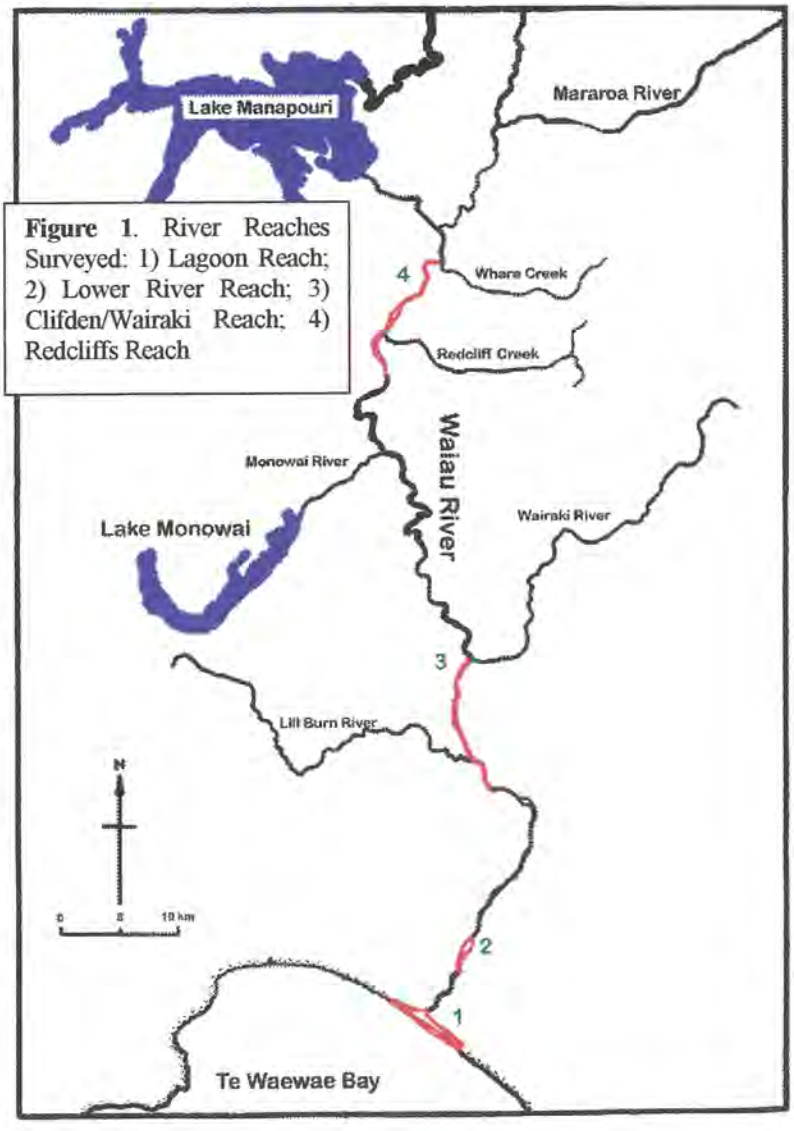


Figure 1. River Reaches Surveyed: 1) Lagoon Reach; 2) Lower River Reach; 3) Clifden/Wairaki Reach; 4) Redcliffs Reach

METHOD

In order to obtain comparable data, the methodology used in this survey was the same as that first used by Sagar 1994. Figure 1 shows the reaches that are surveyed. Since the advent of the new flow regime for the Waiau River, ½ km at the southern end of the Redcliffs Reach is now inaccessible (as compared to when this reach was surveyed by Sagar 1994) and has had to be removed from the survey. In response to this, an additional ½ km was added to the northern end of this reach (in order to keep the survey distance equal).

The totals given in Tables 1 to 3 should be considered as indices of relative abundance rather than absolute counts.

RESULTS

Tables 1 to 3 give the total numbers of each species recorded in each of the reaches during the breeding, post-breeding and winter surveys. This information is presented graphically in Figures 1 to 3. Figures 4 to 6 graph the counts of each individual survey which has been carried out during the breeding, post-breeding and winter time periods. Figures 7 to 9 graph the total counts for each reach for each of the survey periods.

TABLE 1. Numbers of aquatic birds recorded on the Lagoon and Lower River reaches of the Waiau River, during breeding, post-breeding and winter surveys.

Species	Lagoon Breeding	Lower River Breeding	Lagoon Post-Breeding	Lower River Post-Breeding	Lagoon Winter	Lower River Winter
Black Shag	25	-	14	5	-	2
Pied Shag	26	-	1	-	-	-
Little Shag	37	3	26	1	8	-
Spotted Shag	1458	-	1650	-	-	-
White-faced Heron	19	2	10	4	-	-
Black Swan	8	-	7	-	20	-
Canada Goose	-	-	75	-	-	-
Feral Goose	-	-	13	1	-	-
Paradise Shelduck	23	-	42	93	4	2
Mallard	404	8	1094	174	353	200
Grey Duck	-	-	-	-	-	-
Grey Teal	13	-	50	90	-	-
Shoveler	14	-	14	20	-	-
Scaup	4	-	12	4	-	-
Pukeko	1	-	-	4	-	-
Pied Oystercatcher	56	2	-	-	3	3
Variable Oystercatcher	4	-	8	-	-	-
Pied Stilt	25	2	59	12	-	4
Banded Dotterel	19	-	-	-	-	-
Black-fronted Dotterel	2	-	2	2	-	-
Spur-winged Plover	467	14	211	213	36	8
Bar-tailed Godwit	12	-	-	-	-	-
Black-backed Gull	1743	61	279	14	192	110
Red-billed Gull	34	-	37	5	-	6
Black-billed Gull	6031	3	63	82	567	600
Black-fronted Tern	140	-	4	80	4	4
Caspian Tern	2	-	-	-	1	-
White-fronted Tern	1276	-	349	-	2	-

TABLE 2. Numbers of aquatic birds recorded on the Clifden/Wairaki reach of the Waiau River, during breeding, post-breeding and winter surveys.

Species	Clifden/Wairaki Breeding	Clifden/Wairaki Post-Breeding	Clifden/Wairaki Winter
Black Shag	13	43	2
Pied Shag	-	-	-
Little Shag	-	1	-
Spotted Shag	-	-	-
White-faced Heron	2	2	-
Black Swan	-	2	6
Canada Goose	5	211	-
Feral Goose	-	-	-
Paradise Shelduck	550	258	32
Mallard	84	692	167
Grey Duck	-	-	-
Grey Teal	9	1	-
Shoveler	4	-	-
Scaup	-	-	-
Pukeko	-	-	-
Pied Oystercatcher	73	-	14
Variable Oystercatcher	-	-	-
Pied Stilt	25	5	-
Banded Dotterel	54	-	17
Black-fronted Dotterel	-	-	-
Spur-winged Plover	234	88	144
Bar-tailed Godwit	-	-	-
Black-backed Gull	147	29	22
Red-billed Gull	-	-	-
Black-billed Gull	5957	-	695
Black-fronted Tern	51	1	25
Caspian Tern	-	2	-
White-fronted Tern	-	-	-

TABLE 3. Numbers of aquatic birds recorded on the Redcliffs reach of the Waiau River, during breeding, post-breeding and winter surveys.

Species	Redcliffs Breeding	Redcliffs Post-Breeding	Redcliffs Winter
Black Shag	21	41	34
Pied Shag	-	-	-
Little Shag	3	4	1
Spotted Shag	-	-	-
White-faced Heron	2	4	-
Black Swan	-	-	-
Canada Goose	9	175	10
Feral Goose	-	36	21
Paradise Shelduck	266	117	61
Mallard	95	189	212
Grey Duck	5	10	4
Grey Teal	5	-	-
Shoveler	-	-	-
Scaup	6	-	5
Pukeko	-	-	-
Pied Oystercatcher	17	-	4
Variable Oystercatcher	-	-	-
Pied Stilt	6	-	-
Banded Dotterel	-	-	-
Black-fronted Dotterel	-	-	-
Spur-winged Plover	11	6	10
Bar-tailed Godwit	-	-	-
Black-backed Gull	77	13	112
Red-billed Gull	51	-	-
Black-billed Gull	660	-	4
Black-fronted Tern	9	-	11
Caspian Tern	-	-	-
White-fronted Tern	-	-	-

Figure 1. Total sum of birds recorded in all reaches during Breeding Surveys

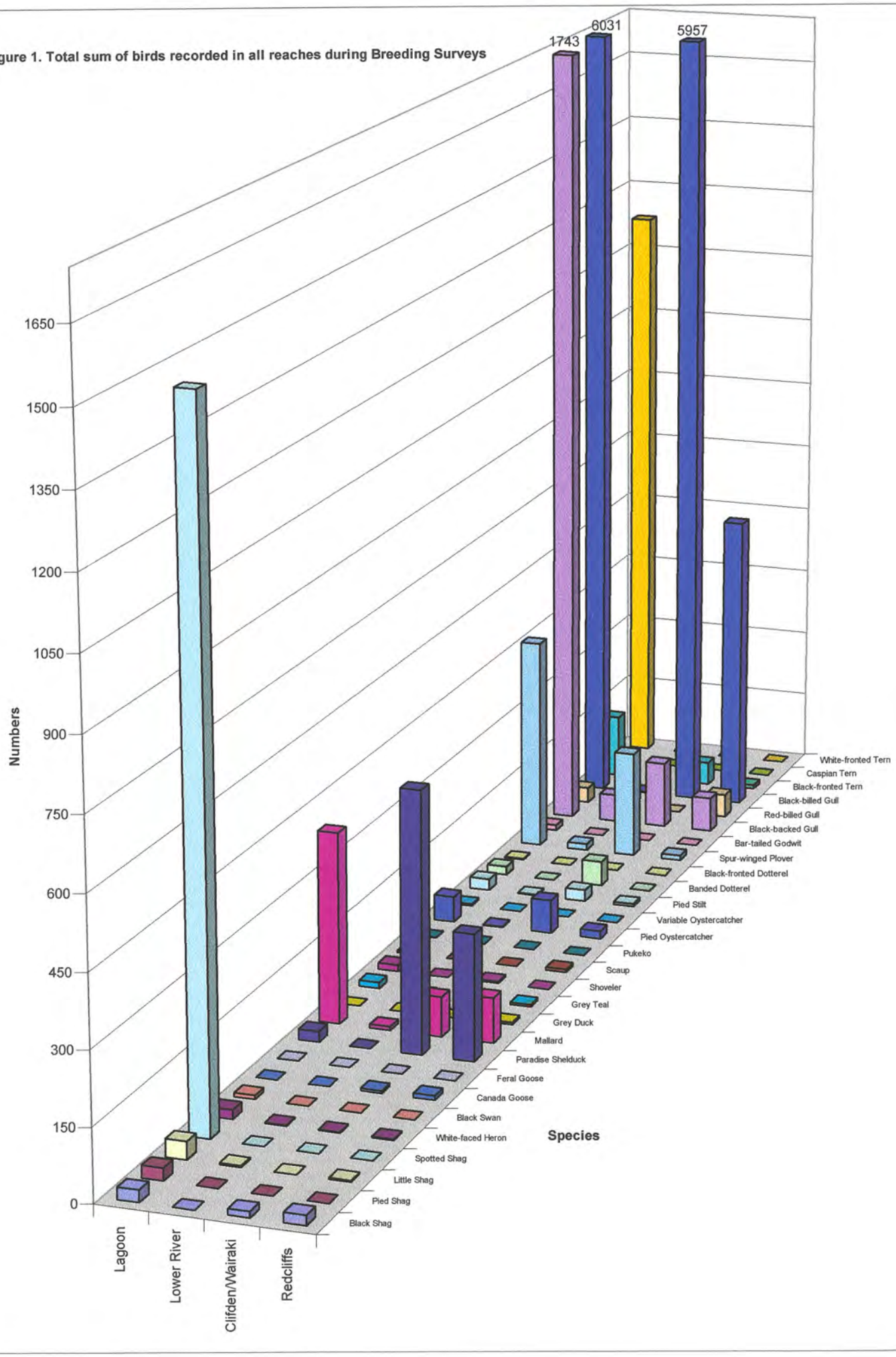


Figure 2. Total sum of birds recorded in all reaches during Post-Breeding Surveys

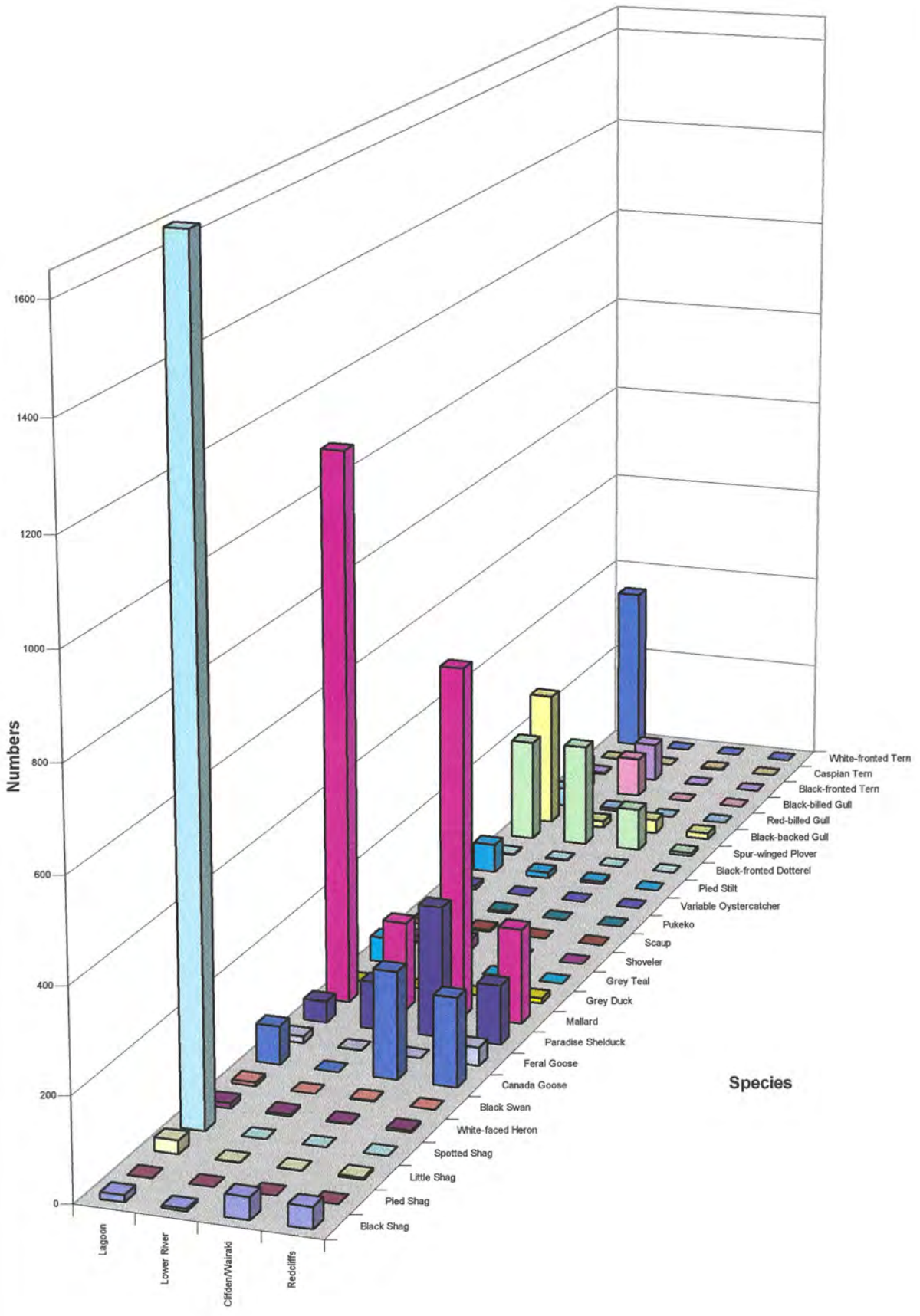


Figure 3. Total sum of birds recorded in all reaches during Winter Surveys

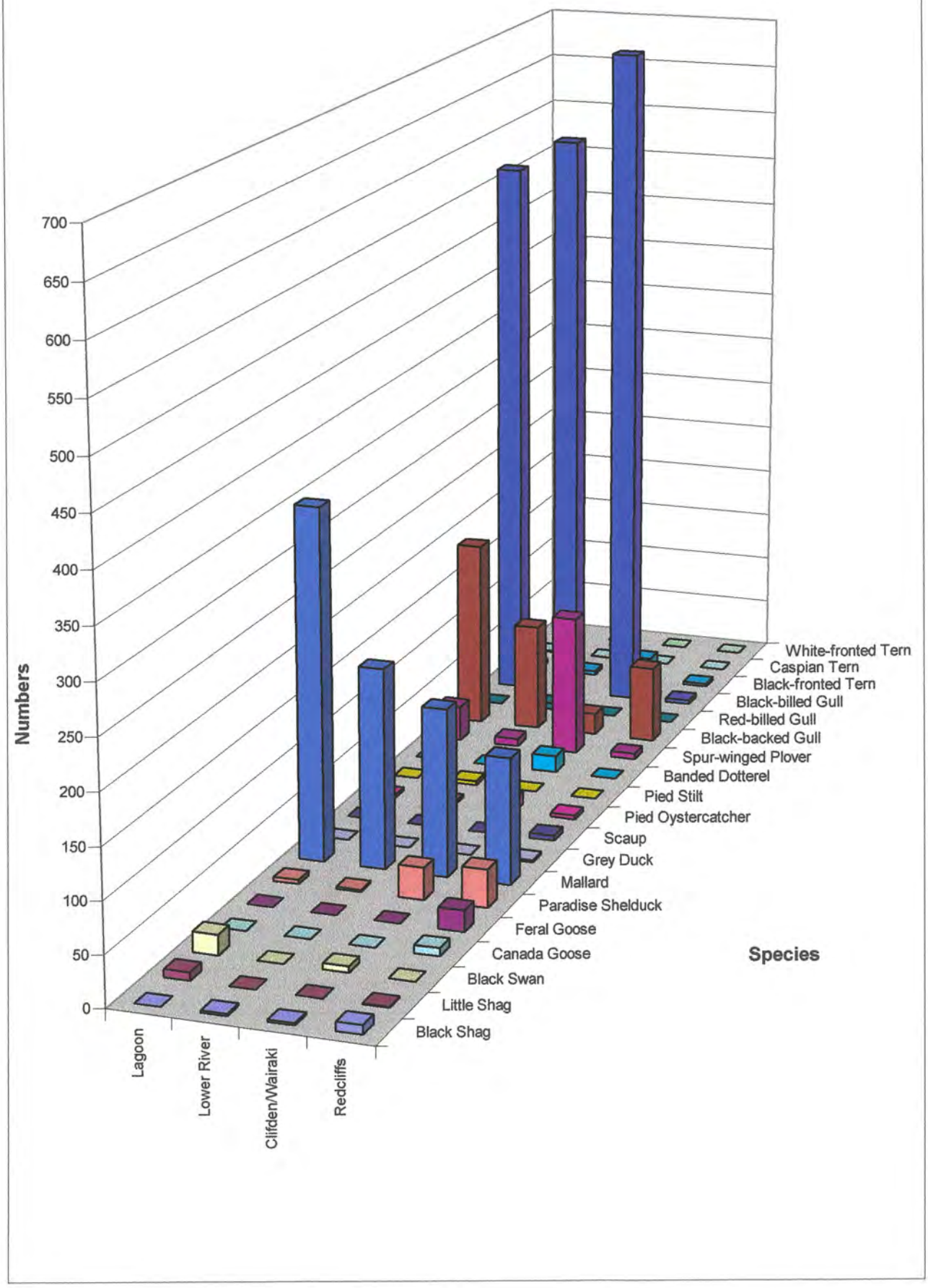


Figure 4. Counts at all reaches during Breeding Surveys

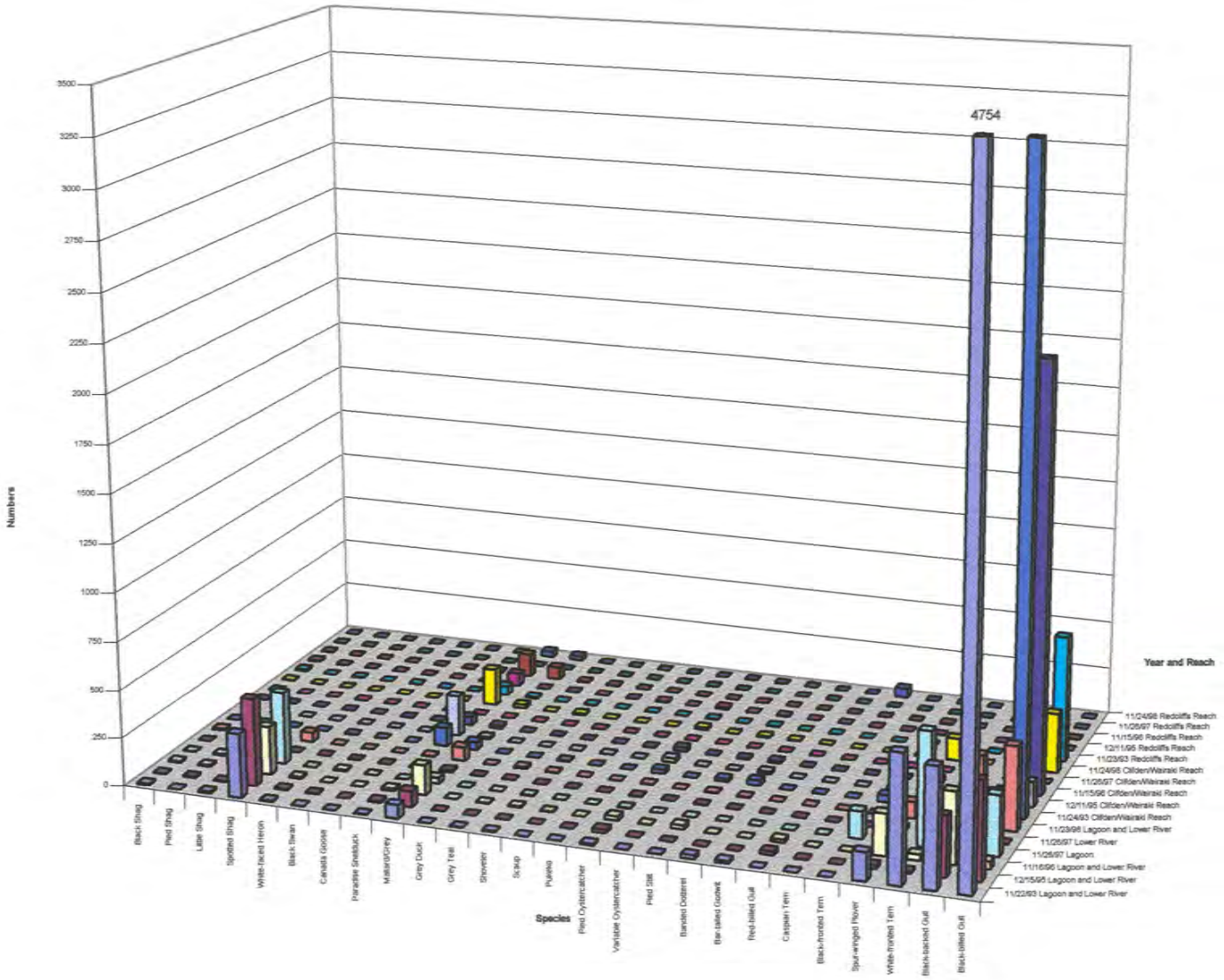


Figure 5. Counts at all reaches during Post-Breeding Surveys

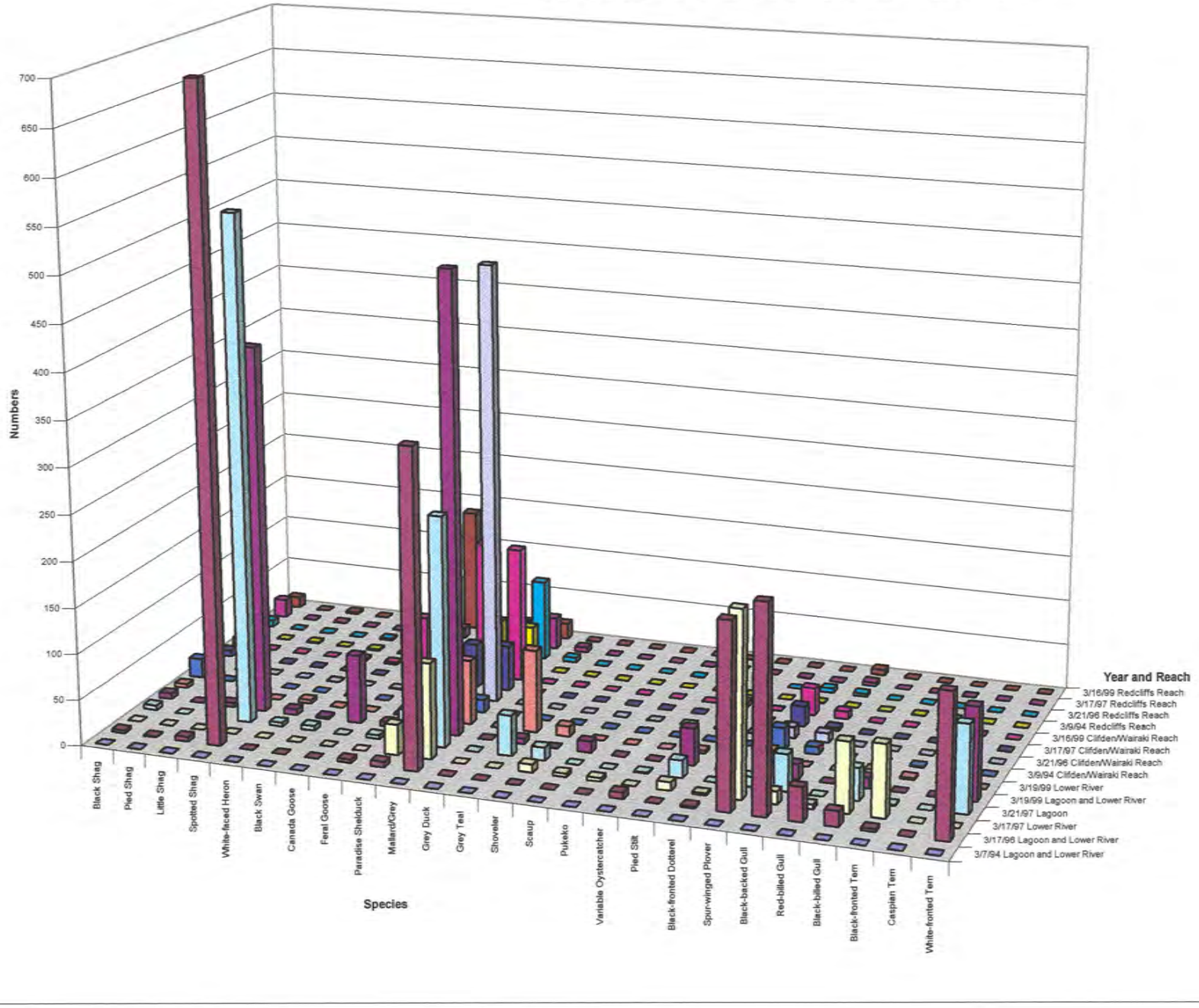


Figure 6. Counts at all reaches during Winter Surveys

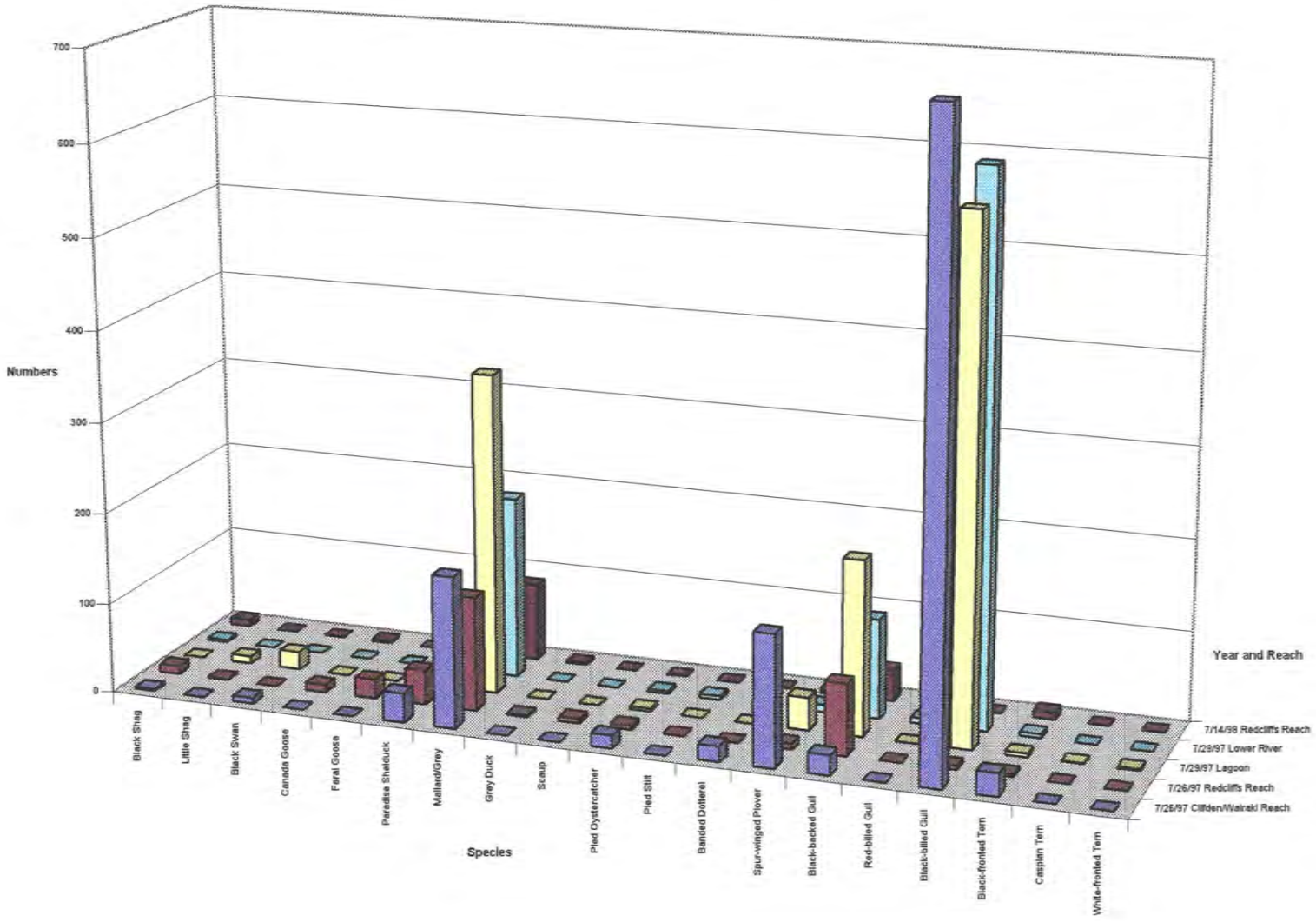


Figure 7. Total counts of each species for each reach during Breeding Surveys

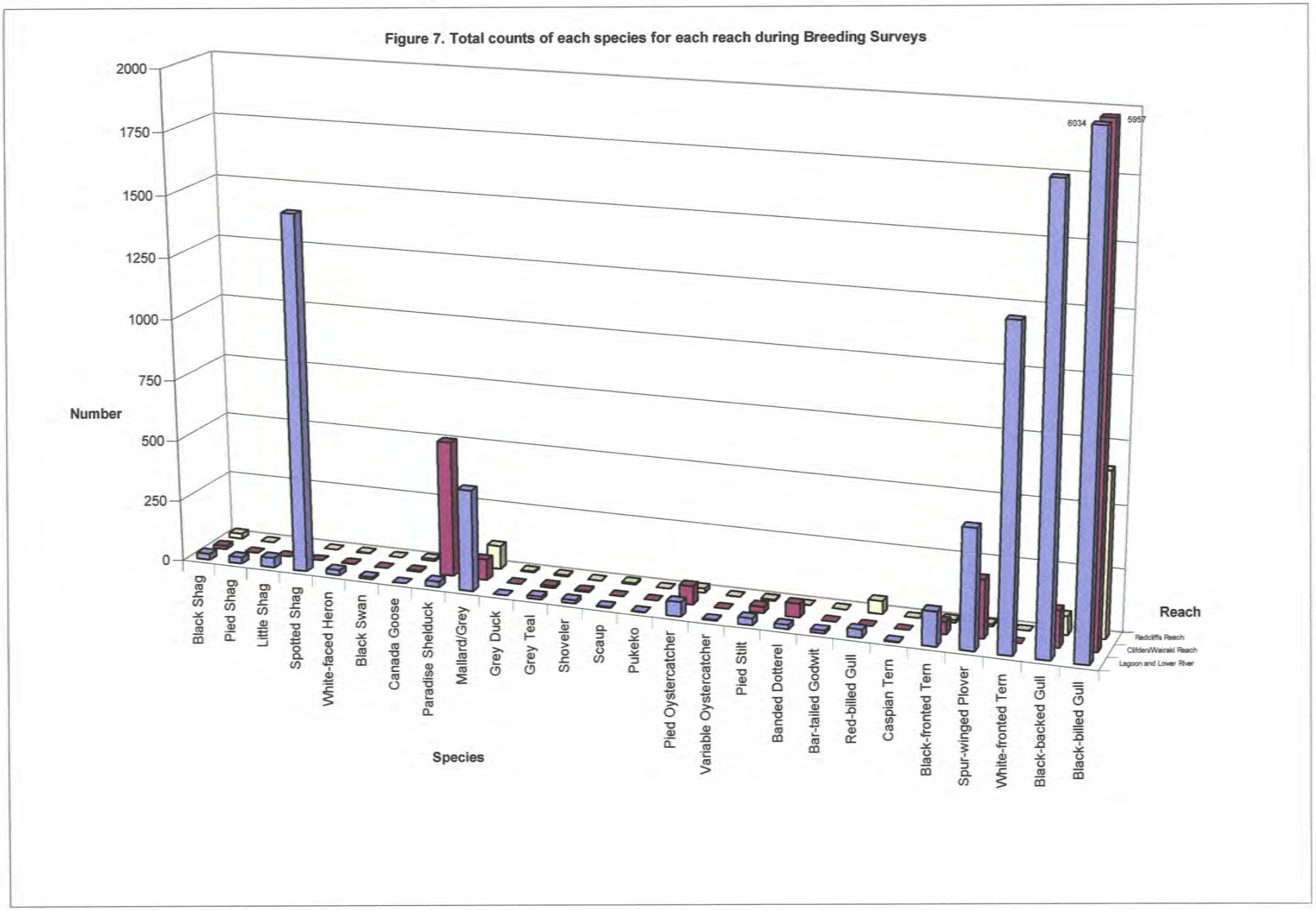


Figure 8. Total counts of each species for each reach during Post-Breeding Surveys

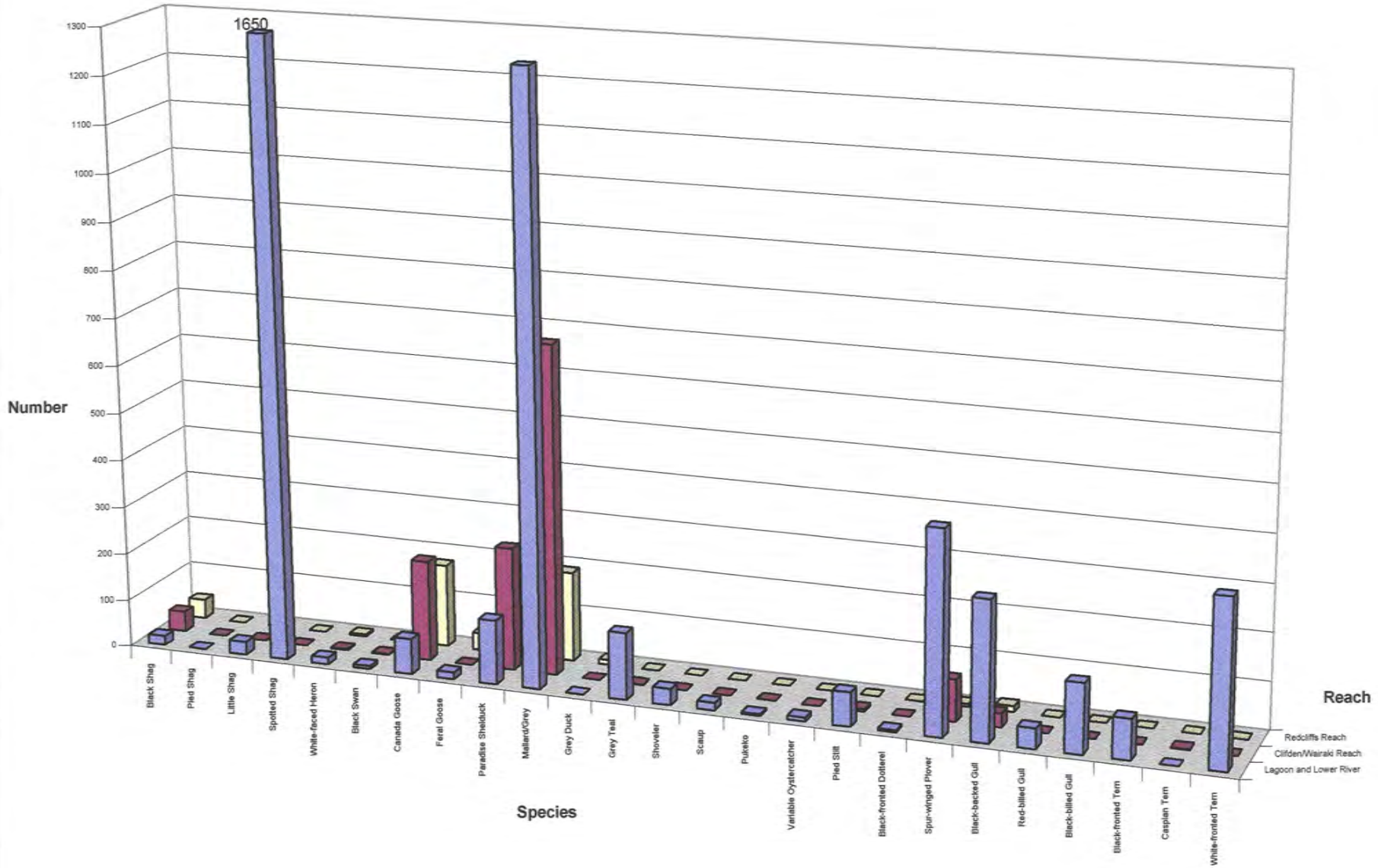
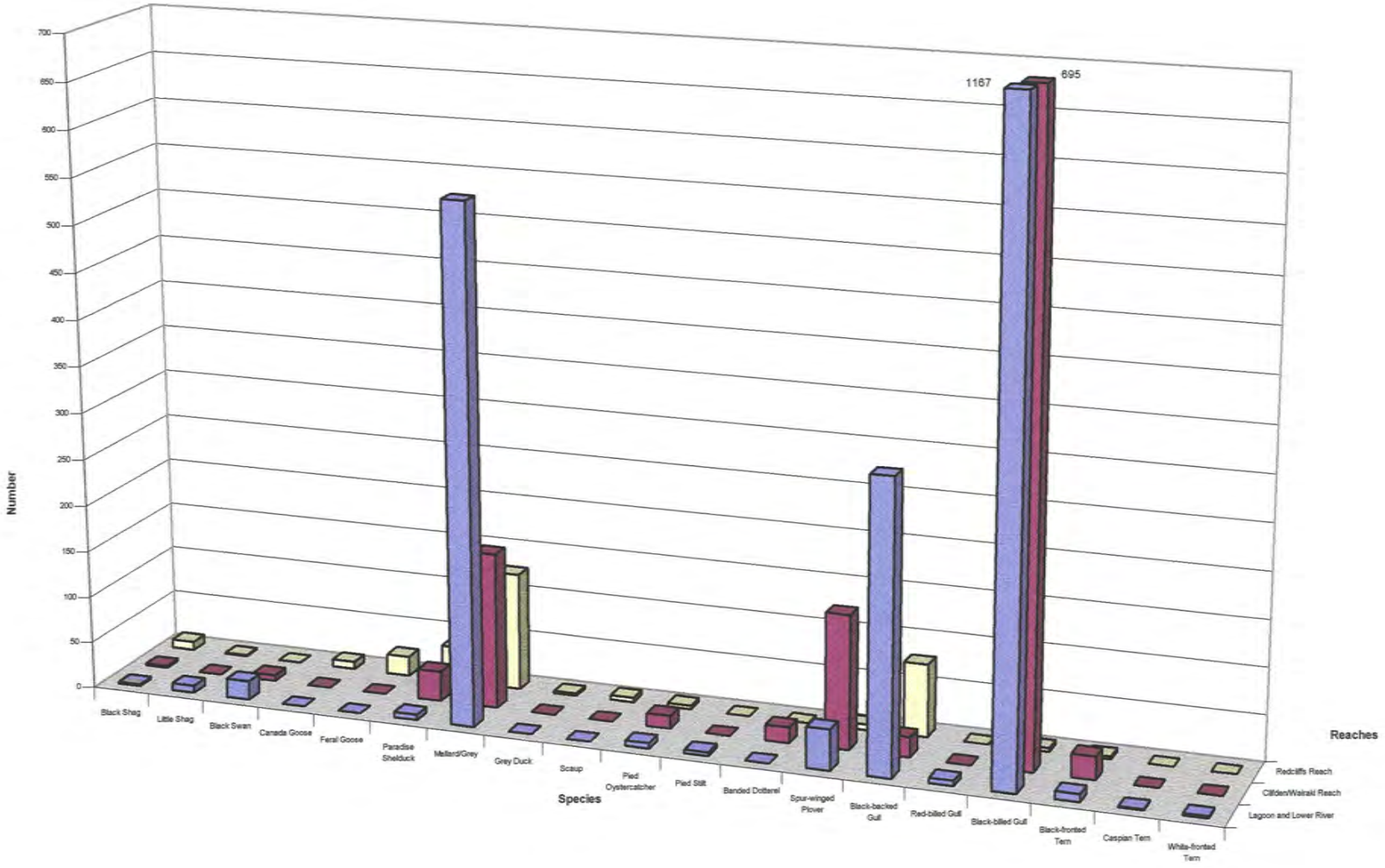


Figure 9. Total counts of each species for each reach during Winter Surveys



DISCUSSION

During the past two years bird numbers have been difficult to record due to higher than average flows. This was a result of high rainfalls throughout the Catchment, and was experienced in all catchments in the Region. The best evidence of the effect on bird numbers and species diversity can be seen in Figure 4. In all reaches both species diversity and total counts decrease from the earlier surveys as compared to the 1997/98 surveys. Numbers and diversity were reduced due to breeding areas (mainly gravel shorelines and islands) being underwater during the pre-nesting and nesting periods. This effect was not due to power generation in the river, but was the outcome of a natural event and experienced throughout the Region.

During the March 1999 post-breeding survey, the most significant effect on birds was the introduction of stock (predominately cattle) onto gravel shorelines and islands in the Clifden/Wairaki Reach. Due to the drought experienced throughout Southland between January and March 1999, pasture growth was minimal and farmers had to find feed elsewhere. When stock, particularly cattle, are in these areas, birds will usually avoid them. The only species which exhibited any measurable increase in relative abundance in the Clifden/Wairaki Reach in the 1999 Post-Breeding Survey was the Feral Goose (Figure 5), all other species (excepting the Black-backed Gull which remained stable) declined in relative abundance as compared to previous years. Again, this effect is not a result of use of the river for power generation, but a combination of natural events (drought) and human response (putting stock in river margins/islands).

Some trends are starting to become visible in the data collected to date. For example, the Lagoon and Lower River Reaches can be identified as having the most diversity of species and largest relative indices of abundance (Figures 1 to 6).

Also, important reaches for certain species during specific times are starting to show up as trends. For example the Lagoon and Lower River and Clifden/Wairaki Reaches are important for priority species such as Black-billed Gulls and White-fronted Terns during the breeding and winter seasons. In comparison, the Lagoon and Lower River Reaches are important to the Black-fronted Tern during the breeding season and the single winter survey indicates that the Clifden/Wairaki Reach is more used by this species at that time (Figures 7 to 9).

ACKNOWLEDGMENTS

Thanks to the survey team of Pete McClelland and Gary Morgan and to Jericho Farm Manager, C Till, and Tuatapere farmer Ray Horrell for access to survey sites.

REFERENCE

Sagar, P.M. 1994. Aquatic Birds of the Waiau River November 1993 and March 1994. Southland Regional Council. *NIWA Christchurch Miscellaneous Report No. 168.* 16 p.

Waiau River Aquatic Birds
Post-Breeding Survey
March 2000

T J McClelland

prepared for Meridian Energy

Teri McClelland
Environmental Resources
P O Box 603
Invercargill

May 2000

EXECUTIVE SUMMARY

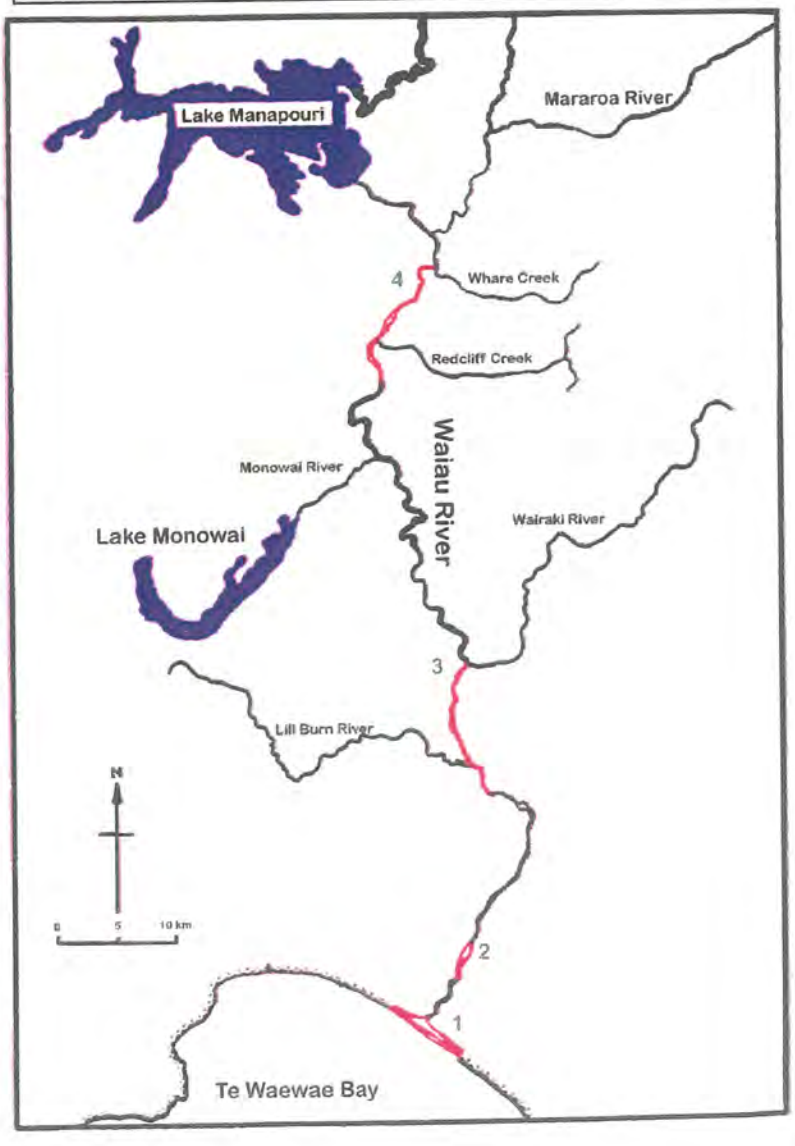
This report compiles the data collected during the post-breeding bird surveys in the Waiau River during March 2000.

INTRODUCTION

Surveys have been undertaken of the breeding, post-breeding and winter aquatic bird populations of the Waiau River for several years as part of the requirements of Meridian Energy's (formerly ECNZ) resource consent for use of water for the Manapouri hydro-scheme. This report is complimentary to previous monitoring reports and supplements the information collated in the 1999 Summary report and the January 2000 report. All surveys have utilised similar methodology and have been carried out during comparative seasons (breeding surveys in November, winter surveys in July and post-breeding surveys in March).

The objective of these surveys is to assist in the development of a long-term monitoring plan and determine the effect of the new hydrology regime on the aquatic bird population of the Lower Waiau River through the development of yearly indices of relative abundance.

Figure 1. River Reaches Surveyed: 1) Lagoon Reach; 2) Lower River Reach: 3) Clifden/Wairaki Reach: 4) Redcliffs Reach



METHOD

In order to obtain comparable data, the methodology used in this survey was the same as that first used by Sagar 1994. Figure 1 shows the reaches that are surveyed. Since the advent of the new flow regime for the Waiau River, ½ km at the southern end of the Redcliffs Reach is now inaccessible (as compared to when this reach was surveyed by Sagar 1994) and has had to be removed from the survey. In response to this, an additional ½ km was added to the northern end of this reach (in order to keep the survey distance equal).

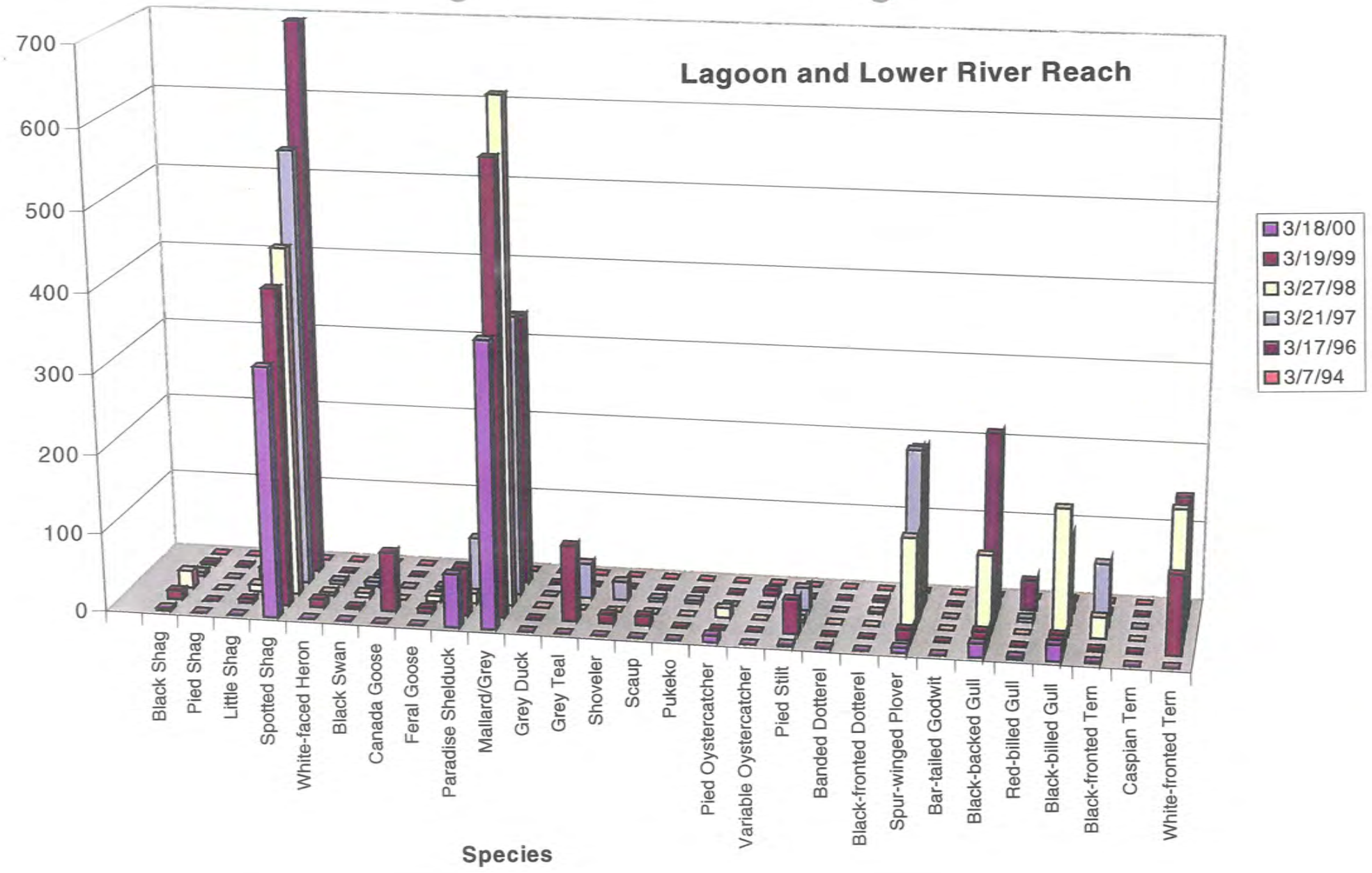
The totals given in Tables 1 to 3 should be considered as indices of relative abundance rather than absolute counts.

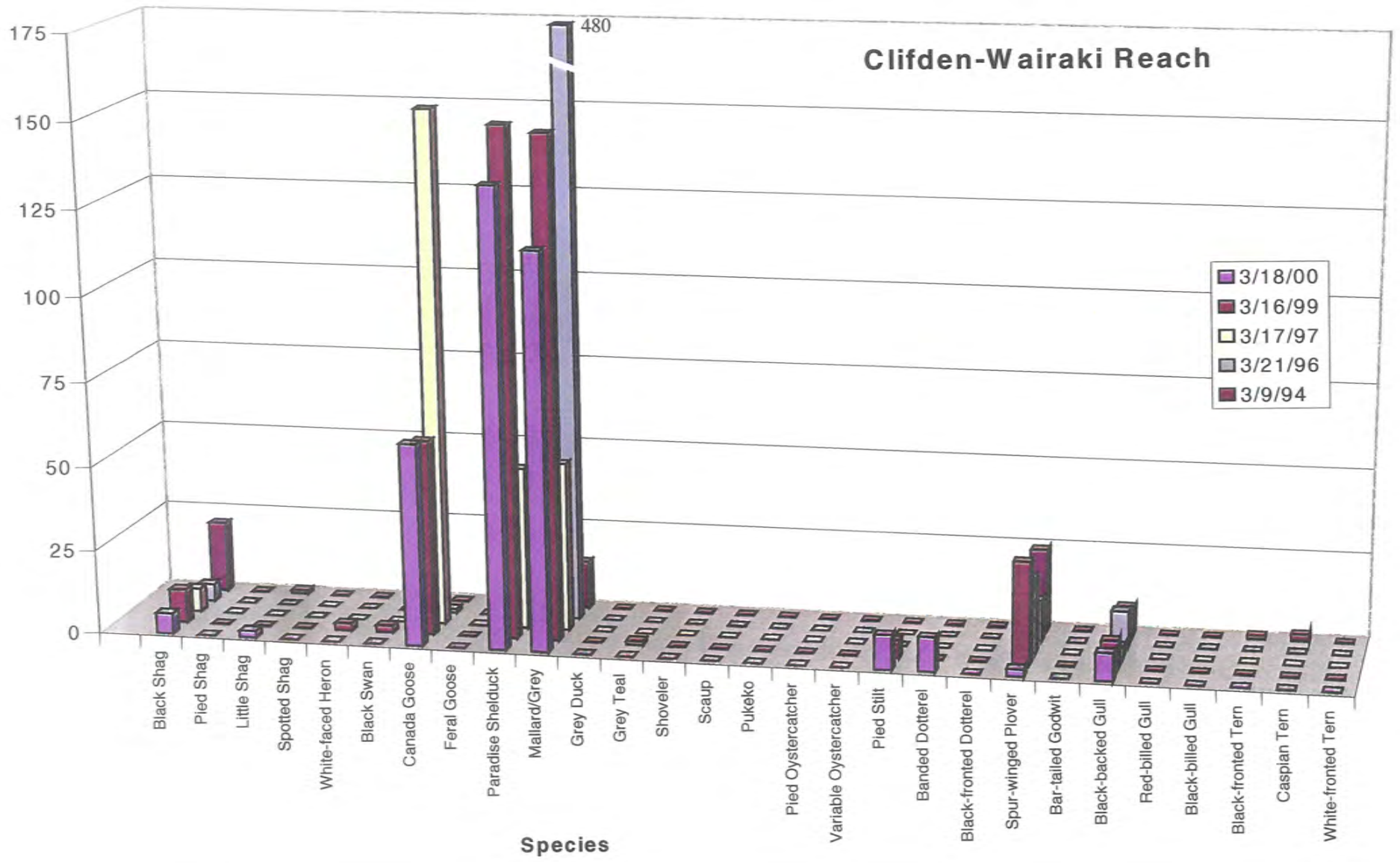
RESULTS

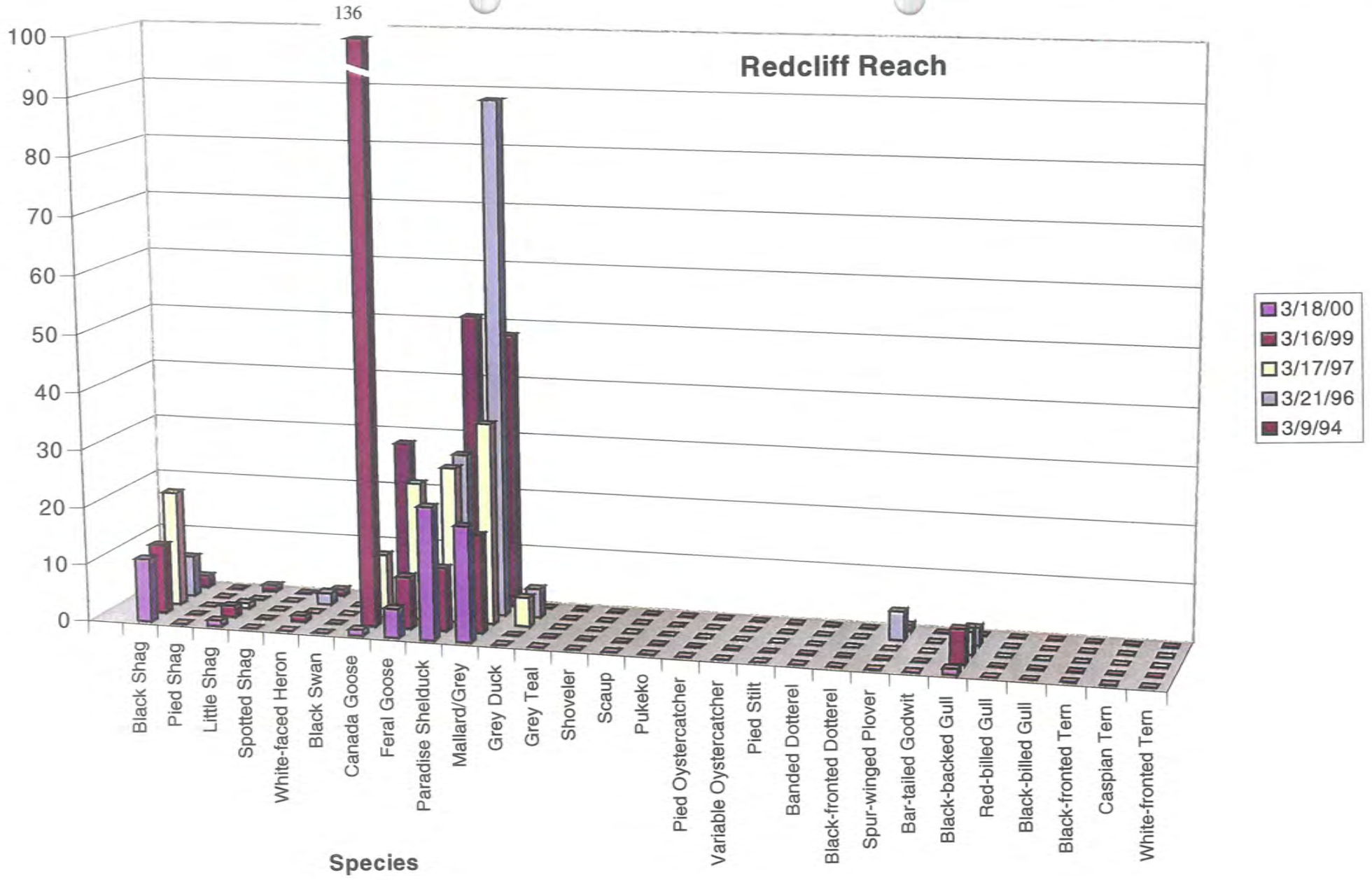
Tables 1 to 3 give the total numbers of each species recorded in each of the reaches during the March 2000 post-breeding surveys. This information has been collated with all previous post-breeding surveys and is presented graphically in Figures 1 to 3.

TABLE 1. Numbers of aquatic birds recorded on the Waiau River reaches during the March 2000 post-breeding surveys.

Species	Lagoon and Lower River	Clifden-Wairaki	Redcliffs
Black Shag	3	6	11
Pied Shag	-	-	-
Little Shag	-	2	1
Spotted Shag	315	-	-
White-faced Heron	-	-	-
Black Swan	-	-	-
Canada Goose	-	60	1
Feral Goose	-	-	5
Paradise Shelduck	67	135	23
Mallard	360	117	20
Grey Duck	-	-	-
Grey Teal	-	-	-
Shoveler	-	-	-
Scaup	-	-	-
Pukeko	-	-	-
Pied Oystercatcher	8	-	-
Variable Oystercatcher	-	-	-
Pied Stilt	2	10	-
Banded Dotterel	1	10	-
Black-fronted Dotterel	-	-	-
Spur-winged Plover	6	2	-
Bar-tailed Godwit	-	-	-
Black-backed Gull	17	8	1
Red-billed Gull	3	-	-
Black-billed Gull	21	-	-
Black-fronted Tern	2	-	-
Caspian Tern	-	-	-
White-fronted Tern	-	-	-


Lagoon and Lower River Reach
700
600
500
400
300
200
100
0
3/18/00
3/19/99
3/27/98
3/21/97
3/17/96
3/7/94
Black Shag
Pied Shag
Little Shag
Spotted Shag
White-faced Heron
Black Swan
Canada Goose
Feral Goose
Paradise Shelduck
Mallard/Grey
Grey Duck
Grey Teal
Shoveler
Scaup
Pukeko
Pied Oystercatcher
Variable Oystercatcher
Pied Stilt
Banded Dotterel
Black-fronted Dotterel
Spur-winged Plover
Bar-tailed Godwit
Black-backed Gull
Red-billed Gull
Black-billed Gull
Black-fronted Tern
Caspian Tern
White-fronted Tern
Species


Clifden-Wairaki Reach
480
175
150
125
100
75
50
25
0
3/18/00
3/16/99
3/17/97
3/21/96
3/9/94
Black Shag
Pied Shag
Little Shag
Spotted Shag
White-faced Heron
Black Swan
Canada Goose
Feral Goose
Paradise Shelduck
Mallard/Grey
Grey Duck
Grey Teal
Shoveler
Scaup
Pukeko
Pied Oystercatcher
Variable Oystercatcher
Pied Stilt
Banded Dotterel
Black-fronted Dotterel
Spur-winged Plover
Bar-tailed Godwit
Black-backed Gull
Red-billed Gull
Black-billed Gull
Black-fronted Tern
Caspian Tern
White-fronted Tern
Species


136
Redcliff Reach
100
90
80
70
60
50
40
30
20
10
0
3/18/00
3/16/99
3/17/97
3/21/96
3/9/94
Black Shag
Pied Shag
Little Shag
Spotted Shag
White-faced Heron
Black Swan
Canada Goose
Feral Goose
Paradise Shelduck
Mallard/Grey
Grey Duck
Grey Teal
Shoveler
Scaup
Pukeko
Pied Oystercatcher
Variable Oystercatcher
Pied Stilt
Banded Dotterel
Black-fronted Dotterel
Spur-winged Plover
Bar-tailed Godwit
Black-backed Gull
Red-billed Gull
Black-billed Gull
Black-fronted Tern
Caspian Tern
White-fronted Tern
Species

DISCUSSION

In general terms numbers were down during this year's post-breeding survey. This is probably related to the November 1999 floods that interrupted breeding activity.

Overall numbers of species of particular concern (such as the black-billed gull) are still well down and while this may be attributable to the high flow events that have occurred during the past 3 breeding seasons, it is still of concern. One suggestion is that monitoring work in the future is more targeted to these species.

Otherwise, this post-breeding survey was similar to others in its findings. A verbal report on this survey, including recommendations for future monitoring will be made at the May 2000 Waiau Working Party meeting.

ACKNOWLEDGMENTS

Thanks to the survey team of Pete McClelland and Gary Morgan and to Jericho Farm Manager, C Till, and Tuatapere farmer Ray Horrell for access to survey sites.

REFERENCE

Sagar, P.M. 1994. Aquatic Birds of the Waiau River November 1993 and March 1994. Southland Regional Council. *NIWA Christchurch Miscellaneous Report No. 168.* 16 p.

Bird Monitoring Programme
Waiau River (Southland)

Report for Meridian Energy
January 2001

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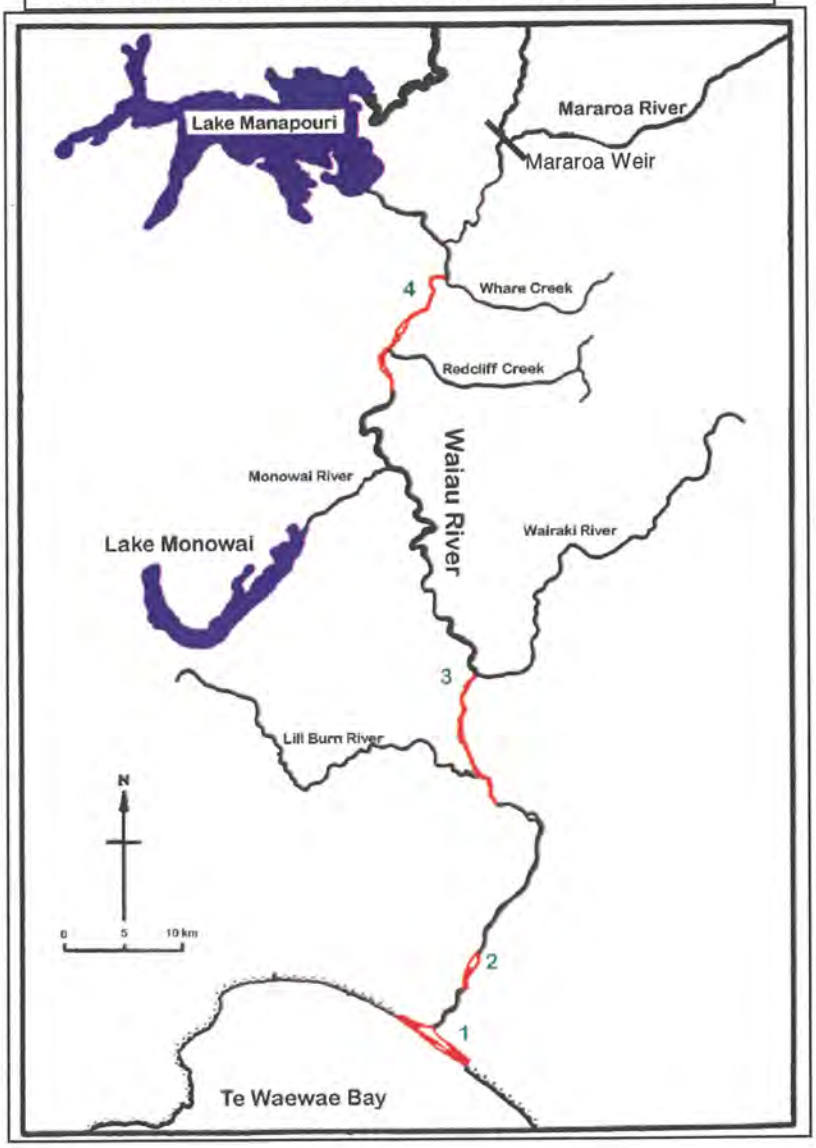
SURVEY BACKGROUND

The aquatic birds of the mainstem Waiau River, Southland, have been monitored for absence/presence and relative abundance since November 1993 (Sagar 1994). During this time four reaches were surveyed (Figure 1) with surveys originally being undertaken during breeding and post-breeding (November and March) and latterly including the winter season as well (July). The results of these surveys have been written up and are available from Meridian Energy, or the Project Manager for the Waiau River Working Party.

At its May 2000 meeting the Waiau Working Party (which includes Meridian Energy, Department of Conservation, Iwi, Fish and Game Southland, and Environment Southland as members) reviewed the findings of previous monitoring and discussed recommendations from Teri McClelland, Environmental Resources, for changes to the monitoring regime. The Waiau Working Party agreed upon the recommendations and Meridian Energy then undertook formal notification and approval procedures with Environment Southland. A synopsis of the new monitoring programme for birds on the Waiau River is attached as Appendix 1.

Figure 1. River Reaches Surveyed: 1) Lagoon Reach; 2) Lower River Reach: 3) Clifden/Wairaki Reach: 4) Redcliffs



SPECIES MONITORED

It was decided to focus the Waiau River bird monitoring programme on the rarer and most likely affected species found on the river. These species were identified as:

- Black-fronted terns *(Sterna albostriata)* – a category B threatened species (Molloy and Davis 1992);
- Black-billed gulls (*larus bullerii)*, which although not listed as a threatened species are of concern because of their decreasing numbers.

Although there are other "rare" species which utilise the river,

most notably black-fronted Dotterel *(Charadrius melanops)* which breed on the river, a relevant monitoring programme for these species would be unjustifiably expensive as they are solitary nesters, e.g. the previous monitoring programme which covered in excess of 30km of river bed only ever included one pair of black-fronted dotterel at the Lower River Reach (number 2 on Figure 1).

Two other species of concern were the red-billed gulls *(Larus novaehollandiae)* and white-fronted terns *(Sterna striata)*, although not listed as rare, they are recognised as being significantly affected by river levels. Since both of these species are frequently found in the same areas as the 2 primary species it was decided to include them in the monitoring regime.

All the species selected for the new programme are colonial breeders which usually nest on gravel bars and islands and are therefore susceptible to large numbers of nests being wiped out by increased river levels during the breeding season. White-fronted terns and red-billed gulls are both predominantly coastal species and are widespread around the NZ coast, although they can at times be found well inland. These species are often found breeding in close vicinity to each other.

Black-fronted terns and black-billed gulls on the other hand are generally inland species, although the latter frequently breed on the coast e.g. Waiau Bar, as well as on islands further upstream. These birds are both believed to be decreasing in numbers through out Southland. The Southland Branch of the OSNZ has been carrying out regional counts for black-billed gulls, largely using aerial photos. While there is some question over the accuracy of photo monitoring of colonies, i.e. how many birds per nest present, there is no doubt that this species has had a significant decline in past years. Of particular concern was the high number of black-backed gulls that were hit on Southland roads where they were finding some respite from the big freeze that saw most of Southland covered in snow for up to 10 days in July 1996. Other possible reasons for the decline in black-backed gulls include:

- Increased predation
- Nesting attempts being wiped out by high river flows
- Illegal killing
- Loss of habitat/food through competition/pollution and invasive weeds.

Black-fronted terns that feed both over land and water also appear to be declining. The reasons for which are unknown.

It has been an issue for many years that the breeding attempts of entire colonies, sometimes numbering several thousand can be wiped out by high river flows – particularly during September through November. High river flows occurring in the months of October and November are likely to have the greatest impact on these species. These are the initial nesting months and, although the birds will routinely re-nest if their first attempt is destroyed, having to re-nest increases the chances of the chicks not being recruited into the population, i.e. the chicks may fledge but not be prepared to survive the winter.

TIMING

It is planned to carry out the surveys in the middle of each month programmed, as this allows a safety margin in case surveys are delayed due to weather or river conditions. Unlike the previous survey technique, the time of day at which this survey is carried out should have little effect, unless there is to be an attempt to monitor the total number of birds present. Timing of the surveys will generally, for reasons of practicality, be based around the high tides at the lagoon.

SITE DESCRIPTIONS

Mararoa Weir

This site is a triangular gravel spit at the confluence of the Mararoa and Waiau Rivers at NZMS 260 D44 955976. It is approximately 500m upstream from the Manapouri Lake Control Structure (commonly known as the Mararoa Weir, Figure 1) which is operated by Meridian Energy to manage the water level in Lake Manapouri. The point of the spit rises up from the river in several gentle steps to the base that is approximately 3m above the river.

Access – this area is easily accessed through a locked gate, controlled by Meridian Energy. Access for the survey is co-ordinated through Colin Sinclair of Meridian Energy.

Lillburn

This site consists of several gravel islands in the Waiau River adjacent to the mouth of the Lillburn Stream at NZMS 260 D45 988534 (Figure 1). None of these islands can be safely reached on foot, even at the current minimum flows, however through access from adjacent farmland; an overview of the islands can be had. Therefore, this site was checked through the use of a spotting scope. If a colony had been observed on the islands, an attempt to access the island by boat would have been made. Black-billed gulls have regularly been recorded congregating/breeding at this site although there are no current exact counts known.

Access – is via a farm track/gravel pit accessway and across paddocks owned by Mr Nick Robertson. There is unlikely to be any problem with ongoing access to this site.

Lagoon

The lagoon colony is situated towards the western end of the Waiau bar at NZMS 260 D46 930330 (Figure 1 – Western end of Reach 1). It is approximately 300m South west of the township of Papatotara on the seaward side of the lagoon.

Access - the current position of the river mouth, west of the colony, means that the only practical access to this colony is by boat. The best site for launching is at the boat ramp

on the eastern lagoon, which means that access is restricted to a couple of hours either side of high tide in order to get safely through the channel.

SURVEY RESULTS

▪ OCTOBER 2000

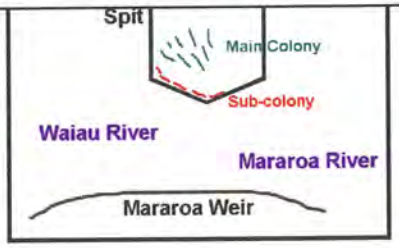
Mararoa Weir

It was apparent that black-billed gull nesting at this site is spread over several months as one nest had small chicks present and the eggs in many other nests (<5%) had starred or pipped (chick starting to break out of the shell). While, at the same time, there were a large number of nest scrapes, which are indications of areas to be laid in the near future. Given the incubation period of 20 – 24 days, for this species, this means that eggs laid at this time will not hatch for another 4-5 weeks at least.

There were large numbers of birds roosting around the periphery of the colony – possibly non-nesters or off duty birds.

Earliest nesting attempts were at the lower site nearer to the weir (sub-colony in Figure 2), however later nesting attempts were higher up the spit, above the water level. The location of the main colony in this area is attributed to a rise in lake/river levels early in the nesting season (Colin Sinclair, pers comm).

Figure 2. Location of main colony and sub-colony at Mararoa Weir site.



Findings:

Number of eggs per nest	Number of nests
0	254
1	409
2	663
3	108
Chicks	1

Totals:

Nest with Eggs	1180
Nests with chicks	1
Operational nests	1181
Nests scrapes without eggs	254
Total number of nests	1435

Lillburn

During this count, no gulls were seen in this area and although five black-fronted terns were seen feeding on one of the smaller branches, there was no evidence of them breeding.

As this colony is the most vulnerable to high river flows, there may be merit in undertaking an earlier survey (i.e. in September) to monitor whether birds have attempted to breed at this site, in order to gauge the effect of any temporary increase in water flows. Given that this site frequently contains a breeding colony, it is possible that nesting attempts were foiled due to high river levels and that birds moved to other sites. On 6 November a visit was paid to a large (>2000 birds) black-billed gull colony on the Whitestone River. Nesting in this colony was obviously spread over a long time and was considerably later than at either of the Waiau colonies with some small chicks present but many birds were still laying. It is possible that at least some of these birds were from a washed out colony at the Lillburn site on the Waiau.

Lagoon

Like the Mararoa Weir colony, this colony had many more birds present than nests. These "extra birds" are likely to be a mix of non-sitting birds of a breeding pair, pairs of birds that have not laid and non-breeders. There was also a significant group – 100+ of white-fronted terns, but there was so sign of this species breeding at this location at this time. The December survey in previous years had recorded significant numbers of this species breeding near the black-billed gull colony.

Prior to this season, the mouth of the river has been east of the colony, however following very high flows in November 1999, the river burst out at the very western end of the lagoon and has remained there ever since. This does not appear to have had any obvious effect on the colony.

Findings:

Number of eggs per nests	Number of nests
0	175
1	349
2	1363
3	599
4	3
Chicks 1	3
Chicks 2	11
Chicks 3	1

Totals:

Nests with Eggs	2314
Nests with chicks	15
Operational nests	2329
Nests scrapes without eggs	175
Total number of nests	2504

NOVEMBER 2000

Mararoa Weir

The nests in the weir colony were at a wide range of stages in the breeding cycle. A large number of well-feathered chicks were present in the colony with an estimated 15-20% of birds still on eggs.

Lillburn

As with the October count, the only birds present in this vicinity were approximately six black-fronted terns feeding on a small reach on the true left of the river.

Lagoon

It was not possible to count the number of chicks or birds still on nests due to the detrimental effect that people walking through the black-billed gull colony could have. When disturbed at this stage of the breeding cycle, i.e. with chicks present, the chicks frequently run into the water and can be swept downstream, at the very least risking a lengthy separation from their parents and at worst being swept out to sea.

In order to minimise disturbance, the colony was observed from a boat and from the bar to the west of the colony. This enabled the colony to be observed with only minimal effect, i.e. at times the adults nearest the observers took off briefly but they quickly settled down again with no noticeable effect on the chicks.

While it was not possible to do a count of the chicks/nests, it is estimated that 5-10% of adult birds present were still on nests – presumably still with eggs or small chicks. The chicks in the colony ranged from a couple of days old to a few that had started to feather-out.

A group of 12 red-billed gull nests had been built in the middle of the black-billed gull colony. These appeared to all be on eggs and were the only red-billed gulls in the vicinity.

During this survey a large number of white-fronted terns were found on nests (an accurate count was not possible at this time given the effect on the adjoining gull colony and the indistinctive nests of the terns, making locating a nest without an adult present very difficult). The breeding terns were divided approximately in half on either side of the gulls. A count of the terns was carried out during the December survey, when the impact on breeding gulls was significantly reduced.

▪ AERIAL SURVEY of WAIAU RIVER

On 13 November an aerial survey of the Waiau was carried out from the lagoon to the weir to check for any additional gull and tern colonies. No additional colonies were located confirming that if there had been a colony at the Lillburn early in the season which had been washed out, the birds had joined other existing colonies either on the Waiau or nearby. This exercise proved invaluable for both confirming the choice of the survey sites and ensuring no at-risk colonies were omitted.

▪ DECEMBER 2000

Mararoa Weir

The majority of the nests had fledged their chicks and those that remained had congregated towards the head of the spit (close to the weir) close to the river. There were only four nests still active and as they all still had eggs, it is likely that they are re-nesting attempts. There were quite a few dead chicks present in the colony but not sufficient to raise undue alarm when compared with the number of live chicks.

Lillburn

Once again there was no sign of any gull or tern colonies at the Lillburn. As noted above, it appears that, if there was a colony this breeding season, it was washed out early on (e.g. September) and all the birds then moved to other colonies either on the Waiau or nearby rivers.

Lagoon

Black-billed gull nesting at the lagoon appears to spread out over a much greater time than at the other sites. During this survey there were chicks present, ranging from < one week old to fully feathered, along with approximately 1200 nests with eggs - which appeared to be re-nesting attempts, as most of the new nests were not at the same sites as earlier nests.

The red-billed gull nests present in November appeared to have all fledged and there was another nest along with eight adults present at another site.

The white-fronted tern nests that had been present during the November count had fledged chicks that were mostly creching around the outside of the gull colony.

In addition there were another approximately 300 new white-fronted tern nests with eggs, mostly at the west end of the gull colony.

Observation – during the surveys no black-fronted tern nesting attempts were observed at any of the survey sites, nor was any colony found during the November aerial survey.

THREATS

While high river levels can seriously impact upon the Mararoa Weir and Lillburn colonies in particular, during this survey river levels were not seen to adversely impact upon the species monitored. The possible loss of a nesting colony at the Lillburn site and the movement of the Weir colony to a higher point on the spit, may be attributable to high river/lake levels prior to this survey commencing (i.e. September). All three sites do face very real threats from vegetation, predator and human interference. These threats, and possibilities for protecting the colonies from them, are summarised below.

Mararoa Weir

Meridian Energy cleared most of the vegetation from this site during the previous year, mainly by bulldozing lupins from the spit (Colin Sinclair, pers comm, see Photo 1). This action has certainly benefited the colony as cover such as lupins encourages predators – stoats, ferrets and cats, to live in the area.

Photo 1. Lupins at Mararoa Site pre control work *(photo taken by Colin Sinclair).*

The controlled grazing of the pasture that borders the spit is probably also of benefit as it increases the open buffer around the colony, making it less attractive to predators. However, some planned plantings in this area may be beneficial.

During the November survey there was a noticeable increase in weeds on the spit, however the disturbance to the colony from carrying out a weed control programme while chicks are present in the colony, would far outweigh the benefits of removing the weeds. This is largely due to the fact that birds with chicks are very susceptible to disturbance and abandonment and the scattered nature of the plants gives only limited cover for predators. However, it will be important that a weed control programme is carried out once the colony is no longer active this season *(this has been carried out by Meridian Energy following advice from T. McClelland, Colin Sinclair pers comm).* It would be beneficial if a weed programme could include spraying of the lupins on the edge of the spit.

Predators are a real threat to this colony and a predator control programme on the edge of the colony, especially at the base of the spit, would be of benefit. A suggested control programme is outlined in the Recommendations section below. Assistance/advice for predator control could possibly come from the Southern Institute of Technology's Pest Control (Predator) programme, Environment Southland or the Department of Conservation.

Lillburn

There is a varying amount of vegetation on the "Lillburn Islands" and it would be beneficial to remove this vegetation, ideally by spraying or hand pulling, so as to reduce any cover for predators and make the site more attractive to birds.

Lagoon

This colony is at greatest risk from humans and/or associated dogs, especially during the whitebaiting season (15 August to 30 November) when there can be large numbers of people in the area. The current location of the mouth probably reduces this disturbance as access is now largely restricted to boats which generally go straight past the colony, compared with previously when access from the west end was usually by 4 wheel bike which had to go past/through the colony.

Other than via boat from the lagoon, access to the mouth from the east end is along a reasonably well defined, if temporary, 4 wheel bike track which runs mainly along the crest of the spit. During the November survey a 4-wheel bike drove past the colony on this track – the effect was minimal and only temporary, possibly in part at least due to the bike travelling at a slow speed.

Another possible source of disturbance to the colony is the presence of whitebaiters fishing in the vicinity, especially a temporary (hopefully) hut that has been built within 50 m of the colony. The effect of these whitebaiters appeared to also be minimal as they did not walk through the colony and did not rush around.

An additional, although not obvious, risk is the presence of fishermen fishing in the lagoon, especially in boats. During the November survey a single boat with two lines out was observed catching two gulls on shiny lures, both gulls were released apparently unharmed.

The location of the new river mouth should provide increased protection to the colony from predators as they now have to travel a greater distance from the base of the spit. While there is considerable cover for predators along much of the spit, the colony is distanced from the nearest significant cover.

RECOMMENDATIONS

Based on the 2000/2001 survey, the following recommendations are made:

- River information, similar to that provided to the Guardians of the Lakes – but made available on a monthly, rather than six-monthly basis (as six-monthly does not meet the time requirements of these surveys), would be of benefit when trying to determine whether river flows attribute to nesting attempt losses or locations.

- That an aerial survey be carried out for the length of the Waiau River and ideally up the tributaries, i.e., Whitestone, Mararoa and Eglinton, to identify the breeding colonies early on in the season, i.e., Sept/Oct. This would be particularly useful for locating black-fronted tern breeding sites as none were observed on the main river this season.

- To carry out additional checks on the colonies in:
  - September to check colony locations to see if colonies are lost due to high river levels etc, early in the season and monitor where these birds may re-nest.
  - January to check the final status of late breeding birds, e.g., the lagoon colony this year.

- That all spraying at the weir be carried out before September and then again after December to avoid disturbing nesting birds.

- That the colonies, especially the weir colony, not be entered when chicks are present as they will frequently go into the river and may be lost downstream.

- That the site of the weir colony continues to be subject to an intensive weed control programme – removing all vegetation on the gravel spit so as to remove cover for predators.

- That a trapping programme be put in place at the weir colony to reduce losses to predators/ monitor the potential impact of predators. This would need to be kill traps, i.e. Fenns for mustelids and Conibars for feral cats, so as to minimise the resources required to check them, i.e., kill traps need only be checked weekly while non-lethal traps need to be checked daily.

ACKNOWLEDGEMENTS:

Thanks to Colin Sinclair, Meridian Energy, for access to Mararoa Weir survey site and for his information and comments regarding the weir colony and to Nick Robertson for access to Lillburn survey site, and to the survey team of Pete McClelland and Gary Morgan.

REFERENCES:

Molloy and Davis. 1992. Ranking of New Zealand's Threatened Wildlife. *Department of Conservation.*

Sagar, P.M. 1994. Aquatic Birds of the Waiau River November 1993 and March 1994. Southland Regional Council. *NIWA Christchurch Miscellaneous Report No. 168.* 16p.

APPENDIX 1

Synopsis of the New Monitoring Programme for Birds on the Waiau River

1. Surveys to be held during October, November, December - to cover the time when birds are most vulnerable to changes in waterflow (i.e. breeding) - the post breeding (March) and winter (July) surveys to be discontinued, as the data usefulness is limited to relative presence/absence of species (and there is ample data on this now from previous surveys) and does not incorporate impacts of changes in waterflow (given birds are very mobile at these times).

2. Surveys to focus on high-priority species (in terms of national/regional significance and potential for impact upon breeding success due to changes in waterflow) such as black-billed gulls; white-fronted terns; dotterels (both banded and black-capped); black-fronted terns, rather than low-priority species such as feral geese; paradise shelduck; black-backed gull; etc.

3. Survey sites to be the known nesting sites at: Te Waewae Lagoon (both eastern and western ends); Clifden/Wairaki Reach; and the gravel areas above the Mararoa Weir, as these are the predominant breeding sites for high-priority species.

4. October survey to focus on nesting attempts (e.g. location, density, and number of nests); November survey to focus on nesting pairs (e.g. how many nests being utilised); December survey to focus on nesting success (e.g. presence of chicks).

This refinement will provide Meridian Energy and the Waiau Working Party with more specific, relevant information as to the possible impacts of activities (both natural, such as flooding; and man-induced, such as flow releases, shingle extraction, and weed encroachment and removal) on specific, high-priority avian species.

Attachment 6

SUBMISSIONS RECEIVED

Resource Consent submission

To: The Chief Executive
Environment Southland
Private Bag 90116
DX20175
Invercargill

Date	17/04/2024 14:25
Online reference number	RC240435325

Full name of submitter	Richard & Isobel Agnew
Postal address	31 Talbot Street, East Gore, Gore 9710
Contact phone number	0274314917
Email	bellarick@xtra.co.nz

Applicant details

Name of applicant	Meridian Energy Limited
Activity location	PO Box 4146 Christchurch 8140
Application number	App20233670

Submission details

My submission relates to the whole application	Yes
Details of my submission	I have read and understood the submission made by the Bluecliffs Beach Landowners Group. I agree with, and my submission endorses in full, all of the points raised in the Bluecliffs Beach Landowners Group submission.
Submission uploaded	No
I am a trade competitor of the applicant (for the purposes of section 308B of the Resource Management Act 1991)	No

Outcome sought

I wish Environment Southland to make the following decision	To oppose the application.
Why I wish Environment Southland to make this decision	I have read and understood the submission made by the Bluecliffs Beach Landowners Group. I agree with, and my submission endorses in full, all of the points raised in the Bluecliffs Beach Landowners Group submission.

Hearing details

I wish to be heard in support of my submission	Yes
I would consider presenting a joint case if others make a similar submission	Yes
I wish to be involved in any pre-hearing meeting that may be held for this application	Yes

Confirmation

I have served a copy of my submission on the applicant and I confirm all of the above information is correct

17th April 2020

SUBMISSION BY THE BLUECLIFFS BEACH LANDOWNERS GROUP (BBLG)

The Chief Executive Officer, Environment Southland, Price Street, Waikiwi, Invercargill.

SUBMISSION TO ENVIRONMENT SOUTHLAND ON BEHALF OF THE BLUECLIFFS BEACH LANDOWNERS GROUP, ON AN APPLICATION FOR RESOURCE CONSENTS BY MERIDIAN ENERGY LTD ("THE PROPOSAL")

The Bluecliffs Beach Landowners Group (BBLG) is a collective of 18 private landowners at Sections 31-51 being formerly SO6767 and Crown land Block 1 Alton Survey District, otherwise known as Bluecliffs Beach Settlement. The properties are a mixture of permanent residences and holiday homes. Currently, all of these properties are in serious danger of being eroded into the sea by the westward migration of the Lower Waiau rivermouth.

This submission is on the application by Meridian Energy Ltd [reference APP-20233670] for the following resource consents to authorise the following proposed activities:

1. A water permit under section 14 of the RMA to temporarily take, divert and use water to facilitate construction and maintenance activities, including within and in proximity to wetlands and for dewatering, dust suppression, and erosion and sediment control activities; and permanently divert surface water into the parallel channel.
2. A discharge permit under section 15 of the RMA to temporarily discharge water and suspended sediment to land and water (the Waiau Arm, Mararoa River and Lower Waiau River) for the purposes of facilitating construction and maintenance activities, including within and in proximity to wetlands and for dewatering, dust suppression, and erosion and sediment control activities.
3. Permits as required under regulation 47 of the National Environmental Standards for Freshwater (NES-F) for activities under sections 14 and 15 of the RMA, including those associated with vegetation clearance, earthworks and land disturbance, and the take, use, diversion and discharge of water, in and/or near a natural inland wetland

Location: At and around the Manapōuri Lake Control Structure, including the Waiau Arm at the confluence of the Waiau Arm and Mararoa River; at or about NZTM2000 1186068E 4935096N.

- The address for service for this submission is: Attn: Bill Chisholm, Chisholm Associates, PO Box 125, Manapouri 9643; email bill@chisholm.co.nz; Phone (027) 221 4739.
- THE SUBMITTER WOULD LIKE TO BE HEARD ON THIS SUBMISSION.
- The submitter wishes to be involved in any pre-hearing meeting that may be held for this application.
- A copy of this submission has been served on the applicant by email to: kate.berkett@meridianenergy.co.nz
- The submitter is not a trade competitor for the purposes of Section 308B of the RMA.

- The submitter is directly affected by an effect as a result of the proposed activity in the application.
- This submission OPPOSES the grant of this consent, for the following reasons:

A. Context:

The problem of accelerated erosion at Bluecliffs Beach Settlement (Bluecliffs) can be directly attributed to the alteration of the natural flow regime in the Lower Waiau River resulting from the operation of the Manapouri Power Scheme. The precise mechanism(s) by which this occurs are not well known, even after scientific and evidentiary studies. These studies, however, demonstrate that the processes causing the Bluecliffs erosion problem are related to the effects of the altered flow regime. They can be broadly categorised as follows:

1. Significant alteration of the flow regime in the Lower Waiau

In 1994, the Waiau Working Party engaged Dr Bob Kirk (a coastal geomorphologist) to assess the effects of the Manapouri Power Scheme on the Waiau River mouth. The report by Kirk and Shulmeister (1994) studied the processes which shape the movement and closure of the Waiau River mouth. It found that the most significant post-control hydrological changes affecting the river mouth system have been the substantial reduction in minimum flows in the river, and the reduction in flood flows. Lower flows had contributed to river mouth closure. However, the principal agent of river mouth closure was the combination of low flows and coastal onshore storms. Closure is most probable in the Autumn and late Winter, when these two events are most likely to coincide. River mouth movements have also reduced, and tended to move in a more westward direction in the post control period.

The findings of Kirk and Shulmeister (1994) are summarised in the subsequent ECNZ Assessment of Effects on the Environment (1996):

Long-term adjustments in rivermouth processes as a result of changes in the catchment, including hydro development, will continue. These adjustment processes may take "... in the order of 50 years" although most of the change has already occurred.

No management action can reasonably be taken which will prevent the process of rivermouth adjustment or reverse the cycle of changes initiated by hydro-electric power development in 1969.

This Assessment of Effects clearly implicates "the changes initiated by hydro-electric power development" as the causative factor in rivermouth changes. This conclusion is supported by a recent report by Tonkin & Taylor (McDowell 2024) which also states that the erosion at Bluecliffs is caused by a combination of river and coastal actions, with the Manapouri Hydro Scheme being acknowledged as a contributor.

The concern here is that further adjustments to the flow regime caused by the proposal will cause rivermouth processes to take another 50-years to reset.

2. Reduction in sediment carrying capacity

The significant reduction in flows in the Lower Waiau River has resulted in a correspondingly significant reduction in the river's ability to transport sediment of all fractions (from fine sediment to large cobbles/boulders) through the catchment to the river mouth. In essence, the river has been de-powered by the altered flow regime and this has led to circumstances culminating in the situation at Bluecliffs.

3. Reduction in sediment load

Perhaps the most damaging potential effect of the proposal is the loss of sand and finer sediment to the Lower Waiau River system. Kirk and Shulemeister (1994) describe the effects of this:

Sand loss would have a dramatic effect on mouth closure and opening because it affects percolation of water through the barrier beach. In turn this affects the head and the scouring power of the flows. It also influences the extent of mouth offsets under wave-driven longshore drift. Such textural changes are not known from other South Island River mouths though the effects of permeability are well established.

Mabin (2009 - paragraph 85) in evidence to the hearing on the Manapouri Tailrace Amended Discharge Project summarised the potential effects of that proposal on coastal geomorphic processes at Te Wae Wae Bay:

I consider that the main way in which the MTAD Regime could potentially affect the Te Wae Wae Bay coastal geomorphic environment is by reducing the volume of sediment delivered to the coast. This reduced volume of sediment could in turn lead to a change in beach sediment budgets such that coastal erosion occurs. This could cause:

a. Coastal barrier retreat or breaching;
b. Reduced or lost coastal lagoon environments; and
c. Cliff erosion.

These statements explain that reduced sediment inputs into the Lower Waiau catchment cause an alteration of lagoon and coastal processes at the river mouth. They directly implicate this as one cause of the catastrophic erosion at Bluecliffs. The huge volume of sediment trapped upstream of the MLC (and which Meridian are now seeking consent to remove) is evidence that the operation of the MLC is adversely affecting sediment budgets down river.

In summary, regardless of the unknown coastal processes/mechanism(s) by which this occurs, the situation at Bluecliffs must be considered an adverse effect of the power scheme to be avoided, remedied or mitigated by the consent holder forthwith.

B. <u>Submitter's reasons for opposition to the proposal</u>

Given the situation outlined above, and in the absence of any realistic mitigation, it is imperative that the flow and sediment regime in the Lower Waiau River is properly managed and enhanced towards a stable state, and towards its natural state, at every opportunity. Doing this will, at the very least, help prevent the Bluecliffs erosion problem from getting worse, which will in turn provide for more sustainable mitigation options.

The National Policy Statement for Freshwater (NPS-F) stresses the fundamental importance of water, and the concept of Te Mana o te Wai, which is "*about restoring and preserving the balance between water, the wider environment, and the community*".

In this context, the proposal fails to achieve this test of the NPS-F (i.e. progression towards a stable, more natural state), and is therefore considered a retrograde step.

Specific concerns are as follows:

1. The proposal does not necessarily meet the S104(D) gateway tests for non-complying activities. Section 104D(1)(a) specifies that the adverse effects of the activities on the environment will be no more than minor. Despite the reports presented with the application, this is a subjective assessment largely based on the "temporary" nature of the works. The applicant has not considered the possibility for effects to occur much further down river, for up to 50 years. This is a glaring gap in their assessment. Furthermore, the applicant seeks a 35 year consent, so these works may not be as "temporary" as assessed in Section 7 of the AEE.

Section 104D(1)(b) specifies that the activities will not be contrary to the objectives and policies of the relevant plans. An assessment of this is provided in Section 9.5 and Appendix J of the AEE. The Appendix J assessment leans heavily on this application providing an "upgrade" of the power scheme operation. This is balanced against the actual and potential adverse effects of the proposed works (for 35 years) and thereby justified as meeting this gateway test.

The AEE describes the purpose of creating a second flow channel as "to facilitate the provision of flushing flows", with difficulties with manipulating lake levels at times of low inflows being cited. However, the present situation is that the provision of flushing flows can be engineered at any time, providing lake levels are managed with this in mind. There is no absolute need to create the second channel at MLC, and the proposal appears to be more a matter of convenience than necessity.

2. Not all alternatives have been explored, as is the requirement of Schedule 4 of the RMA for activities that are likely to result in significant adverse effects on the environment. Other options include: 1) Increasing the minimum flow below the MLC to assist in transporting sediment through the MLC into the Lower Waiau River. This would also have the effect of moving the Lower Waiau River towards a more natural state. 2) Reduce the NTU limit at MLC so that less sediment-laden dirty water is diverted into the Waiau Reach. This would restore the sediment to the Lower Waiau River, and reduce the amount of sediment deposited in the Waiau Reach; thus reducing the need for ongoing dredging in this area.

3. The proposed disposal of sediment is unnatural. This sediment would have naturally flowed down the Lower Waiau River, and would have ultimately contributed to natural geohydrological processes at the rivermouth. The artificial upstream placement of this sediment on an intermittent wetland/paddock is an artificial stopgap measure which in no way mirrors natural processes. It is questionable whether this is sustainable in the long term.

4. The Assessment of Effects does not adequately assess or address all relevant matters of National Importance (s6), including:

(a) The preservation of the natural character of the coastal environment, wetlands, and lakes and rivers and their margins;

(b) The protection of outstanding natural features and landscapes from inappropriate use and development;

(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers;

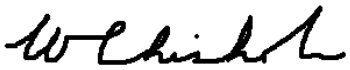
(h) The management of significant risks from natural hazards.

The impact the proposal will have on the existing environment and community at Bluecliffs is not explored by the applicant. Nor is it well-understood. It is therefore essential that the consent authority adopt a precautionary approach in making a decision on this application. The situation at Bluecliffs is an emergency, and the local Bluecliffs community is very concerned that the highly sensitive river mouth environment cannot handle any further stresses or change caused by man-made intervention up-river.

5. The 35-year consent period is excessive and does not match the description of the proposal and accompanying AEE, which states that the activities are "temporary". It is submitted that the term of this consent, if granted (although that is not our preference), should be aligned with the term of the existing power scheme consents, which expire in 2031. This would better match the "temporary" nature of the proposed works, and allow for all adverse effects to be assessed in unison when the time arises in 2031.

Relief sought: The submitter would like this application APP-20233670 to be **declined** by Council.

Yours faithfully



Bill Chisholm

For: Bluecliffs Beach Landowners Group

References:

ECNZ 1996. Manapouri Hydroelectric Power Scheme Resource Consents Renewal Project. Assessment of Effects on the Environment.

Report prepared for Waiau Working Party and Environment Southland 1996.

Kirk, R.M., Shulemeister, J. 1994. Geomorphic Processes and Coastal Change in the Lagoon System, Lower Waiau River, Southland.

Report prepared for Waiau Working Party and Environment Southland 1996.

Mabin, M.C.G. 2009. Statement of Evidence of Mark Charles Grace Mabin on Behalf of Meridian Energy Limited Geomorphology 21 August 2009.

Statement of evidence to the hearing on the Manapouri Tailrace Amended Discharge Project. 2009.

McDowell, B. 2024. Bluecliffs Beach Road Papatotara, Southland. Preliminary Hazard and Geotechnical Assessment – October 2023.

Report to Southland District Council. Tonkin & Taylor Ltd. Job No. 1092596.0000

Department of Conservation
Te Papa Atawhai

DOC Reference: NC705
DOC-7618167

19 April 2024

Southland Regional Council
c/o Bianca Sullivan
Post: corner of Price Street and North Road, Waikiwi, Invercargill
Email: resourceconsents@es.govt.nz.

Address for service: Meridian Energy Ltd
c/o Kate Berkett
Post: PO Box 4146, Christchurch 8140,
Email: kate.berkett@meridianenergy.co.nz

Dear Southland Regional Council,

Meridian Energy Ltd – Manapōuri Lake Control Structure
Publicly Notified Consent Application 20233670

I refer to the applications for a water permit, discharge permit, and permits as required under regulation 47 of the National Environmental Standards for Freshwater, by Meridian Energy Ltd in respect of the Manapōuri Lake Control Structure in and around the Waiau Arm at the confluence of the Waiau Arm and Mararoa River.

Please find enclosed a submission by the Director-General of Conservation in respect of these applications. The submission seeks that the applications as currently proposed be declined unless adequate information is obtained as to i) the effects on indigenous biodiversity, and ii) the conditions proposed (and content of any draft management plans, and any offsetting or mitigation proposals) to avoid, mitigate, or reduce adverse effects on indigenous biodiversity. The submission identifies the Director-General's concerns in greater detail.

DOC does not oppose the activity in principle, however, does oppose the application in its current form and seeks robust conditions if the consent is granted. Please contact Trevor Ellis (RM Regulatory Delivery Manager) in the first instance if you wish to discuss any of the matters raised in this submission (e-mail: trellis@dov.govt.nz).

Yours sincerely,

John Lucas
Operations Manager – Te Anau
Department of Conservation / *Te Papa Atawhai*

Department of Conservation *Te Papa Atawhai*
RMA Shared Services
Private Bag 3072, Hamilton 3240, New Zealand
www.doc.govt.nz

Form 13: Submission on application concerning resource consent

Resource Management Act 1991

To:	Southland Regional Council (the **Council**)
Name of submitter:	Penny Nelson, Director-General of Conservation (the **Director-General**)
Applicant:	Meridian Energy Ltd (the **Applicant**)
Location:	At and around the Manapōuri Lake Control Structure, including the Waiau Arm at the confluence of the Waiau Arm and Mararoa River.
Description of activity:	The application is for the following activities (reference APP-20233670): **A water permit under section 14 of the RMA** to: Temporarily take, divert and use water to facilitate construction and maintenance activities, including within and in proximity to wetlands and for dewatering, dust suppression, and erosion and sediment control activities; and permanently divert surface water into the parallel channel. **A discharge permit under section 15 of the RMA** to: Temporarily discharge water and suspended sediment to land and water (the Waiau Arm, Mararoa River and Lower Waiau River) for the purposes of facilitating construction and maintenance activities, including within and in proximity to wetlands and for dewatering, dust suppression, and erosion and sediment control activities. **Permits as required under regulation 47 of the National Environmental Standards for Freshwater (NES-F**) for activities under sections 14 and 15 of the RMA, including those associated with: Vegetation clearance, earthworks and land disturbance, and the take, use, diversion and discharge of water, in and/or near a natural inland wetland.

Trade competition: I am not a trade competitor for the purposes of section 308B of the Resource Management Act 1991

My submission relates to: The whole application.

My submission is: In principle, I am **neutral** in respect of the **proposal**, however there is currently inadequate information in the application as to: i) the effects on indigenous biodiversity, and ii) the proposed conditions (and content of any draft management plans, and any offsetting or mitigation proposals) that seek to avoid, mitigate, or reduce adverse effects on indigenous biodiversity. My submission is that **without adequate information** the **application** should be **declined** in accordance with s 104(6) of the Resource Management Act 1991. I reserve the right to alter my position once adequate information has been obtained.

The Director-General's interest in the Application:

1. The Director-General of Conservation (the **Director-General**) has all the powers reasonably necessary to enable the Department of Conservation (**DOC**) to perform its functions.[1] The Conservation Act 1987 (the **CA**) sets out DOC's functions which include (amongst other things) management of land and natural and historic resources for conservation purposes, preservation so far as is practicable of all indigenous freshwater fisheries, protection of recreational freshwater fisheries and freshwater fish habitats and advocacy for the conservation of natural resources and historic heritage.[2] Section 2 of the CA defines 'conservation' to mean *'the preservation and protection of natural and historic resources for the purpose of maintaining their intrinsic values, providing for their appreciation and recreational enjoyment by the public, and safeguarding the options of future generation*'.
2. DOC is also the authority responsible for processing applications under the Wildlife Act 1953 and the Freshwater Fisheries Regulations 1983. I understand that approvals under the Freshwater Fisheries Regulation 1983 will be required for the Proposal and must be obtained before any works commence.

Reasons for the Director-General's submission:

[1] Refer section 53 Conservation Act 1987
[2] Conservation Act 1987, section 6.

3. The Proposal is likely to have **adverse effects** on the environment with terrestrial and freshwater habitats being adversely impacted, with one wetland being permanently lost, and others altered and de-vegetated.

4. The Proposal outlined in the Application is likely to create **significant risk** to native species.

5. I consider that the site is likely to contain **significant values** and that the Application does not contain enough information on the extent of significant values within the site.

6. I am not convinced that assessment of effects is sufficient. Further, there is **inadequate information** as to the conditions (and content of any management plans) that the Applicant proposes in order avoid, remedy, or mitigate the adverse effects of the activity, or in relation to any measure/s the Applicant proposes to offset or compensate for the adverse effects on the environment that will result from the activity.

7. The decisions sought in my submission are required to ensure that, the decision-maker:

    a. recognises and provides for the matters of national importance listed in Section 6 of the Resource Management Act 1991 (the **Act**); and

    b. has particular regard to the intrinsic values of ecosystems as required in Section 7(d) of the Act.

    c. has particular regard to the National Policy Statement for Indigenous Biodiversity 2023, National Policy Statement for Freshwater Management 2020 (as amended), Southland Regional Policy Statement 2017, Southland Regional Water Plan 2010, and the proposed Southland Water and Land Plan.

Without being limited to such matters, the Director-General notes the following with respect to the Application:

8. The Applicant has provided insufficient information, and I am concerned that the proposal does not adequately:

    a. Identify and address the potential adverse effects on (including but not limited to):

        i. **Threatened and at-risk indigenous freshwater fish** including: Longfin eel (at risk – declining), lamprey (threatened-nationally vulnerable), Southern Flathead Galaxias (threatened – nationally vulnerable), Gollum galaxias (threatened – nationally vulnerable), torrentfish (at risk – declining), inanga (at risk- declining), giant kōkopu (at risk – declining), in addition to other indigenous species that are not endangered (for example, banded kokopu, redfin bully, upland bully, common bully). Freshwater fish of most concern for this activity are lamprey (based on threat status and known proximity to site), southern flathead and Gollum galaxias (based on threat status,

sensitivity to impacts of sediment and potential proximity to site) and longfin eel (known to be found within project footprint, and due to impacts of turbidity and on instream habitat quality).

ii. **Threatened and at-risk indigenous freshwater invertebrates** including: Kākahi, likely *Echridella menziesii* (at-risk – declining) within the footprint of the site.

iii. **Threatened and at-risk indigenous terrestrial biodiversity** including: black fronted terns (threatened - nationally endangered), black-billed gulls (at-risk - declining), and banded dotterel (at-risk - declining).

iv. **Threatened and at-risk indigenous flora** including: Buchanan's sedge (at-risk – declining) and indigenous vegetation in lacustrine channel areas.

v. **Wetlands**, in the project site and downstream of the site.

vi. **Instream habitat,** including the removal of gravel and alteration of habitat for spawning and larva.

vii. **Water quality,** during the construction phase, including the impacts on suspended sediment and deposited fine sediment, and consequent effects on the health, habitat, feeding, behaviour and spawning (etc.) of threatened and at-risk indigenous biodiversity.

b. Identify how the proposal will avoid, remedy, or mitigate potential adverse effects (including through appropriate and robust conditions, draft management plans, and provisions for offsetting and compensation).

In particular, the Director-General notes that further information and details as to proposed conditions are required in relation to the following issues:

9. **Presence of freshwater fish:** There is inadequate information in the Application in relation to the presence of freshwater fish above and around the Manapoūri Lake Control Structure, especially in the Waiau Arm and the tributaries where activities are proposed to be carried out. Fish records in relation to these areas are extremely limited and / or out-of-date. In particular, there is inadequate information in respect of lamprey and non-migratory galaxiids.

   Adequate and current baseline information should be obtained as to the presence of threatened and at-risk species in the area impacted, in order to properly evaluate the effects of the Proposal.

10. **Water Quality:** Proposed turbidity and exceedance levels are set at a high level (especially with regards to turbidity levels 3, 4, and 5 (160 FNU-1000 FNU)) and are set in accordance with impacts on salmonids not threated and at-risk indigenous species present in the area. The proposed levels would set exceedances in turbidity that are naturally seen in the river for only 0% to c. 1.5% of the time.

    The recommendations contained in the report prepared by NIWA should provide a basis for conditions in relation to water quality. However,

    a. *turbidity level should be re-set to protect the threatened and at-risk indigenous freshwater fauna that will be impacted;*

    b. *and / or other conditions imposed to avoid, remedy, or mitigate adverse effects, on indigenous fish species;*

    c. *conditions should address what actions must occur in the event that turbidity levels, and deposited fine sediment levels, are exceeded*.

11. The Applicant's modelling shows that there is an increased risk of phytoplankton blooms due to lower velocities in the new parallel channel (compared to the existing main and south channel) once the work is completed.

    The risk of phytoplankton blooms in the new channel should be mitigated by a regime set out in conditions for managed flow releases.

12. **Fish entrainment and impacts on fish passage:** There is the potential for fish strandings during dewatering and / or the crushing and entrainment of fish into pumps during works. The Applicant should specify how these adverse effects will be avoided, remedied, or mitigated. Further, the Applicant proposes to install a permanent culvert, but there is no confirmation that New Zealand Fish Passage Guidelines best practice will be followed, or that ongoing maintenance (in accordance with best practice) will be carried out to ensure fish passage.

    Adverse impacts on threatened and at-risk fish and kākahi should be avoided, by salvaging these species during construction. In the event that salvage is not possible for all individuals in threatened and at-risk taxa, other conditions should be imposed to avoid, remedy, or mitigate adverse effects on these species, including appropriate offsetting where possible and compensation measures. Monitoring and reporting of fish salvage should occur, in addition to continuing monitoring and reporting of freshwater fauna in the impacted areas, before, during and post-construction.
    Conditions should ensure that New Zealand Fish Passage Guidelines best practice is followed in the design and construction of any culvert, and ongoing and appropriate best practice maintenance carried out to ensure fish passage.

13. **Disturbance:** The Application states that construction activities will continue for 24 hours a day, seven days per week without cessation. Such activities will require artificial lighting and create noise and, without any daily and weekly cessation in activities, could impact upon the behaviour of threatened and at-risk birds and fish, including potential impacts on predation/feeding, and migratory cues (etc.).

    Provision should be made in conditions for daily and weekly breaks from construction activities to provide respite for threatened and at-risk species in order to minimise impacts on their behaviour, predation, and migratory cues (etc.).

14. **Spawning periods**: there is no information and / or proposal from the Applicant as to whether it will avoid construction activities and sediment disturbance, during spawning periods for threatened and at-risk species including non-migratory galaxiid and lamprey.

    Construction should be avoided during spawning periods for threatened and at-risk species, including non-migratory galaxiid and lamprey due to impacts of disturbance and sediment.

15. **Habitat loss:** The proposal will result in the permanent loss of one wetland and impact at least 12 other areas of palustrine marsh, that support some indigenous wetland species. The proposal will alter and /or de-vegetate instream and wetland areas. In particular, there is inadequate baseline information as to the ecological values of the area where the Applicant proposes to dump spoil.

    The Applicant should provide offsetting and / or compensation for the loss of a wetland, and the alteration / de-vegetation of other wetlands, that includes site rehabilitation and / or creating new or enhancing existing wetland areas. The recommendations from the Wetland Assessment report obtained by Boffa Miskell should be included in and / or form the basis for any conditions to avoid, remedy, or mitigate such effects.

16. The Applicant proposes that much of the detail as to how it will manage adverse effects will be contained in various **management plans** (including a freshwater fish management, sediment and erosion control plan, and vegetation / flora management plan). However, there are no draft management plans in the Application. As the Environment Court has now made clear:

    > We consider the time has passed when conditions of consent can be based on statements of intent as to what will be done at some time in the future. We will require greater certainty of what will occur, by when, what outcomes are to be achieved, who will be responsible and what enforcement mechanisms will be available (*Port of Tauranga Ltd v Bay of Plenty Regional Council* [2023] NZEnvC 270, [26] per Chief Environment Court Judge and Commissioners Hodges, Leijnen and Paine).

Accordingly, draft management plans should be available for review by submitters and the consent authority before any consents are granted.

17. Section 6(c) of the Act requires that all persons exercising functions and powers under it shall recognise and provide for the *protection* of areas of significant indigenous vegetation and significant habitats of indigenous fauna. As the Application does not provide sufficient information to assess the ecological values of the site, or to avoid, remedy or mitigate effects, it fails to give effect to Section 6(c) of the Act.

18. Section 7(d) of the Act requires that all persons exercising functions and powers under it shall have particular regard to the intrinsic value of ecosystems. The failure of the Application to assess potential effects on indigenous biodiversity means that the applicant is not giving effect to Section 7.

19. The Director-General's concerns have been identified following a review of the information that has been provided to date. The Director-General's submission relates to the whole Application. Additional and/or more specific concerns with respect to the Application may be identified once more adequate information has been made available to the Director-General.

Decision sought:

20. I seek the following decision from the Council:

    a) That **without adequate information** being provided as to (i) the **effects** of the proposal on indigenous biodiversity and ecosystems -including adequate ecological baseline assessments to accurately identify the values being impacted and their ecological significance- and (ii) the proposed **conditions** that will be sufficiently robust to avoid, remedy or mitigate effects on indigenous biodiversity and ecosystems, the consent authority **declines the application** in accordance with s 104(6) of the RMA;

    b) If adequate information in received and the consent authority is minded to grant the application, that it imposes **appropriate and robust conditions** to:

        a. reflect the conditions sought in this submission, and address my concerns to protect significant indigenous biodiversity and ecosystems;

        b. include any appropriate offsetting and / or compensation to address the permanent loss of habitat, wetlands, and any flora or fauna;

        c. reflect a precautionary-approach;

        d. avoid, remedy or mitigate any adverse effects of the proposal.

    c) That the terms of consents granted are reduced from the proposed 35 year-period to 15 years, to ensure that any renewals of the consents and conditions can take into account the impacts of climate change and biodiversity depletion.

I also seek such alternative and/or additional relief as may be necessary and appropriate to address my concerns.

I **do wish to be heard** in support of my submission.

If others make a similar submission, I will consider presenting a joint case with them at a hearing.

John Lucas

Operations Manager - Te Anau

Department of Conservation *Te Papa Atawhai*

Acting pursuant to delegated authority on behalf of Penny Nelson, Director-General of Conservation

Date: 19th April 2024

Note: A copy of the Instrument of Delegation may be inspected at the Director-General's office at Conservation House Whare Kaupapa Atawhai, 18/32 Manners Street, Wellington 6011

Address for service:

Attn: Trevor Ellis, RM Regulatory Delivery Manager

Department of Conservation

RMA Shared Services

Private Bag 4715

Christchurch Mail Centre

Christchurch 8140

Email: trellis@doc.govt.nz

GUARDIANS OF LAKES
MANAPOURI, MONOWAI & TE ANAU

Name of applicant **– Meridian Energy Limited**

Activity location address of consent you are submitting on **- Waiau River**

Application number **– APP 20233670**

Submission details
Our submission relates to the whole application.

The Guardians of Lakes Manapouri, Monowai and Te Anau are not a trade competitor of the applicant as described in section 308B of the Resource Management Act 1991)

Outcome sought
The Guardians are Neutral to the proposal subject to a number of concerns being carried into the consent decision.

Hearing details
I wish to be heard in support of my submission - Yes

I wish to be involved in any pre-hearing meeting that may be held for this application – Yes.

We will serve a copy of my submission on the applicant.

Background to submission
The Guardians of Lakes Manapouri, Monowai and Te Anau (The Guardians) are appointed under Section 6X of the Conservation Act (1987) and our functions include:

> "*to make recommendations to the Minister on any matters arising from the environmental, ecological, and social effects of the operation of the Manapouri-Te Anau hydroelectric power scheme on the townships of Manapouri and Te Anau, Lakes Manapouri and Te Anau and their shorelines, and on the rivers flowing in and out of those lakes, having particular regard to the effects of the operation on social values, conservation, recreation, tourism, and related activities and amenities" (s.6X (2a)) and*
>
> *"to make to the Minister, and to the Minister responsible for the administration of the Manapouri-Te Anau Development Act 1963, recommendations on the operating guidelines for the levels of Lakes Manapouri and Te Anau, for the purposes of section 4A of that Act" (s.6X(2c)).*
>
> *The purpose of the lakes' operating guidelines is as detailed in s.4A (1) of the Manapouri-Te Anau Development Act 1963, being "to protect the existing patterns, ecological stability, and recreational values of their vulnerable lakeshores and to optimise the energy output of the Manapouri power station*."

The Guardians take our legislated responsibilities very seriously and have collectively become increasingly concerned about the ecological health of the shorelines of Lakes Manapouri and Te Anau over recent years, particularly in relation to their lakeshore vegetation sequences, and the ecological stability of their distinctive and characteristic vegetation zonation patterns. Our concerns also extend to the ecological health of the Waiau Arm and the Lower Waiau River.

In addition, the Guardians enjoy a strong social licence to speak on behalf of the Waiau catchment communities. Those communities expect us to advocate in consenting matters that have a direct impact on the water quality and quantity of the Waiau River. Councils and other organisations consider the Guardians have a clear role in the consenting process, and as a result are afforded affected party status over a number of activities in the catchment. The Guardians consider they are an affected party to this proposal.

Submission

The Guardians understand that the reason for constructing a channel that will deliver only 70% of the flushing flows to the Lower Waiau River (LWR) is that, currently, the Waiau Arm channel is the factor limiting the delivery of flushing flows, such that only 30% can be delivered. With construction of the parallel channel, the channel will no longer be the limiting factor and the sill level of the MLC is what will limit the flushing flows - hence 70% flow delivery, not 100%.

Whilst the AEE and supporting documents are not clear on this matter, we seek clarification from the applicant on this point, and the implications of this shortfall should our understanding be correct.

Proposed Term of Consent

The Guardians are uncomfortable with the 35 year term promoted by the applicant. This is even more pronounced given the introduction of FMU's to the catchment and the consent renewal process for the Manapouri Scheme in the coming years.

We consider a shorter term aligning with the existing consents in December 2031 would be appropriate. This will allow a full review of the scheme and its effects on the entire catchment, rather than a piecemeal approach to consenting.

Water Quality - Turbidity

The proposed turbidity allowances are outlined in the AEE and in the NIWA Freshwater Ecology AEE (Appendix D, page 7, Executive Summary) where we read that the turbidity thresholds and durations will be nested.

For example, the turbidity threshold of 12.4 FNU will have a total exceedance allowance of 945 hours (+/- 39 days) with a maximum consecutive exceedance allowance of 315 hours (+/- 13 days), and for increasing thresholds of turbidity there are progressively shorter duration allowances for exceedance - both "total" and "consecutive" exceedance hours. The Guardians consider this is appropriate and is supported.

However, there is no minimum interval proposed between the consecutive exceedances. Only three exceedances of maximum consecutive duration will be allowed within the total exceedance allowance at each turbidity level. We consider there is benefit in applying a minimum permitted interval between exceedance events. To illustrate, for an exceedance of say 13 days at 12.4 FNU, followed by an interval of just one day, or two or three, before a further exceedance event, would not allow much respite for ecosystem recovery. We encourage an ecologically-referenced minimum interval should apply. Preferably, this minimum interval should be a ratio such as 3:2, such that it

could be scaled down to apply proportionately to a consecutive exceedance of a shorter period (eg a 12 day exceedance requires a 8-day interval).

Deposited Fine Sediment
There is also a proposed Deposited Fine Sediment (DFS) threshold (p 7 of Appendix D), where the DFS exceedance allowance is "an increase of no more than 20% cover on the baseline value ... at the start of excavation, based on a rolling 4-week average of weekly observations [at the Waiau River monitoring site upstream of Excelsior Creek]."

Appendix D, p 24 then records that a turbidity of 30 FNU for 37 hours is sufficient to cause an increase in Deposited Fine Sediment (DFS) of 20% cover. However, the proposed turbidity threshold for 30 FNU is a total exceedance of 504 hours (21 days), with a maximum consecutive exceedance of 168 hours (7 days) (see p 7 of Appendix D).

The Guardians are uncertain with these calculations, and encourage the applicant to provide further context. The same report telling us on the one hand that the DFS threshold can be reached in as little as 37 hours at 30 FNU, whereas the maximum consecutive exceedance allowance for 30 FNU will be 168 hours (7 days) - ie 454% of the duration known to cause a DFS increase of 20% cover.

Regarding the DFS monitoring site, currently located just upstream of Excelsior Creek in the Waiau River, consideration needs to be given to shifting this site to downstream of Excelsior Creek for the duration of the project. The rationale for this is given on p 28 of Appendix D, where about 20% of DFS surveys have been missed due to elevated river levels, where high flows cause a lack of access due to channel geometry. "At the downstream site the river is much wider and a boulder /cobble bank slopes gradually into the water, so that some part of the river bed is accessible under a wide range of flows" (Appendix D, p 28).

The Guardians suggest the DFS monitoring site being shifted to downstream of Excelsior Creek for the duration of the project.

Phytoplankton Blooms
The risk of phytoplankton blooms developing in the Waiau Arm is considered in terms of both the duration of the project (Appendix D p 55), as well as the longer term situation following excavation of the new parallel channel (Appendix D p 55, plus Appendix E).

Firstly, during the project the application notes "Directing all Mararoa water flow down the LWR during the excavation activities may increase the phytoplankton blooms farther upstream in the arm [due to reduced water velocity]," although we are advised that "the increased risk is likely to be small compared to the risk under typical summer conditions."

Appendix D goes on to say that "In any event, Meridian's usual summer monitoring in the Waiau Arm is designed to pick up warning signs of developing blooms. If blooms are detected, mitigation could be implemented (eg a flushing flow)".

We understand the applicants "usual summer monitoring" is currently under review, due to concerns raised by stakeholders (the Waiau Working Party and the Guardians) that there were instances during both the 2021/22 and 2022/23 monitoring seasons where warning signs of reduced water clarity and increasing chlorophyll a levels were detected and no mitigation action (ie flushing flows) was implemented. (To date the Waiau Arm water quality results of the 2023/24 monitoring season are not available to stakeholders, as the reporting does not occur in real time.)

A review of the Waiau Arm water quality monitoring plan has been requested, seeking increased integration of Waiau Arm flows (direction and magnitude / intensity) in anticipating poor water quality events, as well as more clarity over threshold trigger levels, including an appropriate

chlorophyll a trigger level, and development of a clearer decision-making matrix to ensure that where "mitigation could be implemented (eg a flushing flow)," such mitigation will be implemented, as appropriate.

The Guardians consider the current "usual" summer monitoring programme for Waiau Arm water quality is not satisfactory and it should be a condition of consent for the present application to update and enhance the water quality monitoring programme along the lines just outlined, to the satisfaction of all stakeholders involved.

Ongoing risks of phytoplankton blooms
(ref Appendix D)

Following the completion of the excavation project, the AEE states that "once the breakout excavations are completed, water velocities are expected to be lower in the Waiau Arm just upstream of MLC than those experienced in the current channels," such that "Decreased water velocity in the channels following the Project could increase the risk of development of high levels of phytoplankton in this part of the Waiau Arm."

This is a particular concern because it appears that the post-project plan is to rely on the current Waiau Arm water quality monitoring programme, which has already been identified by stakeholders as deficient in its provisions and unfit for present purposes, let alone the increased risk of phytoplankton blooms developing in this part of the Waiau Arm post-project.

In response to the increased risk, post-project, of elevated chlorophyll a levels leading to phytoplankton blooms, at least one additional water quality monitoring site should be added to the current suite of monitoring sites, and this should be set up in the vicinity of the existing channels, and closer to the MLC, than is the case for the current monitoring sites.

Additionally, the Waiau Arm flow data should be integrated into a predictive model for poor Waiau Arm water quality; there should be clearer water quality trigger levels, particularly the incorporation of a chlorophyll a trigger threshold; plus a more proactive decision-making matrix should be developed such that when mitigation measures are indicated (ie flushing flows) they will be delivered in a timely manner.

On page 55 of Appendix D the authors go on to say that the increased risk of phytoplankton blooms in the Waiau Arm in the vicinity of the MLC "is likely to be offset by the release of more effective flushing flows during summer than are possible at present".

There is nowhere in the AEE that confirms whether this assertion has been tested, and it needs to be tested. There will only be an additional 40% increase in flushing flow capability and it is unclear if this will be sufficient to offset the increased risk of phytoplankton blooms as no analysis is given. Whilst a step up from 30% capability to 70% presents a 133% increase (i.e 40÷30x100) which initially appears significant, the Guardians would prefer the applicant to achive a 100% flow, a 233% increase (being 70÷30x100).

Appendix E
Appendix E (NIWA's Assessment of risk of phytoplankton blooms in the Waiau Arm immediately upstream of the MLC following excavation of a new parallel channel) focuses mainly on velocity changes (reductions) in the existing (main and south) channels following the excavation of a new parallel channel, and finds that velocities will likely be reduced across a range of lake levels, leading to increasing risk of elevated chlorophyll a levels and associated phytoplankton blooms, with three to five times the number of days under high risk conditions expected (Appendix E, p 5).

Temperature effects, temperature stratification and expected shallower water in the three channels vs two channels are mentioned on p 18 of Appendix E, with reference also made to s3.3.1

on p 12 and Figure 3.1 on p 13 regarding temperature effects on chlorophyll a levels. Although not subjected to any detailed analysis in the report, these factors are expected to exacerbate the effects of reduced flow velocities and to increase even further the risk of elevated chlorophyll a levels and associated phytoplankton blooms. Further potential effects on chlorophyll a levels, due to increasing light penetration in shallower water, are not considered.

We note that Table 4.1 on p 18 indicates the increased risk of elevated chlorophyll a levels based on water velocities only - and it is on this basis that three to five times the number of days under high risk conditions are expected - without considering the possible exacerbating effects of increased water temperatures, increased light penetration and shallower depth of channels.

A summary of the effects assessment is given on p 19 of Appendix E, and this reiterates that "the chlorophyll a - velocity relationship suggests substantial increased risk of phytoplankton blooms over the risk in the existing channels. The predicted number of days per year under high risk of phytoplankton blooms in the post-excavation main and south channels was three to five times higher than that predicted for the existing main and south channels."

"Modelled water depth (averaged across the channels) is less than 2.5m in the parallel channel option. The shallow depths ... could increase the risk to more than that suggested by water velocity alone, because of the risk of warmer temperatures at times. While the existing channels are even shallower [than <2.5m], the effect of temperature would enhance phytoplankton growth only when velocities are low: if phytoplankton is continuously washed downstream it cannot accumulate to form blooms".

Whilst we agree with the author, regarding both the risks and the mitigating effects of continuous washing downstream to prevent the accumulation of phytoplankton, there is no indication that the applicant would agree to any such continuous washing downstream.

The author then goes on (on p 21) to assess the effect of the proposed enhanced flow releases as follows –

> "*Following excavation of the proposed parallel channel the increased risk of phytoplankton blooms in all three channels will be reduced by managed flow releases that are part of current flow management in the LWR. Potentially useful flow releases are the larger flushing flows for periphyton management [a total of up to 70% of just 4 - 5 flows per year will be provided, vs 30% at the moment, ie an increase of just 40%], and the smaller [monthly] recreational flow releases."*

There appears to be no analysis of whether this actual number of flows - which are infrequent, of intermittent timing (periphyton flows), and for purposes other than removing phytoplankton - will be sufficient to ensure the frequency of "downstream washing" of phytoplankton necessary to avoid the build-up of blooms. Such "downstream washing" as does occur will certainly not be continuous.

We promote a separate condition of consent is required relating to specific chlorophyll a and phytoplankton thresholds for the Waiau Arm. We consider the current Waiau Arm water quality monitoring programme is not serving its current purpose to the satisfaction of stakeholders - and is under review - let alone serving the increased demands of an increased risk of elevated chlorophyll a levels and associated phytoplankton blooms. A fully revised, updated, upgraded and appropriately tailored Waiau Arm water quality monitoring and mitigation plan needs to be provided as a condition of consent.

Longfin eels
There is a recommendation on p 9 (Executive Summary) and p 60 of Appendix D of "ensuring the instream excavation phase of the Project does not commence until after mid-March to avoid effects on upstream migrating juvenile eels (elvers)."

The current longfin eel trap and transfer programme is a credit to the applicant and it is important that all measures are taken to avoid any adverse effects on this "At Risk - Declining" species. The Guardians support this approach.

Also, the provision of a fish salvage programme for any site-attached longfin eels in the Waiau Arm should be endorsed (see p 8 (Executive Summary) and p60 / 61 of Appendix D).

Kaakahi
Similarly, a salvage programme should be arranged for any kaakahi (At Risk - Declining) present in the project disturbance area (p 61, Appendix D).

Buchanan's sedge
Several plants of Buchanan's sedge (At Risk - Declining) were identified in the artificially constructed, former eastern channel of the Mararoa delta (Appendix F, p23), also in Wetland 8 and some lake margin areas (Appendix F, p 24) where they are under threat from the excavation work. Pages 50 / 51 recommend that <10 of these plants will need to be removed and transplanted to "a suitable area of lacustrine habitat within the Project site, as well as follow-up monitoring of survival and replacement planting (if required)."

We consider the suggested mitigation seems a bit haphazard and risky. Given their threat status and limited number of plants identified for transplanting this may be insufficient intervention to secure this population. A more active approach to ensure survival of the population is encouraged. This would be to collect seed from these plants prior to disturbance and to germinate the seed and raise plants in an off-site nursery area for later rehabilitation of the site. This could be additional to the transplanting and follow-up of transplanted specimens: it offers a more proactive way of ensuring the species' survival at this site than the "wait and see' approach proposed.

Stonecrop (*Sedum acre*)
The species list in Appendix A of Appendix F records the presence of the dicot. herb, stonecrop (*Sedum acre*). This exotic species can regenerate from very small fragments and has been the subject of an intensive eradication programme from the roadside gravels of the Te Anau basin (by people who have since retired - not sure of the DOC succession plan).

DOC and ES will likely be very interested to know of its presence in the proposed work site, and may prefer to initiate an eradication plan prior to works commencing - especially as there is an intention of setting some gravel material aside for use by local contractors (a potential source of further spread).

The Guardians welcome the opportunity to engage with the applicant in a pre-hearing meeting presuming the Council considers this would be beneficial.

Darryl Sycamore
For the Guardians of Lakes Manapouri, Monowai & Te Anau

SUBMISSION FORM

Submission on a Notified or Limited Notified Application for a Resource Consent

environment SOUTHLAND REGIONAL COUNCIL
Te Taiao Tonga

To: The Chief Executive
Environment Southland
Private Bag 90116
DX YX20175
Invercargill

I: Victoria Caseley

(Name(s))

of: Landcorp Farming Limited

(Address)

at: 021763620 *(Phone)* None *(Fax)* caseleyv@landcorp.co.nz *(E-mail)*

Wish to SUPPORT / OPPOSE / submit a NEUTRAL submission on (*circle one*) **the application of:**

Name: Meridian Energy Limited

And/or Organisation:

Application Number: APP-20233670 Location: At and around the Manapouri Lake Control Structure

My reasons for my submission are*: (State the nature of your submission and give clear reasons. Continue on attached pages if necessary)*

The proposed works will create actual or potential adverse noise and dust effects for Landcorp Farming Limited staff residing at 167 Duncraigen Road and 567 Weir Road.

The application does not provide sufficient detail to assess these actual or potential effects. It is not clear from the application:

1. The level and direction of traffic movements both to/from the site and within the site.
2. How the spoil disposal area will be cleared and material will be deposited, the maximum disposal area be exposed at any one time, in which direction the works will progress across the disposal area, how the spoil disposal area will be revegetated/restored.
3. How dust will be monitored and managed for the site, including across the haul road, spoil disposal area, temporary bunds and the excavation area.

Landcorp Farming Limited acknowledges the intention is to complete the excavation works in as short a timeframe as possible but note the full project timeframe is expected to be 10 months from establishment to disestablishment and rehabilitation.

I wish the Council to make the following decision *(Give precise details, including the nature of any conditions sought)*

Impose conditions requiring a noise management plan and dust management plan to be prepared and agreed with Landcorp Farming Limited prior to any works commencing. The plans must address actual and potential adverse effects arising from noise and dust on 164 Duncraigen Road and 567 Weir Roadand set out how how they are to be avoided, remedied or mitigated.

The plans must include, but not be limited too:

- hours of operations
- vehicle movements both to/from the site and around the site
- noise monitoring and control methods to be used
- methodology for clearing the disposal area and depositing dredged material and other material
- maximum area of exposed soil
- revegetation/restoration programme of exposed soil
- dust monitoring and control methods to be used.

I, am/am not *(choose one)* a trade competitor* of the applicant (for the purposes of Section 308B of the Resource Management Act 1991).

**If trade competitor chosen, please complete the next statement*, *otherwise leave blank*

I, am/am not *(choose one)* directly affected by an effect as a result of the proposed activity in the application that:

(a) adversely affects the environment; and

(b) does not relate to trade competition or the effects of trade competition.

I, do/do not *(choose one)* wish to be heard in support of my submission.

I, do/do not *(choose one)* wish to be involved in any pre-hearing meeting that may be held for this application.

I have served a copy of my submission on the applicant. ☑ Yes ☐ No

Signed _____ **Date** 12/04/24

If you have any queries about this form or its purpose, please contact the Consents Division of Environment Southland (03) 211 5115 or 0800 76 88 45.

Notes:

1. This submission will become publicly available information.
2. The person making this submission must send a copy to the applicant as soon as reasonably practicable after serving Environment Southland.
3. A list of all submissions received will be provided to the applicant.
4. Please be aware that third parties may request a copy of submissions received and that request is subject to the Local Government Official Information and Meetings Act 1987.

Resource Consent submission

To: The Chief Executive
Environment Southland
Private Bag 90116
DX20175
Invercargill

Date	17/04/2024 14:54
Online reference number	RC240435572

Full name of submitter	Glenn Puna
Postal address	16 Willis Street, Gore 9710
Contact phone number	032087615
Email	principal@goremain.school.nz

Applicant details

Name of applicant	Glenn Puna
Activity location	5 Bluecliffs Beach Road, RD 1, Tuatapere 9691
Application number	APP-20233670

Submission details

My submission relates to the whole application	Yes
Details of my submission	The acceleration of erosion at Bluecliffs Beach Road can be directly attributed to the alteration of the natural flow regime in the Lower Waiau River resulting from the operation of the Manapouri Power Scheme. This power scheme has altered the natural flow of the Waiau River and affected the way in which the gravel bar at Bluecliffs is replenished. The sediment and gravel that used to come down the river is now not coming

	down the river which is why the erosion over the last few years is taking place. The erosion at Bluecliffs is river erosion not sea erosion.
Submission uploaded	No
I am a trade competitor of the applicant (for the purposes of section 308B of the Resource Management Act 1991)	No

Outcome sought

I wish Environment Southland to make the following decision	To oppose the application.
Why I wish Environment Southland to make this decision	Submitter's reasons for opposition to the proposal Given the situation outlined above, and in the absence of any realistic mitigation, it is imperative that the flow and sediment regime in the Lower Waiau River is properly managed and enhanced towards a stable state, and towards its natural state, at every opportunity. Doing this will, at the very least, help prevent the Bluecliffs erosion problem from getting worse, which will in turn provide for more sustainable mitigation options. The National Policy Statement for Freshwater (NPS-F) stresses the fundamental importance of water, and the concept of Te Mana o te Wai, which is "about restoring and preserving the balance between water, the wider environment, and the community". In this context, the proposal fails to achieve this test of the NPS-F (i.e. progression towards a stable, more natural state), and is therefore considered a retrograde step. Specific concerns are as follows: 1. The proposal does not necessarily meet the S104(D) gateway tests for non-complying activities. Section 104D(1)(a) specifies that the adverse effects of the activities on the environment will be no more than minor. Despite the reports presented with the application, this is a subjective assessment largely based on the "temporary" nature of the works. The applicant has not considered the possibility for effects to occur much further down river, for up to 50 years. This is a glaring gap in their assessment. Furthermore, the applicant seeks a 35 year consent, so these works may not be as "temporary" as assessed in Section 7 of the AEE. Section 104D(1)(b) specifies that the activities will not be contrary to the objectives and policies of the relevant plans. An assessment of this is provided in Section 9.5 and Appendix J of the AEE. The Appendix J assessment leans heavily on this application providing an "upgrade" of the power scheme

operation. This is balanced against the actual and potential adverse effects of the proposed works (for 35 years) and thereby justified as meeting this gateway test.
The AEE describes the purpose of creating a second flow channel as “to facilitate the provision of flushing flows”, with difficulties with manipulating lake levels at times of low inflows being cited. However, the present situation is that the provision of flushing flows can be engineered at any time, providing lake levels are managed with this in mind. There is no absolute need to create the second channel at MLC, and the proposal appears to be more a matter of convenience than necessity.
2. Not all alternatives have been explored, as is the requirement of Schedule 4 of the RMA for activities that are likely to result in significant adverse effects on the environment. Other options include: 1) Increasing the minimum flow below the MLC to assist in transporting sediment through the MLC into the Lower Waiau River. This would also have the effect of moving the Lower Waiau River towards a more natural state. 2) Reduce the NTU limit at MLC so that less sediment-laden dirty water is diverted into the Waiau Reach. This would restore the sediment to the Lower Waiau River, and reduce the amount of sediment deposited in the Waiau Reach; thus reducing the need for ongoing dredging in this area.
3. The proposed disposal of sediment is unnatural. This sediment would have naturally flowed down the Lower Waiau River, and would have ultimately contributed to natural geohydrological processes at the rivermouth. The artificial upstream placement of this sediment on an intermittent wetland/paddock is an artificial stopgap measure which in no way mirrors natural processes. It is questionable whether this is sustainable in the long term.
4. The Assessment of Effects does not adequately assess or address all relevant matters of National Importance (s6), including:
(a) The preservation of the natural character of the coastal environment, wetlands, and lakes and rivers and their margins;
(b) The protection of outstanding natural features and landscapes from inappropriate use and development;
(d) The maintenance and enhancement of public access to and along the coastal marine area, lakes and rivers;
(h) The management of significant risks from natural hazards.
The impact the proposal will have on the existing environment and community at Bluecliffs is not explored by the applicant.
5. The 35-year consent period is excessive and does not match the description of the proposal and accompanying AEE, which states that the activities are “temporary”.

Relief sought: The submitter would like this application APP-

20233670 to be declined by Council.

Hearing details

I wish to be heard in support of my submission	Yes
I would consider presenting a joint case if others make a similar submission	Yes
I wish to be involved in any pre-hearing meeting that may be held for this application	Yes

Confirmation

I will serve a copy of my submission on the applicant and I confirm all of the above information is correct

SUBMISSION FORM

Submission on a Notified or Limited Notified Application for a Resource Consent

To: The Chief Executive
Environment Southland
Private Bag 90116
DX YX20175
Invercargill

✉: esconsents@es.govt.nz

I: Fiona Black

(Name(s))

of: Real Journeys Limited, 14 Captain Roberts Road, Te Anau 9600 / P.O. Box 1, Te Anau 9640

(Address)

at: 0274912087 *(Phone)* ____ *(Fax)* Fiona.Black@realnz.com *(E-mail)*

Wish to ~~SUPPORT / OPPOSE /~~ submit a NEUTRAL submission on (*circle one*) **the application of:**

Name: Kate Berkett

And/or Organisation: Meridian Energy Limited

Application Number: APP-20233670

Location: Lower Waiau River and Mararoa River; specifically at and around the Manapōuri Lake Control Structure, including the Waiau Arm at the confluence of the Waiau Arm and Mararoa River at or about NZTM2000 1186068E 4935096N.

My reasons for my submission are*:*

Real Journeys Limited obtained two resource consents AUTH-20222195-01 (Land Use) and AUTH-20222195-02 (Discharge Permit) to enable the establishment and use of a temporary slipway on the bed and shoreline of the Lower Waiau River. Real Journeys Limited also has a licence agreement with Meridian Energy Limited which gives Real Journeys non-exclusive access to Meridian Energy land and access tracks adjacent Manapōuri Lake Control Structure for establishment and use of this temporary slipway.

This slipway was to be installed and used periodically as required (1x in 2022), to slip Real Journeys Lake Manapouri catamarans to undertake out of water, vessel surveys and maintenance. Typically Real Journeys undertakes this out of water survey and maintenance work on a three yearly cycle, however we are still subject to our Marine Surveyor's stipulations which can require a more frequent out of water vessel inspection.

The requirement to utilise this the Lower Waiau Arm site has recently increased because the remedial work undertaken along the Lower Waiau River banks from Pearl Harbour to Home Creek has narrowed the Home Creek slipway making it too narrow to haul out our smaller Lake Manapouri catamaran (*Fiordland Flyer*) at the Home Creek slipway.

Further the provisions of the current Fiordland National Park Management Plan make the development of a new slipway (with road access) large enough to accommodate Real Journeys Lake Manapouri catamarans very difficult.

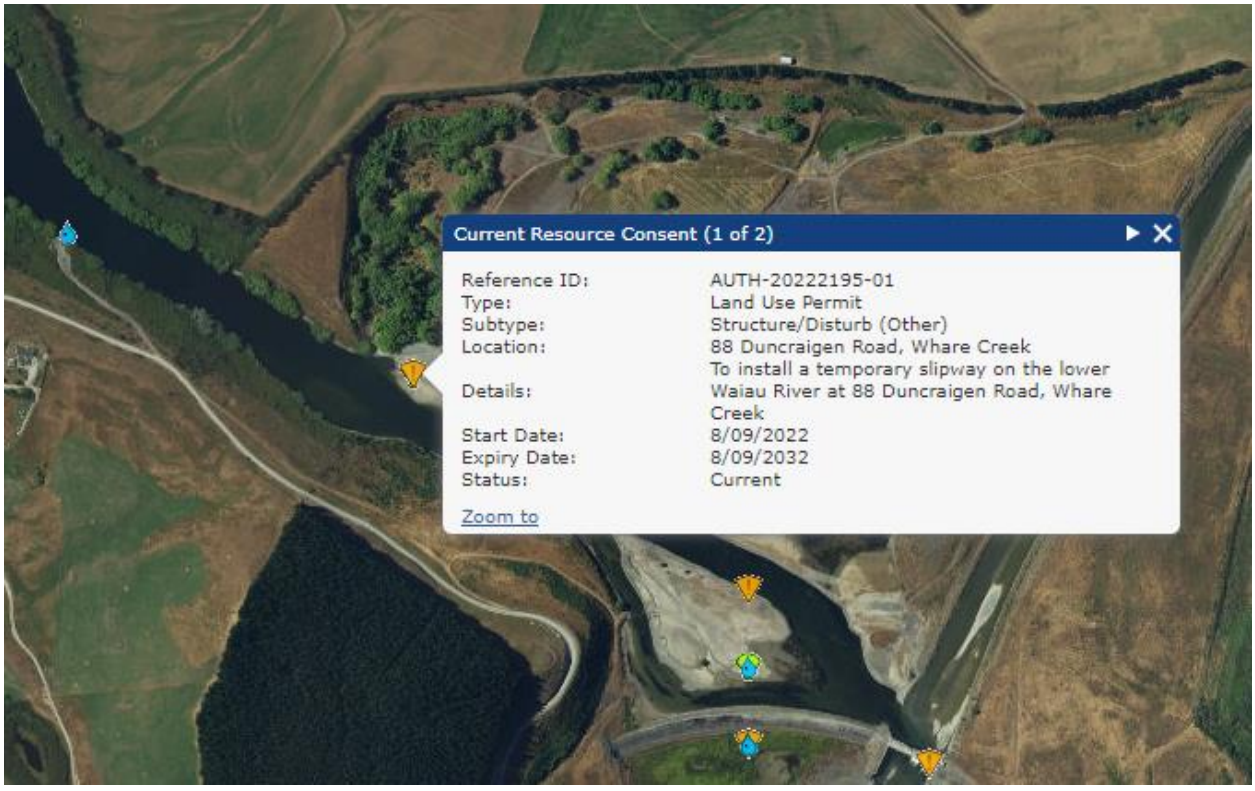
Also the ramp at Supply Bay on Lake Manapouri is too steep to slip vessels and is often unusable due to low lake levels. In 2017 Real Journeys established a temporary slipway at West Arm. However this was within the Fiordland National Park and required all the gear used to establish a slipway and slip a vessel to be transported by barge to and from West Arm making such a slipway project expensive, logistically challenging and not desirable given the National Park status. Accordingly in 2022 we hit on the idea of utilising a site on the Lower Waiau River (where the *Titiroa* was launched) to establish a temporary slipway as and when required.

Real Journeys operates vessels on Lake Manapouri to transport visitors to and from Deep Cove Taipaririki to enable our Doubtful Sound / Patea and Southern Fiords cruise operations. Real Journeys operates larger vessels (catamarans) on Lake Manapouri to reduce the number of vessel movements across the lake to mitigate the overall effects of our Lake Manapouri-Doubtful Sound Patea operation including fuel burn. Accordingly Real Journeys does not deem it practicable to operate more smaller vessels (that can be slipped at Home Creek) on Lake Manapouri, consequently Real Journeys requires a site to slip the company Lake Manapouri catamarans: *Fiordland Flyer* and *Titiroa*.

The location where this temporary slipway is authorised under AUTH-20222195-01 and AUTH-20222195-02 can be established, is directly affected by Meridian Energy Limited's proposed Manapōuri Lake Control Improvement Project – refer figure 1. Specifically the proposed new parallel channel cuts through the location where the temporary slipway can be established, making the site where the temporary slipway can be installed unusable for that purpose.

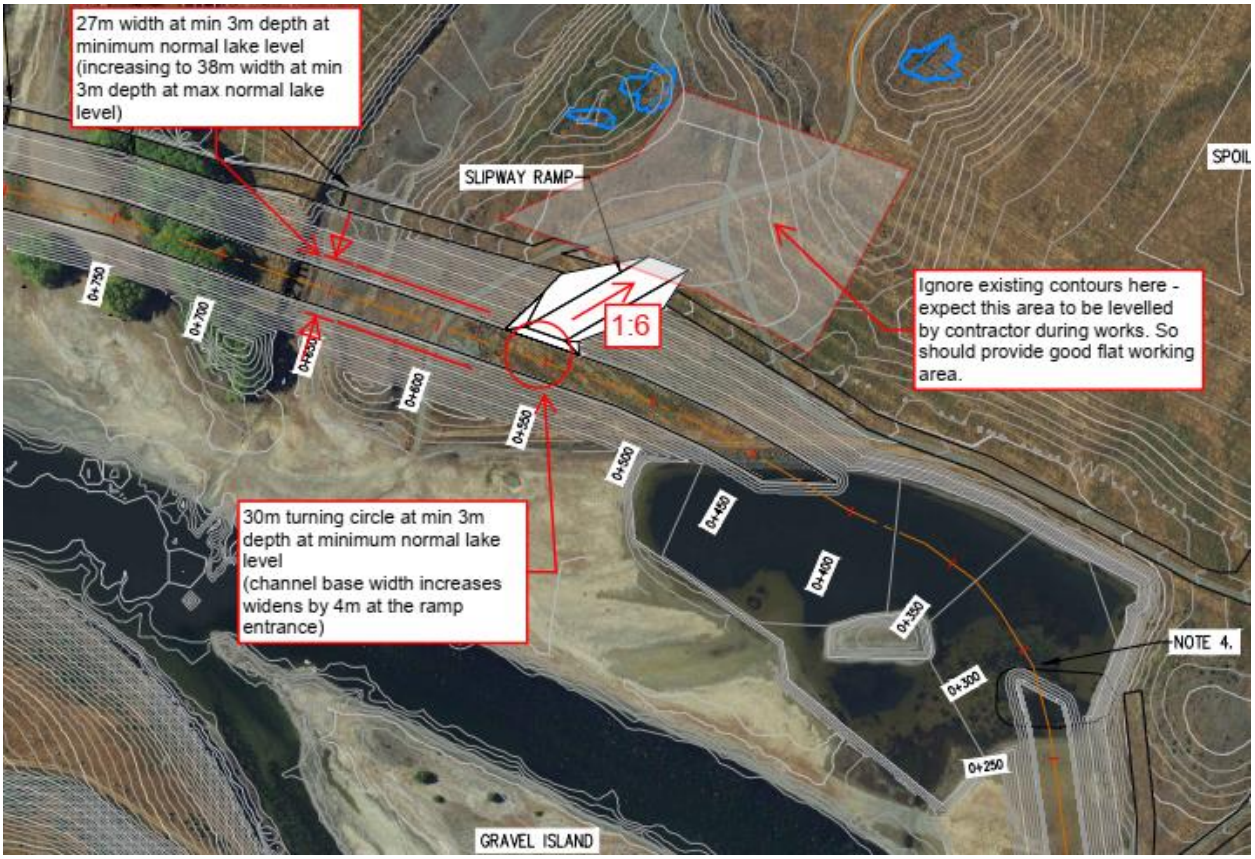
As a consequence Meridian Energy has proposed an alternative location for Real Journeys temporary slipway and a slipway ramp site (with road / track access) has been incorporated into the Project design – refer Figure 6.7 in Damwatch Construction Methodology report, drawing numbers E2243-102 Waiau Arm Channel Excavation Concept Design Excavation Plan, and E2243_108_REHABILATION SITE PLAN (slipway markup) and the drawing segment below; figure 2.

Figure 1. Aerial view showing the location where Real Journeys temporary slipway can be established[1]



[1] https://maps.es.govt.nz/index.aspx?app=consents

Figure 2. Drawing Number E2243_108_REHABILATION SITE PLAN (slipway markup)



I wish the Council to make the following decision *(Give precise details, including the nature of any conditions sought)*

Despite being outside the overall intent of the Meridian Energy Proposed Manapouri Lake Control Improvement Project, Real Journeys Limited wishes to ensure that the "Slipway Ramp" shown in Figure 6.7 in Damwatch Construction Methodology report and drawing # E2243_108_REHABILATION SITE PLAN (slipway markup) is authorised under the resource consents sought by Meridian Energy Limited. Noting that the top of the proposed slipway ramp is to be located at: NZTM 2000 Easting: 1185932; Northing: 4935392.

Real Journeys specifically requires this "Slipway Ramp" be provided for in the scope of the resource consents sought by Meridian Energy Limited as Real Journeys requires a site to slip our Lake Manapouri catamarans to maintain our vessels in safe and compliant operating order. Noting that Real Journeys will still need to seek variations to resource consent numbers AUTH-20222195-01 and AUTH-20222195-02 to provide for the establishment and use of a temporary slipway at the site of the proposed "Slipway Ramp" as shown in figure 2 above.

I, ~~am~~/am not *(choose one)* a trade competitor* of the applicant (for the purposes of Section 308B of the Resource Management Act 1991).
**If trade competitor chosen, please complete the next statement, otherwise leave blank*

I, am~~/am not~~ *(choose one)* directly affected by an effect as a result of the proposed activity in the application that:
(a) adversely affects the environment; and
(b) does not relate to trade competition or the effects of trade competition.

I, do~~/do not~~ *(choose one)* wish to be heard in support of my submission.

I, do~~/do not~~ *(choose one)* wish to be involved in any pre-hearing meeting that may be held for this application.

I have served a copy of my submission on the applicant. ☑ Yes ☐ No

Signed _____ **Date:** 11 April 2024

If you have any queries about this form or its purpose, please contact the Consents Division of Environment Southland (03) 211 5115 or 0800 76 88 45.

Notes:

1. This submission will become publicly available information.
2. The person making this submission must send a copy to the applicant as soon as reasonably practicable after serving Environment Southland.
3. A list of all submissions received will be provided to the applicant.
4. Please be aware that third parties may request a copy of submissions received and that request is subject to the Local Government Official Information and Meetings Act 1987.

Resource Consent submission

To: The Chief Executive
Environment Southland
Private Bag 90116
DX20175
Invercargill

Date	17/04/2024 15:13
Online reference number	RC240435644

Full name of submitter	Ian & Joan Redpath
Postal address	33 Bluecliffs Beach Road, RD 1, Tuatapere 9691
Contact phone number	0220844510
Email	z5839582@gmail.com

Applicant details

Name of applicant	Meridian Energy Ltd
Activity location	164 Duncraigen Road, RD 1, Te Anau 9679
Application number	20233670

Submission details

My submission relates to the whole application	Yes
Details of my submission	I have read and understood the submission made by the Bluecliffs Beach Landowners Group. I agree with, and my submission endorses in full, all of the points raised in the Bluecliffs Beach Landowners Group submission.
Submission uploaded	No
I am a trade competitor of the applicant (for the purposes of section 308B of the Resource Management Act 1991)	No

Outcome sought

I wish Environment Southland to make the following decision	To oppose the application.
Why I wish Environment Southland to make this decision	We wish to have the river mouth considered when water is released from the Manapouri Lake Control Structure and the effects this has on the land and riverbanks at the Waiau river mouth. A more controlled release of this water when levels are high to minimize the damage caused by the river combined with tidal flows should be considered. A consent period of 35 yrs.is to long as it is not known what effect this will have on the Lower Waiau and river mouth. Nothing would be able to be done to mitigate any negative effects it could have on us at the other end of the river so therefore this needs to coincide with the current consent if granted in 2031. The river erosion at the mouth of the river directly below the 18 landowners has been catastrophic in the last year.

Hearing details

I wish to be heard in support of my submission	Yes
I would consider presenting a joint case if others make a similar submission	Yes
I wish to be involved in any pre-hearing meeting that may be held for this application	Yes

Confirmation

I will serve a copy of my submission on the applicant and I confirm all of the above information is correct

Resource Consent submission

To: The Chief Executive
Environment Southland
Private Bag 90116
DX20175
Invercargill

Date	11/04/2024 10:03
Online reference number	RC240420976

Full name of submitter	Uli Sirch
Postal address	29 Bluecliffs Beach Road, RD 1, Tuatapere 9691
Contact phone number	02102956726
Email	guliracer3@gmail.com

Applicant details

Name of applicant	Meridian Energy Limited
Activity location	Manapōuri Lake Control Structure, including the Waiau Arm at the confluence of the Waiau Arm and Mararoa River
Application number	APP20233670

Submission details

My submission relates to the whole application	Yes
Submission uploaded	Submission to Meridian APP20233670.pdf (557 kb)
I am a trade competitor of the applicant (for the purposes of section 308B of the Resource Management Act 1991)	No

Outcome sought

I wish Environment Southland to make the following decision	To oppose the application.
Why I wish Environment Southland to make this decision	I have included my reasons and the conditions sought in my submission

Hearing details

I wish to be heard in support of my submission	Yes
I would consider presenting a joint case if others make a similar submission	Yes
I wish to be involved in any pre-hearing meeting that may be held for this application	Yes

Confirmation

I have served a copy of my submission on the applicant and I confirm all of the above information is correct

Submission to consent APP20233670

Prepared by: Ulrike Sirch

9 April 2024

To the Chief Executive Officer, Environment Southland, Waikiwi, Invercargill

Overview:

Meridian seeks to build a parallel channel to the existing Lake Manapouri's Waiau Arm outlet, just above the Mararoa Weir. This is according to Meridian to provide better flows down the Lower Waiau River, as the existing channel is not deep enough and not well enough aligned. This is the sole reason given and we oppose this project.

Our reasons to oppose the application:

At first glance the new channel might be a good idea to get more water flowing down the Waiau River, that is exactly what lots of people living at the Lower Waiau River want. At times the flow at the Waiau River Mouth, were we live, is that low that it acts more like a lake and not a river anymore and the flushing flows Meridian is supposed to let down the river either aren't noticeable or didn't happen at all.
So on paper it sounds good to get 'more' water down the river but we believe there's reason to object, as outlined below.

Flushing flows in combination with long low flows cause erosion:

Meridian finally acknowledges that the flushing flows were only 30% of the volume they should have been.

The Project seeks to improve flow conveyance and reliability through the MLC for the benefit of freshwater values in the LWR. The proposal is predicted to increase flushing flow reliability to approximately 70% from the existing 30% reliability.(4)

There are consequences to that and Meridian notes the growth of algae and other 'nuisance periphyton' but not the effect it has on the Waiau River Mouth. Because the flushing flows have been so little for so long and way below what the resource consent requires, surely Meridian should be held to account for the damage they have caused to the banks below the houses and should be made to rectify it. We wonder why this has not been enforced by Environment Southland.
We are not experts but have been living in the area for many years and have observed the changes in the river over these years:

A long low flow at the river mouth will cause the mouth itself to get very narrow, sometimes to the point of nearly closing. It forms a 'bottleneck' as there's not enough water to keep a wide mouth open and with the wave action together it does form this type of riverbed:
The picture below was taken after a long period of low flow and with the next high flow the river eroded the bottleneck away on both sides of the riverbed, with that causing erosion on the land side, where our home and that of our neighbours are located.

The beach you can see on the land ward side is by now gone completely.
Meridian now proposes with the new arm that the flushing flows will be holding 70% more water, but there's no thought as to what that will do to the bank on which our homes are built on.
I fear that this scenario of low flow - river channel gets very narrow at the area of the mouth - flushing flow with 70% more water - erosion into the bank where our homes are, will get far worse by the new proposed channel.
In the report prepared by Tonkin and Taylor (1), it states under policy 15 in table 9.1:

Policy 15: Communities are enabled to provide for their social, economic, and cultural well-being in a way that is consistent with this National Policy statement.
The social, economic, and cultural well-being of people and communities is linked to the health and wellbeing of the LWR. In that regard the Project's purpose aligns with this policy.

The effects of the prolonged low flows with some flushing flows on the river mouth environment, especially the erosion it causes has not been acknowledged, or even looked at by Meridian. In my eyes Meridian is 100% to blame for that and has never entered any discussion with us. If we all lose our houses, our homes and in our case our business as well, it is hardly a provision for our social, economic or cultural well being.

As Meridian is 51% government owned, highly profitable and directly responsible, there must be some social obligation to its citizens.

Time frame:

Meridian is applying for a 35 year consent, which we think is a far too long period, given the risks to our home and livelihood. Most of the erosion threatening us has been happening within the last 12 months, but the changes along the river mouth have been going on for far longer. If Meridian keeps the river flow as low as they have been for these extended periods of time and then put occasionally flushing flows with a high volume down without any of our suggested solutions in place it will cause more of our bank to erode. And it will be

inevitable that at the very least some houses will fall in the river. Meridian has not allowed for any observation of the effects of their proposal on the area of the Waiau River Mouth in short term or long term and we think it should be monitored regularly and recorded. To give them a consent for 35 years without having to fix the problems they caused seems to me a free ride for a big and rich company.

Solution:

We would like to suggest three solutions for Meridian to consider:

- Finance the building of a rock wall along the bank where our houses are built on

- Increase the general flow down the river outside of the scheduled flushing flows and with that stop the river mouth forming a tight bottleneck and causing problems for us. A regular higher flow would keep the mouth open, but also help the Lower Waiau River health in general with all the benefits Meridian is claiming for this project and also help move the sediment out of the channel, which is Meridians main problem and only real concern in reality.

- Open a new river mouth to the east of our properties, where Emergency Management Southland attempted to open one, but stopped before the project was finished in February, and in connection with that build an equilibrium rock wall across the existing channel to guide the river out the new mouth. An equilibrium rock wall (spillway) being a rock wall with culverts in it at a higher level to let some water go through. This will be more affordable compared to a totally block rock wall and it will take the pressure off the rock wall in times of high floods and also the small amount of water going through won't do any harm to the then nearly dry lagoon area behind it. Picture of placement attached in appendix. (2), current state of the river mouth, appendix (3).

Conclusion

It is time for Meridian to show some social conscience and accept responsibility for the changes at the Waiau River Mouth. We are no experts with degrees on the river, on power generation, or anything related, but we are local residents and we see the changes every day and we will pay for it with all our possessions. That is more than any expert can give you. Our family has been living at the Waiau Mouth for over 30 years, my sons have grown up here and call it their home.

All of us have very tight connections to the river and to see it every summer and sometimes even in the spring, autumn and winter to have barely any water in it, to be reduced to a mere stream that it can't even make a proper exit into the ocean is without exaggeration quite heartbreaking. People don't believe me when I try to explain that, but it's true. We go for a walk and shake our heads in disgust looking at the dribble coming down. From our back fence we overlook the river, the lagoon and the ocean and now often we look past the river, focusing on the ocean, as the river is an embarrassment. We used to go for swims in the river, now we don't bother as there's not enough water in it to get wet. Meridian has never acknowledged it's responsibility for the changes it has caused at the Waiau River Mouth, with this new project they claim to be concerned about the health of the Lower Waiau River, in which case they can just simply put more water down regularly. They can still provide flushing flows and build their new channel, but please make them put down more water in general, make them pay for a rock wall and also for some independent observation of the effects their project has on the river and the area around the mouth where we live and we care for so much.

Thank you for taking our view in consideration,

kind regards

Uli Sirch, Dean Thompson, Tass Abbott, Oli Abbott

Home owners of Bluecliffs Beach 29 and 31

Appendix:

(1) Tonkin and Taylor report prepared for Meridian Energy Limited, by Tonkin and Taylor Ltd December 2023
https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/environment/consents/notified-consents/2024/Meridian%20Energy%20Limited%20APP-20233670/1%20Application%20Documents%20and%20Further%20Information/AEE%20-%20Manapouri%20Lake%20Control%20Improvement%20Project%20-%20Final

(2)

(3) PICTURE OF THE RIVER MOUTH, DATED 10/4/24, SHOWING HOW PATHETICALLY SMALL THE MOUTH IS AGAIN, AFTER MULTIPLE MONTHS OF LOW RIVER FLOW.

(4) Tonkin and Taylor report prepared for Meridian Energy Limited, by Tonkin and Taylor Ltd December 2023, in the Executive Summary.

https://www.es.govt.nz/repository/libraries/id:26gi9ayo517q9stt81sd/hierarchy/environment/consents/notified-consents/2024/Meridian%20Energy%20Limited%20APP-20233670/1%20Application%20Documents%20and%20Further%20Information/AEE%20-%20Manapouri%20Lake%20Control%20Improvement%20Project%20-%20Final

TE AO MARAMA INC.

17 April 2024

Environment Southland

Consents Manager

Email: service@es.govt.nz

Tēnā Koe,

RE: Submission on Resource consent application – APP-20233670

Please find attached a submission lodged, on behalf of Oraka Aparima Rūnaka on Resource Consent applications to the construction of a new channel to enable a permanent diversion of part of the flow of the Waiau Arm and the associated removal of bed material and gravels, together with any maintenance and ancillary activities by Meridian Energy.

We trust the information contained within the submission is sufficient; however, should you wish to discuss any aspect further, please do not hesitate to contact me.

Nāhaku noa nā,

Stevie-Rae Blair
Te Ao Marama Inc.
Kaitohutohu Kaupapa Taiao

Form 13

To: Environment Southland
Private Bay 90116
Invercargill

1. This is a submission on the application (APP-20233670) to the construction of a new channel to enable a permanent diversion of part of the flow of the Waiau Arm and the associated removal of bed material and gravels, together with any maintenance and ancillary activities at and around the Manapōuri Lake Control Structure, including the Waiau Arm at the confluence of the Waiau Arm and Mararoa River.

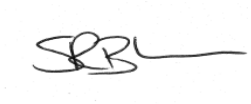
2. Oraka Aparima Rūnaka submission relates to the applications in their entirety (Appendix A). Oraka Aparima Rūnaka is **NEUTRAL** to the granting of the applications.

3. Oraka Aparima Rūnaka does wish TO BE HEARD in support of its submission.

4. Oraka Aparima Rūnaka is not a trade competitor for the purposes of section 308B of the Resource Management Act 1991.

5. A copy of this submission has been sent to the applicant.

Signed for and on behalf of Oraka Aparima Rūnaka.



Stevie-Rae Blair
Te Ao Marama Inc.
Email: stevie@tami.maori.nz

17/04/2024

Attachment A

Introduction

1. This submission is made on behalf of Oraka Aparima Rūnaka.

Papatipu Rūnaka

2. The Te Rūnanga o Ngāi Tahu Act 1996 (the TRoNT Act) and the Ngāi Tahu Claims Settlement Act 1998 (the Settlement Act) give recognition to the status of Papatipu Rūnanga as kaitiaki and mana whenua of the natural resources within their takiwā boundaries.

3. The consent application proposals relate to a water permit and discharge permit that is within the takiwā of Oraka Aparima Rūnaka.

General Position and Reasons for the Submission

4. Ngāi Tahu has a long association with the Murihiku Region. Ngāi Tahu led a nomadic lifestyle, following resources throughout the region. Generally, the use of the areas was extensive rather than intensive; however, this area is thick with Iwi stories, traditions, and cultural practices**.**

5. Te Tangi a Tauira states that:
Named during the southern voyages of Tamatea Ure Haea, and his waka Takitimu. Takitimu was wrecked near the mouth of the river (Te Waewae Bay) and the survivors who landed named the river Waiau due to the swirling nature of its waters. The river was a major travel route connected Murihiku and Te Ara a Kiwa (Foveaux Strait) to Te Tai Poutini. The river was a major source of mahinga kai for Ngāi Tahu, with some 200 species of plants and animals harvested in and near the river.

6. Ngāi Tahu is supportive of development within its takiwā, provided activities are undertaken in a way that respects the environment where the activity is to be undertaken and do not adversely affect Ngāi Tahu cultural values, customs and their traditional relationship with land and water.

7. The rohe (area) that the application is within is a significant cultural landscape to Ngāi Tahu because of historical and contemporary associations. These associations include (but are not limited to) the formation of landscape, wāhi ingoa (place names), mahinga kai, kaimoana, wāhi tapū, Māori land, Mātaitai, and archaeological sites.

8. This cultural, spiritual, historic, and traditional association is recognised by the crown and are Statutory Acknowledgements (See Attachment B) under the Ngāi Tahu Claims Settlement Act, 1997.

9. Ngā Rūnanga, as kaitiaki, are responsible as kaitiaki for protecting the mana and mauri of the environment that the application is within.

10. Oraka Aparima Rūnaka are submitting a neutral submission to the application for the following reasons:

    - That the project is intended to support environmental flushing flows.
    - The applicant met with Te Ao Marama initially for a project overview where staff provided advice for the lodgement of consent.
    - The application was lodged prior to Christmas and requested public notification. Te Ao Marama received the documentation at the same time.
    - Te Ao Marama has drafted a Terms of Engagement to assess the application for Papatipu Rūnanga and to provide the applicant with a comprehensive understanding of an assessment against rūnanga values, rights and interests and to identify any outstanding issues with the application. This piece of mahi has yet to be undertaken.
    - The kaiwhakahaere (chairs) of the four Papatipu Rūnanga have met with Meridian executives who agreed that Te Ao Marama would provide a neutral submission to ensure that continued engagement could occur.
    - Because of timeframes, it has severely impacted the ability for Te Ao Marama to undertake an appropriate engagement and assessment process, informed by tikanga and kawa and therefore places significant limitations on our ability to assess the effects on our values, rights and interests.
    - The application has the potential to significantly affect mana whenua values, rights and interests associated with cultural landscapes, mauri, mahinga kai, species habitat, wāhi tapu, and water quality.
    - It is possible that through proper planning and management some impacts may be reduced or eliminated. However, this will require significant kōrero with Oraka Aparima Rūnaka. Please note that Oraka Aparima Rūnaka are uncertain as to the magnitude of the

effects that are to be avoided and therefore have a level of uncertainty and discomfort regarding the mitigations that are to address the effects of the proposal.

Decision Sought

11. We provide a neutral submission knowing Meridian have committed to continued engagement in good faith to understand and mitigate mana whenua concerns.

Appendix B

Schedule 69

Statutory acknowledgement for Waiau River

ss 205, 206

Statutory area

The statutory area to which this statutory acknowledgement applies is the river known as Waiau, the location of which is shown on Allocation Plan MD 124 (SO 12263).

Preamble

Under section 206, the Crown acknowledges Te Rūnanga o Ngāi Tahu's statement of Ngāi Tahu's cultural, spiritual, historic, and traditional association to the Waiau, as set out below.
Ngāi Tahu association with the Waiau

The Waiau River features in the earliest of traditional accounts, and was a place and resource well known to the earliest tūpuna (ancestors) to visit the area. Rakaihautu and his followers traced the Waiau from its source in Te Ana-au (Lake Te Anau) and Motu-ua or Moturau (Lake Manapōuri), to its meeting with the sea at Te Wae Wae Bay.

The waka Takitimu, under the command of the rangatira (chief) Tamatea, was wrecked near the mouth of the Waiau River and the survivors who landed at the mouth named the river "Waiau" due to the swirling nature of its waters. Tamatea and his party made their way up the river to Lake Manapōuri where they established a camp site. The journey of Tamatea was bedevilled by the disappearance of Kaheraki who was betrothed to Kahungunu, a son of Tamatea. Kaheraki strayed away from the party, and was captured by the Maeroero (spirits of the mountain).

For Ngāi Tahu, traditions such as this represent the links between the cosmological world of the gods and present generations, these histories reinforce tribal identity and solidarity, and continuity between generations, and document the events which shaped the environment of Te Wai Pounamu and Ngāi Tahu as an iwi.

The Waiau has strong links with Waitaha who, following their arrival in the waka Uruao, populated and spread their influence over vast tracts of the South Island. They were the moa hunters, the original artisans of the land. There are remnants of Waitaha rock art associated with the river. Surviving rock art remnants are a particular taonga of the area, providing a unique record of the lives and beliefs of the people who travelled the river.

There is also a strong Ngāti Mamoe influence in this area of the country. Ngāti Mamoe absorbed and intermarried with the Waitaha and settled along the eastern coast of Te Wai Pounamu. The arrival of Ngāi Tahu in Te Wai Pounamu caused Ngāti Mamoe to become concentrated in the southern part of the island, with intermarriage between the two iwi occurring later than was the case further north. The result is that there is a greater degree of Ngāti Mamoe influence retained in this area than in other parts of the island. These are the three iwi who, through conflict and alliance, have merged in the whakapapa (genealogy) of Ngāi Tahu Whānui.

Numerous archaeological sites and wāhi taonga attest to the history of occupation and use of the river. These are places holding the memories, traditions, victories and defeats of Ngāi Tahu tūpuna. The main nohoanga (occupation site) on the Waiau was at the mouth and was called Te Tua a Hatu. The rangatira (chief) Te Wae Wae had his kāinga nohoanga on the left bank of the Waiau River mouth.

The Waiau, which once had the second largest flow of any river in New Zealand, had a huge influence on the lives and seasonal patterns of the people of Murihiku, over many generations. The river was a major mahinga kai: aruhe (fernroot), tī root, fish, tuna (eels), shellfish and tutu were gathered in the summer, a range of fish were caught in the autumn, kanakana (lamprey) were caught in the spring, while the people were largely reliant during winter on foods gathered and preserved earlier in the year. Rauri (reserves) were applied to the mahinga kai resources, so that people from one hapū or whānau never gathered kai from areas of another hapū or whānau. Some 200 species of plants and animals were utilised by Ngāi Tahu as a food resource in and near the Waiau.

The tūpuna had considerable knowledge of whakapapa, traditional trails and tauranga waka, places for gathering kai and other taonga, ways in which to use the resources of the Waiau, the relationship of people with the river and their dependence on it, and tikanga for the proper and sustainable utilisation of resources. All of these values remain important to Ngāi Tahu today.

Place names provide many indicators of the values associated with different areas, including Waiharakeke (flax), Papatōtara (tōtara logs or bark), Kirirua (a type of eel found in the lagoon), Te Rua o te Kaiamio (a rock shelter that was a "designated meeting place" for the local Māori, similar to a marae) and Kā Kerehu o Tamatea – ("charcoal from the fire of Tamatea" – black rocks near old Tuatapere ferry site).

The Waiau River was a major travelling route connecting Murihiku and Te Ara a Kiwa (Foveaux Strait) to Te Tai Poutini (the West Coast) and, as such, was an important link between hapū and iwi. Pounamu on the West Coast, and summer expeditions to Manapōuri (Motu-ua or Moturau) for mahinga kai were the main motivations for movement up and down the Waiau. Mōkihi (vessels made from raupō) were utilised for travel down the river and were a very effective and common mode of travel, making transportation of substantial loads of resources possible.

The tūpuna had an intimate knowledge of navigation, river routes, safe harbours and landing places, and the locations of food and other resources on the Waiau. The river was an integral part of a network of trails which were used in order to ensure the safest journey and incorporated locations along the way that were identified for activities including camping overnight and gathering kai. Knowledge of these trails continues to be held by whānau and hapū and is regarded as a taonga. The traditional mobile lifestyle of the people led to their dependence on the resources of the river.

The Waiau was once a large and powerful river, up to 500m across at the mouth, narrowing to 200m further upstream. The water flow from the Waiau River was an important factor in the ecological health and bio-diversity of the coastal resources.

The mauri of the Waiau represents the essence that binds the physical and spiritual elements of all things together, generating and upholding all life. All elements of the natural environment possess a life force, and all forms of life are related. Mauri is a critical element of the spiritual relationship of Ngāi Tahu Whānui with the river.

Purposes of statutory acknowledgement

Pursuant to section 215, and without limiting the rest of this schedule, the only purposes of this statutory acknowledgement are—

(a)

to require that consent authorities forward summaries of resource consent applications to Te Rūnanga o Ngāi Tahu as required by regulations made pursuant to section 207 (clause 12.2.3 of the deed of settlement); and

(b)

to require that consent authorities, Heritage New Zealand Pouhere Taonga, or the Environment Court, as the case may be, have regard to this statutory acknowledgement in relation to the Waiau, as provided in sections 208 to 210 (clause 12.2.4 of the deed of settlement); and

(c)

to empower the Minister responsible for management of the Waiau or the Commissioner of Crown Lands, as the case may be, to enter into a Deed of Recognition as provided in section 212 (clause 12.2.6 of the deed of settlement); and

(d)

to enable Te Rūnanga o Ngāi Tahu and any member of Ngāi Tahu Whānui to cite this statutory acknowledgement as evidence of the association of Ngāi Tahu to the Waiau as provided in section 211 (clause 12.2.5 of the deed of settlement).

Limitations on effect of statutory acknowledgement

Except as expressly provided in sections 208 to 211, 213, and 215,—

(a)

this statutory acknowledgement does not affect, and is not to be taken into account in, the exercise of any power, duty, or function by any person or entity under any statute, regulation, or bylaw; and

(b)

without limiting paragraph (a), no person or entity, in considering any matter or making any decision or recommendation under any statute, regulation, or bylaw, may give any greater or lesser weight to Ngāi Tahu's association to the Waiau (as described in this statutory acknowledgement) than that person or entity would give under the relevant statute, regulation, or bylaw, if this statutory acknowledgement did not exist in respect of the Waiau.

Except as expressly provided in this Act, this statutory acknowledgement does not affect the lawful rights or interests of any person who is not a party to the deed of settlement.

Except as expressly provided in this Act, this statutory acknowledgement does not, of itself, have the effect of granting, creating, or providing evidence of any estate or interest in, or any rights of any kind whatsoever relating to, the Waiau.

Schedule 69: amended, on 20 May 2014, by section 107 of the Heritage New Zealand Pouhere Taonga Act 2014 (2014 No 26).

Submission of the Waiau Fisheries and Wildlife Habitat Enhancement Trust on APP-20233670

1 Introduction

This submission of the Waiau Fisheries and Wildlife Habitat Enhancement Trust (Waiau Habitat Trust) responds to APP-20233670 by Meridian Energy Limited (Meridian) for activities associated with constructing a new channel to enable a permanent diversion of part of the flow of the Lower Waiau River upstream of the Manapōuri Lake Control Structure (MLC), also referred to as the Waiau Arm.

Thank you for the opportunity to submit on this application. The Waiau Habitat Trust acknowledges Meridian's consultation prior to submitting this application and supports the public notification of this application for resource consent.

The Waiau Habitat Trust was established in 1996. It was one of the community-negotiated outcomes of the Manapōuri Power Scheme resource consent process. The Waiau Habitat Trust has been focused on remediation and mitigation of the significant adverse effects of the power scheme on the fisheries and wildlife of the Waiau River Catchment for 26 years now.

Working with farmers, and in some instances QEII, the Waiau Habitat Trust has protected 3356 ha of stream, wetland and riparian habitats, plus remnant bush habitats associated with tributary headwaters in the Waiau catchment. 223 individual projects have been completed, including several major or flagship wetland restoration and enhancement projects.

The main outcome is enhanced ecosystem health, including reduction in stream and wetland nutrient and sediment loads, expanded or enhanced fish and bird habitats and unimpeded fish access.

The Waiau Habitat Trust understands that APP-20233670 is intended to improve flow conveyance and the reliability of flushing flows through the MLC, and so is anticipated to result in better outcomes for river health in the Lower Waiau River. The Waiau Habitat Trust is generally supportive of this intent.

However, the Waiau Habitat Trust have a number of questions and suggestions it wishes to see addressed prior to consent being granted. The Waiau Habitat Trust wishes to be heard in support of this submission and would like the opportunity to discuss and resolve these issues with ES and Meridian through a pre-hearing meeting.

2 Submission points

The Waiau Habitat Trust is generally supportive of the intent of APP-20233670 to improve flow conveyance and the reliability of flushing flows through the MLC.

The Waiau Habitat Trust notes that the construction timeframe falls outside the normal seasonal water quality monitoring period in the Waiau Arm. Given the increased risk of phytoplankton blooms as set out Dr Kilroy's report, the Waiau Habitat Trust suggests a construction-specific monitoring programme be required through conditions.

The Waiau Habitat Trust supports the Waiau Working Party's (WWP) detailed suggestions on the expansion of the existing water quality monitoring/management regime for the Waiau Arm to persist post-construction, including real time monitoring of dissolved oxygen and fluorometry alongside regular validation monitoring at vulnerable times (low flow, high temperatures and high sunlight hours) and a proactive flushing flow regime to prevent blooms occurring or remove any blooms.

The Waiau Habitat Trust requests a condition requiring any exposed islands created within the Waiau Arm be maintained to provide suitable nesting habitat for black billed gulls (levels, materials, form etc), and that the design of these be discussed and agreed with the Waiau Habitat Trust, and any other interested stakeholders, prior to their construction.

The Waiau Habitat Trust requests a consent expiry of 2031 to align with the key operational consents for the Manapōuri Power Scheme. This will provide ample time for the construction of the new channel and will facilitate a holistic approach to the management of activities and effects associated with the operation of the Manapōuri Power Scheme upon reconsenting. Providing a consent time frame for this consent which outlives the operational consents creates a risk that this consent will set the context for what monitoring and mitigation programmes look like following reconsenting.

The Waiau Habitat Trust also supports the WWP's suggestion to enable the flushing flow regime to be expanded to address emerging concerns relating to the health of the River. The Waiau Habitat Trust is comfortable with the WWP's suggestion that a financial contribution from Meridian be required when flushing flows are triggered under the flushing flow regime but not provided. Further, the WWP's suggestion that a portion of that financial contribution be received by the Waiau Habitat Trust to support ongoing ecological protection and restoration work in the catchment.

The Waiau Habitat Trust requests that the trap and transfer programme be extended to all migratory fish species rather than the existing focus solely on long fin eels on the basis that the MLC provides a barrier to fish passage for other migratory species as well as long fin eels. The Waiau Habitat Trust also requests a consent condition requiring any fish

disturbed during excavations to be returned to the Waiau River via an established methodology.

The Waiau Habitat Trust requests a consent condition requiring an inspection of areas to be disturbed for freshwater fauna (including kakahi mussels) prior to construction combined with relocation to suitable safe areas.

The Waiau Habitat Trust is not a trade competitor of the applicant (for the purposes of Section 308B of the Resource Management Act 1991).

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Waiau Rivercare Group Inc. submission on APP-20233670

1.1 Introduction

This submission of the Waiau Rivercare Group Inc. (WRG) responds to Meridian Energy Ltd.'s (Meridian) resource consent application APP-20233670 to construct an additional channel immediately upstream of the Manapouri Lake Control Structure (MLC) to facilitate improved flushing flow reliability.

The WRG was incorporated in 2018. It is a community group with over 400 members which advocates for the Waiau River and the communities it sustains. WRG has been heavily involved in regulatory and statutory processes concerning the Waiau River and the Manapouri Power Scheme in the last six years at both a regional and central government level.

The WRG appreciates the opportunity to submit on this proposal and is pleased to see Meridian finally responding to the ongoing frustration from the community about the poor performance of Meridian's flushing flow regime over the last decade. The WRG was disappointed that Meridian chose not to undertake pre-application consultation with the WRG and would appreciate being consulted on future relevant applications.

The WRG would like the opportunity to be heard in support of its submission, and to discuss the issues raised in its submission with Meridian at a pre-hearing meeting.

1.2 Submission

The WRG is generally supportive of the intent of the application to improve the reliability of the flushing flow regime. The WRG would like to draw the decision makers attention to the following questions/considerations when considering this application.

The WRG understands from the application that currently, the physical factor that limits the provision of flushing flows is the build-up of sediment/gravels in the channel of the Lower Waiau River immediately upstream of the Mararoa Lake Control Structure (MLC), also referred to as the Waiau Arm. While the improvement from 30% reliability to 70% reliability is an improvement, it is the WRG's understanding that the Meridian would endeavor to provide flushing flows when they are triggered, and even 70% still leaves 30% of the time when flushing flows are required and not provided.

With the reconsenting of the key operational consents looming, WRG will be looking to understand how flushing flows can be provided with 100% reliability, and is disappointed that Meridian has not evaluated other alternatives which might get closer to this, such as reducing the sill height of one of the four MLC gates.

WRG understands the sill height has been lowered before. When the minimum flow in the Waiau River was introduced the sill height prevented the minimum flow from being delivered throughout the full range of lake levels, leading to consent compliance concerns. Gate 2 was lowered in 2003[1] to enable the consistent provision of minimum flow.

So sill height has been used as a lever before, and as far as the WRG can see, has not been considered in this application.

The WRG wishes to understand what additional reliability of flushing flows could be gained by adjusting the sill height. i.e. whether that could get flushing flow reliability to 80 or 90%, or higher still.

Currently, when the Mararoa River has a turbidity of more than 10 NTU, the Mararoa is released in the Lower Waiau River instead of being diverted back upstream into Lake Manapouri[2]. During these turbid conditions, a flow from Lake Manapouri of 5 m^3/s of clean lake water is mandated by the Lake Guidelines to mitigate against the backflow of sedimented Mararoa River water into the Waiau Arm[3]. WRG is concerned that the reduced flow in the existing channel following construction could increase the potential for sediment deposition from turbid Mararoa River. Over time, this may undermine the reliability gain envisaged by constructing an additional channel. **WRG would like to see conditions on this consent require a higher flow of Lake Manapouri water be released through the MLC when the Mararoa is turbid.**

WRG understands the Waiau Working Party (WWP) have provided a detailed submission concerning the increased risk of phytoplankton blooms in the Lower Waiau upstream of the MLC. The WRG supports the WWP's submission on this point and their request for a monitoring and management programme of blooms in the Waiau Arm.

The WRG likewise supports the WWP's suggestion to expand the flushing flow regime to include other water quality characteristics as triggers for flows such as cyanobacteria blooms, fish migration, temperature, sediment, and possibly even gravels.

The existing flushing flow regime was introduced into consent conditions through the Meridian's MTAD[4] consent application in 2009/10. Meridian's application to increase the maximum volume of water discharged through Deep Cove provided an opportunity for consent conditions to address unanticipated effects associated with the Manapouri

[11] Undertaken under resource consents 96022 (2002 variation), 201500-04.
[2] Statement of evidence of Dr J McConchie for Meridian Energy Ltd 29 July 2022 on the proposed Southland Water and Land Plan/
[3] The Guidelines of Lake Te Anau and Manapouri, developed by Meridian Energy Ltd and the Guardians of the Lakes under the Manapouri Te Anau Development Act 1963. The Flood Turbidity Rules for the Mararoa specify that over a turbidity of 11 NTU and 40 cumecs, or over 28 NTU, the full Mararoa River plus 5 m3/s of Lake derived water, must be released through the MLC.
[4] Manapouri Amended Tailrace Discharge.

Power Scheme and enable an ongoing adaptive management approach. The suggestion to expand the flushing flow regime as suggested by the WWP would be a continuation of this approach.

The WRG also supports the suggestion by the WWP that financial compensation from Meridian Energy should be required by consent in instances where a flushing flow is triggered but not delivered. It would be appropriate for this money to be spent in the Lower Waiau Catchment to enhance those values which the provision of a flushing flow would normally assist, namely ecological, recreation and cultural values.

The WRG requests a condition requiring a collaborative process with stakeholders to expand the existing voluntary flushing flow regime to address cyanobacteria blooms, temperature, fish migration, dissolved oxygen and sediment, including gravels.

The WRG requests that Meridian Energy be required, through conditions, to provide a financial contribution if a flushing flow is triggered and not delivered.

The WRG also suggests that the consent duration be set to expire in line with the operational consents for the Manapouri Power Scheme, which expire in 2031. This would provide ample time for the construction of channel, and enable ongoing monitoring and management to be reassessed holistically in the context of the Waiau River catchment as a whole. A more integrated approach to managing the Scheme is critical in moving the Waiau River towards a state of hauora.

The WRG looks forward to being meaningfully involved in that process to come.

The WRG requests that the consent duration align with the operational consents for the Manapouri Power Scheme, expiring in 2031.

The WRG is not a trade competitor of the applicant (for the purposes of Section 308B of the Resource Management Act 1991).

For the Waiau Rivercare Group,

Christina Vaughan and Paul Marshall

Co-Chairs

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Submission on a Notified Application for a Resource Consent from the Waiau Working Party.

To The Chief Executive
Environment Southland
Private Bag 90166
Invercargill

I, Maurice Allan Rodway, 48 Ruru Ave, RD 9, Invercargill (maurice.rodway@gmail.com) on behalf of the **Waiau Working Party,**

Wish to support (with conditions) the application of Meridian Energy to remove bed material and create a channel in the bed of the Waiau River (Waiau Arm) immediately upstream of the Manapouri Lake Control Structure (Reference AP 20233670) to enable more reliable flushing flows to the Lower Waiau River to maintain the health of the Lower Waiau River.

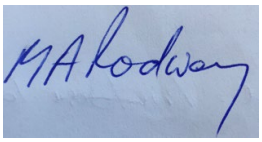
The reasons for my submission and the conditions I wish to see imposed are set out in the following pages.

I am not a trade competitor of the Applicant (for the purposes of s308B of the Resource Management Act.

I do wish to be heard in support of my submission.

I do wish to be involved in any pre-hearing meeting that may be held for this application.

I have served a copy of my submission on the applicant

Signed  17 April 2024

Submission of the Waiau Working Party

1 Introduction

This submission of the Waiau Working Party (WWP) responds to application APP-20233670 from Meridian Energy Ltd for activities associated with construction of a new channel to enable a permanent diversion of part of the flow of the Waiau Arm.

Thank you for the opportunity to submit on this application. The WWP acknowledges Meridian's consultation prior to application and supports the public notification of this (and any similar) applications for resource consent. While this application is relatively narrow in scope, it provides an opportunity to address the ongoing concerns of the WWP, as has been the case in previous resource consent applications by Meridian. Taking such opportunities is consistent with an adaptive management approach to managing the wide-reaching and interrelated impacts associated with the scheme.

The WWP was established in 1990 as a community consultative group by the Southland Regional Council (ES) and the operator of the Manapouri Power Scheme (now Meridian Energy Ltd) as a means of identifying, researching and resolving issues associated with the significant adverse effects of the Manapouri Power Scheme on the Lower Waiau River and wider catchment. The WWP has a long history of engagement with Meridian's consent applications in relation to the Waiau Catchment, as well as regulatory processes which directly concern the Manapouri Power Scheme.

Additionally, the WWP has a formally mandated role in reviewing consent compliance monitoring reports from Meridian Energy providing recommendations to the regulator (ES) on these reports and any alterations required to the existing monitoring and effects management regime.

The WWP understands that APP-20233670 is intended to improve flow conveyance and the reliability of flushing flows through the Manapōuri Lake Control (MLC) structure, and is anticipated to result in better outcomes for river health in the Lower Waiau River. The WWP is generally supportive of this intent.

That said the WWP has a number of questions and suggestions that it believes are important to address prior to consent being granted.

The purpose of the consent is to allow the construction of a new channel in the bed of the "Waiau Arm" of Lake Manapouri immediately upstream of the MLC. The Waiau Arm was the bed of the Lower Waiau River before it's water was diverted into Deep Cove for the Manapouri hydro-electricity power scheme (MPS). The MLC controls the flow of the Lower Waiau River. The Lower Waiau River has a minimum flow regime as a condition of Meridian's main consents in this catchment.

Meridian is obliged to avoid, remedy or mitigate the adverse effects of its activities in the Waiau Catchment. The minimum flow regime delivers a range of flows to the lower Waiau River throughout the year. However because these flows do not vary sufficiently enough to prevent excessive periphyton growth Meridian delivers flushing flows from time to time to try to reduce the adverse effects of the MPS on the river.

Members of the WWP believe a better solution to deliver more reliable flushing flows would be to lower the gate(s) of the MLC but Meridian believe that creating a new channel as described in this consent application is the best solution.

"Flushing flows" are flows with a mean of about 10 times the normal flow for a period of 48 hours. These have been scientifically shown over a period of 20 years to remove accumulated periphyton in the Lower Waiau so that natural character and river biota are protected within the limits of the consented minimum flow regime. It is very important that these flushing flows are delivered when needed according to the current monitoring programme, so the WWP supports this consent as it is intended to help do this.

2 Summary

In summary the WWP:

1. Generally supports the application because it will increase the reliability of flushing flows to control periphyton in the Lower Waiau River.
2. Supports the recommendations in the AEE for the control and monitoring of suspended and deposited fine sediment as set out in the report by Dr Hoyle with minor amendments.
3. Notes the risk of increased phytoplankton blooms as set out in the report by Dr Kilroy and expects that conditions will be included to avoid phytoplankton blooms in the new channel and the existing channels. This will ideally involve real time monitoring of dissolved oxygen, and fluorometry complimented by regular validation monitoring at vulnerable times (low flow, high temperatures and high sunlight hours) complimented by a proactive flushing flow regime to prevent blooms occurring or remove any blooms (further detail on proposed monitoring and mitigation programme provided in section 3.1.2.2).
4. Requests a condition requiring preconstruction inspection of areas that will be disturbed for freshwater fauna including but not limited to: mussel (kakahi) and relocation of these to suitable safe areas.
5. Requests a condition requiring any fish, including eels that are accidentally removed from the river be returned to the water of the Waiau arm. Methods must be in place to ensure this happens.
6. Requests a condition requiring any Buchanan' sedge plants that are in the working area are to be protected or relocated alongside a seed collection and propagation programme.

7. Requests a condition to ensure that stonecrop, an invasive weed, is not spread from the site and that machinery and material is cleaned and checked before leaving the site.
8. Supports the recommendation in the AEE in relation to landscape that "The final form of any exposed islands created within the Waiau Arm shall be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes." The final form could be agreed prior to construction.
9. Further to the above, requests a condition that requires any exposed islands be made suitable for use by black billed gulls for nesting (such as levels, final form, substrate etc).
10. Requests that the term of the consent align with the expiry of the main consents in 2031 that Meridian hold in relation to taking and discharging water for hydroelectricity power generation purposes. Particularly because we don't know what the conditions of the new consents will be and there may be opportunities to protect the environment further when this occurs.
11. Would like to see the expansion of the flushing flow protocol to respond to other environmental concerns that may become apparent as a result of the monitoring programme. For example, in the past 1-2 years cyanobacteria blooms, (*Microcoleous*), which are potentially toxic to humans and dogs at least, have become more common and flushing flows at different times and volumes may be needed to control this. This approach would be similar to the way the existing flushing flow regime was inserted into conditions through Meridian's 2010 consent application to increase the discharge into Deep Cove (referred to as MTAD[1]).

3 Submission

Further detail on the above points is provided in the remainder of this submission. These points fall into the broad categories of water quality, both sediment and phytoplankton blooms, the impacts on and of biota, the voluntary flushing flow regime, compensation for the lack of the delivery of a flush and consent duration.

3.1 Water Quality

3.1.1 Turbidity during construction, and associated issues

The WWP generally supports the nesting of turbidity thresholds and durations, as outlined by Dr Hoyle in the NIWA Freshwater Ecology AEE (Appendix D, page 7, Executive Summary).

The WWP understands that this approach would work as follows. The turbidity threshold of 12.4 FNU will have a total exceedance allowance of 945 hours (+/- 39 days) with a maximum consecutive exceedance allowance of 315 hours (+/- 13 days), and for increasing thresholds

[1] Manapouri Tailrace Amended Discharge.

of turbidity there are progressively shorter duration allowances for exceedance - both "total" and "consecutive" exceedance hours.

There is part of the approach to managing turbidity the WWP wishes to see altered. Rather than specifying that only three exceedances of maximum consecutive duration will be allowed within the total exceedance allowance at each turbidity level, the WWP suggests that a minimum permitted interval between exceedance events be specified instead.

By way of explanation, an exceedance of 13 days at 12.4 FNU for example, followed by an interval of just one day, or two or three, before a further exceedance event, would not allow much respite for ecosystem recovery. An ecologically-referenced minimum interval between these exceedance events provides an alternative that would allow for ecosystem recovery.

Preferably, this minimum interval should be a ratio, so that it could be scaled down from 13 days to apply proportionately to a consecutive exceedance of a shorter period (e.g. 12 days, 10 days etc).

The WWP requests that a minimum interval between the consecutive turbidity exceedances be added to the conditions. A good model for this Minimum Interval Ratio may be the Specified Ratio approach which occurs for High Operating Range (HOR) lake level thresholds in the gazetted Operating Guidelines for Levels of Lakes Manapouri and Te Anau – where there is a maximum duration, minimum interval, and Specified Ratio for each band of the HOR.

In relation to Deposited Fine Sediment (DFS), it appears that the proposed threshold of 20% cover on the baseline value, could be reached after only 37 hours at a turbidity of 30 FNU. This is well below the proposed turbidity maximum consecutive exceedance for 30 FNU of 168 hours. **The WWP requests clarity on how this will be addressed in practice, such as a flushing flow to move DFS through the system.**

The WWP does not support the suggestion that the DFS monitoring site be shifted to downstream of Excelsior Creek for the duration of the project for the reasons provided on p28 of Appendix D of the AEE[2]. This would introduce the Excelsior Creek as a potentially confounding source of sediment and variability in the record. A better approach would be to coordinate monitoring of DFS to suitable flows i.e. post deposition rather than during active sediment transport or use an alternative method to wading i.e. a kayak with a camera mounted to post process DFS levels. A new site could be used for the construction monitoring provided it has a pre-construction baseline established.

[2] About 20% of DFS surveys have been missed at the current site due to elevated river levels, where high flows cause a lack of access due to channel geometry.

3.1.2 Potential for phytoplankton blooms - both during and after the construction works.

Dr Kilroy's report on phytoplankton indicates there will be a greater risk of the development of blooms in the Lower Waiau River upstream of the MLC[3] (referred to as the Waiau Arm) both during the project and following completion of the new channel[4].

3.1.2.1 During the project

At p55 of Appendix D, Dr Kilroy suggests that "directing all Mararoa water flow down the LWR during the excavation activities may increase the phytoplankton blooms farther upstream in the arm [due to reduced water velocity]," although "the increased risk is likely to be small compared to the risk under typical summer conditions."

Dr Kilroy goes on to say that "In any event, Meridian's usual summer monitoring in the Waiau Arm is designed to pick up warning signs of developing blooms. If blooms are detected, mitigation **could be** implemented (e.g. a flushing flow)" (emphasis added).

The WWP wishes to advise that Meridian's "usual summer monitoring" is currently under review, due to concerns raised by stakeholders (WWP and Lakes Guardians) that there were instances during both the 2021 / 22 and 2022 / 23 monitoring seasons where warning signs of reduced water clarity and increasing chlorophyll a levels were detected and no mitigation actions (i.e. flushing flows) were implemented. To date the Waiau Arm water quality results of the 2023 / 24 monitoring season are not available to stakeholders, as the reporting does not occur in real time.

A review of the Waiau Arm water quality monitoring plan has been requested, seeking increased integration of Waiau Arm flows (direction and magnitude / intensity) in anticipating poor water quality events, as well as more clarity over threshold trigger levels, including an appropriate chlorophyll a trigger level, and development of a clearer decision-making matrix to ensure that where "mitigation **could be** implemented (e.g. a flushing flow)," such mitigation **will be** implemented, as appropriate.

The WWP considers the existing summer monitoring programme for Waiau Arm water quality unsatisfactory, and requests that a consent condition be added requiring an update and enhancement of the water quality monitoring programme along the lines just outlined above, to the satisfaction of all stakeholders involved. This could include real-time monitoring of water quality of slow flow (<10 m^3/s) in the Waiau Arm, with a requirement to provide flushing flows when exceedances occur both during the project and following completion.

3.1.2.2 Post construction risks of phytoplankton blooms

Dr Kilroy suggests that "once the breakout excavations are completed, water velocities are expected to be lower in the Waiau Arm just upstream of MLC than those experienced in the current channels," such that "Decreased water velocity in the channels following the Project

[3] Manapouri Lake Control Structure.
[4] AEE Appendix D, p55 and Appendix E.

could increase the risk of development of high levels of phytoplankton in this part of the Waiau Arm."

This is a particular concern because it appears that the post-project plan is to rely on the current Waiau Arm water quality monitoring programme, which has already been identified by stakeholders as deficient in its provisions and unfit for present purposes, let alone the increased risk of phytoplankton blooms developing in this part of the Waiau Arm post-project. Suggested amendments to the existing monitoring programme are provided at the end of this section.

It is unclear on what basis the assertion is made at p 55 of Appendix D that the increased risk of phytoplankton blooms in the Waiau Arm in the vicinity of the MLC "is likely to be offset by the release of more effective flushing flows during summer than are possible at present". **The WWP requests the analysis that supports this assertion.**

Appendix E[5] focuses mainly on velocity changes (reductions) in the existing (main and south) channels following the excavation of a new parallel channel, and reports that velocities will likely be reduced across a range of lake levels, leading to increasing risk of elevated chlorophyll a levels and associated phytoplankton blooms, with three to five times the number of days under high risk conditions expected (Appendix E, p 5).

Temperature effects, temperature stratification and expected shallower water in the three channels vs two channels are mentioned on p 18 of Appendix E, with reference also made to s3.3.1 on p 12 and Figure 3.1 on p 13 regarding temperature effects on chlorophyll a levels. Although not subjected to any detailed analysis in the report, these factors are expected to exacerbate the effects of reduced flow velocities and to increase even further the risk of elevated chlorophyll a levels and associated phytoplankton blooms. Further potential effects on chlorophyll a levels, due to increasing light penetration in shallower water, are not considered.

Note that Table 4.1 on p 18 indicates the increased risk of elevated chlorophyll a levels based on water velocities only - and it is on this basis that three to five times the number of days under high risk conditions are expected - without considering the possible exacerbating effects of increased water temperatures, increased light penetration and shallower depth of channels. **The WWP wishes to understand how these exacerbating effects would impact the number of days under high-risk conditions.**

A summary of the effects assessment is given on p 19 of Appendix E, and this reiterates that "the chlorophyll a - velocity relationship suggests substantial increased risk of phytoplankton blooms over the risk in the existing channels. The predicted number of days per year under high risk of phytoplankton blooms in the post-excavation main and south channels was three to five times higher than that predicted for the existing main and south channels."

[5] NIWA's Assessment of risk of phytoplankton blooms in the Waiau Arm immediately upstream of the MLC following excavation of a new parallel channel

"Modelled water depth (averaged across the channels) is less than 2.5m in the parallel channel option. The shallow depths ... could increase the risk to more than that suggested by water velocity alone, because of the risk of warmer temperatures at times. While the existing channels are even shallower [than <2.5m], the effect of temperature would enhance phytoplankton growth only when velocities are low: if phytoplankton is **continuously washed downstream** it cannot accumulate to form blooms" (emphasis added).

Dr Kilroy then assesses the effect of the proposed enhanced flow releases as follows -
"Following excavation of the proposed parallel channel the increased risk of phytoplankton blooms in all three channels will be reduced by managed flow releases that are part of current flow management in the LWR. Potentially useful flow releases are the larger flushing flows for periphyton management [a total of up to 70% of just 4 - 5 flows per year will be provided, vs 30% at the moment, i.e. an increase of just 40%], and the smaller [monthly] recreational flow releases[6]."

There appears to be no analysis of whether this actual number of flushing flows - which are infrequent, of intermittent timing (benthic periphyton flows), and for purposes other than removing phytoplankton (recreational flows to enable jet boat passage and benthic periphyton flushing flows) - will be sufficient to ensure the frequency of "downstream washing" of phytoplankton necessary to avoid the build-up of blooms in the Waiau Arm. **The WWP requests that this analysis be provided.**

The WWP requests a fully revised, updated, upgraded and appropriately tailored Waiau Arm water quality monitoring and mitigation plan be provided as a condition of consent incorporating the concerns and suggestions made in the above sections.

This would consist of a proactive programme of 'continuous downstream washing' designed to avoid the build-up of blooms both during and post channel construction, supported by an amended Waiau Arm monitoring regime which triggers flushing flows if triggers are exceeded.

The existing monitoring regime should be amended to include:

- **At least one additional water quality monitoring site be added to the current suite of monitoring sites, and this should be set up in the vicinity of the new/existing channels, and closer to the MLC than is the case for the current monitoring sites.**

- **A predictive model for poor Waiau Arm water quality which incorporates Waiau Arm flow data; with clearer water quality trigger levels, particularly the incorporation of chlorophyll a and phytoplankton trigger thresholds with associated mitigation (flushing flows).**

- **A more proactive decision-making matrix to enable flushing flows to be delivered in a timely manner when mitigation is triggered.**

[6] P21 Appendix E.

- **Real time monitoring of water quality of slow flow (<10 m^3/s) in the Waiau Arm, with a requirement to provide flushing flows when exceedances occur both during the project and following completion.**

3.2 Biota

3.2.1 Migratory species

The WWP supports the recommendation on p 9 (Executive Summary) and p 60 of Appendix D of "ensuring the instream excavation phase of the Project does not commence until after mid-March to avoid effects on upstream migrating juvenile eels (elvers)." The WWP also supports the suggestion that any longfin eels removed during excavation be returned to the Waiau Arm (p 8 (Executive Summary) and p60 / 61 of Appendix D). **The WWP requests corresponding consent conditions to ensure the above mitigation measures for all fish species are implemented.**

3.2.2 Kakahi (Freshwater mussel)

The WWP requests a condition requiring divers to check for kakahi (At Risk – Declining) in the areas of the bed that will be disturbed and move them to places where the bed won't be disturbed (p 61, Appendix D).

3.2.3 Buchanan's sedge

Several plants of Buchanan's sedge (At Risk - Declining) were identified in the artificially constructed, former eastern channel of the Mararoa delta (Appendix F, p23), also in Wetland 8 and some lake margin areas (Appendix F, p 24) where they are under threat from the excavation work.

Pages 50 / 51 recommend that <10 of these plants will need to be removed and transplanted to "a suitable area of lacustrine habitat within the Project site, as well as follow-up monitoring of survival and replacement planting (if required)."

Given their threat status and limited number of plants identified for transplanting, the WWP suggests that in addition to transplanting the existing plants, that a condition be included which requires collection of seed from these plants prior to disturbance and that these seeds be germinated and plants raised in an off-site nursery area for later rehabilitation of the site.

3.2.4 Stonecrop / *Sedum acre*

The species list in Appendix A of Appendix F records the presence of the dicot. herb, stonecrop (*Sedum acre*).

This exotic species can regenerate from very small fragments and has been the subject of an intensive eradication programme from the roadside gravels of the Te Anau basin lead by DOC.

DOC and ES will likely be very interested to know of its presence in the proposed work site, and may prefer to initiate an eradication plan prior to works commencing - especially as there

is an intention of setting some gravel material aside for use by local contractors (a potential source of further spread).

The WWP requests a condition to ensure that any stonecrop is not spread from the site, machinery is cleaned and checked before leaving the site.

3.2.5 Black Billed Gull habitat

Page 15 of the Landscape Effects Assessment (Appendix H) recommends that "The final form of any exposed islands created within the Waiau Arm shall be finished to avoid linear engineered forms and ensure sinuous organic shapes which reflect natural patterns subjected to natural elements and processes."

The WWP requests a condition that requires any exposed islands be made suitable for use by black billed gulls for nesting (such as levels, final form, substrate etc).

3.3 The flushing flow regime

While the WWP appreciates that this application has a narrow scope, but the purpose of the new channel is to improve the effectiveness of the flushing flow programme, so the WWP requests that the flushing flow regime is able to be expanded to respond to other environmental concerns that may be discovered from the ongoing monitoring programme.

This approach would be similar to the way the existing flushing flow regime was inserted into conditions through Meridian's 2010 consent application to increase the discharge into Deep Cove (referred to as MTAD). Through the MTAD consent, the existing voluntary flushing flow protocol, with a focus on nuisance periphyton, and in particular didymo, was included to address unanticipated environmental effects associated with the Manapouri Power Scheme, despite arguably being only tangentially relevant to the activity consent was sought for.

An expansion of the voluntary flushing flow regime at this juncture would harness adaptive management to drive collaborative enhancement of the existing regime to address these additional issues ahead of the reconsenting of the Scheme as a whole in 2031.

Either separately or together with the expansion of the flushing flow regime, the WWP would like to see a condition on this consent that requires Meridian to make a financial contribution to offset the associated effects on habitat, recreation, and cultural values if a flushing flow is triggered but not provided. The WWP considers this approach appropriate given that the non-provision of flushing flows earmarked for river health has a direct financial benefit to Meridian Energy Limited. Meridian has agreed to provide 15 GWh of water each year for the flushing flows. (Approximately 5 flushing flows.) If this amount of water is not delivered the value of that water, in dollar terms, should be available to the catchment. The value of the financial contribution could be determined using the electricity spot price at the time the flushing flow is triggered and the amount of water that should have been released in the flushing flow.

The WWP requests that if a flushing flow is triggered and not delivered, that Meridian Energy be required to provide a financial contribution to offset the associated effects on habitat, recreation, and cultural values. The recipients be the trusts set up under the original consent (Waiau Fisheries and Habitat Enhancement, Mahika Kai, and

Tuatapere amenities trusts) plus ES, through the Waiau Catchment Liaison Committee, who would be required to spend their portion in the catchment to assist with erosion control and river management. If the funds were shared equally amongst these parties this would be fair compensation for the lack of a flushing flow when one was required.

The WWP requests that the voluntary flushing flow regime be expanded to address cyanobacteria blooms, and any other adverse effect that is discovered, as well as the existing periphyton biomass removal goals. The WWP envisages that the collaborative process with stakeholders used to develop a new regime would continue.

3.4 Consent duration

A consent duration of 35 years has been requested by the applicant. The WWP acknowledges that this application is relatively narrow in scope. However, it is designed to have a direct (and largely positive) impact on the flow regime of the Lower Waiau River. On that basis, the WWP considers it appropriate to align the consent duration with that of the rest of the Manapouri Power Scheme operational consents, which expire in 2031.

Aligning the expiry dates will support a holistic and integrated approach to managing the effects associated with the Manapouri Power Scheme, and specifically the flow regime of the Lower Waiau River into the future. The WWP considers that such an approach is critically important in the journey towards a state of Hauora for the Lower Waiau River. The WWP anticipates being meaningfully involved in that future process, supporting ES with the WWP's extensive institutional knowledge in relation to the Manapouri Power Scheme and the Lower Waiau River.

The WWP requests a consent expiry date which aligns with the operational consents for the Manapouri Power Scheme, in 2031.

Resource Consent submission

To: The Chief Executive
Environment Southland
Private Bag 90116
DX20175
Invercargill

Date	17/04/2024 11:18
Online reference number	RC240434526

Full name of submitter	Christopher Ronald Wood
Postal address	37 Bluecliffs Beach Road, RD 1, Tuatapere 9691
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Applicant details

Name of applicant	Meridian Energy Ltd
Activity location	164 Duncraigen Road, RD 1, Te Anau 9679
Application number	APP-20233670

Submission details

My submission relates to the whole application	Yes
Details of my submission	I have read and understood the submission made by the Bluecliffs Beach Landowners Group. I agree with, and my submission endorses in full, all of the points raised in the Bluecliffs Beach Landowners Group submission. I believe that the proposal does not address the issues at Bluecliffs Beach Settlement, because of the accelerated erosion which is threatening my house, is likely to be made worse by

	the proposal.
Submission uploaded	No
I am a trade competitor of the applicant (for the purposes of section 308B of the Resource Management Act 1991)	No

Outcome sought

I wish Environment Southland to make the following decision	To oppose the application.
Why I wish Environment Southland to make this decision	I believe that the proposal will have the effect of making the erosion at Bluecliffs worse.

Hearing details

I wish to be heard in support of my submission	Yes
I would consider presenting a joint case if others make a similar submission	Yes
I wish to be involved in any pre-hearing meeting that may be held for this application	Yes

Confirmation

I will serve a copy of my submission on the applicant and I confirm all of the above information is correct