

Section or page number	Error	Comment	Response
Section 3.4	<p>The paragraph is contradictory. Firstly, it says “The greater proportion of poorly drained soils across the proposed ‘sheep block’ favours denitrification.” Then later says “The 60% of the ‘sheep-block’ associated with well drained Mataura and Oreti soils are less likely to support lateral or overland flow but are characterised as having a severe nitrate leaching risk.”</p> <p>No reference is provided for the assertion that 60% of the block has a “severe” nitrate leaching risk.</p>	<p>This has implications in terms of later assessments of the potential for N leaching.</p> <p>The Oxidising Zone Fact Sheet description of “High risk of nitrogen build-up in groundwater” should be used and referenced.</p>	<p>Point 1. This has been clarified within the text. The implications for NO₃-N leaching are accounted for in the Overseer modelling ergo soil drainage class etc), although we note that there is some uncertainty in this tool when used outside of the physiographic context. As such, the physiographic science reports of Rissmann et al (2016) and the Zone characterisation of Hughes et al. (2016) have been included for completeness.</p> <p>Point 2. References provided (TopoClimate South). Very severe for Oreti and Moderate for Mataura. However, these classifications were made without an understanding of redox and hydrological controls over NO₃-N build up. As such, the physiographic science reports</p>

			of Rissmann et al (2016) and the Zone characterisation of Hughes et al. (2016) have been included for completeness.
Page 12	The statement "...general interpretation that the physiographic setting of the property in conjunction with a relatively high intensity dairying operation are likely the dominant drivers of elevated NO ₃ -N beneath the property." May be an error because other land uses in the area have not been assessed. It is an error to simply assume that dairying is the only significant source of nitrogen.	For example, cereal cropping in the area can apply in excess of 100 kg N/ha/yr as urea. This possible source should be considered. This could be addressed by identifying all the relevant land uses and their potential contribution.	We have removed all reference to 'Dairy' here.
Page 12	The comment "This pattern of elevated groundwater NO ₃ -N is not isolated to the Cashmere Bay Ltd property but is a common feature of similar physiographic settings and high intensity land use activities across the region." Is misleading in that the very high concentrations of nitrate N observed at F45/0343 and F45/0172 are not a common feature in Southland. Elevated nitrate N is common, but it is not "common" to see such high concentrations.	We expected that there would be a more in-depth assessment to endeavour to explain such high concentrations in such relatively small areas. "Has been observed in other similar physiographic settings..." would perhaps be an accurate way of making the same point.	The very high concentrations (>NZDWS limit of 11.3 with a median of 13.3 and a mean of 15.5 mg/L) observed at shallow levels beneath the property are also observed within other areas: Waimea Groundwater Management Zone (GWMZ) , Wendonside, Lower Matura, Makarewa, Waihopai, Central Plains, Waimatuku, Upper Aparima, Dipton, Castelrock, Five Rivers GWMZs. Locally these NO ₃ -N hotspots share a similar physiographic setting. For some

			of these wells NO ₃ -N does spike to >20.0 mg/L and this has been known and observed for some time (Rissmann, 2011, 2012 etc).
Page 15	<p>The comment “Further, we disagree with the statement that Cashmere Bay Dairy is “highly unlikely to be contributing to any significant extent to the hotspot at F45/0172” and refer to the above technical assessment for a likely localised (dairy platform) influence over instances of elevated groundwater NO₃-N in both wells F45/0172 and F45/0182 and equivalent settings regionally.” May be an error.</p> <p>It is an error of fact to imply that very high nitrate nitrogen concentrations are caused by a specific activity on land if the groundwater flow direction does not support that conclusion. The report refers to a piezometric survey but does not reproduce that information. If that is available it should be included and then this matter would be clarified.</p>	<p>We expected that with all the additional analysis that the authors would have included the piezometric contour information that they refer to help understand the potential source on the high nitrate N concentrations observed at F45/0172. It would also be prudent to recognise that the groundwater quality data does not distinguish between localised groundwater quality, regional groundwater quality or groundwater quality affected by surface runoff into bores, and endeavour to assess the extent to which high results may or may not reflect regional or localised groundwater quality.</p>	<p>We stand by our interpretation of the local setting.</p> <p>However, we do note that further work is required if the applicants are suggesting that poor well head protection is the main cause of extreme localised NO₃-N values in the order of 3 x the NZDWS.</p>
Page 16	<p>The statement “The Overseer modelling for the sheep block shows an increase in N loss from 16 kg/ha/yr in 2017/18 to 30kg/ha/yr under the proposed activity, while the dairy platform decreases from 45 kg/ha/yr in 2017/18 to 39kg/ha/yr. However due to the above concerns raised by Irricon, the modelled scenarios may not be an accurate representation of current or proposed activities. Other issues surround the inherent uncertainty associated</p>	<p>The dismissal of the Overseer modelling is not justified on the facts at the time and particularly not justified in the light of the recent audit conclusions. As previously discussed, we do not consider that it is good process or natural justice for a technical report to be finalised without taking account</p>	<p>Overseer modelling was not dismissed.</p>

	<p>with Overseer modelling in terms of the level of confidence associated with the reported differences in NO₃-N leaching losses between current and proposed activities reported in the AEE.” is an error because as previously discussed, the author has apparently not been provided with either Brian Goodger’s comments or the final review comments by Irricon.</p>	<p>of the final Overseer audit report.</p>	
<p>Page 17, 18 and 19</p>	<p>There is an error in that the conclusion on page 19 does not line up the earlier conclusions on page 17 and 18</p> <p>Page 17 concludes: “Overall, we agree that due to an increase in land area associated with the proposed sheep-block and no increase in cow numbers that the farm system is unlikely to result in a change in the current intensity of land use across the dairy platform – assuming the lease block is retained for the duration of the proposed consent.”</p> <p>Page 18 concludes “Rather, on the evidence presented here we expect losses to be similar overall.”</p> <p>Page 19 concludes “Although we agree that ‘overall’ the increase in NO₃-N leaching losses is likely to be small, due to an increase in the area of the dairy platform...”</p>	<p>These statements, particularly the conclusion on page 19, are not consistent and therefore at least one of them must be an error.</p>	<p>We do not see any error. However, for the sake of clarification we have reemphasised the difference between localised and ‘overall’ in our conclusion.</p>
<p>Various</p>	<p>Minor spelling and typographical errors e.g., incorrect spelling of surnames, etc.</p>	<p>We assume that a final check would fix all these.</p>	<p>We have checked the spelling of surnames and found one typo for Monaghan and have corrected this.</p>