

**BEFORE THE COMMISSIONER APPOINTED
BY THE SOUTHLAND REGIONAL COUNCIL**

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of resource consents to occupy the Coastal Marine Area with a tide gate and weir and to dam and divert water

AND

IN THE MATTER of an application by **SOUTHLAND REGIONAL COUNCIL**

**SUMMARY EVIDENCE OF LAURA ROSE DRUMMOND FOR
SOUTHLAND REGIONAL COUNCIL**

30 August 2024

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SUMMARY OF EVIDENCE IN CHIEF

1. My full name is Laura Rose Drummond. I provide a summary of my qualifications and experience in my Evidence in Chief, dated 16 August 2024.
2. I have read the Code of Conduct for Expert Witnesses set out in the Environment Court Practice Note 2014 and agree to comply with it. This evidence has been prepared in accordance with the Code of Conduct. I confirm that the opinions I express in this evidence are within my expertise and represent my true and complete professional opinions. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express. The evidence I am giving is within my area of expertise, except where I state that I am relying on the opinion or evidence of others. I understand it is my duty to assist the Court impartially on relevant matters within my area of expertise.
3. The Titiroa tide gates restrict the free passage of fish up and downstream of the structure when closed, which can affect the migration of native fish within the catchment. Passage is available when the gates are open, which is half of the tidal cycle, although instream velocities may limit upstream passage at times for early life stages of fish, as well as weaker swimming species, such as inanga.
4. From an ecological perspective, the best outcome is to remove the gates to provide unobstructed passage. However, if this is not functionally possible, modifications or replacement with automated or fish friendly gates (FFGs) is the preferred option for new or replacement gates, as per the New Zealand Fish Passage Guidelines.¹ It is now proposed by the applicant that modifications to the existing gate structure are undertaken, to provide an improvement to fish passage (condition 9), with associated monitoring to confirm success (condition 10).
5. To mitigate for potential impacts on fish passage caused by increased velocities in the diversion channel (compared to the mainstem) when the gates open, baffles were proposed. Upon further consideration of water depth restrictions at high tide, boulder clusters are proposed within the

¹ [NZ-FishPassageGuidelines-upto4m-NIWA-DOC-NZFPAG.pdf](#)

diversion channel, to provide resting zones for smaller fish. This will also provide predator refugia habitat for smaller fish when gates are closed.

6. A range of potential enhancement options were originally provided for further consideration and consultation², which did not occur. These options have been updated in response to landowner restrictions and include improved inanga spawning habitat of the Titiroa Stream mainstem and tributary enhancement for a total area of approximately 1.1 ha. The ring drain enhancement downstream of the gates has been removed from the aquatic compensation package. A summary of the proposed mitigation and aquatic compensation is provided in Table 1, with indicative areas shown in Figure 1. A Habitat Enhancement Management Plan is proposed as a condition of consent (condition 4 & 5) to provide confirmation of the areas and methodology of habitat enhancement, and associated monitoring to confirm success.

Table 1: Mitigation and compensation summary

Option	Area/Location
Inanga spawning habitat enhancement upstream of the gates	0.6 ha
Tributary enhancement for inanga spawning and native fish habitat downstream of the gates	0.5 ha
Boulder cluster installation in the diversion channel to provide fish resting zones and refugia habitat from predators	In diversion channel
Gate retrofitting to provide letterbox opening or another form of improved passage when gates are closed	Improved fish passage

² PDP (2022). Titiroa Tide Gate – Mitigation Options. Prepared for Environment Southland. November 2022.

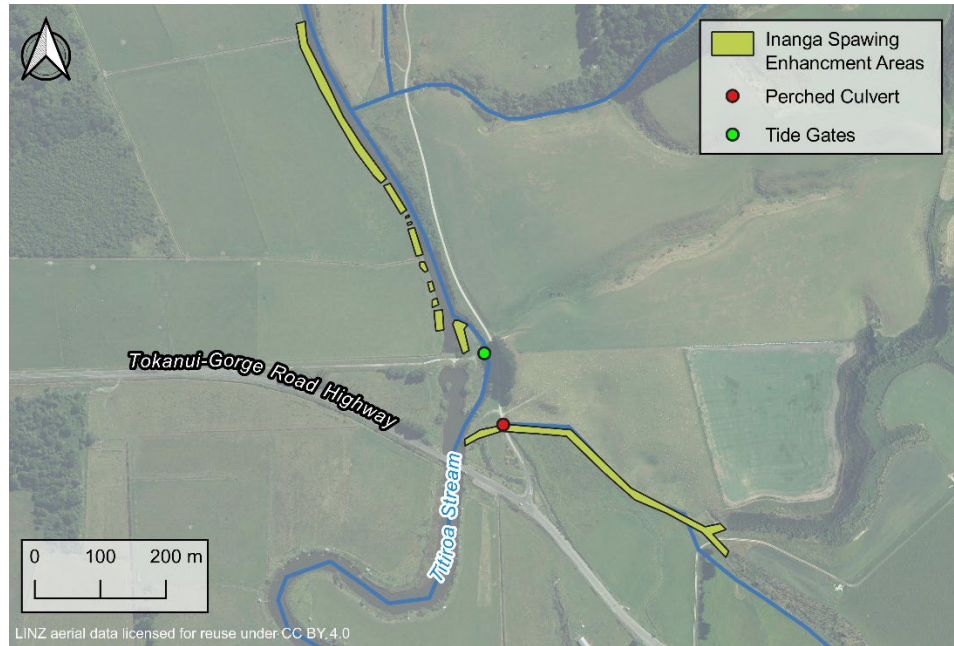


Figure 1: Aquatic compensation locations

7. In my opinion, if the gates cannot be removed, the proposed mitigation in Table 1 will reduce the level of effect on fish passage. Aquatic compensation measures can improve the natural values of the Titiroa Stream near the tide gates and go some way to reducing the level of adverse effect of the tide gates. Conditions are required to ensure that proposed gate mitigation and habitat enhancement works are undertaken with an appropriate level of investigation, transparent methodology and monitoring to compare effectiveness. Collaboration with the Environment Southland science group and stakeholders, including input into and approval of proposed works and associated monitoring plans is highly recommended.

REBUTTAL TO SUBMITTER EVIDENCE

8. In response to submitter evidence by Ms Jane Bowen (Department of Conservation), I provide the following rebuttal or clarification.
9. I agree with Ms Bowen that the gates, when closed impact the migration patterns of native fish within the catchment³ and that design features are available which may help lower the potential impacts on fish passage, and that these could be an appropriate solution if the gates remain⁴. I also agree

³ Paragraph 14 of Ms Bowens evidence

⁴ Paragraphs 45 - 47 of Ms Bowens evidence

with Ms Bowen that insufficient information, consideration or feasibility has been given to assessing the use of FFGs to improve fish passage in the Titiroa Stream⁵. Increased migration ability is now provided for with a condition to provide for fish passage when the gates are closed (condition 9). I agree with Ms Bowen that the side hung nature of the gates should remain if fish friendly modifications are made to the existing structure, as these are preferred to the top hung gates which do not stay open for as long.

10. It is recognised that further investigation is needed to ensure the proposed approach is effective, therefore conceptual designs should be discussed with fish passage experts prior to being installed and monitoring to prove effectiveness will be required. In Paragraph 15 Ms Bowen mentions self-regulating tide gates are considered minimum standard for existing gates. These rely on a stiffener or counterweight to increase the amount of time that passage can occur, but this design on a side hung gate will likely increase channel velocities when closing and will not provide passage when the gates are closed. A bespoke 'letterbox' opening design on one of the gates could be the best outcome to mitigate effects on migrating fish (both up and downstream) as it will enable, if designed correctly, passage through the gates when they are closed, with minimal tidal inundation. When considering the effects management hierarchy, this option falls after avoidance, within minimise. This is because while the impacts to fish passage can be reduced through providing passage when the gates area closed, it will be at a lesser degree than if the gates were not present.
11. In regard to water velocities in the diversion channel, I agree that at times, upstream passage could be restricted for some life stages of fish. Mitigation for this is provided for in the form of boulder refugia habitat within the diversion channel, to provide fish resting areas. Upon reflection, I agree with Ms Bowen that the depth of the channel will make baffle installation difficult⁶, therefore I propose boulder clusters. These will also provide predator refugia habitat for smaller fish when the gates are closed.
12. Paragraphs 36-38 of Ms Bowens evidence discusses the velocity survey. I make the following clarifications. The velocity survey was undertaken

⁵ Paragraph 15 in Ms Bowens evidence.

⁶ Paragraph 64 in Ms Bowens evidence.

downstream of the gates in representative diversion channel habitat. Surveys could not be undertaken in the gate structure itself due to the depth of the channel requiring use of a River Surveyor S5 (boat type profiler). 40 minutes of constant profiles (bank to bank) were undertaken immediately after gates opened (eight transects); the maximum velocity was recorded 38 minutes after the gates opened, not 140 minutes after opening. This was a typographical error. It is recognised that while the velocities measured across the width of the channel would not impede most species upstream passage, some life stages and weak swimming species could be impacted. A condition that requires the installation of boulder clusters is now proposed, with additional velocity surveys at different locations within the channel to identify the best locations for installation. Ms Bowen also comments in paragraph 38 that no comparison to fish swimming speed was provided in the PDP report, I note this is provided in paragraphs 37-38 of my evidence in chief.

13. In Paragraph 34, Ms Bowen disagrees with the minor level of effect on fish passage as discussed in the fish survey results. I would like to clarify that this was related to open passage being provided for in the diversion channel when the gates are open. Therefore, in comparison to other tide gate or flood control dams, that form a full-time barrier, passage can occur when open. This is confirmed by the presence of migratory species upstream of the gates. I agree that the gates could impact the level of, and success of migration and spawning success, through temporally limiting passage, at a level that is more than minor.
14. In Paragraph 48, a fish bypass option is discussed. I agree with Ms Bowen that it would be more effective to modify the gates that are present. However, if an option to install an effective bypass is available this could be investigated as part of condition 9.
15. In Paragraph 16, I agree with Ms Bowen that limited information has been provided on the proposed inanga spawning offsetting. It was the intention of the mitigation options report that further detail would be provided after consultation occurred. As per proposed condition 4 & 5, a Habitat Enhancement Management Plan is proposed to ensure that the locations, methodology and monitoring is undertaken to address these concerns.

16. In Paragraph 40, Ms Bowen comments on the number of surveys undertaken (single salt wedge and spawning surveys). I agree repeated surveys would provide more clarity on current spawning conditions and success. One salt wedge survey was considered appropriate to identify if the salt wedge extended upstream of the gates, and therefore if spawning could occur upstream of the gates when closed. This survey is considered accurate, as it was done during conditions when spawning would occur (spring high tide) during baseflow conditions in the stream. However, I agree further surveys can be done to refine/confirm the salt wedge extent as part of future conditions to confirm proposed enhancement areas. This is now proposed (condition 11).
17. In response to Paragraphs 56-57 of Ms Bowens evidence, further detail on the inanga spawning survey results can be provided, as spawning locations and habitat mapping areas were GPS mapped and photographed. Waypoints of all high, moderate, low and unsuitable bank habitat upstream of and below the gates was mapped by boat, by Aquatic Ecology Limited (AEL), who are experienced in inanga spawning and habitat surveys. Low and unsuitable habitat was considered for enhancement. Repeated surveys are proposed in the updated consent conditions to assist with understanding the current conditions, as surveys were completed in 2022, and conditions may have changed. This will provide more detail and certainty on the enhancement options available.
18. I agree with Ms Bowen⁷ in that the outcome of inanga spawning is uncertain, however note that it would be an improvement on current conditions. Further clarity on the proposed approach (battering of banks to reduce the grade, riparian planting) will be provided in the Habitat Enhancement Management Plan. Land area to undertake enhancement is limited, due to landowner restrictions. Currently available areas have been identified as:
- (a) Bank areas along the mainstem of the Titiroa Stream upstream of the gates (0.6 ha).

⁷ Paragraph 57 of Ms Bowens evidence.

- (b) The tributary on the true left bank downstream of the gates (0.5 ha). This tributary was chosen as previous investigations⁸ into potential inanga spawning areas in Southland rivers highlighted this location as having a salt wedge. There is currently a perched culvert on this tributary, which is proposed to be remediated to improve fish passage at this location.
- (c) The ring drain downstream of the gates⁹ was selected as an option as it is Environment Southland land that can be accessed near the gates, with potential to be modified to provide for native fish habitat. I agree with Ms Bowen that the ring drain downstream of the gates, in its current form, is not suitable for inanga spawning enhancement. It was intended that alteration to the outlets would be required to improve native fish habitat (and potentially inanga spawning habitat). However, considering the changes to the outlets that would be required, and the now proposed tide gate mitigation, this option has been removed from the compensation list.
19. In paragraphs 67-68 of Ms Bowen's evidence she discusses the mitigation/offsetting proposed in the mitigation options report¹⁰ and how that compares to what is being currently proposed. A smaller area of aquatic compensation habitat has been proposed, outside of any consultation occurring. This is because of landowner and budgetary constraints of the Council. I agree that further detail is required, this is proposed to be provided in the Habitat Enhancement Management Plan.
20. In summary, the proposed mitigation and enhancement outlined in Table 1 has been accepted by the applicant and now forms part of the application. In my opinion, the proposed aquatic compensation will improve the current conditions for inanga spawning and native fish habitat, but like-to-like compensation cannot be provided for in this system. The proposed habitat enhancement (undertaken as part of the Habitat Enhancement Management Plan), in conjunction with the proposed mitigation in Table 1,

⁸ Hicks, Andy., Leigh, Bjorn,. & Dare, James,. (2013) *Potential Inanga Spawning Areas in Southland Rivers*. Technical Report. Environment Southland.

⁹ Discussed in paragraph 58 of Ms Bowens evidence.

¹⁰ PDP (2022). Titiroa Tide Gate – Mitigation Options. Prepared for Environment Southland. November 2022.

will provide an improvement to fish passage and habitat values impacted by the tide gates.

Laura Drummond

30 August 2024