

Memo

File No: 47 05 20
Date: 23 March 2020
To: Stuart Beard
From: Janine Kamke
Subject: **Memo Raglan Wastewater discharge consent further information request
23 March 2020**

Dear Stuart,

I have accessed the resource consent application by BECA for Waikato Regional Council for the continued discharge of max. 2600m³ treated wastewater per day.

The application relies almost entirely on modelling and the conclusions based on this modelling do not always seem valid. In many cases the effects on the environment are assumed rather than demonstrated. Further information is required to assess the suitability of the modelling and the connected assumptions.

Generally, it would have been highly desirable to have monitoring data from the receiving environment designed to assess the effects of the discharge rather than models only. This includes water quality as well as shellfish monitoring data. This would make the AEE more robust and easier to process (saves time/money). I strongly recommend the applicant collect data to demonstrate the effects on the environment and human health for any future applications.

In addition to the need for further information about modelling, there are data and information gaps that need to be addressed in order to comprehend the statements made by the applicant. Below I raise several concerns with the application as well as requests for further information.

Discharge time

In point 2.6.1. of the application the applicant proposes a new discharge timeframe in order to maximise the dilution potential. The applicant is suggesting a max. discharge time per outgoing tide of 5.5 hrs starting 0.25 hrs after high tide for a duration of no more than 5 hours. It is unclear if discharge duration is supposed to be 5hrs or 5.5hrs. Is the applicant intending to remove the previous/current consent condition to cease discharge no later than 1 hr before low tide? If this is the case can the applicant demonstrate that the discharge will not be transported further into the harbour?

Discharge location and plume dispersal

Throughout the application it remains unclear where the exact location of the outfall pipe is. A schematic drawing would be helpful including information on the distance to the shore and main channel. Where is the location in relation to the tracer release site in the dye tracer study by Gibbs and Watson (1996) which is referred to in the DHI discharge assessment (Appendix B of Appendix C).

Have any additional investigations or modelling been undertaken since the tracer study by Gibbs and Watson (1996) regarding to the direction of the plume outside the harbour? The DHI modelling does not address this. The abovementioned study was conducted during north westerly swell patterns and

north easterly winds which are rare events. This is also a concern for the DHI model validation (see report by MetOcean Services). Therefore, this may not reflect the most relevant plume movements outside of the harbour. Regarding this and future applications this should be reinvestigated, in particular as this may impact popular surf breaks and marine organisms such as Maui dolphins.

Total Suspended Solids exceedances and suggested consent limit

On page 11 of the application, the applicant states that “Due to summer algal concentration peaks, the pond system occasionally produces peaks of TSS”.

How often is occasionally? Please provide frequency over exceedance per month and year for 2015-2019.

How does the applicant know the exceedances are due to algal growth? Please provide algal biovolume data.

The applicant proposes to change the consent conditions states the with an increased discharge limit of median 40 g/m³ and maximum of 60 g/m³ for 9 out of 10 consecutive samples, which is reported as treatment capacity of the plant. It is not explained why the capacity of the plant would have changed and therefore a change in TSS concentration limits in the discharge are needed. Clarification regarding the setting of the previous consent limits is needed. Was it previously claimed/ assumed that the plant performance is better than it is or has something changed in the treatment process?

The applicant further claims that due to the TSS concentration of the discharge “no observable adverse effects, in terms of colour of clarity are anticipated beyond the zone of reasonable mixing”. This is an assumption. Can the applicant provide any data or modelling that would back up this claim? There is data from WRC monitoring as well as discharge concentrations available. A proper assessment of suspended solids concentration in nearfield and far field areas would be useful. As pathogens and viruses, some of which are not affected by UV treatment (such as *Toxoplasma gondii* which causes toxoplasmosis) can be attached to particles, an increased TSS concentration may have an effect on animal and human health (see also NIWA microbiological water quality report). It may also affect water clarity, which can cause ecological effects by restricting light penetration in the water column and negatively influences aesthetics, which is of particular concern if plumes impact recreational areas. Effects on water clarity need to be assessed.

In terms of further treatment options to reduce TSS concentrations, on p. 35 of the application the applicant excludes the membrane treatment option for the short-term consent but considers it for the long term due to economic reasons. Why are these options investigated in the long-term but for the short term asked to change conditions to accept discharge without these treatment options? For environmental effects the consent duration doesn't matter in this case.

Residence times

The applicant refers to various residence times at the harbour mouth regarding the impact of the discharge. On page 23 of the application and in the assessment of water quality effects (Appendix C) < 1 day is referred to. The cited study by Greer et al. (2016) shows residence times at the harbour mouth is up to 10 days. In the DHI modelling report (Appendix B of Water Quality Assessment) a residence time of approx. 20 days is reported.

The residency times calculated by Greer et al. (2016) were developed as a modelling proof of concept exercise and are therefore are not appropriate for use here. While variation in residence time in a dynamic environment such as Raglan Harbour is expected, the AEE should be completed with consistent values which should be the worst case and typical case scenario using a consistent and appropriate method. The applicant needs to define residence times for the worst case and typical case scenarios based on the expected range and refer to the impact of the discharge. Overall, residence times need to be used with a full understanding of the limitations of this method and in fact may be inappropriate for the purposes of this assessment.

Data from WRC's SoE monitoring programme in Raglan Harbour

In appendix C the applicant refers to the WRC State of the Environment monitoring programme. It remains unclear whether this is in relation to the discharge. The WRC estuarine water quality monitoring programme in Raglan Harbour was not designed to assess impacts of the wastewater treatment plant. The applicant mentions two sites near the harbour mouth and discharge outfall. The WRC programme covers only one site at the harbour mouth. What is the second site they are referring to?

The applicant concludes that “the above data shows that the water quality in the harbour mouth is generally good and representative of open coastal water” – this is not shown with data as there is no comparison to open coastal water. Please compare to national guideline values (ANZECC 2000). Water quality being good is an interpretation. Please see also below under discharge data and modelled dilutions of nutrients and contaminants.

Hydrodynamic modelling

The applicant has not conducted any monitoring of the receiving environment (neither water quality nor shellfish monitoring) and therefore all contamination and nutrient concentration in the receiving environment and their dilutions are based on the near field and far field dilution modelling conducted by DHI for the applicant. Furthermore, the Human Health Risk assessment by NIWA (Appendix C of Appendix C) used the hydrodynamic modelling and tracer release for their estimation of pathogen impacts from the discharge in Raglan Harbour at contact recreation and food gathering sites. The general water quality and human health assessment are therefore highly dependent on the accuracy of the hydrodynamic modelling.

While I cannot comment on the model design itself (see below) I noted that the modelling was conducted using the mean daily discharge rate of 1175m³/day. This is not the maximum consented discharge rate. To assess potential effects on the environment and human health water quality conditions need to be assessed using the worst-case scenario as well as the typical case scenario. Additional analysis using the maximum consented discharge rate is necessary to determine water quality impacts of the discharge on ecological and human health.

Because hydrodynamic modelling is outside the area of my expertise, an independent review of the modelling by DHI was conducted by Met Ocean Solutions. This review lists several issues and concerns and should be carefully addressed by the applicant. This will have an impact on the water quality assessment as nutrient and contaminant dilutions in the receiving environment were calculated based on this modelling.

Discharge data and modelled dilutions of nutrients and contaminants

As mentioned above these values need to be supplied using dilution scenarios with the max. requested daily discharge rate as well as a mean daily discharge rate. The predicted concentrations have been calculated using the average annual median concentration and, for ammonia, using the average annual 90th percentile. To cover both the typical and the “worst-case” scenario calculating the dilutions for each parameter for both the annual median and the annual 95th (not 90th) percentile would be needed. To assess the variability between years it would be better to see the values for each year. Please see also below for further data requested.

For assessment against guidelines the applicant uses the WRC Estuarine Guideline Categories. While still in use at the time this application was drafted these have now been discontinued and the comparison with these categories is not required. Instead we would appreciate direct comparison against national guidelines (ANZECC 2000) as cited in table 3 of Appendix C.

In section 5.4.3 of Appendix C the applicant states that nitrate and total nitrogen are not considered toxicants. It is unclear what is meant by that and under which regulations nitrate is not a toxicant. I do

not agree with this as it can be toxic to fish and other animals. It is important to not dismiss these as non-toxicants. The assessment needs to include nitrate.

Regarding existing TN concentrations based on the applicant's analysis (not using the max consented discharge rate for dilution) the concentration after reasonable mixing is still 0.3 mg /L which is about double that of the concentration in at the closest WRC SOE site (Raglan mouth) which is shown with a median TN concentration of 0.16 g/m³. ANZECC guidelines are 0.12 mg/L. The applicant speculates that with further dilution and due to the highly dynamic environment the ability of nuisance plant growth will be inhibited. There is no data to back this up. The applicant considers benthic macroalgae but not planktonic algae including microalgae. Please provide information on algal growth (including phytoplankton) in the discharge area.

The applicant considers the effects of nutrients to be negligible because concentrations after reasonable mixing are reflective of background concentrations observed in wider WRC water quality investigations. Does "investigations" refer to WRC SOE monitoring? Which sites is this being compared to? Are these investigations showing nutrient values in an acceptable range according to ANZECC guidelines?

Cumulative effects need to be considered in estuarine environments. In the assessment of effects part (Appendix C, Section 5.4.) in particular (but not exclusive) nitrogen related parameters cumulative effects need to be considered. The application addresses the assessment as if the discharge was received into pure water. The existing concentration in the receiving environment is ignored. While the applicant is not responsible for existing concentrations in the receiving environment, they need to be considered to assess the impact of the discharge on the environment given the existing environmental conditions.

Assessment against current consent conditions

The current consent conditions for e.g. TSS are asking for a median of 20g/m³ for 12 consecutive monthly samples and maximum of 30g per cubic metre for 9 out of 10 consecutive monthly samples (one sample per month). The applicant does not present this data but instead reports the average annual 90th percentile, which does not reflect consent conditions. Please provide the number of exceedances or 90th percentile of this limit for 10 months on a rolling window in a graph. Therefore the discharge water quality assessment p. 9 of the AEE does not evaluate the compliance to the discharge conditions. This applies for all other parameters with these consent conditions (BOD₅, faecal coliforms).

The reporting on enterococci consent conditions is not valid as the consent states that the discharge is less than 35 enterococci/100ml in 5 of 6 consecutive weekly samples (one sample per week). Please show the compliance with these consent conditions (see above).

Consent conditions include BOD₅ monitoring but the applicant is providing cBOD₅ data. While generally cBOD₅ is used, the current consent conditions are referring to BOD₅. From my perspective working with cBOD₅ is accurate and this should be changed for potential new consents.

Please plot all data on a graph with consent limits (both median and shown for the relevant parameter), add another plot with the rolling median over 12 months by 1 month (from January to Dec, From Feb to January, etc.).

Please provide all other data available.

Effects on Maui Dolphins

On page 47 of the application the applicant states that "overall the potential magnitude of effects on Maui Dolphin has been assessed as negligible"— This is incorrect, the assessment by Bofa Miskell concludes a "low" effect not negligible. In the Bofa Miskell report it is assumed that the concentration of the pathogen *Toxoplasma gondii* which causes toxoplasmosis and affects Maui dolphins are low but

there is no data to back up this claim. To assess the effect on Maui Dolphins it is necessary to assess/estimate the concentration of *Toxoplasma gondii* in the discharge and its dilution in the environment. I appreciate that this is not easy to do but otherwise the effects cannot be fully assessed and this should be stated.

Missing data

Please provide all available wastewater quality data. Currently only the average annual medians and average annual 90th percentile is provided. Please provide all available data preferably in Excel or CSV format, in addition to the raw data please provide the annual medians, and 95th percentile (not 90th percentile).

On page 52 of the application the applicant states that there is no seepage from ponds to stream, no elevated concentration of ammonia was found in recent water quality samples taken from the streams. This data needs to be provided. I recommend that this part is assessed by a freshwater scientist. Was seepage to groundwater assessed? If so, this needs to be assessed by a groundwater scientist.

Outfall structure

The applicant claims that “the outfall structure is resilient to the dynamic coastal processes in the harbour and no changes to the structure are proposed”. Yet the structure was damaged as a diffuser was previously installed but broke off. Is there any intent to reinstall the diffuser? Should this fall under the maintenance section of the consent conditions?

Microbiological Water Quality Assessment of Ragland Harbour (Appendix A of Appendix C)

This assessment refers to the work by Greer et al., (2015) to determine faecal contamination sources. Under section 3.1.4. of the application BECA points out the level of uncertainty of faecal source concentrations in the Greer et al. (2015) report. It is unclear to what level this uncertainty influences the AEE and the microbial water quality report by NIWA (AEE, Appendix A). This needs to be addressed.

Table 2-2. shows the number of datapoints. Why does discharge data start in June 2016? Where is the earlier discharge data?

Ongoing development in Raglan

Is the ongoing development (Rangitahi) going to influence discharge rates and/or quality?

Once the above-mentioned issues and questions are addressed the technical assessment can be completed.

If there are any questions regarding this initial assessment, please don't hesitate to contact me.

Regards,

Dr. Janine Kamke – Scientist Coastal and Marine