



# memorandum

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Hawke's Bay Regional Council DATE 7 September 2021

RE Takapau WWTP Discharge Consent s92 Response Review

## 1.0 Background

The Central Hawke's Bay District Council (CHBDC) currently operates a pond system for wastewater treatment servicing the township of Takapau with discharge via a wetland drain to the Makaretu River. CHBDC is applying for replacement consents which include a change to the existing wastewater management systems for Takapau. Specifically the application seeks the following consents for a term of 35 years:

- ∴ *Discharge Permit to discharge treated wastewater to land*: treated wastewater discharge to land relating to a low rate land application system (irrigation).
- ∴ *Discharge Permit to discharge treated wastewater to land where it may enter water*: treated wastewater discharge to land where it may enter water relating to a continuation of the existing surface water discharge and the future intermittent indirect surface water discharge via a high rate land passage system.
- ∴ *Discharge Permit to discharge aerosols and odour to air*: discharge of aerosols and odour to air associated with the receipt, treatment, storage and discharge of wastewater from the Takapau Wastewater Treatment Plant and land application system (irrigation).
- ∴ *Land Use Permit*: use of production land within the Tukituki River catchment that does not comply with Rule TT2 of Plan Change 6 to Hawke's Bay Regional Resource Management Plan – Tukituki River Catchment.

The CHBDC submitted the *Takapau Treatment Plant Discharge Resource Consent Application and AEE* (the AEE, April 2021) in support of the application. Pattle Delamore Partners Ltd (PDP) has been engaged to review the following aspects of the application:

- ∴ Treatment, irrigation, and soils;
- ∴ Groundwater;
- ∴ Surface water and ecology;
- ∴ Odour and air; and,
- ∴ Natural hazards.

PDP completed a review of the application in a memorandum dated 25 May 2021. Following this, HBRC issued a s92 request to CHBDC. This memorandum has been prepared to review the additional information provided by CHBDC in the s92 response.

The information in the AEE, s92 response, and supporting documentation has been relied upon for this review.

## 2.0 PDP comments on Applicant's Responses to s92 Questions

### 2.1 Cultural Impact

#### Questions 1 and 2 - Cultural Impact/Archaeology

No comments required - these responses are outside the scope of our review.

### 2.2 Land Management

#### Question 3 – Provision of referenced reports

The reports have been provided as requested.

We note that a hybrid system of irrigation with rapid infiltration has not been considered in the best practicable option (BPO) report. This system would likely be very similar to the proposed option but with rapid infiltration instead of a discharge to surface water. This option could meet community aspirations of removing the discharge completely from surface water and avoiding the discharge of large volumes of wastewater to groundwater by only discharging wastewater that cannot be irrigated or stored. Based on the descriptions provided, the soils on the lower terrace may be highly suited to rapid infiltration due to their good drainage.

We also note the 'business as usual' option proposed in the application results in leaching from the centre pivot area (95 kg/N/ha/y) which is greater than that of the nitrogen in the wastewater applied (84 kg/ha/y) due to synthetic fertiliser use. While we consider this could be reduced via management practices, discharging some of the treated wastewater to land via rapid infiltration may not result in significantly greater impacts on groundwater from nitrogen compared to irrigation, despite no potential plant uptake of nitrogen. Furthermore, rapid infiltration can provide additional removal of pathogens and phosphorus. Rapid infiltration could also be more culturally acceptable relative to a discharge via the high-rate land passage (HRLP) resulting in run-off to the river.

We recommend that the applicant provide evidence of why the proposed BPO option is superior to an irrigation/rapid infiltration system including from an environmental and cultural perspective. Further comments on the deficit/non-deficit irrigation are provided below.

#### Question 4 – Farm Environment Management Plan

Further information on the FEMPs that have been prepared has been provided. HBRC should further consider the requirements here.

#### Question 5(a) – Cut and Carry Regime

We accept that the proposed 'business as usual' option is likely to cause a significant reduction in the contribution of phosphorus and pathogens to the Makaretu and Tukituki Rivers. However, the Overseer modelling indicates that the reduction in nitrogen contribution to the catchment by both direct surface water discharge through the proposed HRLP and leaching is only 10%. As stated in the PDP review of the original application, the HBRC goal for the Upper Tukituki River as set out in RRMP PC6 is a DIN concentration of 0.8 g/m<sup>3</sup>. According to LAWA the 5-year median for the Tukituki at Tapairu Rd was

1.49 mg/L DIN (2014-2019). The timeframe for achieving this goal is 1 July 2030. Given this, there is a need for a significant reduction in nitrogen loss within the entire Tukituki catchment.

The applicant states that the existing discharge is responsible for approximately 0.39% of the total nitrogen load in the Tukituki River at Tapairu Rd. Despite being a relatively small contributor there is a need for all contributors to significantly reduce their contributions to the cumulative nitrogen load within the Tukituki catchment if the DIN water quality target is to be achieved. While it is an improvement, the indicated 10% reduction in nitrogen contribution would not be sufficient to meet the proportional decrease that would be required to help meet the DIN water quality target for the catchment.

The 'cut and carry' regime described in the future farming assessment report (T:C.14a) has the potential to provide significantly more nitrogen uptake which results in a significant decrease in leaching. The Overseer modelling for the cut and carry scenario indicates the nitrogen contribution to the catchment (surface water and leaching) under Stage 2 2048 flows would be reduced by 65% relative to the existing scenario. This is a significant improvement over the existing scenario and would be in line with the proportional reduction in nitrogen load required to meet the DIN water quality target for the Tukituki Catchment.

We consider that the high levels of leaching under the 'business as usual' option are not the best option as the reduction in nitrogen load is not sufficient to meaningfully contribute to achieving water quality targets for nitrogen. The cut and carry regime could be considered a better option to help achieve the DIN water quality target. This is reflected in the status of the two activities; the applicant has assessed the 'business as usual' option as a non-complying activity and the cut and carry option as a permitted activity.

We also note the recent Government response to the OVERSEER review which found that "Overseer is unlikely to be a reliable tool for predicting either relative or absolute loss estimates"<sup>1</sup>. The Overseer modelling should be interpreted with caution and not solely relied upon. The tilling and cropping regime proposed under the 'business as usual' option is at a much higher risk of significant nitrogen leaching compared to the cut and carry regime, which would utilise annual pasture and not require frequent tilling of the soil. This is compounded by the free draining soils identified at the site which generally have a higher risk of nitrogen leaching. Overall, the risk of high nitrogen leaching is lower under a cut and carry regime relative to a cropping regime and we recommend this option is further considered.

### **Question 5(b) – 100% Irrigation**

The applicant states in their response that "it is not practical or financially prudent to capture all water, as this would result in an extremely large storage pond that is only utilised during high rainfall periods". We recommend the applicant confirm, based on the soil moisture modelling, if additional land area at Stage 2 will allow for a greater fraction of the 2048 flows to be irrigated.

The applicant also states in their response that "a non-deficit regime could be adopted, but this is considered unnecessary and may have a detrimental impact on the farm management system employed". The original application and supporting documentation states that the irrigation system is a non-deficit system. We recommend the applicant confirm that the proposed irrigation system will operate in a non-deficit regime and if not, provide more details on why this is not preferable to a direct discharge to surface water.

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<sup>1</sup> The Government response to the findings of the Overseer peer review report.

<https://www.mpi.govt.nz/dmsdocument/46357-The-Government-response-to-the-findings-of-the-Overseer-peer-review-report>

### **Question 6 – Irrigation with Freshwater**

Information has been provided. No further comment is required.

## **2.3 Management of Farm Activities**

### **Question 7 – Irrigation Agreement between CHBDC and Drummonds and Dalby**

PDP wishes to highlight the potential risks of irrigating wastewater to land that is not owned by CHBDC if there is any change of ownership or breakdown of the relationship in the future. The acceptability of these risks is best judged by CHBDC and HBRC.

### **Question 8a – Roles and Responsibilities for Irrigation**

Refer to Question 7 above.

### **Question 8b – Management of Irrigation to Minimise Environmental Effects**

PDP wishes to highlight the potential risk that irrigation does not occur in a manner that minimises potential environmental effects due to economic decisions made on the operating and productive farm.

### **Question 8c – Odour Management**

Question 8c related to the potential for failures to result in odour such as if ponding occurs and or dissolved oxygen in the wastewater was very low.

The applicant has identified that, if odour has developed from septicity in the irrigation system, then a location on the lower terrace will be chosen to re-commence irrigation. The applicant does not indicate what separation distance to the nearest neighbour would be achieved with this approach.

The applicant indicates that the irrigator can be managed to avoid ponding.

The applicant states that they are not proposing DO monitoring, however, in PDP's experience this is a routine requirement for wastewater treatment/storage ponds to manage the potential for odour. In PDP's view, this matter can be addressed by conditions.

### **Question 8d – Flushing of Irrigation Pipes**

PDP queried the regularity with which irrigation lines would need to be flushed with clean water to manage odour by prevent septicity. The applicant indicated that flushing would be considered for long periods and considers these to be periods of over three weeks. PDP acknowledges that the wastewater is treated but considers that a three-week period is potentially too long for the wastewater to sit in the lines without flushing, especially in the summer. In PDP's view, this matter can be addressed by conditions, for example, an appropriate flushing protocol could be set via a management plan.

### **Question 8e – Wind Shutoff Parameters (Condition 18)**

PDP queried what the basis of the wind shut off parameters for proposed Condition 18 was. The applicant responded by saying that wind shut off parameters are typically used for wastewater application systems. That may be so, but no explanation or reference for the levels in the condition has been provided. PDP recommend seeking a reference or references and/or basis for the parameters that have been recommended for the condition.

### **Question 8f – Risk to Stock from Pathogens**

The applicant has stated that a 24-hour standdown period will be used to mitigate the risk of pathogens to stock. Sunlight is a powerful disinfectant, and the concentration of pathogens is likely to decrease rapidly. However, after only 24 hours, particularly in overcast or rainy weather, there may still be high pathogen

concentrations present. We recommend further information or best practice guidelines be provided to support the standdown period proposed and on timing between irrigation and grazing or crop harvesting.

## **2.4 Effluent Treatment and Discharge**

### **Question 9 – High Rate Land Passage System**

PDP support the proposal to design the proposed HRLP in conjunction with Tangata Whenua. HBRC may wish to consider requiring submission of the final design for HBRC approval prior to construction for further assessment of natural hazards and any other relevant aspects. As above, we recommend further options such as rapid infiltration are considered.

### **Question 10 – Feasibility of Irrigation over Terrace**

No further comment required – response is sufficient.

### **Question 11 – WWTP Capacity to Treat Future Flows**

We recommend further details, or links to specific reports, are provided.

### **Question 12 – Pond Leakage**

We would recommend continued monitoring of the bores, and monitoring for pond leakage as part of consent conditions.

### **Question 13 – Effluent Ammonia and TSS Spikes**

No further comment required.

### **Question 14 – Staged Approach of Wastewater Irrigation**

We recommend the applicant confirm, based on the soil moisture modelling, if additional land area at Stage 1 will allow for a greater fraction of the wastewater flows to be irrigated.

### **Question 15 – Stage 2 Irrigation Capacity**

Information has been provided and no further comment is required at this stage.

### **Question 16 – Soil Capacity**

No further comment required at this stage, noting our comments above on irrigation method.

### **Question 17 – UV Disinfection and PFD**

Typically, a UV disinfection system would be expected to achieve greater than the 1 log reduction in faecal coliforms and *E. coli* that has been stated by the applicant. We recommend that the applicant provide further comment on the performance of the UV system. A simple process flow diagram has been provided.

### **Question 18 – Pathogen Concentrations**

Further information has been provided on this. No further comment is required at this stage noting our comments for Question 17, although further assessment of the risk to public health needs to be considered. We agree that significantly greater attenuation could occur with irrigation rather than the direct discharge, reducing effects on the river.

### **Question 19 – Groundwater Phosphorus Concentrations**

The response is satisfactory and no further comment is required, although as above, ongoing monitoring of groundwater and pond leakage is considered important for the conditions.

## 2.5 Surface Water

### Question 20 – Groundwater Flow and the Porangahau Stream

The PDP 25 May 2021 review of the application indicated that groundwater beneath the proposed irrigation areas is likely to travel in an east-southeast direction and resurface within the gaining reaches of the Porangahau Stream. A further assessment of potential groundwater flow directions and effects on Porangahau Stream provided by the applicant (Takapau WWTP Hydrogeology s92 Response Appendix F, T:D.20) is reviewed below.

The applicant's further assessment of groundwater flow concludes that groundwater beneath the proposed discharge area flows to the east-northeast. The further assessment applies recent (June 2021) groundwater level/elevation measurements at the six on-site piezometers and appears to apply similar boundary conditions outside of the site area. This results in a very similar map of interpreted groundwater elevation contours and flow direction as provided originally based on February 2021 groundwater elevations at the on-site bores, which applies surface water elevation data from LiDAR as boundary conditions fully connected to the shallow groundwater along gaining and losing reaches.

Both groundwater elevation contour maps provided thus far do suggest groundwater locally flows to the east-northeast directly under part of the proposed disposal area, so we agree with this statement by the applicant. Just east of the site, however, and to the northeast of the site in the vicinity of the losing (interpreted as mounded groundwater) reach of the Makaretu River, both sets of contours provided suggest the groundwater flow transitions to an east-southeast flow regime at broader scales.

Given both assessments suggest the Makaretu River is losing/does not gain from groundwater near the site, ultimately the nitrogen/other contaminants can be expected to head to the east/south-east in the long term, which is different to what is currently concluded by the applicant. The applicant has commented that the upper terrace alluvial deposits could exhibit saturated hydraulic conductivities 1 to 2 magnitudes lower than the younger alluvium that follows the course of the Makaretu River. Whilst we agree with this statement in terms of broad/bulk aquifer parameters, geologic logs within the older alluvial deposits east of the site show the presence of both shallow and deep permeable gravels, which form part of the shallow aquifer system and the deeper aquifer system utilised for groundwater abstraction. The shallower gravels are interpreted to be recharged (in part) by losses from the Makaretu River and ultimately support some east or east-southeast shallow groundwater flow into the broadly gaining reach of the Porangahau Stream.

The applicant's statement that it is unlikely that shallow groundwater would flow against the hydraulic gradient to the southeast through clay-rich upper terrace deposits towards the losing reach of Porangahau Stream is considered inaccurate for several reasons. As noted above, both sets of contours provided thus far suggest that the gradient is broadly east-southeast as one moves east outside of the immediate on-site conditions at the discharge area. While we agree there are more clay-rich strata within the upper terrace, this has not been shown to impact flow directions. Furthermore, we agree that there are localised reaches of the Porangahau Stream that are interpreted to be losing to groundwater, however, at the broader scale, the assessment by Johnson (2011) as adopted by the applicant and this review suggests the Porangahau Stream will generally gain from groundwater to the east of the site.

We agree with the applicant that near the site the Makaretu River is likely losing to groundwater (with groundwater mounding effects along its reach enforcing a lateral gradient away from the river) and that a component of groundwater flow may locally be east-northeast within the discharge area in the younger alluvium and sub/parallel to the river alignment. To the east of the site, we expect that mobile nitrogen constituents within shallow groundwater will ultimately move towards the east-southeast and into gaining reaches of Porangahau Stream, or other downstream water bodies, in the long term. As such, we recommend the applicant assess effects of nitrogen on the potentially receiving water bodies.

**Question 21 – Correlation between Tukituki and Makaretu River Flows**

We recommend that HBRC check their internal resources to confirm this correlation has been used appropriately, or we would be happy to review this if this can be supplied.

**Question 22 – Surface Water Quality Sampling**

The Applicant has stated that there will be very limited discharge to the river through the HRLP system and that the proposed frequency of surface water quality monitoring (November, March and July) is based on the projected timing of the future surface water discharge (during winter months). A discharge could occur under very high flows during summer, however, there are potential health and safety hazards to consider as part of sampling during high-flow events. For these reasons surface water sampling is only proposed during these times.

It is considered that sampling should occur more frequently than proposed to accurately track water quality of the receiving water body and respond to any adverse effects. It is recommended that one sample per month is taken where the discharge occurs and the sample should be taken at a time when the HRLP discharge is being used. Flow from the HRLP to the Makaretu River must be visible when river sampling occurs.

**Question 23 – Irrigation Buffer Distance**

A confirmation has been provided that a 20 m irrigation setback will be applied from the Makaretu River. We note that no assessment has been provided on the suitability of this.

**Question 24 – Irrigation Site Drainage Channel**

The Applicant has had an ecological impact assessment prepared by BECA. This assessment has determined that both an ephemeral wetland and an ephemeral overland flow path make up the 'drainage channel' at the toe of the terrace within the irrigation site. This is further discussed in response to Question 29. The ecological report states that a buffer distance of 20 m may not be necessary to mitigate potential effects to this site, but no alternative distance is proposed. Further information on how the ephemeral wetland (site 3) compares with the 'natural inland wetland' definition (NES-F 2020) is required for completeness.

**2.6 Groundwater****Question 25 – Potential Effects on Adjacent Groundwater Bores**

Given the uncertainties with groundwater flow directions, the applicant has provided further comments and qualitative assessment of potential impacts on bores to the south of the state highway as requested. We agree that given the range of possible ambient lateral gradients and separation distances, there is little risk expected to the upgradient Takapau community supply bore (1762) to the southwest with respect to pathogens and nitrate contamination. However, our concerns related to the potential for bores to exist in the properties directly to the south of the site. Further information on the water supply to these properties is required.

**Question 26 – Potential Effects on Down-gradient Bores**

The applicant's further assessment of potential impacts on down-gradient bores describes the expected groundwater flow, anisotropy of the aquifer system between the proposed discharge area, and the depth/construction of the closest down-gradient bore (4838). The further assessment concludes negligible risks to groundwater users. The HBRC database notes bore 4838 is a cropping/irrigation bore and there does not appear to be a dwelling associated with it, so the conclusions reached are considered reasonable with respect to drinking water.

Although the further information indicates the rate of movement to deeper aquifers may be slow, we note that in the long term nitrogen from the discharge to land is expected to migrate through confining strata given the downward vertical gradient and mix with deeper groundwater resources/throughflow. This has implications for meeting the limits in Table 5.9.2.

## 2.7 Ecology

### Question 27 – Ecological Values of Porangahau Stream

No assessment of effects to the Porangahau Stream has been conducted, as a result of the response to Question 20. As per PDP's response, we recommend the applicant consider effects on the ultimate receiving water bodies specific to the proposed discharge. We understand that there is uncertainty in this assessment.

### Question 28 – Ecological Values of Wetland/HRLP

The Applicant has had an ecological impact assessment prepared by BECA. The methodology and EIANZ assessment approaches are appropriate and provide further understanding of the aquatic receiving environments.

It has been determined that the overland flow path that flows into the Makaretu River is a constructed wetland (sustained by the Takapau WWTP discharge) of low ecological value with a size of approximately 331 m<sup>2</sup>. Therefore, it does not meet the definition of a 'natural inland wetland' under the NES-F (2020). As a result of the staged discharge to land, an alteration to wetland hydrology is likely, the ecological assessment considered this to have a high magnitude of effect, as the wetland has the potential to dry up. If this were a 'natural inland wetland' this would not be possible, as it would impact the value of the wetland.

We note that this is referred to as Question 29 in Annex J.

### Question 29 – Ecological Values of Drainage Channel

The ecological impact assessment prepared by BECA (Annex J) determined that the drainage channel at the toe of the terrace (bisecting the proposed irrigation area) encompasses an ephemeral overland flow channel and an ephemeral wetland of approximately 319 m<sup>2</sup>, the area is not fenced and is open to stock. It is unclear in the assessment if the authors consider this a 'natural inland wetland' under the NES-F (2020), which could have implications from a planning perspective. We agree that the values of this wetland area are low.

Potential ecological effects of irrigation of wastewater to land include alterations to hydrology and the degradation of water and habitat quality. We agree with this assessment and consider there is potential for increased nutrient migration to these surface water bodies. Mitigation may need to be considered for this adverse effect such as restoration of the ephemeral wetland and ephemeral overland flow path.

In the summary section of Annex J, site 2 (ephemeral wetland) is discussed as a drainage channel and it is recommended that a 20 m setback may not be required. Further confirmation on the classification of this site under the NES-F (2020) is required to determine appropriate buffer distances, mitigation requirements and compliance with the NES-F (2020) and NPS-FM (2020). No buffer distance appears to have been proposed for these sites.

We note that this is referred to as Question 30 in Annex J.



## 2.8 Natural Hazards

### Question 30 – Effluent Storage Locations

Information has been provided - no further comment is required.

### Question 31 – Flood Risk Management

In the event of a 1% AEP flood event, it is explained that the focus will be given to irrigating the higher terraces. There is a chance that the HRLP may be flooded (see comments on Question 33). PDP recommends that conditions are provided related to remediation of flood damaged areas.

### Question 32 – Flood Protection

Given the proposed 18,000 m<sup>3</sup> storage pond is in the flood plain, it is recommended that HBRC include a condition that the flood protection plans be provided to HBRC for review prior to construction.

The draft consent conditions (20 August 2021 – version 2) condition 25 requires that any damage to the pond embankments or signs of pond seepage must be identified, noted, and fixed as soon as practicably possible. HBRC may wish to include a requirement to inform HBRC of any damage or signs of seepage as part of the condition or as part of proposed conditions 28 or 29.

### Question 33 – HRLP System Flood Risk

Figure A1 of Appendix A of the application indicates that the 'Existing Overland Flow Path' understood to be the HRLP is located east of Burnside Road. Figure 4.1 of the Resource Consent Application and AEE Dated April 2021 shows the flood risk region for a 1% AEP. There appears to be an overlap of the two layers indicating that there is potential for the HRLP to be inundated in a 1% AEP.

The applicant should confirm that the HRLP will be designed to discharge treated wastewater while flooded in the event conditions for irrigation have not been met and the storage is full.

## 3.0 Conclusion and Further Information Required

PDP has completed a review of the additional information provided in the s92 response. This has alleviated some of the concerns raised in the initial review. However, some of the responses have not fully addressed the questions asked in the s92 request or have not provided sufficient information to allow the potential environmental effects to be fully assessed.

Based on the current information provided, PDP consider that the proposed 'business as usual' discharge is likely to provide significant reductions in the contribution of the Takapau WWTP to cumulative phosphorus and pathogen impacts within the Makaretu and Tukituki rivers. However, some effects will continue and the reduction in nitrogen contribution is expected to be small in the long term. Limited consideration appears to have been given to the potential risk to public health, including from continued pathogen discharge to the river. Overseer modelling indicates an approximately 10% reduction in nitrogen, but this estimate should not be solely relied upon. The 'business as usual' cropping regime is at a much higher risk of excessive leaching relative to the alternative cut and carry regime. The proposed 10% reduction is not in line with the 46% reduction required to meet the upper Tukituki River DIN target of 0.8 mg/L. We recommend that the cut and carry regime proposed as an alternative by the applicant is likely to be suitable for proportionally reducing the contribution of the Takapau WWTP to levels required to meet the 2030 DIN water quality target, depending on how it is operated.

We also note there may be risks associated with irrigation of land which is not owned by CHBDC and particularly the land leased by the Drummonds.

In the s92 response, the applicant has assessed that there is no risk to the Porangahau Stream. However, based on the information provided and a review of local groundwater reports, PDP expects that at a wider scale the direction of groundwater flow is likely to be towards the Porangahau Stream, although there is some uncertainty. PDP recommend that an assessment of potential effects on the Porangahau Stream or other down-gradient waterways expected to ultimately receive nitrogen from the discharge is required. Additionally, the description of the ephemeral wetland within the s92 ecological report indicates the wetland may fit the description of a 'natural inland wetland' within the NES-F. Assessment against this definition and a recommendation of any mitigation or protection measures required under the NES-F and NPS-FM should be provided.

PDP also recommend an improved surface water monitoring programme with at least one sample per month that the HRLP is used.

To complete the review of environmental effects we recommend the following information is sought from the applicant:

- ∴ Land Management and Effluent Discharge:
  - The applicant should provide evidence of why the proposed BPO option is superior to an irrigation/rapid infiltration system including from an environmental and cultural perspective.
  - The applicant should confirm, based on the soil moisture modelling, if additional land area at Stage 2 will allow for a greater fraction of the 2048 flows to be irrigated.
  - The applicant should confirm that the proposed irrigation system will operate in a non-deficit regime and how this will be operated such that discharges to the river will be minimised.
  - The applicant should confirm, based on the soil moisture modelling, if additional land area at Stage 1 will allow for a greater fraction of the wastewater flows to be irrigated.
  - The applicant should provide more information on the performance of the UV disinfection. 1 log removal is low compared to typical wastewater disinfection levels.
- ∴ Surface Water and Ecology
  - The applicant should provide an assessment of impacts on the Porangahau Stream or other down-gradient waterways expected to ultimately receive nitrogen from the discharge.
  - The applicant should assess how the ephemeral drainage channel and wetland fit within the definition of a 'natural inland wetland' as per the NES-F and the NPS-FM. The applicant should determine appropriate buffer distances, mitigation requirements and compliance with the NES-F (2020) and NPS-FM (2020).
  - Information on potential public health effects, including downstream drinking water supplies should be provided.
- ∴ Groundwater
  - The applicant should consider the potential for bores to exist on properties to the south of the irrigation area and potential impacts on these, in addition to an assessment of water quality compared to the targets in Table 5.9.2.
- ∴ Natural Hazards
  - The applicant should confirm that the HRLP will be designed to discharge whilst flooded or there is another alternative to dispose of wastewater when the irrigation area is saturated, the HRLP is flooded, and the storage is full.

#### 4.0 Limitations

This memorandum has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Hawke's Bay Regional Council and others (not directly contracted by PDP for the work), including Lowe Environmental Impact Ltd and Beca Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

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