Questions for Mr Dempsey

1. You say that you are satisfied with the assessment of current treatment performance (6 Oct 2020 memo, attached to S42a report, p. 139), but you are less certain about the assessment of the performance of the planned UV and filtration installations (6 Oct 2020 memo, attached to S42a report, p. 145–6) which will improve pathogen removal. Since this is critical to the proposed new discharge regime, does this in general undermine your confidence that public health will be protected?
2. Going into specifics, in your 6 Oct 2020 memo you have recommended two sets of effluent discharge standards for pathogens, the first maintaining treatment performance equivalent to the performance under the current consent, and the 2nd post-installation of UV, filtration and extra storage. You acknowledge that WDC does not have the information needed to set post-upgrade standards, and, as a remedy, you recommend changes to the conditions to ensure pathogen standards are revised (reflecting the new level of treatment) once pilot trial information is available. Is this in the V22 conditions to your satisfaction?
3. There has been much discussion about the need for performance standards for the reticulation (I&I) improvements, which are ongoing, the reason being that this work is crucial for reducing/eliminating pump station overflows and for reducing the load on the WWTP, thereby allowing it to operate more effectively. What is your view on this need? What would these standards look like? Are there any particular obstacles?
4. You otherwise recommend that "consent conditions be modified slightly to ensure that I&I continues to be a focus of the consent" (6 Oct 2020 memo, p. 139). Has this recommendation made it into the V22 conditions to your satisfaction?
5. You note (6 Oct 2020 memo) that, in exchange for a 1-year assessment of compliance against discharge parameters, lower, by which I understand you mean more stringent, discharge standards are required. Has this recommendation made it into the V22 conditions to your satisfaction?
6. There has been much discussion of load-based standards for effluent, which you recommended be considered as a way of ensuring that improvements in effluent discharge quality are not achieved just by dilution. The view seems to be that concentration-based standards are appropriate and sufficient for managing biological/ecological risks, which I understand. Do you still see the need for load-based performance measures? Is there an argument not so much for load *limits*, but for being able to measure, say, annual loads as part of an ongoing "performance auditing". If so, what would that kind of system look like, would it be onerous, and could it be put into conditions?
7. Back at V14 of the conditions, you said that many of the conditions represented a significant level of relaxation in treatment performance and cannot stand up to the claim that a similar level of treatment will be maintained (6 Oct 2020 memo, attached to s42a, p. 146). Now that we are at V22 , do you still hold that view? Why?
8. I understand that there is a need to maintain a certain level of effluent flow and transmissivity to ensure optimal operation of the UV filter. Are there outstanding issues around design and operation of the UV filter (and sand filtration, for that matter) that still need to be addressed in conditions or in other ways?
9. Do you agree that there is no need for specific conditions relating to sludge management since sludge will have to be effectively managed anyway in order to comply with discharge standards?

Malcolm Green, Commissioner

3 December 2020

BEFORE THE Hawke's Bay Regional Council **APP- 123774**

IN THE MATTER of the Resource Management Act 1991

And in the Matter Of an application by Wairoa District Council to discharge wastewater into the Wairoa River and related activities

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SUPPLIMENTARY EVIDENCE OF NICK DEMPSEY
ON BEHALF OF HAWKE'S BAY REGIONAL COUNCIL

Reviewed existing wastewater treatment system, staging of the proposed works, management regimes and monitoring conditions.

December 2020

RESPONSES TO QUESTIONS FROM COMMISSIONER MALCOLM GREEN (3 DECEMBER 2020)

1. **Question 1**: You say that you are satisfied with the assessment of current treatment performance (6 Oct 2020 memo, attached to S42a report, p. 139), but you are less certain about the assessment of the performance of the planned UV and filtration installations (6 Oct 2020 memo, attached to S42a report, p. 145–6) which will improve pathogen removal. Since this is critical to the proposed new discharge regime, does this in general undermine your confidence that public health will be protected?

2. **Answer 1**: It is important to note that my area of expertise is not in public health in terms of the receiving environment, mixing zones, food gathering and contact recreation risks; which should be covered by other experts. That said, the draft consent conditions (V22) maintain the current pathogen removal performance (measured as *E.coli* and *Enterococci* as indicator organisms) of the existing treatment plant. This is likely to be approximately a 3 to 5-log reduction for *E.coli* (typical municipal influent levels are $1x10^6$ to $5x10^8$ MPN/100mL) for example.

3. However, the conditions do not provide improved pathogen removal, which appears to be required for the proposed changes to discharge regimes, and from submitters. The approach proposed (with no additional pathogen removal) will not improve upon the current level of public health protection provided by the treatment plant. In order to improve pathogen removal, conditions are required that reflect reduced pathogen levels in the discharge.

4. **Question 2**: Going into specifics, in your 6 Oct 2020 memo you have recommended two sets of effluent discharge standards for pathogens, the first maintaining treatment performance equivalent to the performance under the current consent, and the 2nd post-installation of UV, filtration and extra storage. You acknowledge that WDC does not have the information needed to set post-upgrade standards, and, as a remedy, you recommend

changes to the conditions to ensure pathogen standards are revised (reflecting the new level of treatment) once pilot trial information is available. Is this in the V22 conditions to your satisfaction?

5. **Answer 2**: Unfortunately, no, the V22 of the draft conditions do not reflect my proposed changes, as these were incorrectly copied into V21 of the conditions in HBRC's s42a Officers Report. Typically, and ideally, modelling and microbial risk assessments of the receiving environment would provide clear requirements for a safe level of pathogens in the discharge. In the absence of this analysis, and recognising the intent of the consent to withdraw discharges to the river over time, some level of reasonable pathogen reduction in the discharge should be sought in my view.

6. An arbitrary reduction could be applied in the consent (either log reduction, or reduced cfu/100mL), but the financial impact of this decision would not be known until the Applicant discussed solutions with suppliers. Given the Applicant's stated intent to conduct UV & filtration trials in the near future, I recommend modifying Condition 38 (V22) to require (i) reporting on these trials, and the pathogen reduction that can be achieved reliably, (ii) maximum flows to which these levels of pathogen reduction can be achieved, (iii) recording and alarming of periods when treated flows are discharged at levels greater than this flow, and (iv) modification of the discharge consent conditions (Condition 14, V22), by way of the 5-year review mechanism (System Review Exercise and Reports, Condition 51, V22), or a similar approach.

7. **Question 3**: There has been much discussion about the need for performance standards for the reticulation (I&I) improvements, which are ongoing, the reason being that this work is crucial for reducing/eliminating pump station overflows and for reducing the load on the WWTP, thereby allowing it to operate more effectively. What is your view on this need? What would these standards look like? Are there any particular obstacles?

8. **Answer 3**: In my view, the inclusion of performance standards for I&I reduction is crucial to reduce overflows at pump stations, and ensure the ongoing efficacy of the treatment plant. Investment in I&I improvements without measurement of the improvements is atypical. Accurate measurement of influent to the treatment plant (in particular night flows), measuring and/or recording of overflows, and long term monitors in the network are some of the ways that the impact of I&I improvements can be measured. The biggest barrier to implementing these measures is cost, but given the cost of investment in network improvements, this is a good investment to demonstrate value.

9. **Question 4**: You otherwise recommend that "consent conditions be modified slightly to ensure that I&I continues to be a focus of the consent" (6 Oct 2020 memo, p. 139). Has this recommendation made it into the V22 conditions to your satisfaction?

10. **Answer 4**: In general yes, these are covered in Condition 39 (V22). I would also recommend a slight modification to Condition 39 (a) (V22), to include records of network overflows (volumes and times), and nightflows in the network and at the treatment plant.

11. **Question 5**: You note (6 Oct 2020 memo) that, in exchange for a 1-year assessment of compliance against discharge parameters, lower, by which I understand you mean more stringent, discharge standards are required. Has this recommendation made it into the V22 conditions to your satisfaction?

12. **Answer 5**: Yes. The consent conditions can either be assessed on a rolling basis (typically 12 month rolling) or on a fixed annual period. A rolling assessment can mean that poor performance in any given month impacts the monthly reporting many months in a row. Annual reporting means that exceedences are reported on once per year. Statistically,

the latter typically causes less consent infringements than the former. The proposed discharge conditions presented in V22 reflect what I have calculated to be the lowest concentrations that the treatment plant could have discharged in the past decade and just achieve compliance with the discharge conditions (based on the measurement parameters stated in the consent).

13. **Question 6**: There has been much discussion of load-based standards for effluent, which you recommended be considered as a way of ensuring that improvements in effluent discharge quality are not achieved just by dilution. The view seems to be that concentration-based standards are appropriate and sufficient for managing biological/ecological risks, which I understand. Do you still see the need for load-based performance measures? Is there an argument not so much for load limits, but for being able to measure, say, annual loads as part of an ongoing "performance auditing". If so, what would that kind of system look like, would it be onerous, and could it be put into conditions?

14. **Answer 6**: In my view, the need for load versus concentration limits typically needs to be driven by the sensitivities of the receiving environment. In this case, as you have indicated, the need for load based conditions does not appear to be required. My recommendation that a load based condition be considered for this consent was driven by a lack of data on the historical performance of the treatment plant. Extensive effluent concentration data has since been provided, but without linked flow information this is only part of the story.

15. I agree that measurement and reporting of annual loads would provide valuable performance and trend information. This could also be a useful indicator of the effect of increasing (or decreasing) population, and the staged shift of discharge volumes from the river to land.

16. To be truly meaningful, concentrations of the discharge parameters would need to be measured far more regularly (either via continuous online instruments, or daily/weekly composite samples), combined with daily flows to calculate loads. However this imposes a significant cost on the plant operators, and given the lack of a demonstrable need for load conditions, is not recommended, The alternative is to use the monthly concentrations, and daily flow data already being measured as part of the consent to calculate approximate annual loads, and report these.

17. **Question 7**: Back at V14 of the conditions, you said that many of the conditions represented a significant level of relaxation in treatment performance and cannot stand up to the claim that a similar level of treatment will be maintained (6 Oct 2020 memo, attached to s42a, p. 146). Now that we are at V22 , do you still hold that view? Why?

18. **Answer 7**: I hold the view that the discharge conditions in V22 now reflect a continuation of performance for the treatment plant. At V14, the proposed conditions suggested in some instances a continuation of generous conditions from the previous consent that were in many cases being easily achieved, or offered incongruent parameters (for example a COD condition of 220 mg/L was changed to 220 mg/L of soluble carbonaceous BOD_5, which represents a significant relaxation). The Applicant provided historical monthly effluent measurements from the past 20 years on 07 September 2020 (Letter from WDC "Responses to further information requests for consent application APP-123774 and revised conditions"). I used this data to calculate the lowest effluent conditions that could have just achieved compliance given the measuring methods outlined in Condition 14 (V22). The Applicant has indicated their acceptance of these values in V22.

19. **Question 8**: I understand that there is a need to maintain a certain level of effluent flow and transmissivity to ensure optimal operation of the UV filter. Are there outstanding issues

around design and operation of the UV filter (and sand filtration, for that matter) that still need to be addressed in conditions or in other ways?

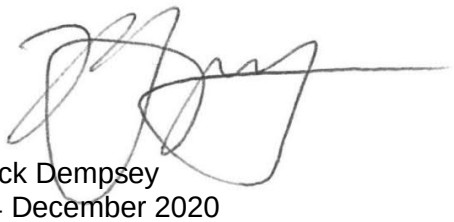
20. **Answer 8**: For clarity, a UV system doses ultraviolet (UV) radiation only, and does not include a filtration barrier. Filtration is commonly paired with UV systems, as solids in the wastewater impare UV disinfection by shielding pathogens, and absorbing the UV radiation. So the filtration system improves the removal of solids in the effluent, and the UV system disables pathogens (disinfection), and its performance is impacted by the concentration of solids in the wastewater.

21. There are two approaches that can be taken to address the removal of pathogens in the consent. A hands off approach is to provide pathogen limits in the discharge conditions only, allowing the treatment plant operator to manage the system as they see fit. This poses the risk that performace of the filtration and UV systems may vary significantly between the monthly measurement of discharge parameters.

22. A more effective way of ensuring that disinfection is occuring on a consistent basis is to measure and record UV transmissivity (typically online) and UV dose (which is a product of the UV intensity of the system and the flow through it). In my view, including these parameters as reported values with conditional limits would be valuable to ensure that effective disinfection is occuring at all times. Measurement of these parameters is commonly designed into modern UV disnfection systems.

23. **Question 9**: Do you agree that there is no need for specific conditions relating to sludge management since sludge will have to be effectively managed anyway in order to comply with discharge standards?

24. **Answer 9**: Yes, I agree that sludge levels in the ponds are an operational matter, and that compliance with the discharge standards is sufficient.



Nick Dempsey
04 December 2020