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Hawke's Bay Regional Council
Private Bag 6006
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Attention: Paul Barrett and Sven Exeter

Dear Paul and Sven,

REQUEST FOR FURTHER INFORMATION – PŌRANGAHAU/TE PAERAHI WASTEWATER DISCHARGE APP-126770

Thank you for your request for further information regarding Central Hawkes Bay District Council's application for resource consent (APP-126770). This letter provides:

A. Response to the information requested in accordance with s92, with supporting documents.

The below information is supported by multiple additional documents. These are set out as Annexures to this letter.

New further information requests:

QMRA

The QMRA conducted to assess the risks of human illness due to the Pōrangahau WWTP discharge uses currently accepted methodology for assessments of this sort. However, there are several aspects of the QMRA that require further elaboration to justify the decisions made in the formulation of the model. These are:

a) The derivation of log removal values for the application of UV treatment.

Response:
Please see Annex A which provides a response.

b) The derivation of dilution estimates for sites 2-4.

Response:
The QMRA describes how these dilutions were estimated using a proportion-based approach to statistically estimate dilution further downstream of site 1, where dilutions were observed as part of the 2009 dye dilution study undertaken by Opus. These present a range of dilutions as reported in Table 2 of the QMRA. Figure 3 of the QMRA then shows the dilutions received in the receiving environment as a result of a monte-carlo simulation. These dilutions are estimates, but generally show that dilution increase downstream. This dilution will be achieved as far-field mixing continues and mixing also occurs with incoming marine water at the estuarine interface. The next level of investigation is to develop a calibrated hydrodynamic model, which is estimated to cost more than $100,000. Notwithstanding this, the QMRA acknowledges there is some existing public health risk and CHBDC has decided to implement UV disinfection for the existing surface water discharge whilst the discharge transitions to land. Given

this, it is more cost effective for this funding to be contributed towards installing the UV disinfection system.

c) *The use of marine microbiological guidelines, rather than the freshwater NPS for assessment of the risks.*

Response:
The MfE guidelines have not been replaced by the National Policy Statement for Freshwater Management (2020). In the 'Recreational Water Quality Guidelines Update, September 2021, ESR' it is stated that:

"*NPS-FM 2020 [guidelines] does not align with NZ Guidelines [i.e. New Zealand Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (MfE 2003)] or international guidelines as it has a different objective which is to manage water quality in general, not recreation sites specifically*." (Page 35, ESR Report to Ministry of Health, Recreational Water Quality Guidelines Update)

While the 2021 ESR Recreational Water Quality Guidelines Update further affirms the confusion behind these two guidelines, it also states why the New Zealand Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas (i.e. NZ Guidelines used in our QMRA study) is a better option when assessing health risks associated with contact recreational sites.

"*The NPS-FM [guidelines] is to manage water quality in general and the NZ Guidelines are specific for recreational sites in conditions when it can be used for recreation (e.g. not during rainfall events with high flows).*" (Page 36, ESR Report to Ministry of Health, Recreational Water Quality Guidelines Update)

Understandably so, several previous NZ QMRAs have also used New Zealand Microbiological Water Quality Guidelines for Marine and Freshwater Recreational Areas when reporting estimated risks associated with discharge of wastewater into recreational sites. The marine risk assessment categories applied in this study, and consistent with previous NZ QMRAs (which are based on <1%, 1-5%, 5-10% and >10% GI, for lowest risk to highest risk), are therefore appropriate.

Land Irrigation Matters

i. *During the site visit it was explained that all areas of the property would be available for irrigation to provide flexibility to the landowner. Section 4 of the Land Application AEE (Appendix H of the original application) only describes irrigation on LMU1 and LMU3 with no mention of irrigation within LMU2 or on the forestry block at the north end of the section.* ***Please confirm*** *which, if any, areas will be excluded from irrigation.*

Response:
There is potential in future to irrigate all areas of the property in addition to LMU 1 and LMU 3 land. At present, irrigation to only LMU 1 and LMU 3 is proposed as this is all that is required in terms of minimum land areas for future Pōrangahau and Te Paerahi flows. Should irrigation of LMU 2 and/or the forestry block be desired in future, a consent variation would be sought.

ii. *In addition, the Overseer modelling described in P:C.14a – Existing/Future Farming System and OverseerFM Analysis (Supporting Information to original application) appears to based on only irrigation to LMU 1 and LMU 3. This Overseer modelling forms the basis for nutrient mass balance calculations and has been relied on as accurate within the application.* ***Please provide*** *Overseer modelling for irrigation of LMU2 and the forestry block (if irrigation is to occur in these areas) including a summary of changes to the total nutrient loss calculations.*

Response:
As noted in the previous question, irrigation is to only LMU 1 and LMU 3. Should there be irrigation of LMU 2 and/or the forestry block, a consent variation will be sought which will involve additional Overseer modelling. In the meantime, no additional Overseer modelling is required.

Outstanding matters from S92 (RMA) Request

Question 19 – Irrigation Area Maps

The buffer map shows buffers to waterways (20 m) and to property boundaries (5 m). This figure does not exclude the forest area identified in Figure 2 of PC.14a, does not include a 100 m buffer to Wetland 1 as confirmed in the applicant's response to Question 45, does not exclude any area for the proposed WWTP and storage pond and includes LMU2, where no irrigation has been proposed. The applicant should provide a figure including all proposed buffers and non-irrigable areas.

The Low Flood Risk Irrigation Area Figure also does not include the above buffers/non-irrigable areas. These buffers should be included to accurately assess the available land outside of the flood risk zone. ***Please provide*** *an updated map.*

Response:
Each of the figures referred to have been updated to include non-irrigable areas and are provided in Annex B. This includes the 5 m property boundary, 20 m from waterways, 100 m from Wetland 1, the proposed location for the new WWTP and storage pond, as well as the LMU 2 and forestry blocks.

For the updated low flood risk figure, this includes the location of all low flood risk areas across the irrigation area. This information was retrieved from the HBRC hazards portal. As noted within both this figure and the previous response to the first Section 92, the entirety of the higher elevated sand dune (LMU 3) is considered low flood risk, with the remainder of the property deemed a flood risk as noted by HBRC. These flood risk areas of LMU 1 have only been noted as flooding once in recent times which was during the February 2004 floods, with LMU 3 never flooding.

Question 42 – Pasture Test Methodology and Results/Question 45 – NES-F Discharge Rules Assessment

You've confirmed that the pasture species cover was 15% for site 1 and 46% for the vegetation plot at site 2 and therefore meets the NPS-FM improved pasture exclusion criteria. The applicant further provided a table with the details of the species present and the percentage ground cover. Based on this it can be concluded that Wetland 1 meets the definition of a natural wetland in terms of NPS-FM. The proposed irrigation therefore is located within 100 m of a natural wetland in terms of the NES-F. This contradicts with the AEE (11.2.2) that interpreted that by 'failing' the pasture test, Wetland 1 is not located within 100m of 'natural' wetland and that the NES-F regulations therefore do not apply.
Please provide updated map(s) *with the 100 m buffer incorporated in the layout map to the confirmed natural wetland: Wetland 1.*

Response:
Please see Annex C which provides a response.

Question 46 – Ecological Assessment of Sites 3 to 11

You've provided details on the steps followed to identify potential wetlands. These potential wetlands were investigated in accordance with the Vegetation Tool: Rapid test. An assessment of the status of these potential wetlands in terms of the Defining 'natural wetlands" and 'natural inland wetlands' guideline (MfE, 2021) and flow diagram however indicate additional steps to be followed. The dominance and the prevalence tests should be completed when the rapid test fail and if it fails both, then it is likely not a wetland, however if one of those is passed or there are some uncertainty the hydric soils tool and the wetland hydrology tool should also be completed. It is also important to note that under this assessment a wetland may be excluded from the 'natural wetland' definition but may still be defined as a wetland and be protected under the Resource Management Act (RMA).

Please provide *the results of these tests including assumptions made in terms of lack of wetland characteristics such as hydrology in accordance with the New Zealand Wetland Delineation data form.*

Response:
Please see Annex C which provides a response.

Based on the location of probable overland flow paths (OLFPS), Land Information New Zealand (LINZ) aerial imagery and Sentinel 2 satellite imagery dated between 2010 and 2021 there may be potential wetland areas that have not been screened. A rapid screening of these imagery revealed four potential wetland locations. One location is just the north of site 4 and another to the south and two at site 8 in terms of the ecological study (Beca 2021:P:D.66). The two areas identified near site 4 may present ephemeral and seasonal wetland characteristics based on the signatures visible in the imagery over different years. It is noted in the ecological study that site 8 was not further assessed as a wetland due presence of dune vegetation. The aerial imagery suggests the presence of moist depressions at site 8.

These are often associated with dune hollows a type of coastal wetland. Please refer to https://www.landcareresearch.co.nz/publications/naturally-uncommon-ecosystems/wetlands/duneslacks/ for more information.

The ecological report references that the full list of vegetation is included in Appendix 2, although that vegetation list was only for sites 1 and 2. Figure 1 to 4 present screenshots of the image intervals and the locations of these potential wetland areas.

Please provide *the results of these potential wetland areas in accordance with the New Zealand Wetland Delineation data form.*

Response:
Please see Annex C which provides a response.

Question 47 – Assessment of Effects on Wetland Hydrology

You indicate that the water discharge to land will not shift away from existing baseline conditions and that it will be unlikely that there will be an ecological shift in the wetland community. Drainage and runoff will also be managed in accordance with a discharge regime described in LEI (2021:P:C.15). Please complete an assessment of wetland condition in terms of the Handbook for monitoring wetland condition (Clarkson et al., 2003) for each identified wetland. This will ensure that the current pressures on the wetlands are identified and facilitate planning to ensure that there is no potential loss in wetland values.

Response:

Please see Annex C which provides a response.

Question 54 – Map of Flood Areas & Climate Change

*You've stated that all properties within the flood plain of the Pōrangahau River are at risk due to increased rainfall intensity and that this risk needs to be appropriately managed. **Please quantify the risk** to the discharge property within the lifetime of the requested consent duration, lifetime of the assets and below guideline timeframes from climate change related increased rainfall intensity and rising sea levels/tidal influence on the Pōrangahau River adjacent to the discharge site. Please provide estimates on when the site would become unusable for the proposed activities due to coastal inundation and state site irrigation land and asset levels relative to river / estuary levels etc. The flooding and climate change risk assessment should be undertaken in accordance with the most current climate change projections and best practice guidelines such as:*

- *NIWA climate change projections report for Hawke's Bay:*

  https://niwa.co.nz/sites/niwa.co.nz/files/GDC-HBRC%20climate%20change%20report%202020_Final-compressed.pdf

- *MFE climate change reports:*

  https://environment.govt.nz/assets/Publications/Files/arotakenga-huringa-ahuarangi-framework-for-national-climate-change-risk-assessment-for-aotearoa-FINAL.pdf

  https://environment.govt.nz/assets/Publications/Files/national-climate-change-risk-assessment-method-report.pdf

  And:

- *ISO 14091:2021 Adaptation to climate change — Guidelines on vulnerability, impacts and risk assessment*

Response:

Climate change has the potential to influence the land based irrigation regime in two ways.

1) through increases in the frequency and intensity of severe weather events, including drought and high intensity rain events. Given the Te Paerahi community's location there could be the impact of coastal storm surges.
2) Sea level rise impacting operational performance of the Discharge Property.

Sea Level Rise/Storm Surges:

In the event that the Discharge Property is inundated as a result of sea level rise, so too will the entirety of the Te Paerahi community. The Pōrangahau community will be less impacted. Should inundation occur, it would result in wastewater flows being significantly lower than currently estimated due to the community likely retreating and vacating the area.

NIWA (2020) notes that historic sea level rise in the Hawke's Bay/Tairāwhiti region between 1993 to present from satellite imagery is in the order of 4 mm/year. A 35 year consent duration is being sought, to which with this trend likely to continue for the consent duration, it is expected sea level will rise in the order of at least 140 mm.

The lowest elevated portion of the property excluding farm drains is approximately 3 m.a.s.l (LMU 2) as retrieved from HBRC lidar. Additionally, the lowest proportion of the property proposed to receive irrigation (LMU 1) is in the order of 4-5 m.a.s.l. By comparison, the Te Paerahi community is approximately 3-5 m.a.s.l.

Sea level rise alone is not expected to impact the Discharge Property. The main potential risk to the Discharge Property is increases in storm surges.

NIWA (2020) notes estimating increases in storm surges and wave heights are difficult to quantify. Furthermore, NIWA (2020) state by 2070-2100 (beyond the consent duration) minor increases in waves heights in the order of 5 % are expected, with changes in waves/swells and storm surges being secondary to the direct effect of sea level rise.

High intensity rainfall:

One of the key impacts of climate change is the increase in the intensity and frequency of extreme rainfall events. Using NIWA's High Intensity Rainfall Design System (HIRDS) which calculates rainfall event totals under varying climate change scenarios from historical data, all sites across the Hawke's Bay region will experience increases in rainfall for 50 and 100 year return interval rainfall events. The closest station to Pōrangahau is at Mangaorapa to the west, within the headwaters of the Pōrangahau River catchment. Here rainfall is projected to increase for the mid-century period (2031-2050) encompassing the consent duration. The two tables below present historical and projected rainfall depths under varying time and climate scenarios for multiple rainfall event durations.

For the mid-century 48 hour events at a 50 year return period, rainfall total are projected to increase from 203 mm to up to 215 mm. For 100 year return 48 hour events, rainfall totals are projected to increase from 225 mm to up to 239 mm.

Table 1: Modelled historical and projected rainfall depths (mm) for Mangaorapa for different event durations with a 50-year return period (ARI) (NIWA, 2020)

Rainfall event duration	Historical depth (mm)	Projected depth (mm)			
		Mid-century average (2031-2050)		Late-century average (2081-2100)	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
1-hour	41.9	46.1	46.8	48.8	56.6
6-hour	95.5	103	105	109	123
12-hour	126	135	136	141	158
24-hour	162	172	173	178	197
48-hour	203	214	215	221	241

Table 2: Modelled historical and projected rainfall depths (mm) for Mangaorapa for different event durations with a 100-year return period (ARI) (NIWA, 2020)

Rainfall event duration	Historical depth (mm)	Projected depth (mm)			
		Mid-century average (2031-2050)		Late-century average (2081-2100)	
		RCP4.5	RCP8.5	RCP4.5	RCP8.5
1-hour	48.8	53.7	54.4	56.8	65.9
6-hour	109	118	119	124	141
12-hour	142	153	154	159	179
24-hour	181	192	194	200	221
48-hour	225	238	239	246	269

A key consideration with climate change is resilience and suitability of infrastructure. As noted in the application there are alternative sites that could be used for land application. However, they would require considerably greater storage due to less suitable soils and more than likely require the option of a treated wastewater discharge to the river during storm events; a proposition not wanted by the community.

Overall, although climate change poses risks to the communities, these risks can be managed effectively at the Discharge Property within the term of the consent; they will not have a detrimental effect to the land irrigation regime. The Discharge Property is sufficiently large enough and contains sufficient land area at sufficient elevation to manage both Pōrangahau and Te Paerahi's flows even under the most extreme of storm events. On balance, the proposed discharge site is the best, albeit with limitations like any other site.

Wastewater

Question 24 – Wastewater Staging & UV at Pōrangahau WWTP

Additional information is still required to demonstrate how the UV system(s) will be protected from fouling prior to the installation of the new treatment plant at the Discharge Location (I.e. while pond effluent from Te Paerahi and Pōrangahau is discharged to the existing discharge points, and at the new site), and at Pōrangahau WWTP (as per the letter received accompanying the QMRA).

Response:

The design and operation of the proposed UV systems at the new treatment plant at the Discharge Property, and the existing Porangahau WWTP, are operational aspects and are yet to be designed. The aspect that is of relevance here is the quality of the discharge, which has been nominated in suggested consent conditions. Effluent shall be monitored and require compliance with effluent quality standards.

Question 26 – Future Flows

You've noted that reliable CHBDC flow data from between 2008 and 2019 was adjusted by future population growth projection factors as a proxy to estimate future flows. Further information is required:

- *Does this include allowances for I&I reductions, when calculating the future All Flows 2057 ADF.*
- *This data set can be used to calculate and include conditions that limit the median and peak flow to the treatment plant, as a means to ensure that I&I in the network is managed for the term of the consent, rather than being used to dilute wastewater concentrations. Please provide the All Flow 2057 Peak Month ADF, and Annual ADF, or justification for other values with workings that could be used as average daily and peak instantaneous consent conditions for flow.*

Response:
With regards to the first bullet point, I&I reductions were not relied on for Pōrangahau or Te Paerahi. N.B. I&I reductions are noted in the determination of design peak ADF for Te Paerahi (Beca, 2021:P:C.16) but determination of loads to land and storage assume no I&I reductions. This approach was adopted to allow a factor of safety.

For the second bullet point, the *'All Flow 2057'* peak month ADF is 792 m^3/day and the annual ADF is 502 m^3/day. For consenting purposes an annual average ADF of 510 m^3/d could be adopted. The maximum 2057 flow in the data set is 3,382 m^3/d. Buffer storage and use of wet weather discharge soils (10 ha) should result in no need to include a peak instantaneous flow in the discharge to land consent.

Yours sincerely,

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Annexures:
Annex A: Log Removal Response
Annex B: Figures
Annex C: P:D.66b – Ecology Section 92 Response