

Technical Comment

To: Aurora Grant (Team Leader – Consents)
Fax No:
From: Ewen Rodway (Environmental Scientist)
Date: Tuesday, 20 November 2018
File Reference: APP-20181792
Subject: *Effects on Water Quality*



**environment
SOUTHLAND**

Te Taiao Tonga

Environment Southland is the brand name of Southland Regional Council

Cnr North Rd & Price St, Private Bag 90116
Invercargill New Zealand
Phone 03 211 5115 Fax 03 211 5252
Tollfree (Southland only) 0800 76 88 45
Email service@es.govt.nz
Web site www.es.govt.nz

Comment:

Tēnā koe Aurora

I have reviewed the application (APP-20181792) particularly with regard to the Overseer modelling, predicted change in contaminant losses, and any subsequent effect on the water quality in the Tussock Creek catchment and relevant downstream receiving environments.

Current Water Quality

Drainage water from the proposed platform area and support block all drains into Tussock Creek, a tributary of the Makarewa River. The Makarewa River joins the Oreti River just south of Wallacetown prior to its discharge into the New River Estuary.

Note: Reference to nitrogen and phosphorus data presented below are from Hodson et al. (2017), for specific methods relating to these assessments please refer to this report. All classifications with respect to human health for recreation under the National Objectives Framework (NOF) are sourced from LAWA.

As identified in the application, the results of water quality monitoring from Tussock Creek show that the stream water quality is degraded, particularly with regard to *E.coli*, nitrogen, and phosphorus (Hodson et al., 2017). The median *E.coli* concentration for this site is 1100 cfu/100ml and would be classed in the 'E' band (lowest band) under the NOF. The predicted average infection rate is greater than 7% (MfE, 2017).

The application gives water quality data from the Oreti River at Wallacetown. This location is upstream of the Oreti and Makarewa confluence so while landuse changes in the Makarewa catchment have no bearing on the water quality results at this site, it does provide a good reference for the state of the receiving water to which the Makarewa discharges into. Monitoring data shows that the water quality in the Oreti River at Wallacetown is degraded particularly with respect to nitrogen and *E.coli*. Median nitrogen concentrations are elevated and exceed guidelines for the

protection of ecosystem health (Hodson et al., 2017). The median *E.coli* concentration for this site is 130 cfu/100ml and would be classed in the 'D' band (second lowest band) under the National Objectives Framework. The predicted average infection rate is greater than 3% (MfE, 2017).

The application does not present water quality data from the state of the environment (SOE) monitoring site on the Makarewa River at Wallacetown. This site is particularly relevant as it is downstream of Tussock Creek and the land area concerned in this application. Monitoring data from this site indicates the water quality in the Makarewa is degraded. Median nitrogen and phosphorus concentrations exceed guidelines for the protection of ecosystem health (Hodson et al., 2017). The median *E.coli* concentration for this site is 335 cfu/100ml and would be classed in the 'E' band (lowest band) under the National Objectives Framework. The predicted average infection rate is greater than 7% (MfE, 2017).

Monitoring of the New River Estuary indicates a significant decline in overall environment health particularly with respect to sedimentation and trophic state. 2016 monitoring shows the New River Estuary is ranked in the 'D Band' (worst level of impairment) for all parameters monitored. Those parameters being macroalgae cover, soft mud, area of anoxic sediment, gross eutrophic zones, and occurrence of seagrass (Robertson et al., 2017). The assessment of the New River Estuary presented in the application uses out of date and very broad scale data.

Groundwater quality in the vicinity of the proposed activity is variable, particularly with respect to nitrogen contamination. Groundwater total oxidised nitrogen concentrations (medians) vary from 0.05 mg/L to 9.86 mg/L (unpublished ES data). This variation is significantly influenced by the depth the sampling was conducted at and generally indicates higher levels of contamination at shallow depths with lower nitrogen concentrations at depth. Contamination in shallow groundwater indicates that despite most of the area being within the gleyed physiographic zone there is still a significant risk of nitrogen loss to shallow groundwater and then subsequent losses to hydraulically connected streams and watercourses.

Effects of the proposed activity

The proposed activity will result in increased N and P losses on the new piece of land (Cox's Road Block). Nitrogen losses from this portion of land are estimated to increase by approximately 48%. This is a conservative estimate as it assumes no winter crop will be grown and grazed on the new area of the dairy platform and accounts for rounding errors. These increases are a result of land use change from drystock to dairy grazing. Increases in nitrogen loss from the land will inevitably result in increased losses of nitrogen to groundwater and subsequent increased contamination of shallow groundwater under the Cox's Road Block.

There is potentially an overall decrease in N loss to the Tussock creek catchment. This offset comes from reduced crop area overall, dilution of stock and effluent across the greater land area, some proposed changes to fertiliser use and land management. However, the total reduction from the current to proposed scenario is only 48 kg N/yr a reduction of 0.21 % which is negligible given the errors associated with the estimates and it could be assumed the total N load in the catchment is predicted to remain fairly constant. Given the poor water quality of the immediate and distant downstream receiving environments, consenting of such a large discharge of nitrogen is unlikely to maintain or improve water quality.

Phosphorus losses are modelling to increase under the proposed scenario. Given the degraded state of downstream receiving environments particularly with regard to eutrophication any increases in phosphorus load to the catchment is likely to contribute to the deterioration of water quality.

Kind regards

A handwritten signature in black ink, appearing to read 'E. Rodway', with a long horizontal stroke extending to the right.

Ewen Rodway

References

Hodson, R., Dare, J., Merg, M L., and Couldrey, M., (2017). Water Quality in Southland: Current State and Trends. Environment Southland Technical Report. Publication No 2017-04.

Ministry for the Environment (MfE), (2017). National Policy Statement for Freshwater Management 2014 (updated 2017).

Robertson, B.M., Stevens, L.M., Ward, N., and Robertson, B.P., 2017. Condition of Southland's Shallow, Intertidal Dominated Estuaries in Relation to Eutrophication and Sedimentation: Output 1: Data Analysis and Technical Assessment – Habitat Mapping, Vulnerability Assessment and Monitoring Recommendations Related to Issues of Eutrophication and Sedimentation. Report prepared by Wriggle Coastal Management for Environment Southland. 172p.