Project Ref: 69507

13 June 2022

Horizons Regional Council
Private Bag 11025
Manawatū Mail Centre
PALMERSTON NORTH 4442

Attention: Fiona Morton

By Email: fiona.morton@horizons.govt.nz

Dear Fiona

APP-2003010585.03: FONTERRA LONGBURN TREATED WASTEWATER DISCHARGE TO THE MANAWATŪ RIVER - RESPONSE TO S92 REQUEST FOR FURTHER INFORMATION

I refer to your letter of 14 December 2021 requesting further information under s92 of the Resource Management Act in relation to the above resource consent application. I also refer to our letter of 26 January 2022 confirming that the applicant would provide the requested information and indicating a timeframe for the provision of that information. This letter provides the applicant's response to request for further information under s92 (being items 1 to 15 of your letter dated 14 December 2021).

The following sets out the specific information requested by Horizons Regional Council in italics with the applicant's response below each item.

1. *The application makes reference to the need/ability to be able to discharge to the Manawatu River during the month of November. However it not clear from the application if any flow restrictions would apply before the discharge can occur to the Manawatu River. Is it proposed that the flow in the Manawatu River need to be above a certain threshold prior to this discharge being allowed to occur? If so, what flow threshold is proposed and why?*

   The proposed November discharge regime is detailed in Section 2.7.3 of the AEE. It must be noted that the applicant proposes that only Whole Milk Reverse Osmosis permeate (WMRO) be discharged during November. The applicant does not propose to discharge any effluent from the wastewater treatment process (WWRO) during November.

   Under the existing consent, WMRO is able to be discharged at any time during November (and at any time during the year) irrespective of River flow conditions (i.e., without any flow restrictions) and at volumes of up to 2,500 m^3/day.

   As detailed in Section 2.7.3 of the AEE, the applicant does not propose any River flow restrictions for the WMRO November discharge but does propose the following restrictions:

   - That the consent authority be notified prior to discharge of WMRO permeate in November
   - That WMRO permeate may only be discharged in November when soil conditions prevent it being discharged to land.
   - That the maximum daily discharge of WMRO during November be limited to 1,000 m^3/day.

2. *The assessment of effects concentrated on effects on periphyton and macroinvertebrate communities. Given the proximity of the discharge to the lower Manawatu and its change to effectively a soft bottomed slower moving river from the Opiki Bridge downstream, does the Applicant consider it appropriate that consideration should also be given to these river characteristics when assessing effects i.e. the potential increase in macrophyte growth and associated changes as a result of the discharge as well? Please provide a comment addressing the Applicant's position on this and an assessment if warranted.*

   The applicant does not consider that an assessment of the effects of the discharge on the soft bottomed portion of the River downstream of the Opiki Bridge (i.e., an assessment of potential increase in macrophyte growth) is warranted or necessary given:

   - The nature of the discharge, in that it represents a negligible contribution to nutrients in to the Lower Manawatū River;
   - The lack of evidence of nuisance macrophyte growths in the lower Manawatū River, in particular:
     - To our knowledge Horizons do not monitor macrophytes in this part of the river;
     - Nuisance blooms have not been recorded in sampling notes made by Horizons field staff when sampling at Ōpiki Bridge and Whirokino; and
     - Macrophytes were not recorded in the lower Manawatū River during historical fish surveys conducted by Hicks and Bell (2003)[1]
   - The relationship between nitrogen and phosphorus availability and macrophyte growth is variable and poorly understood. Nutrients are just one of a number of factors that influence the growth of these plants. Light availability, flow conditions and rooting substrate also have a strong influence over densities and growth rates. As such, assessing the effects of a minor nutrient discharge (in relation to total loads) on an unknown level of macrophyte growth some ~15 km downstream with any material level of confidence is unlikely to be possible.

3. *The water quality assessment focuses on the water quality up and downstream of the discharge from 2011 to 2021. The last upgrades to the treatment plant required by consent conditions were implemented in 2015. If data collected prior to these last upgrades are excluded from the analysis does this change what the current contribution to the river is assessed as? This is important in terms of assessing any improvements that may occur as a result of proposal as this needs to include all the previously consented improvements as the current environment.*

   Future reductions in the contribution of the discharge to overallocation of nutrient budgets are calculated via modelling, not from measured data[2]. Accordingly, the improvements discussed in the AEE are in addition to those resulting from the plant upgrades made in 2015. As stated in Section 4.2.3 of Aquanet's report (Appendix D of the AEE), the baseline used assumes treatment as at 2020, being the use of DAF and RO treatment for wastewater and RO for the whole milk stream. As such the assessment included in the technical report and AEE considers the consented improvements as the current environment.

   When Aquanet's PointSIM modelling is modified so that the baseline wastewater quality reflects pre-2015 treatment (DAF only) the projected future reductions in the discharge's contribution to overallocation are significantly greater than what is presented in the AEE. To demonstrate this, Table 20 of the Aquanet Report has been reproduced below and updated to show the projected improvements from a pre-2015 treatment baseline compared to the post-2015 treatment baseline used in the AEE (Table 1).

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[1] *Hicks, B. J., Bells, G. G., 2003. Electrofishing survey of the Manawatu , Whanganui and Mokau rivers and Lake Rotorangi, Patea River. (CBR Contract Report 30). Centre for Biodiversity and Ecology Research University of Waikato, Hamilton, New Zealand.*

[2] *As discussed in our meeting in May 2022, the modelling approach to assessment is particularly relevant given the pulse nature of the current discharge along; the fact that, prior to 2019 when monitoring protocols were changed to ensure monitoring is carried out when the discharge is occurring, there is not necessarily a correlation between in-river monitoring data and discharge occurring; and that the proposed discharge will be a continuous discharge, rather than pulse discharge.*

Table 1: Modelled future distribution of key water quality parameters downstream of the Longburn discharge compared to an upstream and baseline data series.
Effect is calculated as the relative increase in concentration between upstream and downstream under "baseline" and "future" scenarios. The baseline used in this scenario represents pre-2015 treatment at the Fonterra Plant (wastewater treated via DAF only). However, the reductions in effect under a post-2015 baseline (wastewater treated via DAF and RO) are provided for context.

Parameter	Statistic	Upstream	Downstream (Baseline)	Downstream (Future)	Baseline effect	Future effect	Reduction in effect (pre-2015 baseline)	Reduction in effect (post-2015 baseline)
DRP (g/m^3)	Av.	0.02347	0.02415	0.02351	2.81%	0.17%	94.1%	35.8%
	Av. <20th FEP	0.02357	0.02430	0.02361	3.10%	0.18%	94.3%	39.2%
	Med.	0.02241	0.02319	0.02245	3.47%	0.17%	95.1%	19.4%
	Max.	0.10442	0.10446	0.10442	0.03%	0.00%	100.0%	100.0%
	95th %ile	0.04335	0.04402	0.04337	1.55%	0.05%	96.5%	23.1%
SIN (g/m^3)	Av.	0.57816	0.58091	0.57858	0.48%	0.07%	84.9%	42.8%
	Av. <20th FEP	0.56587	0.56885	0.56630	0.53%	0.08%	85.6%	46.4%
	Med.	0.55367	0.55695	0.55441	0.59%	0.13%	77.4%	0.0%
	Max.	1.38324	1.38877	1.38430	0.40%	0.08%	80.9%	0.0%
	95th %ile	1.02774	1.03288	1.02843	0.50%	0.07%	86.6%	0.0%
NH_4-N (g/m^3)	Av.	0.10130	0.10350	0.10147	2.17%	0.16%	92.4%	58.2%
	Av. <20th FEP	0.11055	0.11294	0.11073	2.16%	0.16%	92.8%	61.5%
	Med.	0.08442	0.08737	0.08488	3.49%	0.54%	84.4%	19.5%
	Max.	0.42329	0.42460	0.42329	0.31%	0.00%	100.0%	100.0%
	95th %ile	0.23083	0.23272	0.23083	0.82%	0.00%	100.0%	100.0%
E.coli (/100mL)	Av.	1006.0	1009.7	1006.1	0.36%	0.01%	97.6%	20.3%
	Av. <20th FEP	409.6	413.6	409.7	0.97%	0.03%	97.0%	20.5%
	Med.	281.3	284.4	281.3	1.12%	0.00%	0.0%	0.0%
	Max.	36432.4	36433.0	36432.4	0.00%	0.00%	0.0%	0.0%
	95th %ile	4410.1	4413.1	4410.1	0.07%	0.00%	100.0%	100.0%

*0% reductions are the result of a statistic currently being driven by upstream concentrations at times when the discharge wasn't operating.
**100% reductions in effect are the result of the removing the discharge at times when upstream concentrations were high, meaning the relevant statistic is now driven by the upstream concentration.

4. *The water quality report does not contain sufficient assessment with respect to a load analysis that is discharged to the river. Please provide an assessment of the current loads and what the future loads will be discharged to the River for each of the contaminants.*

Please find attached a detailed spreadsheet providing the data requested. Current loads reflect what has been modelled under the post-2015 treatment baseline described in the response to question 3 above.

As requested, a summary table of annual loads of key parameters under the baseline (current discharge) and proposed discharge regime is provided below (to provide context loads have also presented as a proportion of upstream load):

Table 2: Modelled annual loads of key water quality parameters downstream of the Longburn discharge under the proposed discharge regime compared to the baseline data series. Loads are presented both in absolute terms (e.g., t/yr) and as percentages of upstream loads in the River.

	DRP				SIN				NH_4-N				*E. coli*			
	Baseline		Future		Baseline		Future		Baseline		Future		Baseline		Future	
Year	Load (t)	% of U/S	Load (t)	% of U/S	Load (t)	% of U/S	Load (t)	% of U/S	Load (t)	% of U/S	Load (t)	% of U/S	Load (tril.)	% of U/S	Load (tril.)	% of U/S
2000	0.14	0.31%	0.11	0.23%	1.65	0.14%	1.19	0.10%	0.73	0.53%	0.46	0.34%	4.66	0.01%	3.69	0.01%
2001	0.17	0.25%	0.12	0.18%	2.01	0.10%	1.36	0.07%	0.90	0.39%	0.50	0.22%	5.66	0.01%	4.34	0.01%
2002	0.18	0.21%	0.16	0.18%	2.14	0.09%	1.79	0.08%	0.94	0.36%	0.68	0.26%	6.07	0.01%	5.63	0.01%
2003	0.18	0.24%	0.14	0.18%	2.09	0.10%	1.53	0.07%	0.92	0.41%	0.58	0.26%	5.93	0.01%	4.83	0.00%
2004	0.20	0.16%	0.17	0.14%	2.26	0.07%	1.89	0.06%	0.98	0.31%	0.72	0.23%	6.51	0.00%	5.97	0.00%
2005	0.17	0.24%	0.15	0.21%	2.02	0.11%	1.62	0.09%	0.90	0.39%	0.60	0.26%	5.69	0.01%	5.19	0.01%
2006	0.19	0.18%	0.16	0.15%	2.24	0.08%	1.75	0.06%	0.97	0.34%	0.64	0.23%	6.43	0.01%	5.59	0.00%
2007	0.17	0.27%	0.15	0.23%	2.03	0.11%	1.64	0.09%	0.90	0.44%	0.62	0.30%	5.70	0.01%	5.13	0.01%
2008	0.19	0.22%	0.16	0.20%	2.15	0.10%	1.81	0.08%	0.94	0.39%	0.69	0.29%	6.13	0.01%	5.68	0.01%
2009	0.19	0.23%	0.15	0.18%	2.20	0.10%	1.61	0.07%	0.96	0.39%	0.60	0.24%	6.29	0.01%	5.12	0.01%
2010	0.18	0.20%	0.16	0.18%	2.11	0.08%	1.79	0.07%	0.93	0.36%	0.68	0.26%	5.99	0.00%	5.64	0.00%
2011	0.19	0.25%	0.15	0.20%	2.17	0.10%	1.64	0.08%	0.95	0.40%	0.60	0.25%	6.20	0.01%	5.24	0.01%
2012	0.18	0.24%	0.14	0.18%	2.10	0.11%	1.57	0.08%	0.93	0.38%	0.59	0.24%	5.96	0.01%	4.93	0.01%
2013	0.19	0.27%	0.16	0.24%	2.19	0.11%	1.81	0.09%	0.95	0.44%	0.69	0.31%	6.25	0.01%	5.67	0.01%
2014	0.20	0.28%	0.14	0.20%	2.26	0.12%	1.53	0.08%	0.98	0.43%	0.57	0.25%	6.51	0.01%	4.86	0.01%
2015	0.20	0.27%	0.16	0.22%	2.25	0.11%	1.78	0.09%	0.98	0.40%	0.67	0.27%	6.48	0.01%	5.63	0.01%
2016	0.19	0.27%	0.16	0.23%	2.20	0.12%	1.77	0.10%	0.96	0.42%	0.66	0.29%	6.30	0.01%	5.58	0.01%
2017	0.20	0.22%	0.17	0.19%	2.28	0.09%	1.87	0.07%	0.99	0.35%	0.70	0.25%	6.56	0.01%	5.89	0.01%
2018	0.16	0.20%	0.12	0.15%	1.91	0.09%	1.34	0.06%	0.86	0.34%	0.48	0.19%	5.31	0.01%	4.35	0.01%
2019	0.18	0.32%	0.15	0.27%	2.08	0.14%	1.64	0.11%	0.92	0.46%	0.62	0.31%	5.87	0.01%	5.16	0.01%
2020	0.03	0.26%	0.03	0.19%	0.40	0.11%	0.27	0.08%	0.18	0.28%	0.09	0.14%	1.14	0.02%	0.92	0.02%
Av	0.18	0.24%	0.14	0.20%	2.04	0.10%	1.58	0.08%	0.89	0.39%	0.59	0.26%	5.79	0.01%	5.00	0.01%

5. *The assessment of effects has used effluent quality at a certain standard. Does the Applicant propose that these are used as limits within the consent conditions? In addition, the application has proposed s107 requirements as conditions for the consent. Please provide a rational as to whether you consider this approach is appropriate given the guidance/targets/limits/triggers that the One Plan provides for managing effects.*

   The assessment has been based on effluent quality and volumes to determine the potential effects of the discharge on the river, given that the load discharged is the key determinant in determining effects after reasonable mixing. The quality used for modelling is based on observed and recorded quality, and the volumes are based on what is necessary and possible in order to meet operational requirements whilst minimising the nature and scale of effects on the Manawatū River (i.e. it is a best practicable option approach). The condition framework reflects this, and it is proposed that conditions be set to require there to be no s107 effects and that specified load limits are met. This is consistent with the existing consent which is based on a load limit approach, albeit one which has presented operational challenges as a result of the load limits being specified on a daily basis. To maintain a load limit approach which is operationally appropriate and incentivises discharge to land, an annual limit is proposed as discussed in our response to Question 6 below. Further, the load limit approach is considered appropriate given that the discharge quality is known (existing treatment has been in place for several year), and there is consistent quality (i.e. concentrations) produced. In this regard, the system differs from other discharges such as municipal wastewater as it is process wastewater only which the consent holder has control over in terms of volume and quality, and does not include inflow and infiltration that occurs in urban wastewater reticulation networks.

   As per Schedule E of the One Plan, the water quality numbers expressed in the tables of Schedule E are to be interpreted as "Targets". Schedule E states that the numbers are to be considered as "standards" only "where specified under conditions / standards / terms in a rule". This application is to be assessed under Rule 14-30 of the One Plan and that rule does not include any "conditions / standards / terms". The Schedule E numbers are therefore to be considered as "targets", noting that these are targets for receiving water bodies. We are not

aware of any water quality "limits" or "triggers" as referenced in the s92 request[3] that lend themselves to use as a condition of consent.

In terms of 'guidance', the Regional Policy Statement specifies (Policy 5-2) that the targets in Schedule E are to be "used to inform the management of surface water quality in the manner set out in Policies 5-3, 5-4, and 5-5" (emphasis added). Those policies require that:

- where targets are met, they must continue to be met beyond the zone of reasonable mixing
- where targets are not met, the water quality in the sub-zone must be managed in a manner which enhances the existing water quality in order to meet the target and / or safeguard the relevant Schedule B values and management objectives.
- Where it is unknown if the targets are met, water quality in the sub-zone must be managed in a manner which maintains or enhances the existing water quality, has regard to the likely effect of the activity on Schedule B values that the targets are designed to safeguard, and has regard to the relevant information about the water quality where such information exists.

These matters are addressed extensively within the AEE and in the context of the existing quality of the receiving water body.

It is critical that the conditions of consent incentivise the discharge to land rather than the river. The BPO, as reflected and provided for in the conditions of consent, does this and the AEE has been developed accordingly. This is explained in further detail in the information included in response to Question 6, particularly in terms of the importance of an annual load limit rather than a median or daily load based conditions framework. The assessment of effects is based on an effects envelope that reflects the BPO and proposed discharge regime in a worst-case scenario which is considered appropriate to ensure that effects are not likely to extend beyond the consented envelope, should consent be granted.

6. *The proposed consent conditions include proposed limits on the loads that are discharged to the River. Please provide context to how these have been derived and how they relate to the assessment of effects has been undertaken.*

Annual loads are proposed as a compliance measure which balances a requirement to minimise adverse effects on the environment and to provide operational flexibility for management of the pond, land discharge and river discharge system. The current consent is based on daily load limits, and this has proven to be difficult from an operational and compliance perspective as it requires an estimation of likely wastewater quality (given that actual quality is not known until several days after discharge when laboratory results become available) prior to calculating acceptable discharge limits for each day. Consideration was also given to a median daily load, however, on analysis an acceptable calculation methodology was difficult to derive for a median daily load (i.e. assumed zero figures for no discharge days would skew the median to be lower than the actual median daily load, but calculating a median only on days that there is a discharge would not incentivise land disposal – i.e. a minor discharge on every day could be used as a strategy to skew median results downward). Further, this approach is considered appropriate given that, even at maximum proposed discharge volumes, the modelling demonstrates that the discharge will not have more than minor acute effects in the River.

Annual load limits have been proposed that set a ceiling under which the consent holder is required to operate the system, and which incentivises discharges to land (in addition to other proposed consent conditions which also require discharge to land in preference to discharge to river), particularly given that the peak load occurs towards the end of the season. It is expected that a target profile cumulative load graph will be developed which the operator will manage the system within in order to ensure compliance with the annual load limit.

Annual load limits have been derived generally by developing a "typical" and "worst year" annual load cumulative assessment with the worst-case year being based on the worst year concentration data for WWRO and WMRO permeate, and the highest river discharge volume from the Aquanet model. This has then been tested against actual data for the 2019, 2020 and 2021 year in order to confirm that compliance with the proposed consent limit is able to be achieved.

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[3] *The exception being in relation to toxicants not otherwise defined in the Water Quality Targets where Schedule E refers to the ANZECC 2000 Guideline trigger values. As all relevant contaminants are defined in Schedule E, these "trigger" values do not apply.*

On this matter, we advise that there is an error on page 49 of the AEE. The discharge quality limits (annual load limits) proposed for phosphorus should be Total Phosphorus, not Dissolved Reactive Phosphorus. For clarity, we advise that the applicant proposes the following discharge quality limits for 1 May to 30 October each year (kg/year):

- Total Nitrogen: 6,500 kg/year
- Total Phosphorus: 450 kg/year.

These parameters are proposed as the discharge has been demonstrated, through modelling and historic monitoring, to have a less than minor effect on the River water quality in the area of the discharge, and because nitrogen and phosphorus are the key parameters of concern for the River in terms of broad scale catchment effects and consideration of cumulative effects. The parameters have been expressed in terms of "total" nutrients rather than specific constituent parameters in order to provide a compliance regime which considers all elements of the nutrients in the discharge, and therefore is a more conservative approach than targeting, for example, only dissolved reactive phosphorus and soluble inorganic nitrogen.

7. *The application states that the river at this point is below the national bottom line for ammonia. The application notes that this is mostly driven from the upstream environment (PNCC) however, this discharge application will contribute additional ammonia to the river. Please explain how they consider this to be consistent with the policy directive to improve degraded water quality and moving out of the national bottom line for ammonia.; AND*

8. *On page 65 the Applicant proposes that the application contributes to the overall improvement of water quality in the Manawatu River. Please expand on this further. The evidence contained in the application shows an improvement on the current discharge however, there is no any evidence to show that the river itself improves as a result of the discharge i.e. the water quality downstream of the discharge will be better than upstream of the discharge as a result of the discharge. The application would appear to base this assessment on the discharge having a right to continue to operate.*

Section 3.1.1 of the Aquanet report (Appendix D of the AEE) provides a detailed assessment of the current state of the upstream and downstream water quality against the National Bottom Line and NOF Attribute states. It finds that the upstream site was more likely to fall below the National Bottom Line for ammonia compared to the downstream site in all years after 2014 with the exception of 2019 when both sites were equally likely to fall below the bottom line. There is already an elevated risk of ammonia toxicity upstream of the proposed discharge and the risk profile did not change after 2019.

The Applicant acknowledges that the proposed discharge, in and of itself, will not result in the Manawatū River water quality in this reach moving out of (above) the bottom line for ammonia. However, the NPSFM20 is focused on ensuring that degraded catchments are managed by the relevant Council/regulatory authorities and the community to either maintain water quality in catchments that are not degraded and achieve improvements over time where catchments are not currently meeting desired water quality outcomes. This is primarily to occur via the freshwater planning process that regional councils must undertake, and which has not yet been undertaken in the Manawatū-Whanganui Region (and noting that, as stated in the AEE, and based on historic monitoring, the ammonia parameter currently meets the Schedule E water quality target). To this extent the obligation imposed on the Regional Council under the NPSFM20 is a "*future obligation rather than a current obligation*"[4] and it is not anticipated that individual consent applicants will need to 'in and of themselves' remedy any full-catchment scale water quality (and quantity) issues as a part of their individual resource consent applications. The applicant does note that there is a need to ensure that compliance collected under a consenting framework is ideally able to be incorporated into an accounting framework developed in accordance with the NPSFM, however, such a framework has not yet been developed.

For this proposal, that means that although it is open for the Regional Council to impose conditions that are consistent with "*contribut*[*ing*] *positively*" to achieving the outcomes sought by the NPSFM20, but "*conditions set must be based on the circumstances applying to the particular discharge being consented*".[5] This also

[4] *Minister of Conservation v Northland Regional Council [2021] NZEnvC 001, para [31].*

[5] *Rangitane o Temaki Nui a Rua Inc v Manawatu- Wanganui Regional Council [2021] NZEnvC 085, para 12*

includes the decision maker needing to ensure that any reduction is not "*inequitable*" when compared to the reductions that may in the future be required of others in the catchment.

How things might change over time is also relevant. For the Manawatu River the decision maker will need to, for example, further consider the extent to which there is likely to be 'improvement over time' as a result of the implementation of the likes of a BPO approach on all consented activities in the catchment. This would include BPO being adopted for the likes of the PNCC wastewater discharge (which is likely to result in material improvements in river water quality).

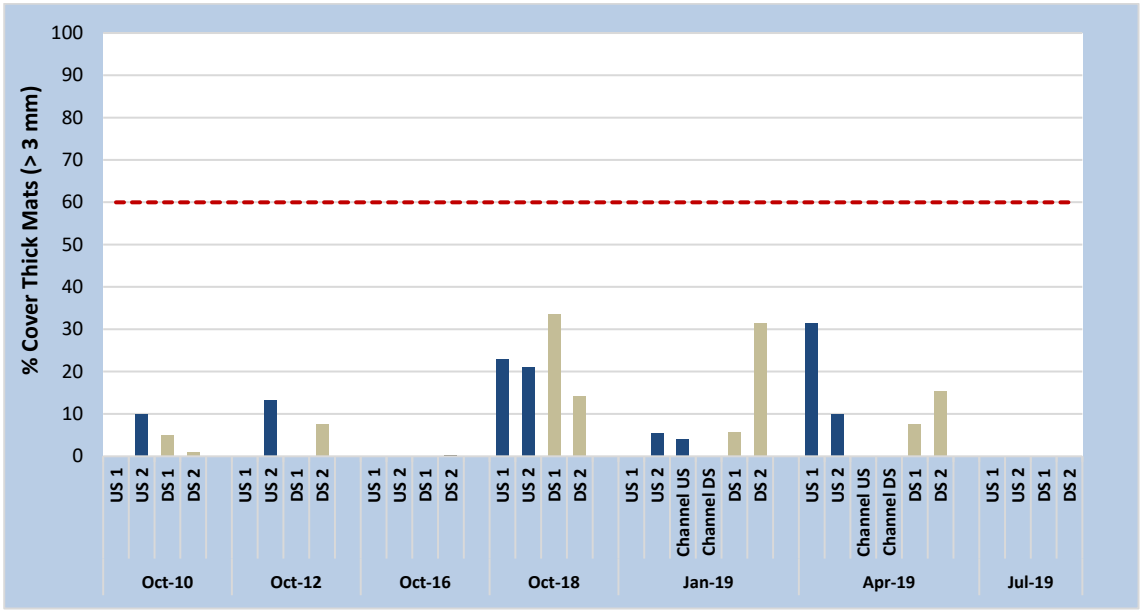
As discussed in detail in the AEE, the proposed discharge regime will ensure that the existing negligible effects on ammonia toxicity will be reduced and to that extent it is consistent with the overall outcomes being sought by the NPSFM20. Even if this individual application may not move the River out of the bottom line for ammonia, that is not determinative in terms of compliance with the NPSFM20 and whether or not to grant consent. Rather, the decision maker can look to the possible reductions that may in the future be made by others (such as PNCC) and also the overall effects of the activity, including positive effects.

9. *In terms of zone of reasonable mixing, the application proposes that special circumstances should apply and that the zone be 400 metre long. Please expand on why they consider that special circumstances apply and whether they have considered a discharge structure that will allow for more rapid mixing of the discharge into the Manawatu River?*

Aquanet's PointSIM model assumes full mixing when predicting downstream water quality. The model has the potential to account for partial mixing, but this is not considered necessary at this time as:

- The risk of direct effects from the discharge is low. As shown in Table 1, with full mixing the discharge is expected to increase concentrations of key contaminants by less than <=0.5%. Thus, even with only 25% to 50% mixing any effects on key water quality concentrations will be negligible. There is likely to be more variability in water quality across the River, than there will be between upstream and downstream sites.
- Periphyton surveys taken in the side channel that discharge enters the Manawatū River suggest that that direct effects on plant growth in the un-mixed plume are unlikely, with low cover of thick mats and long green filaments present in January and April 2019 (<20%) (see Figure 1). Furthermore, heterotrophic growths (i.e., sewage fungus) was not recorded in the side channel at this time.

Given that there is a low risk of adverse effects in the un-mixed plume, there would be limited benefit in moving the discharge to facilitate more rapid mixing.



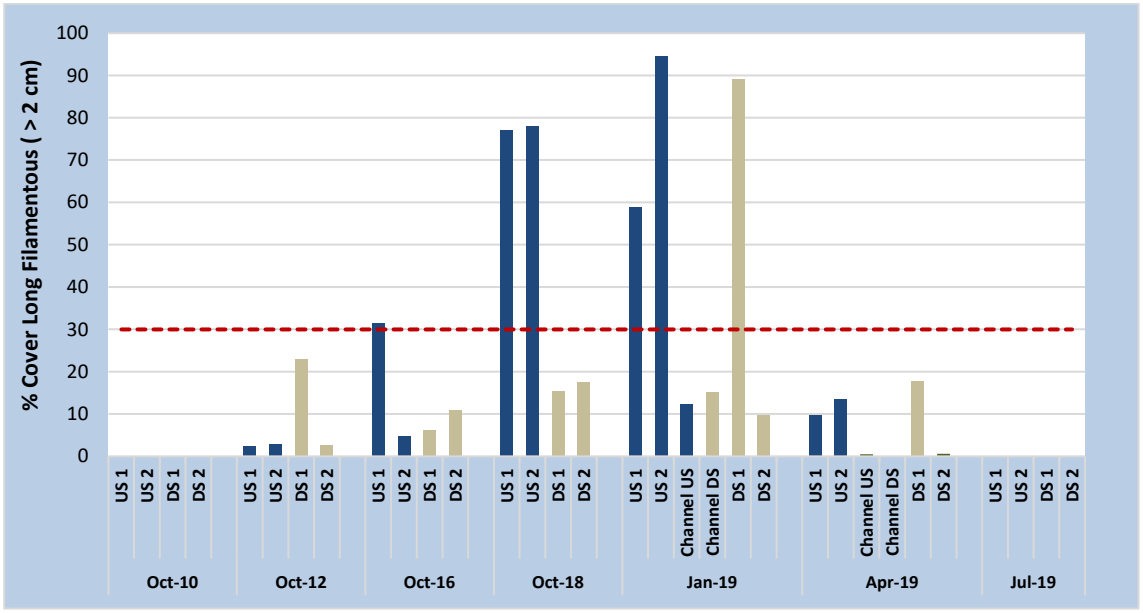


Figure 1: Periphyton cover by Thick diatom mats (> 3 mm) (upper) and Long filamentous algae (> 2 cm) (lower) at sites sampled on the Manawatu River upstream (blue bars) and downstream (brown bars) of the discharge from the Fonterra Longburn plant, 2010-2019. Horizons One Plan targets are represented by dashed red lines.

It is therefore considered against the definition of "*reasonable mixing*" in the One Plan that "*special circumstances*" apply that support the zone of reasonable mixing being maintained consistent with previous consents. This will also provide a consistent comparison and compliance framework with previous consents for this discharge.

The special circumstances include the reasonable mixing zone being long established, the absence of evidence of any adverse effects within the mixing zone that would warrant the mixing zone to be shortened, and further that a new discharge structure to the main stem of the river in a manner which achieved full mixing within the distance specified in clause (a) of the One Plan's definition of "reasonable mixing" is likely to be very disruptive to the river bed.

These reasons are consistent with case law on "*exceptional circumstances*" that apply to analysis under section 107 of the Act[6] (although emphasising that section 107 does not include the 200 metre limit that is included in the "*reasonable mixing*" definition under the One Plan and that care therefore needs to be taken when assessing "*special circumstances*" versus "*exceptional circumstances*" under section 107 – i.e. one is not necessarily fully synonymous with the other).

10. *Throughout the application, the Applicant indicates that they do not intend to vary any of the discharge to land consent conditions as a result of this process. However, if these conditions were to be modified, could the amount of wastewater discharged to land be increased within the hydraulic loading that the land can accept? (Therefore removing more wastewater from the river and not overloading and causing effects on the soil properties of the irrigation farms.) Please provide an assessment as to whether this as a possibility.*

A detailed assessment of the capacity of the land irrigation area to accept treated waste has been included in Appendix C2 of the AEE. As demonstrated in that assessment, the proposal has been developed to optimise (maximise) the amount of wastewater that can be applied to land within the sustainable limits of the land irrigation area. The proposal as presented is the best practicable option being a combined land and water discharge regime which achieves an improvement to the existing situation.

The wastewater irrigation farms will receive a higher hydraulic loading as a result of the proposed storage facility and discharge regime. As stated in section 2.6.2, a key design principle of the storage facility is that it is able to be emptied prior to the next production season, specifically that the maximum storage size is the volume that

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[6] *See for example: Marr v Bay of Plenty RC [2010] NZEnvC 347, (2010) 16 ELRNZ 197, citing Paokahu Trust v Gisborne DC EnvC A162/03*

is able to be discharged to the wastewater irrigation farms without overloading from a hydraulic or nutrient loading perspective. That is, the system has been designed on the basis of providing the maximum storage possible in order to maximise the discharge to land without carrying forward stored wastewater to the next season. The proposal has been developed around maximising the hydraulic loading to land.

As stated in the technical assessment in Appendix C2 of the application, the proposal will result in additional hydraulic and nutrient loading onto the land area. Of note is that the proposal would result in the nutrient loading limits being exceeded if the farms are to be operated on a status quo basis. However, the proposal involves modifications to the farming practices in order to be able to increase the nutrient loading without adversely affecting (increasing) nutrient leaching from the land application areas beyond that provided for under the existing consent or One Plan targets.

As discussed, the Overseer file is being shared with Horizons as per your instructions in your email dated 6th May 2022. As this shares the file with Horizons Regional Council's generic consent monitoring email address, we will also advise you directly via email when this file has been shared with Horizons.

11. *The Applicant notes that there is a lack of information in respect of periphyton, macroinvertebrates, and DO and therefore an assessment cannot be undertaken against the NPS. Does the Applicant believe that such monitoring should be included in the proposed conditions to allow such an assessment to be undertaken after the proposed upgrades have been completed?*

    The applicant does not consider that such monitoring should be included in the proposed conditions to allow an assessment under the NPS in terms of periphyton, macroinvertebrates, or DO. It is considered that there is no justification for requiring macroinvertebrate, periphyton or dissolved oxygen monitoring as a condition of consent for the following reasons:

    - The Aquanet report highlights that the potential for the discharge to impact upon these parameters is limited (see Section 5.2.2). Thus, requiring such costly monitoring would be disproportionate to the scale of the activity.
    - To benchmark monitoring sites against the NPSFM20, periphyton attribute monthly biomass monitoring would be required for three years. The periphyton attribute state assigned to a site is largely dictated by biomass during summer and/or low flows. As the discharge will not be operating at these times (December to April or flows less than <56 m^3/s), such monitoring is very unlikely to reveal any differences between upstream and downstream monitoring sites that can be attributed to the Fonterra Longburn plant.
    - Regarding dissolved oxygen, the NPSFM20 stipulates that assessment against the relevant attribute states must be based on data collected between November and April (inclusive). Only discharges of WMRO permeate under limited circumstances (November only and only when soil moisture conditions prevent discharge to land) are proposed for this period. November discharges are only expected to occur in the order of 25% of the time (ie approx. 5 years out of every 20 years). As such the NPSFM20 dissolved oxygen attribute is not applicable to the discharge and monitoring against it would not provide any pertinent information on effects.
    - The NPSFM20 requires that assessment against the macroinvertebrate attribute states be based on data collected between December and March (inclusive). The discharge will not be operating over this period. Thus, the macroinvertebrate attributes in the NPSFM20 are not relevant to the Fonterra Longburn discharge and monitoring against them would not provide information on effects.

12. *The Applicant notes that the MCI score at the discharge location does not meet the One Plan target – this implies that the life supporting capacity of the river is currently degraded. Please expand on how they consider that the on-going addition of contaminants to water moves towards enhancement of water quality and meeting the life supporting capacity at this point in the river. Within this context, the application states that the contribution from this discharge is minor however, when undertaking such an assessment does the Applicant agree that you should consider cumulative effects and in some situations it is numerous "minor" discharges that result in values in waterways being degraded?*

    It is acknowledged that it is a statutory test that cumulative effects needs to be considered in the assessment of almost any application for resource consent and, it is acknowledged that "in some situations", numerous minor discharges can contribute to waterways being degraded. This application is not considered to be such a situation noting that the proposal will remove the discharge from the River during the most sensitive periods

(summer, and year round during flows below 56 m^3/s) and will not prevent the national bottom line attribute state being met in the River (refer discussion under question 11 above).

The appropriateness or otherwise of an activity must be considered within the context of all relevant statutory tests, as discussed in relation to the questions about the NPSFM20. It is reductionistic and incorrect to consider each test in an isolated manner. Further, it could be found that even if the effects of the discharge were more than minor, it may be considered appropriate to grant consent given the significant contribution of the activities which are enabled by the proposed discharge to the local and regional economies and the significant investments and commitment to improvement made by the Applicant.

In any case, the MCI target is applicable to the state of the environment monitoring not individual discharges. The potential ecological effects of the proposed activity have been assessed comprehensively in the AEE, including regard for MCI and QMCI indices.

13. *At page 59 and the assessment against Policy 9 of the National Policy Statement for Freshwater Management: The lower Manawatū provides important habitat as a migratory pathway for native fish that need to be able to access the catchment upstream of the discharge location. Please provide additional information as to the potential effects of the discharge on this migratory pathway given that the discharge will be operating when fish are migrating?*

As stated in the Aquanet Report the future effects of the discharge on key water quality and ecological attributes are likely to be negligible. As such there is no evidence to suggest that resident fish will be adversely affected. Furthermore, the risk of adverse effects on the passage of migratory life stages is even lower, given:

- Past research by Richardson *et al.* (2001a)[7] has shown that inanga, and common bully do not exhibit an avoidance response to ammonia concentrations as high as 8.5 mg/L. This is 20 times higher than the maximum modelled and measured concentrations downstream of the Fonterra Longburn discharge. As such it appears that there is limited potential for the discharge to affect upstream fish migrations via increased ammonia concentrations. Furthermore, given the discharge is expected to have a negligible impact on ammonia concentrations, any avoidance of this contaminant by fish species would predominantly be the result of upstream activities.
- Some native fish do exhibit an avoidance response to suspended solids at low turbidity (>25 NTU) (Boubée *et al.,* 1997[8]; Richardson *et al.,* 2001b[9]). However, the generally low suspended solid concentrations in the effluent combined with the high dilution rate in the Manawatū River means that the discharge is unlikely to affect turbidity in the Manawatū River in a meaningful way, especially not to the extent that fish migration would be impacted, noting the following:
    - Turbidity downstream of discharge = 0.5286_{TSS} (R^2 = 0.7758, NSE[10] = 0.69) (see attached spreadsheet for workings)
    - Maximum recorded TSS concentration in RO treated effluent = 120 g/m^3
    - Maximum discharge volume = 3,000 m^3/day
    - Minimum river flow = 56.5 m^3/s
    - Minimum dilution = 1:1829
    - Predicted maximum increase in TSS concentration caused by discharge = 0.066 g/m^3
    - Predicted maximum increase in turbidity caused by discharge = 0.034 NTU

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[7] *Richardson, J., Williams, E.K., Hickey, C.W., 2001a. Avoidance behaviour of freshwater fish and shrimp exposed to ammonia and low dissolved oxygen separately and in combination. New Zealand Journal of Marine and Freshwater Research 35, 625–633.*

[8] *Boubée, J.A.T., Dean, T.L., West, D.W., Barrier, R.F.G., 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, 61–69.*

[9] *Richardson, J., Rowe, D.K., Smith, J.P., 2001b. Effects of turbidity on the migration of juvenile banded kokopu (Galaxias fasciatus) in a natural stream. New Zealand Journal of Marine and Freshwater Research 35, 191–196.*

[10] *The Nash–Sutcliffe model efficiency coefficient (NSE) is a measure of how well observed and predicted values fit a 1:1 line when plotted against each other, with values of 0 to 1 considered acceptable and values greater than 0.5 indicating good model performance*

Note: The above workings provide an indication of risk rather than quantitative assessment of the impacts of the discharge on turbidity in the Manawatū River.

14. *In respect of the economic analysis that has been undertaken – the analysis has focused on the benefits to the region of the factory, which is understandable, however does the economic analysis include the costs as a result of the proposed discharge to the Manawatū River?*

    The economic analysis does not include the costs as a result of the proposed discharge to the Manawatū River (and likewise does not quantify any benefits, in economic terms, of the proposed discharge). These costs and benefits would be 'non-market' matters and there is a considerable body of case law that has expressed caution around further assessing, in an economic framework, intangible values such as amenity, ecological, health, cultural and community value.[11]

    As stated in the EIA, the objective of that assessment is to "*assess the economic significance and the economic benefits associated with the on-going operation of Fonterra and Goodman Fielder sites for Palmerston North City and the Manawatū-Whanganui regional economies*". The discharge is one of the activities which enables these sites to continue to operate. No exercise has been undertaken to assign monetary value to the costs and benefits of the discharge itself. The inclusion of the EIA in the application is to demonstrate the contribution of the Longburn processing facility to the Region to assist in the overall assessment of the proposal, as is required under the RMA.

    The impact of the proposed discharge to the Manawatū River have been fully considered in qualitative terms and with regard to the nature and scale of potential effects on water quality in particular. Trying to extend any consideration of such effects would not be possible or meaningfully assist in the assessment and determination of the application.

15. *Further to Section 7.1, please indicate if there has been further progress on consultation with Tangata Whenua, and if there has been any outcomes from that consultation (e.g. draft MoU, proffered consent conditions, updated Cultural Impact Assessments.). The application does not include a CIA or a CVA. Please provide one or detail the pathway and timeline you intend to follow to address cultural effects.*

    Further to Section 7.1, we advise that Fonterra has been working to actively engaging with tangata whenua in regard to cultural effects. Fonterra has met with representatives of Rangitāne on several occasions regarding all activities associated with the Longburn processing site (including this application, stormwater discharges and management and discharges of whey and wastewater treatment solids). Fonterra has also met with representatives of Raukawa on several occasions and facilitated visits to the Longburn site. The work with Raukawa to date has resulted in a base for a cultural values report which will inform further engagement as to relationship building, cultural effects assessments and mitigation measures across the range of activities associated with the Longburn site. Fonterra has similarly sought to actively engage with Ngāti Kauwhata and Muaūpoko Tribal Authority but is, to date, limited by resourcing constraints on behalf of iwi and hapu.

    We therefore advise that the pathway for working through the cultural issues associated with the discharges is one of active engagement to build effective relationships with iwi and hapū at a pace and manner which facilitates effective engagement and in line with iwi and hapū priorities recognising their resourcing constraints. Fonterra has advised iwi and hapu that it is expected that the application will be notified and there will also be a formal process of submissions. Fonterra will be guided but iwi and hapū as to how they seek to understand the cultural values and the specific outcomes and pathways may be different between these groups (eg as to whether or not a CVA or CIA is prepared or whether the cultural values, effects and mitigation measures are communicated and agreed via an alternative process). Fonterra will continue to actively engage with these groups and will provide regular updates to Horizons as consent authority, however it is difficult to put a timeframe on this work.

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[11] *See for example: Careys Bay Association Inc v Dunedin City Council ENC Christchurch C150/2003, 7 November 2003 at [160-165] and Meridian Energy Ltd v Central Otago District Council [2011] 1 NZLR 482 at [103].*

Yours faithfully

Annette Sweeney

Enc Model data spreadsheet