BEFORE THE COMMISSIONER APPOINTED BY THE SOUTHLAND REGIONAL COUNCIL

IN THE MATTER	the Resource Management Act 1991
AND	
IN THE MATTER	of resource consents to occupy the Coastal Marine Area with a tide gate and weir to dam and divert water
AND	
IN THE MATTER	of an application by **SOUTHLAND REGIONAL COUNCIL**

EVIDENCE SUMMARY OF MATTHEW GARDNER
30 August 2024

FLETCHER VAUTIER MOORE
LAWYERS
PO BOX 3029
RICHMOND 7050

Telephone: (03) 543 8301
Facsimile: (03) 543 8302
Email: cthomsen@fvm.co.nz
Solicitor: Chris Thomsen

1. The evidence covers the hydraulic impact of the tide gate and weir on the Titiroa Stream drainage network. The evidence was prepared in accordance with the Code of Conduct for Expert Witnesses set out in the Environment Court Practice Note 2014 and represents my true and complete professional opinions.

Background

2. The tide gate and weir on the Titiroa Stream are part of the wider Mataura Catchment Control Scheme designed to reduce flood damage of land. The tide gate operates by opening when there is positive downstream flow and shutting when tidal flow reverses. The primary purpose is to prevent high tides from raising water levels within the drainage system beyond the gate.

3. I visited the site on the 2nd of July 2024 and met with local farmer, Les Frisby, who shared his views on the criticality of the gates and explained how the extensive network of 'tile' drains operate.

4. Tile drains are subsurface drains that remove excess water from crop roots and allow the surrounding area to be used for productive farming purposes.

5. I have also reviewed various documents related to the history and purpose of the scheme, as well as the evidence of Ian Dave Connor and Colin Shen Young, in order to get a better understanding of the context and issues.

Model Build

6. A detailed 2D hydrodynamic model of the area was built using the MIKE21 FM software package. The model was developed using industry best practice techniques and the latest LiDAR data for the terrain.

7. The tide gate was represented dynamically within the model and opens and closes based on set timings specified by the modeller.

8. Tide levels were set based on levels in the LINZ Nautical Almanac and converted to the NZVD2016 vertical datum to match the datum of the

LiDAR data used in the model. These levels were verified with on-site survey.

9. The model has some limitations, such as no baseflows applied to the Titiroa Stream or drainage network, no detailed survey of the drainage network, and assumptions around the depth of the drainage channels and stream based on the surrounding topography.

Model Results

10. Four simulations were conducted modelling the existing scenario, removal of tide gate, opening the gate for an additional hour, and opening the gate for an additional two hours.

11. Model results show that completely removing the tide gate will significantly increase the peak water levels within a large portion of the drainage network, so that all of the tile drains are completely submerged. This would prevent local runoff from the surrounding farmland from freely draining through the tile drain network, and therefore will likely result in more frequent and longer-lasting ponding of water on farms during wet weather periods as well as saltwater intrusion into the soil, affecting the productivity and quality of the land for agriculture purposes.

12. Model results also show that increasing the opening time by 1 hour and 2 hours increases water levels within the drainage network in the order of 0.09 m and 0.21 m respectively. This would also reduce the performance of the drainage network resulting in land that is more waterlogged and less freely draining. This may result in reduced productivity for agricultural purposes, and if the soil remains in agricultural use, then it is likely that the resulting soil chemistry and stability will change, potentially resulting in increased nutrient runoff due to leaching as well as increased soil erosion.

13. Because the existing tile drains have a diameter of 0.1m and have been placed at the approximate mid tide water level, an increase of 0.1 to 0.2m will be significant as it will result in the drains being submerged and therefore unable to operate.

14. The area most impacted by either the removal of the gate or alteration of the timing is estimated to be at a minimum approximately 9 ha of farmland that would be at increased risk of ponding and saltwater intrusion, impacting on the soil quality and viability of the land for agricultural use.

15. Model results also indicate that the tide gate provides more significant benefit with higher tide levels, such as those expected with sea level rise, as it prevents direct inundation of several of the paddocks immediately upstream of the gate, as well as reducing water levels in an even greater portion of the drainage network.

Conclusion

16. The key finding of this study is that the removal of the tide gates or alteration of the timing of the gate opening will have a significant negative impact on the drainage ability of the upstream farmland, which relies on an extensive network of tile drains to remove excess water from crop roots and allow the land to be used for productive farming purposes.

17. The removal of the tide gates or alteration of the timing of the gate opening will likely result in more frequent and longer-lasting ponding of water on farms during wet weather periods as well as saltwater intrusion into the soil, affecting the productivity and quality of the land for agriculture purposes.

18. The removal of the tide gates or alteration of the timing of the gate opening may also increase the risk of nutrient runoff due to leaching and soil erosion due to changes in soil chemistry and stability assuming it remains in agricultural use.

19. The tide gate provides a significant benefit to the upstream farmland by preventing high tides from raising water levels within the drainage system beyond the gate, and this benefit will increase with higher tide levels expected with sea level rise.

Mathew Gardner

30 August 2024